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GREAT LAKE TAUPŌ

Taupō District Council

Property File

Property File No: REF261279146

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Project Appendix

Addendum of Materials & Finishes

E2-AS1 Risk Matrix

Truss Design

CHH DesignIT Calculations

Bracing Calculations

Insulation Calculations

Cladding Manufacturers Specification

Fireplace Installation

Hot Water Heating System

Waterproofing Systems

Other Items Relevant to this Project

APPROVED CONSENT COPY
THESE PLANS AND SPECIFICATIONS ARE
APPROVED SUBJECT TO THE PROVISIONS
OF THE BUILDING ACT 2004 AND IT'S
REGULATIONS. A FULL (PRINTED) COPY OF
DRAWINGS AND SPECIFICATIONS ARE TO
BE RETAINED ON SITE IN GOOD ORDER
AND PRODUCED UPON REQUEST.

TAUPO DISTRICT COUNCIL

BC181033

APPROVED CONSENT
PLANS/SPECIFICATIONS

Addendum of Materials & Finishes

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PLANS/SPECIFICATIONS

Specification



PENNY HOMES LIMITED SPECIFICATIONS OF PROPOSED NEW HOME FOR: Lot 226 Penny Grove

FLOOR AREA: 173.68m²
DATE PREPARED: Friday, 28 September, 2018

Preliminary Information

Quote and Contracts	Provide for the construction of the dwelling in accordance with the following specifications, the annexed plans and building contracts.
General Specification	Where there is a contradiction between any of the documents then this specification shall take first precedence and the plans second precedence.
Additional Clauses	Any items altered or crossed out or any changes that may be made to this specification by the client and/or the builder must be initialed by both parties.

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General

Insurances	Builders risk insurance throughout build.
Interior Design	Exterior and Interior colour consultation Included. Allowance for four consultations.
Clean	Commercial Clean prior to possession included
Master Build Guarantee	10 Year Premium Guarantee with the full cover outlined in the guarantee
Plans	Full Working Drawings Included
Building Consent	Included
Resource Consent	Excluded
Surveying	Boundary peg location excluded – to be treated as a client variation if boundary pegs are not present
Engineer	Excluded: To be treated as a variation. Should an Engineers report be required, this will incur an additional cost as will any findings made by the Engineer.
Geotech	Geotech Report not included – to be treated as client variation
Site Works	Our quotation and contracts provides for foundation excavation and site cut for a slab on grade foundation as per NZ S3604 Standards.
Foundation	Pod floor system - 85mm thick 20MPa concrete slab reinforced with SE62 500 E Grade ductile mesh over 1100sq x 220 deep EPS Pods on 0.25mm Polythene vapour barrier
Timber Framing	90 x 45 Kiln Dried H1.2 timber framing with studs and dwangs at NZS3604 centres or to suit stud height and loading and cladding requirements. H1.2 to all bottom plates with trussed roof framing H1.2. Truss plan to be supplied by recognized manufacturer including fixings and structural requirements. All exterior timber shall be H3 treated, suitable for paint finish only unless otherwise noted.
Interior Walls	90 x 45 H1.2 Kiln-dried framing with studs and dwangs at NZS3604 centres or to suit stud height and loading and lining requirements. All framing SG8 unless otherwise noted.
Stud Height	2.550m Stud height throughout.
Ceiling Battens	35mm Rondo Metal Ceiling Battens on Clips

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Exterior Materials

Roof	Corrugated Longrun Colorsteel (Std NZ Colours)
Cladding	James Hardie - Axon Panel with 133mm centred grooves Cedar cladding options - Herman Pacific Bevel Back Weatherboards
Fascia/Barge	Cedar - Ex 200 x 40mm
Gutter	Coloursteel
Profile	1/4 Round
Downpipes	80mm PVC – Painted
Soffit Lining	4.5mm Hardiflex
Windows/Doors	Powder Coated Aluminum (Standard NZ Colours) with tinted glass in windows. Double glazing to all windows including garage. Obscure glass to wet areas
Obscure Areas	Bathroom and ensuite areas.
Window Hardware	Coloured to match joinery
Window Liners	Pine H3 Paint Quality
Front Door	Fibreglass FV front entrance door
Front Door Handle	Windsor 7025 round pull handle with 1248 Mortice Lock
Front Door Side Lights	Included as per plan
Garage Door	Windsor Coloursteel Sectional Door, Steel Range 2125 x 4830- Auto Opener with two remotes
Drainage	Sewer and Stormwater connected at road boundary or Council laterals. Work outside net site area not included. Stormwater connected to soakholes as per plan Note: Driveway sumps included - as per plan
Soakholes	Concrete lined soakholes positioning may vary from plan due to site access and storm water layout. Soakholes depths are dependant on watertable levels, easements and ground conditions
Water	20mm Mains supply connected at road Boundary. Work outside net site area not included.
Clothesline	Sun King Retracting 6 Line or Folding Frame Line
Letter box	Courteney's A4 Cedar Letterbox

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Interior Materials

Insulation	R2.8 Wall Batts / R3.6 Ceiling Batts Including garage
Internal Wall Lining	10mm Standard Gib Board
Ceiling Lining	13mm Standard Gib Board
Internal Wet Areas	10mm Aqualine Gib Board on walls and 13mm Aqualine Gib Board on ceiling
Gib Stopping	Grade 4 Paint finish
Painting	Exterior – Soffits- Acrylic Ceilings – Flat Acrylic Architraves, Skirting and Scotia – Semigloss enamel Doors – Sprayed acrylic enamel Interior Walls – Low Sheen Finish. Semi Gloss Finish to water splashback areas

Please Note: The interior painting covers the same colour throughout the home with one contrasting colour for ceilings, doors, skirting and sills. Extras may be incurred if different colours are requested in different rooms or feature walls are required. Gloss lacquer or extra height doors are charged as additional cost.

Scotia	Square stop
Architraves	60mm x 12mm MDF and 60mm x 10mm FJ Pine to Wet Areas
Architrave Profile	Single Bevelled
Skirting	60mm x 12mm MDF and 60mm x 10mm Tiles to Wet Areas 100mm
Skirting Profile	Single Bevelled

Doors	MDF ' U ' Groove Hollow Core - 35mm
Door Height	1980mm

Door Furniture	Windsor Astron Range (Brushed Nickel/ Satin Chrome)
Door Stops	Windsor 5229 Door stop
Interior Door Liners	MDF - Flat for Architrave

Wardrobes/Shelves	Dimensions as per plan - single shelf with wardrobe rail. HWC/Linen Cupboard - Provides for 4 shelves
Vacuum System	Not Included
Window Treatments	No allowance for window treatments

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Flooring

Floor Tiles	To supply and lay standard tile range to Bathroom , ensuite , entry , dining , sitting and kitchen areas 45 m2 Tile supply allowance: \$50 m2
Bath Tiling	To supply and lay standard tile to bath front, shelf and splash Tile supply allowance: \$50 m2
Carpets	To supply and install PHL Range Carpets on 10mm Underlay to: Bedrooms, Hallway, Living and Wardrobes as per plan.

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PLANS/SPECIFICATIONS

Plumbing and Bathroom

Plumbing

Exterior 3 x Exterior Taps
 Laundry Aquatica E6200 Laundry Tub - with Door E6200 (560 x 560)
 Hot Water Rinnai Infinity 26L external NG continuous hot water system (no controller)

Gas Services Supply Gas pipe work, connection fee and certification

Bathroom

Bath Sorrento II Bath 1670 x 760
 Grohe Bauline Shower Mixer
 Progetto - Tube 170mm wall mount bath spout round
 Shower Tiled Shower 1m x 1 m , 2 sided - Tiles to ceiling . Tile Allowance \$50 m². 2 sides
 glass panel with glass door.
 100mm square chrome on brass adjustable floor grate.
 Tiled recess 400w x 300h
 Grohe - Bauline Series Shower Mixer & Grohe New Tempesta 4 Spray Slide
 Vanity Robertson - Studio Plus Wall Hung Vanity 900 mm - 1 Drw - White or Coloured
 Tapware Grohe Bauline Basin Mixer
 Toilet Robertson Agencies – Cygnet - Neu Square BTW Vitreous China Toilet Suite
 with soft close Seat
 Toilet Roll Holder Robertson Agencies Europa Plus Spare
 Bathroom Mirror Frameless mirror above vanity

Ensuite

Shower Tiled Shower 1 m x 1m - 2 sided - Tiles to ceiling . Tile Allowance \$50 m². 2 sides
 with glass panel and a glass door.
 100mm square chrome on brass adjustable floor grate.
 Tiled recess 400w x 300h

Vanity Grohe Bauline Shower Mixer and Grohe New Tempesta 4 Spray Slide Shower
 Robertson - Studio Plus Wall Hung Vanity 900mm - 1 Drw - White or Coloured
 Laminex
 Tapware Grohe - Bauline Series Basin Mixer
 Toilet Robertson Agencies – Cygnet - Neu Square BTW Vitreous China Toilet Suite
 with soft close Seat
 Toilet Roll Holder Robertson Agencies Europa Plus Spare Toilet Roll Holder
 Ensuite Mirror Frameless mirror above vanity

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Kitchen & Appliances

Kitchen	PC Sum \$15,000 for supply and installation of kitchen by PHL preferred supplier. Including splashback and benchtop.
Cabinets	Cabinets constructed of 16mm prefinished MUF (moisture resistant) with 1mm black or white edging.
Cupboards	Cupboard doors, drawer fronts and fixed panels constructed from 18mm Melteca/Melamine with 2mm PVC edging.
Drawers	All drawers fitted with Hettich Sensys Soft Closing hinges on doors and Hettich Soft Closing Drawers
Handles	PHL range of handles fitted to all doors and drawers
Benchtop	40mm Engineered Stone Benchtop included in kitchen PC Sum
Sink	Pero 800 Single sink or Pero 1080 1 1/2 sink
Rangehood	Fitting of Rangehood and Ducting Included
Splashback	Included in Kitchen PC Sum
Sink Mixer	Grohe Bauline Kitchen Mixer
Kitchen Appliances	Westinghouse Range
Oven	Westinghouse Single Wall Oven S/S - WVE616S
Cooktop	Westinghouse 60cm Gas Cooktop S/S - WHG644SA
Rangehood	Westinghouse Integrated Rangehood - EFG750X/A
Dishwasher	Westinghouse Freestanding Dishwasher - S/S - WSF67251S
Insinkerator	Parex Emerson E20 .55hp Insinkerator

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Electrical

Note: Some electrical appliances will require their own "Switched Light Circuit", "Single plug", "Direct All quantities should be finalised on site. Adjustments to cost will be forwarded after selection by invoice and treated as an extra or credit.

Temporary Power	Builders supply included
Power to Site	16mm Neutral Screen connected from Lot Boundary to House site. Work outside net site area not included.
Prewire	As per Electrical Plan. A prewire walk through is completed with Owner, Electrician and Penny Homes representative to note any variations required by owner. Included as Client Variation
Lights/ Power	LED Recessed Downlights as per Electrical Plan. Wall and specialty lights - Supplied by Owner
Switch Gear	PDL Iconic Series, Power points and switches as per electrical plan
Phones/TV	As per Electrical Plan. All connection fees by Owner
Sky	Reticulate for Sky TV – 1 point only. Connection fees and aerials by Owner
Heated Towel Rail Under Tile Heat Pad Fans	Goldair GLTR7C 7 Bar Stainless Steel to Bathroom and Ensuite Heat Pads to bathroom and ensuite areas. Manrose Inline Fans to bathroom and ensuite areas.
Bathroom Heater Alarm	Not Included Not Included
Gas Fire	Escea DL850 – Gas Fire (inbuilt) – Black Bevelled Fascia - Includes zero clearance and one standard flue kit only. No mantle/hearth has been included NG.
Ventilation System	Not Included

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Landscaping

Cobble Paving	Supply and lay 36m ² Firth Flagstone Pavers as per plan (standard colour range). Any extra cobbles laid will be charged at \$94 m ²
Concrete Paving	Exposed Aggregate Supply and lay 43 m² of exposed aggregate concrete to: Driveway and Entry. Any extra exposed aggregate will be charged at \$83 m² Note: Extra Drainage grills or cesspits (if required), traffic management costs or washoff extraction costs will be an additional cost of the driveway. (Any mowing strips/garden edging will be an additional cost and will be quoted separately to the driveway).
Fence	1.8m high steel framed panel fence (std colours) - Total . Areas 34m. North , South fence to finish in line with front of dwelling. To the East boundry fence 19.5 m.
Plants	To the Value of \$ 1000
Turf	Hydroseeding – including the required topsoil. Lawn in such areas as are designated on the Site Plan. The hydroseeding will be sown in accordance with best industry practice having regard to local soil and climatic conditions at the time of application. Note: between the months May and August, conditions to successfully grow lawn are substantially less. The Vendor/Builder shall not have ongoing responsibility to nurture maintain or repair the designated hydroseeded area.

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Proposal Summary

OUR PRICE TO CONSTRUCT PROPOSED NEW HOME FOR:

Lot 226 Penny Grove
0

Our price for construction to the above specification	\$0
Master Build Guarantee	\$0
Land Purchase Price	\$0
Land and Home Package Price	\$0

Please note our quoted price includes GST and is subject to the listed exclusions and PC Sums.

Optional Extras

Masterbuild Guarantee options:

10 Year Standard Guarantee - opting out of any cover for loss of deposit on completion and remedial works	\$0
10 Year Standard Guarantee with the full cover outlined in the guarantee document	\$0

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Exclusions and PC Sums

Our Quotations and Contracts Exclude:

Resource Consents
Engineering Costs for Plan Detail
Valuations/Surveying Fees
Any allowance for street crossing

Window Treatments
Telephone, TV and Sky Connection fees
Wall Lights or Specialty Lights

All costs incurred for additional piling or foundation work found necessary through the existence of poor

PROVISIONAL COST SUMS

Provisional Cost Sums (PC Sums) means a sum included in the contract price for carrying out or providing a defined part of the contract works.

The PC Sums as listed below are inclusive of GST and are net sums, meaning the builder shall have provided for all other costs, margins, charges or allowances elsewhere within the contract sum – unless specified.

PC SUMS OUTLINED IN CONTRACT

Kitchen	Including splashback and benchtop	\$15,000
Exposed Aggragate		43m2.
Cobbles Flasstone		36m2
Gardens/Shrubs		\$1,000

You may obtain your own quotations for the supply of goods contained or works required under the PC Sums.

Please ensure you are aware of the final cost prior to authorising work to proceed or purchasing material contained within the PC Sums.

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E2-AS1 Risk Matrix

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PLANS/SPECIFICATIONS

NZBC E2/AS1 - BUILDING ENVELOPE RISK MATRIX

WALL NUMBER: NORTH	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:	Total risk score:								2
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

WALL NUMBER: SOUTH	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:	Total risk score:								2
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

WALL NUMBER: WEST	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:									2
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

WALL NUMBER: EAST	Risk severity						APPROVED CONSENT PLANS/SPECIFICATIONS		Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0		1		2		5	5	5
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:	Total risk score:								7
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

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APPROVED CONSENT
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Truss Design

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For valley/saddle truss fixing unless stated otherwise use a pair of wire dogs at 900mm centres for up to and including a very high wind zone. Or a pair of CT200's at 900mm centres for extra high wind zone. This fixing is to meet the minimum requirements as per NZS3604.



Fixings shown are for fixing trusses to the top plate. Any other point load uplift fixings down through the framing stud to top plate, stud to bottom plate, bottom plate to floor remain the responsibility of the architect / draughtsman.



**If metal ceiling battens on clips are used, 90x45 SG8 bottom chord restraints are required at 1800mm centres fixed with 2/90x3.15dia nails (skew nails if on edge).
All gable trusses are designed to suit cladding manufacturer's framing requirements.
If a gable truss requires a windbeam brace, the type of MiTek brace will be noted as such on the layout.**

BUILDABLE CONSENT LAYOUT

CARTERS
Carters Manufacturing New Plymouth
(06) 7595472

JOB No 279060C1

Client: PENNY HOMES LTD
Job: 18 Penny Grove
Site: Nukuhau
Taupo

Pitch: 25.0deg
Roof Type: Galv Iron .5mm
Overhang: 600mm
Wind Area: High
Roof Snow: 0.000kPa

Trusses and rafters at 900 mm
max centres unless stated otherwise.
This layout is to be read in conjunction
with the Architectural plans.

DRAWN Warren Dravitsk 19 Sep,2018

↓

Dn

↑

Up

kN

kN

Ultimate Limit
State Loads

Notification of point loaded lintels
or point loads on internal walls
where the downward load is
higher than 8kN (85mm raft type slab)
or 10kN (100mm standard slab), or
the upward load is greater than 10kN.

Any roof loads as stated on this
layout over 16kN up or down are
outside the scope of NZS3604, and
the architect / draughtsperson is
responsible for the design to transfer
the loads to the ground.

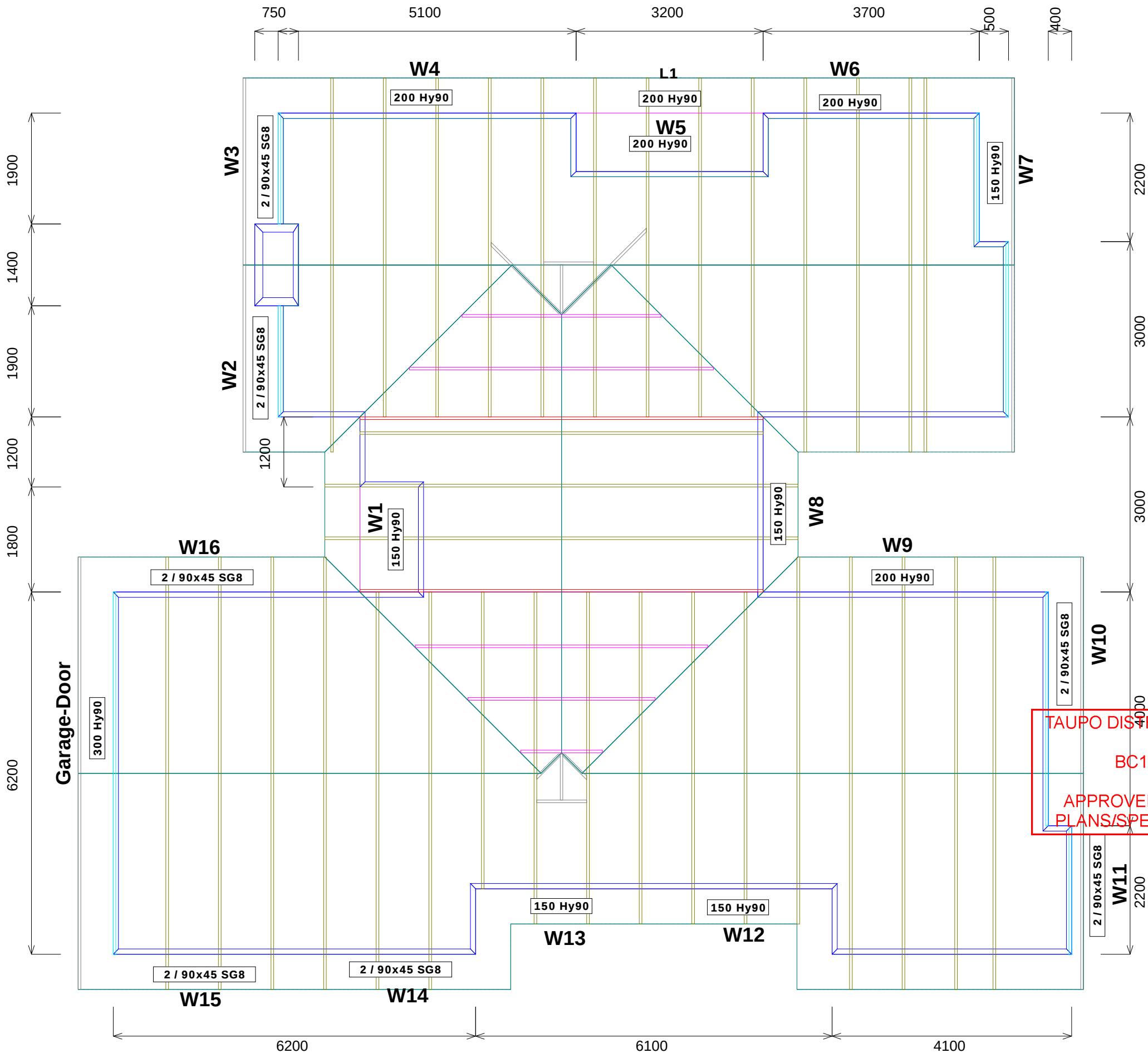
The lintels have been sized using
one of the following:

hy90, hyONE and hySPAN lintels
have been sized using the designIT
for houses - New Zealand series 6
software.

GANGLAM and FLITCH BEAMS
have been sized using the MiTek
Beam Program V1.10 June 2011.

Any treated LVL product is H1.2, which
satisfies the minimum treatment
requirement of NZS3602.

Unless otherwise stated the timber grade
for all lintels is SG8. Lintels not shown
are to be selected as per NZS3604: 2011.



All internal walls shown hatched on this layout are considered to be loadbearing
Lintel fixing specification remains the responsibility of the architect / draughtsperson



MiTek New Zealand Limited

Correspondence from : **AUCKLAND**
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Fax: 09 274 7100

CHRISTCHURCH
14 Pilkington Way, Wigram 8042
PO Box 8387, Riccarton 8440
Phone: 03 348 8691
Fax: 03 348 0314

www.mitek.nz.co.nz

MiTek 20/20 Engineering 4.7.184.0

Printed: 11:45:16 19 Sep 2018

PRODUCER STATEMENT for MiTek 20/20® TRUSS DESIGN - Version 4.7

ISSUED BY: **MiTek New Zealand Limited**

TO: **CARTERS**

IN RESPECT OF: **MiTek® Truss Designs**

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **279060C1** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek 20/20® truss design program has been developed by MiTek New Zealand Limited for the design of MiTek® timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20® are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1/VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution, to satisfy the requirements of Clauses B1 and B2 of the New Zealand Building Code.

On behalf of MiTek New Zealand Limited, and subject to:

- i) All proprietary products meeting their performance specification requirements
- ii) The provision of adequate roof bracing and overall building stability
- iii) Correct selection and placement of GANG-NAIL connector plates
- iv) Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
- v) The design being undertaken by the accredited fabricator under the terms of the software licence
- vi) Timber is graded to the requirements of NZS 3603:1993
- vii) Minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

I believe on reasonable grounds that the trusses, if constructed in accordance with the MiTek 20/20® truss design and shop drawings, will comply with the relevant provisions of the New Zealand Building Code.

MiTek New Zealand Limited holds a current policy of Professional Indemnity Insurance no less than \$500,000.

On behalf of MiTek New Zealand Limited,

Date: Wednesday, 19 September 2018

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

TAUPO DISTRICT COUNCIL

BC181033

**APPROVED CONSENT
PLANS/SPECIFICATIONS**

Job: 279060C1

Client: PENNY HOMES LTD
Phone:Site: 18 Penny Grove
Nukuhau
TaupoDescription:
Building Consent No.:
MiTek 20/20 Engineering 4.7.184.0

MiTek New Zealand Limited.

Phone:

Printed: 11:45:16 19 Sep 2018

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **CARTERS**, being licensed to use the MiTek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MiTek 20/20® TRUSS DESIGN DATA

The MiTek 20/20® computer design for this job is based on the following design parameters entered into the program. The Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek® trusses.

Job Details		Importance Level :	2	Design Working Life :	50 years
Roof Truss					
Timber Group:	MSG8 DDP H1.2	Pitch:	25.000 deg	Nominal Overhang:	600 mm
Roof		Ceiling		Wind	
Material:	Galv Iron .5mm	Material:	Gib Board 13mm	Area:	High (44.0 m/s)
Dead Load:	0.210 kPa	Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Restraints:	900 mm centres	Restraints:	600 mm centres		
Live Load:	Q _r = 0.250 kPa	Live Load:	Q _c = 1.400 kN		
	Q _c = 1.100 kN				

The minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003. The timber for these MiTek® trusses shall be graded to the requirements of NZS 3603:1993. Proprietary fixings and timber connectors shall be selected in accordance with NZS3604:2011 Section 4 - Durability.

MiTek® Truss List

Legend: * = detail only, ? = input only, ✕ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required
GB = gable brace required

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
T3	1	6900	25.000	900	S1B	4	5200	25.000	900	V5	1	5200	25.000	900
T3A	1	6900	25.000	900	T1	8	6200	25.000	900	*HB1	1	592	18.248	900
T4	1	6900	25.000	900	T1A	1	6200	25.000	900	*HB2	1	599	18.249	900
T4A	1	6900	25.000	900	T1B	1	6200	25.000	900	*HB3	1	1695	18.249	900
ET1	1	6209	25.000	900	T2	5	5080	25.000	900	*HB4	1	2041	18.249	900
ET1A	1	4004	25.000	900	T2A	1	5080	25.000	900	*R1	1	787	25.000	900
ET2	2	1900	25.000	900	T2B	1	5080	25.000	900	*R2	1	823	25.000	900
ET3	1	2204	25.000	900	T4B	1	6900	25.000	900	*R3	2	7400	25.000	900
ET4	1	2200	25.000	900	V1	1	1400	25.000	900	*R4	2	6400	25.000	900
ET5	1	3000	25.000	900	V2	1	3200	25.000	900	*R5	1	855	0.000	900
S1	4	5200	25.000	900	V3	1	5000	25.000	900	*R6	1	855	0.000	900
S1A	4	5200	25.000	900	V4	1	3400	25.000	900					

Total quantity : 58

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The computer design input has been carried out by:

MiTek 20/20 Software Operator: Warren Dravitski

MiTek Candidate Number and Qualifications: Trainee Detailer

Accredited Fabricator:



Wednesday, 19 September 2018

Job: 279060C1

Client: PENNY HOMES LTD
Phone:

Site: 18 Penny Grove
Nukuhau
Taupo

Bearings Exceeding 8kN Report : Page 1

Description:
Building Consent No.:
MiTek 2020 Engineering 4.7.184.0

MiTek New Zealand Limited.

Phone:

Printed: 11:45:23 19 Sep 2018

TRUSS BEARINGS EXCEEDING 8KN REPORT - Ultimate Limit State Loads

MiTek® Truss List

Legend: ? = input only, Txx = failed design, Ø = non certified, Unmarked trusses = designed successfully

Critical Trusses	Qty	Span (mm)	Joint	Bearing Reactions (kN)	
				Down	Uplift
T3	1	6900	A	8.091	8.566
			G	8.900	8.956
T3A	1	6900	A	8.077	8.125
			N	9.599	8.624

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Note:

1) Select appropriate Slab Thickening Detail from the MiTek 'Internal Load Bearing On Concrete Floor Slabs' brochure.

DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and Laserframe components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:

NZS 3603:1993 Timber Structures Standard.

NZS 3604:2011 Timber-framed buildings.

AS 1720.1:2010 Timber structures. Part 1: Design methods.

AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings

AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.

AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.

AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 3 May 2017

For further information or advice contact:

Carter Holt Harvey LVL Ltd,
173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Facsimile: 0800 808 132
Email: designit@chhwoodproducts.co.nz
Web: <http://www.chhwoodproducts.co.nz>

Specifier details:

Specifier:	W Dravitski
Business name:	Napier Manufacturing
Address:	Taupo 4312
Email:	Warren.Dravitski@carters.co.nz

TAUPO DISTRICT COUNCIL

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Project & site details:

Project:	279060C1
Site address:	18 Penny Grove Taupo
Design wind zone	High
Snow loading	Design snow zone: N1, Altitude: 100 m (sub-alpine), Ground snow load, $S_g^{1,2} = 0.0$ kPa

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1. designIT does not include any allowance for the effects of drifting and sliding of snow.
2. Snow loads are applied to roofed over structures only, the design of exposed floors/decks are not covered by designIT.

MEMBER DESIGN DETAILS

Member 1

1) Member code and description

W1 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span 1.6 m
Roof load width 'RLW' 4.5 m
Roof type and mass Light roof and ceiling - 40 kg/m²
Nominal wall thickness 90 mm

5) Member specification

Size, stress grade/product Use 150 x 90 hy90
Material type Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.3 mm	1.5 mm (long term)	3.5
Live load - $\Psi_S Q$	6.4 mm	0.5 mm	13.9
Wind load - W_S	8.0 mm	1.4 mm	5.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-2.9
1.2G + 1.5Q	0.80	-4.5
1.2G + W_u + $\Psi_c Q$	1.00	-6.4
0.9G + W_u	1.00	4.1

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 2

1) Member code and description W2-W3 - Lintels - In single or upper storey load bearing wall BC181033

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span 0.9 m
Roof load width 'RLW' 0.6 m
Roof type and mass Light roof and ceiling - 40 kg/m²
Nominal wall thickness 90 mm

5) Member specification

Size, stress grade/product Use 2/90 x 45 SG8 Laserframe
Material type Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density < 480 kg/m³

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6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	3.0 mm	0.2 mm (long term)	14.5
Live load - $\Psi_S Q$	3.6 mm	0.1 mm	59.8
Wind load - W_s	4.5 mm	0.2 mm	24.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.5
1.2G + W_u + $\Psi_c Q$	1.00	-0.8
0.9G + W_u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 3

1) Member code and description W4 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	3.1 m
Roof load width 'RLW'	3.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

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6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	10.0 mm	6.7 mm (long term)	1.5
Live load - $\Psi_S Q$	12.4 mm	1.9 mm	6.4
Wind load - W_s	15.5 mm	5.9 mm	2.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
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1.35G	0.60	-3.8
1.2G + 1.5Q	0.80	-5.9
1.2G + W _u + $\Psi_c Q$	1.00	-8.3
0.9G + W _u	1.00	5.2

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 4

1) Member code and description W5-W6 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.8 m
Roof load width 'RLW'	3.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	9.3 mm	4.2 mm (long term)	2.2
Live load - $\Psi_S Q$	11.2 mm	1.2 mm	9.1
Wind load - W _s	14.0 mm	3.7 mm	3.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-3.4
1.2G + 1.5Q	0.80	-5.3
1.2G + W _u + $\Psi_c Q$	1.00	-7.5
0.9G + W _u	1.00	4.7

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8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 5

1) Member code and description W7 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.5 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.0 mm	0.2 mm (long term)	24.6
Live load - $\Psi_S Q$	6.0 mm	0.1 mm	119.0
Wind load - W_S	7.5 mm	0.2 mm	49.3

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.6
1.2G + W_u + $\Psi_c Q$	1.00	-0.9
0.9G + W_u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 6

1) Member code and description W8 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.7 m
Roof load width 'RLW'	4.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

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Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.7 mm	1.9 mm (long term)	3.0
Live load - $\Psi_S Q$	6.8 mm	0.6 mm	12.1
Wind load - W_s	8.5 mm	1.7 mm	5.0

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-3.2
1.2G + 1.5Q	0.80	-4.9
1.2G + W_u + $\Psi_c Q$	1.00	-7.0
0.9G + W_u	1.00	4.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 7

1) Member code and description W9 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.8 m
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	9.3 mm	4.8 mm (long term)	2.0
Live load - $\Psi_S Q$	11.2 mm	1.4 mm	8.0
Wind load - W_s	14.0 mm	4.2 mm	3.3

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-3.9
1.2G + 1.5Q	0.80	-6.0
1.2G + W_u + $\Psi_c Q$	1.00	-8.5

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0.9G + W _u	1.00	5.4
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8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 8

1) Member code and description W10-W11 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	3.0 mm	0.2 mm (long term)	14.5
Live load - $\Psi_S Q$	3.6 mm	0.1 mm	59.8
Wind load - W _s	4.5 mm	0.2 mm	24.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.5
1.2G + W _u + $\Psi_c Q$	1.00	-0.8
0.9G + W _u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 9

1) Member code and description W12-W13 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

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4) Design inputs

Span	1.7 m
Roof load width 'RLW'	3.5 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.7 mm	1.4 mm (long term)	3.9
Live load - $\Psi_S Q$	6.8 mm	0.4 mm	15.9
Wind load - W_S	8.5 mm	1.3 mm	6.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-2.4
1.2G + 1.5Q	0.80	-3.8
1.2G + W_u + $\Psi_c Q$	1.00	-5.3
0.9G + W_u	1.00	3.4

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 10

1) Member code and description

W14-W15-W16 - Lintels - In single or upper storey load bearing walls

2) Date prepared

19 September 2018

3) Serviceability criteria

AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

6) Serviceability

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Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	3.0 mm	1.3 mm (long term)	2.3
Live load - $\Psi_S Q$	3.6 mm	0.4 mm	8.8
Wind load - W_s	4.5 mm	1.2 mm	3.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-2.3
1.2G + 1.5Q	0.80	-3.6
1.2G + W_u + $\Psi_c Q$	1.00	-5.1
0.9G + W_u	1.00	3.3

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 11

1) Member code and description Garage-Door - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	4.9 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 300 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	10.0 mm	4.3 mm (long term)	2.3
Live load - $\Psi_S Q$	15.0 mm	1.0 mm	15.7
Wind load - W_s	24.5 mm	2.9 mm	8.5

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-1.9
1.2G + 1.5Q	0.80	-2.7
1.2G + W_u + $\Psi_c Q$	1.00	-3.6

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0.9G + W _u	1.00	1.7
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8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 12

1) Member code and description L1 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	3.3 m
Roof load width 'RLW'	1.4 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	10.0 mm	3.7 mm (long term)	2.7
Live load - $\Psi_S Q$	13.2 mm	1.0 mm	13.4
Wind load - W _s	16.5 mm	3.0 mm	5.5

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3}
1.35G	0.60	-1.7
1.2G + 1.5Q	0.80	-2.6
1.2G + W _u + $\Psi_c Q$	1.00	-3.5
0.9G + W _u	1.00	2.0

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Notes for interpretation of serviceability data

- 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720. Deflections calculated using this methodology cannot therefore be usefully compared with deflections calculated using other methods, eg GLTAA design methodology.
- Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

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No 1 Framing – visually graded to NZS 3631
SG grades - mechanically graded to AS/NZS 1748
GL grades for glulam to AS 1328
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)

Average + 100%
Average + 43%
Average + 33%
Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

3. The limits referred are those specified in AS 1720.3 for the stated load case.

4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements of AS 1720.3

Notes for interpretation of reaction data

1. Duration of load factor 'k₁' for strength as per NZ 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
4. End reaction includes allowance for overhang/cantilever where one has been designed

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CHH DesignIT Calculations

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DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and Laserframe components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:

NZS 3603:1993 Timber Structures Standard.

AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.

NZS 3604:2011 Timber-framed buildings.

AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.

AS 1720.1:2010 Timber structures. Part 1: Design methods.

AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.

AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 3 May 2017

For further information or advice contact:

Carter Holt Harvey LVL Ltd,
173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Facsimile: 0800 808 132
Email: designit@chhwoodproducts.co.nz
Web: <http://www.chhwoodproducts.co.nz>

Specifier details:

Specifier:	Shaune
Business name:	JT Design Architecture Ltd
Address:	Level 1, 32 Tuwharetoa Street Taupo
Email:	shaune@jtdesign.co.nz

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Project & site details:

Project:	New Residence
Reference:	JT18105
Site address:	18 Penny Grove, Taupo
Design wind zone	High
Snow loading	Design snow zone: N0

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MEMBER DESIGN DETAILS

Member 1

1) Member code and description

JS1 - Jamb studs - In single or upper storey load bearing walls

2) Date prepared

23 September 2018

3) Serviceability criteria

AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Opening width	4800 mm
Stud height	2610 mm
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Roof load width 'RLW'	1.5 m

5) Member specification

Size, stress grade/product	Use 3/90 x 45 hyCHORD
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Wind load - W _s *	17.4 mm	9.6 mm	1.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3}	
		End kN ⁴	Horizontal kN
1.35G	0.60	-2.2	
1.2G + 1.5Q	0.80	-3.5	
1.2G + W _u + Ψ _c Q	1.00	-5.7	2.6
0.9G + W _u	1.00	0.9	2.1

8) Installation requirements

- Jamb studs to be nogged at maximum 1350 mm
- Notching of the jamb studs not permitted
- Nail Laminate studs in accordance with NZS 3604 Clause 2.4.4.7
- Provide 2 full length studs plus 1 secondary Jamb Stud to Detail H19

Notes for interpretation of serviceability data

- 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720. Deflections calculated using this methodology cannot therefore be usefully compared with deflections calculated using other methods, eg GLTAA design methodology.
- Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631	Average + 100%
SG grades - mechanically graded to AS/NZS 1748	Average + 43%
GL grades for glulam to AS 1328	Average + 33%
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)	Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

- The limits referred are those specified in AS 1720.3 for the stated load case.

- 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements of AS 1720.3

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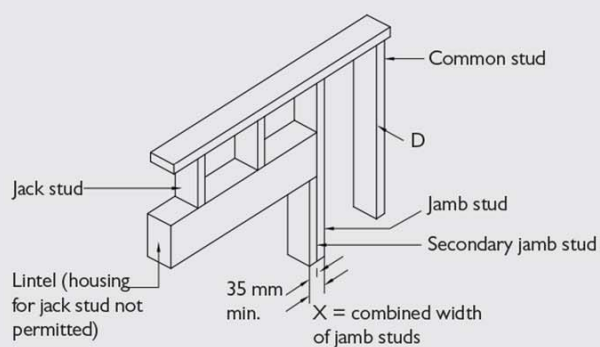
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Notes for interpretation of reaction data

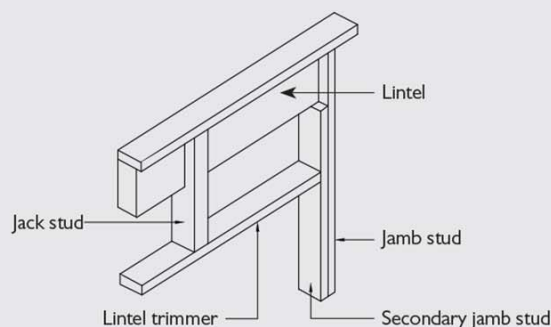
1. Duration of load factor 'k1' for strength as per NZ 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
4. End reaction includes allowance for overhang/cantilever where one has been designed

Detail H19: Multiple Stud Configuration

Lintels having breadth greater than half stud depth



Lintel directly below top plate



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Bracing Calculations

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Demand Calculation Sheet

Job Details

Name: New Residence
 Street and Number: 18 Penny Grove
 Lot and DP Number: Lot: 226 / DP: 522262
 City/Town/District: Taupo
 Designer: Shaune
 Company: JT Design Architecture
 Date: Sunday, 16 September 2018

Building Specification

Number of Storeys: 1
 Floor Loading: 2 kPa
 Foundation Type: Slab

Single
 Cladding Weight: Light
 Roof Weight: Light
 Room in Roof Space: No
 Roof Pitch (degrees): 25
 Roof Height above Eaves (m): 2.2
 Building Height to Apex (m): 4.7
 Ground to Lower Floor (m): 0.2

 Average Stud Height (m): 2.6
 Building Length (m): 16.4
 Building Width (m): 14.4
 Building Plan Area (m²): 173.68

Building Location

Wind Zone = High

Wind Region: A
 Lee Zone: No
 Ground Roughness: Open
 Site Exposure: Exposed
 Topography Class: T1

Earthquake Zone 2

Soil Type: D & E (Deep to Very Soft)
 Annual Prob. of Exceedance: 1 in 500 (NZS3604:2011 Default)

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Bracing Units required for Wind

	Along	Across
Single Level	723	775

Bracing Units required for Earthquake

	Along & Across
Single Level	674



Single Level Along Resistance Sheet

Job Name: New Residence

									Wind	EQ
									Demand	
									723	674
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	837 116%	759 113%
a	1	0.90		2.6	GS1-N	GIB®	52	49		
	2	0.90		2.6	GS1-N	GIB®	52	49		
	3	0.40		2.6	GS1-N	GIB®	20	21		
	4	0.40		2.6	GS1-N	GIB®	20	21		
									144 OK	141 OK
b	1	1.40		2.6	GS1-N	GIB®	89	78		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	1.20		2.6	GS1-N	GIB®	76	66		
									197 OK	176 OK
c	1	1.30		2.6	GS1-N	GIB®	83	72		
	2	1.20		2.6	GS1-N	GIB®	76	66		
	3	1.20		2.6	GS1-N	GIB®	76	66		
									236 OK	205 OK
d	1	1.30		2.6	GS1-N	GIB®	83	72		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	0.60		2.6	GS1-N	GIB®	32	32		
	4	1.80		2.6	GS1-N	GIB®	115	100		
									261 OK	236 OK

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Single Level Across Resistance Sheet

Job Name: New Residence

									Wind	EQ
									Demand	
									775	674
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1137 147%	1066 158%
m	1	0.50		2.6	BLP-H	GIB®	59	64		
	2	0.50		2.6	BLP-H	GIB®	59	64		
									118 OK	128 OK
n	1	0.40		2.6	BL1-H	GIB®	33	37		
	2	0.40		2.6	BL1-H	GIB®	33	37		
	3	0.40		2.6	BL1-H	GIB®	33	37		
	4	0.40		2.6	BL1-H	GIB®	33	37		
									131 OK	148 OK
o	1	1.10		2.6	GS1-N	GIB®	68	61		
	2	1.10		2.6	GS1-N	GIB®	68	61		
									136 OK	121 OK
p	1	1.00		2.7	GS1-N	GIB®	58	53		
	2	1.80		2.6	GS1-N	GIB®	115	100		
									172 OK	153 OK
q	1	1.00		2.7	GS1-N	GIB®	58	53		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	0.60		2.6	GS1-N	GIB®	32	32		
	4	2.00		2.6	GS1-N	GIB®	127	111		
									248 OK	228 OK
r	1	2.80		2.6	GS1-N	GIB®	178	155		
	2	2.40		2.6	GS1-N	GIB®	153	133		
									331 OK	288 OK

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GIB EzyBrace® Systems specification GS1-N

Specification code	Minimum length (m)	Lining requirement
GS1-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard to one side only

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75 x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and 600mm centres thereafter.

External Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for external wall bottom plate fixing.

WALL LINING

- Any 10mm or 13mm GIB® plasterboard lining.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

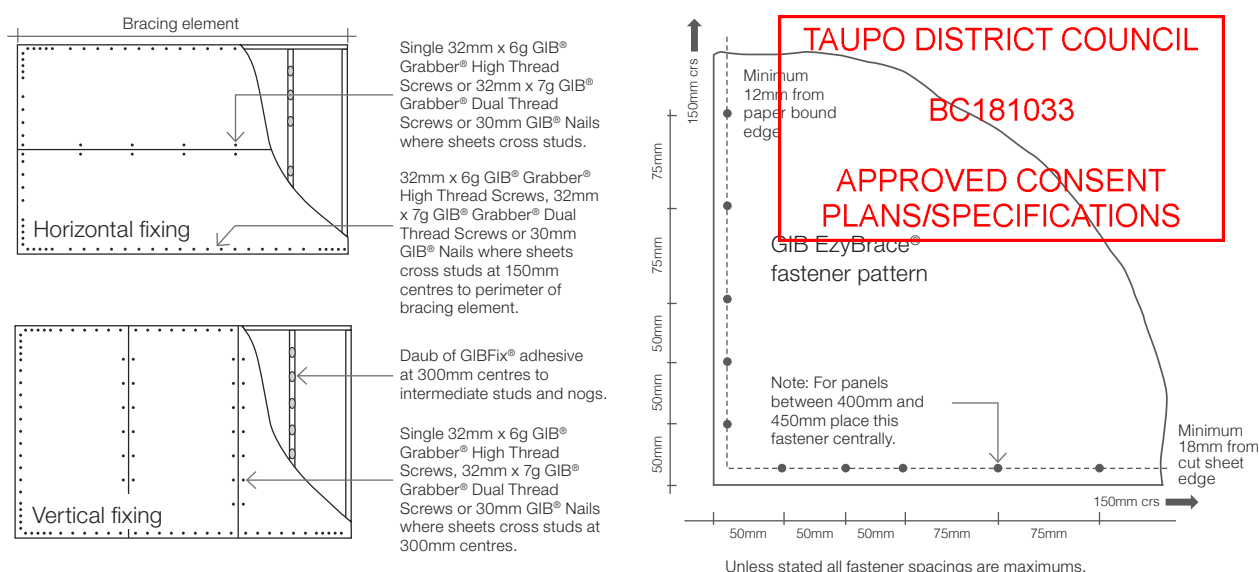
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BL1-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BL1-H	0.4	10mm or 13mm GIB Braceline® to one side only	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline®
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

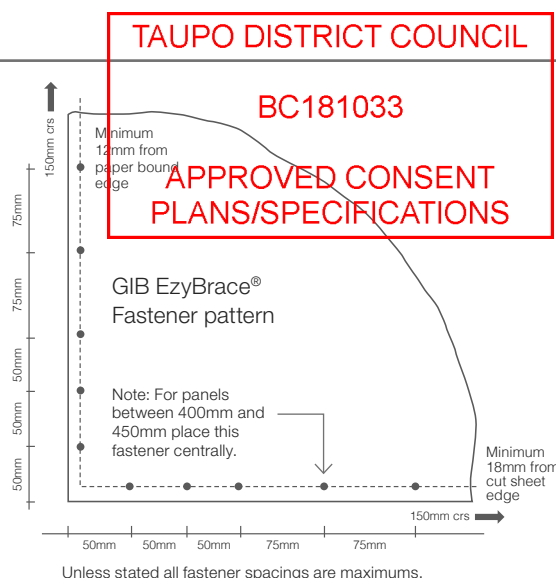
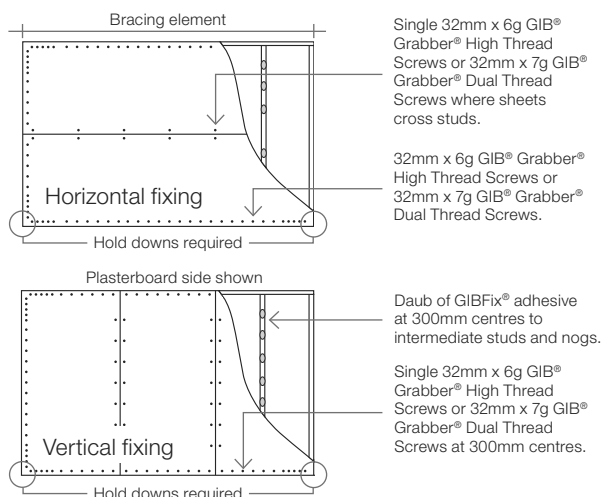
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm from maximum each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the sheet joint. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BLP-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLP-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure; B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB® HandiBrac is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of AS/NZ 2269/0 :2012.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZS 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally.
- Plywood is to be fixed vertically with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

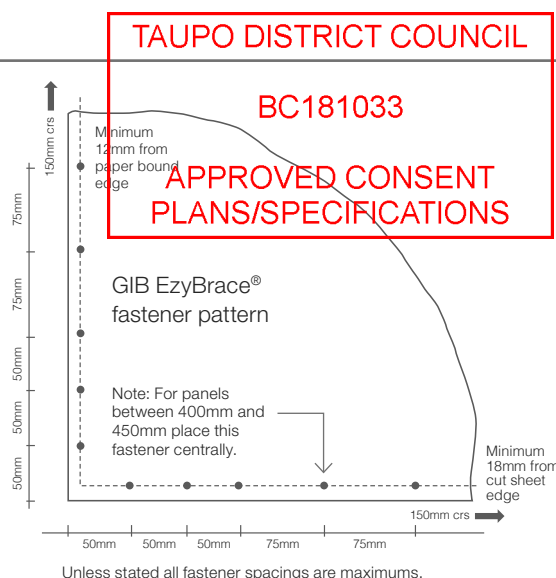
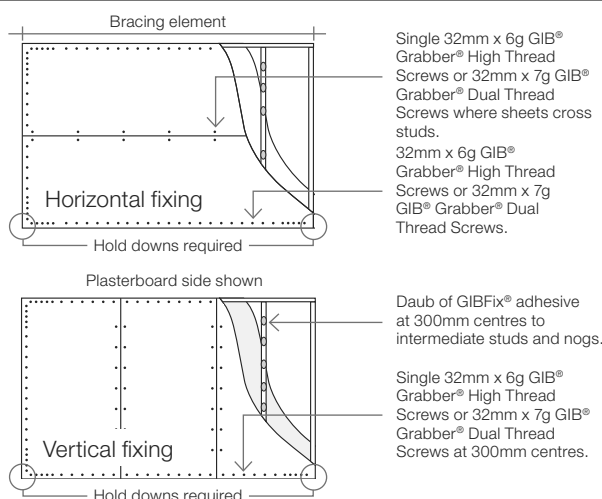
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

GIB® Plasterboard side: 50,100,150, 225, 300mm from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.

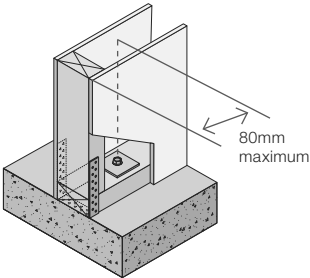
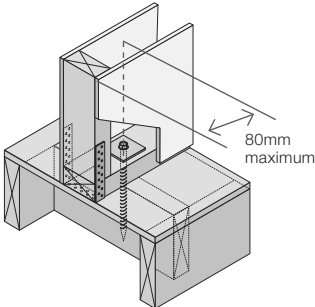
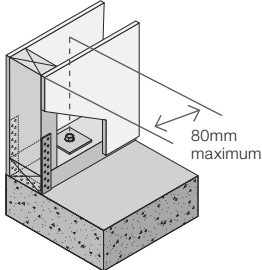
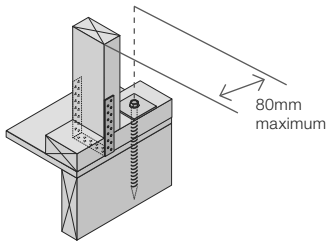
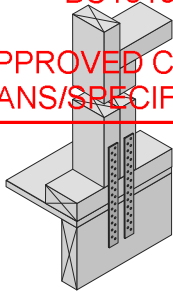


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Bracing strap installation

Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard and

positioned in such a way that the corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the corner fastenings to be installed without having to penetrate the bracing strap.

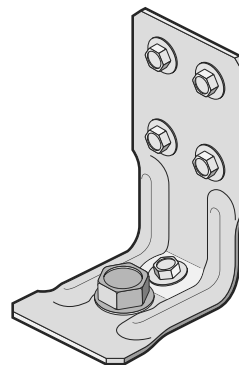
Concrete floor	Timber floor
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.	
Internal wall	
 GEB004	 GEB005
External wall	
 GEB006	 GEB007
Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library.	
2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Bolts to be fitted with 50 x 50 x 3mm washers and 3.75mm nails to stud.	
TAUPO DISTRICT COUNCIL BC181033 APPROVED CONSENT PLANS/SPECIFICATIONS  GEB008	
Hold-down fastener requirements	
Concrete floor	Timber floor
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.	12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element

GIB HandiBrac® installation

Developed in conjunction with MiTek™, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs. The GIB HandiBrac® is a substitute for bottom plate hold-down straps.

- Quick and easy to fit.
- May be fitted at any stage before lining.
- Framing face is clear to allow flush lining.
- Easily inspected.

The GIB HandiBrac® with BOWMAC® blue head screw bolt is suitable for timber and concrete floors constructed in accordance with NZS 3604:2011.



Concrete floor		Timber floor	
External walls	Internal walls	External walls	Internal walls
GEB009 Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.	GEB010 Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.	GEB011 Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.	GEB012 Position GIB HandiBrac® in the centre of floor joist or full depth solid block.
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.		12 x 150mm galvanised coach screw or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.	

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Insulation Calculations

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INSULATION CALCULATION BASIC DATA AND DETERMINATION OF METHOD

This calculation is valid for buildings of non-solid construction only

PROJECT: New Residence - 18 Penny Grove, Taupo
CLIMATE ZONE: 3

BASIC DATA TABLE:

	WALL & GLASS AREAS				
LINE #	WALL	WALL AREA (m²)	GLASS AREA (m²)		
1	NORTH	45.89	21.78		
2	EAST	40.83	6.93		
3	SOUTH	45.68	4.24		
4	WEST	40.81	5.66		
	TOTAL AREAS	(m²)	(m²)	%	
5	N,E,S,W	173.21	38.61	22.29	<=30%
6	E,S,W ONLY	127.32	16.83	13.22	<=30%
7	TOTALS	173.21	38.61	22.29	<=30%
		(m²)	PERIMETER (m)		RATIO
8	TOTAL ROOF AREA (INC SKYLIGHT)	128.24	N/A		N/A
9	FLOOR AREA	127.36			N/A
11	SKYLIGHT AREA		N/A		<=1.5m²
12	LOUVRES/GLAZING AREA		N/A		<3m²
13	ACTUAL WALL AREA	134.60	N/A		N/A
14	ACTUAL ROOF AREA	128.24	N/A		N/A

CONCLUSION OF METHOD:

DO CALCULATIONS COMPLY WITH SCHEDULE METHOD?

USE CALCULATION METHOD FOR OTHER REASONS?

Yes/No?

Yes

No

USE CALCULATION METHOD FOR THE FOLLOWING REASONS:

1

2

3

WALL AREAS:	CONSTRUCTION DESCRIPTION	R-VALUE
1	=	2.18
	INSULATION	
2	=	2.19
	INSULATION	
3	=	2.27
	INSULATION	
4	=	
	INSULATION	
5	=	
	INSULATION	
6	=	
	INSULATION	

Note: Similar highlighted values in the 'Window Areas' calculation box below indicate windows which are in that particular wall type.

WALL AREAS				WINDOW AREAS				STUD HEIGHT WALL LENGTH
NORTH (m²)	EAST (m²)	SOUTH (m²)	WEST (m²)	NORTH (m²)	EAST (m²)	SOUTH (m²)	WEST (m²)	
12.84	2.61	2.61	4.93	4.56	2.99	2.12	3.28	TAUPO DISTRICT COUNCIL BC181033 APPROVED CONSENT PLANS/SPECIFICATIONS
8.82	6.17	3.65	3.13	5.74	2.12	2.12	1.23	
9.19	8.04	10.72	5.01	5.74	0.91		1.23	
1.50	8.30	10.23	4.18	5.74	0.91			
12.50	10.44	14.35	5.01					
1.04	5.27	1.80	2.61					
		2.32	2.92					
			8.12					
			4.90					
45.89	40.83	45.68	40.81	21.78	6.93	4.24	5.66	TOTALS

cont...

ROOF AREAS

ROOF AREAS:			PLAN AREA (m²)	SLOPE ANGLE (°)	ACTUAL AREA	R-VALUE
1	=	Profiled metal on trusses at 900mm centres	70.36		70.36	3.37
	INSULATION	R3.6 insulation to roof space				
2	=	Profiled metal on scissor trusses at 900mm centres	57.00	10.00	57.88	3.35
	INSULATION	R3.6 insulation to roof space				
3	=					
	INSULATION					
4	=					
	INSULATION					
5	=					
	INSULATION					
TOTALS			127.36		128.24	

FLOOR AREAS AND PERIMETER DIMENSIONS:

FLOOR AREAS:			PLAN AREA (m²)	PERIMETER (m)	RATIO	R-VALUE
1	=	85mm thick Firth Ribraft concrete slab on ground	127.36	65.98	1.93	1.30
	INSULATION	220mm deep polystyrene pod system				
2	=					
	INSULATION					
3	=					
	INSULATION					
4	=					
	INSULATION					
5	=					
	INSULATION					
TOTALS			127.36			

CONCLUSION:

PROPOSED R-VALUES			
LOCATION	COMPONENT	R-VALUE ACHIEVED	INSULATION DESCRIPTION & REFERENCE
WALLS	Axon Panel on cavity over 90x45mm studs at 400mm centres.	2.18	R2.8 insulation to frame cavity
			<i>Refer to Design Navigator Calculations in Appendix</i>
	Bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres.	2.19	R2.8 insulation to frame cavity
			<i>Refer to Design Navigator Calculations in Appendix</i>
ROOFS	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres.	2.27	R2.8 insulation to frame cavity
			<i>Refer to Design Navigator Calculations in Appendix</i>
	Profiled metal on trusses at 900mm centres	3.37	R3.6 insulation to roof space
			<i>Refer to Design Navigator Calculations in Appendix</i>
FLOOR	Profiled metal on scissor trusses at 900mm centres	3.35	R3.6 insulation to roof space
			<i>Refer to Design Navigator Calculations in Appendix</i>
	85mm thick Firth Ribraft concrete slab on ground	1.30	220mm deep polystyrene pod system
			<i>Refer to Manufacturers Spec in Appendix</i>
GLAZING	Aluminium joinery with double glazed windows	0.26	Standard aluminium joinery with double glazed windows
			<i>Refer to Branz House Insulation Guide Fifth Edition</i>

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Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#).

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel.

- Floors ☐
- Walls ☒
- Roofs ☐

Axon Panel on cavity over 90mm timber framing

2.18 m²C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail](#)

external surface 0.03

Cladding : Fibre cement board 1470 9mm
R-value: 0.04

Air Barrier : Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 400mm, dwangs @ 800mm
Wall Frame Area: 17.9%
Cavity Area: 82.1%

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

Framing :
R-value: 0.75

Insulation : 2.8

still Airgap: none

R-value: 0.00

Wall Lining : Gypsum plasterboard 10mm
R-value: 0.04

internal surface 0.09

[Print Page](#)

Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction) [i](#):

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets [i](#):

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8

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Construction R-value Calculator

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Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#)

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel .

- Floors ☐
- Walls ☒
- Roofs ☐

Weatherboards direct fixed over 90mm timber framing

2.19 m²°C/W

Type: Wall: Timber Frame (direct fixed cladding) ▼

Timber Frame (direct fixed Cladding)

view detail

external surface 0.03

Cladding : Bevelled weatherboard without building paper ▼
R-value: 0.14

Air Barrier : Building paper ▼
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 400mm, dwangs @ 800mm ▼
Wall Frame Area: 17.9% Cavity Area: 82.1%
Framing : Insulation : 2.8
R-value: 0.75
still Airgap: none ▼
R-value: 0.00

Wall Lining : Gypsum plasterboard 10mm ▼
R-value: 0.04

internal surface 0.09

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8

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Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#).

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel.

- Floors ☐
- Walls ☒
- Roofs ☐

Internal 90mm timber framed wall GIB lining both sides		2.27 m ² °C/W
Type:	Wall: Timber Frame (direct fixed cladding) ▼	
Timber Frame (direct fixed Cladding) view detail		
external surface 0.03		
Cladding :	Gypsum plasterboard 10mm into still air (garage, etc.) ▼	
R-value: 0.10		
Air Barrier :	none ▼	
R-value: 0.00		
Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm ▼		
Wall Frame Area: 14.4% Cavity Area: 85.6%		
Framing :	Insulation : 2.8	
R-value: 0.75		
still Airgap:	none ▼	
R-value: 0.00		
Wall Lining :	Gypsum plasterboard 10mm ▼	
R-value: 0.04		
internal surface 0.09		

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction) [\[?\]](#)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets [\[?\]](#):

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8

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Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#).

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel.

Floors ☐

Walls ☐

Roofs ☒

Profiled metal on trusses at 900mm centres		3.37	m ² °C/W
Type:	Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling ▼		
Timber framed Roof, direct fixed or battened flat Ceiling		view detail	
external surface 0.03			
Roofing :	Corrugate iron with building paper ▼		
R-value: 0.01			
Insulation :			
Timber Frame & Cavity :			
90mm rafters or joists @ 900mm, battens covered with insulation ▼			
Roof Frame Area: 5.0%		Cavity Area: 95.0%	
Roof space (still air) 0.11		Roof space (still air) 0.11	
Framing : R-value: 0.75		Insulation : 3.6	
Roof Lining : Gypsum plasterboard 13mm ▼			
R-value: 0.06			
internal surface 0.09			
Non-IC-rated recessed downlights			
Ceiling Area [m ²]:	Number of downlights:	Clearance from lamp holder side [m]:	i

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets [i](#):

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8





Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#).

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel.

Floors ☐

Walls ☐

Roofs ☒

Profiled metal on scissor trusses at 900mm centres		3.35	m ² °C/W
Type:	Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling ▼		
Timber framed Roof, direct fixed or battened flat Ceiling		view detail	
external surface 0.03			
Roofing :	Corrugate iron with building paper ▼		
R-value: 0.01			
Insulation :			
Timber Frame & Cavity :			
90mm rafters or joists @ 900mm, battens covered with insulation ▼			
Roof Frame Area: 5.0%		Cavity Area: 95.0%	
Roof space (still air) 0.11		Roof space (still air) 0.11	
Framing : R-value: 0.75		Insulation : 3.6	
Roof Lining : Hardboard 6mm ▼			
R-value: 0.04			
internal surface 0.09			
Non-IC-rated recessed downlights			
Ceiling Area [m ²]:	Number of downlights:	Clearance from lamp holder side [m]:	i

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

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Australian Building Code Targets [i](#):

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8



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Cladding Manufacturers Specification

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James Hardie
a smarter way™

Axon®
PANEL



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Technical Specification

MARCH 2017 | NEW ZEALAND

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WE VALUE YOUR FEEDBACK

To continue with the development of our products and systems, we value your input. Please send any suggestions, including your name, contact details, and relevant sketches to:

Ask James Hardie™

Fax 0800 808 988

literaturefeedback@jameshardie.co.nz

THIS TECHNICAL SPECIFICATION
IS FOR AXON® PANEL DIRECT
FIXED AND FIXED TO CLD®
STRUCTURAL CAVITY BATTEN.

1 Application and scope

1.1 APPLICATION

Axon® Panel is manufactured by James Hardie using an advanced lightweight cement composite. Base composition is portland cement, ground sand, cellulose fibre and water. Axon Panel has vertical grooves along the panel. It is classified as lightweight wall cladding suitable for residential and light commercial buildings using timber framing.

- Axon Panel is ideal for achieving feature walls in areas such as gable ends and entrance ways.
- Axon Panel is primed on the face to take a suitable paint finish in any colour.
- Axon Panel 133 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres.
- Axon Panel 133 Grained - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres. Between the grooves is a look of traditional wood-grain texture.
- Axon Panel 400 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 400mm centres.

Specifier

If you are a specifier or other responsible party for a project, ensure that the information in this document is appropriate for the application you are planning and that you undertake specific design and detailing for areas which fall outside the scope of these specifications.

Installer

If you are an installer ensure that you follow the design, moisture management principles, associated details and material selection provided by the designer. All of the details provided in this document must be read in conjunction with this specification.

Make sure your information is up to date

When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or you need more information, visit www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

1.2 SCOPE

The scope of this specification for the use of Axon Panel is limited to buildings which fall within the scope limitations of 'Acceptable Solution E2/AS1 paragraph 1.1' of the New Zealand Building Code (NZBC).

This document is intended for use by architects, designers and specifiers who may be involved with the specification of Axon Panel.

This manual covers the use of Axon Panel for both construction methods i.e. direct fixed to framing or cavity construction, used in external walls of timber framed buildings up to 2.5kPa.

Please refer to E2/AS1 for further information regarding the selection of construction methods to be used for fixing claddings.

1.3 DETAILS

Various Axon Panel figures are provided in the Details section of this document. This specification and details in dwg, dxf, jpg and pdf file format are also available for download at www.jameshardie.co.nz.

All dimensions shown are in millimetres unless noted otherwise.

1.4 SPECIFIC DESIGN

For use of Axon Panel outside this published scope, the architect, designer or engineer must undertake specific design.

For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

2 Design

2.1 COMPLIANCE

Axon Panel complies with E2 of the NZBC as an alternate solution.

Axon Panel cladding has been tested as per E2/VM1 of the NZBC and it passes the test performance requirements. Axon Panel also complies with durability requirements of 'B2' clause of the NZBC.

2.2 RESPONSIBILITY

The specifier or other party responsible for the project must run through a risk matrix analysis to determine which construction method is to be used. The designer must also ensure that the figures published in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this specification. The designers should ensure that the intent of their design meets the requirements of the NZBC.

All New Zealand Standards referenced in this manual are current edition and must be complied with.

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution E1/AS1 'Surface Water'.

Foundations design must comply with the requirements of NZS 3604 'Timber-framed Buildings' or be as per specific engineering design.

The grade of adjacent finished ground must slope away from the building to avoid any possibility of water accumulation in accordance with the NZBC requirements.

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2.4 SURFACE CLEARANCES

The clearance between the bottom edge of cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building.

Axon Panel must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZS 3604.

Axon Panel must have a minimum clearance of 100mm from paved ground, and 175mm from unpaved ground. On roofs and decks, the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground. Refer Figures 3 and 18.

2.5 MOISTURE MANAGEMENT

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled.

Walls must include those provisions as required by the NZBC Acceptable Solution E2/AS1 'External Moisture'. In addition all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in external walls, must comply with the requirements of relevant standards and the NZBC.

For further guidance on designing for weathertightness refer to BRANZ Ltd, and the Ministry of Business Innovation and Employment (MBIE) updates on the following websites respectively, www.branz.co.nz and www.building.govt.nz

2.6 STRUCTURE

2.6.1 Timber framing

Timber-framed buildings must be designed in accordance with NZS 3604 (Timber-framed Buildings). When the framing is provided as per the specific engineering design, the framing stiffness must be either equivalent to or more than the stiffness requirements of NZS 3604.

For timber frame walls longer than 12m it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections etc.

2.6.2 Wind loading

Axon Panel is suitable for use in all wind zones in New Zealand up to and including EH as defined in NZS 3604.

A specific design is required for all situations where the buildings falls outside the scope of NZS 3604 and E2/AS1.

2.7 BRACING

Axon Panel direct fixed can be used to achieve structural bracing when fixed with stainless steel HardieFlex™ nails. For further information refer to the James Hardie Bracing Design Manual.

Axon Panel installed to CLD Structural Cavity Battens as per this specification cannot be used to achieve structural bracing. However, bracing can be achieved by using James Hardie rigid air barrier board installed direct to framing instead of a flexible underlay or by using Villaboard® Lining bracing system on the internal face.

2.8 FIRE RATED WALLS

Axon Panel when direct fixed with HardieFlex nails to external walls can achieve fire ratings up to 60/60/60 to comply with C/AS1 of the NZBC when the walls are constructed in accordance with the current James Hardie 'Fire and Acoustic Design Manual'.

When using Axon Panel fixed to CLD Structural Cavity Battens, a fire rating of up to 60 minutes can be achieved using RAB® Board in conjunction with the fire rated system requirements as specified in the James Hardie 'Fire and Acoustic Design Manual'. Ask James Hardie on 0800 808 868 for further information.

Axon Panel is classified as a non-combustible material suitable for use on walls close to boundary.

2.9 ENERGY EFFICIENCY

External walls constructed as per this technical specification using Axon Panel, bulk insulation, where the area of glazing is 30% or less of the total wall area comply with the requirements for walls in the NZBC Acceptable Solution H1/AS1 (NZBC Clause H1 Energy Efficiency), Replacement Table 1. To meet thermal insulation requirements for the construction, the bulk insulation as specified in Table-1 must be used. This insulation may be substituted with insulations having higher R-values. The thermal insulation of a wall gets affected when the depth of the timber framing is increased or decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and using an internal lining material such as James Hardie Villaboard® Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate Zone	Construction R-Value Requirement	Minimum R-Value of Insulation Required
1 and 2	1.9 m ² °C/W	#R2.0
3	2.0 m ² °C/W	#R2.2

Total construction R-Value depends on the insulation material used and the framing ratio. The insulation material R-Values specified in this table are for studs spaced at 600mm c/c and nogs spaced at 800mm c/c.

To achieve higher R-Values of construction the wall insulation material must be replaced with an insulation material having higher R-Values to suit the requirements.

For further guidance on insulation requirements refer to the current edition of 'House Insulation Guide' published by BRANZ.

3 Framing

3.1 GENERAL

This Axon Panel technical specification is only suitable for timber-framed buildings. Other framing materials are subject to a specific engineering design.

3.2 TIMBER FRAMING

3.2.1 Dimensions

A minimum 45mm wide stud is required.

3.2.2 Structural grade

Minimum timber grade requirement is No. 1 framing grade or MSG6 as per NZS 3604. The grading of timber must comply with the AS/NZS 1748 and NZS 3631 requirements.

3.2.3 Durability

The external framing must be treated to a minimum H1.2 treatment. Refer to the NZBC Acceptable Solution B2/AS1 'Durability' for further information about the durability requirements.

For timber treatment and allowable moisture content information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round Sawn Timber) for minimum timber treatment selection and treatment requirements.

Also refer to the framing manufacturer's literature for further guidance on timber selection. Framing must be protected from moisture at site in accordance with the recommendation of the framing manufacturers.

3.2.4 Frame construction

The framing must fully support all panel edges. The framing must be rigid and not rely on the cladding panel for stability.

Timber framing sizes and its set-out must comply with NZS 3604 and as specified in this specification.

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must comply with the minimum timber sizes stipulated for wall frames in Section 8 of the NZS 3604.

For timber frame walls longer than 12m, it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections generated by loadings etc.

3.3 STEEL FRAMING

Refer to James Hardie Steel Frame Technical Specification about the installation of Axon Panel to steel frame.

3.4 CONSTRUCTION METHODS

3.4.1 Direct fixed

For direct fixed construction method the following framing is required:

- Studs at 600mm c/c maximum
- A minimum 45mm stud width is required at vertical panel joints
- Nogs/dwangs are required at 1200mm c/c maximum.

3.4.2 CLD Structural Cavity Batten

For cavity construction method the following framing is required:

- When studs are spaced at 600mm centres maximum, the nogs/dwangs must be provided at 800mm centres maximum
- When studs are spaced at 400mm centres then the nogs/dwangs may be provided at 1200mm centres
- An extra stud is required in internal corners. Refer to Figure 21.

3.5 TOLERANCES

In order to achieve the required performance and an acceptable wall finish, it is imperative that framing is straight and true.

Framing tolerances must comply with the requirements of NZS 3604. All framing shall be made flush.

4 Preparation

4.1 FLEXIBLE UNDERLAY OR HOMERAB PRE-CLADDING

Flexible underlay or HomeRAB® Pre-Cladding must be provided as per the requirements of the NZBC Acceptable Solution E2/AS1 'External Moisture' and NZS 3604. The flexible underlay must comply with Table 23 of E2/AS1 and AS/NZS 4200.1. The flexible underlay must be fixed in accordance with E2/AS1, NZS 3604 and AS/NZS 4200.2 and the underlay manufacturer's recommendations.

Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC Acceptable Solution E2/AS1 Table 23. For attached garages, flexible underlays must be selected in accordance with the NZBC Acceptable Solution E2/AS1, paragraph 9.1 3.4. HomeRAB Pre-Cladding is suitable for use in these applications. It must be installed in accordance with the James Hardie Rigid Air Barriers installation manual.

4.2 RIGID AIR BARRIER

For EH wind zone or Specific Engineering Design projects where the wind pressures are higher than 1.5kPa (CLD), RAB Board (6mm) must be used. Refer to the James Hardie rigid air barriers installation manual for information regarding its installation. For buildings within the scope NZS 3604 HomeRAB Pre-Cladding Lining (4.5mm) or flexible underlays can be used.

4.3 VENT STRIP

The James Hardie uPVC cavity vent strip must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. James Hardie uPVC vent strip has an opening area of 1000mm²/m length.

4.4 FLASHING

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to panel installation. Please refer to moisture management requirements in Clause 2.5. The flexible underlay or RAB Board must be appropriately taped around the penetrations and lapped/taped to flashings. Materials must be lapped in such a way that water tracks down to the exterior of a building. James Hardie will assume no responsibility for water infiltration within the wall due to poor installation of flashings or flexible underlays. The selected flashing materials must comply with the durability requirements of the NZBC. For information refer to Table 20 of clause E2 of the NZBC.

When using a James Hardie rigid air barrier board the entire framing around window opening must be sealed with a flashing tape. The tape must be finished over the face of James Hardie rigid air barrier board. The flashing tapes like SUPER-STICK Building Tape® by Marshall Innovations or 3M™ All Weather Flashing Tape 8067 by 3M™ are recommended for use with James Hardie rigid air barrier board. Refer to the tape manufacturer's literature for further information regarding their installation.

4.5 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Axon Panel which meet the requirements of E2 'External Moisture', an approved document of the NZBC. Refer to Figures 8 to 10 and 24 to 26.

5 Batten installation

Note: This specification is not for timber cavity battens. Refer to separate technical specification from James Hardie.

5.1 CLD STRUCTURAL CAVITY BATTENS

Buildings with a risk score of 7-20 calculated in accordance with Table 2 of Acceptable Solution E2/AS1 of the NZBC, require Axon Panel to be installed on a cavity. CLD Structural Cavity Battens provide airspace between the frame and the panel and are used to fix cladding into them.

CLD Structural Cavity Battens are made of a low density fibre cement formulation which enables them to have extra strength and durability. CLD Structural Cavity Batten is sealed on all sides and is suitable to fix Axon Panel installed as per this technical specification, and it can withstand the design wind pressures exerted on a cladding within the scope of NZS 3604.

The CLD Structural Cavity Battens are made 2450mm long and 19mm thick. The battens are fully sealed on all sides.

5.2 BATTEN LAYOUT

CLD Structural Cavity Battens must be fixed to the wall framing over flexible underlay or James Hardie rigid air barrier. The smoother face of batten should face towards the cladding.

CLD Structural Cavity Battens are suitable to withstand wind pressures up to 2.5kPa (ULS). For batten fixing, refer to section 5.4. Ensure the battens are straight and provide a flat surface to fix Axon Panel to. Site cut ends of battens must be sealed on site with Dulux® Acraprime 501/1 sealer or Resene Quick Dry.

The battens are run continuously over the studs but they must not be run continuously over the floor joists. There must be a 15mm gap between the battens at floor joist level to allow for structural shrinkages and deflections. Refer to Figure 27.

CLD Structural Cavity Battens can be butt jointed over the studs within the floor height. The batten ends must be cut between 20° to 45° and be installed in a way that the butt joint deflects the moisture to the exterior. The ends must be sealed and jointed with the adhesive sealant before butting them together. Refer to Figure 23.

The designer must ensure that the CLD Structural Cavity Battens are not used in situations where design wind pressures are above 2.5kPa (ULS).

CLD Structural Cavity Battens must always be at least 300mm in length.

5.3 INTERMEDIATE SUPPORT

Where studs are at 600mm centres an intermediate means of restraining the flexible underlay and insulation from bulging into the cavity shall be installed. An acceptable method to achieve this is using a:

- 75mm galvanised mesh; or
- polypropylene tape at 300mm centres fixed horizontally and drawn taut.

No intermediate supports are required.

- when studs are spaced at 400mm centres; or
- when RAB Board instead of flexible underlays are used.

5.4 BATTEN FASTENERS

The CLD Structural Cavity Batten must be fixed to the framing as specified in Table 2. The fasteners must be driven at a minimum distance of 50mm from the batten ends.

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Table 2

Batten fixing				
Fixing Type	Framing	Basic Wind Pressure kPa (ULS)	Batten centres max. (mm)	Fixings centres max. (mm)
65mm x 2.8mm RoundDrive ring shank nail hot dip galv./ s.steel	Timber	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200
50mm x 9-10g Countersunk head steel screw class 3/4	*Steel 0.55 to 1.6mm BMT	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200

For fastener durability information, refer to Clause 6.2 of this document.

CLD Structural Cavity Battens less than 400mm in height must have fixings at maximum 150mm centres.

Battens must be fixed over studs.

6 Panel fixing

6.1 GENERAL

Axon Panel must be kept dry and under cover whilst in storage or during the installation. Every endeavour must be made to keep framing dry once panel fixing commences. All site-cut panel edges must be sealed prior to installation.

- The shiplap jointing of panels is only suitable for vertical fixing of panels.
- Do not fix in the groove of Axon Panel.
- Ensure the sheets are from the same batch.
- It is recommended to fix from the centre of the panel and work outwards.
- Do not overdrive fasteners.
- Fixings must be finished flush with the panel surface.

6.2 FASTENER DURABILITY

Fasteners must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing material to be used in relation to exposure conditions and are summarised in Table 3.

Table 3

Exposure conditions and nail selection prescribed by NZS 3604		
NAIL MATERIAL		
Zone D*	Zone C* outside sea spray zone, Zone B and Geothermal hot spots	Bracing — All Zones
Grade 316 Stainless	Hot-dipped galvanised or Grade 316 stainless	Grade 316 Stainless

*(Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made). Microclimate conditions as detailed in NZS 3604, paragraph 4.2.4 require SED.

Also refer to the NZBC Acceptable Solution E2/AS1 Table 20 and 21 for information regarding the selection of suitable fixing materials and their compatibility with other materials.

6.3 FASTENER — TYPE, SIZE AND LAYOUT

6.3.1 Direct fix

Axon Panel must be fixed to framing using the fixings as specified in Table 4 below and follow the edge distance required for nails as shown in the details. Refer to Figures 2 and 4.

Table 4

Panel fixing	
DIRECT FIXED TO FRAME USING HARDIEFLEX NAILS OVER FLEXIBLE UNDERLAY	
40 x 2.8mm HardieFlex nails.	Fix @ 200mm centres to all framing. Stud width 45mm min. required at vertical joint.

DIRECT FIXED TO FRAME USING BRAD NAIL OVER FLEXIBLE UNDERLAY	
ND 50 stainless steel straight brad nail	Up to 1.5kPa (Up to and including VH wind zone)
Fix 150mm c/c on panel edges and intermediate framing	

Notes:

1. Brad nail fixing method is only suitable up to very high wind speed zones. Do not use this method for EH wind zones described in NZS 3604 or SED projects.
2. Nails must be finished flush with panel surface.
3. Special fixing arrangements are required for bracing and fire-resistance rated wall systems.

For more information Ask James Hardie on 0800 808 868.

When fixing the panels using nail guns, refer to the nail gun manufacturer for information about nails and the type of nail gun to be used.

Note: Do not use 'D' head nails.

6.3.2 CLD Structural Cavity Batten Method

This panel fixing method can be used up to 2.5kPa wind pressure. Axon Panel is only fixed into the CLD Structural Cavity Batten as per this method.

Adhesive sealant

A polyurethane adhesive sealant Seal N Flex-1 manufactured by Bostik or SikaFlex 11FC by Sika are recommended for use in the installation of these products. Apply a 6mm continuous bead of this adhesive sealant over the face of the CLD Structural Cavity Batten before fixing the Axon Panel. Refer to Figure 19, 20 and 21.

When using external box corner flashing, use a 10mm thick bead of adhesive over the aluminium box corner flanges. Refer to Figure 22.

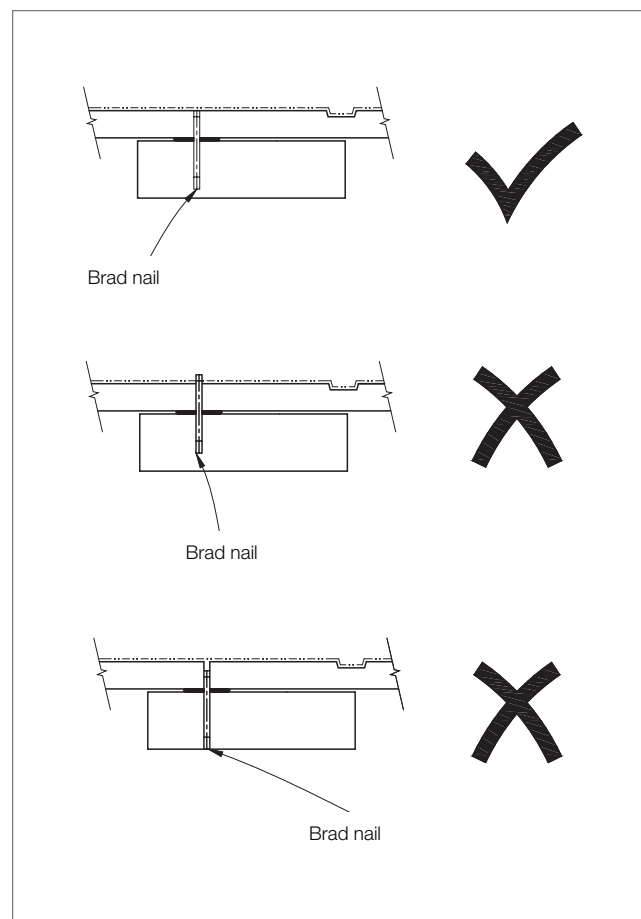
Note: Do not use excessive adhesive.

6.3.3 Cavity construction using timber cavity battens

When fixing Axon Panel using timber cavity battens, these details are available at www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

6.4 PANEL LAYOUT

All panel edges must be supported by the framing. The shi lap joint must be formed vertically. The framing centers must be checked before the panel installation.



Fix Axon Panel to CLD Structural Cavity Battens using one of the following fixings specified in Table 5. The edge distance at panel corner must be minimum 75mm vertically from panel corners. Refer Figure 17.

Table 5

Axon Panel Fixing		
Types of fixings to be used with adhesive sealants	Suitable up to Basic Wind Pressure kPa (ULS)	Fixing to CLD Structural Cavity Battens c/c (mm)
C-25 straight 'T'- Head stainless steel brad nail	1.5 (Up to and including VH wind zone)	150
25 x 2.5mm annular threaded fibre cement nail	2.5 (> VH wind zone)	200
25mm x 10g counter sunk screw class 3/4 or stainless steel	2.5 (> VH wind zone)	200

Notes:

- Brad nail fixing method is only suitable up to 1.5kPa.
- Nails must be finished flush with panel surface.

7 Jointing

7.1 GENERAL

Axon Panels are fixed to form a shi lap joint at vertical edges. The panels have factory-made edges to suit this jointing.

7.2 VERTICAL JOINT

Direct fixed

Axon Panels are shi lap jointed keeping a gap of 1-2mm between the panels. A 50 mm wide 3259 Isosal sealing tape is used under the joint over the face of the timber stud where direct fixed construction method is used. A flexible sealant must be applied to the full length of the shi lap joint before the panels are jointed. The edge distance for a HardieFlex nail must be 18mm min. Refer to Figure 4.

Cavity construction

Fix the CLD Structural Cavity Batten over the studs and it runs behind the entire length of the shi lap joint with a 50mm overhang below the bottom plate and finishes flush with the bottom edge of panel. Refer to Figures 16 and 17. The vertical shi lap joint is formed along the centre line of the batten. A bead of sealant is applied to the vertical edge of the Axon Panel to seal the shi lap joint before fixing the panels. Refer to Figure 19. The edge distance for a brad nail must be 16mm and 18mm. Refer Figures 14 and 19.

8 Finishing

7.3 HORIZONTAL JOINT

At floor joist levels a horizontal joint must be provided to accommodate the movement resulting from timber joist shrinkage and settlement. A JH 9mm panel aluminium horizontal 'h' mould is used to form a horizontal joint. Use the aluminium 'h' mould jointer to cover over the butt joint of 'h' mould. A purpose made metal 'Z' flashing or a James Hardie uPVC flashing could also be used to flash the horizontal joint. Refer to Figures 11, 12 and 27.

7.4 EXTERNAL CORNER

A JH 9mm panel aluminium box corner mould is used to form the external box corner. The site-cut sheet edges must be sealed before butting them into the box corner. Refer to Figure 7.

Do not run the box corner flashing continuously over the floor joist. On a two storey construction the aluminium box corner is finished under the aluminium 'h' mould. A uPVC corner under flashing must be used under the box corner when in this situation. Refer to Figure 12.

For CLD Structural Cavity Batten external corner refer to Figure 22.

The bead of adhesive must be 10mm thick to accommodate for the thickness of the aluminium.

7.5 INTERNAL CORNER

Direct fixed internal corner is formed using a uPVC corner under flashing or an 80mm wide Inseal sealing strip behind the panel edges. The joint is filled with the flexible sealant. Refer to Figure 6.

For CLD Structural Cavity Batten internal corner joint detail refer to Figure 21.

7.6 FLASHING MATERIAL DURABILITY

Please refer to Table 20 of E2/AS1 of the NZBC regarding the durability requirements of various flashing materials.

8.1 PREPARATION

Painting of Axon Panel is mandatory to meet the durability requirements of the NZBC and 15 year James Hardie product warranties. Axon Panel must be dry and free of any dust or grime before painting. The panels must be painted within 90 days of their installation. There is no restriction on the LRV of paint to be applied on the Axon Panel.

When using uPVC flashings, dark colours should be avoided as it will affect the durability of uPVC flashing. The LRV of paint must be above 40% when using uPVC flashings.

Dark paints can be used when using the aluminium flashings.

Panels are pre-primed and are suitable for site applied acrylic paints. Pre-finished panels can also be installed using exposed head fasteners.

In order to seal cut edges or sanded patches, Dulux 1 Step, Resene quick dry, Taubmans Underproof Acrylic Primer Undercoat or a similar product should be applied. The primer should be compatible with the paint to be used.

Where panels are fixed with brad nails, the nail heads must be finished flush with panel surface. The nail gun should be set to nail "proud" of the panel surface and nail heads to be manually finished flush with surface. The nail heads can be skimmed over with an exterior grade 2 part builders fill if required. The skimmed area must be primed prior to site-applied finishing.

For site-applied finishes where brad nails are used. James Hardie recommends an undercoat and a minimum of two coats of acrylic paint. Follow the paint manufacturer's recommendations to prepare the surface and to adequately cover and conceal the panel fixings.

8.2 FLEXIBLE SEALANT

All sealants used must comply with the relevant requirements of the NZBC. Their application and usage must be in accordance with manufacturer's instructions. Check with sealant manufacturer prior to coating over sealants. Some sealant manufacturers do not recommend coating over their products.



9 Storage and handling

When storing Axon Panel, boards must be laid flat on a smooth level surface. Edges and corners must be protected from chipping.

To ensure optimum performance, store panels under cover and keep dry prior to fixing. If the panels become wet, allow them to dry thoroughly before fixing.

Do not carry panels on the flat, carry in the vertical position to avoid excessive bending.

10 Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*
- Re-applying of exterior protective finishes if necessary**
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants that may provide a means of moisture entry beyond the exterior cladding.
- Cleaning out gutters, blocked pipes and overflows as required
- Pruning back vegetation that is close to or touching the building
- The clearance between the bottom edge of Axon Panel and the finished ground must always be maintained.

*Do not use a water blaster to wash down the cladding.

*In extreme coastal conditions or sea spray zones, wash every 3-4 months.

**Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.

11 Product information

11.1 MANUFACTURING AND CLASSIFICATION

Axon Panel is an advanced lightweight cement composite building product. The basic composition is portland cement, ground sand, cellulose fibre and water. The panels are easily identified by the name 'Axon Panel' printed at regular intervals on the back face of panel.

CLD Structural Cavity Battens are manufactured using a low density fibre cement formulation. The basic composition is Portland cement, ground sand, cellulose fibre and water and proprietary additives. The battens are sealed on all sides.

Axon Panel is manufactured to AS/NZS 2908.2 'Cellulose-Cement Products Part 2: Flat Sheets' (ISO 8336 'Fibre Cement Flat Panels') standards in New Zealand. James Hardie New Zealand is an ISO 9001 'Telarc' certified manufacturer.

Axon Panel is classified Type A, Category 3 in accordance with AS/NZS 2908.2 "Cellulose-Cement Products".

For Safety Data Sheets (SDS) visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

11.2 PRODUCT MASS

Axon Panel is manufactured in 9.0mm thickness and has a mass of 12.1kg/m² at EMC.

Axon Panel cladding is defined as a Light Weight Wall Cladding (not exceeding 30kg/m²) as per NZS 3604.

11.3 DURABILITY

11.3.1 General

Axon Panel installed as per this technical specification will meet the durability requirements for claddings as required under clause 'B2-Durability' of the NZBC.

11.3.2 Resistance to moisture/rotting

Axon Panel has demonstrated resistance to permanent moisture induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Heat Rain (Clause 6.5).
- Water Permeability (Clause 8.2.2).
- Warm Water (Clause 8.2.4).
- Soak Dry (Clause 8.2.6).

11.3.3 Control of External Fire Spread

Axon Panel is assessed as per Appendix C C7.1.1 and is classified as 'Non-Combustible Material' which is suitable for use as external wall cladding and complies with requirements of Paragraph 5.4 of the NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of Acceptable Solutions C/AS2 to C/AS6 of the NZBC.

11.3.4 Alpine regions

In regions subject to freeze/thaw conditions, Axon Panel must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions must be protected where snow drifts over winter are expected.

The Axon Panel has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

12 Safe working practices

STAY HEALTHY WHEN WORKING WITH BUILDING PRODUCTS CONTAINING CRYSTALLINE SILICA

Crystalline Silica

What is it? Why and when is it a health hazard?

Crystalline Silica is

- Commonly known as sand or quartz
- Found in many building products e.g. concrete, bricks, grout, wallboard, ceramic tiles, and all fibre cement materials

Why is Crystalline Silica a health hazard?

- Silica can be breathed deep into the lungs when present in the air as a very fine (respirable) dust
- Exposure to silica dust without taking the appropriate safety measures to minimise the amount being breathed in, can lead to a potentially fatal lung disease – silicosis – and has also been linked with other diseases including cancer. Some studies suggest that smoking may increase these risks.
- The most hazardous dust is the dust you cannot see!

When is Crystalline Silica a health hazard?

- It's dangerous to health if safety protocols to control dust are not followed when cutting, drilling or rebating a product containing crystalline silica.
- Products containing silica are harmless if intact (e.g. an un-cut sheet of wall board).

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS AND INSTALLATION INSTRUCTIONS WHEN WORKING WITH JAMES HARDIE PRODUCTS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

AVOID BREATHING IN CRYSTALLINE SILICA DUST!

Safe working practices

- 👍 NEVER use a power saw indoors or in a poorly ventilated area
- 👍 NEVER dry sweep
- 👍 ALWAYS use M Class extractor unit as a minimum and always hose down with water/wet wipe for clean up
- 👍 NEVER use grinders
- 👍 ALWAYS use a circular sawblade specifically designed to minimise dust creation when cutting fibre cement – preferably a sawblade that carries the HardieBlade™ logo or one with at least equivalent performance.
- 👍 ALWAYS follow tool manufacturers' safety recommendations
- 👍 ALWAYS expose only the minimum required depth of blade for the thickness of fibre cement to be cut
- 👍 ALWAYS wear an approved properly-fitted, approved dust mask (P1 or P2) or respirator

Use one of the following methods based on the required cutting rate:

BEST

- Score and snap knife
- Hand guillotine
- Fibreshear

BETTER

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and M Class extractor unit.

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade

Working outdoors

- 👍 Make sure you work in a well ventilated area
- 👍 Position cutting station so wind will blow dust away from yourself and others in the working area
- 👍 Cut products with either a 'Score or snap' knife or fibre cement shears or, when not feasible, use a HardieBlade™ Saw Blade (or equivalent) and a dust-reducing circular saw attached to a M Class extractor unit
- 👍 When sawing, sanding, rebating, drilling or machining fibre cement products, always:
 - Wear your P1 or P2 mask (correctly fitted in accordance with manufacturers' instructions) and when others are close by, ask them to do the same
 - If you are not clean shaven, then use a powered air respirator with a loose fitting head top.
 - Wear safety glasses
 - Wear hearing protection
 - When others are close by, ask them to do the same.

Working indoors

- 👍 Never cut using a circular saw indoors
- 👍 Position cutting station in a well ventilated area
- 👍 Cut ONLY using a score and snap knife, hand guillotine or fibreshears (manual, electric or pneumatic)
- 👍 Make sure you clean up BUT never dry sweep. Always hose down with water/wet wipe or use an M Class extractor unit

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IF CONCERN STILL EXISTS ABOUT EXPOSURE LEVELS OR YOU DO NOT COMPLY WITH THE ABOVE PRACTICES, YOU SHOULD ALWAYS CONSULT A QUALIFIED INDUSTRIAL HYGIENIST.

Working Instructions

- Refer to Recommended Safe Working Practices before starting any cutting or machining of product.



HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.

Hole-Forming

For smooth clean cut circular holes:

- Mark the centre of the hole on the sheet.
- Pre-drill a 'pilot' hole.
- Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.



For irregular holes:

- Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face.
- Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.

STORAGE & DELIVERY

Keeping products and people safe

Off loading

- James Hardie products should be off-loaded carefully by hand or by forklift.
- James Hardie products should not be rolled or dumped off a truck during the delivery to the jobsite.

Storage

James Hardie products should be stored:

- in their original packaging
- under cover where possible or otherwise protected with a waterproof covering to keep products dry
- off the ground – either on a pallet or adequately supported on timber or other spacers
- flat so as to minimise bending

James Hardie products must not be stored:

- directly on the ground
- in the open air exposed to the elements

JAMES HARDIE IS NOT RESPONSIBLE FOR DAMAGE DUE TO IMPROPER STORAGE AND HANDLING.

TIPS FOR SAFE AND EASY HANDLING

Weatherboard products

- Do not lift planked products flat and in the middle
- Carry the products on the edge
- If only one person is carrying the product, hold it in the middle and spread arms apart to better support the product
- If two people are carrying the plank, hold it near each end and on edge
- Exercise care when handling weatherboard products to avoid damaging the edges/corners

Sheet products

- Carry with two people
- Hold near each end and on edge
- Exercise care when handling sheet products to avoid damaging the edges/corners

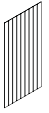
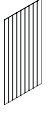
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13 Product sizes and accessories

Table 7

Axon Panel information					
Product	Description	Thickness	Size		Product Code
	Axon Panel 133 Smooth Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m2	9	Length	Width	
			2450	1200	403780
			2750	1200	403781
	Axon Panel 133 Grained Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m2	9	3000	1200	403782
			2450	1200	404510
			2750	1200	404511
	Axon Panel 400 Smooth Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 400mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m2	9	3000	1200	404512
			2450	1200	404414
			2750	1200	404415
			3000	1200	404416

Note: The actual width of the panel is 1203mm. All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

Table 8

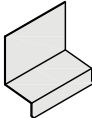
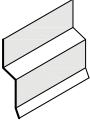
Accessories/tools supplied by James Hardie			
Accessories	Description	Quantity/Size (approx)	Code
	CLD Structural Cavity Batten 19mm thick fibre cement cavity batten installed over RAB Board or a flexible underlay. Axon Panels are fixed to the battens.	19 x 70mm, 2450mm long	403870
	JH 9mm Panel Aluminium External Box Corner A box corner mould to form the external joints. 9mm etch primed.	2450mm long	304509
		2750mm long	304510
		3000mm long	305150
		4000mm long	305808
	JH 9mm Panel Aluminium Horizontal 'h' Mould A horizontal flashing to flash the horizontal joints. 9mm etch primed.	3000mm long	304508
	Aluminium 'h' Mould Jointer A jointer to cover the butt joint of 'h' mould.	100mm long	304512
	uPVC Corner Under Flashing A 50 x 50mm corner under flashing for internal and external joints.	3000mm long	303745
	uPVC Vent Strip Used to provide protection from vermin entering cavity space.	3000mm long	302490
	Annular Threaded Nail 25 x 2.5mm nail.	500mm	300390
	INSEAL® 3259 Tape Black 50mm tape to be used under the vertical shiplap joint. Black 80mm tape to be used at corners.	50m roll	300767 300769
	CLD Batten Corner Flashing Aluminium Used at internal corner sealant joints at floor joist level.		304652
Tools			
	HardieBlade™ Saw Blade Diamond tip 184mm diameter fibre cement circular saw blade. Spacers not included.	Each	300660

NOTE: uPVC 'h' mould and jointer accessories are also available from James Hardie.

Table 9

Accessories/tools not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with Axon Panel. James Hardie does not supply these products and does not provide a warranty for their use. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description
	Flexible Underlay To comply with Table 23 of E2/AS1.
	Flexible Tape A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information. e.g. Tyvek®, Protecto or Thermakraft or similar.
	Joint Sealant Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information. e.g. Sika Silaflex MS, Sika AT Façade, Bostik Seal N Flex-1 or similar
	Head Flashing Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.
	Flashing Material as per Table 20, 'E2/AS1'
	HardieFlex™ Hot Dip Galv and Stainless Steel 316 nails For fixing panels direct to framing. 40 x 2.8mm
	C-25 Stainless Steel Brad Nails 304SS brad nails used to install Axon Panels to the CLD Structural Cavity Battens used in a straight bradder. Paslode: (09) 477 3000
	ND 50 Stainless Steel Brad Nails Used to install Axon Panel direct fix to timber framing. Used in a straight bradder.
	65 x 2.87mm RoundDrive Ring Shank Nail For fixing CLD Structural Cavity Battens to the framing. Paslode: (09) 477 3000
	Bostik Seal N Flex-1 'Seal N Flex-1' Polyurethane adhesive sealant manufactured by BOSTIK for applying between the panels and battens, Refer to section 5 for more information. BOSTIK: ALK: (09) 579 6253, WGTN: (04) 567 5119, CHCH: (03) 366 2583.
	Sika Sikaflex 11FC Sika: 0800 SIKAZ (0800 745 269)
	200mm wide Polypropylene DPC Product used over flexible underlay at external and internal corners. ie. Super Course 500

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14 Details

The following generic details have been provided in this document for both direct fixed and cavity construction methods.

Table 10

Details				
Description	Direct Fixed		CLD Structural Cavity Batten Construction	
	Figure No.	Page No.	Figure No.	Page No.
Typical framing setout	Figure 1	16	Figure 15	25
Typical panel nail fixing setout	Figure 2	17	Figure 17	27
	Figure 13	24		
Foundation detail	Figure 3	18	Figure 18	28
Vertical shiplap joint	Figure 4	18	Figure 19	29
	Figure 14	25		
Soffit detail	Figure 5	19	Figure 32	39
Internal corner detail	Figure 6	19	Figure 21	30
External corner detail	Figure 7	20	Figure 22	31
Section at sill	Figure 8	20	Figure 24	33
Window jamb	Figure 9	21	Figure 25	34
Window head	Figure 10	21	Figure 26	34
Window head with facings			Figure 27	35
Window jamb with facings			Figure 28	35
Window sill with planted sill			Figure 29	36
Horizontal joint detail	Figure 11	22	Figure 30	37
			Figure 31	38
Corner at 'h' mould joint detail	Figure 12	23		
Batten fixing setout			Figure 16	26
Intermediate stud fixing			Figure 20	30
Jointing of CLD Structural Cavity Batten			Figure 23	32
External corner			Figure 33	40
Cavity pipe penetration			Figure 34	40
Internal corner			Figure 35	41
Aluminium 'h' mould joiner			Figure 36	42
One piece apron flashing joint			Figure 37	43
Drained flashing joint at floor joist			Figure 38	44
Meter box at sill			Figure 39	45
Meter box at jamb			Figure 40	45
Meter box at head			Figure 41	46
Garage door jamb			Figure 42	47
Garage door head			Figure 43	48
Junction between Axon Panel and fascia board			Figure 44	49
Enclosed roof to wall intersection			Figure 45	50

Figure 1: Direct fixed typical framing setout

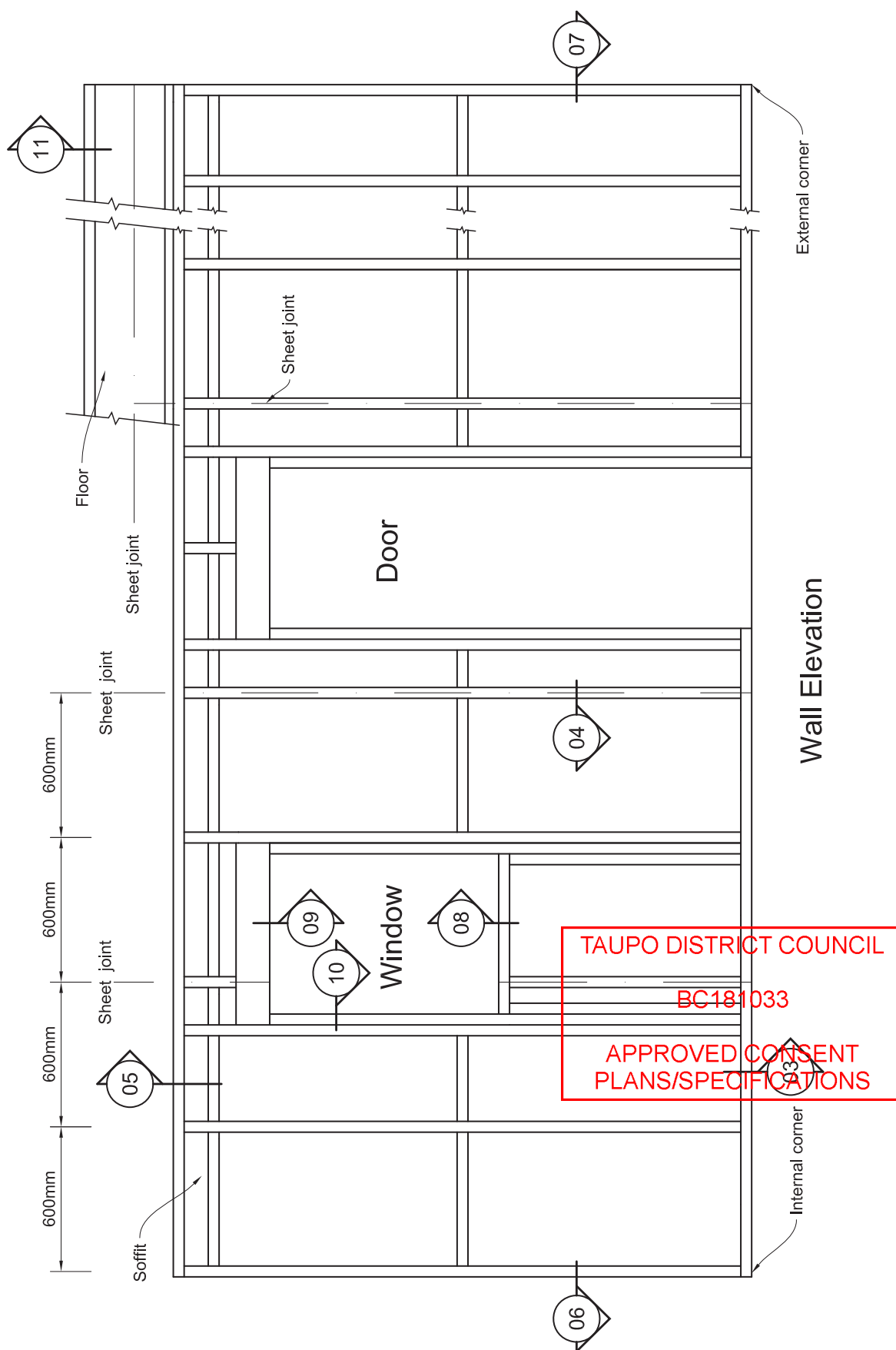
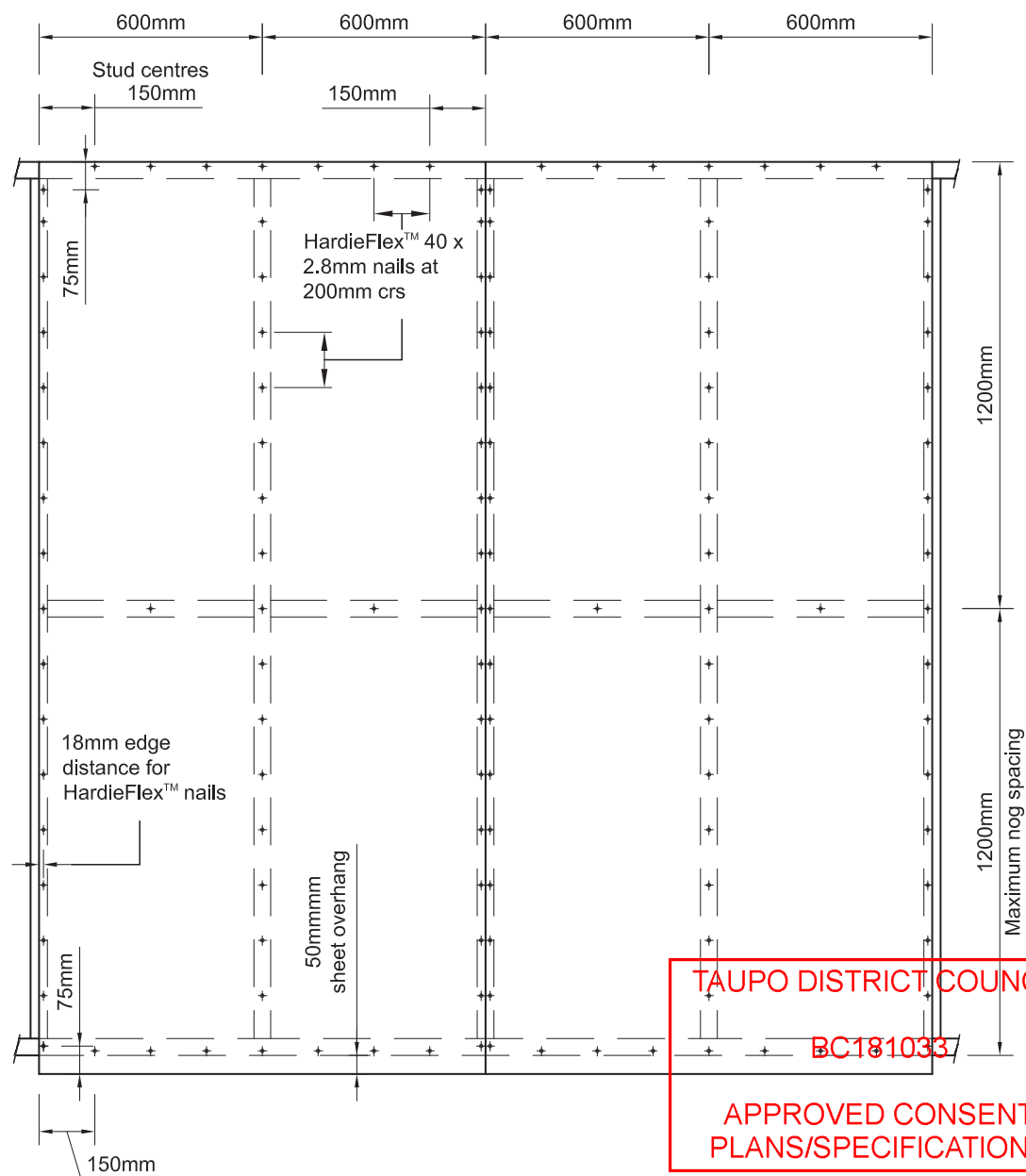
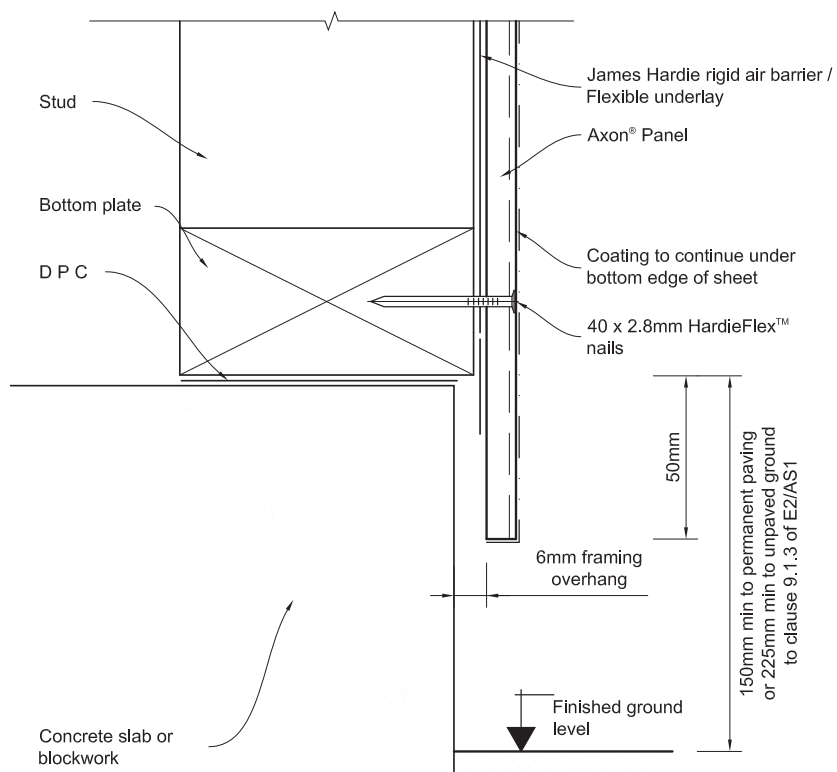


Figure 2: Direct fixed typical panel HardieFlex nail fixing setout



Note: When studs spaced at 400mm centres using Axon® Panel 400, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.

Figure 3: Direct fixed foundation detail



Note: Refer to Section 2.4 for further information

Figure 4: Vertical shiplap joint — HardieFlex nail

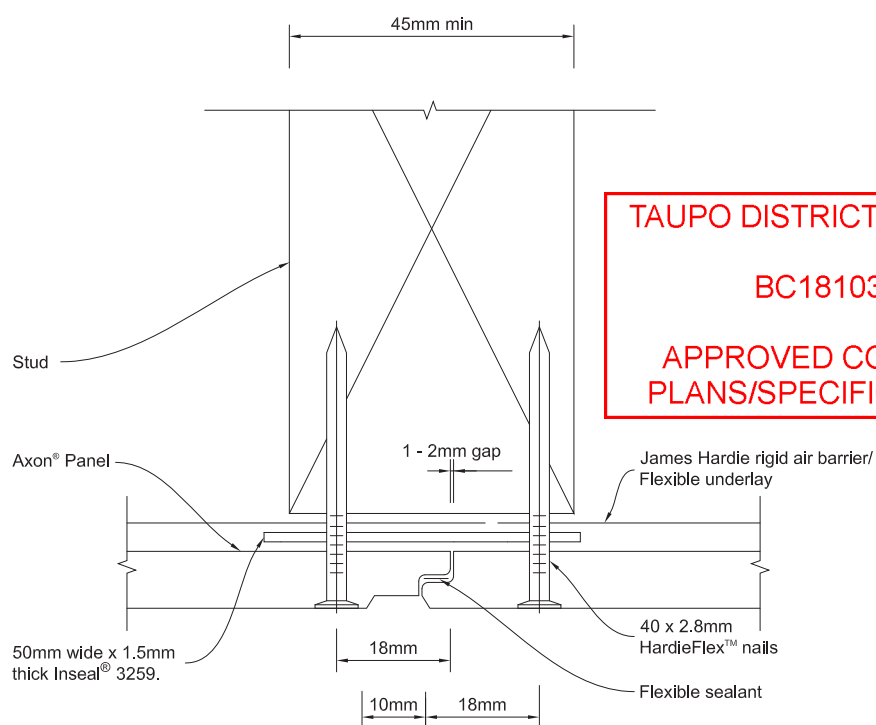


Figure 5: Soffit detail

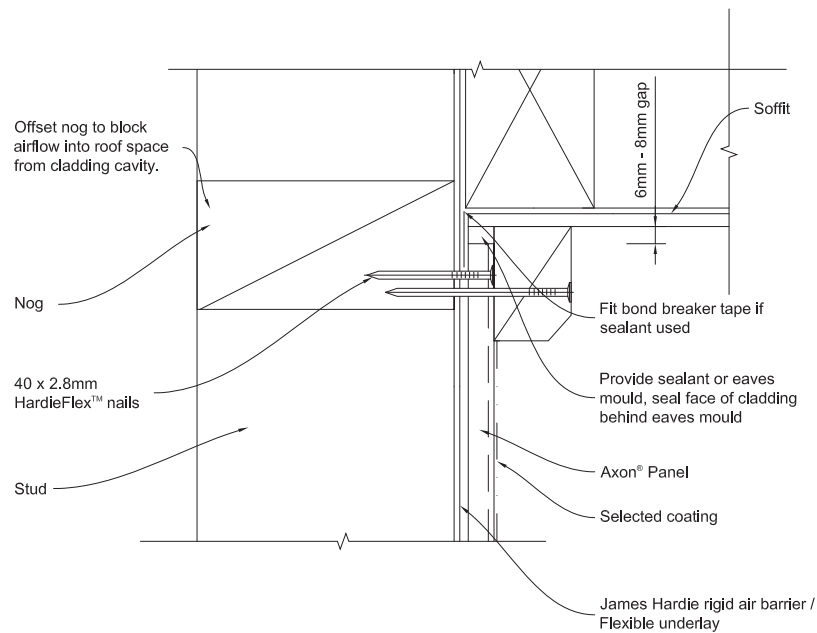


Figure 6: Internal corner detail

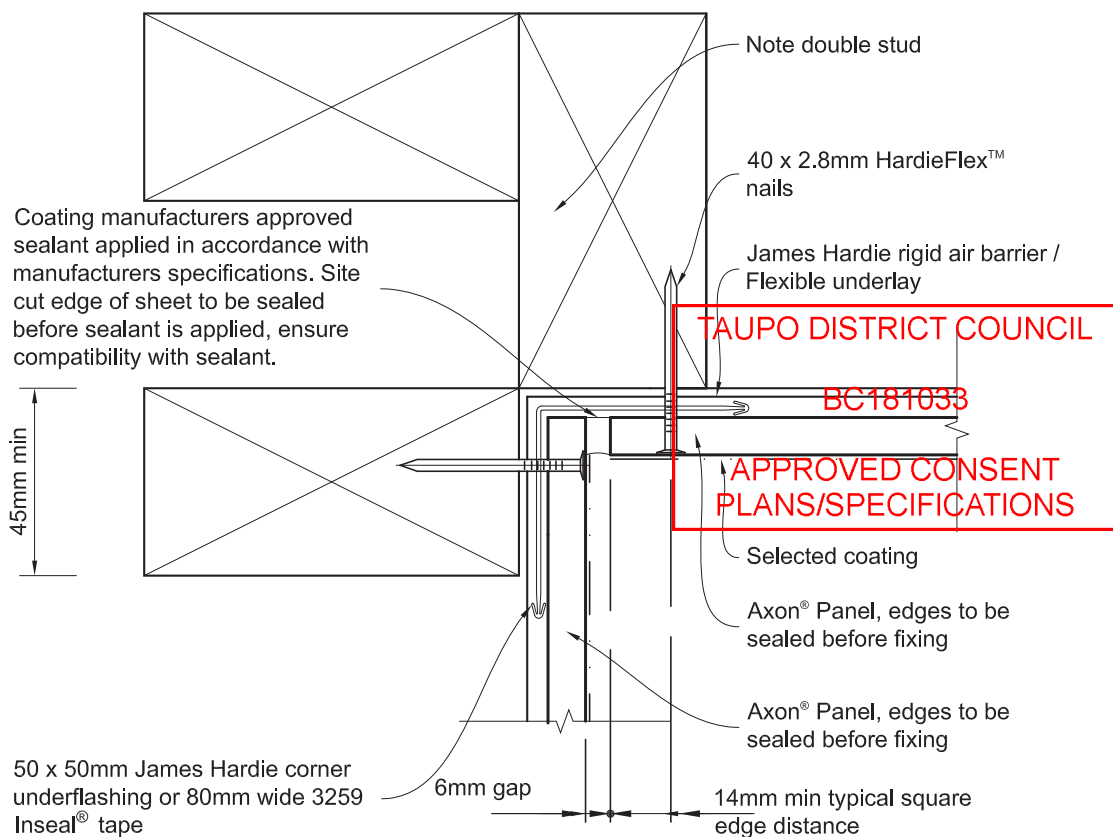


Figure 7: External corner detail

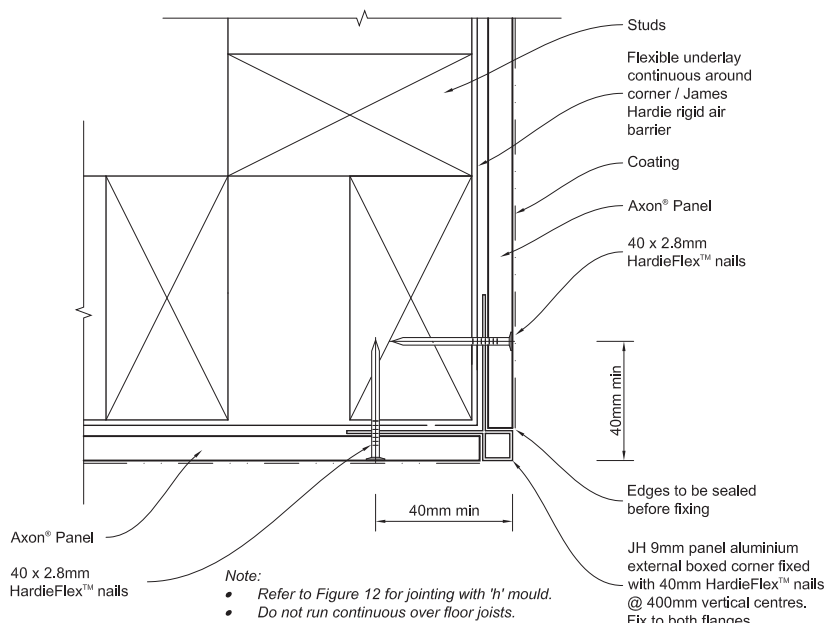
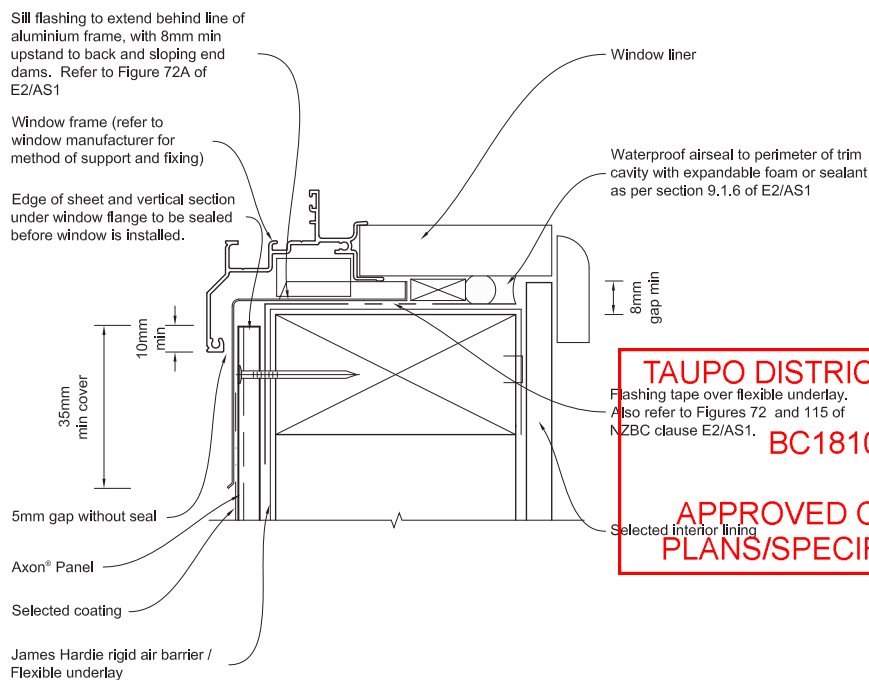


Figure 8: Section at sill



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General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

Figure 9: Window jamb

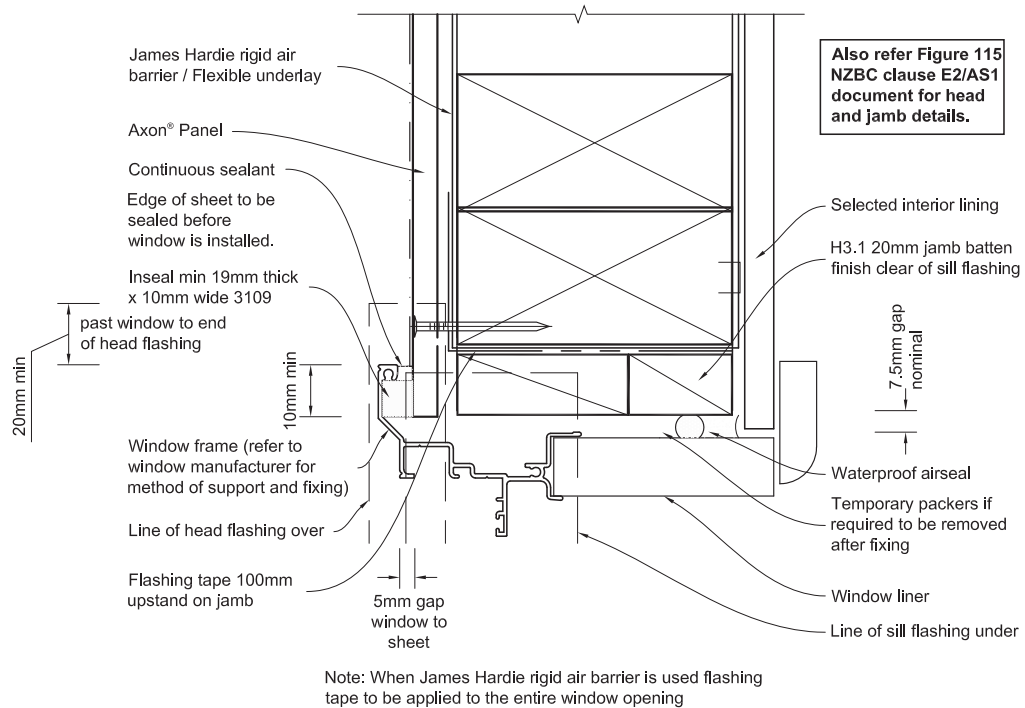


Figure 10: Window head

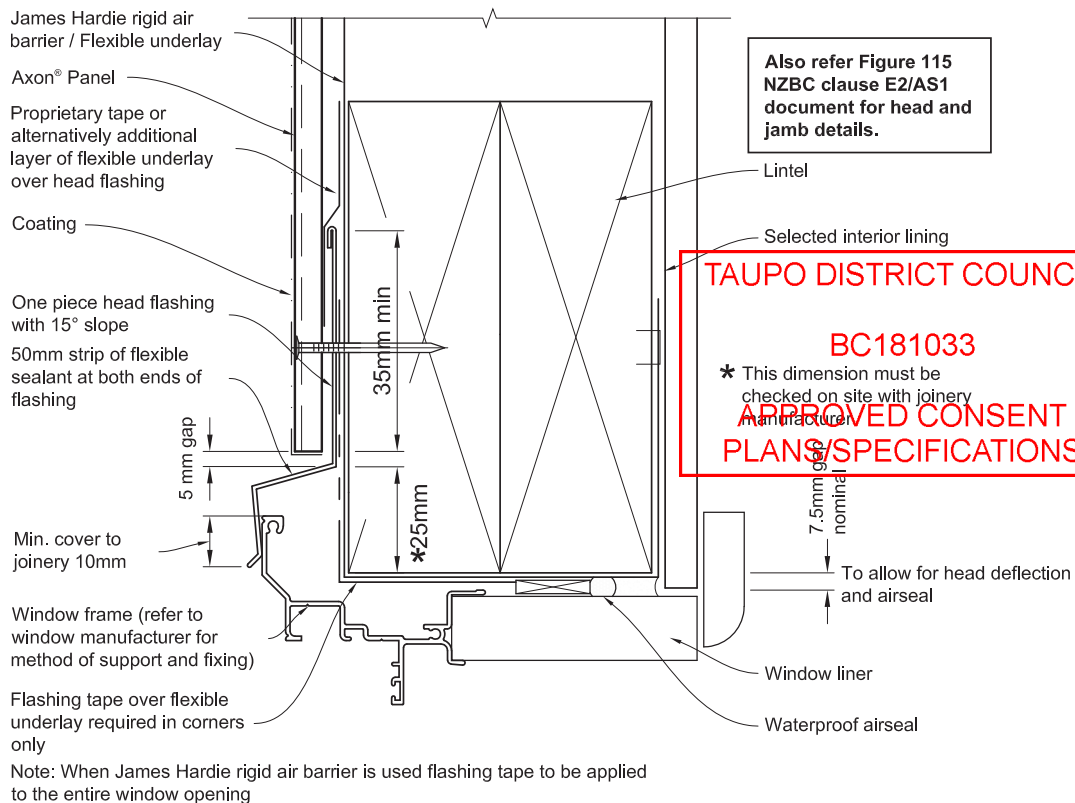


Figure 11: Horizontal joint detail

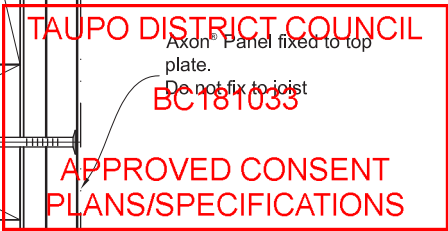
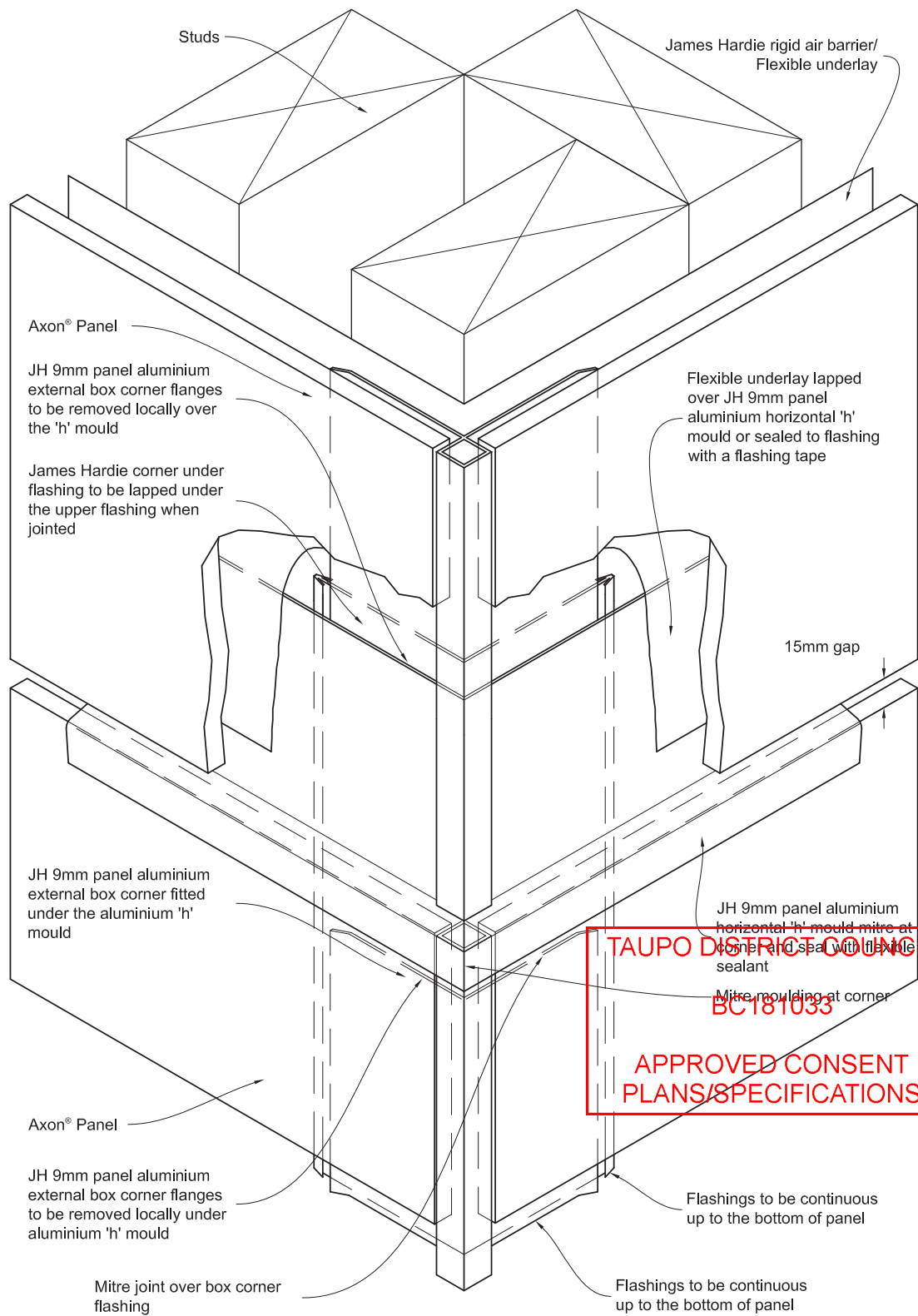


Figure 12: Corner at 'h' mould joint detail



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Figure 13: Direct fixed typical panel brad nail fixing setout

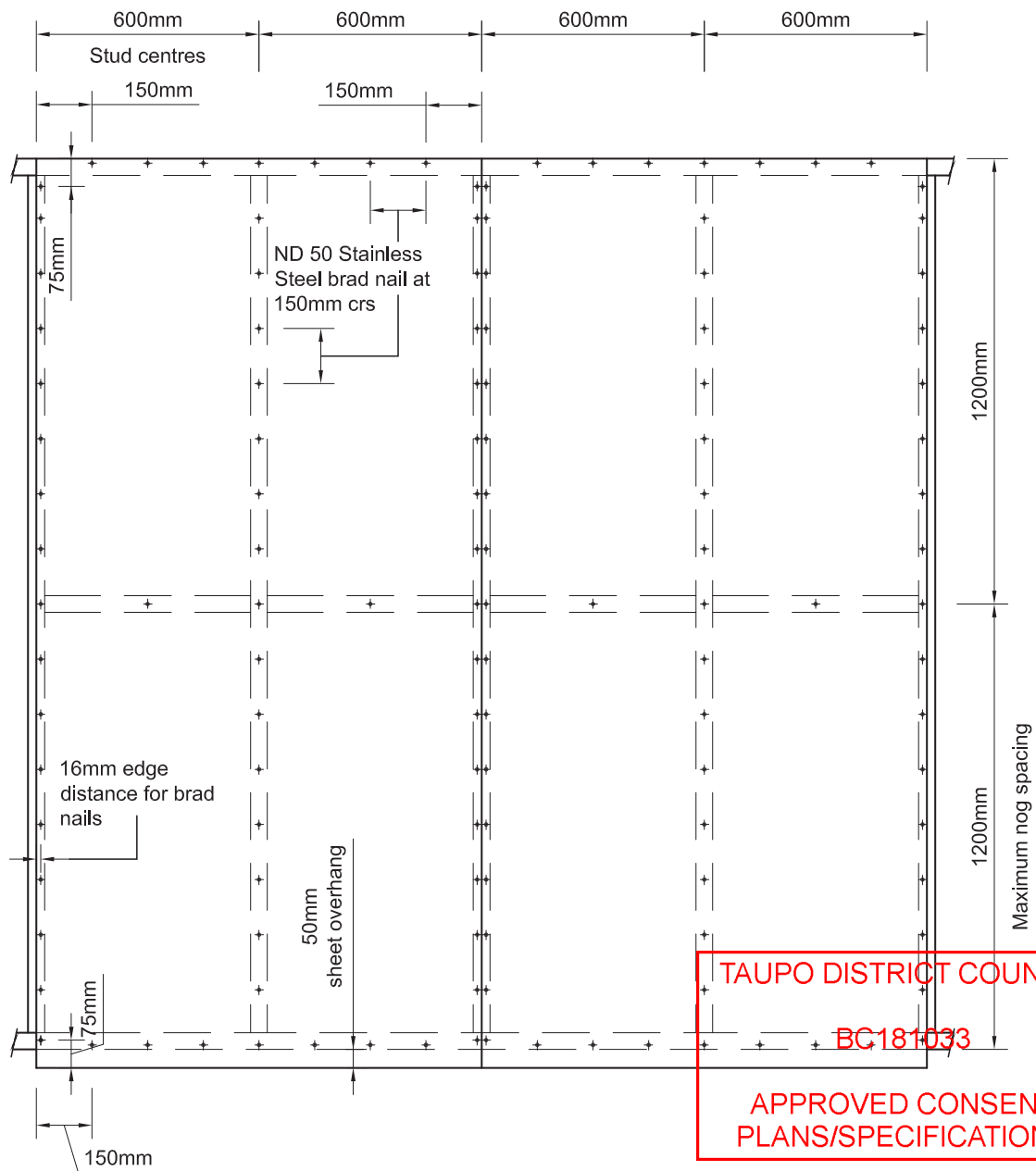


Figure 14: Shiplap joint — brad nail

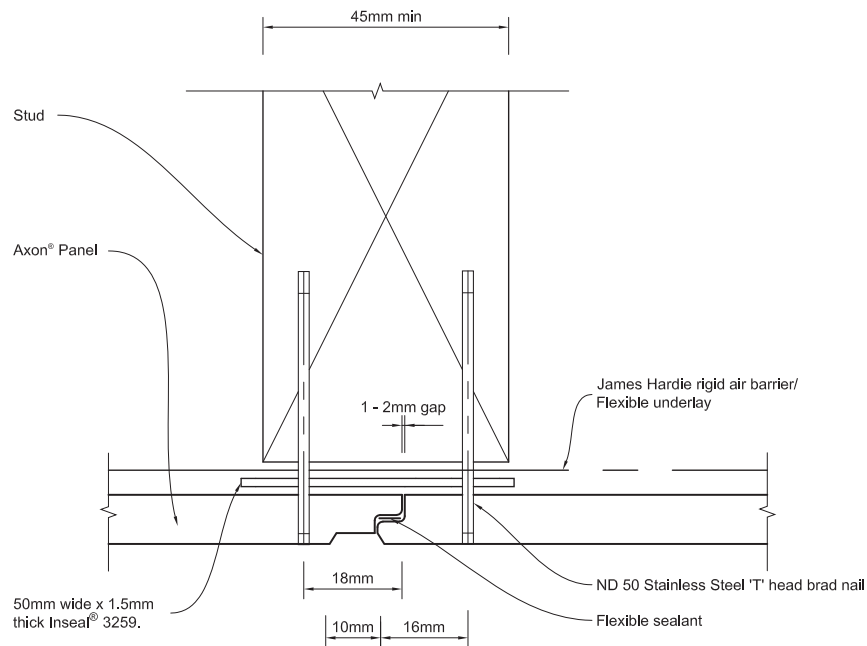


Figure 15: Framing setout

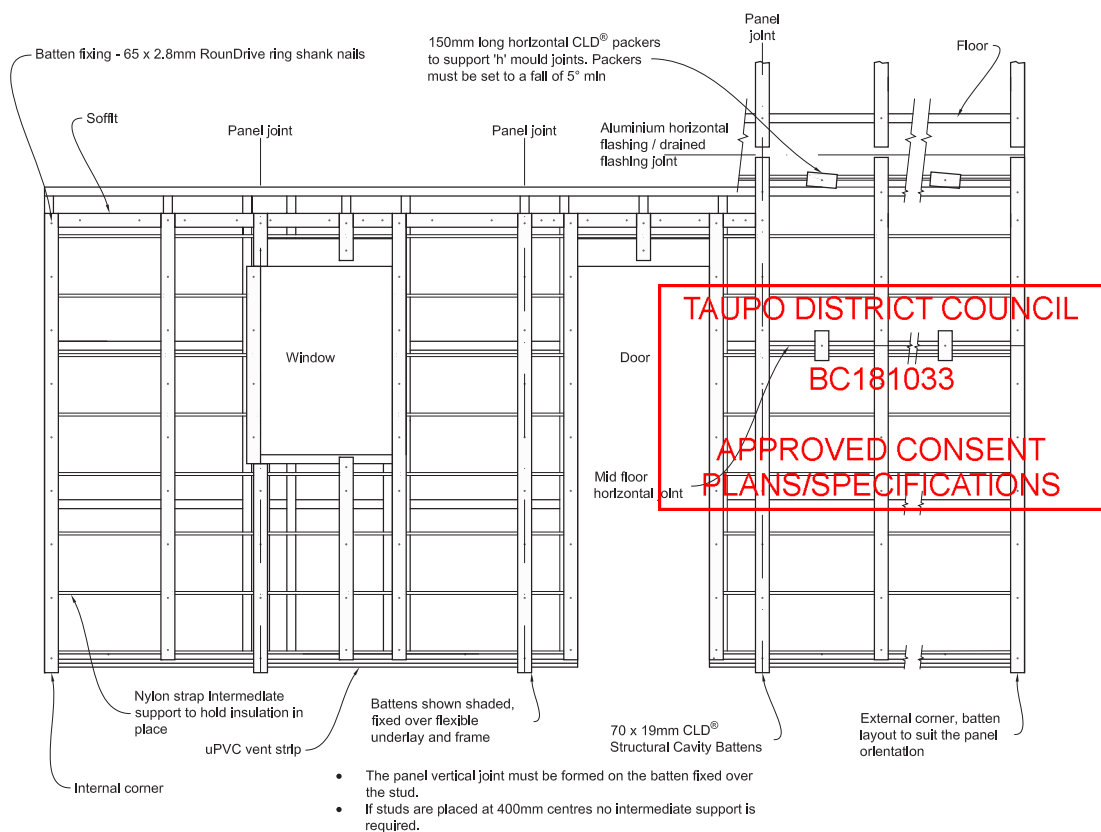


Figure 16: Batten fixing setout

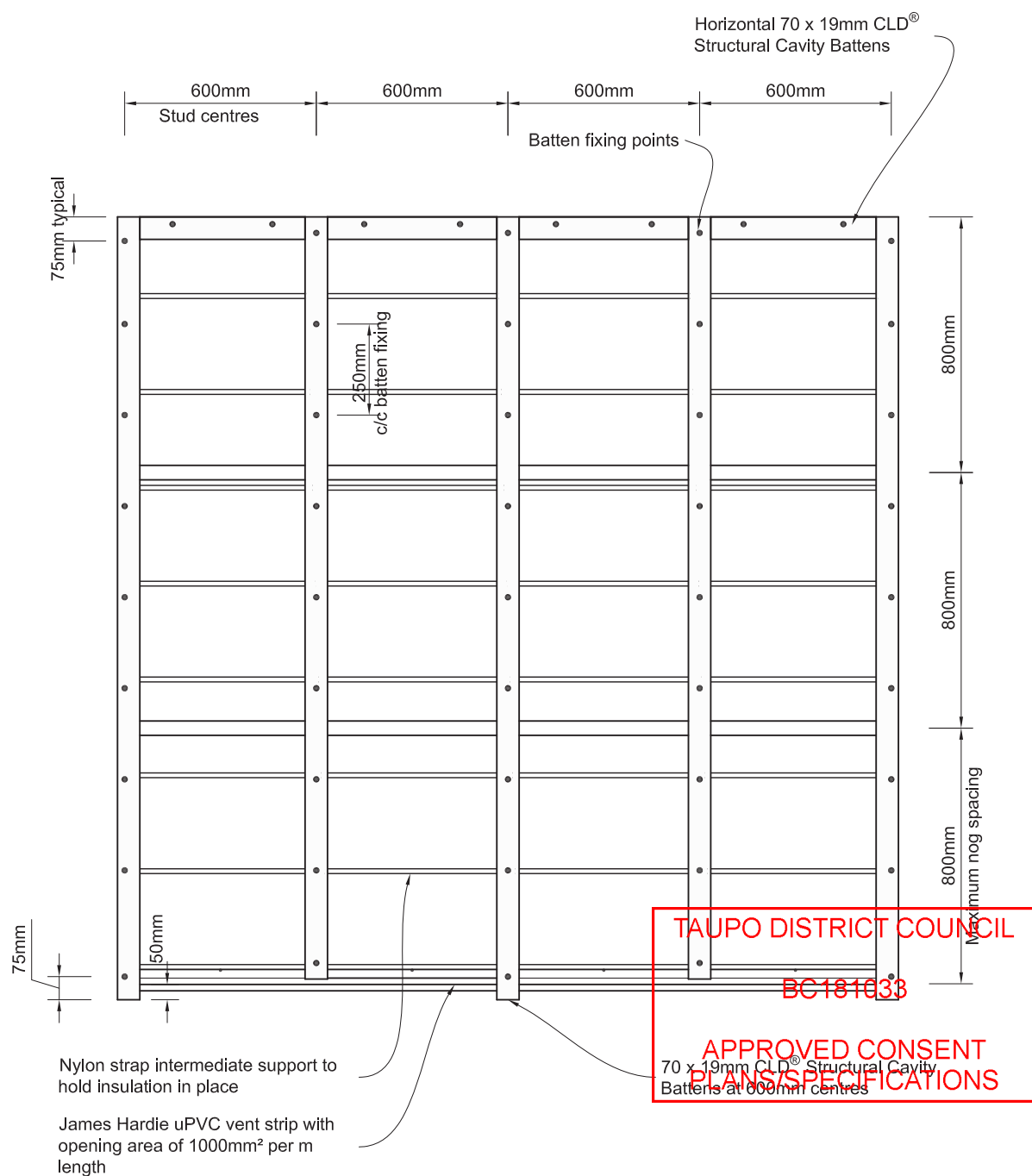
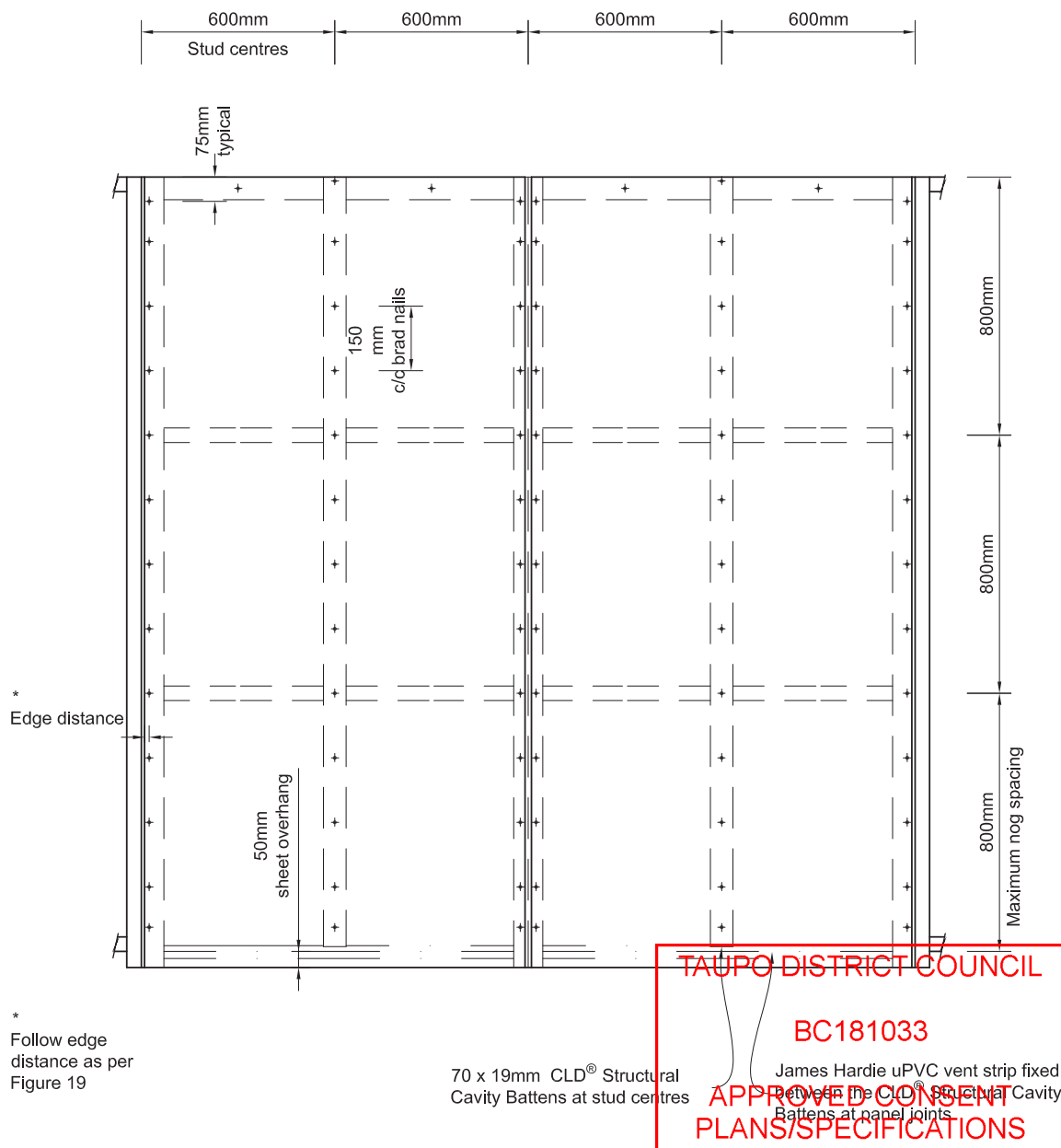
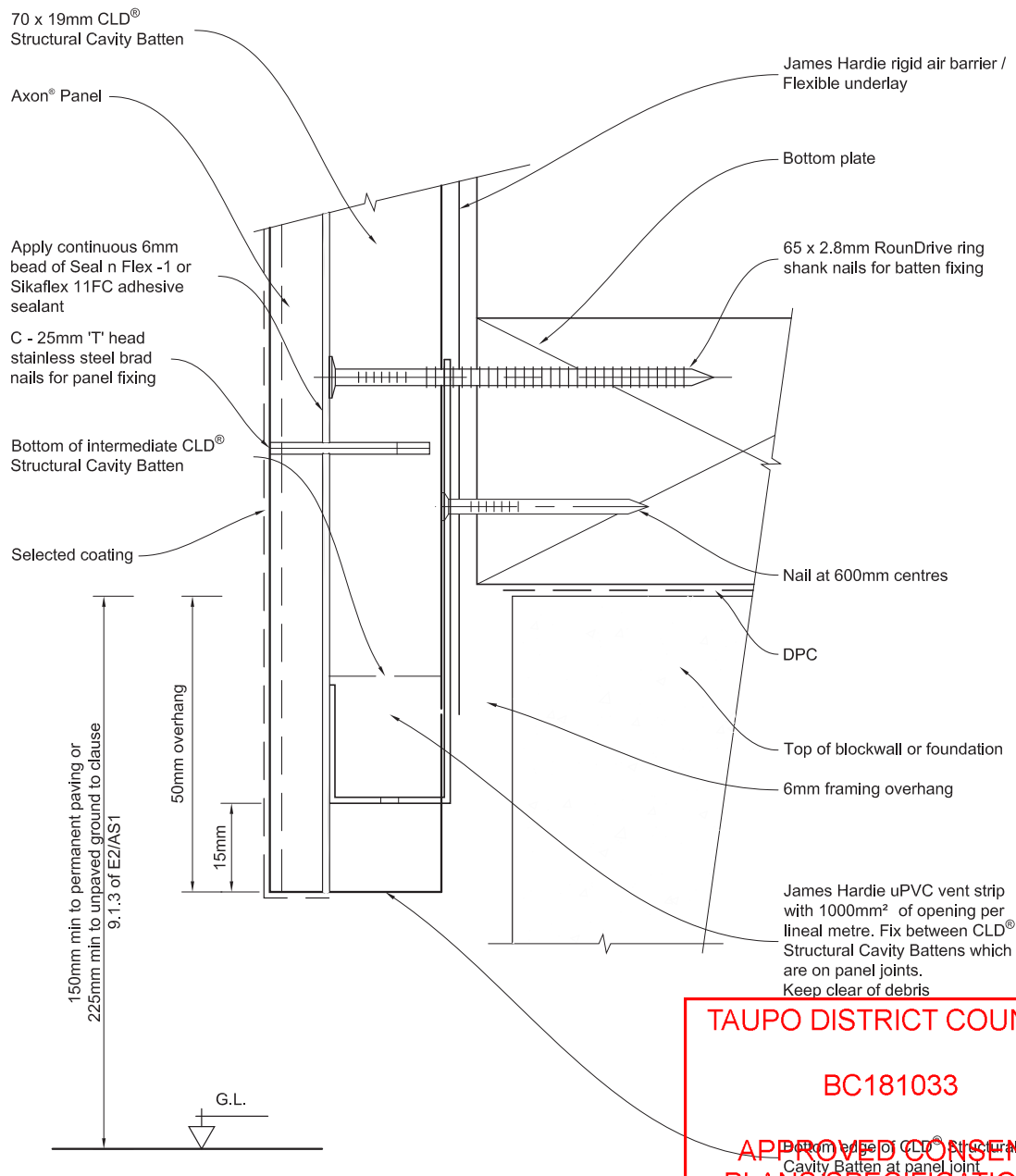


Figure 17: Sheet fixing setout



Note: When studs spaced at 400mm centres using Axon[®] Panel 400, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.

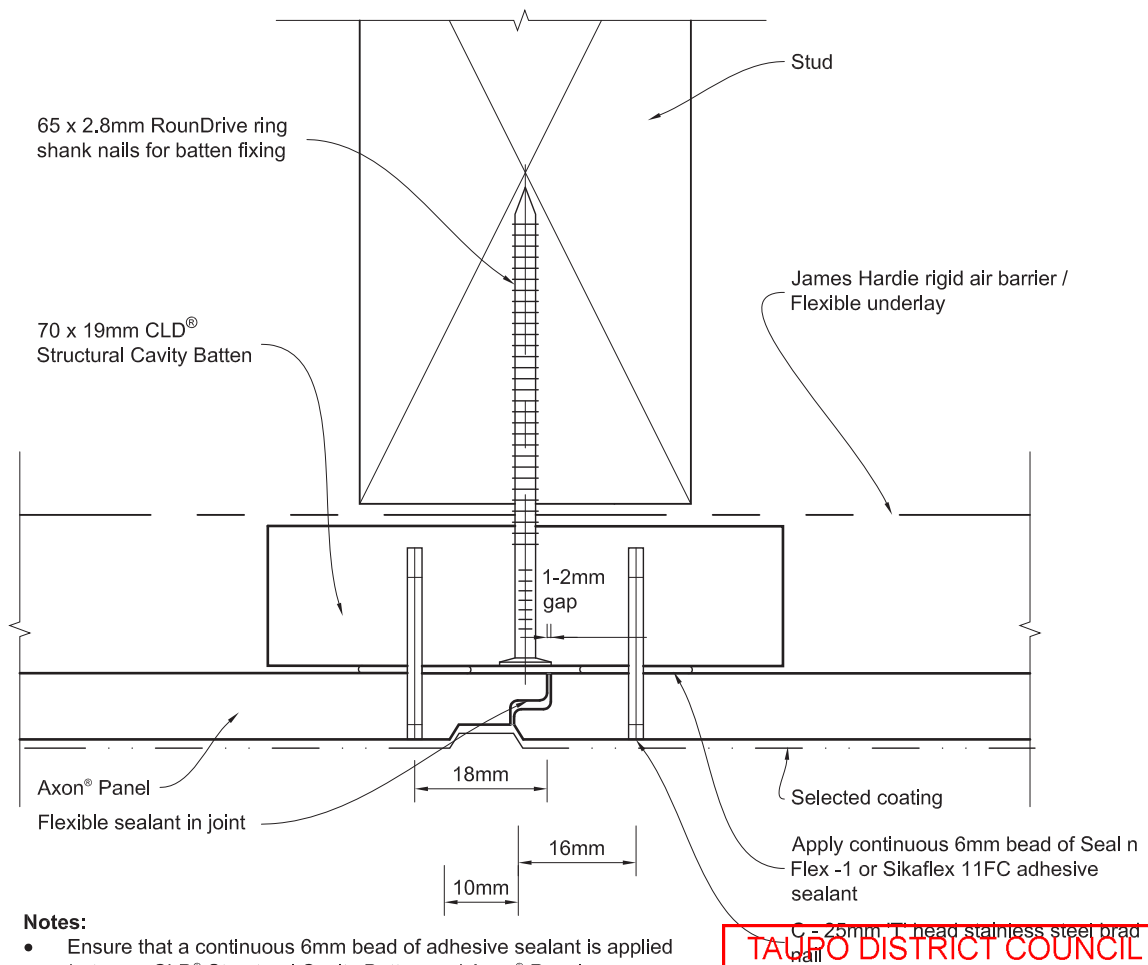
Figure 18: Foundation detail



Notes:

- Check panel extends past bottom plate as specified in Architects specification (50mm min).
- uPVC Vent strip must remain level and secure during construction. Cut and fix uPVC vent strip between CLD® Structural Cavity Battens fixed under the panel joints.
- Check vent strip is free from site debris.

Figure 19: Vertical shiplap joint



Notes:

- Ensure that a continuous 6mm bead of adhesive sealant is applied between CLD[®] Structural Cavity Batten and Axon[®] Panel.
- Ensure that the required edge distance is maintained when fixing.
- Seal cut edges with a primer compatible with final coatings.

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Figure 20: Intermediate stud fixing

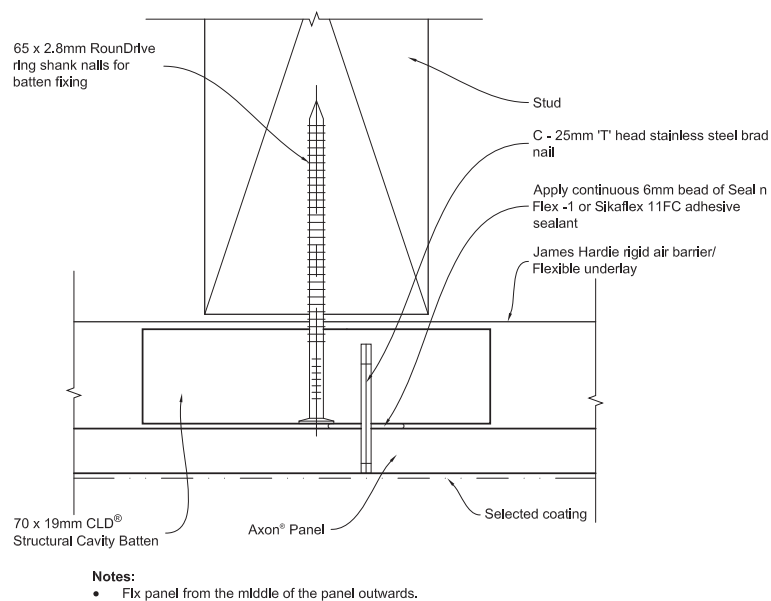


Figure 21: Internal corner

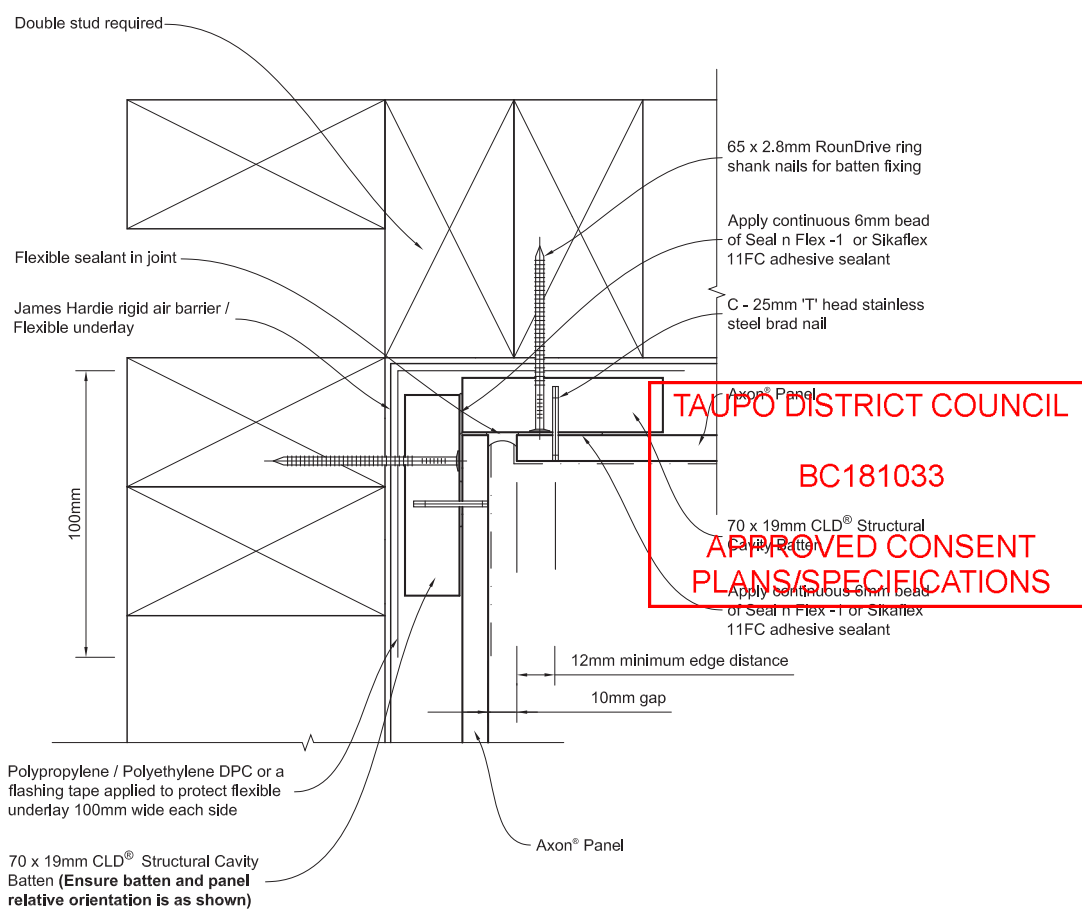
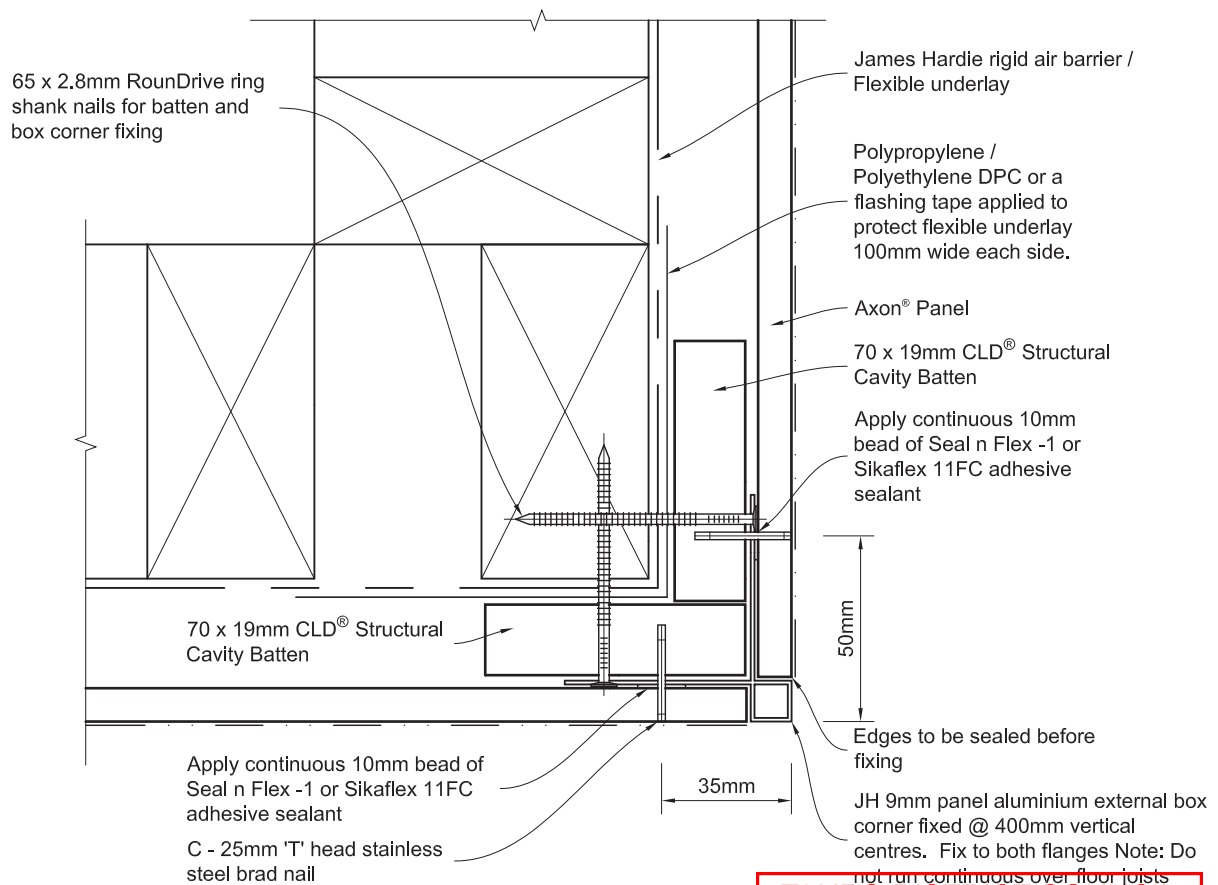


Figure 22: External corner



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Figure 23: Jointing of CLD Structural Cavity Batten

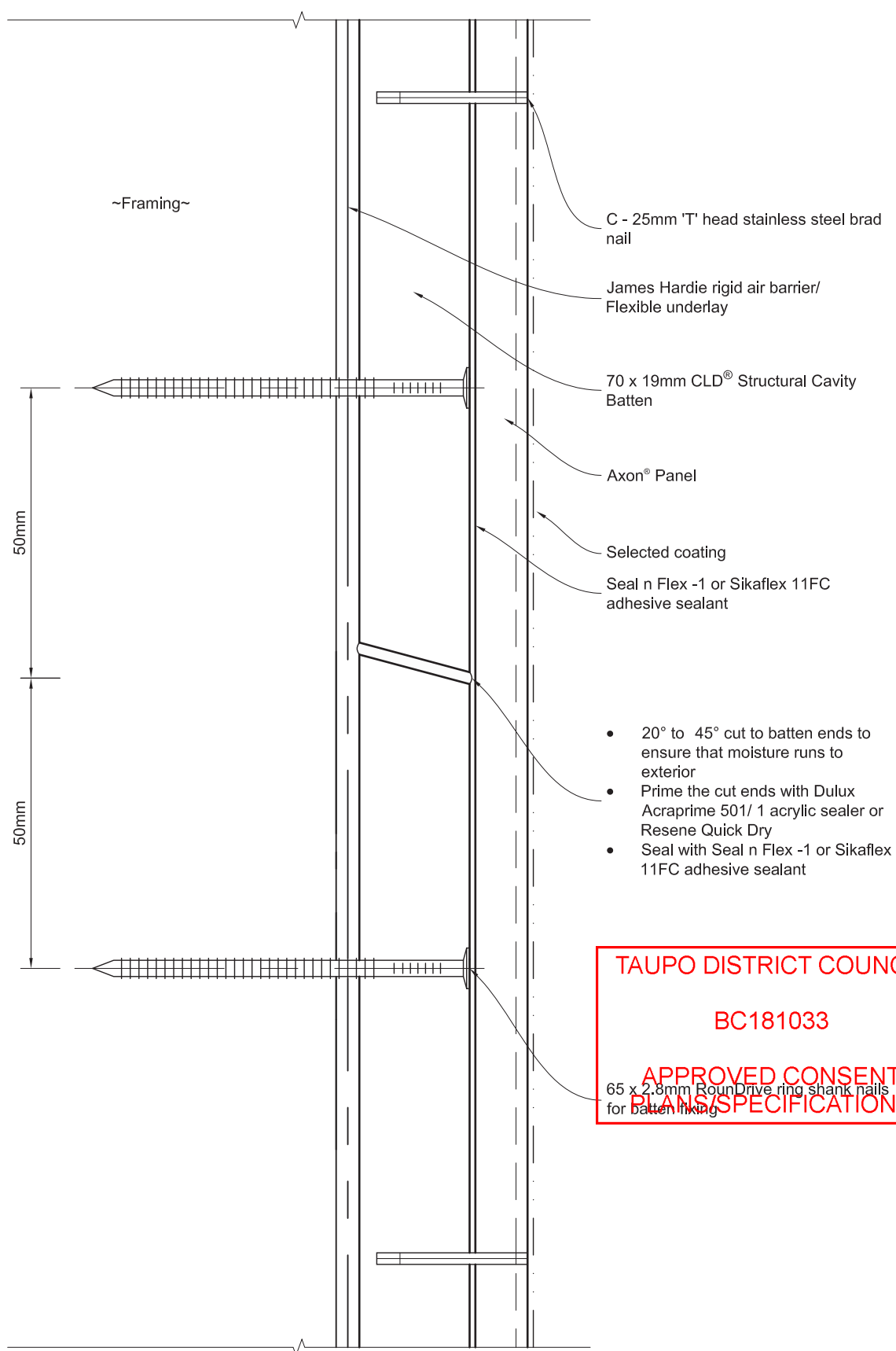
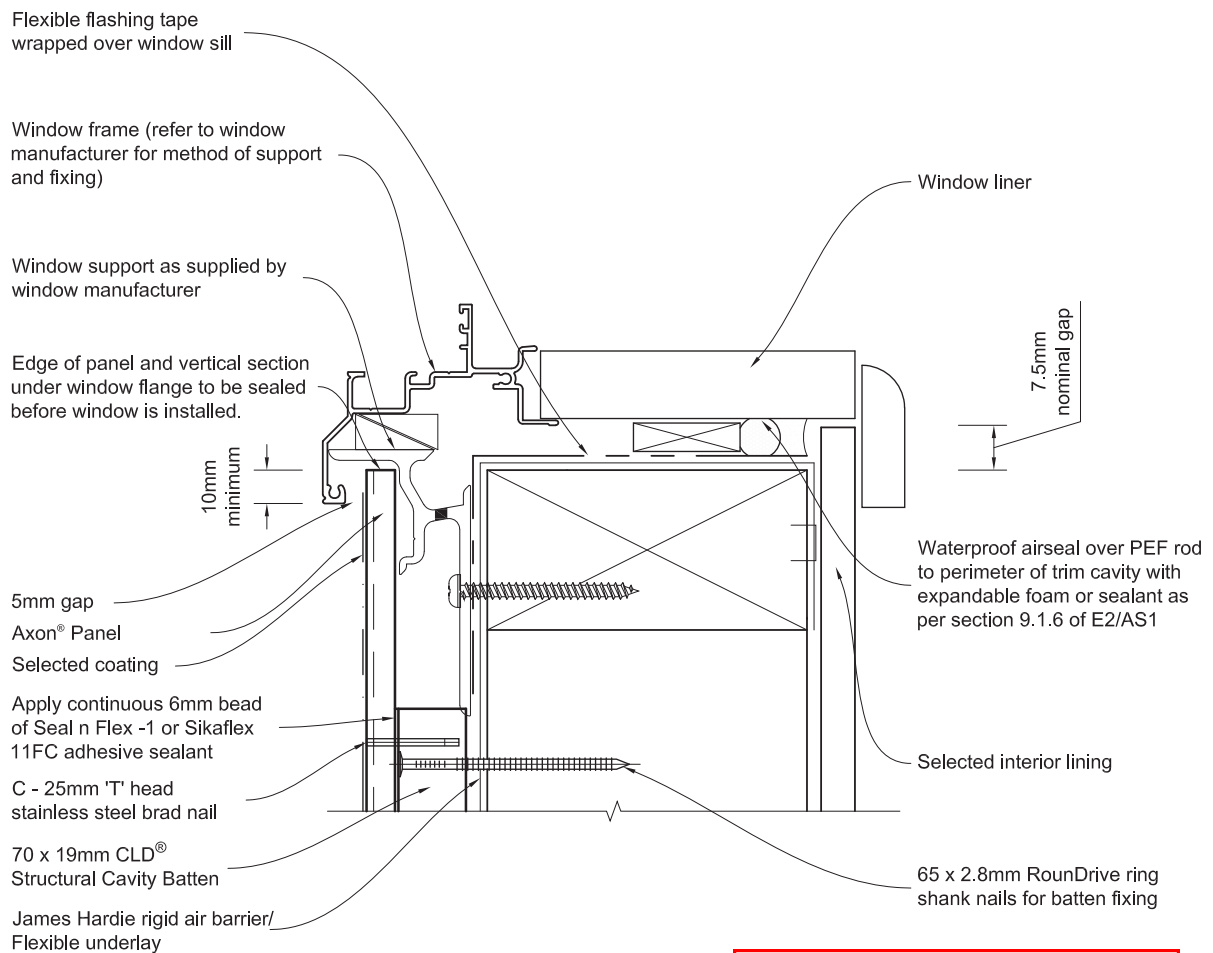


Figure 24: Window sill



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

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Figure 25: Window jamb

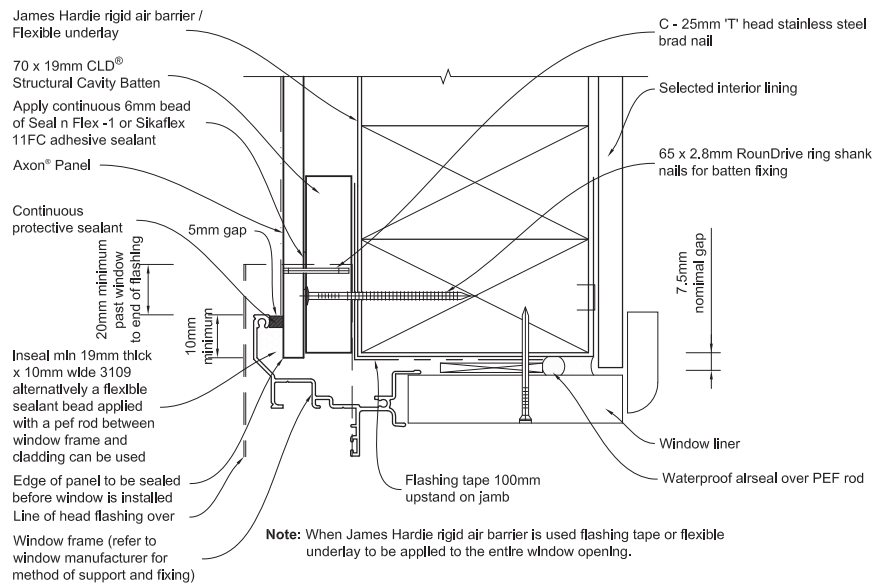


Figure 26: Window head

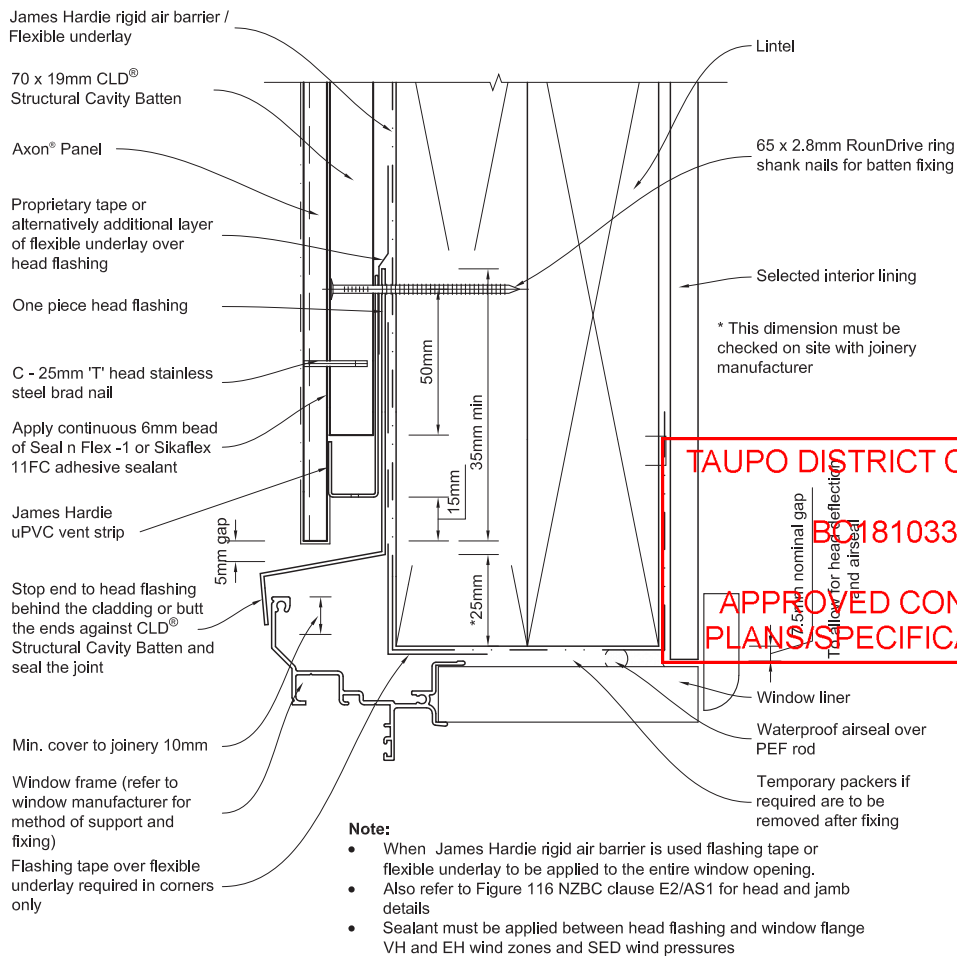


Figure 27: Window head with facings

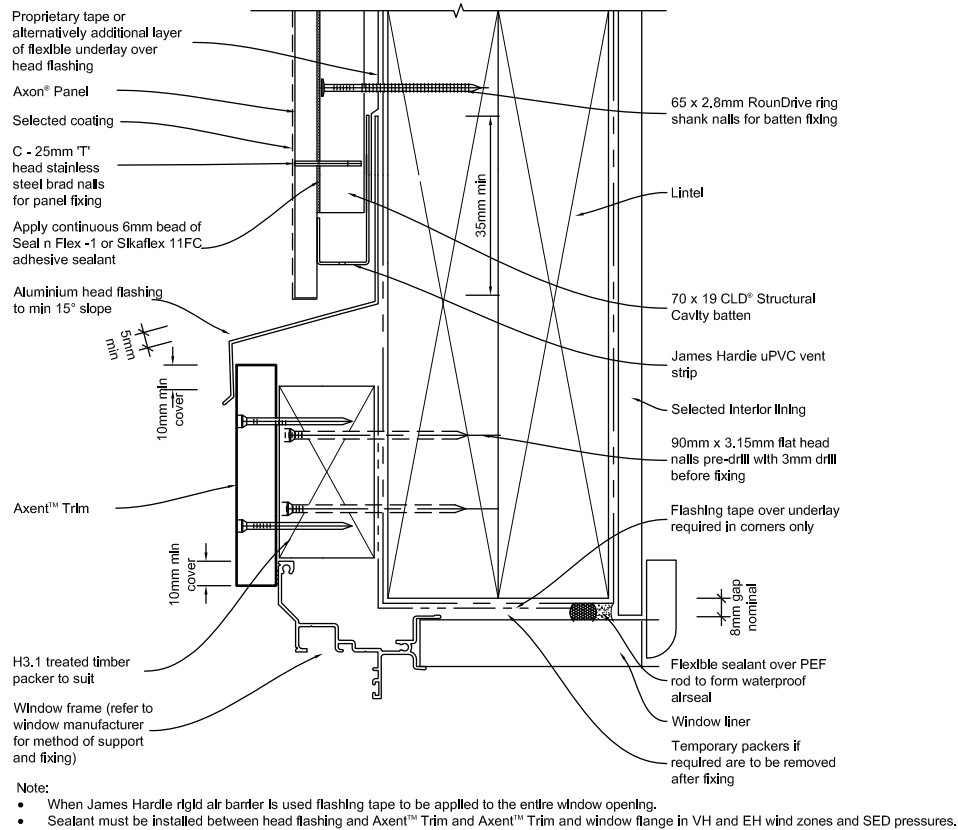
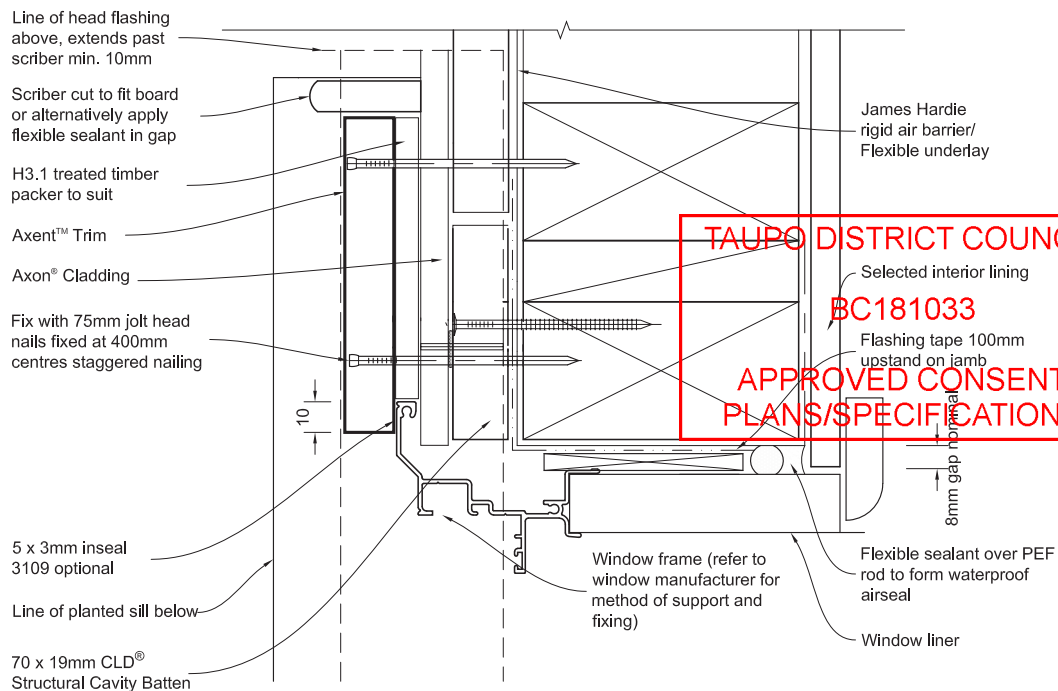
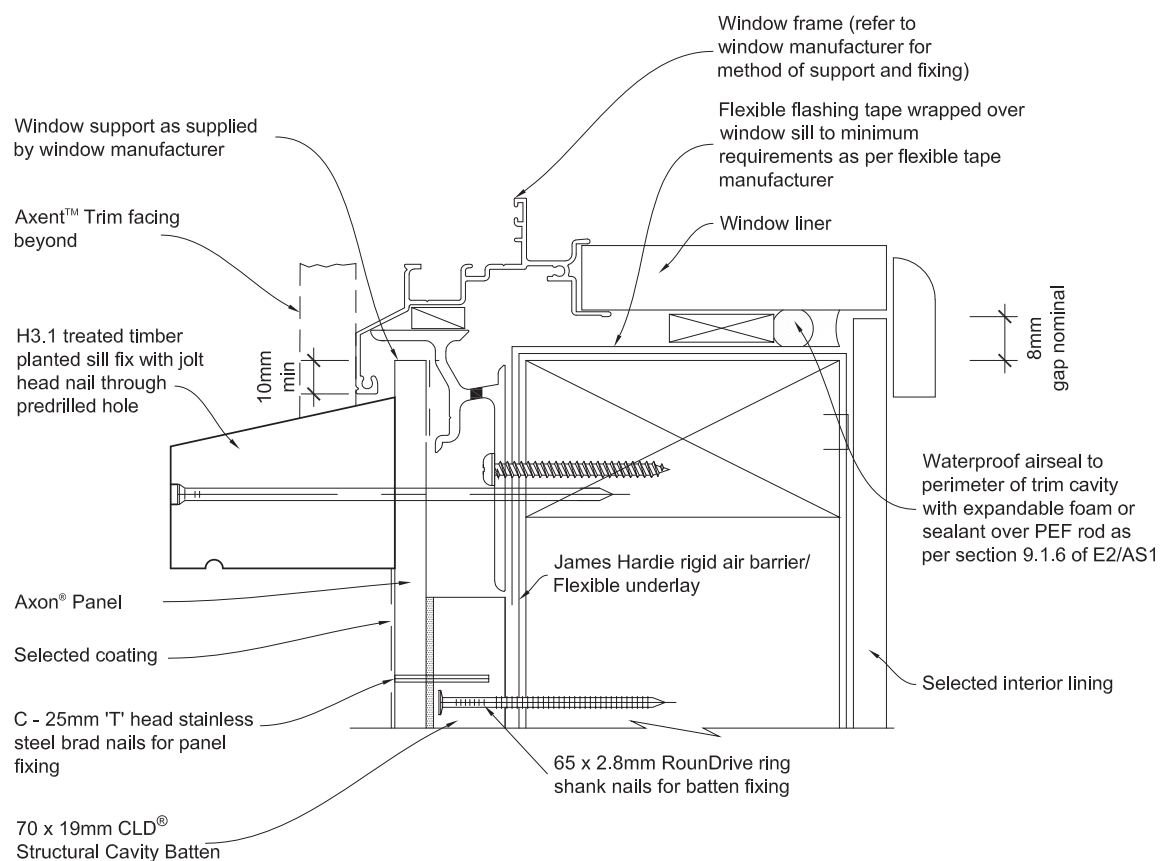


Figure 28: Window jamb with facings



Note: When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.

Figure 29: Window sill with planted sill



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.
4. When James Hardie rigid air barriers are used flashing tape to be applied to the entire opening.

Refer to the manufacturer or supplier for technical information for these materials.

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Figure 30: Horizontal joint at floor joist

Seal n Flex -1 or Sikaflex
11FC adhesive sealant
between panel and batten
omitted for clarity

James Hardie rigid air barrier /
Flexible underlay

70 x 19mm CLD® Structural
Cavity Batten

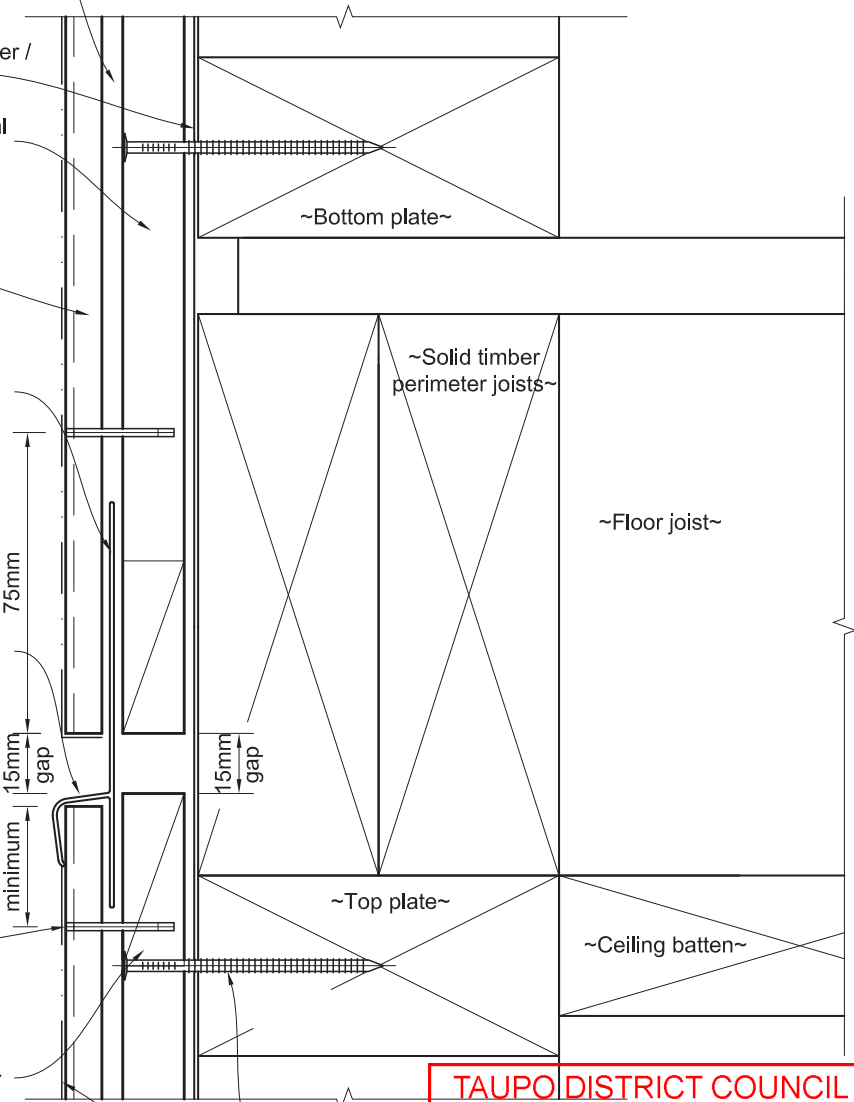
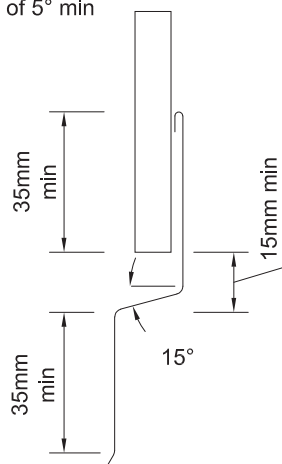
Axon® Panel

JH 9mm panel aluminium
horizontal 'h' mould.

Seal sheet and sheet edge
before installing horizontal
flashing

C - 25mm 'T' head
stainless steel brad nail

150mm long horizontal
CLD® packers optional
between vertical battens
when battens are fixed over
studs at 600mm apart.
Packers must be set to a fall
of 5° min



Alternative Flashing Option

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Note:

1. When 50 year durability is required refer Table 20
of NZBC E2/AS1 document.

Figure 31: Horizontal joint in tall wall

Seal n Flex -1 or Sikaflex 11FC adhesive sealant between panel and batten omitted for clarity

James Hardie rigid air barrier / Flexible underlay

70 x 19mm CLD[®] Structural Cavity Batten

Axon[®] Panel

JH 9mm panel aluminium horizontal 'h' mould.

Seal sheet and sheet edge before installing horizontal flashing

10mm gap

C - 25mm 'T' head stainless steel brad nail

150mm long vertical CLD[®] packers optional between vertical battens when battens are fixed over studs at 600mm apart.

65 x 2.8mm RoundDrive ring shank nails for batten fixing

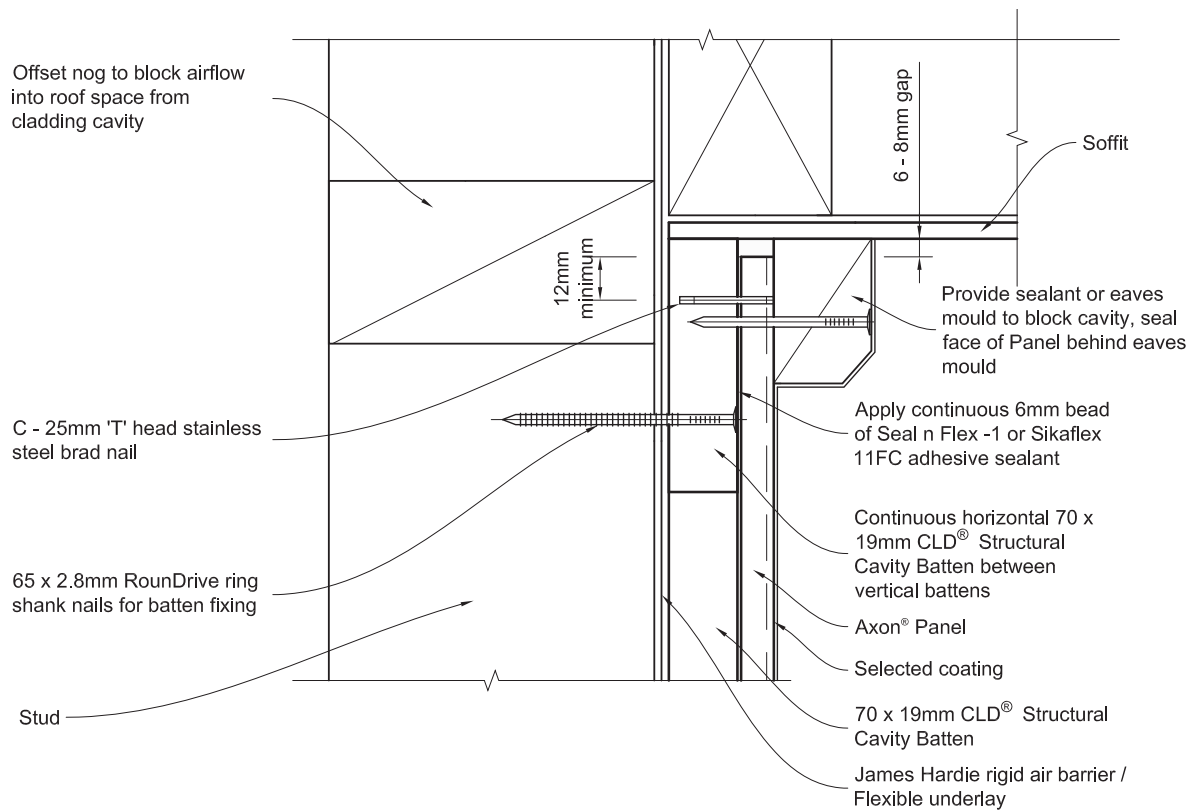
Selected coating

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Figure 32: Soffit detail



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Figure 33: External corner at 'h' mould joint detail

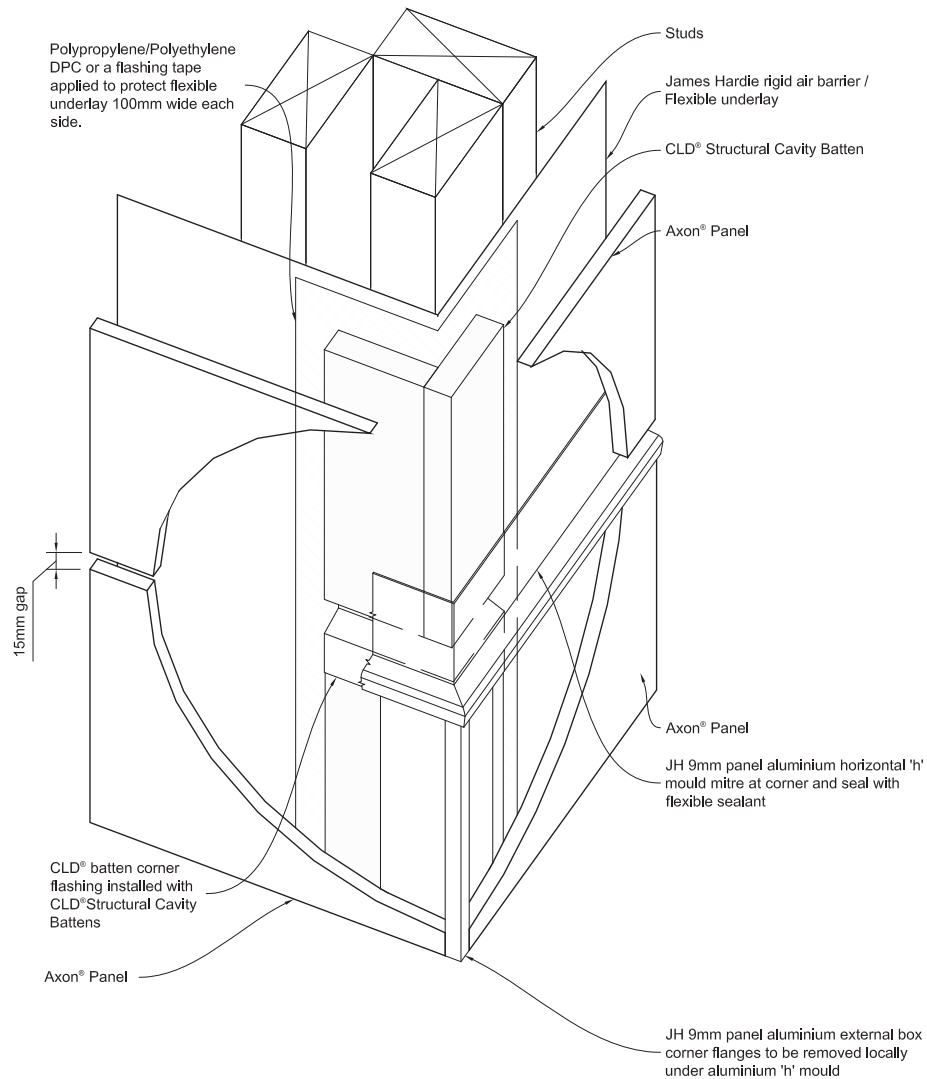
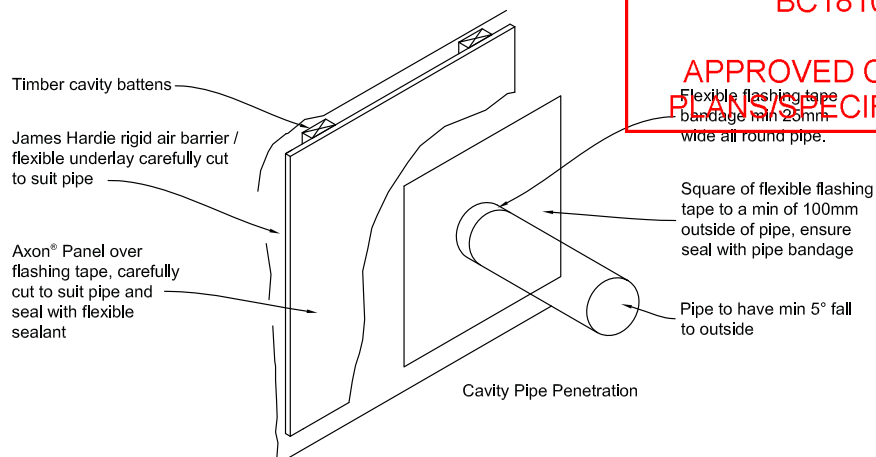


Figure 34: Cavity pipe penetration



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Flexible flashing tape
bandage min 25mm
wide all round pipe.

Figure 35: Internal corner at 'h' mould joint detail

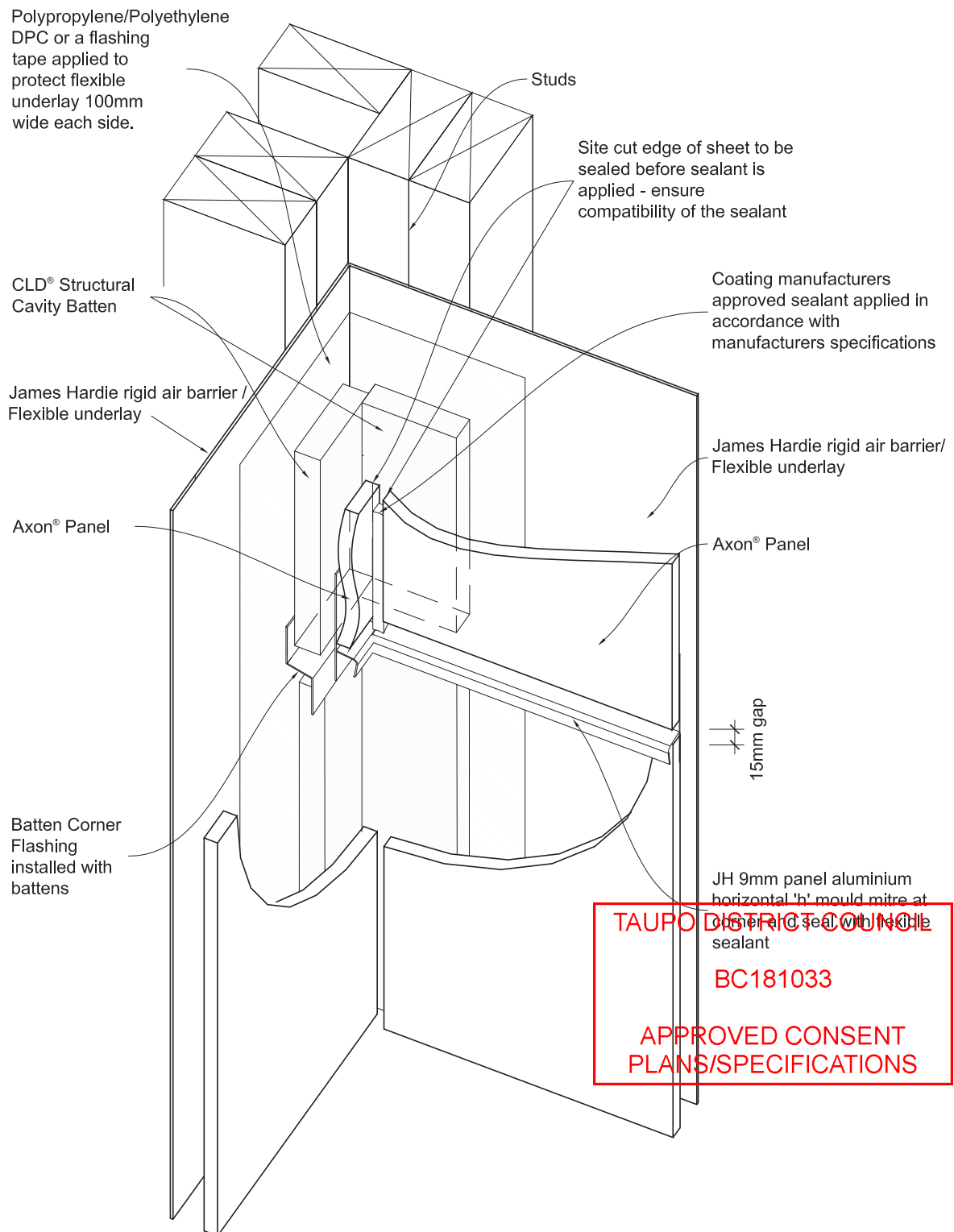
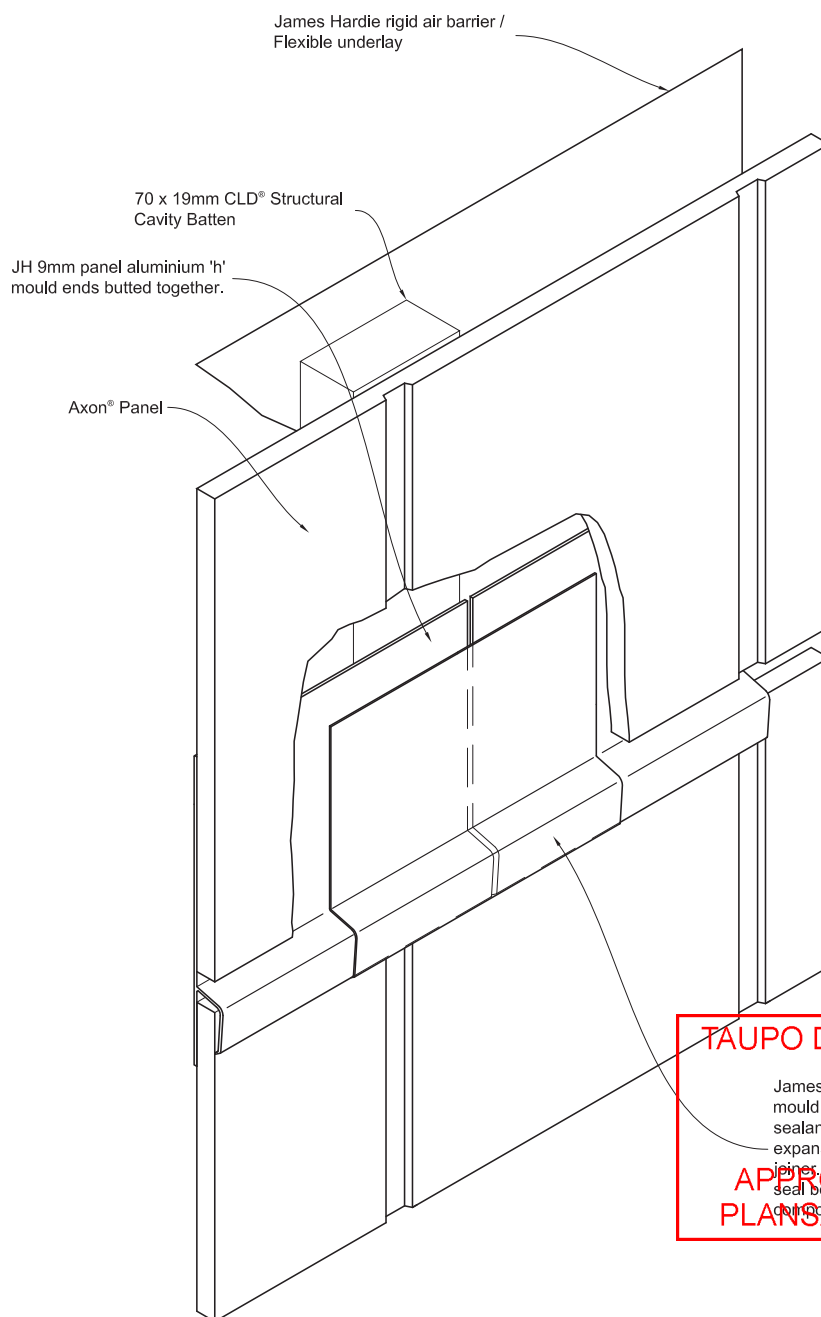


Figure 36: Aluminium 'h' mould joiner

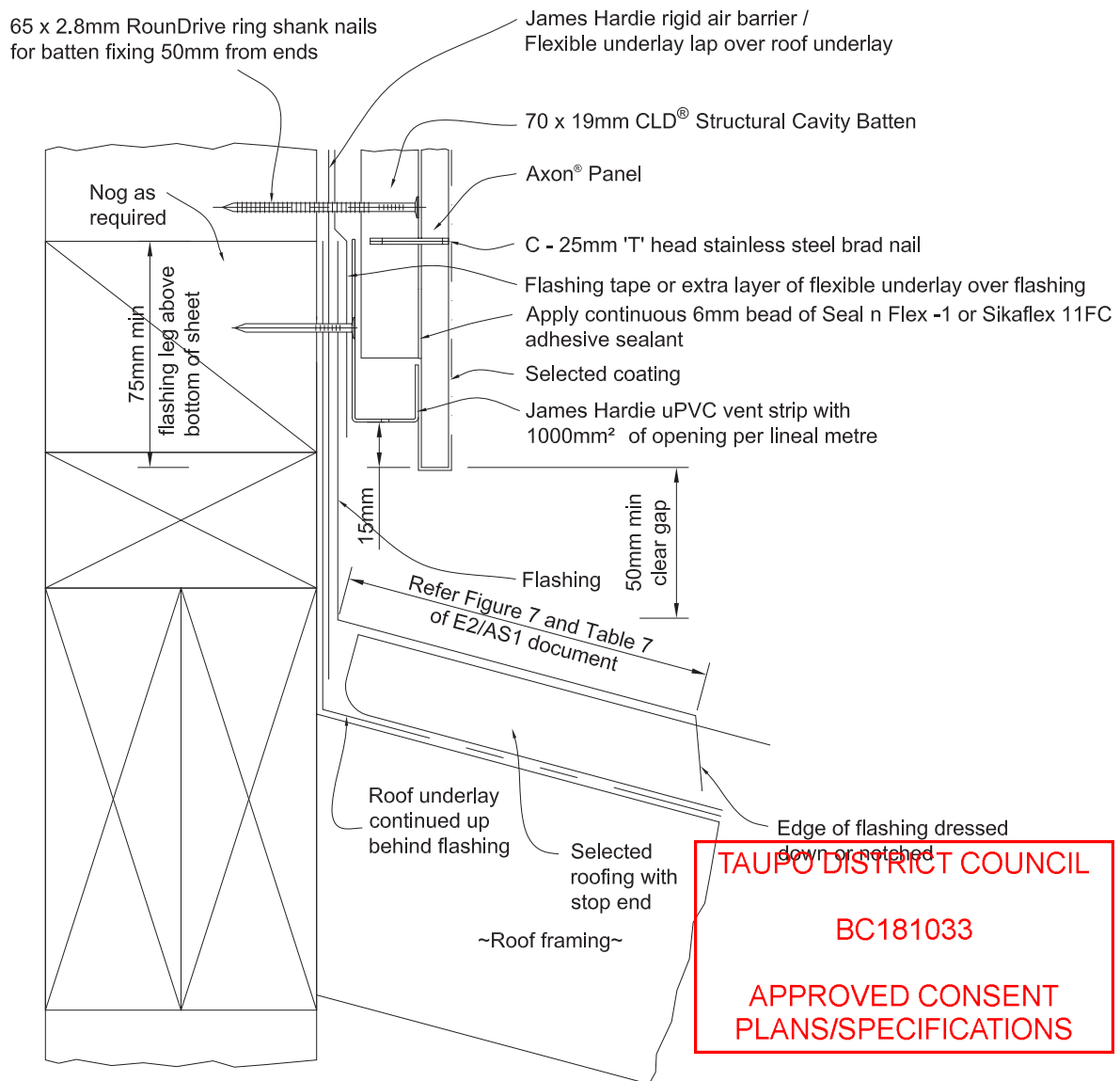


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James Hardie aluminium 'h'
mould joiner, 1800
sealant to allow for
expansion to both sides of
joint. Ensure adequate
seal between both
components.

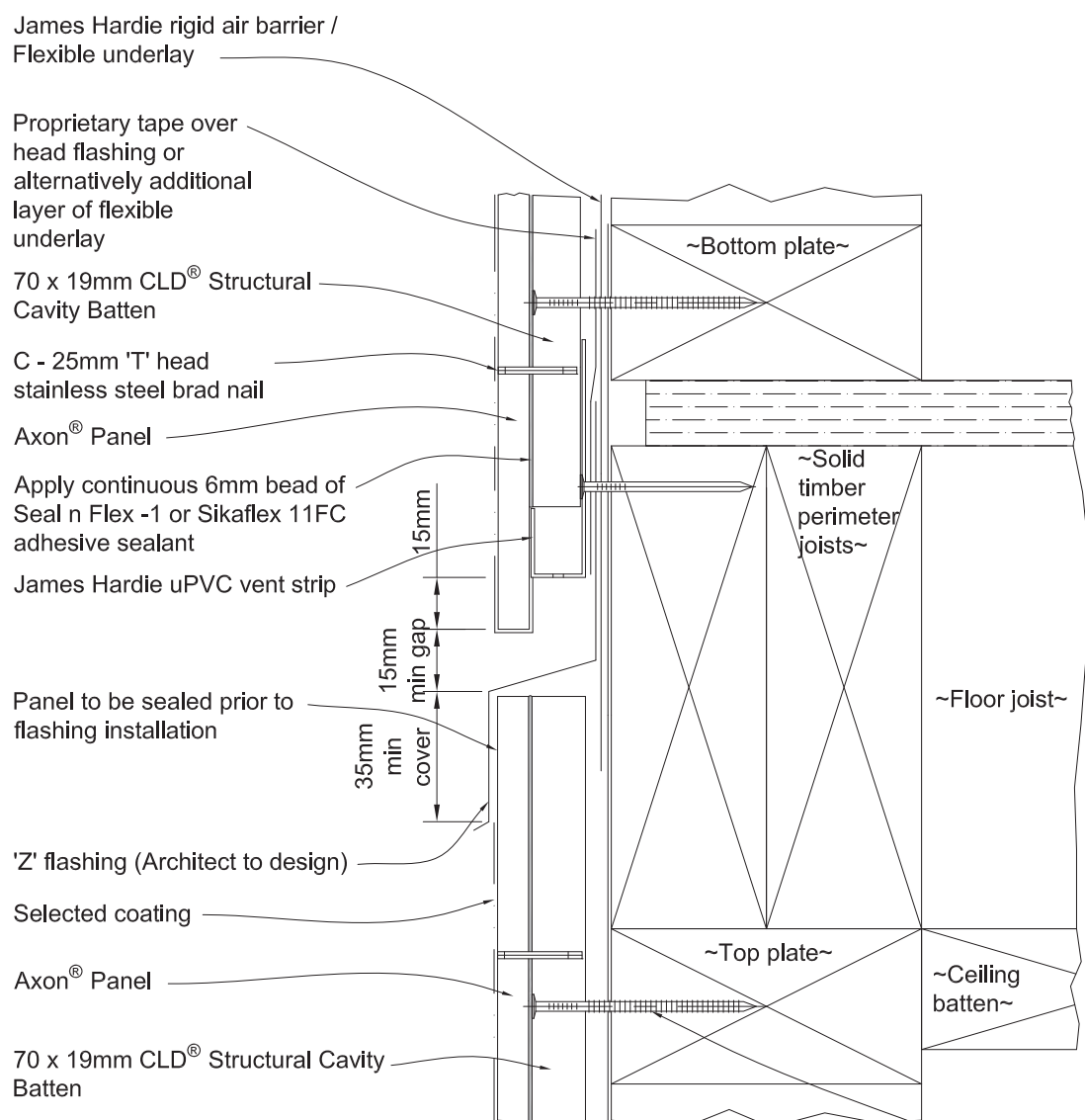
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Figure 37: One piece apron flashing joint



When 50 year durability for flashing is required refer Table 20 NZBC E2/AS1 document.

Figure 38: Drained flashing joint at floor joist



Step 1

- Check Architect's plans for the type of flashing to be used.

Step 2

- Check fixing centres and edge distances.
- If top fixings are to be hidden by the Z flashing they will need to be fixed and sealed before the Z flashing is installed.
- Cut edges need to be primed with sealer.

Step 3

- When 50 year durability is required refer Table 20 E2/AS1.

Step 4

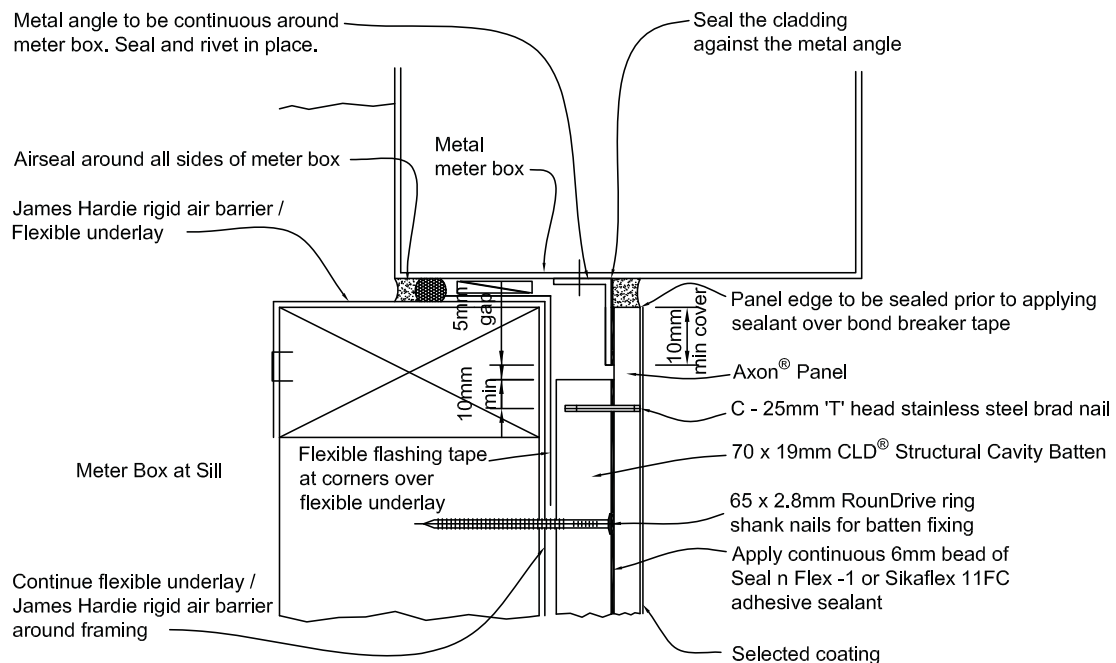
- The flashing to be placed in the centre of the floor joists. Do not fix CLD® Structural Cavity Battens or panels into floor joists.

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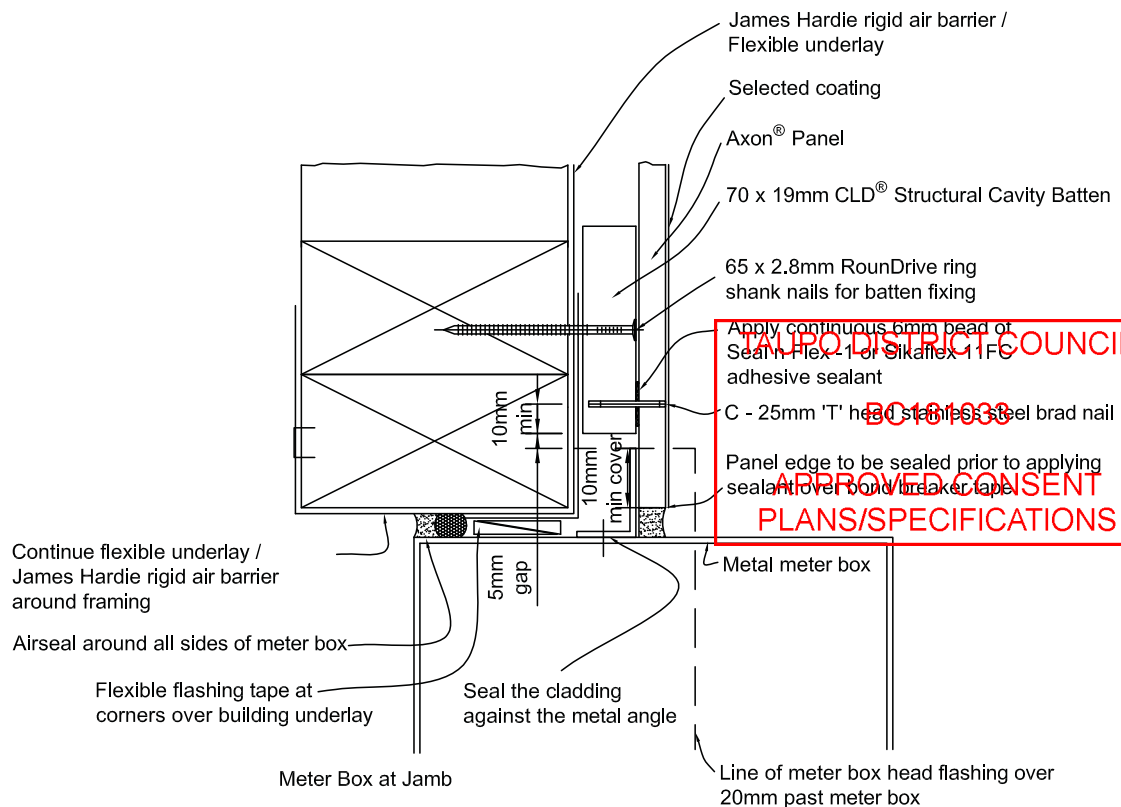
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Figure 39: Meter box at sill



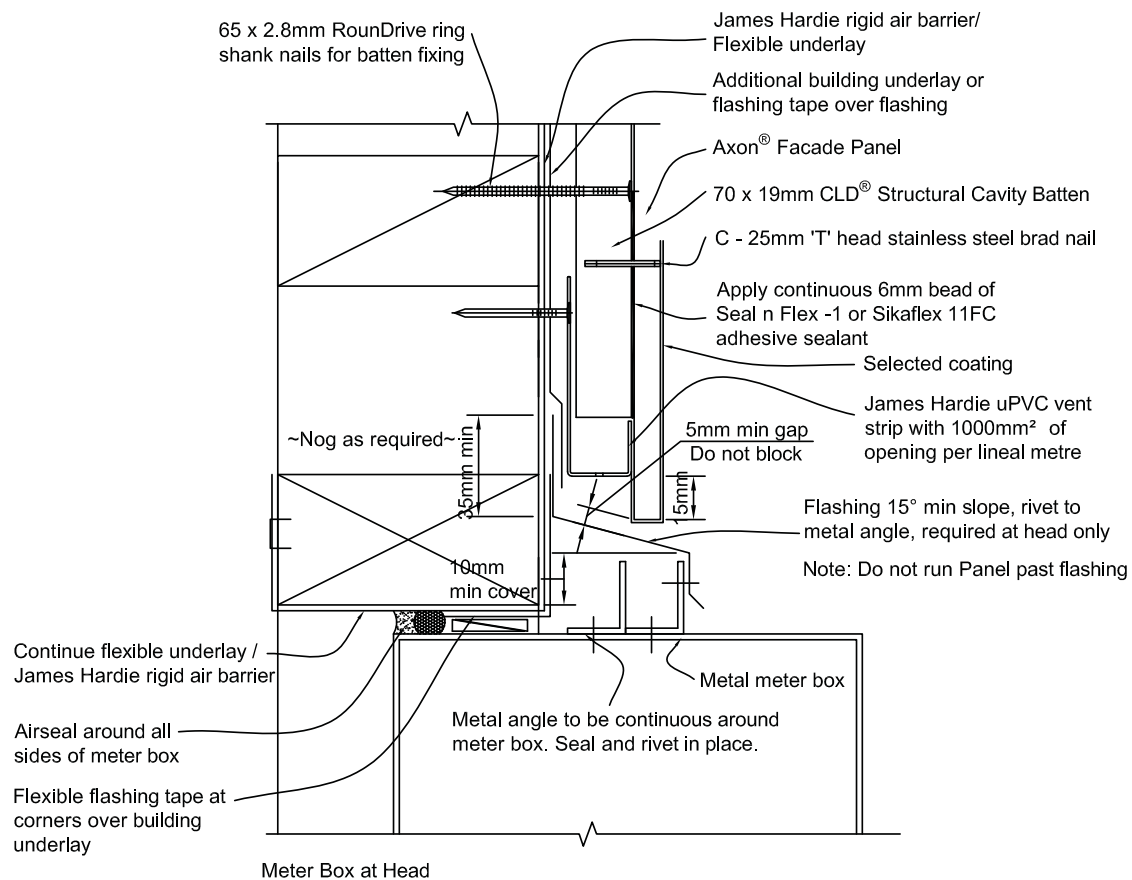
Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box sill.

Figure 40: Meter box at jamb



Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box jamb.

Figure 41: Meter box at head



Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box head.

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Figure 42: Garage door jamb

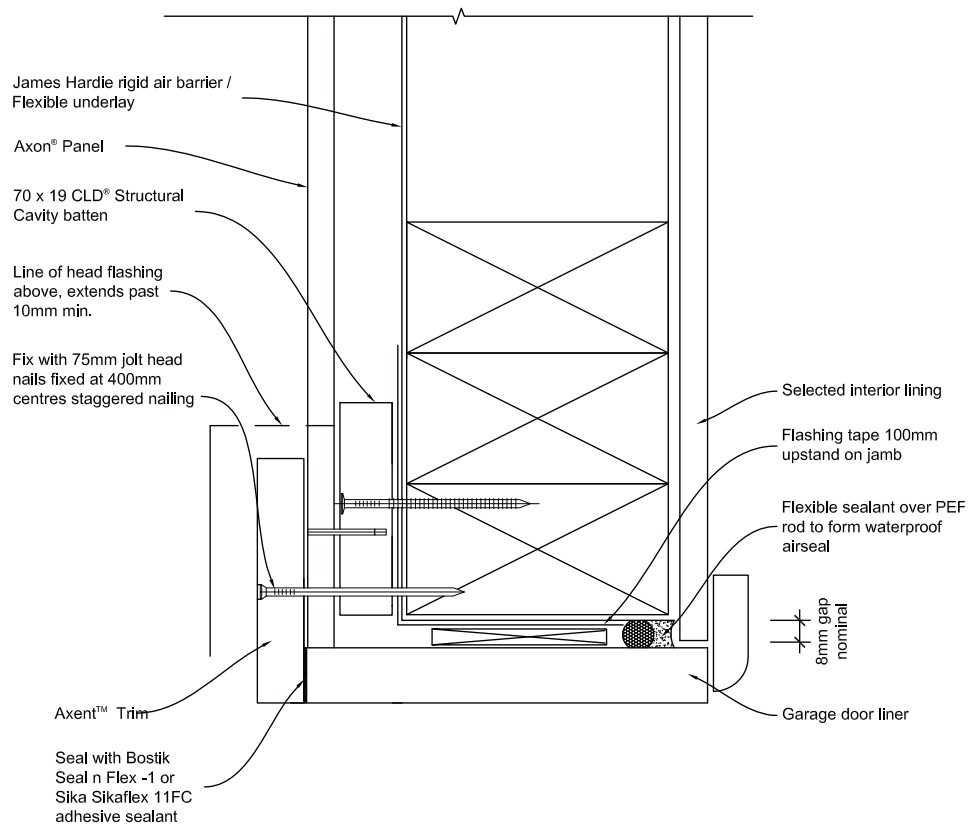
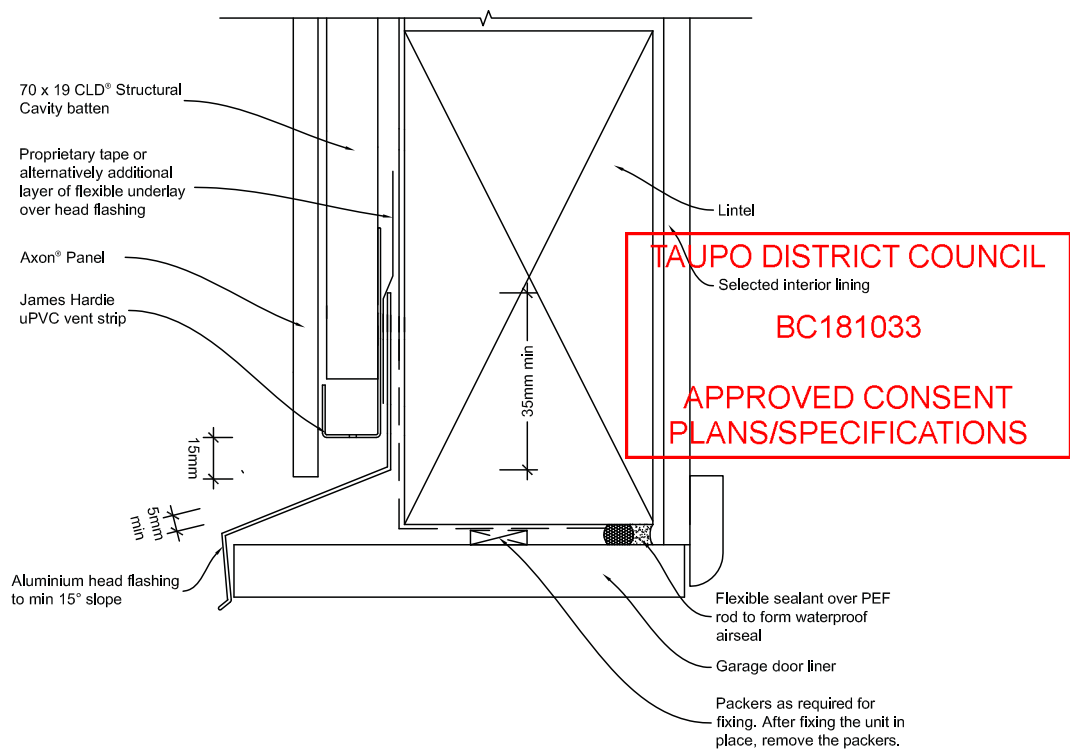


Figure 43: Garage door head



Sealant must be applied between head flashing and door liner in VH and EH wind zones and SED wind pressures.

Figure 44: Junction between Axon Panel and fascia board

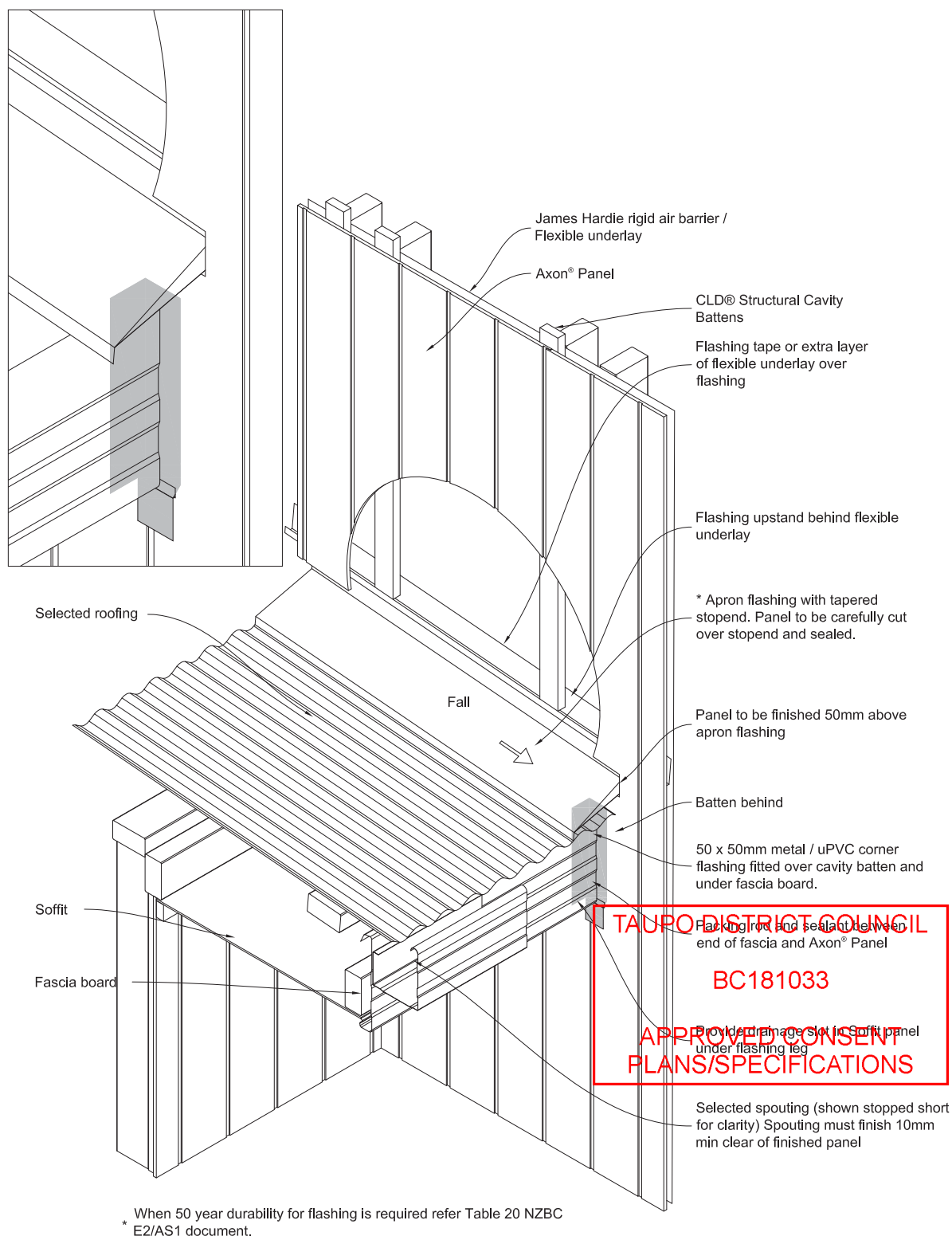
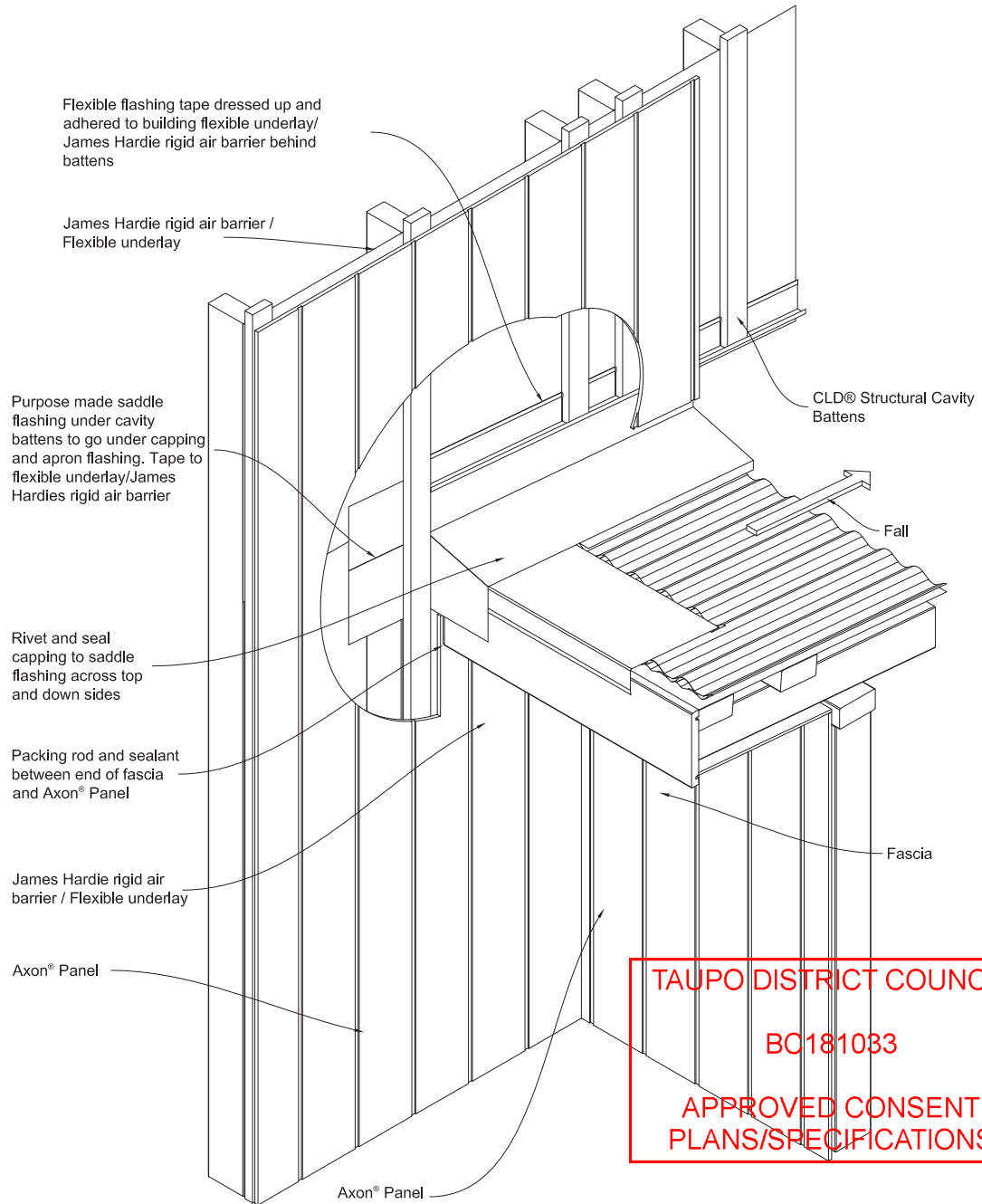


Figure 45: Enclosed roof to wall intersection



Product Warranty

Axon®
PANEL

March 2017

James Hardie New Zealand ("James Hardie") warrants for a period of 15 years from the date of purchase that the Axon® Panel and CLD Structural Cavity Battens (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested/assessed the performance of the Axon® Panel when installed in accordance with the Axon® Panel technical specification, in accordance with the standards and verification methods required by the NZBC and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design), James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

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Bevelback and Rebated Bevelback Weatherboard **Direct Fix System**

Installation Specifications

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p. 03 341 2163 f. 03 341 2173

Bevelback and Rebated Bevelback Weatherboard Direct Fix System

Installation Specifications

1.0 General Information

1.1 Introduction

The Hermpac Bevelback and Rebated Bevelback Weatherboard System is an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

The cladding system consists of horizontally fixed Hermpac Bevelback and Rebated Bevelback weatherboards, flashings and accessories and is finished with a premium penetrating oil stain or paint finish to Hermpac specifications.

1.2 Hermpac Bevelback and Rebated Bevelback Weatherboards

Hermpac Bevelback and Rebated Bevelback weatherboards are manufactured from Canadian Coastal Western Red Cedar. Selected profiles are manufactured from DuraLarch (oil/stain or paint finish) or Ashin-Dura (paint finish only).

The weatherboard lap and rebate profiles are in accordance with NZS 3617 and BRANZ Bulletin 411. The weatherboards are minimum 18.5mm thick and are available in a range of widths and face profiles. They are supplied as a random length supply. Select lengths are outside of the general specification and are available by special contract.

1.3 Accessories

Accessories supplied by Hermpac for use with the Hermpac Bevelback and Rebated Bevelback System include:

- Hermpac cover battens – HP201 (69 x 18mm) and HP202 (90 x 19mm).
- Hermpac internal corner mould – HP110 (39 x 39mm).
- Hermpac eaves moulding – HP32 (40 x 27mm), HP33 (26 x 15mm) or HP7 (30 x 18mm) bevelled profile.
- Hermpac scribes – HP11 – HP18, with bevelled or radiused edges supplied (cut to suit as required).
- Hermpac weatherboard fixings – (oil stain finish) – silicon bronze, Grade 316 stainless steel annular grooved Hermpac Crown Head, Rose Head or Flat Head nails. The nail shank must be minimum 3.25mm diameter and the length must allow minimum 30mm penetration of the wall frame.
- Hermpac weatherboard fixings – (paint finish) – grade 316 stainless steel annular grooved Hermpac Jolt Head nails. The nail shank must be minimum 3.25mm diameter and the length must allow minimum 35mm penetration of the wall frame.
- Hermpac cover batten fixings – 50 x 2.8mm silicon bronze, Grade 316 stainless steel annular grooved Hermpac Crown Head, Rose Head or Flat Head nails for stain finish or Grade 316 stainless steel annular grooved Jolt Head nails for paint finish.
- Hermpac scribe fixings – length to suit scribe size (minimum 50 x 2.8mm) stainless steel annular grooved Crown Head, Rose Head or Flat Head nails for stain finish or Jolt Head nails for paint finish.
- Hermpac flat and corner soakers – 90° soakers available in copper, stainless steel or etch primed aluminium.
- Hermpac soaker fixings – 19 x 1.6mm silicon bronze or stainless steel Rose Head or Flat head nails.
- Hermpac aluminium flashings – widths to suit specified corners – 2.4m and 3.0m lengths.

1.4 Handling and Storage

Hermpac Bevelback and Rebated Bevelback weatherboards must be stacked flat and true, clear of the ground by a minimum of 150mm and supported on dry and clean timber bearers at maximum 900mm centres.

The weatherboards must be kept dry at all times either by storing within an enclosed building or when stored externally an additional secondary cover to the plastic wrapping is required. Care must be taken to avoid damage to edges, ends and the weatherboard surfaces.

2.0 Design Information

2.1 Design Responsibility

The Specifier for the project must ensure that the details in this literature are suitable for the intended application and that additional detailing is provided for specific design or any areas that fall outside the scope and specifications of this literature.

2.2 Scope

This specification covers the use of the Hermpac Bevelback and Rebated Bevelback Weatherboard System as an external horizontally fixed wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable System E2/AS1, Paragraph 1.1; and,
- constructed with timber framing complying with the NZBC; and,
- with a risk score of 0-12 calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Building Wind Zones up to, and including 'Very High'.

CedarOne or painted weatherboards fixed with Grade 316 stainless steel annular grooved Jolt Head nails are limited to use in NZ 3604 Wind Zones up to, and including Medium where studs are at 600mm centres maximum, and NZS 3604 Wind Zones High and Very High where studs are at 400mm centres maximum.

For applications which are outside the scope of this literature and details which are not in this literature the specifier must ensure that the design meets the relevant performance requirements of the NZBC.

Hermpac recommends that professional design advice is sought in these circumstances.

2.3 Building Regulations

The Hermpac Bevelback and Rebated Bevelback Weatherboard System is designed, used and installed in accordance with the statements and conditions of this literature, will meet the following provisions of the New Zealand Building Code:

- Clause B1 Structure
- Clause B2 Durability
- Clause E2 External Moisture
- Clause F2 Hazardous Building Materials

2.4 Ground Clearances

The finished floor level must have a minimum clearance to paved or unprotected ground as required by NZS 3604:2011.

Hermpac weatherboards must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZBC Acceptable Solution E2/AS1, Table 18.

The bottom edge of the Hermpac Bevelback and Rebated Bevelback Weatherboard System must finish a minimum of 100mm above paved surfaces or 175mm above unprotected ground.

At deck or low pitch roof/wall junctions, the bottom edge of the Hermpac weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 35mm.

2.5 Structure & Framing

Timber wall framing behind the Hermpac Bevelback and Rebated Bevelback Weatherboard System must be treated



Bevelback and Rebated Bevelback Weatherboard Direct Fix System

Installation Specifications

as required by NZS 3602:2003 Timber and wood-based products for use in building.

Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. Use of timber framing must be in accordance with framing manufacturer's specifications.

In all cases, studs must be at maximum 600mm centres, with nogs/dwangs fitted flush between the studs at maximum 800mm centres. Note: For CedarOne or painted weatherboards fixed with Grade 316 stainless steel annular grooved Jolt Head nails, studs must be at a maximum 600mm centres for NZS 3604 Wind Zones up to, and including Medium, and 400mm centres maximum for NZS 3604 Wind Zones High and Very High.

2.6 Framing Tolerances

In order to achieve an acceptable wall finish, it is imperative that framing is straight and true. Framing tolerances must comply with the requirements of NZS 3604:2011.

2.7 Wall Underlay

The Hermpac Bevelback and Rebated Bevelback Weatherboard System must be installed over wall underlay complying with NZBC Acceptable Solution E2/AS1, Table 23, or other BRANZ Appraised breather-type membranes.

Unlined gables and walls must incorporate a rigid sheathing or an air barrier fixed to the framing, which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. Where rigid sheathings are used, the fixing length must be increased by a minimum of the thickness of the sheathing.

2.8 Hermpac Bevelback and Rebated Bevelback Weatherboards

Hermpac Bevelback weatherboards must be overlapped a minimum of 32mm. Hermpac Rebated Bevelback weatherboards must be overlapped a minimum of 25mm with an expansion gap of 2 mm at the overlap between boards. Hermpac Bevelback and Rebated Bevelback profiles are all manufactured in accordance with BRANZ Bulletin 411 (Refer to E2/AS1 page 106, paragraph 9.4.1.1).

The weatherboards shall be pre-coated with the selected coating (prior to site delivery and installation) by Hermpac associate Machinecoat (NZ) Ltd, by the flood coat inundation method or in-line spray coat system (subject to coating type selected).

Pre-finished Bevelback and Rebated Bevelback weatherboards shall be over-coated and maintained in accordance with the coating manufacturer's specification. All cut ends and/or uncoated surfaces shall be double coated during installation to protect against the penetration of moisture, post installation.

The weatherboards shall be fixed to the studs at maximum 600mm centres using Hermpac weatherboard fixings (refer to Section 1.3 of this specification).

External corners shall be weatherproofed by the use of corrosion resistant corner flashings and cover battens HP201 and HP202 with Hermpac scribes, or Hermpac corner soakers.

Internal corners shall be weatherproofed by the use of corrosion resistant internal corner flashings along with internal mouldings eg. Hermpac profile HP110.

3.0 Installation Information

3.1 System Installation

This section of the literature should be read in conjunction with the installation details.

The selected wall underlay and flexible sill and jamb tape system must be installed in accordance with the underlay and tape manufacturer's instructions prior to the installation of the rest of the Hermpac Bevelback and Rebated Bevelback weatherboard system. The wall underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75mm minimum at horizontal joints and 150mm minimum over studs at vertical joints.

Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed timber wall framing in the opening is protected. All penetrations through the wall underlay must be sealed and joints sealed or lapped 150 mm.

Where the studs are at greater than 450mm centres, a wall underlay support, e.g. polypropylene strap, 75mm galvanised mesh or galvanised wire must be installed over the wall underlay at maximum 300mm horizontal centres, to prevent the wall underlay bulging into the drainage cavity.

3.1.1 Aluminium Joinery Installation

Aluminium joinery and associated head flashings must be installed in accordance with the window manufacturer's instructions. A 7.5-10mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6 after the joinery has been secured in place.

3.1.2 Hermpac Bevelback and Rebated Bevelback Weatherboard Installation

Hermpac Bevelback and Rebated Bevelback weatherboards must not be wet prior to installation. The back, face and edges of the Hermpac Bevelback and Rebated Bevelback weatherboards must be sealed prior to installation with an exterior grade oil-based penetrating stain or paint.

During installation, cut ends and edges and all fresh cuts or exposed timber must be double sealed with the same oil stain or paint.

Before the weatherboards are installed, the corner detail must be prepared to suit the selected option, e.g. external box corner, external corner moulding etc. The necessary flashings must be installed before commencing weatherboard fixing.

The first course of weatherboards must be full length and commence from an external corner. The first weatherboard must be installed level to assist with the installation of subsequent weatherboards. The weatherboards must overhang the bottom plate by a minimum of 50mm.

Immediately prior to installing the weatherboards over the internal and external corner flashings, a continuous bead of sealant must be applied to the face of the flashing along the fixing line.

Hermpac Bevelback weatherboards must be overlapped a minimum of 32mm.

Hermpac Rebated Bevelback weatherboards must be overlapped a minimum of 25mm with an expansion gap of 2mm at the overlap. For best practice use the Hermpac clinch nail to restrain the top of the weatherboard lap at every stud.

Hermpac Bevelback and Rebated Bevelback weatherboards must be pre-drilled on a slight up-slope, with a hole slightly smaller than that of the nail to reduce the risk of moisture entry.

Fix each weatherboard with one nail per board at every stud. Fixing must be carried out using silicon bronze or Grade 316 stainless steel annular grooved Hermpac Crown Head, Rose Head or Flat Head nails. The nail shank must be minimum 3.25mm diameter and the length must allow minimum 30mm penetration of the wall frame.

Bevelback and Rebated Bevelback Weatherboard **Direct Fix System**

Installation Specifications

Note: For CedarOne or painted weatherboards, use Grade 316 Stainless Steel annular grooved Jolt Head nails and allow minimum 35mm penetration of the wall frame. Punch nails 2mm below the weatherboard surface, prime nail holes and fill prior to sanding and finishing.

The fixing must be located 35-40mm above the bottom edge of the weatherboard, be located no closer than 32mm from the end of the board (where practical), and the head of the nail must finish flush onto the surface of the weatherboard, not into or below the surface.

Fix weatherboards in full lengths where possible. Where joints are unavoidable, scarf the weatherboard at 30° over a stud and fix as per drawn detail.

3.1.3 Boxed Corners, Cover Battens and Mouldings

External and internal corners must be finished in accordance with the installation detailing.

3.1.4 Finishing

At least two coats of an exterior grade quality oil-based penetrating stain must be used over the front face of the Hermpac Bevelback and Rebated Bevelback weatherboards to protect the weatherboards and give the desired finish colour to the exterior walls. The stain must be recommended for use as a wall cladding stain by the manufacturer and must be brush or Machinecoat NZ Ltd applied. Hermpac recommends the use of oil based stains manufactured by Wood-X and Resene.

Follow the stain manufacturer's instructions at all times for application of the stain finish. To ensure a top quality paint finish:

To ensure a top quality paint finish:

1. Any sharp edges should be removed to provide a radius to aid in uniform paint film coverage.
2. Use a premium alkyd oil or acrylic based primer to envelope prime all cut ends and bare timber surfaces twice.
3. Punch nail holes and prime promptly after punching.
4. Fill holes with a suitable filler and allow to dry.
5. When filler is fully dry and cured, sand area smooth.
6. Apply one coat of an alkyd oil or acrylic based primer to sanded area and allow to fully dry before sanding lightly.
7. Ensure surface is clean and free from any chalking, dirt, dust, mould or other contaminants prior to painting top coats.
8. Apply two coats of premium high quality 100% exterior grade acrylic to surface allowing adequate time for drying between coats.

Timber is a natural product and for best results use a colour with a LRV of 40-45 or above. Please consult with us for a specific recommendation minimum for your chosen timber.

Follow the paint manufacturer's instructions at all times for application of the paint finish.

Refer to Section 4.0 for maintenance requirements.

4.0 Maintenance

Building owners are responsible for the maintenance of the Weatherboards. Annual inspections must be made to ensure that all aspects of the cladding system, including flashings remain in a weatherproof condition. Any damaged areas or areas showing signs of

deterioration which would allow water ingress, must be repaired immediately. Sealant, coatings, flashings or the weatherboards must be repaired in accordance with the relevant manufacturer's instructions.

Regular cleaning (at least annually) of the surface finish with water and a mild detergent is recommended to remove grime, dirt and organic growth, to maximise the life and appearance of the cladding.

Recoating of the stain finish will be necessary throughout the life of the cladding system. Re-staining must be carried out every 2-3 years in accordance with the stain manufacturer's instructions. Re-staining will be required more frequently on exposed northern and western facing walls. When re-staining, care must be taken to ensure bottom edges are well covered and penetrated with the stain.

Recoating of the paint finish will be necessary throughout the life of the cladding system. Re-coating must be carried out every 7-10 years in accordance with the paint manufacturer's instructions. When re-coating, care must be taken to ensure bottom edges are well covered and penetrated with the paint.

5.0 Health & Safety

Cutting of Hermpac Bevelback and Rebated Bevelback weatherboards must be carried out in well ventilated areas and dust masks, eye and hearing protection must be worn.

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DL850 / DL1100
Gas Fireplaces

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Important:

The appliance shall be installed in accordance with;

- This installation instruction booklet
- Local gas fitting regulations
- Municipal building codes
- Electrical wiring regulations
- Any other relevant statutory regulations.
- AS/NZS 5601:2010 Gas Installations



WARNING:

This appliance must be installed by a qualified person.

Do not modify this appliance.

This appliance is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.

Young children should be supervised to ensure that they do not play with the appliance.

Failure to follow these instructions could cause a malfunction of the heater, which could result in death, serious bodily injury, and/or property damage. Failure to follow these instructions may also void your fire insurance and/or warranty.

Who can install this product:

Installation must be carried out by a registered installer who, on completion of the installation, must issue a:

AUS: Certificate of Compliance

NZ: Certificates that comply with the latest legislation

in accordance with national and/or local codes. If these are not issued then the Escea warranty may be void.

Warranty Repair and Annual Servicing:

Warranty repair work must be carried out by a recognized Escea Gas Fire Technician. It is recommended that recognized Escea Gas Fire Technicians are also used to carry out annual servicing requirements (particularly during the warranty period). For contact details of recognized Escea Gas Fire Technicians in your area, please contact the retailer from whom the appliance was purchased.

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The heater must be installed according to these instructions and in compliance with all relevant building, gas fitting, electrical and other statutory regulations (e.g. AS/NZS 5601). Any shortcomings in the appliance and flue installation will be the responsibility of the installer, and Escea will not be accountable for any such failings or their consequences.

Manufactured by: Escea Ltd, PO Box 5277 Dunedin NZ, Ph: +64 3 478 8220

For contact details of your local escea distributor or dealer please visit:

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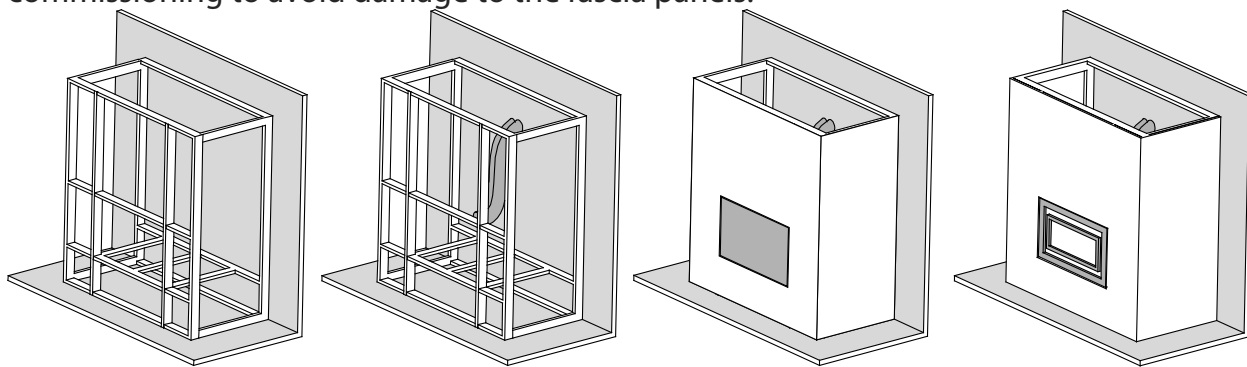
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A Installation Process and Product Description

A1 Recommended Installation Process:

The following diagram illustrates the steps required to install your gas fire..

The sequence in which you choose to do these tasks will vary depending on your individual scenario. Please read these instructions fully before proceeding with the installation. Leave the installation of the fascia panels until the very end of the installation and commissioning to avoid damage to the fascia panels.



Create the Cavity	Install electrical / gas connections and flue system	Install appliance and finish cavity	Finish installation, fit fascia and test appliance
Section B	Section C, D	Section E	Section F

A2 Product Description:

The Escea DL series gas fire is a room sealed gas appliance designed to be built into a cavity. These appliances are flued using collinear flexible aluminium flue (with PolyPro flue extensions in some installations) connected to a powerflue.

The user will control their fire with the Radio Frequency (RF) remote that will normally be left in its wall mount cradle. In addition to the RF remote the appliance has a single auxiliary On/Off button on the unit. When not in operation it is in a standby mode unless it is physically isolated from the mains supply.

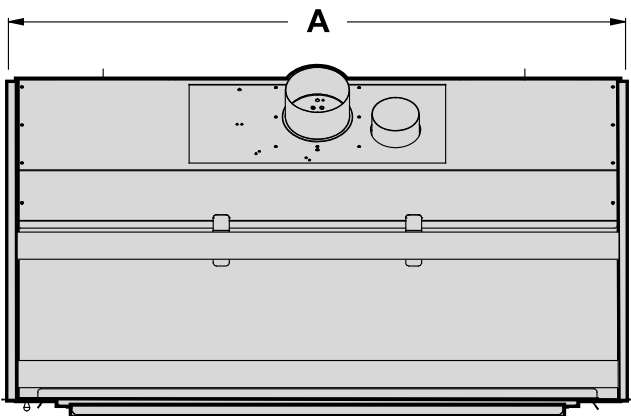
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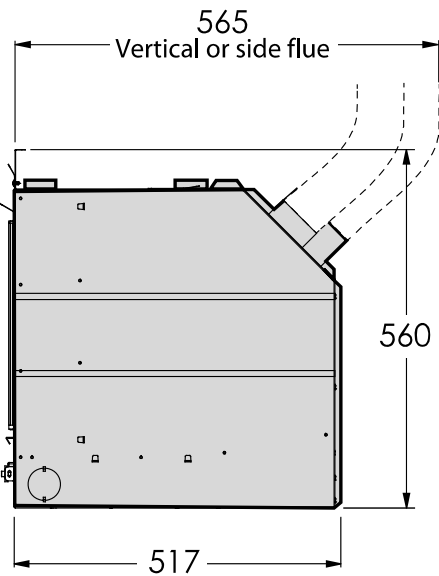
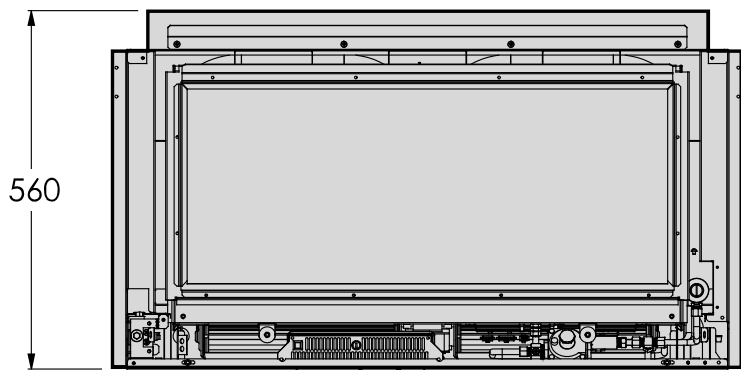
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A3 Product Dimensions:

All dimensions are in mm



	DL850	DL1100
A	959	1259



B Creating the Cavity

B1 Cavity Shape:

The DL850/DL1100 is suitable for both timber framed and masonry cavities.
The cavity shape is dependant on two things:

- The flue configuration (section B2)
- The fascia (section B4)

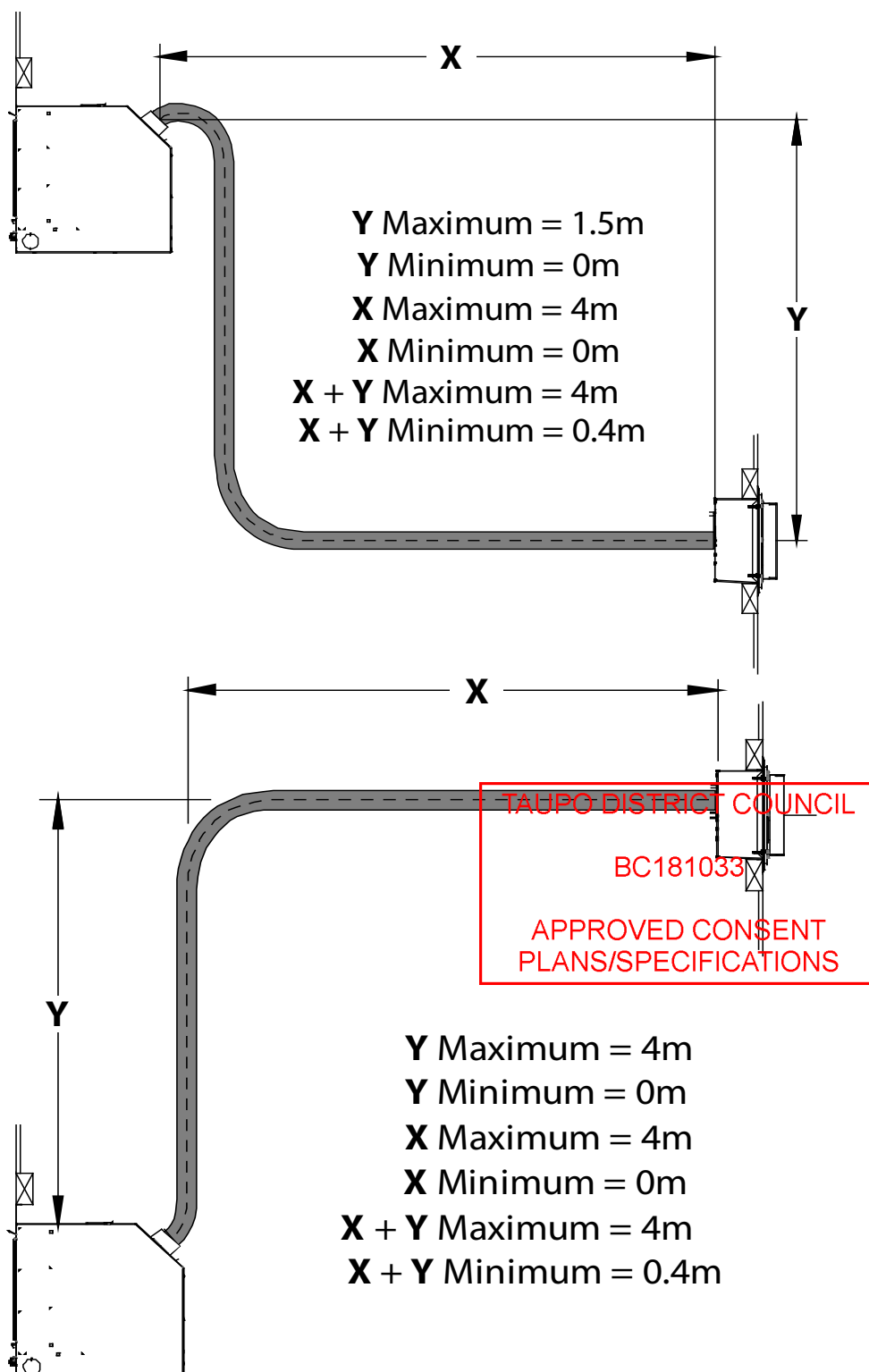
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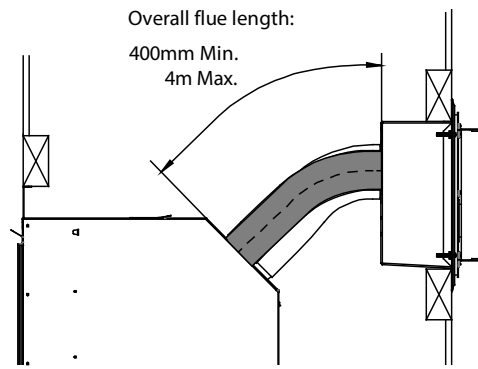
B2 Flue Configuration (If less than 4 m flue length is required):

If your flue system is less than 4m long (as shown in diagrams below), then a simple aluminium flexible flue is required. If you wish to install a longer flue run, up to 12m, see section B3.

Horizontally Terminated: *(utilizes the escea horizontal power flue enclosure kit)*

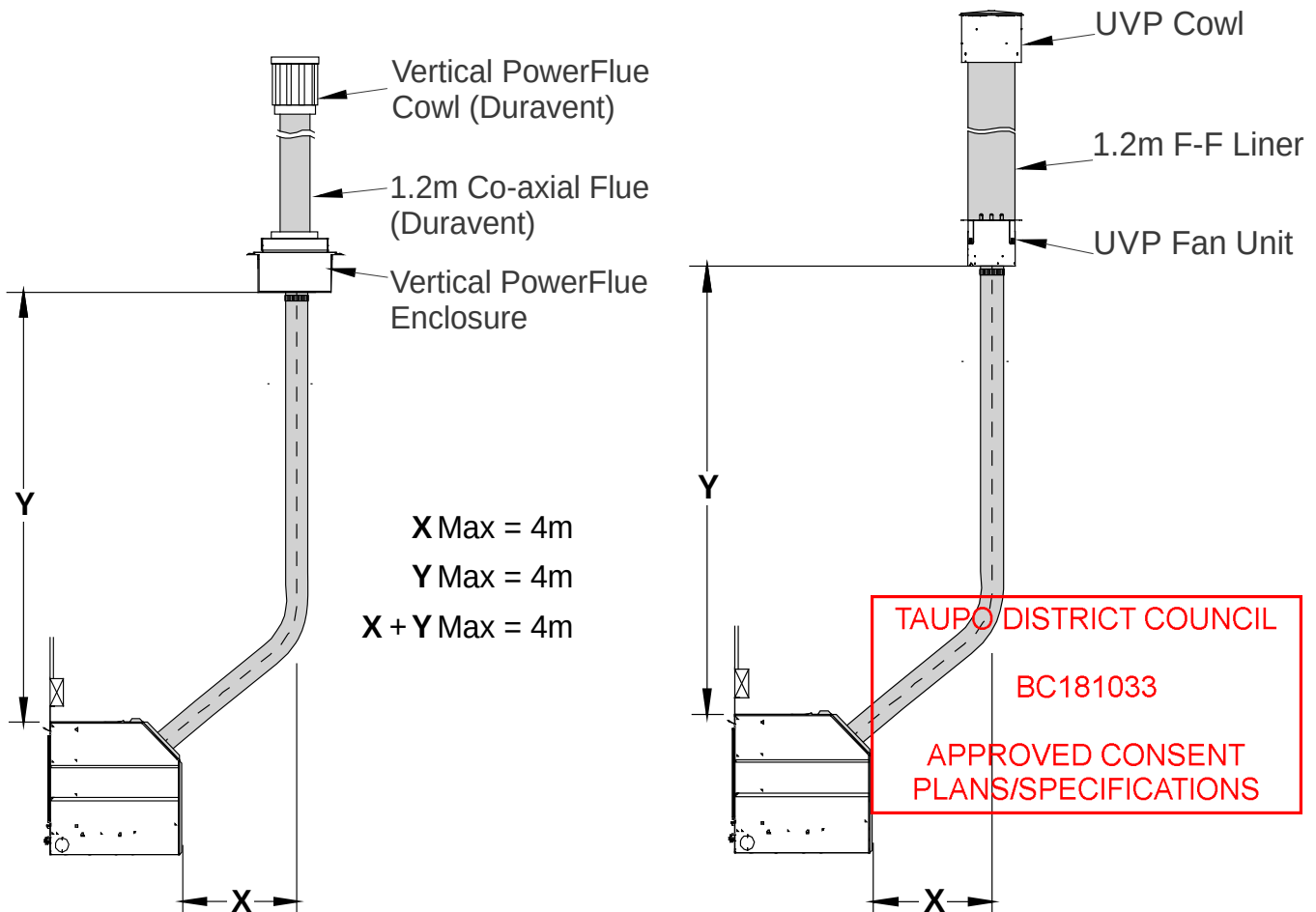
The horizontal offset of the terminal can be any amount up to the total flue length listed below. Please consult with Escea's technical staff if your intended flue configuration steps outside of the bounds of the flue configurations shown below.





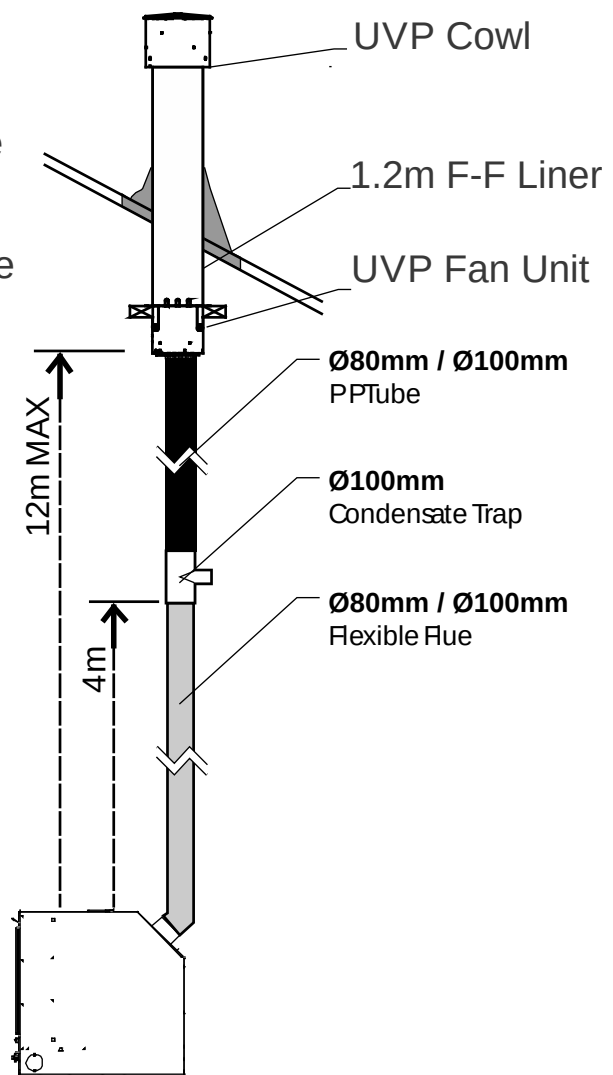
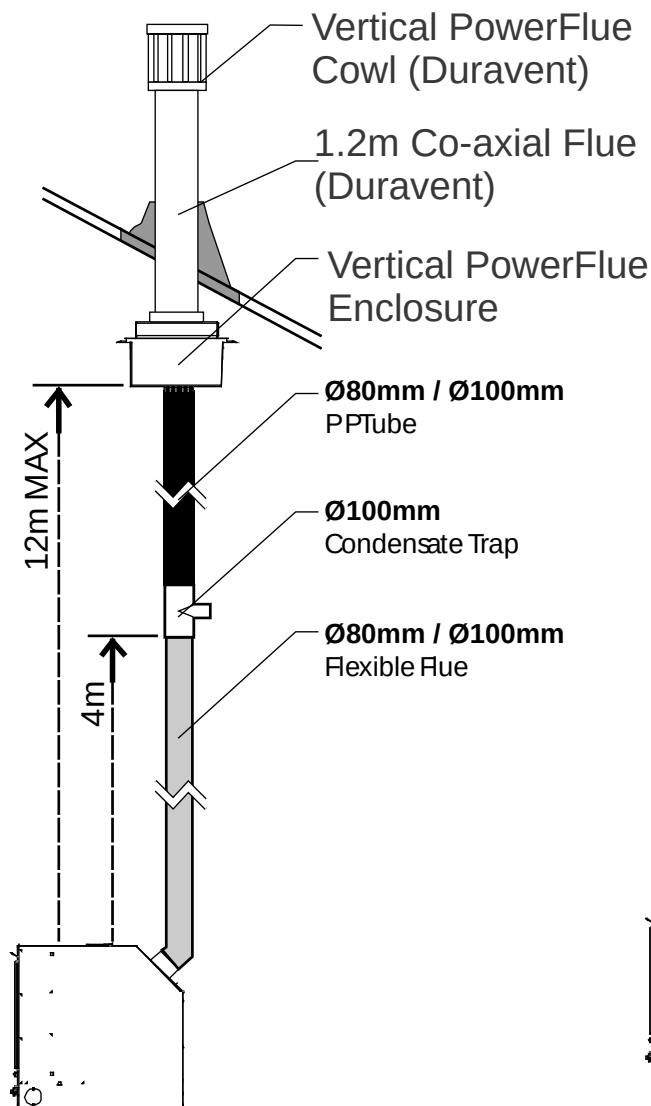
Vertically Terminated:

(utilizes the escea vertical power flue enclosure kit)

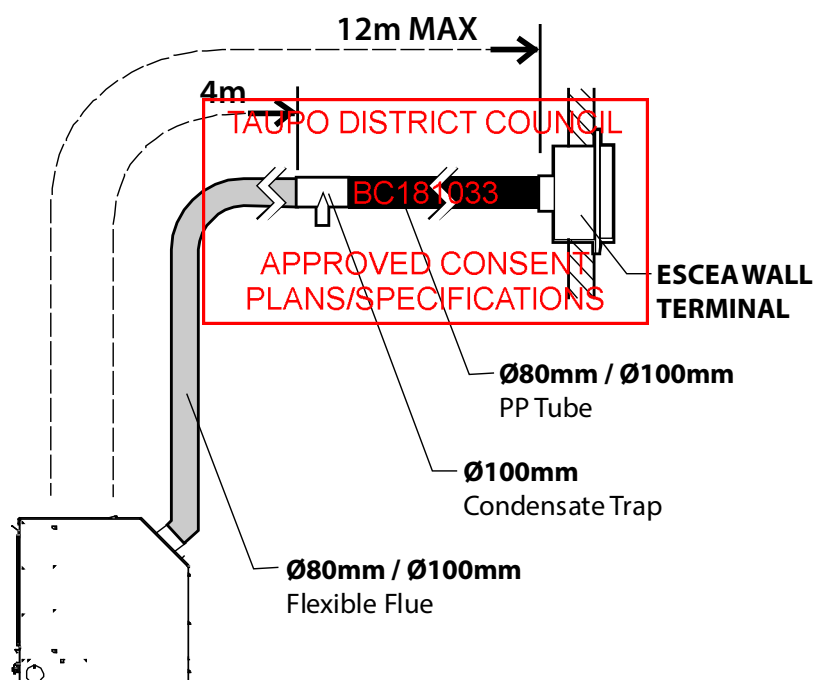


B3 Flue Configuration (If more than 4m flue length is required):

If your flue system is greater than 4m long (as shown in diagrams below), then a flexible flue with condensate trap and rigid PP tube flue lengths is required.

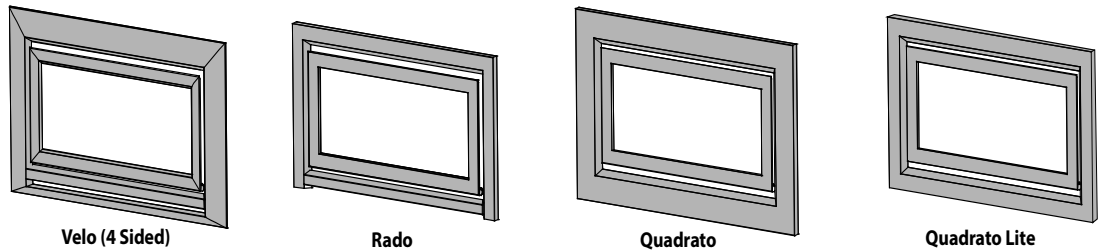


For further information and detail on PolyPro (Rigid) flue and condensate traps, see the documentation supplied with the flue components.

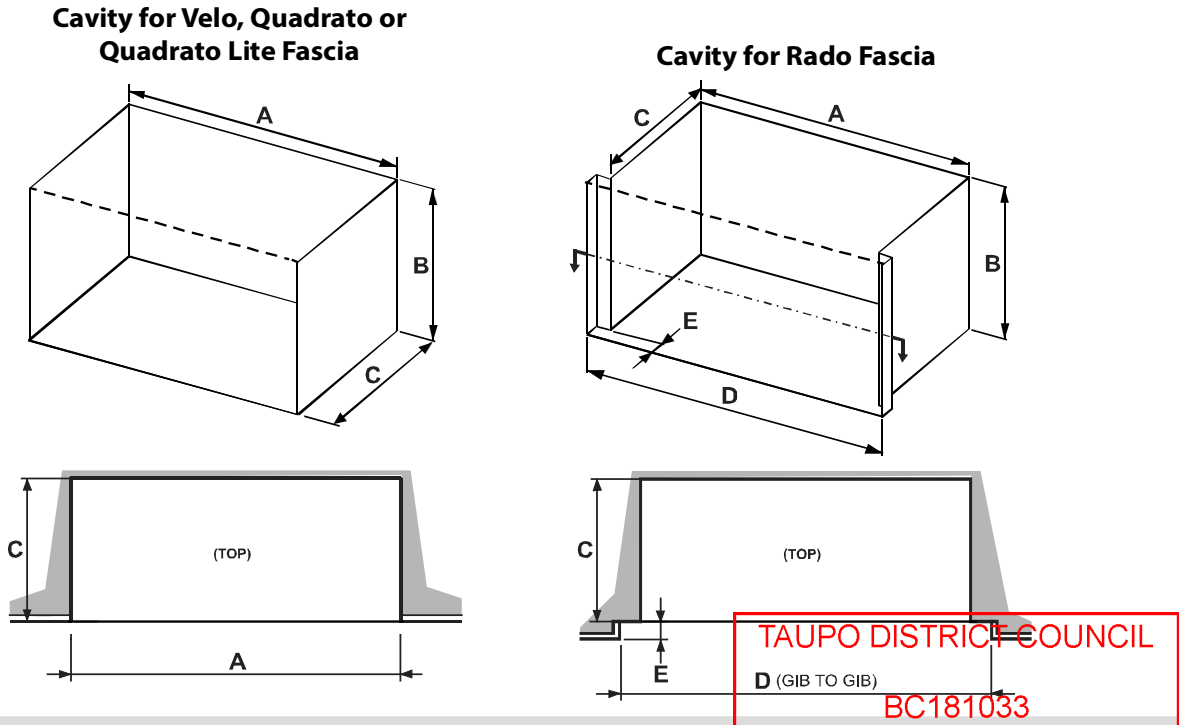


B4 Fascia:

The cavity shape is dependent on the fascia type. There are four fascia types available with the DL850 and DL1100:

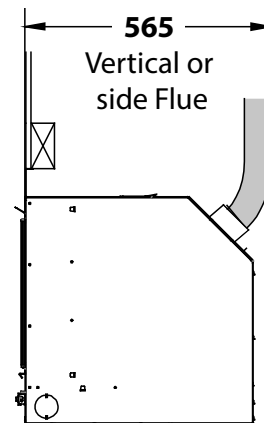
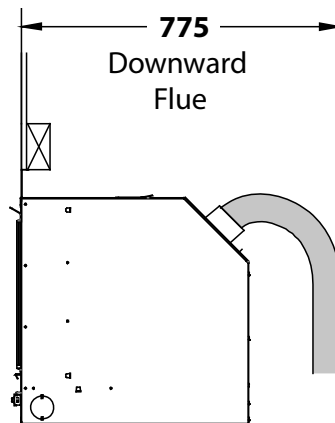


The **Velo**, **Quadrato** and **Quadrato Lite** fascias sit proud of the finished wall surface and have a simple cavity shape. The cavity may be constructed from combustible materials. The **Rado** fascia sits flush with, or inset from, the finished wall surface and has a more complex cavity shape. **The cavity framing and wall facing for a minimum of 300mm directly above the Rado fascia must be constructed from non-combustible materials.** Please check the style of fascia before commencing the building of the cavity to the dimensions shown below. The cavity for Velo, Quadrato and Quadrato Lite fascias may be constructed from combustible timber framing materials. Note: It is not necessary to line the sides, top or back of the cavity.



Ideal Cavity Dimensions (mm):							
DL850:	A	B (min)	B (max)	C (min)	D (min)	E (min)	F (max)
Velo / Quadrato / Quadrato Lite	965	560	575	565	-	-	-
Rado	965	585	590	565	995	30	130
DL1100:							
Velo / Quadrato / Quadrato Lite	1265	560	575	565	-	-	-
Rado	1265	585	590	565	1295	30	130

NOTE: The final cavity size and shape should account for the flue direction as shown on following page.



B5 Cavity Base:

This appliance **MUST** be fully supported on its base. The base must extend over the entire area of the underside of the appliance. The base must also be levelled to prevent vibration from possible fan imbalance. The base of the cavity must be strong enough to support the total product weight, which is approximately 65kg (DL850) and 80kg (DL1100), depending on fuel bed.

B6 Hearth:

The base of the appliance must be installed a minimum of 100mm off the floor, unless the appliance is being installed at floor level in which case a hearth is required, made from non-combustible material and must extend no less than 300mm from the front of the fire. This hearth should be at least as wide as the fire's outer fascia and no less than 10mm thick. Raised hearths can be any size but must also be constructed from non-combustible materials.

QUADRATO or QUADRATO LITE FASCIA ONLY: The fascia must not be installed flush against a hearth as the fireplace draws air from the lower surface of the fascia. As such the fascia must be raised a minimum of 25mm from a hearth.

The floor in front of this hearth will still get warm so if the floor covering is vinyl, nylon carpet or another heat sensitive material then we recommend extending the hearth to 450mm from the fire. A raised hearth can be of any size but must be constructed from non-combustible materials. **NOTE:** *If the hearth is to be covered with tiles or some other veneer then the fire must be installed so that the base of the appliance is level with the finished top surface of the hearth.*

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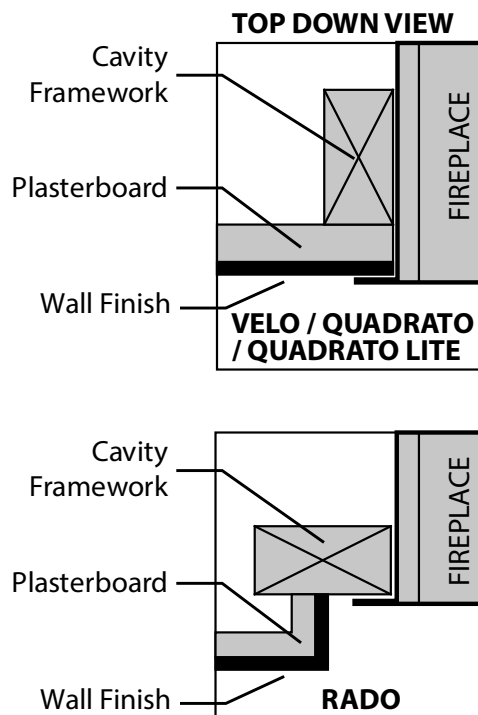
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B7 Wall Linings:

The front mounting flanges of the appliance must be on top of the finished wall surface in order for the fascia panels to mount properly. Take into account any plaster board, tiles or any other finishing surface that may be intended for the finished wall surface. Wall finishing materials must not encroach upon the minimum cavity clearances given in section 2.2. The wall board that lines the outside of this opening can be normal dry wall (plaster board) and does not need to be non-combustible.

Note: The temperature of the wall lining directly above the heater does get warm and hence may discolour paint finishes that are susceptible to temperature damage or distort vinyl wall coverings. For durability of finishes and surfaces you should contact the relevant manufacturer for their specification.



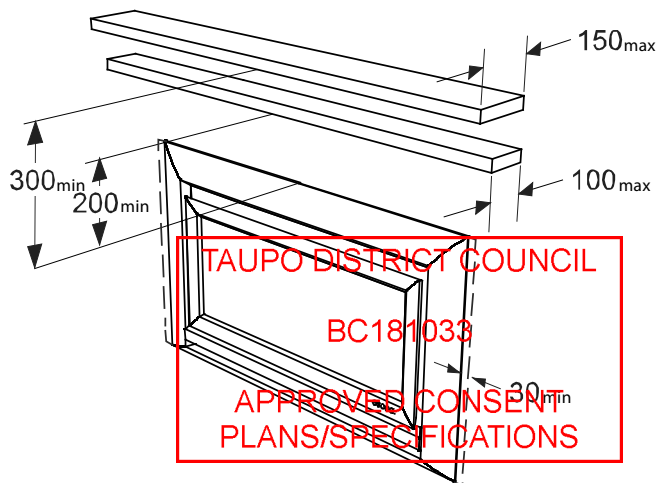
The cavity framing and wall facing for a minimum of 300mm directly above the Rado fascia must be constructed from non-combustible materials.

For more detail on cavity construction, view the "Drawings for Architects" in the technical section of the Escea website.

B8 Mantle Clearance:

Please refer to the diagram to the right. Mantles or protruding ledges mounted above the heater that are made from combustible materials, must not extend outside of the dimensions shown.

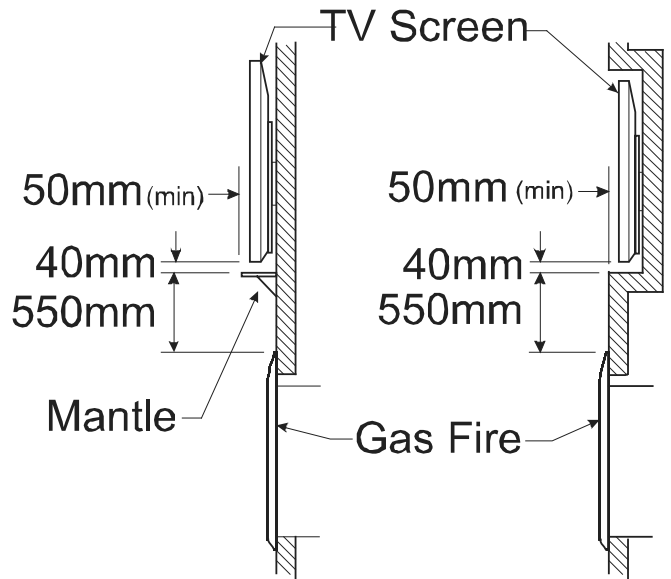
Except for Rado fascias, maintain a 30mm clearance around the fascia to ensure ease of fascia removal. NB: No clearance is needed underneath Velo Three Sided or Rado Fascias



B9 Television Clearances:

The following are the recommended minimum clearances for the location of any electrical equipment (such as Plasma TV, LCD TV or home theatre) above an Escea DL Series gas fire. Use either a shelf or mantle below your TV screen or alternatively you can construct a recess to mount your TV screen into.

Note: The above television clearance recommendations are to be treated as a suggestion of a suitable installation only. It is the responsibility of the end user to check the installation instructions of their electrical appliances to ensure that the location in relation to the gas fire is suitable. Escea in no way guarantees or takes responsibility that the above installation suggestion will be suitable for all electrical or home entertainment appliances.

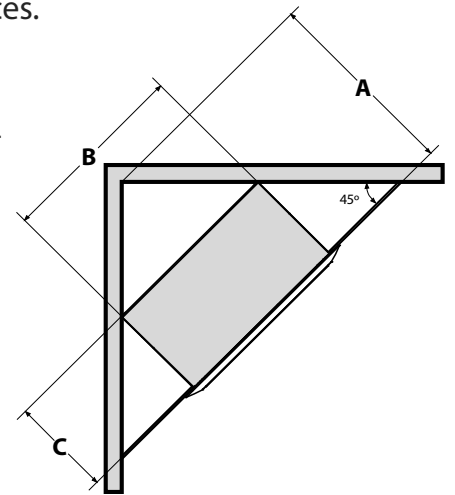


B10 Corner Installations:

If a cavity is to be created in a corner, the following drawing gives the minimum sized interior wall dimensions.

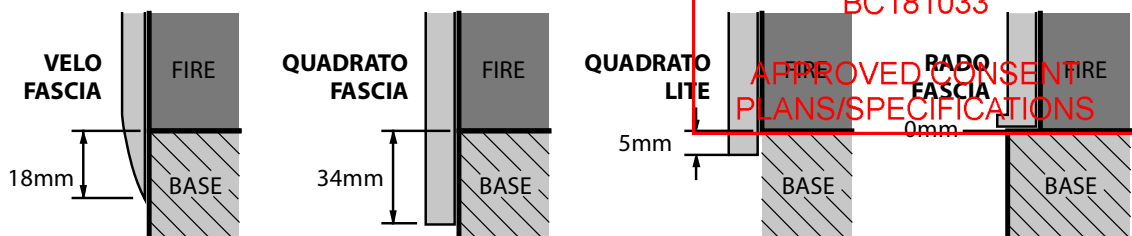
Minimum corner install dimensions (mm):

	DL850	DL1100
A	970	1145
B	960	1260
C	510	510



B11 Distance from Fireplace base to Fascia base:

The following side-on views show the measurement from the base of the fireplace to the base of the Fascia.



END OF SECTION B

By the end of this section, you should have:

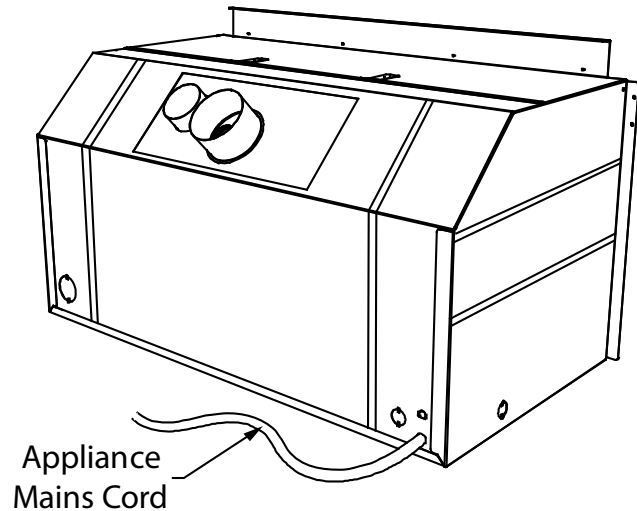
- ☐ A framed, but un-lined, cavity sized to suit your fascia and flue configuration
- ☐ Provision for sufficient access to the powerflue for future servicing

C Installing the Electricity and Gas to the Appliance

C1 Power Supply:

Whilst the cavity is being created consideration should be given to appropriate location of a standard 3 pin, EARTHED 230/240V power outlet. This must be within 1.0m of the rear bottom left hand corner of the appliance.

IMPORTANT: Locating the power outlet within the cavity makes the installation very neat but the provision **MUST** be made to be able to switch the power supply off and on (electrical isolation switch) and **MUST** be accessible after the heater has been installed. This is normally done by means of a separate switch which must be located adjacent to the appliance as per AS/NZS 5601.1.2010. This will allow service technicians to isolate the power supply before performing service work on the appliance.



This appliance must not be located directly below a socket outlet.

This appliance will draw a maximum of 2 Amps from a 230/240V supply. No additional power supply is required for the power flue.

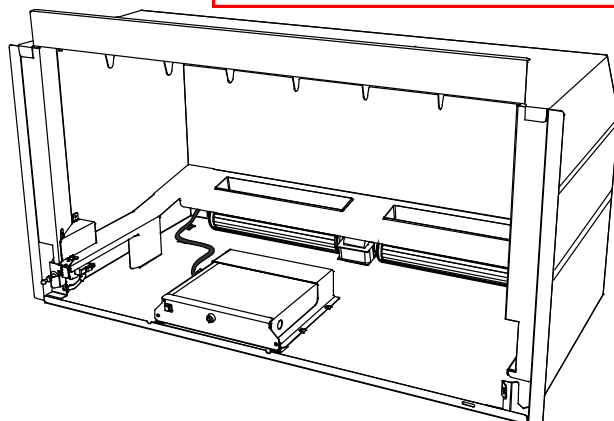
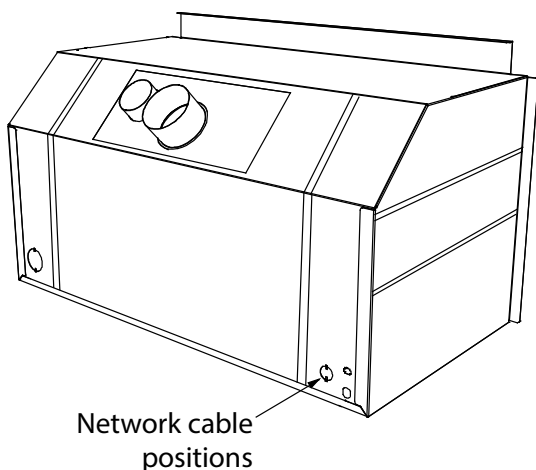
An electrical wiring diagram is located underneath the electronic tray, and also in the rear of this manual (Service section)

C2 Network Cable:

If the appliance is to be wired to a home automation system or internet router/network is being installed then provision must be made for the network cable to get to the control tray. A plastic plug is provided on the rear left of the appliance for a network cable to pass through the chassis and reach the control tray. Allow enough slack in the network cable to ensure the electronic tray can still be removed from the appliance. See Section E2 for final connection of the network cable.

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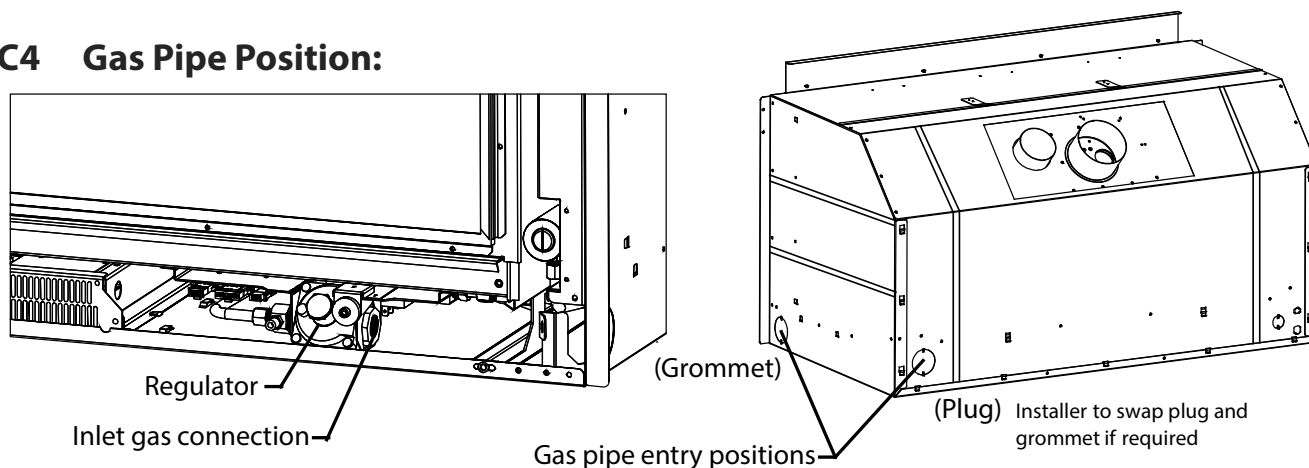


C3 Gas Pipe Sizing:

Gas pipe should be sized as per the requirements of AS/NZS 5601. The pipe sizing must be sufficient to deliver the following volume of gas to the heater with all other gas appliances in the home running at the same time:

DL850 Gas Consumption = 38MJ/hr
DL1100 Gas Consumption = 42Mj/hr

C4 Gas Pipe Position:



The DL850 / DL1100 has 2 possible entry points for gas pipe, on the rear right corner and the front right. Each is sealed by either a plastic grommet or plastic plug. If you wish to use the rear exit location, you may swap the grommet and plug positions.

The gas connection on the appliance is a ½" female BSP at the very front right of the appliance. This section of the piping will need to be flexible to allow for pipe disconnection and firebox removal.

C5 Gas Isolating Valve:

It is recommended that a gas isolating valve be installed as close to the regulator on the gas inlet side as possible with easy access if the fascia is removed. This will allow for easier servicing in the future.

C6 Pressure Test Point:

As per AS/NZS 5601, a pressure test point shall be provided by the installer prior to the inlet of the appliance

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END OF SECTION C

By the end of this section, you should have:

- ☐ An unlined cavity with a standard three pin 230/240V AC supply that the appliance can be plugged into
- ☐ An electrical isolating switch that is accessible once the appliance is installed
- ☐ A suitably sized gas supply to the right hand side of the appliance with a pressure test point, ready to be connected once installed
- ☐ Network cable installed, ready for plugging into appliance (if being connected to internet router/network)

D Installing the flue

For Horizontally terminated flue, see section D1. For Vertically terminated flue, see section D5.

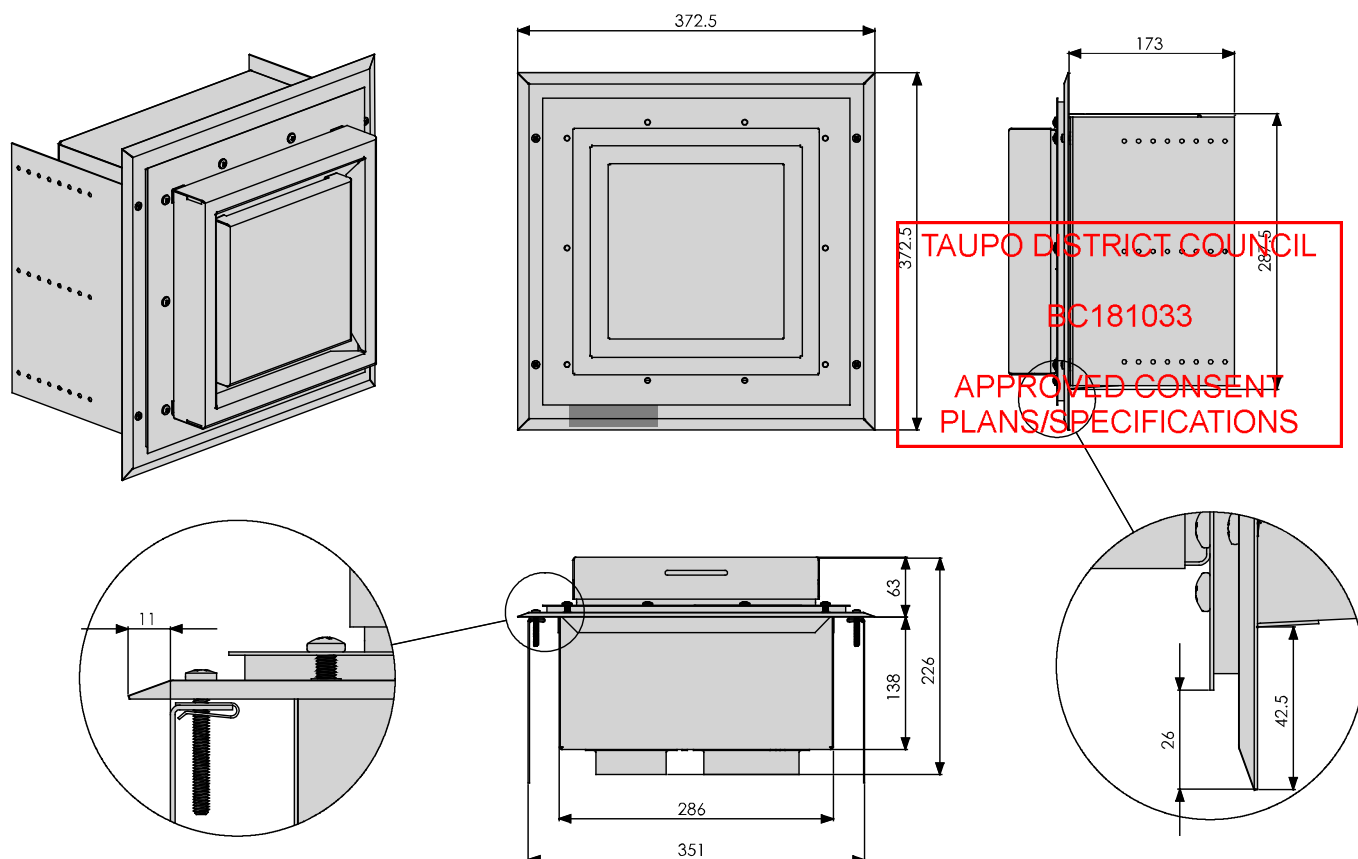
D1 Horizontal Powerflue Description

Note: The appliance is designed only to operate using the approved flexible or PolyPro flue supplied by Escea. Other brands of flue may not fit, and this will affect the appliance warranty.

The Horizontal Powerflue Wall Terminal must be installed in the correct orientation. This allows for the correct operation of the flue system and prevents the ingress of rain.

The Horizontal Powerflue Wall Terminal must be weather-tight when installation is complete to prevent damage to the dwelling. It must be installed by a suitably qualified person.

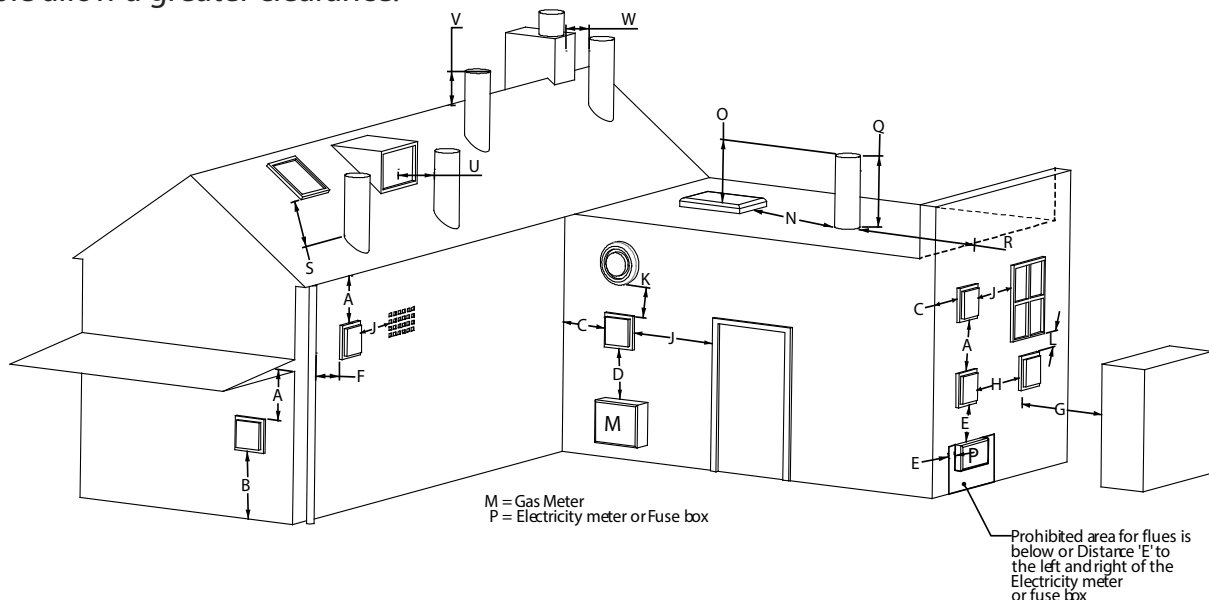
For flexible aluminium flue, access to the powerflue from the outside must be provided for servicing, and this should be taken into consideration when installing in tall buildings. For PolyPro flue installations, internal and external access is required.



D2 Installing in Accordance with Relevant Codes:

The location of the Powerflue Terminal must be installed in accordance with AS/NZS 5601 and any other relevant building codes. If possible, avoid installing the Powerflue Terminal in areas exposed to high winds and extreme weather.

Some of the minimum clearances for a fan assisted terminal are listed below; please refer to AS/NZS 5601 Gas installation standard for full guidance on the design of the flue system. Where possible allow a greater clearance.



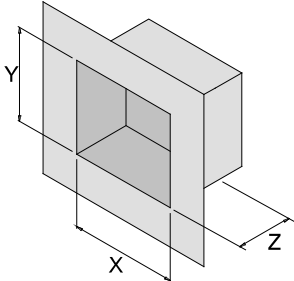
A	Below eaves, balconies and other projections	200mm
B	From the floor, above a balcony or other surface	300mm
C	From a return wall or external corner	300mm
D	From a gas meter or regulator vent	1000mm
E	From electricity meter or fuse box	500mm
F	From a drain pipe or soil stack	75mm
G	Horizontally from any building structure or obstruction	500mm
H	From any other flue terminal or combustion air intake	300mm
J	Horizontally from any openable window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
K	From a mechanical air inlet or spa blower	1000mm
L	Vertically below any openable window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
N	Horizontally from a roof light	600mm
O	Vertically from a roof light	500mm
Q	Vertically from a flat roof	500mm
R	Horizontally from a vertical structure	500mm
S	Below a roof window	2000mm
T	Above or either side of a roof window	600mm
U	From a dormer window	1500mm
V	Above the apex of the roof (see note 1 on following page)	300mm
W	From an open flue	1500mm

Notes:

- 1) Should the flue not extend past the apex, the top of the flue should extend at least 400mm from the roof (or 500mm in regions with heavy snow).
- 2) The installation of a flue into a carport is not recommended.
- 3) The flue terminal will get very hot when in use. Precautions should be taken to protect people and animals from injury.

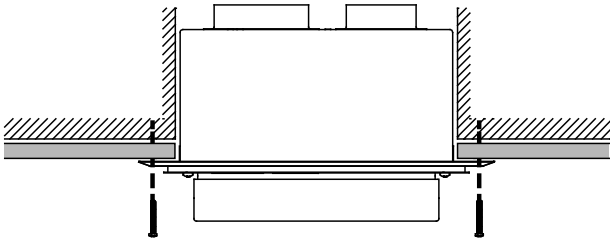
D3 Creating the Hole in the Outside Wall

When cutting the hole in the outside wall, be mindful of how the installation Horizontal Powerflue Wall Terminal will be finished, the installation must be weatherproof.

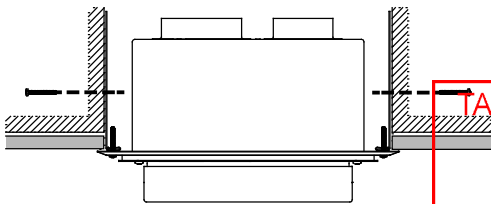


Ideal hole/cavity size for Horizontal Powerflue		
	Without Side Brackets	With Side Brackets
X	298mm	360mm
Y	298mm	298mm
Z	175mm Excluding allowance for flue which exits here	

The Horizontal Powerflue Wall Terminal can be attached to the wall in two ways,
A) From the front of the terminal:



B) By attaching the optional Wall Terminal Installation Brackets to the sides of the cavity and attaching the Horizontal Powerflue Wall Terminal to these, from the front:



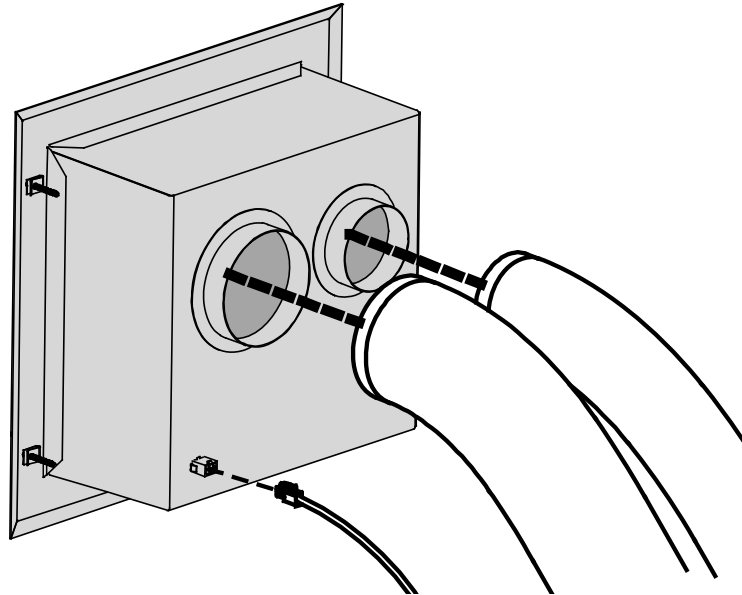
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D4 Installing the Horizontal Powerflue Wall Terminal

Attach the Ø100mm and Ø75mm flexible aluminium flues to the spigots on the rear of the Horizontal Powerflue Wall Terminal using the hose band clamps supplied. Plug the powerflue electrical cable into the back of the Horizontal Powerflue Wall Terminal.

For information on the PolyPro flue , see the installation manual which is supplied with the flue components.

Ensure that the electrical cable is firmly secured to the wall terminal or building to prevent damage or disconnection if pulled



Fit the Horizontal Powerflue Wall Terminal into the hole and fix in place, making sure the installation is sealed appropriately to prevent the ingress of water from outside the wall cladding.

NOTE: It is the responsibility of the installer to ensure the Horizontal Powerflue Wall Terminal is installed to all relevant building codes to ensure weather tightness. This may necessitate the use of appropriate flashing material where appropriate.

IMPORTANT: Ensure that flashings do not restrict the air intake slot around the periphery of the cowl

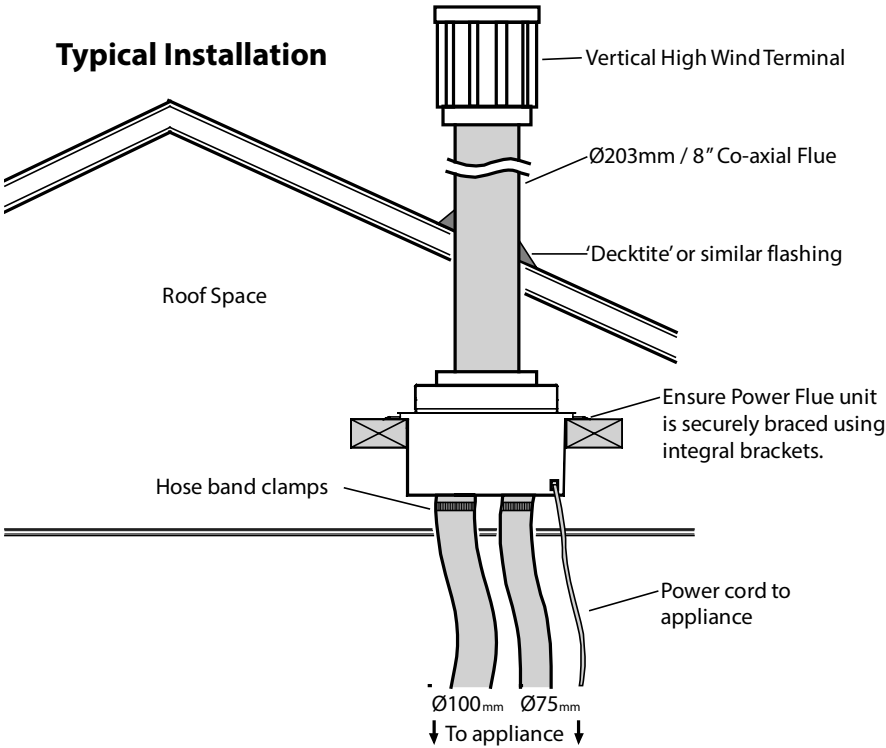
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D5 Internal Vertical Power Flue (Duravent)

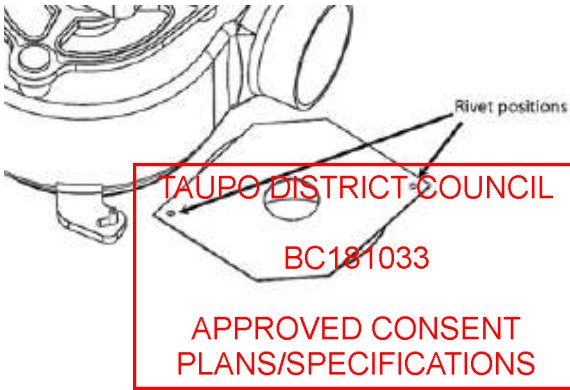
The Vertically terminated flue kit is intended for use within an accessible roof space or accessible 'chimney' construction. **Service access must be provided.**
Ensure installation complies with relevant building codes and regulations.



D6 Installation the restrictor plate (Internal Vertical Power Flue Only) (Duravent)

Every Internal Vertical Power Flue(Duravent) must have the restrictor plate fitted when installing a DL850 or DL1100. To do this:

- ☐ Remove the powerflue lid, remove the screw that secures the elbow & then slide the elbow off.
- ☐ Attach the restrictor centrally over the air inlet as shown using the two rivets provided.
- ☐ Replace the elbow, replace the screw, and then replace and secure the lid.



D7 Installing the Universal Vertical Powerflue (Internal Install)

Note: For information regarding an external install of the UVP, go to section D8.

The UVP Internal configuration is designed to have the fan, mounted within the roof space of the house, and the vertical $\varnothing 225\text{mm}$ diameter liner, containing a $\varnothing 100\text{mm}$ flexi, penetrate through the roof. The UVP internal conversion kit comes with 1200mm liner which is specific to the internal installation and must always be used.

Note: The flue setup must comply with section B2 or B3.

Use standard methods to flash the roof penetration. the installation must be weather proof and conform to all local council standards including powered flue termination rules.

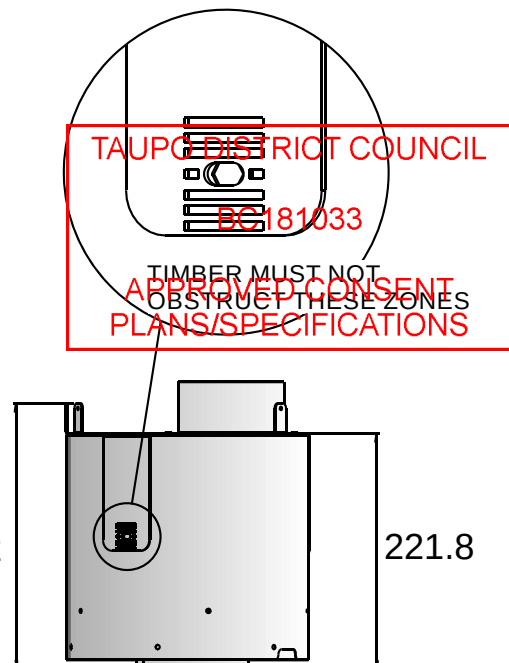
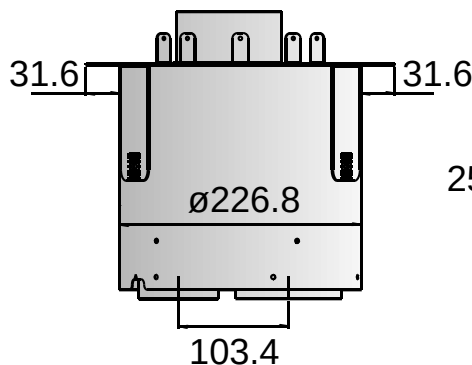
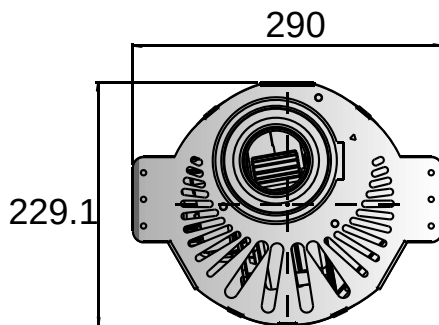
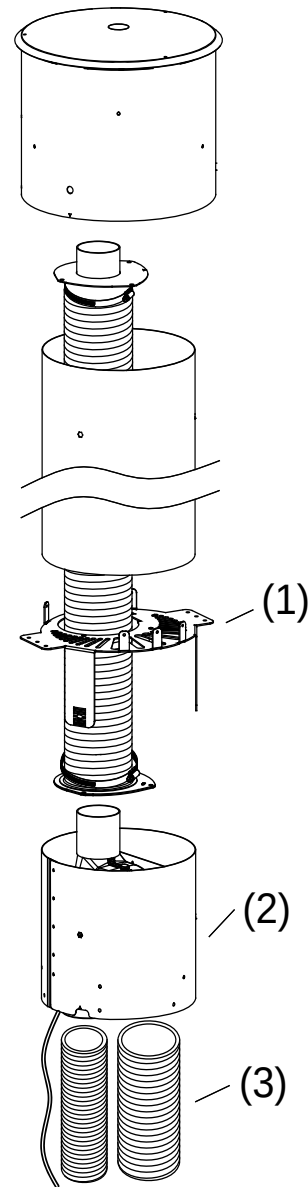
Mount the fan mount bracket(1) to the roof framing and strapping using timber ensuring that the flue is rigid and vertical. Ensure that the mounting timber does not obstruct access to the 3 x M5 screw threads on the side of the fan unit.

Aim to have the fan enclosure(2) mounted as high as possible, mainly to allow sufficient fall for condensation drainage if the flexi-flue is to run horizontally.

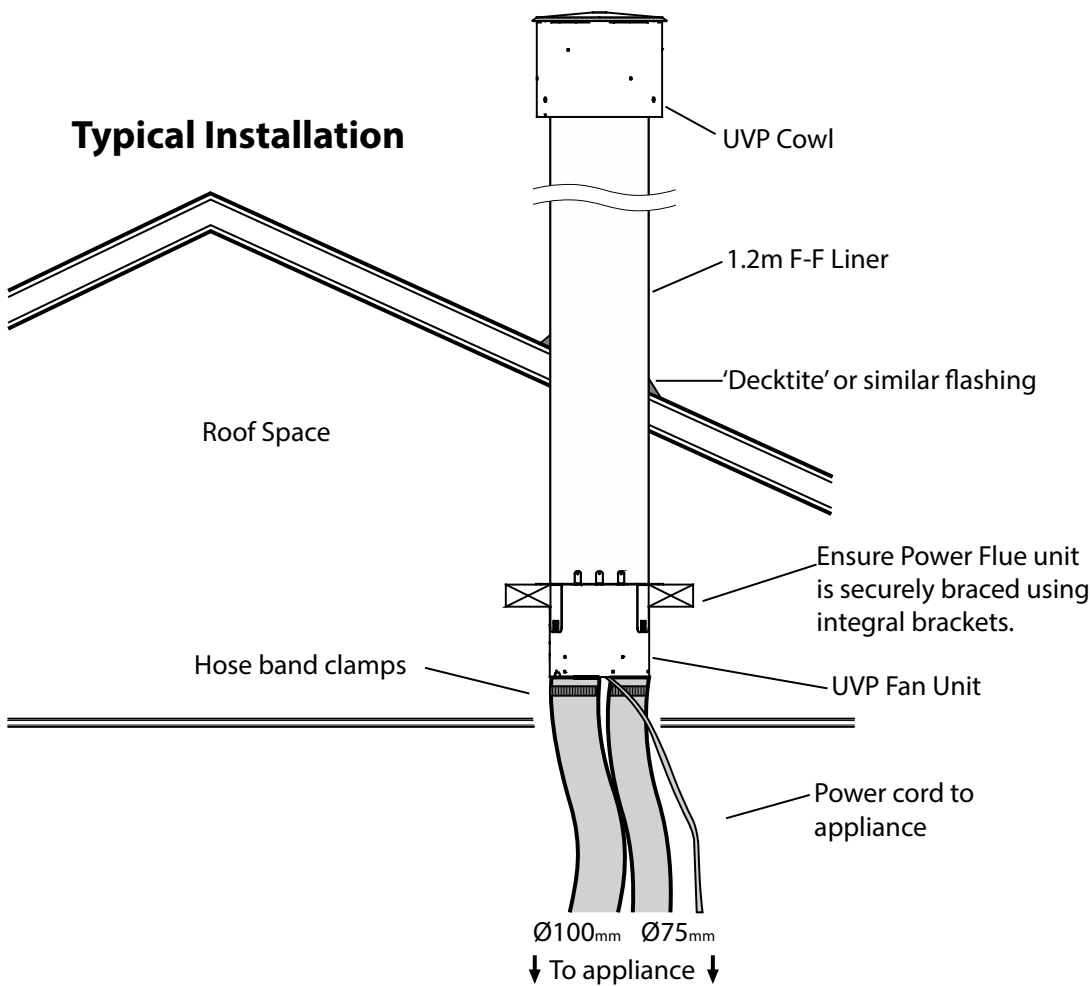
Ensure there is sufficient space below fan enclosure(2) to have access to fit the flexi-flue tubes(3) and allow flowing bends if required.

Note: The UVP-Internal and the flexi flue connections must be installed in a location accessible for service or replacement, a service hatch or removable flashing to allow access may be required.

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. **ENSURE** the $\varnothing 25\text{mm}$ restriction plate is installed on the Inlet.



The UVP-Internal kit is intended for use within an accessible roof space or ‘chimney’ construction. Service access must be provided.
Ensure installation complies with relevant building codes and regulations



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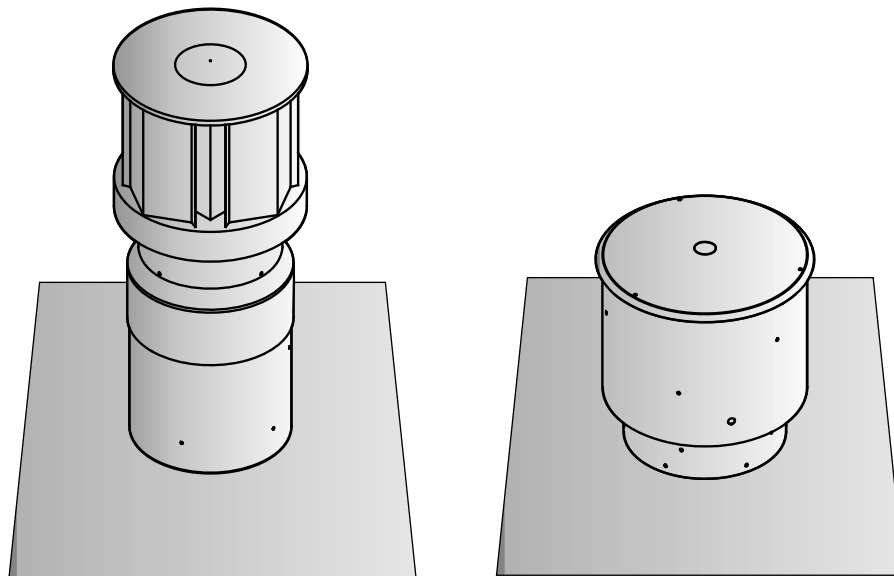
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D8 Installing an External Vertical Powerflue (EVP or UVP)

Note: For information regarding an internal install of the UVP, go to section D7.

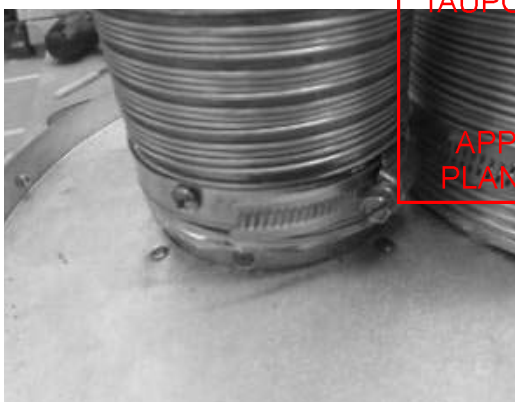
The EVP and UVP are designed to have the enclosure containing the fan unit mounted externally.

The cowl surround should be fixed in place as shown.



Depending on the kit purchased, mount the EVP/UVP kit to the top of a chimney flashing plate or penetrate the roof with an optional flue liner accessory and fit the EVP or UVP kit over the flue liner; sealing the penetration with a decktite or similar flashing. Ensure the terminal is vertical and rigidly mounted and the flexi flue attached below is fixed to the terminal spigots using the supplied hose clamps and is held in place by drilling 3 holes and screwing 3 self tapping screws evenly around each hose band clamp (as shown in the picture below).

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. **ENSURE** the Ø25mm restriction plate is installed on the Inlet.



D9 Running the Flue

Run the Ø100mm and Ø75mm flexible aluminium hoses from the cavity to the rear of where the Horizontal or Vertical Powerflue Terminal will be installed. **The flue system for the DL850 / DL1100 is zero rated, so no spaces are required between the flue and any timber framing.** Allow enough stretch in the flexible aluminium flue to allow it to be able to protrude through the wall/ceiling to enable it to be connected to the Powerflue Terminal. The flue should be expanded at each end in order for the flue to be attached to the fire / powerflue.

For information on running the PolyPro flue , see the installation manual which is supplied with the flue components.

It is advisable to secure the flexi flue at regular intervals to prevent vibration and movement. Steel wire or 'builders strapping' may be used for this purpose.
Note: The flexible flue is shipped in a 'compressed' form. Extend it to your desired length by stretching (up to 4m maximum per length).

D10 Running the Powerflue Electrical Cable

Note: The Horizontal Powerflue Wall Terminal is powered from the appliance, and must be connected to the appliance with the supplied electrical cable only.

Run the electrical cable from the cavity where the appliance will be installed to the hole in the outside wall. Ensure it is not draped over, or in contact with, the outer shell of the appliance or the flues and kept clear from any other possible heat sources, sharp edges, or moisture. Fix it appropriately and allow enough cable looped to be able to pull both the appliance and the Horizontal Powerflue Wall Terminal out from their installed positions.

END OF SECTION D

By the end of this section, you should have:

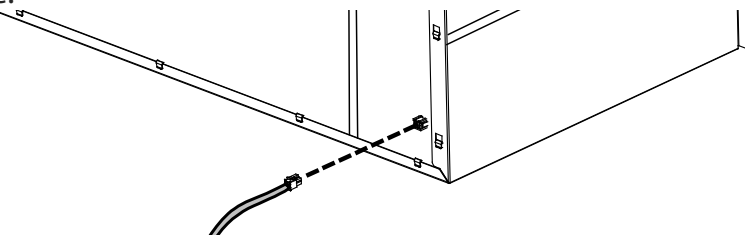
- ☐ A weather-tight installed Horizontal Powerflue Wall Terminal with clearance as specified by AS/NZ5601
- ☐ Reasonable access to the outside face for maintenance purposes
- ☐ Flue attached to the rear of the Horizontal Powerflue Wall Terminal leading back to the appliance
- ☐ The electrical cable from the Horizontal Powerflue Wall Terminal attached to the rear of the installation and run back to the appliance cavity in an electrically safe manner

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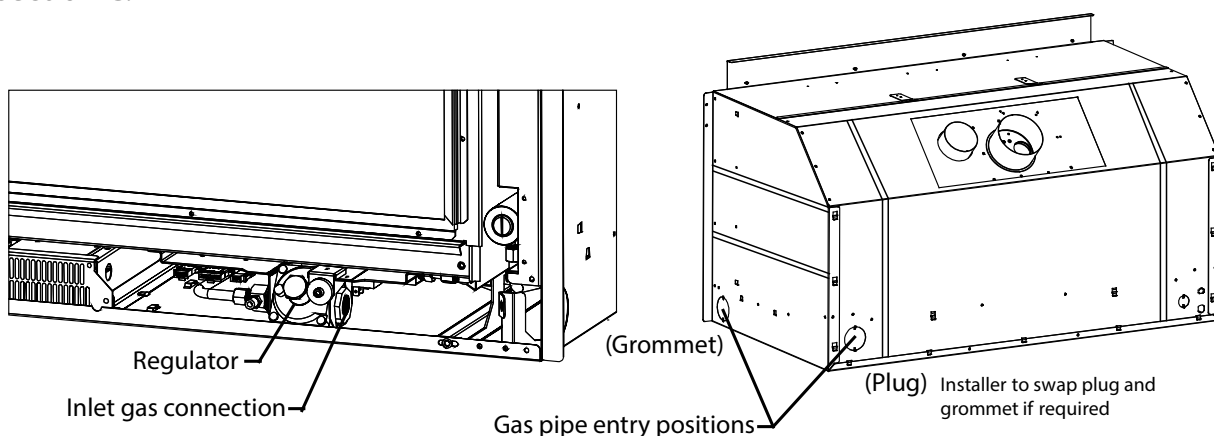
E Installing the Appliance

E1 Installation

Note: Ensure the wall has been lined and finished (plastered/painted/covered) before starting the appliance install. Plug the powerflue electrical cable into the appliance in the back right hand side.



With the appliance electrical cord plugged into the outlet in the cavity, carefully place the appliance on the cavity base and push it into the cavity. Bring the gas connection through the outer shell of the appliance and connect it to the regulator on the bottom right hand side of the appliance. The gas pipe should have already been tested as per section C.



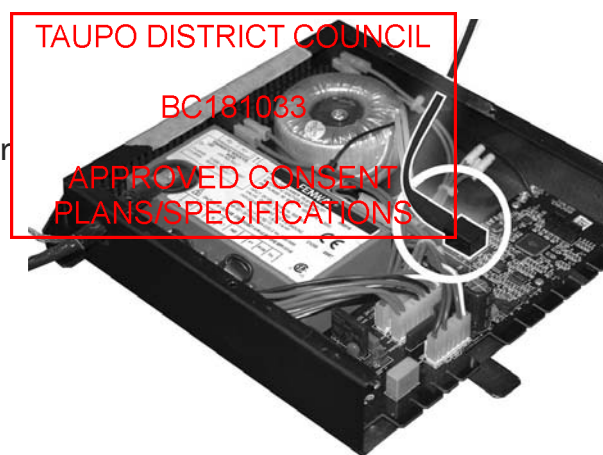
Note: If using rear entry for gas pipe (shown above), re-use the plug from the side entry position.

Note: The regulator that is supplied with the fire **MUST NOT BE REMOVED**. Removal of the regulator, or replacing it with one not intended for use with an Escea fire, will void the limited appliance warranty.

E2 Connecting the Network Cable

If a network cable is being installed for a wired connection to an internet router/network (as per Section C2) then bring the cable through the chassis as described earlier and attach it to the correct socket inside the electronic tray.

Remove the electronic tray by unscrewing the two screws at the front and pulling the tray forward and over the lip in the front of the chassis. Unscrew the four screws in the top and remove the lid. Bring the network cable through the side of the tray and plug it into the network socket. Replace the lid and electronic tray by reversing the steps above. Ensure the network cable does not interfere with the pressure switch hoses beneath the firebox and does not rest against the firebox bottom surface.



E3 Connecting the Flue

Remove the lid of the appliance by removing the two screws on either side of the top front of the appliance.

If there is not enough room to reach into the cavity the appliance may need to be pulled forward slightly out of the cavity. Stretch out the last 300mm of the flues, and reach through into the cavity and connect both the inlet flue (Ø75mm) and the exhaust flue (Ø100mm) to their respective spigots on the rear of the appliance. Orientate and position the hose band clamps to provide easy access from the front of the appliance. Tighten the flue onto the spigots by the use of the hose clamps (provided). Ensure the flue connection is as sound as possible and that the flue connection is air tight.

E4 Fixing the Appliance to the Base and Wall:

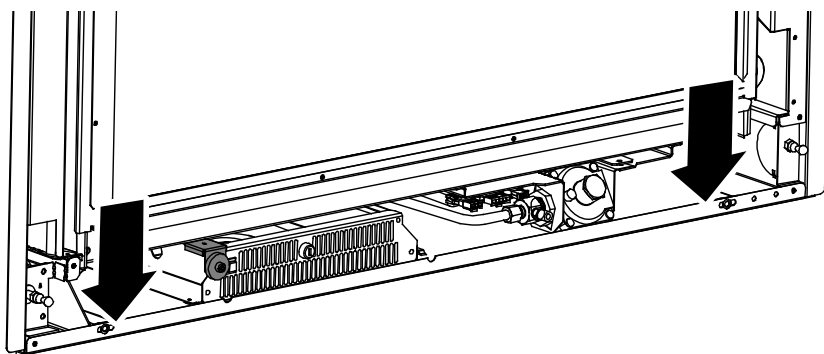
There are several ways that the appliance can be fixed against movement: It is a requirement that this appliance be securely fastened to the wall and base.

Note: It is important that the outer fascia is used during this process to ensure that the appliance is located in the appropriate position within the cavity.

E5 Fixing Appliance to Base:

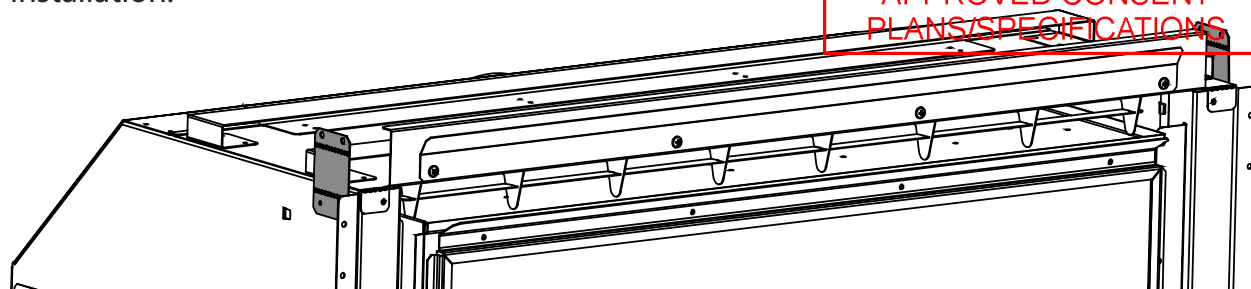
The Appliance has several holes along the front edge of the base panel that have been provided to allow installers to screw the appliance to the floor. Because of a lack of access for drilling it may be necessary to mark the appropriate location for these screws and then remove the appliance and drill holes into hard flooring.

Alternatively a socket set can be used to drive in hex headed screws.



E6 Fixing Appliance to Wall:

The installer must also fix the appliance to the sides of the cavity using the brackets on the side of the appliance shown below. These flanges can be bent to accommodate the installation.



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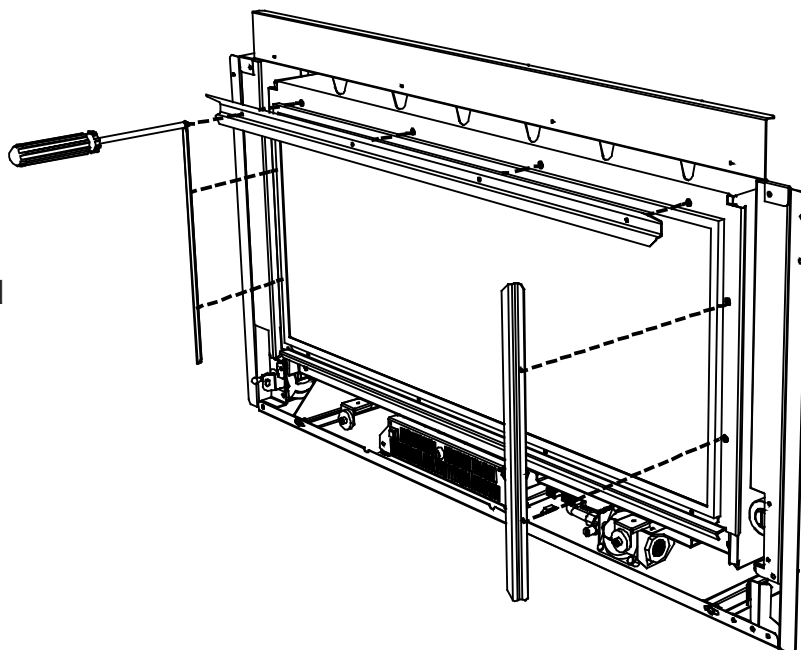
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E7 Removing the Glass

Unscrew the top glass retainer bracket and the two side glass retainer brackets. Take care that the glass does not fall forward at this stage.

Pull the top of the glass toward you slightly and lift the glass out of the bottom glass retainer. You may need to tilt the glass to achieve this.

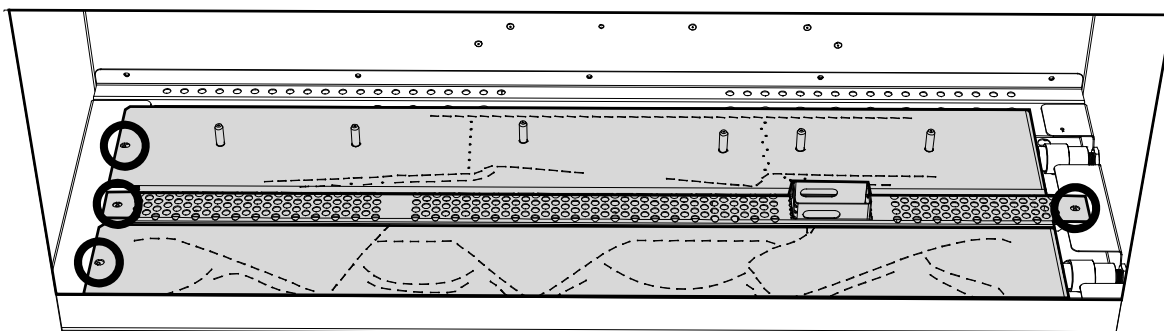
Place the glass carefully aside. Note that the fibreglass tape around the glass can mark carpet and furnishings.



E8 Converting the Appliance Gas Type

This appliance has been factory set to operate on Natural Gas only. To convert the appliance to operate on **propane or ULPG**, proceed as follows:

- ☐ Remove the small perforated shroud on the right hand side of the firebox.
- ☐ Remove the 2 screws securing the burners in place and lift out the burners as shown.
- ☐ Remove the 2 screws securing the pilot guard shown below and lift it out.



Jets	DL850 Front	DL850 Rear	DL1100 Front	DL1100 Rear
NG	Ø2.45mm	Ø2.3mm	Ø2.6mm	Ø2.6mm
Propane	Ø1.4mm	Ø1.3mm	Ø1.4mm	Ø1.3mm
ULPG	Ø1.2mm	Ø1.1mm	Ø1.3mm	Ø1.2mm

- ☐ Remove the front burner jet and replace with the correct jet as stated in the above table.
- ☐ Remove the 2 screws securing the Pilot Cover Plates and slide these out as shown on following page.
- ☐ Remove the 4 screws securing the pilot bracket and lift out the bracket and pilot hood assembly.
- ☐ Remove (un screw) the existing pilot jet and replace with the jet marked red supplied in the conversion kit.

☐ Refit the pilot bracket / Hood assembly and pilot cover plates. **NOTE: Ensure the orientation of the pilot gas ports is as shown in section E9.**

☐ Remove the aeration collars from both burners

☐ Refit the pilot guard and then burners.

☐ Turn the restrictor indicator to the vertical position as shown.

☐ Remove the regulator screw cap and screw out the nylon adjuster screw to remove the existing spring.

☐ Replace the spring with the blue spring supplied in the conversion kit and reassemble the regulator

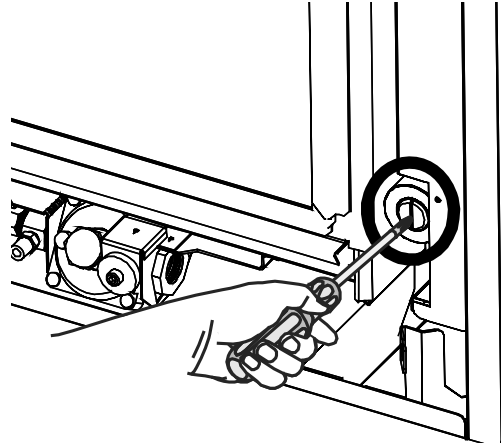
☐ Adjust operating pressure to **2.3kPa for DL1100**

(Propane / ULPG) and the DL850 (Propane) OR

2.6kPa for DL850 (ULPG) by turning the nylon adjuster screw whilst the appliance is running on maximum.

☐ Adhere the Conversion label over the top of the Natural Gas data on the appliance data plate.

☐ Adhere the 'Propane' or 'ULPG' label over the top of the existing Natural Gas label on the side of the appliance (if accessible).



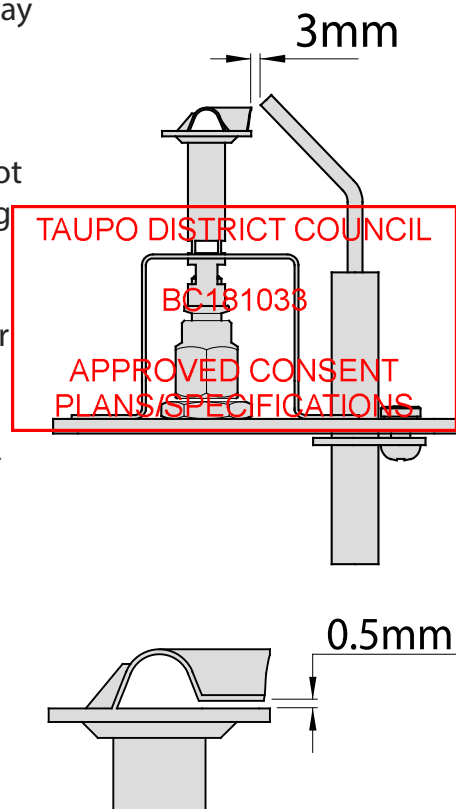
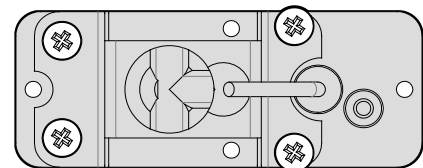
E9 Checking the Pilot Ignition

The placement of the electrode is CRITICAL to the operation of the fire. The gap is factory set but in the event that the electrode or pilot hood have moved during installation or the fire is having trouble lighting or staying lit then below is a guide to electrode placement. Ensure no logs, coals, stones or pieces of Crystalight have worked their way around the pilot guard and are touching the electrode or pilot hood.

If the appliance has difficulty igniting, ensure that the pilot hood has the correct gap for the gas to escape from using feeler gauges.

Ensure there is not an excessive carbon build up on either the electrode or the pilot hood. Clean them if necessary.

As shown below, check (and if necessary, set) the gap between the 3 pilot ports to 0.5mm



E10 Log Fuel Bed Installation

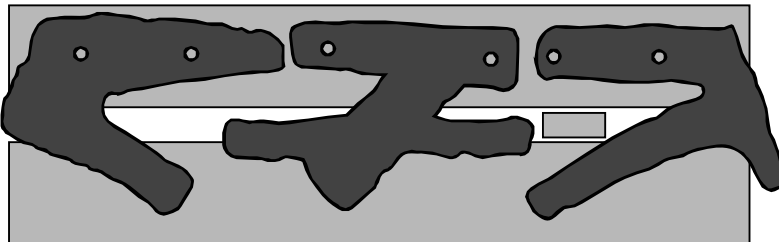
Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Starting at the right hand side, place the 'v' shaped log in place, using the pins on the rear burner to line up with the holes in the base of the log. Ensure the port pattern follows the log shape:

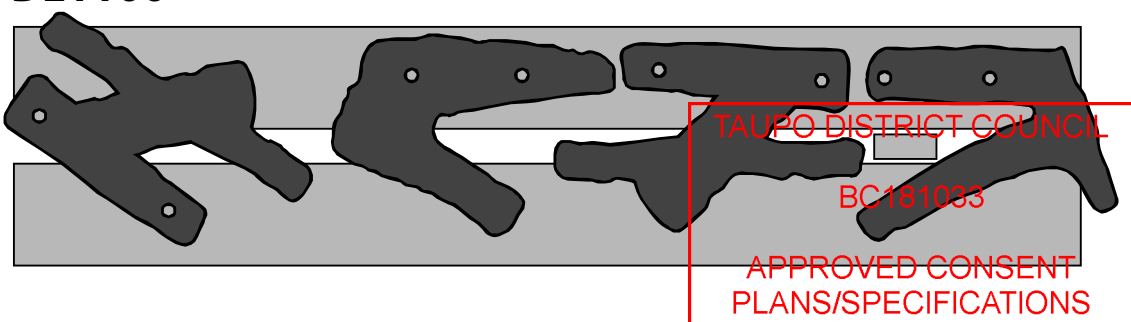


Place the other logs using the same method as above, using the diagrams below to ensure correct log placement

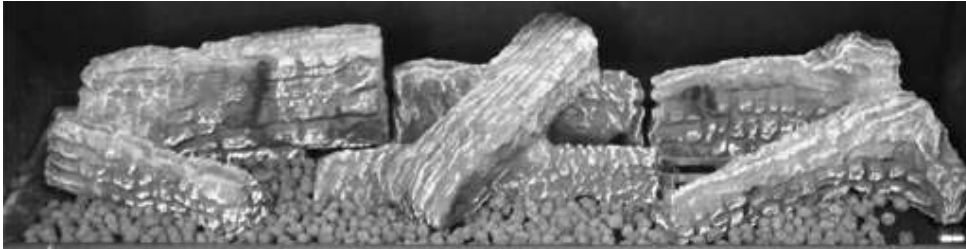
DL850



DL1100



Pour the supplied 'embers' into all the visible gaps around the front of the logs, being careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard. If possible keep the area where the pilot hood flame is directed at the burner ports clear.



Replace the glass and the three glass retainers.

Note: Improper positioning of logs may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper log placement is not covered under warranty.

E11 River Stone or Coal (Pebbles) Fuel Bed Installation

Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Place all the River Stones or Coals in a single layer atop the burners, covering the entire area. Be careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard, and if possible keep the area where the pilot hood flame is directed at the burner ports clear to aid reliable ignition.



Replace the glass and the three glass retainers.

Note: Improper positioning of Stones/Coals/Pebbles may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper Stone/Coal/Pebble placement is not covered under warranty.

E12 Crystalight Fuel Bed Installation

Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Place all the Crystalight pieces in a SINGLE LAYER atop the burners, covering the entire area. Be careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard, and if possible keep the area where the pilot hood flame is directed at the burner ports clear. Replace the glass and the three glass retainers.

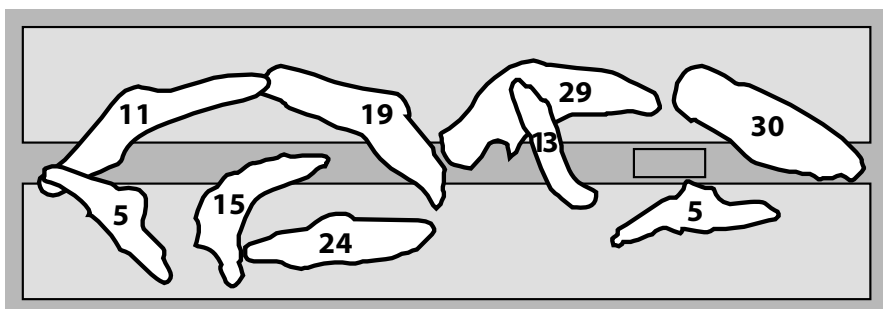
Note: Improper positioning of Crystalight may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper Crystalight placement is not covered under warranty

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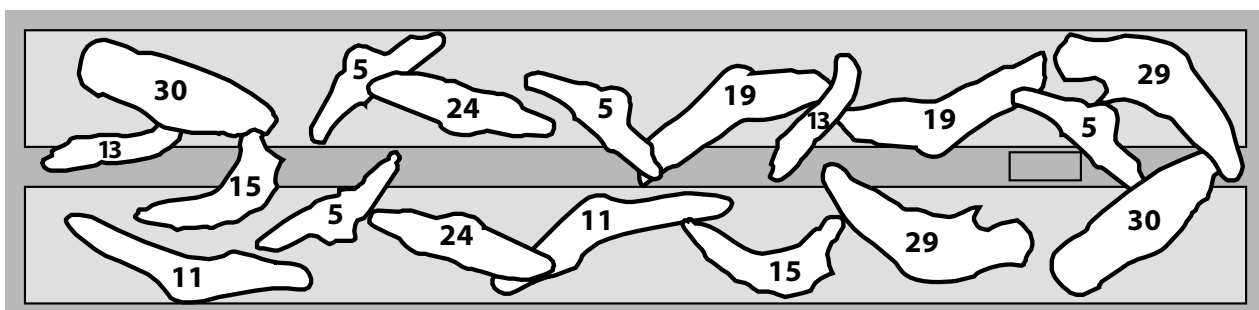
E13 Crystalight and Driftwood Fuel Bed Installation

As per E12, and then once Crystalight has been evenly spread across the base of the firebox place the supplied driftwood on top of the Crystalight as shown:

DL850



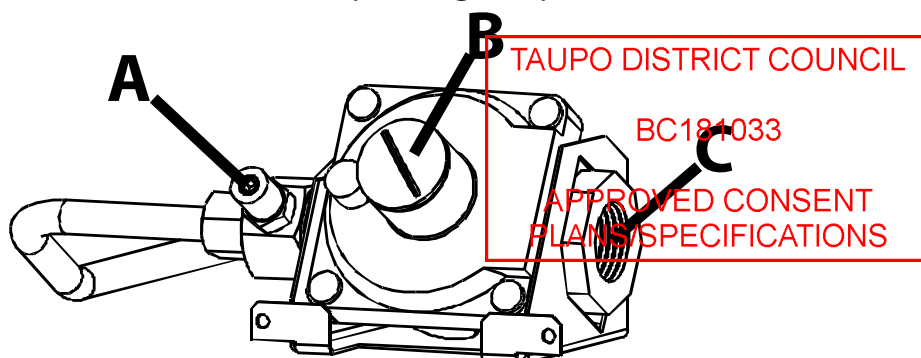
DL1100



E14 Checking the Operating Pressure

WARNING: The regulator that is supplied with the fire **MUST NOT BE REMOVED**. Removal of the regulator, or replacing it with one not intended for use with an Escea fire, will void the limited appliance warranty.

Check the operating pressure at the regulator located at the front RH corner of the appliance. This is best done before the fascia panels have been fitted to avoid fascia damage. A pressure test point is available for the operating test pressure (as shown below).



A = Operating Pressure test point

B = Pressure adjustment screw (To access first remove metal cap)

C = Inlet gas connection (1/2" Female BSPT)

☐ Check the inlet pressure to the appliance. Attach manometer tube to the first test point upstream of the appliance (typically at the gas utility meter or auto change device for a propane bottle station)

□ Run the heater on full (both burners running) and measure inlet pressure with all the other gas appliances in the building running. If pressure does not fall within the maximum or minimum pressures listed on the table below then reassess installation pipe size or upstream regulator settings.

□ Remove the operating pressure test point screw. Connect manometer tube and measure pressure with heater running on full (both burners running) and with all the other gas appliances in the building running.

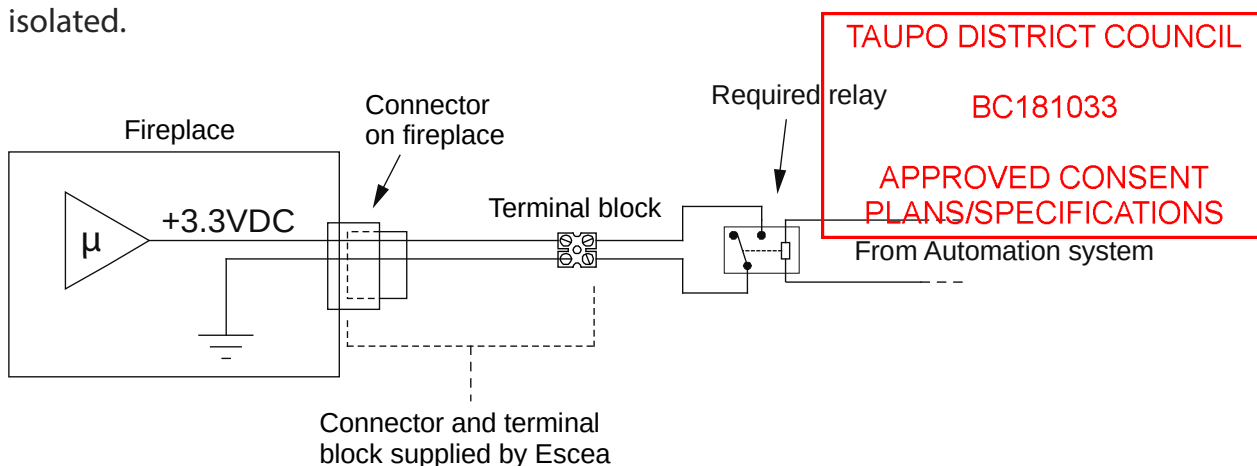
□ If the appliance has not had a gas type conversion on installation, then the appliance regulator pressure has been factory set to 1.0kPa. Please check that the operating pressure is exactly as listed and if not, adjust the screw in the centre of the regulator until the pressure is correct.

□ Replace operating test point screw and leak test both test points.

	Operating Pressures	Propane	Natural Gas	ULPG
DL850	Minimum inlet pressure	2.75kPa	1.13kPa	2.75kPa
	Maximum inlet pressure	5.0kPa	5.0kPa	5.0kPa
	Operating pressure	2.30kPa	1.0kPa	2.60kPa
DL1100	Minimum inlet pressure	2.75kPa	1.13kPa	2.75kPa
	Maximum inlet pressure	5.0kPa	5.0kPa	5.0kPa
	Operating pressure	2.30kPa	1.0kPa	2.30kPa

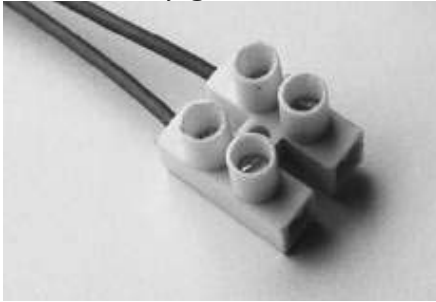
E15 Home Automation Setup

Escea D-Series fireplaces have a simple interface for connection to a home automation system. Simply put this allows the fireplace to be woken up and started and then shut down. The “Close to wake” connection shown is essentially taking one of the 3.3 volt DC pins on the fireplace micro controller and pulling it down to ground. In order to isolate the fireplace from the automaton system a relay needs to be used as shown. This allows you to use any nominal voltage to drive the relay while keeping the fireplaces 3.3V supply isolated.



Note: you will need to match the relay coil voltage with the voltage from your automaton system.

The Home Automation connection can be found inside the DL850 and DL1100 electronic tray (for access instructions see section E2). The socket is shown to the right and can be identified by green wires.



Home Automation Operation:

Relay closed

The fireplace will start in a medium setting until it receives a signal from the remote control unit (up to 4 minutes). Once the remote has communicated with the fireplace it will turn on and begin operating the fireplace thermostatically. The remote will use whatever temperature the user has previously set and cannot be altered by the home automation system. The fireplace will continue to operate while the relay is closed.

Note: If the fireplace cannot communicate with the remote controller within 10 minutes of the relay contact closure then the fireplace will shut down and return to standby. The remote controller is required to be operating within range of the fireplace for its safe operation.

Relay open

If the fireplace was operating with a closed relay then upon opening the relay contacts the fireplace will shut down and return the remote controller to its standby mode when it next updates (up to 4 minutes). While the relay is open the fireplace will be in standby mode and available for manual operation by the user.

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END OF SECTION E

By the end of this section, you should have:

- ☐ The appliance installed in the cavity
- ☐ The appliance fixed to the cavity base and wall lining
- ☐ The appliance plugged into a mains electricity supply
- ☐ The selected fuel bed installed and glass in place
- ☐ The appliance gas supply attached and pressure tested with all other gas appliances running
- ☐ Checked that the appliance ignites reliably and safely at least three times

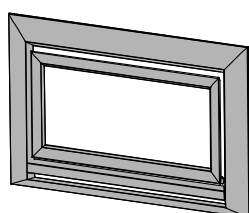
F Fitting the Fascia and Finishing Installation

F1 Fitting the Fascia Panels:

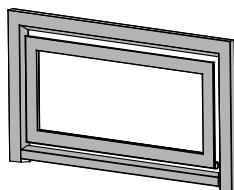
To avoid scratches or knocks to the fascia panels of this heater they must be fitted at the complete conclusion of the installation process. It may be necessary to use the outer fascia to initially locate the heater but then remove it again so that there is no chance of damage. Use the soft gloves provided whenever handling the fascia.

Never, ever rub the fascia panels. Refer to cleaning instructions supplied with fascia.

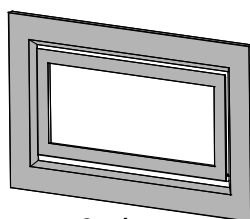
There are four fascia types available with the DL850 / DL1100:



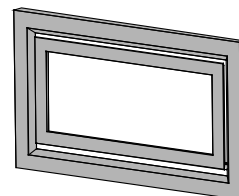
Velo (4 Sided)



Rado



Quadrato



Quadrato Lite

The fascia installation will depend on the fascia and cavity type. For:

Velo Four Sided, see section **F2**

Quadrato / Quadrato Lite, see section **F3**

Rado, see section **F4**

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A

B

C

D

E

F

G

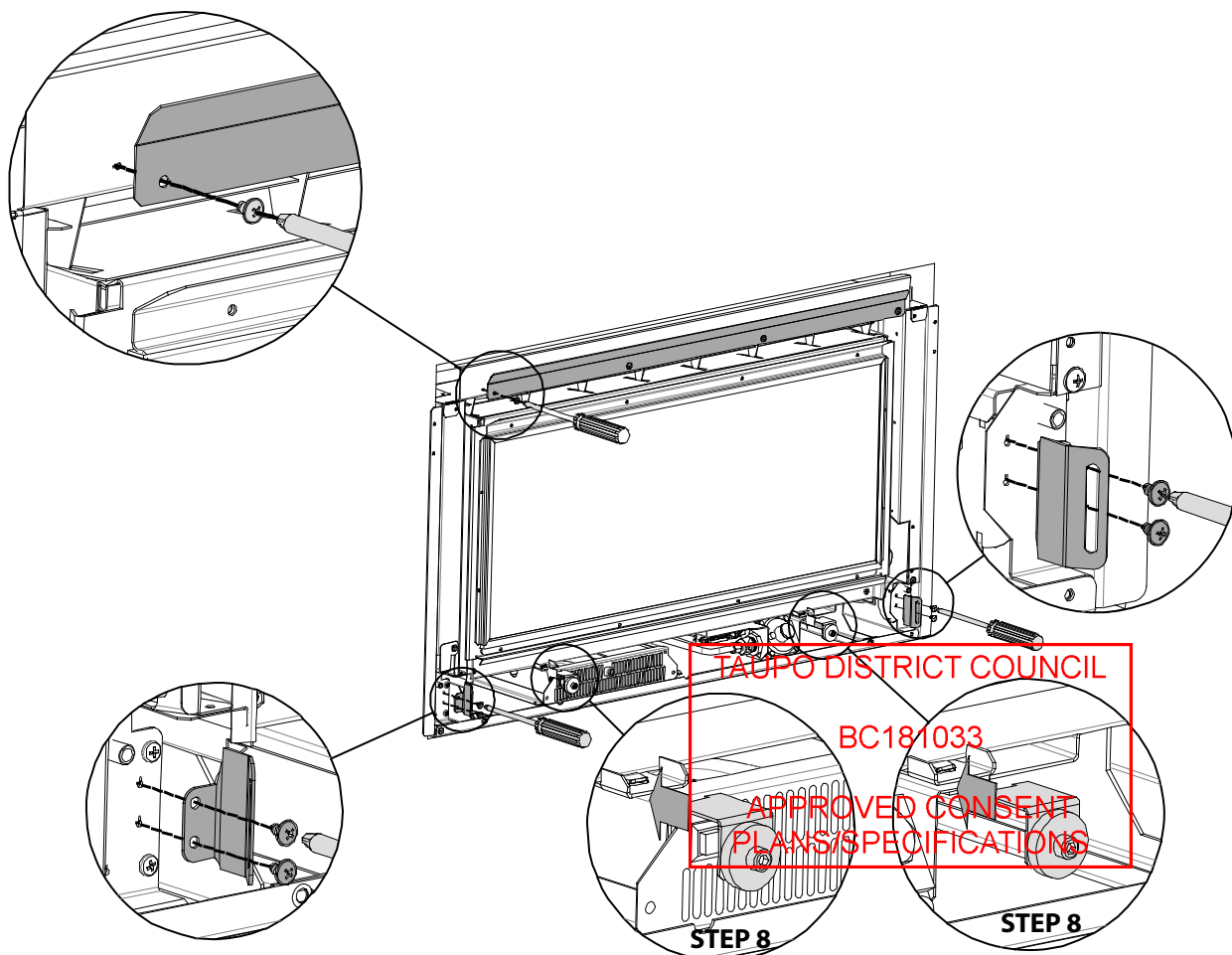
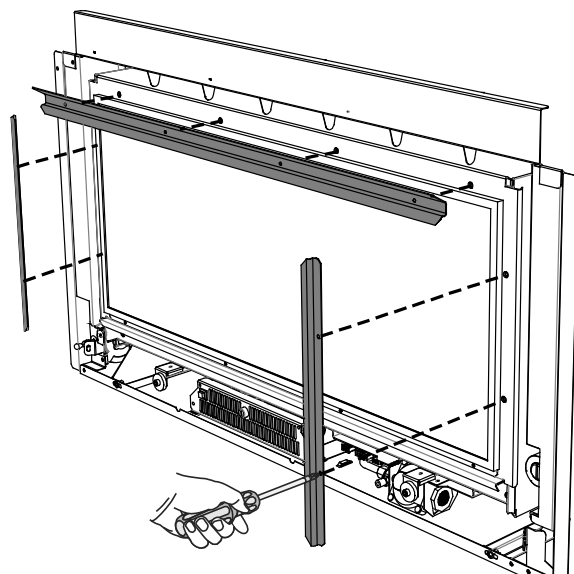
SERVICE

F2 Fitting the Velo Four Sided Fascia Panels

Step 1: Ensure the glass and all glass retainers are securely fitted. Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

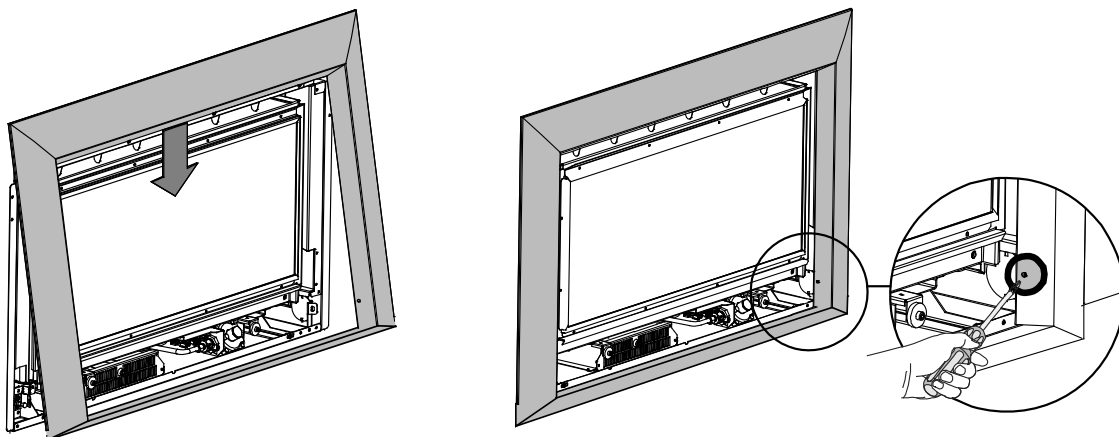
Step 2: Attach the Velo Outer Fascia Bracket to the top lid as shown below:

Step 3: Fit the Velo Outer Fascia brackets to the bottom left and right sides of the appliance as shown.

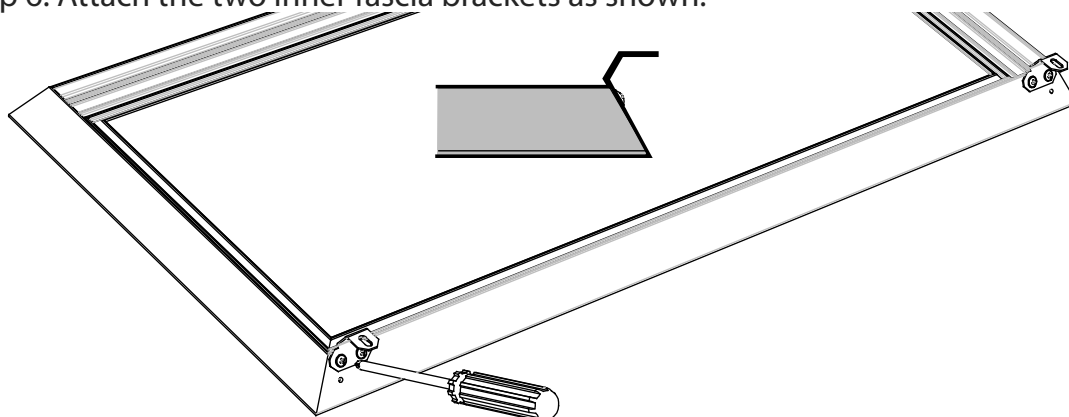


Step 4: Wearing the fabric gloves supplied with your fascia kit, hang the Outer Fascia from the Velo Outer Fascia Bracket attached to the top lid as shown

Step 5: Check that the Outer Fascia is centred on the chassis. Screw the Outer Fascia to the chassis at the bottom left and right of the Outer Fascia as shown

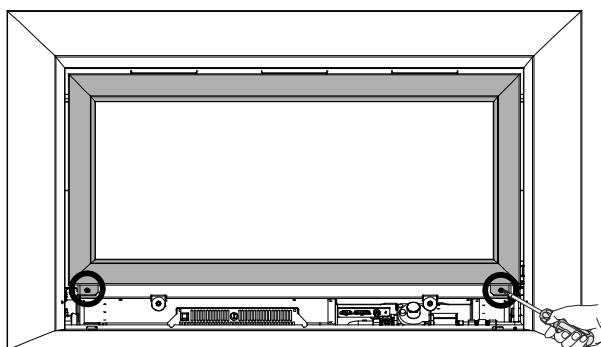
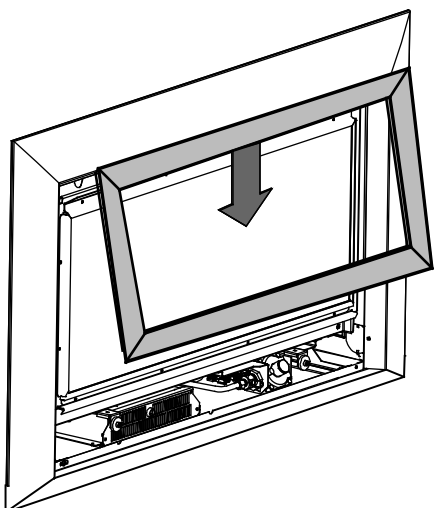


Step 6: Attach the two inner fascia brackets as shown:



Step 7: Hang the Inner Fascia from the metal bracket on the front of the firebox. Centre the Inner Fascia relative to the Outer Fascia.

Step 8: Screw the Inner Fascia to the bottom left and right of the firebox as shown

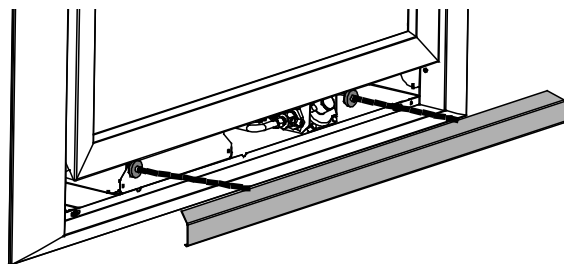


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Step 9: Push the supplied magnet brackets into position. Place the bottom fascia trim onto the magnets. If this panel does not fit, adjust the outer fascia side to side or the appliance in/out until the trim fits well.



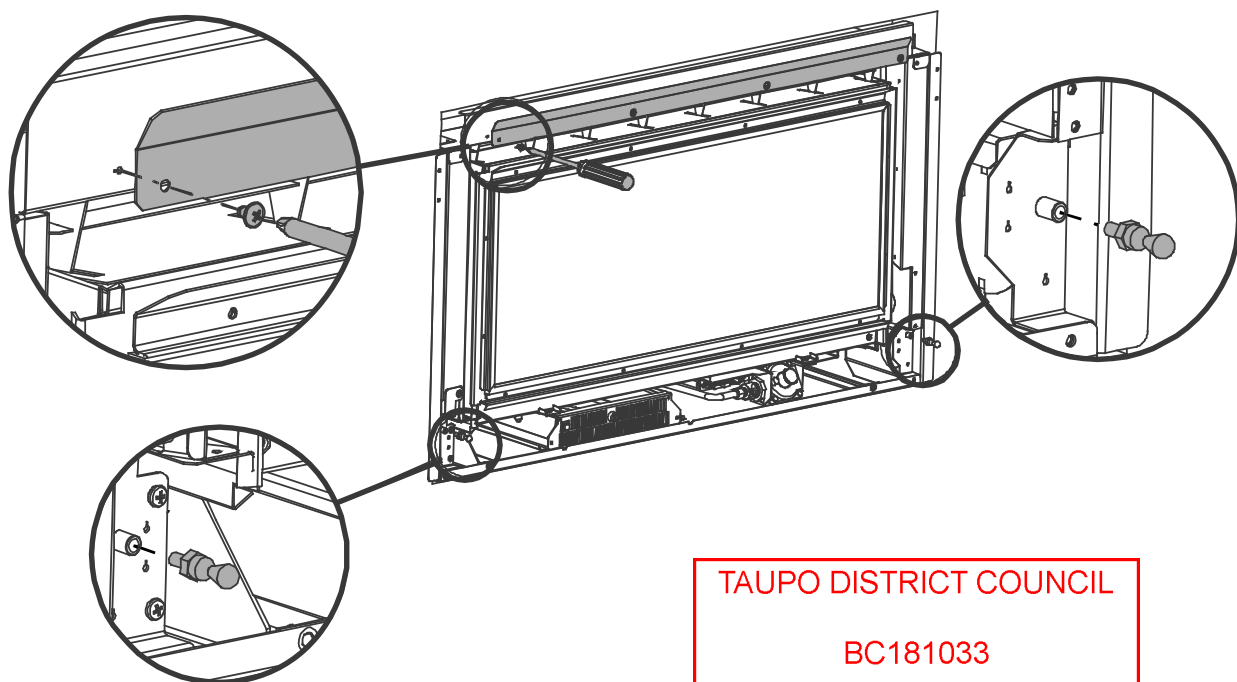
F3 Fitting the Quadrato or Quadrato Lite Fascia Panels

Step 1: Ensure the glass and all glass retainers are securely fitted

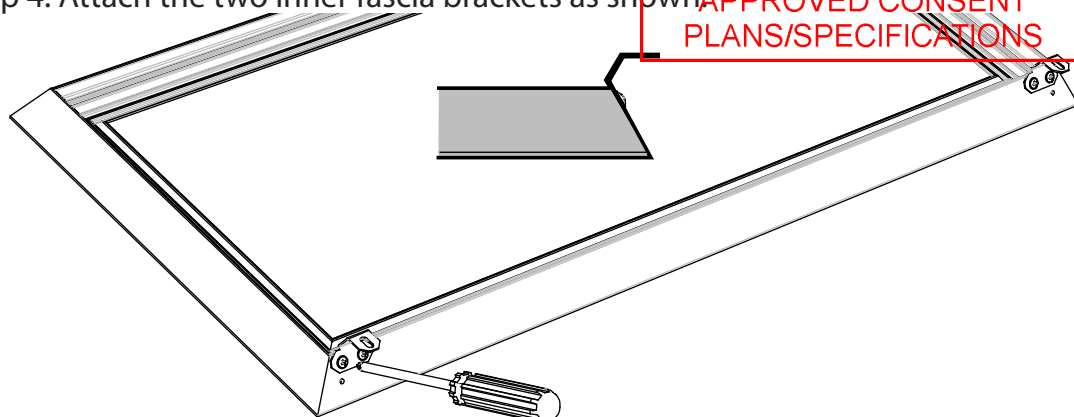
Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

Step 2: Attach the Outer Fascia Bracket to the top lid as shown below

Step 3: Screw the two Outer Fascia studs into the two brackets at the bottom left and right of the appliance as shown below.



Step 4: Attach the two inner fascia brackets as shown



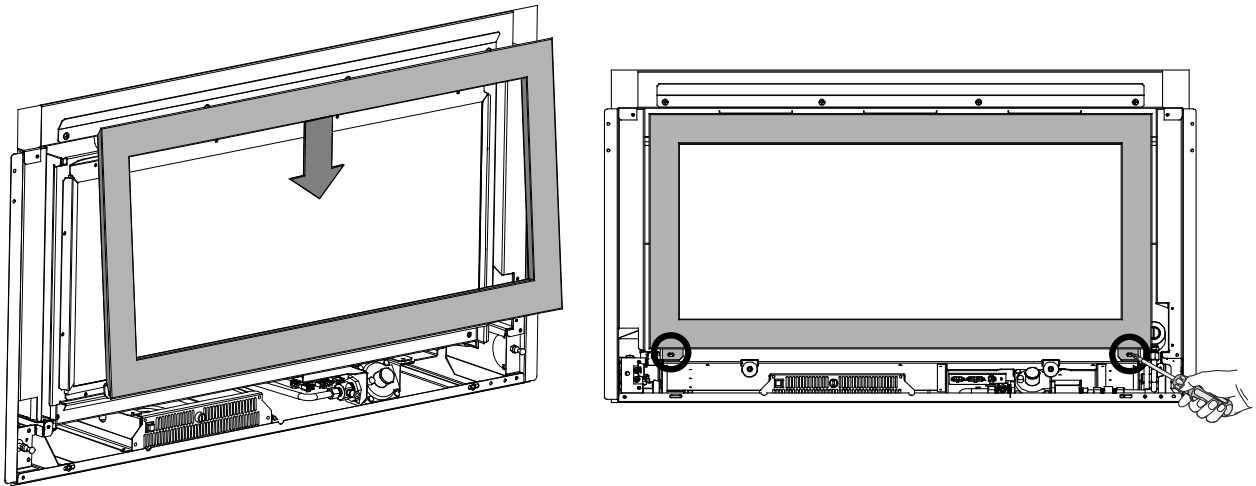
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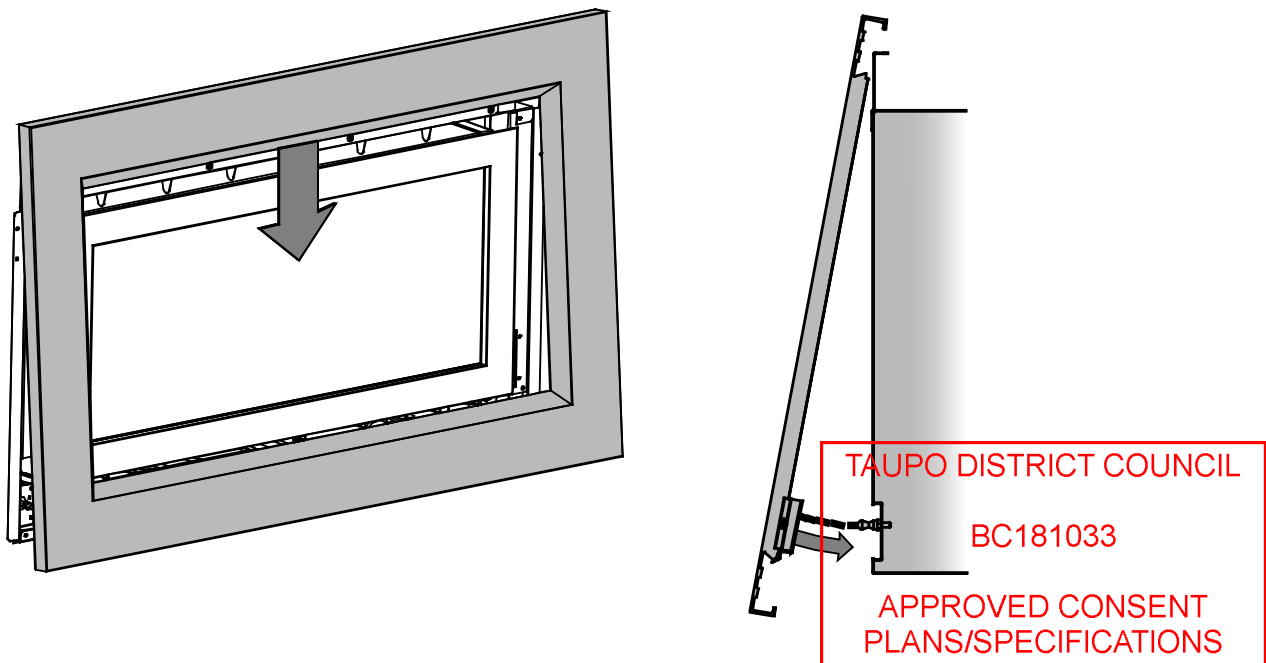
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Step 5: Hang the Inner Fascia from the metal bracket on the front of the firebox.

Step 6: Screw the Inner Fascia to the bottom left and right of the firebox as shown below.



Step 7: The Outer Fascia is now fitted over the top of the Inner Fascia. Hang the Outer Fascia (larger one) from the 30 degree flange at the top of the fireplace, being very careful not to damage either the Inner or Outer Fascias as there is not a lot of room to fit the Outer over the Inner. Once the Fascia is hung on this flange and clear of the Inner Fascia it will swing down and press firmly into place.



TAKE CARE: When securing the outer fascia, ensure it does not hit the inner fascia.

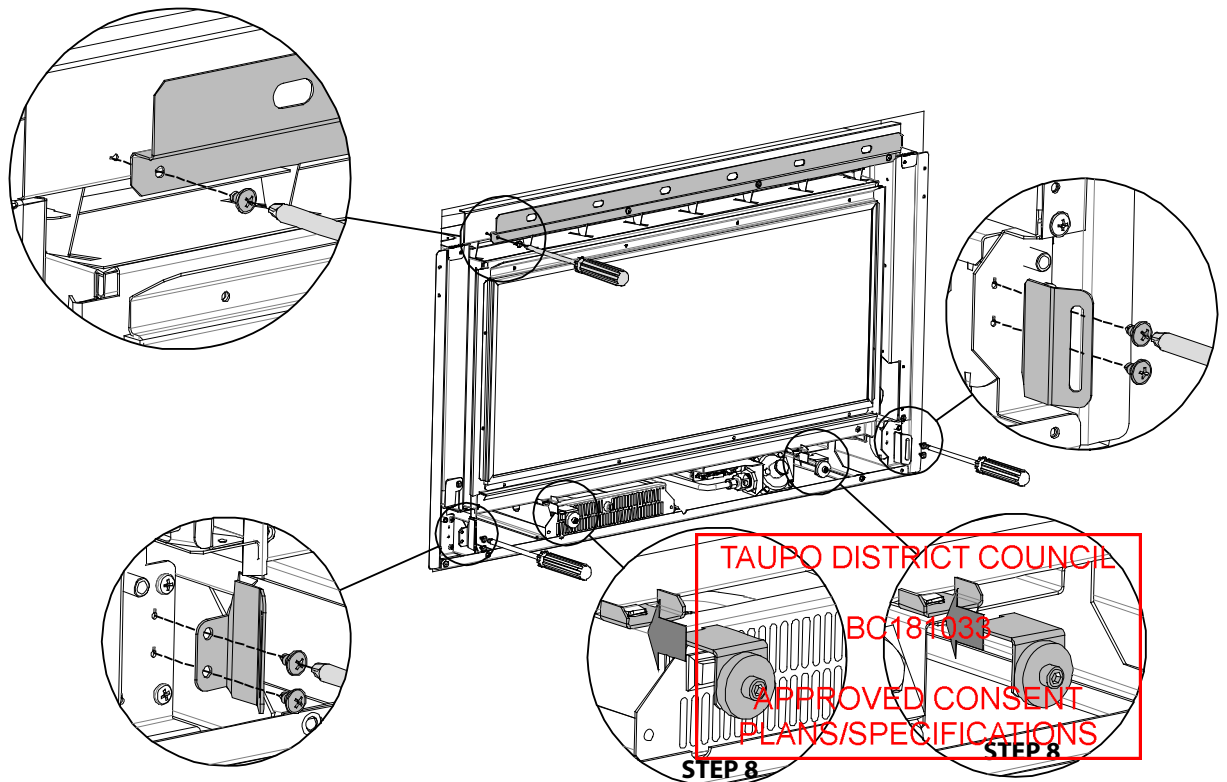
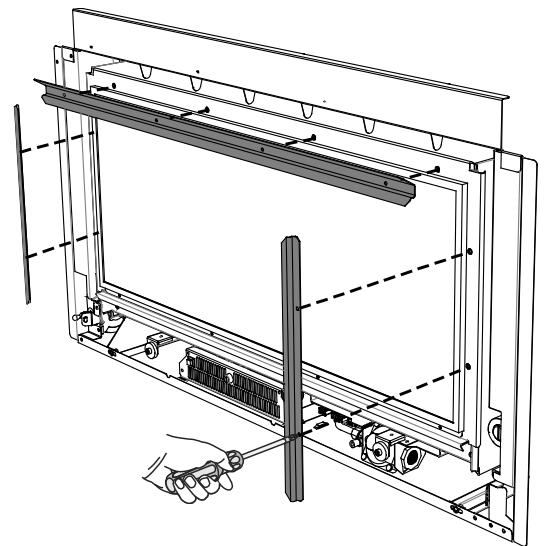
Step 8: Once it has clipped onto the fireplace check that the Fascia is parallel with the wall. The fascia installation is now complete.

F4 Fitting the Rado Fascia Panels

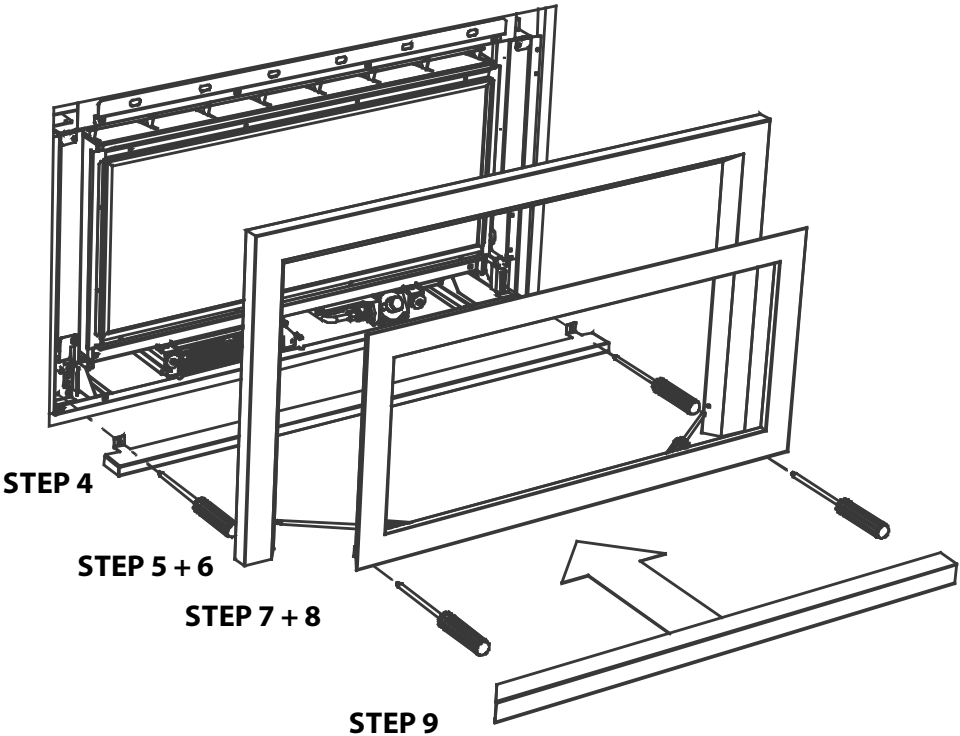
Step 1: Ensure the glass and all glass retainers are securely fitted. Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

Step 2: Attach the Rado Outer Fascia Bracket to the top lid as shown below. Note: Ensure the correct orientation of the bracket. If the bracket is installed upside down, the fascia will not fit.

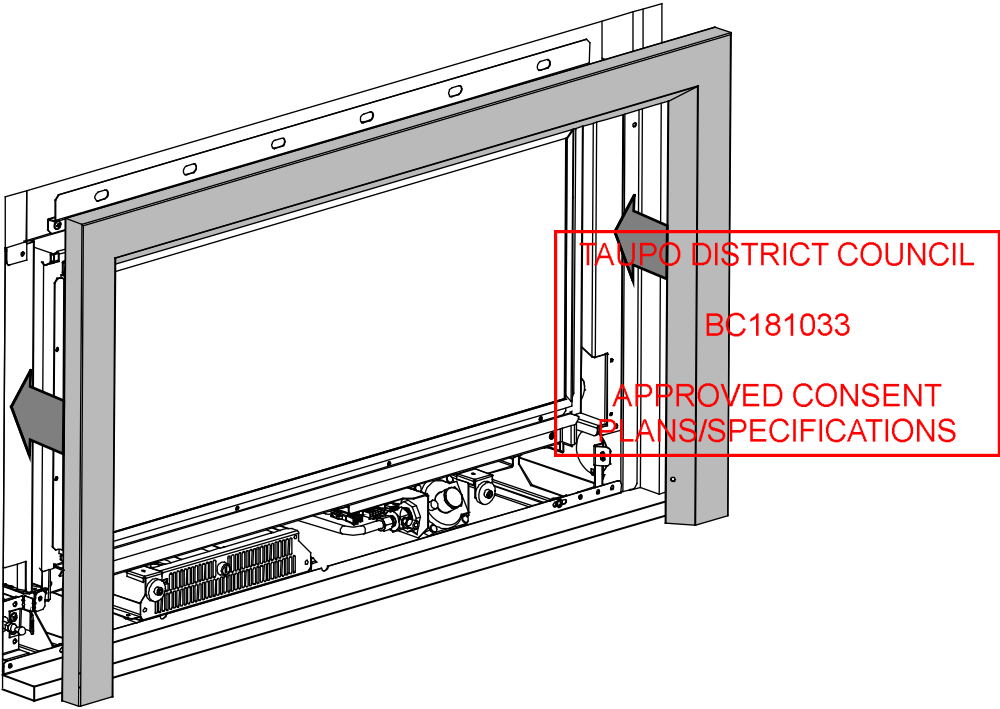
Step 3: Fit the Rado Outer Fascia brackets to the bottom left and right sides of the appliance as shown below.



Step 4: Attach the lower foot to the fascia by screwing it in the positions shown below.

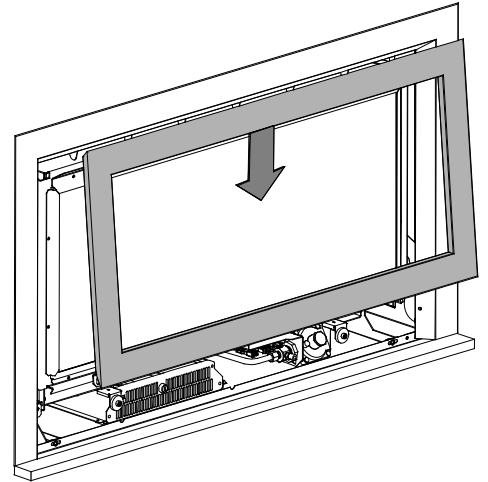


Step 5: Hang the Outer Fascia from the magnet bracket attached to the top of the fire-box. Insert the fascia so that it is parallel with the front of the gas fireplace. The Hex-nuts attaching the magnets to the fascia will locate in the holes on the magnet bracket, securing the Outer Fascia in the correct position. If this fascia does not fit, check to make sure the magnet bracket installed above is in the correct orientation.

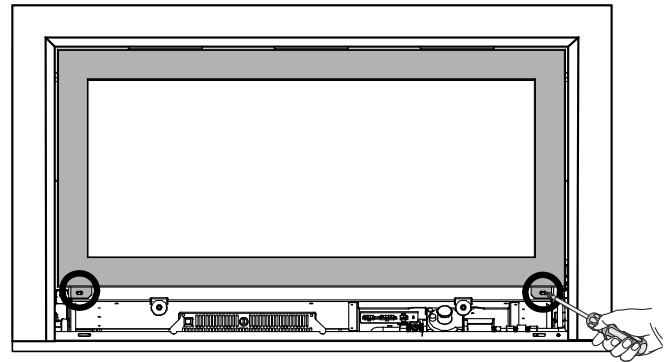


Step 6: Fit the two screws at the base of each side of this fascia. The heater may have to be adjusted in or out of the cavity to ensure fascia fits correctly.

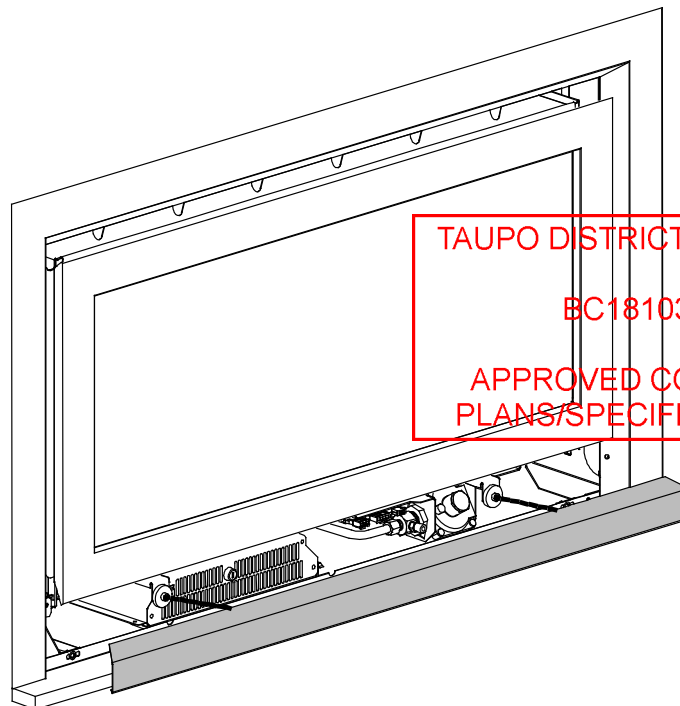
Step 7: Attach the inner fascia brackets to the Inner Fascia as per the instruction page supplied with the fascia. Hang the top edge of the Inner Fascia from the lip that extends at 45 degrees from the top of the firebox. This fascia is attached to the fire at its base by two screws. Leave the screws loose enough to be able to adjust the Inner Fascia.



Step 8: Check that the Inner Fascia is centred. If this panel is not centred, adjust the Inner Fascia side to side until the spaces on either side are even. Tighten the screws to fix the Inner Fascia in place.



Step 9: Push the supplied magnet brackets into position. Place the bottom fascia trim onto the magnets. If this panel does not fit, adjust the outer fascia side to side or the appliance in/out until the trim fits well.



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F5 **Locating Wall Mount Cradle for Wireless Control:**

The appliance’s remote contains the thermostat that will sense the room temperature and communicate this back to the heater via radio frequency.
A wall mount cradle has been provided for the wireless control and where possible the control should be housed in this cradle.

The location of this cradle should be decided by taking into account the following factors;

- Simple, convenient access for the user
- Away from air flow and drafts through the room
- The parts of the room that people are likely to spend time
- Away from direct sun light
- A suitable distance away from the heater.
- Ideally 1.2m to 1.5m from the floor

The radio frequency signal will go through some walls but for best results Escea suggest that the cradle position is between 1 and 5 metres away from the heater.

Please ensure that cradle is screwed firmly onto the wall using the screws provided.

F6 **Operating the Appliance for the First Time:**

Remove the battery cover on the rear of the remote. Insert the new “AA” size batteries, paying attention to the polarity.
You should now see on the display of the remote the time showing “0:00”.

To turn the fire on, press the “POWER” button once, and within a few seconds the appliance will begin its startup sequence.

NOTE: The appliance begins its startup with a thirty second pre-start purge, where the combustion fan runs on its own to clear the firebox before it tries to ignite. During the pre-purge the remote will alternately show the remote’s “Set” temperature and a rotating segment indicator to show that the fire is in start up mode and will try to ignite.

When the appliance has lit, set the room temperature by pressing the ‘plus’ or ‘minus’ button repeatedly until the display is showing the desired temperature. The remote will then revert back to the ‘current’ room temperature 30 seconds after making the change.

Run the appliance on full for an hour with the windows and doors open in the dwelling. This will ensure any running-in smells have the chance to dissipate.

The appliance is turned off by pressing the “POWER” button once more. The remote will display the time only.

Run the appliance again and check the operation of the thermostat by increasing and reducing the set temperature. Check the Flame Effect function and the Fan Boost functions work correctly.

For further operation instructions please refer to the User Guide.

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F7 Normal Operating Sounds and Smells:

Note: Each time the fire is lit from cold the glass may fog up with condensation. This is normal and the condensation will disappear within a few minutes once the glass heats up.

Sounds

It is possible that you will hear some sounds from your gas appliance. This is perfectly normal due to the fact that there are various types of materials used within your appliance. Listed below are some examples. These are all normal operating sounds and should not be considered as defects in your appliance.

- **Fan:**
Escea gas appliances use electric fans to push heated air further into the room. It is not unusual for the fan to make a “whirring” sound when ON. This sound will increase or decrease in volume depending on the speed setting of your fan.
- **Gas Control Valve:**
As the gas control valves turn ON and OFF, a dull clicking sound may be audible, this is the normal operation of a valve. When the fire is switched off after being run for a while, there may be popping and fluttering noises as the residual gas in the burners burns away. These are normal and should be no cause for concern.
- **Unit Body/Firebox:**
Different types and thicknesses of steel will expand and contract at different rates resulting in some “cracking” and “ticking” sounds being heard throughout the heating and cool down processes.

Smells:

The first few times the unit is operated, the unit may release an odour and the flames will appear orange caused by the curing of the paint, the burning off of the starch in the gas logs and the oils in the metal. This is a temporary curing process which will disappear with use.

F8 Cleaning the glass

A deposit on the inside of the glass, caused by the starch in the logs, may appear as a build up after several uses. If this film is not removed, it will bake on and may become difficult to remove. When the glass is cold, remove it and clean the inside with a non-abrasive cleaner.

DO NOT ATTEMPT TO CLEAN THE GLASS WHILE IT IS HOT. NEVER OPERATE THE UNIT WITH THE GLASS REMOVED.

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END OF SECTION F

By the end of this section, you should have:

- ☐ A completely fitted fascia
- ☐ The remote control mounted on its cradle on a wall
- ☐ Operated the fire and verified that it lights reliably and safely
- ☐ Run the appliance on full for an hour with the doors & windows open
- ☐ Checked the operation of the thermostat, Flame Effect & Fan Boost functions

G Installation Checklist

Go through the following checklist to ensure you have installed the appliance correctly

- ☐ Correctly sized cavity to suit your fascia and flue configuration
- ☐ Correct clearances to combustibles and mantles around the fascia
- ☐ An electrical isolating switch to the appliance, accessible after finished installation
- ☐ Correctly sized gas supply with a pressure test point, ensuring adequate supply with all other gas appliances in the dwelling running
- ☐ A weather-tight installed Horizontal or Vertical Powerflue Terminal with clearance as specified by AS/NZ5601
- ☐ Reasonable access to the outside face of the Horizontal Powerflue Wall Terminal for maintenance purposes OR
- ☐ Access to the Vertical Power Flue Enclosure for maintenance purpose
- ☐ Flue attached to the rear/bottom of the Powerflue Terminal leading back to the appliance
- ☐ The electrical cable from the Powerflue Terminal attached to the rear of the installation and run back to the appliance cavity in an electrically safe manner
- ☐ The appliance fixed to the cavity base and wall lining
- ☐ The appliance plugged into a mains electricity supply
- ☐ All gas joints and pressure points leak tested, and soapy water and drop tests completed on gas pipework
- ☐ Gas type conversion process carried out if required
- ☐ Log, coal, river stone or crystalight fuel bed correctly installed
- ☐ Glass correctly fitted
- ☐ A completely fitted fascia
- ☐ The remote control mounted on its cradle on a wall
- ☐ Operated the fire and verified that it lights reliably and safely
- ☐ Run the appliance on full for an hour with the doors & windows open
- ☐ Appliance functions checked, including thermostat operation, Flame Effect and Fan Boost
- ☐ Dwelling owner shown how to operate the appliance correctly
- ☐ Warranty card filled in with installer details and appliance serial number
- ☐ User Guide made available for end user
- ☐ Plumbing Industry Commission Compliance Certificate given to end user

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IMPORTANT:

- This appliance must be serviced every 12 months.
- Any service operation should be carried out only by a suitably qualified and trained person.
- Gas and electricity supply **MUST** be isolated before any service operation is carried out on this appliance.
- This manual should be left with the appliance.
- **DO NOT MODIFY THIS APPLIANCE.**

S1 Error Codes:

This gas fire has been designed to show error codes to help explain and identify any fault situation that occurs. These codes will appear on the wireless remote control in the form of a large letter "E" with a number beside it. Codes can normally be reset by turning the heater off then on again at the mains power wall switch.

The following table shows what each code means and possible ways to rectify the situation. In the case of persistent or repeated shutdown errors, action must be taken immediately to find and repair the fault.

Error Code	Suggestion action
 Electronics Over Temp	• Excess lint and dust build-up on the front of the controller tray. • Possibly fascia panels installed incorrectly resulting in restricted air flow. • Room air fans may be slowed or stalled. Remove firebox, check that fans are plugged in, cleaned, and free turning Note: This error has a permanent lock out and will require the unit to be reset after the initial error (turning the power to the fire off at the wall" then on again after a few seconds). BC181033
 Flame Failure or Power Flue trip	The fire has tried to light three times and failed. • Check gas supply and check other gas appliances to see if they are affected. If you have two separate propane cylinders, switch over to the full bottle or contact your gas supplier. You may need to retry igniting the fire a few times after re-establishing gas supply. • Check the electrode placement in relation to the pilot flame. Ensure it is well enveloped in flame as per the diagram in the installation instructions. Ensure no small coals have dropped onto the ignition electrodes between the burners. • Check that the fan inside the powerflue wall terminal is running during startup. This fan may need servicing if it is slowed or stalled.



Appliance Over Temperature Sensor Trip

The bimetallic snap disk mounted on the spigot seal plate at the rear of the fire has tripped. The possible causes for this could include:

- Possibly fascia panels installed incorrectly resulting in restricted air flow at the top of the fire.
- Room air fans may be slowed or stalled. Remove firebox, check that fans are plugged in, cleaned, and free turning
- The gas regulator being set too high resulting in excess heat build-up.
- The inlet flue not being connected and the appliance drawing warm air from the cavity. Check flues are securely connected at both ends.



Valve Solenoid Check Failure

The valve solenoids have failed the pre-ignition test. This is to detect a faulty valve solenoid. However, it is possible a wire has dislodged.

- Check that the connections to each solenoid are secure and in place. It may be that the connections on the ends of the wires need to be tightened a little (e.g. with a pair of pliers) to ensure a robust connection to the valve terminal.
- Disconnect and reconnect the firebox connectors ensuring they are firmly pushed into place.
- It could also be that one of the solenoids on the valve inside the fire has failed. If this is the case the valve will need to be replaced.



Remote Cannot communicate with fire

The remote cannot communicate with the fire. Reasons for this could include:

- The fire being turned off "at the wall" i.e. a loss of power to the fire or the remote is outside of its effective radio frequency range (too far away from the fire). Typical remote range is 1m to 5m.
- Ensure there is power to the fire by pressing the auxiliary on/off (red) button on the fire, then press the on/off button on the remote to clear the error.



Combustion Air Flow Error

- Check whether the pressure switch is activating at startup (there is an orange indicator LED in the control tray which should be lit). If not check the pressure switch electrical connection is correct.
- Check that the hoses are connected at both ends. Ensure the hoses are not kinked.
- Ensure the pressure switch is mounted vertically and the diaphragm is operational. The grey hose should be connected to the low pressure port and the translucent to the high pressure port
- Check that both flues are securely connected at both ends to the appliance and the powerflue wall terminal and that the flue is not damaged

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S2 Serial Number:

The serial number for the fire can be found in two places. The first is in the battery compartment of the wireless remote under the batteries. The second is on the data sticker on the chassis under the firebox on the left hand side.

S3 Checking Operating Pressure:

See section E14 of this manual.

S4 Cleaning the Log Set and Glass:

NEVER RUB THE FASCIA. The outside of the fascia's must only be cleaned with a clean damp cloth, dry off after cleaning. The high temp silver powder coating that is used on Escea fascia parts contains certain amounts of aluminium that when rubbed too hard will oxidise leaving a black smudge that cannot be removed. Always clean when cold.

This is a service procedure that will need to be carried out whenever soot builds up on logs and/or inside of glass. If soot build up becomes excessive or regular then one of the following actions may be required;

- Reset gas pressure, pressure may be too high;
- Reposition log set so that front edge of each log is just behind each row of holes in burner top;
- Clear any blockage from primary air port of burner;
- Check flue tube is not damaged or disconnected.

For diagrams and further info on removing your fascia, reverse the steps found in section F.

- Remove fascia bottom panel by pulling it off the magnets that retain it to the fire. Remove the 2 screws holding the inner fascia, lift off the inner fascia by pulling the base of the inner fascia out and lifting it up and off.
- Unscrew the side and top glass retainers and remove them. Take care that the glass does not fall forwards at this stage.
- Lift out glass and place it carefully aside.
- Take out fuel bed and gently brush any soot from log with a soft hearth brush. The burner tops can be vacuumed to remove any excess material.
- Clean the inside and outside of glass with normal glass cleaning products. Use a CLEAN DRY cloth only. Stubborn marks may be cleaned with a ceramic glass cleaner.
- Replace in opposite order and test run heater.

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S5 Servicing the Horizontal Powerflue Wall Terminal

If the Horizontal Powerflue Wall Terminal needs servicing, the fan can be accessed from the outside of the installation.

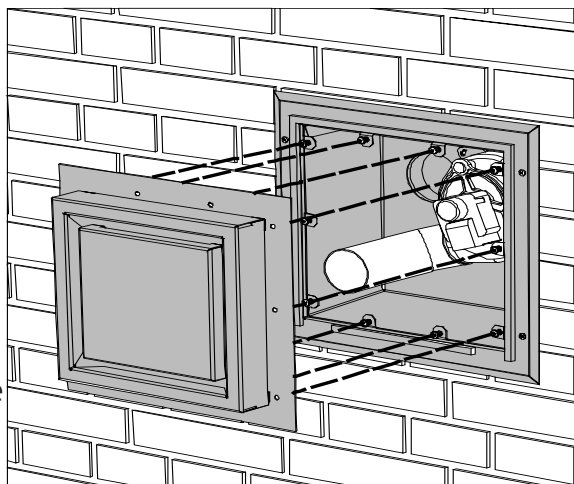
Ensure the power to the Horizontal Powerflue Wall Terminal is off by disconnecting the power to the appliance inside. If the appliance has been running, allow the terminal to cool before attempting to service it.

Undo the ten screws holding the outer cowl in place and pull the whole plate and cowl

directly outwards. Note: Be careful of any flashing that may have been installed above the terminal.

Removing this plate gives complete access to the fan for servicing or replacement.

Check that all the seals are still intact. Check the fan electrical terminals, motor and impellor are not corroded. Ensure there is no signs of leakage in or around the terminal.



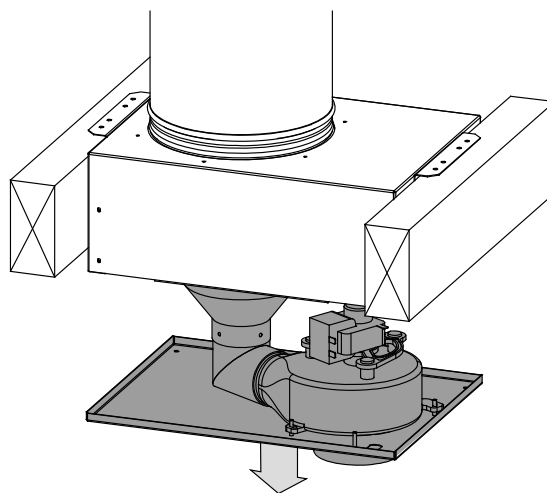
When reassembling the terminal, line up the round silicon grommets with the outlet tube of the fan and push the cowl back into place. Ensure all seals are still in place and replace all of the screws to hold the cowl in the correct position.

Servicing a vertical Powerflue:

If the vertical Powerflue needs servicing the fan can be accessed without disturbing the final twin walled flue length or roof terminal.

To gain access to the fan and electrical terminals remove the eight screws that hold the base of the Powerflue to the lid, making sure to support the base while removing the screws.

Note: When inspecting or working on the Powerflue take care not to damage the two flexible flue pipes that connect to the Powerflue base.



Once the base has been removed clean away any dust or debris found and check that the fan electrical terminals, motor and impellor are not corroded. Also check for signs of leakage in or around the Powerflue.

When reassembling the Powerflue support the base under the lid and replace the 8 securing screws. After assembly check that the two flexible flue pipes are not damaged and that the twin walled final flue length and roof terminal are still sealed.

Note : Take care not to trap any wires between the base and lid of the Powerflue when reassembling.

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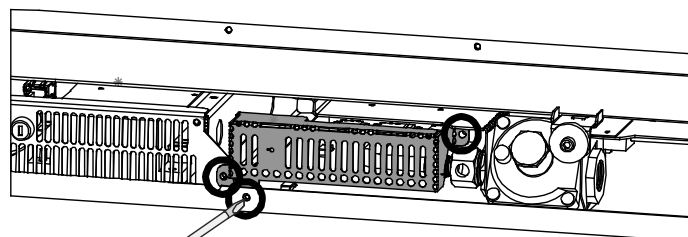
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S6 Removing or Cleaning Fan

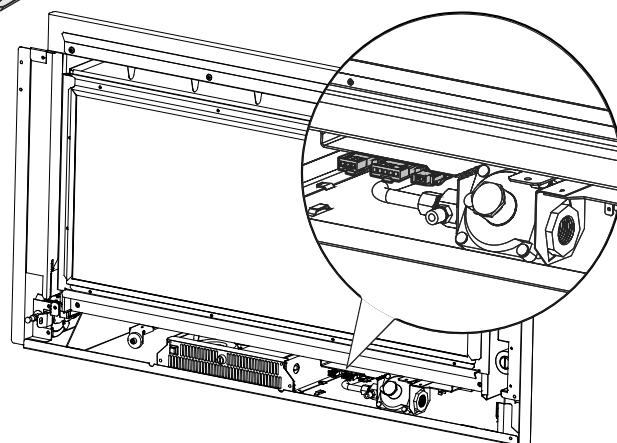
As part of regular service procedure, it is recommended that the fan is removed for cleaning. Dust will build up on the fan rotor and in the cavity where the fan is located. This can be removed by the service person using a hearth brush and a vacuum cleaner. ISOLATE THE POWER AND GAS SUPPLY TO THE FIRE BEFORE COMMENCING THIS PROCEDURE

Step 1: Remove the inner/outer fascia, front glass, and log set as described in section S4.

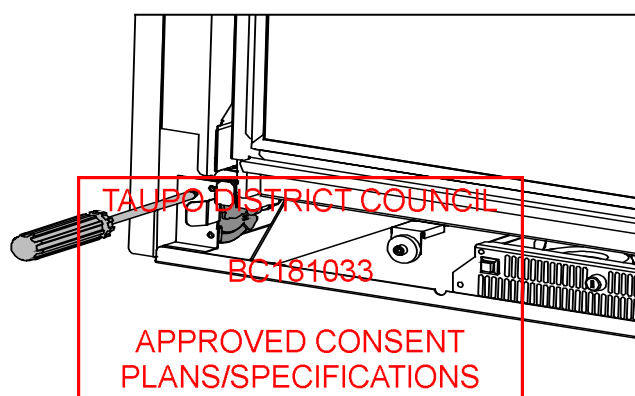
Step 2: Remove the guard covering the electrical connections and earth lead by removing the 3 screws.



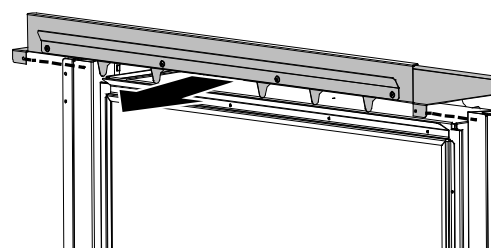
Step 2: Disconnect the gas supply from the fire and unplug the three wiring looms connecting the valve and spark electrode on the bottom right of the fire box. Unscrew the earth strap



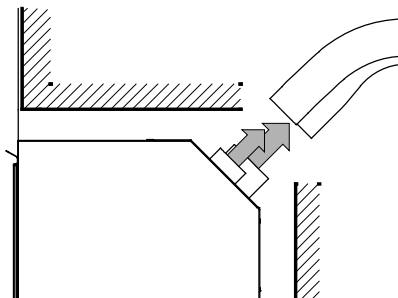
Step 3: Remove the 2 screws holding the pressure switch bracket. Carefully pull the switch out and remove the hoses from the rear of it.



Step 5: Remove outer shell top by removing the screws in each corner and sliding out.

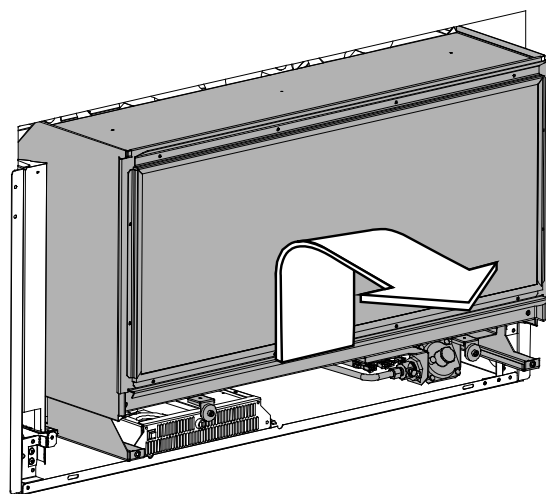
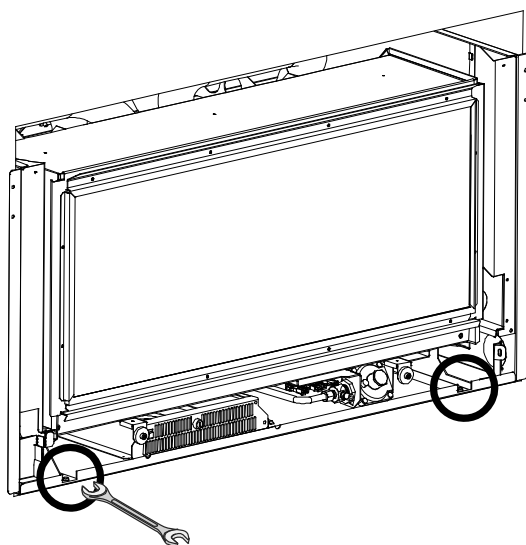


Step 6: Reach in and loosen the clamps holding the flexible inlet and outlet tubes and detach them from the fire.



Step 7: Remove firebox from heater by taking out the screws from the bottom corners, lifting the firebox over the chassis lip and pulling firebox directly outwards (as shown).

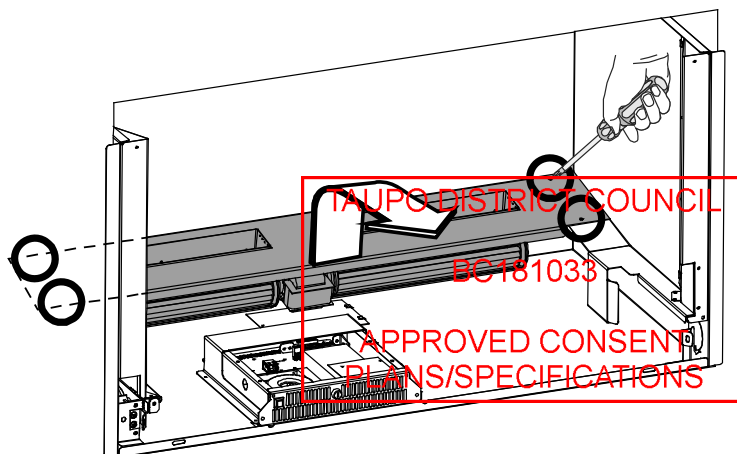
Note: Proceed with caution as the firebox assembly is heavy. Be aware of the components on the underside of the firebox that could easily be damaged.



Step 8: Take out the 4 screws on top of fan plate assembly.

Step 9: Unplug wires lift the fan unit up and out to fully remove fan assembly.

Step 10: Clean fans, removing all dust build up.



Step 11: Replace fan assembly and firebox by repeating these steps in reverse order.

NOTE:

- ☐ Ensure the earth strap is reconnected (Screwed) into the electrical guard (step 2)
- ☐ Ensure the Pressure Switch hoses are connected to the correct nozzles without any kinks or restrictions. These can be identified by an "H" (high) and "L" (low) labelled on the hoses and the pressure switch. (step 3)

S7 Replacing Electronic Drawer

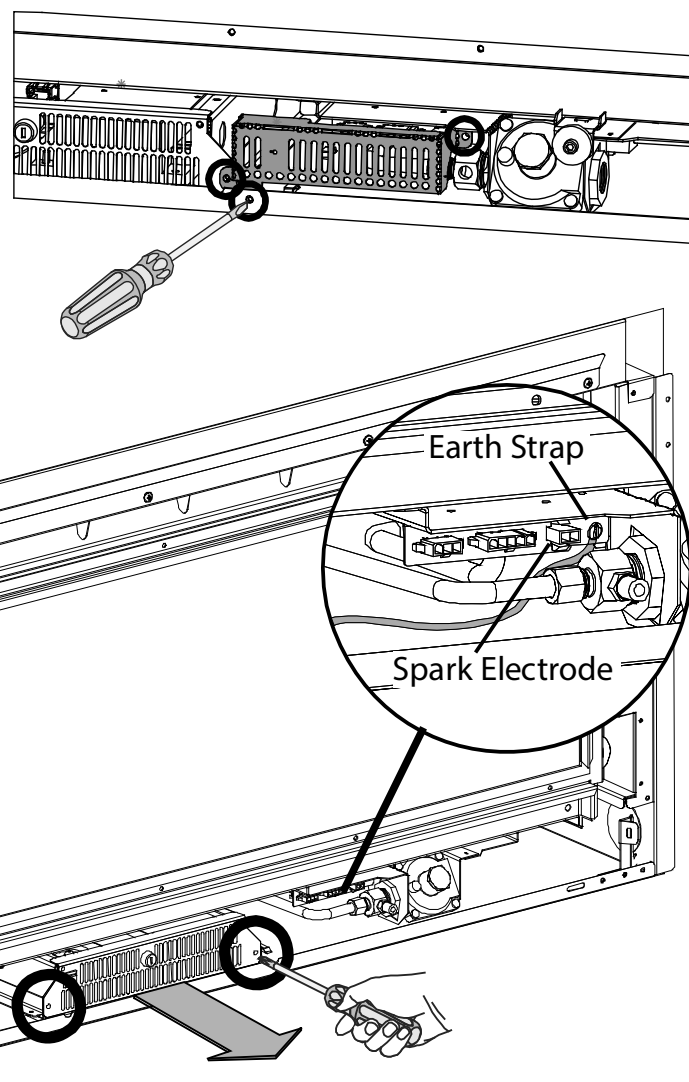
ISOLATE THE POWER TO THE FIRE BEFORE THIS PROCEDURE.

All of the electronic components of the heater have been located on a removable drawer. This drawer is located under the firebox, near the front left of the appliance. On the back of the drawer are two large connectors that unplug as the drawer is removed.

Remove the protective grill from in front of the electrical connections (shown in first diagram) and unplug electrode wire from firebox and remove screw holding earth strap to firebox. Take out the two screws at each end of the electronic drawer and pull drawer outwards and up slightly to clear the chassis lip. If an ethernet / network cable is con-

nected the lid of the drawer will have to be removed and the cable unplugged before the drawer is completely extracted from the fire.

Reverse this procedure to refit. Ensure drawer is fully seated into the draw housing.



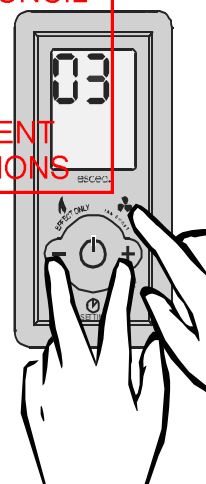
S8 Replacing a Wireless Control:

If the wireless control becomes lost or damaged, a new one can be ordered from any Escea retail agent. When you have the new remote, the following procedure needs to be followed to "teach" the remote to only communicate with that fire.

1. Ensure the fire and remote are set to "Off" (only the time is displayed on the remote).

2. While the remote is in its "OFF" mode with only the time showing on the display, press the MINUS (4), PLUS (8) and FAN BOOST (7) buttons simultaneously (as shown right) until the characters "03" light up on the display. Release the buttons and the remote will count down and display "GO". The screen will then display all characters. This will put the remote into test mode and the two big temperature digits should begin counting from 0 to 99 repeatedly.

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3. Press and hold the – (minus) button until the two large temperature digits reading 00 start to flash slowly. Release the – (minus) button. The remote control is now ready to be addressed to the fire.

4. Press and hold the red auxiliary on/off button (found on the front face of the fireplaces electronic drawer, shown on the left with an arrow) for a minimum of eight seconds, or until the two large temperature digits start counting upwards from 00 to 99 repeatedly on the remote control.

Note: Pressing the red auxiliary button on/off button will start the fire. Once the remote control is counting the fire can be turned off by pressing the red auxiliary button again.

5. Press the large power button in the middle of the remote control to exit the test mode and return to normal operation. The remote should only be displaying the time. Check the fire will start using the remote control by pressing the large power button. Turn it off again using the remote control.

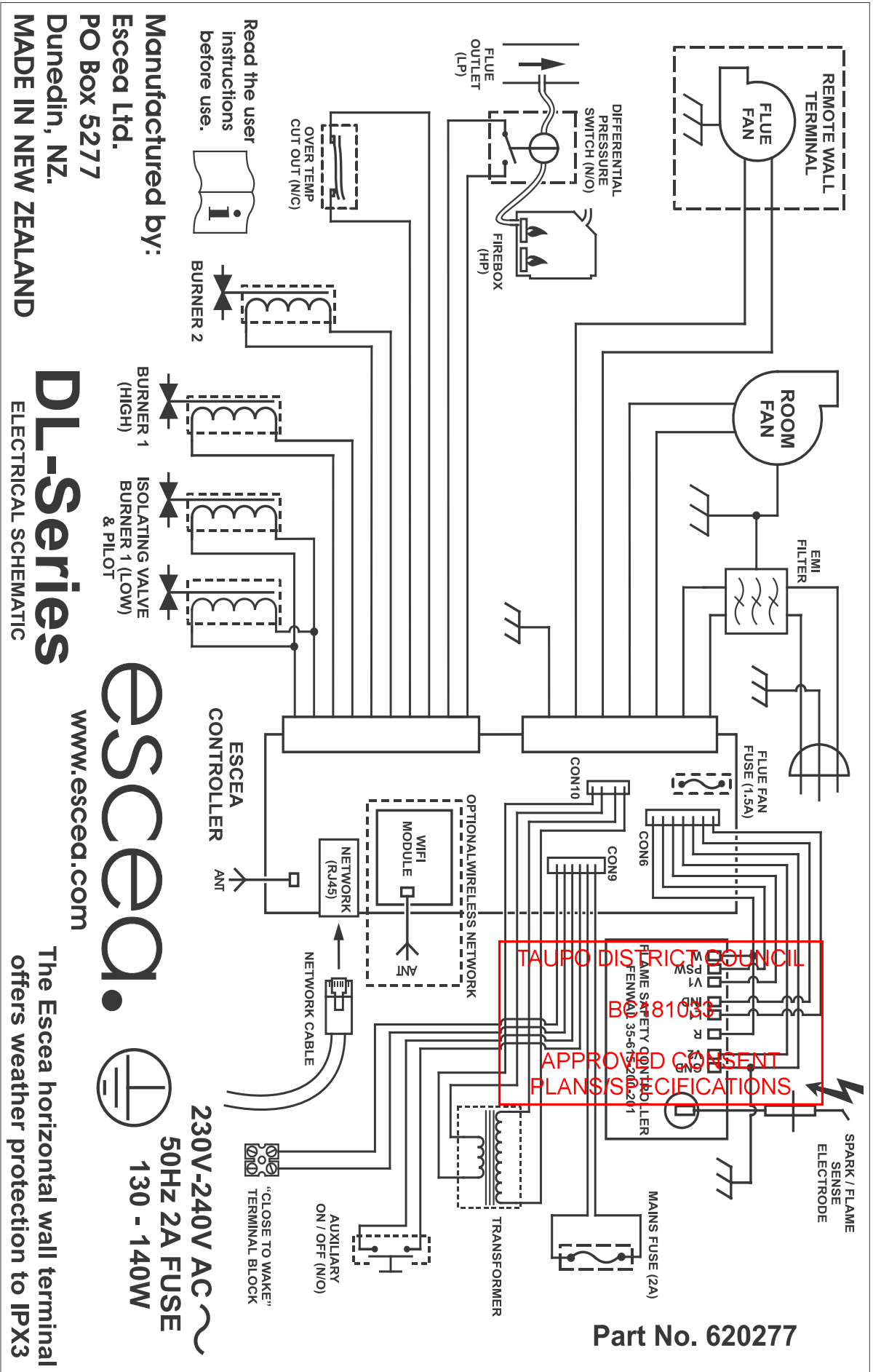
6. The fire is now re-addressed to the remote control.

S9 Annual service procedure:

- ☐ Isolate power and gas supply to fire.
- ☐ Remove front glass and clean inside of glass.
- ☐ Remove fuel bed and brush off any soot.
- ☐ Clean electrode and pilot hood of any carbon build up and ensure correct gaps between electrode and pilot hood
- ☐ Remove burners and blow compressed air through the burner ports.
- ☐ Remove jets and clean injector hole with solvent.
- ☐ Remove firebox to give access to fan, brush and vacuum any dust build up from fan blades.
- ☐ Vacuum any dust from the cavity that houses the fan and from the underside of the fire box around the valve and solenoids.
- ☐ If the gas piping includes a flexible hose connected to the regulator, check the hose for signs of wear (discolouration, loss of flexibility, cuts, worn covers, cracks, crushing, kinking, flattening or loose end fittings) and replace if worn, or more than five years old.
- ☐ Test all joints for gas tightness.
- ☐ Reassemble heater and check that operating pressure is correct. 2.3kPa Propane, 1.0kPa Natural Gas with all burners running.
- ☐ Check glass sealing tape and replace if necessary.
- ☐ Check to make sure that flue system is intact and not in any way blocked.
- ☐ Trial heater with several start/stop cycles and trial fan-boost, flame effect only and thermostat modes to ensure that all modes function correctly.
- ☐ Check and set the gap between the 3 pilot parts to 0.5mm as per diagram in section E9

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S10 Wiring Diagram:



The Escea horizontal wall terminal offers weather protection to IPX3

PROMINA

Product Information

PROMINA is a non-combustible matrix engineered mineral board, used for soffits, one way boundary external fire wall, sub floor spaces, built-in fireplaces, and internal partitioning.

1. Product composition

PROMINA sheets consist of the following:

- Portland cement
- Calcium silicate
- Lime and mineral fillers
- Functional additives

It does not contain inorganic fibres or formaldehyde.

2. Production method

PROMINA sheets are manufactured on a FLOW ON machine and are autoclaved at high temperature and pressure. PROMINA is produced in Asia by the Etex Group, the most global manufacturer of calcium silicate sheets with production facilities in 40 different countries.

PROMINA is manufactured under a quality management system certified in accordance with ISO9001: 2000 Certification and in accordance with the environmental standards of ISO 14001.

3. Dimensions and tolerances

Standard thickness: 9 mm

Length: 2400 mm

Width: 1200 mm

Tolerances

	After cutting
Thickness	- 0.5 / + 1.0 mm
Length and width	⁺ /- 5.0 mm
Squareness	1.0 mm / m

4. Weight

Thickness	Weight
9 mm	Approx 9.7 kg/m ²

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5. Colours

PROMINA is beige in colour and is coloured through-out.

6. Technical properties (average values)

Density		: 1000 kg/m ³
Bending strength ₃ (24h immersed in water)	//	: 7.5 N/mm ²
	T	: 5.2 N/mm ²
Modulus of elasticity		: > 3,800 N/mm ²
Moisture movement (30-90%, mean)		: 1.6 mm/m
Thermal expansion coefficient		: 7.5*10 ⁻⁶ m/mK
Thermal conductivity coefficient		: 0.136 W/mK
Reaction to fire according to AS/NZS1530: Part1		: Incombustible
Reaction to fire according to BS476: Part4		: Incombustible
Surface spread of flame to AS/NZS1530: Part3		: Ignitability = 0, Spread of flame=0, Heat evolved=0, Smoke developed=0
Surface spread of flame to BS476: Part 7		: Class 1

7. Advantages

- No flame spread, no fume development, no toxic gasses
- Resistant to high temperatures
- Resistant to the effects of humidity: PROMINA will not physically deteriorate when used in damp or humid conditions
- Resistant to fungus, bacteria, insects, vermin, etc.
- Resistant to many chemicals
- Environmentally friendly, no harmful gas emissions
- High dimensional stability
- One surface is semi-smooth and will accept a wide range of architectural finishes

8. Working guidelines

Cutting:

- Hand circular saw (with rail), slow rotation with tungsten carbide-tipped blade or fast rotation with a fluted diamond cutting blade without teeth. A diamond tipped blade can be used in either dry or wet state, but caution has to be taken that when cutting wet, a cement slurry is generated that has to be drained and the sheet and equipment will have to be cleaned.
- Jigsaw with tungsten carbide-tipped tooth cutting blade
- Conventional woodworking equipment can be used but have in general wear faster.
- Pacific Build Supply Ltd operates a CNC waterjet cutting machine in Auckland that facilitates the cutting of intricate designs with minute tolerances. Please contact Pacific Build Supply Ltd for more information.

At all times, cutting should be carried out in well ventilated spaces, using dust extraction. Operators should take precautions and wear protective and respiratory gear at all times.

Edge finish:

- Fine emery cloth or sanding block when the cut is rough.

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Drilling:

- For holes: carbide-tipped twist drill (or completely in carbide) with a 60° or 80° nose angle
- For round apertures: cup drill or circular cutter, carbide-tipped
- The sheet should be supported around the hole to be drilled (e.g. by a wooden surface).
- Cutting and drilling must take place in a dry environment.

Fixing accessories:

The method and choice of fixing accessories (e.g. stainless steel, galvanized steel, cadmium plated steel) is dependent on the application and the environment.

1) Screwing in timber construction:

- Use drywall screws SUREFAST N°6 x 30 mm
- The PROMINA sheets need to be pre-drilled not less than 12 mm from the edge and at 50 mm and 100 mm from the edges at sheet corners (see detail).
- Do not overdrive the screws. The optimum is to have the screw head at 0.5 mm below the surface of the sheet.
- Variable-speed screw guns can be used with a maximum speed of 2,500 rpm and fitted with a depth gauge.
- Use the fixing patterns as specified by Pacific Build Supply Ltd.

2) Nailing in timber construction:

- Stainless steel clouts 40 x 2.8 mm.
- Distance to edge is min 12 mm and 50 mm and 100 mm from the edges at the sheet corners.
- Nails cannot be overdriven into the sheet. The optimum is to have the nail head flush with the sheet surface.

Caulking:

- Only use Promaseal Intumescent Mastic.

Health and safety aspects:

While the sheets are being processed, dust can be released which can irritate airways and eyes. It is recommended that a minimum P2 dust mask and safety goggles be worn. Appropriate dust extraction or proper ventilation should be used depending on the room in which the work is being carried out or the equipment being used. Long-term exposure to dust can be harmful to health.

9. Maintenance and cleaning

For minor soiling, washing with a mild household detergent or soft soap solution followed by rinsing with clear water. PROMINA's surface is porous and cleaning requires rather chemical than mechanical ways to clean. No abrasive products or tools shall be used to clean the surface. Please consult the Pacific Build Supply cleaning instructions for more specific cleaning advice.

10. Handling

The sheets are packed on pallets. They must be kept dry during transport. The sheets must be horizontally stacked on a flat surface. The sheets must always be sufficiently supported so that they do not sag. The sheets must be stored in a dry ventilated space. If the sheets are stored outside, they must always be protected against rain by a tarpaulin or plastic sheet. If the sheets do become wet in the packing, all packaging must be removed and the sheets must be wiped dry and placed in a way that they can dry completely. A sheet must always be lifted from a stack by two people and then be carried on edge.

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11. Guarantee

The guarantee and the guarantee conditions are available on request from Pacific Build Supply Ltd,

Trade name: **PROMINA® 60****1. Identification of the product and of the company**

Product name: PROMINA® 60
Intended Product use: Suitable for internal and semi-exposed external non-load-bearing applications such as ceiling linings, soffits, etc.
Company: Comp : Promat International (Asia Pacific) Ltd.
Address : Unit 19-02-01, Level 2, PNB Damansara,
No. 19, Lorong Dungun, Damansara Heights,
50490 Kuala Lumpur, Malaysia.
Tel # : +60(3)-2095 5111
Fax# : +60(3)-2095 6111
E-mail address: info@promat-ap.com

2. Composition / Information on ingredients

Description: Silicate Fire Protective Board, in large dimensions, for universal applications in preventive fire protection and in technical high temperature insulation.

Chemical characterisation This product is a manufactured article, not a substance nor a preparation.
It is manufactured from a combination of cement, sand, cellulose and selected fillers. Asbestos-free autoclaved product.

3. Hazard Identification

Indication of the hazards: The installed product in its final application: no hazards known.

When machining (drilling, cutting, sanding, etc.) the product: airborne dust can be released.

- As with most types of nuisance dust, excessive inhalation of dust may cause irritation of the airways.
- Eye contact with dust may lead to transient eye irritation or inflammation.
- Prolonged skin contact may lead to skin irritation.
- Long term hazards: see section 11

Specific risk information for humans and environment: see section 7 and 8

4. First aid measures

Inhalation: Remove to fresh air
Ingestion: Drink plenty of water
Skin contact: Rinse the skin thoroughly with water

SAFETY DATA SHEET

Promat

Issued: 25/07/2007

Trade name: **PROMINA[®] 60**

Eye contact:

Do not rub the eye, flush copiously for at least 15 minutes. If eye irritation or inflammation persists, seek medical advice.

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Trade name: **PROMINA® 60****5. Fire fighting measures**

Additional Information: The product is non-combustible, according to the standards such as AS 1530.1, BS 476: Part 4, etc.

6. Accidental spill / release measures

Methods for cleaning up: Shovel up small pieces. Dampen down any dust before putting into open skips

7. Handling and storage

Handling: Instructions for handling and machining
-Dust, generated during machining and processing must be exhausted and the regulatory occupational exposure limits for total and respirable dust must be respected.
-Work in a well ventilated area.
-Use tools with appropriate dust exhaust equipment.
-When total dust concentration is higher than occupational exposure limits (refer to local regulations), or when dust extraction is not available, use individual respiratory protective equipment.
-Collect dust with a vacuum cleaner or soak with water before sweeping up.

Storage: Store in dry, covered and frost proof area.

8. Exposure controls / Personal protection

When machining (drilling, cutting, sanding, etc.) boards, respect Occupational Exposure Limits for inhalable and respirable dust and for respirable quartz dust.
Check the latest Occupational Exposure Limits (OEL) for airborne contaminants that are applicable in your country.

Typical Occupational Exposure Limits (8hrs TWA) on the date of issue of this document are:

In mg/m ³	Fraction	COUNTRY (3)						
		AUS	CHN	HK	INDIA	MY	SG	
Particles NOR (1)	Inhalable	10		10		10	10	
	Respirable		4	4			5	
Quartz (2)	Respirable	0.2	0.5	0.1		0.1	0.1	

- (1) Particles NOR: particles not otherwise classified or regulated (nuisance dust). Applies for all other components in the product.
(2) Quartz – CAS number: 14808 - 60 - 7
(3) Country abbreviations on basis of IANA (Internet Assigned Numbers Authority)

Trade name: **PROMINA® 60**

Engineering controls:	Ensure vacuum dust exhaust with correct filter when using motorised machining tools.
Personal protection:	Avoid breathing dusts. Avoid eye and skin contact. Wear personal protective equipment appropriate to the task. (See below)
- Respiratory protection:	Use approved individual respirators (e.g. disposable P2 types) whenever occupational exposure levels are or can be foreseen to be exceeded.
- Eye protection:	Use safety glasses whenever tools are used and dusts are produced.
- Skin protection:	Use working clothes and gloves to protect against mechanical injury and direct skin contact.

9. Physical and chemical properties

Appearance: Rigid self supporting board with smooth upper surface
Colour: light beige or grey **Odour:** None

Important safety parameters:

Boiling point / boiling range:	N.A.
Melting point / melting range:	N.A.
Flash point:	N.A.
Flammability (solid, gaz):	N.A.
Flammability temperature:	N.A.
Auto-flammability:	N.A.
Explosive properties (danger and limits):	N.A.
Oxidizing properties:	N.A.
Vapour pressure:	N.A.
Relative density:	ca. 950kg/m ³
Solubility:	
- water solubility:	Insoluble
- fat solubility:	N.A.
pH value:	9
Partition coefficient (n-octanol/water):	N.A.
Viscosity:	N.A.

10. Stability and reactivity Nothing to report

11. Toxicological information

Acute toxicity:	Calcium Silicates boards are not expected to have significant acute toxicity. Apart from mild skin, throat, airway or eye irritation, workers producing these boards have reported no significant health complaints.
	- As with most types of nuisance dust, excessive inhalation of dust may cause irritation of the airways. - Eye contact with dust may lead to transient eye irritation or inflammation. - Prolonged skin contact may lead to skin irritation.

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Trade name: **PROMINA® 60****Further information:**

Inhalation of excessive concentrations of quartz-containing dust can be hazardous for health. This risk will be minimal if correct working practices are observed and applied. (Refer to Section 8)

12. Ecological information

Nothing to report.

13. Disposal considerations**Product disposal:**

Handle as construction industry waste and dispose in accordance with local legislation.

Packaging disposal:

Dispose according to local legislation.

14. Transport information**Road transport:**

Product is not classified as dangerous.

Inland shipping transport:

Product is not classified as dangerous.

Sea shipping transport:

Product is not classified as dangerous.

Air transport:

Product is not classified as dangerous.

15. Regulatory information**Labelling according to EEC – Directives:**

The Product is a manufactured article, not a substance nor a preparation. Therefore the EU Directive on classification and labelling 67/548EEC is not applicable.

Danger indication: not applicable

Symbol: not applicable

R – sentence: not applicable

S – sentence: not applicable

16. Other information

The recommendations for use and installation of PROMINA® 60, of various fire protection systems, have to be followed as indicated in the Promat Handbook.

The health and safety information contained herein is believed to be accurate and correct based on our current knowledge at the date of issue and no liability can be accepted for any loss, injury or damage resulting from its use. It is intended as a guide for the safe handling, storage and use under normal conditions, but does not necessarily refer to the particular requirements of a customer when further advice should be obtained.

This data sheet and the information it contains is not intended to supersede any terms or conditions of sale and does not constitute a specification. Nothing contained herein is to be construed as a recommendation for use in violation of any patent or applicable laws or regulations.

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Hot Water Heating System

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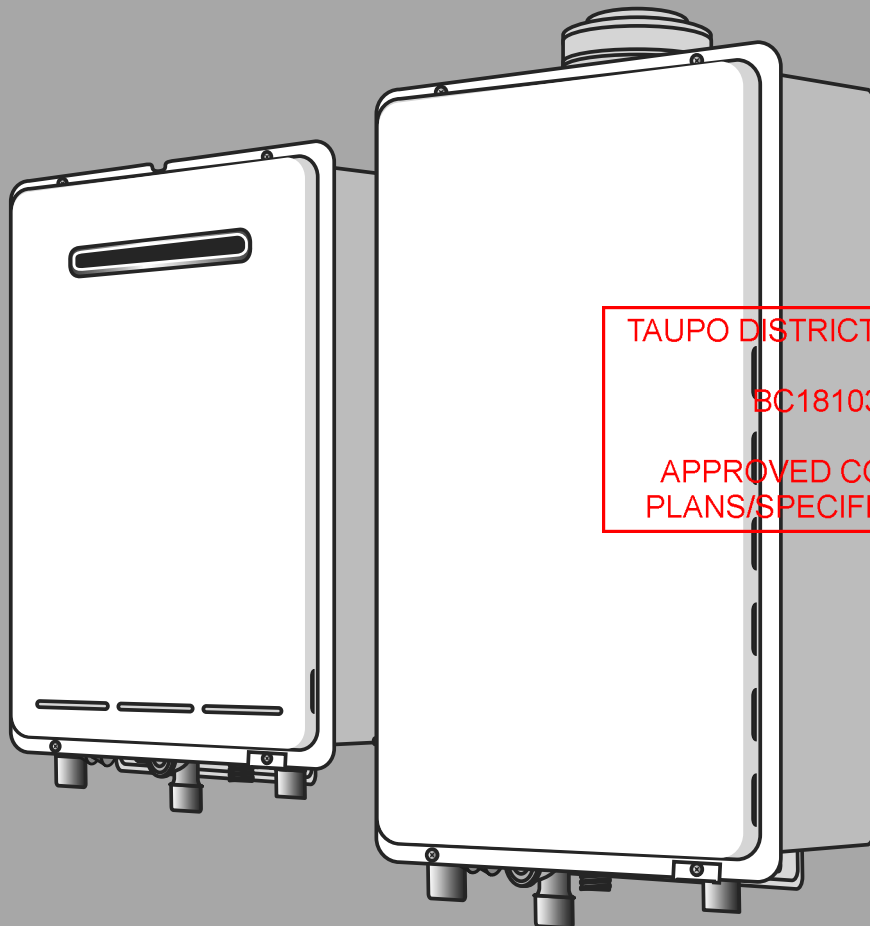
Rinnai

Installation guide

Continuous flow water heaters



Models: VT16-26, HD200, HDi200, HD250, EF24, EF250, EFi250



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Important:

This appliance must be installed in accordance with:

- Manufacturer's installation instructions
- Current AS/NZS3000, AS/NZS3500, AS/NZS 5601.1 and G12/AS1
- Local regulations and municipal building codes

For use with Natural Gas or Universal LPG as indicated on the appliance.

Not suitable as a spa or swimming pool heater.

Rinnai continuous flow internal water heaters ('i' models) must be installed with an approved Rinnai flue system.

Appliance must be installed, commissioned and serviced by an authorised person, being in New Zealand a licensed gasfitter, in accordance with these instructions and all applicable local rules and regulations.

Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

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For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624)

Rinnai New Zealand Limited
105 Pavilion Drive, Mangere, Auckland
PO Box 53177, Auckland Airport, Auckland 2150

Phone: (09) 257 3800, Fax: (09) 257 3899
Email: info@rinnai.co.nz
Web: www.rinnai.co.nz, www.youtube.com/rinnainz

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Before installation

Check for damage

Unpack the appliance and flue components (if applicable) and check for damage. DO NOT install any damaged items.

Check components and gas type

Check all components have been supplied and that you have the correct gas type.

Read these instructions before starting

Read these instructions to get an overview of the steps required before starting the installation. Failure to follow these instructions could cause a malfunction of the appliance. This could result in serious injury and property damage.

Solar installations

For Rinnai continuous flow water heaters used in solar installations, refer 'Recommended Solar System Layout'.

EF models are heavy

The Rinnai Infinity EF models are 32 kg. Please use care when lifting and seek assistance if required.

Applicable models

These installation instructions apply to the following Rinnai continuous flow water heaters.

Rinnai Infinity VT16	External	REU-VR1620WG	Model number Note: The model number is written on the data plate on the left hand side of the appliance.
Rinnai Infinity VT20	External	REU-VR2024WG	
Rinnai Infinity VT24	External	REU-VR2426WG	
Rinnai Infinity VT26	External	REU-VR2626WG	
Rinnai Infinity HD200	External	REU-VRM2632WC	
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG	
Rinnai Infinity HD250	External	REU-VR3237WG	
Rinnai Infinity EF24	External	REU-K2430WG	
Rinnai Infinity EF250	External	REU-KM3237WD	
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD	

i = internal—these must be installed with an approved Rinnai flue system

For nominated gas consumption, gas pressures, and gas types please refer to the data plate on the left hand side of the appliance.

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Appliance location

Installation in environments free from corrosive compounds

Air surrounding the water heater, venting and vent termination(s) is used for combustion and must be free from compounds that cause corrosion of internal components. These include corrosive compounds that are found in aerosol sprays, detergents, bleaches, cleaning solvents, oil based paints/varnishes, and refrigerants. Therefore Rinnai recommends outdoor models be used for these locations where possible. The water heater, venting and vent termination(s) should not be installed in any areas where the air may contain these corrosive compounds. Chemicals that are corrosive in nature should not be stored or used near the water heater or vent termination.

Damage and repair due to corrosive compounds in the air is not covered by warranty.

If it is necessary for a water heater to be located in areas which may contain corrosive compounds, Rinnai strongly recommends the following:

Indoor (internal) water heaters

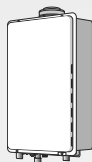
- DO NOT install in areas where contaminated air is present.
- Consider, before installation, where air has the ability to travel within the building.
- Where possible, install the heater in a sealed closet so that it is free of contaminated indoor air.

Outdoor (external) water heaters and vent terminations of indoor (internal) water heaters

- Install as far away as possible from exhaust vent hoods
- Install as far away as possible

from air inlet vents—corrosive fumes may be released through these vents when air is not being run through them

Internal models



Internal models are designed for indoor installations only. They may be installed in an enclosure if the requirements of

AS/NZS 5601.1 are satisfied.

An enclosure is defined as a compartment, enclosed area or partitioned off space primarily used for the installation of the appliance.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed in roof spaces or elevated structures, specific requirements apply. Refer to AS/NZS 5601.1 for details.

Catch pan



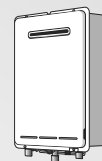
It is important that a suitably drained catch pan is fitted where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

This appliance MUST be used with the appropriate Rinnai flue system.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

Manufacturer's instructions for model REU-KM3237FFUD (EFi250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

External models



External models are designed for outdoor installations only. They must be located in an above ground open-air situation with natural ventilation, without stagnant areas, and where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

Manufacturer's instructions for model REU-KM3237WD (EF250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

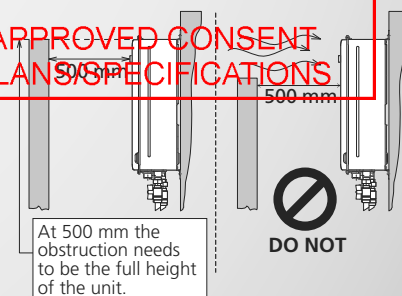
Horizontal obstructions

AS/NZS 5601 stipulates a minimum horizontal clearance of 500 mm between a building structure and obstruction facing the terminal. At 500 mm the obstruction needs to be the full height of the unit (as shown), and not a partial obstruction. A partial obstruction of less than 1 m could result in wind pushing flue gases back into the flue terminal.

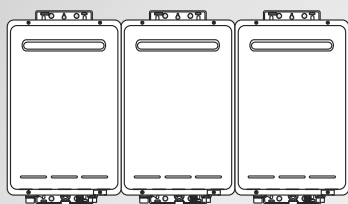
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When multiple units of the same model are installed on the same vertical face, with the flue terminals at the same height, they can be installed next to each other (as shown).



All models

This appliance must be placed as close as possible to the most frequently used hot water outlet or outlets to minimise the delay for hot water delivery.

For installations where the distance between the water heater and the outlets is considerable, a flow and return system can be used to minimise the waiting time for hot water delivery. Alternatively, multiple appliances can be strategically placed to serve different outlets. Contact Rinnai for further information.

An AC 230 V, 10 Amp, earthed power point must be provided adjacent to the appliance. For outdoor installations, this power point must be weatherproof. It must be clear of the gas and water connections to the appliance and also the flue exhaust and water pressure relief valve. The power cord of the appliance is 1.5 m long.

All appliances must be installed to ensure access can be gained without hazard or undue difficulty for inspection, repair, renewal or operational purposes. Sufficient clearances shall allow access to and removal of all serviceable components.

Appliances should not be mounted higher than 3.5 m above the ground or floor level unless the customer can arrange permanent and safe access or can provide another means of access such as scissor or boom lifts.

Clearances from combustible materials

The appliance can be mounted directly against the wall or structure. There is no need to use non-combustible sheeting or leave an air gap between the appliance back panel and the wall or structure for the purposes of meeting the temperature hazard requirements of AS/NZS 5601.

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General installation information

Catch pan

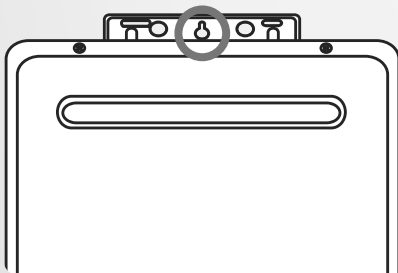
It is important a suitably drained catch pan is fitted (especially for internal units) where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

Mounting the appliance

Refer 'Connections and Fittings' for individual appliance weights. The wall or structure on which these units are to be mounted must be capable of supporting these weights and the associated pipe work.

Ensure suitable fixing screws or bolts are used to secure the units to the walls, in accordance with AS/NZS 5601.1. Wooden plugs shall not be used.

The top bracket has a keyhole slot (circled below) so the appliance can be positioned by hanging it on one screw while the other screws are secured.



Circuit diagrams

Refer to commissioning sheet supplied with the appliance (inside front cover of appliance).

Pipe sizing



Refer 'Connections and Fittings' for appliance gas consumption. If the gas pipe sizing is insufficient the customer will not get the full performance benefit. Gas pipe sizing must consider the gas input to this appliance as well as all the other gas appliances in the premises. The gas meter and regulator must be specified for this gas rate.

An approved sizing chart such as the one in AS/NZS 5601.1, or proprietary system manufacturer guide should be used.

Water pipe sizing and layout should be performed in accordance with AS/NZS 3500. All hot water pipe work should be insulated to optimise performance and energy efficiency.

Water supply



Refer 'Connections and Fittings' for applicable water pressures. Approved pressure limiting valves may be required if the stated maximum rated water supply pressures are exceeded. To achieve the rated flow, the stated minimum water supply pressures must be supplied. The water heaters will operate at lower pressures but will not achieve the rated flow.

Water chemistry and impurity limits are stated in our detailed warranty statement. Most metropolitan water supplies fall within these requirements. If you are unsure about the quality of the water, please contact Rinnai and we will provide you with the details of an authorised agency who are able to test your water for compliance to Rinnai standards. If sludge or foreign matter is present in the water supply, a suitable filter or strainer should be incorporated in the water supply to the water heater.

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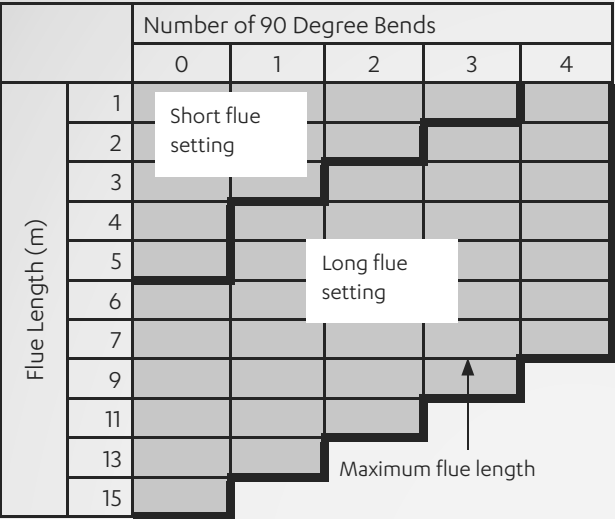
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Flued (internal) water heaters

This water heater must be fitted with the appropriate Rinnai flue system.

The chart below highlights the maximum flue length and number of bends. It also shows the difference between a short and long flue—this is important if changing settings (DIP switches).



Refer to separate Rinnai flue guide for further details.

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Water delivery temperature

Local regulations and/or requirements of AS/NZS3500.4 must be considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of these areas may be limited to 55 °C or less.

If the appliance is to deliver water primarily for the purposes of personal hygiene in an early childhood centre, school, nursing home or similar facility as defined in AS/NZS3500.4 a Temperature Limiting Device (TLD), such as a Tempering Valve may be required (even if the appliance is set to 55 °C or less). For these types of applications contact Rinnai.

Requirements for Rinnai continuous flow units installed without controllers

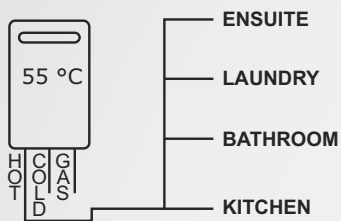


Diagram 1 - 55 °C Appliance

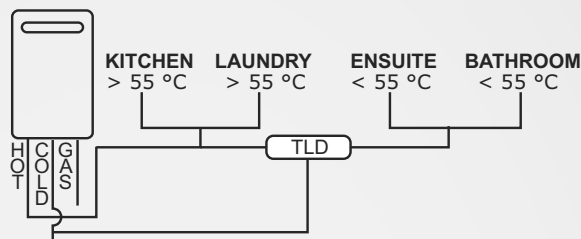


Diagram 2 - Not a 55 °C Appliance
(TLD = Temperature Limiting Device)

When the continuous flow unit is set to deliver water at a temperature higher than 55 °C, it will be necessary to fit a Temperature Limiting Device for delivery to areas used for the purposes of personal hygiene.

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Connections and fittings

Models	Gas consumption MJ/h	Water Supply kPa		Weight kg	Fittings			Condensate
		Min.	Max.		Hot	Cold	Gas	
VT16 external REU-VR1620WG	125	120	1000	15	R $\frac{1}{2}$ (15 mm)	R $\frac{1}{2}$ (15 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT20 external REU-VR2024WG	160	160	1000	16	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT24 external REU-VR2426WG	188	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT26 external REU-VR2626WG	199	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD200 external REU-VRM2632WC	199	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HDi200 internal REU-VR2632FFUG	195	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD250 external REU-VR3237WG	249	200	1000	29	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
EF24 external REU-K2430WG	162	240	1000	27	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EF250 external REU-KM3237WD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EFi250 internal REU-KM3237FFUD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)

Service connection points

These dimensions are NOT an indication of the pipe sizes required.

An approved full flow isolation valve and disconnection union **MUST** be fitted to the cold water inlet. A non-return valve is not required unless required by local regulations.

Isolation valves must be fitted so the appliance can be removed.

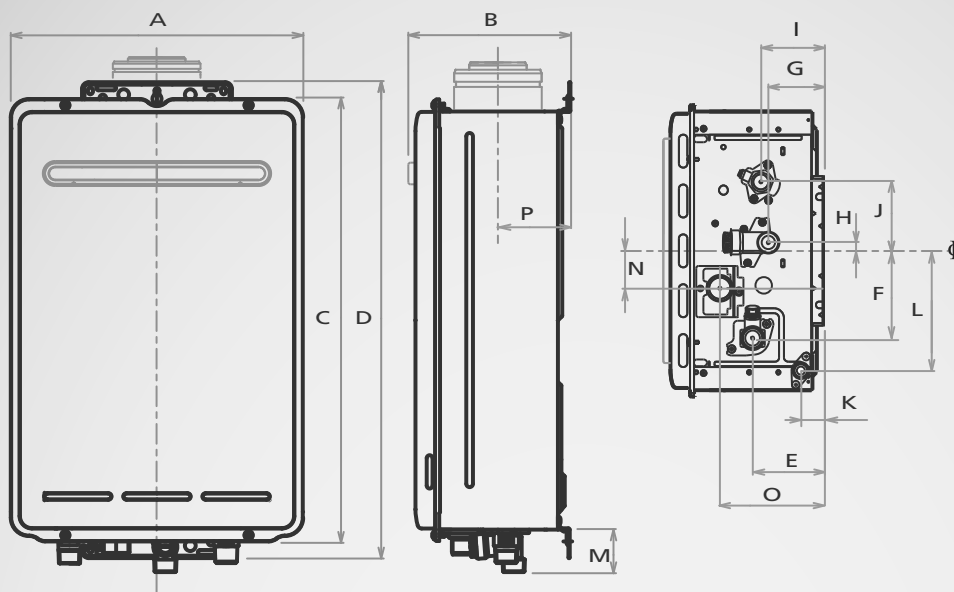
Purge gas and cold water supply lines to remove air and swarf before final connection of the appliance. Swarf in the gas or water supplies may cause damage.

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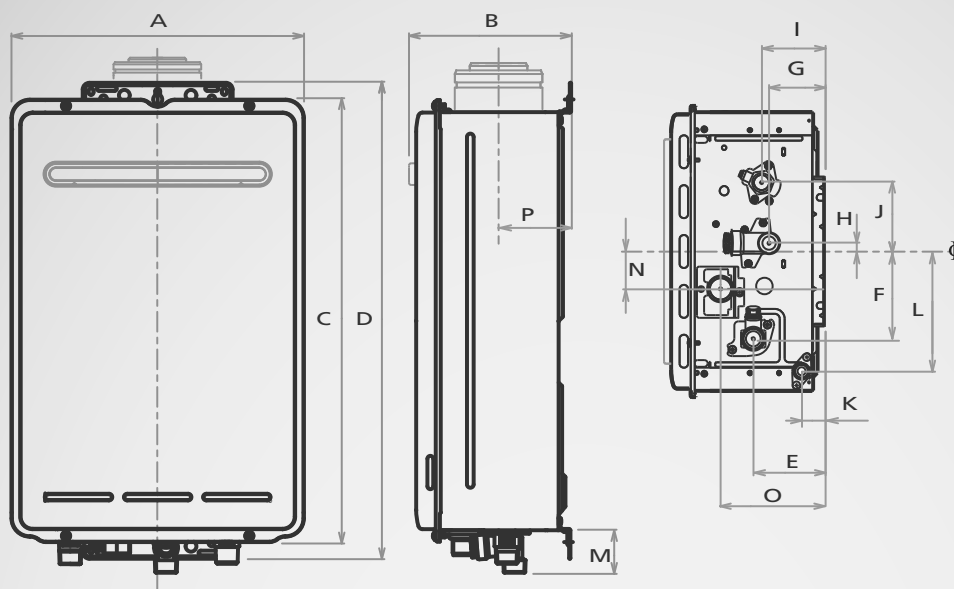
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Dimensions: VT and HD models



Dimensions table (mm)		VT16 external (REU-VR1620WG)	VT20 external (REU-VR2024WG)	VT24 external (REU-VR2426WG)	VT26 external (REU-VR2626WG)	HD200 external (REU-VRM2632WC)	HDi200 internal (REU-VR2632FFUG)	HD250 external (REU-VR3237WG)
A	Width	350	350	350	350	350	350	470
B	Depth	194	194	194	194	250	235~275	244
C	Height - unit	530	530	530	530	600	600	600
D	Height - including brackets	571	571	571	571	636	641	644
E	Hot water outlet (from wall)	87	87	87	87	95	91~131	115
F	Hot water outlet (from centre)	105	105	105	105	110	110	61
G	Cold water inlet (from wall)	68	68	68	68	74	70~110	99
H	Cold water inlet (from centre)	10	10	10	10	27*	27*	53
I	Gas connection (from wall)	77	77	77	77	103	99~139	61
J	Gas connection (from centre)	83	83	83	83	89	89	110
K	Condensate outlet (from wall)	-	-	-	-	TAUPO DISTRICT COUNCIL BC181033 -APPROVED CONSENT PLANS/SPECIFICATIONS		
L	Condensate outlet (from centre)	-	-	-	-			
M	Gas: Length gas connection (from base)	40	40	40	40	41	41	41
	Cold: Length of cold water inlet (from base)	50	50	50	50	51	51	51
	Hot: Length of hot water outlet (from base)	39	39	39	39	42	42	42
N	Electrical connection (from centre)	45	45	45	45	21**	21**	2**
O	Electrical connection (from wall)	128	128	128	128	160	160~200	100
P	Flue spigot centre line (from wall)	-	-	-	-	-	95~135	-
* This measurement is to the left of the centre line								
** This measurement is to the right of the centre line								
HDi200, height of flue spigot from base of unit approx. 85 mm								

Dimensions: EF models



Dimensions table (mm)		EF24 external (REU-K2430WG)	EF250 external (REU-KM3237WD)	EFi250 internal (REU-KM3237FFUD)
A	Width	350	470	470
B	Depth	277	283.1	257~307
C	Height - unit	600	654	654
D	Height - including brackets	644	721.6	721.6
E	Hot water outlet (from wall)	164.5	115	110~150
F	Hot water outlet (from centre)	100	100	100
G	Cold water inlet (from wall)	83	79.6	74.6~114.6
H	Cold water inlet (from centre)	53*	27.2	27.7
I	Gas connection (from wall)	70.5	104	99~139
J	Gas connection (from centre)	25	103.2	103.2
K	Condensate outlet (from wall)	33	137.6	132.6~172.6
L	Condensate outlet (from centre)	132	195	195
M	Gas: Length gas connection (from base)	51	40.2	40.2
	Cold: Length of cold water inlet (from base)	62	50.2	50.2
	Hot: Length of hot water outlet (from base)	41	41.2	41.2
	Condensate connection length (from base)	24	22.4	22.4
N	Electrical connection (from centre)	10**	49	49
O	Electrical connection (from wall)	175	200	195~235
P	Flue spigot centre line (from wall)	-	-	139~179

* This measurement is to the left of the centre line

** This measurement is to the right of the centre line

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EF250 models: Earthing the unit

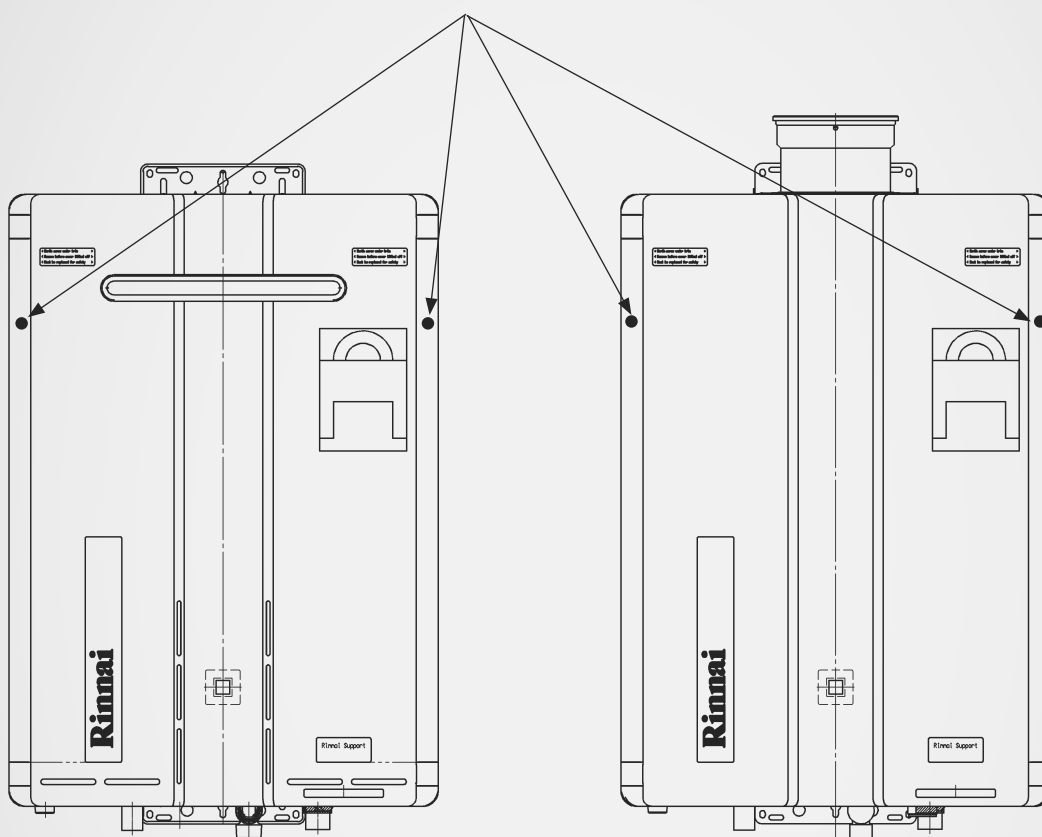
Removing the cover and earthing the unit

For the Rinnai condensing continuous flow water heaters (EF250 & EF250i), the earthing screws are located under the side trim, refer image below. First remove the trim and then the earthing screws before lifting off the cover.



For safe operation of the appliance the earthing screws **MUST** be replaced.

Earthing screws located under side trim



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EF models: Condensate drain

The Rinnai Infinity EF water heaters generate condensate continuously at a rate of up to five litres per hour as a by-product of a highly efficient gas burner. Condensate must be drained via a pipe to a suitable discharge point.

As condensate is a by-product of gas combustion it is mildly acidic. For this reason copper tube and fittings **MUST NOT** be used as it will corrode. Instead Rinnai recommend plastic pipes and fittings.

Important considerations for the condensate drain pipe

Content of AS3500.4.2003 section 5.12 'Temperature/Pressure Relief and Expansion Control Valve Drain Lines' has been used as a guide in preparing these considerations.

- A. Water heater drain outlet connection, ½ " (15 mm) BSP male.
- B. PE ½ "BSP (15 mm) female to barbed ignition system connector (13-19 mm) or equivalent plastic fitting.
- C. Drain pipe and fittings to match (B).
- D. Continuous fall of at least 2° from water heater to discharge point, length and bends in accordance with 'Maximum length and changes of direction greater than 45°'.
- E. Suitable points of discharge are deemed to be sewers or pits. **DO NOT** discharge onto electrical connections, earth stakes, copper pipes, concrete paths, or into a pond.

Maximum length and changes of direction greater than 45°

Length and changes of direction				
Max. length (m)	9	8	7	6
Max. changes of direction (> 45°)	3	4	5	6

Installation of a condensate drain

Point of discharge from each drain line shall be located so the release of condensate does not cause a nuisance, is readily discernible and incurs no risk of building damage. There shall be no tap, valve or other restrictions in any line. Each line shall fall continuously from the valve to the approved point of discharge.

Drain lines shall not discharge into a storage water heater safe tray. The end of the condensate drain line shall be:

- Not lower than 200 mm, or higher than 300 mm above an unpaved surface; or
- Not lower than 75 mm, or higher than 300 mm above a gravel pit, and not less than 100 mm in diameter in a paved surface.

Where discharging over a tundish or gully trap, drain lines shall have an air gap of a size at least twice the diameter of a drain line.

Joining of condensate drain lines

Condensate drain lines from multiple water heaters may be joined together provided they conform with the installation requirements stated on this page.

Common stack discharge

Where individual heaters are installed in a multistory building, the condensate drain lines may discharge into a common stack subject to the following:

- Drained to a tundish having a discharge line that is not less than the common stack, directly connected to a fixture trap, and installed in a connection with any adjacent soil or waste stack.
- Discharge point of the common stack is readily visible and does not cause any nuisance.
- Common stack is vented by extending the pipe upwards, above the roof level.

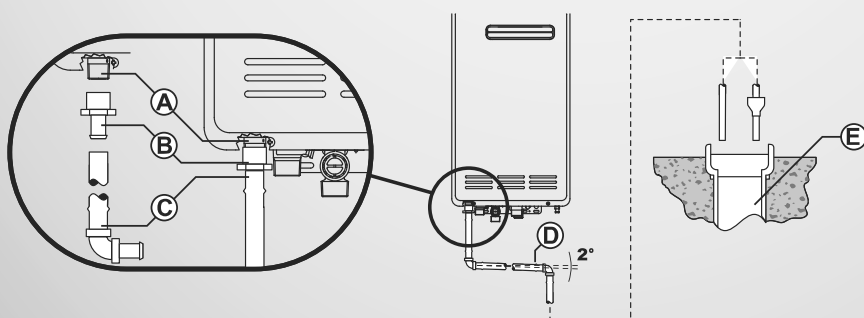
Tundish drain lines

The drain line from any tundish shall be not less than DN 20 or less than one size larger than that of the largest drain line discharging into the tundish. Tundish drain

lines shall comply with the installation requirements above.

Areas subject to freezing

In areas where water pipes are prone to freezing, the drain pipe from any valve shall be insulated and not exceed 300 mm in length. It shall discharge into a tundish through an air gap of not less than 75 mm and not exceed more than 150 mm measured from the outlet of the drain pipe to the rim of the tundish.



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Controllers - general information

Water controllers are available as an optional extra. Universal (Compact), Deluxe, and Wireless controllers can be used together.

Maximum number of controllers

A maximum of four water controllers can be fitted with the following limitations:

- Max. of one Kitchen Deluxe controller (MV-100V)
- Max. of two Bathroom Deluxe controllers (BC-100V)

Only one controller can be set to deliver 55 °C, this cannot be a Bathroom Deluxe controller.

This next section refers to wired controllers. For details on wireless controllers refer to separate instructions.

Important

Others manufacturers' controllers are not compatible with Rinnai Infinity continuous flow water heaters.

Installation of controllers

Do not install controllers:

- near a heat source such as, a cook top, stove or oven—heat, steam, smoke, or hot oil may cause damage
- in direct sunlight
- outdoors unless protection from dust ingress and sunlight are provided
- against a metal wall unless in accordance with AS3000

Positioning

Controllers must be installed in shaded and clean locations. They should be fitted out of reach of children (suggested height 1.5 m). The Compact and Bathroom Deluxe Controllers are water resistant, however, durability is improved when positioned outside the shower recess or at least 400 mm above the highest part of a sink, basin or bath.

Water controller cables

Water controllers operate at extra low voltage (12 Volts DC) which is supplied from the water heater. Controllers come with 15 m of electrical cable. The appliance end of the controller cables are fitted with spade terminals.

Extension cabling is available as an accessory from Rinnai. Alternatively, a two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used.

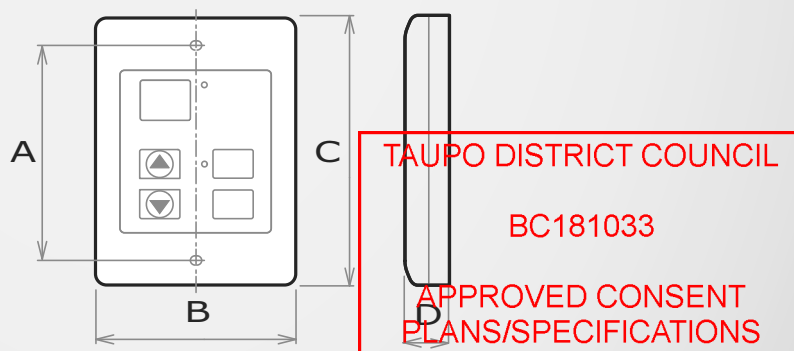
Maximum individual cable runs:

One controller	= 100 m
Two controllers	= 50 m*
Three plus controllers	= 20 m*

* per controller

Water controller cables are not polarity sensitive.

Dimensions



Dim.	Description	Compact (MC-91)	Kitchen Deluxe (MC-100V)	Bathroom Deluxe (BC-100V)
A	Distance between mounting holes	83	83	181
B	Width	90	128	195
C	Height	120	120	97
D	Depth	20	20	22

Controllers - Universal (Compact)

Fitting the Universal (Compact) controller

1. Determine the most suitable position for the controller.
2. Drill three holes as shown (Fig. 1 and Fig. 2) for securing screws and one to provide cable access.

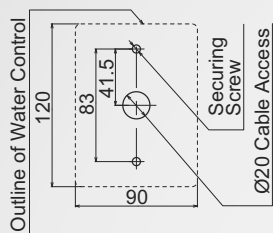


Fig.1

3. When running cable through the access hole ensure the connector and the end of the cable is located nearest to the controller (Fig. 2).

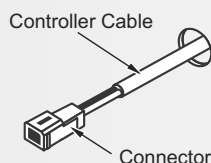


Fig.2

4. Carefully remove the face plate from the controller using the screwdriver (Fig. 3).

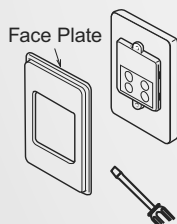


Fig.3

5. Fix the controller to the wall using appropriate fittings as shown (Fig. 4).

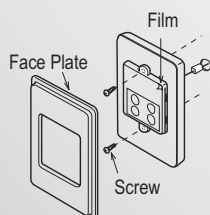


Fig.4

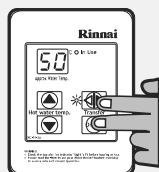
6. Remove protective plastic from the controller face as shown (Fig. 4) and replace the face plate.

Optional programming of the Universal controller

Step one

Are four controllers connected?
If NO—refer to step two. If YES, activate the fourth controller as follows.

1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).



2. Check display on all four controllers is displaying a temperature when switched on. If any controller displays two dashes, repeat above step.



Step two

1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).
2. When the controller fitted in the kitchen is switched on it will be possible to select temperatures higher than 50 °C (at this controller). If not repeat above step.

If the kitchen controller is swapped repeat the programming procedure.

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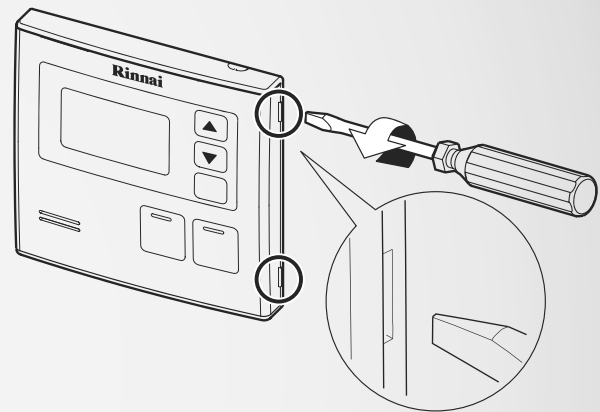
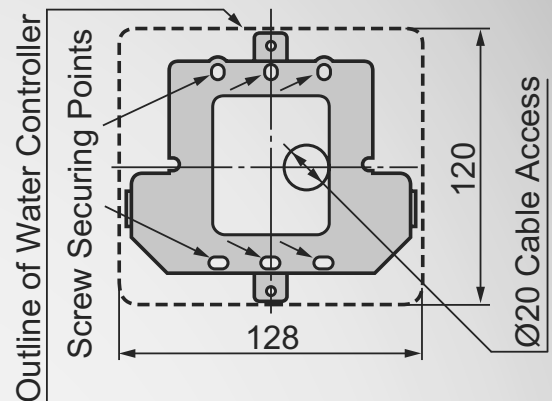
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Controllers - Kitchen Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Use the wall mounting bracket as a template to mark and drill three holes, locating the cable access hole as shown.
3. Fix the mounting bracket to the wall using the appropriate fixings.
4. Run the water controller cable through the hole in the wall.
5. Carefully remove the face plate from the controller using a screwdriver as shown.
6. Connect the controller cable to the kitchen water controller. At this point cables from other controllers (if fitted) may also be connected to the kitchen water terminals, eliminating the need for multiple cable runs directly to the water heater. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the water controllers.
7. Fasten water controllers to wall mounting bracket. Avoid the use of impact drills and over-tightening of fixings as this may damage the controllers.
8. Remove the protective plastic from the controller face and replace the face plate.



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Controllers - Bathroom Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Mark and drill three holes, locating the cable access hole as shown (Fig.1).
3. When running a cable through the access hole ensure the connector end of the cable is located nearest to the controller (Fig.2).
4. Affix the double sided self-adhesive seal to the back of the controller (Fig.3).
5. Carefully remove the face plate from the controller. Do this by placing your thumbs on the front digital display while hooking your fingers behind the top plate and gently push down as shown (Fig.4). Do not use a screwdriver as this may damage the controller.
6. Connect the cable to the bathroom controller. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the controller.
7. Fix bathroom controller to the wall using appropriate fixings. Avoid the use of impact drills and over-tightening of fixings as this may damage the controller.
8. Remove the protective plastic from the controller face and replace the face plate.

Outline of Water Controller

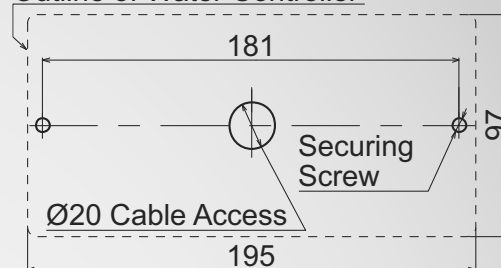


Fig.1

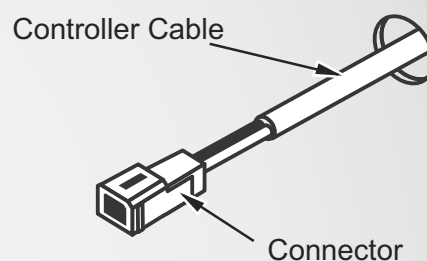


Fig.2

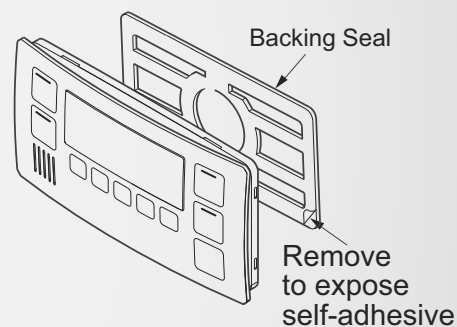


Fig.3

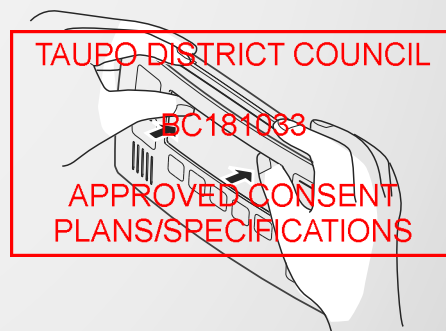


Fig.4

Controllers - communication cables

Communication cables connect the water heater to the water controllers and operate at an extra low voltage (12 Volts DC) which is supplied from the water heater. Communication cables are supplied with the water controllers (15 m) and are fitted with spade terminals for connection to the water heater.

Up to two cables can be connected to the cable connector at the water heater. Extension cables are available from Rinnai. Alternatively two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used (refer maximum individual cable lengths on p. 15).



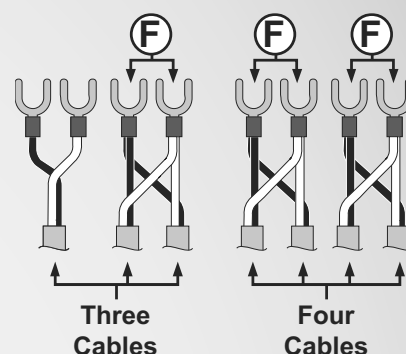
Do not attempt to connect cables to the cable connector at the water heater unless the electric power supply to the water heater is switched off otherwise damage to electrical components may occur.

To connect up to two cables to the cable connector

1. Turn off power supply and unplug water heater from the power point.
2. Remove retaining screw of the cable connector at the base of the appliance.
3. Swing the cable connector door open. Thread the cable through the weather seal of the cable access hole (B) in the direction shown allowing sufficient cable length so the cable sheath can be secured with the cable clamp (C) supplied with the transceiver.
4. Loosen screw terminals (D) and (E) and connect cable spade connectors to these terminals and re-tighten. Polarity is not important, either wire colour can be connected to either terminal.
5. Return the cable connector to the original position taking care not to damage cable wires in the process and replace the retaining screw.

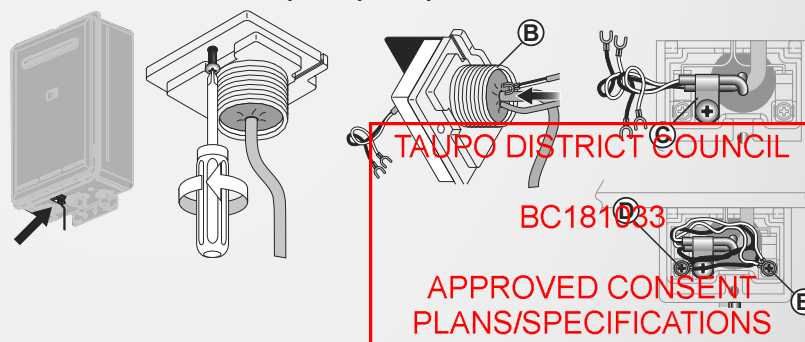
Connecting three to four controllers

1. Repeat steps 1-3 for connecting up to two controllers.
2. To connect three to four controllers, separate all the cables to be fitted into pairs. Cut off the existing spade connectors from each pair and re-terminate each pair into a new spade connector (F) so there are only two sets of spade connectors. Four spade connectors in total to be terminated.
3. Repeat steps 4 and 5 for connecting up to two controllers.

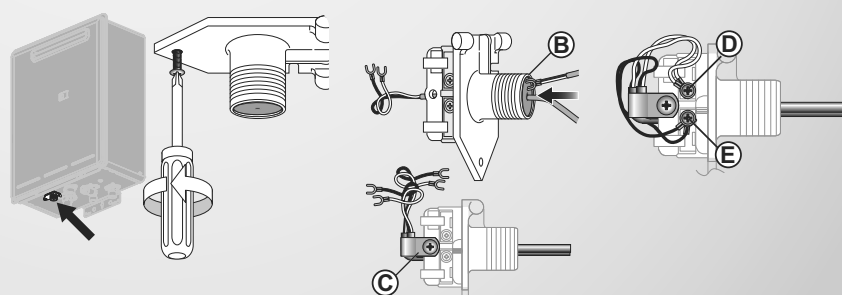


Spade connectors are available from your local electrical supplier.

Cable connector for VT26, VT24, VT20, and VT16



Cable connector for HD250, HD200, HDi200, and EF models



Commissioning



The appliance operation must be tested after installation. Ensure building occupants do not have access to the hot water outlets during this procedure.

Testing

1. Before final connection of the water heater, purge the gas and hot and cold water supply lines. Swarf in the gas or water supplies may cause damage.
2. Turn on the gas and water supplies and test for leaks (gas and water) near the unit.
3. Isolate gas supply. Remove test point screw located on the gas inlet and attach pressure gauge.
4. Turn the power on at the power point socket and turn on the gas.
5. If water controllers are fitted ensure they are on. Select the maximum delivery temperature and open all available hot water taps including the shower. If water controllers are not fitted, open all available hot water taps.
6. Operate all other gas appliances at their maximum gas rate.
7. With all gas appliances operating on maximum, the pressure should read between 1.0-3.5 kPa (NG) or 2.75-3.5 kPa (ULPG). If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the responsibility of the installer to check the gas meter, service regulator and pipe work for correct operation and sizing. The gas regulator on the appliance is electronically controlled and factory preset. Under

normal circumstances it does not need adjustment during installation.

8. Close all hot water outlets.
9. Inspect and clean the strainer located on the cold water inlet connection. This may need to be repeated to ensure the strainer remains clear, especially on new installations.
10. If water controllers are fitted, it is necessary to test their operation through the complete range of functions (refer operation guide).
11. Confirm hot water delivery temperatures using a thermometer. If controllers are fitted, ensure temperatures exceeding 55 °C cannot be selected on bathroom controllers.
12. After testing is completed, explain to the customer how to operate the water heater and water controllers (if fitted). Ensure your details are entered in the customer operation guide (Installer details).

Gas pressure setting

The gas regulator on the appliance is electronically controlled and factory preset. Under normal circumstances it does not need adjustment during installation. Make adjustments only if the unit is not operating correctly and all other causes for incorrect operation have been eliminated. Instructions for gas pressure setting are in the instruction pocket located inside the appliance front cover.

Commissioning checklist

Commission the unit in accordance with the Commissioning Checklist supplied with the appliance (inside front cover of appliance). Ensure you leave the completed checklist with the customer.

If the appliance can not be adjusted to perform correctly call 0800 RINNAI (0800 746 624) for assistance.

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Recommended solar system layout

Rinnai continuous flow water heaters configured for solar systems produce hot water at 75 °C and are not suitable for use with water controllers. The household water supply **MUST** be protected by a suitable tempering valve.

Installation

Rinnai continuous flow water heaters in solar installations are only suitable as gas boosters in solar hot water systems. These models produce water at higher than normal temperatures and must be connected to the hot water supply by use of a suitable tempering valve.

Install a Rinnai continuous flow water heater using a flow diversion valve as shown. Remember 'B to Boiler' when setting up the flow diversion valve.

The water heater must be set to 75 °C (refer dip switch settings on following pages).

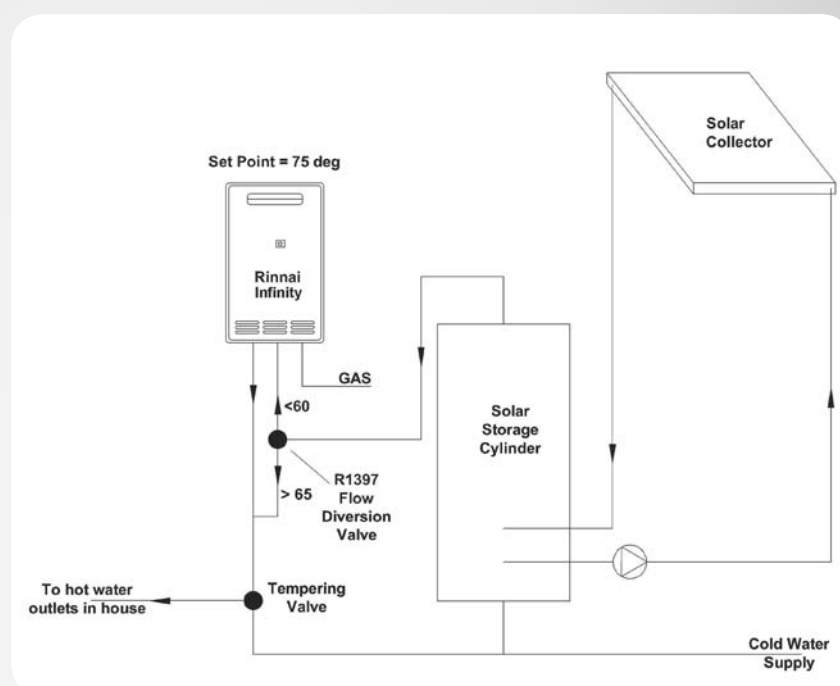
Rinnai water controllers cannot be used with Rinnai Infinity solar units as the hot water does not always pass through the Rinnai Infinity, and the Rinnai Infinity dip switch setting of 75 °C is unable to be adjusted.

System configuration to protect for Legionella

If the system is configured according to the details above it will meet the requirements of the Acceptable Solution G12/AS2 for protection against Legionella. Section 3.5.2 states:

b) the instantaneous water heater must heat all water passing through it to not less than 70 °C.

Recommended system layout using a Rinnai Continuous Flow water Heater and Flow Diversion Valve



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DIP switch settings

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DIP switch settings - important

DIP switch settings must only be changed by a licensed gasfitter. They have been provided as there may be a requirement to change the temperature of the water delivered from the water heater.



Care must be taken when changing the temperature settings as the DIP switches are small and can be easily switched or bumped into the wrong position. Please use this information carefully and fully check the operation of the water heater before leaving site including the temperature of the water delivered.

The cover of the water heater will need to be removed to carry out this operation. As this will expose live mains voltage wiring **please disconnect the power supply before removing the front cover.**

We wish to draw your attention to the requirements of the New Zealand Building Code and compliance document G12. This requires that water delivered to sanitary fixtures be no more than 55 °C. Increasing the water heater set temperature will therefore require that you protect all sanitary fixtures to which the appliance is plumbed with suitable tempering valves or similar.

Rinnai will accept no liability for issues arising out of the use of this DIP switch information.

If you have any doubts about the performance of the water heater please contact Rinnai by phoning 0800 TO RINNAI (0800 86 746 624).

The setting of water temperatures in domestic model Infinity units (white cases) to greater than 55 °C (with the exception of units set to 75 °C in domestic solar installations) will reduce the warranty period. Refer to warranty

information in the Operation Guide for further information.

The following pages detail DIP switch settings for the specific Rinnai continuous flow water heaters listed. They ARE NOT applicable for older models.

Legend for DIP switch settings
(black indicates position of switch)



Short and long flues

Reference to what is a short and long flue can be found on page 8.

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DIP switch settings



Applicable models and REU numbers

Rinnai Infinity VT16	External	REU-VR1620WG
Rinnai Infinity VT20	External	REU-VR2024WG
Rinnai Infinity VT24	External	REU-VR2426WG
Rinnai Infinity VT26	External	REU-VR2626WG
Rinnai Infinity EF24	External	REU-K2430WG

DIP switch 1: Upper SW (8P)

SW No.	Note						
1		Off					
2	Fixed temperature (with controllers)	Off	Fixed temperature	On	With controllers		
3	Temperature settings	See Chart A					
4							
5							
6		Off					
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.
8		Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	not to be used	40	40
On	On	On	not to be used	55	75

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	ULPG	On	NG
2,3,4	Model settings	See Chart B			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	VT26 (VR2626WG) and EF24 (K2430WG)
Off	On	Off	VT24 (VR2426WG)
Off	Off	On	VT20 (VR2024WG)
Off	On	On	VT16 (VR1620WG)

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DIP switch settings



Applicable models and REU numbers

Rinnai Infinity HD200	External	REU-VRM2632WC
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG
Rinnai Infinity HD250	External	REU-VR3237WG

DIP switch 1: Upper SW (8P)

SW No.	Note							
1	HDi200	Flue setting	Off	Long flue (p. 8)			On	Short flue (p. 8)
	HD200, HD250	Model setting	Off					
2	Fixed temperature (with controllers)		Off	Fixed temperature			On	With controllers
3	Temperature settings		See Chart A					
4								
5								
6			Off					
7	Gas pressure		Off	Normal	On	Forced min.	On	Forced max.
8			Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	85, 95 ¹	40	40
On	On	On	85	55	75

¹ 95 °C setting only available for HD250 model

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	ULPG	On	NG
2,3,4	Model settings	See Chart B			
5,6	Not in use	Off			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	HD250 (VR3237WG)
Off	Off	On	HD200 (VRM2632WC)
Off	On	On	HDi200 (VR2632FFUG)

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DIP switch settings



Applicable models and REU numbers

Rinnai Infinity EF250	External	REU-KM3237WD
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD

DIP switch 1: Upper SW (8P)

SW No.	Note							
1	Flue settings	Off	EF250 Ext & EFi250 Int long flue (p. 8)			On	EFi250 Internal short flue (p. 8)	
2	Fixed temperature (with controllers)	Off	Fixed temperature			On	With controllers	
3	Temperature settings	See Chart A						
4								
5								
6	Not in use	Factory setting is 'Off'						
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.	
8		Off		Off		On		

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	95	40	40
On	On	On	85	55	75

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type settings	Off	ULPG	On	NG
2		Off		Off	
3	Type settings	Off	External	Off	Internal
4		Off		On	
5	Automatic return	Off	Inactive	On	Active
6	External device	Off	S-BMS	On	AH

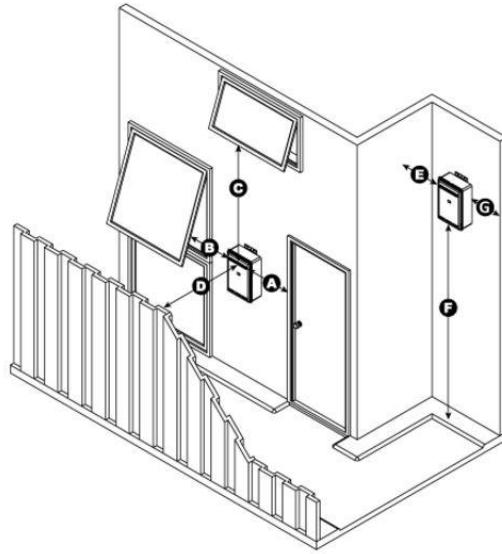
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General clearances

The following diagram has been provided to assist you in determining where (and if) an external continuous flow water heater can be positioned. If in doubt, prior to purchase, consult a licensed gasfitter.



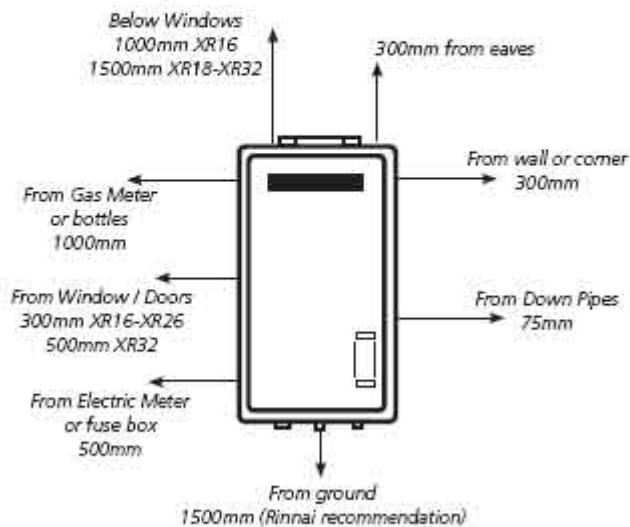
Dimension	Infinity VT models Infinity HD200 models Infinity EF models	Infinity HD250 models
A	Min. 300 mm	Min. 500 mm
B	Min. 300 mm	Min. 500 mm
C	Min. 1.5 m	Min. 1.5 m
D	Min. 500 mm	Min. 500 mm
E	Min. 300 mm	Min. 300 mm
F	Min. 300 mm*	Min. 300 mm*
G	Min. 300 mm	Min. 300 mm

Clearance below eaves, balconies, and other projections, for all models is 300 mm.

* Rinnai recommend 1.5 m to give enough clearance for the pipe work, and to safely expel flue gases.

Installation Clearances

External Model diagram



NZ Standards 5261:2003 2.6.13.3

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Waterproofing Systems

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Technical Data Sheet

Dampfix Gold

Water Based Polyurethane Liquid Waterproofing Membrane

DESCRIPTION

One part, highly elastic, Class 3, water-based polyurethane waterproofing membrane system that meets the requirements of AS3740 by complying with AS/NZ 4858.

This Technical Data Sheet may be revised, as appropriate, to comply with changes to relevant Australian and New Zealand Standards, reflect changes in Industry best practice in waterproofing procedures or include improvements to current technologies.

The Applicator is advised to reference the latest Technical Data Sheet issue, before commencing application, by visiting www.bostik.co.nz and following the Technical Data sheet links or by contacting Bostik Customer Service on 0508 222 272.

The **Bostik Dampfix Gold** waterproofing membrane system is specifically formulated for application on graded substrates that provide positive falls to drainage outlets. Overlaying tiling systems must comply with Guide to the Installation of Ceramic Tiles - AS3958.1).

This is a 2-coat system applied over primed porous & non-porous substrates. It is not recommended as a membrane system in immersed applications (such as pools or spas)



FEATURES

- ✓ Class 3, high elasticity.
- ✓ Fast drying.
- ✓ Recoat in 2 hours @ 20° C & 50% RH
- ✓ Early access for following trades.
- ✓ Tile next day in most conditions.
- ✓ May be tiled directly onto with approved ASA adhesives
- ✓ Reinforced with clump free fibres.
- ✓ No mixing.
- ✓ High resistance to detergents & bleach.
- ✓ Will not re-emulsify after curing.
- ✓ Does not embrittle with age.
- ✓ Excellent adhesion to concrete; rendered masonry; wet area plasterboard; FC sheet & plywood.
- ✓ Can be applied to damp substrates, i.e. no free water
- ✓ Brush, roller or trowel applied.
- ✓ Flood Test in 72 hours.

RECOMMENDED USES

- ✓ As a waterproofing membrane to internal wet area shower, bathroom, kitchen, laundry & toilet areas to AS/NZ 3740.
- ✓ As a waterproofing membrane to external balconies, rooftops & podium levels to AS/NZ 4654.2.
- ✓ All applications to be covered by tile or other surface wearing and protective systems by following trades.
- ✓ Suitable for concrete; cement rendered masonry; FC sheeting; water resistant plasterboard; and structural plywood (Type A Stamped "PAA JAS-ANZ" to AS/NZS2269-2004) substrates.



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Dampfix Gold

APPLICATION INSTRUCTIONS

IMPORTANT NOTES

- The following instruction steps as detailed in this Technical Data Sheet may not be applicable in every application. They are provided as a guide to meet the requirements of AS/NZ3740 and AS/NZ4654.2.
- It is recommended that the installation should be carried out by a Bostik ASA trained Dampfix waterproofing course applicator.
- Bostik Technical Division must approve any modification or variances to this technical data sheet in writing followed by the issuance of an amended Technical Data Sheet.
- Wherever appropriate, the application must comply with AS/NZ 3740 'Waterproofing of Internal Wet Areas in residential buildings' & AS/NZ 4654.2 "Waterproofing membrane systems for exterior use – Above ground level".
- This product is specially formulated for brush, roller or trowel application to both small and large areas.
- A wet film gauge must be used regularly to ensure that minimum wet film builds are achieved for each coat.
- All vertical terminations, including perimeter walls, hobs and penetrations etc. must be of adequate height to satisfy AS/NZ 3740 for internal applications & AS/NZ 4654.2 for external applications.
- The minimum film build requirements are identical for horizontal applications and must be applied without slump or deformation when cured.
- Apply bond breaker joint to all horizontal/vertical junctions, e.g. wall/floor, wall/wall, hob/ floor, hob/wall & shower set downs etc., prior to all membrane applications (see note on suitable sealants).
- Allow 72 hours before flood testing the installed **Dampfix Gold** system.

Suitable Sealants

ASA silicones or Bostik Industrial Silicone are suitable sealants for use as bond breakers.

Correct bond breaker selection and installation is vital to overall membrane performance. Using an unsuitable sealant can increase the risk of failure and must be avoided. **Contact Bostik for advice if unsure or if considering products not listed above.**

SUBSTRATE PREPARATION

- Read precautions prior to applying any component of the waterproofing system.
- Commencement of membrane system installation shall be taken as acceptance of the substrate suitability and preparation by the applicator.
- Check that the surface of all substrates to be coated are: structurally sound, clean, dry or damp with no free surface water, smooth and free of voids & protrusions, oils, grease, curing compounds, coatings, adhesive residues and are uncontaminated by preceding trade activities.
- Check that all composite substrates, such as wall & floor sheets are fully supported and installed to the manufacturer's instructions.
- Where platform floor sheeting, in particular particleboard, is installed check manufacturer's Specification for suitability in wet area applications and ensure that protective coatings do not impair membrane adhesion.
- New concrete and render must have cured for a minimum 28 days.
- Sand & cement screeds and polymer modified renders must have cured for a minimum 28 days.
- Substrates that are not smooth or free of voids and protrusions must be ground and vacuumed clean. All remaining voids must be repaired using, **Bostik UL-Ultrafine**, making sure to follow instructions for preparation, application and curing time. Refer to **Bostik UL-Ultrafine** Technical Data Sheet
- **Bostik Multiprime** must be applied as a primer coat on all applications to porous substrates, e.g. concrete, screeds, renders. Refer **Bostik Multiprime** Technical Data Sheet.
- **Bostik N40** primer must be applied using "2 cloth method" on all applications to dry rigid plastic & metallic non-porous substrates, e.g., UPVC drainage outlets and penetrations; aluminium angle water stops, brass, copper and galvanised penetrations, stainless steel drains and gutters etc. Refer **Bostik N40** Technical Data Sheet.
- 2 coats of **Bostik Moisture Seal** must be used to seal concrete slabs subject to a hydrostatic head of pressure from the negative side. **Bostik Moisture Seal** must be clean, dry and smooth immediately prior to the application of **Bostik Dampfix Gold**. Refer **Bostik Moisture Seal** Technical Data Sheet.

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- Membranes should not be applied until all preparation steps have been completed.
- **Dampfix Gold** is not recommended for use in swimming pools, ponds or spas.

CRACKS & JOINT SEALING

CONCRETE & MASONRY SUBSTRATES

- Static cracks up to 2mm in width, i.e. cracks that do not move or continue to propagate, must be filled with **Bostik Dampfix Gold** or **Bostik UL-Ultrafine** after substrate priming and prior to the first full coat of **Bostik Dampfix Gold**.
- Static cracks greater than 2mm and less than 4 mm in width, i.e., cracks that do not move or continue to propagate, must be filled with **Bostik UL-Ultrafine** after substrate priming and prior to the first full coat of membrane.
- Cracks greater than 2mm that are subject to movement or propagation must be referred to the builder or engineer for structural assessment and method of rectification to perform as an expansion joint.
- Expansion joints must be a minimum 6mm in width and require a backer rod installed prior to the installation of a suitable sealant (see note on page 2) at a width: depth ratio of 2:1. See "Expansion Joints" below.

FLOOR & WALL SHEET JOINS

- All floor and wall sheets must be installed to sheet manufacturer's specification and primed with **Bostik Multiprime**.
- Internal or external sheet floor systems, suitable for wet area applications, require sealant application to seal sheet joints at the time of installation to comply with manufacturer's instructions. The Waterproofer must confirm that the sealant used is compatible with all **Bostik Dampfix Gold** membrane system components.
- Floor sheet joints that use Polyurethane sealants at installation must have cured for a minimum 7 days prior to the application of the membrane.
- All sheet joints must be isolated from the membrane by a min 25mm wide bond breaker tape that covers the entire width & length of the sheet joint.
- As floor sheet joints are more prone to movement over joist supports, apply an extra 1000-micron (1.0 mm) wet coat of **Bostik Dampfix Gold** extending a minimum 35mm either side of the bond breaker tape. A further 2 full coats, at 1000 microns each, must be applied to the remaining area to be waterproofed.

EXPANSION JOINTS

- All expansion joints must be isolated from the membrane by a minimum 25mm wide bond breaker tape that covers the entire width & length of the joint.
- An extra 1000-micron (1.0 mm) wet coat of membrane extending a minimum 35mm either side of the bond breaker tape must be applied as an extra coat. A further 2 full coats, at 1000 microns wet coat each, is required to the remaining area to be waterproofed.

PRIMING

POROUS SUBSTRATE

- A porous or absorbent substrate will allow a bead of water to easily soak into, and wet out, the surface of the substrate.
- To avoid pin holing **Bostik Multiprime** must be stirred and not shaken if colour separation is evident. Colour separation will not affect the performance of **Bostik Multiprime**.
- **Bostik Multiprime** must be applied as a primer coat on all **Bostik Dampfix Gold** applications to porous substrates.
- Refer **Bostik Multiprime** Technical Data Sheet.

NON-POROUS SUBSTRATE

- A non-porous or impervious substrate will cause a bead of water to be retained on the surface of the substrate as a raised droplet. The droplet does not easily soak into the surface of the substrate.
- **Concrete that is overworked or burnished** at the time of placement can present, when cured, as a non-porous substrate that will not easily absorb a bead of water. Mechanical abrasion, such as captive

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Dampfix Gold

shot blasting or vacuumed grinding is required to open substrate pores prior to the application of **Multiprime** primer.

- **Rigid plastic and metallic substrates** require **Bostik N40** primer applied using the “2 cloth method” e.g., uPVC drainage outlets & penetrations, aluminium angle water stops, brass, copper or galvanised penetrations, stainless steel drains & gutters etc. Refer **Bostik N40** Technical Data Sheet.
- **“Two Cloth Method”** -
 - o Dampen a clean & dry cloth with N40 primer and spread evenly over the non-porous substrate using a cleaning/rubbing action.
 - o With a second clean & dry cloth, immediately wipe all primer residues off with a buffing action.
 - o Allow the substrate to dry for a minimum of 5 minutes before installing a suitable sealant (see note on page 2) and/or **Bostik Dampfix Gold** membrane.
 - o Do not leave the primer longer than 4 hours before applying sealant/membrane.
 - o Re-prime if 4 hours has elapsed without applying sealant/membrane.
 - o Clean & Re-prime if the primed surface is contaminated with excavation spoil, water, condensation, dust or other contaminants before sealant or membrane can be applied.

NB: For pre-treated surfaces, contact Bostik Technical Division for P.A.T.S. Service.

APPLICATION

MOIST OR DAMP SURFACES

- Membrane must be applied to a primed substrate.
- **Multiprime** can be applied to damp porous substrates, i.e. with no free water on the surface.
- **N40 Primer** must **not** be applied to a damp non-porous substrate.
- **Multiprime** must be used as a primer coat to porous substrates, e.g., concrete, renders, FC sheet, water resistant plasterboard & external grade plywood.
- **Dampfix Gold** is not a vapour barrier and is not designed to stop a negative hydrostatic head of pressure. Where a substrate is subject to a hydrostatic head of pressure from the negative side **Moisture Seal** must be applied and allowed to fully cure before the application of **Dampfix Gold** system. Refer **Moisture Seal** Technical Data Sheet.

BOND BREAKER & MEMBRANE INSTALLATION

- Internal wet area installation must comply with the minimum requirements of AS/NZ3740 Section 3, “Installation”. As a guide, refer pages 12 to 33.
- External wet area installation must comply with the minimum requirements of AS/NZ4654.2, Section 2, “Design and Installation”. As a guide, refer pages 7 to 30.
- When installing bond breakers only use sealants that have been approved for use in writing by Bostik. See the note on suitable sealants on pg 2 for more details or if unsure, contact Bostik before work commences.
- Bond breaker is to be installed over the dry primer coat where a bond breaker joint is required, e.g. to internal corners and changes in direction of substrate plane, such as wall/floor, wall/wall, hob/wall junctions, pipe penetrations, tap bodies, water stops, drainage outlets or similar.
- Bond breaker joints must be a minimum 12mm x 12mm covered bead of sealant applied by caulking gun continuously into all changes of substrate plane, such as, wall/floor, hob/floor, hob/wall and wall/wall corners to the minimum termination height required by AS/NZ3740 or AS/NZ4654.2 as applicable.
- The sealant must bridge all gaps and holes with a minimum 6mm contact onto the adjacent substrates.
- All bond breaker joint sealant profiles must be a minimum 6mm in depth at the mid point of the joint.
- Substrate gaps at drainage outlets, flashings, and water stops, nail/screw holes etc must also be sealed using sealant prior to membrane application.
- Applied, sealant must be spatula tooled smooth around fittings and at all changes of substrate plane to a minimum 12mm x 12mm covered joint. The sealant must be a minimum 6mm in depth at the mid point of the bond breaker joint and extend a minimum 6mm on either side of the joint or gap.
- Apply membrane as soon as the bond breaker joint can be over coated without deformation of the coved sealant profile.



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APPLICATION OF THE MEMBRANE

- Can be applied using a brush, roller or trowel.
- Should not be applied in excess of 2mm thick per coat.
- This is a 2-coat system.
- The 2nd coat should be applied perpendicular to the 1st coat.
- Each coat must be applied at a uniform minimum 1000 microns in thickness to achieve a total wet film thickness of 2.0mm.
- A wet film gauge should be used to regulate adequate membrane coverage during application of each coat. **(Refer table on page 5.)**
- As a further guide a 15Lt pail, applied at 1.0 litre/m² (1000 microns) will cover approx. 15m² per coat.
- A 15Lt pail will cover approx. 7.5m² in 2 coats.

MEMBRANE PROTECTION

- Membrane should be protected throughout the application process and during the initial 24-hour cure period by the placement of signs and barriers to deny access by following trades.
- Further temporary protection sheets must be installed securely, to protect the cured dry film from damage by following trades, until a protective screed or finished floor system is installed.

MEMBRANE RECOATING AND/OR REPAIR

RECOATING

- The surface must be cleaned free of all tile adhesive residue, surface dust and any form of contamination or substrate irregularity.
- The surface of membrane must be washed down with diluted **Bostik Sugar Soap**, thoroughly rinsed and allowed to dry.

REPAIRING

- The adjacent **Dampfix Gold** membrane must be sound with minimum dry film thickness of 1.2mm that is fully adhered to the substrate.
- Membrane must be thoroughly cleaned of all foreign material and left free of all cleaning agent residue, dust or contamination.
- Ensure that any exposed porous and non-porous substrates are correctly prepared, primed and sealed.
- Apply 2 coats of membrane as per "Coverage" instructions.
- Ensure that the membrane repair overlaps the existing membrane by a minimum 100mm.
- A consistent minimum 1.2mm dry film thickness is required over both previously coated and uncoated repair areas. **(Refer "Coverage" table below)**

COVERAGE

- **Bostik Dampfix Gold** is a min 2-coat system
- Each coat must be applied at 1.0 litre / m² or 1000-microns (1.0mm) thick resulting in a total wet film thickness of 2.0mm after 2 coats.
- A minimum of 2 hours should be allowed between coats.
- The 2nd coat should be applied perpendicular to the 1st coat.
- Extra coats may be applied if required at the same rate of 1000 microns (1mm thick) per coat.
- Do not thin with water or add fillers.
- The regular use of a wet film gauge during application is recommended to ensure correct wet film build per coat.
- The dry film thickness, after 2 coats should be a minimum of 1200-microns (1.2mm thick).

- Each 15Lt pail will cover, depending on substrate conditions:
 - o 15m² / coat
 - o 7.5 m² / 2 coats.

Application	Wet Film Thickness	Dry Film Thickness
1 st Coat	1000 microns (1.0mm)	600 microns (0.6mm)
2 nd Coat	1000 microns (1.0mm)	600 microns (0.6mm)
Total Film Thickness after 2 coats	2000 microns (2.0mm)	1200 microns (1.2mm)





Dampfix Gold

PRECAUTIONS

- **Must not** be installed directly on wet, contaminated, or friable substrates.
- Minimum dry film thickness after 2 coats is 1.2mm
- Regular checks with a wet film gauge during the application of each coat are advised.
- Do not apply any component of the system when air or substrate temperatures are below 5° C.
- Cold damp conditions will adversely effect application properties and slow rate of curing.
- Do not apply Bostik Dampfix Gold when air and substrate temperature is greater than 35°C or below 5°C .
- Membrane should not be used as an exposed finish or as top coating exterior membrane.
- When used in areas subject to ambient conditions below freezing special installation precautions must be taken. Contact Bostik for advice before commencing work.
- All 4654.1 **external** membrane applications covered with a reinforced tile bed or screed must be separated from the membrane by a minimum one layer of 200um plastic sheet as a separation layer in accordance with AS3958.1 - 3.3.2.3.
- The installation of protection board and ballast, such as river pebbles or similar loose laid unbound coverings, must be isolated from the membrane by a compatible drainage cell and filter fabric system.
- Must not be applied directly over lightweight concrete.
- Hobs constructed of autoclaved aerated blocks, e.g. Hebel, must be saturated with 2 coats of Multiprime to consolidate and seal the substrate. This is to prevent pin holing of the membrane and provide enough strength to support tiling of the hob.
- Autoclaved aerated block walls must be rendered prior to the application of the waterproofing system.
- Should not be used in constantly submerged applications such as swimming pools, ponds & spas.
- Not designed to withstand negative side substrate head of pressure.
- Use only suitable sealants (see note on page 2). Incorrect sealants will significantly increase the risk of failure.
- Any intended application of membrane outside of recommended installation should be referred to Bostik Technical Services for approval.
- Protect contents of pail from excessive heat, and freeze/thaw prior to use.
- Contact Bostik prior to work commencing if there is any uncertainty regarding suitability, installation or any other matters related to the system (including bond breakers).

BOSTIK CO-OPERATIVE TEST PROGRAM

Bostik offers a service in which a programme has been established to eliminate potential field problems by pre-testing Bostik membranes with samples of the building materials to which the membrane will be applied. This service is available on large projects where pre-application testing will aid in determining the proper method to achieve optimum adhesion. Consult a Bostik representative for further information

PAINTABILITY

Bostik Dampfix Gold is paintable. Refer paint supplier recommendations.

PROPERTIES

Colour	Gold or Grey
Appearance	Smooth, brush/roller grade paste
Shore "A" Hardness	Approx 60
Elongation	>900%
Minimum Dry Film Thickness	1.2mm
2mm Crack Bridging	Pass
Volume Solids	Approx 60%
Packaging	15L & 4L pails

Tensile Strength	1.5 - 2.0 MPa
Dry Time per coat	2 hours @ 25°C & 50% RH
Dry time following Trades	24 hours @ 25°C & 50% RH
SG	Approx 1.3
Minimum Wet Film	1.0mm / coat
Membrane Rating	Class 3
Moisture Vapour Transmission Rate	1.24 grams / m2 / 24hours
Flammability	Non-flammable



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Dampfix Gold

Complies with AS3740 by meeting all requirements of AS/NZ4858
Wet Area Membranes

STORAGE & SHELF LIFE

Store between 5°C and 30°C. If stored, unopened within these temperature ranges, this product has a shelf life of **12 months**. Protect from excessive heat, moisture and freeze/thaw.

HEALTH & SAFETY

SEE THE MATERIAL SAFETY DATA SHEET FOR ADDITIONAL INFORMATION.

TECHNICAL SERVICES TOLL FREE NUMBER: 0508 222 272 (Land lines only)

MSDS can be downloaded from www.bostik.co.nz

Clean-Up

Warm soapy water will remove **Dampfix Gold** from tools and equipment prior to full cure

PACKAGING

15 Litre & 4 Litre pails

VOC – 23 g/Lt

PRODUCT DETAILS

ITEM NO	ITEM NAME	Colour	SIZE
30804399	DAMPFIX GOLD	Yellow	4L
30804461	DAMPFIX GOLD	Yellow	15L

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Division: Construction

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BRANZ Appraised
Appraisal No. 745 [2017]

DAMPFIX GOLD INTERIOR WATERPROOFING MEMBRANE

Appraisal No. 745 [2017]

This Appraisal replaces BRANZ
Appraisal No. 745 [2011]



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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Product

- 1.1 Dampfix Gold Interior Waterproofing Membrane is a liquid-applied waterproofing membrane for use under ceramic or stone tile finishes in internal wet areas.

Scope

- 2.1 Dampfix Gold Interior Waterproofing Membrane has been appraised for use as a waterproofing membrane for internal wet areas of buildings, within the following scope:
- on floor substrates of concrete, flooring grade particleboard, plywood, compressed fibre cement sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
 - when protected from physical damage by ceramic or stone tile finishes; and,
 - where floors are designed and constructed such that deflections do not exceed 1/360th of the span.
- 2.2 The use of Dampfix Gold Interior Waterproofing Membrane on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Movement and control joints in the substrate must be carried through the membrane and tile finish. The design and construction of the substrate and movement and control joints is specific to each building, and is therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.4 The ceramic or stone tile finishes are outside the scope of this Appraisal.
- 2.5 The membrane must be installed by trained applicators, approved by Bostik New Zealand Limited.

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Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Dampfix Gold Interior Waterproofing Membrane if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 [b], 15 years and B2.3.2. Dampfix Gold Interior Waterproofing Membrane meets this requirement. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Dampfix Gold Interior Waterproofing Membrane meets this requirement. See Paragraphs 11.1- 11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Dampfix Gold Interior Waterproofing Membrane meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 Materials supplied by Bostik New Zealand Limited are as follows:

- **Dampfix Gold Interior Waterproofing Membrane** - An elastomeric, one-part, water-based, fibre reinforced polyurethane waterproofing membrane. It is supplied as a gold colour in 15 litre pails.
- **ASA Multiprime** - A synthetic latex based primer for a variety of porous substrates. It is supplied as an opaque pink liquid in 1, 5 and 20 litre containers.
- **Bostik Ultra NP Primer 2 Part** - A two part water based epoxy primer for non-porous substrates. It is supplied in a 4 litre kit and is a uniform greenish colour when mixed.
- **ASA Neutral Cure Silicone** - A flexible, neutral cure silicone for use as an expansion joint filler or bondbreaker. It is supplied as a white or coloured paste in 300 ml cartridges.

Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Dampfix Gold Interior Waterproofing Membrane. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 Dampfix Gold Interior Waterproofing Membrane is for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 The membrane must be protected from physical damage by the application of ceramic or stone tile finishes.
- 7.3 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ Good Practice Guide - Tiling.
- 7.4 Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported.
- 7.5 Timber framing supporting the substrates must be constructed such that deflections do not exceed 1/360th of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

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Substrates

Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with the sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used.
- 8.2 The plywood must be laid with the face grain at right angles to the floor joists. Joists must be at 400 mm centres maximum and the edges of the sheets must be supported with blocking or framing. The plywood must be fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres along the sheet edges and 200 mm centres to all framing through the body of the sheets.

Fibre Cement Compressed Sheet/ Fibre Cement Sheet Tile Underlay

- 8.3 Fibre cement compressed sheet must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Fibre cement sheet tile underlay must be suitable for use in internal wet areas. Installation must be in accordance with the instructions of the manufacturer.

Particleboard

- 8.4 Particleboard must be specified for the end use in accordance with NZS 3602.

Concrete and Concrete Masonry

- 8.5 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229, and concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

- 8.6 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be suitable for use in internal wet areas.
- 8.7 Fibre cement sheet must be suitable for use in wet areas and comply with the requirements of AS/NZS 2908.2
- 8.8 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

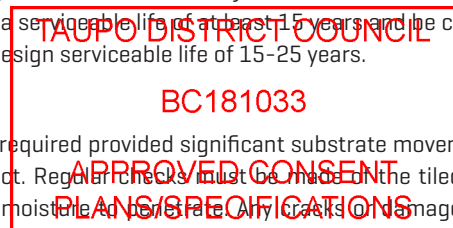
Durability

Serviceable Life

- 9.1 The Dampfix Gold Interior Waterproofing Membrane, when subjected to normal conditions of environment and use, is expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design serviceable life of 15-25 years.

Maintenance

- 10.1 No maintenance of the membrane will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made on the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grout and sealant.
- 10.2 In the event of damage to the membrane, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.
- 10.3 Drainage outlets must be maintained to operate effectively, and ceramic or stone tile finishes must be kept clean.



Internal Moisture

- 11.1 Dampfix Gold Interior Waterproofing Membrane is impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Dampfix Gold Interior Waterproofing Membrane is suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of compliance for containment of overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.1.
- 11.3 Surfaces must be finished with ceramic or stone tile finishes. A means of compliance to NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 [b], 3.1.2 [b] and 3.3.1 [b].
- 11.4 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes and drainage flanges must be provided and the floor must fall to the outlet.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, BRANZ Good Practice Guide – Tiling, and flooring and wallboard manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must flash over the membrane a minimum of 30 mm.
- 11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms.

Installation Information

Installation Skill Level Requirement

- 12.1 Installation of substrates must always be carried out in accordance with the Dampfix Gold Interior Waterproofing Membrane Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.
- 12.2 Installation and finishing of components and accessories supplied by Bostik New Zealand Ltd and its approved applicators must be completed by trained applicators, approved by Bostik New Zealand Ltd.

Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of concrete substrates must be 75% or less before membrane application. Concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.
- 13.3 All voids, cracks, holes, joints and excessively rough surfaces must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have a bond breaker installed as set out in the Technical Literature.
- 13.4 All substrates must be primed and the primer allowed to cure before the membrane is installed. Refer to the membrane supplier for primer specification.

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Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 10°C or above 35°C.
- 14.2 Dampfix Gold Interior Waterproofing Membrane must be thoroughly stirred before application.
- 14.3 The membrane must be applied in a minimum of two coats to give a total dry film thickness of 1.0 mm. Subsequent coats must be applied at an opposite direction to the previous coat.
- 14.4 Application can be made by roller [medium/long nap], brush [long bristle], or a rubber or plastic float.
- 14.5 Clean up may be undertaken with water.

Tiling

- 15.1 The membrane must be fully cured before tiling. The cured membrane must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide - Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer and Bostik New Zealand Limited.

Inspections

- 16.1 Critical areas of inspection are:
 - Construction of substrates, including crack control and installation of bond breakers and movement control joints.
 - Moisture content of the substrate prior to the application of the membrane.
 - Acceptance of the substrate by the membrane installer prior to application of the membrane.
 - Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness.
 - Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

Health and Safety

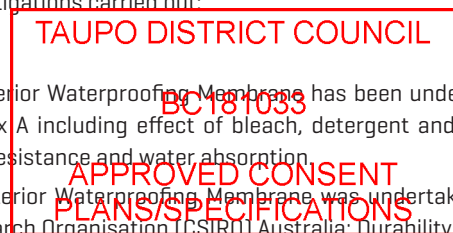
- 17.1 Safe use and handling procedures for the membrane are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 18.1 The following testing of Dampfix Gold Interior Waterproofing Membrane has been undertaken by BRANZ: Testing to AS/NZS 4858 Appendix A including effect of bleach, detergent and water on tensile and elongation, cyclic movement resistance and water absorption.
- 18.2 The following testing of Dampfix Gold Interior Waterproofing Membrane was undertaken by the Commonwealth Scientific Industrial Research Organisation [CSIRO] Australia: Durability testing to AS/NZS 4858 Appendix A including effect of bleach, detergent and water on tensile and elongation, water vapour transmission to ASTM E96-92, water absorption to AS 3558.1 and cyclic movement resistance.
- 18.3 Testing of Dampfix Gold Interior Waterproofing Membrane has been undertaken by by Thor Specialties Pty Limited for fungi resistance to the requirements of ASTM G21.
- 18.4 The above test methods and results have been reviewed by BRANZ and found to be satisfactory.



Other Investigations

- 19.1 An assessment was made of the durability of the Dampfix Gold Interior Waterproofing Membrane by BRANZ technical experts.
- 19.2 Site inspections have been carried out by BRANZ to examine the practicability of installation.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 20.1 The manufacture of the membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 20.2 The quality management system of the membrane's manufacturer has been assessed and found to be satisfactory.
- 20.3 The quality of supply of the membrane system materials to the market is the responsibility of Bostik New Zealand Limited.
- 20.4 Quality on site is the responsibility of trained applicators, approved by Bostik New Zealand Limited.
- 20.5 Designers are responsible for the building design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Bostik New Zealand Limited and this Appraisal.
- 20.6 Building owners are responsible for the maintenance of the tiling or stone finishing systems in accordance with the instructions of Bostik New Zealand Limited.

Sources of Information

- AS 3558.1 - 1999 Methods of testing plastics and composite materials sanitary plumbing and fixtures - Determination of water absorption characteristics.
- AS 3740 - 2010 Waterproofing of domestic wet areas.
- AS 3958.1 - 2007 Guide to the installation of ceramic tiles.
- ASTM E96-92 Standard test methods for water vapour transmission of materials.
- ASTM G21-96 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- AS/NZS 2908.2: 2000 Cellulose-cement products - flat sheet.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2269: 2012 Plywood - Structural.
- AS/NZS 4858 - 2004 Wet area membranes.
- BRANZ Bulletin Number 585. Measuring Moisture in Timber and Concrete, June 2015
- BRANZ Good Practice Guide Tiling - April 2015.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3602: 2003 Timber and wood-based products for use in buildings.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of concrete masonry structures.
- Ministry of Business, Innovation and Employment Record of Amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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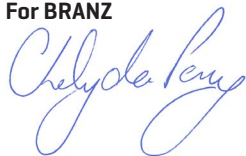
In the opinion of BRANZ, **Dampfix Gold Interior Waterproofing Membrane** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Bostik New Zealand Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Bostik New Zealand Ltd:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Bostik New Zealand Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Bostik New Zealand Ltd** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

22 August 2017

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Other Items Relevant to this Project

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INSTRUCTIONS ON THE USE OF THIS MANUAL

This Manual consists of three Sections:

Section 1: Firth RibRaft Floor System Design Information

Section 2: Firth RibRaft Floor System Installation Information

Section 3: Firth RibRaft Floor System Verification

Section 1 contains information principally useful for the specifier or building designer. Section 2 is primarily aimed at the person on site installing the Firth RibRaft Floor system. While Section 3 describes the required verification checks.

This document contains design and installation information. A variation to any of the information given requires specific engineering design and is hence beyond the scope of this document.

Firth RibRaft Floor System can be constructed for all slab-on-ground concrete floors for domestic or residential buildings that fall within the scope of NZS 3604:2011 “Timber Framed Buildings” and Clause 3 “Scope” of Section 1 of this Manual. The design and installation details in this Manual shall be used to design and construct such a floor.

The Firth RibRaft Floor System is covered by the DBH Codemark®. This is conditional on the system being used as described in CertMark Australasia certification decision, which in turn requires design in accordance with Section 1 and installation in accordance with Section 2 of this Manual and on site Verification in accordance with Section 3.

Note that a DBH Codemark means that if this manual is rigidly followed the relevant Building Control Authority will automatically provide a building permit without the need for producer statements. To comply with the manual does mean that Firth Concrete must be used.

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FIRTH RIBRAFT FLOOR SYSTEM

SECTION 1: DESIGN INFORMATION

1 GENERAL

This Section of this Manual contains design information not requiring specific engineering input for the Firth RibRaft Floor System (the system). Full information on the installation procedures is described in Section 2 of this Manual (Installation Information). Where Standards are referenced in this manual, these shall include the latest amendments.

2 TECHNICAL DESCRIPTION

2.1 Overview

The Firth RibRaft Floor System is a reinforced concrete waffle raft floor slab-on-ground. It consists of an 85mm thick slab supported by a grid of ribs normally 100mm wide at 1200mm x 1200mm centres. The overall depth is 305mm. Edge beams and ribs under load bearing walls are 300mm wide to provide for the extra load carried by these members. Where heating coils of less than 25mm diameter are embedded in the topping, the slab concrete thickness shall be 110mm meaning the overall thickness is 330mm.

2.2 Pods

Firth RibRaft polystyrene pods 1100mm square and 220mm thick are placed directly on levelled ground and are arranged in such a way as to form a reinforced concrete floor slab with a grid of reinforced concrete ribs and edge beams when concrete is placed onto them. Pods may be cut to suit specific architecture layout and also to accommodate services. (300mm thick pods are available if needed for deeper edge beams and internal ribs for construction following specific engineering design. Such uses are outside the scope of this document.)

2.3 Steel

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m², a lower

characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 300mm centres, and ductility class L or E, hereafter referred to as “665 mesh, or mesh”. The reinforcing bars in the ribs and edge beams shall conform to AS/NZS 4671:2001 “Steel Reinforcing Materials”. Specifically designed spacers are used to position the polystyrene pods and the rib and edge beam reinforcing steel bars in a secure manner until the concrete is placed. The reinforcing mesh is held in place by mesh chairs. Conventional timber or steel formwork is used to form the edge of the slab.

2.4 Concrete

One of the following Firth concrete products shall be used in the system:

- 1) Raftmix – a 20MPa 100mm slump structural mix available in either a 13mm or more usually a 19mm nominal aggregate size. This mix is normally placed in the floor straight from the concrete truck chute and if necessary by wheelbarrow over planks set up over the pods.
- 2) Raftmix Pump – a 20MPa 100mm slump pump mix available in either a 13mm or more commonly a 19mm nominal aggregate size. The selection of aggregate size may be determined either by the capability of the available concrete pump or by the concrete placer's preference.

The exception being for buildings constructed in the 'sea spray zone' (i.e. within 500m of the sea including harbours, within 100m of tidal estuaries or inlets, on offshore islands and elsewhere as defined as exposure zone D in 4.2.3.3 of NZS3604) in which case one of the following Firth concrete products shall be used in the system:

- 1) Raftmix25 – a 25MPa 100mm slump structural mix available in either a 13mm or more usually a 19mm nominal aggregate size. This mix is normally placed in the floor straight from the concrete truck chute

and if necessary by wheelbarrow over planks set up over the pods.

- 2) Raftmix Pump25 – a 25MPa 100mm slump pump mix available in either a 13mm or more commonly a 19mm nominal aggregate size. The selection of aggregate size may be determined either by the capability of the available concrete pump or by the concrete placer’s preference.

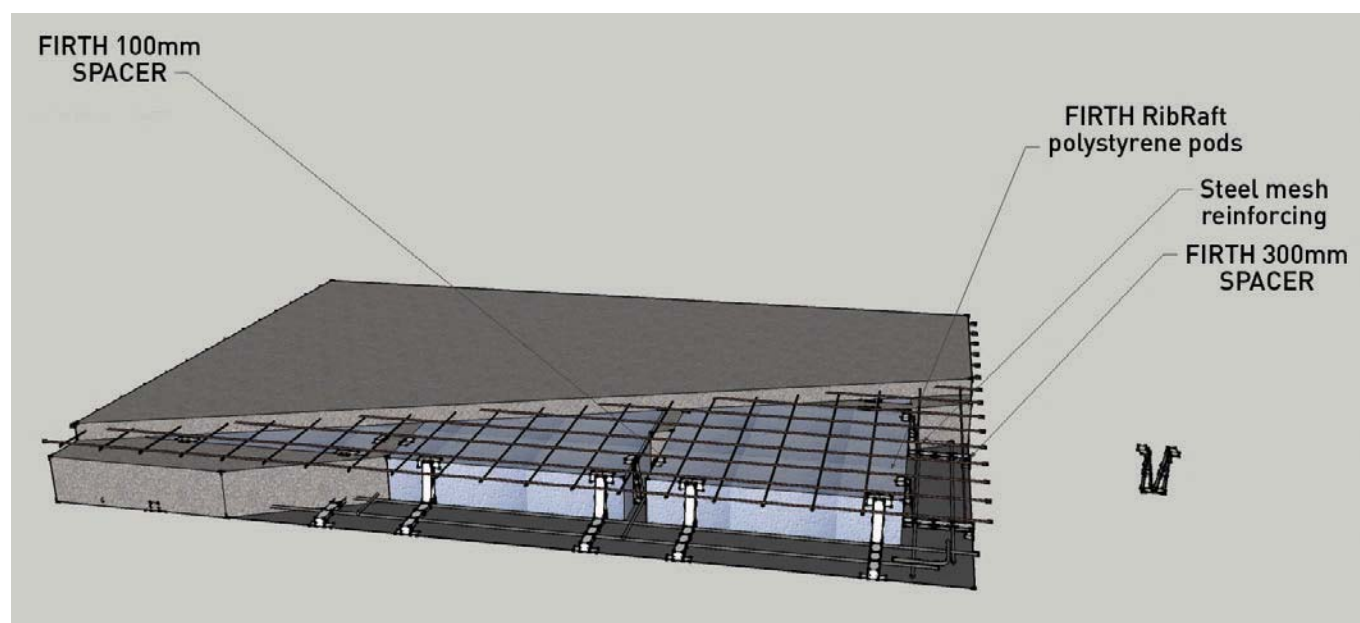


Figure 1 *The RibRaft System*

3 SCOPE

This Clause sets out the limitations that apply to the use of the system to ensure that specific engineering input is not required. The concrete floor slab for buildings or ground conditions that do not meet this scope must be subjected to specific engineering design to comply with the requirements of the New Zealand Building Code.

3.1 Structure Limitations

Specific engineering input shall not be required only where the structure supported by the system complies with the following criteria:

- The structure supported by the system is constructed in a location where the Seismic Hazard Factor Z (defined in NZ1170.5) is less than or equal to 0.45 (refer to figure 6).
- The system is laid level, and is not stepped.
- The structure supported by the system has no basement, part basement or foundation walls.
- The total height from the lowest ground level to the highest point of the roof shall not exceed 10m.
- The structure supported by the system has a roof

pitch limited to 60 degrees maximum from the horizontal.

- The maximum height of each storey of the structure supported by the system is 3m.
- Only ground floor walls of the structure supported by the system are permitted to be “heavy external walls” (as defined in Clause 3.3).
- The roof truss span shall be less than or equal to 12m when the roof and ceiling loads are supported entirely by the external walls.
- Where internal load bearing walls are used to support the roof or floors, the loaded dimensions stated in Tables 8.2 and 14.10 of NZS3604:2011 shall apply, and the load bearing wall shall be supported on a 300mm wide load bearing rib as detailed in this manual.
- Floors may be of unlimited size provided that the maximum dimension between free joints shall not exceed 30m. Where free joints are required they should be detailed in accordance with NZS3604:2011.

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3.2 Live Loading

The live loading cases of structures covered by these designs are:

- 1.5kPa and 3.0kPa as per NZS 3604:2011 "Timber Framed Buildings".
- 13kN concentrated load in garage over area of 0.3 x 0.3m (vehicle limited to 2500kg gross).

3.3 Dead Loading For Use With This Manual

The dead load cases of structures covered by these designs are:

- Light external walls with total mass not exceeding 60kg/m² – e.g. timber framing with weather boards and interior wall linings.
- Heavy external walls with total mass greater than 60kg/m² but not exceeding 290kg/m² – e.g. timber framing with masonry veneer or partially filled 20 series masonry blocks.
- Internal walls with total mass not exceeding 45kg/m² – e.g. timber framing and linings.
- Light roofs with total mass not exceeding 45kg/m² – e.g. ceiling linings and metal roof, including framing.
- Heavy roofs with total mass greater than 45kg/m² but not exceeding 85kg/m² – e.g. ceiling lining and concrete tiles or slates, including framing.
- Mid-floors with total mass not exceeding 60kg/m² – e.g. timber framing and flooring, including ceiling linings.
- Heavy internal walls and/or load bearing internal walls supported on a load bearing rib.

3.4 Building Types

The designs given in this Manual are limited to where the system supports Building Types A to D as described in Table 1. The classification of wall weights is as detailed in Clause 3.3 of this Section. Single and two storey shall be as defined in NZS 3604:2011.

Table 1 *Building Identifier*

Building Type	Description	Ground Floor External Walls	Second Storey External Walls
A	Single Storey	Light	
B	Single Storey	Heavy	
C	Two Storey	Light	Light
D	Two Storey	Heavy	Light

3.5 Foundation Soils

The system may be used when the supporting ground meets the definitions of "good ground" given in Section 3 of NZS 3604:2011: (as modified by B1 of the Building Compliance Documents). In addition, the system shall not be used for damp sites i.e. where it can be reasonably expected that the ground water level could come within 600mm of the underside of the system. The acceptability of the ground shall be verified in accordance with Clause 3.1.3 of NZS 3604:2011.

Where the ultimate bearing capacity required of the supporting ground is verified by Scala Penetrometer testing in accordance with Clause 3.3 of NZS 3604:2011. The bearing capacity shall be considered adequate when the number of blows per 300mm depth of penetration below the underside of the system at each test site, exceeds the values given in Table 2 below. For RibRaft foundations compliance with Table 2 allows ultimate bearing capacities of less than 300kPa. However, with the exception of bearing capacity all other requirements in NZS3604:2011 for "good ground" shall be complied with.

Table 2 *Scala Penetrometer Blows Required For Determining Ultimate Bearing Capacity*

Building Type	Min. blows per 300mm depth
A	6
B	7
C	8
D	9

3.6 Flow Diagrams

The flow diagrams on the following pages (adapted from NZS 3604:2011) will help in determining whether the non-specific details for the system can be used for the purposes of the concrete floor slab construction. There are two types of flow diagrams. The first is to determine whether a proposed building complies with the requirements set out in this Manual (Building Check), and the second is to determine whether the site complies with the requirements set out in this Manual (Site Check).

(Note: NZS 3604:2011 provides for parts of buildings to be considered as individual buildings. These flow diagrams apply to those parts of the building where slab-on-ground is being considered and where the part of the building can be considered as an individual building under NZS 3604:2011).

Figure 2 Building Check Flow Diagram

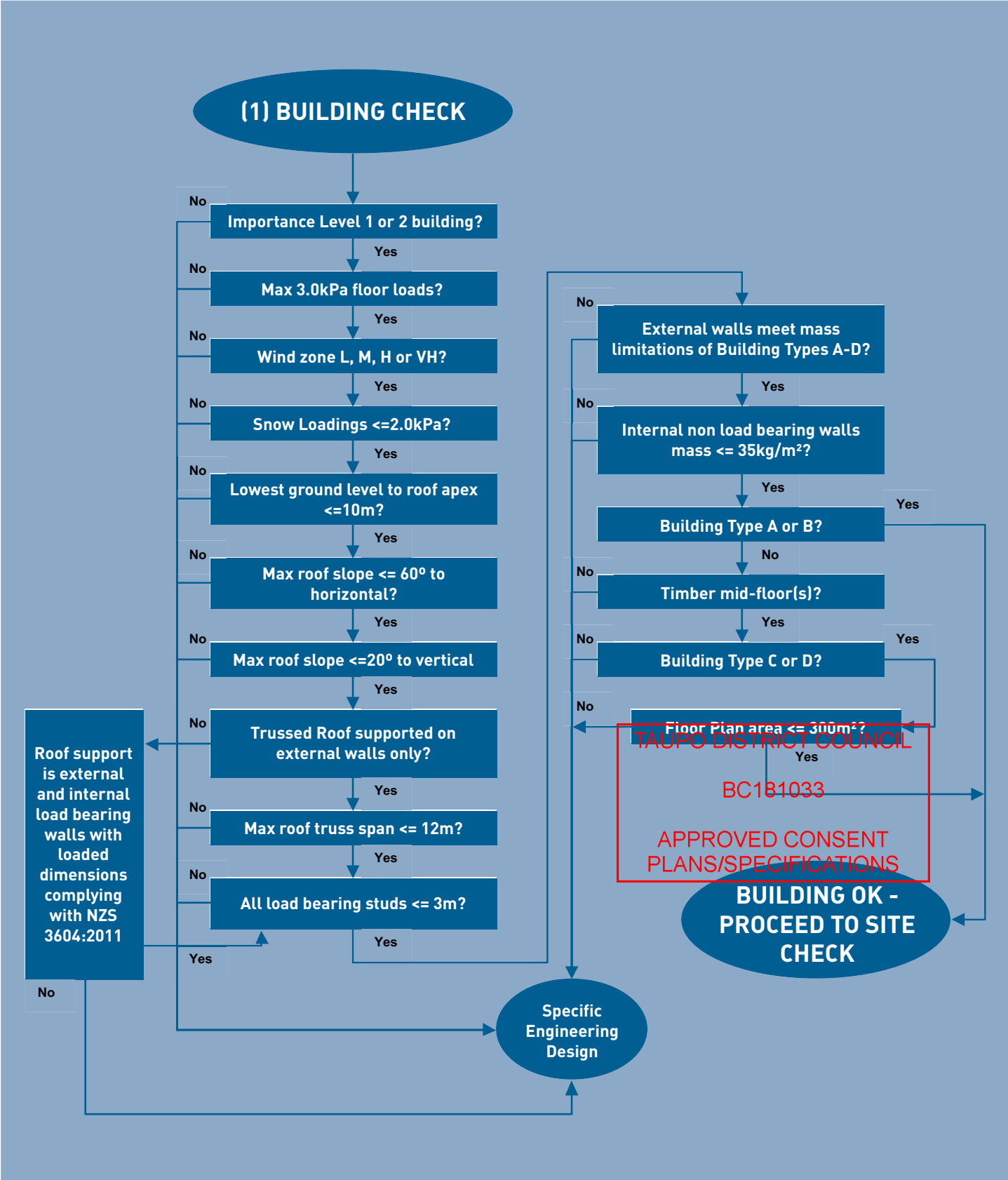
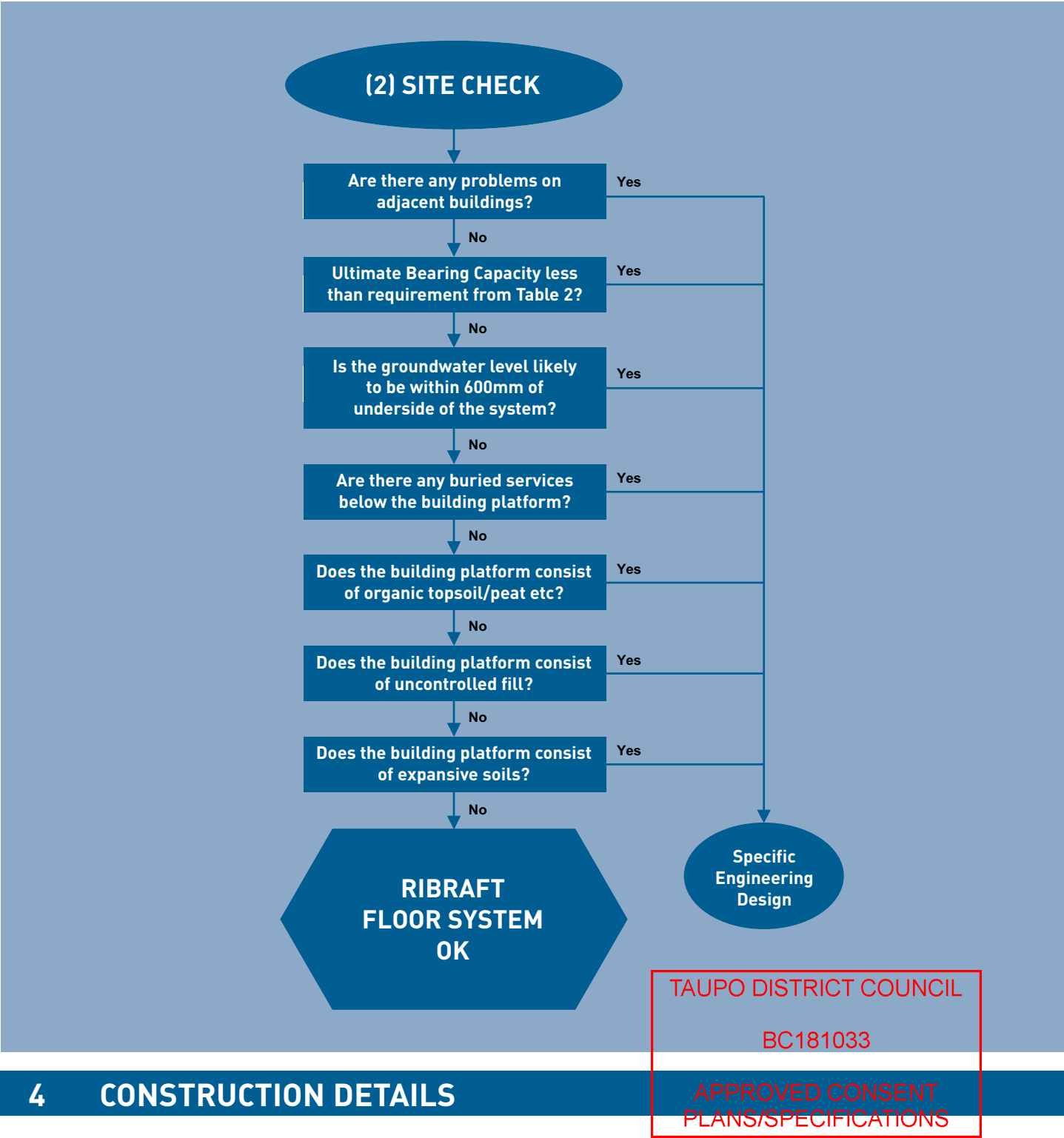


Figure 3 Site Check Flow Diagram



4 CONSTRUCTION DETAILS

Standard construction details for the system are provided here for buildings that fall within the above scope.

4.1 Pod Layout

RibRaft polystyrene pods supplied by Firth (1100 x 1100 x 220mm thick) shall be placed on levelled ground and arranged in a waffle pattern. The pods are used as void formers while the concrete is curing. These pods are an integral component of the system and shall not be substituted.

Pods shall be placed so as to provide the necessary spacing between the edge beams and ribs as described below. The first rib out from the edge beam shall have a maximum clear separation of 1100mm however in all other cases the centre to centre distance between the ribs, whether they are 100mm or 300mm wide, shall be 1200mm. In the case of 100mm ribs this centre to centre spacing is achieved by the 1100mm square pods however between 100mm and 300mm ribs, or between two 300mm ribs, the pods shall be cut down to suit. Pods may be cut down to size but shall not be added to, where this is necessary to suit the building layout,

penetrations or orientation of beams and ribs.

Figure 4 below shows a typical layout of the pods and ribs. Note the part pods around the edge, where the building shape dictates, and adjacent to the 300mm rib.

Firth suggests that when drawing the building plan, a generic RibRaft grid (100mm wide ribs at 1200mm centres) is set out using the corner of the building as a starting point. The location of any load bearing ribs are identified and pods cut to establish 300mm wide ribs. The most cost effective solution being a simple grid layout which requires minimum cutting of the pods. Ribs can be used at less than 1200mm centres, however it is more cost effective to use the 1200mm centres wherever practicable.

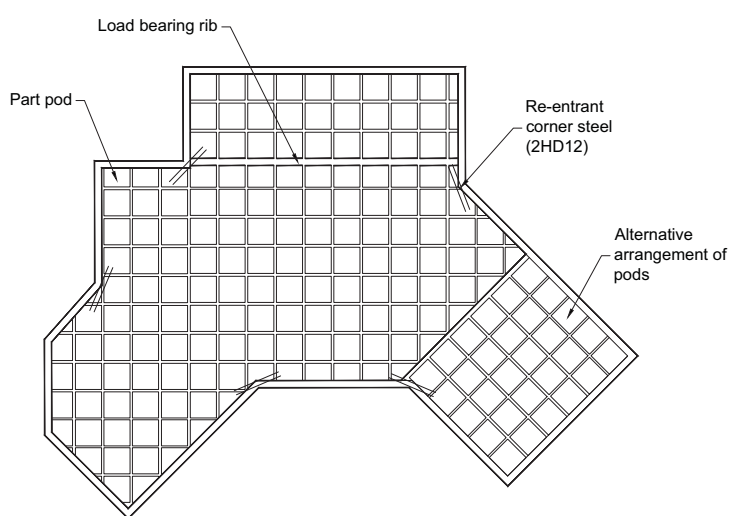


Figure 4 Typical RibRaft Plan

4.2 Edge Beam Width and Reinforcement

Edge beams around the perimeter of the floor slab shall be 300mm to provide bearing capacity for external load bearing walls, and contain 2-HD12 bars (Grade 500E) as bottom steel and 1-HD12 bar (Grade 500E) in the top. This top bar shall be tied to the underside of the reinforcement mesh. Refer Figure 5, below for construction details. The edge beam shall be rebated for brick veneers where necessary as shown in Figure 5(C).

4.3 Internal Ribs (non load bearing) Width and Reinforcement

Each standard internal rib shall be 100mm wide and shall contain 1-HD12 steel bar (Grade 500E) held in place at the bottom of the rib by a Firth spacer. Refer Figure 5E for construction details.

4.4 Internal Ribs (load bearing) Width and Reinforcement

For all load bearing walls and heavy internal walls, the pods shall be cut to create a 300mm wide rib directly under the load bearing wall, with 2-HD12 (Grade 500E) steel bars as bottom steel. Refer Figure 5(D) for construction details under load bearing walls.

Where the load bearing ribs meet and terminate at an edge beam or internal rib the bottom reinforcement from the load bearing rib shall be bent into the adjacent rib and tied together. The reinforcement shall lap for at least 720mm.

4.5 Mesh Reinforcement

The entire floor slab shall be reinforced with 665 Mesh supported on 40mm mesh chairs sitting on the polystyrene pods.

4.6 Re-entrant Corners

In order to limit cracking at the re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover from the internal corner – refer Figure 4.

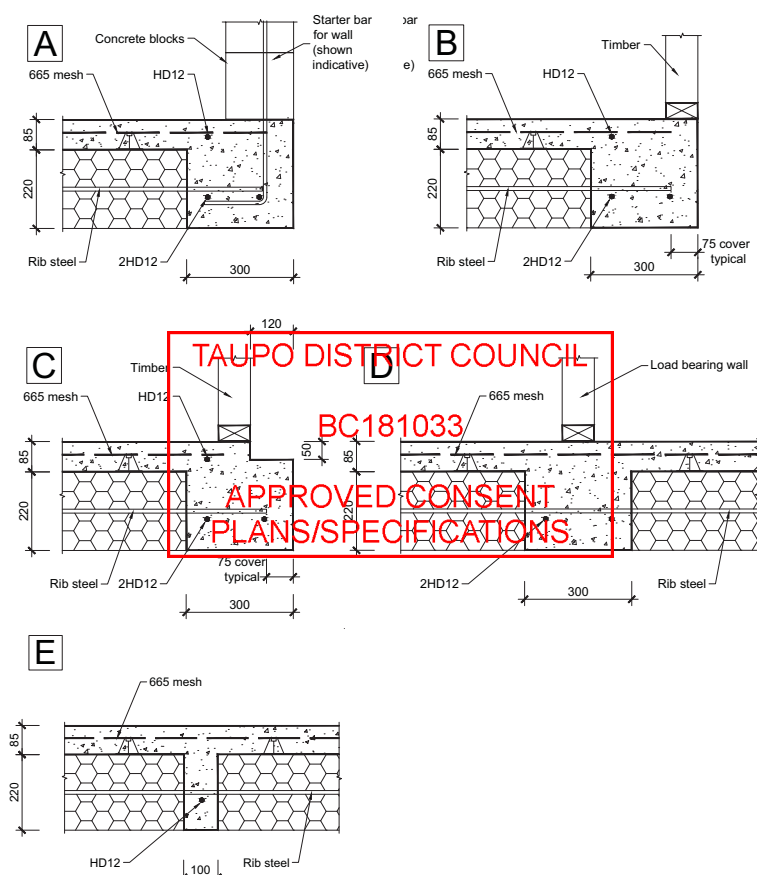


Figure 5 Standard RibRaft Construction Details

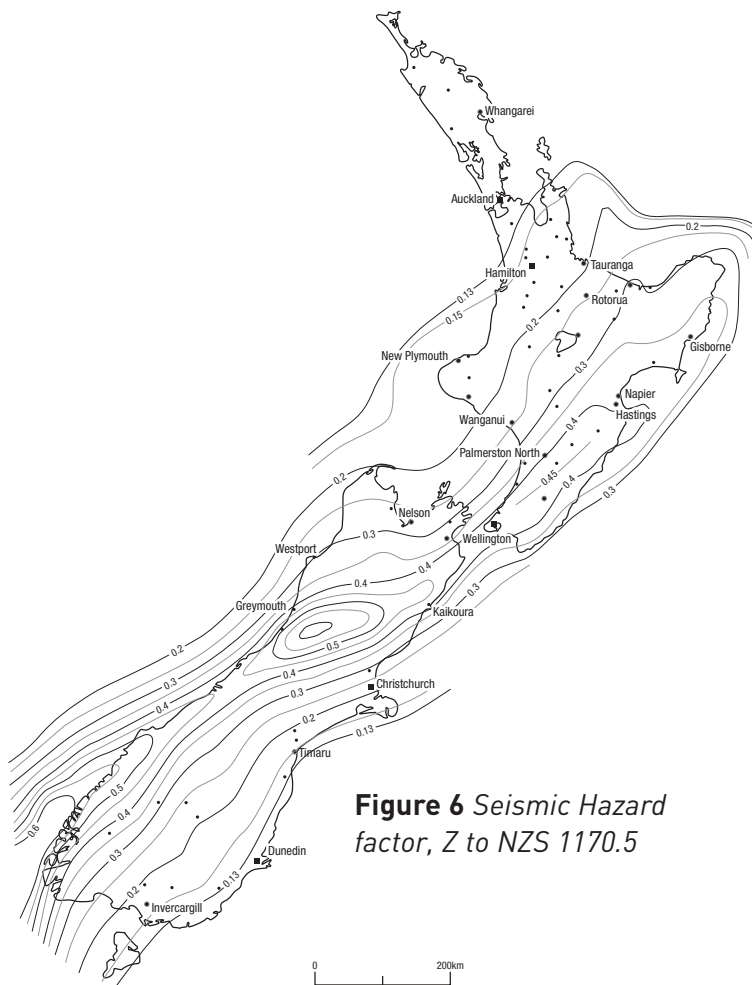
5 LATERAL RESISTANCE

5.1 Earthquake Resistance

Unlike conventional foundation systems, the Firth RibRaft system is not embedded into the ground. Sliding resistance to horizontal seismic loads is provided by frictional contact with the soil.

In locations where the Seismic Hazard Factor, Z is greater than 0.45, shear keys may be required to resist seismic loads. Such buildings require specific engineering design and are outside the scope of this document. Refer to figure 6.

Depending on the wind zone and the weight of the building elements this frictional resistance may not be sufficient to provide sliding resistance to wind loads, and specific shear keys may be required, as detailed in clause 5.2.



For the purposes of this Manual, the ground shall be classified as clay or sand according to the following descriptions:

Clay: retains shape when moulded under hand pressure; may stick to boots and hands; cracks and becomes hard, but retains shape, when dried in direct sunlight; and when dug with a spade the cut vertical surface stands.

Sand: Individual particles visible to the unaided eye; when dry will run through the fingers and forms a conical mound if poured; when moist quickly dries out under direct sunlight; and when dug with a spade the vertical surface does not stand for long.

5.2 Wind Resistance

The building's bracing demand from wind loading shall be assessed from Section 5 of NZS 3604:2011 for both directions (i.e. along and across the building). The bracing capacity of the system must exceed the greater of the bracing demands determined.

The bracing capacity of the system shall be determined as the sum of the bracing capacity provided by frictional resistance (i.e. friction between the system and the ground) and the bracing capacity provided by the shear keys (if any) necessary to meet the requirements of Clause 5.2.

The bracing capacity provided by frictional resistance shall be determined from Table 6 depending on the building type, roof weight, and floor live loading.

The bracing capacity provided by the shear keys shall be the sum of the bracing capacity of the individual shear keys determined as follows. If the shear key is in clay, each shear key shall be considered to contribute 170 BU's. If the shear key is in sand, each shear key shall be considered to contribute 200 BU's.

If the bracing capacity of the system, determined from the frictional resistance and the shear keys as described above, is less than the bracing demand further shear keys shall be added until the bracing demand is met.

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Building Type	Roof Type	BUs provided per 100m ² for live loading of:	
		1.5kPa	3.0kPa
A	Light	1150	1267
A	Heavy	1267	1383
B	Light	1800	1917
B	Heavy	1917	2033
C	Light	1617	1833
C	Heavy	1717	1950
D	Light	2267	2483
D	Heavy	2367	2600

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Table 6 Bracing Capacity provided by Frictional Resistance per 100m² of ground floor area.

5.3 Shear Keys

Shear key piles required by Clause 5.2 must be uniformly distributed around the perimeter of the building, and be located at the edge beam/internal rib junction. Where a shear key is required, the minimum number of shear keys shall be two per floor plan. Where two shear keys are used they shall be placed at diagonally opposite ends of the floor plan.

Construction details of the shear keys shall be as shown on Figure 7 below. Shear keys shall be a minimum of 900mm long. The holes shall be over-drilled at least 100mm and a polystyrene RibRaft Shear Key Support placed into the bottom of each hole. This will support only the plastic (wet) concrete and then allow movement of the shear key if settlement of the supporting ground occurs. The effective end bearing of the shear keys is therefore eliminated.

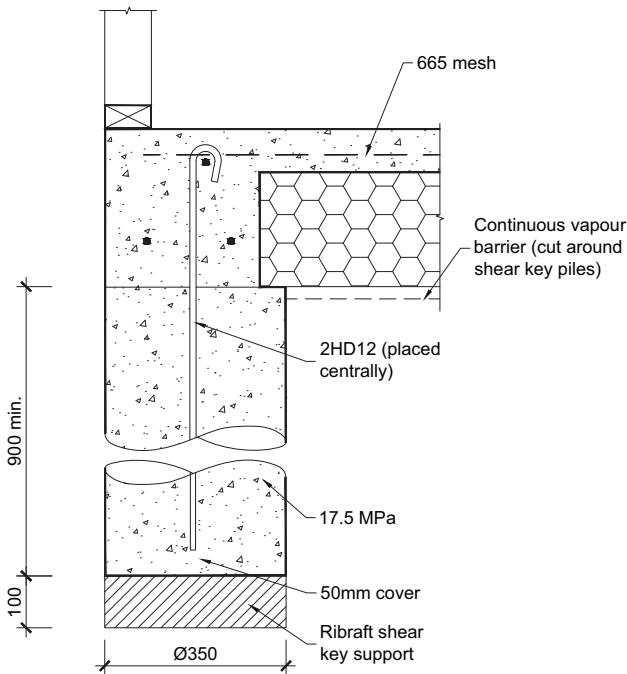


Figure 7 RibRaft Shear Key

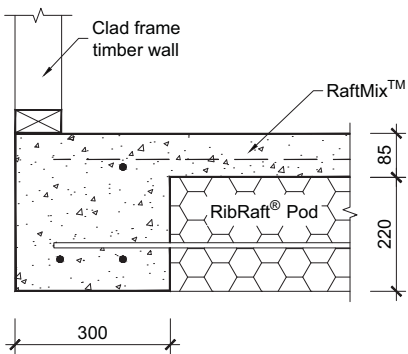
6 OTHER DESIGN DETAILS

6.1 R-Values

The insulation performance of a building element is measured by the “R-Value”. The schedule method is the simplest method to achieve compliance with Clause H1 of the Building Code. Using this method the minimum R-Values required for floors are R1.3 for light timber frame construction, and typically R1.5 for masonry construction. R values of R1.3 can be used for masonry construction if glazing with greater insulation is used (refer NZBC, Clause H1). If in-floor heating is used the

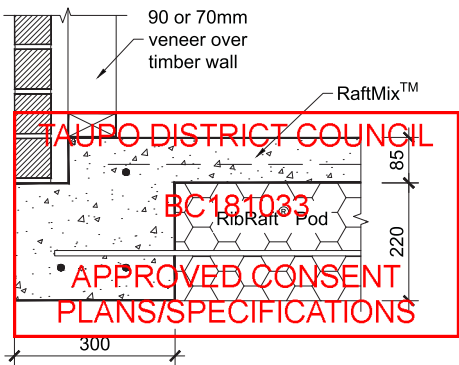
minimum required R-Value is increased to R1.9, and the resistance to thermal movement into the room must be one tenth of that to the outside environment.

The R-Value of a RibRaft floor is dependent on the floor area to perimeter ratio, and the details of the floor perimeter. The R-Value for various solutions are illustrated below. The R-Values have been independently calculated using NZS4214:2006 “Methods of Determining the Total Thermal Resistance of Parts of Buildings,” though modified for perimeter heat loss using recommendations from the Building Research Establishment.



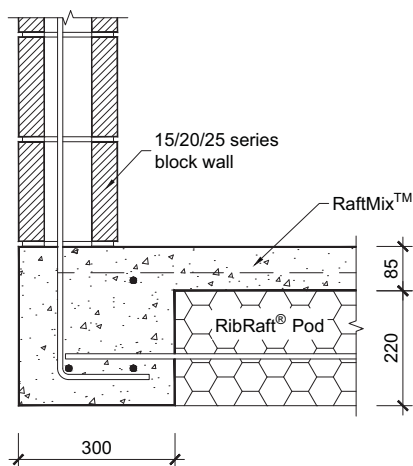
R-value m ² °C/W	Floor Area To Perimeter Ratio m ² /m									
	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	4.00
	1.39	1.51	1.63	1.74	1.85	1.96	2.07	2.18	2.28	2.68

Figure 8 RibRaft R-Values for 90mm thick walls on the floor edge.



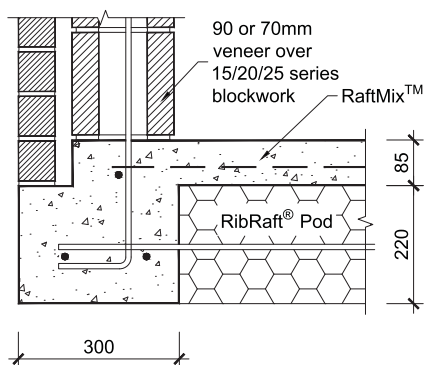
R-value m ² °C/W	Floor Area To Perimeter Ratio m ² /m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84

Figure 9 RibRaft R-Values for 70-90mm thick veneer, cavity, and 90mm walls.



	Block	Floor Area To Perimeter Ratio m ² /m										
		1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m ² °C/W	15 series	1.46	1.59	1.71	1.84	1.96	2.07	2.19	2.30	2.41	2.63	2.84
	20 series	1.52	1.66	1.79	1.92	2.04	2.17	2.29	2.40	2.52	2.75	2.93
	25 series	1.57	1.72	1.85	1.99	2.12	2.24	2.37	2.49	2.61	2.85	3.08

Figure 10 RibRaft R-Values for various thicknesses of masonry walls.



	Block	Floor Area To Perimeter Ratio m ² /m									
		1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m ² °C/W	15 series	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95
	20 series	1.64	1.78	1.92	2.06	2.19	2.32	2.44	2.56	2.81	3.04
	25 series	1.69	1.83	1.98	2.11	2.25	2.38	2.51	2.64	2.88	3.12

Figure 11 RibRaft R-Values for 70-90mm thick veneer, cavity, and various thicknesses of masonry walls.

6.2 Shrinkage Control

Shrinkage control joints reduce the risk of unwanted cracks, and their placement needs to be carefully considered where cracking could be unacceptable. Factors to consider are the type of floor finish, the location of ribs and ground beams, underfloor heating and the effect of piles restraining shrinkage. Shrinkage control joints shall be saw cut after hardening. The saw cuts shall be cut to a depth of 25mm and shall be cut no later than 24 hours. The shrinkage control joints shall be positioned to coincide with major changes in floor plan. Where the concrete is to be exposed, or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 6m.

Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 2:1.

Shrinkage control joints shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib then the joint shall be located directly above one edge of the 300mm rib.

Supplementary reinforcing using 2-HD12 bars (Grade 500E) shall be used at all re-entrant corners as shown on Figure 4. These bars shall be 1200mm long, 200mm apart, tied to the top of the mesh, with 50mm side cover and shall not be placed across any shrinkage control joints.

6.3 Services Detailing

Ideally, services ducts shall be conveyed underground to their plan location then brought up through the polystyrene pod and the concrete floor slab, but this may not always be possible. Services shall not be placed within any concrete except to cross that section of concrete i.e. services shall not run along ribs or edge beams.

The maximum diameter of the services shall be as outlined in Table 7.

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Table 7 Maximum Diameter of Pipe Services

Element	Vertical Services	Horizontal Services
300mm wide edge beam	50mm in a duct 50mm larger diameter than pipe	50mm in a duct 50mm larger diameter than pipe unless detailed as per note 2
500mm localised wide edge beam ⁽¹⁾	100mm in a duct 50mm larger diameter than pipe	50mm in a duct 50mm larger diameter than pipe, see note 2
300mm wide internal load bearing rib	50mm in a duct 50mm larger diameter than pipe	50mm in a duct 50mm larger diameter than pipe, see note 2
100mm wide internal rib	Nil	50mm in a duct 50mm larger diameter than pipe, see note 2
Slab	110mm in a duct 50mm larger diameter than pipe or for large services 450mm square ⁽⁴⁾ see also note 2.	Nil

Notes

(1) For situations where a 100mm diameter pipe is required to pass through the edge beam, the edge beam shall be locally increased in width to a minimum of 500mm wide. This shall be achieved by keeping flush the outside face of the edge beam and removing 200mm from the pod. The width shall remain at 500mm for a distance of 600mm beyond the service pipe. Refer to figure 12 for details.

(2) The need for a duct 50mm larger than the service diameter can be deleted when the pipe work does not cross the interface between the bottom of the RibRaft system and the ground at any point along its length. An example would be services laid within the plane of the pods and passing through the edge beam and discharging to a gully trap or similar. In these cases the diameter of the service can be increased to a maximum of 100mm and a service duct is not required. The pipe work shall be wrapped in denso tape where it crosses concrete elements to prevent adhesion between the concrete and pipe work.

(3) Where a gas pipe line runs through the RibRaft floor system, in addition to the requirements above, the pipeline shall enter the building through the outside face of the perimeter foundation beam and be located in the plane of the pods. The aim being to ensure that damage to the gas pipe will most likely occur outside the building envelope should movement occur between the ground and RibRaft in a large earthquake.

(4) Larger penetrations or voids up to 450mm square (e.g. for shower waste/traps) are permitted through the slab provided all the conditions of this paragraph are met. These openings shall be trimmed with 1 HD12 (Grade 500E) bar 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under

the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall not be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower will ensure that the void is sealed/covered).

Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in figure 12, services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in figure 12 at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however, to cut the mesh). In some instances this will prevent the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

Except as noted in table 7, all services shall be placed centrally within an opening 50mm greater in diameter than the service duct/pipe, where they pass through the system. This is to allow seismic tolerances to reduce the probability of shearing of the services during a seismic event. Where the services pass through the slab, the opening shall be sealed to prevent materials entering the subfloor cavities. (This can be achieved with Denso tape

and a type of easily compressible foam). A pictorial of some of the above requirements is illustrated in figure 12:

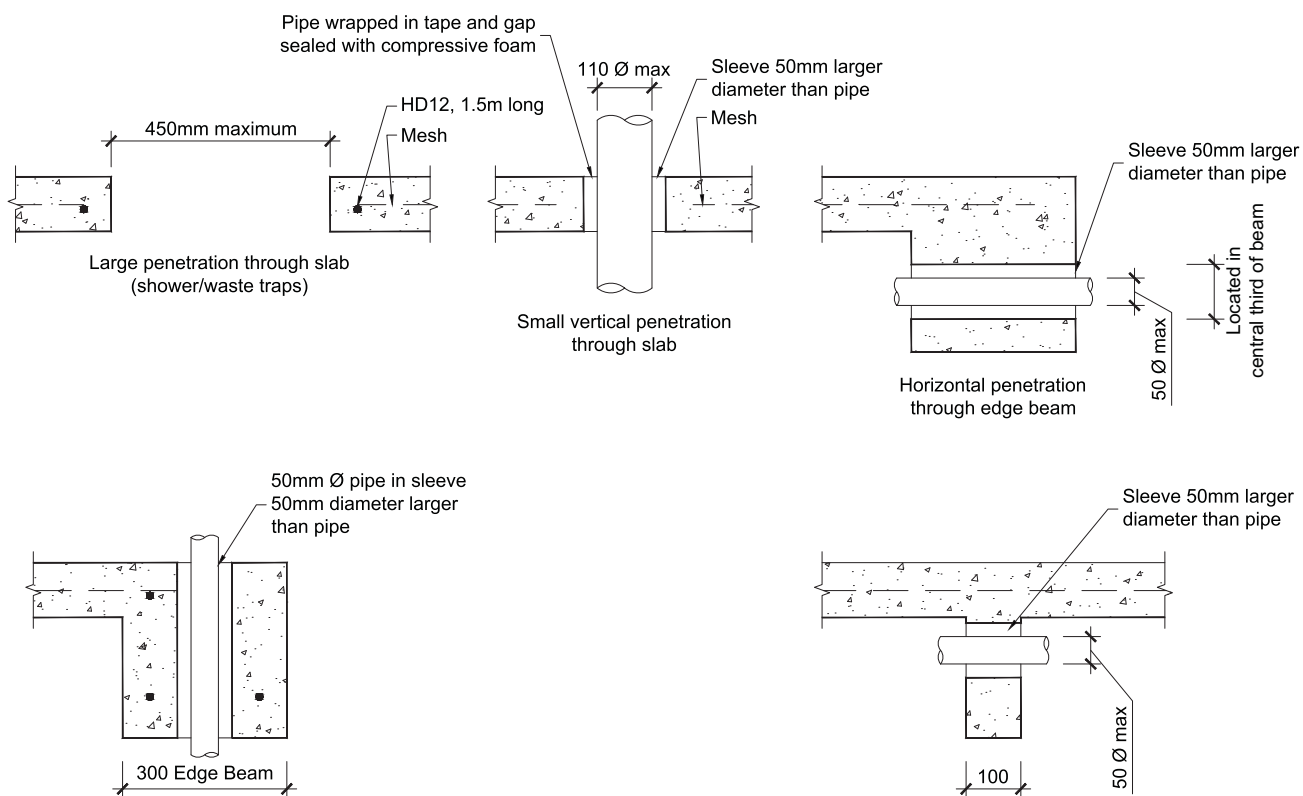


Figure 12 Example of detailing requirements for services

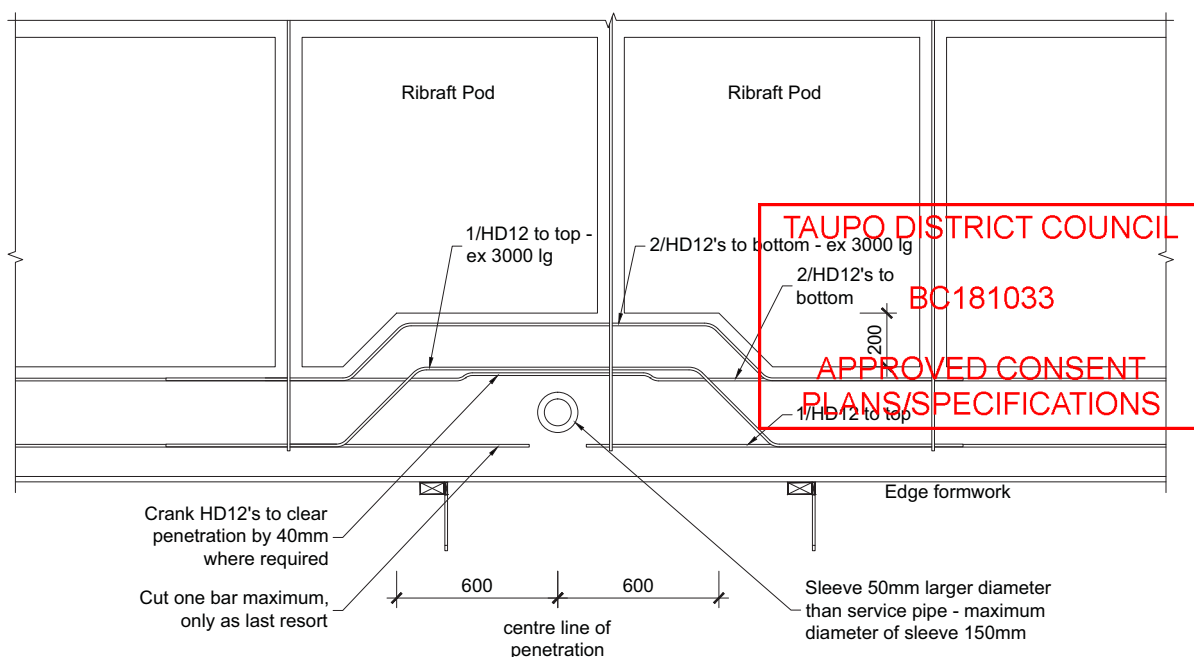


Figure 13 Localised increase in width at edge beam where vertical services up to 100mm diameter are required

FIRTH RIBRAFT FLOOR SYSTEM

SECTION 2: INSTALLATION INFORMATION

1 GENERAL

This Section details the installation information required for the Firth RibRaft Floor System (the system). Full information on the design procedures not requiring specific engineering input, and requirements for the site assessment are described in Section 1 of this Manual (Design Information). Where standards are referenced in this manual these shall include the latest amendments.

2 SITE REQUIREMENTS

2.1 General

The site requirements of this Manual are concerned solely with the soil conditions under or immediately adjacent to the system. If a site does not comply with this Manual, the system shall be subject to specific engineering design.

This Section shall only apply for building sites such that:

- The ground is as specified in Section 1 of this Manual;
- Any system erected at the top of a slope (whether fill compacted in accordance with NZS4431, or

natural ground) shall be located as shown in Figure 1 so that the finished ground is always outside the dashed line shown. (The vertical distance, V, shall be measured to 50mm below the underside of the slab).

Where the finished ground does not comply with Figure 1, the slope shall be retained by a specifically designed retaining wall.

2.2 Temporary Excavations

No excavation shall take place at a location or in a manner where the stability of the foundation material is likely to be compromised. The backfilled material shall match the compaction and strength of, and have similar properties to, the surrounding material. The sides of the excavation shall be propped as necessary.

Temporary excavations shall be open for no longer than 48 hours and shall take place only above the critical depth line as shown on Figure 2. Should temporary excavations be required below this line, specific engineering design is required.

2.3 Surface Water

Surface water from the site shall not flow across the slab platform. For example, on cut and fill sites the

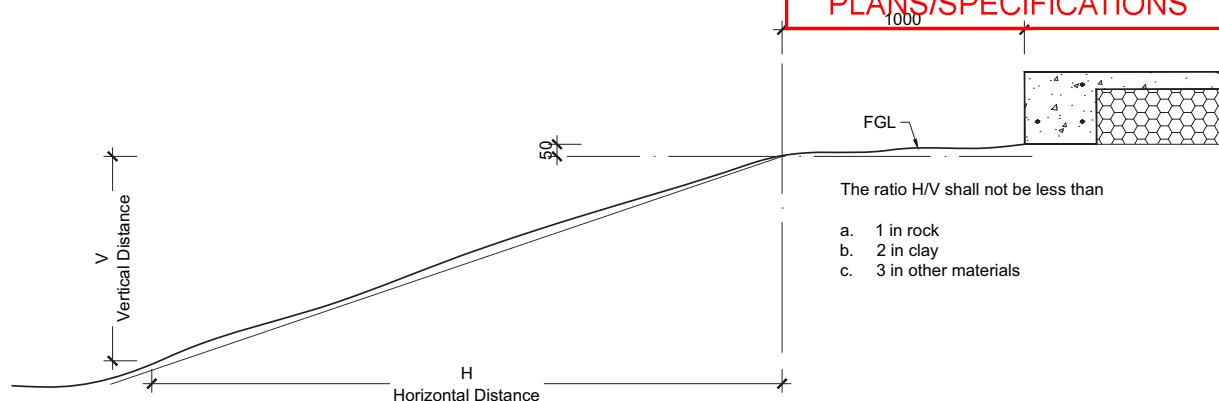


Figure 1 Relationship of RibRaft to Sloping Ground Surface

ground uphill from the system shall be graded to direct any surface run-off away from the system as shown in Figure 3.

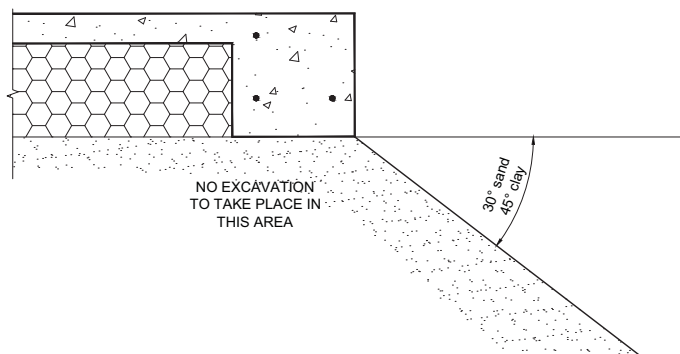


Figure 2 *Temporary Excavation Limited*

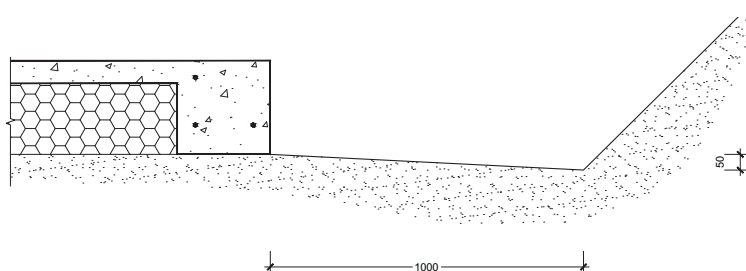


Figure 3 *Site Grading*

3.1 Site Preparation

All vegetation, topsoil and other organic or deleterious material shall be removed from the area to be covered by the building (formation area) prior to commencing construction of the system.

3.2 Earthworks

The formation area shall be cut or filled to a level approximately 330mm below finished floor level. Where fill is required to achieve this level, the fill shall be certified by a geotechnical engineer (outside the scope of this Manual) or shall be granular fill in accordance

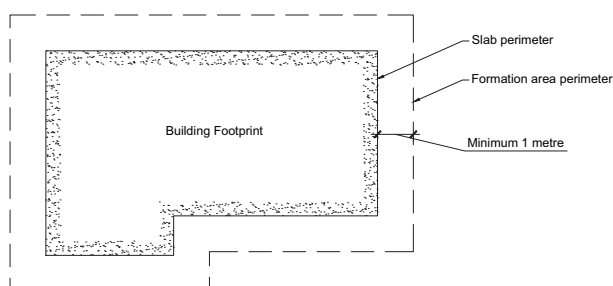


Figure 4 *Plan of Formation Area*

with Clause 7.5.3 of NZS 3604:2011 "Timber Framed Buildings". The formation area shall also extend a minimum of 1000mm beyond the slab perimeter as shown in Figure 4 below. The installer shall confirm the acceptability of the ground over the entire building platform before proceeding with the construction. Refer to Clause 3.5 of Section 1 (Design Information) for requirements.

3.3 Shear Keys

Where shear keys are required, the holes shall be drilled following the site clearing and earthworks, in accordance with Clause 4 below, and prior to the construction of the system commencing.

3.4 Plumbing and Services

Plumbing and services required beneath the system should preferably be conveyed underground to their plan location then brought up through the system. The trenching, placing, and bedding of the pipes/ducts and the backfilling of the trenches shall conform to the requirements of the consent documentation. Services shall not be placed within any concrete except to cross that section of concrete i.e. services shall not run along ribs or edge beams. The maximum diameters of the services/ducts shall be as dictated in clause 6.3 of Section 1.

Where required, the services can be installed by removing unnecessary polystyrene and placing pipes within the pod depth. All pipes shall be held firmly in place and have temporary end covers. Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in figure 12 (section 1) services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in figure 12 (section 1) at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

Except as noted in 6.3 of section 1, services shall be placed centrally within an opening 50mm greater in diameter than the service duct/pipe, where they pass through the system. This is to allow seismic tolerances to prevent shearing of the services during a seismic event. Where the services pass through the top of the system, the opening shall be sealed to

prevent materials entering the subfloor cavities. (This can be achieved with Denso tape and a type of easily compressible foam).

Larger penetrations or voids that are required, up to 450mm square (e.g. for shower waste/traps), shall be installed in accordance with all the conditions of this paragraph. These openings shall be trimmed with 1 HD12 bar (Grade 500E) 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall not be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower will ensure that the void is sealed/covered).

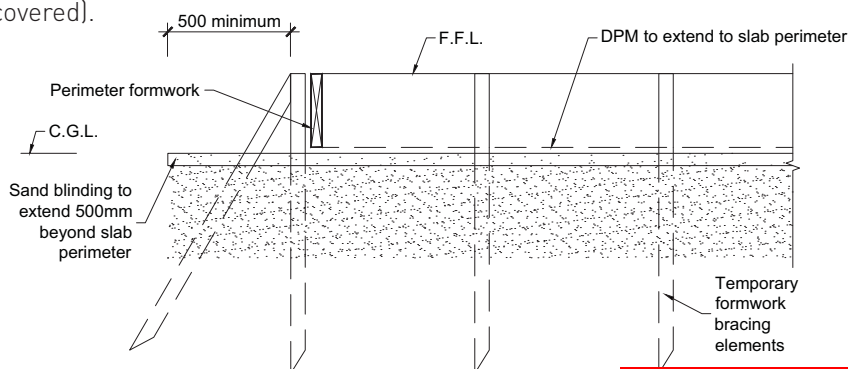


Figure 5 Sand Blinding/DPM/Formwork Details

3.5 Sand Blinding

A layer of sand shall be placed, screeded and compacted over the building platform, extending to at least 500mm beyond the system perimeter – refer Figure 5. The maximum thickness of this blinding layer shall be 50mm. The surface shall be level and a minimum of 305mm below finished floor level. A small plate compactor, vibrating roller or similar, should be used to compact the sand blinding layer. When the building platform is clay, it is essential that the blinding sand is compacted onto a clay surface that has not been softened by construction activities. If the clay has been softened (i.e. has a muddy surface layer due to construction activities), remove the softened material

from under the RibRaft ribs before placing the sand. If excavation lowers the clay surface to more than 50mm below the underside of the RibRaft, fill shall be placed in accordance with Clause 7.5.3 of NZS 3604:2011 “Timber Framed Buildings”. *The sand is required to be level to ensure that pods remain stable throughout the installation of the system.*

3.6 Damp Proof Membrane

The damp proof membrane (DPM) material shall be polyethylene sheet in accordance with NZS 3604:2011. The DPM shall be laid over the entire building platform directly on top of the sand blinding layer, extending to the outside of the edge beam – refer Figure 5 below. The joints shall be lapped not less than 150mm and sealed with pressure sensitive tape not less than 50mm wide. All penetrations of the DPM by plumbing and services or punctures during construction shall also be sealed with pressure sensitive tape. The DPM may extend beyond the edge of the slab i.e. underneath the formwork, or may be folded and stapled up the inside of the formwork. The minimum requirement is that the DPM extends to the outside of the edge beam. It is very important that the DPM is not bunched up at the formwork. The installer shall ensure a square and tidy finish at the underside and at all corners of the edge beam.

3.7 Edge Formwork

The edge formwork shall be constructed ensuring that the requirements of NZS 3109:1997 “Concrete Construction” are adhered to. The formwork shall be adequately supported and braced to prevent any buckling or warping. If the wall is to be constructed in masonry veneer, formwork for a masonry veneer rebate should be adequately fixed to the perimeter formwork.

Thorough cleaning of re-useable formwork and the use of release agents enhances the life and performance of formwork and maintains a quality surface finish.

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3.8 Laying the Pods and Spacers

The Firth RibRaft polystyrene pods shall be laid out over the DPM in a regular waffle pattern ensuring direct contact with the ground across the entire pod. The edge beam shall be formed using the Firth approved 300mm spacers (refer figure 9). These shall be placed at a maximum of 1200mm centres along the perimeter of the slab and one per pod or part pod. Ribs supporting a load bearing wall shall be formed using a minimum of one Firth approved 300mm spacer along the edge of each pod or part pod.

Except where a 300mm wide rib is required, each pod or part pod shall always be separated by 100mm using a minimum of one Firth approved 100mm spacer along each edge of each pod or part pod. The ribs in both directions shall form a waffle pattern throughout the slab. It is essential that the ribs and edge beams are straight when the concrete is poured, i.e. the pods need to be lined up. Figure 6 shows a detailed layout of the pods and spacers.

Where the shape of the house plan dictates, it may be more practical to consider the floor to be made up of different segments. The pods in each segment shall be in a regular waffle pattern – refer right hand side of Figure 7. Where these segments meet, the pods shall be cut to suit and the ribs made to join. The non right-angle rib junctions created by this approach are acceptable.

Alternatively, it is also acceptable to keep the orientation of the pods constant throughout the plan and have non right-angle junctions between the ribs and edge beam – refer left hand side of Figure 7.

As can be seen from Figure 7, it is not necessary for the pods to line up perfectly with the edge beam. It is acceptable to cut the pods (i.e. use part pods).

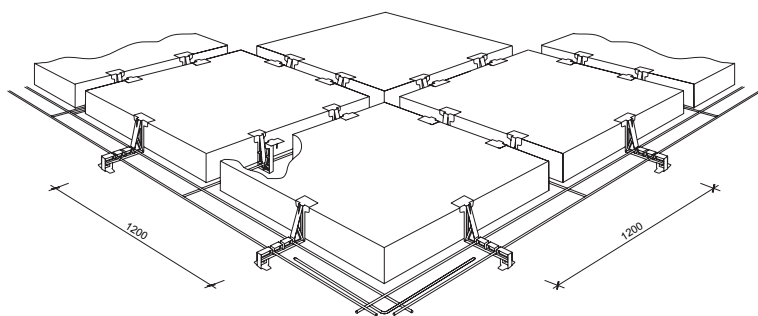


Figure 6 Detailed Layout of Pods and Spacers
(mesh and top steel omitted for clarity)

3.9 Reinforcing Steel

Reinforcing bars shall conform to NZS 4671:2001 “Steel Reinforcing Materials”. All bars shall be of deformed type (Grade 500E). All bends shall be made cold without fracture and in accordance with the bend diameters given in NZS 3109 “Concrete Construction”. Welded lap joints are not permitted.

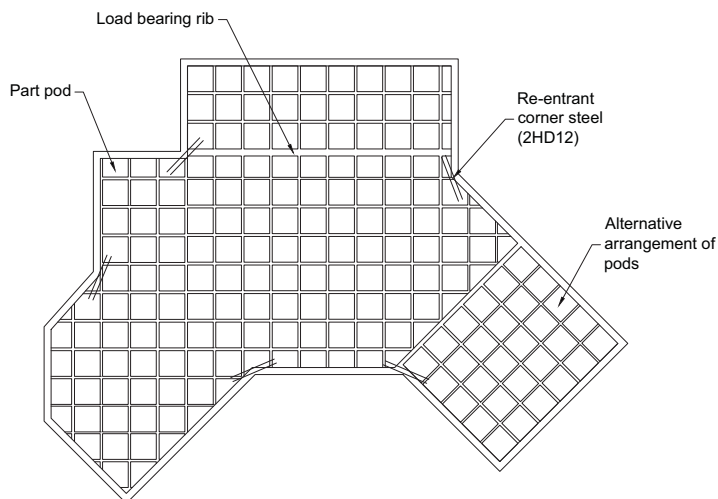


Figure 7 Typical Pod and Rib Layout

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m², a lower characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 300mm centres, and ductility class L or E, hereafter referred to as “665 mesh, or mesh”.

Figure 10 shows the detailed layout of the spacers and the steel in the edge beam and the standard ribs.

3.9.1 Edge Beam Steel

Two edge beam reinforcing bars shall be placed in the bottom of the edge beam and supported in the correct position by the Firth spacers, as shown in Figure 10. One edge beam bar shall be tied below the mesh at the perimeter of the area covered by the polystyrene pods as shown in Figure 10.

All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). Tying of the edge beam steel is only required at corners. Figure 8 shows the layout for the edge beam bottom steel bars at the corner. The inner bottom bars and the top bars shall cross each other and extend to 75mm from the outside face of the edge beam as shown. These bars shall be tied together where they cross.

3.9.2 Rib Steel

Rib reinforcing steel shall be placed in the bottom of the internal ribs and supported in the correct position by the Firth or Wilton Joubert spacers (WJ). Figure 9 shows the detail of the Firth and WJ spacers, and Figure 10 shows a detailed section identifying how the steel is located in the spacers. The 300mm spacer shall be used for the 300mm wide internal ribs. These spacers ensure that cover to DPM below the base is greater than 45mm and cover to the exterior perimeter is 75mm.

All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). At the junction with the edge beam, each rib steel bar shall sit on top of the edge beam bars, and extend to the outermost bar. The 75mm cover to the edge of the beam shall still be allowed for. One HD12 bar (Grade 500E) shall be placed in each 100mm wide rib and two HD12 bars (Grade 500E) shall be placed in the bottom of each 300mm wide rib. For perimeter 300mm Ribs a HD12 bar is also required in the top at the beam.

3.9.3 Mesh Reinforcing

665 Mesh reinforcing shall be placed over the pods and supported on 40mm mesh chairs spaced at a minimum of 1200mm centres, with at least two mesh chairs placed per pod and at least one per part pod. The mesh shall be lapped 225mm minimum and tied at all laps.

3.9.4 Re-entrant Corner Steel

Two HD12 bars (Grade 500E), 1200mm long shall be placed across the corner, tied to the top of the mesh at re-entrant corners at 200mm centres, with 50mm cover from the internal corner as detailed in Figure 7 (this steel is to control cracking at this potential weak point).

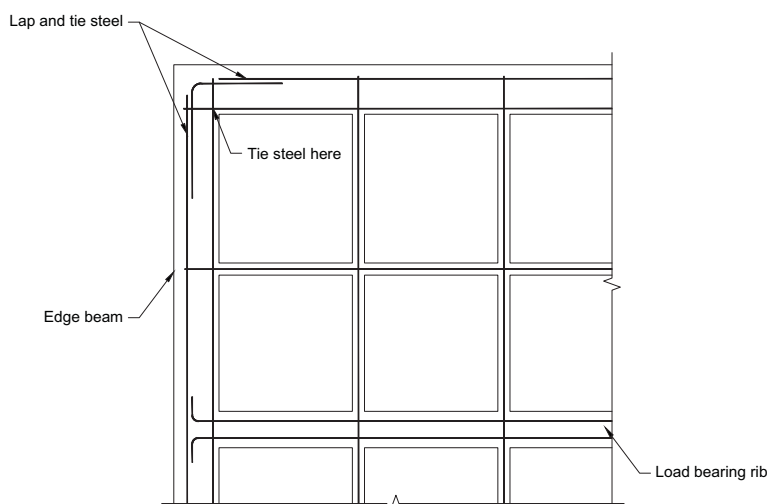


Figure 8 Corner Steel Layout

3.10 Concrete Installation

Concrete placing, finishing and curing shall be in accordance with NZS 3109:1997, Clause 7.

3.10.1 Placing

Only Firth Raftmix, Raftmix Pump, Raftmix25 or Raftmix Pump25 concrete shall be used in the floor.

These two different concrete mixes shall be used in the following instances:

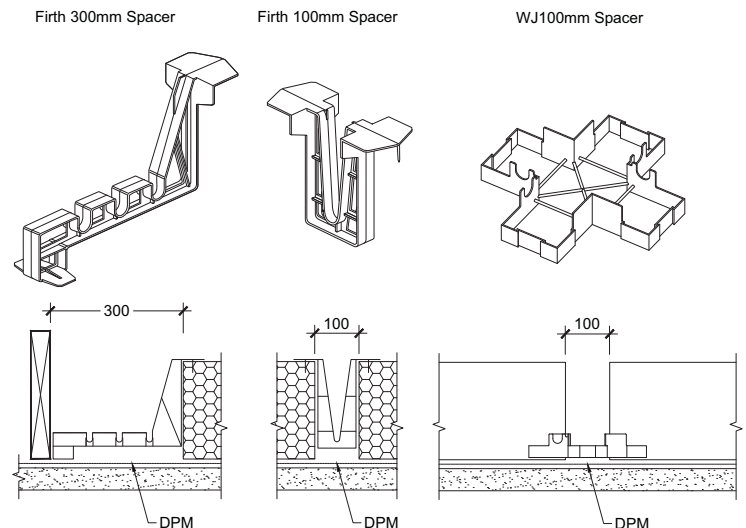


Figure 9 Spacer Details

- Raftmix – For placement in the floor directly from the concrete truck chute.
- Raftmix Pump – For placement in the floor by concrete pump.

Refer 2.4 of Section 1 for locations where Raftmix 25/ Raftmix 25 Pump is required.

The concrete supplied by Firth shall be poured in such a way to ensure that the pods remain in position during placing (Firth recommends that small amounts of concrete be placed on top of the pods prior to the ribs being filled). The concrete shall be compacted with the use of an immersion vibrator around all steel and into all corners of the formwork.

3.10.2 Finishing

Screeding with the aid of a level shall commence immediately after compaction. Unless specifically installed as a screeding datum, the top of the formwork shall not be assumed as level and thus shall not be used for screeding purposes. Final finishing with a trowel shall take place after all the bleed water has

evaporated. The edge of the slab and rebates shall be tooled to prevent chipping of the top of the slab.

Early age care of the slab shall be in accordance with good trade practice appropriate for the weather conditions. The surface shall be a blemish free surface to class U3 finish (refer NZS 3114:1987 "Specification for Concrete Finishes").

3.10.3 Curing

Proper curing of the concrete must take place immediately after finishing the concrete. One of the following methods of curing is recommended:

- Ponding or continuous sprinkling of water.
- Placing a wet covering or plastic membrane over the slab.
- The use of liquid membrane curing compounds.

When warm sunny days are followed by cool nights, the change in temperature can cause cracking. Immediate and continuous wet curing to reduce the maximum temperature and/or raise the minimum temperature can reduce the risk of this type of cracking.

3.11 Shrinkage Control Joints

Shrinkage control joints shall be saw cut after hardening. The saw cut shall be cut to a depth of 25mm and shall be cut no later than 24 hours in summer, or 48 hours in winter. The shrinkage control joints shall be positioned to coincide with major changes in floor plan. Where the concrete is to be exposed or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 6m. Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 2:1.

Shrinkage control joint shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib then the joint shall be located directly above one edge of the 300mm rib. Supplementary reinforcing bars shall not be placed across any shrinkage control joints.

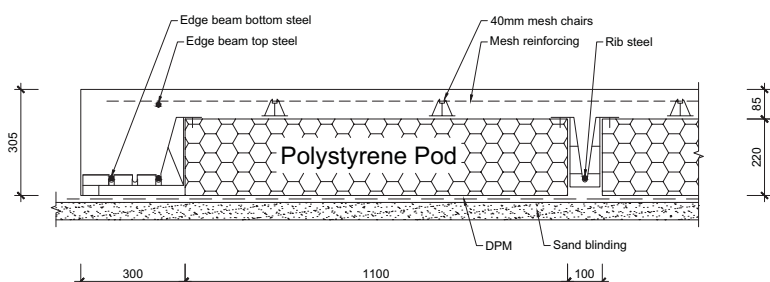


Figure 10 Detailed Section

3.12 Removal of Formwork

The formwork shall not be removed prior to 12 hours after the slab has been finished. No installation loads are to be placed on the system before adequate curing has taken place.

3.13 Masonry Veneer

Where the building is to be clad with masonry veneer, the rebate in the edge beam shall be waterproofed with a bituminous sealer due to the possibility of ponding of water. Firth recommends a Flintcote® or equivalent coating on both the vertical and horizontal faces of the rebate.

3.14 Landscaping/Paving

Landscaping and/or paving adjacent to the slab shall be kept as a minimum the specified distance below finished floor level as required by NZS 3604:2011. The landscaping shall allow for large trees to be kept sufficiently away from the edge of the slab. This is to prevent the tree roots from disturbing the soil moisture conditions under the slab. As a guide, trees should be as far away from the edge of the slab as they are tall when fully grown.

3.15 Ongoing Maintenance

The building owner shall ensure that the ground surrounding the system be maintained so that the integrity of the system is not jeopardised. In other words, at no time shall the ground immediately adjacent to the system be allowed to settle away to expose the underside of the slab.

This can also be ensured by maintaining the landscaping or providing a paved surface or similar around the edge of the building.



Shear keys, if required, shall be provided to conform to the requirements of Section 1 of this Manual. Holes for the shear keys shall be drilled at least 1000mm deep. Into the bottom of each hole a RibRaft Shear Key Support shall be placed. Every precaution shall be taken to ensure that the shear key support is laid level and at the base of the hole. The minimum depth of concrete placed on the support shall be 900mm. Refer to Figure 11 for construction details.

The connection steel (2HD12 Grade 500E) shall be secured in place and held during pouring to ensure

the bars are correctly located. The concrete for the shear keys shall be placed separately to the rest of the floor and shall be finished level to the top of the sand blinding layer. The top surface of the shear key shall be finished rough to ensure a good join to the Raftmix concrete in the system and the DPM shall be neatly cut around the shear keys.

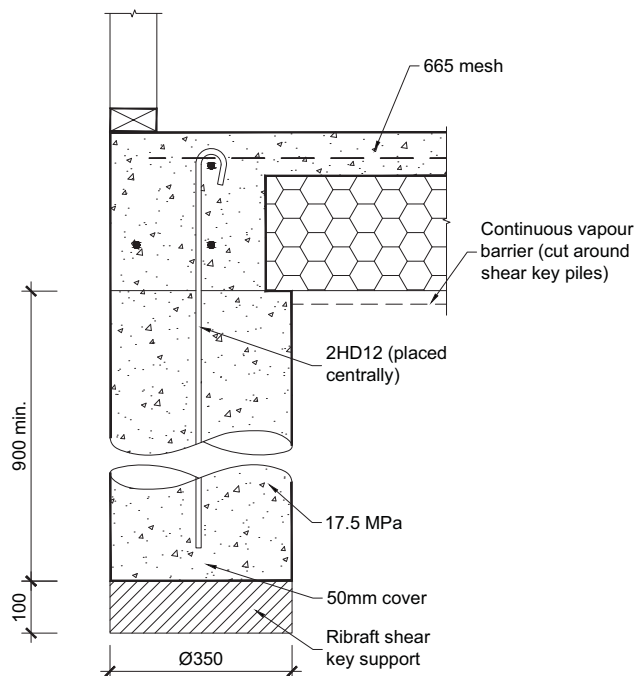


Figure 11 *Shear Pile Construction Detail*

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FIRTH RIBRAFT FLOOR SYSTEM

SECTION 3: VERIFICATION

1 DESIGN

Verification that the design complies with the structural limitation outlined in this Manual is the responsibility of the designer, and shall be confirmed by the Building Control Authority issuing the Building Consent. Solutions outside the limitations outlined in this Manual will require specific engineering design.

2 CONSTRUCTION

The RibRaft foundation system has been designed to accommodate structures complying with the non specific design standards NZS3604 or NZS4229. With these types of structures the Building Control Authority specifies the inspections required and often conducts these. A similar construction verification process shall be applied to the RibRaft system.

To assist inspection the following checklist has been prepared for structures complying with the limitation:

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Pre-pour Inspection Check list

Confirmed	
Good Ground confirmed as per NZS3604, clause 3.1.3.	
Vegetation, topsoil, organic or deleterious material removed.	
Proximity to slope-ground surface is always above dash line shown in figure 1.	
Shear piles (where required) in place and reinforcement protruding.	
Formation area extends at least 1m beyond building footprint.	
No steps in the formation.	

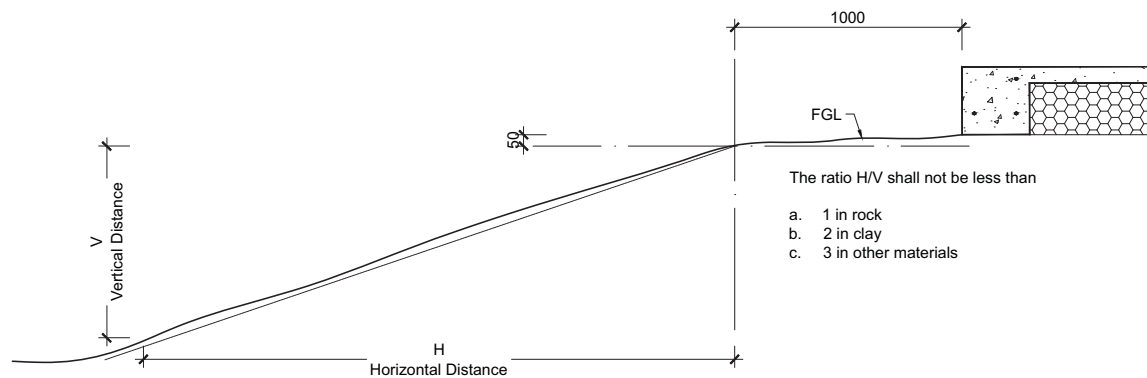
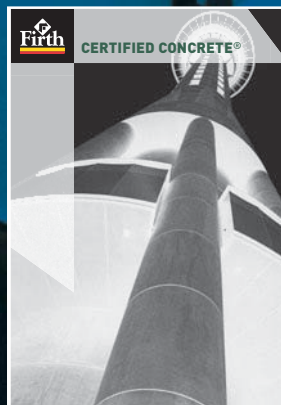


Figure 1 Relationship of RibRaft to Sloping Ground Surface

Pre-layout Inspection Check list

Confirmed	
Damp proof membrane in place.	
Perimeter foundation	Width 300mm ⁽¹⁾ .
	Reinforcement 2 x HD12 bottom, 1 x HD12 top.
	Firth supplied spacer used at 1.2m maximum centres.
Internal Ribs	Width 100mm.
	Reinforcement 1 x HD12.
	Firth supplied spacer, max spacing of one per pod or part pod.
Load Bearing ribs	Width 300mm.
	Reinforcement 2 x HD12 bottom.
	Firth supplied spacer, max spacing of one per pod or part pod.
Pods	Firth supplied RibRaft pod.
Mesh	40mm chairs, 1.2m max centres, min two per pod or one per part pod.
	Mesh in place and 665 or equivalent area.
	Mesh laps minimum of 225mm.
Reinforcement	2 x HD12 bars 1.2m long provided at re-entrant corners.
	Laps for 12mm reinforcement minimum of 720mm.
Concrete	Cover to pods minimum of 85mm or 110mm if infloor heating used.
	Firth Raftmix ordered.
Service penetrations	No reinforcement (with exception of mesh) cut to allow passage of service pipes. Refer clause 6.3 of Section 1 for exceptions.
	Diameter of opening for services 50mm greater than service pipe. Refer clause 6.3 of Section 1 for exceptions.
	Diameter/size of penetrations as per Table 7, Section 1 of this manual.

(1) At locations of service penetrations the width of the perimeter foundation may be locally increased. Refer figure 12 section 1 for details.



SUSTAINABILITY: THE FIRTH CONCRETE & CONCRETE MASONRY SUSTAINABILITY LIFECYCLE

- ☒ Environmentally compliant manufacturing plants
- ☒ Surplus water and some aggregates recycled
- ☒ Low transport impacts
- ☒ Leftover concrete returned from construction sites
- ☒ Passive solar heated thermal mass makes completed buildings more energy-efficient

- ☒ Most wash water returned from construction sites
- ☒ Highly durable, low maintenance buildings and no rot
- ☒ High degree of noise control
- ☒ Inherent fire resistance
- ☒ Overall longer effective building life
- ☒ Demolished concrete can be recycled as hard fill or aggregate

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Jan 2012 Chatis FIR20960



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CERTIFICATE OF CONFORMITY

This is to certify that



RibRaft® Floor System



Product Description

The RibRaft® Floor System comprises of polystyrene pods, steel reinforcing rods, plastic spacers and Firth RaftMix concrete.

Complies with the Building Code of New Zealand:

1. NZBC Clause B1 Structure: B1.3.1, B1.3.2 & B1.3.3.
2. NZBC Clause B2 Durability: B2.3.1 (a).
3. NZBC Clause E2 External Moisture: E2.3.3.
4. NZBC Clause F2 Hazardous Building Materials: F2.3.1.
5. NZBC Clause H1 Energy Efficiency: H1.3.1. Refer to limitation c.

Product Purpose or Use

The RibRaft® Floor System is a method of concrete floor construction, offering an insulated floor with a quick, practical and efficient construction method.

Subject to the following Conditions & Limitations:

- a. Must be installed in accordance with the RibRaft® Technical Manual (CBI3100/3111/3112/4711) (Jan 12).
- b. Specified products must be supplied by Firth Industries or an approved agency.
- c. The energy efficiency rating of the RibRaft® Floor System relates only to NZS 4214:2006 - Methods of determining the total thermal resistance of parts of buildings and is applicable only to the thermal efficiency of the floor system.
- d. This certification relates only the clauses of the NZBC as contained herein. Consequently the following clauses are excluded from the certification: C-E1-E3 these clauses are outside the scope of this Certificate. The need for compliance with the requirements of excluded clause in the use of the subject product are to be determined by the regulatory authority (building certifier or building surveyor).
- e. This certification relates only to the product that is described above, and has to be read, considered and used as a whole document — it may be considered misleading and will be incomplete to be selective.
- f. For further information contact the certificate holder.

Certificate Holder

Fletcher Concrete and Infrastructure Ltd

T/A Firth Industries
NZBN: 942903777548
585 Great South Road
Penrose Auckland NZ 1061
Ph: 0800 800 576
W: www.firth.co.nz

Certification Body

CertMark International Pty Ltd

T/A CertMark New Zealand
ABN: 80 111 217 568
JAS-ANZ Accreditation No. Z4450210AK
PO Box 321 Tuakau 2121
www.CertMark.org

22/05/2014

Date of Issue

CMA-CM40015 (Rev3)

Certificate Number

Revised May 2015

Originally issued under CMNZ-2012-0522
Initially Issued 22/05/2012

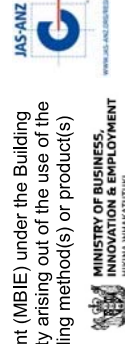
John Thorpe
CertMark International Pty Ltd

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- This certificate is issued by an independent certification body accredited by the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation & Employment (MBIE) under the Building Act 2004. MBIE does not in any way warrant, guarantee, or represent that the building method or product the subject of this certificate conforms to the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product. MBIE disclaims, to the extent permitted by law, all liability (including negligence) for claims of losses, expenses, damages, and costs arising as a result of the use of the building method(s) or product(s) referred to in this certificate
- It is advised to check that this Certificate of Conformity is currently valid and not withdrawn, suspended or superseded by a later issue by referring to the MBIE website, www.mbie.govt.nz
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SUPERIOR FLOOR INSULATION DESIGN SOLUTIONS



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It's easy to see why the Firth RibRaft® floor system is one of NZ's fastest growing flooring solutions.

Offering a strong, fast and efficient construction method – it also delivers superior insulation performance. RibRaft® has been designed to meet and exceed the H1 Energy Efficiency requirements of the Building Code.

NZ BUILDING CODE REQUIREMENTS

In 2007, changes were made to Clause H1 (Energy Efficiency) of the Building Code.

The **Schedule Method** is the simplest method to achieve compliance under the Code. Using this method, the minimum R-values required for floors are:

R 1.3 m² °C/W
R 1.5 m² °C/W

}

Depending on the
glazing R- value

While the Schedule Method is simple and quick, the **Calculation Method** offers greater flexibility as it allows low R-values in some elements of the construction to be offset against higher R-values in other building elements such as floors.

THE SUPERIOR SOLUTION

The insulation performance of a concrete floor is dependent upon a number of physical factors including:

- the floor structure
- the concrete mix used in the floor structure
- the ratio of the interior surface area to external perimeter area of the floor
- the thickness of the exterior wall placed on top of the perimeter of the floor
- the positioning and properties of specific insulation elements in the floor design

The Firth RibRaft® floor system - consisting of proprietry RibRaft® polystyrene pods, plastic spacers and RaftMix™ concrete - has been further developed to meet and exceed the insulation requirements of Clause H1 of the Code.

That’s the reason why RibRaft® offers such a superior solution. Where RibRaft® floors have higher R-values than required by the Schedule Method, there is now an opportunity to have less insulation in the other building elements by using the Calculation Method.

RIBRAFT® R-VALUE DESIGN SOLUTIONS

The following wall, floor and floor area:perimeter ratio construction details describe a range of floor R-values which can only be achieved using the proprietary RibRaft® system.

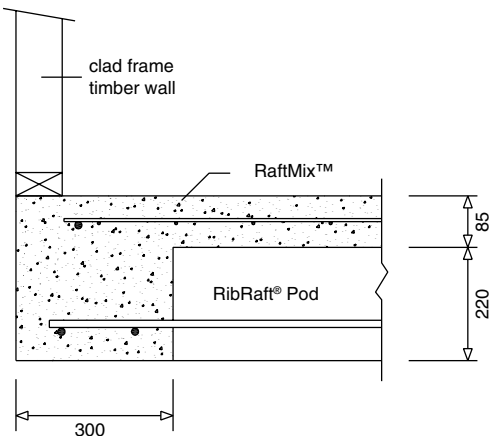
SOLUTION 1

All RibRaft® Floors

All RibRaft® floors are acceptable under the Code which assumes a minimum of R 1.3 m² °C/W.

SOLUTION 2

RibRaft® Floors with a 90mm Frame Timber Clad External Wall



IMPORTANT NOTES:

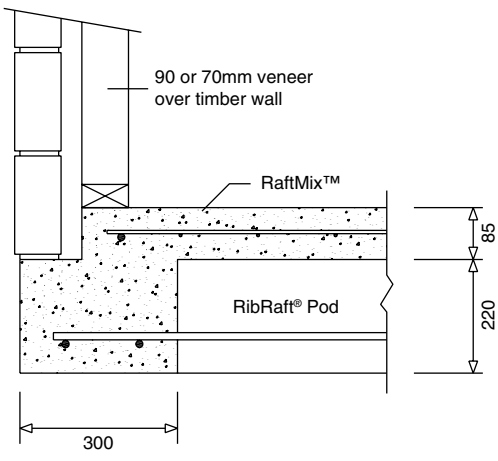
1. The R-values in the following tables only apply to RibRaft® floors which have been constructed with RaftMix™ and RibRaft® pods and spacers.
2. The R-values below are calculated in accordance with NZS 4214:2006 "Methods of Determining the Total Thermal Resistance of Parts of Buildings".

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	Floor Area To Perimeter Ratio m²/m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m² °C/W	1.48	1.52	1.64	1.75	1.86	1.97	2.07	2.17	2.38	2.57

SOLUTION 3

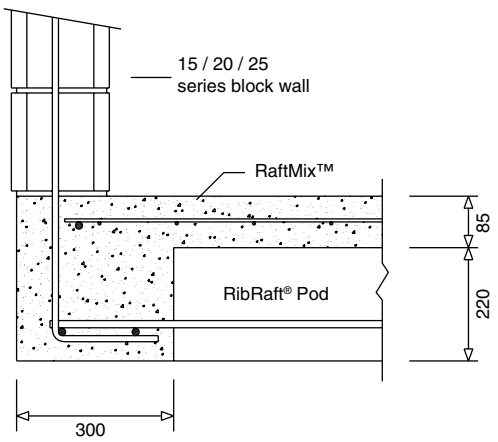
RibRaft® Floors with a 90mm Timber Frame and 70-90mm Veneer Wall with Cavity



	Floor Area To Perimeter Ratio m²/m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m² °C/W	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84

SOLUTION 4

RibRaft® Floors with a Firth Standard or HotBloc® Masonry External Wall



	Block	Floor Area To Perimeter Ratio m²/m									
		1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m² °C/W	15 series	1.48	1.60	1.73	1.85	1.96	2.08	2.19	2.30	2.51	2.72
	20 series	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84
	25 series	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95

SOLUTION 5

RibRaft® Heated Floors

Where in-floor heating is used, the combination of RaftMix™ and RibRaft® pods ensures that $(R_{IN})/(R_{OUT})$ is always less than 0.1. The R-value of the floor can

be established from the above tables. The Building Code requires that the floor has a R-value not less than 1.9 m² °C/W.

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DESIGN AND CONSTRUCTION

RibRaft® design and construction details can be found in the 'Firth RibRaft® Flooring Solutions' brochure and the 'Firth RibRaft® Floor System Manual'. These publications are available at www.firth.co.nz or by phoning 0800 800 576.



SUSTAINABILITY: THE FIRTH CONCRETE & CONCRETE MASONRY SUSTAINABILITY LIFECYCLE

- ☒ Environmentally compliant manufacturing plants
- ☒ Surplus water and some aggregates recycled
- ☒ Low transport impacts
- ☒ Leftover concrete returned from construction sites
- ☒ Passive solar heated thermal mass makes completed buildings more energy-efficient

- ☒ Most wash water returned from construction sites
- ☒ Highly durable, low maintenance buildings and no rot
- ☒ High degree of noise control
- ☒ Inherent fire resistance
- ☒ Overall longer effective building life
- ☒ Demolished concrete can be recycled as hard fill or aggregate

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SYNTHETIC WALL UNDERLAY

The ultimate wrap, all walls, all systems

Watergate Plus 295 is a fire retardant, absorbent, breathable wall underlay. It is a white composite Non-woven polypropylene, specifically designed as a wall underlay behind exterior wall cladding. Watergate Plus 295 also offers a high degree of water resistance, with a high level of water vapour permeability.

ADVANTAGES

- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding direct fixed to framing.
- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding installed over an 18mm minimum drained cavity.
- » Is suitable for use in all Wind Zones of NZS 3604 up to, and including, "Very High", when used as standalone flexible underlay, and Extra High when used as a flexible underlay over a rigid wall underlay.
- » Will provide temporary weather protection during construction. (Max 60 Days).
- » Can be used as a non-rigid backing material for Stucco Plaster.*
- » May be used as a slip layer over rigid backing for Stucco Plaster.*
- » Is fire retardant.*
- » Unaffected by LOSP treated timber.
- » Is suitable as an air barrier in unlined walls.

* Refer technical specifications

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For additional details and latest specifications www.thermakraft.co.nz or scan QR code.



BRANZ Appraised
Appraisal No.695 [2017]



Thermakraft Watergate Plus 295 – Technical Specification

Fire Retardant | Breathable | Absorbent | Non Woven | Wall Underlay

Thermakraft Watergate Plus 295 can be used as a wall underlay on timber and steel framed buildings within the following scope:

- » The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, with regards to building height and floor plan area; and,
- » With absorbent wall claddings directly fixed to timber and steel framing; and,
- » With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- » With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity;
- » With masonry veneer in accordance with NZS 3604, NZBC Acceptable Solution E2/AS1 for timber framed buildings, or specific engineering design for steel framed buildings; and,
- » Situated in NZS3604 Building Wind Zones up to, and including 'Very High' when used as a standalone flexible underlay, and "Extra High" when used as a flexible underlay over a rigid wall underlay.
- » Can be used as a non-rigid backing material for Stucco Plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1 Paragraph 9.3.5.1. The Underlay must be supported with 75mm galvanized mesh, or Thermakraft Stud Strap at 150mm centres run across cavity battens to limit deflection to a maximum of 5mm.
- » May also be used as a slip layer over rigid backing for Stucco Plaster in accordance with the requirements of NZBC E2/AS1 Paragraph 9.3.3(b).
- » Refer BRANZ Appraisal No 695 (2010) for full details.
- » May be used with LOSP treated timber.
- » Is suitable as an air barrier in unlined wall spaces.
- » Is suitable to be used in conjunction with thermal breaks on steel framed buildings.
- » Is suitable for direct fixing behind metal cladding.

Flammability Index

Thermakraft Watergate Plus 295 Wall Underlay has an AS 1530 Part 2 Flammability Index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Limitations

- » Must not be used as a roof underlay.

Durability

Meets the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture (E2.3.2), and F2 Hazardous Building Materials F2.3.1, providing

- » It is not damaged.
- » Installed in accordance with instruction guide.
- » Is not left exposed for more than 60 days.
- » Installed by or under guidance of Licensed Building Practitioners.
- » Is compatible with cladding system used.

Table 1: NZBC E2/AS1 wall underlay requirements

NZBC E2/AS1 TABLE 23 (NZS2295) WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 100gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 20mm	Pass
Air Resistance	≥ 0.1 MN.s/m ³	295 can be used as an air barrier

Roll Dimensions

WIDTH (MM)	LENGTH (M)	M ²
1370	18.5	25
1370	37.0	50
1370	73.0	100
2740	18.5	50
2740	36.5	100

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*M² is the roll size for
actual coverage, allow for
laps and joins.



For additional details and latest specifications www.thermakraft.co.nz

BRANZ Appraised
Appraisal No.695 [2017]



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Fax +64 9 273 3726 **Email** info@thermakraft.co.nz **www.thermakraft.co.nz**

INTELLIGENT MEMBRANES FOR THE BUILDING INDUSTRY

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website.



BRANZ Appraised
Appraisal No. 695 [2017]

WATERGATE-PLUS 295 FIRE RETARDANT WALL UNDERLAY

Appraisal No. 695 [2017]

This Appraisal replaces BRANZ
Appraisal No. 695 [2010]



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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BRANZ

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Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz



Product

- 1.1 Watergate-Plus 295 is a fire retardant, flexible synthetic wall underlay for use under direct fixed and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured from coated, non-woven polyolefin and is coloured white.

Scope

Flexible Wall Underlay

- 2.1 Watergate-Plus 295 has been appraised for use as a flexible wall underlay for timber and steel framed buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with direct fixed absorbent and non-absorbent wall claddings; or,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; or,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or to a specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Very High.

Use over Rigid Wall Underlay

- 2.2 Watergate-Plus 295 has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or to a specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Extra High.

Specific Design

- 2.3 Watergate-Plus 295 has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Watergate-Plus 295 into their design in accordance with the declared properties and the instructions of Thermakraft Limited.

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Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Watergate-Plus 295, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, B2.3.1 (b), 15 years and B2.3.2. Watergate-Plus 295 meets these requirements. See Paragraphs 9.1 and 9.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.4 (c). Watergate-Plus 295 meets this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Watergate-Plus 295 will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Watergate-Plus 295 meets this requirement and will not present a health hazard to people.

Technical Specification

- 4.1 Watergate-Plus 295 is a white, 112 g/m² non-woven, microporous polyolefin fabric underlay.
- 4.2 The product is supplied in rolls 1.370 m wide x 54.8 and 30 m long and 2.740 m wide x 30 and 18.5 m long. The product is printed with the Watergate-Plus 295 logo repeated along the length of the roll and is labelled with the marketing or construction company's name. The rolls are wrapped in clear polythene film.

Accessories

- 4.3 Accessories used with Watergate-Plus 295 which are supplied by the installer are:
- Fixings - staples, clouts, screws or proprietary underlay fixings, or other temporary fixings to attach the wall underlay to the framing.
 - Wall underlay support - polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

- 5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Watergate-Plus 295. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

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Design Information

- 7.1 Watergate-Plus 295 is intended for use as an alternative to conventional building papers which are fixed over timber or steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain. Refer to Table 1 for material properties.
- 7.2 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.
- 7.3 Watergate-Plus 295 must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.
- 7.4 Watergate-Plus 295 is suitable for use as an air barrier where walls are not lined, such as attic spaces at gable ends, in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 [c].
- 7.5 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5. Wall underlay support options include polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens.

Table 1: NZBC E2/AS1, Table 23 [NZS 2295] Requirements

NZBC E2/AS1, Table 23 [NZS 2295] Wall Underlay Properties	Property Performance Requirement	Actual Property Performance
Absorbency	$\geq 100 \text{ g/m}^2$	Pass
Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Water Resistance	$\geq 20 \text{ mm}$	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Edge tear and tensile strength	Edge tear [Average]: Machine direction = 110 N Cross direction = 91 N Tensile strength [Average]: Machine direction = 2.09 kN/m Cross direction = 1.78 kN/m
Air Barrier	Air resistance: $\geq 0.1 \text{ MPa s/m}^3$	Pass. Watergate-Plus 295 can be used as an air barrier.

Claddings

- 7.6 Watergate-Plus 295 is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23 on timber framed buildings, including non-absorbent wall claddings such as vinyl and metal-based weatherboards in direct fixed situations. Watergate-Plus 295 is suitable for use under cavity based wall claddings as an absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings.

Stucco Plaster

- 7.7 Watergate-Plus 295 is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm.
- 7.8 Watergate-Plus 295 may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3.1 [b].

Structure

- 8.1 Watergate-Plus 295 is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a stand-alone flexible wall underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid wall underlays.

Durability

- 9.1 Watergate-Plus 295 meets code compliance with NZBC Clause B2.3.1 [a], not less than 50 years for wall underlays used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, and code compliance with NZBC Clause B2.3.1 [b], 15 years for wall underlays used where the cladding durability requirement is 15 years.

Serviceable Life

- 9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Watergate-Plus 295 is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

- 10.1 Watergate-Plus 295 has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 [b], for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to Watergate-Plus 295 from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 12.1 Watergate-Plus 295 must be used behind claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.
- 12.2 Watergate-Plus 295, when installed in accordance with the Technical Literature and this Appraisal will assist in the total cladding systems compliance with NZBC Clause E2.

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Installation Information

Installation Skill Level Requirements

- 13.1 Installation must always be carried out in accordance with the Watergate-Plus 295 Technical Literature and this Appraisal, by or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.

Underlay Installation

- 14.1 Watergate-Plus 295 must be fixed to all framing members at maximum 300 mm centres with large-head clouts 20 mm long, 6-8 mm staples, self drilling screws or proprietary underlay fixings. The underlay must be pulled taut over the framing before fixing.
- 14.2 Watergate-Plus 295 must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 150 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.
- 14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the underlay by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut underlay must be folded inside the opening and stapled to the penetration framing. Excess underlay may be cut off flush with the internal face of the wall frame.
- 14.4 Watergate-Plus 295 can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.
- 14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.
- 14.6 Any damaged areas of Watergate-Plus 295, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

- 14.7 The Technical Literature must be referred to during the inspection of Watergate-Plus 295 installations.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 15.1 The following tests have been carried out on Watergate-Plus 295 in accordance with NZBC Acceptable Solution E2/AS1, Table 23: tensile strength, edge tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6, pH of extract in accordance with AS/NZS 1301.421s and air resistance to BS 6538.3. A range of these tests were completed before and after Watergate-Plus 295 was exposed to ultra-violet light.
- 15.2 The flammability Index of Watergate-Plus 295 has been evaluated in accordance with AS/NZS 1530.2.

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Other Investigations

- 16.1 A durability opinion has been given by BRANZ technical experts.
- 16.2 An evaluation of the expected performance of Watergate-Plus 295 in direct contact with metal wall cladding has been completed by BRANZ.
- 16.3 The practicability of installation of Watergate-Plus 295 has been assessed by BRANZ and found to be satisfactory.
- 16.4 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

- 17.1 The manufacture of Watergate-Plus 295 has not been examined by BRANZ, but details of the methods adopted for quality control and the quality of the materials used, have been obtained and found to be satisfactory.
- 17.2 The quality of supply to the market is the responsibility of Thermakraft Limited.
- 17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall underlay into their design in accordance with the instructions of Thermakraft Limited.
- 17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

Sources of Information

- AS 1530.2: 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp - Cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays - Materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays - Methods of test - Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays - Methods of test - Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays - Methods of test - Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays - Methods of test - Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays - Methods of test - Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, permeable building underlays
- NZS 3604: 2011 Timber-framed buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 (Amendment 7, 01 January 2017).
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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In the opinion of BRANZ, **Watergate-Plus 295 Fire Retardant Wall Underlay** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Thermakraft Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Thermakraft Limited:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Thermakraft Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Thermakraft Limited** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

21 September 2017

TAUPO DISTRICT COUNCIL

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**APPROVED CONSENT
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THERMAKRAFT 215

BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

APPLICATION AND INSTALLATION

Product Description	Thermakraft 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY is specifically designed for use in Domestic and Commercial type buildings. Thermakraft 215 is a breathable, absorbent bituminous wall and roofing underlay. Thermakraft 215 will provide the following functions: • Reduce wind entry into the cavity, thereby assisting the performance of thermal insulation. • Highly water vapour permeable, thereby allowing excess water vapour which might otherwise condense in the structure, to escape. • Provides a temporary protection against wind, dust, rain and other weathering elements until the external cladding is applied.				
Applications	Thermakraft 215 is suitable as a wall and roofing underlay where Fire Retardancy is NOT required, and with all cladding types. Thermakraft 215 is self-supporting to 1200mm rafter/purlin spacing. Thermakraft 215 can be used as an Air Barrier. Thermakraft 215 must not be left exposed to the elements for more than 7 days. Cladding on the same day is recommended. If Fire Retardancy (FI <5) is required, use Thermakraft CoverTek roof underlay				
Installation Roofing	Thermakraft 215 may be run unsupported vertically over purlins with a 150mm lap if roof pitch ≥ 8 degrees. May be run vertically at pitches $\geq 3-8$ degrees if supported Fix securely to purlins with 8mm staples or 20mm clouts. The membrane should be firmly laid to avoid excessive dishing between purlins.				
Control of Condensation	Thermakraft 215 may be run horizontally across rafter/trusses with a 150mm lap, for roof pitches ≥ 3 degrees. Fix securely with 8mm staples or 20mm clouts. In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation to prevent moisture build-up in the roof cavities. Factors which adversely affect the condensation risk in a typical system include: • Humid, and/or cold climatic regions • Warm/Skillion roof construction • Low roof cavity air volume and restricted air movement • Omitting Vapour Control Layers • Ceiling penetrations and entry of warm air into roof cavities • Occupancy activities which have high moisture loading of roof spaces • Low pitched roof • Bulk insulation • Building structures ability to naturally dry Construction Moisture Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer MRM Code of Practice for details.				
Storage	Thermakraft 215 should be stored on end in dry conditions. Protect from the weather and direct sunlight.				
Roll Dimensions	<table> <tr> <td>1250mm x 40.0m = 50m²</td> <td>20kg</td> </tr> <tr> <td>1250mm x 20.0m = 25m²</td> <td>10kg</td> </tr> </table>	1250mm x 40.0m = 50m ²	20kg	1250mm x 20.0m = 25m ²	10kg
1250mm x 40.0m = 50m ²	20kg				
1250mm x 20.0m = 25m ²	10kg				

THERMAKRAFT 215

BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

TECHNICAL SPECIFICATIONS

Technical Data

THERMAKRAFT 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY complies with the requirements of NZBC E2/AS1 Table 23.

Nominal Grammage 400g/m²

NZBC E2/AS1 TABLE 23 AS A WALL UNDERLAY REQUIREMENTS

NZBC E2/AS1 TABLE 23 WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥100gsm	Pass
Vapour Resistance	≤7 MN.s/g	Pass
pH of Extract	≥6 and ≤9	Pass
Shrinkage	≤0.5%	Pass
Water Resistance	≥100mm	Pass
Air Barrier	≥0.1 MN.s/m ³	Pass
Duty		Heavy

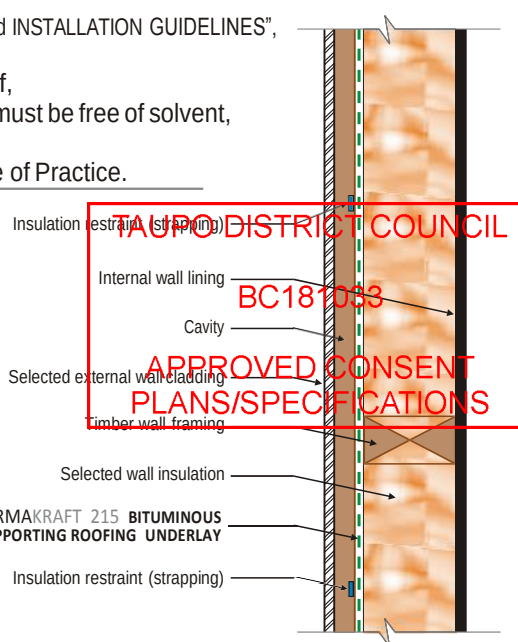
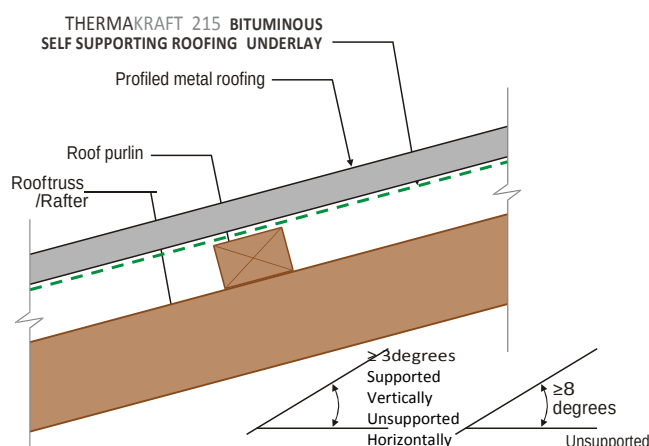
NZS2295:2006 Classification

Flammability Index		Non Fire Retardant
Wind Zone	R2	Up to Very High
NZS2295:2006 Classification	R2	Self Supporting

Durability/Limitations

For THERMAKRAFT 215 to meet the Performance Requirements of NZBC Clause B2, Durability B2.3.1(a) 50 years and B2.3.1(b) 15 years, E2 External Moisture, THERMAKRAFT 215:

- must be installed in accordance to the "APPLICATION and INSTALLATION GUIDELINES",
- run length no greater than 10 metres,
- is not left exposed for more than (7 days) roof,
- when used on LOSP treated timber, the timber must be free of solvent,
- installed by a licensed building practitioner,
- Installed in accordance with the Roofing Code of Practice.



The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards.

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APPROVED CONSENT
PLANS/SPECIFICATIONS

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Reference Number:	REF181108047
Submitted On:	08/11/2018 11:44
Submitted By:	David Park

Property Selection

Property ID	0730164819
Address	18 Penny Grove, Taupo
House Number	
Street	
Suburb	
Area Description	
Legal Description	Lot 226 DP 522262
Location	Map
Property Type	Residential
Valuation Number	
Property Ward	

Application & Project

Nature of application:	Residential
Application Info	Building Consent & Project Information Memorandum (PIM)
Project Information Memorandum	
Memo Available	• Alterations to land contours (e.g. digging out the site for a building platform) • New or altered connections to public utilities (e.g. Council sewer, stormwater or water mains) • Disposal of wastewater or stormwater • Building work over any existing drains or sewers or in close proximity to wells or water mains
Is there an existing PIM?	No
National Multi-Use Approval	No
Building name:	
Location of building within site/block number:	18 Penny Grove Lot 226
Level/Unit number:	

Number of levels:	1
Floor area:	173.68
Current, lawfully established use:	Housing
Year first constructed:	
Add number of occupants per level and per use if more than one:	
Description of the building work:	New 3 bedroom dwelling
Will the building work result in a change of use of the building?	No
Intended life of the building, if less than 50 years:	
List any previous building consents/PIMs for this project, if applicable:	
Estimated value of the building work on which the building levies will be calculated (including GST):	435000.00
Does the building/site have any cultural significance, or is a Marae?	No
Is there a new swimming pool or spa pool proposed for this project?	No
Will the building work include any restricted building work?	No
Type:	
Name:	
Company name:	
Address:	
Landline:	
Mobile:	
Email address:	
Accept TandC	Yes

Applicant Details

Privacy Statement	
Name of owner(s)	Penny Homes Ltd
Contact person	David Park
Mailing address	1 Jarden Mile, Nukuhau, Taupo 3330
Street address/registered office	1 Jarden Mile , Nukuhau , Taupo 3330
Landline	07 3770154
Mobile	027 4909129
Daytime	
After hours	
Fax	
Email address	david@pennyhomes.co.nz
Confirm email address	david@pennyhomes.co.nz
Website	
The following evidence of ownership is attached	Council to provide Certificate of Title (cost associated)
Does a consent notice exist for this property?	No
Is there an agent working on behalf of the applicant?	No
First point of contact for technical queries related to the processing of this application	Owner

The person specified below will be responsible for all debt associated with this building consent.

In ticking this box I agree that I will pay, or arrange payment, of all fees payable in respect of this application. I acknowledge that a cancellation fee may be payable if this application is withdrawn before a building consent is issued	Yes
Please specify the billing details for this application	Owner

Building Code

For further information on the below Building Code Clauses please visit the following website address: https://www.building.govt.nz/building-code-compliance/

Please complete all applicable building code clauses	
B1 Structure	Yes
Please select all that apply to your project:	• NZS3604
Please select all applicable verification methods	• B1/VM1
Alternative solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
B2 Durability	Yes
Please select all that apply to your project	• B2/AS1
Please select all applicable verification methods	• B2/VM1
Alternative solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
C1-C6 Fire Safety Classes	Yes
Please select all that apply to your project	• C/AS1
Please select all applicable verification methods	• C/VM1
Proposed Inspector	Council
D1 Access Routes	Yes
Please select all that apply to your project	• D1/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
D2 Mechanical Installation for Access	N/A
E1 Surface Water	Yes
Please select all that apply to your project	• AS3500
Please select all applicable verification methods	• E1/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
E2 External Moisture	Yes
Please select all that apply to your project	• E2/AS1
Please select all applicable verification methods	• E2/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council

E3 Internal Moisture	Yes
Please select all that apply to your project	• E3/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F1 Hazardous Agents on Site	N/A
F2 Hazardous Building Materials	Yes
Please select all that apply to your project	• F2/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F3 Hazardous Substances and Processes	N/A
F4 Safety from Falling	N/A
F5 Construction and Demolition Hazards	Yes
Please select all that apply to your project	• F5/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F6 Visibility in Escape Routes	N/A
F7 Warning Systems	Yes
Please select all that apply to your project	• F7/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F8 Signs	N/A
G1 Personal Hygiene	Yes
Please select all that apply to your project	• G1/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
G2 Laundering	Yes
Please select all that apply to your project	• G2/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
G3 Food Preparation and Prevention of Contamination	Yes
Please select all that apply to your project	• G3/AS1
Alternative Solution?	No
Waiver/Modifications?	No
Proposed Inspector	Council
G4 Ventilation	Yes
Please select all that apply to your project	• G4/AS1
Please select all that apply to your project	

Alternative Solution?	No
Please upload supporting documents	No files uploaded
Waiver/Modification?	No
Proposed Inspector	Council
G5 Interior Environment	N/A
G6 Airbourne Impact Sound	N/A
G7 Natural Light	Yes
Please select all that apply to your project	• G7/AS1
Please select all that apply to your project	• G7/VM1
Alternative Solution?	No
Waiver/Modifications	No
Proposed Inspector	Council
G8 Artificial Light	N/A
G9 Electricity	Yes
Please select all that apply to your project	• G9/AS1
Please select all that apply to your project	• G9/VM1
Alternative Solution?	No
Waiver/Modification?	No
By certification only	
G10 Piped Services	Yes
Please select all that apply to your project	• G10/AS1
Please select all that apply to your project	• G10/VM1
Alternative Solution?	No
Waiver/Modification?	No
By certification only	
G11 Gas as an Energy Source	Yes
Please select all that apply to your project	• G11/AS1
Alternative Solutions?	No
Waiver/Modifications?	No
By certification only	
G12 Water Supplies	Yes
Please select all that apply to your project	• G12/AS1
Please select all that apply to your project	• G12/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
G13 Foul Water	Yes
Please select all that apply to your project	• AS3500
Please select all that apply to your project	• G13/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	• Council
G14 Industrial Liquid Waste	N/A

G15 Solid Waste	N/A
H1 Energy Efficiency	Yes
Please select all that apply to your project	• H1/AS1
Please select all that apply to your project	• H1/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council

Compliance Schedule

SS16 - Cable Cars	Not Applicable
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Application Checklist

Use this checklist when finalising your building drawings/plans to assist you to lodge a complete application and to avoid delays in processing. Your application will be accepted based on this checklist to ensure that it has sufficient information to commence processing. All items on this checklist must be circled to show that they are either provided or are not applicable to your project (N/A).

Later additional information may be requested during the processing of your building consent to confirm compliance with the Building Act, Building Code, District Plan and any other relevant legislation. Processing time will be suspended until information is received.

General Documentation Required

Owner authorisation provided	N/A
Form 2A Certificate of Design Work	Yes
All drawings must meet the minimum requirements of the technical drawings standard AS/NZS1100 with a minimum font size of Microsoft Word text size 8. Index provided for plans and specifications.	Yes
Are you applying for owner/builder exemption? If yes, the appropriate documentation including Form 2B is to be supplied	N/A
All documents including photocopies must be legible	Yes
All plans are to be titled and dated (or version number)	Yes
Comments	

Legal Documentation Required

Evidence of ownership provided.	N/A
Comments	

Site/Location Plan

Site/Location Plan	Yes
North point	Yes
Road frontage indicated and street named	Yes
Location of all existing and proposed buildings	Yes
Distance of buildings to boundaries and distance between existing and proposed buildings including eaves and gutters.	Yes
Site levels and finished floor levels relative to Moturiki Datum survey point (if applicable)	Yes
Existing contours (proposed cut or fill also needs to be shown).	Yes
Building line restrictions and easements, if applicable	Yes

Site boundaries/exclusive area boundaries for cross lease properties and common areas clearly shown	Yes
Show calculations and percentage of net site coverage	Yes
Labelled points on boundaries where overshadowing is taken from.	Yes
Existing and proposed crossings/driveways, also showing berms and footpaths.	Yes
Sediment control plan	N/A
If building under or near transmission lines, please show transmission plan area or location of power lines.	N/A

Comments

Retaining Walls/Site Works

Retaining Walls/Site Works	N/A
Comments	

Foundation Plan

Foundation Plan	Yes
Foundation details	Yes
For timber floors and decks, show the location of piles, pile type, sub-floor bracing calculations, foundation perimeter walls and internal piling system where applicable.	N/A
Concrete floor details provided	Yes
Control joints shown/saw cuts.	Yes
Bearer layout for floors and decks	N/A
Access/ventilation to subfloor space.	N/A

Comments

Floor Plan

Floor Plan	Yes
Plan of all floors describing the function of each room	Yes
Show all doors, windows and ventilation including enclosed space ventilation	Yes
Stairs, handrails and decking shown showing dimensions and details	N/A
Smoke alarm positions shown	Yes
For additions and alterations, the existing shall be shown separately to the proposed and to the same scale for comparison	N/A
Chimneys and solid fuel heaters	Yes
Lintel sizes/beam sizes and proprietary systems.	Yes

Comments

Framing Plan/Bracing Plan

Framing Plan/Bracing Plan	Yes
Bracing calculations/details - type and fixings	Yes
Framing plan, including size, centres, grade and treatment of members.	Yes
Bottom plate, top plate, stud, lintel fixing details.	Yes
Floor joist layout for floors and decks.	N/A
Upper storey floor design, if applicable.	N/A

Comments

Roof Plan

Roof Plan	Yes
Roof plans and roof bracing.	Yes
Truss types/roof framing layout, design statement and manufacturers PS1.	Yes
Truss/Rafter and purlin fixings.	Yes

Comments

Specific Design Engineering

Specific Design Engineering	N/A
------------------------------------	-----

Comments

Elevations

Elevations	Yes
North, South, East and West elevations.	Yes
Overshadowing labelled to correspond with points on site plan shown on all elevations	Yes
Height from ground level to apex of building	Yes
Show existing finished ground levels/floor levels and proposed finished ground levels/floor levels (sub-floor ventilation and access).	Yes
Stairs, handrails and decking shown	N/A
Cladding systems, roofing type and any other relevant details	Yes
Window schedule	Yes
Roof pitch and chimneys (show height of chimney in relation to ridge)	Yes
Alterations to land contour, retaining, cut and fill and batters	Yes

Comments

Specifications &Other Documentation

Specifications and Other Documentation	Yes
Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.)	Yes
H1 calculations	Yes
E2 Risk Matrix	Yes
Natural hazard assessment report, where applicable (erosion, falling debris, subsidence, inundation, slippage).	Yes
If the building was built before 1 April 2000, provide an asbestos assessment in accordance with the Health and Safety at Work (Asbestos) Regulations 2016, and if necessary an asbestos management plan.	N/A

Comments

Plumbing &Drainage

Plumbing and Drainage	Yes
All existing SEWERS, sewer connections and sewer drains shown including Territorial Authority services	Yes
All existing STORMWATER drains and connections shown including Territorial Authority services	Yes
Proposed sewer and stormwater drains/soak holes, terminal vents shown.	Yes

Existing and proposed potable water supply.	N/A
All existing and proposed sanitary fittings including pipe sizes and gradients (isometric)	Yes
Wastewater design and on-site soil evaluation to show compliance with Waikato Regional Council rules.	N/A
Specifications for hot water heating system including seismic restraints.	Yes
Stormwater disposal design and calculations.	Yes

Comments

Swimming Pool/Spa Pool

Swimming Pool/Spa Pool	N/A
------------------------	-----

Comments

Fireplace

Solid Fuel Heater	N/A
-------------------	-----

Comments

Solar Heating

Solar Heating	N/A
---------------	-----

Comments

Cross Section

Cross sections	Yes
----------------	-----

Drawings showing constructional details of foundations, floor systems, wall, ceiling, stud heights and stud sizes, roof construction, balustrades and barriers.	Yes
---	-----

Surface finishes to wet areas (walls and floor to laundry, kitchen and bathroom).	Yes
---	-----

Location and type of insulation.	Yes
----------------------------------	-----

Details for all penetration in walls, roof (i.e. windows, doors, meter boards, skylights etc.)	Yes
--	-----

Cavity construction details, where applicable.	Yes
--	-----

Comments

Relocatable Buildings

Relocatable buildings	N/A
-----------------------	-----

Comments

Attachments

<u>Please ensure all documents are correctly and adequately named prior to uploading.</u>

Please upload the plans related to the proposed work as <u>one PDF (not as individual sheets):</u>	• JT18105 - 18 Penny Grove - BC Plans.pdf (3478645 bytes)
---	--

Please upload all generic specifications related to proposed works as <u>one PDF (not as individual sheets):</u>	• PROJECT SPECIFICATION - 18 Penny Grove.pdf (485045 bytes)
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Please upload the project specific specifications related to proposed works as <u>one PDF (not as individual sheets):</u>	• LBP FORM 2A - 18 Penny Grove.pdf (355074 bytes)
--	--

Please upload any additional documents not yet provided:	• PROJECT APPENDIX - 18 Penny Grove.pdf (14777319 bytes)
--	---

Once issued I would like to receive my consent documentation by:	Pickup electronic copy - On a USB memory stick, extra \$10.00 fee
--	---

REQUIRED ITEMS FOR BUILDING CONSENT BC 181033

Inspections Required

The following inspections are required:

- | | |
|---|--|
| 1 Prefloor or subfloor Plumbing and Drainage | (siting, under slab/floor drains and plumbing) |
| 1 Prefloor Building | (polythene, mesh, reinforcement, bracing connections etc) |
| 1 Sanitary Sewer/Drainage | (sewer connection, storm-water, materials, septic tank, falls etc) |
| 1 Framing Inspection | (wall and roof framing, connections and fittings, timber sizes & treatments, bracing and fixings) |
| 1 Pre-Ext Cladding Systems-Building | (cavities, head, jamb, sill flashings & wraps penetrations, cavities fixings etc prior to installation of exterior cladding. Brick veneer at ½ height) |
| 1 Preline Plumbing | (internal plumbing and fittings, pressure test) |
| 1 Preline Building | (exterior claddings & joinery, insulation, bracing, timber moisture content, fire protection glazing, building systems etc) |
| 1 Post Lining | (wall bracing, fixings, fire protection, etc) |
| 1 Code Compliance - Building (Single Dwelling Only) | (Surface finishes, access & egress, fire safety features, weathertightness, as per approved plans etc) |
| 9 Total Inspections | |

Documentation Required

The following documentation is required:

CCC application form
Drainage as-built
Stormwater as- built
PS3 for stormwater drainage (soakhole/ soakpit) including photos
Electrical Certificate
Gas Certificate
Correct siting form
Pre-floor plumbing as built
PS3 Fireplace
Roof Cladding Memorandum (E2)
Water Proofing Certificate - Internal (E3) Tilers membrane

Gas fireplace

TAUPO DISTRICT COUNCIL

BC181033

APPROVED CONSENT
PLANS/SPECIFICATIONS

Licensed Building Practitioner Forms Required

The following Restricted Building Work must be carried out or supervised by a registered Licensed Building Practitioner (LBP) and a Record of Building Work form signed by each LBP is required at the completion of the work.

Design 1 William Thomson
Carpentry 1

The above list is an indication only of the inspections that may need to be carried out to ensure the work complies with the building consent. Additional inspections may be required to satisfy the requirements of Section 90 of the Building Act 2004. Persons carrying out building work are to ensure that adequate inspections are carried out to enable the Building Consent Authority to be satisfied the work complies with the consent as required by Section 94(1)(a) of the Building Act 2004.

Please ensure that all relevant components are inspected and 'signed off' by Taupō District Council building control staff before progressing to the next stage and all conditions/notes are complied with.

Inspection Bookings:
For **Taupō & Mangakino** phone (07) 376 0899
For **Turangi** phone (07) 386 7017

Foundations 1
Roofing 1

Advice Notes

When all building work authorised by this building consent is complete, an electronic Application for Code Compliance Certificate must be submitted online <https://online.taupo.govt.nz>
Until such time as all documentation is received and approved, the final inspection will not be carried out. If no application has been made, Taupo District Council must decide whether to issue the CCC after 2 years of the building consent being granted.

LBP Building Work
Section 87 Building Act 2004

If not stated on the application form the owner must notify the Council in writing of the names and LBP numbers of ALL licensed building practitioners engaged in this project before building work commences
LBP related building inspections will not take place until Council has been notified of all the LBP's engaged in the project.

#Drainage/as built plans including stormwater drains and soakholes, are to be provided, drawn to scale, and all parts clearly identified at the time of inspection. Failure to do this may result in the inspection not being carried out. A recheck will then be required, which will incur further charges.

All AS/NZS3500.2.2: underslab plumbing to be inspected and tested with as-built supplied before pipe work is covered up

#All buildings and associated works are to be kept clear of public drains in accordance with the Taupo District Council policy, unless a relaxation has been given by the Services Engineer. Refer to the Project Information Memorandum.

#It is recommended that prior to the fire appliance being used a Code of Compliance Certificate should be obtained from the Taupo District Council.

PLEASE NOTE: All external cladding's and internal linings that contribute to B1 - Structure, C3 & C6 - Protection from Fire, E2- External Moisture, E3 - Internal Moisture, & G6 - Acoustic and Impact Sound requirements of the Building Code must be installed in strict accordance with the manufacturers specifications and details except where details have been proposed and approved as alternative solutions as part of this consent.

#As agreed prior to granting of consent, At the completion of the works and prior to the issue of the C.C.C, the applicant shall provide the Taupo District Council the following documentation to assist Council in establishing compliance with the NZBC for the Dampfix Gold WPM system

- Copy of the applicators approval certificate
- A producers statement from the Applicator
- Copy of Manufacturers' warranty

#Prior to a Code of Compliance Inspection being undertaken, an Energy Works certificate shall be provided to the Taupo District Council to demonstrate compliance with Clause G9 and/or G10 and G11 of the NZBC.

Fire Appliance: Prior to a Code of Compliance Inspection being carried out, a PS3 from a suitably qualified person is to be supplied stating the roof flashing system has been installed as per the manufacturers specifications. Photographic evidence must be supplied showing compliance with Clause E2.

APPROVED CONSENT COPY
THESE PLANS AND SPECIFICATIONS ARE
APPROVED SUBJECT TO THE PROVISIONS
OF THE BUILDING ACT 2004 AND IT'S
REGULATIONS. A FULL (PRINTED) COPY OF
DRAWINGS AND SPECIFICATIONS ARE TO
BE RETAINED ON SITE IN GOOD ORDER
AND PRODUCED UPON REQUEST.

AS AMENDED

18 Mar 2020

TAUPO DISTRICT COUNCIL

DRAWING CONTENTS	SHT
SITE & DRAINAGE PLAN	1
FOUNDATION PLAN	2
FLOOR PLAN	3
ELEVATIONS	4
SECTIONS A & B	5
FRAMING & FIXINGS PLAN	6
BRACING PLAN	7
ELECTRICAL PLAN (SMOKE ALARMS & INSULATION)	8
DETAILS	9-11
WET AREA DETAILS	12
AXON PANEL CLADDING DETAILS	13-17
LINEA CLADDING DETAILS	18-20

R E V I S I O N	B
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TAUPO DISTRICT COUNCIL

BC181033

APPROVED CONSENT
PLANS/SPECIFICATIONS

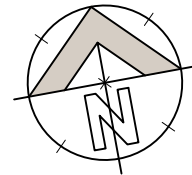
BLOMQUIST RESIDENCE

18 PENNY GROVE, TAUPO



18 Mar 2020

TAUPO DISTRICT COUNCIL



LOT: 226
DP: 522262
AREA: 427m²

TOWN PLANNING INFORMATION:

Site Area:	427 sq.m
Floor Area:	172.70 sq.m
Additional Roof Area:	6.2 sq.m
Driveway as Coverage:	34 sq.m

Building Coverage: $172.70 + 6.2 = 178.90$
 $178.90/427 = 41.9\% (<50\%)$

Total Coverage: $178.90 + 34 = 212.90$
 $212.90 / 427 = 49.8\% (<75\%)$

Plot Ratio: $178.90/427 = 41.9\% (<100\%)$

SITE PLAN AND DRAINAGE NOTES:

CONFIRM DEPTH AND POSITION OF PUBLIC SEWER CONNECTION BEFORE COMMENCING ANY EXCAVATIONS.

ALL PLUMBING AND DRAINAGE TO BE INSTALLED AND TESTED BY A REGISTERED TRADESPERSON IN ACCORDANCE WITH **AS/NZS3500.2** AND **NZBC E1/AS1** WHERE APPLICABLE. WATER SUPPLY TO **NZBC G12/AS1**.

CHECK ALL PIPE AND DRAIN DIAMETERS, AND GRADIENTS.

CHECK LOCATION OF EXISTING FIXTURES AND DRAINS ON SITE. REUSE WHERE POSSIBLE AND ACCEPTABLE.

EROSION & SEDIMENT CONTROL PLAN:

PROVIDE SILT FENCING AND OTHER METHODS OF SEDIMENT CONTROL LIKE MULCHING STRAW AS DETERMINED NECESSARY & APPLICABLE ON SITE.

USE EROSION CONTROL TECHNIQUES TO PREVENT
SEDIMENT GENERATION SUCH AS:

- REVEGETATION
- MINIMIZATION OF EARTHWORKS
- TIMING
- STAGING OF EARTHWORKS OPERATIONS

AS/NZS 3500.2
MINIMUM TRAP & DISCHARGE PIPE SIZE ABOVE SLAB

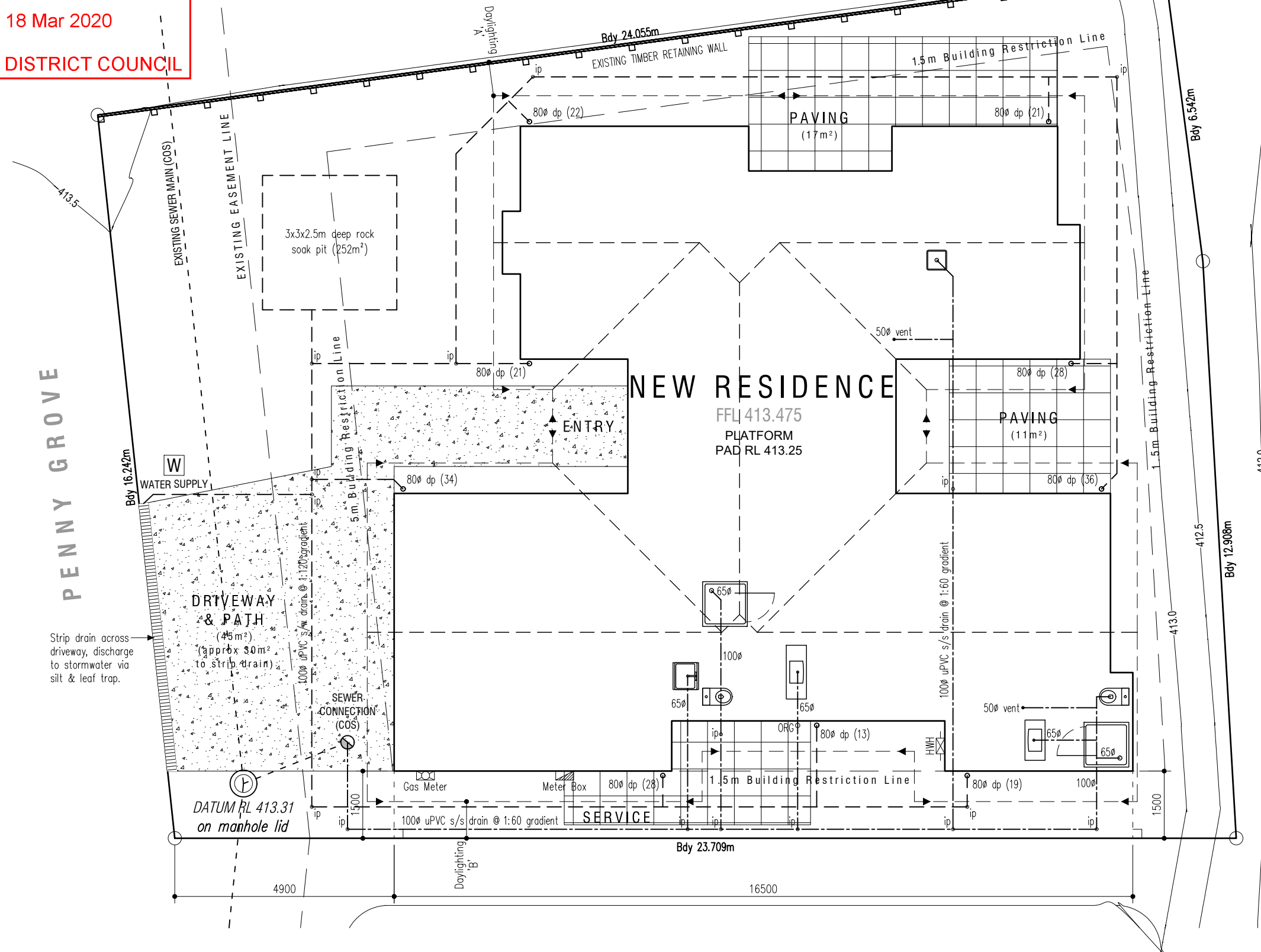
FIXTURE	FU's	PIPE Ø
Basin	1	400
Shower	2	400
Bath	4	400
Kitchen Sink	3	650
Laundry Tub	5	650
WC Pan	1	1000

WC Pan 4 1000
TAUPO DISTRICT COUNCIL

DRAIN SIZES AS SHOWN ON DRAWING

BC181033

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PLANS/SPECIFICATIONS



Penny Homes Ltd
PO Box 708, Taupo
ph | 07 377 0154 fax | 07 377 0155
email: john@pennyhomes.co.nz
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www.pennyhomes.co.nz

TITLE:	BLOMQUIST RESIDENCE
ht	18 PENNY GROVE, TAUPO

DRAWING:

SITE & DRAINAGE PLAN

CONSENT COPY

REV B

SCALE:	1:100
DRAWN:	SK
DATE:	Nov 2018

NOTES:	Wind Zone = High Eq Zone = 2 Exposure Zone = B
SK	
18	

be checked and verified by the Contractor
ment of any work

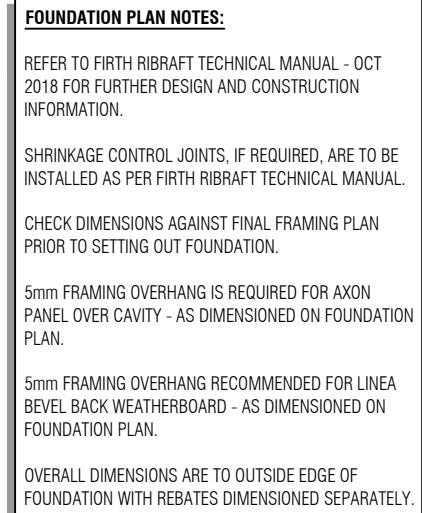
E&OE

DATE:	REVISION:
24/11/18	A Stormwater & soakholes amended, bracing plan amended.
19/02/20	B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.

SHEET
1
20
No. JT18105

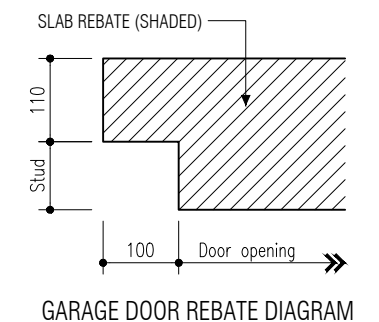
18 Mar 2020

TAUPO DISTRICT COUNCIL



CONTRACTOR TO CONFIRM DOOR AND WINDOW JOINERY PROFILES WITH OWNER & JOINERY MANUFACTURER PRIOR TO SETTING OUT SLAB TO ALLOW FOR ACCURATE SLAB REBATES WHERE REQUIRED.

FLOOR COVERINGS NEED TO BE CONSIDERED IN ALL SITUATIONS TO ENSURE A FLUSH FINISH WITH THE JOINERY.



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BC181033

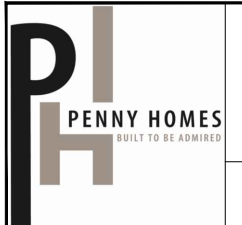
APPROVED CONSENT
PLANS/SPECIFICATIONS

AS AMENDED
18 Mar 2020
TAUPO DISTRICT COUNCIL

GENERAL NOTES:
ALL FRAMING TO BE SG 8 GRADE UNLESS OTHERWISE SPECIFIED.
WINDOW DIMENSIONS ARE ROUGH OPENING AND ALLOW FOR SPACERS AND FLASHING TAPE TO PERIMETER.
CONFIRM ALL INTERNAL DOOR HEIGHTS WITH OWNER PRIOR TO PRICING AND CONSTRUCTION.



TAUPO DISTRICT COUNCIL
BC181033
APPROVED CONSENT
PLANS/SPECIFICATIONS
AREA : 172.70m²



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PO Box 708, Taupo
ph | 07 377 0154 fax | 07 377 0155
email: john@pennyhomes.co.nz
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www.pennyhomes.co.nz

TITLE:
BLOMQUIST RESIDENCE
18 PENNY GROVE,
TAUPO

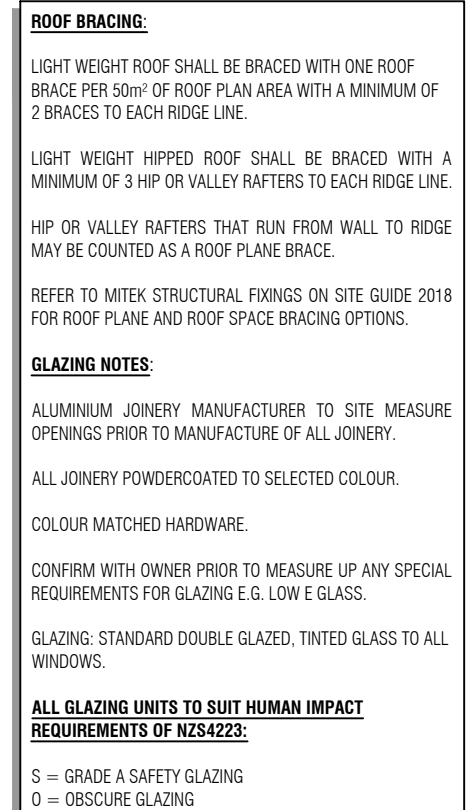
DRAWING:
FLOOR PLAN
CONSENT COPY
REV B

SCALE:
1:100
DRAWN: SK
DATE: Nov 2018
NOTES:
Wind Zone = High
Eq Zone = 2
Exposure Zone = B
All dimensions to be checked and verified by the Contractor before commencement of any work
E&OE

DATE:
24/11/18
19/02/20
REVISION:
A Stormwater & soakholes amended, bracing plan amended.
B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.

SHEET
3
OF:
20
JOB No. **JT18105**

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PLANS/SPECIFICATIONS

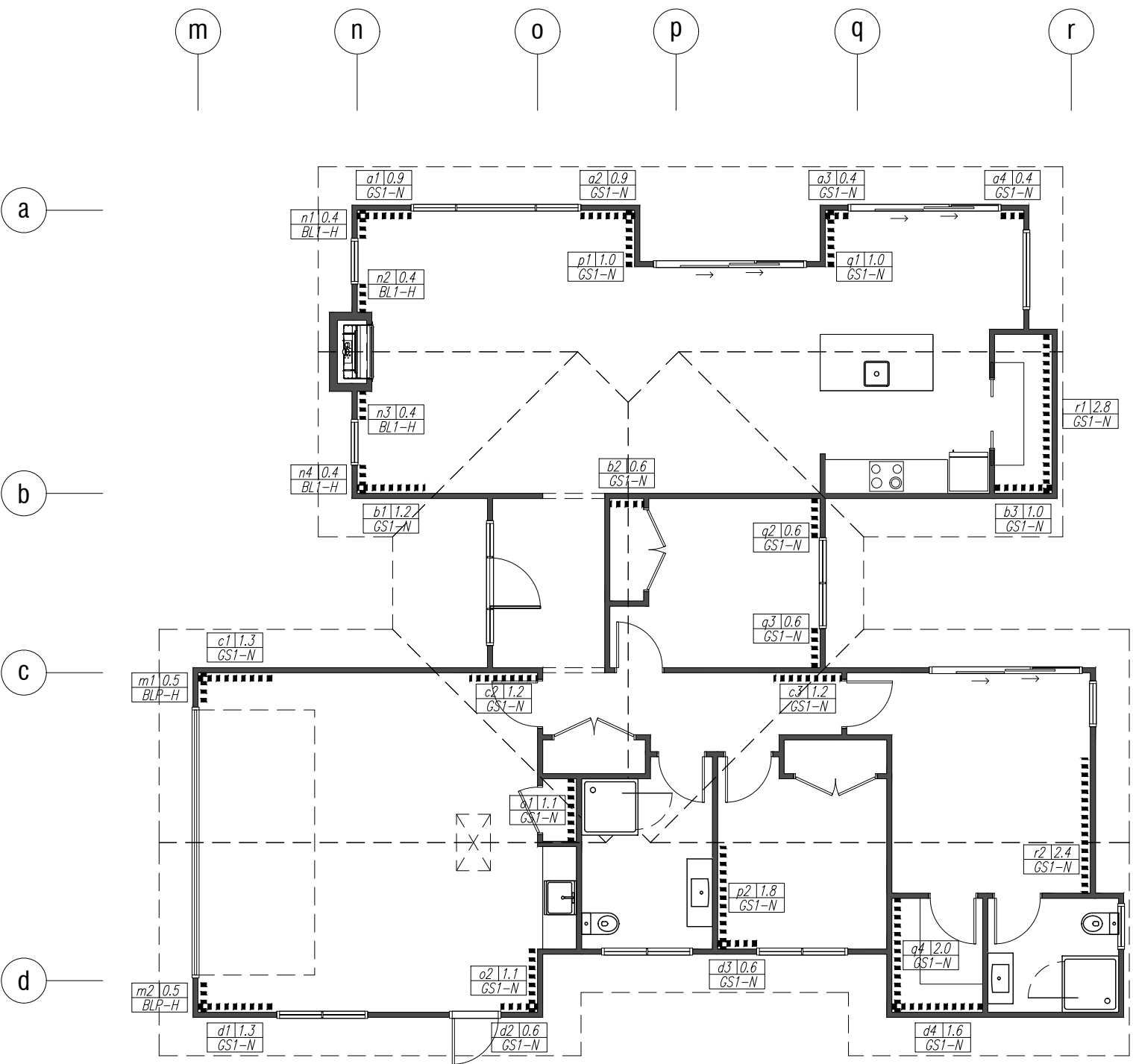
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18 Mar 2020
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TOP PLATE CONNECTIONS

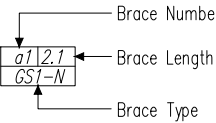
Wall frames at right angles to external framing to be fixed with a 6kN LUMBERLOK PLATE-LOK in accordance with the Mitek Structural Fixings On-Site Guide.

6kN LUMBERLOK PLATE-LOK satisfies bracing as required by Clause 8.7.3 NZS3604:2011.

For brace elements exceeding 250 BU's additional fixings are required and will be indicated on the Framing Fixings and Bracing Plans.



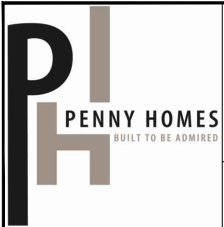
Bracing Symbol



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PLANS/SPECIFICATIONS



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TITLE:
BLOMQUIST RESIDENCE
18 PENNY GROVE,
TAUPO

DRAWING:
BRACING PLAN
CONSENT COPY
REV B

SCALE:
1:100
DRAWN: SK
DATE: Nov 2018

NOTES:
Wind Zone = High
Eq Zone = 2
Exposure Zone = B
All dimensions to be checked and verified by the Contractor before commencement of any work
E&OE

DATE:
24/11/18
19/02/20

REVISION:
A Stormwater & soakholes amended, bracing plan amended.
B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.

SHEET
7
OF:
20
JOB No. **JT18105**

INSULATION TABLE

PROPOSED R-VALUES			
LOCATION	COMPONENT	R-VALUE ACHIEVED	INSULATION DESCRIPTION & REFERENCE
WALLS	Axon Panel on cavity over 90x45mm studs at 400mm centres.	2.18	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Linea bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres.	2.13	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres.	2.27	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
ROOFS	Profiled metal on trusses at 900mm centres	3.37	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
	Profiled metal on scissor trusses at 900mm centres	3.35	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
FLOOR	85mm thick Firth Ribraft concrete slab on ground	1.30	220mm deep polystyrene pod system <i>Refer to Manufacturers Spec in Appendix</i>
GLAZING	Aluminium joinery with double glazed windows	0.26	Standard aluminium joinery with double glazed windows <i>Refer to Branz House Insulation Guide Fifth Edition</i>

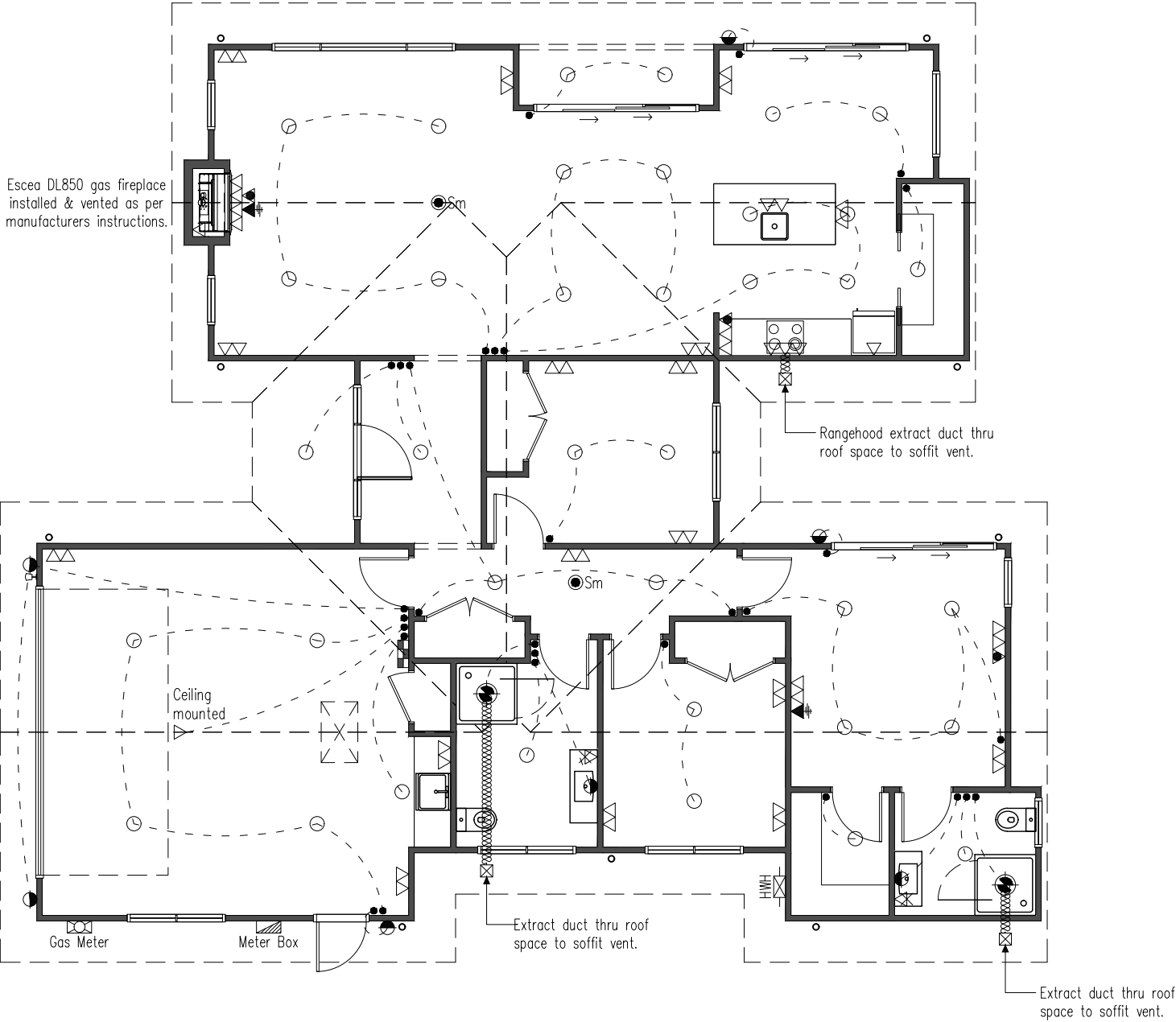
INSULATION NOTES:

GARAGE NOT INCLUDED IN THERMAL ENVELOPE FOR INSULATION CALCULATIONS. INTERNAL GARAGE WALLS TO BE INSULATED WITH R2.8 BATTS AS PER REST OF HOUSE.

AS AMENDED

18 Mar 2020

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- LEGEND:
- Distribution Board
 - Meter Box
 - Gas Meter Box
 - Rinnai VT26 HWH
 - Light Sensor
 - Recessed LED light
 - Wall Mounted Light
 - Extract Fan
 - Smoke Detector
 - Power Outlet
 - Double Power Outlet
 - Earth Leakage point
 - Phone Outlet
 - Light Switch
 - TV Outlet

ELECTRICAL NOTES:

CHECK KITCHEN APPLIANCE POSITIONS AND TYPES BEFORE INSTALLATION WITH FINALIZED KITCHEN PLAN.

CHECK POSITIONS AND TYPES OF ALL FITTINGS PRIOR TO INSTALLATION.

ALLOW PC SUMS FOR SPECIALIST FITTINGS WHERE APPLICABLE.

ALL RECESSED DOWNLIGHTS TO BE CA RATED. TYPES: ICF, IC, CA80, CA135.

SMOKE ALARMS TO BE TYPE 1 WITH HUSH AND TEST FACILITY IN ACCORDANCE WITH NZBC F7/AS1.

ALLOW FOR THE INSTALLATION OF:

- UNDER TILE HEATING TO BATHROOM & ENSUITE.

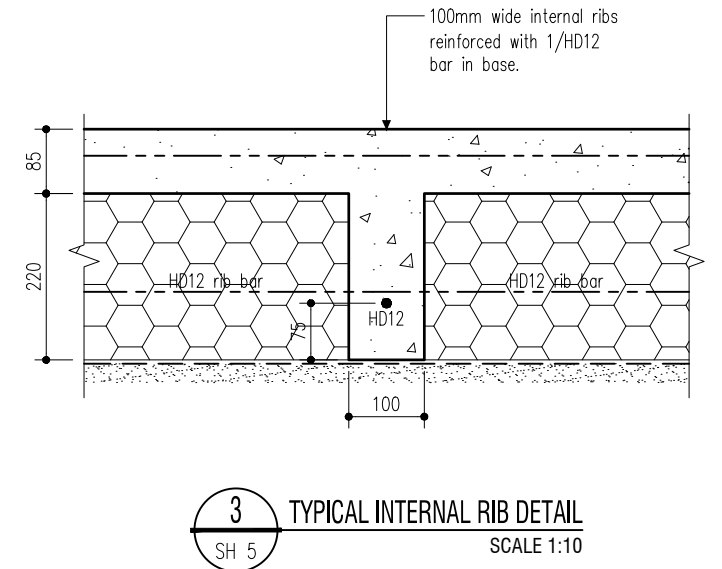
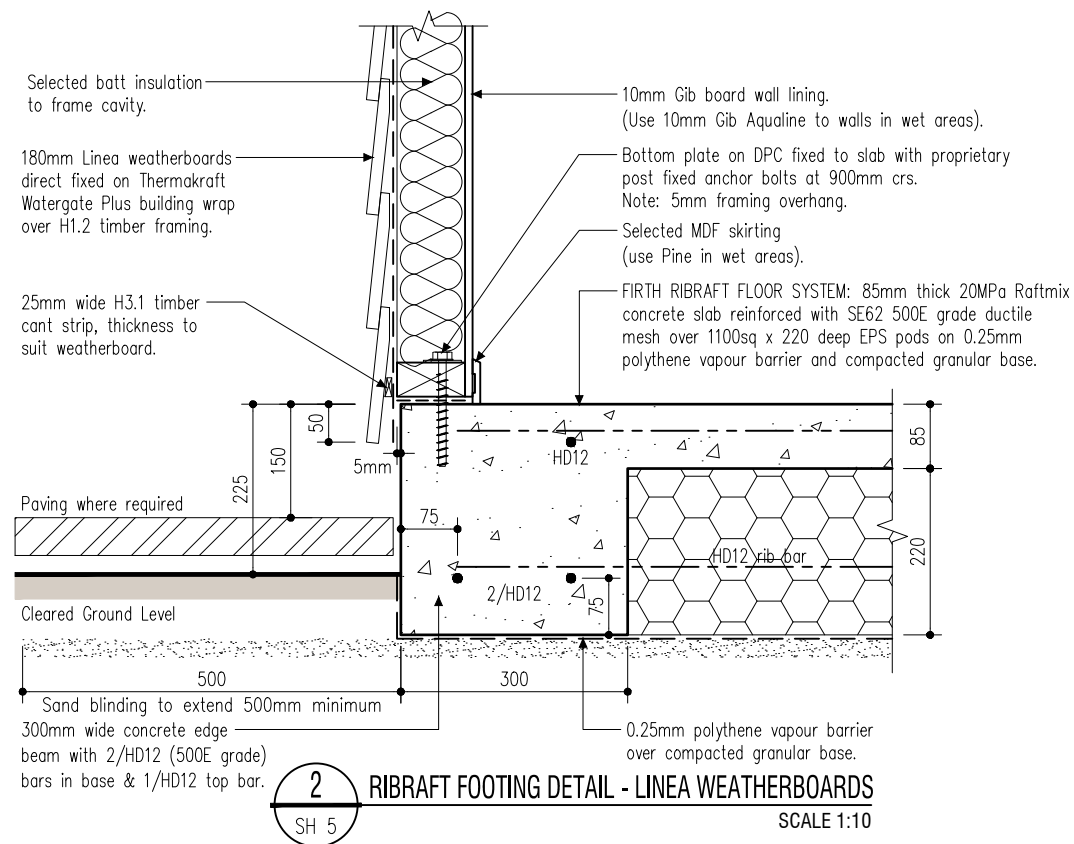
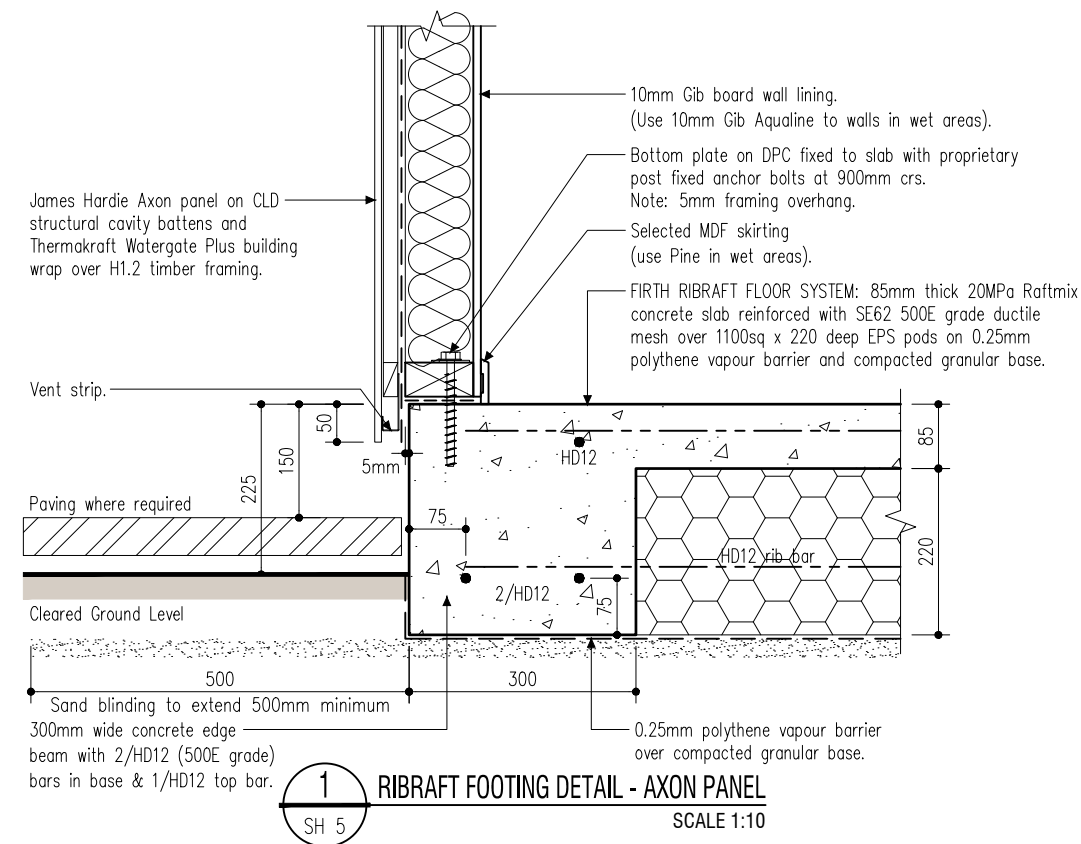
CONFIRM THE FOLLOWING IF REQUIRED:

- SPECIALIST FITTINGS
- MIRROR DEMISTERS
- AIRCONDITIONING SYSTEM IF APPLICABLE
- SECURITY SYSTEM
- DIMMERS/SELECTED LIGHTS
- ENTRY CONTROL SYSTEM

TAUPO DISTRICT COUNCIL

BC181033

APPROVED CONSENT PLANS/SPECIFICATIONS



AS AMENDED

18 Mar 2020

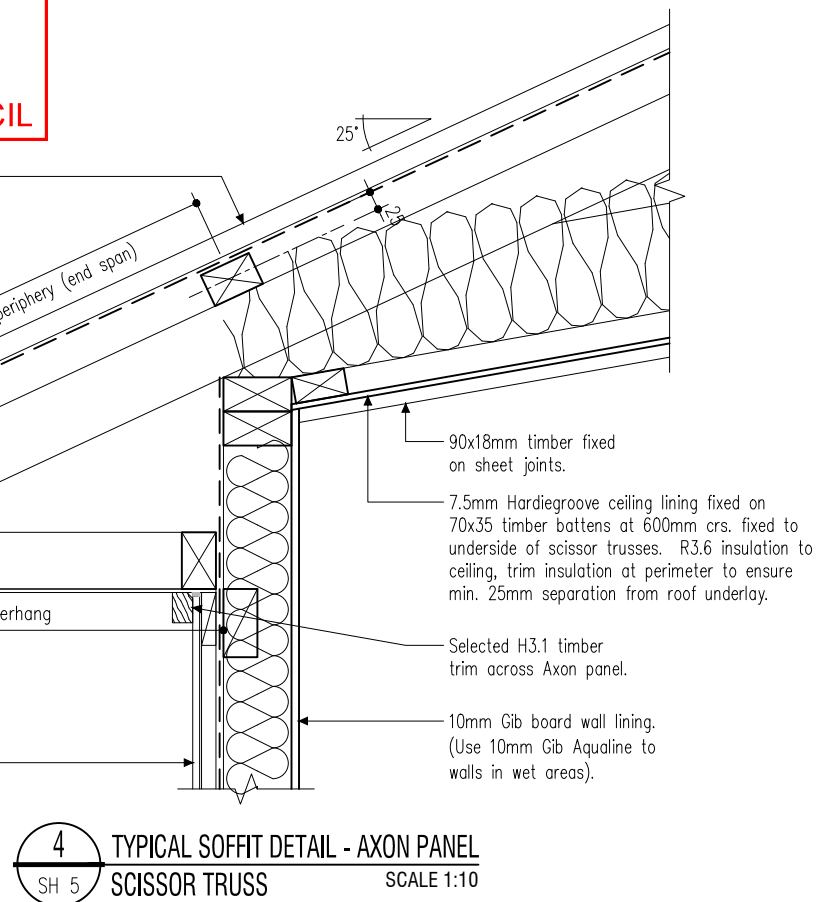
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Colorsteel Endura corrugated roofing on Thermakraft 215 roof underlay on 70x45 H1.2 purlins at 900mm crs. over trusses at 900mm crs. to manufacturers spec.

Colorsteel Endura 1/4 round gutter on Colorsteel Endura fascia.

4.5mm Hardieflex soffit lining to underside of soffit framing.

James Hardie Axon panel on CLD structural cavity battens and Thermakraft Watergate Plus building wrap over H1.2 timber framing.

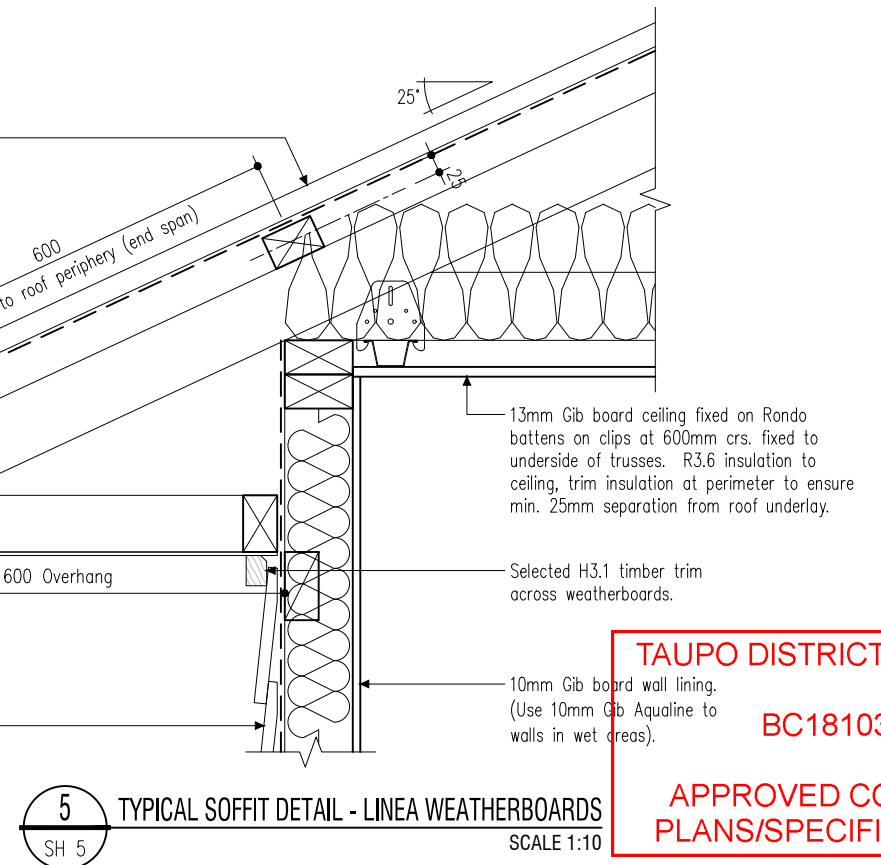


Colorsteel Endura corrugated roofing on Thermakraft 215 roof underlay on 70x45 H1.2 purlins at 900mm crs. over trusses at 900mm crs. to manufacturers spec.

Colorsteel Endura 1/4 round gutter on Colorsteel Endura fascia.

4.5mm Hardieflex soffit lining to underside of soffit framing.

180mm Linea weatherboards direct fixed on Thermakraft Watergate Plus building wrap over H1.2 timber framing.



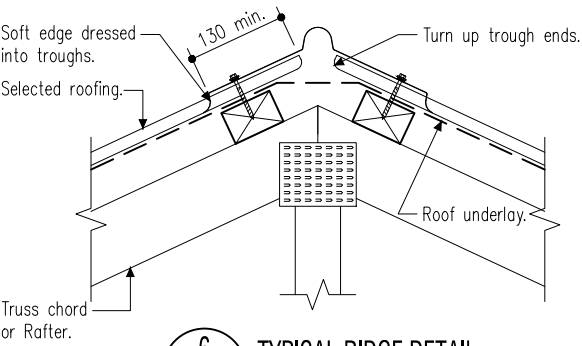
TAUPO DISTRICT COUNCIL

BC181033

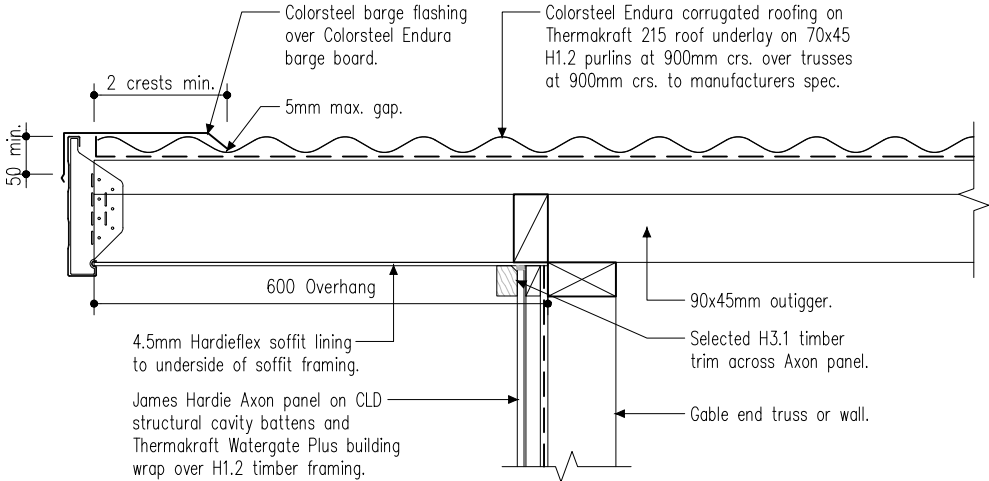
APPROVED CONSENT PLANS/SPECIFICATIONS

	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: BLOMQUIST RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: DETAILS CONSENT COPY REV B	SCALE: 1:10 DRAWN: SK DATE: Nov 2018	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work E&OE	DATE: 24/11/18 19/02/20 REVISION: A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	SHEET 9 OF: 20 JOB No. JT18105
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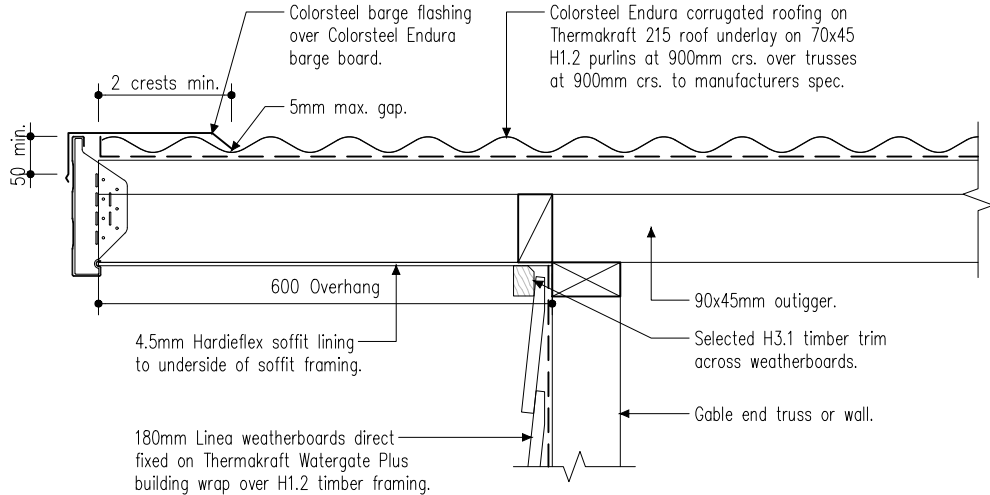
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18 Mar 2020
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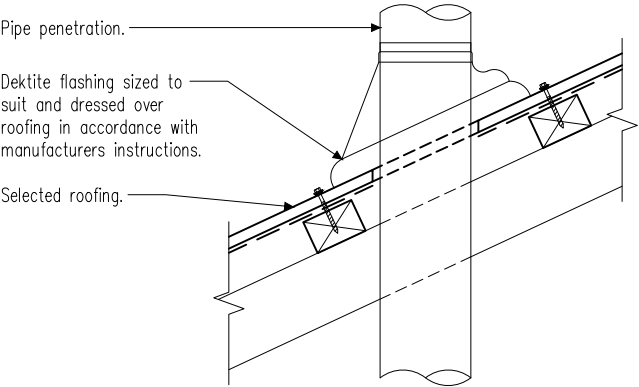
6 TYPICAL RIDGE DETAIL
SH 5 SCALE 1:10



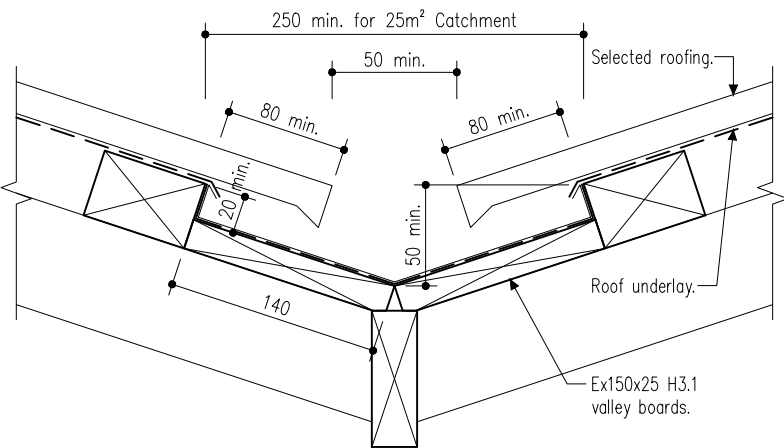
7 TYPICAL 600mm BARGE DETAIL - AXON PANEL
SH 4 SCALE 1:10



8 TYPICAL 600mm BARGE DETAIL - LINEA WEATHERBOARDS
SH 4 SCALE 1:10



TYPICAL ROOF PENETRATION DETAIL
SCALE 1:10



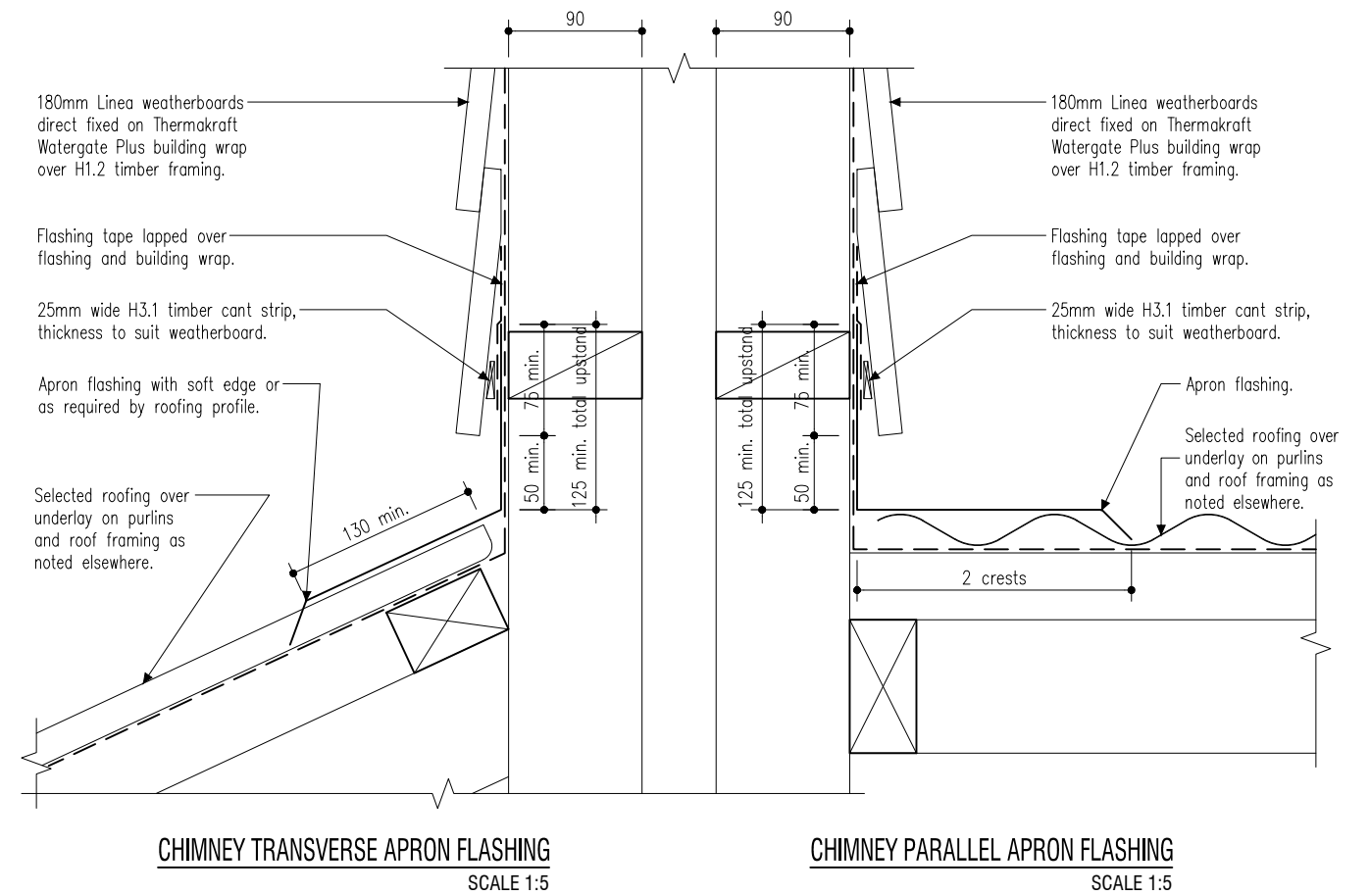
TYPICAL VALLEY GUTTER DETAIL
SCALE 1:5

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				DRAWN: SK				
				DATE: Nov 2018				

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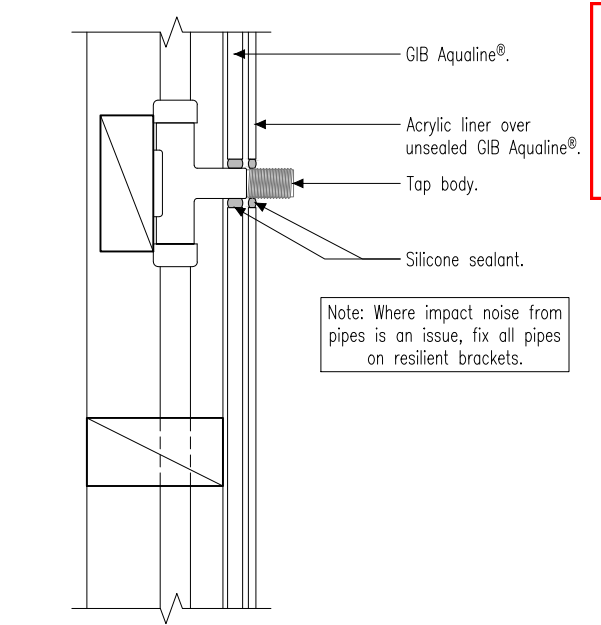
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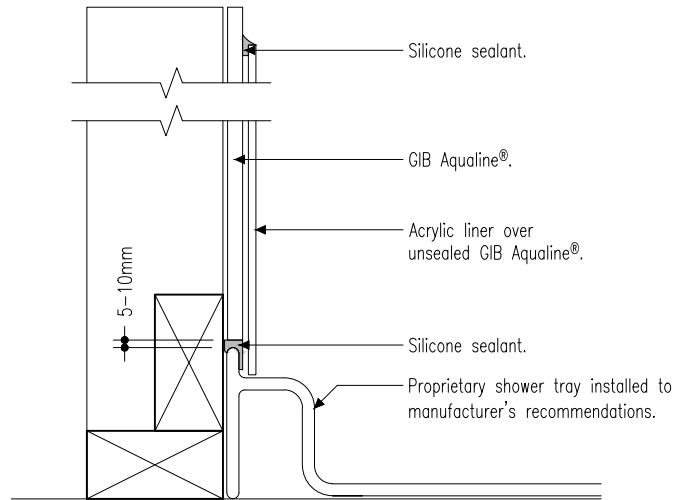
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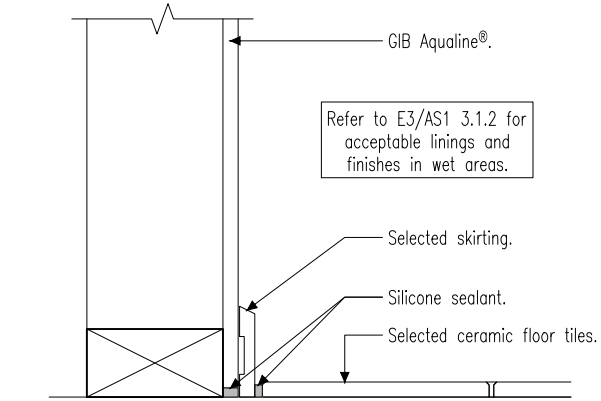
ACRYLIC LINER PENETRATION DETAIL

SCALE 1:5



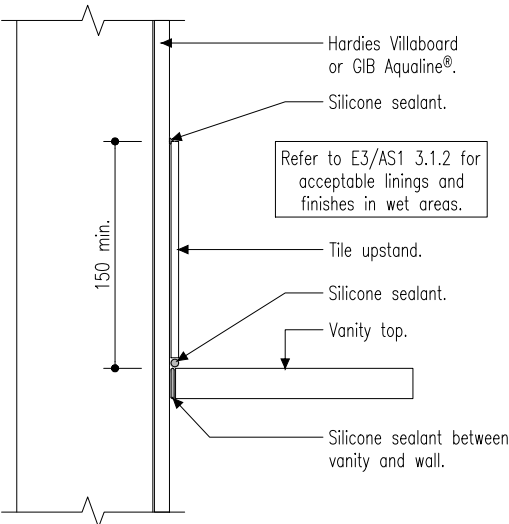
SHOWER WALL/TRAY DETAIL (ACRYLIC LINER & BASE)

SCALE 1:5



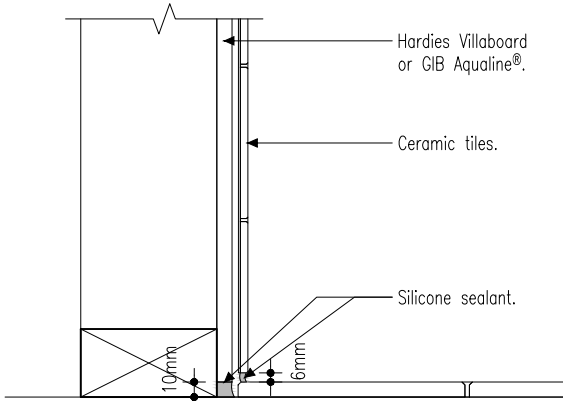
WALL/FLOOR DETAIL (GIB AQUALINE/TILED FLOOR)

SCALE 1:5



VANITY/KITCHEN BENCH TOP DETAIL

SCALE 1:5



WALL/FLOOR DETAIL (CERAMIC TILES)

SCALE 1:5

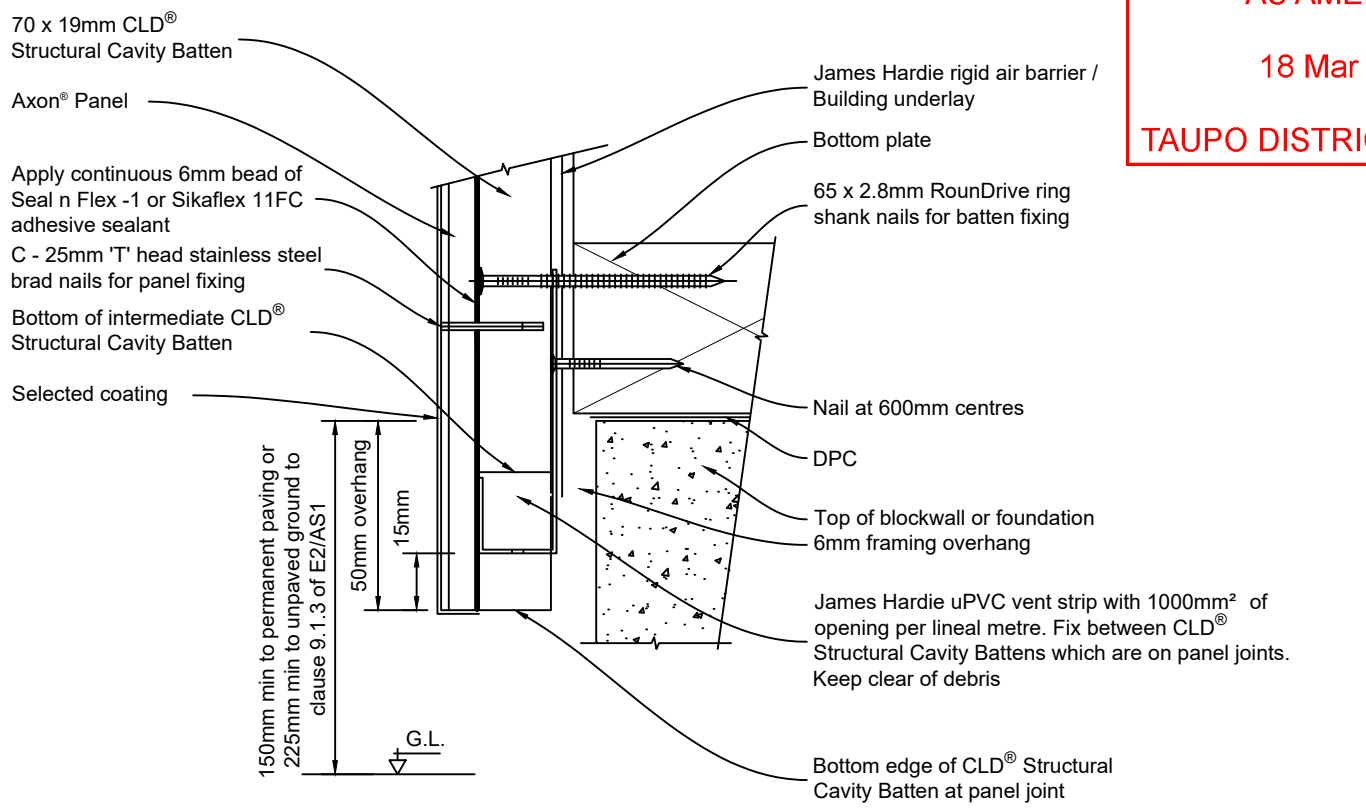
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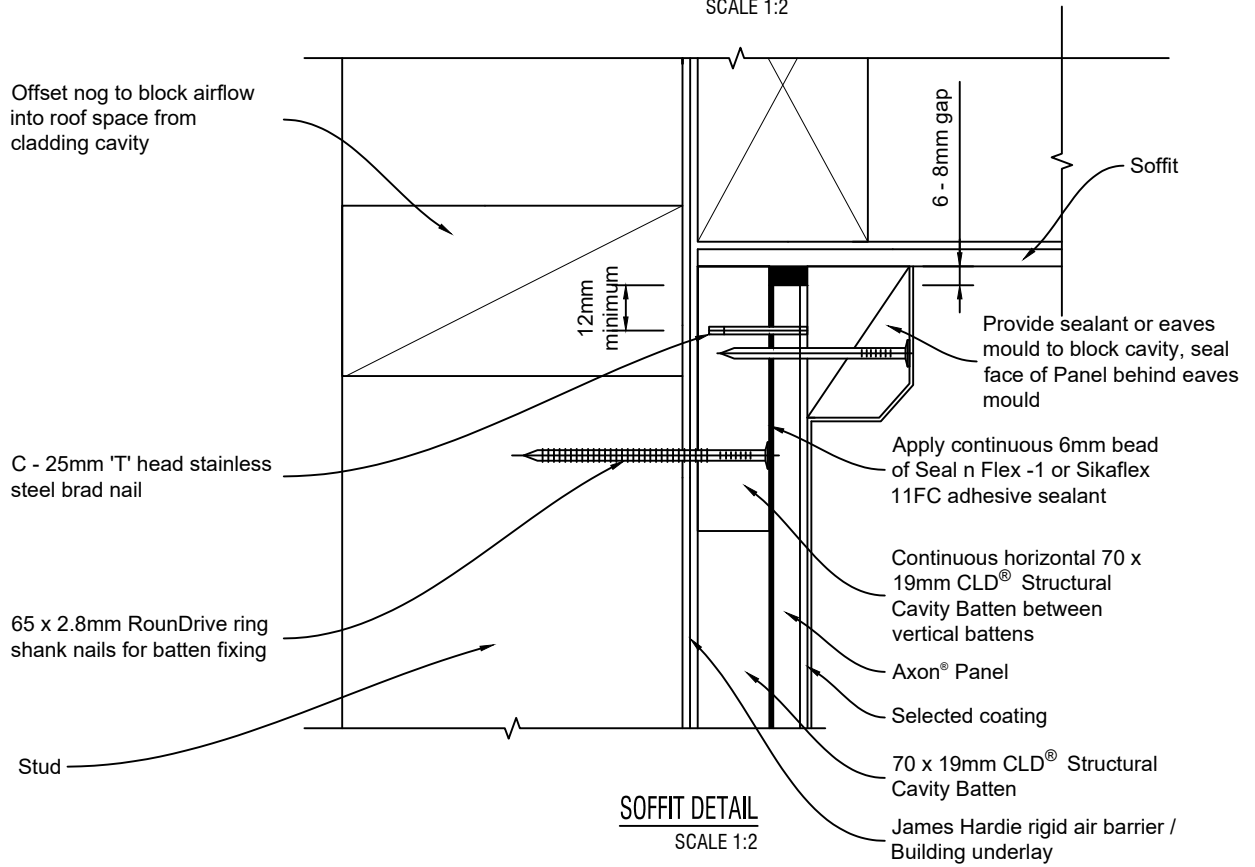
	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE:	BLOMQUIST RESIDENCE	DRAWING:	WET AREA DETAILS	SCALE:	1:5	NOTES:	Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE:	24/11/18 19/02/20	REVISION:	A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	SHEET	12		
	www.pennyhomes.co.nz	18 PENNY GROVE, TAUPO	CONSENT COPY REV B	DRAWN:	SK	DATE:	Nov 2018	All dimensions to be checked and verified by the Contractor before commencement of any work E&OE					OF:	20			
												JOB No.	JT18105				

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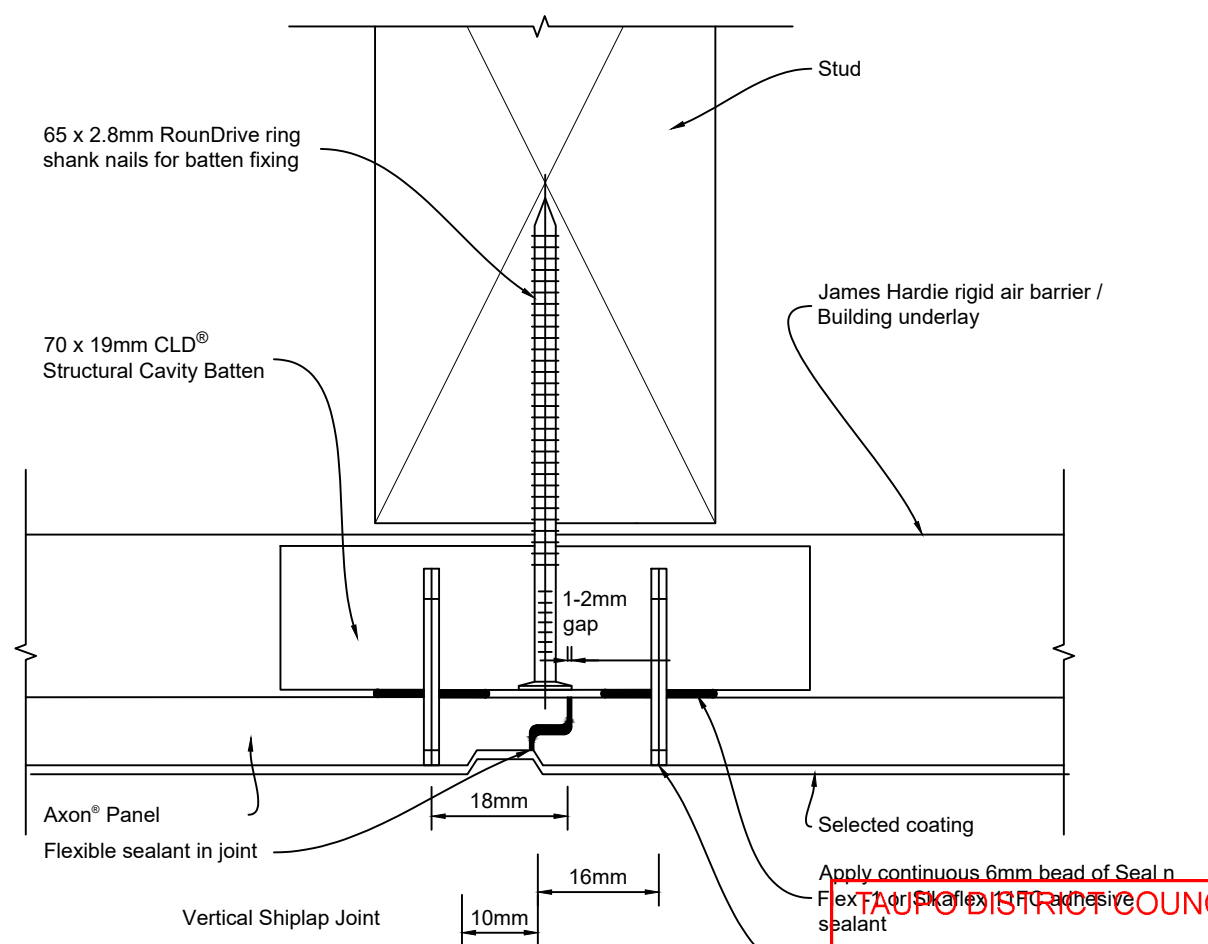


- Notes:**
- Check panel extends past bottom plate as specified in Architects specification (50mm min).
 - uPVC Vent strip must remain level and secure during construction. Cut and fix uPVC vent strip between CLD[®] Structural Cavity Battens fixed under the panel joints.
 - Check vent strip is free from site debris.

FOUNDATION DETAIL
SCALE 1:2



SOFFIT DETAIL
SCALE 1:2

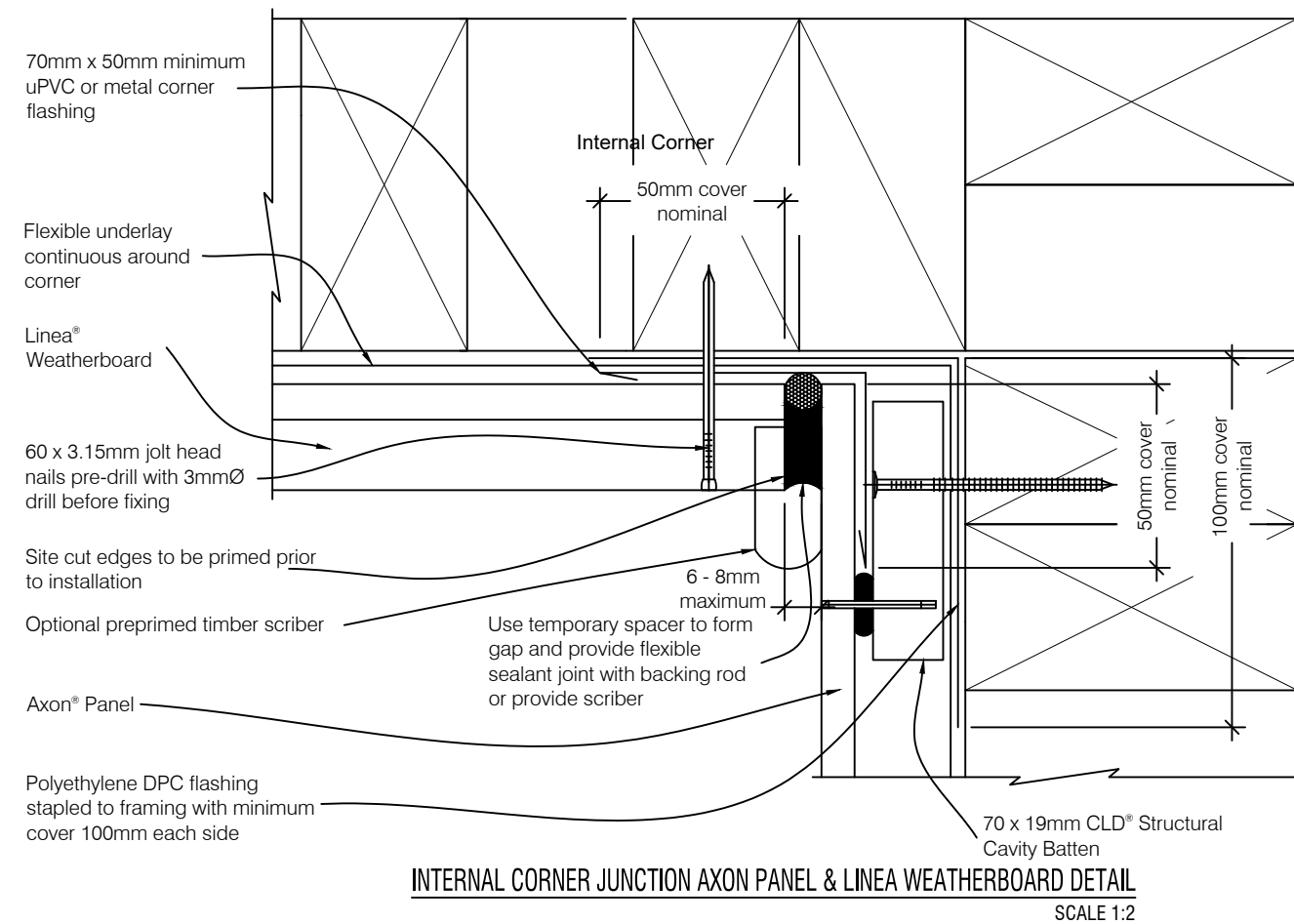
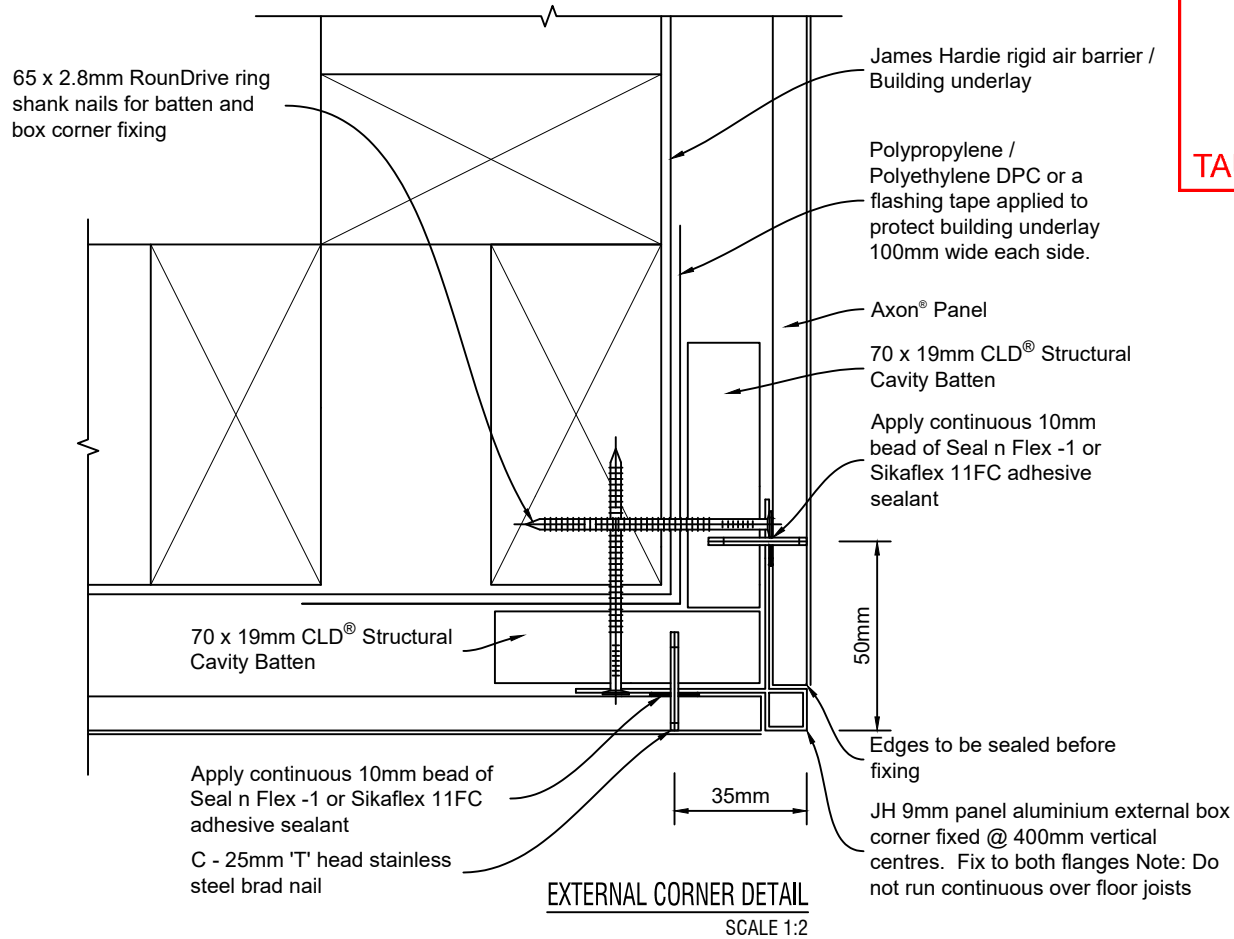


- Notes:**
- Ensure that a continuous 6mm bead of adhesive sealant is applied between CLD[®] Structural Cavity Batten and Axon[®] Panel.
 - Ensure that the required edge distance is maintained when fixing.
 - Seal cut edges with a primer compatible with final coatings.

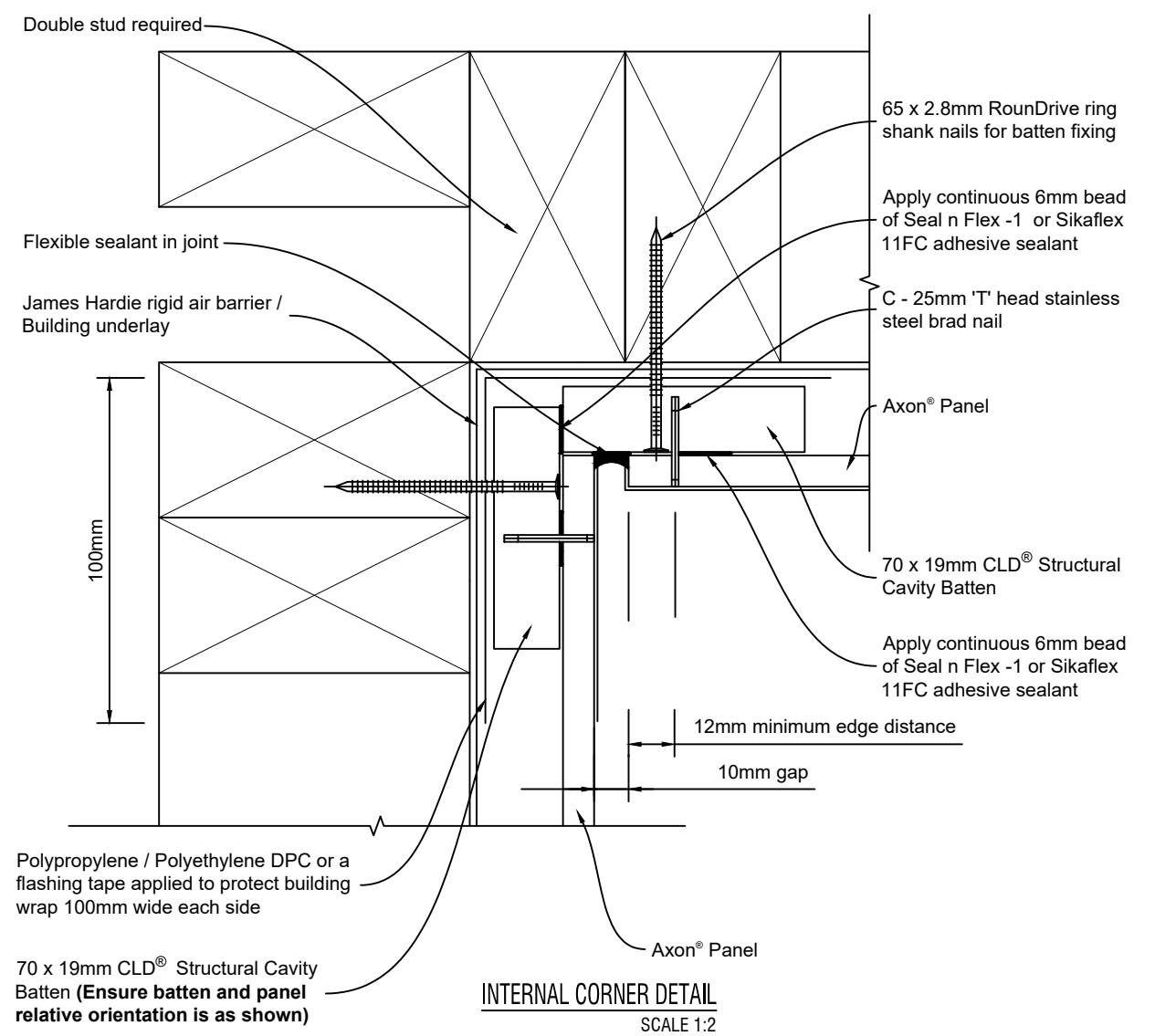
SHIPLAP JOINT DETAIL
SCALE 1:1

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		DRAWN: SK						
		DATE: Nov 2018						
		All dimensions to be checked and verified by the Contractor before commencement of any work			E&OE			



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		BLOMQUIST RESIDENCE		AXON PANEL CLADDING DETAILS		1:2	Wind Zone = High Eq Zone = 2 Exposure Zone = B	24/11/18 19/02/20	A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	14
		18 PENNY GROVE, TAUPO		CONSENT COPY REV B		DRAWN: SK				OF: 20
						DATE: Nov 2018				All dimensions to be checked and verified by the Contractor before commencement of any work E&OE



1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Building underlay must comply with acceptable solution E2/AS1 and NZS 3604.
3. Flashing tape must have proven compatibility with the selected building underlay and other materials with which it comes into contact as per Table 21 of E2/AS1.

Refer to the manufacturer or supplier for technical information for these materials.

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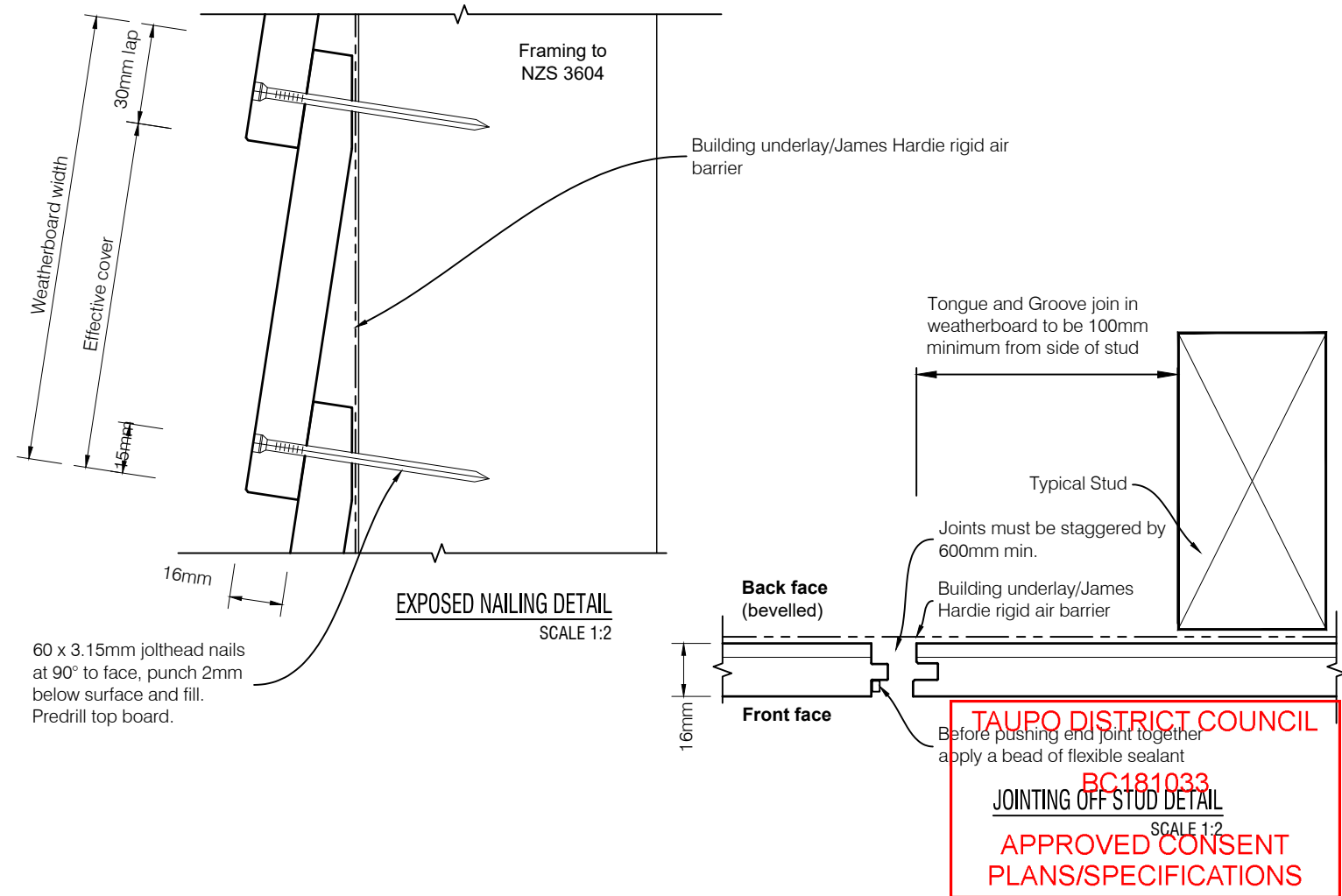
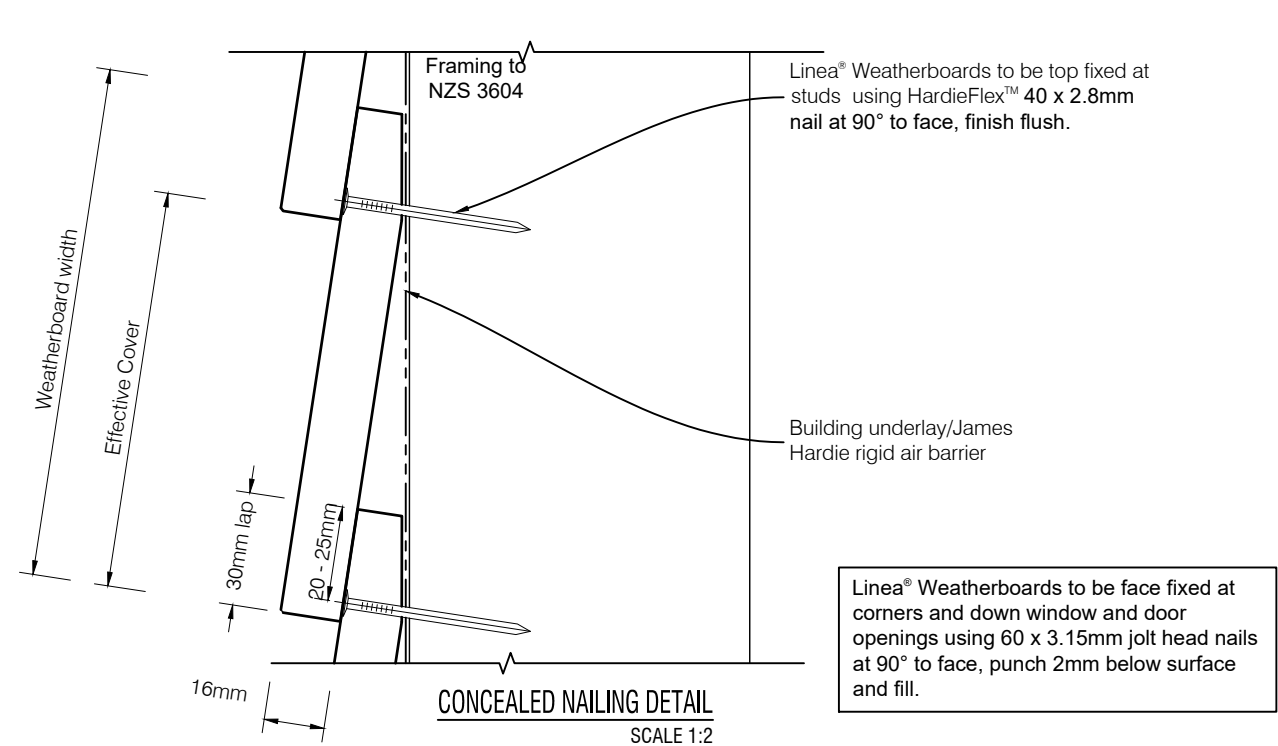
18 Mar 2020

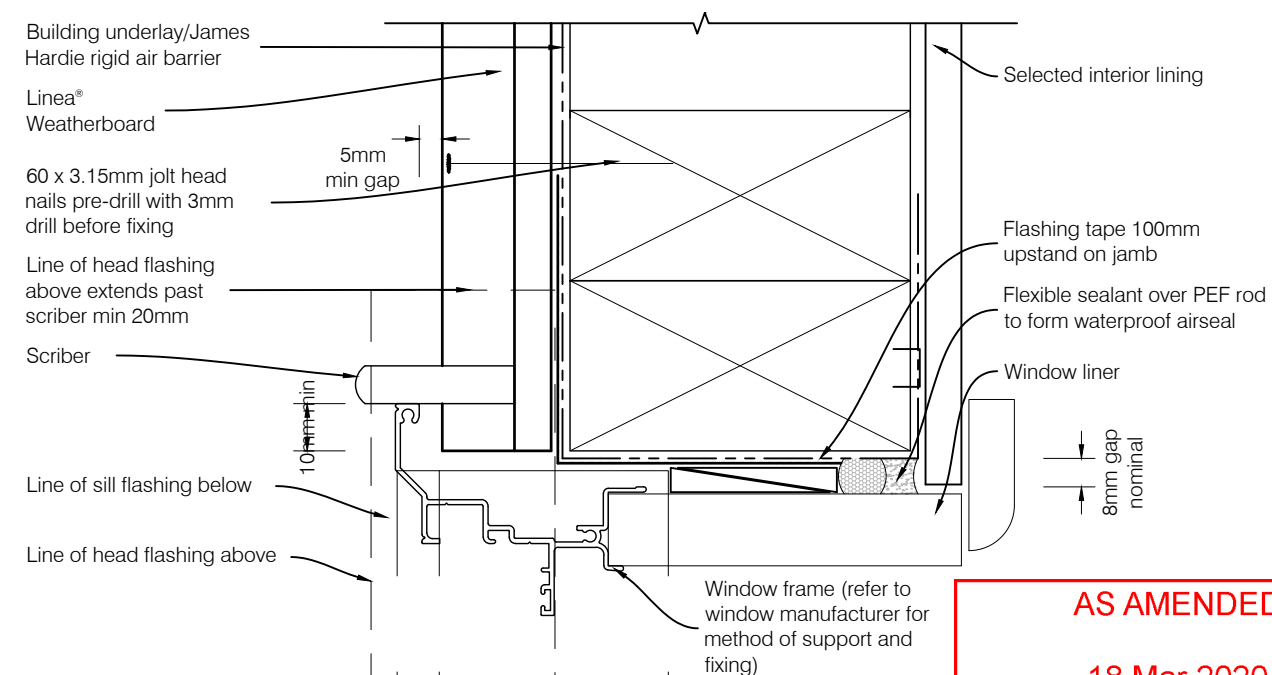
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	www.pennyhomes.co.nz	18 PENNY GROVE, TAUPO	CONSENT COPY REV B	DRAWN: SK		All dimensions to be checked and verified by the Contractor before commencement of any work E&OE		OF: 20
				DATE: Nov 2018				JOB No. JT18105

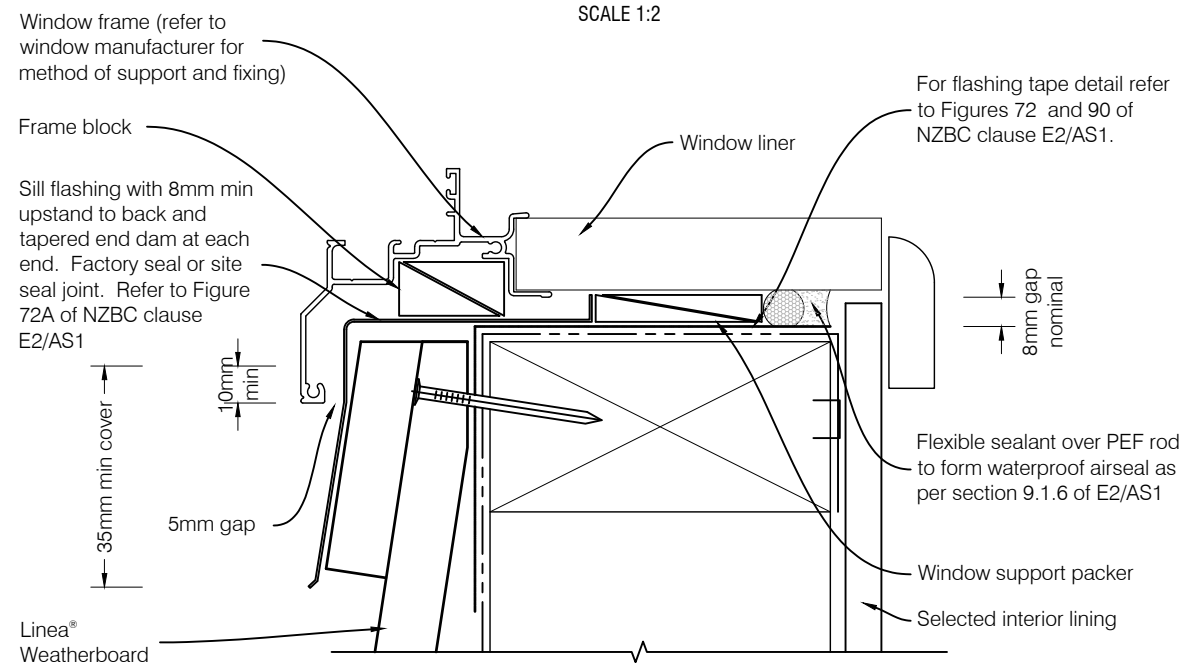




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Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.
Alternatively window jamb can be formed as per E2/AS1 with jamb battens.

WINDOW JAMB DETAIL
SCALE 1:2

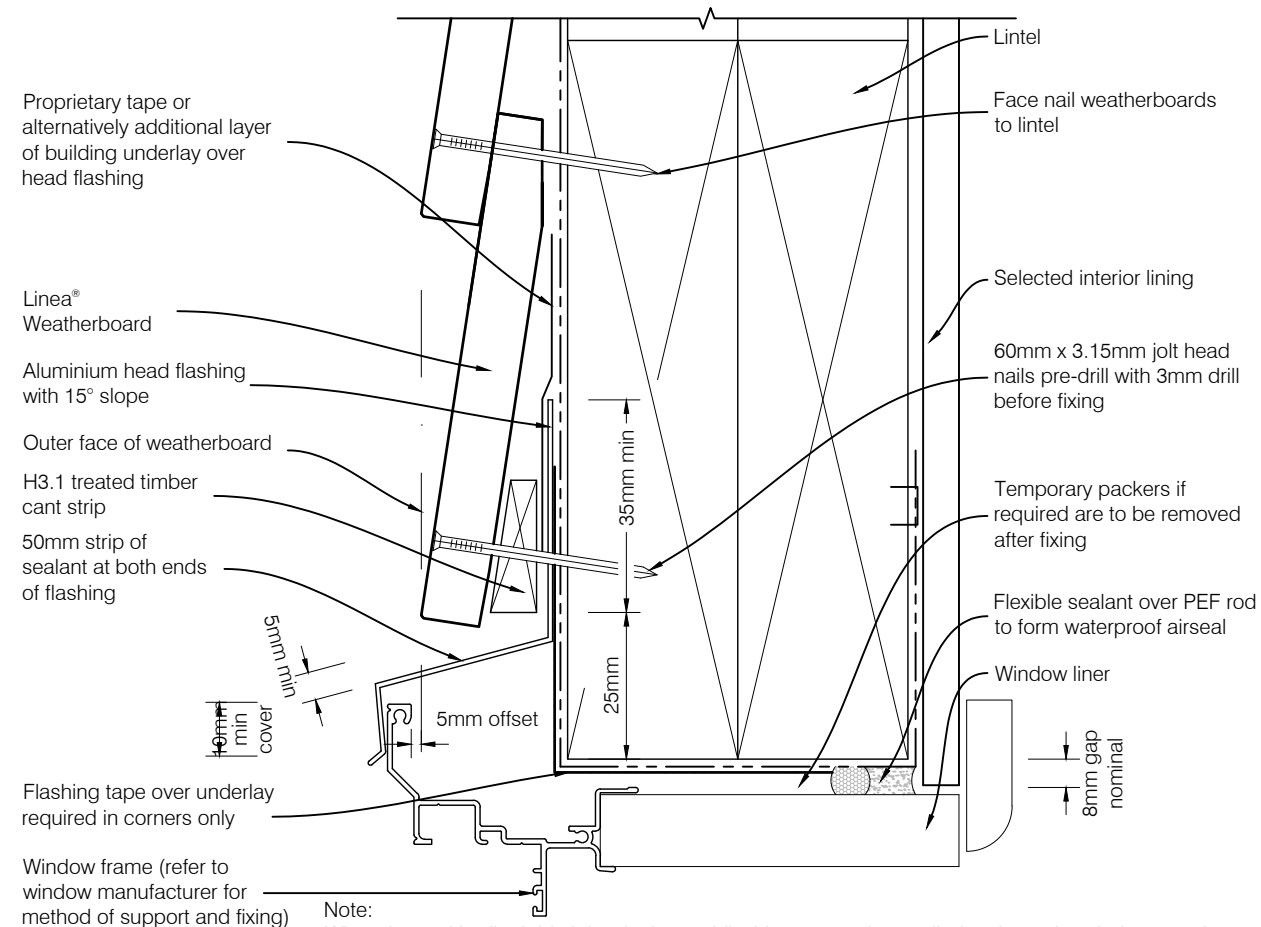


General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC clause E2/AS1.
2. Building underlay must comply with acceptable solution NZBC clause E2/AS1.
3. Flashing tape must have proven compatibility with the selected building underlay/James Hardie rigid air barrier and other materials with which it comes into contact as per Table 21 of NZBC clause E2/AS1.

Refer to the manufacturer or supplier for technical information for these materials.

WINDOW SILL DETAIL
SCALE 1:2



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.
Sealant must be installed between head flashing and window flange in VH wind zones. Refer Figure 71 of E2/AS1

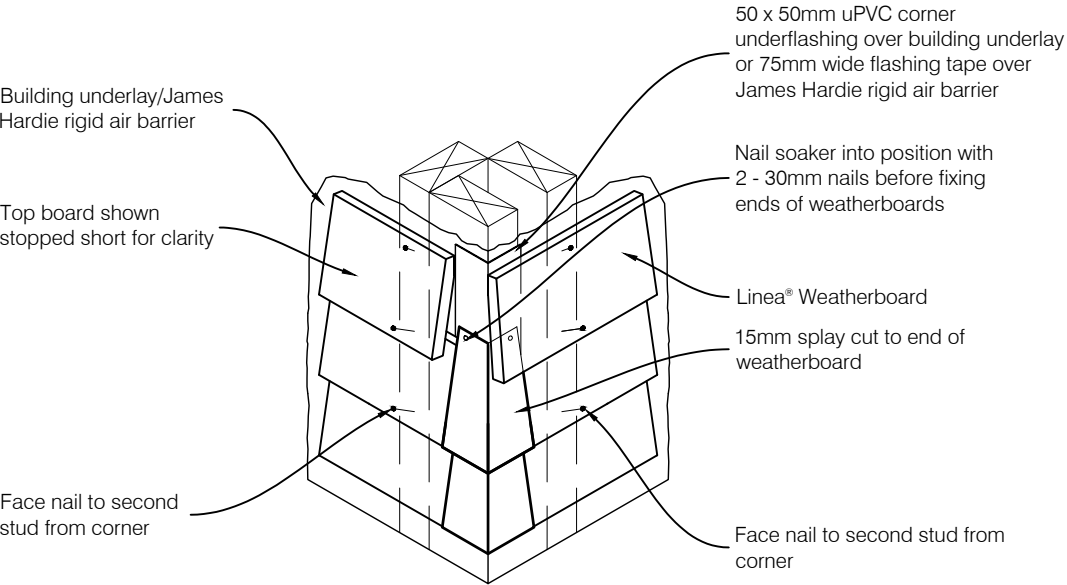
WINDOW HEAD DETAIL
SCALE 1:2

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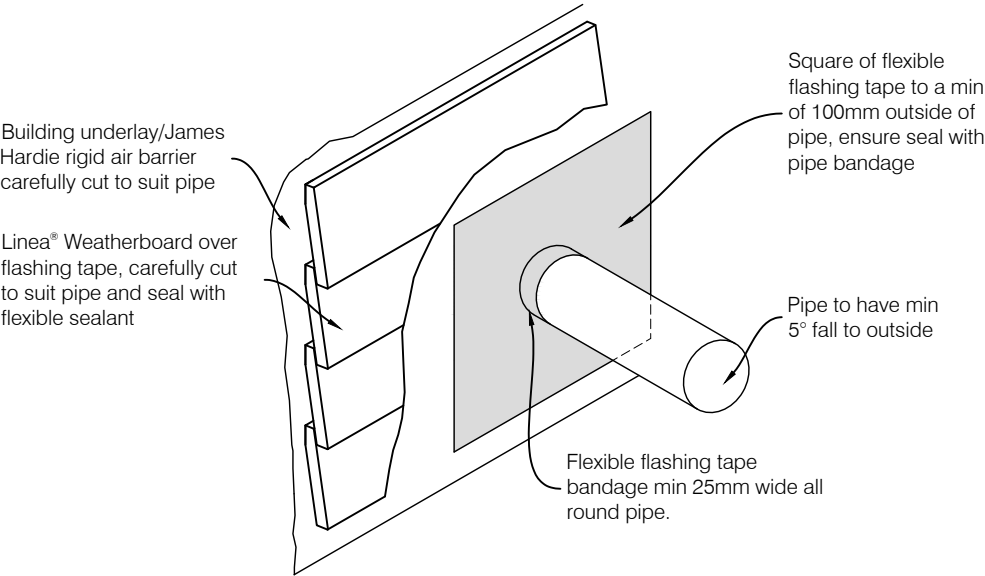
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Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: BLOMQUIST RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: LINEA CLADDING DETAILS CONSENT COPY REV B	SCALE: 1:2	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: 24/11/18 19/02/20	REVISION: A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	SHEET 19 OF: 20 JOB No. JT18105
			DRAWN: SK				
			DATE: Nov 2018				
			All dimensions to be checked and verified by the Contractor before commencement of any work				

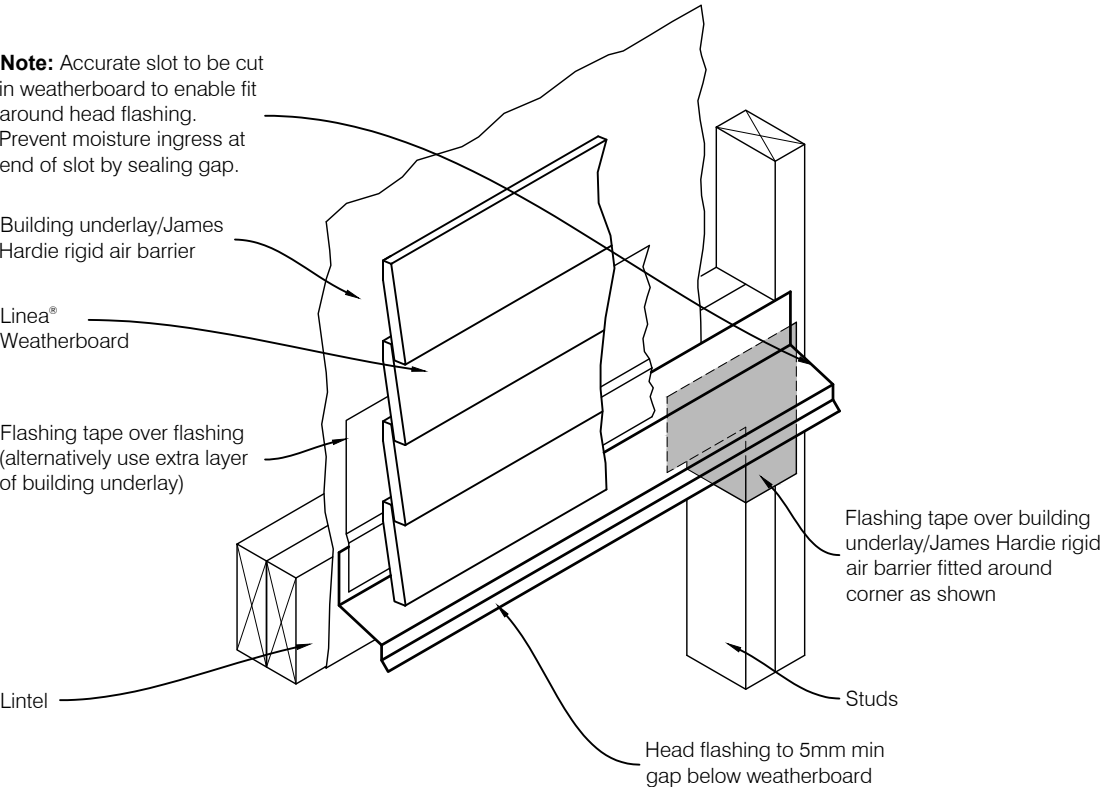


Soaker material	Nail material
Copper	Copper or phosphor bronze
Aluminium	Hot dip galvanised
Stainless steel	Stainless steel

CORNER SOAKER
SCALE 1:10



PIPE PENETRATION
SCALE 1:10



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.

HEAD FLASHING TERMINATION
SCALE 1:10

Memorandum from LBP-Design BC181033 - A2348897

Memorandum from licensed building practitioner: Certificate of design work

Section 30C or Section 45, Building Act 2004

Please fill in the form as fully and correctly as possible.

If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING	
Street address: 18 Penny Grove	
Suburb: Nukuhau	
Town/City: Taupo	Postcode: 3330

THE OWNER	
Name(s):	
Mailing address: c/o Penny Homes Ltd	
Suburb:	PO Box/Private Bag: PO Box 708
Town/City: Taupo	Postcode: 3330
Phone number: 07 377 0154	Email address: willie@pennyhomes.co.nz

BASIS FOR PROVIDING THIS MEMORANDUM	
I am providing this memorandum in my role as the: Please tick the option that applies (✓)	
()	Sole designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project.
()	Lead designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and no other person will be providing any additional memoranda for the project.
(✓)	Lead designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design.
()	Specialist designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work.

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IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK (RBW)			
I William James Thomson carried out / supervised the following design work that is restricted building work.			
Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
Tick (✓) if included	If appropriate, provide details of the restricted building work	Specify whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
PRIMARY STRUCTURE: B1			
All RBW design work relating to B1 ()		() Carried out () Supervised	
Foundations and subfloor framing (✓)	Concrete slab on ground to Firth Ribraft Floor System	() Carried out (✓) Supervised	Sheets 2 & 5
Walls (✓)	SG8 framing & fixings to NZS3604:2011 Lintels to DesignIT PS1	() Carried out (✓) Supervised	Sheets 3, 5 & 6
Roof (✓)	Truss layout	() Carried out (✓) Supervised	Truss manufacturers PS1
Columns and beams ()		() Carried out () Supervised	
Bracing (✓)	Gib Plasterboard sheet bracing to Gib Ezybrace	() Carried out (✓) Supervised	Sheet 7
Other ()		() Carried out () Supervised	
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2			
All RBW design work relating to E2 ()		() Carried out () Supervised	
Damp proofing (✓)	DPM under slab and DPC under framing	() Carried out (✓) Supervised	Sheets 5 & 9
Roof cladding or roof cladding system (✓)	Longrun metal roofing on self-supporting underlay	() Carried out (✓) Supervised	Sheets 5, 9 & 10
Ventilation system (for example, subfloor or cavity) (✓)	20mm drained cavity to Axon Panel cladding	() Carried out (✓) Supervised	Sheets 9 & 13 - 17
Wall cladding or wall cladding system (✓)	Axon Panel cladding on cavity Bevel back weatherboard direct fixed	() Carried out (✓) Supervised	Sheets 9 & 13 - 17 Sheets 9 & 18 - 22
Waterproofing ()		() Carried out () Supervised	
Other ()		() Carried out () Supervised	

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FIRE SAFETY SYSTEMS: C1-C6			
Emergency warning () systems, evacuation and fire service operation systems, suppression or control systems, or other		() Carried out () Supervised	
Note: The design of fire safety systems is only restricted building work when it involves small-to-medium apartment buildings as defined by the Building (Definition of Restricted Building Work) Order 2011.			

WAIVERS AND MODIFICATIONS	
Are waivers or modifications of the building code required? () Yes (✓) No	
If Yes, provide details of the waivers or modifications below:	
Clause (List relevant clause numbers of building code)	Waiver/modification required (Specify nature of waiver or modification of building code)

ISSUED BY	
Name: William James Thomson	LBP or Registration number: BP115814
The practitioner is a:	
(✓) Design LBP () Registered architect () Chartered professional engineer	
Design Entity or Company (optional): JTDesign Architecture Ltd.	
Mailing address (if different from below):	
Street address / Registered office: Level 1, 32 Tuwharetoa Street	
Suburb:	Town/City: Taupo
PO Box/Private Bag: P.O. Box 1267	Postcode: 3330
Phone number: 07 377 1998	Mobile: 0274 820 881
After Hours:	Fax:
Email address: james@jtdesign.co.nz	Website: www.jtdesign.co.nz

DECLARATION	
I William James Thomson (<i>name of practitioner</i>), LBP, state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW: - Complies with the building code; or - Complies with the building code subject to any waiver or modification of the building code recorded on this form.	
Signature: 	TAUPO DISTRICT COUNCIL BC181033 APPROVED CONSENT PLANS/SPECIFICATIONS
Date: 4/11/2018	



JTDesign Architecture Ltd

PROJECT SPECIFICATION

New Residence

18 Penny Grove

Nukuhau

Taupo

APPROVED CONSENT COPY
THESE PLANS AND SPECIFICATIONS ARE
APPROVED SUBJECT TO THE PROVISIONS
OF THE BUILDING ACT 2004 AND IT'S
REGULATIONS. A FULL (PRINTED) COPY OF
DRAWINGS AND SPECIFICATIONS ARE TO
BE RETAINED ON SITE IN GOOD ORDER
AND PRODUCED UPON REQUEST.

Issued for Construction

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JT18105

PROJECT OVERVIEW

Scope

New single storey residential dwelling with three bedrooms and attached double garage.

Address

Site Address	18 Penny Grove
Suburb	Nukuhau
City	Taupo
Lot #	226
DP #	522262

Site Conditions

Wind Zone	H - High Wind Speed
Earthquake Zone	Zone 2
Exposure Zone	Zone B - Low
Snow Loading Zone	Zone N0

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1 PRELIMINARIES & GENERAL

1.1 Project Overview

1.1.1 Contract Documents

Contract Documents

The Contract Documents are complementary and comprise this Specification, the accompanying drawings, the NZ Standards Contract together with Schedules as specified below, any written documentation clarifications issued during tendering/estimating, any manufacturer/supplier information issued with this Specification, any list of agreed Subcontractors, the contract establishment letter and any other relevant correspondence, and any Site Instructions or additional details or instructions issued as Variations. (The NZ Standards Contract will be emailed upon request). These Project Specific Conditions supersede the Standard Conditions where they are in conflict. Refer any ambiguity or apparent discrepancy within or between any Contract Documents to the Architect/Designer, whose interpretation shall be binding on all parties.

Ensure that all Trades are aware of all Conditions and that subcontract prices are accepted on this basis, and in a form acceptable to the Registered Master Builders Federation or the Certified Builders Association. Ensure that all persons engaged on the works are aware of all items in this specification and on the drawings that may in any way affect their section of the works.

1.1.2 Site

Site

Relevant site conditions are believed to be correctly represented in the Contract Documents, however the Contractor (and Subcontractors where appropriate) are requested to inspect the site to ascertain for themselves the nature and extent of the works and the rights and interests that may be interfered with in the execution of the works, as no claims for additional payment will be recognised on the grounds of insufficient description.

1.1.3 Adjacent Owners

Adjacent Owners

Carry out whatever actions or precautions are required to avoid or to absolutely minimise noise, dirt, dust, access, etc. inconvenience or disruption of any nature to the adjacent owners or tenants. Indemnify the Principal against any claims arising from this source.

1.1.4 Protection

Protection

Take all appropriate precautions to protect all third party property, services, etc. and indemnify the Principal against any claims arising from the construction operations. Any damage to third party property caused by construction activities or failure to protect shall be rectified as soon as possible by the person causing the damage, or by appropriately qualified trades-persons employed by the person responsible for the damage if necessary.

Suspend operations during weather which would affect the quality of work in progress. Secure the

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works as soon as possible against adverse weather, dust and vandals. Avoid structural damage that is caused by overloading.

Adequately protect all finished work and maintain until the date of Practical Completion. Each trade shall protect the work of all other trades, and each trade is responsible for making good any damage they cause to finished works. Arrange special protection as required for windows and doors, finished timber work, plumbing fittings and hardware, cabinets and other joinery, and similar items.

1.1.5 Responsibility

Responsibility

The Contractor will be held responsible for the full period of his legal responsibility in connection with this Contract for ensuring that all work execution, materials, and fittings, are completely in accordance with Contract requirements.

The Contractor is responsible to the Principal for the appropriateness and fitness, in relation to a reasonable expectation or requirement, of all of the materials and workmanship incorporated into the works by himself or his subcontractors; for this reason few specific guarantees are required in these contract documents. The terms and conditions of any warranty or guarantee required or provided shall not in any way negate the minimum remedies available under common law as if no warranty or guarantee had been furnished.

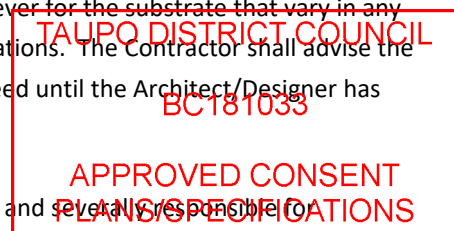
No apparent expression of the Architect's/Designer's reasonable satisfaction shall be deemed to be acceptance of defective materials or workmanship within the terms of the Contract or to be an authority for any Variation except where such Variation is authorised as provided for in the Contract. Instructions that are given verbally are deemed to be instructions for proper execution of the works and do not involve extra charges.

Workmanship in all trades is required to be equal to or better than recognised good trade practice. The Contractor shall provide all necessary setting out information and component dimensions for subcontractors and shall check and be responsible for the accuracy of their work.

Should any tradesperson consider that the surface finish or general conditions of previous work are unsatisfactory to ensure a proper finish for their own work thereon, that tradesperson shall give immediate notice to the Contractor or Architect/Designer as appropriate and shall not proceed until all necessary improvements have been made. Failing such notice the trade concerned will not be relieved of responsibility for a poor finish due to such unsatisfactory condition.

Specialist Finishes Subcontractors are responsible for ensuring that substrates are completely appropriate for them to achieve first class results, and to this end shall, in sufficient time, instruct the Contractor with regard any fixings, primings, sealings or whatever for the substrate that vary in any way from the substrate manufacturer's standard recommendations. The Contractor shall advise the Architect/Designer with regard these variances, and not proceed until the Architect/Designer has agreed to them.

The Contractor and all Subcontractors affected shall be jointly and severally responsible for completion of the whole of the works in a completely watertight condition and shall therefore examine all details to be satisfied that this condition can be achieved. If any detail is considered unsatisfactory the Architect/Designer shall be notified immediately and he/she will then either



interpret the detail to the Contractor's satisfaction, or accept responsibility for watertightness at the points in question, always assuming reasonable workmanship.

Ensure that all materials or items incorporated into any particular construction or finish are compatible and that their individual use is approved by the manufacturers and/or suppliers of the other parts of the system.

For all electronic/electrical/mechanical operating systems all work and all necessary materials and items incidental to the primary item specified, that are incorporated into the works, shall be such as to leave a neat, efficient, easily maintained and robust installation, completely in accordance with all of the recommendations of the primary items' manufacturers. Where appropriate, source all parts of a system from a single supplier or manufacturer.

1.1.6 Specification

Specification

This Specification covers contract administration, standards, materials quality, workmanship and the scope of works only: the exact nature of the works and all specialist items, descriptions, etc., are contained on the drawings, which also take full precedence.

All clauses in all specification sections apply to their full extent and meaning to the entire Contract. Trade sections and paragraphs have been introduced into this specification for reference only and it shall not be construed that each trade section is a complete segregation of the materials and labour of that trade. The onus is on all trades to be conversant with any and all clauses which in any way affect their work.

(Be aware that the 'scope' noted in the 'Project Overview', and scope and general extent clauses within this specification, are included to provide a general indication only and must NOT be interpreted as schedules of quantities - the exact nature and extent of all aspects of the works are shown on the drawings).

1.1.7 Standards

Standards

New Zealand Standards (NZS), Australian Standards (AS), Joint Standards (AS/NZS), British Standards (BS), Acts of Parliament, Regulations made thereunder, Codes of Practice, and any specific Manufacturer's Instructions or Manufacturer's Recommendations that are referred to in these Contract Documents shall all be deemed to be the latest published edition thereof at the time of drawings issue, and shall be followed by the Contractor and all Subcontractors to the full extent applicable consistent with the intent of this Contract. Documents cited within other cited publications are deemed to form part of this specification.

Where Standards have a number of Divisions, e.g. AS/NZS 3500.1, AS/NZS 3500.2, etc., each of the Divisions relevant to this project is deemed to form part of this specification. Retain current copies of significant cited documents and manufacturer's technical literature on the site.

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1.1.8 Authorities and Charges

Authorities and Charges

Comply with all relevant provisions of the NZ Building Code, and with all relevant territorial or statutory authority regulations, by-laws, obligations, etc. Give all required notices.

The Principal has obtained a Land Use Consent. The Principal has applied for and paid for the Project Information Memoranda, the Building Consent and other approvals required for the works to start. The PIM and Building Consent will be forwarded to the Contractor as quickly as possible after they are issued by the Territorial Authority. Note: It is an offence under the Building Act to carry out work not in accordance with a Building Consent.

Should the Building Consent be subject to any conditions which modify the requirements of the Contract Documents in any way, the Architect/Designer reserves the right to negotiate any or all of these modifying conditions with the Building Consent Authority. If after these negotiations additional work is required, it will be handled as a Variation to the Contract.

1.1.9 Code Compliance Certificate

Code Compliance Certificate

The Principal will apply for the Code Compliance Certificate (CCC) and any other licenses or approvals for the building to be used. However, Practical Completion will NOT be certified until the CCC inspection has occurred and any additional works required by the local Building Consent Authority have been completed. To this end it is recommended that the Contractor obtains all required certificates, guarantees, as-built drawings, etc., required for the CCC application as work proceeds, to facilitate application for the CCC as soon as the works are completed. For his part, the Principal hereby undertakes to apply for the CCC within one day of all required material being in hand. Likewise, the Contractor should have capacity available to attend as quickly as possible to any items identified by the Building Consent Authority as being required prior to the issue of the CCC.

1.1.10 Co-ordination of the Works

Co-ordination of the Works

Co-ordinate the works of all trades to ensure efficient progress of the works. Ensure that all holes, sleeves, penetrations, supports, etc., that are required for services are correctly incorporated as work proceeds. Identify and sufficiently forward-notify the appropriate persons of all deadlines for the supply of fittings, components, information, etc.

1.1.11 Documents Interpretation

Documents Interpretation

Except where they are clearly to the contrary, all dimensions are deemed to be to the bare surface of concrete, masonry, timber framing or other basic construction material. All figured dimensions take precedence over scaled sizes. Where any detail is included in more than one drawing the larger scale detail takes precedence. Where any ambiguity exists refer to the Architect/Designer for interpretation.

The word 'provide' and the word 'fix' used separately in the Documents shall be taken to mean 'provide and fix' unless otherwise stated.

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When the term 'allow' occurs in the Documents, except with reference to Monetary Allowances, the cost of the item shall be at the risk of the Contractor.

The terms 'approved', 'directed', and 'selected' when used in the Documents refers to the approval, direction or selection of or by the Architect/Designer. Please give adequate notice of when these decisions are required. 'Architect/Designer' shall mean the Architect or Designer, their representative or any Consulting Engineer engaged by the Architect/Designer.

1.1.12 Work Shown and Mentioned

Work Shown and Mentioned

The Contract Documents show the extent and nature of the works but there is no warranty expressed or implied that they show each and every minor detail or item required to be included by the Contractor. Should any material, structural member, fixing, or item or work appear to be inadequately described, yet obviously necessary for the neat, strong and satisfactory completion of the work, it shall be incorporated into the Contract Works.

1.1.13 Site Safety

Site Safety

Comply with all of the requirements of the New Zealand Building Code, and in particular with Approved Documents F1 - F5 inclusive. Comply with all relevant Worksafe NZ Approved Codes of Practice and Information and Guidance requirements, particularly those for construction and building maintenance. Comply with any other relevant safety legislation and/or regulations.

Take all practical steps to make the site and the contract works safe and to provide and maintain a safe working environment. Ensure that all those working on or visiting the site are aware of the site safety rules and are not unnecessarily exposed to hazards.

In compliance with the Health and Safety in Employment Act 1992 the Contractor shall have:

- a). A safety programme that shall include selection and training standards, monitoring of compliance, safety performance measures and safety rules.
 - b). A safety register to record accidents, injuries, operational safety, ACC claims, and so forth.
 - c). A health and safety plan specific to the contract works, which will address methods of identifying and controlling hazards, protective clothing and equipment to be used, staff training and supervisory requirements, management of subcontractors and their staff, and restricted areas and site security.
- Notify the Ministry of Business, Innovation and Employment in writing of the Certified Safety Supervisor responsible for safety aspects of the works.

Scaffolding shall comply with all Statutory and Local Authority Regulations, with the Ministry of Business, Innovation and Employment's 'Best Practice Guidelines for Scaffolding', with AS/NZS 1576 (Scaffolding equipment), AS/NZS 4576 (Guidelines for Scaffolding), and AS/NZS 4994 (Roof edge scaffolding), shall be maintained for the duration, and shall be removed on completion.

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The use of ballistic fixings must absolutely comply with all relevant safety recommendations at all times. No rubbish fires are allowed on site. Portable/personal disc/tape players, radios and iPods must not be used anywhere on the site. No smoking on site, except in the designated location in

accordance with the Smoke Free Environments Act 1990, the location of which will be determined by the Contractor, with the approval of the Principal.

1.1.14 Variations

Variations

The Architect/Designer will issue Site Instructions (SI) to amend or clarify the works. Upon receipt of a SI the Contractor shall immediately notify the Architect/Designer if he believes there are price or timing adjustment implications. The Architect/Designer will then issue a Variation Price Request (VPR) for pricing of the possible Variation by the Contractor, within the time stipulated, or within 10 days if no time is stipulated. If the Contractor does not return the VPR within the time stipulated the Architect/Designer will assess it at reasonable rates. Once agreement is reached on price and/or timing a Variation Order (VO) for the item will be issued. Note that works covered by a SI or a VPR must NOT be actioned until the VO is issued.

When a Variation is contemplated and timing does not allow SI and VPR action the Contractor is to advise, and record in the site diary, an estimate of price and timing implications. If accepted by the Architect/Designer, a VO will be issued immediately. The Contractor shall then co-operate with the Architect/Designer to establish agreed pricing.

Claims for Variations neither priced nor estimated prior to being put in hand (but considered valid) will be incorporated into Progress Payment Certificates or the Draft Final Accounts as claimed and accepted but with a proviso allowing 5 (five) days for written objections by either the Principal or the Contractor, to any aspect of them, for further consideration.

The Main Contractor's Variations Margin agreed pre-contract will be the maximum accepted for any trade unless higher rates are nominated pre-contract and are accepted. The Main Contractor's agreed Variations Margin shown shall be deemed to include all preliminary and general costs, overheads, variation processing costs, and profit. If no margin is given, a 5% overall margin will be applied.

Note that 'loss of anticipated profit' claims consequent upon reduction of works extent will NOT be recognized, and that the cost of processing Variations is deemed to be included in the P & G Allowance.

Also note that for Variations pricing all materials shall be charged at the actual net invoiced cost plus margin; i.e. recognised 'Trade Price', volume discounted where appropriate.

1.1.15 Progress Claims

Progress Claims

Progress Claims shall be in writing, shall be in accordance with the requirements of the Construction Contracts Act 2002, and shall include all of the following:

- The overall amount claimed.
- The percentage completion and amount claimed for each Subcontractor. For accurate claim verification please ensure that this breakdown exactly matches the trades costs breakdown agreed to pre-contract.
- The total Contract Sum Adjustment for any/all Variations authorised prior to the claim.
- Items covered by Monetary Allowances listed separately.

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- And, if specifically requested, confirmation that amounts previously claimed on behalf of Subcontractors, certified by the Architect/Designer, and paid by the Principal, have actually been paid to the Subcontractor (apart from normal retentions).

Note that retentions will be held exactly in accordance with the Conditions of Contract.

1.1.16 Cleaning and Completion

Cleaning and Completion

Clear construction debris and rubbish from the works at regular intervals, and additionally if so instructed by the Architect/Designer. Clean each space thoroughly before commencing any finishing works.

In preparation for the Practical Completion inspection carry out the following:

- Clean the works thoroughly, removing all debris, surplus materials, splashes, marks, temporary markings, etc. (All cleaning methods and materials shall be as recommended by the manufacturer of the item being cleaned).
 - Remove protective wrappings and coverings unless otherwise directed.
 - Touch up minor painting faults, carefully matching colour, and brushing out edges. Repaint any badly marked surfaces back to suitable break-lines.
 - Adjust, ease and/or lubricate as required all doors, drawers, controls and other moving parts to ensure their efficient operation.
 - Any other works required to leave all spaces ready for immediate occupation and all electronic/electrical/mechanical systems fully operational.
 - Clean out all spoutings, gutters, downpipes, and gullies and flush out all drains.
 - Clean all sanitary appliances and check all aspects of the water services.
 - Thoroughly re-inspect all aspects of the works (and have any defects fully rectified) to be certain that the works are completely ready for the Practical Completion inspection - if an unreasonable number of items are noted by the Architect/Designer during the inspection it will be terminated and then rescheduled for at least a week forward to allow proper completion to be achieved.
- (Note that a Code Compliance Certificate must be obtained before Practical Completion will be certified. Obtain all required certificates, guarantees, as-built drawings, etc., as work proceeds to enable the CCC application to be submitted as soon as construction is completed).

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2 CONCRETE

2.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

2.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3124:1987(NZS)	Specification for concrete construction for minor works
3604:2011(NZS)	Timber-framed buildings
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
4671:2001(AS/NZS)	Steel reinforcing materials

2.3 Materials

2.3.1 Damp Proof Membrane

Polythene DPM

Polythene damp proof membrane shall be 0.25mm thick and shall be continuous under slabs on grade or fill and under foundations. All joints lapped 200mm and continuously sealed with pressure sensitive tape. Tape seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

2.3.2 Reinforcement

Grade

Reinforcing grades are identified by bar diameters prefixed with letters thus:

D indicates Grade 300E deformed bar

R indicates Grade 300E plain round bar

HD indicates Grade 500E deformed bar

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HR indicates Grade 500E plain round bar

RB indicates Grade 500 Reidbar (uniquely deformation patterned bars)

Quality

Imported reinforcing steel will not be accepted without the prior approval of the Engineer.

Reinforcing free of loose rust, mill scale, dirt, paint, oil, etc. and stored clear of the ground. Accurately place reinforcing and tie securely to prevent displacement during pouring of concrete. Tie wires must not project into specified concrete cover. Welding of reinforcing is not permitted unless specifically approved by the Engineer.

Installation

All terminal ends of reinforcing bars shall be hooked. Intersecting walls, beams and foundations shall contain return longitudinal reinforcement, as detailed for the intersecting members, all to NZS 3109 unless shown otherwise on the drawings.

Continuous

Unless detailed otherwise all bars assumed to be continuous, with lap lengths not shown otherwise to be 40 diameters for grade 300 steel, 60 diameters for grade 500 steel, 250mm for mesh. Bars shall generally have minimum bends of five times their diameter.

Supports

Support slab steel at 1 metre maximum centres. Use plastic spacers for fairface concrete. Co-operate with others to accurately place all block/brick starters, as the bending of starters to the core position will not be permitted.

2.3.3 Concrete Cover

Concrete Cover

Concrete cover not shown otherwise to be:

- Foundations - 75mm where poured against ground, 50mm elsewhere.
- Beams and columns - 40mm (for main reinforcing).
- Slabs - 50mm where poured on ground, 40mm where exposed to weather, 30mm elsewhere.
- Walls - 40mm where exposed or against ground, 30mm elsewhere.

2.4 Ribraft Concrete Floors

2.4.1 Scope

Supply the required/selected Firth RibRaft components and construct the concrete on-ground floor slab as shown on the drawings. All aspects of this work shall be in accordance with the Firth RibRaft Technical Manual (check www.firth.co.nz or call 0800 800576 for the latest edition), a copy of which must be held on site (and referenced for any aspect where there is the slightest uncertainty). The RibRaft Floor System CodeMark Certificate of Conformity - [Certificate No CM/SEN4001B \(Rev3\)](#) and as shown on the drawings.

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No Substitutions are permitted for Firth RibRaft Floor System.

2.4.2 Selections

220mm Pod Thickness - Non-specific Design

Pods thickness: 220mm

DPM: as per NZS 3604:2011

Slab thickness above pods: 85mm

Slab finish: U3

2.4.3 Installation

Installation

All RibRaft installation work shall be carried out by experienced and competent tradesmen, familiar with the techniques and materials specified, in accordance with Firth RibRaft Technical Manual and as shown on the drawings. All handling, preparatory blinding DPM, formwork and reinforcing, and concreting and finishing techniques shall be exactly as recommended by Firth Industries Ltd.

Notify the BCA for inspection of the excavation and of the Ribraft slab ready for pouring, and keep whatever records or test results they may require.

Check that all topsoil etc. has been removed from the RibRaft slab location and that the excavated (or hardfill made-up where necessary) platform is level and approximately 330mm below the required finished floor level. Co-ordinate with other trades to ensure that any wastewater drains or other piped or wired service lines are correctly incorporated (and fully operationally tested as appropriate) as work proceeds.

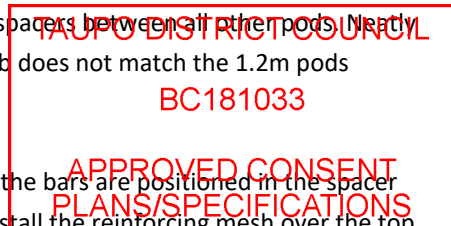
Place and compact any hardfill or basecourse required by the Engineer for specific design. Blind the surface with up to 50mm of sand, and compact (and adjust if necessary) to accurately level, carrying the sand blinding to at least 500mm beyond the RibRaft perimeter. (Install shear key piles if required or specified).

Lay the specified DPM over the entire platform and extending at least 200mm beyond the RibRaft perimeter, with strips lapped 150mm and 50mm PVC adhesive tape sealed, and any services penetrations tape sealed. Tape repair any damage to the DPM as soon as it occurs, and re-inspect/repair just before pouring. Construct the slab perimeter formwork as specified above and as detailed, including edge rebates and any slab cut-outs required.

Unload and handle components carefully to avoid any damage, and keep them clean until installed.

Place the RibRaft pods in the grid pattern as shown on the layout plan, with Firth 300mm spacers to the perimeter and under loadbearing walls, and Firth 100mm spacers between all other pods. Neatly cut pods as required to infill where the shape or size of the slab does not match the 1.2m pods module.

Reinforce as specified and as noted on the drawings, ensuring the bars are positioned in the spacer lugs, install plumbing waste pipes etc. as required, and then install the reinforcing mesh over the top of the pods, seated on mesh chairs, and install the re-entrant corner steel (Grade 500E) across internal corners as noted. Install starters as detailed for any subsequent masonry walls, ensuring accurate positioning (as bending to masonry core positions is not acceptable).



Pour Firth RaftMix (or pump Firth RaftMix Pump), and vibrate and screed and finish as specified, and cure and install shrinkage control joints as specified or noted.

Remove trade debris from the area progressively; on completion leave the works area completely clean.

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3 CARPENTRY

3.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

3.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1491:1996(AS/NZS)	Finger jointed structural timber
1859.1:2004(AS/NZS)	Reconstituted wood-based panels - Specifications - Particleboard
1859.2:2004(AS/NZS)	Reconstituted wood-based panels - Specifications - Dry-processed fibreboard
2269.2:2007(AS/NZS)	Plywood - Structural - Determination of structural properties - Evaluation methods
2270:2006(AS/NZS)	Plywood and blockboard for interior use
2271:2004(AS/NZS)	Plywood and blockboard for exterior use
2295:2006(NZS)	Pliable, permeable building underlays
2588:1998(AS/NZS)	Gypsum plasterboard
2589:2017(AS/NZS)	Gypsum linings - Application and finishing
2904:1995(AS/NZS)	Damp-proof courses and flashings
2908.2:2000(AS/NZS)	Cellulose-cement products - Flat sheets
3602:2003(NZS)	Timber and wood-based products for use in building
3603:1993(NZS)	Timber Structures Standard
3604:2011(NZS)	Timber-framed buildings
3617:1979(NZS)	Specification for profiles of weatherboards, fascia boards, and flooring
3618:1984(NZS)	Mechanical stress grading of timber
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber
4200.1:2017(AS/NZS)	Pliable building membranes and underlays - Part 1: Materials
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4389:2015(AS/NZS)	Roof safety mesh
4859.1:2002(AS/NZS)	Materials for the thermal insulation of buildings - General criteria and technical provisions

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AS/NZS 2269.0:2012	Plywood ² - Structural - Part 0: Specifications
AS/NZS 2269.1:2012	Plywood - Structural - Part 1: Determination of structural properties - Test methods
BRANZ BU411	Recommended timber cladding profiles
NZBC B2	Durability
NZBC E2	External moisture
NZBC E2/AS1	External Moisture
NZBC E3	Internal Moisture

3.3 General

This section includes the receiving, stacking and storage of all Carpenter's materials and the fabrication, erection and fixing of all framing, sheathings and finishing timbers, including all work incidental to neatly finishing in other trades and all temporary work and temporary bracing.

The Carpenter shall attend upon all trades, and shall supply and fix all obviously necessary but not specifically mentioned fixings and materials.

3.4 Bostik Sealants

3.4.1 Scope

Scope

Supply and install the selected Bostik Sealants and Adhesives, complete with accessories, to the works as identified on the drawings and described below. All aspects of this work shall be in complete accordance with Bostik sealants and adhesives guides and technical manuals, (check 0508 222 777 for the latest editions), and other relevant product manufacturer's recommendations, and as shown on the drawings.

No substitutions are permitted for Bostik Sealants or Adhesives.

3.4.2 Interior Sealants - Wet Areas

Wet Area Installations

Bostik Kitchen & Bathroom Silicone to shower, bath, and basin floor and wall joints.

Location:

Wet Area Shower Panel Adhesive

Bostik Gold Ultra to joints between acrylic shower panel and timber frame.

Location:

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3.4.3 Installation

Installation

Co-operate with other trades to ensure that all other associated works, fittings and fixturers are completed and installed to specification and as shown on the drawings.

All sealant and adhesive work, including preparation, shall be carried out by experienced and competent applicators, familiar with the techniques and materials specified, approved by the manufacturer. All substrate and surface preparation, sealing and adhesive accessories and materials, application techniques, and clean-up shall be exactly as recommended by Bostik and as noted on the drawings. Apply continuous sealant beads to the required depth and tool finish neatly with clean edges. Remove any masking tape, clean contaminated surfaces as recommended by the manufacturer leaving sealant beads undamaged and surrounding surfaces clean.

Issue to the Main Contractor a copy of the Bostik specific maintenance requirements together with the Bostik NZ Ltd 10 Year Warranty for the completed works.

3.5 Timber Framing

3.5.1 Scope

Scope

Supply and install timber framing to the floors, walls, roofs, and other timber framed elements, as identified and detailed on the drawings. All aspects of this work shall be in accordance with NZS 3604, product manufacturers' recommendations, and as shown on the drawings and the specification.

3.5.2 Workmanship

Workmanship

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All work shall be carried out to current best trade practise by experienced and competent tradesmen, familiar with the materials and installation techniques, in accordance with NZS 3604 and as shown on the drawings.

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installing timber framing.

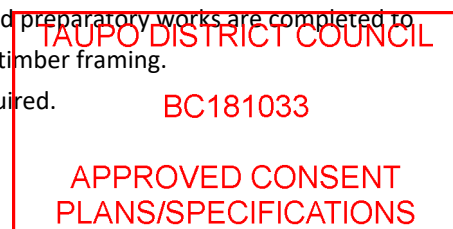
Co-ordinate with other trades to install timber framing as required.

3.5.3 Timber Framing

Timber Grade and Quality

Unless otherwise noted or specified on the drawings or specification all framing timber shall be minimum structural grade SG 8 Radiata pine in accordance with NZS 3622.

Framing timber shall be seasoned or kiln dried, and be straight and true and free from wind, warp and



distortion, and in lengths suitable for the members required, and shall have a moisture content of between 12% and 18% before installation.

Do not use damaged, faulty or defective materials.

Timber Treatment

Timber framing shall be appropriately treated against moisture and/or insect decay by a member of the NZ Timber Industry Federation Inc. Preservative treatment shall be to the requirements of NZS 3602 as an absolute minimum, and treated framing shall be identified and marked accordingly. Carefully manage treated framing during installation to avoid accidental use of timber with a lower performance or durability treatment than that required or specified.

Storage & Handling

Check timber framing upon delivery and reject sub-standard or damaged material.

Store timber framing dry under cover, fillet stacked and well clear of the ground, and protect from damage, moisture, and contamination.

Ensure all appropriate personal protection equipment is worn at all times when handling and cutting treated framing.

Framing Installation

All timber framing members, including all dunnage, strutting, blocking, bracing etc, shall be sized, setout, fitted and fixed to the requirements of NZS 3604 and as shown on the drawings to accommodate structural loadings, cladding and lining setout and support, and the installation of other building components, fixtures and fittings.

All framing shall be erected without deviation, true to line, level, angle and plumb, and evenly aligned and square, and within the tolerances allowed in NZS 3604 Table 2.1. Framing members accurately cut, lapped, housed, joined, and seated so as to provide full contact over the bearing surfaces.

Temporarily prop, brace, tie, and secure framing members and elements as required until the framing is complete and self supporting. Leave in place for safety purposes as long as required.

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

Concrete Separation

Separate timber framing with an approved continuous damp proof course when in direct contact with concrete or masonry. Ensure that the DPC material is compatible with the timber treatment.

Free draining separations to external vertical faces shall be 12mm minimum and as noted on the drawings.

Timber Re-treatment

All cut or drilled surfaces of H4 and H5 treated timber framing shall be flood coat re-treated, with a suitable product recommended by the original treatment plant, before installation.

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Edge Notching and Centre Holes

The notching, checking, and boring of framing members shall be in strict accordance with the requirements of NZS 3604.

Avoided checking and cutting where possible and keep to such dimensions so as not to prejudice the purpose for which the member is used. Keep edge notching to a minimum and where possible use centrally bored holes instead.

Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the lining's fixing reach.

Framing Protection

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

Built-up Framing Members

Except for jack studs, bottom plates and top plates, framing members may be substituted with built-up members in accordance with the limitations of NZS 3604 2.4.4.7 with the prior approval of the Architect/Designer only.

3.5.4 Steel Fixings

Fastenings and Connectors

Unless otherwise noted or specified timber framing fastenings and connectors shall be as specified in the relevant fixing schedules of NZS 3604 or have an equivalent capacity as specified therein. Timber framing connectors and fixings shall comply with the product information as required in NZS 3604 2.4.6, and shall be used and installed in accordance with the manufacturer's recommendations. Pre-drill nail holes in split-prone framing as necessary.

Durability of Fixings & Fastenings

Unless otherwise noted or specified the minimum durability of timber framing fixings and fastenings, excluding nails and screws, shall comply with the durability requirements of NZS 3604 Table 4.1. Galvanised steel fixing components, excluding nails and screws, shall have galvanised coating masses in accordance with NZS 3604 Table 4.2.

Unless noted or specified otherwise the materials for nails and screws shall be as given in NZS 3604 Table 4.3.

Steel fixings and fastenings in contact with timber treated with copper based timber preservatives (H3.2 or higher) shall be in accordance with NZS 3604 4.4.4.

Stainless steel nails shall be minimum Grade 304 unless otherwise specified or noted.

Bolts and Coachscrews

Unless specified or shown otherwise all bolted and coach screwed connections shall be M12 or M16 in accordance with the relevant fixing requirements given in NZS 3604.

Bolted and coach screwed connections shall have either a 50mm x 3mm square, or a 55mm x 3mm round, washer to each head and nut for M12 and M16 fixings. Washers shall be of the same material and durability as the bolt or coach screw.

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3.5.5 Wall Framing

Plates

Top and bottom plates shall be to the dimensions and layout shown on the drawings. Unless specified or shown otherwise top and bottom plates shall be fixed in accordance with NZS 3604 7.5.12 and Tables 8.18 and 8.19, true to line and level or angle.

Joints in top plates shall be made over a stud or over blocking between studs, and all top plate connections shall be in accordance with NZS 3604 8.7.3. Form all holes and edge notches in top and bottom plates in accordance with NZS 3604 8.7.5.

Studs

Studs shall be to the dimensions and spacings shown on the drawings, and installed true to line and plumb in both directions between top and bottom plates.

Unless noted otherwise non-load bearing wall studs shall be to the spacings given in NZS 3604 Table 8.4, stud width as shown on the drawings.

Form all holes and edge notches in studs in accordance with NZS 3604 8.5.1.5. Do not notch, check, cut, or bore holes in the middle third of any trimming stud.

Should the need arise studs shall be straightened in accordance with NZS 3604 8.5.3 with prior approval from the Architect/Designer only.

Lintels

Lintels shall be to the dimensions and locations shown on the drawings and DesignIT calcs where laminated veneer lintels are specified, and installed true to line and level, and shall be supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud, and secured against uplift in accordance with NZS 3604 8.6.1.8 as required.

The thickness of a lintel may be made from two or more members, where each member is the length of the lintel, in accordance with NZS 3604 2.4.4.7.

Sill & Head Trimmers

Unless specified or shown otherwise sill and head trimmers to openings shall be the same width as the wall stud and to the thickness given in NZS 3604 Table 8.15, and installed at the required opening height true to line and level, and supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud.

Dwangs

Dwangs shall be the same width and thickness as the wall stud, and installed at the centres noted on the drawings, and accurately cut and fixed in place true to line and level and flush with stud edges.

Dwangs fixed in accordance with NZS 3604 Table 8.19.

3.5.6 Posts

Timber Posts

Timber posts shall be to the sizes and locations shown on the drawings, and installed true to line and plumb each way, and supported at the base by steel post brackets as detailed.

Base bracket brand name & type: Bowmac bracket or similar approved

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3.5.7 Roof Framing

Rafters

All rafters (including hip, valley and jack rafters) shall be to the dimensions, spacings, pitch, and layout shown on the drawings.

Rafters shall be aligned and paired at the required spacings to ridge boards, ridge beams, hip rafters and valley rafters, and as shown on the drawings, and installed parallel, true to line, pitch and plane, and fixed in accordance with NZS 3604 Table 10.1.

Any required jointing of rafters shall be made over supports shown on the drawings only.

Unless shown otherwise rafter seating to top plates, beams, and lintels shall have a minimum bearing of 32mm without reducing the rafter depth to less than 65mm, or 80%, at the birds mouth.

Extend rafter ends to form eaves where possible or scab a 90x45 member to side of rafter as detailed on the drawings and in accordance with NZS 3604 10.2.1.14.

Fly rafters and outriggers installed to form gable verges as detailed on the drawings and in accordance with NZS 10.2.1.15.3

Valley Boards

Valley boards shall be sized to the dimensions and installed to the supporting framing as detailed on the drawings.

Ceiling Joists

Unless specified or shown otherwise ceiling joists shall be to the dimensions and spacings given in NZS 3604 Table 10.3.

Ceiling joists shall be installed parallel true to line and plane, and shall be joined directly over framing supports and lapped minimum 300mm, or butted and flitched, in accordance with NZS 3604 10.2.1.6.5.

Do not support ceiling joists from a strutting beam.

Purlins

Purlins shall be to the dimensions and spacings shown on the drawings and as required by the cladding material, and fixed to rafters and/or trusses in accordance with NZS 3604 Table 10.10, or 10.11, or clause 10.2.1.15.1(b).

Purlins on their flat shall be continuous over a minimum of two spans.

Provide all necessary blocking and lateral support to purlins laid on edge in accordance with NZS 3604 10.2.1.16.6, and as detailed.

Extend purlins to form gable verges as detailed and in accordance with NZS 3604 10.2.1.15.

Roof Trusses

Roof trusses shall be Specific Engineering Design (SED) in accordance with NZBC B1/VM1 and manufactured by an accredited fabricator, and shall comply with all aspects of NZS 3604 10.2.2. Roof trusses shall be fabricated to meet the specific design requirements of the roof including, but not limited to; roof layout, pitch, and details, in accordance with the drawings and specification.

Roof trusses shall be supported and fixed to the truss fabricators specifications but shall be no less than that required by NZS 3604 Tables 10.14 and 10.15. Roof trusses shall be braced as shown on the drawings and in accordance with NZS 3604 10.3.

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Roof Bracing

Roof bracing shall be as shown on the drawings and in accordance with NZS 3604 10.3 and 10.4 as necessary.

3.5.8 Ceiling Framing

Ceiling Framing

Ceiling framing shall be to the dimensions, layout, spacings, and details shown on the drawings, and shall be installed true to line, level and plane, and securely fixed in accordance with NZS 3604 Table 13.3.

3.6 Workmanship & Materials

3.6.1 Workmanship

Supervision

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. It is the main contractor's responsibility to ensure that the construction of all structural timber complies in all respects with the drawings and the specification.

All non-restricted building work shall be carried out by or under the direct supervision of competent tradespersons, suitably qualified for the work undertaken, and in accordance with the best and latest trade practice.

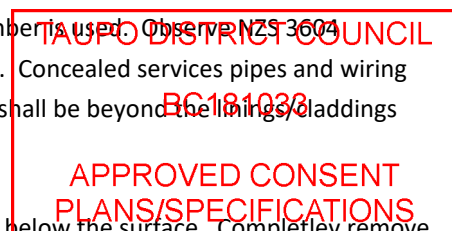
Timberwork

All timber shall be worked and cut to be true and square and free from wind and warp with all joints matching and mating to a proper contact fit over the full surface of the joint. All connections whether nailed screwed, glued, mortised or dovetailed shall be accurately made and properly executed to provide sound satisfactory connections for the class of work required.

Timber containing unacceptable defect or distortion shall not be cramped to provide mating at connections but shall be discarded and replaced by true defect-free timber before connections are made. Distribute any acceptable defects in timber so as not to impair the strength or the appearance of the finished work. Do not cut studs across the grain to straighten them.

The checking and cutting away of timbers shall be avoided where possible and shall be limited to such dimensions as will not prejudice the purpose for which the timber is used. Observe NZS 3604 restrictions on holing and checking of timber joists and beams. Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the linings/claddings fixings reach.

Neatly punch exposed nailing to the diameter of the nail head below the surface. Completely remove bruises and tool marks, and replace all split timbers and hammer-marked finishing timbers.



Fit a 3-ply bituminous DPC or a single layer high impact polyethylene DPC at all timber to concrete junctions to provide complete separation. Ensure that the DPC material is compatible with the timber treatment.

Clean out framing voids before fixing sheathings or linings. Ensure framing voids are fully vermin proofed to the exterior. Build in as necessary all required flashings (supplied by others) to windows, doors, roof edges, etc.

Wall Underlay

Install a flexible heavyweight building paper or breathable/absorbent wall underlay behind all exterior wall claddings, fixed horizontally, with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.

Fix wall underlay at maximum 300mm centres, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings, fixed through nylon vertical strapping at every stud in exposed locations. Provide additional fasteners fixed through the underlay around framed openings. Cut window and door openings just prior to joinery installation; cut underlay at 45° angle away from each corner and return full framing depth and fasten to inside of frame.

Finish wall underlay at edges as detailed, and return full framing depth into window and door openings. Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with wall underlay manufacturer's requirements and as shown on the drawings.

For drained cavity construction to framed walls without a rigid wall underlay and where the studs are at greater than 450mm centres, restrain the underlay with nylon strapping to prevent the underlay from bulging into the cavity space.

Any damaged underlay shall be made good by lapping in a new section.

Do not leave wall underlays exposed before covering with wall cladding for more than the manufacturer's recommended duration.

Roof Underlay

Install heavyweight building paper or breathable/absorbent roof underlay behind roof cladding as detailed, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned in a manner that prevents sagging or ponding.

R1 class roof underlays shall be fully supported on nylon straps or non-corrosive netting/mesh; R2 class self-supporting underlays shall be laid to maximum 1200mm span between adjacent supports.

Run roof underlay horizontally or vertically up the roof slope on roof pitches above 10° pitch, and horizontally on roof pitches 10° or less.

Fix roof underlay at maximum 300mm centres to purlins, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or proprietary underlay fixings.

For tiled roofs, lay the roof underlay over the anti-ponding board and non-corrosive support netting/mesh, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Finish roof underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45° angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with the underlay manufacturer's requirements and as detailed. Roof underlay must be separated from

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chimneys and flues in accordance with the requirements of the NZBC C1-C6 Acceptable Solutions. Any damaged underlay shall be made good by lapping in a new section. Do not leave roof underlays exposed before covering with the roof cladding for more than the manufacturer's recommended duration.

Window Installation

Prepare window and external door framing openings for joinery installation by neatly cutting the building wrap at 45° into corners, returning turning the wrap through the frame depth and fixing to the inside face.

Over-flash the underlay along the sill with a flexible flashing tape, installed full frame depth and length of the opening, returned minimum 100mm up the jambs, and with minimum 50mm return over the outside edge.

Over-flash the underlay at head/lintel corners with a flexible flashing tape, extending minimum 100mm each way from the corner, full frame depth, and with minimum 50mm return over the outside face.

Install external joinery frames with metal flashings as detailed and/or as required to completely weatherproof all frame-to-cladding junctions.

Unless shown otherwise, head flashings shall be carried minimum 75mm up behind claddings, extended at 15° out over the joinery head or facing board and returned down to cover the joinery or facing board minimum 10mm and finished with a 5mm, 45° 'kick out' drip-edge.

Neatly dress down the head flashings at the ends of the facings - for drained cavity construction, also form up-turned stop-ends in-line with the outside edge of cavity above.

Install metal (as specified) head flashings, fixed over the wall underlay, with the flashing upstand over-flashed minimum 50mm with a flexible flashing tape against the underlay, or with an additional piece of underlay extended over and lapped behind the underlay above, behind the inter-storey flashing or sill flashing above, or to the underside of the eaves.

Unless shown otherwise, sill flashings, where required, shall have a minimum 5° slope, minimum 8mm rear upstand with sealed sloping stop-ends, and be carried down minimum 35mm over the lower cladding and finished with a 5mm, 45° 'kick out' drip-edge.

Take delivery of window and door joinery. Check substrates for correct profile and alignment and that the joinery is fabricated to the correct wall construction set-out and depth. Set shims or pack as necessary to install joinery exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim, etc.

Install neat sealant beads as detailed or required.

After joinery installation, install closed cell backing rods as required and expanding foam seal the gap between the opening substrate and joinery liners/reveals (all round, from the inside).

On completion ensure that all sashes and doors neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating smoothly, without binding, to the required functionality.

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Joinery Installation

Take delivery of all scheduled joinery items (doors, cabinets, shelves, etc.) and install in the positions shown, accurately aligned, true to level, plumb and square, and securely fastened as noted and in accordance with best trade practice and with due regard for adjacent linings, finishes and trim, and anticipated movements.

Cabinets scribed and/or recessed packers scribed to adjacent surfaces as detailed or directed. Protect all installed Joinery from damage including surface marking and contamination, dirt and dust, and moisture until completion. Do not use Joinery items for working supports or platforms or for storage of materials or tools and equipments.

On completion ensure that joinery item doors and drawers all neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating to the required functionality.

3.6.2 Timber*Timber Materials*

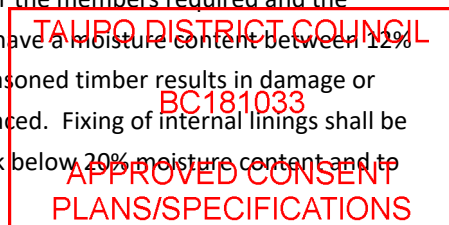
All timber shall be graded in accordance with NZS 3631 - Structural Grade MSG8 or better for all framing timber - (to meet the requirements of Table 2.3 of NZS 3603 for mechanically graded timber), and Dressing Grade for all finishing timber. Timber that is deemed below standard, in the opinion of the Architect/Designer, shall be removed from the site.

All non-durable timber, including components in manufactured items, shall be appropriately treated against moisture and/or insect decay by a member of the NZ Timber Industry Federation Inc. Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required. Ensure that similar timbers with different treatment levels are carefully managed during construction to avoid accidental use of an H1 treated item where H3 hazard class treatment is required by the NZS 3602.

Do not use LOSP (light organic solvent-based preservative) treated timber that has not adequately 'flushed-off'.

Ensure that all cut or drilled surfaces of H4 and H5 hazard class treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation.

All timber shall be seasoned or kiln dried, to the stable moisture content, be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required and the location in the finished construction. All framing timber shall have a moisture content between 12% and 18 % before being installed. If the use of inadequately seasoned timber results in damage or opening joints in the finished building the timber shall be replaced. Fixing of internal linings shall be delayed after closing in until the timber framing has dried back below 20% moisture content and to allow for the maximum settling of substrates.



All kiln dried, dressed and/or finishing timbers shall be stacked under cover on delivery to the site, and all timber shall be full to the nominal sizes shown or specified, subject only to normal cutting and dressing tolerances.

All finishing timber shall have machine marks, stains and roughness removed and shall be sanded smooth.

Ensure that enclosed surfaces and ends of paint-finished exterior finishing timbers are fully primed before fixing. If this trade (Carpentry) carries out the priming it shall be to the specification and standard required of the Painter.

Unless specified otherwise, exposed framing timbers shall be unfinished to the exterior, and be fine bandsawn milled, treated with a minimum of discolouration, handled carefully at all times to avoid surface damage, and delivered free of crayon or pencil or other markings. Hazard class treatment markings shall be on the ends, NOT on the faces.

Other Materials

Materials shall be delivered to site with the packaging and labelling intact, shall be of the same type, finish or colour to maintain continuity, shall be stored, and conditioned if required, in accordance with manufacturer's recommendations, and shall be protected from damage, contamination, and moisture - as appropriate.

Handle all materials in accordance with best practice and the manufacturer's requirements, and in a manner that prevents damage or deterioration to the material. Do not use damaged or defective materials or products, or products that are beyond their designated shelf life.

3.6.3 Laminated Veneer Lumber

Laminated Veneer Lumber

Laminated Veneer Lumber (LVL) shall comply with AS/NZS 4357.0. Each piece of structural LVL shall be branded at least once with the manufacturer's logo and a registered brand or marking that clearly identifies the structural properties that apply to the product and its limitations on end use; all in conjunction with associated published literature.

Structural properties identified in the associated published literature shall be:

- details of marking specific to the product
- veneer details
- physical properties including
 - modulus of elasticity
 - bending stress
 - tension stress parallel to grain
 - compression stress perpendicular to grain
 - compression stress parallel to grain
 - shear stress
- joint group
- density
- dimensional tolerances
- adhesives used
- limitations on end use

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The storage and handling of LVL shall comply with Appendix A of AS/NZS 4357.0. In particular:

- LVL should be kept dry during storage and transit
- LVL should be stacked on bearers well clear of the ground and arranged so that their supporting surfaces are in the one plane
- Bearers should be spaced sufficiently close so that LVL spanning between them does not deflect excessively under its own weight.
- Bearers or spacers within a stack should be located near direct vertical alignment
- Care should be taken in lifting and handling LVL in order to avoid mechanical damage
- Wrapping should avoid and prevent entrapment of moisture
- LVL should not be used in high humidity conditions or exposed to the weather.

3.6.4 Proprietary Sheet Bracing Systems

Proprietary Sheet Bracing Systems

Proprietary sheet bracing systems to walls, ceilings and sub-floor foundations shall be installed in strict accordance with the manufacturer's technical literature and design guides. No materials specified in the manufacturer's technical literature and design guide can be substituted without the written approval from the Architect/Designer.

3.6.5 Proprietary Roof Trusses

Proprietary Roof Trusses

Roof trusses shall be of proprietary design, complying with the requirements of NZS 3603, NZS 3604, and AS/NZS 1170, and manufactured by suitably qualified fabricators.

Make allowance for all notching and holing to timber members to accommodate roof bracing etc., in the design of member sections of the roof trusses. Allow for all additional rafters, purlins, fixings and bracing necessary to complete the roof framing system with all accessories and incidental items necessary for proper installation even where not specifically shown on the drawings.

Proprietary roof trusses shall be designed to carry all imposed gravity and lateral loads. Refer to the approved design drawings for truss set-out and specified design loads. Roof trusses are assumed to be generally at 900mm centres spanning clear between walls or roof beams as shown on the drawings. The Main Contractor is responsible for the design of proprietary roof trusses, including their layout and interaction with and dependence on adjoining elements.

Provide all necessary design information and shop drawings for all proprietary roof trusses to be incorporated in the works for review prior to fabrication.

Provide Producer Statements from a Chartered Professional Engineer covering the design and construction of the roof trusses. Provide all information required by the Territorial Authority for the purpose of obtaining a Building Consent.

3.6.6 Fixings

Nails

Comply with the requirements of NZS 3604 Section 2.4.4 and the Nailing Schedules of NZS 3604 as applicable. Unless noted or specified on the drawings or elsewhere in this specification, all nails fixing

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exterior timbers shall be Grade 304 or 316 stainless steel. Nails that will be covered with plaster or any similar material shall be hot-dipped galvanised, unless noted or specified otherwise.

Finishing brads to all finishing timbers shall be set out neatly and punched to the diameter of the nail below the surface. Bore slightly undersize holes for nailing that could cause splitting of the timber. Power-driven staples are completely unacceptable in finishing timbers.

Screws

Screw fastenings shall be of suitable gauge, head type, thread design, and length to provide secure fastening into the substrate material, and be suitable for the assembly/construction of the fixed item/element and the substrate material.

Unless noted or specified otherwise, screws exposed to the exterior shall be Grade 304/316 stainless steel or hot-dipped galvanised, and hot-dipped galvanised or similar corrosion resistant for damp situations.

Self-drilling screws shall be in accordance with AS 3566 for fastener type and corrosion resistance class.

Unless noted or specified otherwise, screws fixing hardware or similar shall be of the same material and finish as the hardware. Except where raised head screws are shown or specified, screws shall be countersunk flush or recessed where stopped/filled.

Bolts

Where bolts are used they shall be complete with nuts and washers unless specified otherwise. All bolts, nuts and washers are to be hot-dipped galvanised finish unless noted otherwise. The diameter of a hole for a bolt shall not be less than the bolt diameter nor exceed it by 1.5mm.

For the following bolt diameters use washer sizes as below unless noted otherwise on the drawings:

- up to M8 - 25 x 25 x 1.5mm
- up to M12 - 50 x 50 x 3mm
- up to M20 - 65 x 65 x 5mm
- up to M20 - 75 x 75 x 6mm

Round washers may be used providing they are of a thickness and area not less than those specified above.

Unless noted otherwise on the drawings, holding down bolts shall be M12 galvanised, spaced at maximum 900mm centres and within maximum 300mm from each end of the timber, set minimum 150mm into concrete, and located centrally on the timber.

Framing - timber/timber and timber/steel - Unless noted otherwise on the drawings, M16, hot-dipped galvanised, hexagonal head mild steel and with 50 x 50 x 3mm washers.

Timber/concrete (dry situations) - Unless noted otherwise on the drawings, Ramset Trubolts, T12140 at maximum 900mm centres - for damp or exterior situations use stainless steel Trubolts.

Bolts shall be tightened until the washer just indents the timber surface. Exposed bolts shall be re-tightened just prior to Practical Completion to remove any slack consequent on timber shrinkage.

Allow to countersink bolt heads and nuts as necessary to clear linings.

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Framing Hardware

Proprietary timber framing hardware and fixings, including multigrips, joist shoes, Z nails, gang nails and similar hardware, may be used where specifically approved, or where required on the drawings or by NZS 3604 schedules, in accordance with the manufacturer's requirements.

Proprietary timber framing structural brackets and ties, including post and bearer brackets, beam supports, angle brackets, tie cleats and similar hardware, shall be as noted on the drawings and installed in accordance with the manufacturer's requirements.

Refer to Metalwork or Structural Steel section of this specification for specific design engineered fabricated steel components that connect structural timber framing.

Adhesives

Aliphatic PVA for dry timber applications - all other adhesives for timber jointing are subject to specific approval or as specified. Check surfaces are in appropriate condition to receive adhesive, and that adhesives are used strictly in accordance with the manufacturer's instructions. Clamp adhesive-jointed timber connections and check alignment of members before the adhesive has set.

3.6.7 Sealants

Sealants

For critical joints such as primary water/weatherproofing seals, precast panels primary seals, structural floor slab control joints, structural glazing, immersion or hydrostatic pressure seals, etc., either use the sealant noted on the drawings or obtain a reputable sealant manufacturer's recommendation for the precise situation, and submit the manufacturer's specifications covering all relevant criteria and characteristics of the proposed sealant, primers, joint surfaces preparation, etc. to the Architect/Designer for review and confirmation to proceed.

If so requested, additionally submit a sample of the proposed sealant made up into a demonstration joint, incorporating the same materials, preparation, finish tooling, etc. After confirmation to proceed with the proposed sealant install a sample joint to approval, length approximately 2% of the overall length of the joints required, with a minimum length of two metres; when accepted this joint becomes the quality control sample for all subsequent similar joints.

For less critical joints such as those in covered or protected situations, and bathroom and kitchen ceramics and sanitaryware etc., either use the sealant noted on the drawings or select the sealant from a reputable manufacturer's range for the substrate materials involved, with due regard for the flexibility required, acid or neutral curing, mould resistance, paintability or clear or standard colours, slumping characteristics, temperature range expected, etc. - silicone, polymer or polyurethane sealants are anticipated.

For all simple gap-filling and draught sealing situations, either use the sealant noted on the drawings or select from a reputable manufacturer's range for a paintable acrylic sealant with good adhesion characteristics for the substrates involved - pay particular care in the sealant selection where bare metal, polycarbonate, polystyrene or similar substrates or where bituminous based membranes are adjacent or where exposure to solvents is possible.

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All joint surfaces preparation and priming and all sealant application work shall be exactly in accordance with the sealant manufacturer's recommendations, and carried out by competent and experienced applicators familiar with the materials and techniques required.

Ensure that the sealant is being used within the manufacturer's stated design parameters, particularly with regard joint design and anticipated cyclic movement.

Check that the joint faces are sound, completely dry, and frost free, clean and free of dirt, rust, oil, grease, laitance, etc., and they are primed to suit the surface porosity - particularly for critical locations.

Insert a polyethylene tape slip layer at the back of the joint or a closed cell polyethylene PEF backer rod where required and to the sealant manufacturer's recommendations. Mask off joint edges where a clean straight finish line is required.

Check the toxicity of the selected sealant and handle it appropriately. Check that the temperature during sealant installation is within the manufacturer's guidelines.

Apply the sealant and tool the filled joint's surface smooth and even, utilising a lubricant as necessary and strictly within the manufacturer's guidelines.

Remove any masking tape immediately after tooling, clean up all adjacent surfaces using the recommended cleaning agents as required, and protect the finished joint until the sealant has properly cured.

3.6.8 Interior Finishing Trim

All interior finishing trim shall be cut to the exact dimensions and fine sanded smooth, and with lightly sanded arrisses, and all fixed with plated finishing pins. Machine staple fixing is NOT acceptable.

Note that even traces of planer marks are unacceptable on architraves. Margins between interior trim and other elements shall be exactly even, and all mitres shall be exact and tight.

3.6.9 Garage Door

Garage Door - option 2

Garage door(s) as shown and noted on the drawings, installed complete with automatic opening door gear including integrated light(s), wall switch and two remote car activators per door.

3.6.10 Sundry Items

Sundry General

Supply and install, complete with all normal incidentals, and in total compliance with the item manufacturer's recommendations and instructions and with all of the appropriate preceding clauses:

3.7 James Hardie Eaves & Soffits

3.7.1 Scope

4.5mm HardieFlex Eaves Lining

Supply and install James Hardie 4.5mm thick HardieFlex Eaves Lining as a fibre cement sheet lining material to the eaves and soffits identified on the drawings, complete with all accessories. The sheets are to be finished with a paint system. All aspects of this work shall be in complete accordance with James Hardie Eaves And Soffits Installation Manual (check www.jameshardie.co.nz, or call 0800 808 868 for the latest edition) and other relevant product manufacturers' recommendations.

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3.7.2 Co-operation

Co-operation

Co-ordinate with other trades to ensure that the panels correctly allow for fascia and wall cladding installation and associated flashings etc., and that services penetrations are correctly handled to maintain full weathertightness and sheet integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

3.7.3 Preparation

Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. The fascia and framing shall be in true alignment, complete and suitable for the sheets, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that any hold-downs from the roof framing to the wall framing are correctly installed.

Check that the building underlay or rigid air barrier to the wall framing has been installed in full accordance with the manufacturer's requirements and the drawings. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flashings etc that will enable the sheets and all accessories to be installed.

3.7.4 Flexible Sealant

SIKA Silaflex MS

Flexible silicone sealant to be SIKA Silaflex MS. Use to seal the sheets and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

3.7.5 Workmanship

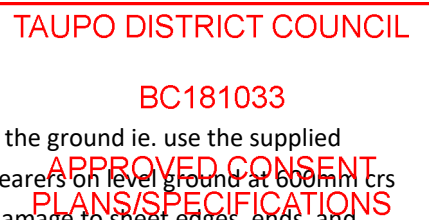
Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with James Hardie Eaves And Soffits Installation Manual and other relevant product manufacturers' recommendations.

3.7.6 Delivery & Handling

Delivery & Handling

Carry all sheets on edge. Stack sheets flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm c/s maximum). Keep sheets and accessories dry at all times. Avoid damage to sheet edges, ends, and surfaces. Keep uPVC flashings etc. out of direct sunlight, and store all accessories on flat and avoid damage. All installers to be familiar with and comply with the James Hardie Safe Working Practices in the Installation Manual, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished sheets or accessories.



3.7.7 Installation

Installation General

Install the sheets to the framing in accordance with the Installation Manual, complete with all accessories eg. mouldings, sealant, underflashings, etc.

Ensure that all cut edges of panels are primed prior to installation with Dulux Primacryl, Resene Quick Dry, or similar. Ensure that the bottom edge of the fascia forms a drip edge of 15mm minimum to the sheet. Seal around services penetrations to maintain weathertightness and air pressure resistance.

Timber Trim Details

Install H3.1 finger-jointed pine timber trim, scribes, eaves moulds, etc. to complete the sheet junctions as shown on the drawings.

3.7.8 Fixings

HardieFlex Sheet 4.5mm, Durability Zone B or C

Fix sheets with galvanised nails in accordance with James Hardie requirements.

Timber Trim, Durability Zone B, C, or D

Fix timber trim accessories with jolt-head galvanised nails in accordance with James Hardie requirements, punched below the surface and flushed with exterior grade builders fill.

3.7.9 Completion

HardieFlex Sheet

Ensure that the sheets have been fixed correctly, that all joints and accessories have been completed correctly, and that all penetrations have been taped correctly. Check that no damage has occurred to any installed sheet element or associated component, replace as necessary. Ensure that the sheets are painted within 90 days of the sheet installation, complete with all accessories and flashings. Hand over a copy of the latest edition of the James Hardie HardieFlex Eaves Lining Product Warranty to the client. Hand over a copy of the latest James Hardie Eaves And Soffits Installation Manual to the client for their maintenance information.

3.8 GIB® Plasterboard Sheets

3.8.1 Scope

Scope

Supply and install the selected GIB® Plasterboard sheets, complete with all accessories, as sheet lining material to the walls, ceilings and other elements identified on the drawings. All aspects of this work shall be in complete accordance with Winstone Wallboards Ltd technical literature and installation guidelines (call Winstone Helpline on 0800 100 442 or check www.gib.com for the latest editions) and other relevant product manufacturers' recommendations.

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Substitution of any specified GIB® system, GIB® System component or GIB® plasterboard is not permitted.

3.8.2 Performance

GIB® plasterboard as a Component of a 'General' Wall or Ceiling Lining Element

To the areas noted on the drawings as 'General Plasterboard Wall or Ceiling Lining', comply with all relevant aspects of the [GIB® Site Guide \(2014\)](#) publication, complete with all recommended components and accessories, and other relevant manufacturers recommendations.

GIB® plasterboard as a Component of a Wet Area Element

Wet Area Plasterboard Linings - GIB Aqualine® Wet Area Systems. To the areas noted as 'Wet Area' on the drawings, additionally comply with all relevant aspects of the [GIB Aqualine® Wet Area Systems \(2007\)](#) publication, [BRANZ Appraisal No.427 \(2007\)](#), and other relevant product manufacturers' recommendations. Refer to separate specification GIB Aqualine® Wet Area Systems.

GIB® plasterboard as a Component of a Bracing Element (Timber Framing)

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the [GIB EzyBrace® Systems \(2016\)](#) publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, [BRANZ Appraisal No.928 \(2016\)](#), and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

3.8.3 GIB Plasterboard

GIB® Standard, 10mm

GIB® Standard plasterboard, 10mm thick.

Location: To all dry area walls unless otherwise noted on plans

GIB® Standard, 13mm

GIB® Standard plasterboard, 13mm thick.

Location: To all dry area ceilings unless otherwise noted on plans

GIB Aqualine®, 10mm

GIB Aqualine® plasterboard, 10mm thick.

Location: To all wet area walls - refer to latest version of GIB site guide

GIB Aqualine, 13mm

GIB Aqualine® plasterboard, 13mm thick.

Location: To all wet area ceilings - refer to latest version of GIB site guide

GIB Braceline® / GIB Noiseline®, 10mm

GIB Braceline® / GIB Noiseline® plasterboard, 10mm thick.

Location: Refer to bracing plans and calculations for locations

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3.8.4 Fixings

GIB® Grabber® Screws

Fix sheets with adhesive and GIB® Grabber® drywall screws in accordance with Winstone Wallboards Ltd requirements.

GIBFix® All-Bond Adhesive

GIBFix® All-Bond adhesive. Use to adhere the sheets and accessories to the framing in accordance with Winstone Wallboards Ltd requirements.

3.8.5 Level of Plasterboard Finish

Level of Finish

To the areas noted as a specific Level of Finish (3-5) on the drawings, additionally comply with all relevant aspects of Winstone Wallboards Ltd literature and AS/NZS 2589, complete with all system accessories, and other relevant product manufacturers' recommendations.

NOTE: Unless stated otherwise, Level 4 is the default Level of Finish.

Control Joints

To the areas noted as 'control joint', comply with all relevant aspects of Winstone Wallboards Ltd literature and AS/NZS 2589.

3.8.6 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to ensure that appropriate clearances are allowed from adjacent internal linings, fixtures, products, and associated services, etc, that the sheets correctly allow for door and window installation, and that services penetrations are correctly handled to maintain sheet integrity.

3.8.7 Workmanship

Workmanship

All installation work shall be carried out by experienced tradesmen familiar with the techniques and materials specified and in accordance with the current requirements of Winstone Wallboards Ltd.

3.8.8 Delivery & Handling

Delivery & Handling

Store GIB® plasterboard sheets undercover inside a watertight building and keep sheets dry at all times. Stack sheets flat on a dry level surface in accordance with Winstone Wallboards Ltd recommendations. Avoid damage to sheet edges, ends, and surfaces. Carry all sheets on edge. Do not use damaged or faulty sheets.

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3.8.9 Preparation

Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and otherwise in accordance with the specified Level of Finish and Winstone Wallboards Ltd requirements. Framing shall be plumb and in true alignment, complete and suitable for the sheets, and maximum moisture content 18% or as recommended by Winstone Wallboards Ltd. Ensure that the framing is true to line and plane and with no projections due to structural and bracing bracketry etc. Ensure that all framing brackets, plates, braces and hold-downs etc. are correctly installed.

Check that the building has been completely finished to all penetrations including doors, windows, services, etc so that the sheets can be installed without being affected by any weather conditions. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flooring, setout of services, etc. that will enable the sheets and accessories to be installed. Clear building debris and rubbish from framing voids and keep clean until GIB sheet linings are installed.

3.8.10 Installation

Installation

Install the sheets, complete with all accessories, to the framing in accordance with the relevant Winstone Wallboards Ltd recommendations and literature, and as noted and detailed on the drawings.

3.8.11 Completion

Completion

Ensure that the sheets have been cut, fitted and joined, and fixed correctly. Check for damage and replace as necessary.

Clean up thoroughly on completion and remove all waste and rubbish from site.

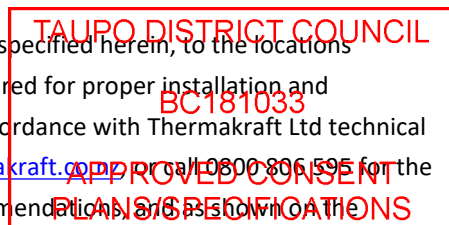
Provide a copy of the Winstone Wallboards Ltd maintenance requirements to the owner.

3.9 Thermakraft Underlay, DPM & DPC

3.9.1 Scope

Scope

Supply and install Thermakraft Underlays and Membranes, as specified herein, to the locations identified on the drawings, complete with all accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Thermakraft Ltd technical information and installation requirements (check www.thermakraft.co.nz or call 0800 806 595 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the design drawings.



No substitutions are permitted for the specified products from Thermakraft Ltd.

Extent of Work

The following is a list and a general description of the extent of the Thermakraft Underlays and Membranes works, which are more specifically defined in the contract documents, required for the completion of the contract works:

3.9.2 Requirements*Safety*

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

Warranty

[Thermakraft Ltd Product Warranty](#):

- 15 Years Warranty - for all Thermakraft warranted products installed, according to the warranty conditions.
- Provide the Thermakraft Ltd Product Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

Substitutions

Thermakraft Ltd products shall be as specified herein and as indicated on the approved drawings. The substitution of Thermakraft branded products for alternative brands is not permitted under any circumstances.

The substitution of a specified Thermakraft product for an alternative Thermakraft branded product by the Contractor shall only be permitted with the Contract Administrator's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative Thermakraft branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

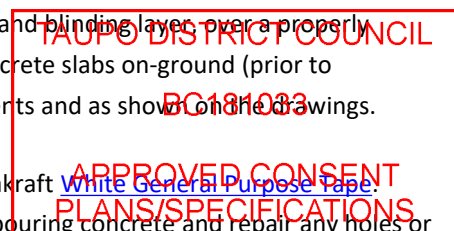
3.9.3 Damp-Proof Membrane*Thermathene Black (250µm)*

[Thermathene Black](#) (250µm). A 250 micron thick (0.25mm), tear resistant, polyethylene film sheet concrete underlay. Coloured black.

Installed over nominal 10mm (max. 25mm) thick compacted sand blinding layer over a properly prepared base course, as a moisture vapour barrier under concrete slabs on-ground (prior to concreting), in accordance with the manufacturer's requirements and as shown on the drawings.

All joints lapped 200mm and continuously sealed with Thermakraft [White General Purpose Tape](#). Tape-seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

Installed Location: As per drawings



3.9.4 Damp-Proof Course

Supercourse 500 DPC

[Supercourse 500 DPC](#). A 0.75mm thick, high-impact, single-layer Polyethylene film, embossed on both sides. Available in 50mm, 75mm, 90mm, 100mm, 150mm, 200mm, 250mm, 300mm, 400mm, 500mm and 1000mm roll widths. Supercourse 500 DPC is suitable for use as a separation barrier between most incompatible and dissimilar materials.

Used as a general damp proof course (DPC) for separating timber and wood-based products and metal from concrete, masonry, brick, and stone surfaces, and as a moisture barrier.

Also used as a concealed flashing behind brick veneer cladding in accordance with NZS 4229 and NZBC E2/AS1.

Installed in accordance with the manufacturer's requirements, [BRANZ Appraisal No.329 \(2016\)](#), and as shown on the drawings.

3.9.5 Wall Underlay

Watergate Plus 295 - Synthetic Wall Underlay

[Watergate Plus 295](#). A fire-retardant, absorbent, breathable, composite non-woven polyolefin synthetic underlay. Nominal weight 110g/m².

Installed as a standalone flexible underlay over timber or steel wall framing in accordance with the manufacturer's requirements and [BRANZ Appraisal No.695 \(2017\)](#), in NZS 3604 Wind Zones up to and including 'Very High'.

Installed as a flexible underlay over a rigid air barrier in accordance with NZBC E2/AS1 9.1.7.2 to the manufacturer's requirements and [BRANZ Appraisal No.695 \(2017\)](#), in NZS 3604 Wind Zones up to and including 'Extra High'.

Watergate Plus can be used with absorbent and non-absorbent direct-fixed wall claddings, and absorbent and non-absorbent wall claddings over a 20mm drained cavity, and masonry veneer cladding over a drained cavity in accordance with NZBC E2/AS1 and [BRANZ Appraisal No.695 \(2017\)](#).

Do not leave Watergate Plus 295 exposed on walls for more than a total of 60 days before covering.

Installed Location: All external walls and as noted on drawings

3.9.6 Roof Underlay

Thermakraft 215 - Bitumen Building Paper

[Thermakraft 215 Building Paper](#). A self-supporting, absorbent, breathable, bituminous impregnated non-synthetic underlay (non-fire retardant). Heavy class, nominal weight 400g/m².

Installed as a roof underlay over timber or steel roof framing in accordance with the manufacturer's requirements and as shown on the drawings.

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Thermakraft 215 Building Paper roof underlay can be used directly under direct-fixed roof claddings, or directly under roof tile battens in accordance with Thermakraft requirements.

Thermakraft 215 Building Paper roof underlay must be installed in a manner that prevents ponding of water. Provide additional support at no more than 300mm centres when Thermakraft 215 Building paper is installed on roofs with slopes less than 10°.

Do not leave Thermakraft 215 Building Paper exposed on roofs for more than a total of 7 days before covering.

Installed Location: Under all roofs unless otherwise noted on drawings

3.9.7 Underlay Support

Thermakraft Thermastrap 201 Strap

[Thermakraft Thermastrap 201](#). A 19mm wide x 0.4mm thick polythene embossed strap. For use as a support for non-self support roof underlays, and to restrict the bellowing of flexible wall underlays in drained cavities. Suitably tensioned when installed to avoid any sagging and to keep the flexible underlay in a flat plane. Installed at right angles to roof purlins or wall studs, at maximum 300mm centres.

Application/Use: to all roofs below 10 degree roof pitch

Thermakraft Stud Strap

[Thermakraft Stud Strap](#). A 25mm wide x 0.4mm thick polypropylene woven and coated strap. For use as a support for non-self support roof underlays, and to restrict the bellowing of flexible wall underlays in drained cavities. Suitably tensioned when installed to avoid any sagging and to keep the flexible underlay in a flat plane. Installed at right angles to roof purlins or wall studs, at maximum 300mm centres.

Application/Use:

3.9.8 Underlay Penetration Seals

Multi-Fit Penetration Seals

[Thermakraft Multi-Fit Penetration Seals](#). A range of pipe and service penetration seals consisting of soft, flexible EPDM membrane with a self-adhesive flange.

Multi-Fit Penetration Seals are part of the Thermakraft membrane system, and are a patented airtight solution for round or rectangular pipes, cables or conduits when passing through underlay barriers.

Pipe seals accommodate pipe diameters from 15mm up to 110mm. Cable seals accommodate cable diameters from 7mm up to 22mm, and 80mm trunking.

Installed in accordance with the manufacturer's requirements and [BRANZ Appraisal No.942 \(2017\)](#), with stand-alone flexible wall underlay over timber or steel wall framed walls on buildings situated in NZS 3604 Wind Zones up to and including 'Very High'.

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Installed in accordance with the manufacturer's requirements and [BRANZ Appraisal No.942 \(2017\)](#), with flexible wall underlay used over a rigid wall underlay on buildings situated in NZS 3604 Wind Zones up to and including 'Extra High'.

3.9.9 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to install Thermakraft Underlays, DPMs, and DPCs as required.

3.9.10 Workmanship

Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

All cutting, joining, and fixing techniques shall be exactly as recommended by the manufacturer, and carried out with the use of suitable tools and equipment appropriate for the application. All work shall be such as to leave a neat, efficient, and weathertight installation.

3.9.11 Delivery & Handling

Delivery & Handling

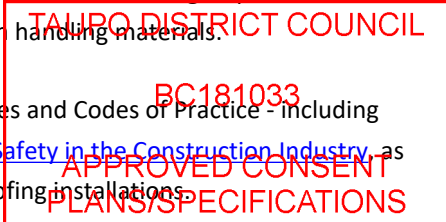
Store underlay rolls on end, undercover, on a flat, clean and dry surface. Keep stored materials dry, out of direct sunlight, and protected from damage and contamination at all times.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the product.

Do not use damaged or defective materials, or products that are beyond their designated shelf life.

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform with all relevant [WorkSafe NZ](#) Guidelines and Codes of Practice - including the [OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry](#), as well as the [Best practice guidelines for working on roofs](#) for roofing installations.



3.9.12 Preparation

General

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades has been completed to specification and as shown on the approved drawings.

Do not commence installation until all necessary preliminary works by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades is complete.

Supporting timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content of 20% at the time of cladding installation. Allow LOSP treated timber to sufficiently flash-off before installing Thermakraft building underlays and foils.

Supporting light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. Comply with the light structural steel framing fabricator's specifications and requirements for fixing cladding and roofing components.

Supporting heavy steel structures shall comply with NZS 3404.

Under-Slab Basecourse

Under-Slab Basecourse - prior to laying under-slab DPM, check all aspects of preparatory works, including but not limited to:

- Check that the under-slab basecourse has been correctly laid and compacted as specified.
- Check that the surface has been properly prepared and compacted to the required standard, and is smooth and flat.
- Ensure any sand blinding is free of aggregate, sharp protrusions.
- Ensure the final surface is free of hollows and ponded water prior to laying the DPM.

Wall Framing

Wall Framing - prior to wall underlay installation check all aspects of preparatory works, including but not limited to:

- Check that wall framing has been completed as shown on the drawings, complies with the relevant design and construction standards.
- Check that framing is securely fixed, true to line and plane, is plumb and level where required, and is trimmed at edges, openings and penetrations as required.
- Check that there are no projections due to structural bracing and bracketry etc.
- Check that the required clearances from ground, deck, balcony or lower roof to the bottom edge of the underlay/cladding are in accordance with NZBC E2/AS1.

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Roof Structure

Roof Structure - prior to roof underlay installation check all aspects of preparatory works, including but not limited to:

- Check that the supporting purlins or battens are set-out to the required set-out and spacings, are

straight and true to line and plane, and are securely fixed.

- Check that all barge and fascia boards have been installed to the correct line and plane with all edge blocking complete and secure.
- Check that valley gutter and hidden gutter framing is to the required dimensions with solid backing supports securely fixed, true to line and plane.
- Check that internal gutter membrane linings are complete, and dressed back and adhered to a solid substrate along the roof edge as shown on the approved drawings.
- Check that all trimming for roof penetrations, all roof/wall junction blocking, and all necessary work by other trades is complete.
- Check that solid sarking required for fully-supported roofing is complete and securely fixed in accordance with the approved drawings.
- Check that any required anti-ponding boards for tiled roofs have been correctly installed to a minimum 5° (1:12) fall to the eaves gutter.

3.9.13 Installation - Wall Underlay

Watergate Plus 295 Wall Underlay

Watergate Plus 295 Wall Underlay shall be installed, printed face out, to the exterior face of the wall framing, run horizontally, starting from the bottom edge and finishing at the top edge, extending 35mm below the bottom plate or bearer, and lapped such that any water will be shed to the outside of the underlay with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.

Fix at maximum 300mm centres, with 6-8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings. Provide additional fasteners fixed through Thermakraft Stud Strap around framed openings before cutting Watergate Plus 295 at openings.

Cut window and door openings just prior to joinery installation; cut underlay at 45° angle away from each corner and return full framing depth and fasten to inside of frame. Install Thermakraft Corner Moulded flashings and Thermakraft Window Flashing Tape over the underlay at opening corners and along sill trimmers in accordance with Thermakraft requirements.

For drained cavity wall construction where studs are at greater than 450mm centres, install Thermakraft Stud Strap horizontally at 300mm centres to prevent bulk insulation from pushing the underlay into the cavity space.

Finish Watergate Plus 295 underlay at edges as detailed.

Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with Thermakraft requirements and as shown on the drawings.

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3.9.14 Installation - Roof Underlay

Thermakraft 215 Building Paper

Thermakraft 215 Building Paper shall be installed without support on roofs with slopes 10° or greater (unless specified otherwise), run horizontally across the roof slope and over the purlins, starting from the gutter/lowest point up to the ridge/highest point, extending maximum 20mm into gutters, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned without sagging.

The maximum run length shall be no greater than 10 metres.

Fix at maximum 300mm centres to purlins, with 8-12mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary grippers.

For tiled roofs, lay Thermakraft 215 over the anti-ponding board and rafters/trusses, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Finish Thermakraft 215 along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45° angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with Thermakraft requirements and as detailed. Leave underlay minimum 50mm distance clear of the outer liner of flue stacks.

3.9.15 Completion

Completion

Check that all underlays have been installed correctly and are properly supported, and that all underlay edges, joins and ends are correctly finished prior to closing off with claddings - all in accordance with Thermakraft installation requirements.

Check installed membranes and underlays for defective work and damage - replace and/or repair as necessary to the required standard.

Leave all of this work complete, and free of defects, and to the required standard in accordance with the manufacturer's warranty requirements.

Issue to the Owner a copy of the Thermakraft maintenance requirements and the Thermakraft product warranties for the installed products.

3.10 Axon Panel

3.10.1 Scope

Cavity Construction with CLD Structural Cavity Battens

Supply and install Axon Panels as a fibre-cement panel cladding material to the walls identified on the drawings, complete with all accessories. The panels are to be finished with a paint system.

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All aspects of this work shall be in complete accordance with the [Axon Panel Technical Specification](#) (check www.jameshardie.co.nz, or call 0800 808 868 for the latest edition) and other relevant product manufacturers' recommendations. Use the Axon Panel Installation Checklist at all relevant stages of the work.

3.10.2 Co-operation

Co-ordinate with other trades to ensure that appropriate clearances are allowed from roofing products and associated flashings etc., that the panels correctly allow for door and window installation, and that services penetrations are correctly handled to maintain full weathertightness and panel integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

3.10.3 Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. Framing shall be plumb and in true alignment, complete and suitable for the panels, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that the bottom plate hold-downs are correctly installed.

Check that the building underlay or rigid air barrier has been installed in full accordance with the manufacturer's requirements and the drawings, and completely finished to all penetrations including doors, windows, services, etc. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flashings etc that will enable the panels and all accessories to be installed.

Check that the ground levels are sloping away from the building so that there will be no ponding water against the building, and that the ground will be remain clear of the panels by at least 100mm at all times in accordance with E2/AS1.

3.10.4 Sealants

Flexible silicone sealant to be SIKA Silaflex MS. Use to seal the panels and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

Polyurethane adhesive sealant to be SIKA Sikaflex 11FC. Use to adhere the panels to the CLD Structural Cavity Battens and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with jointing and texture finishes.

3.10.5 Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with Axon Panel Technical Specification and other relevant product manufacturers' recommendations.

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3.10.6 Delivery & Handling

Carry all panels on edge. Stack panels flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm c/s maximum). Keep panels and accessories dry at all times. Avoid damage to panel edges, ends, and surfaces. Keep uPVC flashings etc out of direct sunlight, and store all accessories on flat and avoid damage to any. All installers to be familiar with and comply with the James Hardie Safe Working Practices in the Technical Specification, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished panels or accessories.

3.10.7 Installation

Fix uPVC vent strip through the building underlay or rigid air barrier. Ensure that the openings in the vent strip are kept clear and unobstructed at all times. Fix CLD Structural Cavity Battens through the building underlay or rigid air barrier to the framing. Install the panels to the CLD Structural Cavity Battens in accordance with the Technical Specification, complete with all accessories. Install Scyon mould accessories to complete the installation.

Ensure that all cut edges of CLD Structural Cavity Battens are primed prior to installation with Dulux Acraprime 501/1 sealer or Resene Quick Dry.

Ensure that all cut edges of panels are primed prior to installation with Dulux 1 Step Prep, Resene Quick Dry, or similar. Ensure that the bottom edge of the panel overhangs below the bottom plate by 50mm, and is clear of the ground surface by at least 100mm; the finished ground clearance shall be in accordance with E2/AS1. Seal around services penetrations to maintain weathertightness and air pressure resistance.

3.10.8 Horizontal Joint & Drainage Joint

Horizontal joints to be formed on cavity batten framing with aluminium 'h' mould. Ensure that the panels are not fixed to the floor joists.

Horizontal drainage joints to be formed at floor joist with folded Z-flashing as per E2/AS1 requirements. Ensure the panels are not fixed to the floor joists.

3.10.9 Batten Fixings

Fix CLD Structural Cavity Battens and other accessories with galvanised nails in accordance with Axon Panel requirements.

3.10.10 Panel Fixings

Fix panels and accessories to the CLD Structural Cavity Battens with Grade 304 stainless steel nails and adhesive sealant in accordance with Axon Panel requirements.

3.10.11 Completion

Complete the Axon Panel Installation Checklist and hand over a copy to the client.

Ensure that the panels have been fixed correctly, that all vertical joints and accessories have been completed correctly, and that all penetrations have been taped correctly.

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Check that no damage has occurred to any installed panel element or associated component, replace as necessary.

Check that no dirt has been mounded up within 175mm of the panels, and maintain the clearance.

Ensure that the panels are painted within 90 days of the sheet installation, complete with all accessories and flashings.

Hand over a copy of the latest edition of the Axon Panel Product Warranty to the client.

Hand over a copy of the latest Axon Panel Maintenance Schedule to the client.

3.11 Weatherboard Cladding Systems

3.11.1 Scope

Horizontal Bevelback Weatherboard

Supply and install the Hermpac Bevelback Weatherboard Cavity System, as specified herein, to the walls identified on the drawings, complete with all accessories and trim. All aspects of this work shall be in complete accordance with the Hermpac product specifications and technical literature (check www.hermpac.co.nz, email: technical@hermpac.co.nz, or call 09 421 9840 for the latest editions), [BRANZ Appraisal No.663 \(2014\)](#), NZBC E2/AS1, other relevant product manufacturers' recommendations, and as shown on the drawings.

The Hermpac Bevelback Weatherboard Cavity System is CodeMark assured: [CodeMark Certificate of Conformity No. GM-CM30038-RevG](#), issued by Global-Mark Pty Ltd.

No substitutions or deletions are permitted for the Hermpac Bevelback Weatherboard Cavity System.

3.11.2 Timber Species & Grade

Western Red Cedar, Premium Clears No.1 - Bevelback Weatherboard

Hermpac Bevelback Weatherboard shall be manufactured from Canadian Coastal Western Red Cedar (*Thuja plicata*), [Premium Clears No.1 \(PC1\)](#) grade.

3.11.3 Weatherboard Profile

HP62 Standard Bevelback - 158mm Cover

HP62 Hermpac Standard Bevelback Weatherboard: 158mm cover, 190mm wide x 18.5mm thick.

Installed Location:

3.11.4 Weatherboard Finish & Coating

Bandsawn Face - Resene Waterborne Woodsman Oil Stain - Cedar Bevelback Weatherboard

The selected Hermpac Cedar Bevelback Weatherboard shall be manufactured with a Bandsawn Face (BSF), and pre-finished with Resene Waterborne Woodsman Penetrating Oil Stain to the specified colour, factory-applied by the Machinecoat Floodcoat coating system.

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Colour:

3.11.5 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works, including membranes, flexible underlays, rigid air barriers, and trims and any other related works are completed in accordance with the Hermpac Cavity System Installation Specification and Construction Drawings.

Refer www.herpac.co.nz, email: technical@herpac.co.nz, or call 09 421 9840 for any technical assistance required, and ensure that current Hermpac technical literature is referenced and followed when installing Hermpac weatherboards.

Coordinate with trades the locations of pipes, outlets, cables, meter boards and other fittings installed by others, and to install Hermpac Weatherboard Cladding System as required.

3.11.6 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation work shall be carried out by suitably qualified and experienced tradespersons, familiar with the specified products and the required construction and installation techniques, in accordance with the requirements of the Hermpac technical literature and associated BRANZ Appraisal, NZBC E2/AS1, and as noted and detailed on the approved construction drawings.

Upon completion of the installation, the installing LBP shall complete and sign a Restricted Building Work (RBW) memorandum and the associated Hermpac Weatherboard Cladding System Quality Assurance Check List. Issue a copy of the RBW document to the Building Consent Authority and to the Main Contractor.

All work shall be such as to leave a neat, efficient, robust and weathertight installation, to the required standard, free from damage and defects, including surface marking.

Make all necessary provisions to protect adjacent finished work and surfaces from damage during installation.

Refer www.herpac.co.nz, email: technical@herpac.co.nz, or call 09 421 9840 for any technical assistance required, and ensure that current Hermpac technical literature is referenced and followed when installing Hermpac weatherboards.

3.11.7 Delivery & Handling

Store weatherboards and accessories undercover, flat and true, clear of the ground by at least 150mm and supported on dry and clean timber bearers at maximum 900mm centres in accordance with Hermpac recommendations. Keep stored weatherboards and accessories dry and protected from damage and contamination, and free from bending or excessive compression.

Do not use damaged or defective weatherboards or accessories.

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Dock any oversized knots, unacceptable or unrequired grade characteristic, or damaged areas of weatherboard. Do not install weatherboards during periods of wet weather. Double seal all cut ends and fresh cut timber with selected exterior coating.

Handle weatherboards in accordance with the manufacturer's recommendations and in a manner that prevents damage and surface marking.

Installers shall be familiar with, and comply with, the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform with all relevant [WorkSafe NZ](#) Guidelines and Codes of Practice - including the [Best practice guidelines for working at height in NZ](#), and the [OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry](#).

3.11.8 Preparation

Direct Fix over Flexible Underlay - Bevelback Weatherboard

Hermpac Bevelback Weatherboard Direct-Fixed over a Flexible Wall Underlay on Timber Framing - check all aspects of preparatory works, including, but not limited to:

- Check that the timber wall framing complies with NZS 3604, has studs at maximum 600mm centres and nogs/dwangs at maximum 800mm centres for horizontal cladding, is plumb and in true alignment, includes all blocking required for fixing at openings, joints, corners, soffits, etc., and has a maximum moisture content of 18% at the time of cladding installation.
- Check that the flexible wall underlay, as specified, has been installed in accordance with NZBC requirements and the manufacturer's recommendations, and with all finishing tapes, flashings etc. at windows, doors, corners and penetrations all correctly incorporated to provide a continuous seal.
- Check that all preparatory materials are lapped such that any water will run down to the exterior.

3.11.9 Installation

General Requirements

Install the specified Hermpac Weatherboard Cladding System, complete with accessories, in accordance with the Hermpac installation requirements and technical literature and as shown on the approved construction drawings.

Confirm the layout and location of all control joints; the layout of cavity battens; and any specific cladding detailing requirements prior to installation.

Ensure that all associated preliminary and preparatory works are completed to the required standard and specification, and as shown on the drawings.

Ensure that the current and up-to-date Hermpac installation and technical literature is readily available on site for reference during installation.

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Weatherboard soaker and/or flashing material compatibility shall be in accordance with NZBC E2/AS1 2.2, and as shown on the drawings.

Ensure all cut ends and fresh timber is double coated and sealed in accordance with Hermpac requirements before fixing.

Refer to Fixing for fixing type and placement etc.

All internal and external weatherboard corner junctions, inter-storey junctions, and weatherboard trim and accessories, shall be constructed and installed to the details shown on the drawings.

Always keep Hermpac weatherboard cladding lines consistent and true along walls and around corners.

All flashings around windows, doors and other openings, at corner junctions, inter-storey junctions, soffit junctions, and pipe penetrations, shall be carefully constructed, fixed and finished to the details shown on the drawings.

Direct Fix over Flexible Underlay - Bevelback Weatherboard

Hermpac Bevelback Weatherboards direct-fixed to timber framing over a flexible wall underlay:

Back flash all internal and external corners with Hermpac aluminium corner flashings.

Carefully set-out and fix the base weatherboard to the timber studs, level along the base line, minimum 50mm, or as detailed, below the bottom plate or floor structure.

Install full length weatherboards where possible. From the base board upwards, level and true the weatherboards to the framing.

Where joints are unavoidable, scarf the weatherboards at 30° directly over a stud line, and fix weatherboard ends as specified and just clear of the scarf join.

Overlap, joint and fix direct-fixed Hermpac Bevelback Weatherboards in accordance with Hermpac installation requirements and as detailed on the drawings. NB: Ensure weatherboard end-grains are double coated.

3.11.10 Fixing

Crown Head Nail, Silicon Bronze - Cedar Bevelback Weatherboard

Fix Hermpac Cedar Bevelback Weatherboards with Silicon Bronze Annular Grooved Hermpac Crown Head Nails in accordance with Hermpac fixing requirements and as shown on the drawings.

The nail shank must be minimum 3.15mm diameter for cavity-fixed weatherboards, or 2.9mm diameter for direct-fixed weatherboards.

When fixing with crown head nails (used most often for an oil/stain finish), the nail length must allow minimum 30mm penetration of the wall frame.

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All nail fixings shall be pre-drilled a maximum of 1mm diameter smaller than the nail gauge.

Ensure the weatherboards are set-out with an overlap of 32mm.

Single fix weatherboards at every fixing point, with nails driven in a slight upward slope, located 35-40mm from the bottom edge of the weatherboard, and no closer than 32mm from the end of the board.

Nails shall be set flush onto the board surface - not into or below the surface.

The hidden top lap must be restrained using the Hermpac Clinch Nail at every fixing point, with the nail shank flush against the top edge - the nail must not be fixed through the lap, refer to Hermpac details for correct placement.

3.11.11 Completion

Check that the specified Hermpac Weatherboard System has been correctly installed and fixed to the layout and details shown on the drawings; that all joints, associated trim and accessories finished correctly; and that all openings and penetrations have been properly flashed and sealed.

Check for damaged materials and defective work - carry out repairs as necessary to the required standard.

Ensure that the work of other trades does not negatively impact on or reduce the minimum clearances required by the NZ Building Code, between the cladding and ground, roof and/or deck junctures.

Leave all of this work complete and weathertight and to the required standard in accordance with Hermpac requirements and NZBC E2/AS1.

Leave the completed works and surrounding surfaces clean and free of debris and rubbish. Remove all rubbish and excess material from the site.

Complete and sign the Restricted Building Work (RBW) memorandum, and the Hermpac Weatherboard Cladding System Quality Assurance Check List. Issue a copy of the RBW document to the Building Consent Authority and to the Main Contractor.

Issue to the Owner a copy of the Hermpac Weatherboard Cladding System maintenance requirements.

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4 ROOFING

4.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

4.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1397:1993(AS/NZS)	Steel sheet and strip - hot-dipped, zinc-coated or aluminium/zinc-coated
1562.1:1992(AS)	Design and installation of sheet roof and wall cladding. Part 1: Metal
2295:2006(NZS)	Pliable, permeable building underlays
3604:2011(NZS)	Timber-framed buildings

4.3 COLORSTEEL®

4.3.1 Scope

Inland - Moderate (ISO C2)

Supply the selected Colorsteel roofing and install on the areas identified on the Roof Plan. All aspects of the work shall be in complete accordance with NZ Steel 'Installers Guide' (check 0800 100 523 for the latest edition) and any other relevant Product Manufacturers Recommendations.

4.3.2 Product

Colorsteel Endura

COLORSTEEL® Endura™.

Colour:

4.3.3 Profile

Corrugated 0.40mm

Corrugated 0.40 BMT x G550.

Location:

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4.3.4 Qualifications

Qualifications

All installation work shall be carried out by experienced and competent tradesmen who are familiar with the techniques and materials specified. All handling and fixing techniques, and all jointing and sealing materials and techniques, shall be exactly as recommended by New Zealand Steel.

4.3.5 Co-operation

Co-operation

Co-operate with other trades to ensure that roof framing has appropriate spacings, alignments and fixings, and is in accordance with NZS3604, and coordinate to ensure that all timber members required for ridges, hips, valleys, barge, penetrations, junctions with vertical faces, etc. are correctly in place.

Note and co-ordinate with the installer of the rainwater system specified above. Handle roofing without scratching, distortion or other damage, store on even bearers, and keep dry until installed. Ensure that each section of roof is waterproofed as soon as possible after preparatory work is complete; allow to carry out the works in several operations if necessary to comply with this condition.

4.3.6 Installation

Installation

Set-out the roofing sheets exactly square to building axis and maintain this accurate setout throughout the works, and set-out to lap sheets away from the prevailing wind.

Install the underlay running up and down the slope with minimum 300mm side laps. Do NOT install any fixings to the underlay (to avoid dissimilar metals/electrolysis) - install the underlay length by length as the roofing proceeds and ensure it is taut and evenly lapped when the roofing screws are installed.

4.3.7 Fixings

Fixing

Screw fix, screws to comply with AS3566 (Self-drilling construction screws) Class 3 or 4. (Do NOT use stainless steel screws). Use only low carbon (

4.3.8 Flashings

Flashings

Ridges, hips, and barge flashings etc. shall all be matching Colorsteel, and as detailed. Soft zinc flashing edges very neatly dressed down where required, plumbing penetrations custom flexible rubber flashed (fully sealed), and instruct the Plumber that no copper (or brass) pipes are to discharge on to the roof.

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4.3.9 Protection

Protection

Protect the coated surface from damage at all times; replace the whole sheet where a significant depth of the coating has been damaged. Completely clean off all drill and power saw swarf and pop-rivet shanks as the work proceeds (at least daily, and keep them and other rubbish out of the spoutings). Remove trade debris from the roof and from the site progressively, and on completion leave the roof and rainwater system completely clean.

Do not use black lead pencils for marking Colorsteel - permanent marking may result. Observe NZ Steel's recommendations where flues discharge above roofs, and for the installation of solar heating panels. Do NOT weld Colorsteel. NO abrasive disc cutters, no soldering, no lead head nails or lead edged flashings, no touch-up paints, and do not slide tools down the roof.

4.3.10 Maintenance

Maintenance

Advise owner to minimize walking on the roof, and to use soft-sole shoes during maintenance access. Advise owner re maintenance of unwashed surfaces, and to light detergent wash the whole roof every three to five years. Advise owner that any leaf build-up gutter protection system that traps water will invalidate the roofing warranty.

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5 ALUMINIUM JOINERY

5.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

5.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1865:1997(AS/NZS)	Aluminium and aluminium alloys - Drawn wire, rod, bar and strip
2208:1996(AS/NZS)	Safety glazing materials in buildings
4211:2008(NZS)	Specification for performance of windows
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
AS/NZS 1231	Aluminium, anodic coatings
AS/NZS 1866	Aluminium / alloys - extruded sections
AS/NZS 4666:2012	Insulating glass units

5.3 Aluminium Windows

5.3.1 Alternatives

Alternatives Option 1

The materials and elements specified indicate the required standards for these works. Alternatives which are equal to or superior to these materials and elements may be tendered for approval.

Thermal performance (NZBC H1/AS1) must be as required to meet the Designer's Thermal Evaluation.

5.3.2 Installation Type

Timber Frame Installation - Direct Fix

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ.WIS), and details on the drawings or supplied by the windows manufacturer.

Check framing alignment, and that window openings are square and the correct size for fitting tolerances.

Prepare framing openings by neatly cutting the building wrap at 45° into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape,

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stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the sill flashing, extending from an upstand lip behind the line of the aluminium frame out to lap a minimum of 35mm down over the top of the cladding, sloping at 15° unless the glazing weight requires the frame be blocked up for support. (If the flashing is level for blocking-up the sill, upstand its ends to create 'dams' as shown in E2/AS1).

Set shims or pack as necessary and install the frames exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15° down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm, before finishing with a 5mm 45° 'kick out'. Seal between head flashing and cladding at the ends as detailed. Install jamb flashings/sealant or scribes as detailed.

After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

Timber Frame Installation - Cavity Construction

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.

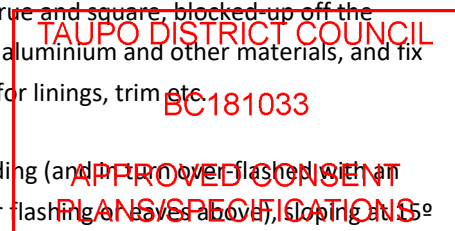
Check framing alignment, and that window openings are square and the correct size for fitting tolerances.

Prepare framing openings by neatly cutting the building wrap at 45° into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape, stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the WANZ extruded aluminium support bar with built in drainage and ventilation to NZBC E2, to provide continuous support to the window unit. Install the head cavity closer, positioned to provide a 15mm drip edge to the cladding.

Set shims or pack as necessary and install the frames exactly true and square, blocked up off the support bar as required. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15° down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm, before finishing with a 5mm 45° 'kick out'. Upstand the head flashing ends as detailed. Install jamb flashings/ sealant or scribes as detailed.



After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

5.3.3 Interior Finish

Architraved

Architraved.

5.3.4 Reveal

Timber Finger Jointed - 19mm

Timber reveals for paint finish with all sides primed.

5.3.5 Glass Platform

Double Glazed

Double Glazed.

5.3.6 Finish

Powder Coated Aluminium - Matt

Polyester powder coating in accordance with WANZ Powder Coating Quality Assurance System and AAMA 2603-98 performance is required.

5.3.7 Hardware

Colour Matched Hardware

Hardware colour matched to Aluminium Joinery: confirm with owner prior to manufacture of joinery

Hinges, stays, catches, fasteners, latches, locks and furniture as offered by the window and door manufacturer. Key alike all lockable window hardware able to be keyed alike.

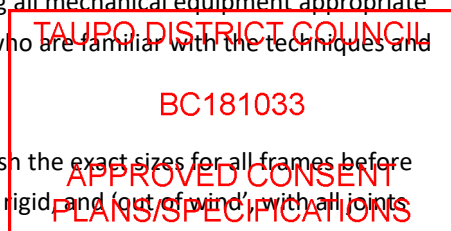
Account for all keys and deliver separately to the site manager. Factory fit all required and scheduled hardware.

5.3.8 Workmanship

Workmanship

These windows will be manufactured in workshops containing all mechanical equipment appropriate for the work, and by experienced and competent tradesmen who are familiar with the techniques and materials specified.

The manufacturer will co-ordinate with other trades to establish the exact sizes for all frames before fabrication. Frames and sashes will be fabricated true, square, rigid and 'out of wind', with all joints strongly mechanically fixed, and with mitres tight and fully sealed. Potential thermal, wind and seismic movements will be accommodated within the construction. All cavities will drain to the exterior, and all drilling swarf etc. will be removed during fabrication.



Stays, hinges, running gear and glazing will be installed as scheduled (the Designer will be notified if any scheduled hardware of fixing position appears to be inappropriate for this project).

Hardware will be fixed true to line and position, and adjusted and oiled as required for correct operation.

Glass will be cut true and square, sized to provide correct edge clearances, blocked into place as required, and all units will be delivered either pressure fit, pocket glaze, or beaded/wedged, unless site glazing is required. Glazing gaskets will be compatible with all adjacent materials, and cut 1% over-length to absolutely avoid stretching during installation. Frames will be braced etc. as necessary for transportation to the site.

Flashings as detailed will be supplied. Flashing materials will be compatible with the windows.

5.3.9 Delivery and Installation

Delivery and Installation

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and the construction principles that are embodied in the Acceptable Solutions.

Arrange for delivery of windows to the site only when a suitable storage situation is available for them, handle the windows in accordance with the manufacturers requirements, avoid any frame distortion, avoid rubbing damage, avoid contact with concrete, plaster, mud etc. and keep them dry. Retain protective coverings for as long as possible, and remove them at completion.

Experienced and competent tradesmen who are familiar with the techniques and materials specified shall carry out all installation work. Fix in accordance with the manufacturer's instructions. Take utmost care to avoid damage to anodized or powder coated surfaces - correction of any such disfigurement requires written authority - replace any badly damaged items.

Use fixings compatible with the materials involved, as recommended by the windows manufacturer and to comply with the DWP requirements, basically aluminium or Type 316 stainless steel where exposed externally; galvanized to AS/NZS 4680, 610g/m2, may be used where not exposed.

Thoroughly check all preparatory work to openings prior to installation, including wrap, corner seal tapes, adjacent cladding, pre-installed flashings, etc. as appropriate. Use inert barriers or coatings to prevent contact between dissimilar metals or between aluminium and concrete.

Install flashings as detailed and supplied by the windows manufacturer, installed tightly and neatly with absolute minimum tolerances, with head weathering jamb, jamb weathering sill, and sill open (draining) to exterior. Except where the window is recessed all head flashings shall extend 30mm minimum beyond the frame.

Air-seal all frame perimeters to adjacent structure to a depth of 15 - 20mm with expanding foam or appropriate sealant including a PEF rod at head, sill and jambs to retard the spread of sealant.

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Weather-seal frame jambs etc. to adjacent surfaces (or to each other) as detailed or as required by the windows manufacturer, to achieve a fully watertight installation. In preparation for sealant the joints shall be clean, dry, and primed if necessary. Insert closed cell polyethylene backer rods or a polyethylene tape slip layer if required. Mask adjacent surfaces if appropriate, install the sealant fully in accordance with the sealant manufacturers recommendations, and finish to even smooth surfaces.

Remove trade debris progressively, appropriately clean any affected adjacent surfaces, thoroughly clean the windows, check that all hardware is in full working order, and provide safety indication of the glass for the balance of adjacent works.

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6 GLAZING

6.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

6.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.0:2002SUPP1(AS/NZS) A1	Structural design actions - General principles - Commentary: Amendment 1
1170.5:2004(NZS)	Structural design actions - Earthquake actions - New Zealand
2208:1996(AS/NZS)	Safety glazing materials in buildings
3604:2011(NZS)	Timber-framed buildings
4211:2008(NZS)	Specification for performance of windows
4223.1:2008(NZS)	Code of practice for glazing in buildings - Glass selection and glazing
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4223.4:2008(NZS)	Glazing in buildings - Part 4: Wind, dead, snow, and live actions
4223.SUPP1:2008(NZS)	Code of practice for glazing in buildings - Supplement 1 to NZS 4223.1:2008 and NZS 4223.4:2008
4232.2:1988(NZS)	Performance criteria for fire resisting enclosures - Part 2: Fire resisting glazing systems
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
4668:2000 (AS/NZS)	Glossary of terms used in the glass and glazing industry
AS/NZS 4666:2012	Insulating glass units

6.3 Non-Structural Glazing

6.3.1 Scope

Scope

Supply and install the selected glass products to the windows, doors, curtain wall systems, roofs and canopies, balustrades and barriers, partitions and screens, and other non-structural glazing elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the glass manufacturer's installation requirements and recommendations, other relevant product manufacturers' recommendations, and as shown on the drawings.

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6.3.2 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Co-ordinate with other trades for all necessary holes and cut-outs etc. for glass mounted hardware, fittings and fixtures, and to install all glass and glazed elements as required.

6.3.3 Workmanship

Workmanship

All installation work shall be carried out by experienced and competent tradesmen familiar with the products specified and installation techniques, to the manufacturer's requirements and recommendations, and the requirements of the relevant Glazing Standards, and to the layout and details shown on the drawings.

Handle and store glass in accordance with the manufacturer's recommendations.

Provide temporary safety markings to all glass panes as the installation work progresses.

Finish all external glazing wind and watertight.

Do not use damaged, marked or faulty materials.

6.3.4 Glass Type

Clear Float Glass

Clear Float Glass: Clear annealed float glass, in accordance with NZS 4223, to the locations identified on the drawings.

Manufacturer, brand name & type: TBC

Obscure Patterned Glass

Obscure Patterned Glass: Surface patterned obscure glass, in accordance with NZS 4223, to the locations identified by the home owner.

Manufacturer, brand name & type: TBC

Toughened Safety Glass

Toughened Safety Glass: Toughened Grade 'A' Safety Glass, in accordance with AS/NZS 2208 and NZS 4223, to the locations identified on the drawings. All cutting and drilling and other processing requirements shall be done prior to toughening. Install safety glass in accordance with the manufacturer's recommendations and NZS 4223.

Manufacturer, brand name & type: TBC

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6.3.5 Insulating Glass Units

Insulated Glass Units (IGU's)

Insulating Glass Units. Sealed, gas filled, insulating glass units manufactured and installed in accordance with AS/NZS 4666, and the Insulating Glass Manufacturers' Association recommendations, to the locations identified on the drawings.

Manufacturer, brand name & type: TBC

External Glass, type & thickness:

Space width and Gas:

Internal Glass, type & thickness:

6.3.6 Components & Accessories

Aluminium Framed Glazing

Provide all necessary glazing components and accessories including glazing tape, setting and distance blocks, sealants, gaskets, etc., to complete aluminium framed glazing as required.

6.3.7 Installation

Aluminium, Double Glazed (IGU's)

Install Insulated Glass Units into aluminium frames in accordance with the glazing manufacturer's recommendations and NZS 4223, and as detailed.

6.3.8 Completion

Completion

Check that all glass has been installed correctly to the required standard and as shown on the drawings. Check for damage and surface marking and replace as necessary. Clean off and remove all temporary safety markings, as programmed and when instructed, and leave glass trade clean.

Remove all rubbish and waste material from site.

Issue to the Owner a copy of the Glass Manufacturer's maintenance requirements and all necessary Manufacturer Warranties.

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7 INSULATION

7.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

7.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3604:2011(NZS)	Timber-framed buildings
4220:1982(NZS)	Code of practice for energy conservation in non-residential buildings
4243.1:2007(NZS)	Energy efficiency - Large buildings - Building thermal envelope
4246:2016(NZS)	Energy efficiency - Installing bulk thermal insulation in residential buildings
4859.1:2002(AS/NZS)	Materials for the thermal insulation of buildings - General criteria and technical provisions

7.3 Thermal Insulation

7.3.1 Scope

Scope

Supply and install the selected products as thermal insulation to the specified R-values, complete with all accessories, to the floors, walls, ceilings, roofs, and other thermally insulated building elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the product manufacturer's technical literature and installation requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

7.3.2 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Co-ordinate with other trades to install all thermal insulation as required.

7.3.3 Workmanship

Workmanship

All installation work shall be carried out by experienced and competent tradesmen, familiar with the specified products and installation techniques, in accordance with the manufacturer's installation requirements, and as noted and detailed on the drawings.

Store and handle products in accordance with the manufacturer's recommendations, keep dry and

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protect from damage. Do not compress fibre insulation bales, do not use damaged or faulty insulation products and accessories.

The building must be completely enclosed and water tight before installation commences with the exception of roof insulation when installed with roofing. Ensure the moisture content of timber framing is no greater than 18% prior to installing insulation to timber framed elements. Always maintain the full insulation thickness to ensure the required thermal values are achieved. Do not install insulation pads or blankets into closed cavities that are less than the stated insulation nominal thickness.

7.3.4 Product

Glass Fibre Pads

Glass fibre thermal insulating pads.

Manufacturer, brand name & type: Pink Batts or similar approved

R-Value: refer to H1 calculations

Location: refer to H1 calculations

Glass Fibre Blanket

Glass fibre thermal insulating blanket.

Manufacturer, brand name & type: Pink Batts or similar approved

R-Value: refer to H1 calculations

Location: refer to H1 calculations

7.3.5 Installation

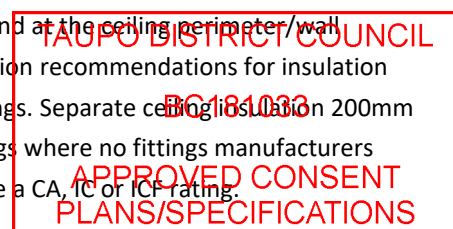
Wall Insulation - Glass Fibre Pads

Install glass fibre insulation pads, complete with accessories, friction fitted between wall studs and dwangs etc. and held in place in accordance with the manufacturer's installation recommendations. Completely fill the framing voids, leave no gaps at the edges or at penetrations etc, and maintain full insulation pad thickness. Support external wall insulation with vertical strapping tape at 400mm centres to the outside face, stainless steel stapled to the framing.

Ceiling Insulation - Glass Fibre Blanket

Install glass fibre insulation blanket, complete with accessories, friction fitted between the ceiling framing over the ceiling lining in accordance with the manufacturer's installation recommendations.

Leave no gaps along the insulation blanket edges and joints, and at the ceiling perimeter/wall junction. Refer to the electrical fitting manufacturer's installation recommendations for insulation separation requirements around their recessed electrical fittings. Separate ceiling insulation 200mm from recessed light fittings and other recessed electrical fittings where no fittings manufacturers installation information is available and product does not have a CA, IC or ICF rating.



7.3.6 Completion

Completion

Check that all insulation has been installed correctly and is correctly supported and that all edges, joins and ends are fully closed without gaps. Check for damage and faults and repair or replace as necessary. Collect and remove from site all rubbish and waste material.

Issue to the Owner a copy of any product maintenance requirements and a copy of the Thermal Insulation Product and Installation Warranties for the completed works.

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8 TILING

8.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

8.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3103:1991(NZS)	Specification for sands for mortars and plasters
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
4858:2004(AS/NZS)	Wet area membranes

8.3 Workmanship

8.3.1 Co-operation

Co-operation

Co-operate with the Contractor and other Subcontractors to ensure that substrates are completely appropriate for the tiling required, particularly with regard to concrete surface finish, the use of retarders, release agents or curing compounds, and with regard fixing and finishing of sheet substrates and their support.

8.3.2 Workmanship

Sequence

Delay tiling to allow maximum curing and settling and initial creep of the substrates, particularly to load bearing structural elements.

Qualifications

All work by competent and experienced tilers. Co-ordinate with other trades and instruct them as necessary to ensure appropriate substrate conditions to assure first class tiling results.

Preparation

Protect all adjacent surfaces from damage or staining during tiling: arrange any making good or cleaning required as instructed by the Architect/Designer. Wash down and remove form work, release agents, slab curing compounds, and surface retarders. Clean down with Amoult 5 Killer Etching Agents, or wire brush as required. Grind off high spots if required. Ensure that the moisture content of substrates is appropriate.

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Set-out

Set out tiles as detailed or for even margins with patterns to register in all directions. The finished surfaces shall be true and even and with lines accurate, level and plumb, or to even falls as noted, and finished flush with adjoining work as appropriate. Cut edges to the manufacturers instructions, and stone arris where the cut edges are not concealed under adjoining work.

Installation

No retempering of partially set or dried mortar, adhesive or grout. Prior to grouting rake out any excess bedding material. Grout shall be coloured as directed, placed full depth, and finish tooled to a dense, uniform surface. Clean excess grout off tiles and adjacent surfaces.

Control Joints

Form control joints at tiling edges abutting concrete or masonry, within the tiled surface to give a maximum panel dimension of 2m, and over any control joints in the substrate. Rake control joints full depth to the substrate as work proceeds, mask edges and clean out just prior to placing filler, and fill full depth and flush. Clean excess filler off the tiles or other surfaces.

Completion

On completion thoroughly clean the full tiled surfaces, and lightly buff where appropriate. Protect finished work from subsequent damage.

Exterior Tiling

No exterior tiling during inclement weather.

8.4 Materials

8.4.1 Materials

Adhesives & Grouts

All adhesives/beddings/grouts shall be selected for each specific tile/substrate situation, selected as the best readily available, and each is subject to approval by the Architect/Designer (who may require appropriate manufacturers information for consideration prior to approval).

Standards

Water, cement, sand and sand particle size grading, all exactly to the relevant NZS requirements.

Crack Control

Crack control joint filler as recommended by the tiles supplier, with the colours selected from the standard range.

Materials shall be from the same batch for even type and colour, and shall be delivered with their packaging and labeling intact.

Requirements

Store in dry areas, machine mix all materials to the manufacturers requirements, and do not mix proprietary materials.

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8.4.2 Tiles/Scope

Delivery & Handling

All tiles true to shape, free of warp, and accurate in dimensions to facilitate laying with minimum joint width. All tiles true to samples and free of imperfections. Tiles from the same batch where possible, and delivered with the original packaging and labeling intact. Tiles handled and stored carefully to preserve edges.

Setout

The exact setout will be notified with the tile(s) selection.

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9 PAINTING & DECORATING

9.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

9.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2310:2002(AS/NZS)	Glossary of paint and painting terms
2311:2017(AS/NZS)	Guide to the painting of buildings
3750.0:2008(AS/NZS)	Paints for steel structures - Introduction and list of Standards
AS 1580	Methods of test for paints
BRANZ IB 257	Wood primers
NZBC E3	Internal Moisture
NZS 7702	Colours for specific purposes

9.3 General

9.3.1 Alternatives

Alternatives - Option 1

The materials specified in this section or on the drawings indicate the required standards for these works. Alternatives which are considered equal to or superior to these may be tendered for approval (in writing, and they must NOT be used unless they are approved in writing).

9.3.2 Co-operation

Co-operation

Co-operate with all trades and attend upon Concretor, Joiner, Carpenter, etc. to ensure that the surfaces provided by these trades are completely suitable for the Painter works that are required.

9.3.3 Preparation

Preparation

No painting or varnishing or other surface coating work shall be undertaken unless the surfaces to be coated are in a correct and proper condition to ensure first class results.

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Inspect the works of other trades on which Painter work is scheduled and report to the Main Contractor and the Architect/Designer any defects or irregularities that would affect the permanency or finish of the painting work, and do not proceed until the defects or irregularities have been

completely rectified. Failure to examine and report will be construed as an acceptance that all preparatory works are completely satisfactory.

This clause does not relieve the Painter of any of the usual preparatory work to surfaces customarily performed by this trade.

Clean down all surfaces with sugar soap, strippers, mould killers, etching agents, etc. as required. Sand or rub all sharp edges off exterior timbers and other materials as appropriate before painting. Finish rub down ALL surfaces. Ensure that the moisture content of all substrates is appropriate. Remove locks, fastenings, and similar hardware before painting and refix on completion. Remove all electrical switch and power plates before painting and refix them on completion. Mask adjacent surfaces as required to a true line and remove the masking on completion. Dust and wipe down all surfaces for Painter work and completely remove all dust, rubbish, dirt etc. from areas involved immediately prior to commencement. To each area of the works complete all surface preparation before applying paint to any surface.

9.3.4 Protection

Protection

Take adequate precautions to prevent paint spots falling on prefinished or similar surfaces, and extreme care to keep absorbent materials (e.g. cedar, sawn framing, decking, paving) completely clean during all adjacent painting work. Correction of any such disfigurement shall be to the Architect/Designer's approval.

9.3.5 Qualifications

Qualifications - Option 2

All work by the Painting Subcontractor shall be of the highest reasonable standard, and executed by experienced and competent tradesmen to the Architect/Designer's approval.

9.3.6 Workmanship

Workmanship

Strictly adhere to all Manufacturers' instructions.

Strictly observe Manufacturers' requirements with regard to surface and air temperatures for painting. No work shall be carried out on surfaces that are not completely dry, and no external work shall be carried out during damp or wet conditions.

In all finishes any irregularities or brushmarks or dust etc. in each preceding coat shall be rubbed down to provide a smooth clean surface for the following coat. Each coat shall be finished over all surfaces before a further coat is applied, and each coat shall be completely dry before subsequent coats. Finish broad areas before painting trim, paint ceilings before walls and walls before joinery, trim and other items.

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Each coat and the full completed system shall be of uniform finish, colour, texture and sheen, shall have proper covering of thin edges, corners, end grain etc. and shall be free of blemishes such as runs, sags, fat edges, entrained hairs, brush marks, starved patches etc.

9.3.7 General

General

The schedules indicate the general extent of the works to be carried out but are in no way exhaustive in their description of the actual items for painter work. Complete all work necessary for the proper and entire completion of the works. All items and portions of items reasonably inferable but not specifically mentioned are deemed included, i.e. cupboard interiors, the top and bottom of doors, unseen cabinetry tops, etc. All doors shall have equal painter work on ALL surfaces.

Where timber work is specified for priming before fixing the priming shall be thoroughly brushed in to all surfaces, and all exterior timber work for paint finishing shall be fully primed within one week of fixing. Should more than one month elapse between priming and undercoating the timber shall be fully reprimed.

Stopping up work shall be carried out immediately the priming or sealing coat is dry, and shall be solidly placed to finish clean and dry. Stopping tinted to match the timber for clear finished work.

9.3.8 Materials

Materials

All Painter materials shall be ready mixed and delivered in unopened containers. Materials shall be used only for the purpose and in the manner intended by the manufacturer; any apparent scheduled discrepancy in this respect shall be referred to the Architect/Designer immediately for clarification.

Where surfaces are specified to be finished in a particular manner or material, all preparatory work, priming, or undercoating, that is necessary to ensure a proper finish shall be provided, irrespective of any apparent omission herein.

In water splash or wet areas that require a paint finish the paint must be gloss or semi-gloss finish as per NZBC E3/AS1 3.1.2.

Thinning shall only be to manufacturer's specification. Thoroughly stir as required to lift any settled pigment and ensure the paint is homogeneous. Paints shall be factory or shop tinted to the colour required. Undercoats shall be fully tinted to match the final colour scheduled. All paints shall have the finished film thickness that is specified by the manufacturer (checked by monitoring the coverage per litre).

9.3.9 Completion

Completion

Allow to touch up to approval any Painter work which is damaged during the finishing works of other trades. Replace all hardware, remove all masking, covers, containers etc., thoroughly clean all

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affected surfaces, and leave all spaces ready for immediate occupation. Avoid scratching or abrading glass or hardware during any cleaning.

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10 PLUMBING

10.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

10.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1221:1997(AS/NZS)	Fire hose reels
1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1477:2017(AS NZS)	PVC pipes and fittings for pressure applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
2032:2006(AS/NZS)	Installation of PVC pipe systems
2033:2008(AS/NZS)	Installation of polyethylene pipe systems
2492:2007(AS/NZS)	Cross-linked polyethylene (PE-X) pipes for pressure applications
2537.1:2011(AS/NZS)	Mechanical jointing fittings for use with crosslinked polyethylene (PE-X) for pressure applications - Part 1: Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - General
2642.2:2008(AS/NZS)	Polybutylene pipe systems - Polybutylene (PB) pipe for hot and cold water applications
2712:2007(AS/NZS)	Solar and heat pump water heaters - Design and construction
3500.1:2015(AS/NZS)	Plumbing and drainage - Part 1: Water services
3500.2:2015(AS/NZS)	Plumbing and drainage - Part 2: Sanitary plumbing and drainage
3500.3:2015(AS/NZS)	Plumbing and drainage - Part 3: Stormwater drainage
3500.4:2015(AS/NZS)	Plumbing and drainage - Part 4: Heated water services
3500.5:2012(AS/NZS)	Plumbing and drainage - Part 5: Housing installations
3501:1976(NZS)	Specification for copper tubes for water, gas, and sanitation
4121:2001(NZS)	Design for access and mobility: Buildings and associated facilities
4305:1996(NZS)	Energy efficiency - Domestic type hot water systems
4517:2010(NZS)	Fire sprinkler systems for houses
4541:2007(NZS)	Automatic fire sprinkler systems
4602:1988(NZS)	Low pressure copper thermal storage electric water heaters
4603:1985(NZS)	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems)

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4606.1:1989(NZS)	Storage water heaters - General requirements
4607:1989(NZS)	Installation of thermal storage electric water heaters: valve-vented systems
4613:1986(NZS)	Domestic solar water heaters
4614:1986(NZS)	Installation of domestic solar water heating systems
4617:1989(NZS)	Tempering (3-port mixing) valves
4692.1:2005(AS/NZS)	Electric water heaters - Energy consumption, performance and general requirements
4766:2006(AS/NZS)	Polyethylene storage tanks for water and chemicals
5262:2003(NZS)	Gas appliance safety
5601.1:2013(AS NZS)	Gas installations - Part 1: General installations
7602:1977(NZS)	Specification for polyethylene pipe (Type 5) for cold water services
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
7646:1978(NZS)	Specification for polyethylene pipes and fittings for gas reticulation
AS/NZS 1596	LP gas handling and storage
AS/NZS 2053	Specification for unplasticized PVC conduit and fittings for electrical wiring
NZBC G12	Water Supplies
NZBC G13	Foul Water

10.3 General

Carry out all works necessary to leave the water, waste, vent and soil systems serving the sanitary fittings and the plumbing hardware shown on the drawings or specified below in correct working order complete with all ancillary systems (safetrays, floor drains, overflows, relief valves, etc.) required, and with all normal incidentals customarily installed by this trade.

Comply with the Building Code, Territorial Authority By-laws and statutory authority Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange for all tests and pay all fees and customary charges in connection with the required works.

10.4 Workmanship

10.4.1 Co-operation

Co-operation

Co-operate with all other trades. Attend upon Concretor, Drainlayer and Carpenter to set out the exact positions of pipe runs before adjacent work is put in hand, and to ensure that all pipes, sleeves, fixings, flashings etc. are correctly incorporated into the structure as construction proceeds.

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10.4.2 Workmanship

Qualifications

All plumbing work shall be carried out by, or under the direct control of, properly qualified tradesmen, and shall be to recognised high standards.

Winter Conditions

Observe best local trade practice to avoid problems which arise from freezing winter conditions.

Cutting & Checking Timber

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials only to approval. Install seismic restraints to storage tanks and HWCs.

Weatherseal

Weatherseal wherever pipes, screws, bolts or other fastenings penetrate an external surface, and particularly roofing; seal with gaskets, flashings (and overflashings if necessary) or mastic as appropriate - any damage that results from failure of such seals will be made good at the Plumber's expense.

Protection

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Plumber's expense.

10.4.3 Pipework

Joints

Joints between pipes of different materials shall always be to the approval of the TA Plumbing Inspector.

Pipework Set-out

Pipework set-out neatly with a minimum number of bends, and more or less parallel to and at right angles to structural elements - avoid diagonal piping.

Concealed & Exposed Pipework

All internal pipework shall be concealed except where otherwise is either shown or approved. Exposed pipework shall be accurately and neatly run. Arrange all pipework (and particularly traps) in a manner which will allow maximum future accessibility for repairs or maintenance. Arrange for access panels to any primary maintenance positions, and install conveniently located isolating valves for each group of fittings. Wingbacks securely and squarely fixed. Crox unions usually acceptable only at the final connection to fittings. Install white plastic flanges where pipes penetrate linings in visible locations.

Marked Positions

Where pipes are covered with nail fixed linings and trim ensure that their positions are marked on the linings to minimise the risk of subsequent nailings penetrating the pipe. Any such damage shall be rectified immediately, with all consequential damage made good.

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Fixing Pipework

Set pipework out in straight runs to even gradients. Fix all pipes to the structure sufficiently to fully support and to prevent sagging or vibration. Clips and saddles shall be the same material as the pipe.

Exterior pipes on stand-off brackets. Fixings to the exterior or damp locations shall all be hot dip galvanized unless otherwise noted. Sleeves for pipes or drains penetrating concrete or masonry shall be uPVC, 20mm minimum larger internal diameter than the external diameter of the pipe, finished flush with concrete or masonry, and packed and mastic sealed.

During Construction

Close open ends of the systems during construction to prevent the entry of foreign matter.

10.4.4 Temperature Movement

Thermal Issues

All work shall respect in full all probable thermal movements - layouts, fixings and jointings shall be arranged to allow thermal movement without risk of prejudice to watertight conditions, or risk of damage from straining of the pipes which will generate failures.

In particular, observe best local trade practice to avoid problems arising from freezing conditions.

10.4.5 Excavation

Excavation Requirements

Allow to carry out all excavation that is required to suit the services installed by this trade. Check for other services before excavation. Trenches true to line and level, base of trenches clear of loose material, and shore trenches as required to suit the ground conditions. Backfilling shall be carried out by this trade, and be to the requirements specified in Siteworks.

10.4.6 Testing

Services Testing

All plumbing services shall be completed in stages which will allow for proper testing under normal working pressures prior to the application of insulation, concealment or other enclosure. All leaks remedied and retested. On completion the whole of the plumbing services to be subjected to full operational tests in the presence of the plumbing inspector, with any defects revealed in these tests properly remedied.

10.4.7 Warranties

Warranties Submittal

Warranty cards and manufacturer's guarantees for all items supplied and installed by this trade shall be correctly filled in and handed over at Practical Completion.

10.5 Materials

10.5.1 Materials

Materials Quality

Materials shall be delivered with packaging and labeling intact. Incidentals (jointing compounds, PTFE tape, seals, washers, silfos, solvent cements, etc.) shall be completely appropriate for the application involved. The use of imperfect items or items damaged in any way is always subject to approval.

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10.5.2 Materials Separation

Materials Separation

Separate dissimilar metals in any circumstances which could produce contact or electrolytic action by a water film, with thick plastic tape, bituminous felt or other inert material. Pipes in contact with or built into concrete or masonry shall be fully spiral wrapped in Denso tape or equal.

10.6 Systems

10.6.1 Wastes & Vents

Sizes & Falls

All traps sized to AS 3500.2. Wastes and vents all uPVC. Wastes shall be to AS 3500.2 falls as a minimum. Vents shall be generally as indicated, but avoid where permissible in compliance with AS 3500.2, or shall be combined above the flood level of the fittings.

Bird-proof Domes

Fit bird proof domes to all vents.

10.6.2 Cold Water System

Supply From Existing Toby

All cold water supply pipework shall be polybutylene, arranged and fixed so that all joints are in a fully 'relaxed' condition, without any stress or tension.

Lay on a 20mm main from the existing toby along the route designated by the plumber to the connection position designated by the plumber (pipe depth, protection, backfilling, signal strip etc. to comply with all Supply Authority requirements). At the connection position take a branch feed off for the hosecocks (and reticulate to the positions shown and install angle hosecocks) and toilet cisterns and then take the main feed through an accessibly positioned cleanable in-line sediment and dirt filter.

Primary distribution from the water filter shall be in 20mm piping, with water pipe sizes to individual fixtures sized to suit clause 5.3.1 of NZBC G12/AS1. Install conveniently located isolating valves to turn off each group of fittings, and install a small isolating valve alongside each toilet cistern not integrally fitted with one. (Note that these isolating valves and the hosecocks are not covered by the Plumbing Hardware Prime Cost Sum).

10.6.3 Hot Water System

Gas Instant Hot Water Device

Supply the gas instant hot water device complete with a wall recess box as noted on the drawings and install it where shown on the plan and elevation.

Install pressure relief valves, cold water expansion valves, flow control valves, pressure limit valves, and non-return/isolating valves as required to leave the hot water systems in full Design Operational order.

Install a tempering valve to control the hot water temperature at any sanitary fixture used for personal hygiene at not more than 55°C.

Flush all pipework before making the final connections. Lag the main distribution pipes full length

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with wall pipe insulation.

Showers shall have priority feeds, without 'tees', and the pipework layout shall ensure that the showers temperature and pressure remain as even as possible.

10.6.4 Gas Fitting

Scope

Is included in the Plumbing trade, although all work must be carried out by Registered Gasfitters, and be in complete accordance with all relevant Regulations and standards and be in full accordance with best trade practice.

Obtain all necessary permits and pay all fees. If necessary obtain a Dangerous Goods Licence for the storage installation in the name of the Owner; and if the Owner's signature is required forward all relevant papers to the Architect/Designer.

Testing & Compliance

Test the full systems to all relevant requirements; if any faults are discovered rectify them and then re-test the full system.

Check that all necessary flues comply in all respects with the regulations and the item manufacturer's requirements.

10.7 Elements

10.7.1 Sanitary Fittings

Sanitary Fittings - Option 1

Supply and fix all of the sanitary fittings as scheduled on the drawings. All fittings checked on delivery for 'perfect' condition, and all fittings plain white. Supply and fix all normal accessories that are not usually supplied with the fitting.

The Plumber is responsible for fittings from delivery until Practical Completion of the contract.

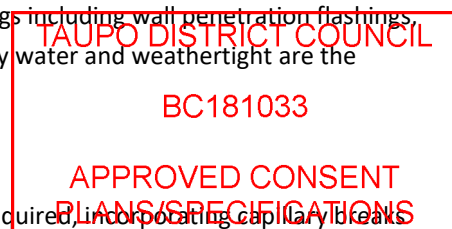
10.7.2 Flashings

Responsibility

Ridges, hips, barges, valleys, aprons etc. flashings all supplied and installed by the Roofer. Metal windows flashings (those installed during windows installation ONLY) will be supplied by the windows subcontractor and installed by the Carpenter. All other flashings including wall penetration flashings, soakers, etc. that are required to leave the building completely water and weathertight are the Plumber's responsibility.

Flashings Fabrication

All flashings shall be machine folded to profiles as shown or required, incorporating capillary breaks where appropriate, shall be formed in one piece where possible, and lead or other soft edged where required. Stop ends, external angles, junctions etc. soldered or sealed and blind riveted as appropriate.



Materials - Option 1

All flashings 1mm powder coated aluminium unless otherwise noted. Supply the flashings to appropriate trades for building in as work proceeds, with all flashings neatly dressed to substrates.

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11 DRAINLAYING

11.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

11.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS/NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
2032:2006(AS/NZS)	Installation of PVC pipe systems
3500.2:2015(AS/NZS)	Plumbing and drainage - Part 2: Sanitary plumbing and drainage
3500.3:2015(AS/NZS)	Plumbing and drainage - Part 3: Stormwater drainage
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
AS/NZS 1547:2012	On-site domestic wastewater management
BS 5572	Code of practice for sanitary pipework
NZBC G13	Foul Water

11.3 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals.

Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

11.4 Workmanship

11.4.1 General

General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals. Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

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11.4.2 Co-operation

Co-operation

Cooperate with all trades and attend upon the Concretor and Plumber to set out exact pipe runs before any adjacent work is put in hand and ensure that all sleeves etc. are correctly incorporated as work proceeds.

11.4.3 Materials

Materials

All pipes and other materials shall comply with the appropriate Standards, and shall be protected from damage of any kind until installation is complete. All incidentals appropriate for the applications involved. Concrete shall be 17.5MPa and as specified under Concretor, Mortar shall be as specified in Blocklayer.

11.4.4 Workmanship

Workmanship

All drainlaying shall be carried out by, or under direct control of, properly qualified tradesmen, and shall be to recognised high standards. Ensure cast-in items are installed when required so that no delay is caused by this trade. Adequately protect all adjacent surfaces - clean down to remove dirt etc., and any damage shall be made good by the appropriate trade at the Drainlayer's expense.

On completion of drainlaying clean up full area affected by this trade to the condition it was in before drainlaying commenced.

Site is to be returned as close as possible to its present condition on completion of the contract.

11.4.5 Excavation

Excavation

As required for sewer and stormwater. Check for other service lines before excavation - the Drainlayer is responsible for making good any damage. Trenches true to line and with even gradients between gullies, soil stack terminations or downpipes, etc.

Keep the bottom of trenches clear of loose material. All pipes shall be laid in appropriate bedding material, compacted as required. Shore trenches if required to suit ground conditions. Backfilling shall be by this trade, to the standards required in Siteworks.

11.5 Elements

11.5.1 Drainlaying

Drainlaying

Commence drainlaying at the low end of even fall sections of drains and proceed in a continuous sequence to the fittings connections.

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Sumps, gullies, etc. solidly bedded. Lay 110 (ODmm) uPVC drains to connect gullies, sumps, stacks, and downpipes through to the street edge connections.

Junctions and bends shall have an inspection point as shown on the drawings and as required by NZS3500.2. Temporarily seal the open ends of incomplete drains to prevent entry of foreign matter. Make appropriate provision for any anticipated differential settlement. Place signal strip above all drains.

Ensure that stormwater drains are very accurately positioned so that downpipes can drop directly into them, without offsets.

11.5.2 Soakage Pits

Soakage Pits

Where shown on the site plan, Soakage Pits shall be dimensioned and filled in accordance with best local trade practice, and to the complete satisfaction of the Territorial Authority Inspector.

11.5.3 Testing

Testing

The sewer and stormwater systems shall both be fully tested to the approval of the Territorial Authority Inspector before being covered in. If any defects show rectify and then fully retest.

11.5.4 As Built Drawings

As Built Drawings

During drainlaying plot the location of all bends and changes in direction and all cleaning access positions. Locate each item by two diagonal measures from structure corners, etc. and record on a blank plan copy (supplied by Architect/Designer when requested).

Note that Practical Completion of the contract will not be certified until this as-built drawing has been produced (made available to the Contractor in time for the Code Compliance Certificate application).

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12 ELECTRICAL

12.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

12.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1125:2001(AS/NZS)	Conductors in insulated electric cables and flexible cords
2201.1:2007(AS/NZS)	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
2293.2:1995(AS/NZS)	Emergency evacuation lighting for buildings - Inspection and maintenance
3000:2007(AS/NZS)	Electrical installations (known as the Australia/New Zealand Wiring Rules)
3085.1:2004(AS/NZS)	Telecommunications installations - Basic requirements
3191:2008(AS/NZS)	Electrical flexible cords
5000.1:2005(AS/NZS)	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV
60227.5:2003(AS/NZS)	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Flexible cables (cords)
60335.2.30:2009(AS/NZS)	Household and similar electrical appliances - Safety - Particular requirements for room heaters
60335.2.35:2004(AS/NZS)	Household and similar electrical appliances - Safety - Particular requirements for instantaneous water heaters
60898.1:2004(AS/NZS)	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Circuit-breakers for a.c. operation
61009.1:2015(AS/NZS)	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules
6104:1981(NZS)	Specification for emergency electricity supply in buildings
AS/NZS 2053	Specification for unplasticized PVC conduit and fittings for electrical wiring
AS/NZS 3012	Electrical installations - Construction and demolition sites
AS/NZS 3018	Domestic electrical installations
AS/NZS 3100	Requirements for electrical apparatus
AS/NZS 3439	Electrical switchgear and controlgear
AS/NZS 3947	Low-voltage switchgear
AS/NZS 60598	Luminaires - Particular requirements - Recessed luminaires

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NZEC 54	Recessed luminaires
NZS 1989	Plugs and socket outlets
NZS 6206	Electric meter boxes

12.3 Workmanship

12.3.1 General

Scope

Supply and install all materials, including all necessary minor and incidental items, for proper completion of all of the electrical services specified or shown on the drawings. The contract will not be deemed to be complete until the Electrician has provided an Electrical Certificate of Compliance in accordance with NZEC 11 (made available to the Contractor in time for the Code Compliance Certificate application).

Required Tasks

Obtain all necessary permits and consents, serve all notices and pay all fees in and customary charges connection with the works.

Position of Items (Edit)

The position of switches, light and power outlets and other fittings, although shown specifically in some instances, are in general only shown diagrammatically. The exact location of each of these items will be as directed on site by the Architect/Designer and home owner; the Electrician shall give reasonable notice of when this information is required. Items positioned in contravention of this shall be repositioned if directed, including rewiring if necessary, all at the Electrician's expense.

Unless drawn (on 1:20 wall elevations) or specified otherwise the mounting height to the centreline of the following items above the floor shall be:

- 1000mm for lighting switches;
- 2000mm for wall mounted lights;
- 2100mm for the bayonet of pendant lights;
- 300mm for power points, except at benches.

(Notify the Architect/Designer if either the actual fitting or mounting position seem to make the mounting height noted above inappropriate).

Warranties Submittal

Warranty cards and manufacturers guarantees for items supplied and installed by this trade shall be filled in correctly and handed over at Practical Completion. Arrange all circuits to obtain an optimum balance of the system, and check and reconnect where necessary to achieve this on completion. Leave the works clean and tidy and in full operational order.

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12.3.2 Co-operation

Co-operation

Co-operate with all other trades and attend upon the Concretor and Carpenter to set out all required penetrations and to ensure that all wiring and fittings are correctly incorporated as work proceeds. The Carpenter will provide and fix all necessary dwangs and timber supports in locations determined by the Electrician.

12.3.3 Workmanship

Qualifications

All electrical work shall be carried out by, or under the direct control of, registered tradesmen, and shall be to recognized high standards. All work shall be such as to leave a neat, efficient and robust installation. Neatly label switchboards to identify each circuit.

Cutting & Checking Timber

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604: 2011 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials shall be only to approval.

Protection

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Electrician's expense.

12.3.4 Wiring

Wiring Quality

Joints within cable runs will not normally be accepted. TPS cable shall be adequately supported, and clipped at regular intervals. At terminations all strands of conductors shall be fully secured in a terminal block or clamped under a screw head washer; do not cut away any strands. Wiring which terminates in enclosed fittings and/or where subject to heat liable to cause deterioration, shall be high temperature type, with the tails made off with heat resisting sleeves, to protect the permanent wiring.

Wiring Cable

Wire lights in 1.5mm 3 core - 7.5 amps loading max per circuit (allow for 100w to all light fittings unless identified otherwise).

Wire power outlets in 2.5mm 3 core - 7 maximum GPO singles or doubles per circuit. Assess power outlets for specific equipment and allow accordingly.

Conceal Wiring

Conceal all wiring except as noted on drawings or below. All wiring cast into concrete shall be run in conduit pipes. All cables shall be stranded (single core is unacceptable).

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Wiring Layout

Wire more or less parallel to and at right angles to the structural elements - avoid any diagonal wiring. Layout of the principal distribution wiring shall be to approval. Position all wires to minimise the risk of damage from subsequent nailing of linings etc.

Wiring in Timber Framing

Generally, do not run TPS horizontally within timber walls except in the area up to 300mm above floor. Wire in the ceiling framing and drop vertically to outlets and switches.

Exterior Lighting Wiring

Wire exterior lighting in screened cable.

12.4 Systems

12.4.1 Earth

Earth

Provide a driven main earth suitable for the full installation, close to the meterboard, complying fully with all appropriate regulations and to the complete approval of a certified inspector. Bond all exposed metals, including light fittings and piped services and provide earth conductors for the entire system. Sheathing to any neutral screened cables may be used for earthing.

12.4.2 Mains

Mains, Single Phase, Underground

Install a neutral screened 16mm main cable underground (depth, cover/protection, backfilling, signal strip etc. to comply with all relevant regulations) from the grid connection position to the meterboard, positioned where shown on the drawings, and make appropriate arrangements for the grid connection. Install pilot as required. The meterboard shall be metalclad with a meter reading window, recessed maximum depth into the wall and at 2m to the top of the board, with the meters and water heater controllers by the supply company nominated by the Principal. Install all switches and fuses that are necessary. From the meterboard run (route to approval) a neutral screened 16mm main plus controllers etc. to the switchboard.

12.5 Materials & Control

12.5.1 Materials

Material Quality

All materials delivered with packaging and labeling intact. All required incidentals (e.g. tape, seals, fixings, etc.) shall be completely appropriate for the application involved. The use of items damaged in any way is subject to approval in each instance.

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12.5.2 Switchboard

Single Switchboard

The switchboard shall be an appropriate size standard PDL DBF series board installed fully recessed where shown and at 2m to the top of the board. Install appropriate sized MCB's for all circuits, including a minimum of two power and one lighting RCDs as required to cover all outlets.

12.6 Elements

12.6.1 Appliances

Appliances - Option 2

All appliances are exactly identified on the drawings notes. Main Contractor will establish, in consultation with the Plumber and Electrician, which of them will be supplied by each of these trades.

The Electrician shall supply appliances that are his responsibility, install them exactly in accordance with their manufacturer's instructions, and protect them until completion.

12.6.2 Light Fittings

Light Fittings - Option 1

Generally light fittings are identified as to type on the drawing, and will be supplied by the Principal. Take delivery, install in accordance with any directions supplied and protect until Practical Completion.

All light fittings and fixtures are to be confirmed by the home owner

12.6.3 Tele Communications

Workmanship

Workmanship shall be recognised best trade practice, and in accordance with the manufacturers' recommendations. All work shall be by competent and experienced operatives.

12.6.4 Other Wired Services

Other Wired Services

Co-operate with all other trades to ensure that the following services are installed complete and in accordance with their manufacturer's recommendations with all normal or necessary incidentals and with all wiring concealed.

The installation of the following are to be confirmed with the home owner: BC181033

- SKY TV.
- Garage door operating mechanisms.
- Gas hot water supply unit installed complete by the Plumber - supply electrical feed and connect.
- Wall mounted fan heaters.
- Front door bell - supply and install.
- Kitchen, laundry and wet areas air exhaust fans and ducting as noted - supply and install.

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- Under-tile electric heating to the bathroom and shower room complete with thermostat control installed where shown. Supply and install (immediately prior to tiles installation) exactly to the suppliers recommendations.
- Heated towel rails to bathroom and shower room.
- Heat pump
- Supply a Heavy Duty TV Aerial (suitable for TV1, 2, and 3, Sky, and all local and community TV stations) and install on the roof ridges where directed, stayed against wind, and with all connections compatible with the roofing and waterproof. Feed to the outlets shown with the complete system exactly to aerial suppliers recommendations.
- Heating.

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To: david@pennyhomes.co.nz[david@pennyhomes.co.nz]; Tech Support[businesssupport@taupo.govt.nz]; buildingconsents[buildingconsents@taupo.govt.nz]
From: buildingconsents
Sent: Wed 7/11/2018 11:32:43 p.m
Importance: Normal
Subject: Accepted Building Consent application for 18 Penny Grove, Taupo
MAIL_RECEIVED: Wed 7/11/2018 11:32:50 p.m
[REF181108047.pdf](#)

;

Your online building consent application has been accepted.

Attached is a copy of the vetting checksheet completed by the vetting officer, for the proposed works at 18 Penny Grove, Taupo (REF181108047).

We will advise you of the outcome within 20 working days of the **consent being submitted.**

Please note that further information may be requested during the processing of your application.

Kind regards,
Taupō District Council Building Consent Team

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Checklist

Reference Number:	REF181108047
Submitted On:	08/11/2018 10:36
Submitted By:	David Park
Status:	Accepted

Office Use Only

PIM Required?	PIM
Compliance Schedule?	N/A
Restricted Building Work?	Yes
Fast track amendment?	N/A
Building Category	Residential 1

General Documentation Required

Owner authorisation provided	Pass
Form 2A Certificate of Design Work	Pass
All drawings must meet the minimum requirements of the technical drawings standard AS/NZS1100 with a minimum font size of Microsoft Word text size 8. Index provided for plans and specifications.	Pass
Are you applying for owner/builder exemption? If yes, the appropriate documentation including Form 2B is to be supplied	N/A
All documents including photocopies must be legible	Pass
All plans are to be titled and dated (or version number)	Pass

Legal Documentation Required

Evidence of ownership provided.	Pass
Vetting Officer Comments	Council to provide CT

Site/Location Plan

North point	Pass
Road frontage indicated and street named	Pass
Location of all existing and proposed buildings	Pass

Distance of buildings to boundaries and distance between existing and proposed buildings including eaves and gutters.	Pass
Site levels and finished floor levels relative to Moturiki Datum survey point (if applicable)	Pass
Existing contours (proposed cut or fill also needs to be shown).	Pass
Building line restrictions and easements, if applicable	Pass
Site boundaries/exclusive area boundaries for cross lease properties and common areas clearly shown	Pass
Show calculations and percentage of net site coverage	Pass
Labelled points on boundaries where overshadowing is taken from.	Pass
Dimensions and location of parking spaces shown onsite	Pass
Existing and proposed crossings/driveways, also showing berms and footpaths.	Pass
Sediment control plan	Pass
If building under or near transmission lines, please show transmission plan area or location of power lines.	Pass

Foundation Plan

Foundation details	Pass
Concrete floor details provided	Pass
Control joints shown/saw cuts.	Pass
Bearer layout for floors and decks	Pass

Floor Plan

Plan of all floors describing the function of each room	Pass
Show all doors, windows and ventilation including enclosed space ventilation	Pass
Stairs, handrails and decking shown showing dimensions and details	Pass
Smoke alarm positions shown	Pass
For additions and alterations, the existing shall be shown separately to the proposed and to the same scale for comparison	N/A
Lintel sizes/beam sizes and proprietary systems.	Pass
Dimensions of proposed building work.	Pass
Finished floor levels/datum, daylight angles.	Pass

Framing Plan/Bracing Plan

Bracing calculations/details - type and fixings	Pass
Framing plan, including size, centres, grade and treatment of members.	Pass
Bottom plate, top plate, stud, lintel fixing details.	Pass

Roof Plan

Roof plans and roof bracing.	Pass
Truss types/roof framing layout, design statement and manufacturers PS1.	Pass

Truss/Rafter and purlin fixings.	Pass
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Elevations

North, South, East and West elevations.	Pass
Overshadowing labelled to correspond with points on site plan shown on all elevations	Pass
Height from ground level to apex of building	Pass
Show existing finished ground levels/floor levels and proposed finished ground levels/floor levels (sub-floor ventilation and access).	Pass
Cladding systems, roofing type and any other relevant details	Pass
Window schedule	Pass
Roof pitch and chimneys (show height of chimney in relation to ridge)	Pass
Alterations to land contour, retaining, cut and fill and batters	Pass

Specifications &Other Documentation

Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.)	Pass
H1 calculations	Pass
E2 Risk Matrix	Pass
Technical specifications for proprietary systems/products e.g. foundations/structural design.	Pass
Vetting Officer Comments	Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.) - please provide the generic specs (masterspec document) in it's entirety. The pdf named PHL Spec Lot 226 Penny Grove is the incorrect document. **Done**

Plumbing &Drainage

All existing SEWERS, sewer connections and sewer drains shown including Territorial Authority services	Pass
All existing STORMWATER drains and connections shown including Territorial Authority services	Pass
Proposed sewer and stormwater drains/soak holes, terminal vents shown.	Pass
Existing and proposed potable water supply.	Pass
All existing and proposed sanitary fittings including pipe sizes and gradients (isometric)	Pass
Specifications for hot water heating system including seismic restraints.	Pass
Stormwater disposal design and calculations.	Pass
Cross sections	Yes
Drawings showing constructional details of foundations, floor systems, wall, ceiling, stud heights and stud sizes, roof construction, balustrades and barriers.	Pass
Surface finishes to wet areas (walls and floor to laundry, kitchen and bathroom).	Pass
Location and type of insulation.	Pass

Details for all penetration in walls, roof (i.e. windows, doors, meter boards, skylights etc.)	Pass
Cavity construction details, where applicable.	Pass
Comment from Vetting Officer:	Accepted, thank you.

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Checklist

Reference Number:	REF181108047
Submitted On:	08/11/2018 10:36
Submitted By:	David Park
Status:	Accepted

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Building Category	Residential 1

General Documentation Required

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All drawings must meet the minimum requirements of the technical drawings standard AS/NZS1100 with a minimum font size of Microsoft Word text size 8. Index provided for plans and specifications.	Pass
Are you applying for owner/builder exemption? If yes, the appropriate documentation including Form 2B is to be supplied	N/A
All documents including photocopies must be legible	Pass
All plans are to be titled and dated (or version number)	Pass

Legal Documentation Required

Evidence of ownership provided.	Pass
Vetting Officer Comments	Council to provide CT

Site/Location Plan

North point	Pass
Road frontage indicated and street named	Pass
Location of all existing and proposed buildings	Pass

Distance of buildings to boundaries and distance between existing and proposed buildings including eaves and gutters.	Pass
Site levels and finished floor levels relative to Moturiki Datum survey point (if applicable)	Pass
Existing contours (proposed cut or fill also needs to be shown).	Pass
Building line restrictions and easements, if applicable	Pass
Site boundaries/exclusive area boundaries for cross lease properties and common areas clearly shown	Pass
Show calculations and percentage of net site coverage	Pass
Labelled points on boundaries where overshadowing is taken from.	Pass
Dimensions and location of parking spaces shown onsite	Pass
Existing and proposed crossings/driveways, also showing berms and footpaths.	Pass
Sediment control plan	Pass
If building under or near transmission lines, please show transmission plan area or location of power lines.	Pass

Foundation Plan

Foundation details	Pass
Concrete floor details provided	Pass
Control joints shown/saw cuts.	Pass
Bearer layout for floors and decks	Pass

Floor Plan

Plan of all floors describing the function of each room	Pass
Show all doors, windows and ventilation including enclosed space ventilation	Pass
Stairs, handrails and decking shown showing dimensions and details	Pass
Smoke alarm positions shown	Pass
For additions and alterations, the existing shall be shown separately to the proposed and to the same scale for comparison	N/A
Lintel sizes/beam sizes and proprietary systems.	Pass
Dimensions of proposed building work.	Pass
Finished floor levels/datum, daylight angles.	Pass

Framing Plan/Bracing Plan

Bracing calculations/details - type and fixings	Pass
Framing plan, including size, centres, grade and treatment of members.	Pass
Bottom plate, top plate, stud, lintel fixing details.	Pass

Roof Plan

Roof plans and roof bracing.	Pass
Truss types/roof framing layout, design statement and manufacturers PS1.	Pass

Truss/Rafter and purlin fixings.	Pass
----------------------------------	------

Elevations

North, South, East and West elevations.	Pass
Overshadowing labelled to correspond with points on site plan shown on all elevations	Pass
Height from ground level to apex of building	Pass
Show existing finished ground levels/floor levels and proposed finished ground levels/floor levels (sub-floor ventilation and access).	Pass
Cladding systems, roofing type and any other relevant details	Pass
Window schedule	Pass
Roof pitch and chimneys (show height of chimney in relation to ridge)	Pass
Alterations to land contour, retaining, cut and fill and batters	Pass

Specifications &Other Documentation

Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.)	Pass
H1 calculations	Pass
E2 Risk Matrix	Pass
Technical specifications for proprietary systems/products e.g. foundations/structural design.	Pass
Vetting Officer Comments	Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.) - please provide the generic specs (masterspec document) in it's entirety. The pdf named PHL Spec Lot 226 Penny Grove is the incorrect document. **Done**

Plumbing &Drainage

All existing SEWERS, sewer connections and sewer drains shown including Territorial Authority services	Pass
All existing STORMWATER drains and connections shown including Territorial Authority services	Pass
Proposed sewer and stormwater drains/soak holes, terminal vents shown.	Pass
Existing and proposed potable water supply.	Pass
All existing and proposed sanitary fittings including pipe sizes and gradients (isometric)	Pass
Specifications for hot water heating system including seismic restraints.	Pass
Stormwater disposal design and calculations.	Pass
Cross sections	Yes
Drawings showing constructional details of foundations, floor systems, wall, ceiling, stud heights and stud sizes, roof construction, balustrades and barriers.	Pass
Surface finishes to wet areas (walls and floor to laundry, kitchen and bathroom).	Pass
Location and type of insulation.	Pass

Details for all penetration in walls, roof (i.e. windows, doors, meter boards, skylights etc.)	Pass
Cavity construction details, where applicable.	Pass
Comment from Vetting Officer:	Accepted, thank you.

Consent Notice - BC181033 - A2348911



View Instrument Details

Instrument No.	11138428.1
Status	Registered
Date & Time Lodged	06 Jun 2018 15:18
Lodged By	Hollman, Karyn Elizabeth
Instrument Type	Consent Notice under s221(4)(a) Resource Management Act 1991

Toitu te
Land whenua
Information
New Zealand



Affected Computer Registers	Land District
787099	South Auckland

Annexure Schedule: Contains 4 Pages.

Signature

Signed by Karyn Elizabeth Hollman as Territorial Authority Representative on 05/06/2018 06:46 PM

***** End of Report *****



GREAT LAKE TAUPŌ
Taupō District Council

In the Matter of

the Resource Management Act
1991

And

In the Matter of

Resource Consent
Taupo District Council
RM 170010B

CONSENT NOTICE

Pursuant to Section 221 of the Resource Management Act 1991

To: The District Land Registrar
South Auckland Land Registration District

TAKE NOTICE that the land described below is subject to conditions in relation to a subdivision consent as follows:

Lots 213 to 252 DP 522262 shall be subject to the following conditions:

- a. Maximum Building Coverage - 50%.
- b. Maximum Plot Ratio – 100%.
- c. Maximum Total Coverage – 75%.
- d. Minimum Building Setback Front Boundary – 4m [except for the face of any garage/carport opening from which the setback shall be 5m].
- e. Maximum Earthworks - Disturbance of the allotment at any one time while redeveloping – 100%, subject to provision of an Earthworks Management Plan for approval to Taupō District Council's Manager Consents & Regulatory at the time of building consent application. The Earthworks Management Plan shall detail how all sediment, debris and dust is to be contained on-site to ensure that there is no nuisance beyond the site boundaries, and how these sediment and dust controls are to be maintained until the site is fully stabilised.
- f. All future driveways that slope toward the road shall have a slot drain or stormwater catch-pit installed within the lot immediately adjacent to the road boundary and connected back into a soak hole within the lot boundary.

Lots 208 to 212 DP 522262 shall be subject to the following conditions:

- g. Maximum Building Coverage - 35%.
- h. Maximum Earthworks - Disturbance of the allotment at any one time while redeveloping –100%, subject to provision of an Earthworks Management Plan for approval to Taupō District Council's Manager Consents & Regulatory at the time of building consent application. The Earthworks Management Plan shall detail how all sediment, debris and dust is to be contained on-site to ensure that there is no nuisance beyond the site boundaries, and how these sediment and dust controls are to be maintained until the site is fully stabilised.
- i. All future driveways that slope toward the road shall have a slot drain or stormwater catch-pit installed within the lot immediately adjacent to the road boundary and connected back into a soak hole within the lot boundary.

Lots 224 to 227 and 242 to 252 DP 522262 shall be subject to the following conditions:

- j. Any fencing to be established along or within 1.5m of the eastern boundary of these lots shall be a visually permeable fencing (such as swimming pool fencing) of a maximum height of 1.2m and dark green or grey coloured. If there is a retaining wall along this boundary the fence shall be constructed along the top of the retaining wall. If the fencing is damaged or removed, it shall be replaced with identical type and colour fencing of the same height within one month of the damage or removal occurring. *[Advice Note: This is in accordance with Schedule 8 –Reserves section of the Taupo District Council Code of Practice for the Development of Land (September 2009). It is noted that Schedule 8 states that visually permeable means that fence materials comprise less than 50% of the fence surface.]*

Lots 208 to 219 and 223 to 252 DP 522262 shall be subject to the following conditions:

- k. Each lot is restricted to the vehicle crossing point constructed at the time of subdivision.

Lots 228 to 233 DP 522262 shall be subject to the following conditions:

- l. The landscaping within the 1.5m setback area between the retaining walls, shall be maintained in a healthy state in perpetuity at a minimum height of 1.5m as per the approved Landscaping Plan and Plant Schedule [held on the Council subdivision file].

Notes:

- The terms used above – such as Building Coverage, Plot Ratio, Total Coverage, Building are as defined in Section 10 of the Operative Taupo District Plan (as at May 2018).

- *Any infringements of the bulk and location controls mentioned above, will require an application for a variation of consent notice pursuant to section 221(3) of the Resource Management Act 1991.*

Other Taupo District Plan performance standards not included above are also applicable, such as:

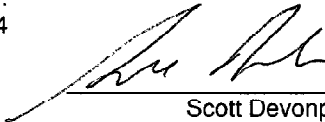
- *Maximum height to boundary*
- *Maximum earthworks (cut / fill)*
- *Signage*
- *Parking, Loading & Access*

Infringements of these performance standards will require land use consent under the relevant provisions.

AND THAT you are hereby requested to register the same pursuant to section 221 of the Resource Management Act 1991.

DATED this *2nd* day of *May* 2018

SIGNED for and on behalf of
THE TAUPO DISTRICT COUNCIL
by way of delegated authority to the
Consents and Regulatory Manager:
Regulatory & Risk pursuant to Section 34
of the Resource Management Act 1991.



Scott Devonport
Authorised Officer

Certificate of Title - BC181033 - A2348912



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



**Guaranteed Search Copy issued under Section 172A
of the Land Transfer Act 1952**


R. W. Muir
Registrar-General
of Land

Identifier 827968
Land Registration District South Auckland
Date Issued 06 June 2018

Prior References

787099

Estate Fee Simple
Area 427 square metres more or less
Legal Description Lot 226 Deposited Plan 522262

Proprietors

Jarden Corporation Limited

Interests

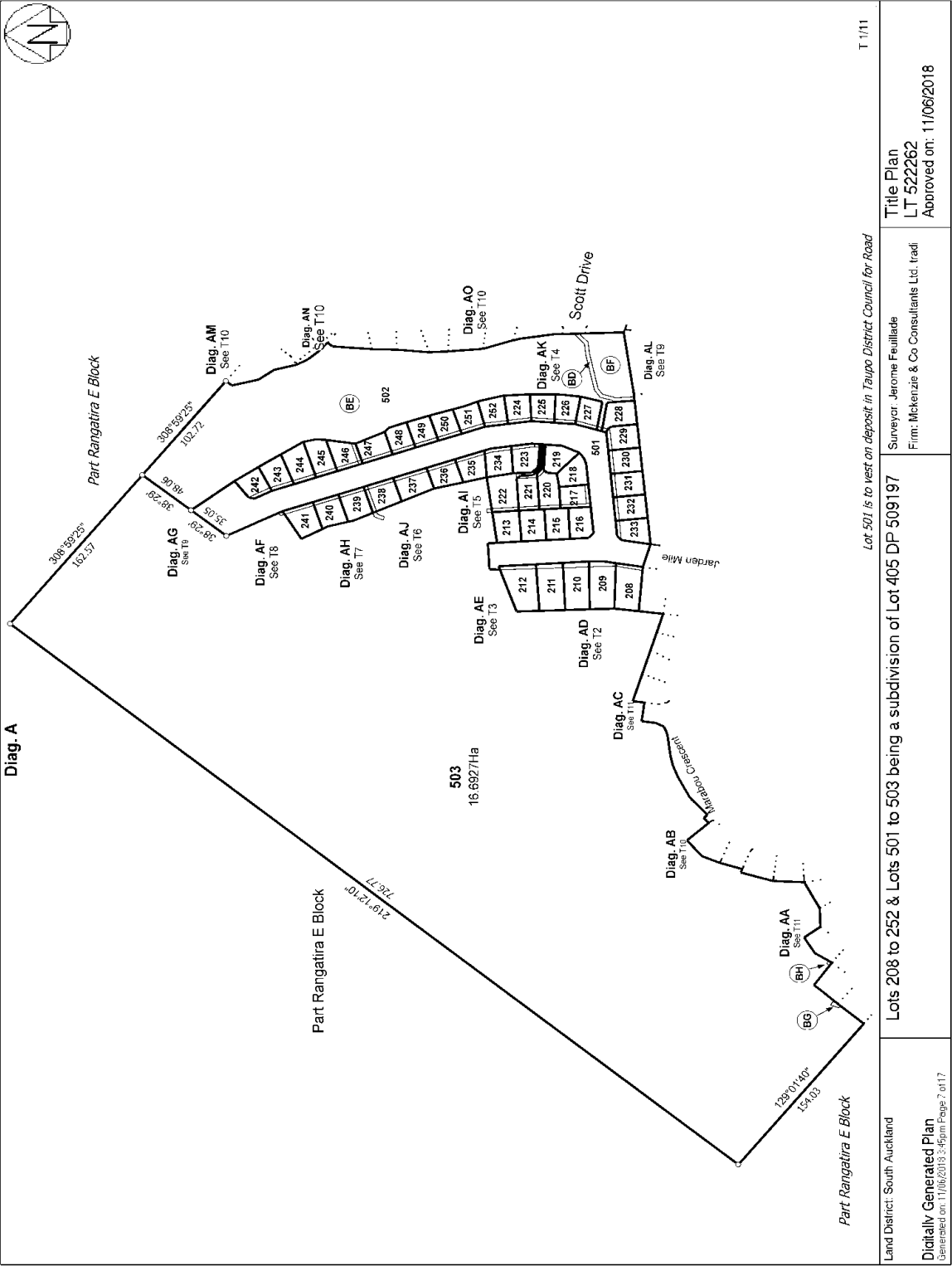
11138428.1 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 6.6.2018 at 3:18 pm

Subject to a right (in gross) to drain sewage over part marked AF on DP 522262 in favour of Taupo District Council created by Easement Instrument 11138428.3 - 6.6.2018 at 3:18 pm

The easements created by Easement Instrument 11138428.3 are subject to Section 243 (a) Resource Management Act 1991

Fencing Covenant in Deed 11086693.5 - 10.9.2018 at 9:39 am

Subject to Section 6(2) Fencing Act 1978



T 1/11

Lot 501 is to vest on deposit in Taupo District Council for Road

Land District: South Auckland	Lots 208 to 252 & Lots 501 to 503 being a subdivision of Lot 405 DP 509197	Surveyor: Jerome Feuillade Firm: Mckenzie & Co Consultants Ltd. trad	Title Plan LT 522262 Approved on: 11/06/2018
Digitally Generated Plan Generated on: 11/06/2018 3:46pm Page 7 of 17			



Services Plan - 18 Penny Grove

LEGEND:

- Property Boundaries
- Proposed Subdivisions
- Lease Boundaries
- Taupō District Boundary
- TDC Reserves
- DOC Reserves
- Council Owned Land
- Council Easements

SERVICES

Sewer (wastewater)

- Manhole
- Node
- Pump Station
- Sewer pipe

Water

- Water point (valve, fire hydrant)
- Water pipe

Stormwater

- Manhole
- Inlet / cesspit
- Node
- Stormwater pipe
- Fibre Optic Cable (Council)
- Street Lights

MAP PRODUCED FROM GEOCORTX

26.194 Meters

Scale = 1: 500 (A4)

Date Created: 9 November 2018 9:44 a.m.

Author:



Services Plan - 18 Penny Grove



GREAT LAKE TAUPŌ
Taupō District Council

PROJECT INFORMATION MEMORANDUM

Section 34, Building Act 2004

BC No: 181033

*This Project Information Memorandum is not a building consent to build. It is confirmation that the proposed building work may be undertaken once any notices and/or certificates attached to this memorandum have been complied with and any additional authorisations you are required to obtain have been obtained. Commencement of the work is also subject to the provisions of the Building Act 2004 and requires a building consent. **THIS IS NOT A BUILDING CONSENT.***

Owner Name: Penny Homes Limited

Owner Address: 1 Jarden Mile, Taupo 3330

Property Location: 18 Penny Grove, Taupo

Valuation Number: 0730164819

Legal Description: Lot 226 DP 522262

Description of Work: New three bedroom dwelling.

Planning Comment:

- Planning assessment has been undertaken and the proposal complies.

Engineering Comment:

- Stormwater soakholes must be located no less than 3m from any dwelling, 1.5m from any boundary, and 1.5m from any public wastewater main.

Stormwater

- No piped council stormwater system is provided for this site and all runoff from roofs and paving must be disposed of onsite (i.e. to soakholes).
- If the driveway slopes toward the public road it shall have a slot drain or stormwater catch-pit installed within the lot adjacent to the public road boundary and connected back to a soakhole in the property.
- Soakholes must be kept clear of Taupo District Council easements and be at least 1.5m away from Taupo District Council sewer mains at the closest edge.
- As per the Consent Notice on the title, the stormwater cut-off drains and soakage pit shall be retained on site to prevent the risk of sediment leaving the site. The pit may be modified to suit site levels.

Wastewater

- There is a connection provided to the Taupo District Council sewerage system for the disposal of all wastewater from the site. Refer to the Taupo District Council services plans.

- The Taupo District Council sewer manhole lid must be set at finished ground level and not covered over. If the lid needs to be raised or lowered to match the finished ground level the applicant will need to liaise with TDC's Mel Montesa.

Water

- There is a connection provided to the Taupo District Council water supply system. Refer to the Taupo District Council services plan. The water toby box lid shall be set at ground level after any site works.
- If the water to the toby is off, the ferrule on the Taupo District Council adjacent main must be turned on. This can be done by Taupo District Council by applying at Taupo District Council and paying the turn-on fee. Alternatively, your plumber may also do this.

Access

- A formed vehicle crossing is required - if not already existing. This must comply with Council's Code of Practice for Development of Land. An application form for this must be completed at a Taupo District Council service centre.

Attachments *(The following attachments are included with this Project Information Memorandum):*

- Services plan
- Certificate of Title
- Consent Notice

Signed for and on behalf of Taupo District Council



Shona Biddle
Business Support Officer
Date: 15/11/18



Services Plan - 18 Penny Grove

LEGEND:

- Property Boundaries
- Proposed Subdivisions
- Lease Boundaries
- Taupō District Boundary
- TDC Reserves
- DOC Reserves
- Council Owned Land
- Council Easements

SERVICES

Sewer (wastewater)

- Manhole
- Node
- Pump Station
- Sewer pipe

Water

- Water point (valve, fire hydrant)
- Water pipe

Stormwater

- Manhole
- Inlet / cesspit
- Node
- Stormwater pipe
- Fibre Optic Cable (Council)
- Street Lights

MAP PRODUCED FROM GEOCORTX

26.194 Meters

Scale = 1: 500 (A4)

Date Created: 9 November 2018 9:44 a.m.

Author:



Services Plan - 18 Penny Grove



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



**Guaranteed Search Copy issued under Section 172A
of the Land Transfer Act 1952**


R. W. Muir
Registrar-General
of Land

Identifier 827968
Land Registration District South Auckland
Date Issued 06 June 2018

Prior References

787099

Estate Fee Simple
Area 427 square metres more or less
Legal Description Lot 226 Deposited Plan 522262

Proprietors

Jarden Corporation Limited

Interests

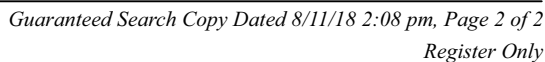
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Fencing Covenant in Deed 11086693.5 - 10.9.2018 at 9:39 am

Subject to Section 6(2) Fencing Act 1978





View Instrument Details

Instrument No.	11138428.1
Status	Registered
Date & Time Lodged	06 Jun 2018 15:18
Lodged By	Hollman, Karyn Elizabeth
Instrument Type	Consent Notice under s221(4)(a) Resource Management Act 1991

Toitu te
Land whenua
Information
New Zealand



Affected Computer Registers	Land District
787099	South Auckland

Annexure Schedule: Contains 4 Pages.

Signature

Signed by Karyn Elizabeth Hollman as Territorial Authority Representative on 05/06/2018 06:46 PM

***** End of Report *****



GREAT LAKE TAUPŌ
Taupō District Council

In the Matter of

the Resource Management Act
1991

And

In the Matter of

Resource Consent
Taupo District Council
RM 170010B

CONSENT NOTICE

Pursuant to Section 221 of the Resource Management Act 1991

To: The District Land Registrar
South Auckland Land Registration District

TAKE NOTICE that the land described below is subject to conditions in relation to a subdivision consent as follows:

Lots 213 to 252 DP 522262 shall be subject to the following conditions:

- a. Maximum Building Coverage - 50%.
- b. Maximum Plot Ratio – 100%.
- c. Maximum Total Coverage – 75%.
- d. Minimum Building Setback Front Boundary – 4m [except for the face of any garage/carport opening from which the setback shall be 5m].
- e. Maximum Earthworks - Disturbance of the allotment at any one time while redeveloping – 100%, subject to provision of an Earthworks Management Plan for approval to Taupō District Council's Manager Consents & Regulatory at the time of building consent application. The Earthworks Management Plan shall detail how all sediment, debris and dust is to be contained on-site to ensure that there is no nuisance beyond the site boundaries, and how these sediment and dust controls are to be maintained until the site is fully stabilised.
- f. All future driveways that slope toward the road shall have a slot drain or stormwater catch-pit installed within the lot immediately adjacent to the road boundary and connected back into a soak hole within the lot boundary.

Lots 208 to 212 DP 522262 shall be subject to the following conditions:

- g. Maximum Building Coverage - 35%.
- h. Maximum Earthworks - Disturbance of the allotment at any one time while redeveloping –100%, subject to provision of an Earthworks Management Plan for approval to Taupō District Council's Manager Consents & Regulatory at the time of building consent application. The Earthworks Management Plan shall detail how all sediment, debris and dust is to be contained on-site to ensure that there is no nuisance beyond the site boundaries, and how these sediment and dust controls are to be maintained until the site is fully stabilised.
- i. All future driveways that slope toward the road shall have a slot drain or stormwater catch-pit installed within the lot immediately adjacent to the road boundary and connected back into a soak hole within the lot boundary.

Lots 224 to 227 and 242 to 252 DP 522262 shall be subject to the following conditions:

- j. Any fencing to be established along or within 1.5m of the eastern boundary of these lots shall be a visually permeable fencing (such as swimming pool fencing) of a maximum height of 1.2m and dark green or grey coloured. If there is a retaining wall along this boundary the fence shall be constructed along the top of the retaining wall. If the fencing is damaged or removed, it shall be replaced with identical type and colour fencing of the same height within one month of the damage or removal occurring. *[Advice Note: This is in accordance with Schedule 8 –Reserves section of the Taupo District Council Code of Practice for the Development of Land (September 2009). It is noted that Schedule 8 states that visually permeable means that fence materials comprise less than 50% of the fence surface.]*

Lots 208 to 219 and 223 to 252 DP 522262 shall be subject to the following conditions:

- k. Each lot is restricted to the vehicle crossing point constructed at the time of subdivision.

Lots 228 to 233 DP 522262 shall be subject to the following conditions:

- l. The landscaping within the 1.5m setback area between the retaining walls, shall be maintained in a healthy state in perpetuity at a minimum height of 1.5m as per the approved Landscaping Plan and Plant Schedule [held on the Council subdivision file].

Notes:

- The terms used above – such as Building Coverage, Plot Ratio, Total Coverage, Building are as defined in Section 10 of the Operative Taupo District Plan (as at May 2018).

- *Any infringements of the bulk and location controls mentioned above, will require an application for a variation of consent notice pursuant to section 221(3) of the Resource Management Act 1991.*

Other Taupo District Plan performance standards not included above are also applicable, such as:

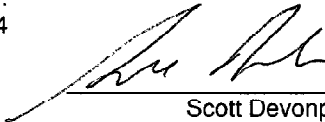
- *Maximum height to boundary*
- *Maximum earthworks (cut / fill)*
- *Signage*
- *Parking, Loading & Access*

Infringements of these performance standards will require land use consent under the relevant provisions.

AND THAT you are hereby requested to register the same pursuant to section 221 of the Resource Management Act 1991.

DATED this *2nd* day of *May* 2018

SIGNED for and on behalf of
THE TAUPO DISTRICT COUNCIL
by way of delegated authority to the
Consents and Regulatory Manager:
Regulatory & Risk pursuant to Section 34
of the Resource Management Act 1991.



Scott Devonport
Authorised Officer



GREAT LAKE TAUPŌ

Taupō District Council

46 Horomatangi Street, Taupō 3330

Private Bag 2005, Taupo Mail Centre

Taupō 3352, New Zealand

T 07 376 0899

F 07 378 0118

E info@taupo.govt.nz

www.taupo.govt.nz

20 November 2018

Penny Homes Limited
1 Jarden Mile
Taupo 3330

BC No: 181033

Dear Sir/Madam

**PROCESSING OF BUILDING CONSENT APPLICATION
PENNY HOMES LIMITED - 18 PENNY GROVE, TAUPŌ
NEW THREE BEDROOM DWELLING**

The Building Act 2004 requires a Building Consent Authority to be satisfied on reasonable grounds that the provisions of the Building Act and Regulations will be met if the building work were properly completed in accordance with the plans and specifications that accompany the building consent application.

As a code compliance certificate will be issued against the approved plans and specifications it is imperative that the plans and specifications clearly reflect compliance with the building code.

Having assessed your plans and specifications, we require the following additional information to ensure compliance is properly demonstrated and enables the building consent to be issued:

- 1. As required by Section 8.7.3.4 NZS3604 all walls that have bracing panels (especially isolated internal bracing walls) will need plate connectors to the external walls to comply with these clauses. Please note on the bracing plan which parts of the wall require these fixing details and the KN value of each fixing. (For other references: refer to Build 138 and 162)**
- 2. The soakhole located in the eastern side yard of the property, appears to be too close to the dwelling foundations. The side of the soakhole is to be no closer than 3.0 metres to the dwelling and 1.5 metres to the boundary. Could you please relocate the soakhole accordingly to the required setback dimensions.**

We appreciate that requests for those items may be frustrating but unless compliance can be clearly demonstrated a building consent cannot be granted. We have suspended processing this building consent until the above information is provided. Please be assured of our earliest attention to completion of processing and issue of building consent on receipt of this information.

Please note that if the requested information is not received within 20 working days of the date of this letter then the application may be refused pursuant to Section 48 (1)(b) of the Building Act 2004.

For further enquiries please contact me by email or on 07 3760730.
Please note that I am not available on Mondays and Fridays

Yours sincerely

Graham Boyle
Building Control Officer

Email reply to RFI - A2359594

To: Graham Boyle[gboyle@taupo.govt.nz]
From: Shaune Kyle
Sent: Fri 23/11/2018 10:27:22 p.m
Importance: Normal
Subject: RE: B/C 181033 - 18 Penny Grove _Request_For_Information_
MAIL_RECEIVED: Fri 23/11/2018 10:27:58 p.m

.....
>>>>>>>>
Hi Graham

Please find my comments below regarding your RFI dated 20 November 2018 for BC No. 181033.

1. As required by Section 8.7.3.4 NZS3604 all walls that have bracing panels (especially isolated internal bracing walls) will need plate connectors to the external walls to comply with these clauses. Please note on the bracing plan which parts of the wall require these fixing details and the KN value of each fixing. (For other references: refer to Build 138 and 162).

Bracing line 'p' has been moved slightly and brace 'p2' relocated so it isn't isolated, brace 'o1' also relocated. Top plate connections note added to framing and fixings plan and bracing plan.

2. The soakhole located in the eastern side yard of the property, appears to be too close to the dwelling foundations. The side of the soakhole is to be no closer than 3.0 metres to the dwelling and 1.5 metres to the boundary. Could you please relocate the soakhole accordingly to the required setback dimensions.

Soak hole on eastern side removed and stormwater redirected to soak pit at front of lot, soak pit has been resized accordingly.

Updated set of drawings attached.

Regards

Shaune

From: David Park [mailto:david@pennyhomes.co.nz]
Sent: Tuesday, 20 November 2018 10:14 AM
To: shaune@jtdesign.co.nz
Subject: FW: B/C 181033 - 18 Penny Grove _Request_For_Information_

Hi Shaune

Are you the right person to forward this question from council ?.

Regards

David Park SALES CONSULTANT



0274 909 129



david@pennyhomes.co.nz



1 Jarden Mile, Brentwood, Taupo

pennyhomes.co.nz



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From: Graham Boyle [mailto:gboyle@taupo.govt.nz]
Sent: Tuesday, 20 November 2018 11:49 AM
To: David Park
Subject: B/C 181033 - 18 Penny Grove _Request_For_Information_

Hello David,

Attached is a request letter for the above building consent application

Thank You

Graham Boyle

Building Control

WARNING

This message may contain privileged and confidential information intended only for the use of the addressee named above. If you have received this message in error, please notify the Taupo District Council immediately. Phone +64 7 376 0899.
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ADVICE OF LICENSED BUILDING PRACTITIONER/(S)

Section 87, Building Act 2004

1 THE BUILDING (project location)

Building name (if applicable) _____

Building street address: _____

2. THE PROJECT

Building consent number: _____

3. THE OWNER (must be completed and all details must be the owner's)

Owner's name (for individuals, state the preferred form of title, e.g. Mr, Mrs, Ms, Miss, Dr. For companies, trusts and other organisations provide a contact person's name): _____

Address: _____

Date: _____

Landline: _____

Mobile: _____

After Hours: _____

Fax: _____

E-mail: _____

4. LICENSED BUILDING PRACTITIONERS ENGAGED TO CARRY OUT/SUPERVISE RESTRICTED BUILDING WORK

Particular work to be carried out or supervised	Name, address, email, and phone number of Licensed Building Practitioner	Licensed Building Practitioner number (or registration number if treated as being licensed under section 291 of Act)	Licensing class (Tick box) ☒ ☐
	Name: _____ Address: _____ Email: _____ Telephone: _____		Foundations ☐ Carpenter ☐ Bricklayer ☐ Plasterer ☐ Roofer ☐
	Name: _____ Address: _____ Email: _____ Telephone: _____		Foundations ☐ Carpenter ☐ Bricklayer ☐ Plasterer ☐ Roofer ☐

4. LICENSED BUILDING PRACTITIONERS ENGAGED TO CARRY OUT/SUPERVISE RESTRICTED BUILDING WORK (cont.)

Particular work to be carried out or supervised	Name, address, email, and phone number of Licensed Building Practitioner	Licensed Building Practitioner number (or registration number if treated as being licensed under section 291 of Act)	Licensing class (Tick box) ✓ ☐
	Name: _____ Address: _____ Email: _____ Telephone: _____		Foundations ☐ Carpenter ☐ Bricklayer ☐ Plasterer ☐ Roofer ☐
	Name: _____ Address: _____ Email: _____ Telephone: _____		Foundations ☐ Carpenter ☐ Bricklayer ☐ Plasterer ☐ Roofer ☐
	Name: _____ Address: _____ Email: _____ Telephone: _____		Foundations ☐ Carpenter ☐ Bricklayer ☐ Plasterer ☐ Roofer ☐
	Name: _____ Address: _____ Email: _____ Telephone: _____		Foundations ☐ Carpenter ☐ Bricklayer ☐ Plasterer ☐ Roofer ☐
	Name: _____ Address: _____ Email: _____ Telephone: _____		Foundations ☐ Carpenter ☐ Bricklayer ☐ Plasterer ☐ Roofer ☐

SIGNATURE

Signature of owner/agent on behalf of and with the authority of the owner *[delete one]*:

Name of person signing:

Date:

COUNCIL USE ONLY

LBP(s) checked

Y

All OK

Y

N

Comments:



GREAT LAKE TAUPŌ

Taupo District Council

46 Horomatangi Street, Taupo 3330

Private Bag 2005, Taupo Mail Centre, Taupo 3352

Ph: 07 376 0899

businesssupport@taupo.govt.nz

www.taupo.govt.nz

SERVICES AS LAID PLAN

☐ Prefloor

☐ Drainage

☐ Soakholes

Please select the items covered in this document

Building Consent No: _____

Owners Name: _____

Property Address: _____

Plumber: _____
Name/s Address Contact Phone No.

Registration No. _____

Drainlayer: _____
Name/s Address Contact Phone No.

Registration No. _____

DRAW PLAN IN BLACK BALLPOINT ON GRAPH OPPOSITE

Plan is to show:

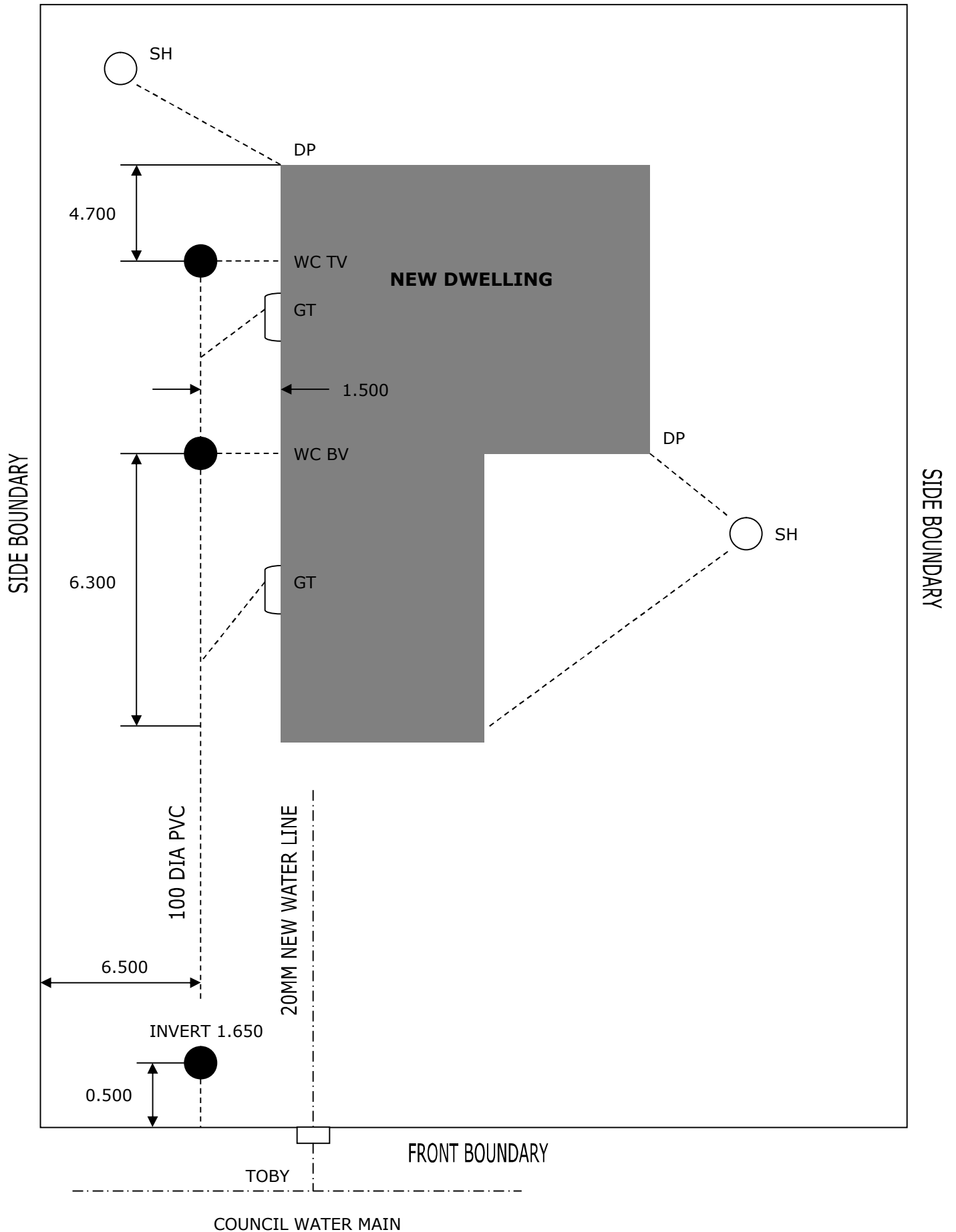
- ☐ All drains in correct position relative to building and boundaries
- ☐ The road frontage
- ☐ Depth of drains at connection points
- ☐ All foul water and stormwater drains
- ☐ All inspection openings, accurately dimensioned
- ☐ All buildings and boundaries
- ☐ Outside water lines and the source of supply
- ☐ The type, location and size of all on site sewage disposal systems
- ☐ Size and position of soak holes

REFER TO EXAMPLE ON LAST PAGE

NOTE: If the inspector cannot be satisfied of compliance and/or the drain layout differs from the approved building consented documents, an amendment to the consent may be requested.

PLAN EXAMPLE

REAR BOUNDARY



All sections of this form must be completed

TO BE COMPLETED BY THE PERSON WHO HAS UNDERTAKEN THE DRAINAGE WORK

Author company: _____ BC number: _____

Author name: _____

Description of drainage work: _____

Legal description: _____

Site address: _____

I have sighted the above building consent and read the attached conditions of consent and confirm that the drainage pipe work and fittings have been selected and constructed to comply with the consented plans to the extent required by the above building consent and comply with clauses E1 and G13 of the Building Regulations 1992.

I hereby certify that the storm water disposal system that has been constructed in accordance with the approved plans for the above building consent and/or the details as shown on the 'as built' plans supplied with this statement.

I hereby certify that I have personally tested the drainage system by the method indicated below:

- ☐ NZ Building Code E1/VM1 air test in accordance with paragraph 8.3; or
☐ AS/NZS3500.2.2:2003 air test in accordance with clause 12.3.2; or
☐ NZS7643 water test in accordance with section 11.

I understand that the Council will rely upon this producer statement, for the purposes of establishing compliance with the above building consent.

Signature: _____ Date: _____

Certifying drainlayer's registration number: _____

Drainlayer's contact details:

Address: _____ Postcode: _____

Phone: _____ Fax: _____

Mobile: _____ Email: _____



GREAT LAKE TAUPŌ

Taupo District Council

UNDERTAKING AS TO CORRECT SITING OF BUILDING

Building Act 2004

This form must be completed and be available for collection by the Building Management Officer when the first inspection is carried out or at such other time as agreed. A Code Compliance Certificate will not be issued until such time as this form is received and correctly filled out.

BC No:

I hereby certify that the building work currently being carried out at

(Address of Property)

is positioned in accordance with, and is the same size, as shown on the approved plans of the Building Consent.

Name of Builder/Owner: _____

(Delete that which does not apply)

Signature: _____

Date: _____

Taupo District Council

46 Horomatangi Street, Private Bag 2005, Taupo Mail Centre, Taupo 3352

Phone: 07 3760899 Email: info@taupo.govt.nz Website: www.taupo.govt.nz



GREAT LAKE TAUPŌ
Taupō District Council

Producer Statement Construction (PS3)

General construction work

All sections of this form must be completed

TO BE COMPLETED BY THE PERSON WHO HAS UNDERTAKEN THE BUILDING WORK

Author company: _____ BC number: _____

Author name: _____ Author registration number: _____

Description of work: _____

Legal description: _____

Site address: _____

NZBC clauses
(circle as applicable):

B1	B2	C1	C2	C3	C4	C5	C6	D1	D2	E1	E2
E3	F1	F2	F3	F3	F5	F6	F7	F8	F9	G1	G2
G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14
G15	H1										

I have sighted the above building consent and read the attached conditions of consent and confirm that I have undertaken the building work described above in accordance with the consented plans and specifications.

I understand that Council will rely upon this producer statement, for the purpose of establishing compliance with the above building consent. This PS3 needs to be accompanied by supporting documents; for example, reports and site photos to help support the PS3

Signature: _____ Date: _____

Tradesperson's contact details:

Address: _____ Postcode: _____

Phone: _____ Fax: _____

Mobile: _____ Email: _____



GREAT LAKE TAUPŌ
Taupō District Council

REQUIRED ITEMS FOR BUILDING CONSENT BC 181033

Inspections Required

The following inspections are required:

- | | |
|---|--|
| 1 Prefloor or subfloor Plumbing and Drainage | (siting, under slab/floor drains and plumbing) |
| 1 Prefloor Building | (polythene, mesh, reinforcement, bracing connections etc) |
| 1 Sanitary Sewer/Drainage | (sewer connection, storm-water, materials, septic tank, falls etc) |
| 1 Framing Inspection | (wall and roof framing, connections and fittings, timber sizes & treatments, bracing and fixings) |
| 1 Pre-Ext Cladding Systems-Building | (cavities, head, jamb, sill flashings & wraps penetrations, cavities fixings etc prior to installation of exterior cladding. Brick veneer at ½ height) |
| 1 Preline Plumbing | (internal plumbing and fittings, pressure test) |
| 1 Preline Building | (exterior claddings & joinery, insulation, bracing, timber moisture content, fire protection glazing, building systems etc) |
| 1 Post Lining | (wall bracing, fixings, fire protection, etc) |
| 1 Code Compliance - Building (Single Dwelling Only) | (Surface finishes, access & egress, fire safety features, weathertightness, as per approved plans etc) |
| 9 Total Inspections | |

Documentation Required

The following documentation is required:

CCC application form
Drainage as-built
Stormwater as- built
PS3 for stormwater drainage (soakhole/ soakpit) including photos
Electrical Certificate
Gas Certificate
Correct siting form
Pre-floor plumbing as built
PS3 Fireplace
Roof Cladding Memorandum (E2)
Water Proofing Certificate - Internal (E3) Tilers membrane

Gas fireplace

Licensed Building Practitioner Forms Required

The following Restricted Building Work must be carried out or supervised by a registered Licensed Building Practitioner (LBP) and a Record of Building Work form signed by each LBP is required at the completion of the work.

Design 1 William Thomson
Carpentry 1

The above list is an indication only of the inspections that may need to be carried out to ensure the work complies with the building consent. Additional inspections may be required to satisfy the requirements of Section 90 of the Building Act 2004. Persons carrying out building work are to ensure that adequate inspections are carried out to enable the Building Consent Authority to be satisfied the work complies with the consent as required by Section 94(1)(a) of the Building Act 2004.

Please ensure that all relevant components are inspected and 'signed off' by Taupō District Council building control staff before progressing to the next stage and all conditions/notes are complied with.

Inspection Bookings:

For Taupō & Mangakino phone (07) 376 0899

For Turangi phone (07) 386 7017

Advice Notes

When all building work authorised by this building consent is complete, an electronic Application for Code Compliance Certificate must be submitted online <https://online.taupo.govt.nz>

Until such time as all documentation is received and approved, the final inspection will not be carried out. If no application has been made, Taupo District Council must decide whether to issue the CCC after 2 years of the building consent being granted.

LBP Building Work

Section 87 Building Act 2004

If not stated on the application form the owner must notify the Council in writing of the names and LBP numbers of ALL licensed building practitioners engaged in this project before building work commences

LBP related building inspections will not take place until Council has been notified of all the LBP's engaged in the project.

#Drainage/as built plans including stormwater drains and soakholes, are to be provided, drawn to scale, and all parts clearly identified at the time of inspection. Failure to do this may result in the inspection not being carried out. A recheck will then be required, which will incur further charges.

All AS/NZS3500:2:2: underslab plumbing to be inspected and tested with as-built supplied before pipe work is covered up

#All buildings and associated works are to be kept clear of public drains in accordance with the Taupo District Council policy, unless a relaxation has been given by the Services Engineer. Refer to the Project Information Memorandum.

#It is recommended that prior to the fire appliance being used a Code of Compliance Certificate should be obtained from the Taupo District Council.

PLEASE NOTE: All external cladding's and internal linings that contribute to B1 - Structure, C3 & C6 - Protection from Fire, E2- External Moisture, E3 - Internal Moisture, & G6 - Acoustic and Impact Sound requirements of the Building Code must be installed in strict accordance with the manufacturers specifications and details except where details have been proposed and approved as alternative solutions as part of this consent.

#As agreed prior to granting of consent, At the completion of the works and prior to the issue of the C.C.C, the applicant shall provide the Taupo District Council the following documentation to assist Council in establishing compliance with the NZBC for

the Dampfix Gold WPM system

- Copy of the applicators approval certificate
- A producers statement from the Applicator
- Copy of Manufacturers' warranty

#Prior to a Code of Compliance Inspection being undertaken, an Energy Works certificate shall be provided to the Taupo District Council to demonstrate compliance with Clause G9 and/or G10 and G11 of the NZBC.

Fire Appliance: Prior to a Code of Compliance Inspection being carried out, a PS3 from a suitably qualified person is to be supplied stating the roof flashing system has been installed as per the manufacturers specifications. Photographic evidence must be supplied showing compliance with Clause E2.



WORKS ORDER APPLICATION FOR: WATER CONNECTION

Date: 26/11/2018

Works Order No: _____ Code No: _____

BC No: 181033

Owner Name: Penny Homes Limited Phone No: _____

Owner's Address: 1 Jarden Mile, Taupo 3330, ,

Property Address: 18 Penny Grove, Taupo

Legal Description: Lot 226 DP 522262

Fee Paid: \$144.00 Receipt No: _____

Dimensions: Toby turn on

Assigned Department: Mel Montesa Target Date: ASAP

Assigned By: Business Support

SKETCH WHERE REQUIRED (*Attach Sheets For Sketch If Required*)

RETURN CHIT (FILL IN WHEN WORK COMPLETE)

Works Order No: _____

Date Work Started: _____ Date Completed: _____

Action Taken: _____

Is additional work or further action needed? Yes ☐ No ☐

Describe additional work or action: _____

Signature: _____ Date: _____

*BC181033 - Items to send to applicant - A2360258

To: Tech Support[businesssupport@taupo.govt.nz]
From: Graham Boyle
Sent: Sun 25/11/2018 6:51:41 p.m
Importance: Normal
Subject: B/C181033 - 18 Penny Grove - Approved
MAIL_RECEIVED: Sun 25/11/2018 6:51:42 p.m
[ObjRef.obr](#)

Graham Boyle has sent you links to the following 9 documents from Objective:

"173 Producer Statement Template - General construction work (A1119149)" (A2359601)
"200 Correct Siting Form (A620432)" (A2359600)
"201 Services As Laid Plan Form (A620433)" (A2359599)
"Advice of Licensed Building Practitioner form (A1452379)" (A2359597)
"Building Plans - BC181033" (A2348896)
"Memorandum from LBP-Design BC181033" (A2348897)
"Services Plan - 18 Penny Grove BC181033" (A2349386)
"Specification - Appendix BC181033" (A2348894)
"Specification - General BC181033" (A2348898)

Open in Navigator
Double click on the attachment

Open in NEW ECM Browser

173 Producer Statement Template - General construction work (A1119149)
<https://objective.taupodc.govt.nz:8443/objective/#item=A2359601>
200 Correct Siting Form (A620432)
<https://objective.taupodc.govt.nz:8443/objective/#item=A2359600>
201 Services As Laid Plan Form (A620433)
<https://objective.taupodc.govt.nz:8443/objective/#item=A2359599>
Advice of Licensed Building Practitioner form (A1452379)
<https://objective.taupodc.govt.nz:8443/objective/#item=A2359597>
Building Plans - BC181033
<https://objective.taupodc.govt.nz:8443/objective/#item=A2348896>
Memorandum from LBP-Design BC181033
<https://objective.taupodc.govt.nz:8443/objective/#item=A2348897>
Services Plan - 18 Penny Grove BC181033
<https://objective.taupodc.govt.nz:8443/objective/#item=A2349386>
Specification - Appendix BC181033
<https://objective.taupodc.govt.nz:8443/objective/#item=A2348894>
Specification - General BC181033
<https://objective.taupodc.govt.nz:8443/objective/#item=A2348898>

Open in Your Browser

173 Producer Statement Template - General construction work (A1119149)
Latest: <https://objective.taupodc.govt.nz/id:A2359601/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2359601/document/versions/published>
200 Correct Siting Form (A620432)
Latest: <https://objective.taupodc.govt.nz/id:A2359600/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2359600/document/versions/published>
201 Services As Laid Plan Form (A620433)
Latest: <https://objective.taupodc.govt.nz/id:A2359599/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2359599/document/versions/published>
Advice of Licensed Building Practitioner form (A1452379)

Latest: <https://objective.taupodc.govt.nz/id:A2359597/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2359597/document/versions/published>
Building Plans - BC181033

Latest: <https://objective.taupodc.govt.nz/id:A2348896/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2348896/document/versions/published>
Memorandum from LBP-Design BC181033

Latest: <https://objective.taupodc.govt.nz/id:A2348897/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2348897/document/versions/published>
Services Plan - 18 Penny Grove BC181033

Latest: <https://objective.taupodc.govt.nz/id:A2349386/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2349386/document/versions/published>
Specification - Appendix BC181033

Latest: <https://objective.taupodc.govt.nz/id:A2348894/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2348894/document/versions/published>
Specification - General BC181033

Latest: <https://objective.taupodc.govt.nz/id:A2348898/document/versions/latest>
Published: <https://objective.taupodc.govt.nz/id:A2348898/document/versions/published>

A2359601
A2359600
A2359599
A2359597
A2348896
A2348897
A2349386
A2348894
A2348898



GREAT LAKE TAUPŌ
Taupō District Council

Building Consent

Section 51, Building Act 2004

BC No: 181033

The Building

Street address of building: 18 Penny Grove, Taupo

Legal description of land where building is located: Lot 226 DP 522262

Valuation number: 0730164819

Building name: N/A

Location of building within site/block number: N/A

Level/unit number: N/A

The Owner

Name of owner: Penny Homes Limited

Contact person: David Park

Mailing address: 1 Jarden Mile, Taupo 3330

Street address/registered office: Unknown

Phone number: **Landline:** Unknown

Mobile: 027 4909129

Daytime: Unknown

After hours: 07 3770154

Facsimile number: 07 3770155

Email address: david@pennyhomes.co.nz

Website: N/A

First point of contact for communications with the council/building consent authority:

As above

Building Work

The following building work is authorised by this building consent:

New three bedroom dwelling

This building consent:

- Is issued under section 51 of the Building Act 2004.
- Does not relieve the owner of the building (or proposed building) of any duty or responsibility under any other Act relating to or affecting the building (or proposed building).
- Also does not permit the construction, alteration, demolition, or removal of the building (or proposed building) if that construction, alteration, demolition, or removal would be in breach of any other Act.

This building consent is issued subject to the following conditions and advice notes:

1. **Condition: It is a condition of this consent that agents authorized by the building consent authority for the purposes of section 90 of the Building Act 2004 are entitled, at all times during normal working hours or while building work is being done, to inspect -**
 - (a) land on which building work is being or is proposed to be carried out; and
 - (b) building work that has been or is being carried out on or off the building site; and
 - (c) any building.
2. **LBP Building Work Section 87 Building Act 2004** If not stated on the application form the owner must notify the Council in writing of the names and LBP numbers of ALL licensed building practitioners engaged in this project before building work commences LBP related building inspections will not take place until Council has been notified of all the LBP"s engaged in the project.
3. **Drainage/as built plans** including stormwater drains and soakholes, are to be provided, drawn to scale, and all parts clearly identified at the time of inspection. Failure to do this may result in the inspection not being carried out. A recheck will then be required, which will incur further charges. All AS/NZS3500:2:2: underslab plumbing to be inspected and tested with as-built supplied before pipe work is covered up
4. **All buildings and associated works** are to be kept clear of public drains in accordance with the Taupo District Council policy, unless a relaxation has been given by the Services Engineer. Refer to the Project Information Memorandum.
5. It is recommended that prior to the fire appliance being used a Code of Compliance Certificate should be obtained from the Taupo District Council.
6. **PLEASE NOTE:** All external cladding"s and internal linings that contribute to B1 - Structure, C3 & C6 - Protection from Fire, E2- External Moisture, E3 - Internal Moisture, & G6 - Acoustic and Impact Sound requirements of the Building Code must be installed in strict accordance with the manufacturers specifications and details except where details have been proposed and approved as alternative solutions as part of this consent.
7. **As agreed prior to granting of consent, At the completion of the works and prior to the issue of the C.C.C, the applicant shall provide the Taupo District Council the following documentation to assist Council in establishing compliance with the NZBC for the Dampfix Gold WPM system - Copy of the applicators approval certificate - A producers statement from the Applicator - Copy of Manufacturers" warranty**
8. **Prior to a Code of Compliance Inspection being undertaken, an Energy Works certificate shall be provided to the Taupo District Council to demonstrate compliance with Clause G9 and/or G10 and G11 of the NZBC.**
9. **Fire Appliance:** Prior to a Code of Compliance Inspection being carried out, a PS3 from a suitably qualified person is to be supplied stating the roof flashing system has been installed as per the manufacturers specifications. Photographic evidence must be supplied showing compliance with Clause E2.

When all building work authorised by this building consent is complete, electronic application should be made to Taupo District Council for a **CODE COMPLIANCE CERTIFICATE** and submit the documentation requested as part of this consent. This application and documentation must be submitted and approved prior to booking the final inspection. If no application has been made, Taupo District Council must decide whether to issue the CCC after 2 years of the building consent being granted.

Compliance Schedule

A compliance schedule is not required for the building.

Attachments

Copies of the following documents are attached to this building consent:

- Approved Plans and Specifications

- Required items sheet attached to front of plans including a list of the inspections required (*Section 90*)
- Project Information Memorandum

Signature: _____



Dean Southey

Building Inspections and Processing Manager

On behalf of: Taupo District Council

Date: 24 April 2020

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Prefloor/Subfloor Plumbing & Drainage**
Inspection Outcome: **Pass**
Inspected By: **Peter Kay**
Inspection Date: **29 April 2020 4:34 PM**
Duration: **60 minutes**

Inspection Element	Status
General	Pass
Verify drainlayer's registration Chris Lacey	Pass
Previous inspections	Pass
Approved building consent documents or as-laid plan on site?	Pass
Conditions of consent (if any) are met and consent documents on site	Pass
Appropriate materials being used	Pass
Drainage	Pass
Correct location, type, sizes, cover, and gradients	Pass
Adequate support and protection where required	Pass
Under test water or air On water test	Pass
On Site Wastewater System	N/A
Plumbing	N/A
Outcome of Inspection	Pass
Approved Work appears correct as per approved consented documents ok to proceed.	Pass
Further Inspection Required (Recheck Required)	N/A
Required documents not yet received As-laid seen onsite. To be emailed to council	Pass

SITE NOTICE

Consent No:	181033	Date Printed: 29 April 2020
Applicant:	Penny Homes Limited	
Valuation Ref:	0730164819	
Site Address:	18 Penny Grove, Taupo	
Work Type:	New three bedroom dwelling	
Building Category:	Residential Level 1	

Inspection Type:	Prefloor/Subfloor Plumbing & Drainage
Inspection Outcome:	Pass
Inspected By:	Peter Kay
Inspection Date:	29 April 2020

Passed Items

General

Verify drainlayer's registration	Chris Lacey
Previous inspections	
Approved building consent documents or as-laid plan on site?	
Conditions of consent (if any) are met and consent documents on site	
Appropriate materials being used	

Drainage

Correct location, type, sizes, cover, and gradients	
Adequate support and protection where required	
Under test water or air	On water test

Outcome of Inspection

Approved	Work appears correct as per approved consented documents ok to proceed.
Required documents not yet received	As-laid seen onsite. To be emailed to council

Documentation

Documentation	Status
CCC application form (online)	Required
Wastewater Drainage As-built	Required
Stormwater As-built	Required
PS3 Stormwater Drainage (soakholes/soakpits) incl. photos	Required
Electrical Certificate	Required
Gas Certificate	Required
Correct siting form	Required
Pre-floor/Subfloor Plumbing As-built	Required
PS3 Fireplace	Required
Gas fireplace	
Roof Cladding Memorandum (E2)	Required
PS3 Water Proofing Certificate - Internal (E3) Membrane	Required

Licensed Building Practitioners

Status

Design 1
William Thomson
Carpentry 1
Foundations 1
Roofing 1

Accepted

Required
Required
Required

Pre-Floor As-Laid - A2679425

Date: Wed, 29 Apr 2020 10:34:06 AM (UTC)
Sent: Wed, 29 Apr 2020 10:33:50 AM (UTC)
Subject: BC181033A 18 Penny Grove.
From: C J Lacey Plumbing <chris@pipesrus.co.nz>
To: Peter Kay <pkay@taupo.govt.nz>;
Attachments: PHL BC181033A 18 Penny Grove form412 pg1.jpg; PHL BC181033A 18 Penny Grove form412 pg2.jpg; PHL BC181033A 18 Penny Grove form412 pg3.jpg

Good morning Peter,

Please find attached inspection sheets.

Cheers Chris.



GREAT LAKE TAUPŌ

Taupō District Council

72 Lake Terrace, Taupo 3330

Private Bag 2005, Taupo Mail Centre, Taupo 3352

Ph: 07 376 0899

techsupport@taupo.govt.nz

www.taupo.govt.nz

SERVICES AS LAID PLAN

☒ Prefloor

☐ Drainage

☐ Soakholes

Please select the items covered in this document

Building Consent No: 181033A

Owners Name: Blomquist

Property Address: 18 PENNY GROVE TAupo

Plumber: CHRIS LACEY 115 TAupo VIEW RD TAupo 027 3487473
Name/s Address Contact Phone No.

Registration No. 10 900

Drainlayer: _____
Name/s Address Contact Phone No.

Registration No. _____

DRAW PLAN IN BLACK BALLPOINT ON GRAPH OPPOSITE

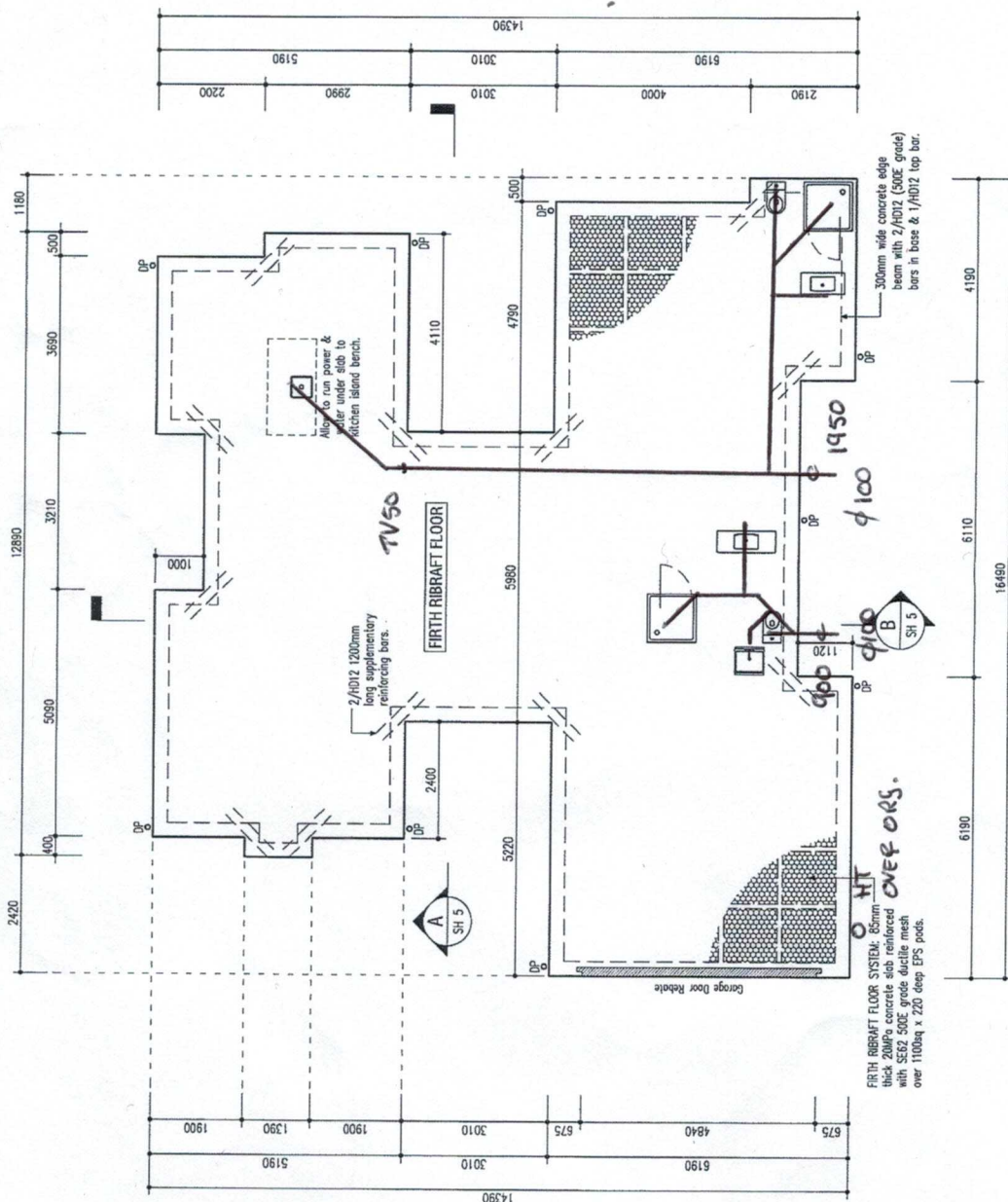
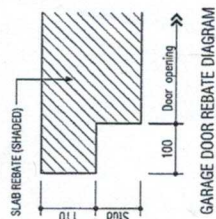
Plan is to show:

- ☐ All drains in correct position relative to building and boundaries
- ☐ The road frontage
- ☐ Depth of drains at connection points
- ☐ All foul water and stormwater drains
- ☐ All inspection openings, accurately dimensioned
- ☐ All buildings and boundaries
- ☐ Outside water lines and the source of supply
- ☐ The type, location and size of all on site sewage disposal systems
- ☐ Size and position of soak holes

REFER TO EXAMPLE ON LAST PAGE

NOTE: If the inspector cannot be satisfied of compliance and/or the drain layout differs from the approved building consented documents, an amendment to the consent may be requested.

FLOOR COVERINGS NEED TO BE CONSIDERED IN ALL SITUATIONS TO ENSURE A FLUSH FINISH WITH THE JOINERY.



FIFTH RIBRAFT FLOOR SYSTEM: 85mm thick 20MPa concrete slab reinforced with SE62 500E grade ductile mesh over 1100sq x 220 deep EPS nodes

Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz PENNY HOMES	BLOMQUIST RESIDENCE		18 PENNY GROVE, TAUPO	FOUNDATION PLAN	SCALE: 1:100	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: 19/11/18	REVISION: A Stormwater & eavesdrotes amended, tracing and plumbing B Amended bathroom layout, increased eavesdrotes, changed WZ, EQ & R10, removed R16 replaced C108, 1000 litre bottles with Lingo waterproofers		SHEET 2
	www.pennyhomes.co.nz	© Copyright								

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Prefloor Building**
Inspection Outcome: **Fail**
Inspected By: **Martyn Trainor**
Inspection Date: **4 May 2020 8:41 AM**
Duration: **60 minutes**

Prefloor inspection for new dwelling.

Inspection Element	Status
General	Pass
As per the approved plans	Pass
Previous inspections	Pass
Approved building consent documents on site	Pass
Proposed floor level correct	Pass
Slab on Ground or Suspended Concrete	Pass
Appropriate materials being used	Pass
Correct location, type, sizes, cover, laps etc of reinforcing	Pass
Steel and mesh is clean and tied	Pass
Compaction for base	Pass
Proposed floor level correct	Pass
Engineer inspected (if required)	N/A
Damp Proof Membrane	Pass
Timber Floor	N/A
Outcome of Inspection	Fail
Approved	Pass
The work was proceeding as the approved plan. This is a rib raft floor construction. The poly pods, polythene, steel and mesh was provided. The slab thickenings were in place and ground bearing appeared firm. Ok to proceed on reasonable grounds.	
Further Inspection Required (Recheck Required)	Pass
Required documents not yet received	Fail
Correct siting form to come.	



Taken at 8:41 AM on Monday 4/05/2020



Taken at 8:41 AM on Monday 4/05/2020



Taken at 8:41 AM on Monday 4/05/2020



Taken at 8:48 AM on Monday 4/05/2020

SITE NOTICE

Consent No:	181033	Date Printed: 4 May 2020
Applicant:	Penny Homes Limited	
Valuation Ref:	0730164819	
Site Address:	18 Penny Grove, Taupo	
Work Type:	New three bedroom dwelling	
Building Category:	Residential Level 1	

Inspection Type: **Prefloor Building**
 Inspection Outcome: **Fail**
 Inspected By: **Martyn Trainor**
 Inspection Date: **4 May 2020**
Prefloor inspection for new dwelling.

Failed Items

Outcome of Inspection

Required documents not yet received

Correct siting form to come.

Passed Items

General

As per the approved plans
 Previous inspections
 Approved building consent documents on site
 Proposed floor level correct

Slab on Ground or Suspended Concrete

Appropriate materials being used
 Correct location, type, sizes, cover, laps etc of reinforcing
 Steel and mesh is clean and tied
 Compaction for base
 Proposed floor level correct
 Damp Proof Membrane

Outcome of Inspection

Approved

The work was proceeding as the approved plan. This is a rib raft floor construction. The poly pods, polythene, steel and mesh was provided. The slab thickenings were in place and ground bearing appeared firm. Ok to proceed on reasonable grounds.

Further Inspection Required (Recheck Required)

Documentation

Pre-floor/Subfloor Plumbing As-built
 CCC application form (online)
 Wastewater Drainage As-built
 Stormwater As-built
 PS3 Stormwater Drainage (soakholes/soakpits) incl. photos
 Electrical Certificate

Status

Accepted
 Required
 Required
 Required
 Required
 Required

Gas Certificate	Required
Correct siting form	Required
PS3 Fireplace Gas fireplace	Required
Roof Cladding Memorandum (E2)	Required
PS3 Water Proofing Certificate - Internal (E3) Membrane	Required

Licensed Building Practitioners	Status
Design 1 William Thomson	Accepted
Carpentry 1	Required
Foundations 1	Required
Roofing 1	Required

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Prefloor Building**
Inspection Outcome: **Pass**
Inspected By: **Martyn Trainor**
Inspection Date: **5 May 2020 3:03 PM**
Duration: **0 minutes**

Prefloor inspection for new dwelling.

Inspection Element	Status
Outcome of Inspection	Pass
Required documents not yet received	Pass

SITE NOTICE

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**
Building Category: **Residential Level 1**

Date Printed: **5 May 2020**

Inspection Type: **Prefloor Building**
Inspection Outcome: **Pass**
Inspected By: **Martyn Trainor**
Inspection Date: **5 May 2020**

Prefloor inspection for new dwelling.

Passed Items

Outcome of Inspection

Required documents not yet received

Correct siting form - A2680730

Date: Mon, 4 May 2020 4:31:04 AM (UTC)
Sent: Mon, 4 May 2020 4:30:50 AM (UTC)
Subject: FW: 18 Penny Grove [#1543BB]
From: Customer ServiceTeam <INFO@TAUPO.GOV.T.NZ>
To: buildingconsents <buildingconsents@taupo.govt.nz>;
CC: Martyn Trainor <mtrainor@taupo.govt.nz>;
Attachments: Image (12).jpg

Hi

Please see attached.

Thank you

Tina

-----Original Message-----

From: taupo@rfl.co.nz

Sent: Monday, 4 May 2020 4:05:31 PM

To: info@taupo.govt.nz

Subject: 18 Penny Grove

Hi Martin,

Please find attached my siting form for your inspection this morning at 18 Penny Grove

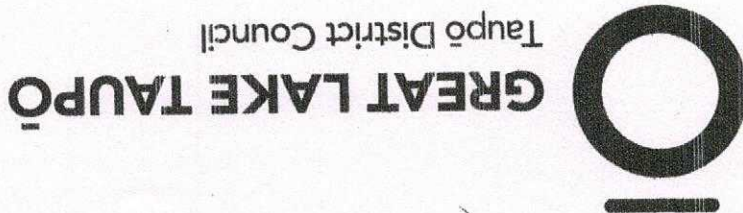
Cheers

Pera Taepa

Taupo Area Manager

RFL

02102992120



GREAT LAKE TAUPŌ
Taupo District Council

UNDERTAKING AS TO CORRECT SITING OF

BUILDING

Building Act 2004

This form must be completed and be available for collection by the Building Management Officer when the first inspection is carried out or at such other time as agreed. A Code Compliance Certificate will not be issued until such time as this form is received and correctly filled out.

BC No: 181033

I hereby certify that the building work currently being carried out at

(Address of Property)

is positioned in accordance with, and is the same size, as shown on the approved plans of the Building Consent.

Pera Taepa

LBP: 127456

Name of Builder/Owner:

(Delete that which does not apply)

Signature:

[Handwritten signature]

Date:

4 5 20

Taupo District Council

46 Horomatangi Street, Private Bag 2005, Taupo Mail Centre, Taupo 3352
Phone: 07 3760899 Email: info@taupo.govt.nz Website: www.taupo.govt.nz

Drainage asbuilt - A2684139

Date: Mon, 11 May 2020 3:05:17 AM (UTC)
Sent: Mon, 11 May 2020 3:04:38 AM (UTC)
Subject: 18 Penny Grove BC181033
From: Kelvin & Natalie Price <pricek.n@outlook.com>
To: Glenn Walker <gwalker@taupo.govt.nz>;
Attachments: CCF11052020.pdf

Hi Glenn

Drainage Aslaid attached for 18 Penny Grove

Thanks

Kelvin



GREAT LAKE TAUPŌ
Taupō District Council

72 Lake Terrace, Taupo 3330
Private Bag 2005, Taupo Mail Centre, Taupo 3352
Ph: 07 376 0899
techsupport@taupo.govt.nz
www.taupo.govt.nz

SERVICES AS LAID PLAN

☐ Prefloor

☒ Drainage

☐ Soakholes

Please select the items covered in this document

Building Consent No:

181033

Owners Name:

Blomqvist

Property Address:

18 Penny Lane

Plumber:

Name/s

Address

Contact Phone No.

Registration No.

Drainlayer:

Kevin Rice 22 Kewapoto Lane

021 158 5214

Name/s

Address

Contact Phone No.

Registration No.

16309

Tarp

DRAW PLAN IN BLACK BALLPOINT ON GRAPH OPPOSITE

Plan is to show:

- ☐ All drains in correct position relative to building and boundaries
- ☐ The road frontage
- ☐ Depth of drains at connection points
- ☐ All foul water and stormwater drains
- ☐ All inspection openings, accurately dimensioned
- ☐ All buildings and boundaries
- ☐ Outside water lines and the source of supply
- ☐ The type, location and size of all on site sewage disposal systems
- ☐ Size and position of soak holes

REFER TO EXAMPLE ON LAST PAGE

NOTE: If the Inspector cannot be satisfied of compliance and/or the drain layout differs from the approved building consented documents, an amendment to the consent may be requested.

FOUNDATION PLAN NOTES:

REFER TO FIRTH REBRAFT TECHNICAL MANUAL - OCT 2018 FOR FURTHER DESIGN AND CONSTRUCTION INFORMATION.

SHRINKAGE CONTROL JOINTS, IF REQUIRED, ARE TO BE INSTALLED AS PER FIRTH REBRAFT TECHNICAL MANUAL. CHECK DIMENSIONS AGAINST FINAL FRAMING PLAN PRIOR TO SETTING OUT FOUNDATION.

5mm FRAMING OVERHANG IS REQUIRED FOR AXON PANEL OVER CAVITY - AS DIMENSIONED ON FOUNDATION PLAN.

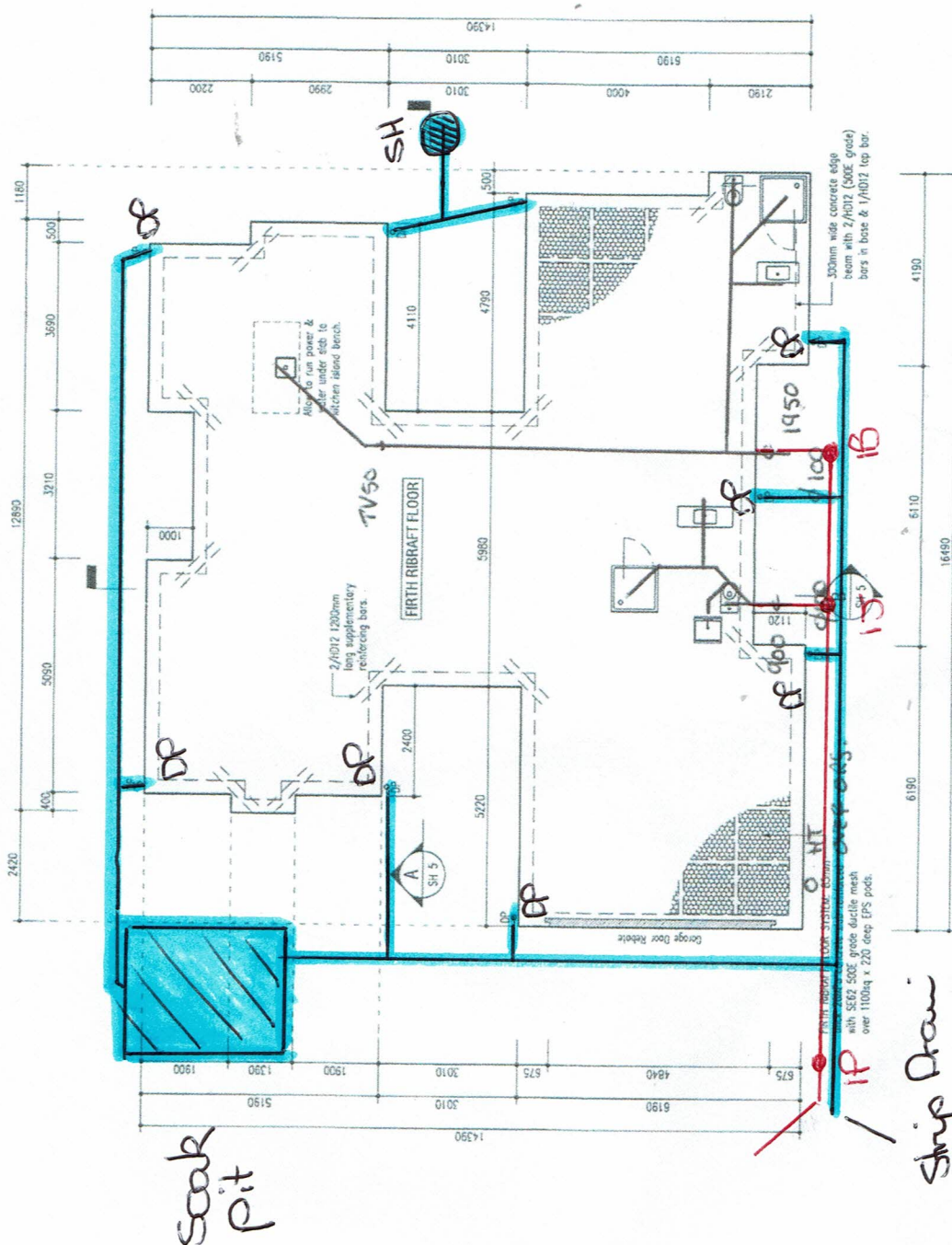
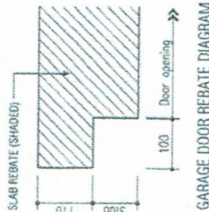
5mm FRAMING OVERHANG RECOMMENDED FOR LINEA BEVEL BACK WEATHERBOARD - AS DIMENSIONED ON FOUNDATION PLAN.

OVERALL DIMENSIONS ARE TO OUTSIDE EDGE OF FOUNDATION WITH REBATES DIMENSIONED SEPARATELY.

SLAB REBATES FOR FULL HEIGHT JOINERY:

CONTRACTOR TO CONFIRM DOOR AND WINDOW JOINERY PROFILES WITH OWNER & JOINERY MANUFACTURER PRIOR TO SETTING OUT SLAB TO ALLOW FOR ACCURATE SLAB REBATES WHERE REQUIRED.

FLOOR COVERINGS NEED TO BE CONSIDERED IN ALL SITUATIONS TO ENSURE A FLUSH FINISH WITH THE JOINERY.



Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email ph@pennyhomes.co.nz www.pennyhomes.co.nz	BLOMQUIST RESIDENCE 18 PENNY GROVE, TAUPU	FOUNDATION PLAN CONSENT COPY	SCALE: 1:100 DATE: Nov 2018 DRAWN: SJC CHECKED: SJC	DATE: 24/11/18 REVISION: 19/02/20 A: Structural & services amended, tracing B: Structural & services amended, tracing C: Structural & services amended, tracing D: Structural & services amended, tracing E: Structural & services amended, tracing F: Structural & services amended, tracing G: Structural & services amended, tracing H: Structural & services amended, tracing I: Structural & services amended, tracing J: Structural & services amended, tracing K: Structural & services amended, tracing L: Structural & services amended, tracing M: Structural & services amended, tracing N: Structural & services amended, tracing O: Structural & services amended, tracing P: Structural & services amended, tracing Q: Structural & services amended, tracing R: Structural & services amended, tracing S: Structural & services amended, tracing T: Structural & services amended, tracing U: Structural & services amended, tracing V: Structural & services amended, tracing W: Structural & services amended, tracing X: Structural & services amended, tracing Y: Structural & services amended, tracing Z: Structural & services amended, tracing	SHEET 2 OF 20 JOB No. JT18105
	TITLE: BLOMQUIST RESIDENCE 18 PENNY GROVE, TAUPU	FOUNDATION PLAN CONSENT COPY	SCALE: 1:100 DATE: Nov 2018 DRAWN: SJC CHECKED: SJC	DATE: 24/11/18 REVISION: 19/02/20 A: Structural & services amended, tracing B: Structural & services amended, tracing C: Structural & services amended, tracing D: Structural & services amended, tracing E: Structural & services amended, tracing F: Structural & services amended, tracing G: Structural & services amended, tracing H: Structural & services amended, tracing I: Structural & services amended, tracing J: Structural & services amended, tracing K: Structural & services amended, tracing L: Structural & services amended, tracing M: Structural & services amended, tracing N: Structural & services amended, tracing O: Structural & services amended, tracing P: Structural & services amended, tracing Q: Structural & services amended, tracing R: Structural & services amended, tracing S: Structural & services amended, tracing T: Structural & services amended, tracing U: Structural & services amended, tracing V: Structural & services amended, tracing W: Structural & services amended, tracing X: Structural & services amended, tracing Y: Structural & services amended, tracing Z: Structural & services amended, tracing	SHEET 2 OF 20 JOB No. JT18105

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Sanitary Sewer/Drainage**
Inspection Outcome: **Fail**
Inspected By: **Glenn Walker**
Inspection Date: **11 May 2020 10:48 AM**
Duration: **60 minutes**

Inspection Element	Status
General	Pass
Previous inspections	Pass
Approved building consent documents or as-built plan on site o	Pass
Conditions of consent (if any) are met	Pass
As per the approved plans	Pass
Sanitary Drainage	Pass
Appropriate materials being used	Pass
Adequate support and protection where required	Pass
correct size & type used ,as/nz3500 & approved consent document	
Correct location, type, sizes, cover, and gradients of drains	Pass
G13 or AS/NZS3500	Pass
Test of entire system	Pass
water test appears ok good fall	
Stormwater	Fail
To approved disposal system (onsite or reticulated system)	Fail
Disposal system adequate	Fail
As built provided with PS3 and photos	Fail
On Site Wastewater System	N/A
Outcome of Inspection	Fail
Approved	Pass
All appears ok to proceed as per approved consented document, as/nz 3500	
Further Inspection Required (Recheck Required)	N/A
Required documents not yet received	Fail
Stormwater asbuilt to come	



Taken at 10:45 AM on Monday 11/05/2020



Taken at 10:46 AM on Monday 11/05/2020

SITE NOTICE

Consent No:	181033	Date Printed: 11 May 2020
Applicant:	Penny Homes Limited	
Valuation Ref:	0730164819	
Site Address:	18 Penny Grove, Taupo	
Work Type:	New three bedroom dwelling	
Building Category:	Residential Level 1	

Inspection Type:	Sanitary Sewer/Drainage
Inspection Outcome:	Fail
Inspected By:	Glenn Walker
Inspection Date:	11 May 2020

Failed Items

Stormwater

To approved disposal system (onsite or reticulated system)

Disposal system adequate

As built provided with PS3 and photos

Outcome of Inspection

Required documents not yet received

Stormwater asbuilt to come

Passed Items

General

Previous inspections

Approved building consent documents or as-built plan on site o

Conditions of consent (if any) are met

As per the approved plans

Sanitary Drainage

Appropriate materials being used

Adequate support and protection where required

correct size & type used ,as/nz3500 & approved consent document

Correct location, type, sizes, cover, and gradients of drains

G13 or AS/NZS3500

Test of entire system

water test appears ok good fall

Outcome of Inspection

Approved

All appears ok to proceed as per approved consented document, as/nz 3500

Documentation

Correct siting form

Pre-floor/Subfloor Plumbing As-built

CCC application form (online)

Wastewater Drainage As-built

Stormwater As-built

PS3 Stormwater Drainage (soakholes/soakpits) incl.

Status

Accepted

Accepted

Required

Required

Required

photos	Required
Electrical Certificate	Required
Gas Certificate	Required
PS3 Fireplace	Required
Gas fireplace	
Roof Cladding Memorandum (E2)	Required
PS3 Water Proofing Certificate - Internal (E3) Membrane	Required

Licensed Building Practitioners

Status

Design 1	Accepted
William Thomson	
Carpentry 1	Required
Foundations 1	Required
Roofing 1	Required

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Pre-Ext Cladding Systems**
Inspection Outcome: **Pass**
Inspected By: **Glenn Walker**
Inspection Date: **18 June 2020 8:39 AM**
Duration: **60 minutes**

Inspection Element	Status
General	Pass
Previous inspections	Pass
Approved building consent documents on site meet wade	Pass
Conditions of consent (if any) are met	Pass
As per the approved plans	Pass
Walls	Pass
Cladding type(s) axon,linea weather board	Pass
Appropriate materials used (e.g. timber treatment & grade, approved/appraised)	Pass
Flashing details & materials	Pass
Internal & external corners & junctions	Pass
Battens (cavity system) and/or ventilation	Pass
Tanking to foundations for brickwork	N/A
Proprietary fixings (metal tie down straps/connection etc for trusses/bracing etc)	Pass
Building wrap (Correct type/installation)	Pass
Penetrations	Pass
Deck Flashings	N/A
Roof	Pass
Roof type(s) long run iron	Pass
Correct installation and materials	Pass
Flashings	Pass
Outcome of Inspection	Pass
Approved all appears ok to proceed as per approved consented document /NZBC	Pass
Further Inspection Required (Recheck Required)	N/A
Required documents not yet received	N/A



Taken at 8:25 AM on Thursday 18/06/2020



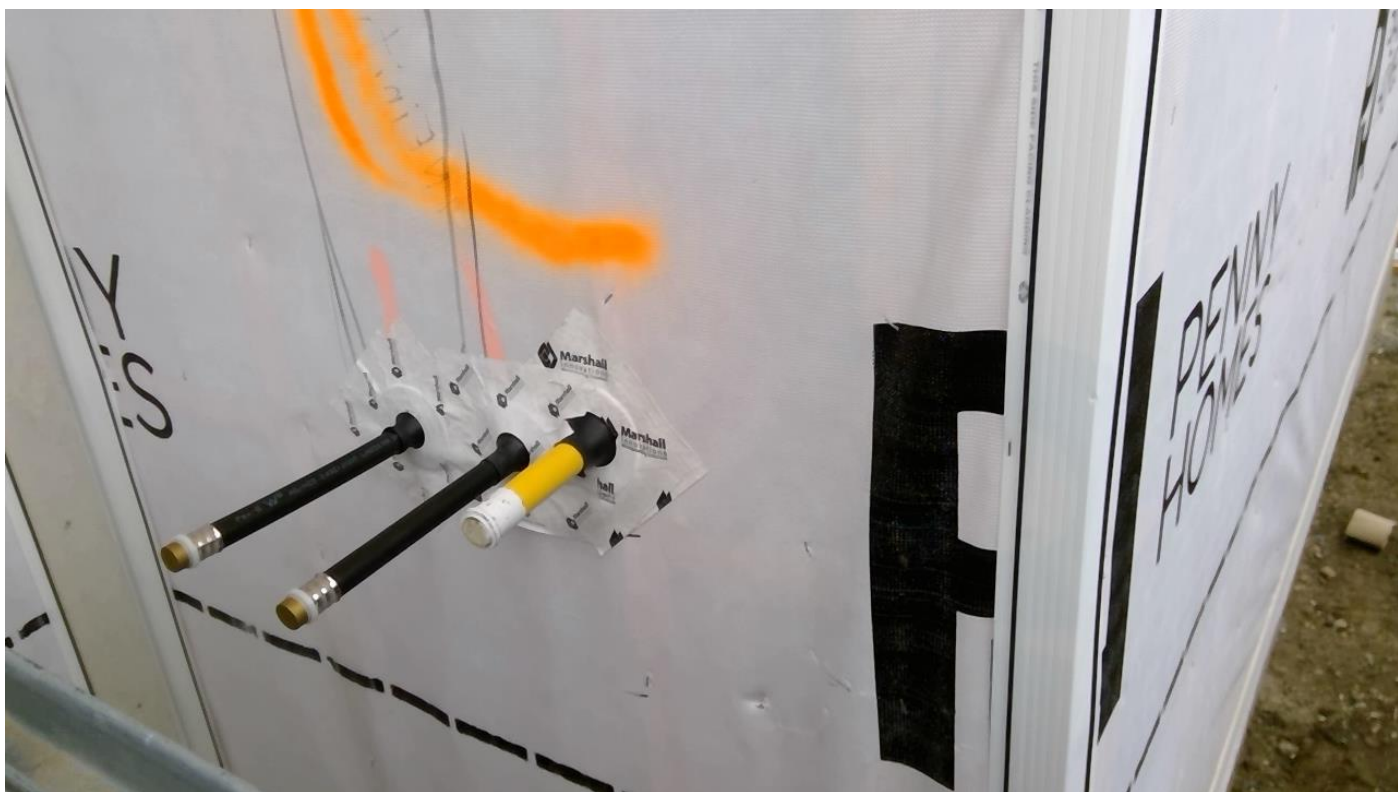
Taken at 8:26 AM on Thursday 18/06/2020



Taken at 8:26 AM on Thursday 18/06/2020



Taken at 8:26 AM on Thursday 18/06/2020



Taken at 8:26 AM on Thursday 18/06/2020



Taken at 8:27 AM on Thursday 18/06/2020



Taken at 8:27 AM on Thursday 18/06/2020



Taken at 8:27 AM on Thursday 18/06/2020



Taken at 8:28 AM on Thursday 18/06/2020

SITE NOTICE

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**
Building Category: **Residential Level 1**

Date Printed: **18 June 2020**

Inspection Type: **Pre-Ext Cladding Systems**
Inspection Outcome: **Pass**
Inspected By: **Glenn Walker**
Inspection Date: **18 June 2020**

Passed Items

General

Previous inspections
Approved building consent documents on site **meet wade**
Conditions of consent (if any) are met
As per the approved plans

Walls

Cladding type(s) **axon,linea weather board**
Appropriate materials used (e.g. timber treatment & grade, approved/appraised)
Flashing details & materials
Internal & external corners & junctions
Battens (cavity system) and/or ventilation
Proprietary fixings (metal tie down straps/connection etc for trusses/bracing etc)
Building wrap (Correct type/installation)
Penetrations

Roof

Roof type(s) **long run iron**
Correct installation and materials
Flashings

Outcome of Inspection

Approved **all appears ok to proceed as per approved consented document /NZBC**

Documentation

Documentation	Status
Correct siting form	Accepted
Pre-floor/Subfloor Plumbing As-built	Accepted
CCC application form (online)	Required
Wastewater Drainage As-built	Required
Stormwater As-built	Required
PS3 Stormwater Drainage (soakholes/soakpits) incl. photos	Required
Electrical Certificate	Required

Gas Certificate	Required
PS3 Fireplace Gas fireplace	Required
Roof Cladding Memorandum (E2)	Required
PS3 Water Proofing Certificate - Internal (E3) Membrane	Required

Licensed Building Practitioners

Status

Design 1 William Thomson	Accepted
Carpentry 1	Required
Foundations 1	Required
Roofing 1	Required

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Preline Plumbing**
Inspection Outcome: **Pass**
Inspected By: **Glenn Walker**
Inspection Date: **14 July 2020 10:35 AM**
Duration: **60 minutes**

Inspection Element	Status
General	Pass
Previous inspections meet Chris lasey	Pass
Plumbers Registration	Pass
Approved building consent documents on site	Pass
Conditions of consent (if any) are met	Pass
As per the approved plans	Pass
Plumbing	Pass
Appropriate materials being used	Pass
Adequate support and protection where required	Pass
Integrity of framing (notches, holes etc) it appears ok	Pass
Sealing of penetrations	Pass
Position of HWC, (roof space etc.)	N/A
Soil and waste pipes as per AS/NZ 3500/G10 & G13	N/A
Pressure test of entire system pressure test ok 200 PSI	Pass
Outcome of Inspection	Pass
Approved all appears ok to proceed as per approved consented documents , G10 G12	Pass
Further Inspection Required (Recheck Required)	N/A
Required documents not yet received	N/A



Taken at 10:25 AM on Tuesday 14/07/2020



Taken at 10:25 AM on Tuesday 14/07/2020



Taken at 10:26 AM on Tuesday 14/07/2020



Taken at 10:26 AM on Tuesday 14/07/2020



Taken at 10:26 AM on Tuesday 14/07/2020



Taken at 10:27 AM on Tuesday 14/07/2020



Taken at 10:27 AM on Tuesday 14/07/2020



Taken at 10:27 AM on Tuesday 14/07/2020



Taken at 10:34 AM on Tuesday 14/07/2020

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Preline Building**
Inspection Outcome: **Pass**
Inspected By: **Glenn Walker**
Inspection Date: **14 July 2020 9:59 AM**
Duration: **60 minutes**

Inspection Element	Status
General	Pass
Previous inspections	Pass
Approved building consent documents on site	Pass
Conditions of consent (if any) are met	Pass
Floor plan as per the approved plans	Pass
Walls	Pass
Appropriate materials being used	Pass
Airseals in place at window and door inplace	Pass
Wall bracing (internal) all bracing inplace & holding down inplace correctly	Pass
Fixings (nailing, proprietary fixings for uplift, bracing etc)	Pass
Moisture content (specify) % Between 15-18 %	Pass
Roof	N/A
Insulation	Pass
Correct installation wool	Pass
Outcome of Inspection	Pass
Approved all appears ok to proceed as per approved consented document /NZBC	Pass
Further Inspection Required (Recheck Required)	N/A
Required documents not yet received	N/A



Taken at 9:48 AM on Tuesday 14/07/2020



Taken at 9:49 AM on Tuesday 14/07/2020



Taken at 9:49 AM on Tuesday 14/07/2020



Garage

Taken at 9:49 AM on Tuesday 14/07/2020



Taken at 9:52 AM on Tuesday 14/07/2020



Taken at 9:52 AM on Tuesday 14/07/2020

SITE NOTICE

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**
Building Category: **Residential Level 1**

Date Printed: **14 July 2020**

Inspection Type: **Preline Plumbing**
Inspection Outcome: **Pass**
Inspected By: **Glenn Walker**
Inspection Date: **14 July 2020**

Passed Items

General

Previous inspections **meet Chris lasey**
Plumbers Registration
Approved building consent documents on site
Conditions of consent (if any) are met
As per the approved plans

Plumbing

Appropriate materials being used
Adequate support and protection where required
Integrity of framing (notches, holes etc) **it appears ok**
Sealing of penetrations
Pressure test of entire system **pressure test ok 200 PSI**

Outcome of Inspection

Approved **all appears ok to proceed as per approved consented documents , G10 G12**

Inspection Type: **Preline Building**
Inspection Outcome: **Pass**
Inspected By: **Glenn Walker**
Inspection Date: **14 July 2020**

Passed Items

General

Previous inspections
Approved building consent documents on site
Conditions of consent (if any) are met
Floor plan as per the approved plans

Walls

Appropriate materials being used
Airseals in place at window and door **inplace**
Wall bracing (internal) **all bracing inplace & holding down inplace correctly**
Fixings (nailing, proprietary fixings for uplift, bracing etc)

Moisture content (specify) %	Between 15-18 %
Insulation	
Correct installation	wool
Outcome of Inspection	
Approved	all appears ok to proceed as per approved consented document /NZBC

Documentation

Documentation	Status
Correct siting form	Accepted
Pre-floor/Subfloor Plumbing As-built	Accepted
CCC application form (online)	Required
Wastewater Drainage As-built	Required
Stormwater As-built	Required
PS3 Stormwater Drainage (soakholes/soakpits) incl. photos	Required
Electrical Certificate	Required
Gas Certificate	Required
PS3 Fireplace	Required
Gas fireplace	
Roof Cladding Memorandum (E2)	Required
PS3 Water Proofing Certificate - Internal (E3) Membrane	Required

Licensed Building Practitioners

Licensed Building Practitioners	Status
Design 1	Accepted
William Thomson	
Carpentry 1	Required
Foundations 1	Required
Roofing 1	Required

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Post Lining**
Inspection Outcome: **Pass**
Inspected By: **Shane Taylor**
Inspection Date: **24 July 2020 8:25 AM**
Duration: **60 minutes**

Inspection Element	Status
General	Pass
Previous inspections	Pass
Approved building consent documents on site Approved consent documents on site.	Pass
Conditions of consent (if any) are met	Pass
As per the approved plans Appears to be as per approved plans.	Pass
Linings	Pass
Appropriate materials used Appropriate materials being used. 10mm gib to walls 13mm gib to ceilings, aqualine to wet areas.	Pass
Wall Bracing Bracing correct as per approved plans.	Pass
Fixings Fixings as per manufactures requirements.	Pass
Fire Resistant Ratings	N/A
Accoustic Noise Ratings	N/A
Outcome of Inspection	Pass
Approved Met with Wayne on site. The brace elements appeared in the correct location and fixed to specification. Aqualine was used in the wet areas. Ok to proceed on reasonable grounds.	Pass
Further Inspection Required (Recheck Required)	Pass
Required documents not yet received	N/A

SITE NOTICE

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**
Building Category: **Residential Level 1**

Date Printed: **24 July 2020**

Inspection Type: **Post Lining**
Inspection Outcome: **Pass**
Inspected By: **Shane Taylor**
Inspection Date: **24 July 2020**

Passed Items

General

Previous inspections

Approved building consent documents on site

Conditions of consent (if any) are met

As per the approved plans

Approved consent documents on site.

Appears to be as per approved plans.

Linings

Appropriate materials used

Wall Bracing

Fixings

**Appropriate materials being used. 10mm gib to walls
13mm gib to ceilings, aqualine to wet areas.**

Bracing correct as per approved plans.

Fixings as per manufactures requirements.

Outcome of Inspection

Approved

**Met with Wayne on site. The brace elements appeared
in the correct location and fixed to specification.
Aqualine was used in the wet areas. Ok to proceed on
reasonable grounds.**

Further Inspection Required (Recheck Required)

Documentation

Correct siting form
Pre-floor/Subfloor Plumbing As-built
CCC application form (online)
Wastewater Drainage As-built
Stormwater As-built
PS3 Stormwater Drainage (soakholes/soakpits) incl.
photos
Electrical Certificate
Gas Certificate
PS3 Fireplace
Gas fireplace
Roof Cladding Memorandum (E2)
PS3 Water Proofing Certificate - Internal (E3) Membrane

Status

Accepted
Accepted
Required
Required
Required
Required
Required
Required
Required
Required
Required

Licensed Building Practitioners

Status

Design 1

Accepted

24 July 2020

KEEP ON SITE FOR RECHECK

Page 1 of 2

William Thomson

Carpentry 1

Required

Foundations 1

Required

Roofing 1

Required

Application for Code Compliance Certificate

Reference number: REF200916570

Submitted on: 15/09/2020 01:03 p.m.

The Building Consent

Building consent number: 181033
Issued by: Taupō District Council
Valuation number: 0730164819
Property address: 18 Penny Grove, Taupo
Legal description: Lot 226 DP 522262

The Owner

Name of owner: Alan and Jean Blomquist
Contact person: Alan Blomquist
Mailing address:: 43 Koha Road, Taupo 3330
Street address/registered office:
Landline:
Mobile: 021122 7652
Daytime:
After hours:
Fax:
Email address: alanjblomquist@gmail.com
Website:

The Agent

Is there an agent working on behalf of the applicant? Yes
Name of agent/business: Penny Homes Ltd
Contact person: Debbie Grimwood
Mailing address:: PO Box 708, Taupo 3351
Street address/registered office:
Landline:
Mobile: 07 377 0154
Daytime:
After hours:
Fax:
Email address: operations@pennyhomes.co.nz
Website:
Relationship to owner: Agent

First Point of Contact

First point of contact for communication with Council: Agent

The Application

All building work to be carried out under the building consent specified on this form was completed on: 10/09/2020

Building work undertaken: Construction of a new 3 bedroom plus garage residential dwelling.

The personnel who carried out building work are as follows:

Type of practitioner: Designer

Name:

Company name: MiTek New Zealand Ltd

Address: PO Box 58014, Botany, Auckland 2163

Landline: 092747109

Mobile:

Email address:

Type of practitioner: Builder

Name: Wayde Pirovano

Company name:

Address:

Landline:

Mobile: 027 255 9501

Email address: waydepirovanobuilders@outlook.co.nz

Type of practitioner: Drainlayer

Name: Kelvin Price

Company name: Kelvin Price Drainage

Address:

Landline:

Mobile: 021 158 5214

Email address:

Type of practitioner: Electrician

Name: Brian Farmer

Company name: HQ Electrical

Address:

Landline:

Mobile: 021 861 931

Email address: brian@hqelectrical.co.nz

Type of practitioner: Builder

Name: Pera Taepa
Company name: Reliable Foundations Limited
Address:
Landline:
Mobile: 021 029 92120
Email address:

Type of practitioner: Builder
Name: Jamie Rajek
Company name: Roofing and Waterproofing Ltd
Address:
Landline:
Mobile: 021 509 627
Email address:

Type of practitioner: Plumber
Name: Huia Anderson
Company name: Great Lake Plumbing and Gas
Address:
Landline:
Mobile: 021 659 663
Email address:

Type of practitioner: Builder
Name: Zhengxi Hu
Company name: Advanced Gibstopping and Plastering
Address:
Landline:
Mobile: 021 220 519
Email address:

Type of practitioner: Drainlayer
Name: Todd Elming
Company name: GGL
Address: 95 Miro Street, Taupo
Landline:
Mobile: 021 703 078
Email address:

Specified systems: There are no specified systems in the building

I request that you issue a code compliance certificate for this work under section 95 of the Building Act 2004.

The code compliance certificate should be sent to:

Agent

Attachments

[279060M1-Final-PS1_20200423T024559066Z.pdf](#)

[As laid Drainage.pdf](#)

[bloomquist 18 penny grove lbp.pdf](#)

[Builder LBP.pdf](#)

[Builder LBP_Gib Fix.pdf](#)

[Floor LBP_RFL.pdf](#)

[5773A-certificate.pdf](#)

[gas certificate_18936-896.pdf](#)

[CCE15092020.pdf](#)

Upload any other relevant documents (please upload each document separately): (18 kb)



Upload any other relevant documents (please upload each document separately): (18 kb)



Upload any other relevant documents (please upload each document separately): (18 kb)



Upload any other relevant documents (please upload each document separately): (18 kb)



Upload any other relevant documents (please upload each document separately): (22 kb)



Upload any other relevant documents (please upload each document separately): (25 kb)



Name of person completing this Code Compliance Certificate application:

Debbie Grimwood

Relationship to owner (if not owner):

Agent

As Laid Drainage Plan - BC181033 - A2773979



GREAT LAKE TAUPŌ
Taupō District Council

72 Lake Terrace, Taupo 3330
Private Bag 2005, Taupo Mail Centre, Taupo 3352
Ph: 07 376 0899
techsupport@taupo.govt.nz
www.taupo.govt.nz

SERVICES AS LAID PLAN

☐ Prefloor

☒ Drainage

☐ Soakholes

Please select the items covered in this document

Building Consent No:

181033

Owners Name:

Blomqvist

Property Address:

18 Penny Lane

Plumber:

Name/s

Address

Contact Phone No.

Registration No.

Drainlayer:

Kelvin Rice 22 Kewapoto Lane

021 158 5214

Name/s

Address

Contact Phone No.

Registration No.

16309

Tarp

DRAW PLAN IN BLACK BALLPOINT ON GRAPH OPPOSITE

Plan is to show:

- ☐ All drains in correct position relative to building and boundaries
- ☐ The road frontage
- ☐ Depth of drains at connection points
- ☐ All foul water and stormwater drains
- ☐ All inspection openings, accurately dimensioned
- ☐ All buildings and boundaries
- ☐ Outside water lines and the source of supply
- ☐ The type, location and size of all on site sewage disposal systems
- ☐ Size and position of soak holes

REFER TO EXAMPLE ON LAST PAGE

NOTE: If the Inspector cannot be satisfied of compliance and/or the drain layout differs from the approved building consented documents, an amendment to the consent may be requested.

[illegible]

JOB INFORMATION

Reference / Job#: 5773A
Installation address: 18 Penny Grove, Taupo, 3330

CUSTOMER INFORMATION

Name: Penny Homes Ltd Email: jayne@pennyhomes.co.nz Phone: 07 377 0154
Postal address: 1 Jarden Mile, Nukuhau, Taupo, 3377 Mobile:

ELECTRICAL WORKER INFORMATION

Name: Brian Farmer Registration: E16616
Company Name: HQ Electrical Ltd Phone: 021861931
Email: brian@hqelectrical.co.nz

WORK DETAILS

Date Started: 17/03/2020 Date Completed: 18/09/2020 Work Risk: High Risk
Type of System: 230/400v MEN Type of Work: New Work
Work has been done in accordance with: Part 2 of AS/NZS 3000

DESCRIPTION OF WORK DONE

Install the following in new residence:

1x main switchboard inc main switch, RCCBs & mcbs for sub circuits.
16mm N/S service mains to main switchboard & connect.
25mm main earth buried adjacent to service mains.
30x recessed light fitting. Vynco E33.
6x bulkhead light fitting. Ambius ABH80L.
2x client supplied bathroom light fitting.
4x client supplied pendant light fitting.
8x single socket outlet.
30x double socket outlet.
2x heated towel rail. Goldair GLTR7C.
2x bathroom exhaust fan/light. Manrose Extract-a-LED.
1x waterproof socket outlet. PDL WSO310.
1x oven.
1x hob.

WORKERS UNDER SUPERVISION

Kane John Inskeep Apprentice Electrician, Kane Sollitt Apprentice Electrician, Sean Rodgers Electrician (E278171)

CERTIFICATION OF WORK

I certify that the completed prescribed electrical work to which this Certificate of Compliance applies, has been done lawfully and safely and the information in the certificate is correct in that the installation, or part of the installation:

Has been installed in accordance with a certified design *	☐
Has an earthing system that is correctly rated	☒
Contains fittings which are safe to connect to a power supply	☒
Relies on supplier's Declaration of Conformity *	☒
Relies on manufacturer's instructions *	☒
Has been satisfactorily tested in accordance with Electrical (Safety) Regulations 2010	☒
All parts of the installation are safe to connect to a power supply, if NOT, please detail what parts ARE safe to connect	☒

* References, where applicable, can be found on the additional information sheet.

Certified Worker's
Signature

Date: 18/09/2020

ELECTRICAL SAFETY CERTIFICATE

I certify that the installation, or part of the installation, to which the Electrical Safety Certificate applies is connected to a power supply and is safe to use.

This ESC applies to: Whole Installation



Name: Brian Farmer
Date: 18/09/2020

Registration: E16616
Connection Date: 18/09/2020



This certificate also confirms that the electrical work complies with the building code for the purposes of Section 19 (1)(e) of the Building Act Version 3.01

This is an important document and should be retained for a minimum of seven years.



Gasfitting Certificate - BC181033 - A2773981

GASFITTING CERTIFICATE OF COMPLIANCE

GAS SAFETY CERTIFICATE

Pursuant to the Gas Act 1992 and the Gas (Safety and Measurement) Regulations 2010

ENERGY WORK CERTIFICATE

(Pursuant to the Building Act 2004)

This certificate is not transferable

www.certsonline.co.nz
Great Lake Plumbing & Gas Ltd
ph 021659663
22A Arthur Crescent, Hilltop,
Taupo, 3330, NZ



Consumer:	. Blomquist	Certificate Number:	18936-896	Test Result:	7 min Duration
Installation Address:	18 Penny grove	Gas Supplier:			7kPa test pressure
	Taupo 3330	Category:	Gasfitters		0kPa Loss / Gain
Vehicle Registration:		Installation Type:	New		2.75kPa Working pressure
Vessel Registration:		Gas Type:	NG	Risk Category:	General
		Certification Date:	10-09-2020	Installation Date:	10-09-2020

DESCRIPTION OF GASFITTING TO WHICH THIS CERTIFICATE APPLIES	ADDITIONAL INFORMATION (include install dates - references)
☒ Includes Pipework Installation ☒ Includes work on an appliance or fitting, imported or manufactured, for consumers own use ☒ This certificate relates to the whole of the gas installation or ☒ Just to specified parts of it	

Qty	Item Type	Item Location	Make/Model	Input Rate	Flue Type	Flue Location	Vent Type	Vent Location
1	Water heater continuous flow	RH wall	Rinnai REU 2626WG ZK	199mj/h	Forced Draught Flue (Power)		Natural	
1	Hob	Kitchen	Westinghouse	36mj/h	Unflued			
1	Space heater inbuilt	Lounge	Escea DL850	38mj/h	Power Flue (Room Sealed)			

I CERTIFY THAT:
☒ I Certify that all appliances and fittings worked on by me or by persons working under my supervision are safe to connect to a gas supply and that all work carried out was in accordance with all applicable requirements of the Gas Act 1992 and Gas (Safety and Measurement) Regulations 2010 & all information entered in this certificate is correct.
☒ I Certify that work required complies with standards in addition to AS/NZS 5601.1 or AS/NZS 5601.2 (as applicable), and are referenced in the Additional Information text.
☒ I Certify that all Gasfitting Work has been done in accordance with sections 3 to 6 of AS/NZS 5601.1
☒ I Certify that all Gasfitting Work has been done in accordance with sections 3 to 9 of AS/NZS 5601.2.
☒ I Certify that all Gasfitting Work has been done in accordance with the certified design ☒ manufacturer's instructions ☒ for the gas installation or part installation and the manufacturer's and/or certified design compliance documents are attached, or an electronic location referenced on this Certificate.
☒ The gasfitting work has been done lawfully & safely and is connected to a gas supply & is safe to use. All information entered in this certificate is correct.

Installer(s) supervised by certifier	Gas Connection Made By	Certifier
	Name: Anderson Huia Te Kawa Registration No: 18936 Connection Date: 10-09-2020 Signed: 	Name: Anderson Huia Te Kawa (18936) Employer License No: Signed: 

Memorandum from LBP - Building - BC181033 - A2773982

Memorandum from licensed building practitioner: Record of building work
Section 88, Building Act 2004

The building

Street address of building:

18 PENNY GROVE, LOT226 DP522262

Taupo

The project

Building consent number: BC

181033

The owner

Name: Blomquist JOB

Address: LOT 226, DP522262, 18 PENNY GROVE Taupo

Telephone number:

Email address:

Record of work that is restricted building work

Work that is restricted building work	Description	Carried out/ supervised
<i>[Tick]</i>	<i>[If necessary, describe the restricted building work]</i>	<i>[Specify whether you carried out the restricted building work or supervised someone else carrying out the restricted building work]</i>

Primary structure

Foundations and subfloor framing	(N)	DONE BY OTHERS	(N) Carried out (N) Supervised
Walls	(y)	All framing erected and constructed as per approved plans and to NZ3604 standard. H1.2 frames. All work inspected and approved by Taupo council inspector. Work done	(y) Carried out (y) Supervised
Roof	(y)	Standard GABLE and truss roof, TIN corrugated roof done by others Tin fascia and strap roof bracing as per plans. Inspected and passed by Taupo council inspector	(y) Carried out (y) Supervised
Columns and beams	(y)	One timber 300x90 HY 90 beam over garage door opening,	(y) Carried out (y) Supervised

Bracing	(N)	All GIB bracing done others	(N) Carried out (N) Supervised
Other	(N)	ALL GIBBING DONE BY OTHERS	(N) Carried out (N) Supervised

External moisture management systems

Damp proofing	(y)	DPC To underside of bottom plates etc	(y) Carried out (y) Supervised
Roof cladding or roof cladding system	(n)	Roofing installed by OTHERS	(n) Carried out (n) Supervised
Ventilation system (for example, subfloor or cavity)	(y)	20mm cavity CLD batten for axon areas,	(y) Carried out (y) Supervised
Wall cladding or wall cladding system	(y)	Wall claddings as per plans. DIRECT FIX LINEA And Axon on CLD cavity battens. All axon done by myself and other builder apprentice Nick Barnes. All Inspected and passed by Taupo council inspector	(y) Carried out (y) Supervised
Waterproofing	(y)	Protecto tape flashings used on window and door openings as per plan and PVC under flashings used.	(y) Carried out (y) Supervised
Other	(N)		(n) Carried out (n) Supervised

Note: continue on another page if necessary.

Issued by

Name: Wayde Pirovano

LBP number: BP107469

Class(es) licensed in : CARPENTRY

Plumbers, Gasfitters and Drainlayers registratrion number (if applicable):

Mailing address : 96 Wakeman Rd, Acacia bay Taupo 3330

Street address or registered office:

Phone number: 0272559501 **Landline:**

Mobile: 0272559501

Email: waydepirovanobuilders@outlook.co.nz

Declaration

I Wayde Pirovano

[name of practitioner]
09/09/20

Wayde Pirovano

carried out or supervised the restricted building work recorded on this form.

Signature

LR

Memorandum from LBP - Building GIB Fix - BC181033 - A2773983

Memorandum: record of building work

Section 88, Building Act 2004



Please use this form if you carried out or supervised restricted building work on a building consent.

Building details

Street address of building: 18 Penny Grove, Taupo.

Postcode:

Project details

Building consent number: BCO181033

Owner's details

Owner's name:

Mailing address:

Postcode:

Daytime phone:

Mobile:

Email address:

Record of work that is restricted building work

Work that is restricted building work (Tick ☐)	Description (If necessary, describe the restricted building work)	Carried out or supervised (Specify whether you carried out the restricted building work or supervised someone else carrying out the restricted building work)
Primary structure		
Foundations and subfloor framing	☐ N/A	☐ Carried out ☐ Supervised
Walls	☐ N/A	☐ Carried out ☐ Supervised
Roof	☐ N/A	☐ Carried out ☐ Supervised
Columns and beams	☐ N/A	☐ Carried out ☐ Supervised
Bracing	☒ install gib bracing element.	☐ Carried out ☒ Supervised
Other	☐ N/A	☐ Carried out ☐ Supervised

Record of work that is restricted building work

Work that is restricted building work (Tick ☐)	Description (If necessary, describe the restricted building work)	Carried out or supervised (Specify whether you carried out the restricted building work or supervised someone else carrying out the restricted building work)
---	--	--

External moisture management systems

Damp proofing	☐	N/A	☐ Carried out ☐ Supervised
Roof cladding or roof cladding system	☐	N/A	☐ Carried out ☐ Supervised
Ventilation system (for example, subfloor or cavity)	☐	N/A	☐ Carried out ☐ Supervised
Wall cladding or wall cladding system	☐	N/A	☐ Carried out ☐ Supervised
Waterproofing	☐	N/A	☐ Carried out ☐ Supervised
Other	☐	N/A	☐ Carried out ☐ Supervised

Issued by

LBP's name: Zhengxi Hu

LBP number: 128289

Class(es) licensed in: Carpentry

Plumbers, Gasfitters and Drainlayers registration number: (if applicable)

Mailing address:

Postcode:

Street address or registered address (if different) 18 Orohena close, North Park.

Postcode:

Phone number: (home) 021220519

(work)

Facsimile number:

(mobile)

Email address:

Website:

Licensed building practitioners statement

I, (LBP's name) Zhengxi Hu

carried out or supervised the restricted building work recorded on this form.

LBP's signature: Zhengxi Hu

Date: 04/08/2020

Memorandum from LBP - Flooring - BC181033 - A2773984

Memorandum from licensed building practitioner: Record of building work

Section 88, Building Act 2004

Please fill in the form as fully and correctly as possible.

If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING	
Street address: 18 PENNY GROVE	
Suburb:	
Town/City: TAUPO	Postcode:

THE PROJECT
Building consent number: 181033

THE OWNER(S)	
Name(s): PENNY HOMES	
Mailing address:	
Suburb:	PO Box/Private Bag:
Town/City:	Postcode:
Phone number:	Email address:

RECORD OF WORK THAT IS RESTRICTED BUILDING WORK

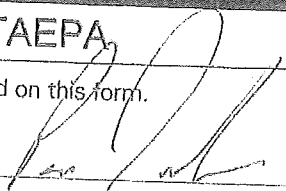
PRIMARY STRUCTURE

Work that is restricted building work	Description of restricted building work	Carried out or supervised
Tick ☒	If necessary, describe the restricted building work.	Tick ☒ whether you carried out the restricted building work or supervised someone else carrying out the restricted building work.
Foundations and subfloor framing ☒	Installed ribraft concrete foundation to engineers design and as per consented plans	☒ Carried out ☐ Supervised
Walls ☐		☐ Carried out ☐ Supervised
Roof ☐		☐ Carried out ☐ Supervised
Columns and beams ☐		☐ Carried out ☐ Supervised
Bracing ☐		☐ Carried out ☐ Supervised
Other ☐		☐ Carried out ☐ Supervised

EXTERNAL MOISTURE MANAGEMENT SYSTEMS

Work that is restricted building work	Description of restricted building work	Carried out or supervised
Tick ☒	If necessary, describe the restricted building work.	Tick ☒ whether you carried out the restricted building work or supervised someone else carrying out the restricted building work.
Damp proofing ☒	Installed polythene to underside of concrete foundation as per rafter design shown in consented plans	☒ Carried out ☐ Supervised
Roof cladding or roof cladding system ☐		☐ Carried out ☐ Supervised
Ventilation system (for example, subfloor or cavity) ☐		☐ Carried out ☐ Supervised
Wall cladding or wall cladding system ☐		☐ Carried out ☐ Supervised
Waterproofing ☐		☐ Carried out ☐ Supervised
Other ☐		☐ Carried out ☐ Supervised

ISSUED BY	
Name and contact details of the licensed building practitioner who is licensed to carry out or supervise restricted building work.	
Name: PERA TAEPA	LBP number: 127456
Class(es) licensed in:	
CARPENTRY	
Plumbers, Gasfitters and Drainlayers registration number (if applicable):	
Mailing address (if different from below):	
Street address/Registered office: 1 OTUPAI STREET	
Suburb: TWO MILE BAY	Town/City: TAUPO
PO Box/Private Bag	Postcode:
Phone number: 021 029 92120	Mobile:
After hours:	Fax:
Email address: perat68@hotmail.com	Website:

DECLARATION	
PERA TAEPA _____ carried out or supervised the restricted building work recorded on this form.	
Signature:	
Date:	06/05/20

Memorandum from LBP - Roofing - BC181033 - A2773985



Form 6A

Memorandum from licensed building practitioner: Record of building work

Section 88, Building Act 2004

THE BUILDING

Street address of building: 18 penny grove

THE PROJECT

Building consent number: 181033a

THE OWNER

Name: bloomquist

Address: 18 penny grove

Phone : _____ or Mobile: _____

Email: _____ Fax: _____

RECORD OF WORK THAT IS RESTRICTED BUILDING WORK

Work that is restricted building work	Description	Carried out/ supervised
[Tick]	[If necessary, describe the restricted building work]	[Specify whether you carried out this design work or supervised someone else carrying out this design work]
Primary structure		
Foundations and subfloor framing ☐		☐ Carried out ☐ Supervised
Walls ☐		☐ Carried out ☐ Supervised
Roof ☐		☐ Carried out ☐ Supervised
Columns and beams ☐		☐ Carried out ☐ Supervised

Primary structure cont'd		
Bracing ☐		☐ Carried out ☐ Supervised
Other ☐		☐ Carried out ☐ Supervised
External moisture management systems		
Damp proofing ☐		☐ Carried out ☐ Supervised
Roof cladding or roof cladding system ☒		☐ Carried out ☒ Supervised
Ventilation system for example, subfloor or cavity) ☐		☐ Carried out ☐ Supervised
Wall cladding or wall cladding system ☐		☐ Carried out ☐ Supervised
Waterproofing ☐		☐ Carried out ☐ Supervised
Other ☐		☐ Carried out ☐ Supervised
Note: continue on another page if necessary.		

ISSUED BY:		
Name: <u>Jamie Rajek</u>		
LBP number: <u>bp115013</u>		
Class(es) licensed in: <u>r2r3r4r5r6r7</u>		
Plumbers, Gasfitters and Drainlayers Registration Number [if applicable]: _____		
Mailing address: <u>311 oruanui rd taupo</u>		
Street address or registered office: _____		
Phone No:	Landline: _____	Mobile: <u>021509627</u>
	Daytime: _____	After hours: _____
	Fax: _____	
Email address: _____	Website: _____	

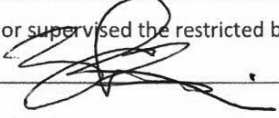
DECLARATION	
I <u>jamie rajek</u>	[name of practitioner]
carried out or supervised the restricted building work recorded on this form.	
Signature: 	
Date: <u>10/09/2020</u>	

Photo 1 - BC181033 - A2773986



Photo 2 - BC181033 - A2773987



Photo 3 - BC181033 - A2773988



Photo 4 - BC181033 - A2773989



Photo 5 - BC181033 - A2773990

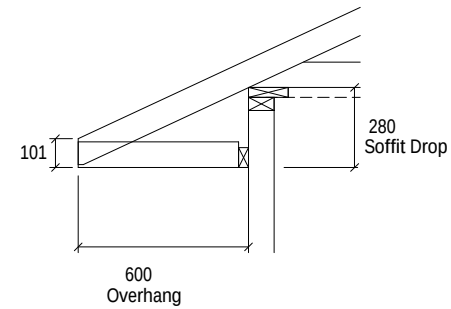


Photo 6 - BC181033 - A2773991

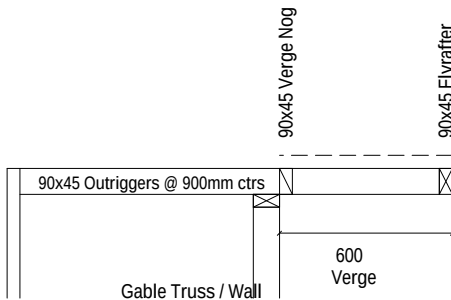


AS BUILT FINAL LAYOUT

For valley/saddle truss fixing unless stated otherwise use a pair of wire dogs at 900mm centres for up to and including a very high wind zone.
Or a pair of CT200's at 900mm centres for extra high wind zone.
This fixing is to meet the minimum requirements as per NZS3604.

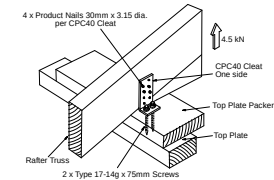
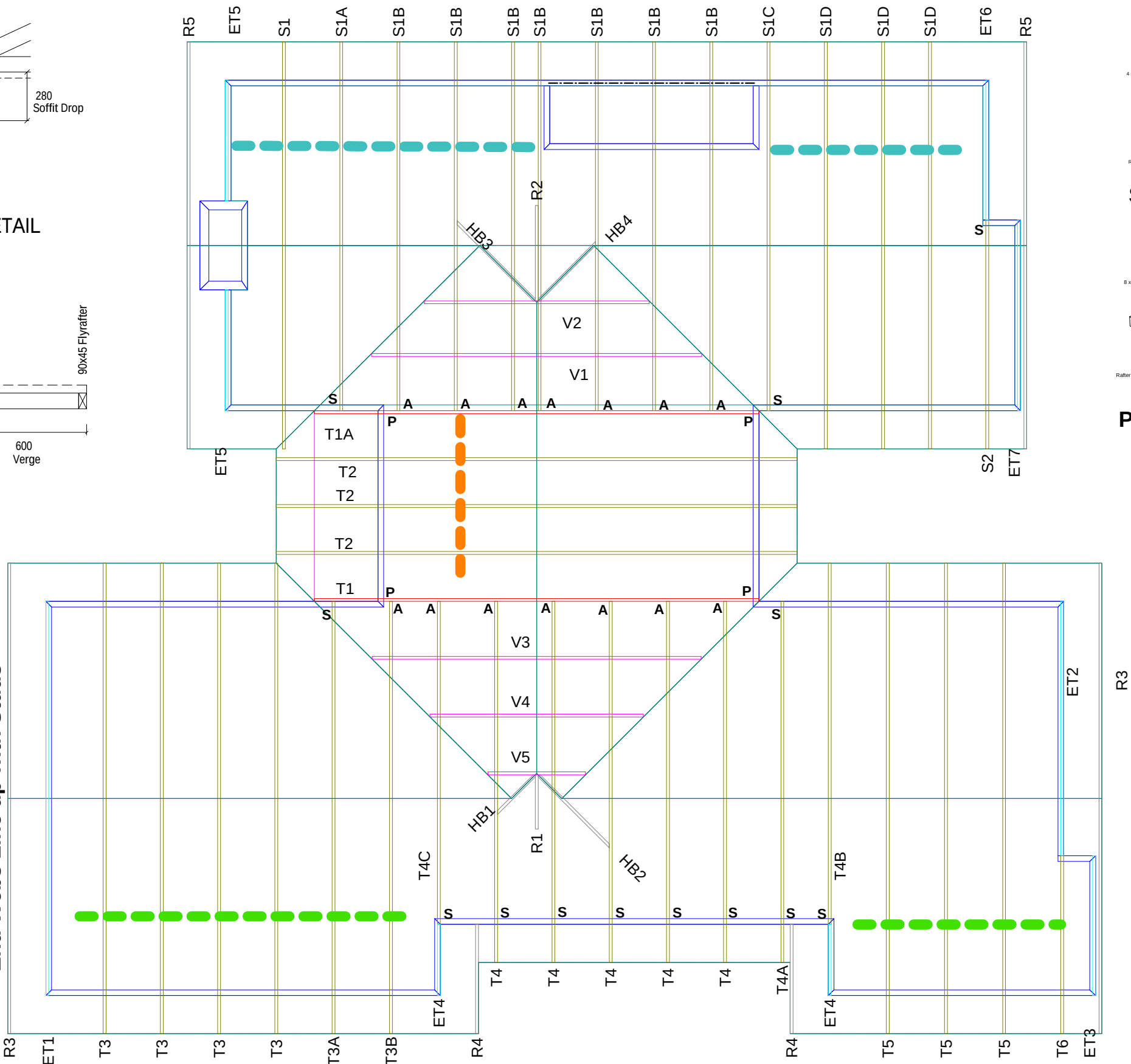


SOFFIT DETAIL
147mm

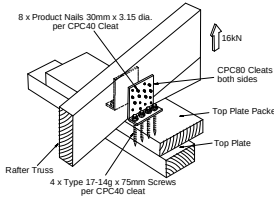


VERGE DETAIL

Builder to Check Gable
End Webs Line up with Studs



S Type Fixing



P Type Fixing

CARTERS
Carters Manufacturing Napier
(06) 8342636

JOB No **279060M1**

Client: Penny Homes Ltd
Job: Blomquist
Site: 18 Penny Grove
Taupo

Pitch: 25.0deg
Roof Type: Galv Iron .5mm
Overhang: 600mm
Wind Area: High
Roof Snow: 0.000kPa
Ceiling Restraint Centres:600mm

Trusses and rafters at 900mm
max centres unless stated otherwise.
This layout is to be read in conjunction
with the Architectural plans.

DRAWN Hilton Familton 31 Mar,2020

FIXINGS

- A = 47x90 Joist Hanger**
- B = 47x120 Joist Hanger**
- C = CT200 (pair)**
- D = 47x190 Joist Hanger**
- E = 95x165 Joist Hanger**
- F = SH-140 Split Hanger**
- G = SH-180 Split Hanger**
- H = SH-220 Split Hanger**
- J = 2x6kN Strap (12kN Total)**
- K = 6kN Strap**
- L = Multigrip (single)**
- M = Multigrips (pair)**
- N = Nailon Plate (240x110x1)**
- P = 16kN Pack**
- Q = 9kN Pack**
- S = CPC 40 Single Cleat**
- T = CPC 40 Short (pair)**
- U = CPC 80 Single Cleat**
- V = 16kN Uplift**
- W= 24kN Uplift**
- X = 25kN Uplift**
- Y = 35kN Uplift**
- Z = 45kN Uplift**

Unless otherwise indicated, all specified truss fixings are to use L/Lok product nail fasteners (as per the MiTek On-site Guide) when the choice of using screws or nails is optional.

All truss to frame fixings require 2 additional 2/90x3.15dia skew nails.

All truss fixings not indicated as above must have 2 wire dogs for cross joints and 2/90x3.15dia nails for butt joints.

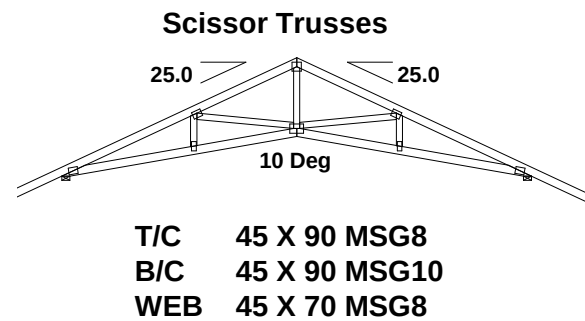
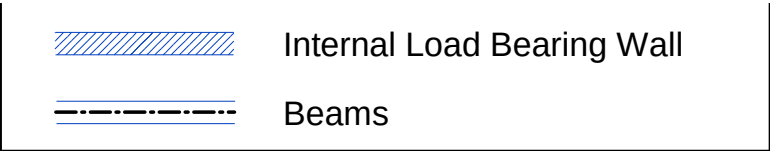
Fixings shown are for fixing trusses to the top plate. Any other point load uplift fixings down through the framing stud to top plate, stud to bottom plate, bottom plate to floor remain the responsibility of the architect / draughtsman.

Please contact your local CARTERS Manufacturing Branch, for any queries regarding this layout, or if any on site remedial work is required.
No modifications to Roof Trusses or Wall Frames are to be undertaken without first obtaining written authority from CARTERS.

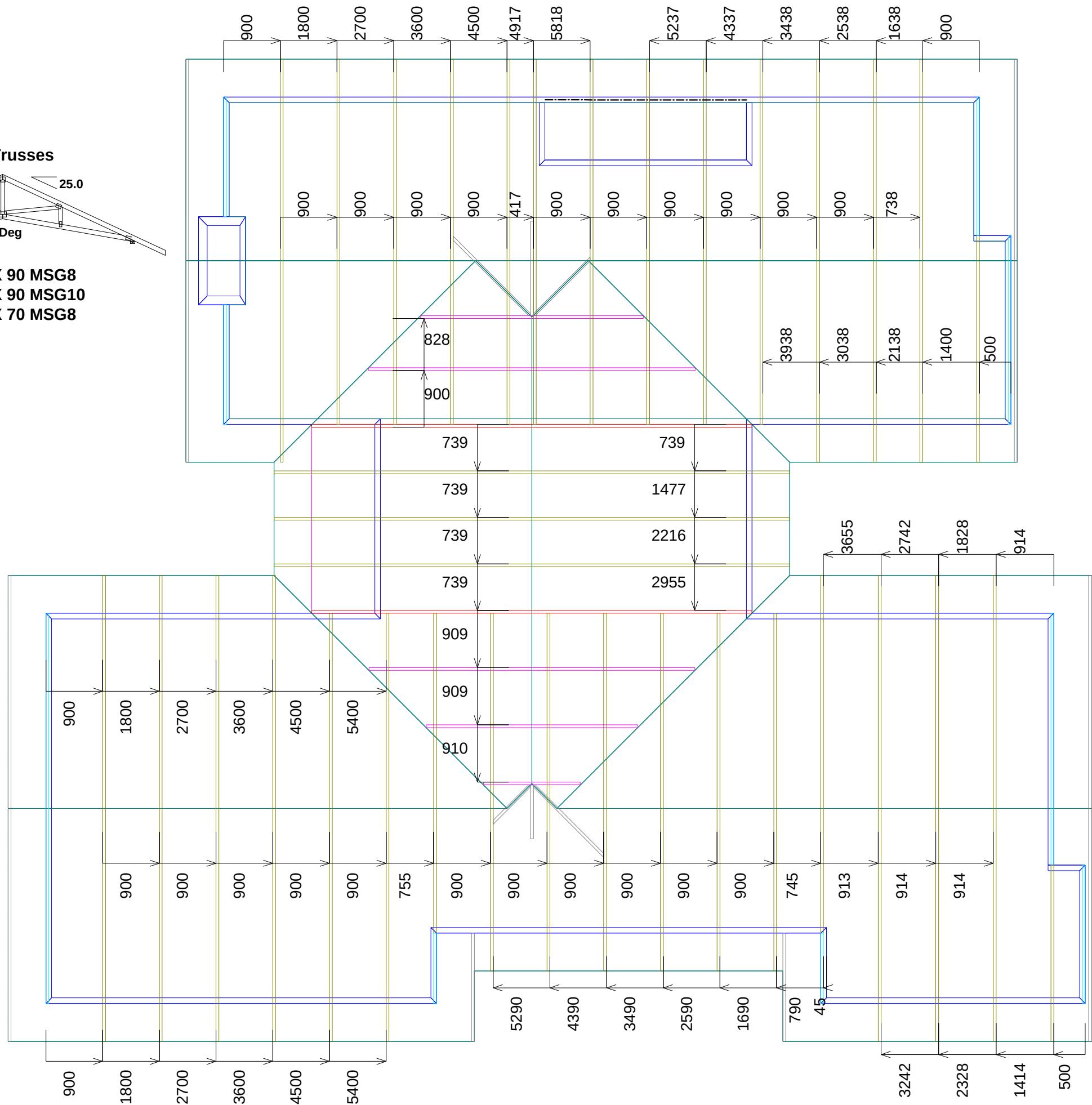
All gable trusses are designed to suit cladding manufacturer's framing requirements.
If a gable truss requires a windbeam brace, the type of MiTek brace will be noted as such on the layout.

Truss Layout

AS BUILT FINAL LAYOUT



Builder to Check Gable
End Webs Line up with Studs



CARTERS
Carters Manufacturing Napier
(06) 8342636

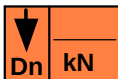
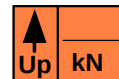
JOB No **279060M1**

Client: Penny Homes Ltd
Job: Blomquist
Site: 18 Penny Grove
Taupo

Pitch: 25.0deg
Roof Type: Galv Iron .5mm
Overhang: 600mm
Wind Area: High
Roof Snow: 0.000kPa
Ceiling Restraint Centres:600mm

Trusses and rafters at 900mm
max centres unless stated otherwise.
This layout is to be read in conjunction
with the Architectural plans.

DRAWN Hilton Familton 31 Mar,2020

 **Dn kN**  **Up kN** Ultimate Limit
State Loads

Notification of point loaded lintels
or point loads on internal walls
where the downward load is
higher than 8kN (85mm raft type slab)
or 10kN (100mm standard slab), or
the upward load is greater than 10kN.

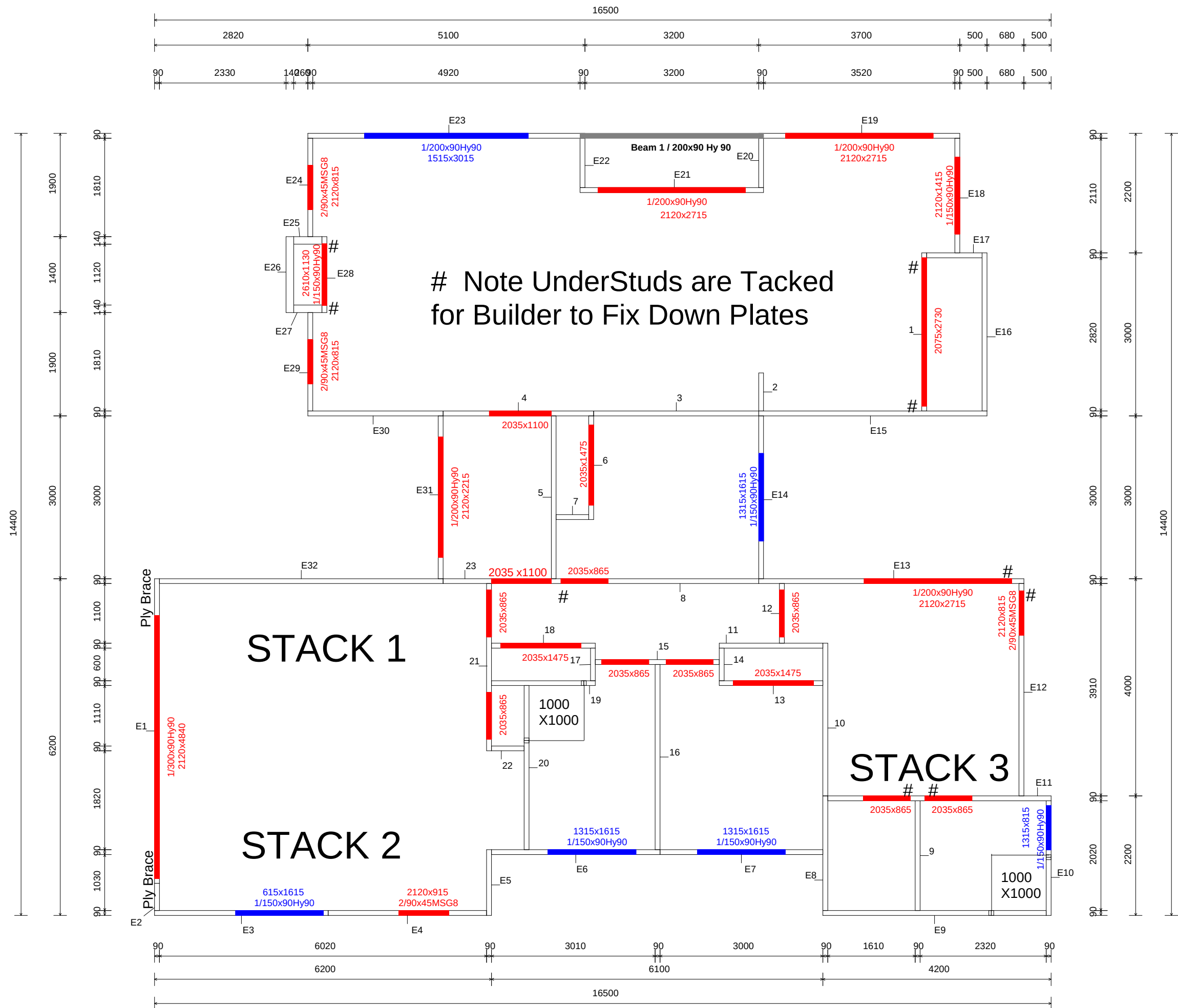
No allowance for any loading
within the truss space has been
allowed for including storage
unless specifical stated.

Any roof loads as stated on this
layout over 16kN up or down are
outside the scope of NZS3604, and
the architect / draughtsperson is
responsible for the design to transfer
the loads to the ground.

Truss Dimensions

Please contact your local CARTERS
Manufacturing Branch, for any queries
regarding this layout, or if any on site
remedial work is required. No modifications
to Roof Trusses or Wall Frames are to be
undertaken without first obtaining
written authority from CARTERS.

AS BUILT
FINAL LAYOUT



CARTERS
Carters Manufacturing Napier
(06) 8342636

JOB No 279060M1
Client: Penny Homes Ltd
Job: Blomquist
Site: 18 Penny Grove
Taupo

Wind Area: High
Roof Snow: 0.000kPa
Ext Stud Spacing: 400 Centres
Int Stud Spacing: 600 Centres
Nog Spacing: 850 Centres
Frame Height: 2610 Double Top Plate

DRAWN Hilton Familton 31 Mar,2020

The lintels have been sized using one of the following:

hy90, hyONE and hySPAN lintels have been sized using the designIT for houses - New Zealand series 6 software.

GANGLAM and FLITCH BEAMS have been sized using the MiTek Beam Program V1.10 June 2011.

Unless otherwise stated the timber grade for all lintels is SG8. Lintels not shown are to be selected as per NZS3604: 2011.

Please contact your local CARTERS Manufacturing Branch, for any queries regarding this layout, or if any on site remedial work is required.

No modifications to Roof Trusses or Wall Frames are to be undertaken without first obtaining written authority from CARTERS.

Level 1 Frames



MiTek New Zealand Limited

Correspondence from : **AUCKLAND**
40 Neales Road, East Tamaki 2013
PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

CHRISTCHURCH
14 Pilkington Way, Wigram 8042
PO Box 8387, Riccarton 8440
Phone: 03 348 8691
Fax: 03 348 0314

www.mitek.nz.co.nz

MiTek 20/20 Engineering 4.7.334.0

Printed: 14:28:02 23 Apr 2020

PRODUCER STATEMENT for MiTek 20/20® TRUSS DESIGN - Version 4.7

ISSUED BY: **MiTek New Zealand Limited**

TO: **CARTERS**

IN RESPECT OF: **MiTek® Truss Designs**

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **279060M1** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek 20/20® truss design program has been developed by MiTek New Zealand Limited for the design of MiTek® timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20® are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1/VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution, to satisfy the requirements of Clause B1 of the New Zealand Building Code.

On behalf of MiTek New Zealand Limited, and subject to:

- i) All proprietary products meeting their performance specification requirements
- ii) The provision of adequate roof bracing and overall building stability
- iii) Correct selection and placement of GANG-NAIL connector plates
- iv) Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
- v) The design being undertaken by the accredited fabricator under the terms of the software licence
- vi) Timber is graded to the requirements of NZS 3603:1993
- vii) Minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

I believe on reasonable grounds that the trusses, if constructed in accordance with the MiTek 20/20® truss design and shop drawings, will comply with the relevant provisions of the New Zealand Building Code.

MiTek New Zealand Limited holds a current policy of Professional Indemnity Insurance no less than \$500,000.

On behalf of MiTek New Zealand Limited,

Date: Thursday, 23 April 2020

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

Job: 279060M1

Client: Penny Homes Ltd
Phone:Site: Blomquist
18 Penny Grove
TaupoDescription:
Building Consent No.:
MiTek 20/20 Engineering 4.7.334.0

Phone:

Printed: 14:28:02 23 Apr 2020

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **CARTERS**, being licensed to use the MiTek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MiTek 20/20® TRUSS DESIGN DATA

The MiTek 20/20® computer design for this job is based on the following design parameters entered into the program. The Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek® trusses.

Job Details		Importance Level :	2	Design Working Life :	50 years
Roof Truss					
Timber Group:	MSG8 DDP H1.2	Pitch:	25.000 deg	Nominal Overhang:	600 mm
Roof		Ceiling		Wind	
Material:	Galv Iron .5mm	Material:	Gib Board 13mm	Area:	High (44.0 m/s)
Dead Load:	0.210 kPa	Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Restraints:	900 mm centres	Restraints:	600 mm centres		
Live Load:	Qur = 0.250 kPa	Live Load:	Qc = 1.400 kN		
	Qc = 1.100 kN				

The minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003. The timber for these MiTek® trusses shall be graded to the requirements of NZS 3603:1993. Proprietary fixings and timber connectors shall be selected in accordance with NZS3604:2011 Section 4 - Durability.

MiTek® Truss List

Legend: * = detail only, ? = input only, ✕ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required
GB = gable brace required

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
T1	1	6990	25.000	739	S1D	3	5200	25.000	900	V2	1	3535	25.000	900
T1A	1	6990	25.000	739	S2	1	3000	25.000	900	V3	1	5172	25.000	900
ET1	1	6200	25.000	900	T2	3	6990	25.000	739	V4	1	3354	25.000	900
ET2	1	4000	25.000	900	T3	4	6200	25.000	900	V5	1	1535	25.000	900
ET3	1	2200	25.000	900	T3A	1	6200	25.000	900	*HB1	1	860	18.249	900
ET4	2	1120	25.000	900	T3B	1	6200	25.000	900	*HB2	1	1603	18.249	900
ET5	2	1900	25.000	900	T4	5	5080	25.000	900	*HB3	1	1758	18.249	900
ET6	1	2200	25.000	900	T4A	1	5080	25.000	900	*HB4	1	1295	18.249	900
ET7	1	3000	25.000	900	T4B	1	5080	25.000	900	*R1	1	855	25.000	900
S1	1	5200	25.000	900	T4C	1	5080	25.000	900	*R2	1	1500	25.000	900
S1A	1	5200	25.000	900	T5	3	6200	25.000	900	*R3	2	7400	25.000	900
S1B	7	5200	25.000	900	T6	1	2200	25.000	900	*R4	2	1720	25.000	900
S1C	1	5200	25.000	900	V1	1	5190	25.000	900	*R5	2	6400	25.000	900

Total quantity : 63

The computer design input has been carried out by:

MiTek 20/20 Software Operator: Hilton FAMILTON

MiTek Candidate Number and Qualifications: 10021 - MiTek 101, 201, 301, COC

Accredited Fabricator:



Thursday, 23 April 2020

CARTERS

Bearings Exceeding 8kN Report : Page 1

Job: 279060M1

Client: Penny Homes Ltd
Phone:Site: Blomquist
18 Penny Grove
TaupoDescription:
Building Consent No.:
MiTek 2020 Engineering 4.7.334.0

MiTek New Zealand Limited

Phone:

Printed: 14:28:30 23 Apr 2020

TRUSS BEARINGS EXCEEDING 8KN REPORT -
Ultimate Limit State Loads**MiTek® Truss List**Legend: ? = input only, ~~xxx~~ = failed design, Ø = non certified, Unmarked trusses = designed successfully

Critical Trusses	Qty	Span (mm)	Joint	Bearing Reactions (kN)	
				Down	Uplift
T1	1	6990	H	9.678	8.843
T1A	1	6990	H	9.588	8.661

Note:

1) Select appropriate Slab Thickening Detail from the MiTek 'Internal Load Bearing On Concrete Floor Slabs' brochure.



GREAT LAKE TAUPŌ
Taupō District Council

Producer Statement Construction (PS3)

General construction work

All sections of this form must be completed

TO BE COMPLETED BY THE PERSON WHO HAS UNDERTAKEN THE BUILDING WORK

GGL site development-earthmoving LTD.

Author company: _____ BC number: 181033

Author name: TODD ELMIGER Author registration number: _____

Description of work: Install Soak pits as per EL AS2,

Dimensions of Soak pits given by JT Design install x 4

22.5m³ rock Soak pit as per plan.

Legal description: Lot 226 DP 522262

Site address: 18 penny grove, Taupo

B1	B2	C1	C2	C3	C4	C5	C6	C7	D1	D2	<u>E1</u>
E2	E3	F1	F2	F3	F4	F5	F6	F7	F8	G1	G2
G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14
G15	H1										

NZBC clauses
(circle as applicable):

I have sighted the above building consent and read the attached conditions of consent and confirm that I have undertaken the building work described above in accordance with the consented plans and specifications.

I understand that Council will rely upon this producer statement, for the purpose of establishing compliance with the above building consent.

Signature: _____ Date: 14-9-20

Tradesperson's contact details:

Address: 95 MIND STREET TAUPŌ Postcode: 3330

Phone: _____ Fax: _____

Mobile: 021 703078 Email: todd@ggltel.co.nz

GoGet Inspection Audit Report

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**

Inspection Type: **Sanitary Sewer/Drainage**
Inspection Outcome: **Pass**
Inspected By: **Marty Devonport**
Inspection Date: **16 September 2020 3:00 PM**
Duration: **0 minutes**

Inspection Element	Status
Stormwater	Pass
To approved disposal system (onsite or reticulated system)	Pass
Disposal system adequate	Pass
As built provided with PS3 and photos	Pass
Outcome of Inspection	Pass
Required documents not yet received	Pass
Stormwater asbuilt to come	

SITE NOTICE

Consent No: **181033** Date Printed: **16 September 2020**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **New three bedroom dwelling**
Building Category: **Residential Level 1**

Inspection Type: **Sanitary Sewer/Drainage**
Inspection Outcome: **Pass**
Inspected By: **Marty Devonport**
Inspection Date: **16 September 2020**

Passed Items

Stormwater

To approved disposal system (onsite or reticulated system)

Disposal system adequate

As built provided with PS3 and photos

Outcome of Inspection

Required documents not yet received

Stormwater asbuilt to come

GoGet Inspection Audit Report

Consent No: **181033**
 Applicant: **Penny Homes Limited**
 Valuation Ref: **0730164819**
 Site Address: **18 Penny Grove, Taupo**
 Work Type: **New three bedroom dwelling**

Inspection Type: **Code Compliance - Building (Single Dwelling Only)**
 Inspection Outcome: **Pass**
 Inspected By: **Marty Devonport**
 Inspection Date: **23 September 2020 9:50 AM**
 Duration: **60 minutes**

Inspection Element	Status
General	Pass
Mt Wayne Hawkes on site	
Previous inspections	Pass
Approved building consent documents on site	Pass
Conditions of consent (if any) are met	Pass
As per the approved plans	Pass
Shrinkage control joints	Pass
Application for Code Compliance Certificate	Pass
Potable water as per Clause G12	Pass
Section 75 confirmation	N/A
Warnings / Bans	N/A
Exterior	Pass
External envelope complete & weatherproof	Pass
Exterior painted and sealed. Penetrations sealed.	
Claddings completed in accordance with standards/specifications	Pass
Claddings appear to be installed as per manufactures specifications	
Correct protective coating/paint systems as required	Pass
Wall and roof penetrations sealed/flushed	Pass
Access to building	Pass
Barriers as required completed and compliant	N/A
Subfloor access as required	N/A
Ground levels/paving heights	Pass
Landscaping completed and ground levels sighted and are compliant with NZBC.	
Stormwater disposed of appropriately	Pass
Retaining walls	N/A
Vehicle and footpath damage	Pass
Interior	Pass
Ceiling and wall insulation in place	Pass
Fire ratings stopped	N/A
Installation of shower / bath linings, splash boards etc	Pass
Shower lining checked.	
Safety glass in bath / shower screens and adjacent windows	Pass
Safety glass checked in showers	
Wet areas (walls, ceilings, floors)	Pass
Wet areas complete and sealed.	
Tempering valve installed	N/A
Mains gas to building.	
Mechanical ventilation extraction to exterior	Pass

Catches on low windows (safety from falling)	N/A
Barrier heights and handrails	N/A
Lighting to access routes / stairs	Pass
Smoke alarms fitted and working	Pass
Smoke alarm in hallway.	
Visual awareness	Pass
Barriers for residential pools	N/A
Covers for small heated pools	N/A
Fireplace	N/A
Outcome of Inspection	Pass
Further Inspection Required (Recheck Required)	N/A
Have all documents been received, checked and Goget documentation updated?	Pass
Approved	Pass
Work appears to have been done in accordance with the approved consent as required by Section 94 of the BA04, and/or the performance requirements of the NZBC. Required documentation received OK to issue SOC	



Taken at 9:21 AM on Wednesday 23/09/2020



Taken at 9:21 AM on Wednesday 23/09/2020



Taken at 9:21 AM on Wednesday 23/09/2020



Taken at 9:22 AM on Wednesday 23/09/2020



Taken at 9:22 AM on Wednesday 23/09/2020



Taken at 9:23 AM on Wednesday 23/09/2020



Taken at 9:23 AM on Wednesday 23/09/2020



Taken at 9:24 AM on Wednesday 23/09/2020



Taken at 9:24 AM on Wednesday 23/09/2020



Taken at 9:25 AM on Wednesday 23/09/2020



Taken at 9:25 AM on Wednesday 23/09/2020



Taken at 9:27 AM on Wednesday 23/09/2020



Taken at 9:29 AM on Wednesday 23/09/2020



Taken at 9:29 AM on Wednesday 23/09/2020



Taken at 9:30 AM on Wednesday 23/09/2020

SITE NOTICE

Consent No:	181033	Date Printed: 23 September 2020
Applicant:	Penny Homes Limited	
Valuation Ref:	0730164819	
Site Address:	18 Penny Grove, Taupo	
Work Type:	New three bedroom dwelling	
Building Category:	Residential Level 1	

Inspection Type:	Code Compliance - Building (Single Dwelling Only)
Inspection Outcome:	Pass
Inspected By:	Marty Devonport
Inspection Date:	23 September 2020

Passed Items

General

Previous inspections
Approved building consent documents on site
Conditions of consent (if any) are met
As per the approved plans
Shrinkage control joints
Application for Code Compliance Certificate
Potable water as per Clause G12

Mt Wayne Hawkes on site

Exterior

External envelope complete & weatherproof
Claddings completed in accordance with standards/specifications
Correct protective coating/paint systems as required
Wall and roof penetrations sealed/flushed
Access to building
Ground levels/paving heights

Stormwater disposed of appropriately
Vehicle and footpath damage

**Exterior painted and sealed. Penetrations sealed.
Claddings appear to be installed as per manufactures specifications**

Landscaping completed and ground levels sighted and are compliant with NZBC.

Interior

Ceiling and wall insulation in place
Installation of shower / bath linings, splash boards etc
Safety glass in bath / shower screens and adjacent windows
Wet areas (walls, ceilings, floors)
Mechanical ventilation extraction to exterior
Lighting to access routes / stairs
Smoke alarms fitted and working
Visual awareness

**Shower lining checked.
Safety glass checked in showers**

Wet areas complete and sealed.

Smoke alarm in hallway.

Outcome of Inspection

Have all documents been received, checked and Goget documentation updated?

Approved

Work appears to have been done in accordance with the approved consent as required by Section 94 of the BA04, and/or the performance requirements of the NZBC. Required documentation received OK to issue SOC

Documentation**Status**

CCC application form (online)	Accepted
Wastewater Drainage As-built	Accepted
Stormwater As-built	Accepted
PS3 Stormwater Drainage (soakholes/soakpits) incl. photos	Accepted
Electrical Certificate	Accepted
Gas Certificate to include gas fireplace	Accepted
Correct siting form	Accepted
Pre-floor/Subfloor Plumbing As-built	Accepted

Licensed Building Practitioners**Status**

Carpentry 2 Zhengxi Hu	Accepted
Roofing 1 J Rajek	Accepted
Foundations 1 P Taepa	Accepted
Carpentry 1 W Pirovano	Accepted
Design 1 William Thomson	Accepted

Statement of Compliance with the NZ Building Code

Consent No: 181033

ISSUED BY: **Taupo District Council**

PROJECT

Site Address: 18 Penny Grove, Taupo
Legal Description: Lot 226 DP 522262
Work Description: New three bedroom dwelling
Building Category: Residential Level 1

OWNER

Name(s): Penny Homes Limited
Address: 1 Jarden Mile, Taupo

-
- [P] Application for CCC Received, Signed, Dated and have correct details
 - [P] Check documentation Tab in Go Get is received and approved
 - [P] Check CCC dashboard complete
 - [P] Check all Inspections required and completed with reasons identified
 - [P] All records in file complete including Plans, Specifications, Inspection Notes, Certificate and Notices
 - [P] All checks been completed as per the QMS and Policy Manual.
 - [P] Should a CCC be issued?

NOTES:

Inspections Prepaid: 9
Inspections Done: 9
Total Inspections Chargeable: 9
CCC Backdating of Durability Requirements: N/A
Current Lawful Established Use: Detached Dwelling
Year First Built: 2020

LICENSED BUILDING PRACTITIONERS:

Design 1	BP115814	William Thomson
Carpentry 1	BP107469	W Pirovano
Carpentry 2	BP128289	Zhengxi Hu
Foundations 1	BP127456	P Taepa
Roofing 1	BP115013	J Rajek

Taupo District Council confirms that work done in relation to this project has been completed in accordance with the Building Consent and the New Zealand Building Code.

Signed:
Name: Stephanie Massey
Position: Building Officer

Date: 23 September 2020

Code of Compliance Certificate - A2781548



GREAT LAKE TAUPŌ

Taupo District Council

Form 7

Code Compliance Certificate

Section 95, Building Act 2004

BC No: 181033

The Building

Street address of building: 18 Penny Grove, Taupo
Legal description of land where building is located: Lot 226 DP 522262
Valuation number: 0730164819
Building name: N/A
Location of building within site/block number: N/A
Level/unit number: N/A
Current, lawfully established, use: Detached dwelling
Year first constructed: 2020

The Owner

Name of owner: Blomquist Alan Gordon & Blomquist Lorna Jean
Contact person: Alan Blomquist
Mailing address: 43 Koha Road, Taupo 3330
Street address/registered office: Unknown
Phone number: Landline: Unknown Mobile: 0211227652 Daytime: Unknown After hours: Unknown
Facsimile number: 07 3770155
Email address: alanjblomquist@gmail.com
Website: N/A

First point of contact for communications with the council/building consent authority

Name: Penny Homes Ltd
Address: PO Box 708, Taupo 3351
Phone: 07 3770154
Email: operations@pennyhomes.co.nz

Building Work

Issued by: Taupo District Council
Description of work: New three bedroom dwelling
Intended Use: Detached dwelling **Intended Life:** Indefinite, but not less than 50 years

Code Compliance

The building consent authority named below is satisfied, on reasonable grounds, that:

a) The building work complies with the building consent

Signature: _____

Dean Southey

Building Inspections and Processing Manager

On behalf of: Taupo District Council

Date: 25/09/20



GREAT LAKE TAUPŌ

Taupō District Council
46 Horomatangi Street, Taupō 3330
Private Bag 2005, Taupo Mail Centre
Taupō 3352, New Zealand
T 07 376 0899
F 07 378 0118
E info@taupo.govt.nz
www.taupo.govt.nz

25 September 2020

Blomquist Alan Gordon & Blomquist Lorna Jean
43 Koha Road
Taupo 3330

Dear Sir/Madam

Code Compliance Certificate in relation to BC181033
18 Penny Grove, Taupo - New three bedroom dwelling

Please find enclosed the Code Compliance Certificate for the above Building Consent.

If you require further information, please contact this office on 07 376 0899 or email techsupport@taupo.govt.nz.

Yours sincerely

Krystal Foden
Business Support Officer

Application for builing consent BC181033A - A2649350

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Reference Number:	REF200230446
Submitted On:	25/02/2020 12:03
Submitted By:	willie robinson

Property Selection

Property ID	0730164819
Address	18 Penny Grove, Taupo
House Number	
Street	
Suburb	
Area Description	
Legal Description	Lot 226 DP 522262
Location	Map
Property Type	Residential
Valuation Number	
Assessment Number	
Property Ward	
Rates Account Identifier	
Rates Account Number	
Annual Rates Assessment Amount	
Capital Value	
Land Value	
Value of Improvements	

Application & Project

Nature of application:	Residential
Application Info	Amendment to an existing Building Consent

This application is to gain consent for minor changes which could arise from on-site problems and re-arrangement of facilities including reductions in the scope of the original consent. Proposals will not meet this criteria if they fall outside space of the original consent or need more than minor changes to the existing conditions.

Amended plans are accepted at the discretion of Council. A full consent will be required if it becomes apparent that the submitted plans do not meet the above criteria. Also, depending on the scope of the amended work, a project information memorandum may be required.

Existing Building Consent No:	BC181033
Would you like this application processed as an urgent amendment?	No
Is there an existing PIM?	Yes
Provide PIM	
National Multi-Use Approval	No
Building name:	
Location of building within site/block number:	
Level/Unit number:	
Number of levels:	
Floor area:	172.70
Current, lawfully established use:	Communal Residential
Year first constructed:	
Add number of occupants per level and per use if more than one:	
Description of the building work:	3 bedroom house - change of cladding
Will the building work result in a change of use of the building?	No
Intended life of the building, if less than 50 years:	
List any previous building consents/PIMs for this project, if applicable:	BC181033
Estimated value of the building work on which the building levies will be calculated (including GST):	10000.00
Does the building/site have any cultural significance, or is a Marae?	No
Is there a new swimming pool or spa pool proposed for this project?	No
Will the building work include any restricted building work?	No
Type:	
Name:	
Company name:	
Address:	
Landline:	
Mobile:	
Email address:	
Accept TandC	Yes

Applicant Details

Privacy Statement	
Name of owner(s)	penny homes
Contact person	
Mailing address	11 Jarden Mile, Nukuhau, Taupo 3330
Street address/registered office	
Landline	
Mobile	0275334252
Daytime	
After hours	
Fax	

Email address	willie@pennyhomes.co.nz
Confirm email address	willie@pennyhomes.co.nz
Website	
The following evidence of ownership is attached	Council to provide Certificate of Title (cost associated)
Does a consent notice exist for this property?	No
Is there an agent working on behalf of the applicant?	No
First point of contact for technical queries related to the processing of this application	Owner
The person specified below will be responsible for all debt associated with this building consent.	
In ticking this box I agree that I will pay, or arrange payment, of all fees payable in respect of this application. I acknowledge that a cancellation fee may be payable if this application is withdrawn before a building consent is issued	Yes
Please specify the billing details for this application	Owner

Building Code

For further information on the below Building Code Clauses please visit the following website address: https://www.building.govt.nz/building-code-compliance/

Please complete all applicable building code clauses

B1 Structure	N/A
B2 Durability	N/A
C1-C6 Fire Safety Classes	N/A
D1 Access Routes	N/A
D2 Mechanical Installation for Access	N/A
E1 Surface Water	N/A
E2 External Moisture	N/A
E3 Internal Moisture	N/A
F1 Hazardous Agents on Site	N/A
F2 Hazardous Building Materials	N/A
F3 Hazardous Substances and Processes	N/A
F4 Safety from Falling	N/A
F5 Construction and Demolition Hazards	N/A
F6 Visibility in Escape Routes	N/A
F7 Warning Systems	N/A
F8 Signs	N/A
G1 Personal Hygiene	N/A
G2 Laundering	N/A
G3 Food Preparation and Prevention of Contamination	N/A
G4 Ventilation	N/A
G5 Interior Environment	N/A
G6 Airbourne Impact Sound	N/A
G7 Natural Light	N/A
G8 Artificial Light	N/A
G9 Electricity	N/A

G10 Piped Services	N/A
G11 Gas as an Energy Source	N/A
G12 Water Supplies	N/A
G13 Foul Water	N/A
G14 Industrial Liquid Waste	N/A
G15 Solid Waste	N/A
H1 Energy Efficiency	N/A

Compliance Schedule

Is a compliance schedule or changes to an existing compliance schedule required for this building?

Yes

SS16 - Cable Cars

Not Applicable

Application Checklist

Use this checklist when finalising your building drawings/plans to assist you to lodge a complete application and to avoid delays in processing. Your application will be accepted based on this checklist to ensure that it has sufficient information to commence processing. All items on this checklist must be circled to show that they are either provided or are not applicable to your project (N/A).

Later additional information may be requested during the processing of your building consent to confirm compliance with the Building Act, Building Code, District Plan and any other relevant legislation. Processing time will be suspended until information is received.

General Documentation Required

Owner authorisation provided	N/A
Form 2A Certificate of Design Work	N/A
All drawings must meet the minimum requirements of the technical drawings standard AS/NZS1100 with a minimum font size of Microsoft Word text size 8. Index provided for plans and specifications.	N/A
Are you applying for owner/builder exemption? If yes, the appropriate documentation including Form 2B is to be supplied	N/A
All documents including photocopies must be legible	N/A
All plans are to be titled and dated (or version number)	N/A
Comments	

Legal Documentation Required

Evidence of ownership provided.	N/A
Comments	

Site/Location Plan

Site/Location Plan	N/A
Comments	

Retaining Walls/Site Works

Retaining Walls/Site Works	N/A
Comments	

Foundation Plan

Foundation Plan	N/A
Comments	

Floor Plan

Floor Plan	N/A
Comments	

Framing Plan/Bracing Plan

Framing Plan/Bracing Plan	N/A
Comments	

Roof Plan

Roof Plan	N/A
Comments	

Specific Design Engineering

Specific Design Engineering	N/A
Comments	

Elevations

Elevations	N/A
Comments	

Specifications &Other Documentation

Specifications and Other Documentation	N/A
Comments	

Plumbing &Drainage

Plumbing and Drainage	N/A
Comments	

Swimming Pool/Spa Pool

Swimming Pool/Spa Pool	N/A
Comments	

Fireplace

Solid Fuel Heater	N/A
Comments	

Solar Heating

Solar Heating	N/A
Comments	

Cross Section

Cross sections	N/A
Comments	

Relocatable Buildings

Relocatable buildings	N/A
Comments	

Attachments

Please ensure all documents are correctly and adequately named prior to uploading.

Please upload the plans related to the proposed work as **one PDF (not as individual sheets)**: • **JT18105 - BLOMQUIST - BC Plans - Rev B.PDF (3581837 bytes)**

Please upload all generic specifications related to proposed works as **one PDF (not as individual sheets)**: • **PROJECT SPECIFICATION - Blomquist.pdf (522800 bytes)**

Please upload the project specific specifications related to proposed works as **one PDF (not as individual sheets)**: • **PROJECT APPENDIX - Blomquist.pdf (20015494 bytes)**

Please upload any additional documents not yet provided: • **LBP FORM 2A - Blomquist.pdf (358155 bytes)**

Once issued I would like to receive my consent documentation by: Pickup electronic copy - On a USB memory stick, extra \$10.00 fee

Building plans BC181033A - A2649351

REQUIRED ITEMS FOR BUILDING CONSENT BC 181033A

Below is a list of council inspections **assessed to be required** to ensure the work complies with the building consent & Building Code, and to satisfy the requirements of Sections 90 & 94(1)(a) of the Building Act 2004.

Additional inspections may be required where missing from the list, where "part" inspections are only undertaken, or where failed inspections need to re-checked. These will be charged out as additional inspections before CCC is issued. Any queries, please talk to your council inspector.

All inspections noted below are to be signed off by Taupō District Council building control staff before the application for CCC. The order of inspections is indicative but may vary for each consent.

For Inspection Bookings call (07) 376 0899, or...
Try our "GoBuild" App available from Play Store & Apple App Store.



Inspections Required

The following inspections are required:

Advice Notes

#Amendments are to be read in conjunction with the approved consent documents and all associated conditions and endorsements.

AS AMENDED

18 Mar 2020

TAUPO DISTRICT COUNCIL

APPROVED CONSENT COPY
THESE PLANS AND SPECIFICATIONS ARE
APPROVED SUBJECT TO THE PROVISIONS
OF THE BUILDING ACT 2004 AND IT'S
REGULATIONS. A FULL (PRINTED) COPY OF
DRAWINGS AND SPECIFICATIONS ARE TO
BE RETAINED ON SITE IN GOOD ORDER
AND PRODUCED UPON REQUEST.

TAUPO DISTRICT COUNCIL

BC181033A

APPROVED CONSENT
PLANS/SPECIFICATIONS

AS AMENDED

18 Mar 2020

TAUPO DISTRICT COUNCIL

DRAWING CONTENTS	SHT
SITE & DRAINAGE PLAN	1
FOUNDATION PLAN	2
FLOOR PLAN	3
ELEVATIONS	4
SECTIONS A & B	5
FRAMING & FIXINGS PLAN	6
BRACING PLAN	7
ELECTRICAL PLAN (SMOKE ALARMS & INSULATION)	8
DETAILS	9-11
WET AREA DETAILS	12
AXON PANEL CLADDING DETAILS	13-17
LINEA CLADDING DETAILS	18-20

R E V I S I O N	B
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TAUPO DISTRICT COUNCIL

BC181033A

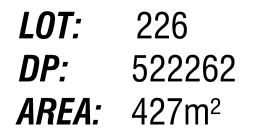
APPROVED CONSENT
PLANS/SPECIFICATIONS

BLOMQUIST RESIDENCE

18 PENNY GROVE, TAUPO



TAUPO DISTRICT COUNCIL



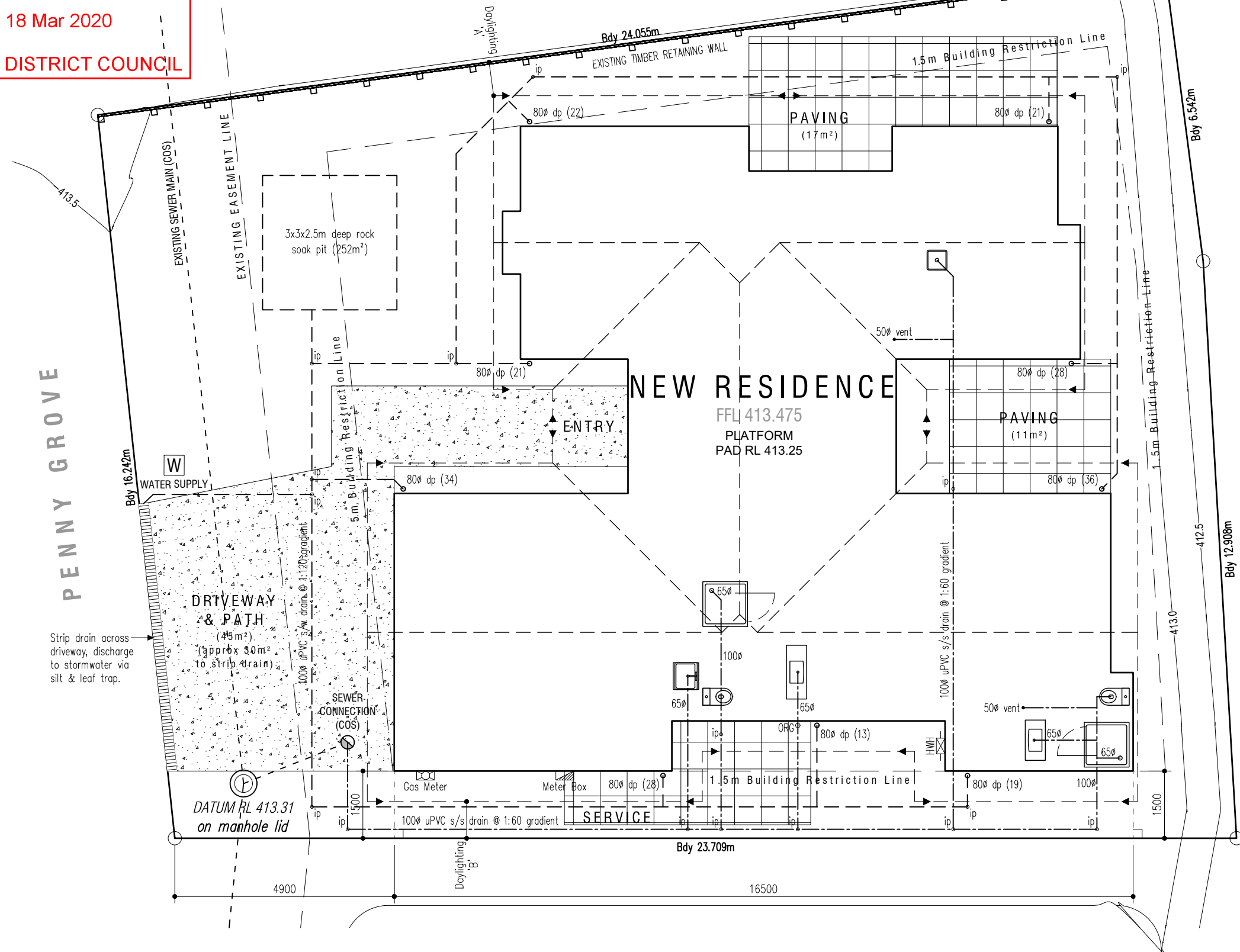
Plot Ratio: $178.90/427 = 41.9\% (<100\%)$

- REVEGETATION
- MINIMIZATION OF EARTHWORKS
- TIMING
- STAGING OF EARTHWORKS OPERATIONS

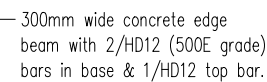
FIXTURE	FU's	PIPE Ø
Basin	1	400
Shower	2	400
Bath	4	400
Kitchen Sink	3	650
Laundry Tub	5	650
WC Pan	4	1000

DRAIN SIZES AS SHOWN ON DRAWING

APPROVED CONSENT
PLANS/SPECIFICATIONS



TAUPO DISTRICT COUNCIL



GARAGE DOOR REBATE DIAGRAM

APPROVED CONSENT
PLANS/SPECIFICATIONS

AS AMENDED
18 Mar 2020
TAUPO DISTRICT COUNCIL

GENERAL NOTES:
ALL FRAMING TO BE SG 8 GRADE UNLESS OTHERWISE SPECIFIED.
WINDOW DIMENSIONS ARE ROUGH OPENING AND ALLOW FOR SPACERS AND FLASHING TAPE TO PERIMETER.
CONFIRM ALL INTERNAL DOOR HEIGHTS WITH OWNER PRIOR TO PRICING AND CONSTRUCTION.



TAUPO DISTRICT COUNCIL
BC181033A
APPROVED CONSENT
PLANS/SPECIFICATIONS

AREA : 172.70m²

	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE:	BLOMQUIST RESIDENCE	DRAWING:	FLOOR PLAN	SCALE:	1:100	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: 24/11/18 19/02/20	REVISION: A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Lineo weatherboards.	SHEET 3
		18 PENNY GROVE, TAUPO	CONSENT COPY REV B	DRAWN:	SK	DATE:	Nov 2018				
	www.pennyhomes.co.nz				All dimensions to be checked and verified by the Contractor before commencement of any work				E&OE		

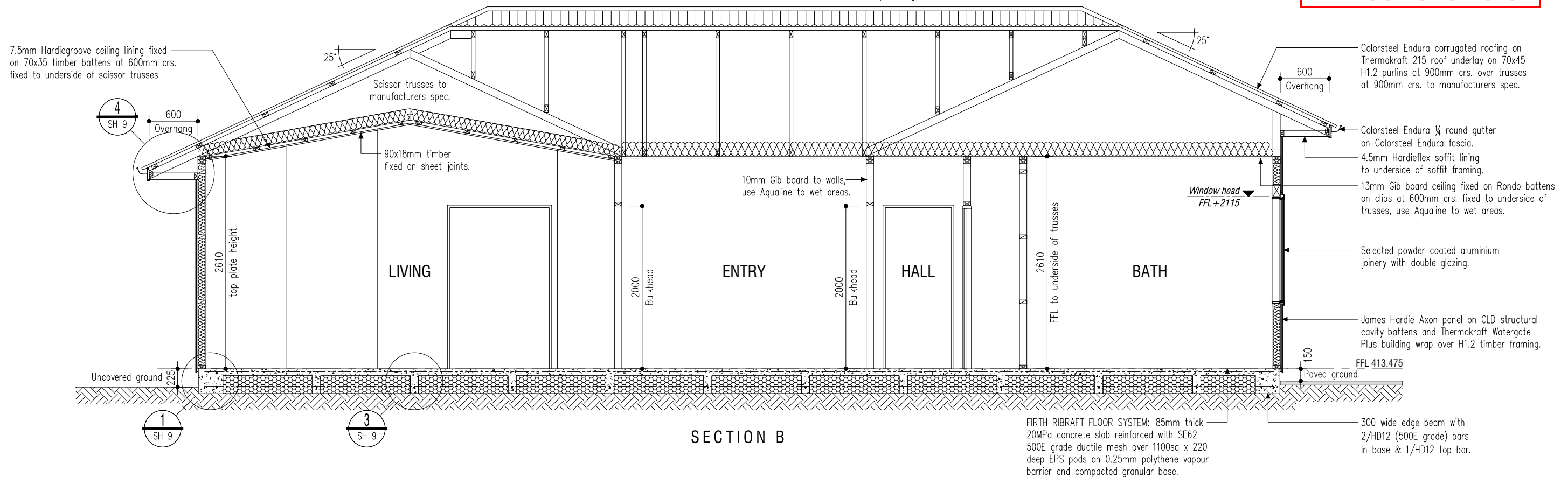
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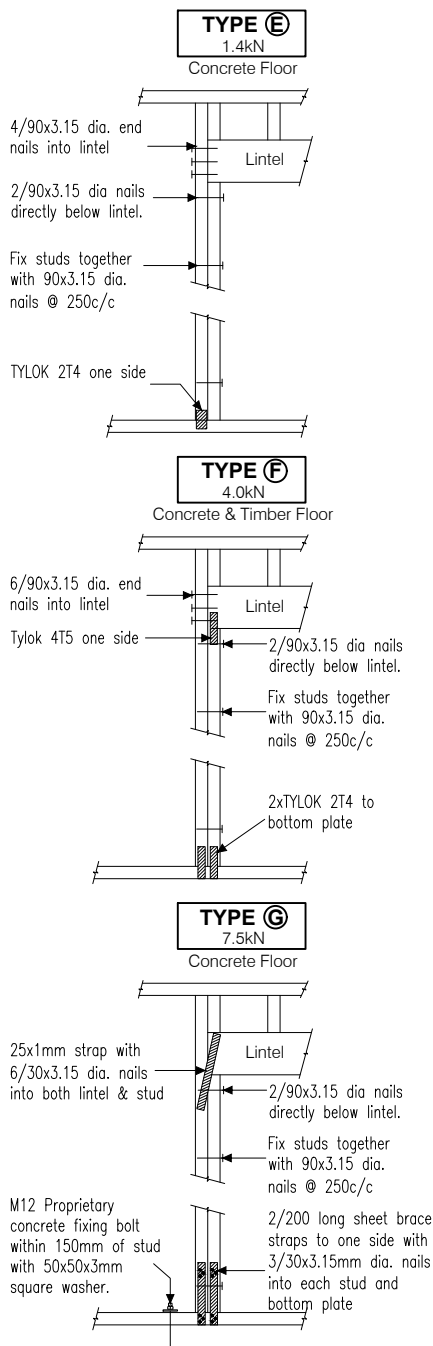
18 Mar 2020

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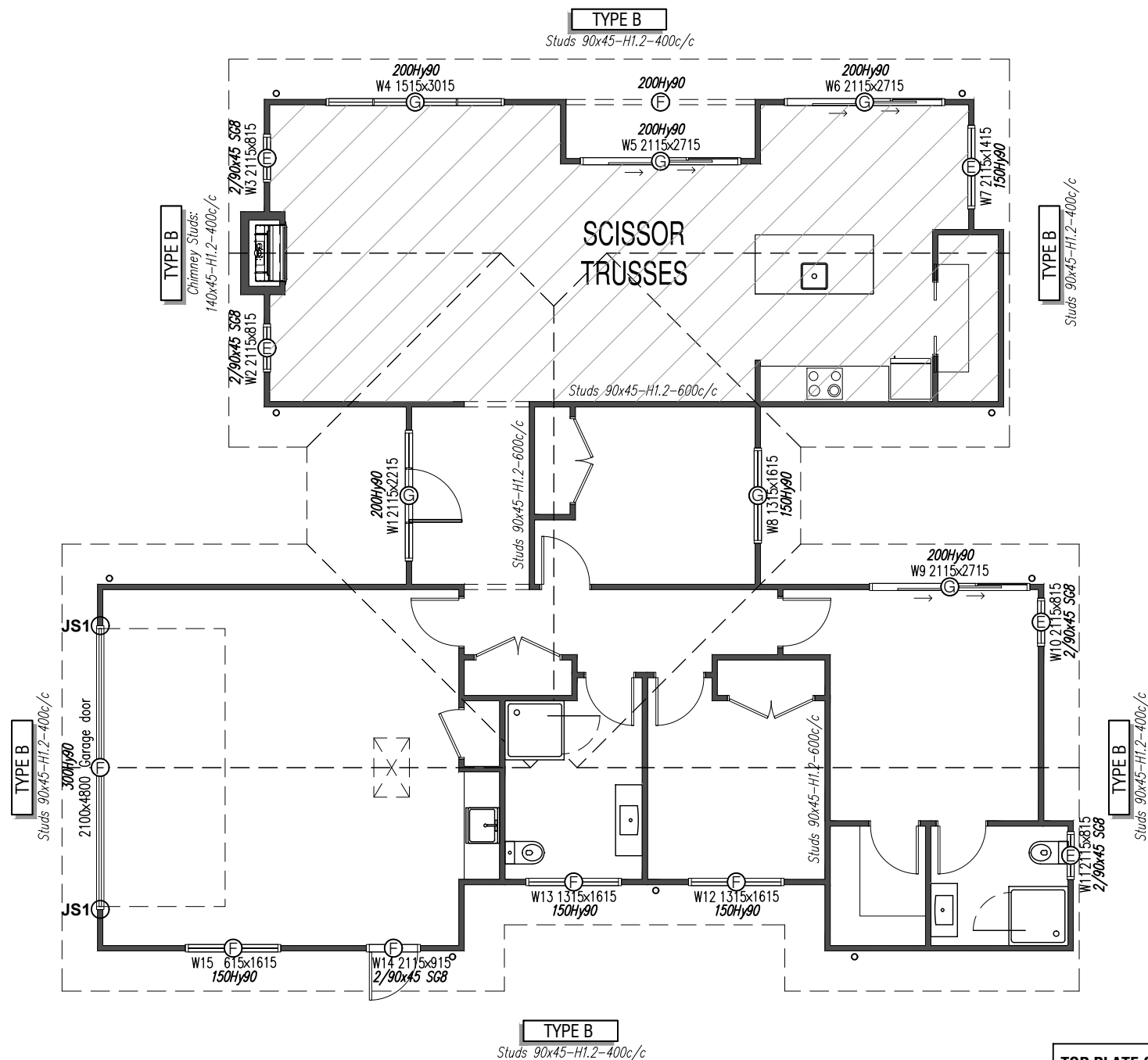
IF METAL CEILING BATTENS ON CLIPS ARE USED,
BOTTOM CHORD BRACING IS REQUIRED AT 1800mm
CENTRES, REFER TO TRUSS MANUFACTURERS
DESIGN.



IMPORTANT NOTE: trimming stud numbers shown are indicative only



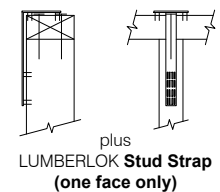
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APPROVED CONSENT PLANS/SPECIFICATIONS

TYPE B (external wall)
4.7kN

2/90x3.15 dia. plain steel wire
nails driven vertically into stud.



(ALTERNATIVE TO NZS3604:2011 TABLE 8.18)

TYPE B

To calculate the number of B type fixings required, divide the wall length by the stud centres, add 1 to this figure and locate this number of fixings as evenly as possible along the wall length. This figure includes the start and end studs in each wall length

PURLIN FIXING REQUIREMENTS:

Refer to NZS 3604:2011 Table 10.10 for purlin fixing requirements.

70x45mm H1.2 purlins - Achieve fixing *Type T* (2.4kN)
1/10g x 80mm long self drilling screw

STUD SIZING:

Stud size and spacings as per NZS 3604:2011 Table 8.2 and Table 8.4. Typically:

External walls 90x45 H1.2 at 400mm crs.
Chimney external walls 140x45 H1.2 at 400mm crs.
Internal walls 90x45 H1.2 at 600mm crs.

DWANG REQUIREMENTS:

Dwangs at 800mm crs. to all framing unless noted otherwise.

TRIMMING STUDS TO OPENINGS:

Refer to NZS 3604:2011 Fig. 8.5 and Table 8.5 to determine the number of trimming studs required for window and door openings.

TRIMMING STUDS: OUTSIDE SCOPE OF NZS 3604:2011

As per DesignIT calculations and where indicated on plans:

JS1 - 3/90x45 HyCHORD trimming studs

BOTTOM PLATE FIXINGS TO CONCRETE:

BOTTOM PLATE TO STUD CONNECTION TO COMPLY
WITH NZS 3604:2011 table 8.19 AND AS REQUIRED FOR
LINTEL FIXINGS.

BOTTOM PLATE TO FLOOR SLAB CONNECTION AS PER
NZS 3604:2011 7.5.12 AND AS REQUIRED FOR LINTEL
FIXINGS.

PROPRIETARY ANCHORS SHALL HAVE A MINIMUM CAPACITY AS PER NZS3604:2011 7.5.12.3 & 7.5.12.4. INSTALL AS PER MANUFACTURERS INSTRUCTIONS.

EXTERNAL WALLS: PROPRIETARY POST FIXED BOTTOM
PLATE ANCHORS @ 0.9m CTRS.

INTERNAL LOAD BEARING WALLS: PROPRIETARY POST
FIXED BOTTOM PLATE ANCHORS @ 0.9m CTRS.

INTERNAL WALLS: PROPRIETARY POST FIXED BOTTOM
PLATE ANCHORS @ 0.9m CTRS OR 8x75mm DRIVE PIN
& WASHER @ 0.6m CTRS.

LINTELS:

ALL LINTELS SIZED BY CARTERS PRENAIL, REFER TO
CARTERS DRAWINGS FOR ROOF & LINTEL DESIGN.

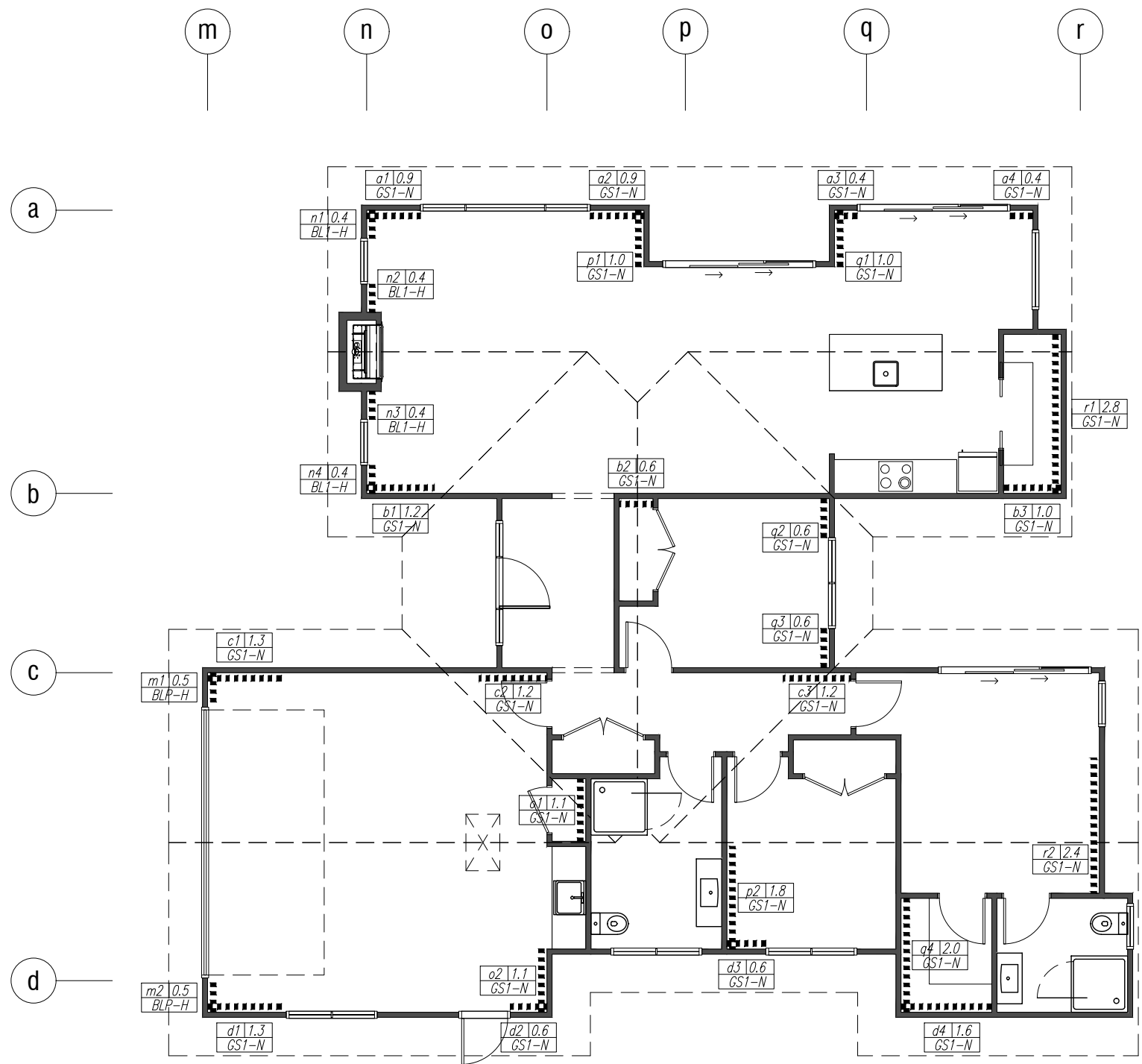
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TOP PLATE CONNECTIONS

Wall frames at right angles to external framing to be fixed with a 6kN LUMBERLOK PLATE-LOK in accordance with the Mitek Structural Fixings On-Site Guide.

6kN LUMBERLOK PLATE-LOK satisfies bracing as required by Clause 8.7.3 NZS3604:2011.

For brace elements exceeding 250 BU's additional fixings are required and will be indicated on the Framing Fixings and Bracing Plans.



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	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE: BLOMQUIST RESIDENCE	DRAWING: BRACING PLAN	SCALE: 1:100	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: 24/11/18 19/02/20	REVISION: A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	SHEET 7 OF: 20 JOB No. JT181
	www.pennyhomes.co.nz	18 PENNY GROVE, TAUPO	CONSENT COPY REV B	DRAWN: SK				
				DATE: Nov 2018				
				All dimensions to be checked and verified by the Contractor before commencement of any work E&OE				

INSULATION TABLE

PROPOSED R-VALUES			
LOCATION	COMPONENT	R-VALUE ACHIEVED	INSULATION DESCRIPTION & REFERENCE
WALLS	Axon Panel on cavity over 90x45mm studs at 400mm centres.	2.18	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Linea bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres.	2.13	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres.	2.27	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
ROOFS	Profiled metal on trusses at 900mm centres	3.37	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
	Profiled metal on scissor trusses at 900mm centres	3.35	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
FLOOR	85mm thick Firth Ribraft concrete slab on ground	1.30	220mm deep polystyrene pod system <i>Refer to Manufacturers Spec in Appendix</i>
GLAZING	Aluminium joinery with double glazed windows	0.26	Standard aluminium joinery with double glazed windows
			<i>Refer to Branz House Insulation Guide Fifth Edition</i>

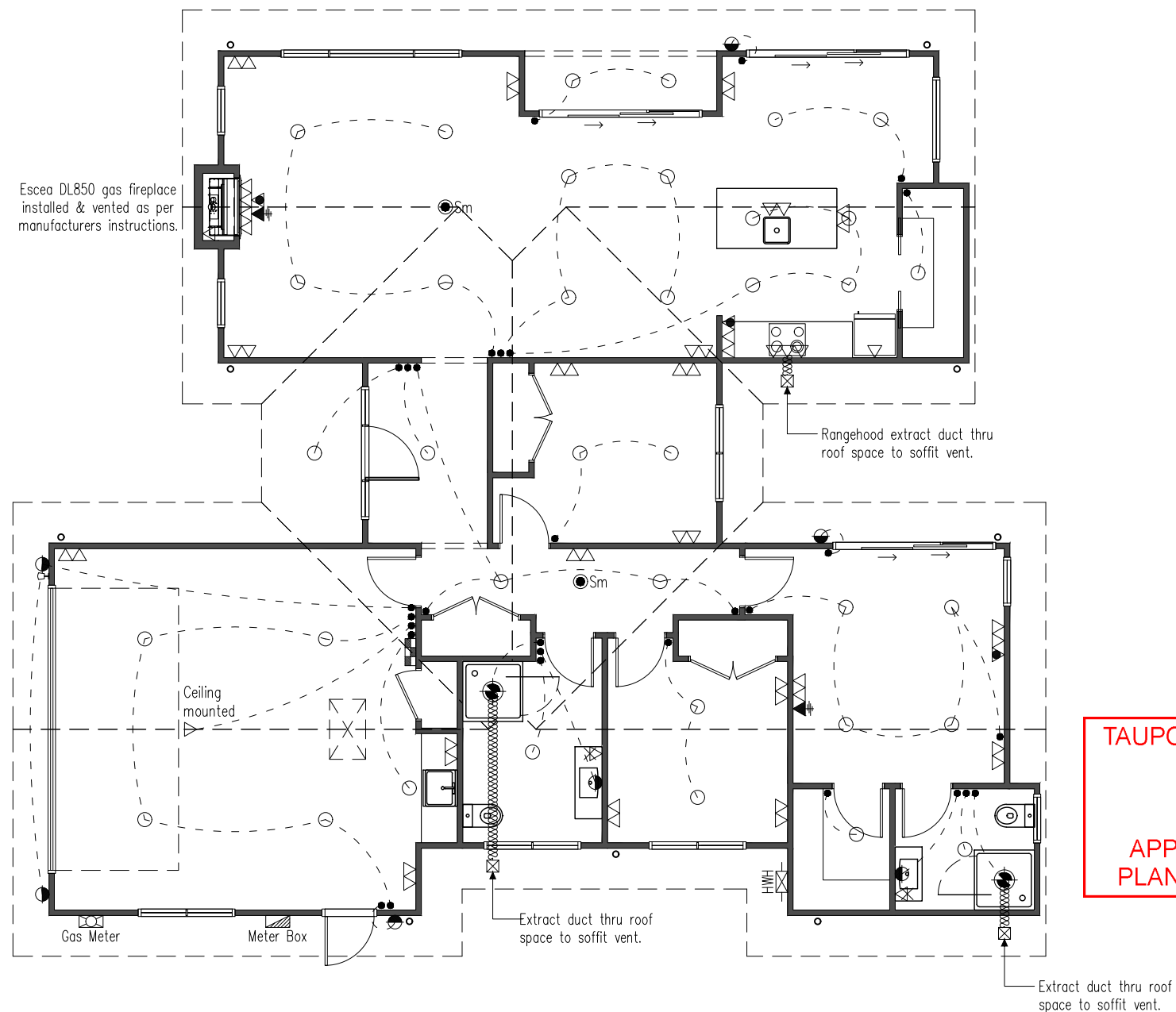
INSULATION NOTES:

GARAGE NOT INCLUDED IN THERMAL ENVELOPE FOR INSULATION CALCULATIONS. INTERNAL GARAGE WALLS TO BE INSULATED WITH R2.8 BATTS AS PER REST OF HOUSE.

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LEGEND:

- | | |
|---|---------------------|
|  | Distribution Board |
|  | Meter Box |
|  | Gas Meter Box |
|  | Rinnai VT26 HWH |
|  | Light Sensor |
|  | Recessed LED light |
|  | Wall Mounted Light |
|  | Extract Fan |
|  | Smoke Detector |
|  | Power Outlet |
|  | Double Power Outlet |
|  | Earth Leakage point |
|  | Phone Outlet |
|  | Light Switch |
|  | TV Outlet |

ELECTRICAL NOTES:

CHECK KITCHEN APPLIANCE POSITIONS AND TYPES BEFORE INSTALLATION WITH FINALIZED KITCHEN PLAN.

CHECK POSITIONS AND TYPES OF ALL FITTINGS PRIOR TO INSTALLATION.

ALLOW PC SUMS FOR SPECIALIST FITTINGS
WHERE APPLICABLE.

ALL RECESSED DOWNLIGHTS TO BE CA RATED.
TYPES: ICF, IC, CA80, CA135.

SMOKE ALARMS TO BE TYPE 1 WITH HUSH AND TEST FACILITY IN ACCORDANCE WITH NZBC F7/AS1.

ALLOW FOR THE INSTALLATION OF:

- UNDER TILE HEATING TO BATHROOM & ENSUITE.

CONFIRM THE FOLLOWING IF REQUIRED:

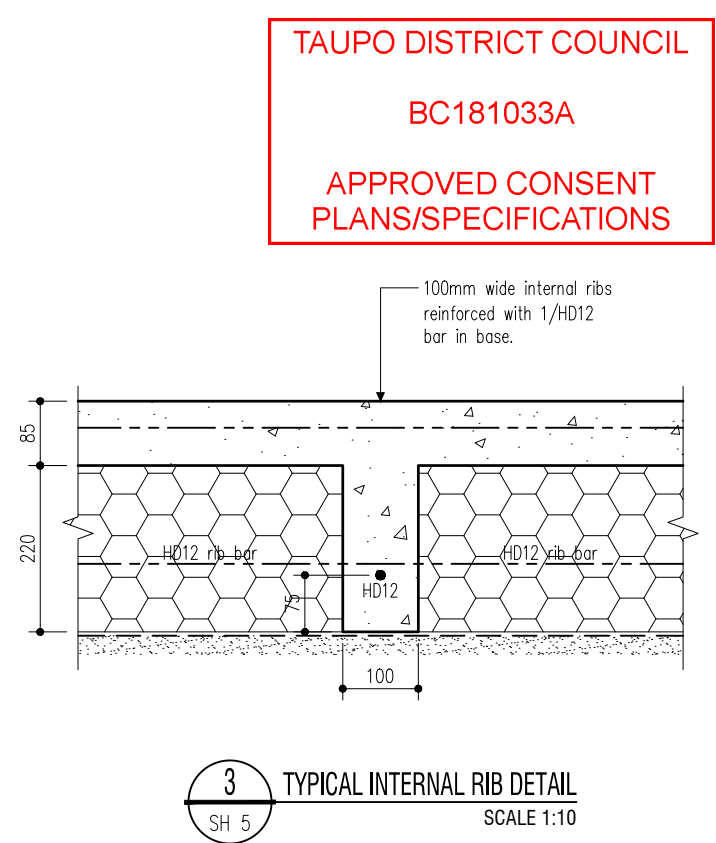
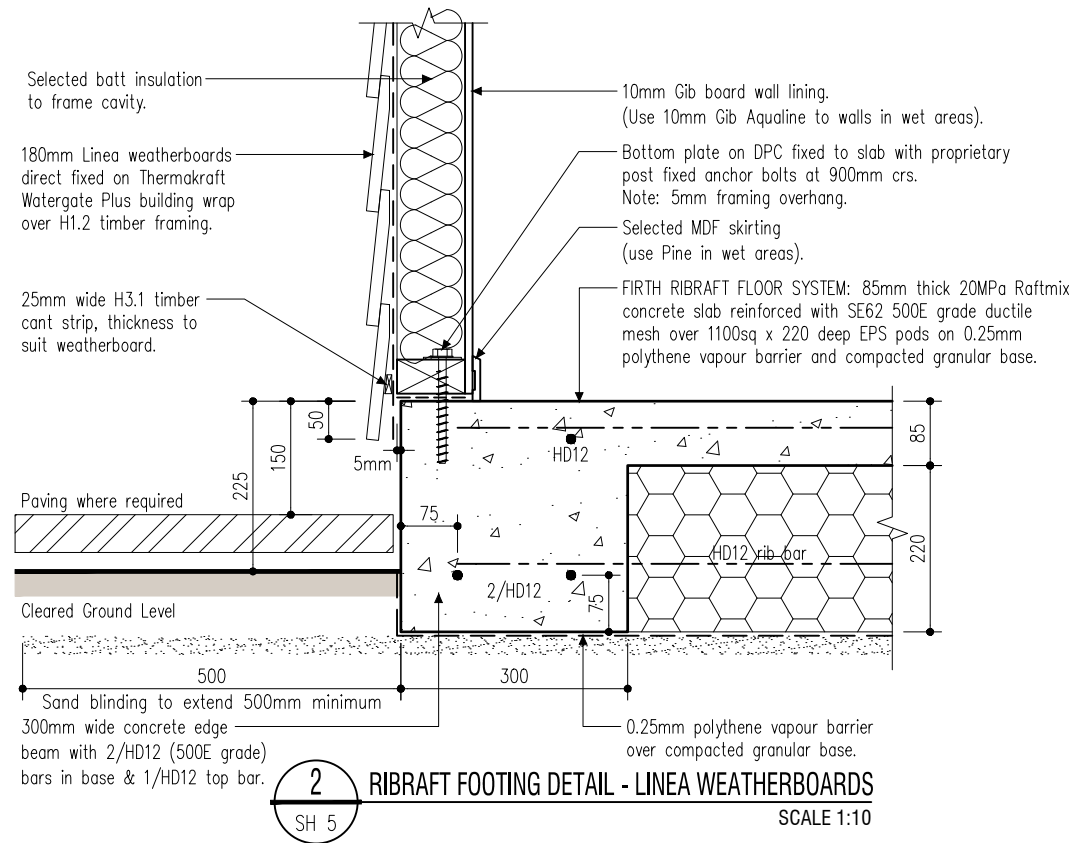
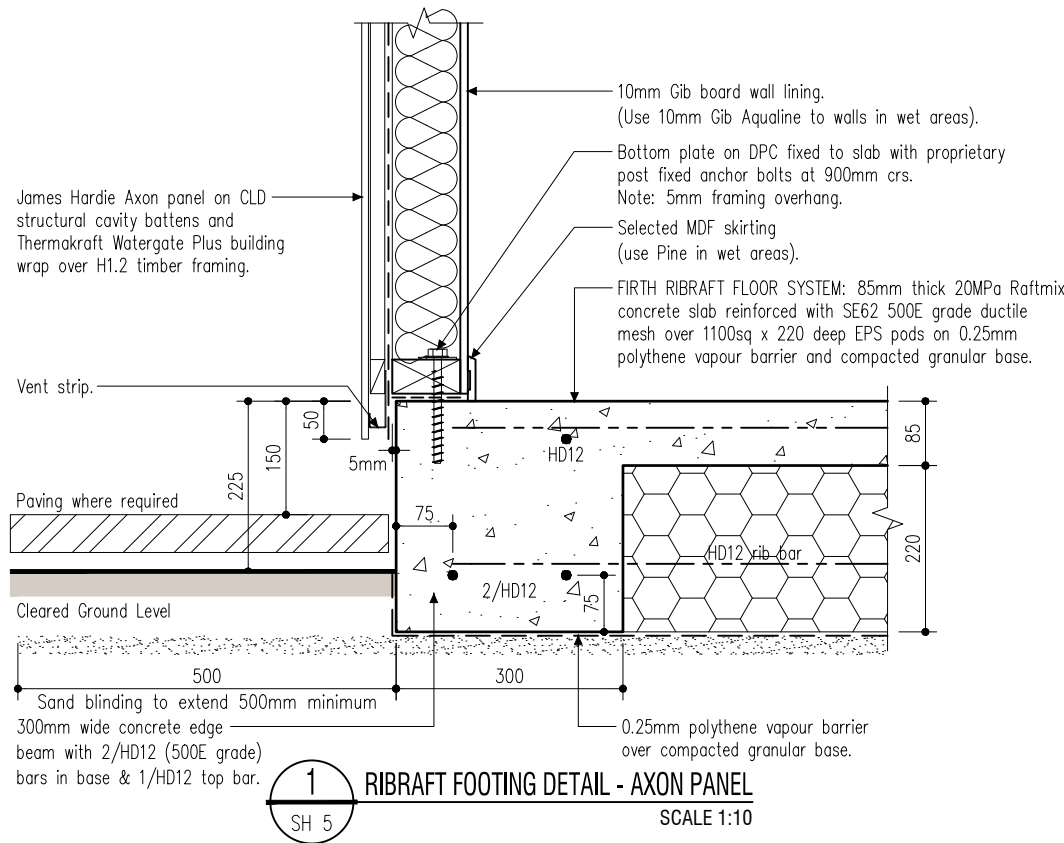
- SPECIALIST FITTINGS
- MIRROR DEMISTERS
- AIRCONDITIONING SYSTEM IF APPLICABLE
- SECURITY SYSTEM
- DIMMERS TO SELECTED LIGHTS
- ENTRY CONTROL SYSTEM

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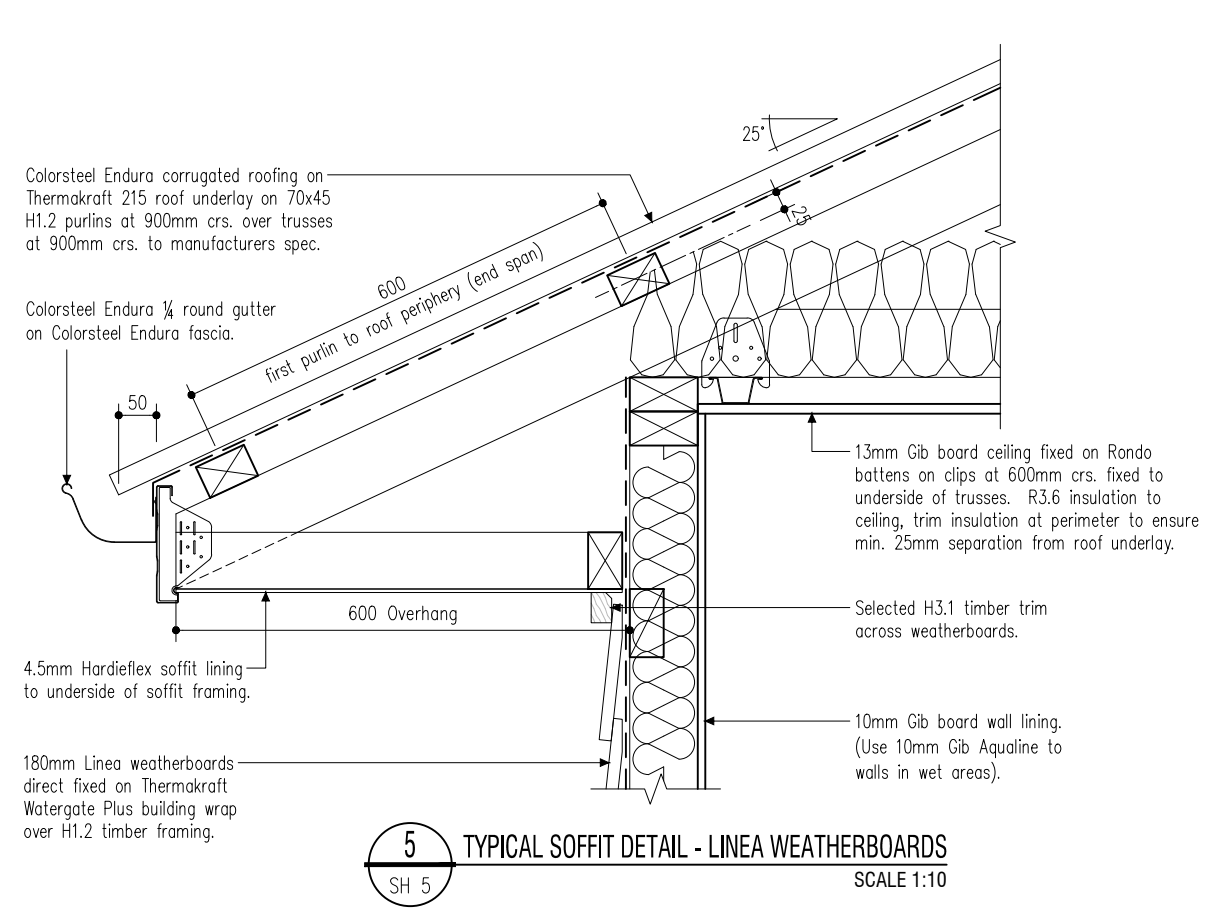
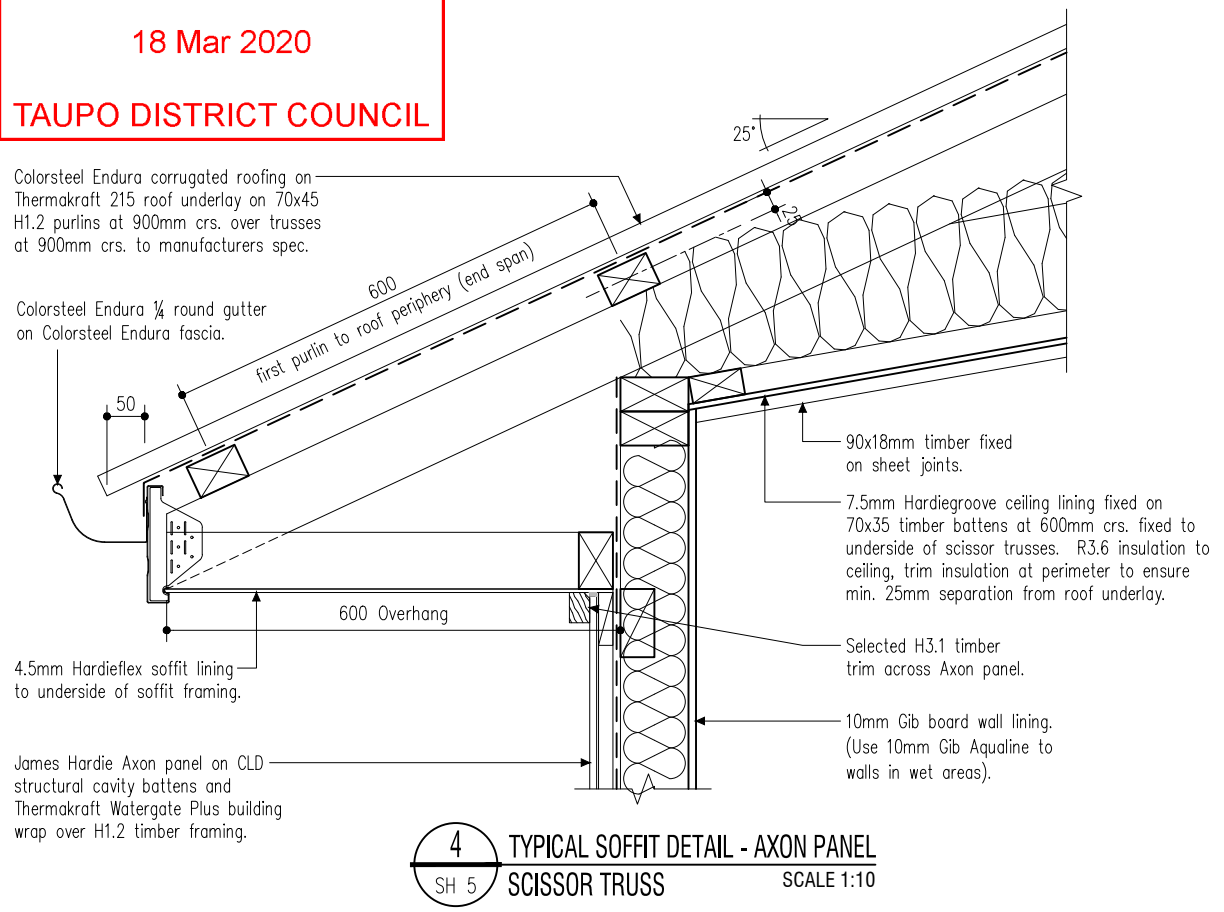
 PENNY HOMES BUILT TO BE ADMIRER	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	BLOMQUIST RESIDENCE	ELECTRICAL PLAN	1:100	Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: 24/11/18 19/02/20	REVISION: A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	SHEET 8 OF: 20 JOB No. JT18105
	18 PENNY GROVE, TAUPO	CONSENT COPY REV B	DRAWN: SK DATE: Nov 2018	All dimensions to be checked and verified by the Contractor before commencement of any work E&OE				
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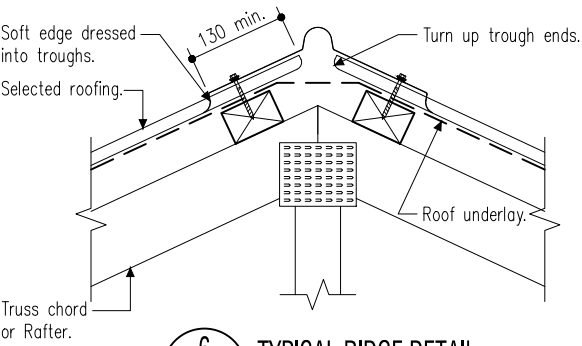
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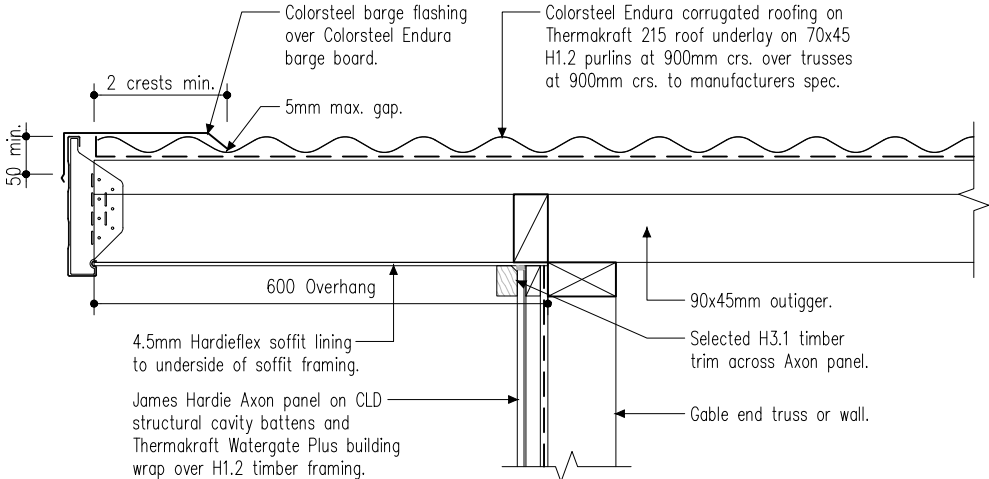
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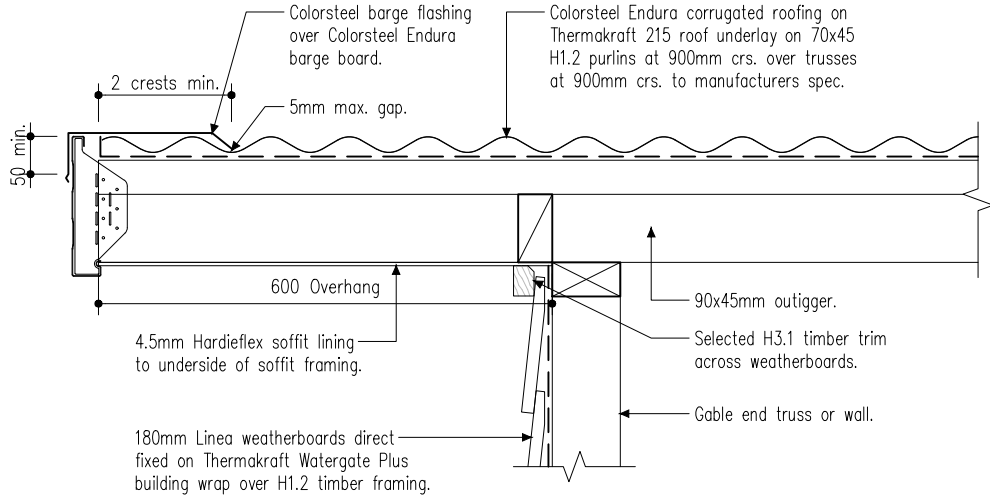
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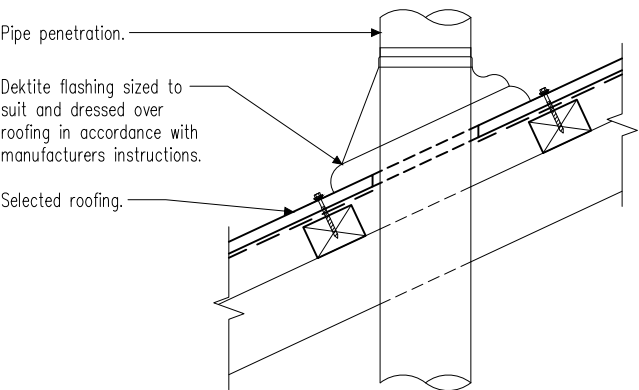
6 TYPICAL RIDGE DETAIL
SH 5 SCALE 1:10



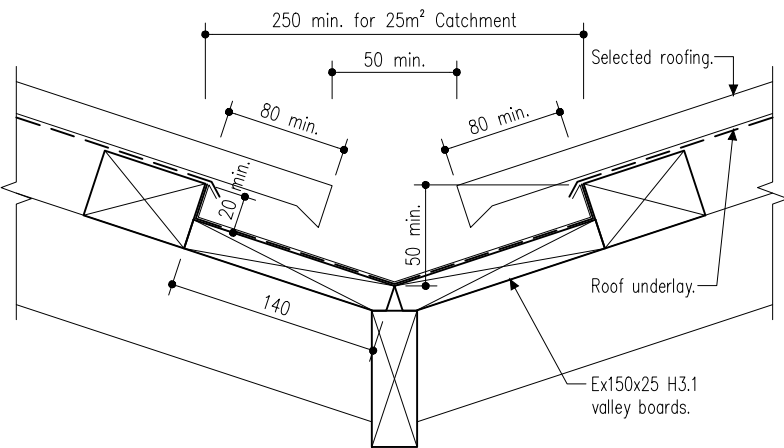
7 TYPICAL 600mm BARGE DETAIL - AXON PANEL
SH 4 SCALE 1:10



8 TYPICAL 600mm BARGE DETAIL - LINEA WEATHERBOARDS
SH 4 SCALE 1:10



TYPICAL ROOF PENETRATION DETAIL
SCALE 1:10



TYPICAL VALLEY GUTTER DETAIL
SCALE 1:5

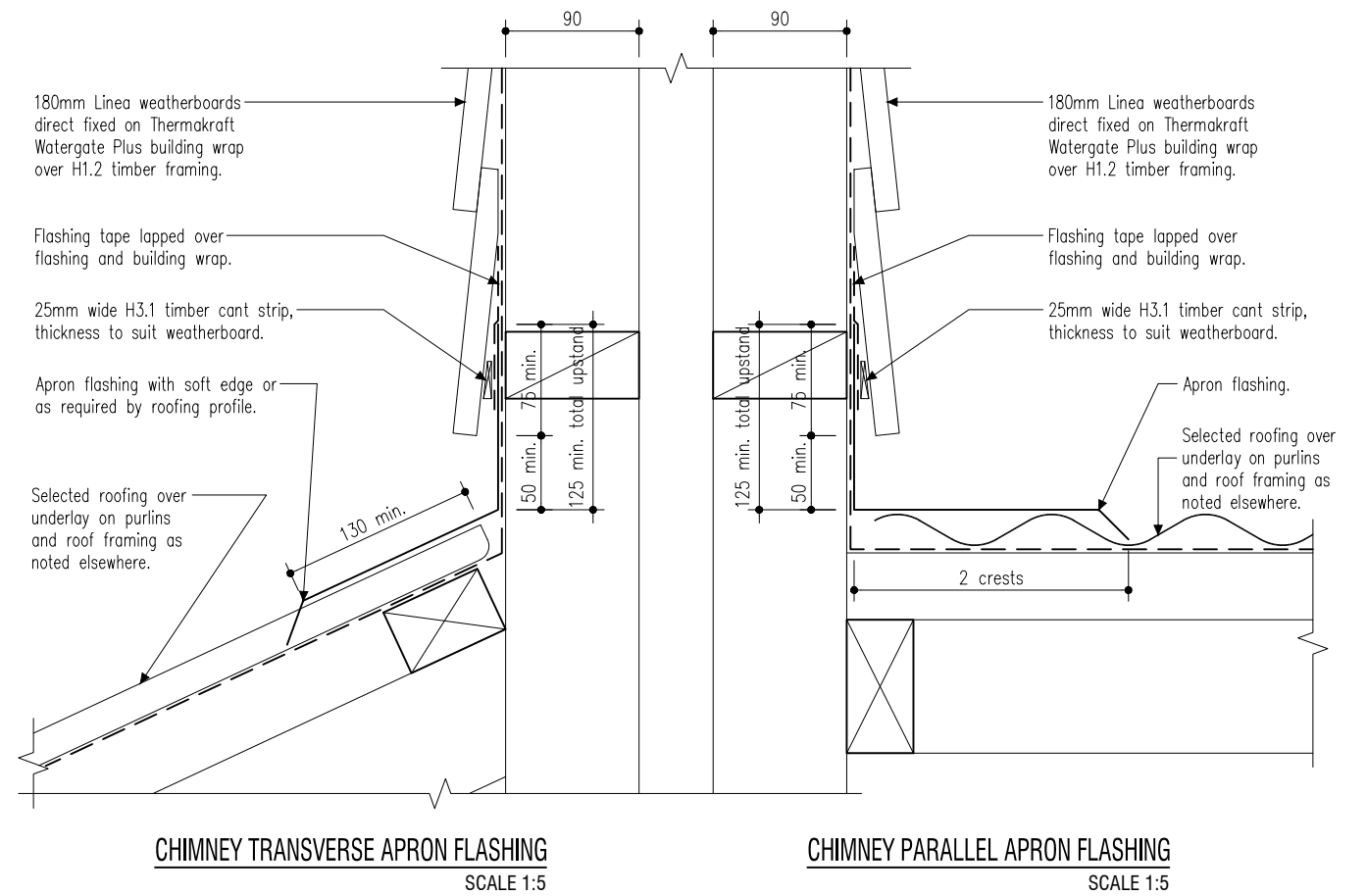
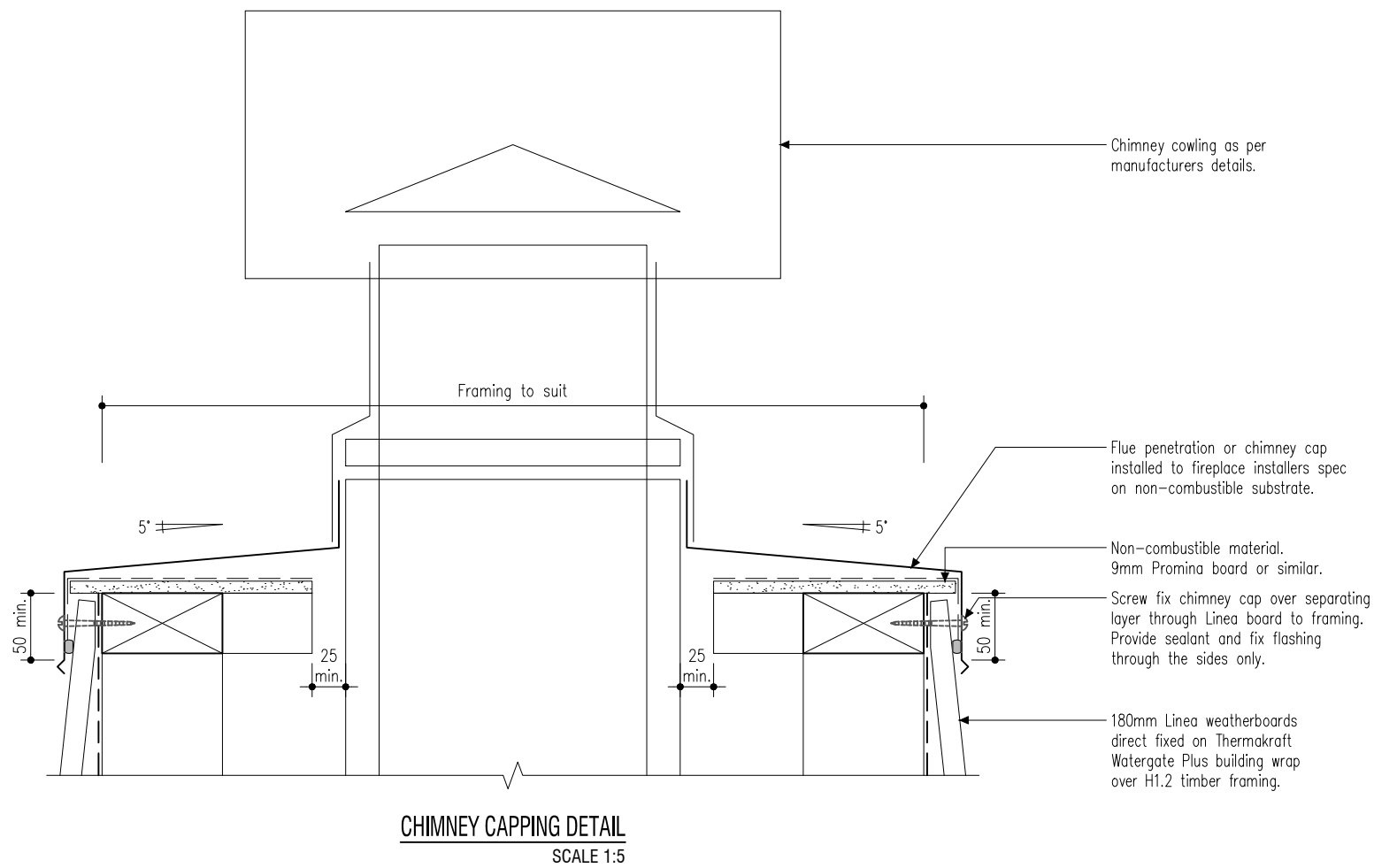
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				DRAWN: SK				
				DATE: Nov 2018				

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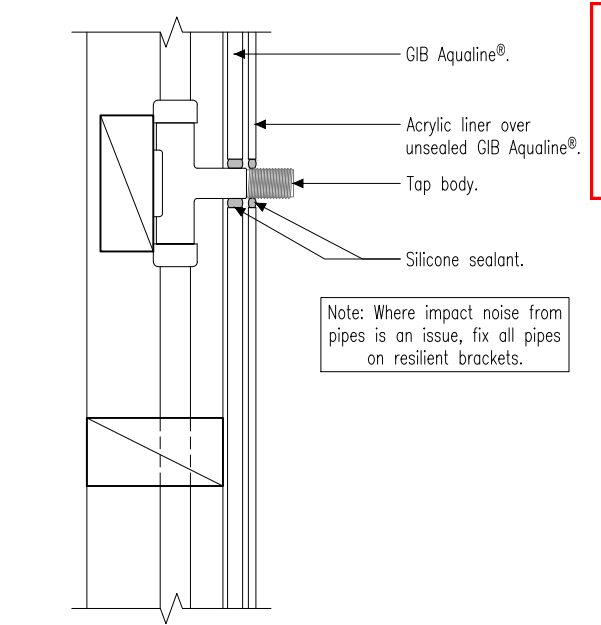


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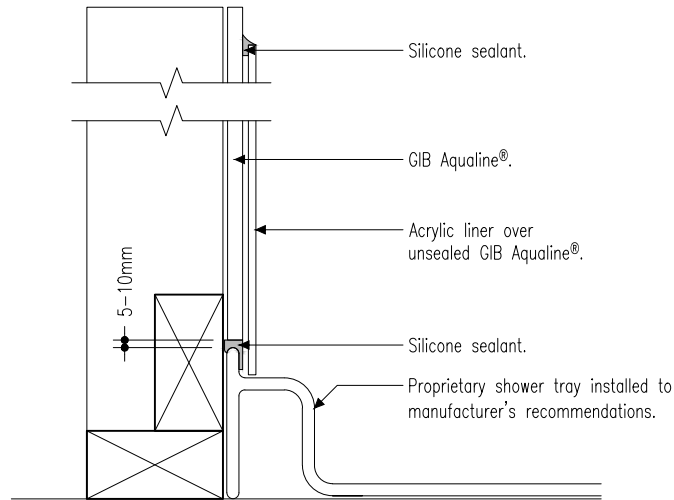
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				DRAWN: SK				
				DATE: Nov 2018				

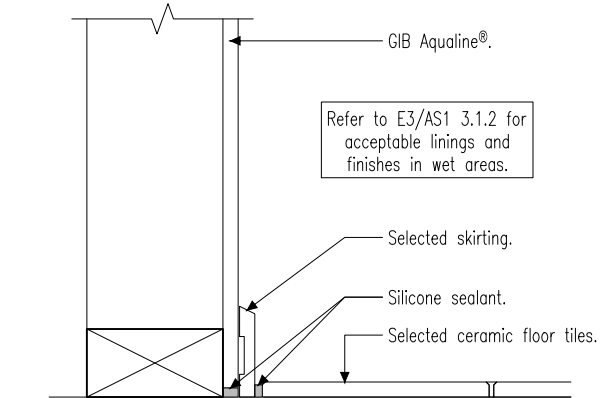


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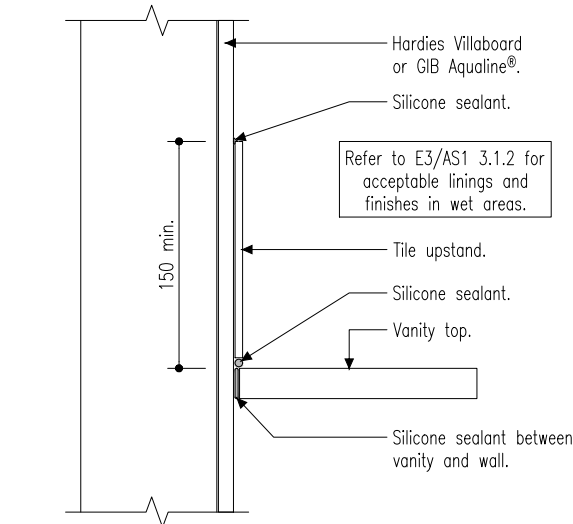
ACRYLIC LINER PENETRATION DETAIL
SCALE 1:5



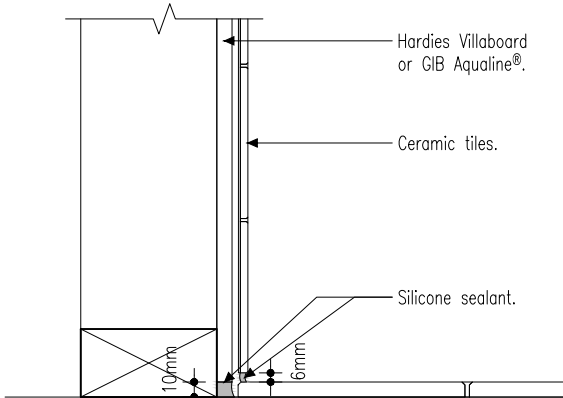
SHOWER WALL/TRAY DETAIL (ACRYLIC LINER & BASE)
SCALE 1:5



WALL/FLOOR DETAIL (GIB AQUALINE/TILED FLOOR)
SCALE 1:5



VANITY/KITCHEN BENCH TOP DETAIL
SCALE 1:5



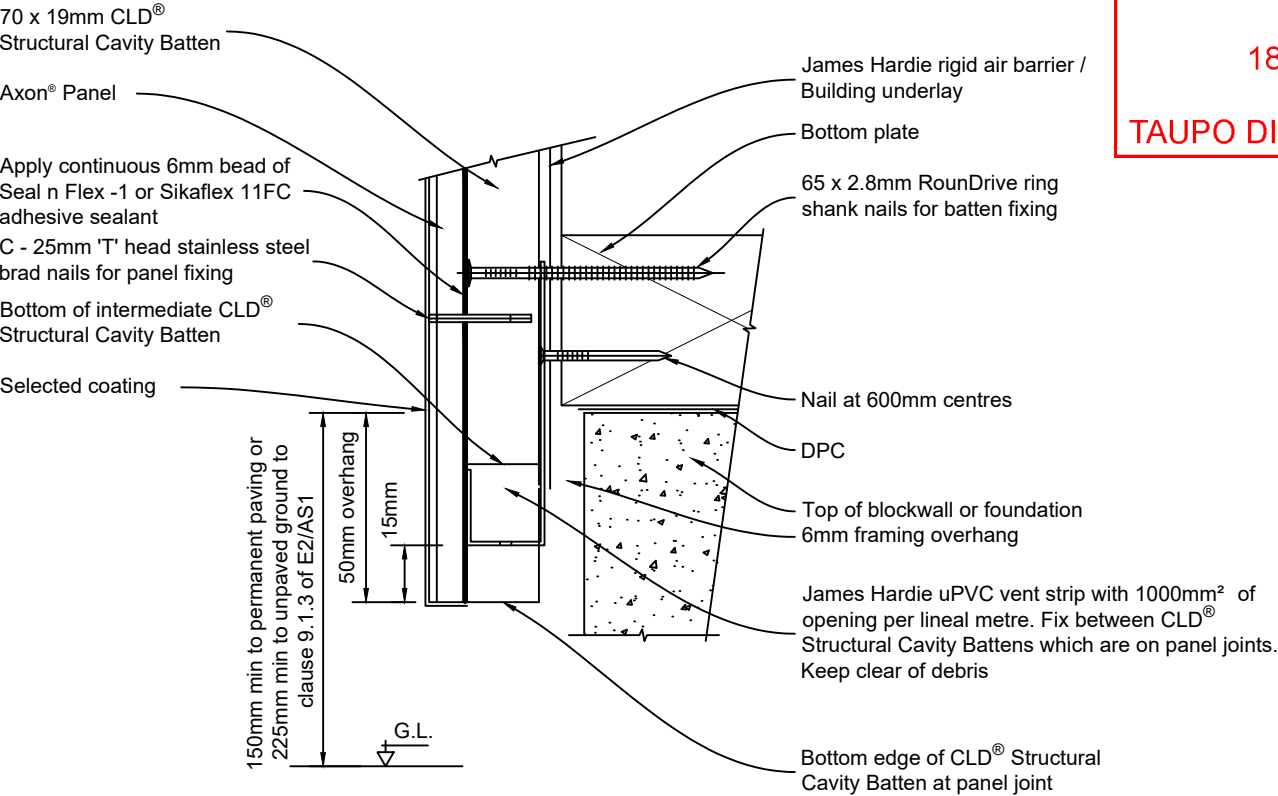
WALL/FLOOR DETAIL (CERAMIC TILES)
SCALE 1:5

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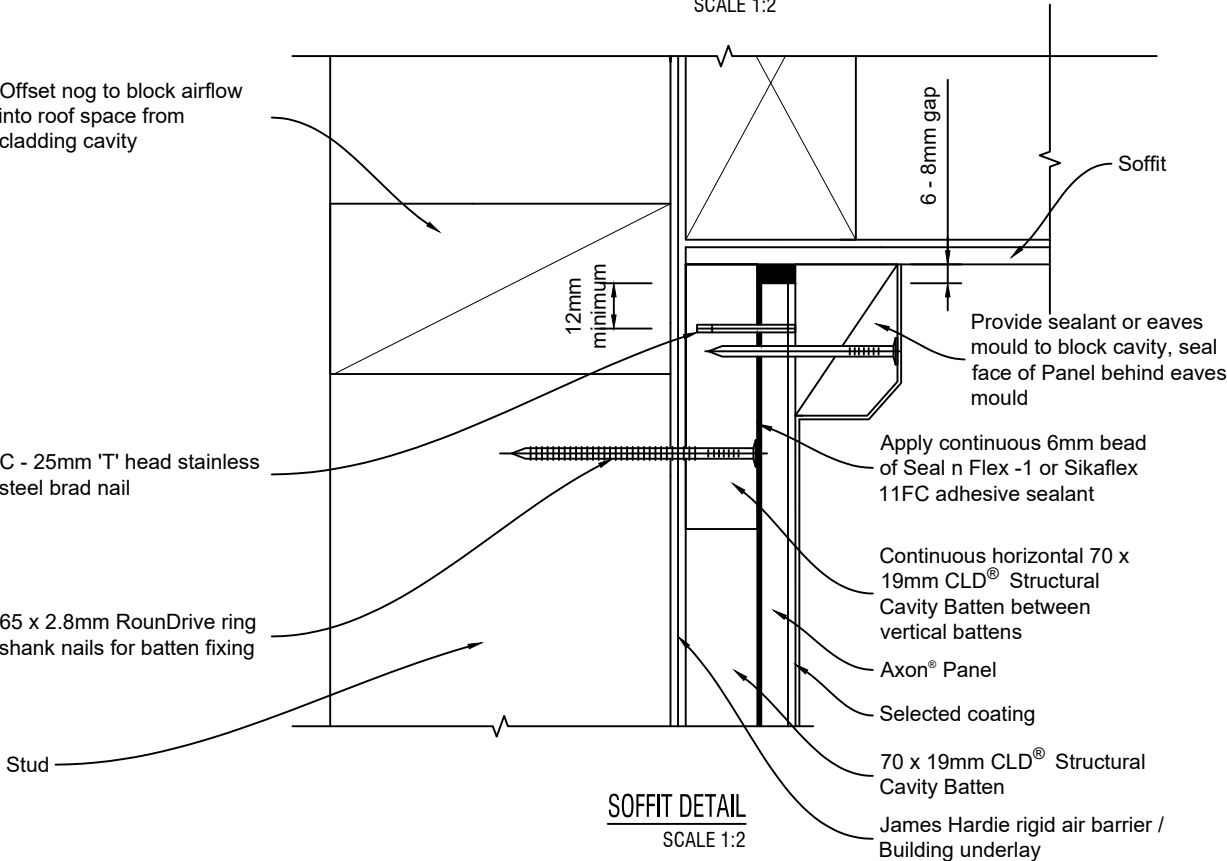
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				DATE: Nov 2018				

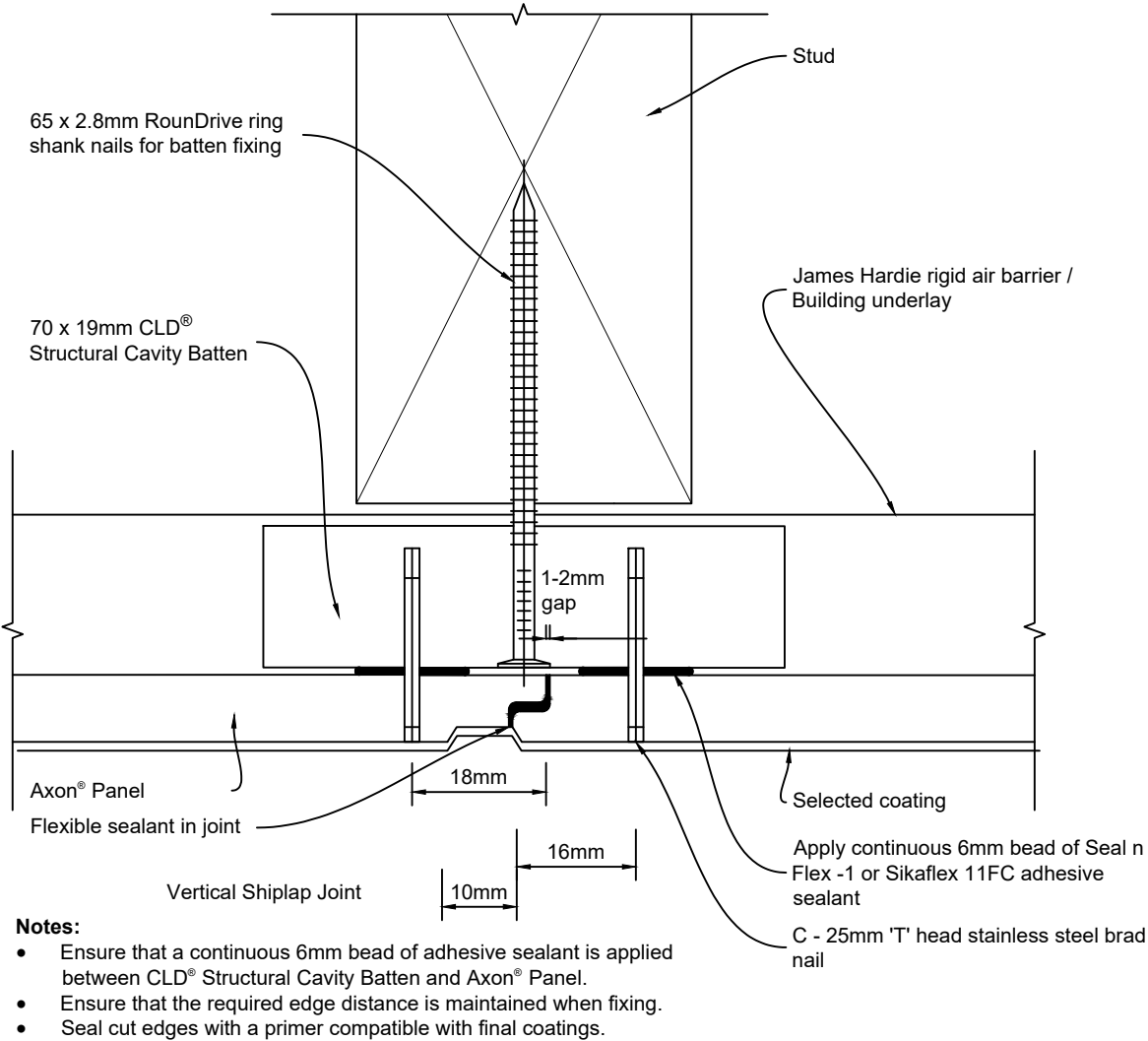


- Notes:**
- Check panel extends past bottom plate as specified in Architects specification (50mm min).
 - uPVC Vent strip must remain level and secure during construction. Cut and fix uPVC vent strip between CLD® Structural Cavity Battens fixed under the panel joints.
 - Check vent strip is free from site debris.

FOUNDATION DETAIL
SCALE 1:2



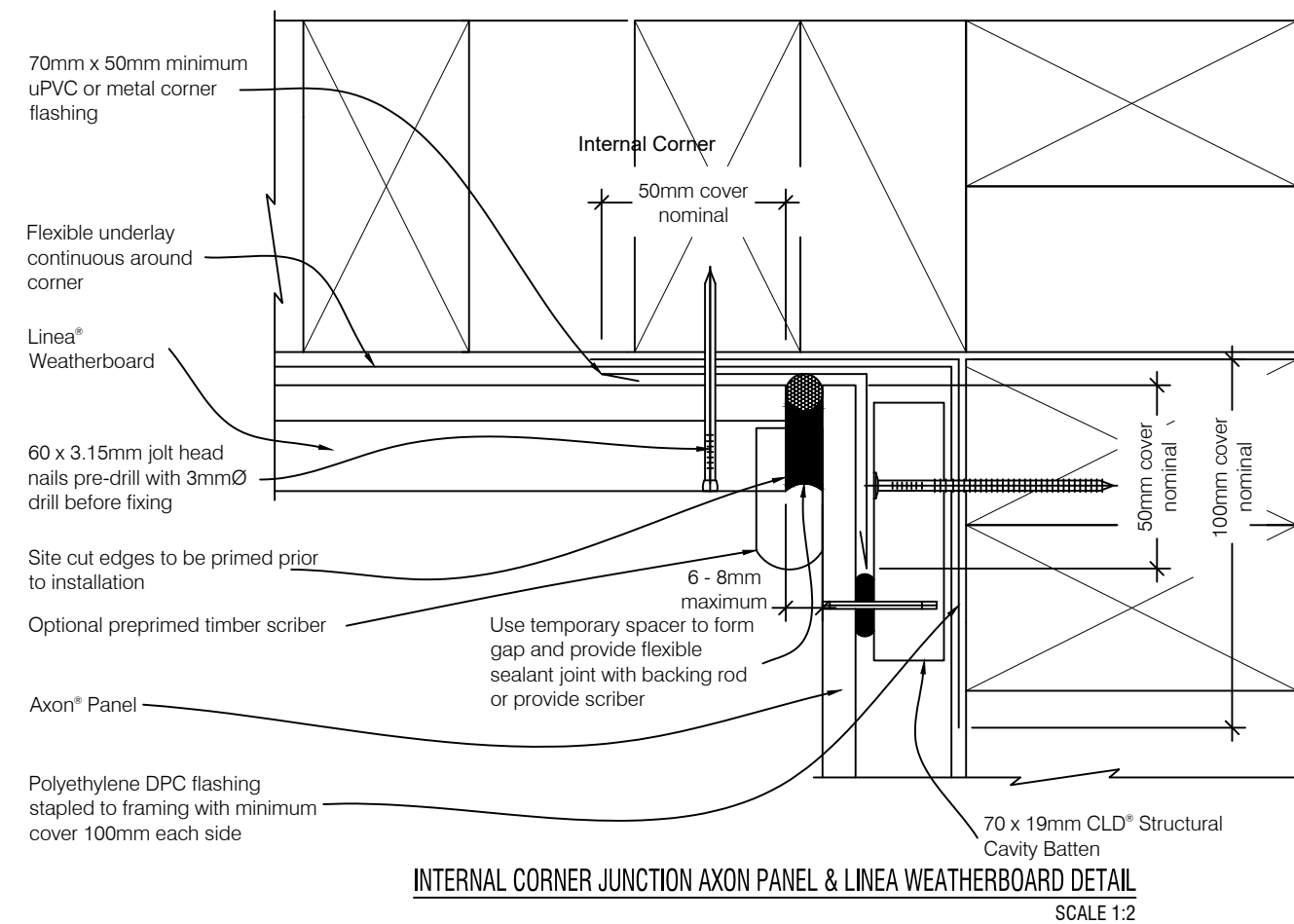
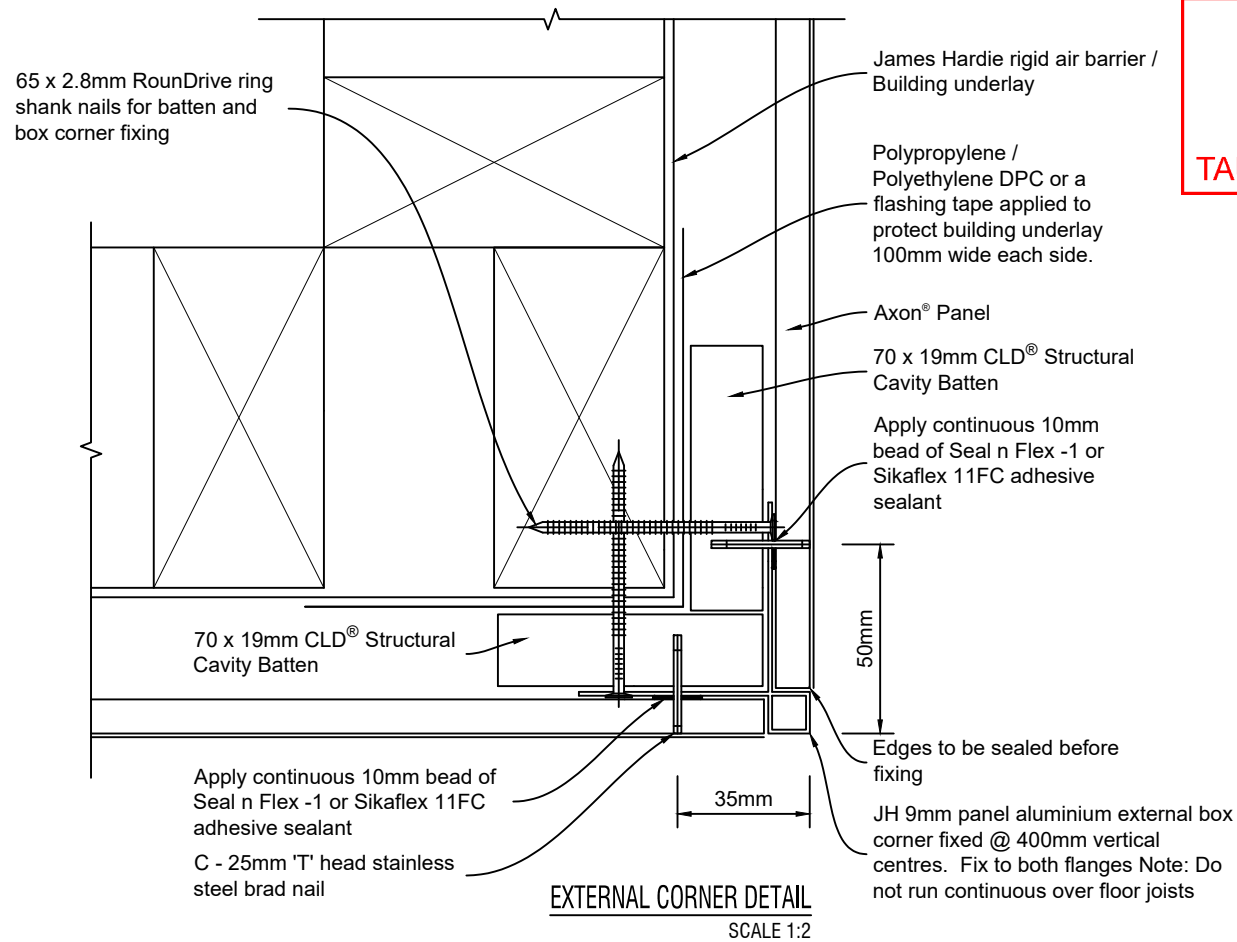
SOFFIT DETAIL
SCALE 1:2



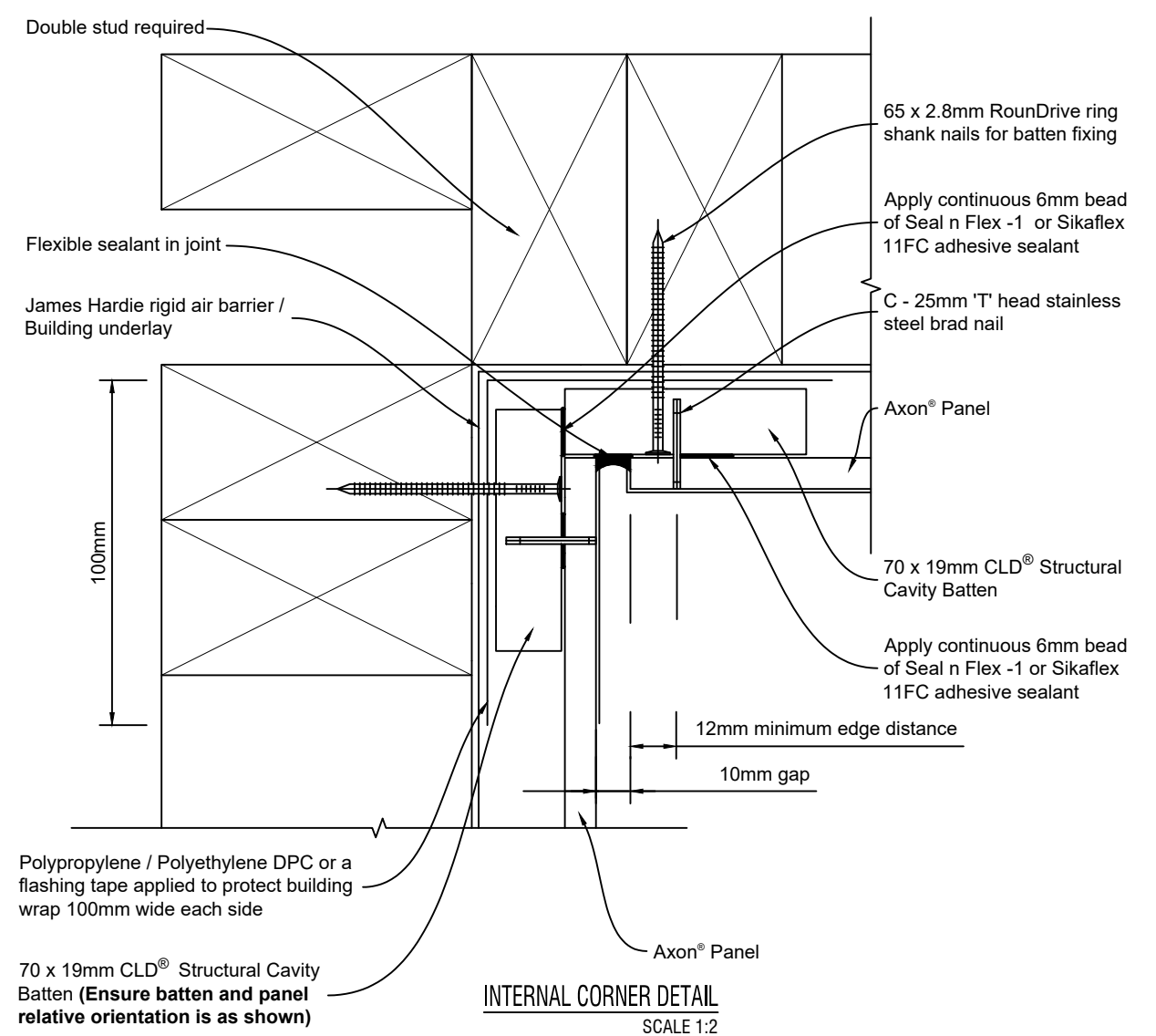
- Notes:**
- Ensure that a continuous 6mm bead of adhesive sealant is applied between CLD® Structural Cavity Batten and Axon® Panel.
 - Ensure that the required edge distance is maintained when fixing.
 - Seal cut edges with a primer compatible with final coatings.

SHIPLAP JOINT DETAIL
SCALE 1:1

P PENNY HOMES BUILT TO BE ADMIRER	Penny Homes Ltd	TITLE: BLOMQUIST RESIDENCE	AXON PANEL CLADDING DETAILS	SCALE:	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE:	REVISION:	SHEET 13	
	PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz			DRAWN: SK		24/11/18 19/02/20	A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.		OF: 20
	© Copyright					DATE: Nov 2018	All dimensions to be checked and verified by the Contractor before commencement of any work E&OE		JOB No. JT18105
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				DRAWN: SK			
				DATE: Nov 2018			



1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Building underlay must comply with acceptable solution E2/AS1 and NZS 3604.
3. Flashing tape must have proven compatibility with the selected building underlay and other materials with which it comes into contact as per Table 21 of E2/AS1.

Refer to the manufacturer or supplier for technical information for these materials.

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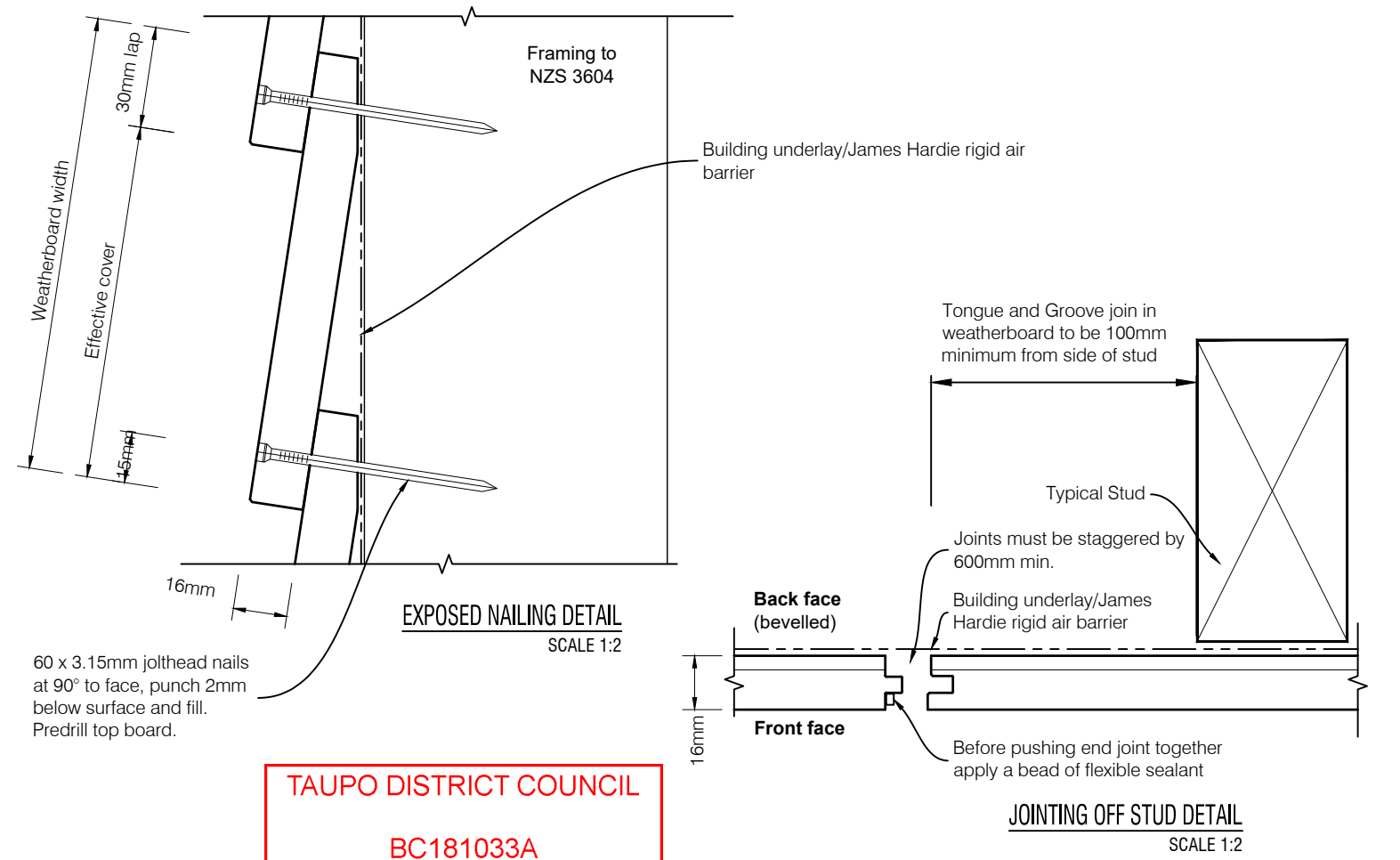
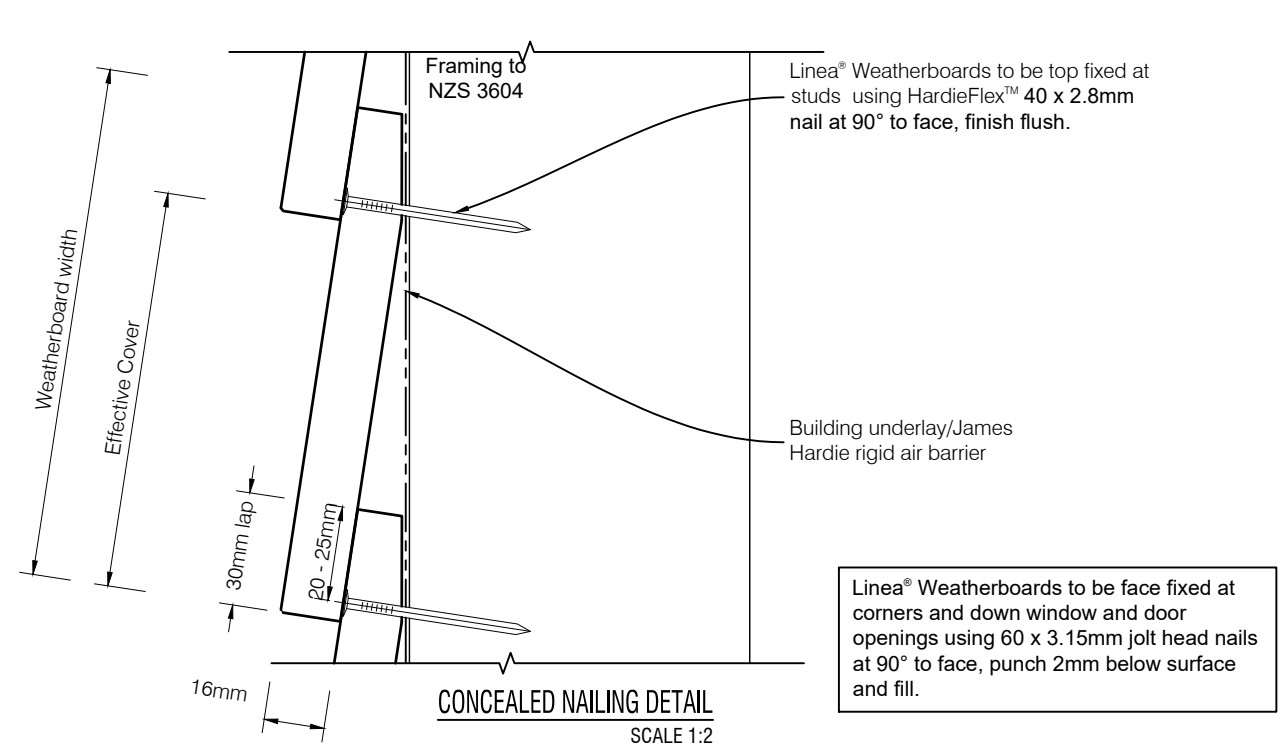


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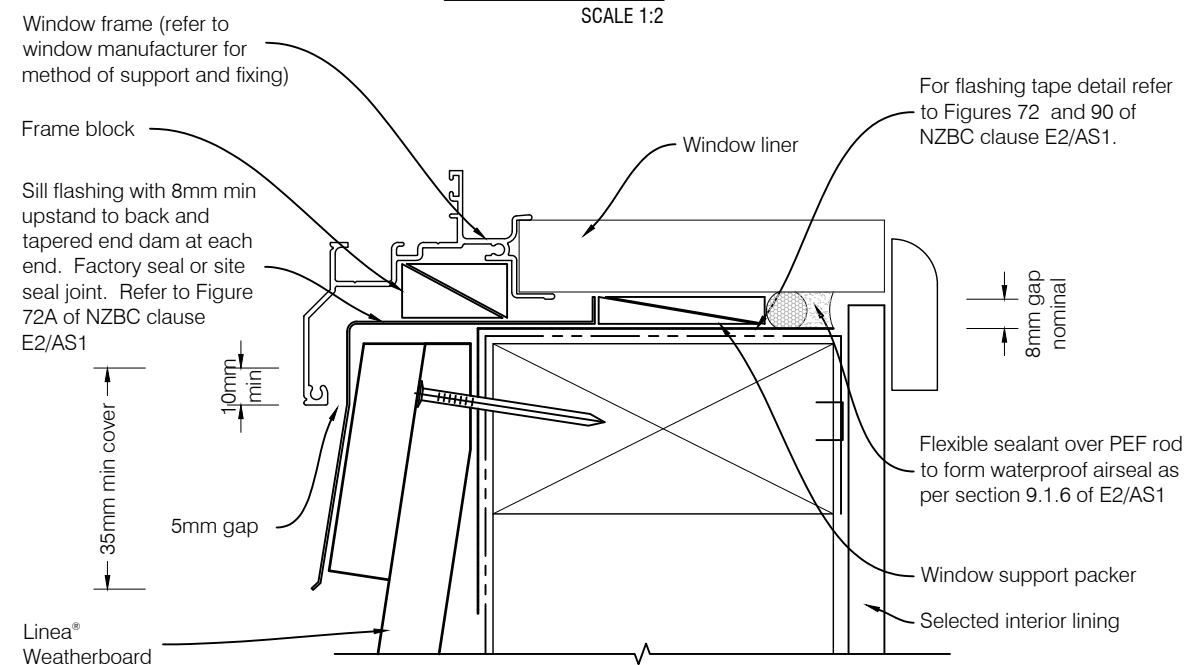
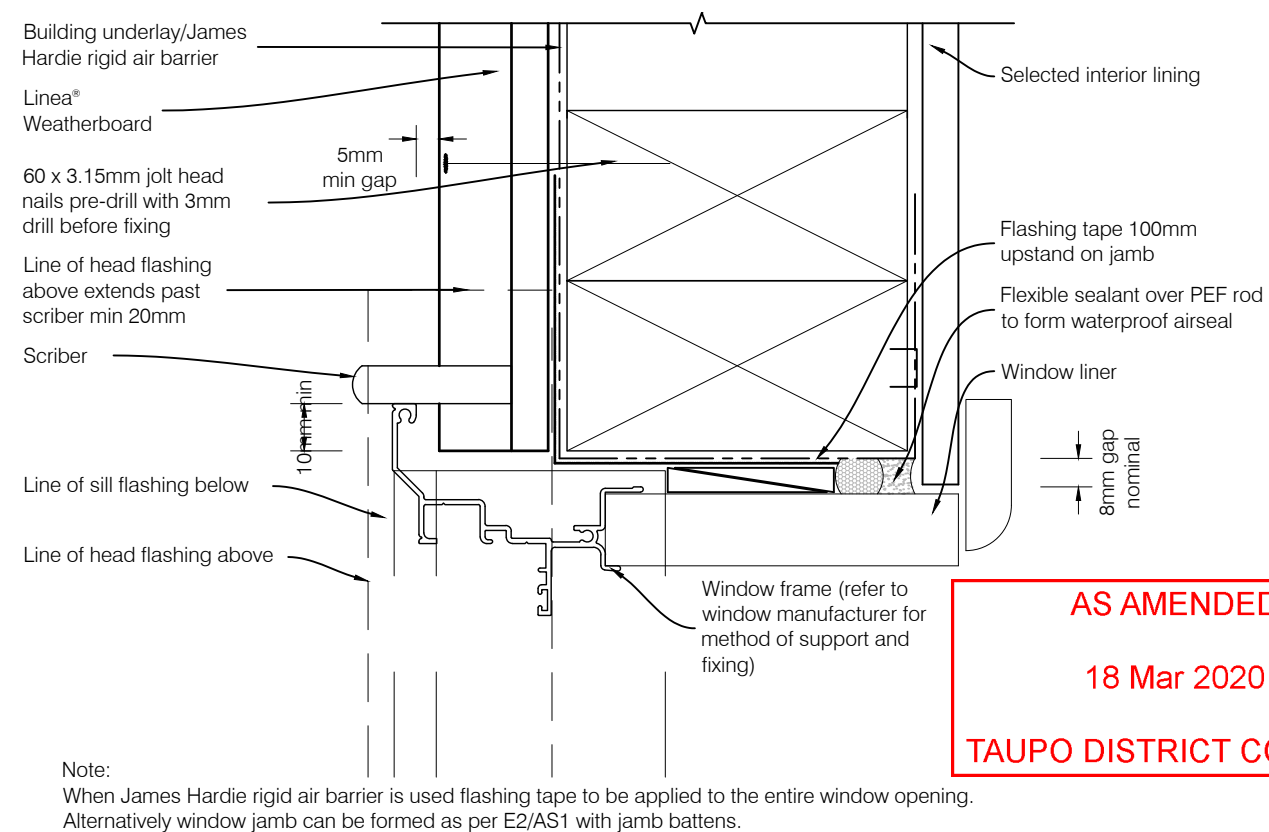
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P H PENNY HOMES BUILT TO BE ADMIRER	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE: BLOMQUIST RESIDENCE	DRAWING: AXON PANEL CLADDING DETAILS	SCALE: 1:5	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: 24/11/18 19/02/20	REVISION: A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	SHEET 16
	www.pennyhomes.co.nz	18 PENNY GROVE, TAUPO	CONSENT COPY REV B	DRAWN: SK		All dimensions to be checked and verified by the Contractor before commencement of any work E&OE	DATE: Nov 2018	OF: 20
							JOB No. JT18105	



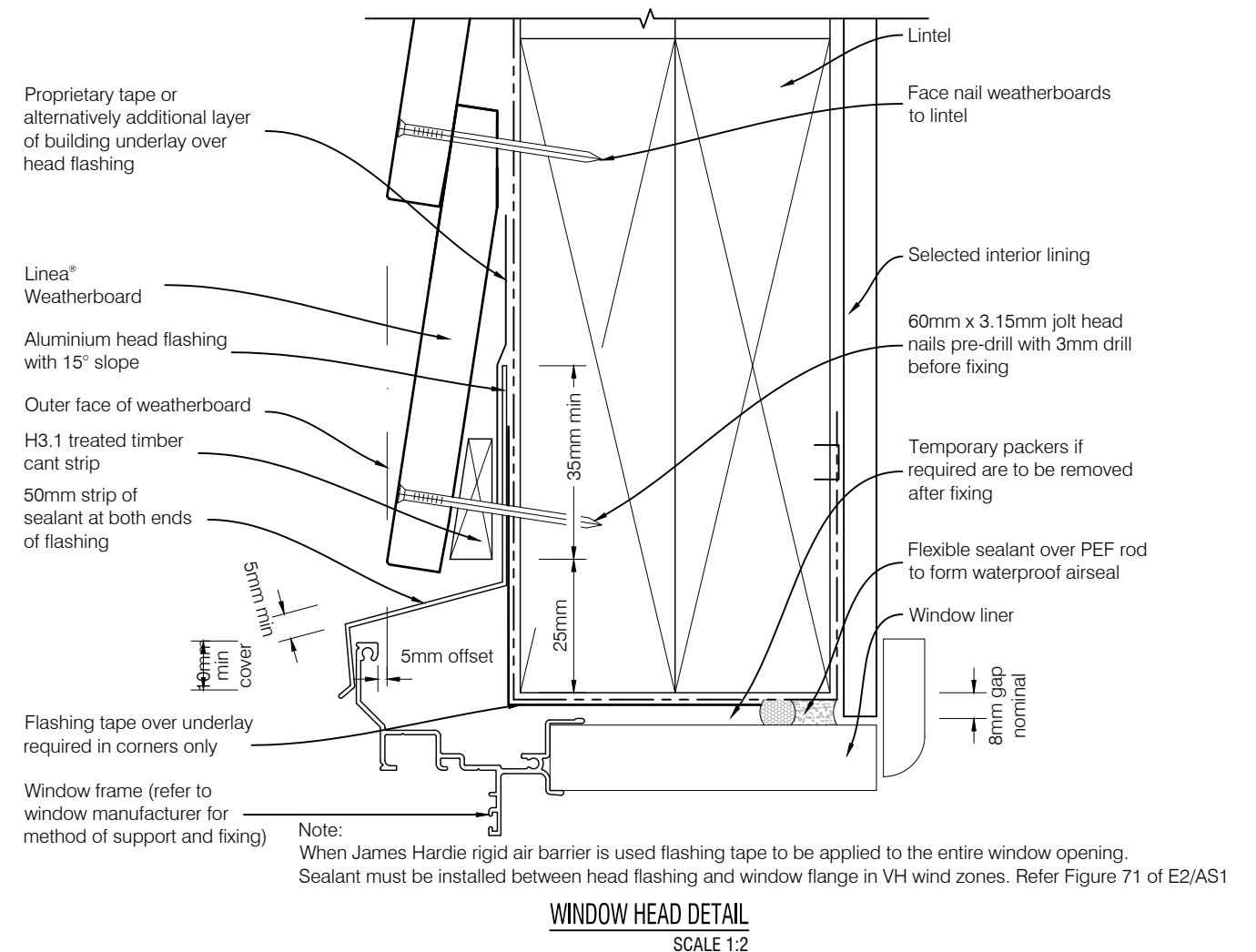
 PENNY HOMES BUILT TO BE ADMIRER	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE: BLOMQUIST RESIDENCE	DRAWING: LINEA CLADDING DETAILS	SCALE: 1:2	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: 24/11/18 19/02/20	REVISION: A Stormwater & soakholes amended, bracing plan amended. B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.	SHEET 18
	18 PENNY GROVE, TAUPO	CONSENT COPY REV B	DRAWN: SK DATE: Nov 2018	E&OE				OF: 20
	www.pennyhomes.co.nz		All dimensions to be checked and verified by the Contractor before commencement of any work					JOB No. JT18105



- ### General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC clause E2/AS1.
2. Building underlay must comply with acceptable solution NZBC clause E2/AS1.
3. Flashing tape must have proven compatibility with the selected building underlay/James Hardie rigid air barrier and other materials with which it comes into contact as per Table 21 of NZBC clause E2/AS1.

Refer to the manufacturer or supplier for technical information for these materials.



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.
Sealant must be installed between head flashing and window flange in VH wind zones. Refer Figure 71 of E2/AS1

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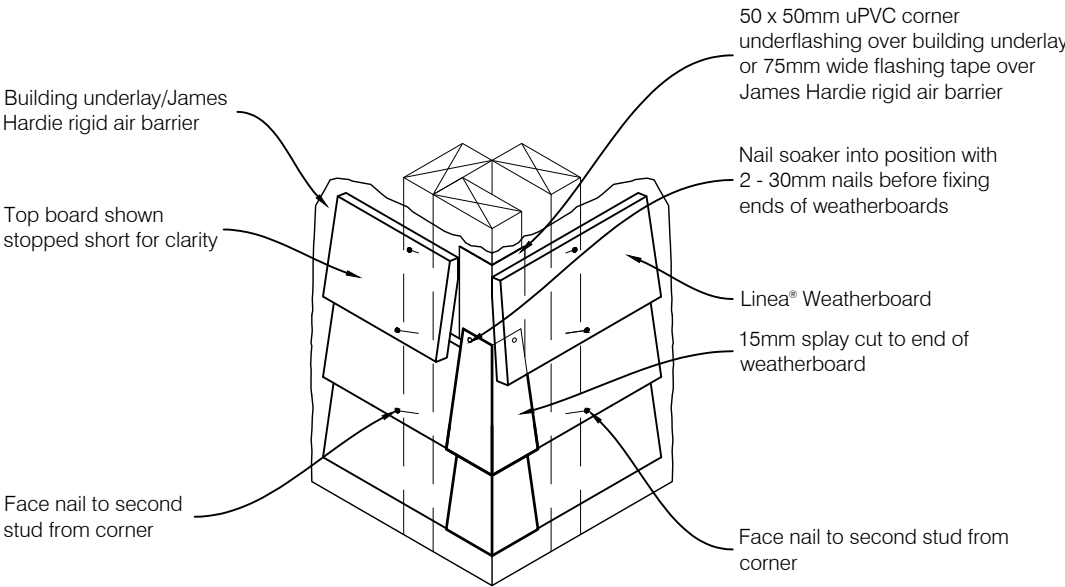
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PLANS/SPECIFICATIONS

AS AMENDED

18 Mar 2020

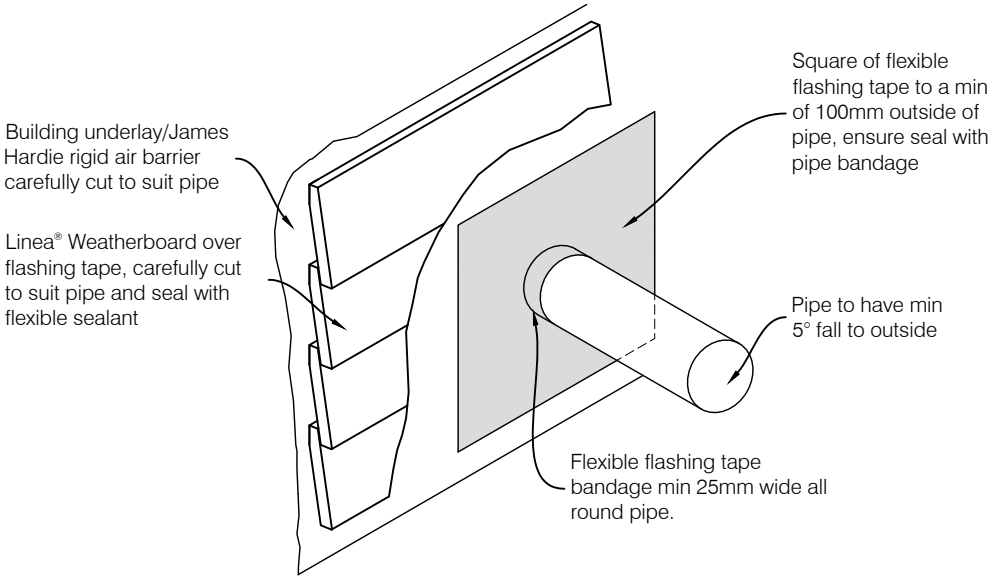
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Soaker material	Nail material
Copper	Copper or phosphor bronze
Aluminium	Hot dip galvanised
Stainless steel	Stainless steel

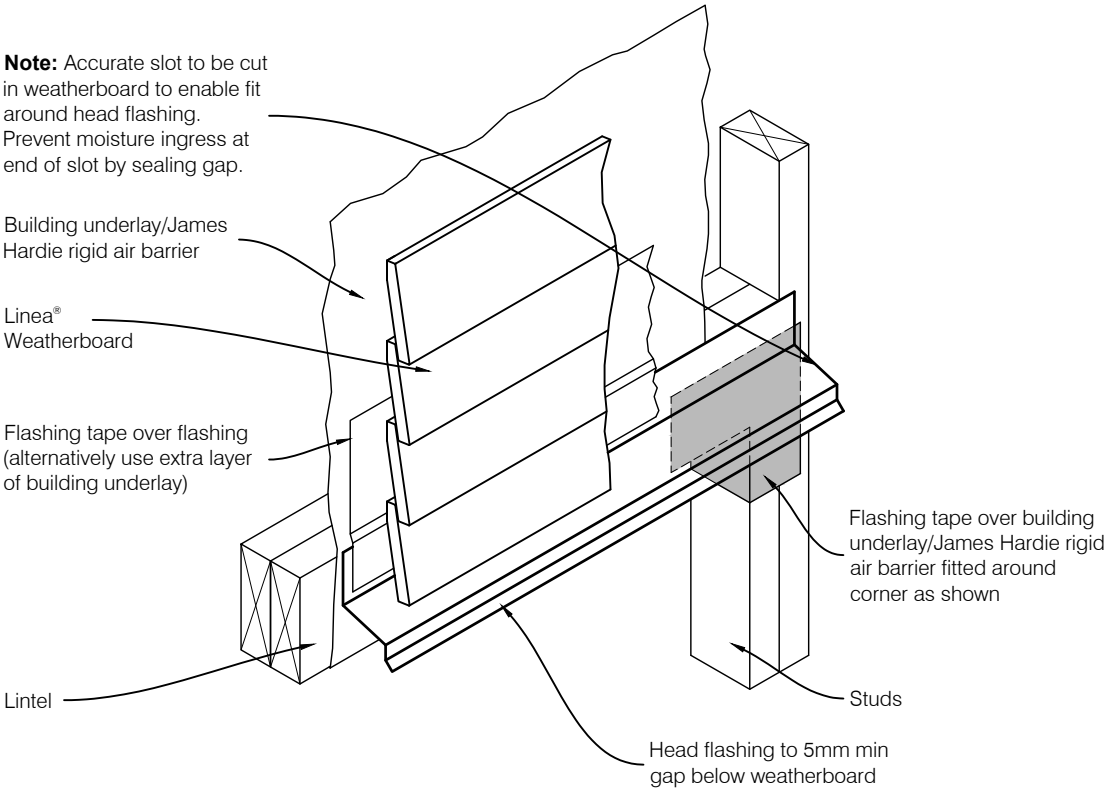
CORNER SOAKER

SCALE 1:10



PIPE PENETRATION

SCALE 1:10



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.

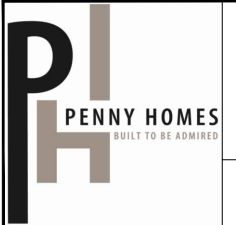
HEAD FLASHING TERMINATION

SCALE 1:10

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PLANS/SPECIFICATIONS



Penny Homes Ltd
PO Box 708, Taupo
ph | 07 377 0154 fax | 07 377 0155
email: john@pennyhomes.co.nz
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www.pennyhomes.co.nz

TITLE:
BLOMQUIST RESIDENCE
18 PENNY GROVE,
TAUPO

DRAWING:
LINEA CLADDING DETAILS
CONSENT COPY
REV B

SCALE:
1:10
DRAWN: SK
DATE: Nov 2018
All dimensions to be checked and verified by the Contractor before commencement of any work

NOTES:
Wind Zone = High
Eq Zone = 2
Exposure Zone = B
E&OE

DATE:
24/11/18
19/02/20
REVISION:
A Stormwater & soakholes amended, bracing plan amended.
B Amended bathroom layout. Increased ensuite size. Added pantry. Changed W2, W3 & W15, removed W16. Replaced cedar weatherboards with Linea weatherboards.
SHEET
20
OF:
20
JOB No. JT18105

Memorandum from LBP - designer BC181033A - A2649352

Memorandum from licensed building practitioner: Certificate of design work

Section 30C or Section 45, Building Act 2004

Please fill in the form as fully and correctly as possible.

If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING	
Street address: 18 Penny Grove	
Suburb: Nukuhau	
Town/City: Taupo	Postcode: 3330

THE OWNER	
Name(s):	
Mailing address: c/o Penny Homes Ltd	
Suburb:	PO Box/Private Bag: PO Box 708
Town/City: Taupo	Postcode: 3330
Phone number: 07 377 0154	Email address: willie@pennyhomes.co.nz

BASIS FOR PROVIDING THIS MEMORANDUM	
I am providing this memorandum in my role as the: Please tick the option that applies (✓)	
()	Sole designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project.
()	Lead designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and no other person will be providing any additional memoranda for the project.
(✓)	Lead designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design.
()	Specialist designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work.

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IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK (RBW)			
I William James Thomson carried out / supervised the following design work that is restricted building work.			
Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
Tick (✓) if included	If appropriate, provide details of the restricted building work	Specify whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
PRIMARY STRUCTURE: B1			
All RBW design work relating to B1 ()		() Carried out () Supervised	
Foundations and subfloor framing (✓)	Concrete slab on ground to Firth Ribraft Floor System	() Carried out (✓) Supervised	Sheets 2 & 5
Walls (✓)	SG8 framing & fixings to NZS3604:2011 Lintels to DesignIT PS1	() Carried out (✓) Supervised	Sheets 3, 5 & 6
Roof (✓)	Truss layout	() Carried out (✓) Supervised	Truss manufacturers PS1
Columns and beams ()		() Carried out () Supervised	
Bracing (✓)	Gib Plasterboard sheet bracing to Gib Ezybrace	() Carried out (✓) Supervised	Sheet 7
Other ()		() Carried out () Supervised	
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2			
All RBW design work relating to E2 ()		() Carried out () Supervised	
Damp proofing (✓)	DPM under slab and DPC under framing	() Carried out (✓) Supervised	Sheets 5 & 9
Roof cladding or roof cladding system (✓)	Longrun metal roofing on self-supporting underlay	() Carried out (✓) Supervised	Sheets 5, 9 & 10
Ventilation system (for example, subfloor or cavity) (✓)	20mm drained cavity to Axon Panel cladding	() Carried out (✓) Supervised	Sheets 9 & 13 - 17
Wall cladding or wall cladding system (✓)	Axon Panel cladding on cavity Linea weatherboard direct fixed	() Carried out (✓) Supervised	Sheets 9 & 13 - 17 Sheets 9 & 18 - 20
Waterproofing ()		() Carried out () Supervised	
Other ()		() Carried out () Supervised	

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PLANS/SPECIFICATIONS

FIRE SAFETY SYSTEMS: C1-C6			
Emergency warning () systems, evacuation and fire service operation systems, suppression or control systems, or other		() Carried out () Supervised	
Note: The design of fire safety systems is only restricted building work when it involves small-to-medium apartment buildings as defined by the Building (Definition of Restricted Building Work) Order 2011.			

WAIVERS AND MODIFICATIONS	
Are waivers or modifications of the building code required? () Yes (✓) No	
If Yes, provide details of the waivers or modifications below:	
Clause (List relevant clause numbers of building code)	Waiver/modification required (Specify nature of waiver or modification of building code)

ISSUED BY	
Name: William James Thomson	LBP or Registration number: BP115814
The practitioner is a:	
(✓) Design LBP () Registered architect () Chartered professional engineer	
Design Entity or Company (optional): JTDesign Architecture Ltd.	
Mailing address (if different from below):	
Street address / Registered office: Level 1, 32 Tuwharetoa Street	
Suburb:	Town/City: Taupo
PO Box/Private Bag: P.O. Box 1267	Postcode: 3330
Phone number: 07 377 1998	Mobile: 0274 820 881
After Hours:	Fax:
Email address: james@jtdesign.co.nz	Website: www.jtdesign.co.nz

DECLARATION	
I William James Thomson (<i>name of practitioner</i>), LBP, state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW: - Complies with the building code; or - Complies with the building code subject to any waiver or modification of the building code recorded on this form.	
Signature: 	TAUPO DISTRICT COUNCIL BC181033A
Date: 19/02/2020	APPROVED CONSENT PLANS/SPECIFICATIONS

Project Appendix

Addendum of Materials & Finishes

E2-AS1 Risk Matrix

Truss Design

CHH DesignIT Calculations

Bracing Calculations

Insulation Calculations

Cladding Manufacturers Specification

Fireplace Installation

Hot Water Heating System

Waterproofing Systems

Other Items Relevant to this Project

APPROVED CONSENT COPY
THESE PLANS AND SPECIFICATIONS ARE
APPROVED SUBJECT TO THE PROVISIONS
OF THE BUILDING ACT 2004 AND IT'S
REGULATIONS. A FULL (PRINTED) COPY OF
DRAWINGS AND SPECIFICATIONS ARE TO
BE RETAINED ON SITE IN GOOD ORDER
AND PRODUCED UPON REQUEST.

AS AMENDED

18 Mar 2020

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APPROVED CONSENT
PLANS/SPECIFICATIONS

Addendum of Materials & Finishes

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APPROVED CONSENT
PLANS/SPECIFICATIONS

Specification



PENNY HOMES LIMITED SPECIFICATIONS OF PROPOSED NEW HOME FOR:

Blomquist Residence
Lot 226 No 18 Penny Grove

FLOOR AREA: 173.68m²
DATE PREPARED: Monday, 17 February, 2020

Preliminary Information

Quote and Contracts	Provide for the construction of the dwelling in accordance with the following specifications, the annexed plans and building contracts.
General Specification	Where there is a contradiction between any of the documents then this specification shall take first precedence and the plans second precedence.
Additional Clauses	Any items altered or crossed out or any changes that may be made to this specification by the client and/or the builder must be initialled by both parties.

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PLANS/SPECIFICATIONS

General

Insurances	Builders risk insurance throughout build.
Interior Design	Exterior and Interior colour consultation Included. Allowance for four consultations.
Clean	Commercial Clean prior to possession included
Master Build Guarantee	Guarantee Not Included
Plans	Full Working Drawings Included
Building Consent	Included
Resource Consent	Not Required
Surveying	Building location included.
Engineer	Excluded: To be treated as a variation if required. Should an Engineers report be required, this will incur an additional cost as will any findings made by the Engineer.
Geotech	Not Required
Structural Steel	Not Required
Site Works	Our quotation and contracts provides for foundation excavation and site cut for a slab on grade foundation as per NZ S3604 Standards.
Foundation	Pod floor system - 85mm thick 20MPa concrete slab reinforced with SE62 500 E Grade ductile mesh over 1100sq x 220 deep EPS Pods on 0.25mm Polythene vapour barrier
Timber Framing	90 x 45 Kiln Dried H1.2 timber framing with studs and dwangs at NZS3604 centres or to suit stud height and loading and cladding requirements. H1.2 to all bottom plates with trussed roof framing H1.2. Truss plan to be supplied by recognized manufacturer including fixings and structural requirements. All exterior timber shall be H3 treated, suitable for paint finish only unless otherwise noted.
Interior Walls	90 x 45 H1.2 Kiln-dried framing with studs and dwangs at NZS3604 centres or to suit stud height and loading and lining requirements. All framing SG8 unless otherwise noted.
Stud Height	Scissor Truss through Living,Dining,kitchen, 2.550m Stud height throughout.
Ceiling Battens	35mm Rondo Metal Ceiling Battens on Clips

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Exterior Materials

Roof	Corrugated Longrun Colorsteel (Std NZ Colours)
Cladding	James Hardie - Axon Panel with 133mm centred grooves
	Linea Weatherboard (Painted) – 180mm with Zinc Soakers (refer to plan for Linea Detail).
Fascia/Barge	Coloursteel
Gutter	Coloursteel
Profile	1/4 Round
Downpipes	80mm PVC – Painted
Soffit Lining	4.5mm Hardiflex with PVC Joints
Windows/Doors	Powder Coated Aluminum (Standard NZ Colours) with tinted glass in windows. Double glazing to all windows including garage. Obscure glass to wet areas
Obscure Areas	Bathroom and ensuite
Window Hardware	Coloured to match joinery
Window Liners	Pine H3 Paint Quality
Front Door	Fibreglass FV front entrance door
Front Door Handle	Windsor 7025 round pull handle with 1248 Mortice Lock
Front Door Side Lights	Included as per plan
Garage Door	Windsor Coloursteel Sectional Door, Steel Range 2125 x 4830- Auto Opener with two remotes
Drainage	Sewer and Stormwater connected at road boundary or Council laterals. Work outside net site area not included. Stormwater connected to soakholes as per plan Note: Driveway sumps included - as per plan
Soakholes	Concrete lined soakholes positioning may vary from plan due to site access and storm water layout. Soakholes depths are dependant on watertable levels, easements and ground conditions
Water	20mm Mains supply connected at road Boundary. Work outside net site area not included.
Clothesline	Sun King Retracting 6 Line or Folding Frame Line
Letter box	Courteney's A4 Cedar Letterbox

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Interior Materials

Insulation	R2.8 Wall Batts / R3.6 Ceiling Batts including garage
Internal Wall Lining	10mm Standard Gib Board
Ceiling Lining	9mm Grooved MDF to Living,Dining,kitchen areas, 13mm Standard Gib Board to remaining areas.
Internal Wet Areas	10mm Aqualine Gib Board on walls and 13mm Aqualine Gib Board on ceiling
Gib Stopping	Grade 4 Paint finish
Painting	Exterior – Soffits- Acrylic Ceilings – Flat Acrylic Architraves, Skirting and Scotia – Semigloss enamel Doors – Sprayed acrylic enamel Interior Walls – Low Sheen Finish. Semi Gloss Finish to water splashback areas Please Note: The interior painting covers the same colour throughout the home with one contrasting colour for ceilings, doors, skirting and sills. Extras may be incurred if different colours are requested in different rooms or feature walls are required. Gloss lacquer or extra height doors are charged as additional cost.
Attic Stairs	Supply and installation of Attic stairs to garage
Scotia	Square stop
Architraves	90 x 18mm MDF and 90 x 18mm Pine to Wet areas
Architrave Profile	Single Bevelled
Skirting	90mm x 18mm MDF and 100mm tiled skirt to wet areas.
Skirting Profile	Single Bevelled
Doors	MDF Pressed Panel Smooth Panel - 35mm
Door Height	1980mm
Door Furniture	Windsor Astron Range (Brushed Nickel/ Satin Chrome)
Door Stops	Windsor 5229 Door stop
Interior Door Liners	MDF - Flat for Architrave
Wardrobes/Shelves	Dimensions as per plan - single shelf with wardrobe rail. HWC/Linen Cupboard - Provides for 4 shelves
Vacuum System	Not Included
Window Treatments	No allowance for window treatments

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Flooring

Floor Tiles	To supply and lay tiles to Bathroom , Ensuite areas. Tile supply PHL Gold Range.
Laminated Timber	Supply and install Quickstep classic range of laminated flooring to Entry,Kitchen and Scullery areas as per plan.
Carpets	To supply and install PHL 11 Range of Carpets on 10mm Underlay to: Bedrooms, Hallway, Living,Dining,Sitting and Wardrobes as per plan.

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Plumbing and Bathroom

Plumbing

Exterior	3 x Exterior Taps
Laundry	Aquatica E6200 Laundry Tub - with Door E6200 (560 x 560)
Hot Water	Rinnai Infinity 26L external NG continuous hot water system (no controller)
Gas Services	Supply Gas pipe work, connection fee and certification

Bathroom

Shower	Athena New Eclipse - 1000 x 1000 2 Sided Square- Contoured Wall
Vanity	Grohe - Bauline Series Shower Mixer & Grohe New Tempesta 4 Spray Slide Robertson - Studio Plus Wall Hung Vanity 1200 mm - 1 Drw - White or Coloured Laminex
Tapware	Grohe Bauline Basin Mixer
Toilet	Robertson Agencies – Cygnet - Neu BTW Vitreous China Toilet Suite with soft close Seat
Toilet Roll Holder	Robertson Agencies Europa Plus Spare
Bathroom Mirror	Frameless mirror above vanity
Towel Rail	7 Bar Stainless Steel to Bathroom and Ensuite

Ensuite

Shower	Athena New Eclipse - 1000 x 1000 2 Sided Square- Contoured Walls
Vanity	Grohe Bauline Shower Mixer and Grohe New Tempesta 4 Spray Slide Shower Robertson - Studio Plus Wall Hung Vanity 900mm - 1 Drw - White or Coloured Laminex
Tapware	Grohe - Bauline Series Basin Mixer
Toilet	Robertson Agencies – Cygnet - Neu BTW Vitreous China Toilet Suite with soft close Seat
Toilet Roll Holder	Robertson Agencies Europa Plus Spare Toilet Roll Holder
Ensuite Mirror	Frameless mirror above vanity
Towel Rail	7 Bar Stainless Steel to Bathroom and Ensuite

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Kitchen & Appliances

Kitchen **Provisional Sum** allowance of \$18,000 for the supply and installation of kitchen by a Penny Homes preferred manufacturer.
Please note the Provisional Sum allowance includes the cost to supply and install sink, supply and install the splashback, and installation of the rangehood

Cabinets Included in Provisional Sum

Cupboards Included in Provisional Sum

Drawers Included in Provisional Sum

Handles Included in Provisional Sum

Benchtop Included in Provisional Sum

Sink Included in Provisional Sum

Rangehood Fitting of Rangehood and Ducting Included

Splashback Kitchen Provisional Sum includes the supply and installation of Splashback

Sink Mixer Grohe Bauline Kitchen Mixer

Kitchen Appliances

Oven Westinghouse Single Wall Oven S/S - WVE616S
Cooktop Westinghouse 60cm Gas Cooktop S/S - WHG644SA
Rangehood Westinghouse Integrated Rangehood - EFG750X/A
Dishwasher Westinghouse Freestanding Dishwasher - S/S - WSF67251S
Insinkerator Parex Emerson E20 .55hp Insinkerator

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Electrical

Note: Some electrical appliances will require their own "Switched Light Circuit", "Single plug", "Direct All quantities should be finalised on site. Adjustments to cost will be forwarded after selection by invoice and treated as an extra or credit.

Temporary Power	Builders supply included
Power to Site	16mm Neutral Screen connected from Lot Boundary to House site. Work outside net site area not included.
Prewire	As per Electrical Plan. A prewire walk through is completed with Owner, Electrician and Penny Homes representative to note any variations required by owner. Included as Client Variation
Lights/ Power	LED Recessed Downlights as per Electrical Plan. Wall and specialty lights - Supplied by Owner
Switch Gear	PDL Iconic Series, Power points and switches as per electrical plan
Phones/TV	As per Electrical Plan. All connection fees by Owner
Sky	Reticulate for Sky TV – 1 point only. Connection fees and aerials by Owner
Heated Towel Rail	Excluded - see bathrooms
Fans	Manrose Inline Fans to Bathroom and Ensuite areas
Under Tile Heating	Supply and installation of Under Tile heating to Ensuite and Bathrrrom areas.
Alarm	Not Included
Gas Fire	Escea DL850 – Gas Fire (inbuilt) – Black Bevelled Fascia - Includes zero clearance and one standard flue kit only. No mantle/hearth has been included. < NG>
Ventilation System	Not Included

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Landscaping

Cobble Paving

Provisional Sum allowance to supply and lay 80 m² of Exposed Agregate (standard colour range). Any extra laid will be charged at \$85 per m²

Note: Extra Drainage grills or cesspits (if required), traffic management costs or washoff extraction costs will be an additional cost of the driveway. (Any mowing strips/garden edging will be an additional cost and will be quoted separately to the driveway).

Fence

Erect 1.8m high steel framed panel fence (std colours) - Areas North and South to finish in line with front of dwelling.

Balastrade Fence Retaining

Supply and Install 1.2m blasatrade fence to rear boundary
Excluded

Plants

Prime Cost Sum for the purchase of plants \$ 1,000

Turf

Hydroseeding – including the required topsoil.

Lawn in such areas as are designated on the Site Plan. The hydroseeding will be sown in accordance with best industry practice having regard to local soil and climatic conditions at the time of application. Note: between the months May and August, conditions to successfully grow lawn are substantially less. The Vendor/Builder shall not have ongoing responsibility to nurture maintain or repair the designated hydroseeded area.

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Proposal Summary

OUR PRICE TO CONSTRUCT PROPOSED NEW HOME FOR:

Lot 226 No 18 Penny Grove

Our price for construction to the above specification	\$470,000
Master Build Guarantee (if included)	\$0
Land Purchase Price	\$260,000
Land and Home Package Price	\$730,000

Please note our quoted price includes GST and is subject to the listed Exclusions and Allowances.

Optional Extras

Masterbuild Guarantee options:

10 Year Standard Guarantee - opting out of any cover for loss of deposit, non-completion and remedial works	\$1,250
10 Year Standard Guarantee with the full cover outlined in the guarantee document	\$1,550

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Exclusions

Our Quotations and Contracts Exclude:

Resource Consents
Engineering Costs for Plan Detail
Valuations/Surveying Fees
Window Treatments
Telephone, TV and Sky Connection fees
Wall Lights or Specialty Lights

All costs incurred for additional piling or foundation work found necessary through the existence of poor soils upon the building site will be charged as an extra to the contract sum.

Allowances

The Sums as listed below are inclusive of GST and are net sums, meaning the builder shall have provided for all other costs, margins, charges or allowances elsewhere within the contract sum – unless specified.

Prime Cost Sum means an amount included in the contract price for defined **materials or fittings** where the materials or fittings have not yet been finalised.

Prime Cost	Tile Purchase	PHL Gold Range
Prime Cost	Gardens/Shrubs	\$1,000

Provisional Sum means an allowance included in the contract price for carrying out or providing a defined part of the contract works.

Provisional Sum	Kitchen/Splashback	\$18,000
Provisional Sum	Concrete	80 m ²

You may obtain your own quotations for the supply of goods contained or works required under these allowances. Please ensure you are aware of the final cost prior to authorising work to proceed or purchasing material contained within these Provisional and Prime Cost Sums.

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E2-AS1 Risk Matrix

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NZBC E2/AS1 - BUILDING ENVELOPE RISK MATRIX

WALL NUMBER: NORTH	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes: Total risk score:									2
James Hardie Axon Panel over cavity and Linea bevel back weatherboards direct fixed									

WALL NUMBER: SOUTH	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes: Total risk score:									2
James Hardie Axon Panel over cavity and Linea bevel back weatherboards direct fixed									

WALL NUMBER: WEST	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes: Total risk score:									2
James Hardie Axon Panel over cavity and Linea bevel back weatherboards direct fixed									

WALL NUMBER: EAST	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0		1		2		5	5	5
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes: Total risk score:									7
James Hardie Axon Panel over cavity and Linea bevel back weatherboards direct fixed									

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Truss Design

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For valley/saddle truss fixing unless stated otherwise use a pair of wire dogs at 900mm centres for up to and including a very high wind zone. Or a pair of CT200's at 900mm centres for extra high wind zone. This fixing is to meet the minimum requirements as per NZS3604.



FTMA
NEW ZEALAND

If metal ceiling battens on clips are used, 90x45 SG8 bottom chord restraints are required at 1800mm centres fixed with 2/90x3.15dia nails (skew nails if on edge).
All gable trusses are designed to suit cladding manufacturer's framing requirements.
If a gable truss requires a windbeam brace, the type of MiTek brace will be noted as such on the layout.

BUILDABLE CONSENT LAYOUT

CARTERS
Carters Manufacturing New Plymouth
(06) 7595472

JOB No 279060C1

Client: PENNY HOMES LTD
Job: 18 Penny Grove
Site: Nukuhau
Taupo

Pitch: 25.0deg
Roof Type: Galv Iron .5mm
Overhang: 600mm
Wind Area: High
Roof Snow: 0.000kPa

Trusses and rafters at 900 mm
max centres unless stated otherwise.
This layout is to be read in conjunction
with the Architectural plans.

DRAWN Warren Dravitsk 19 Sep,2018

Ultimate Limit
State Loads

Notification of point loaded lintels
or point loads on internal walls
where the downward load is
higher than 8kN (85mm raft type slab)
or 10kN (100mm standard slab), or
the upward load is greater than 10kN.

Any roof loads as stated on this
layout over 16kN up or down are
outside the scope of NZS3604, and
the architect / draughtsperson is
responsible for the design to transfer
the loads to the ground.

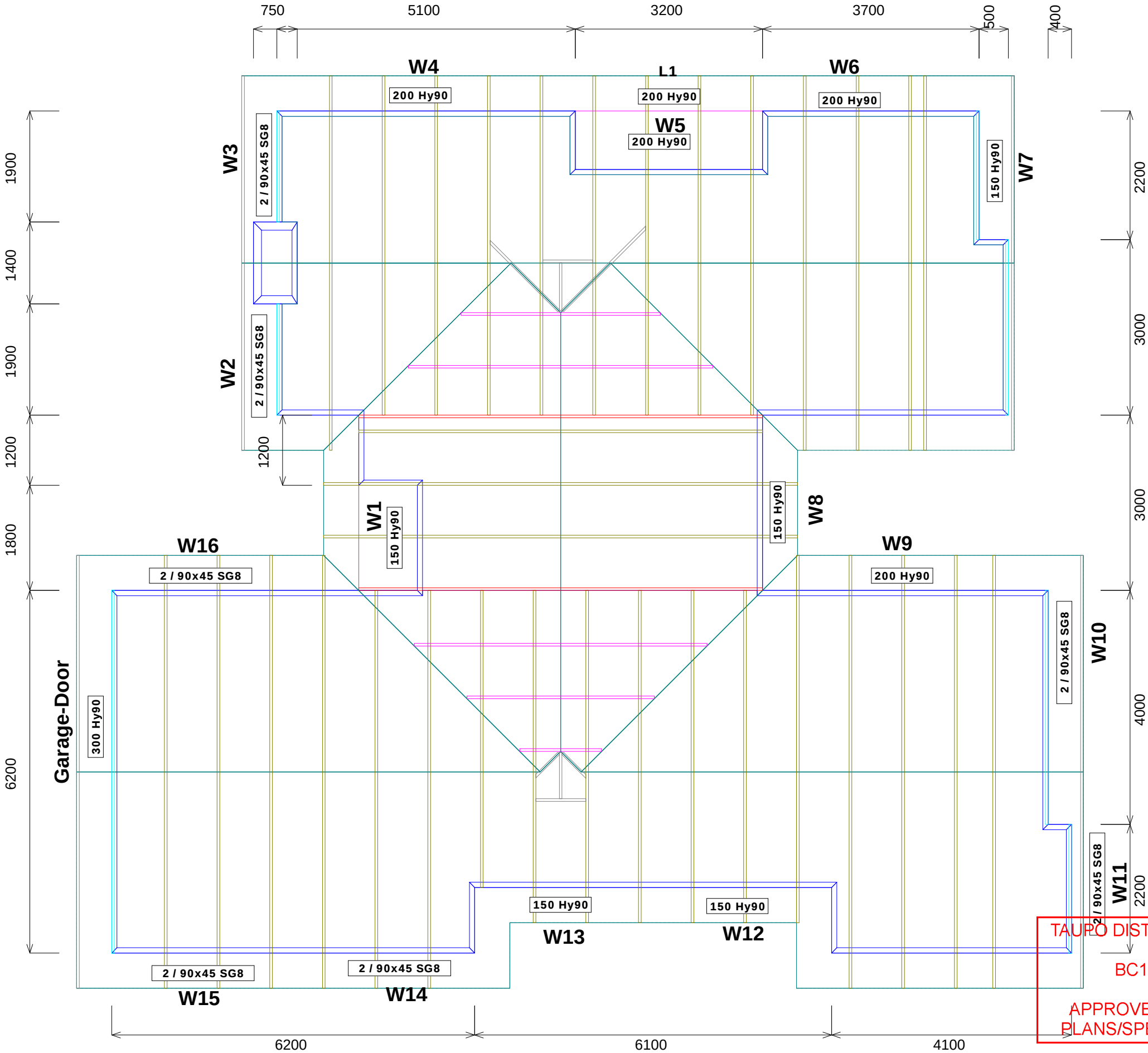
The lintels have been sized using
one of the following:

hy90, hyONE and hySPAN lintels
have been sized using the designIT
for houses - New Zealand series 6
software.

GANGLAM and FLITCH BEAMS
have been sized using the MiTek
Beam Program V1.10 June 2011.

Any treated LVL product is H1.2, which
satisfies the minimum treatment
requirement of NZS3602.

Unless otherwise stated the timber grade
for all lintels is SG8. Lintels not shown
are to be selected as per NZS3604: 2011.



All internal walls shown hatched on this layout are considered to be loadbearing
Lintel fixing specification remains the responsibility of the architect / draughtsperson

TAUPO DISTRICT COUNCIL
BC181033A
APPROVED CONSENT
PLANS/SPECIFICATIONS



MiTek New Zealand Limited

Correspondence from : **AUCKLAND**
40 Neales Road, East Tamaki 2013
PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

CHRISTCHURCH
14 Pilkington Way, Wigram 8042
PO Box 8387, Riccarton 8440
Phone: 03 348 8691
Fax: 03 348 0314

www.mitek.nz.co.nz

MiTek 20/20 Engineering 4.7.184.0

Printed: 11:45:16 19 Sep 2018

PRODUCER STATEMENT for MiTek 20/20® TRUSS DESIGN - Version 4.7

ISSUED BY: **MiTek New Zealand Limited**

TO: **CARTERS**

IN RESPECT OF: **MiTek® Truss Designs**

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **279060C1** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek 20/20® truss design program has been developed by MiTek New Zealand Limited for the design of MiTek® timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20® are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1/VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution, to satisfy the requirements of Clauses B1 and B2 of the New Zealand Building Code.

On behalf of MiTek New Zealand Limited, and subject to:

- i) All proprietary products meeting their performance specification requirements
- ii) The provision of adequate roof bracing and overall building stability
- iii) Correct selection and placement of GANG-NAIL connector plates
- iv) Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
- v) The design being undertaken by the accredited fabricator under the terms of the software licence
- vi) Timber is graded to the requirements of NZS 3603:1993
- vii) Minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

I believe on reasonable grounds that the trusses, if constructed in accordance with the MiTek 20/20® truss design and shop drawings, will comply with the relevant provisions of the New Zealand Building Code.

MiTek New Zealand Limited holds a current policy of Professional Indemnity Insurance no less than \$500,000.

On behalf of MiTek New Zealand Limited,

Date: Wednesday, 19 September 2018

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

TAUPO DISTRICT COUNCIL

BC181033A

APPROVED CONSENT
PLANS/SPECIFICATIONS

Job: 279060C1

Client: PENNY HOMES LTD
Phone:Site: 18 Penny Grove
Nukuhau
TaupoDescription:
Building Consent No.:
MiTek 20/20 Engineering 4.7.184.0

MiTek New Zealand Limited.

Phone:

Printed: 11:45:16 19 Sep 2018

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **CARTERS**, being licensed to use the MiTek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MiTek 20/20® TRUSS DESIGN DATA

The MiTek 20/20® computer design for this job is based on the following design parameters entered into the program. The Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek® trusses.

Job Details		Importance Level :	2	Design Working Life :	50 years
Roof Truss					
Timber Group:	MSG8 DDP H1.2	Pitch:	25.000 deg	Nominal Overhang:	600 mm
Roof		Ceiling		Wind	
Material:	Galv Iron .5mm	Material:	Gib Board 13mm	Area:	High (44.0 m/s)
Dead Load:	0.210 kPa	Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Restraints:	900 mm centres	Restraints:	600 mm centres		
Live Load:	Qur = 0.250 kPa Qc = 1.100 kN	Live Load:	Qc = 1.400 kN		

The minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003. The timber for these MiTek® trusses shall be graded to the requirements of NZS 3603:1993. Proprietary fixings and timber connectors shall be selected in accordance with NZS3604:2011 Section 4 - Durability.

MiTek® Truss List

Legend: * = detail only, ? = input only, ✕ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required
GB = gable brace required

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
T3	1	6900	25.000	900	S1B	4	5200	25.000	900	V5	1	5200	25.000	900
T3A	1	6900	25.000	900	T1	8	6200	25.000	900	*HB1	1	592	18.248	900
T4	1	6900	25.000	900	T1A	1	6200	25.000	900	*HB2	1	599	18.249	900
T4A	1	6900	25.000	900	T1B	1	6200	25.000	900	*HB3	1	1695	18.249	900
ET1	1	6209	25.000	900	T2	5	5080	25.000	900	*HB4	1	2041	18.249	900
ET1A	1	4004	25.000	900	T2A	1	5080	25.000	900	*R1	1	787	25.000	900
ET2	2	1900	25.000	900	T2B	1	5080	25.000	900	*R2	1	823	25.000	900
ET3	1	2204	25.000	900	T4B	1	6900	25.000	900	*R3	2	7400	25.000	900
ET4	1	2200	25.000	900	V1	1	1400	25.000	900	*R4	2	6400	25.000	900
ET5	1	3000	25.000	900	V2	1	3200	25.000	900	*R5	1	855	0.000	900
S1	4	5200	25.000	900	V3	1	5000	25.000	900	*R6	1	855	0.000	900
S1A	4	5200	25.000	900	V4	1	3400	25.000	900					

Total quantity : 58

The computer design input has been carried out by:

MiTek 20/20 Software Operator: Warren Dravitski

MiTek Candidate Number and Qualifications: Trainee Detailer

Accredited Fabricator:



TAUPO DISTRICT COUNCIL

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Wednesday, 19 September 2018

Job: 279060C1

Client: PENNY HOMES LTD
Phone:

Site: 18 Penny Grove
Nukuhau
Taupo

Bearings Exceeding 8kN Report : Page 1

Description:
Building Consent No.:
MiTek 2020 Engineering 4.7.184.0

MiTek New Zealand Limited.

Phone:

Printed: 11:45:23 19 Sep 2018

TRUSS BEARINGS EXCEEDING 8KN REPORT - Ultimate Limit State Loads

MiTek® Truss List

Legend: ? = input only, Txx = failed design, Ø = non certified, Unmarked trusses = designed successfully

Critical Trusses	Qty	Span (mm)	Joint	Bearing Reactions (kN)	
				Down	Uplift
T3	1	6900	A	8.091	8.566
			G	8.900	8.956
T3A	1	6900	A	8.077	8.125
			N	9.599	8.624

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Note:
1) Select appropriate Slab Thickening Detail from the MiTek 'Internal Load Bearing On Concrete Floor Slabs' brochure.

DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and Laserframe components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:

NZS 3603:1993 Timber Structures Standard.

NZS 3604:2011 Timber-framed buildings.

AS 1720.1:2010 Timber structures. Part 1: Design methods.

AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings

AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.

AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.

AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 3 May 2017

For further information or advice contact:

Carter Holt Harvey LVL Ltd,
173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Facsimile: 0800 808 132
Email: designit@chhwoodproducts.co.nz
Web: <http://www.chhwoodproducts.co.nz>

Specifier details:

Specifier:	W Dravitski
Business name:	Napier Manufacturing
Address:	Taupo 4312
Email:	Warren.Dravitski@carters.co.nz

Project & site details:

Project:	279060C1
Site address:	18 Penny Grove Taupo
Design wind zone	High
Snow loading	Design snow zone: N1, Altitude: 100 m (sub-alpine), Ground snow load, $S_g^{1,2} = 0.0$ kPa

1. designIT does not include any allowance for the effects of drifting and sliding of snow.
2. Snow loads are applied to roofed over structures only, the design of exposed floors/decks are not covered by designIT.

MEMBER DESIGN DETAILS

Member 1

1) Member code and description

W1 - Lintels - In single or upper storey load bearing walls

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- 2) Date prepared 19 September 2018
- 3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.6 m
Roof load width 'RLW'	4.5 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.3 mm	1.5 mm (long term)	3.5
Live load - $\Psi_S Q$	6.4 mm	0.5 mm	13.9
Wind load - W_S	8.0 mm	1.4 mm	5.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-2.9
1.2G + 1.5Q	0.80	-4.5
1.2G + W_u + $\Psi_c Q$	1.00	-6.4
0.9G + W_u	1.00	4.1

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 2

- 1) Member code and description W2-W3 - Lintels - In single or upper storey load bearing walls
- 2) Date prepared 19 September 2018
- 3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

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6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	3.0 mm	0.2 mm (long term)	14.5
Live load - $\Psi_S Q$	3.6 mm	0.1 mm	59.8
Wind load - W_s	4.5 mm	0.2 mm	24.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.5
1.2G + W_u + $\Psi_c Q$	1.00	-0.8
0.9G + W_u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 3

1) Member code and description W4 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	3.1 m
Roof load width 'RLW'	3.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	10.0 mm	6.7 mm (long term)	1.5
Live load - $\Psi_S Q$	12.4 mm	1.9 mm	6.4
Wind load - W_s	15.5 mm	5.9 mm	2.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
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1.35G	0.60	-3.8
1.2G + 1.5Q	0.80	-5.9
1.2G + W _u + $\Psi_c Q$	1.00	-8.3
0.9G + W _u	1.00	5.2

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 4

1) Member code and description W5-W6 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.8 m
Roof load width 'RLW'	3.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	9.3 mm	4.2 mm (long term)	2.2
Live load - $\Psi_S Q$	11.2 mm	1.2 mm	9.1
Wind load - W _s	14.0 mm	3.7 mm	3.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-3.4
1.2G + 1.5Q	0.80	-5.3
1.2G + W _u + $\Psi_c Q$	1.00	-7.5
0.9G + W _u	1.00	4.7

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 5

1) Member code and description W7 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

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3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.5 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.0 mm	0.2 mm (long term)	24.6
Live load - $\Psi_S Q$	6.0 mm	0.1 mm	119.0
Wind load - W_S	7.5 mm	0.2 mm	49.3

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.6
1.2G + W_u + $\Psi_c Q$	1.00	-0.9
0.9G + W_u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 6

1) Member code and description W8 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.7 m
Roof load width 'RLW'	4.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

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Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.7 mm	1.9 mm (long term)	3.0
Live load - $\Psi_S Q$	6.8 mm	0.6 mm	12.1
Wind load - W_s	8.5 mm	1.7 mm	5.0

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-3.2
1.2G + 1.5Q	0.80	-4.9
1.2G + W_u + $\Psi_c Q$	1.00	-7.0
0.9G + W_u	1.00	4.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 7

1) Member code and description W9 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.8 m
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	9.3 mm	4.8 mm (long term)	2.0
Live load - $\Psi_S Q$	11.2 mm	1.4 mm	8.0
Wind load - W_s	14.0 mm	4.2 mm	3.3

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-3.9
1.2G + 1.5Q	0.80	-6.0
1.2G + W_u + $\Psi_c Q$	1.00	-8.5

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0.9G + W _u	1.00	5.4
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8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 8

1) Member code and description W10-W11 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	3.0 mm	0.2 mm (long term)	14.5
Live load - $\Psi_S Q$	3.6 mm	0.1 mm	59.8
Wind load - W _s	4.5 mm	0.2 mm	24.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.5
1.2G + W _u + $\Psi_c Q$	1.00	-0.8
0.9G + W _u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 9

1) Member code and description W12-W13 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

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4) Design inputs

Span	1.7 m
Roof load width 'RLW'	3.5 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.7 mm	1.4 mm (long term)	3.9
Live load - $\Psi_S Q$	6.8 mm	0.4 mm	15.9
Wind load - W_S	8.5 mm	1.3 mm	6.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-2.4
1.2G + 1.5Q	0.80	-3.8
1.2G + W_u + $\Psi_c Q$	1.00	-5.3
0.9G + W_u	1.00	3.4

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 10

1) Member code and description

W14-W15-W16 - Lintels - In single or upper storey load bearing walls

2) Date prepared

19 September 2018

3) Serviceability criteria

AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

6) Serviceability

TAUPO DISTRICT COUNCIL

BC181033A

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Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	3.0 mm	1.3 mm (long term)	2.3
Live load - $\Psi_S Q$	3.6 mm	0.4 mm	8.8
Wind load - W_s	4.5 mm	1.2 mm	3.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-2.3
1.2G + 1.5Q	0.80	-3.6
1.2G + W_u + $\Psi_c Q$	1.00	-5.1
0.9G + W_u	1.00	3.3

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 11

1) Member code and description Garage-Door - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	4.9 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 300 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	10.0 mm	4.3 mm (long term)	2.3
Live load - $\Psi_S Q$	15.0 mm	1.0 mm	15.7
Wind load - W_s	24.5 mm	2.9 mm	8.5

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-1.9
1.2G + 1.5Q	0.80	-2.7
1.2G + W_u + $\Psi_c Q$	1.00	-3.6

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0.9G + W _u	1.00	1.7
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8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 12

1) Member code and description L1 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	3.3 m
Roof load width 'RLW'	1.4 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + Ψ LQ [*]	10.0 mm	3.7 mm (long term)	2.7
Live load - Ψ SQ	13.2 mm	1.0 mm	13.4
Wind load - W _s	16.5 mm	3.0 mm	5.5

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-1.7
1.2G + 1.5Q	0.80	-2.6
1.2G + W _u + Ψ cQ	1.00	-3.5
0.9G + W _u	1.00	2.0

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Notes for interpretation of serviceability data

- 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720. Deflections calculated using this methodology cannot therefore be usefully compared with deflections calculated using other methods, eg EURO design methodology.
- Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

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No 1 Framing – visually graded to NZS 3631
SG grades - mechanically graded to AS/NZS 1748
GL grades for glulam to AS 1328
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)

Average + 100%
Average + 43%
Average + 33%
Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

3. The limits referred are those specified in AS 1720.3 for the stated load case.

4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements of AS 1720.3

Notes for interpretation of reaction data

1. Duration of load factor 'k₁' for strength as per NZ 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
4. End reaction includes allowance for overhang/cantilever where one has been designed

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CHH DesignIT Calculations

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DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey LVL Limited (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and SG8 components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:

1. NZS 3603:1993 Timber Structures Standard.
2. NZS 3604:2011 Timber-framed buildings.
3. AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.
4. AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.
5. AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.
6. AS 1720.1:2010 Timber structures. Part 1: Design methods.
7. AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 30 October 2019

For further information or advice contact:

Carter Holt Harvey LVL Limited,
173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Email: designit@futurebuild.co.nz
Web: <https://futurebuild.co.nz/>

Specifier details:

Specifier:	Shaune
Business name:	JT Design Architecture Ltd
Address:	Level 1, 32 Tuwharetoa Street Taupo
Email:	shaune@jtdesign.co.nz

Project & site details:

Project:	Blomquist Residence
Reference:	JT18105
Site address:	18 Penny Grove, Taupo
Design wind zone	High
Snow loading	Design snow zone: N0

MEMBER DESIGN DETAILS

Member 1

- 1) **Member code and description** W1 - Lintels - In single or upper storey load bearing walls
- 2) **Date prepared** 18 February 2020

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3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.2 m
Roof load width 'RLW'	4.5 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	7.3 mm	1.8 mm (long term)	4.1
Live load - $\Psi_S Q$	8.8 mm	0.5 mm	16.8
Wind load - W_s	11.0 mm	1.6 mm	7.0

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-3.6
1.2G + 1.5Q	0.80	-5.6
1.2G + W_u + $\Psi_c Q$	1.00	-7.9
0.9G + W_u	1.00	5.0

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 2

1) Member code and description W15 - Lintels - In single or upper storey load bearing walls

2) Date prepared 18 February 2020

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.6 m
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

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Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.3 mm	1.4 mm (long term)	3.8
Live load - $\Psi_S Q$	6.4 mm	0.4 mm	15.3
Wind load - W_S	8.0 mm	1.3 mm	6.3

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-2.7
1.2G + 1.5Q	0.80	-4.2
1.2G + W_u + $\Psi_c Q$	1.00	-5.9
0.9G + W_u	1.00	3.8

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 3

1) Member code and description JS1 - Jamb studs - In single or upper storey load bearing walls

2) Date prepared 23 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Opening width	4800 mm
Stud height	2610 mm
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Roof load width 'RLW'	1.5 m

5) Member specification

Size, stress grade/product	Use 3/90 x 45 hyCHORD
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Wind load - W_S^*	17.4 mm	9.6 mm	1.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-2.2
1.2G + 1.5Q	0.80	-3.5
1.2G + W_u + $\Psi_c Q$	1.00	-5.7
0.9G + W_u	1.00	0.9

8) Installation requirements

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- Jamb studs to be nogged at maximum 1350 mm
- Notching of the jamb studs not permitted
- Nail Laminate studs in accordance with NZS 3604 Clause 2.4.4.7
- Provide 2 full length studs plus 1 secondary Jamb Stud to Detail H19

Notes for interpretation of serviceability data

1. 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720.
2. Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631	Average + 100%
SG grades - mechanically graded to AS/NZS 1748	Average + 43%
GL grades for glulam to AS 1328	Average + 33%
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)	Average + 18%

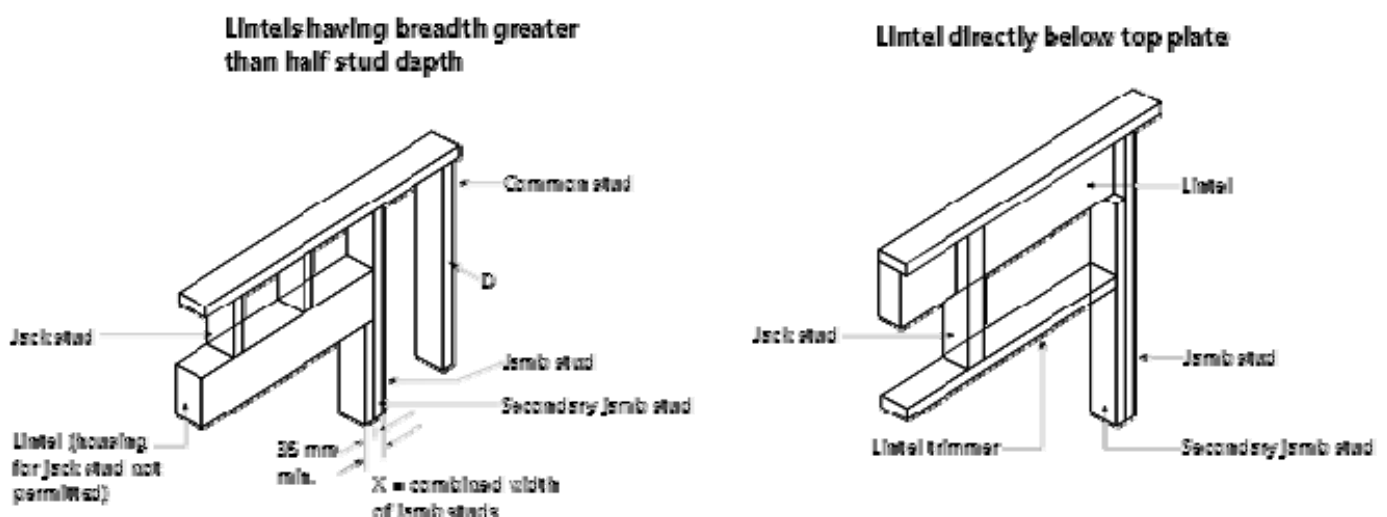
As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

3. The limits referred are those specified in AS 1720.3 for the stated load case.
4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements detailed.

Notes for interpretation of reaction data

1. Duration of load factor 'k₁' for strength as per NZS 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
4. End reaction includes allowance for overhang/cantilever where one has been designed

Detail H19: Multiple Stud Configuration



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Bracing Calculations

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Demand Calculation Sheet

Job Details

Name: Blomquist Residence
 Street and Number: 18 Penny Grove
 Lot and DP Number: Lot: 226 / DP: 522262
 City/Town/District: Taupo
 Designer: Shaune
 Company: JT Design Architecture
 Date: Tuesday, 18 February 2020

Building Specification

Number of Storeys 1
 Floor Loading 2 kPa
 Foundation Type Slab

Single

Cladding Weight Light
 Roof Weight Light
 Room in Roof Space No
 Roof Pitch (degrees) 25
 Roof Height above Eaves (m) 2.2
 Building Height to Apex (m) 4.7
 Ground to Lower Floor (m) 0.2

Average Stud Height (m) 2.6
 Building Length (m) 16.4
 Building Width (m) 14.4
 Building Plan Area (m²) 173.68

Building Location

Wind Zone = High

Wind Region A
 Lee Zone No
 Ground Texture Open
 Site Exposure Exposed
 Hill Ste Category T1

Earthquake Zone 2

Soil Type D & E (Deep to Very Soft)
 Annual Prob. of Exceedance: 1 in 500 (Default)

Bracing Units required for Wind

	Along	Across
Single Level	723	775

Bracing Units required for Earthquake

	Along & Across
Single Level	674

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Single Level Along Resistance Sheet

Job Name: Blomquist Residence

									Wind	EQ
									Demand	
									723	674
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	795 110%	725 108%
a	1	0.90		2.6	GS1-N	GIB®	52	49		
	2	0.90		2.6	GS1-N	GIB®	52	49		
	3	0.40		2.6	GS1-N	GIB®	20	21		
	4	0.40		2.6	GS1-N	GIB®	20	21		
									144 OK	141 OK
b	1	1.20		2.6	GS1-N	GIB®	76	66		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	1.00		2.6	GS1-N	GIB®	60	55		
									168 OK	154 OK
c	1	1.30		2.6	GS1-N	GIB®	83	72		
	2	1.20		2.6	GS1-N	GIB®	76	66		
	3	1.20		2.6	GS1-N	GIB®	76	66		
									236 OK	205 OK
d	1	1.30		2.6	GS1-N	GIB®	83	72		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	0.60		2.6	GS1-N	GIB®	32	32		
	4	1.60		2.6	GS1-N	GIB®	102	89		
									248 OK	225 OK

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Single Level Across Resistance Sheet

Job Name: Blomquist Residence

									Wind	EQ
									Demand	
									775	674
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1137 147%	1066 158%
m	1	0.50		2.6	BLP-H	GIB®	59	64		
	2	0.50		2.6	BLP-H	GIB®	59	64		
									118 OK	128 OK
n	1	0.40		2.6	BL1-H	GIB®	33	37		
	2	0.40		2.6	BL1-H	GIB®	33	37		
	3	0.40		2.6	BL1-H	GIB®	33	37		
	4	0.40		2.6	BL1-H	GIB®	33	37		
									131 OK	148 OK
o	1	1.10		2.6	GS1-N	GIB®	68	61		
	2	1.10		2.6	GS1-N	GIB®	68	61		
									136 OK	121 OK
p	1	1.00		2.7	GS1-N	GIB®	58	53		
	2	1.80		2.6	GS1-N	GIB®	115	100		
									172 OK	153 OK
q	1	1.00		2.7	GS1-N	GIB®	58	53		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	0.60		2.6	GS1-N	GIB®	32	32		
	4	2.00		2.6	GS1-N	GIB®	127	111		
									248 OK	228 OK
r	1	2.80		2.6	GS1-N	GIB®	178	155		
	2	2.40		2.6	GS1-N	GIB®	153	133		
									331 OK	288 OK

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GIB EzyBrace® Systems specification GS1-N

Specification code	Minimum length (m)	Lining requirement
GS1-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard to one side only

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75 x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and 600mm centres thereafter.

External Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for external wall bottom plate fixing.

WALL LINING

- Any 10mm or 13mm GIB® plasterboard lining.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

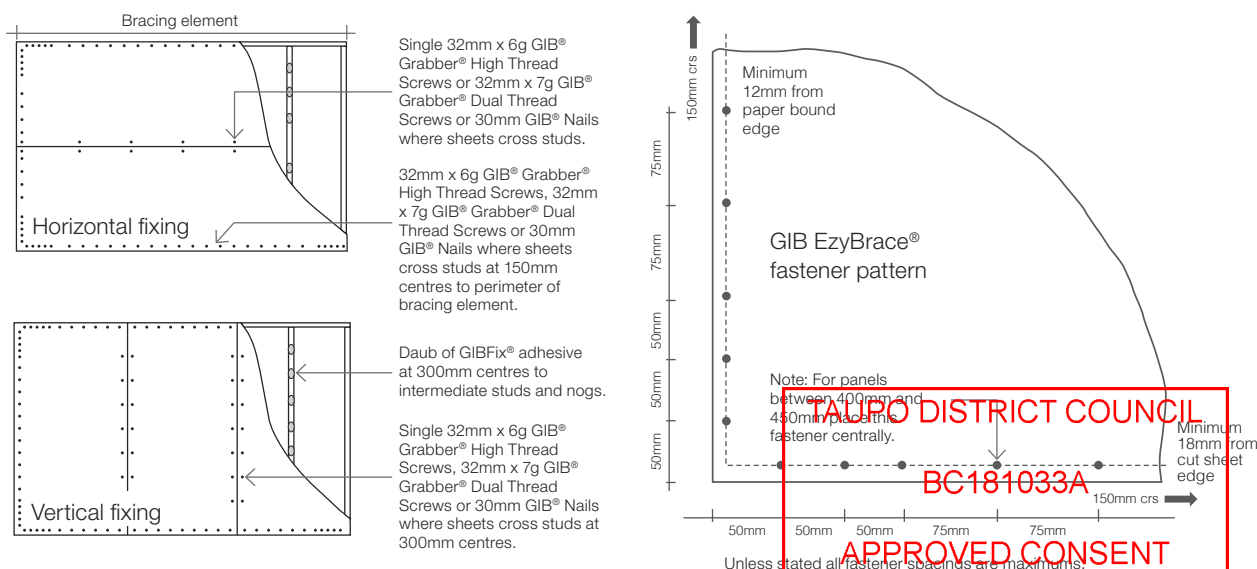
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BL1-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BL1-H	0.4	10mm or 13mm GIB Braceline® to one side only	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or
Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline®
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

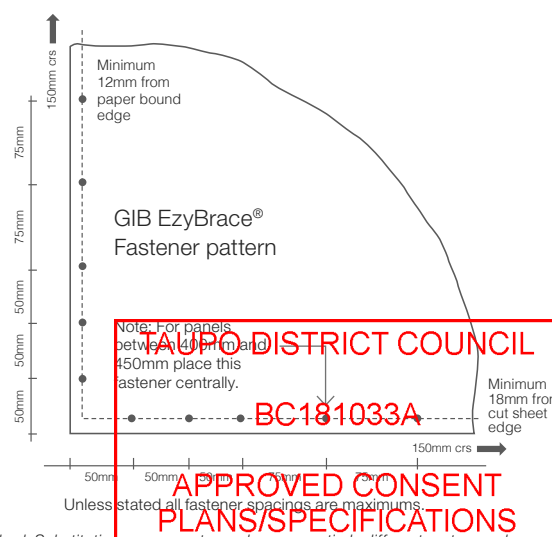
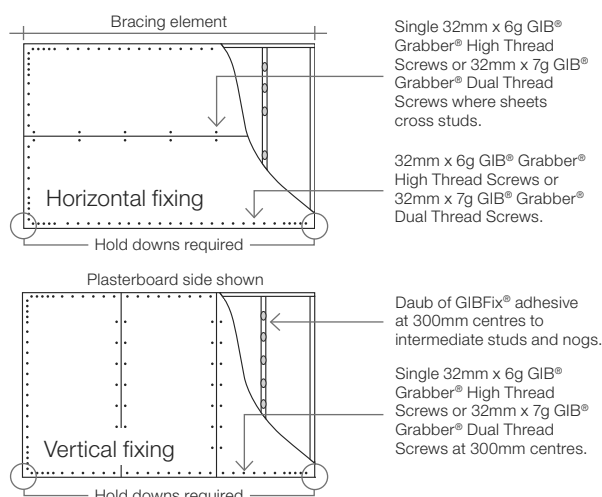
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm from maximum each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the sheet joint. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BLP-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLP-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with:

- NZBC B1 — Structure; B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB® HandiBrac is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or
Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GiB HandiBrac® is recommended. See details in GiB EzyBrac® Systems or GiB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of AS/NZ 2269/0 :2012.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZS 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally.
- Plywood is to be fixed vertically with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

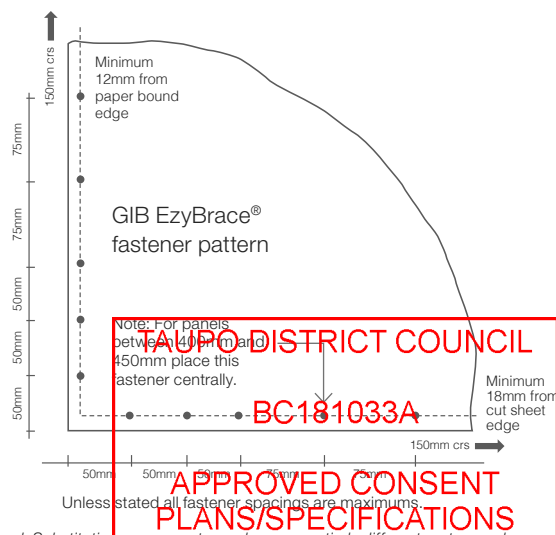
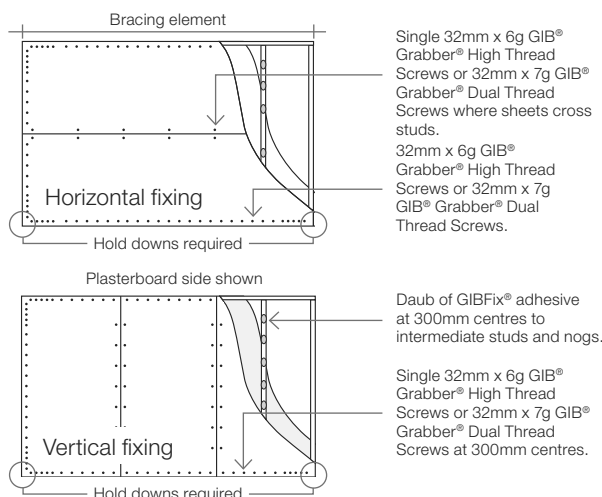
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws.
Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

GIB® Plasterboard side: 50,100,150, 225, 300mm from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



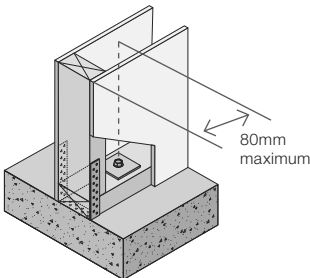
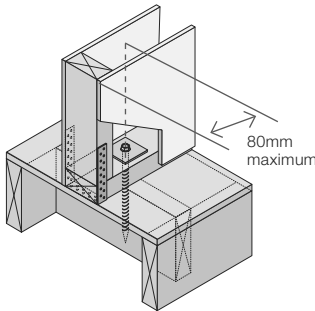
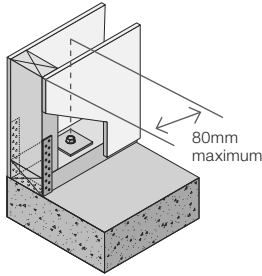
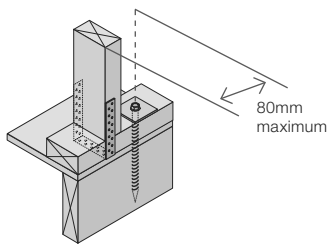
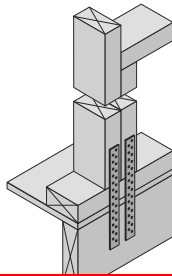
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In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzvBrace® Systems

Bracing strap installation

Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard and

positioned in such a way that the corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the corner fastenings to be installed without having to penetrate the bracing strap.

Concrete floor		Timber floor	
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.			
Internal wall			
			
GEB004		GEB005	
External wall			
			
GEB006		GEB007	
Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library .		2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Block to nog fixed with 3/100 x 3.75mm nails to stud.	
			
		GEB008	
Hold-down fastener requirements			
Concrete floor		Timber floor	
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.		12 x 150mm galvanised straps fitted with 450 x 50 x 3mm square washer within 80mm of the ends of the bracing element	

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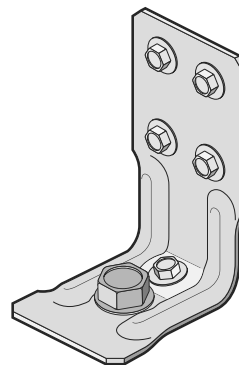
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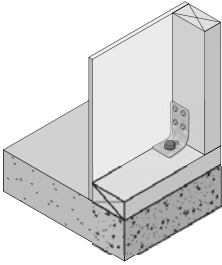
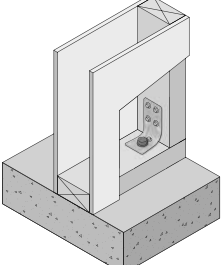
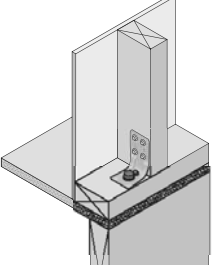
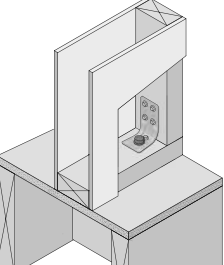
GIB HandiBrac® installation

Developed in conjunction with MiTek™, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs. The GIB HandiBrac® is a substitute for bottom plate hold-down straps.

- Quick and easy to fit.
- May be fitted at any stage before lining.
- Framing face is clear to allow flush lining.
- Easily inspected.

The GIB HandiBrac® with BOWMAC® blue head screw bolt is suitable for timber and concrete floors constructed in accordance with NZS 3604:2011.



Concrete floor		Timber floor	
External walls	Internal walls	External walls	Internal walls
 GEB009 Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.	 GEB010 Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.	 GEB011 Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.	 GEB012 Position GIB HandiBrac® in the centre of floor joist or full depth solid block.
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.		12 x 150mm galvanised coach screw or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.	

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Insulation Calculations

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INSULATION CALCULATION BASIC DATA AND DETERMINATION OF METHOD

This calculation is valid for buildings of non-solid construction only

PROJECT: Blomquist Residence - 18 Penny Grove, Taupo
CLIMATE ZONE: 3

BASIC DATA TABLE:

	WALL & GLASS AREAS				
LINE #	WALL	WALL AREA (m²)	GLASS AREA (m²)		
1	NORTH	46.15	21.78		
2	EAST	40.83	6.93		
3	SOUTH	45.94	4.24		
4	WEST	40.81	8.12		
	TOTAL AREAS	(m²)	(m²)	%	
5	N,E,S,W	173.73	41.07	23.64	<=30%
6	E,S,W ONLY	127.58	19.29	15.12	<=30%
7	TOTALS	173.73	41.07	23.64	<=30%
		(m²)	PERIMETER (m)		RATIO
8	TOTAL ROOF AREA (INC SKYLIGHT)	126.66	N/A		N/A
9	FLOOR AREA	125.78			N/A
11	SKYLIGHT AREA		N/A		<=1.5m²
12	LOUVRES/GLAZING AREA		N/A		<3m²
13	ACTUAL WALL AREA	132.66	N/A		N/A
14	ACTUAL ROOF AREA	126.66	N/A		N/A

CONCLUSION OF METHOD:
DO CALCULATIONS COMPLY WITH SCHEDULE METHOD? Yes/No? Yes
USE CALCULATION METHOD FOR OTHER REASONS? Yes/No? No

USE CALCULATION METHOD FOR THE FOLLOWING REASONS:	
1	
2	
3	

WALL AREAS:	CONSTRUCTION DESCRIPTION	R-VALUE
1	= INSULATION	2.18
	Axon Panel on cavity over 90x45mm studs at 400mm centres. R2.8 insulation to frame cavity	
2	= INSULATION	2.13
	Linea bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres. R2.8 insulation to frame cavity	
3	= INSULATION	2.27
	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres. R2.8 insulation to frame cavity	
4	= INSULATION	
5	= INSULATION	
6	= INSULATION	

Note: Similar highlighted values in the 'Window Areas' calculation box below indicate windows which are in that particular wall type.

WALL AREAS				WINDOW AREAS				STUD HEIGHT WALL LENGTH
NORTH (m²)	EAST (m²)	SOUTH (m²)	WEST (m²)	NORTH (m²)	EAST (m²)	SOUTH (m²)	WEST (m²)	
12.84	2.61	6.26	8.06	4.56	2.99	2.12	4.68	
8.82	6.17	10.72	5.01	5.74	2.12	2.12	1.72	
9.19	8.04	10.49	4.18	5.74	0.91		1.72	
1.50	8.30	14.35	5.01	5.74	0.91			
12.50	10.44	1.80	2.61					
1.30	5.27	2.32	2.92					
			8.12					
			4.90					
46.15	40.83	45.94	40.81	21.78	6.93	4.24	8.12	

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ROOF AREAS

ROOF AREAS:			PLAN AREA (m²)	SLOPE ANGLE (°)	ACTUAL AREA	R-VALUE
1	=	Profiled metal on trusses at 900mm centres	68.78		68.78	3.37
	INSULATION	R3.6 insulation to roof space				
2	=	Profiled metal on scissor trusses at 900mm centres	57.00	10.00	57.88	3.35
	INSULATION	R3.6 insulation to roof space				
3	=					
	INSULATION					
4	=					
	INSULATION					
5	=					
	INSULATION					
TOTALS			125.78		126.66	

FLOOR AREAS AND PERIMETER DIMENSIONS:

FLOOR AREAS:			PLAN AREA (m²)	PERIMETER (m)	RATIO	R-VALUE
1	=	85mm thick Firth Ribraft concrete slab on ground	125.78	66.18	1.90	1.30
	INSULATION	220mm deep polystyrene pod system				
2	=					
	INSULATION					
3	=					
	INSULATION					
4	=					
	INSULATION					
5	=					
	INSULATION					
TOTALS			125.78			

CONCLUSION:

PROPOSED R-VALUES			
LOCATION	COMPONENT	R-VALUE ACHIEVED	INSULATION DESCRIPTION & REFERENCE
WALLS	Axon Panel on cavity over 90x45mm studs at 400mm centres.	2.18	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Linea bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres.	2.13	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres.	2.27	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
ROOFS	Profiled metal on trusses at 900mm centres	3.37	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
	Profiled metal on scissor trusses at 900mm centres	3.35	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
FLOOR	85mm thick Firth Ribraft concrete slab on ground	1.30	220mm deep polystyrene pod system <i>Refer to Manufacturers Spec in Appendix</i>
GLAZING	Aluminium joinery with double glazed windows	0.26	Standard aluminium joinery with double glazed windows
			<i>Refer to Branz House Insulation Guide Fifth Edition</i>

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Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#).

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel.

- Floors ☐
- Walls ☒
- Roofs ☐

Axon Panel on cavity over 90mm timber framing		2.18	m ² °C/W
Type:	Wall: Timber Frame with vented Cavity ▼		
Timber Frame with vented Cavity		view detail	
external surface 0.03			
Cladding :	Fibre cement board 1470 9mm ▼	R-value: 0.04	
Air Barrier :	Building paper ▼	R-value: 0.01	
Timber Frame & Cavity : 90mm, studs @ 400mm, dwangs @ 800mm ▼			
Wall Frame Area: 17.9%		Cavity Area: 82.1%	
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08		15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	
Framing : R-value: 0.75		Insulation : 2.8	
		still Airgap: none ▼ R-value: 0.00	
Wall Lining :	Gypsum plasterboard 10mm ▼	R-value: 0.04	
internal surface 0.09			

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction) [i](#):

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets [i](#):

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8

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- Floors ☐
- Walls ☒
- Roofs ☐

Weatherboards direct fixed over 90mm timber framing		2.13	m ² °C/W
Type:	Wall: Timber Frame (direct fixed cladding) ▼		
Timber Frame (direct fixed Cladding)		view detail	
external surface 0.03			
Cladding :	James Hardie Linea weatherboard ▼ R-value: 0.08		
Air Barrier :	Building paper ▼ R-value: 0.01		
Timber Frame & Cavity : 90mm, studs @ 400mm, dwangs @ 800mm ▼			
Wall Frame Area: 17.9%		Cavity Area: 82.1%	
Framing :	Insulation : 2.8		
R-value: 0.75	still Airgap: none ▼ R-value: 0.00		
Wall Lining : Gypsum plasterboard 10mm ▼ R-value: 0.04			
internal surface 0.09			

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8



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Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel .

- Floors ☐
- Walls ☒
- Roofs ☐

Internal 90mm timber framed wall GIB lining both sides

2.27 m²C/W

Type: Wall: Timber Frame (direct fixed cladding) ▼

Timber Frame (direct fixed Cladding)

view detail

external surface 0.03

Cladding : Gypsum plasterboard 10mm into still air (garage, etc.) ▼
R-value: 0.10

Air Barrier : none ▼
R-value: 0.00

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm ▼
Wall Frame Area: 14.4% Cavity Area: 85.6%
Framing : Insulation : 2.8
R-value: 0.75
still Airgap: none ▼
R-value: 0.00

Wall Lining : Gypsum plasterboard 10mm ▼
R-value: 0.04

internal surface 0.09

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8



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Construction R-value Calculator

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Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel .

Floors ☐

Walls ☐

Roofs ☒

3.37 m²C/W

Type:

Timber framed Roof, direct fixed or battened flat Ceiling

external surface 0.03

Roofing :

R-value: 0.01

Insulation :

Timber Frame & Cavity :

Roof Frame Area: 5.0% Cavity Area: 95.0%

Roof space (still air) 0.11 Roof space (still air) 0.11

Framing :

Insulation :

Roof Lining :

R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights

Ceiling Area Number of Clearance from lamp holder side

[m²]: downlights: [m]:

Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8

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Construction R-value Calculator

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Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel .

Floors

Walls ☐

Roofs

Profiled metal on scissor trusses at 900mm centres	3.35 m ² °C/W
Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling ▼	
Timber framed Roof, direct fixed or battened flat Ceiling view detail	
external surface 0.03	
Roofing : Corrugate iron with building paper ▼	
<i>R-value: 0.01</i>	
Insulation : 	
Timber Frame & Cavity :	
90mm rafters or joists @ 900mm, battens covered with insulation ▼	
<i>Roof Frame Area: 5.0%</i> <i>Cavity Area: 95.0%</i>	
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : <i>R-value: 0.75</i>	Insulation : 3.6
Roof Lining : Hardboard 6mm ▼	
<i>R-value: 0.04</i>	
internal surface 0.09	
Non-IC-rated recessed downlights	
Ceiling Area [m ²]: 	Number of downlights:
Clearance from lamp holder side [m]: 	

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Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction) [i](#):

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8

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Cladding Manufacturers Specification

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Technical Specification

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WE VALUE YOUR FEEDBACK

To continue with the development of our products and systems, we value your input. Please send any suggestions, including your name, contact details, and relevant sketches to:

Ask James Hardie™

Fax 0800 808 988

literaturefeedback@jameshardie.co.nz

THIS TECHNICAL SPECIFICATION
IS FOR TAUPŌ DISTRICT COUNCIL
FIXED AND FIXED TO CLD®
STRUCTURAL CAVITY BATTEN.

APPROVED CONSENT
PLANS/SPECIFICATIONS

1 Application and scope

1.1 APPLICATION

Axon® Panel is manufactured by James Hardie using an advanced lightweight cement composite. Base composition is portland cement, ground sand, cellulose fibre and water. Axon Panel has vertical grooves along the panel. It is classified as lightweight wall cladding suitable for residential and light commercial buildings using timber framing.

- Axon Panel is ideal for achieving feature walls in areas such as gable ends and entrance ways.
- Axon Panel is primed on the face to take a suitable paint finish in any colour.
- Axon Panel 133 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres.
- Axon Panel 133 Grained - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres. Between the grooves is a look of traditional wood-grain texture.
- Axon Panel 400 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 400mm centres.

Specifier

If you are a specifier or other responsible party for a project, ensure that the information in this document is appropriate for the application you are planning and that you undertake specific design and detailing for areas which fall outside the scope of these specifications.

Installer

If you are an installer ensure that you follow the design, moisture management principles, associated details and material selection provided by the designer. All of the details provided in this document must be read in conjunction with this specification.

Make sure your information is up to date

When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or you need more information, visit www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

1.2 SCOPE

The scope of this specification for the use of Axon Panel is limited to buildings which fall within the scope limitations of 'Acceptable Solution E2/AS1 paragraph 1.1' of the New Zealand Building Code (NZBC).

This document is intended for use by architects, designers and specifiers who may be involved with the specification of Axon Panel.

This manual covers the use of Axon Panel for both construction methods i.e. direct fixed to framing or cavity construction, used in external walls of timber framed buildings up to 2.5kPa.

Please refer to E2/AS1 for further information regarding the selection of construction methods to be used for fixing claddings.

1.3 DETAILS

Various Axon Panel figures are provided in the Details section of this document. This specification and details in dwg, dxf, jpg and pdf file format are also available for download at www.jameshardie.co.nz.

All dimensions shown are in millimetres unless noted otherwise.

1.4 SPECIFIC DESIGN

For use of Axon Panel outside this published scope, the architect, designer or engineer must undertake specific design.

For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

2 Design

2.1 COMPLIANCE

Axon Panel complies with E2 of the NZBC as an alternate solution.

Axon Panel cladding has been tested as per E2/VM1 of the NZBC and it passes the test performance requirements. Axon Panel also complies with durability requirements of 'B2' clause of the NZBC.

2.2 RESPONSIBILITY

The specifier or other party responsible for the project must run through a risk matrix analysis to determine which construction method is to be used. The designer must also ensure that the figures published in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this specification. The designers should ensure that the intent of their design meets the requirements of the NZBC.

All New Zealand Standards referenced in this manual are current edition and must be complied with.

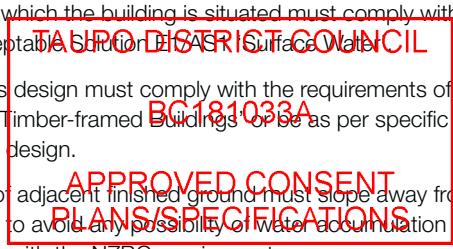
James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution E2/AS1 Surface Water.

Foundations design must comply with the requirements of NZS 3604 'Timber-framed Buildings' or be as per specific engineering design.

The grade of adjacent finished ground must slope away from the building to avoid any possibility of water accumulation in accordance with the NZBC requirements.



2.4 SURFACE CLEARANCES

The clearance between the bottom edge of cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building.

Axon Panel must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZS 3604.

Axon Panel must have a minimum clearance of 100mm from paved ground, and 175mm from unpaved ground. On roofs and decks, the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground. Refer Figures 3 and 18.

2.5 MOISTURE MANAGEMENT

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled.

Walls must include those provisions as required by the NZBC Acceptable Solution E2/AS1 'External Moisture'. In addition all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in external walls, must comply with the requirements of relevant standards and the NZBC.

For further guidance on designing for weathertightness refer to BRANZ Ltd, and the Ministry of Business Innovation and Employment (MBIE) updates on the following websites respectively, www.branz.co.nz and www.building.govt.nz

2.6 STRUCTURE

2.6.1 Timber framing

Timber-framed buildings must be designed in accordance with NZS 3604 (Timber-framed Buildings). When the framing is provided as per the specific engineering design, the framing stiffness must be either equivalent to or more than the stiffness requirements of NZS 3604.

For timber frame walls longer than 12m it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections etc.

2.6.2 Wind loading

Axon Panel is suitable for use in all wind zones in New Zealand up to and including EH as defined in NZS 3604.

A specific design is required for all situations where the buildings falls outside the scope of NZS 3604 and E2/AS1.

2.7 BRACING

Axon Panel direct fixed can be used to achieve structural bracing when fixed with stainless steel HardieFlex™ nails. For further information refer to the James Hardie Bracing Design Manual.

Axon Panel installed to CLD Structural Cavity Battens as per this specification cannot be used to achieve structural bracing. However, bracing can be achieved by using James Hardie rigid air barrier board installed direct to framing instead of a flexible underlay or by using Villaboard® Lining bracing system on the internal face.

2.8 FIRE RATED WALLS

Axon Panel when direct fixed with HardieFlex nails to external walls can achieve fire ratings up to 60/60/60 to comply with C/AS1 of the NZBC when the walls are constructed in accordance with the current James Hardie 'Fire and Acoustic Design Manual'.

When using Axon Panel fixed to CLD Structural Cavity Battens, a fire rating of up to 60 minutes can be achieved using RAB® Board in conjunction with the fire rated system requirements as specified in the James Hardie 'Fire and Acoustic Design Manual'. Ask James Hardie on 0800 808 868 for further information.

Axon Panel is classified as a non-combustible material suitable for use on walls close to boundary.

2.9 ENERGY EFFICIENCY

External walls constructed as per this technical specification using Axon Panel, bulk insulation, where the area of glazing is 30% or less of the total wall area comply with the requirements for walls in the NZBC Acceptable Solution H1/AS1 (NZBC Clause H1 Energy Efficiency), Replacement Table 1. To meet thermal insulation requirements for the construction, the bulk insulation as specified in Table-1 must be used. This insulation may be substituted with insulations having higher R-values. The thermal insulation of a wall gets affected when the depth of the timber framing is increased or decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and using an internal lining material such as James Hardie Villaboard® Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate Zone	Construction R-Value Requirement	Minimum R-Value of Insulation Required
1 and 2	1.9 m ² °C/W	#R2.0
3	2.0 m ² °C/W	#R2.2
Total construction R-Value depends on the insulation material used and the framing ratio. The insulation material R-Values specified in this table are for studs spaced at 600mm c/c and nogs spaced at 800mm c/c.		
# To achieve higher R-Values of construction the wall insulation material must be replaced with an insulation material having higher R-Values to suit the requirements.		
For further guidance on insulation requirements refer to the current edition of 'House Insulation Guide' published by BRANZ.		

3 Framing

3.1 GENERAL

This Axon Panel technical specification is only suitable for timber-framed buildings. Other framing materials are subject to a specific engineering design.

3.2 TIMBER FRAMING

3.2.1 Dimensions

A minimum 45mm wide stud is required.

3.2.2 Structural grade

Minimum timber grade requirement is No. 1 framing grade or MSG6 as per NZS 3604. The grading of timber must comply with the AS/NZS 1748 and NZS 3631 requirements.

3.2.3 Durability

The external framing must be treated to a minimum H1.2 treatment. Refer to the NZBC Acceptable Solution B2/AS1 'Durability' for further information about the durability requirements.

For timber treatment and allowable moisture content information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round Sawn Timber) for minimum timber treatment selection and treatment requirements.

Also refer to the framing manufacturer's literature for further guidance on timber selection. Framing must be protected from moisture at site in accordance with the recommendation of the framing manufacturers.

3.2.4 Frame construction

The framing must fully support all panel edges. The framing must be rigid and not rely on the cladding panel for stability.

Timber framing sizes and its set-out must comply with NZS 3604 and as specified in this specification.

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must comply with the minimum timber sizes stipulated for wall frames in Section 8 of the NZS 3604.

For timber frame walls longer than 12m, it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections generated by loadings etc.

3.3 STEEL FRAMING

Refer to James Hardie Steel Frame Technical Specification about the installation of Axon Panel to steel frame.

3.4 CONSTRUCTION METHODS

3.4.1 Direct fixed

For direct fixed construction method the following framing is required:

- Studs at 600mm c/c maximum
- A minimum 45mm stud width is required at vertical panel joints
- Nogs/dwangs are required at 1200mm c/c maximum.

3.4.2 CLD Structural Cavity Batten

For cavity construction method the following framing is required:

- When studs are spaced at 600mm centres maximum, the nogs/dwangs must be provided at 800mm centres maximum
- When studs are spaced at 400mm centres then the nogs/dwangs may be provided at 1200mm centres
- An extra stud is required in internal corners. Refer to Figure 21.

3.5 TOLERANCES

In order to achieve the required performance and an acceptable wall finish, it is imperative that framing is straight and true.

Framing tolerances must comply with the requirements of NZS 3604. All framing shall be made flush.

4 Preparation

4.1 FLEXIBLE UNDERLAY OR HOMERAB PRE-CLADDING

Flexible underlay or HomeRAB® Pre-Cladding must be provided as per the requirements of the NZBC Acceptable Solution E2/AS1 'External Moisture' and NZS 3604. The flexible underlay must comply with Table 23 of E2/AS1 and AS/NZS 4200.1. The flexible underlay must be fixed in accordance with E2/AS1, NZS 3604 and AS/NZS 4200.2 and the underlay manufacturer's recommendations.

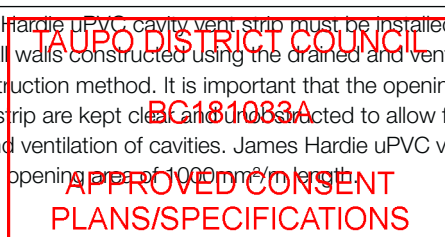
Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC Acceptable Solution E2/AS1 Table 23. For attached garages, flexible underlays must be selected in accordance with the NZBC Acceptable Solution E2/AS1, paragraph 9.1 3.4. HomeRAB Pre-Cladding is suitable for use in these applications. It must be installed in accordance with the James Hardie Rigid Air Barriers installation manual.

4.2 RIGID AIR BARRIER

For EH wind zone or Specific Engineering Design projects where the wind pressures are higher than 1.5kPa (ULS), RAB Board (6mm) must be used. Refer to the James Hardie rigid air barriers installation manual for information regarding its installation. For buildings within the scope NZS 3604 HomeRAB Pre-Cladding Lining (4.5mm) or flexible underlays can be used.

4.3 VENT STRIP

The James Hardie uPVC cavity vent strip must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. James Hardie uPVC vent strip has an opening area of 1000 mm²/m length.



4.4 FLASHING

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to panel installation. Please refer to moisture management requirements in Clause 2.5. The flexible underlay or RAB Board must be appropriately taped around the penetrations and lapped/taped to flashings. Materials must be lapped in such a way that water tracks down to the exterior of a building. James Hardie will assume no responsibility for water infiltration within the wall due to poor installation of flashings or flexible underlays. The selected flashing materials must comply with the durability requirements of the NZBC. For information refer to Table 20 of clause E2 of the NZBC.

When using a James Hardie rigid air barrier board the entire framing around window opening must be sealed with a flashing tape. The tape must be finished over the face of James Hardie rigid air barrier board. The flashing tapes like SUPER-STICK Building Tape® by Marshall Innovations or 3M™ All Weather Flashing Tape 8067 by 3M™ are recommended for use with James Hardie rigid air barrier board. Refer to the tape manufacturer's literature for further information regarding their installation.

4.5 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Axon Panel which meet the requirements of E2 'External Moisture', an approved document of the NZBC. Refer to Figures 8 to 10 and 24 to 26.

5 Batten installation

Note: This specification is not for timber cavity battens. Refer to separate technical specification from James Hardie.

5.1 CLD STRUCTURAL CAVITY BATTENS

Buildings with a risk score of 7-20 calculated in accordance with Table 2 of Acceptable Solution E2/AS1 of the NZBC, require Axon Panel to be installed on a cavity. CLD Structural Cavity Battens provide airspace between the frame and the panel and are used to fix cladding into them.

CLD Structural Cavity Battens are made of a low density fibre cement formulation which enables them to have extra strength and durability. CLD Structural Cavity Batten is sealed on all sides and is suitable to fix Axon Panel installed as per this technical specification, and it can withstand the design wind pressures exerted on a cladding within the scope of NZS 3604.

The CLD Structural Cavity Battens are made 2450mm long and 19mm thick. The battens are fully sealed on all sides.

5.2 BATTEN LAYOUT

CLD Structural Cavity Battens must be fixed to the wall framing over flexible underlay or James Hardie rigid air barrier. The smoother face of batten should face towards the cladding.

CLD Structural Cavity Battens are suitable to withstand wind pressures up to 2.5kPa (ULS). For batten fixing, refer to section 5.4. Ensure the battens are straight and provide a flat surface to fix Axon Panel to. Site cut ends of battens must be sealed on site with Dulux® Acraprime 501/1 sealer or Resene Quick Dry.

The battens are run continuously over the studs but they must not be run continuously over the floor joists. There must be a 15mm gap between the battens at floor joist level to allow for structural shrinkages and deflections. Refer to Figure 27.

CLD Structural Cavity Battens can be butt jointed over the studs within the floor height. The batten ends must be cut between 20° to 45° and be installed in a way that the butt joint deflects the moisture to the exterior. The ends must be sealed and jointed with the adhesive sealant before butting them together. Refer to Figure 23.

The designer must ensure that the CLD Structural Cavity Battens are not used in situations where design wind pressures are above 2.5kPa (ULS).

CLD Structural Cavity Battens must always be at least 300mm in length.

5.3 INTERMEDIATE SUPPORT

Where studs are at 600mm centres an intermediate means of restraining the flexible underlay and insulation from bulging into the cavity shall be installed. An acceptable method to achieve this is using a:

- 75mm galvanised mesh; or
- polypropylene tape at 300mm centres fixed horizontally and drawn taut.

No intermediate supports are required:

- when studs are spaced at 400mm centres; or
- when RAB Board instead of flexible underlays are used.

5.4 BATTEN FASTENERS

The CLD Structural Cavity Batten must be fixed to the framing as specified in Table 2. The fasteners must be driven at a minimum distance of 50mm from the batten ends.

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Table 2

Batten fixing				
Fixing Type	Framing	Basic Wind Pressure kPa (ULS)	Batten centres max. (mm)	Fixings centres max. (mm)
65mm x 2.8mm RoundDrive ring shank nail hot dip galv./ s.steel	Timber	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200
50mm x 9-10g Countersunk head steel screw class 3/4	*Steel 0.55 to 1.6mm BMT	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200

For fastener durability information, refer to Clause 6.2 of this document.

CLD Structural Cavity Battens less than 400mm in height must have fixings at maximum 150mm centres.

Battens must be fixed over studs.

6 Panel fixing

6.1 GENERAL

Axon Panel must be kept dry and under cover whilst in storage or during the installation. Every endeavour must be made to keep framing dry once panel fixing commences. All site-cut panel edges must be sealed prior to installation.

- The shiplap jointing of panels is only suitable for vertical fixing of panels.
- Do not fix in the groove of Axon Panel.
- Ensure the sheets are from the same batch.
- It is recommended to fix from the centre of the panel and work outwards.
- Do not overdrive fasteners.
- Fixings must be finished flush with the panel surface.

6.2 FASTENER DURABILITY

Fasteners must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing material to be used in relation to exposure conditions and are summarised in Table 3.

Table 3

Exposure conditions and nail selection prescribed by NZS 3604		
NAIL MATERIAL		
Zone D*	Zone C* outside sea spray zone, Zone B and Geothermal hot spots	Bracing — All Zones
Grade 316 Stainless	Hot-dipped galvanised or Grade 316 stainless	Grade 316 Stainless

*(Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made). Microclimate conditions as detailed in NZS 3604, paragraph 4.2.4 require SED.

Also refer to the NZBC Acceptable Solution E2/AS1 Table 20 and 21 for information regarding the selection of suitable fixing materials and their compatibility with other materials.

6.3 FASTENER — TYPE, SIZE AND LAYOUT

6.3.1 Direct fix

Axon Panel must be fixed to framing using the fixings as specified in Table 4 below and follow the edge distance required for nails as shown in the details. Refer to Figures 2 and 4.

Table 4

Panel fixing		
DIRECT FIXED TO FRAME USING HARDIEFLEX NAILS OVER FLEXIBLE UNDERLAY		
40 x 2.8mm HardieFlex nails.	Fix @ 200mm centres to all framing. Stud width 45mm min. required at vertical joint.	
DIRECT FIXED TO FRAME USING BRAD NAIL OVER FLEXIBLE UNDERLAY		
ND 50 stainless steel straight brad nail	Up to 1.5kPa (Up to and including VH wind zone)	Fix 150mm c/c on panel edges and intermediate framing

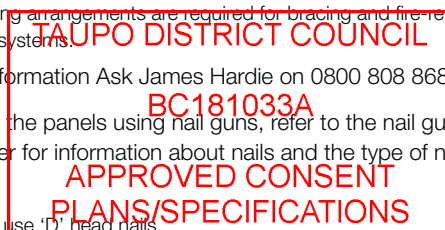
Notes:

1. Brad nail fixing method is only suitable up to very high wind speed zones. Do not use this method for EH wind zones described in NZS 3604 or SED projects.
2. Nails must be finished flush with panel surface.
3. Special fixing arrangements are required for bracing and fire-resistance rated wall systems.

For more information Ask James Hardie on 0800 808 868

When fixing the panels using nail guns, refer to the nail gun manufacturer for information about nails and the type of nail gun to be used.

Note: Do not use 'D' head nails.



6.3.2 CLD Structural Cavity Batten Method

This panel fixing method can be used up to 2.5kPa wind pressure. Axon Panel is only fixed into the CLD Structural Cavity Batten as per this method.

Adhesive sealant

A polyurethane adhesive sealant Seal N Flex-1 manufactured by Bostik or SikaFlex 11FC by Sika are recommended for use in the installation of these products. Apply a 6mm continuous bead of this adhesive sealant over the face of the CLD Structural Cavity Batten before fixing the Axon Panel. Refer to Figure 19, 20 and 21.

When using external box corner flashing, use a 10mm thick bead of adhesive over the aluminium box corner flanges. Refer to Figure 22.

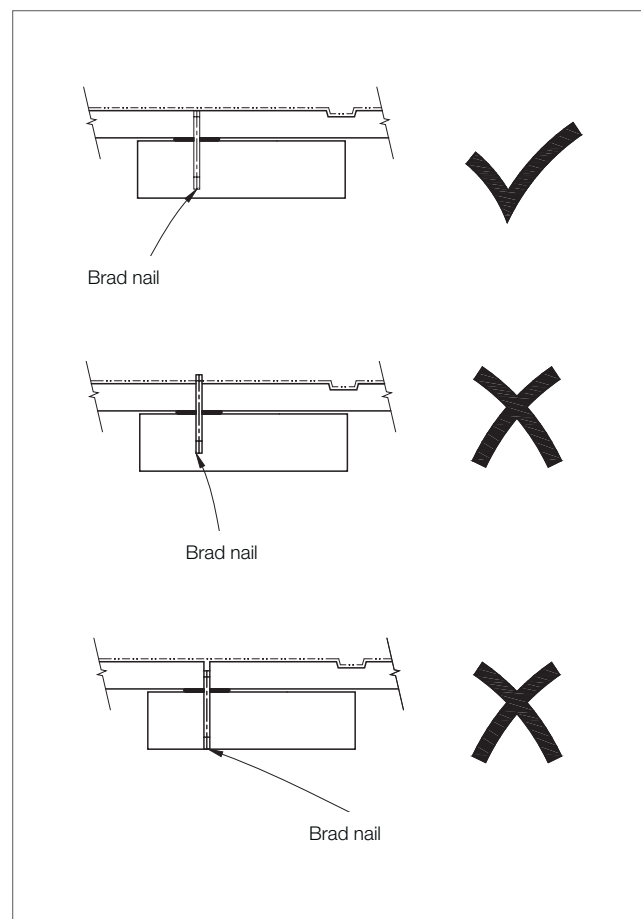
Note: Do not use excessive adhesive.

6.3.3 Cavity construction using timber cavity battens

When fixing Axon Panel using timber cavity battens, these details are available at www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

6.4 PANEL LAYOUT

All panel edges must be supported by the framing. The shi lap joint must be formed vertically. The framing centers must be checked before the panel installation.



Fix Axon Panel to CLD Structural Cavity Battens using one of the following fixings specified in Table 5. The edge distance at panel corner must be minimum 75mm vertically from panel corners. Refer Figure 17.

Table 5

Axon Panel Fixing		
Types of fixings to be used with adhesive sealants	Suitable up to Basic Wind Pressure kPa (ULS)	Fixing to CLD Structural Cavity Battens c/c (mm)
C-25 straight 'T'- Head stainless steel brad nail	1.5 (Up to and including VH wind zone)	150
25 x 2.5mm annular threaded fibre cement nail	2.5 (> VH wind zone)	200
25mm x 10g counter sunk screw class 3/4 or stainless steel	2.5 (> VH wind zone)	200

Notes:

- Brad nail fixing method is only suitable up to 1.5kPa.
- Nails must be finished flush with panel surface.

7 Jointing

7.1 GENERAL

Axon Panels are fixed to form a shi lap joint at vertical edges. The panels have factory-made edges to suit this jointing.

7.2 VERTICAL JOINT

Direct fixed

Axon Panels are shi lap jointed keeping a gap of 1-2mm between the panels. A 50mm wide 3259 Inseal sealing tape is used under the joint over the face of the timber stud where direct fixed construction method is used. A flexible sealant must be applied to the full length of the shi lap joint before the panels are jointed. The edge distance for a HardieFlex nail must be 18mm min. Refer to Figure 4.

Cavity construction

Fix the CLD Structural Cavity Batten over the studs and it runs behind the entire length of the shi lap joint with a 50mm overhang below the bottom plate and finishes flush with the bottom edge of panel. Refer to Figures 16 and 17. The vertical shi lap joint is formed along the centre line of the batten. A bead of sealant is applied to the vertical edge of the Axon Panel to seal the shi lap joint before fixing the panels. Refer to Figure 19. The edge distance for a brad nail must be 15mm min. Refer Figures 14 and 19.

8 Finishing

7.3 HORIZONTAL JOINT

At floor joist levels a horizontal joint must be provided to accommodate the movement resulting from timber joist shrinkage and settlement. A JH 9mm panel aluminium horizontal 'h' mould is used to form a horizontal joint. Use the aluminium 'h' mould jointer to cover over the butt joint of 'h' mould. A purpose made metal 'Z' flashing or a James Hardie uPVC flashing could also be used to flash the horizontal joint. Refer to Figures 11, 12 and 27.

7.4 EXTERNAL CORNER

A JH 9mm panel aluminium box corner mould is used to form the external box corner. The site-cut sheet edges must be sealed before butting them into the box corner. Refer to Figure 7.

Do not run the box corner flashing continuously over the floor joist. On a two storey construction the aluminium box corner is finished under the aluminium 'h' mould. A uPVC corner under flashing must be used under the box corner when in this situation. Refer to Figure 12.

For CLD Structural Cavity Batten external corner refer to Figure 22.

The bead of adhesive must be 10mm thick to accommodate for the thickness of the aluminium.

7.5 INTERNAL CORNER

Direct fixed internal corner is formed using a uPVC corner under flashing or an 80mm wide Inseal sealing strip behind the panel edges. The joint is filled with the flexible sealant. Refer to Figure 6.

For CLD Structural Cavity Batten internal corner joint detail refer to Figure 21.

7.6 FLASHING MATERIAL DURABILITY

Please refer to Table 20 of E2/AS1 of the NZBC regarding the durability requirements of various flashing materials.

8.1 PREPARATION

Painting of Axon Panel is mandatory to meet the durability requirements of the NZBC and 15 year James Hardie product warranties. Axon Panel must be dry and free of any dust or grime before painting. The panels must be painted within 90 days of their installation. There is no restriction on the LRV of paint to be applied on the Axon Panel.

When using uPVC flashings, dark colours should be avoided as it will affect the durability of uPVC flashing. The LRV of paint must be above 40% when using uPVC flashings.

Dark paints can be used when using the aluminium flashings.

Panels are pre-primed and are suitable for site applied acrylic paints. Pre-finished panels can also be installed using exposed head fasteners.

In order to seal cut edges or sanded patches, Dulux 1 Step, Resene quick dry, Taubmans Underproof Acrylic Primer Undercoat or a similar product should be applied. The primer should be compatible with the paint to be used.

Where panels are fixed with brad nails, the nail heads must be finished flush with panel surface. The nail gun should be set to nail "proud" of the panel surface and nail heads to be manually finished flush with surface. The nail heads can be skimmed over with an exterior grade 2 part builders fill if required. The skimmed area must be primed prior to site-applied finishing.

For site-applied finishes where brad nails are used. James Hardie recommends an undercoat and a minimum of two coats of acrylic paint. Follow the paint manufacturer's recommendations to prepare the surface and to adequately cover and conceal the panel fixings.

8.2 FLEXIBLE SEALANT

All sealants used must comply with the relevant requirements of the NZBC. Their application and usage must be in accordance with manufacturer's instructions. Check with sealant manufacturer prior to coating over sealants. Some sealant manufacturers do not recommend coating over their products.

9 Storage and handling

When storing Axon Panel, boards must be laid flat on a smooth level surface. Edges and corners must be protected from chipping.

To ensure optimum performance, store panels under cover and keep dry prior to fixing. If the panels become wet, allow them to dry thoroughly before fixing.

Do not carry panels on the flat, carry in the vertical position to avoid excessive bending.



10 Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*
- Re-applying of exterior protective finishes if necessary**
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants that may provide a means of moisture entry beyond the exterior cladding.
- Cleaning out gutters, blocked pipes and overflows as required
- Pruning back vegetation that is close to or touching the building
- The clearance between the bottom edge of Axon Panel and the finished ground must always be maintained.

*Do not use a water blaster to wash down the cladding.

*In extreme coastal conditions or sea spray zones, wash every 3-4 months.

**Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.

11 Product information

11.1 MANUFACTURING AND CLASSIFICATION

Axon Panel is an advanced lightweight cement composite building product. The basic composition is portland cement, ground sand, cellulose fibre and water. The panels are easily identified by the name 'Axon Panel' printed at regular intervals on the back face of panel.

CLD Structural Cavity Battens are manufactured using a low density fibre cement formulation. The basic composition is Portland cement, ground sand, cellulose fibre and water and proprietary additives. The battens are sealed on all sides.

Axon Panel is manufactured to AS/NZS 2908.2 'Cellulose-Cement Products Part 2: Flat Sheets' (ISO 8336 'Fibre Cement Flat Panels') standards in New Zealand. James Hardie New Zealand is an ISO 9001 'Telarc' certified manufacturer.

Axon Panel is classified Type A, Category 3 in accordance with AS/NZS 2908.2 "Cellulose-Cement Products".

For Safety Data Sheets (SDS) visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

11.2 PRODUCT MASS

Axon Panel is manufactured in 9.0mm thickness and has a mass of 12.1kg/m² at EMC.

Axon Panel cladding is defined as a Light Weight Wall Cladding (not exceeding 30kg/m²) as per NZS 3604.

11.3 DURABILITY

11.3.1 General

Axon Panel installed as per this technical specification will meet the durability requirements for claddings as required under clause 'B2-Durability' of the NZBC.

11.3.2 Resistance to moisture/rotting

Axon Panel has demonstrated resistance to permanent moisture induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Heat Rain (Clause 6.5).
- Water Permeability (Clause 8.2.2).
- Warm Water (Clause 8.2.4).
- Soak Dry (Clause 8.2.5).

11.3.3 Control of External Fire Spread

Axon Panel is assessed as per Appendix C C7.1.1 and is classified as 'Non-Combustible Material' which is suitable for use as external wall cladding and complies with requirements of Paragraph 5.4 of the NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of Acceptable Solutions C/AS2 to C/AS6 of the NZBC.

11.3.4 Alpine regions

In regions subject to freeze/thaw conditions, Axon Panel must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions must be protected where snow drifts over winter are expected.

The Axon Panel has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

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12 Safe working practices

STAY HEALTHY WHEN WORKING WITH BUILDING PRODUCTS CONTAINING CRYSTALLINE SILICA

Crystalline Silica

What is it? Why and when is it a health hazard?

Crystalline Silica is

- Commonly known as sand or quartz
- Found in many building products e.g. concrete, bricks, grout, wallboard, ceramic tiles, and all fibre cement materials

Why is Crystalline Silica a health hazard?

- Silica can be breathed deep into the lungs when present in the air as a very fine (respirable) dust
- Exposure to silica dust without taking the appropriate safety measures to minimise the amount being breathed in, can lead to a potentially fatal lung disease – silicosis – and has also been linked with other diseases including cancer. Some studies suggest that smoking may increase these risks.
- The most hazardous dust is the dust you cannot see!

When is Crystalline Silica a health hazard?

- It's dangerous to health if safety protocols to control dust are not followed when cutting, drilling or rebating a product containing crystalline silica.
- Products containing silica are harmless if intact (e.g. an un-cut sheet of wall board).

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS AND INSTALLATION INSTRUCTIONS WHEN WORKING WITH JAMES HARDIE PRODUCTS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

AVOID BREATHING IN CRYSTALLINE SILICA DUST!

Safe working practices

- 👍 NEVER use a power saw indoors or in a poorly ventilated area
- 👍 NEVER dry sweep
- 👍 ALWAYS use M Class extractor unit as a minimum and always hose down with water/wet wipe for clean up
- 👍 NEVER use grinders
- 👍 ALWAYS use a circular sawblade specifically designed to minimise dust creation when cutting fibre cement – preferably a sawblade that carries the HardieBlade™ logo or one with at least equivalent performance.
- 👍 ALWAYS follow tool manufacturers' safety recommendations
- 👍 ALWAYS expose only the minimum required depth of blade for the thickness of fibre cement to be cut
- 👍 ALWAYS wear an approved properly-fitted, approved dust mask (P1 or P2) or respirator

Use one of the following methods based on the required cutting rate:

BEST

- Score and snap knife
- Hand guillotine
- Fibreshear

BETTER

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and M Class extractor unit.

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade

Working outdoors

- 👍 Make sure you work in a well ventilated area
- 👍 Position cutting station so wind will blow dust away from yourself and others in the working area
- 👍 Cut products with either a 'Score or snap' knife or fibre cement shears or, when not feasible, use a HardieBlade™ Saw Blade (or equivalent) and a dust-reducing circular saw attached to a M Class extractor unit
- 👍 When sawing, sanding, rebating, drilling or machining fibre cement products, always:
 - Wear your P1 or P2 mask (correctly fitted in accordance with manufacturers' instructions) and when others are close by, ask them to do the same
 - If you are not clean shaven, then use a powered air respirator with a loose fitting head top.
 - Wear safety glasses
 - Wear hearing protection
 - When others are close by, ask them to do the same.

Working indoors

- 👍 Never cut using a circular saw indoors
- 👍 Position cutting station in a well ventilated area
- 👍 Cut ONLY using a score and snap knife, hand guillotine or fibreshears (manual, electric or pneumatic)
- 👍 Make sure you clean up BUT never dry sweep. Always hose down with water/wet wipe or use an M Class extractor unit

IF CONCERN STILL EXISTS ABOUT EXPOSURE LEVELS OR YOU DO NOT COMPLY WITH THE ABOVE PRACTICES, YOU SHOULD ALWAYS CONSULT A QUALIFIED INDUSTRIAL HYGIENIST.

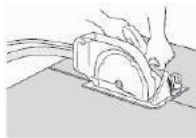
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Working Instructions

- Refer to Recommended Safe Working Practices before starting any cutting or machining of product.



HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.

Hole-Forming

For smooth clean cut circular holes:

- Mark the centre of the hole on the sheet.
- Pre-drill a 'pilot' hole.
- Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.



For irregular holes:

- Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face.
- Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.

STORAGE & DELIVERY

Keeping products and people safe

Off loading

- James Hardie products should be off-loaded carefully by hand or by forklift.
- James Hardie products should not be rolled or dumped off a truck during the delivery to the jobsite.

Storage

James Hardie products should be stored:

- in their original packaging
- under cover where possible or otherwise protected with a waterproof covering to keep products dry
- off the ground – either on a pallet or adequately supported on timber or other spacers
- flat so as to minimise bending

James Hardie products must not be stored:

- directly on the ground
- in the open air exposed to the elements

JAMES HARDIE IS NOT RESPONSIBLE FOR DAMAGE DUE TO IMPROPER STORAGE AND HANDLING.

TIPS FOR SAFE AND EASY HANDLING

Weatherboard products

- Do not lift planked products flat and in the middle
- Carry the products on the edge
- If only one person is carrying the product, hold it in the middle and spread arms apart to better support the product
- If two people are carrying the plank, hold it near each end and on edge
- Exercise care when handling weatherboard products to avoid damaging the edges/corners

Sheet products

- Carry with two people
- Hold near each end and on edge
- Exercise care when handling sheet products to avoid damaging the edges/corners

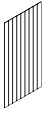
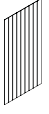
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13 Product sizes and accessories

Table 7

Axon Panel information					
Product	Description	Thickness	Size		Product Code
	Axon Panel 133 Smooth Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m2	9	Length	Width	
			2450	1200	403780
			2750	1200	403781
	Axon Panel 133 Grained Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m2	9	3000	1200	403782
			2450	1200	404510
			2750	1200	404511
	Axon Panel 400 Smooth Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 400mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m2	9	3000	1200	404512
			2450	1200	404414
			2750	1200	404415
			3000	1200	404416

Note: The actual width of the panel is 1203mm. All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

Table 8

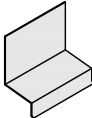
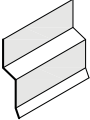
Accessories/tools supplied by James Hardie			
Accessories	Description	Quantity/Size (approx)	Code
	CLD Structural Cavity Batten 19mm thick fibre cement cavity batten installed over RAB Board or a flexible underlay. Axon Panels are fixed to the battens.	19 x 70mm, 2450mm long	403870
	JH 9mm Panel Aluminium External Box Corner A box corner mould to form the external joints. 9mm etch primed.	2450mm long	304509
		2750mm long	304510
		3000mm long	305150
		4000mm long	305808
	JH 9mm Panel Aluminium Horizontal 'h' Mould A horizontal flashing to flash the horizontal joints. 9mm etch primed.	3000mm long	304508
	Aluminium 'h' Mould Jointer A jointer to cover the butt joint of 'h' mould.	100mm long	304512
	uPVC Corner Under Flashing A 50 x 50mm corner under flashing for internal and external joints.	3000mm long	303745
	uPVC Vent Strip Used to provide protection from vermin entering cavity space.	3000mm long	302490
	Annular Threaded Nail 25 x 2.5mm nail.	500gm	300390
	INSEAL® 3259 Tape Black 50mm tape to be used under the vertical shiplap joint. Black 80mm tape to be used at corners.	50m roll	300767
			300769
	CLD Batten Corner Flashing Aluminium Used at internal corner sealant joints at floor joist level.		304652
Tools			
	HardieBlade™ Saw Blade Diamond tip 184mm diameter fibre cement circular saw blade. Spacers not included.	Each	300660

NOTE: uPVC 'h' mould and jointer accessories are also available from James Hardie.

Table 9

Accessories/tools not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with Axon Panel. James Hardie does not supply these products and does not provide a warranty for their use. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description
	Flexible Underlay To comply with Table 23 of E2/AS1.
	Flexible Tape A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information. e.g. Tyvek®, Protecto or Thermakraft or similar.
	Joint Sealant Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information. e.g. Sika Silaflex MS, Sika AT Façade, Bostik Seal N Flex-1 or similar
	Head Flashing Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.
	Flashing Material as per Table 20, 'E2/AS1'
	HardieFlex™ Hot Dip Galv and Stainless Steel 316 nails For fixing panels direct to framing. 40 x 2.8mm
	C-25 Stainless Steel Brad Nails 304SS brad nails used to install Axon Panels to the CLD Structural Cavity Battens used in a straight bradder. Paslode: (09) 477 3000
	ND 50 Stainless Steel Brad Nails Used to install Axon Panel direct fix to timber framing. Used in a straight bradder.
	65 x 2.87mm RoundDrive Ring Shank Nail For fixing CLD Structural Cavity Battens to the framing. Paslode: (09) 477 3000
	Bostik Seal N Flex-1 'Seal N Flex-1' Polyurethane adhesive sealant manufactured by BOSTIK for applying between the panels and battens, Refer to section 5 for more information. BOSTIK: ALK: (09) 579 6253, WGTN: (04) 567 5119, CHCH: (03) 366 2583.
	Sika Sikaflex 11FC Sika: 0800 SIKAZ (0800 745 269)
	200mm wide Polypropylene DPC Product used over flexible underlay at external and internal corners. ie. Super Course 500

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14 Details

The following generic details have been provided in this document for both direct fixed and cavity construction methods.

Table 10

Details				
Description	Direct Fixed		CLD Structural Cavity Batten Construction	
	Figure No.	Page No.	Figure No.	Page No.
Typical framing setout	Figure 1	16	Figure 15	25
Typical panel nail fixing setout	Figure 2	17	Figure 17	27
	Figure 13	24		
Foundation detail	Figure 3	18	Figure 18	28
Vertical shiplap joint	Figure 4	18	Figure 19	29
	Figure 14	25		
Soffit detail	Figure 5	19	Figure 32	39
Internal corner detail	Figure 6	19	Figure 21	30
External corner detail	Figure 7	20	Figure 22	31
Section at sill	Figure 8	20	Figure 24	33
Window jamb	Figure 9	21	Figure 25	34
Window head	Figure 10	21	Figure 26	34
Window head with facings			Figure 27	35
Window jamb with facings			Figure 28	35
Window sill with planted sill			Figure 29	36
Horizontal joint detail	Figure 11	22	Figure 30	37
			Figure 31	38
Corner at 'h' mould joint detail	Figure 12	23		
Batten fixing setout			Figure 16	26
Intermediate stud fixing			Figure 20	30
Jointing of CLD Structural Cavity Batten			Figure 23	32
External corner			Figure 33	40
Cavity pipe penetration			Figure 34	40
Internal corner			Figure 35	41
Aluminium 'h' mould joiner			Figure 36	42
One piece apron flashing joint			Figure 37	43
Drained flashing joint at floor joist			Figure 38	44
Meter box at sill			Figure 39	45
Meter box at jamb			Figure 40	45
Meter box at head			Figure 41	46
Garage door jamb			Figure 42	47
Garage door head			Figure 43	48
Junction between Axon Panel and fascia board			Figure 44	49
Enclosed roof to wall intersection			Figure 45	50

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Figure 14: Shiplap joint — brad nail

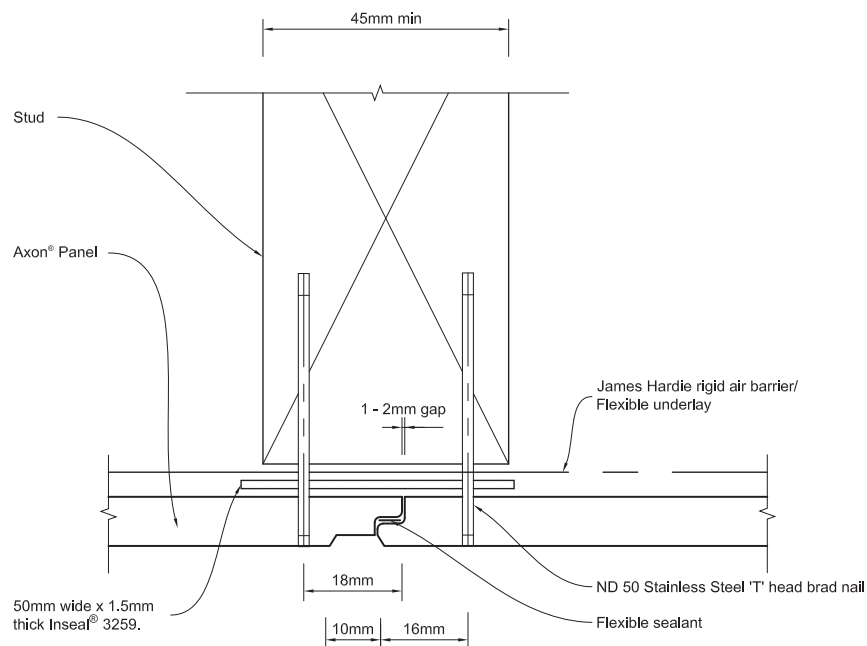
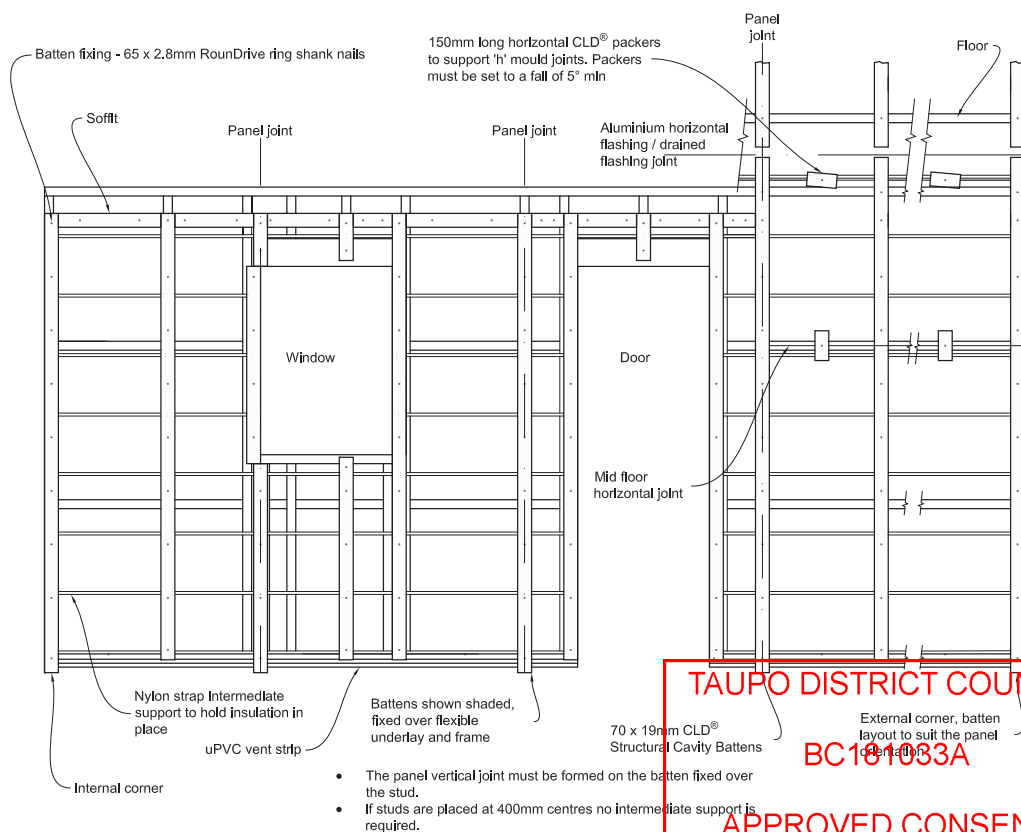


Figure 15: Framing setout

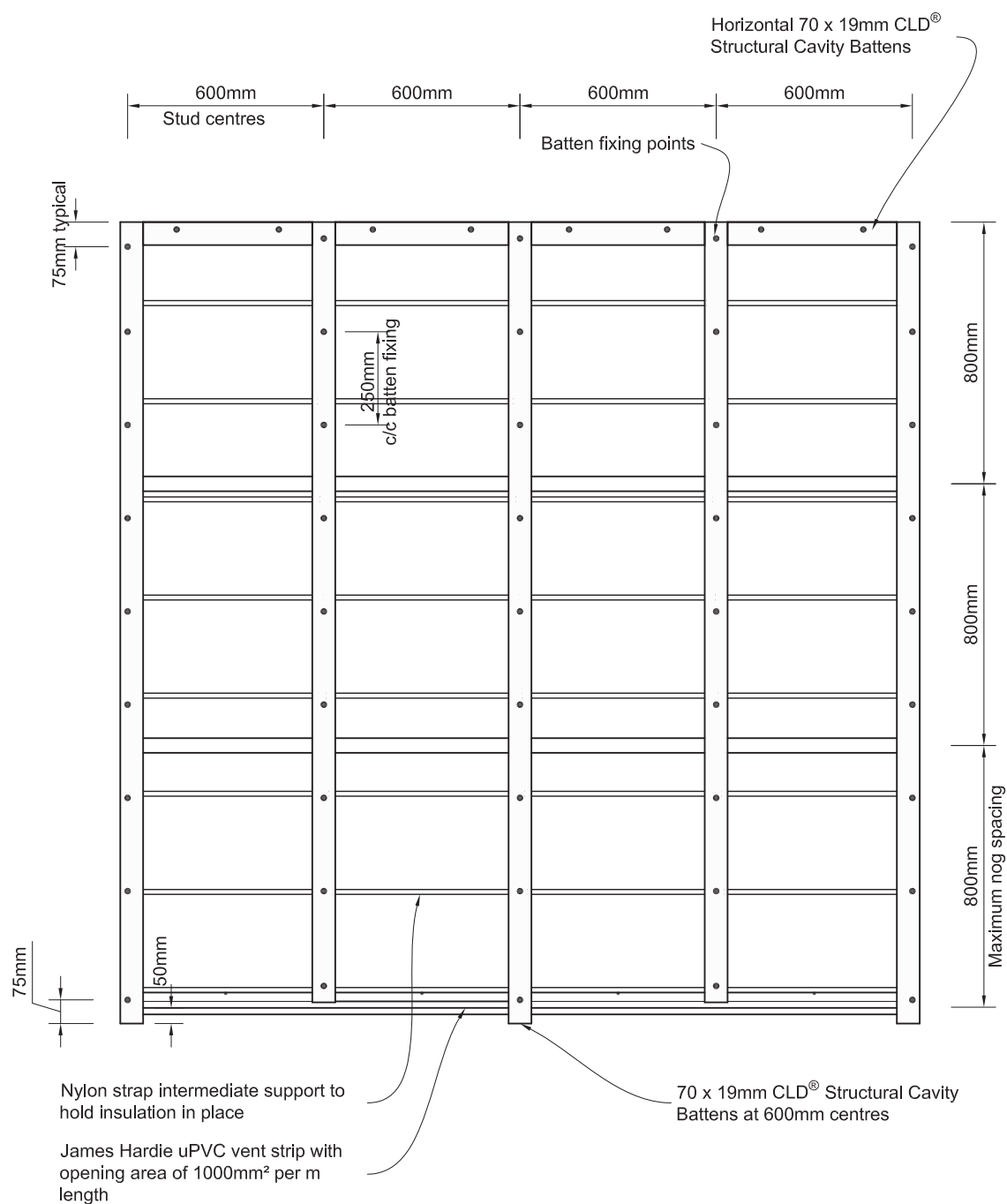


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Figure 16: Batten fixing setout

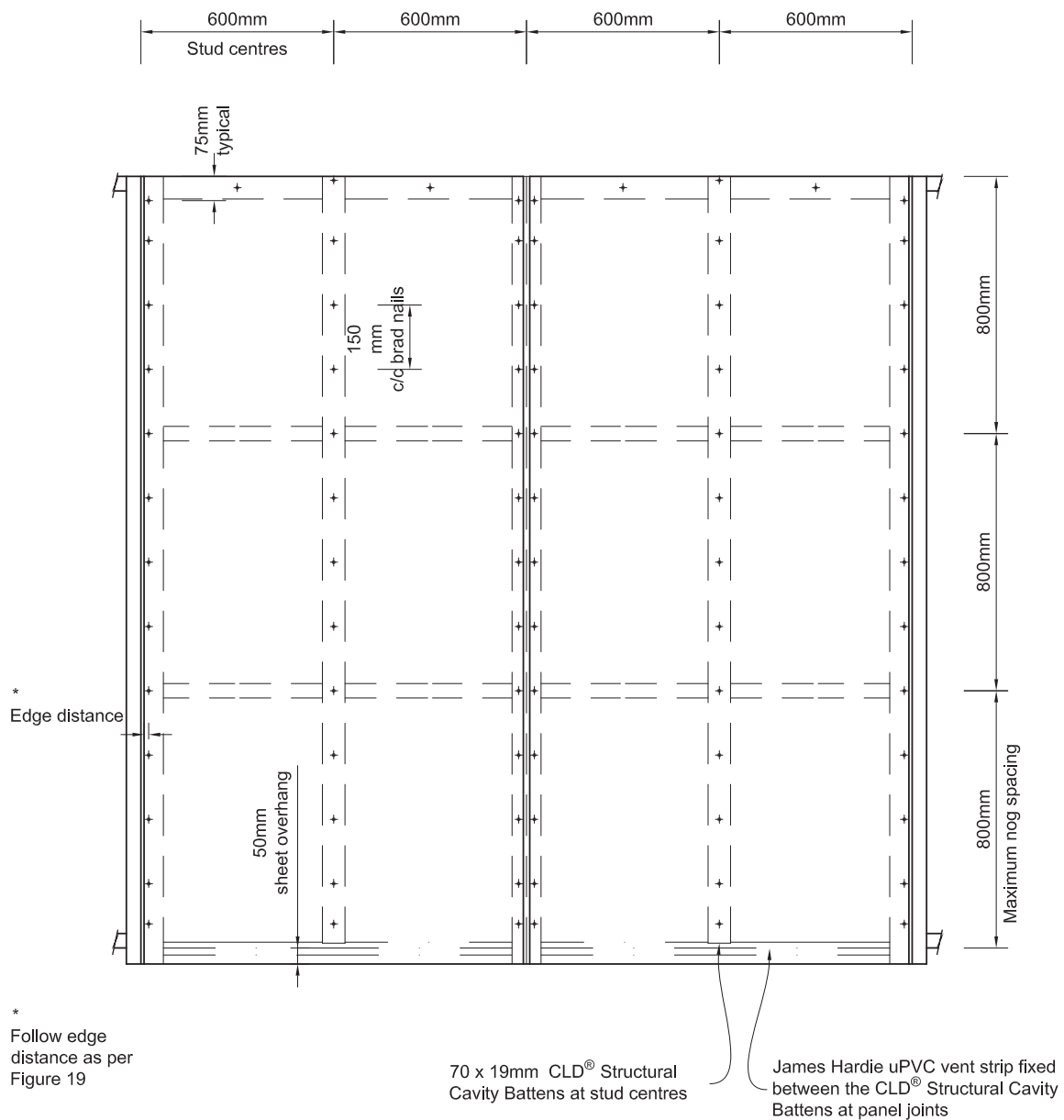


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Figure 17: Sheet fixing setout



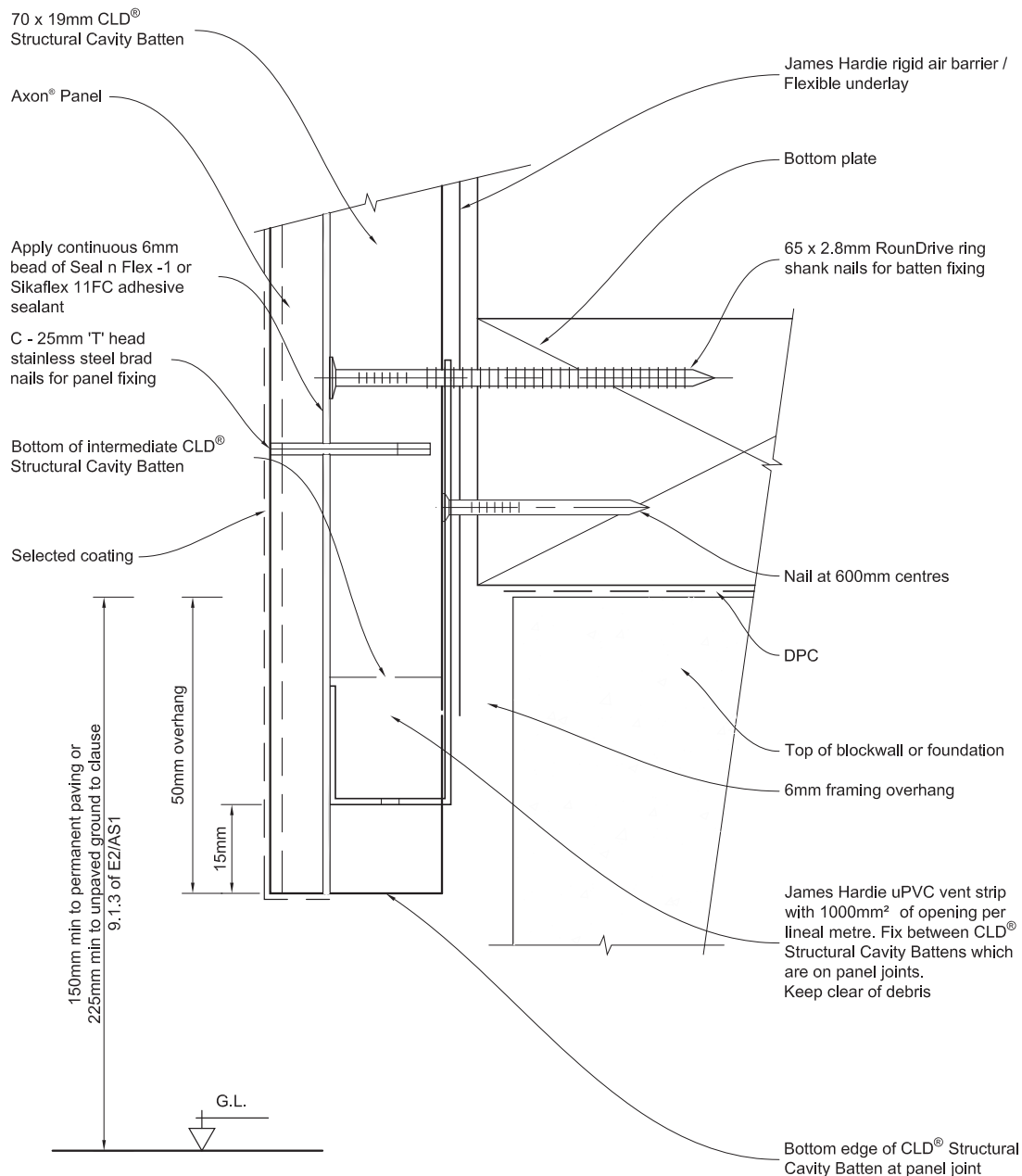
Note: When studs spaced at 400mm centres using Axon® Panel 400, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.

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Figure 18: Foundation detail



Notes:

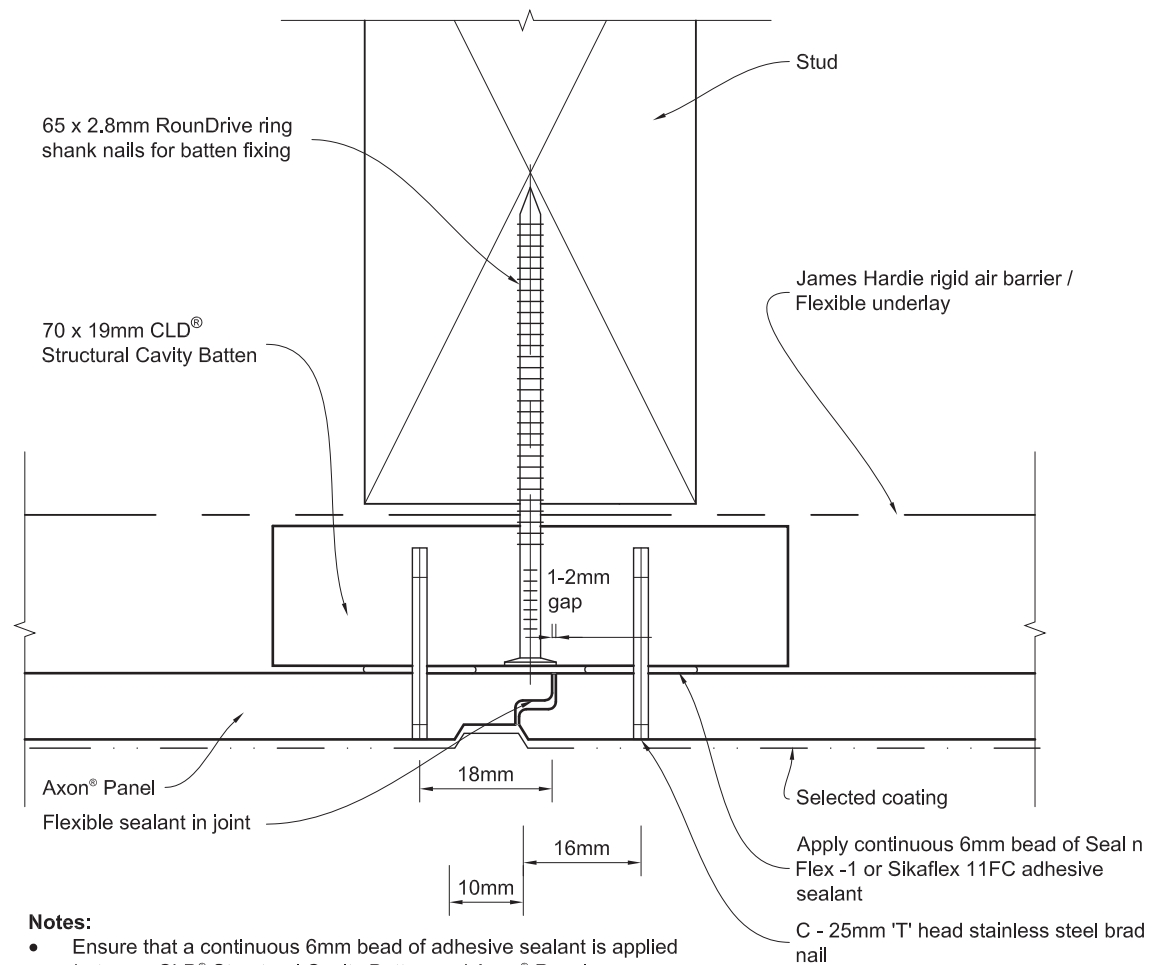
- Check panel extends past bottom plate as specified in Architects specification (50mm min).
- uPVC Vent strip must remain level and secure during construction. Cut and fix uPVC vent strip between CLD[®] Structural Cavity Battens fixed under the panel joints.
- Check vent strip is free from site debris.

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Figure 19: Vertical shiplap joint



Notes:

- Ensure that a continuous 6mm bead of adhesive sealant is applied between CLD[®] Structural Cavity Batten and Axon[®] Panel.
- Ensure that the required edge distance is maintained when fixing.
- Seal cut edges with a primer compatible with final coatings.

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Figure 20: Intermediate stud fixing

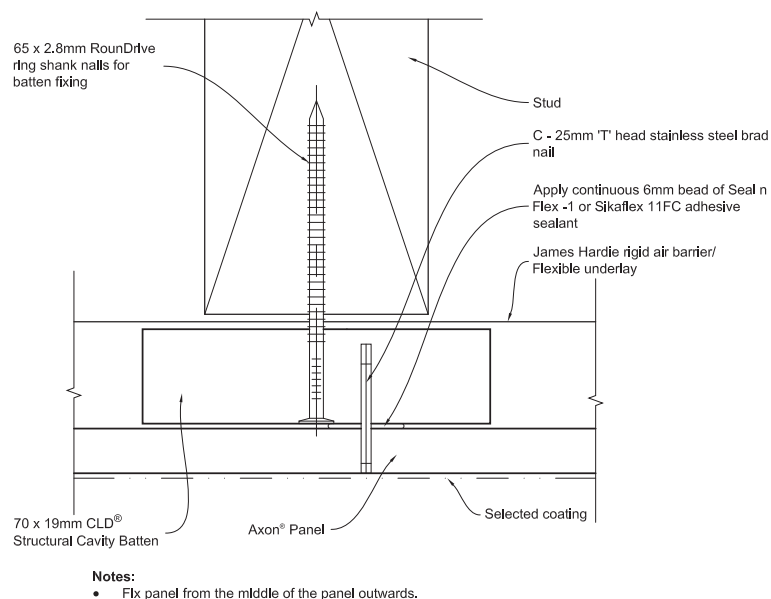
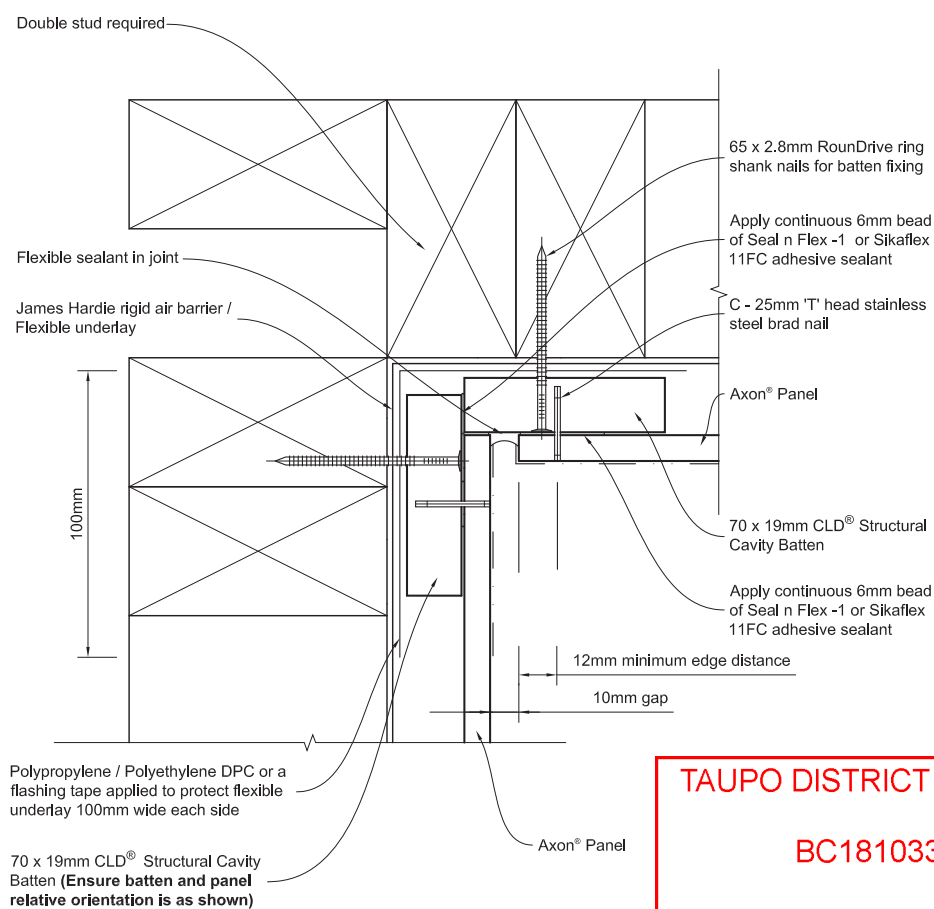


Figure 21: Internal corner

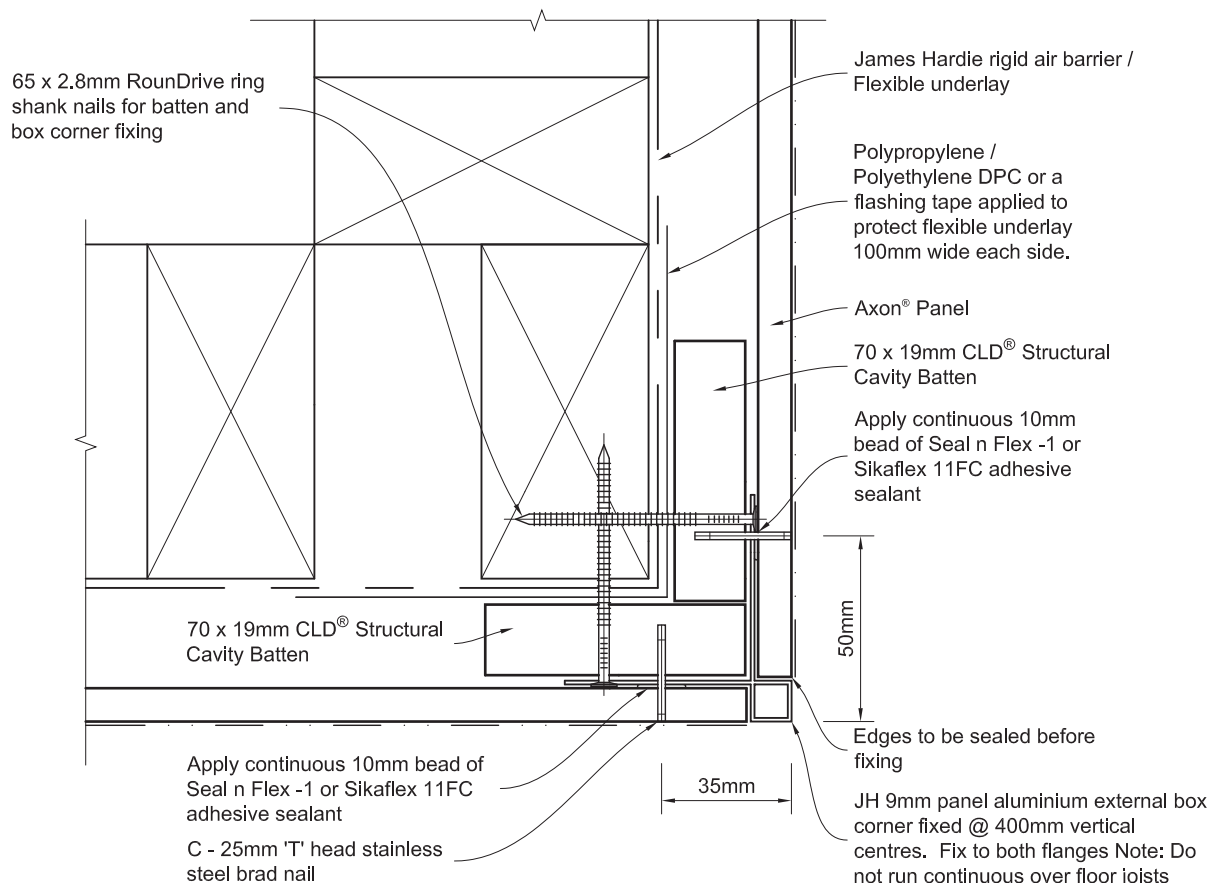


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Figure 22: External corner

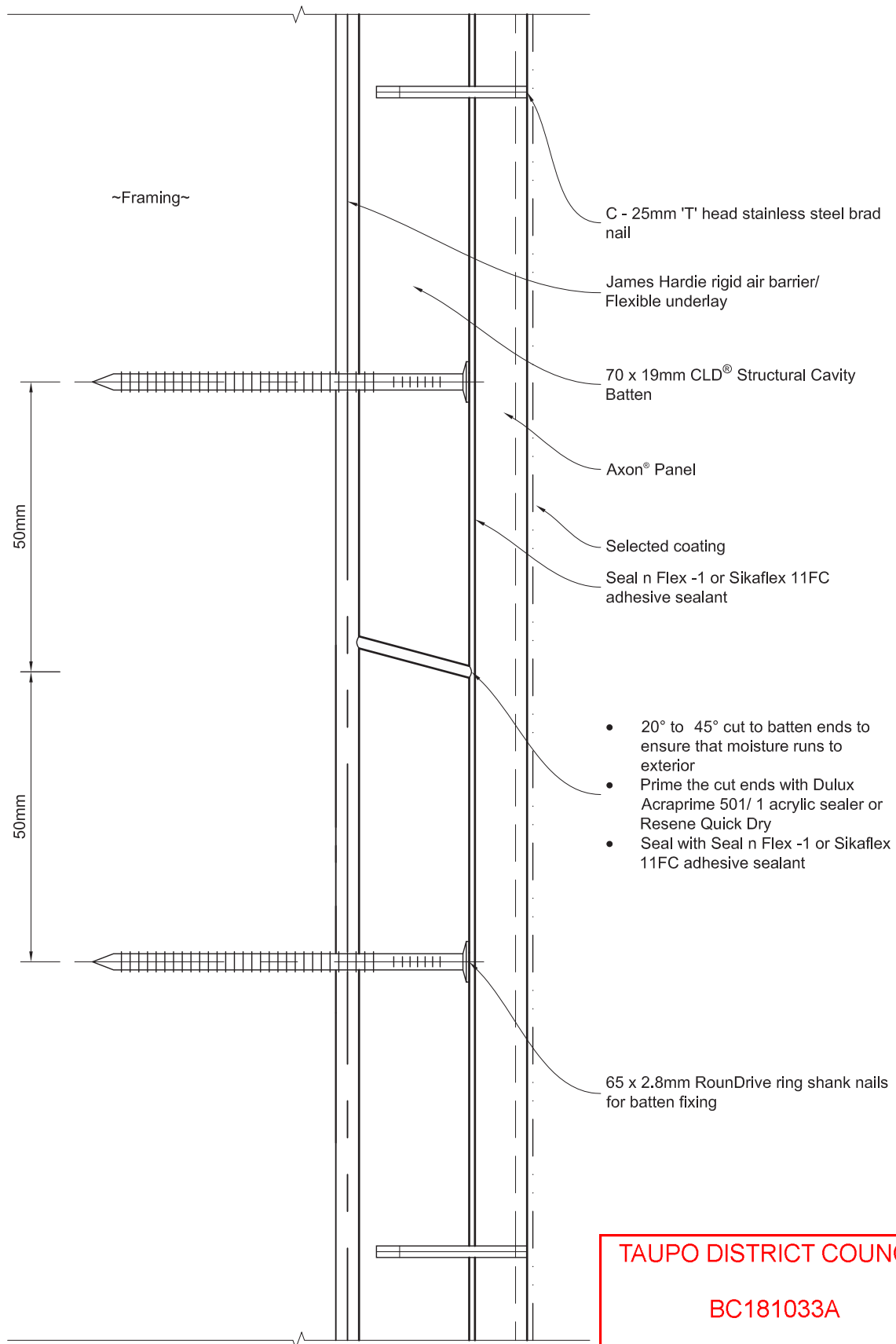


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Figure 23: Jointing of CLD Structural Cavity Batten

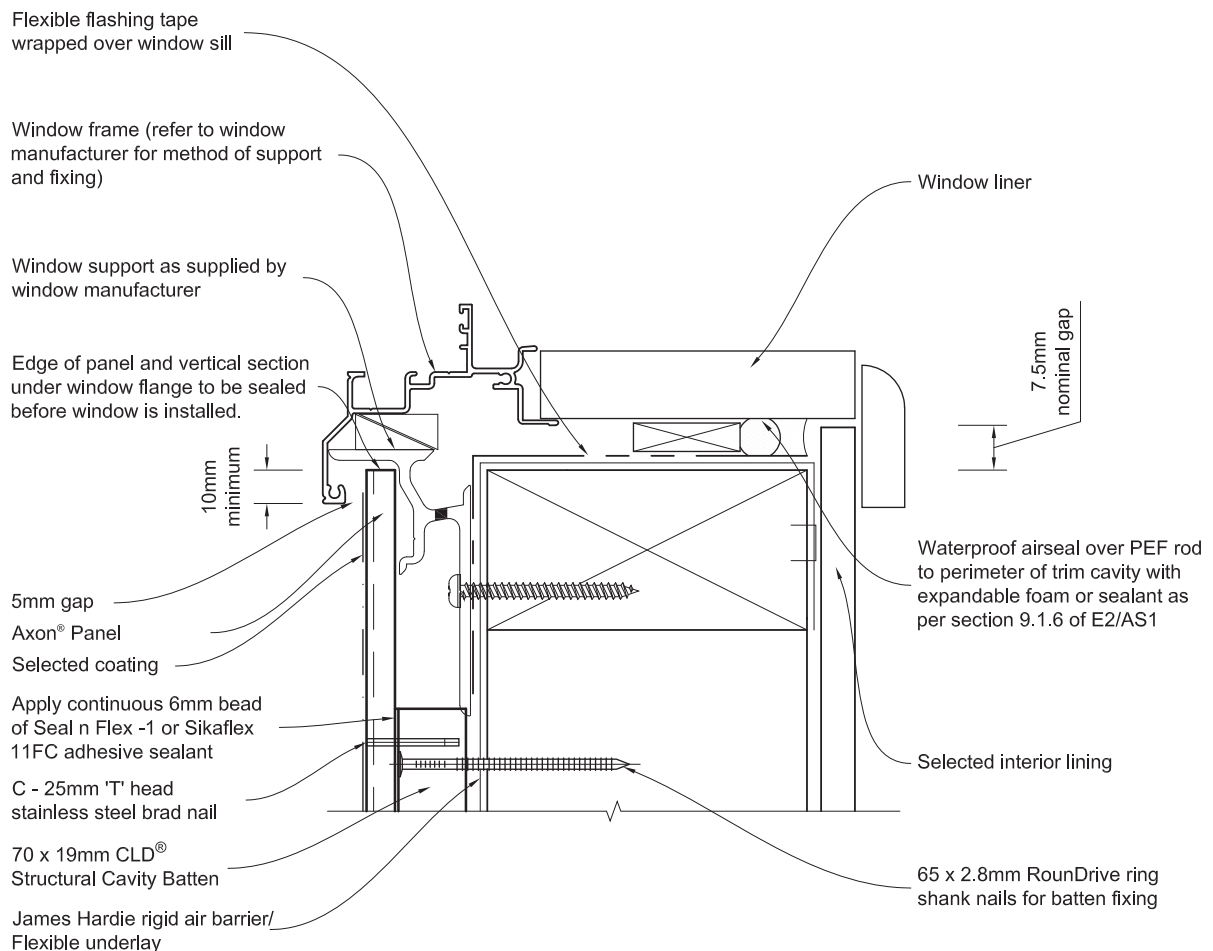


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Figure 24: Window sill



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

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Figure 25: Window jamb

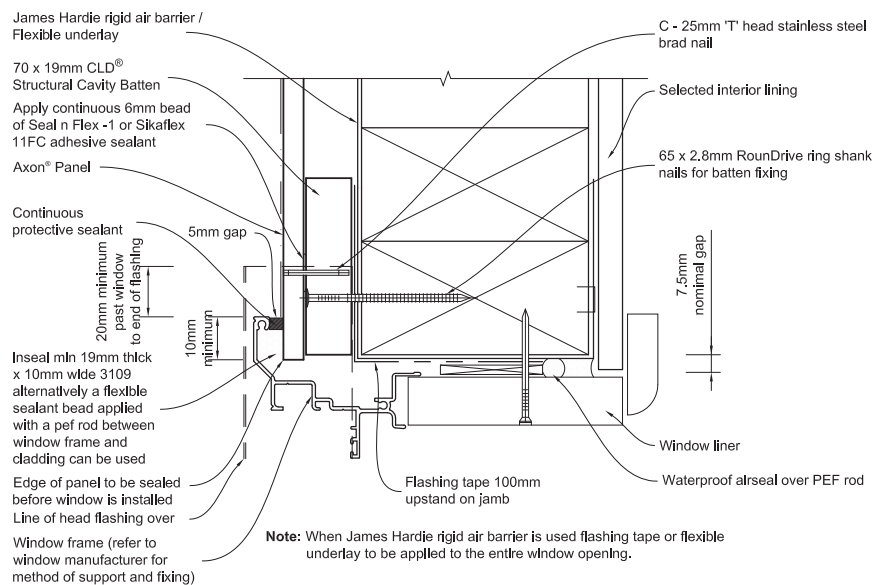
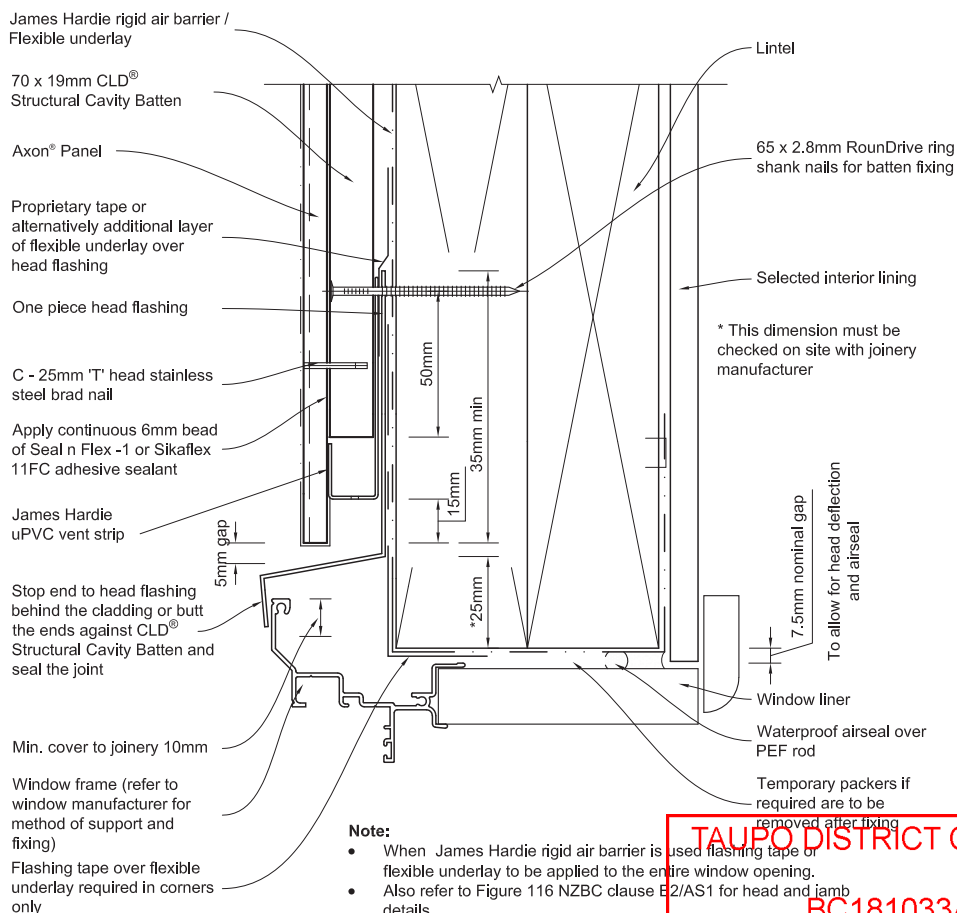


Figure 26: Window head



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Figure 27: Window head with facings

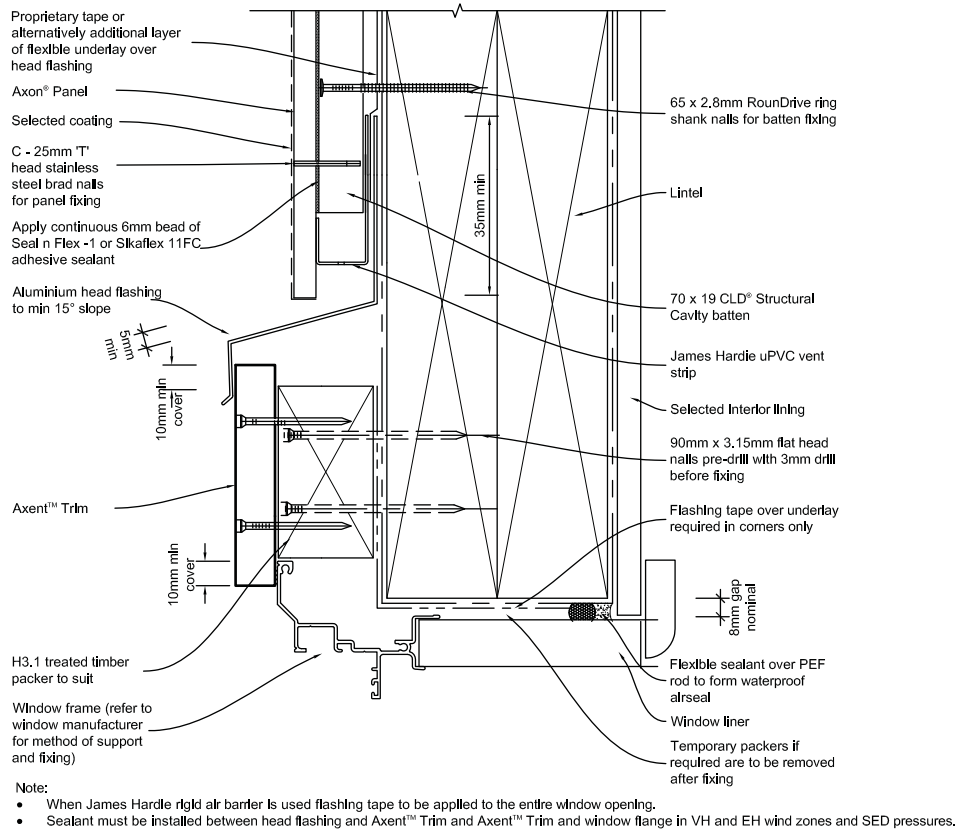
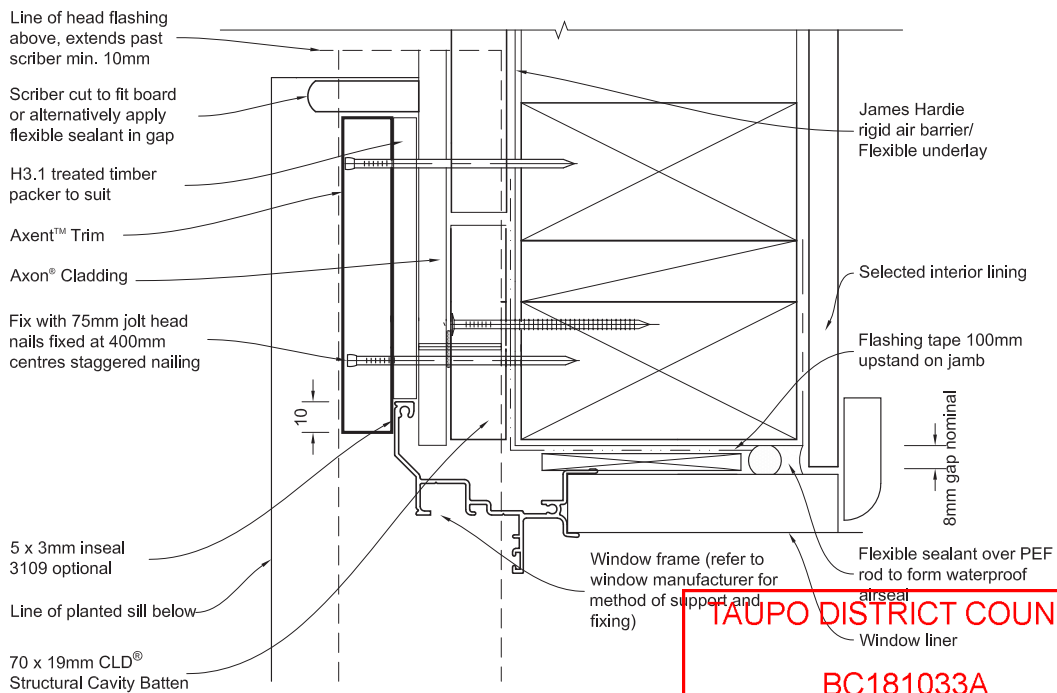


Figure 28: Window jamb with facings

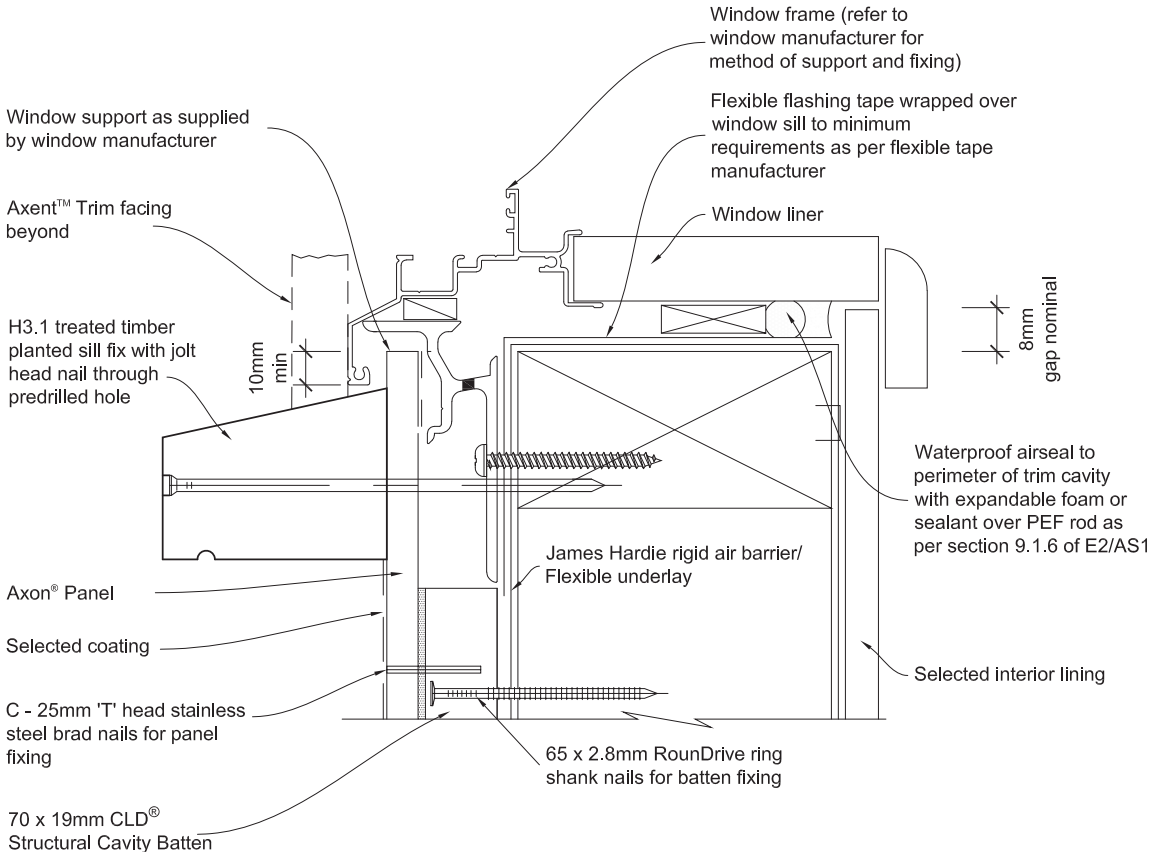


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Figure 29: Window sill with planted sill



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.
4. When James Hardie rigid air barriers are used flashing tape to be applied to the entire opening.

Refer to the manufacturer or supplier for technical information for these materials.

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Figure 30: Horizontal joint at floor joist

Seal n Flex -1 or Sikaflex
11FC adhesive sealant
between panel and batten
omitted for clarity

James Hardie rigid air barrier /
Flexible underlay

70 x 19mm CLD® Structural
Cavity Batten

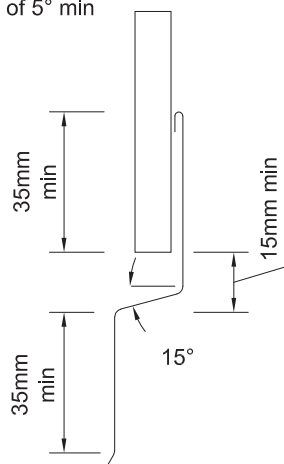
Axon® Panel

JH 9mm panel aluminium
horizontal 'h' mould.

Seal sheet and sheet edge
before installing horizontal
flashing

C - 25mm 'T' head
stainless steel brad nail

150mm long horizontal
CLD® packers optional
between vertical battens
when battens are fixed over
studs at 600mm apart.
Packers must be set to a fall
of 5° min



Alternative Flashing Option

Note:

1. When 50 year durability is required refer Table 20
of NZBC E2/AS1 document.

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Figure 31: Horizontal joint in tall wall

Seal n Flex -1 or Sikaflex 11FC adhesive sealant between panel and batten omitted for clarity

James Hardie rigid air barrier / Flexible underlay

70 x 19mm CLD[®] Structural Cavity Batten

Axon[®] Panel

JH 9mm panel aluminium horizontal 'h' mould.

Seal sheet and sheet edge before installing horizontal flashing

10mm gap

C - 25mm 'T' head stainless steel brad nail

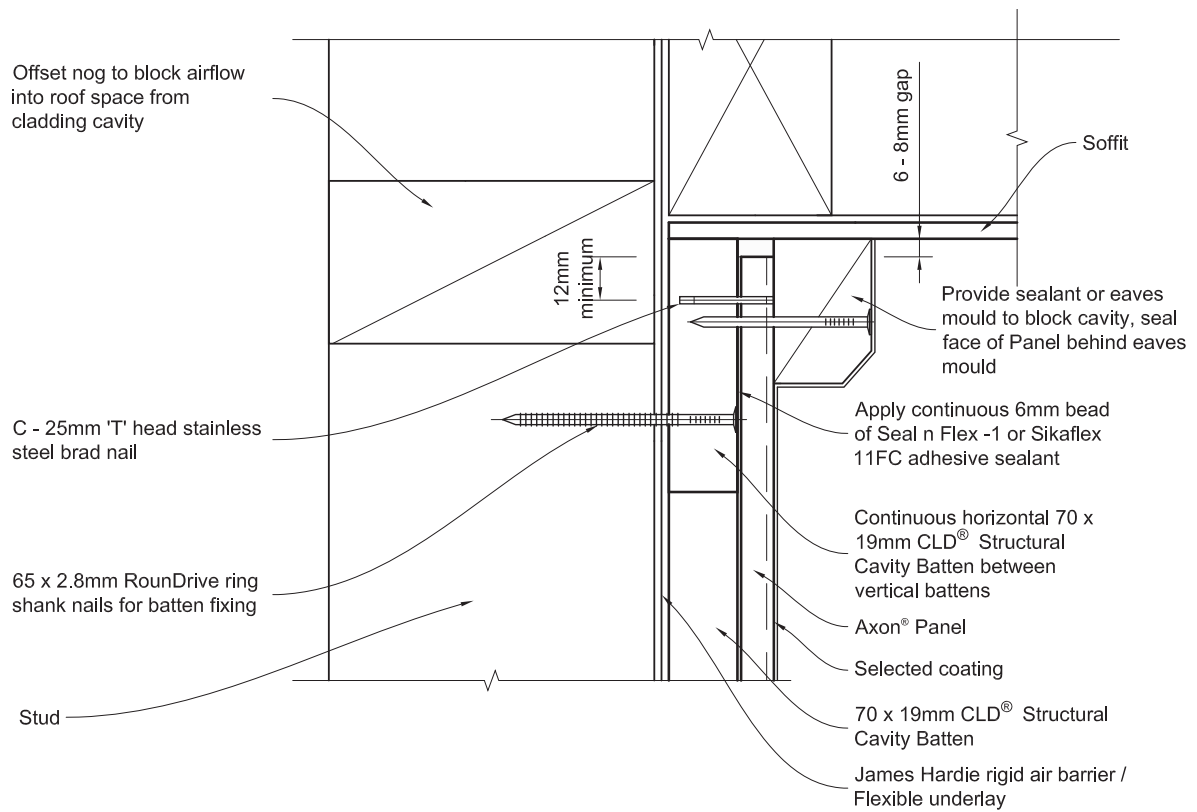
150mm long vertical CLD[®] packers optional between vertical battens when battens are fixed over studs at 600mm apart.

65 x 2.8mm RoundDrive ring shank nails for batten fixing

Selected coating

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Figure 32: Soffit detail



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Figure 33: External corner at 'h' mould joint detail

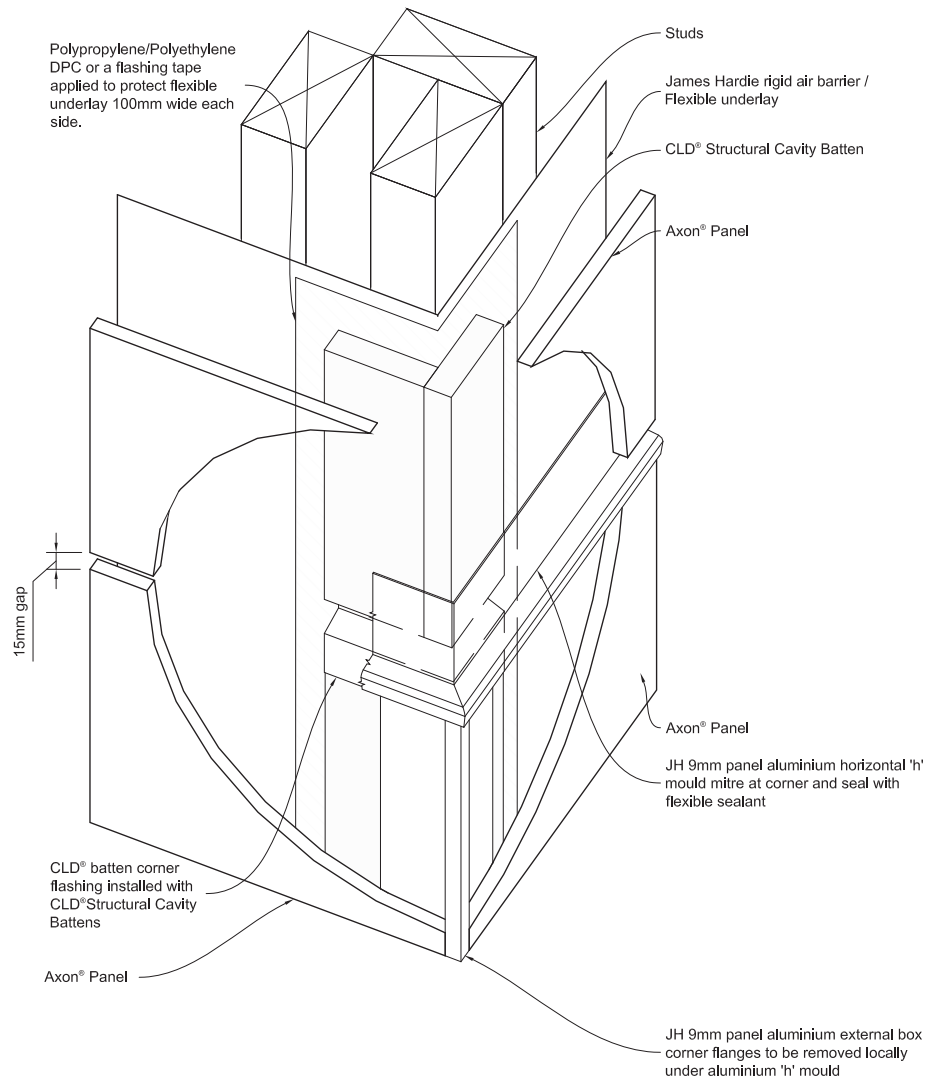
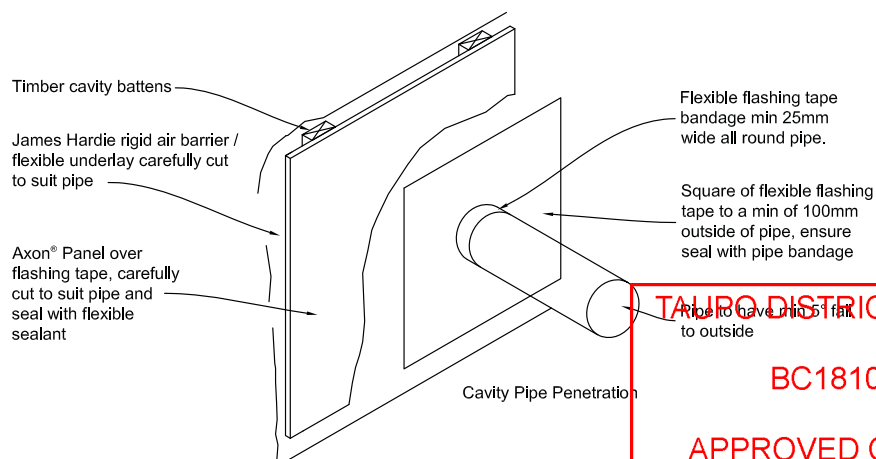


Figure 34: Cavity pipe penetration

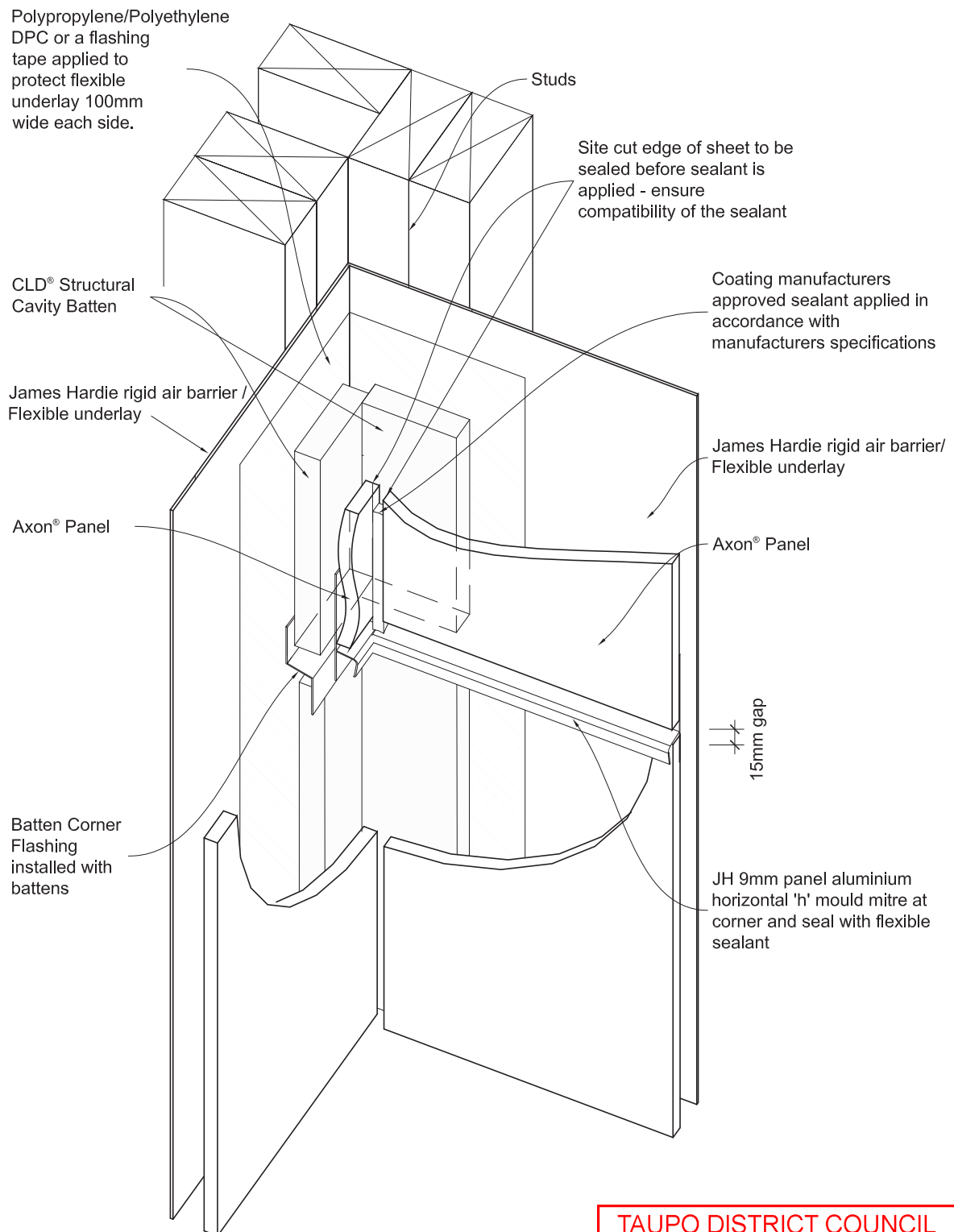


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Figure 35: Internal corner at 'h' mould joint detail

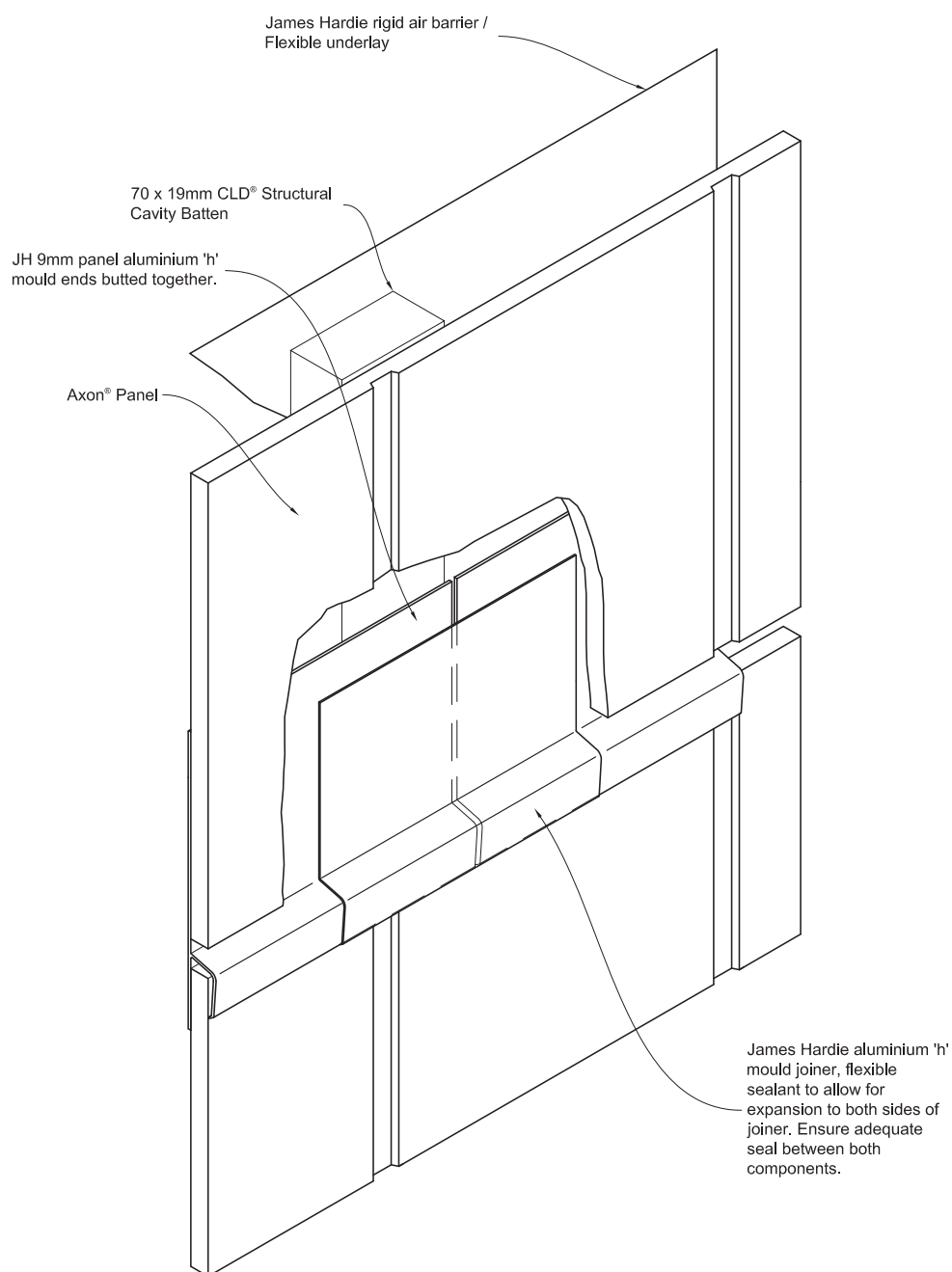


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Figure 36: Aluminium 'h' mould joiner

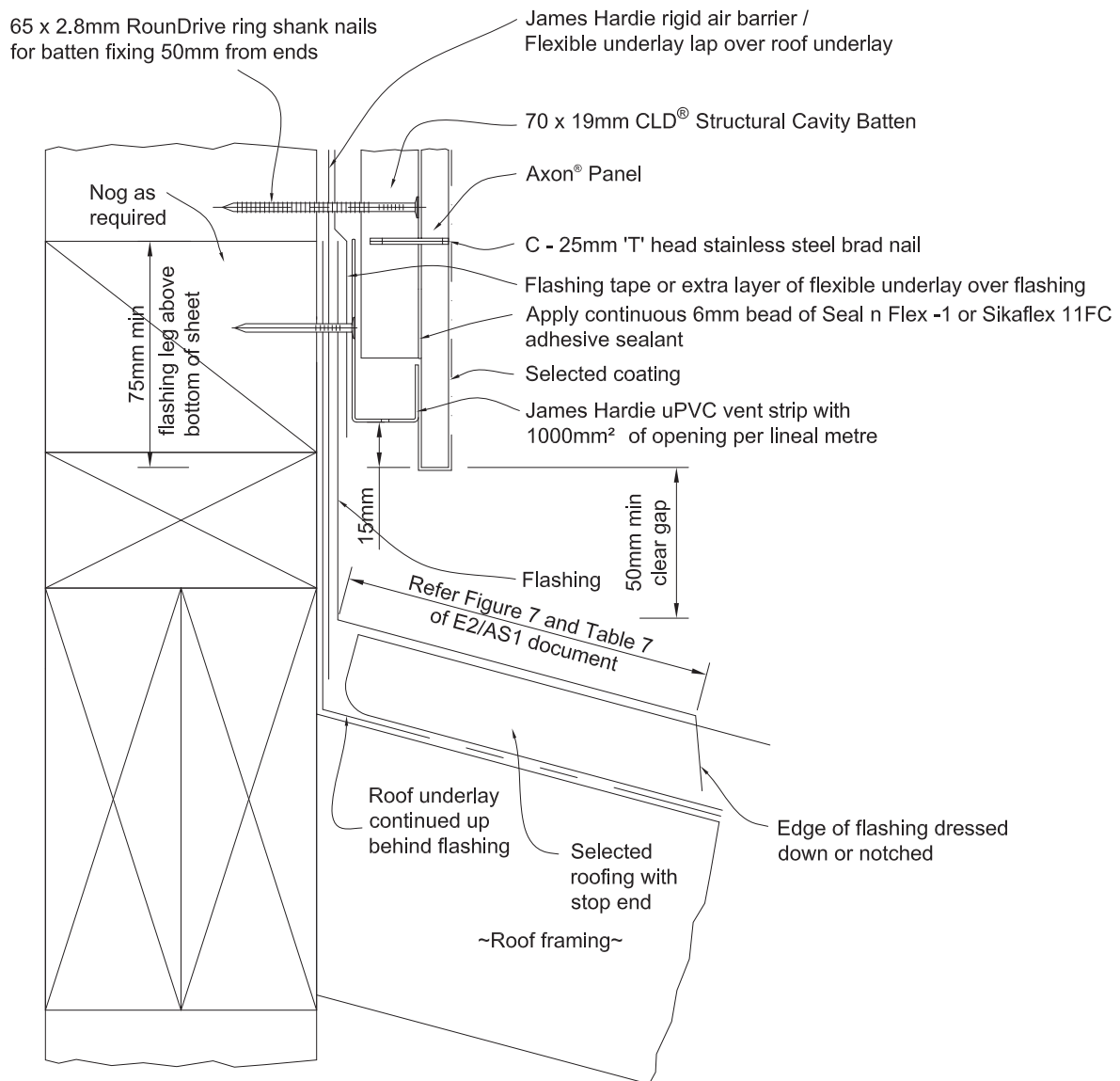


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Figure 37: One piece apron flashing joint



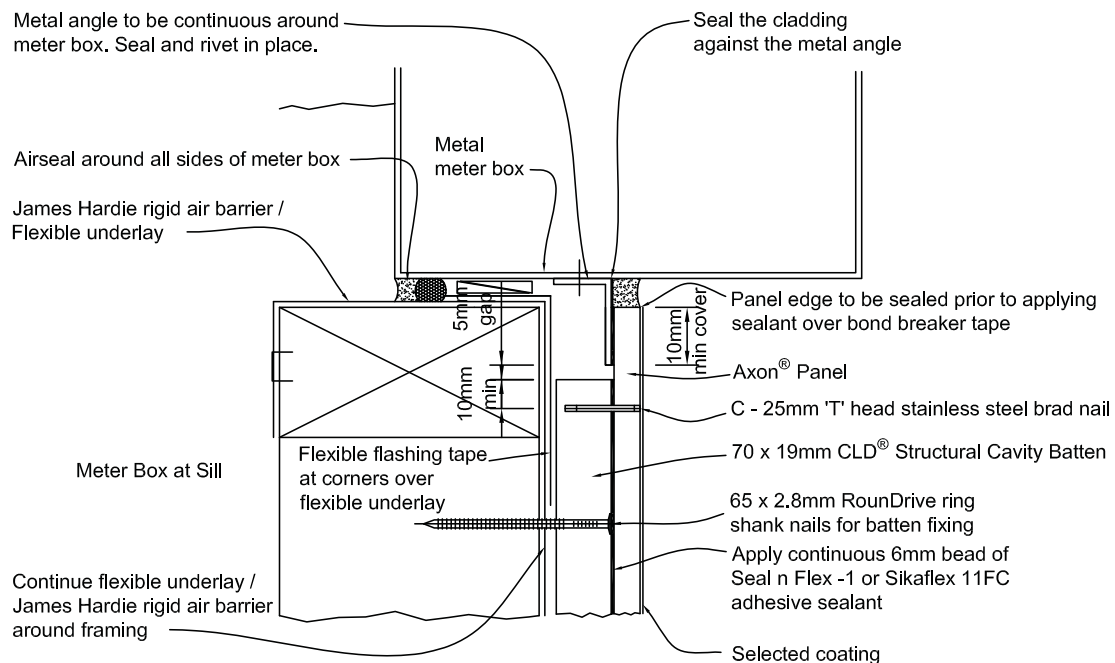
When 50 year durability for flashing is required refer Table 20 NZBC E2/AS1 document.

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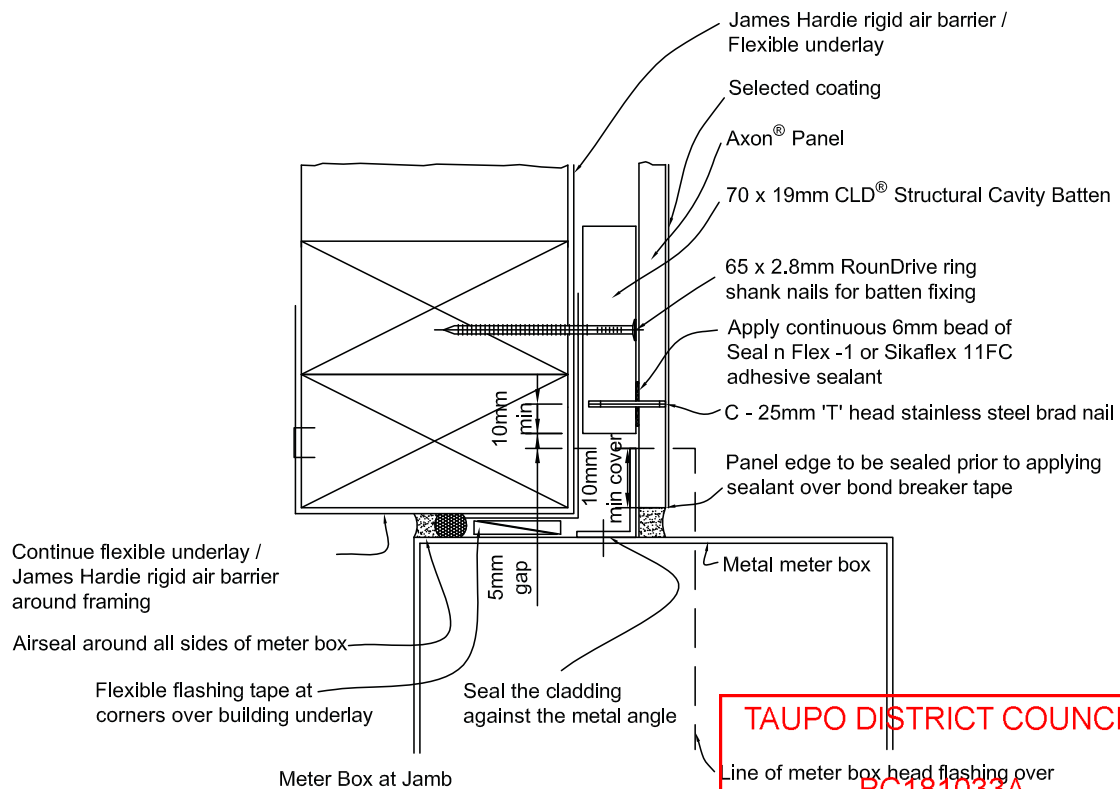
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Figure 39: Meter box at sill



Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box sill.

Figure 40: Meter box at jamb



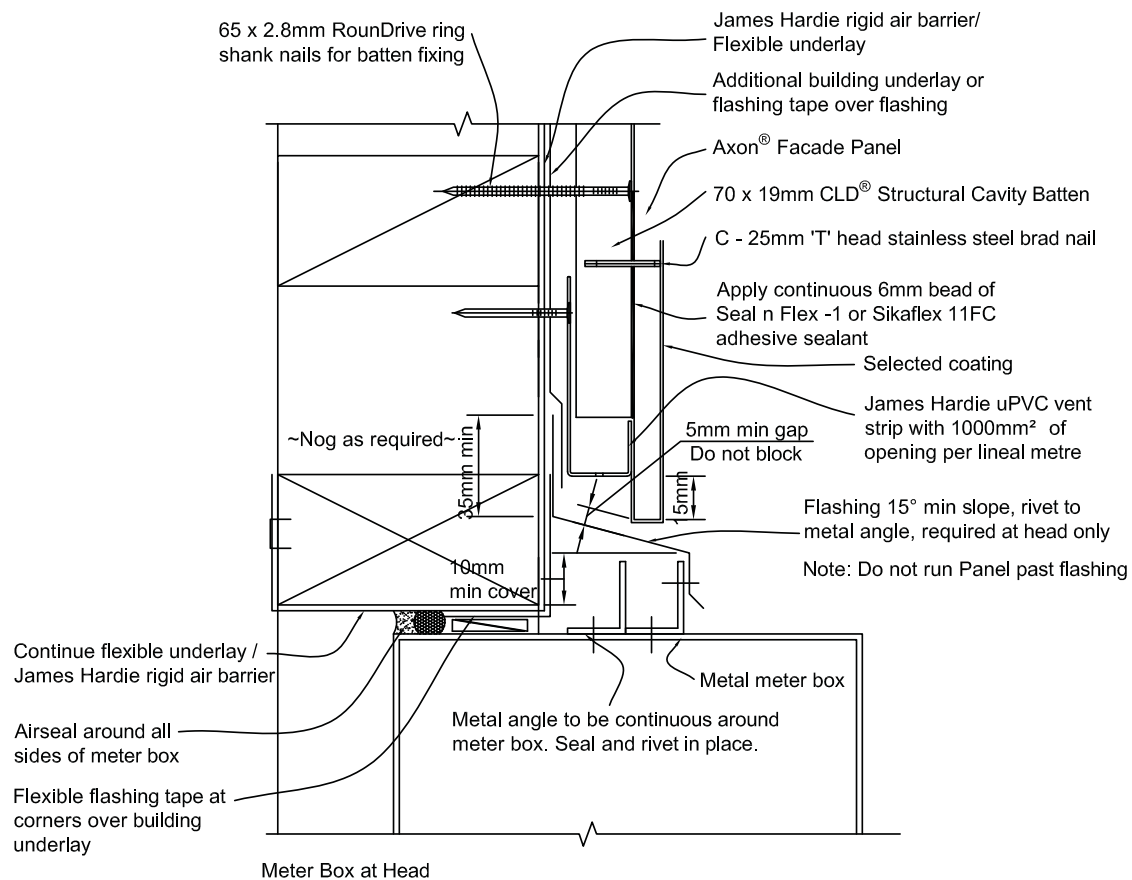
Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box jamb.

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Figure 41: Meter box at head



Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box head.

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Figure 42: Garage door jamb

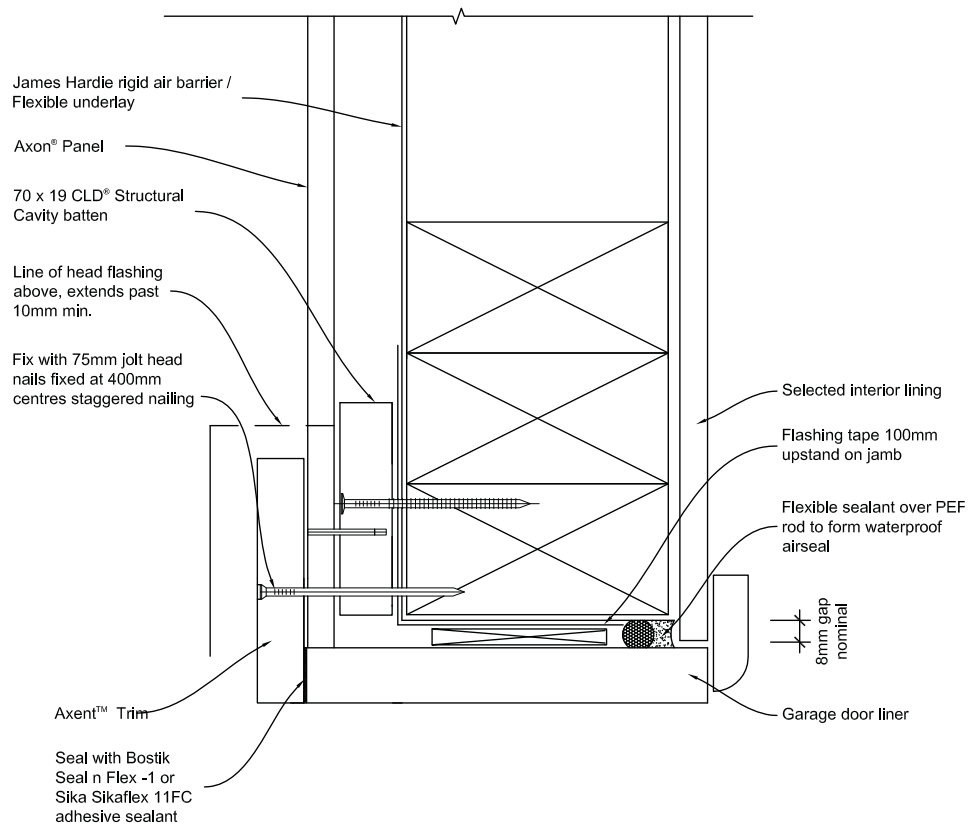
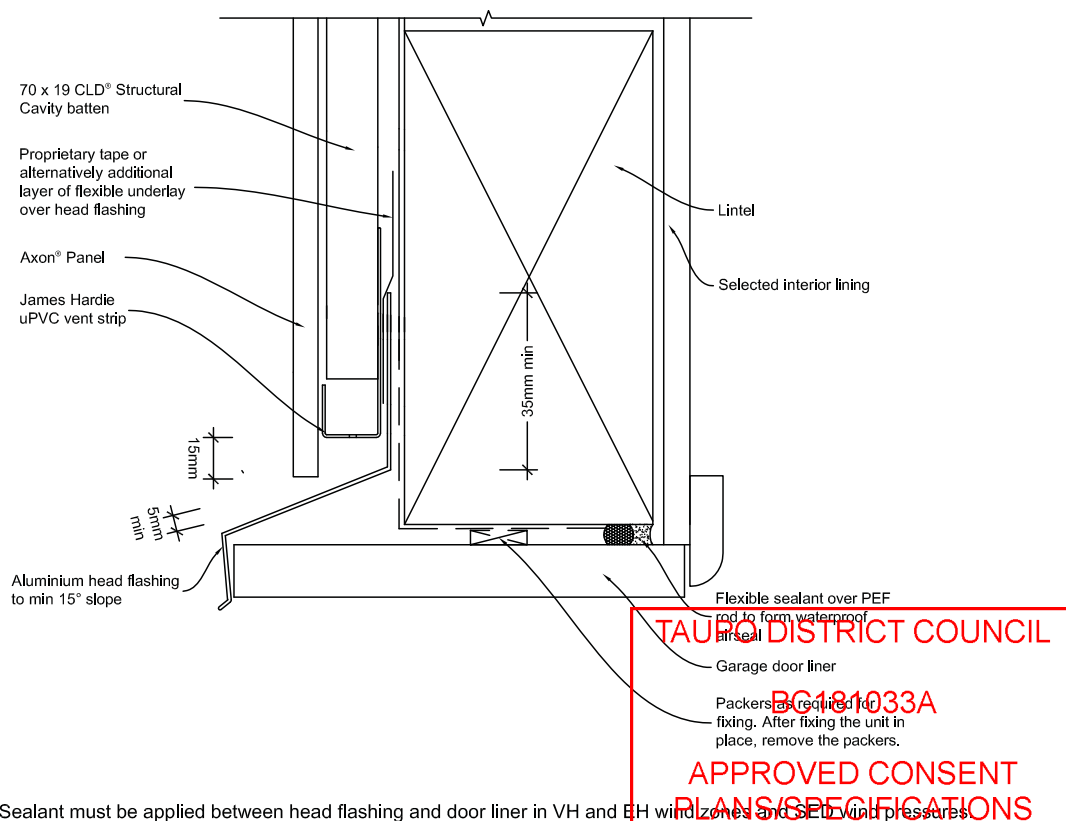


Figure 43: Garage door head





Technical Specification

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Fax 0800 808 988
literaturefeedback@jameshardie.co.nz

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CODemark™
30018

1 Application and scope

1.1 APPLICATION

Linea® Weathrboard is a 16mm thick, pre-primed bevel back fibre cement weatherboard and is classified as lightweight wall cladding suitable for residential and light commercial construction using timber framed external walls. Linea Weatherboard is available in 135mm, 150mm and 180mm widths.

James Hardie also has available:

- Axent™ Fascia in two widths. Axent Fascia is a 16mm thick, pre-primed fibre cement product designed to accommodate James Hardie soffit linings.
- Axent™ Trim comes in a variety of widths for use as decorative trims around openings and external corners. Axent Trim is a 16mm thick, pre-primed fibre cement product.

Specifier

If you are a specifier or other responsible party for a project ensure that the information in this document is appropriate for the application you are planning and that you undertake specific design and detailing for areas which fall outside the scope of these specifications.

Installer

If you are an installer ensure that you follow the design, moisture management principles, associated figures and material selection provided by the designer and this James Hardie Technical Specification.

All the details provided in this document must be read in conjunction with the specifiers specification.

Make sure your information is up to date

When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or, if you need more information, visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

1.2 SCOPE

This specification covers the use of Linea Weatherboard on buildings that fall within the scope limitations of the New Zealand Building Code (The NZBC) Acceptable Solution E2/AS1, Paragraph 1.1.

This specification includes the use of Linea Weatherboard in both direct to stud and cavity construction method and must be read in conjunction with the current BRANZ Appraisals for Linea Weatherboard.

This specification also covers the use of Linea Weatherboard in cavity construction for specific design projects (SED) subject to a wind pressure of 2.5kPa (ULS) maximum. This document is intended for use by architects, designers, specifiers or builders who are involved in specifying Linea Weatherboard. The document also serves the purpose of an installation manual for this product.

1.3 DETAILS

Various Linea Weatherboard details are provided in the Details section of this document. This specification and details in CAD file are also available to download from our website at www.jameshardie.co.nz.

1.4 SPECIFIC DESIGN

For use of Linea Weatherboard outside this published scope, the architect, designer or engineer must undertake specific design.

For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

2 Design

2.1 COMPLIANCE

Linea Weatherboard direct fixed and cavity cladding has been issued a CodeMark certificate number GM-10-30018 which confirms Linea Weatherboard is deemed to comply with the requirements of the NZBC. Please refer to our website www.jameshardie.co.nz for a copy of the CodeMark certificate. Linea Weatherboard also has a BRANZ Appraisal number 446 (2010) and 447 (2010) at www.branz.co.nz or www.jameshardie.co.nz.



2.2 RESPONSIBILITY

The specifier or other party responsible for the project must ensure that the information and details in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this technical specification. For applications outside the scope of this literature and figures which are not provided herein, the architect, designer or engineer must undertake specific design and it should be ensured that the intent of their design meets the requirements of the NZBC.

All dimensions shown are in millimetres unless noted otherwise. All New Zealand Standards referenced in this manual are current edition and must be complied with.

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution E1/AS1 'Surface Water'. Foundation design must comply with the requirements of NZS 3604 'Timber-framed Buildings' or be as per specific engineering design. The grade of adjacent finished ground must slope away from the building to avoid any possibility of water accumulation in accordance with the NZBC requirements.



2.4 SURFACE CLEARANCES

The clearance between the bottom edge of cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building.

Linea Weatherboards must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by the NZBC Acceptable Solution, E2/AS1 Table 18.

On the roofs and decks the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground.

2.5 MOISTURE MANAGEMENT

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled. Walls shall include those provisions as required by the NZBC Acceptable Solution E2/AS1 'External Moisture'. In addition, all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in the walls, must comply with the requirements of relevant standards and the NZBC. For information in relation to designing for weathertightness, refer to BRANZ and the Ministry of Business Innovation & Employment (MBIE) updates on the following websites, respectively www.branz.co.nz and www.dbh.govt.nz.

2.6 STRUCTURE

Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific engineering design in accordance with NZS 3603 and AS/NZS 1170. Where specific engineering design is required, the framing stiffness must be equivalent to or more than the framing provisions of NZS 3604. In all cases stud spacing must not exceed 600mm centres maximum for buildings designed to NZS 3604 and 400mm centres maximum for specific engineering design buildings subject to design wind pressures higher than 1.5kPa.

For timber frame walls longer than 12m, it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflection etc

2.7 WIND LOADING

Linea Weatherboard cladding is suitable for use in all wind zones as defined in NZS 3604. It is also suitable for use in SED buildings exposed to wind pressures up to 2.5kPa (ULS).

For wind pressures higher than those mentioned above, contact James Hardie at 0800 808 868 for assistance.

2.8 STRUCTURAL BRACING

Linea Weatherboard direct fixed installed as per Linea Weatherboard specific bracing details will provide bracing for buildings designed and constructed in accordance with NZS 3604. The Linea Weatherboard bracing systems have been independently tested by SCION using direct fixed construction. The following range of bracings can be achieved

- Wind 75 – 130 BU'S/m
- Earthquake 67 – 101 BU'S/m

Refer to the James Hardie Bracing Design Manual for details.

2.9 FIRE RATED WALLS

Walls clad with Linea Weatherboard using a direct fix or cavity construction method can achieve fire ratings of up to 90/90/90 when constructed in accordance with the James Hardie 'Fire and Acoustic' Design Manual. Linea Weatherboard must be face fixed for Fire Rated applications.

Refer to Fire and Acoustic Design Manual for further information about fire rated systems.

2.10 ENERGY EFFICIENCY

External walls constructed as per this technical specification, using Linea Weatherboard and bulk insulation, where the area of glazing is 30% or less of the total wall area, complies with the minimum R-value requirements for walls as per the NZBC Acceptable Solution H1/AS1 (The NZBC Clause H1 Energy Efficiency), Replacement Table 1. To meet the minimum thermal insulation requirements for the construction, the bulk insulation as specified in Table 1 must be used. This insulation may be substituted with insulation material having higher R-values. Thermal insulation of a wall is affected when the depth of the timber framing is increased or decreased or stud spacing is decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and an internal lining material such as James Hardie Villaboard® Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate Zone	Construction R-Value Requirement	Minimum R-Value of Insulation Required
1 and 2	1.9 m ² °C/W	#R2.0
3	2.0 m ² °C/W	#R2.2

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Total construction R-Value depends on the insulation material used and the framing ratio. The insulation material R-Values specified in this table are for studs spaced at 600mm c/c and nogs spaced at 800mm c/c.

To achieve higher construction R-Values the wall insulation material must be replaced with an insulation material having higher R-Values to suit the requirements.

For further guidance on insulation requirement refer to current edition of 'House Insulation Guide' published by BRANZ.

3 Framing

3.1 GENERAL

This Linea Weatherboard technical specification is only suitable for timber-framed buildings. Other framing materials are outside the scope of this specification.

For Steel Framing refer to James Hardie Claddings Installation to Steel Framing Technical Supplement.

3.2 TIMBER GRADE

Timber must be graded in accordance with NZS 3631 'New Zealand Timber Grading Rules'. The timber grade to be used must be in accordance with NZS 3604 requirements.

3.3 DURABILITY

To comply with the NZBC requirements the external framing must be treated to a minimum H1.2 treatment. Refer to the NZBC Acceptable Solution B2/AS1 Durability for further information about the durability requirements. For timber treatment information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round and Sawn Timber) for minimum timber treatment selection and treatment requirements. Also refer to framing manufacturer's literature for further guidance on timber selection.

Framing must be protected from moisture at sites in accordance with the recommendations of framing manufacturers.

Note: refer to NZS 3602 for information about the allowable moisture content in timber.

3.4 FRAME CONSTRUCTION

For buildings within the scope of NZS 3604 the framing sizes and set-out must comply with NZS 3604 with stud, nog/dwang centres as required by this specification.

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must be in accordance with truss design and specification supplied by the frame and truss manufacturer/supplier supported by independent design producer statement.

3.4.1 Direct fixed construction method

The following framing must be provided for direct fixed construction method:

- Studs must be provided at 600mm centres maximum.
- Nogs must be provided at 1200mm centres maximum.
- Double studs are required at internal corners.
- Extra packers may be required at external corners.
- Extra studs are required for aluminium internal corner sections.

3.4.2 Cavity construction method

The following framing must be provided for cavity construction method:

- When studs are at 600mm centres the nogs must be provided at 800mm centres maximum.
- When studs are at 400mm centres the nogs may be provided at 1200mm centres maximum.
- Double studs are required at internal corners.
- Extra packers may be required at external corners.
- Extra studs are required for aluminium internal corner sections.

3.4.3 Specific Engineering Design (SED)

For EH wind zone and specific engineering design projects the timber framing is required to be designed in accordance with NZS 3603 and AS/NZS 1170. The minimum framing sizes and layout must comply with this specification.

- Stud spacing 400mm centres maximum
- Nog spacing 1200mm centres maximum
- Other requirements as per 3.5.2 above

3.5 TOLERANCES

In order to achieve an acceptable wall finish, it is imperative that framing is straight and true. Framing tolerances must comply with the requirements of NZS 3604 and the manufacturer's specifications. All framing must be made flush.

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4 Preparation

4.1 FLEXIBLE UNDERLAY OR HOMERAB PRE-CLADDING

Flexible underlay must be provided as per the requirements of the NZBC Acceptable Solution E2/AS1 'External Moisture' Table 23. The flexible underlay must be fixed in accordance with E2/AS1 and the underlay manufacturer's recommendations. Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC Acceptable Solution E2/AS1 Table 23. For attached garages, flexible underlays must be selected in accordance with the NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. HomeRAB Pre-Cladding is suitable for use in these applications. It must be installed in accordance with James Hardie Rigid Air Barriers installation manual.

4.2 RIGID AIR BARRIER

For EH wind zone or Specific Engineering Design (SED) projects where the design wind pressures are between 1.5kPa (ULS) and 2.5kPa (ULS), RAB Board (6mm) must be used. Refer to James Hardie Rigid Air Barriers installation manual for information regarding its installation.

4.3 FLASHING

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to weatherboard installation. Please refer to moisture management requirements in Clause 2.5. The flexible underlay must be appropriately incorporated with penetration and junction flashings. Materials must be lapped in such a way that water tracks down to the exterior on the face of flexible underlay. The selected flashing materials must comply with the durability requirements of Table 20 of the NZBC Acceptable Solution E2/AS1.

4.4 VENT STRIP

The James Hardie uPVC cavity vent strip must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. James Hardie uPVC vent strip has an opening area of 1000mm²/m length. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities.

4.5 CAVITY BATTENS

Buildings with a risk score of 13-20 calculated in accordance with the NZBC Acceptable Solution E2/AS1 Table 3 require Linea Weatherboards to be installed on a cavity.

The cavity battens provide airspace between the frame and cladding and are considered a "packer" only in this specification.

The timber battens must be minimum H3.1 treated in accordance with NZS 3640 (Chemical Preservation of Round and Sawn Timber) to comply with the durability requirements of B2/AS1.

Cavity battens must comply with E2/AS1 and:

- be minimum 18mm thick.
- be minimum as wide as the width of studs.
- must be fixed by the cladding fixings to the main framing through the flexible underlay.
- fix cavity battens to studs at maximum 600mm centres.
- until claddings are fixed the battens need only to be tacked to framing with 40 x 2.8mm nails at 800mm centres maximum.

(Batten fixing is required temporarily to keep them straight on the wall during construction.)

4.6 INTERMEDIATE SUPPORT

Where studs are at 600mm centres an intermediate means of restraining the flexible underlay and insulation from bulging into the cavity must be installed. An acceptable method to achieve this is using one of the following:

- intermediate cavity batten between the studs; or
- 75mm galvanised mesh; or
- polypropylene tape at 300mm centres fixed horizontally and drawn taut.

No intermediate supports are required:

- where studs are at maximum 400mm centres; or,
- when rigid sheathings instead of flexible underlays are used.

4.7 CORNERS

Anticipated joist shrinkage must be allowed for in the design process. Do not run trims or aluminium extrusions continuously across solid floor joists. There are a number of options to select from when detailing external corners:

- 90° corner soaker in aluminium, copper or stainless steel. Refer to Figures 7 and 33.
- 135° corner soaker 180mm aluminium, contact James Hardie
- Box corners using Axent Trim. Refer to Figures 3, 4 and 30.
- Mitred corners to weatherboards. Refer to Figures 5 and 31.
- Aluminium boxed corners. Refer to Figures 6 and 32.

There are a number of options to select from when detailing internal corners:

- Scribed corner. Refer to Figures 8 and 34.
- 90° or 135° Aluminium W-mould. Refer to Figures 9, 10, 35 and 36.

4.8 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Linea Weatherboards which meet the performance requirements of E2 'External Moisture', an approved document of the NZBC. Refer to Figures 11 to 22 and 38 to 51.

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5 Fixing Linea Weatherboard

5.1 GENERAL

The horizontal lap of Linea Weatherboards must be 30mm minimum. In certain scenarios you may require to creep up the lap. This must not exceed 33mm. Linea Weatherboards must be kept dry whilst in storage prior to and during fixing. Cut ends which are exposed after installation or where sealant is applied to the boards such as slimline box corners, internal corners, mitred external corners etc, must be primed prior to installation. Dust and loose material must be removed before priming.

A minimum H3.1 treated timber cant strip must be provided to support the bottom board on the wall. Refer to Figure 1 and Figure 26.

5.2 FASTENER DURABILITY

Fasteners must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing's material to be used in relation to the exposure conditions and are summarised in Table 2.

Table 2

Exposure conditions and nail selection prescribed by NZS 3604

NAIL MATERIAL

Zone D *	Zone C outside sea spray zone and Zone B and Geothermal hot spots	Bracing — All zones
Grade 316 Stainless	Hot-dipped galvanised or 316 stainless	Grade 316 stainless

* (Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made)
Microclimate conditions as detailed in NZS 3604, Paragraph 4.2.4 require SED.

Also refer to the NZBC Acceptable Solution 'E2/AS1' Table 20 and 21 for information regarding the selection of suitable fixing materials and their compatibility with other materials.

5.3 NAIL SIZE AND FIXING METHOD

Linea Weatherboards and Axent Trim must be fixed to timber with the types of nails specified in Tables 3 and 4, in accordance with the following requirements:

- Linea Weatherboard can either be face/exposed fixed or concealed fixed.
- Linea Weatherboard must be fixed into studs at maximum 600mm centres. Fixing centres to coincide with stud spacing. Refer to Figure 2 and 28.
- All concealed nails must be driven flush with the board surface.
- When concealed fixing Linea Weatherboards, nails must be driven under the lap of boards, except at all corners and vertical edges of openings where Linea Weatherboards must be face fixed. Refer to Figure 2 and Figure 29.
- Nails must be fixed 25mm from the end of the board when hand nailing. For gun nailing refer to Section 5.4.
- When using concealed fixing method, any gaps that may appear under the lap due to site conditions can be minimised by fixing a jolt head nail through the lap as per the exposed nailing method. Refer to Figure 2 and 29.
- When using concealed fixing method, Linea Weatherboard can also be tied together by face fixing through the lap using 32mm brad nails if desired.

- When face fixing Linea Weatherboard, the upper board must be pre-drilled before fixing with a jolt head nail.

Table 3

Nail requirements for Linea Weatherboards

DIRECT TO STUD FIXING UP TO AND INCLUDING VH WIND ZONE

Concealed Nailing over flexible underlay	
40 x 2.8mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over flexible underlay	
60 x 3.15mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.
Concealed Nailing over rigid air barrier	
50 x 2.8mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over rigid air barrier	
75 x 3.15mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.

CAVITY FIXING UP TO AND INCLUDING VH WIND ZONE

Concealed Nailing over flexible underlay	
60 x 3.15mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over flexible underlay	
75 x 3.15mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.
Concealed Nailing over rigid air barrier	
75 x 3.15mm HardieFlex™ nails	Finish flush with the board surface.
Face Nailing over rigid air barrier	
90 x 4.0mm jolt head nails	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.

CAVITY FIXING UP TO AND INCLUDING VH WIND ZONE AND SED PROJECTS (1.5KPA - 2.5KPA WIND PRESSURE)

Face Nailing	
90 x 4.0mm jolt head nail	Hot-dipped galvanised jolt head nail with pre-drilling* through the top weatherboard.
	Stainless steel jolt head nail with pre-drilling* through the top weatherboard.

7 Finishing

Table 4

Nail requirements for trim	
Single Thickness	60mm jolt head nails. If fixing over Linea Weatherboard use predrilled* 75 x 3.15mm jolt head nails.
Double Thickness	60mm jolt head nails.
Single plus packer	If fixing over Linea Weatherboard use 75 x 3.15mm jolt head nails through a pre-drilled* hole. When fixing to timber support use 60mm jolt head nails.

* Use a 3.0mm drill bit. ** Use a 3.5mm drill bit

Note: Special fixing arrangements are required for bracing and fire-resistance rated wall systems. For more information Ask James Hardie on 0800 808 868.

5.4 GUN NAILING

Linea Weatherboard can also be gun-nailed with a D head or RounDrive nail when concealed fixing method is used.

- Gun-nailing must not be used when Linea Weatherboard is used for bracing.
- Nails must be no closer than 50mm from the ends of boards when gun nailing is used — double studs will be required.
- Be minimum length and gauge as per Table 3.
- Be finished flush with surface of board.

6 Jointing

The ends of Linea Weatherboards are jointed off-stud by means of a tongue and groove joint. Tongue and groove joints may be located centrally between studs but no closer than 100mm from the edge of a stud. The joints must be staggered by 600mm minimum. Flexible sealant must be applied in the tongue and groove joint at the time of installation.

Note: Protective coating of Linea Weatherboard and Axent Trim is required in order to meet the durability requirements of the NZBC.

7.1 PREPARATION AND PRIMING

The Linea Weatherboard and Axent Trim must be dry before painting. Punch and fill all exposed nails a maximum of 2mm below the surface. Fill the hole with an exterior grade builders fill, allow to cure and sand smooth ready for priming. Prime the filled holes in accordance with paint manufacturer's specifications.

It is not recommended to seal under the lap of weatherboards as it helps circulation of air behind the weatherboard cladding.

7.2 SEALANTS

All sealants must demonstrate the ability to meet the relevant requirements of the NZBC and hold a current BRANZ Appraisal. Application and use of sealants must comply with manufacturer's instructions. Sealants, if coated, must be compatible with the paint system.

7.3 PAINTING

All Linea Weatherboards are pre-primed on their face and bottom edge with a factory applied acrylic base coat.

Linea Weatherboard must be painted within 90 days of installation. There is no restriction on the LRV of paint to be applied on the Linea Weatherboard. All exposed faces, including the top edges under the sills and bottom edges of Linea Weatherboard, Axent Trim and accessories must be finished with latex exterior paint system complying with any of parts 7, 8, 9, and 10 of AS 3730.

Dark coloured paints can be used on Linea Weatherboard and Trim. The dark colours in certain environments may fade over a period of time. Special paints/coatings are required in certain harsh environments.

Stainless steel soakers are generally left natural. For painting over stainless steel soakers, refer to paint manufacturer as special preparation and paints are required.

8 Storage and handling

Paint selection and the preparation required is dependant on paint chosen. Refer to the paint manufacturer for information before starting painting.

Linea Weatherboards and Axent Trim must be laid flat on a smooth level surface. To ensure optimum performance, store weatherboards under cover and keep dry prior to fixing. If the weatherboards should become wet, allow to dry thoroughly before fixing. Do not carry weatherboards on the flat carry in the vertical position to avoid excessive bending.

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9 Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. It is the responsibility of the specifier to determine normal maintenance requirements to comply with The NZBC Acceptable Solution B2/AS1. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*,
- Re-applying exterior protective finishes**,
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants,
- Cleaning out gutters, blocked pipes and overflows as required,
- Pruning back vegetation close to or touching the building,
- The clearances between the bottom edge of Linea Weatherboard and the finished/unfinished ground must always be maintained.
- Stainless steel soakers used in extreme coastal conditions or in sea spray zones may show some signs of 'tea staining'. It is an aesthetic issue and to minimise staining soaker must be washed/polished frequently.

*Do not use a water blaster to wash down the cladding.

*In extreme coastal conditions or sea spray zones, wash every 3-4 months.

**Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.

10 Product information

10.1 MANUFACTURING AND CLASSIFICATION

James Hardie New Zealand is an ISO 9001 Telarc certified manufacturer. Linea Weatherboard and Axent Trim are manufactured to meet the requirements of AS/NZS 2908.2: 2000 'Cellulose-Cement Products'. Linea Weatherboard has a classification of Type A Category 3 in accordance with this Standard. Linea Weatherboard is an advanced lightweight cement composite building product incorporating James Hardie proprietary Scyon technology. The basic composition of product is Portland cement, ground sand, cellulose fibre and water.

Linea Weatherboard has a bevel back and tongue and groove at the ends for jointing. The bottom front edge of Linea Weatherboard is chamfered. The weatherboards are supplied pre-primed on their face and bottom edge with an acrylic primer.

Linea Weatherboards and Axent Trim are identified by the printing at regular intervals of the name Linea on the back face.

10.2 JAMES HARDIE TRIM

The Axent Trim, used for box corners, around windows and doors as well as special architectural features, is also made with the CLD technology and is supplied pre-primed with an acrylic primer.

10.3 DURABILITY

Linea Weatherboard and Axent Trim, when installed and maintained as per the technical specification, will meet the durability requirements for claddings as required in the NZBC Approved Document B2 'Durability'.

10.3.1 Resistance to moisture/rotting

Linea Weatherboard and Axent Trim have demonstrated resistance to permanent moisture-induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Water Permeability (Clause 6.2)
- Warm Water (Clause 6.4)
- Heat Rain (Clause 6.5)
- Soak Dry (Clause 6.6).
- Freeze-Thaw (Clause 8.2.3)

10.3.2 Control of External Fire Spread

Linea Weatherboard meets the requirements of Appendix C C7.1.1 and is classified as 'Non-Combustible Material' which is suitable for use as external wall cladding and complies with the requirements of Paragraph 5.4 of the NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of Acceptable Solutions C/AS2 to C/AS6 of the NZBC.

10.3.3 Alpine regions

In regions subject to freeze/thaw conditions, Linea Weatherboard must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions subject to snow drifts over winter.

The Linea Weatherboard has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

10.4 PRODUCT SIZES AND MASS

Available sizes of Linea Weatherboard and Axent Trim and its weight are given in Table 6.

10.5 SIZE AND WEIGHT

Linea Weatherboard is categorised as a Light Weight Wall Cladding as described in NZS 3604. Physical properties of Linea Weatherboard and Axent Trim are provided in Table 6.

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11 Safe working practices

WARNING — DO NOT BREATHE DUST AND CUT ONLY IN WELL VENTILATED AREA

James Hardie products contain sand, a source of respirable crystalline silica which is considered by some international authorities to be a cause of cancer from some occupational sources. Breathing excessive amounts of respirable silica dust can also cause a disabling and potentially fatal lung disease called silicosis, and has been linked with other diseases. Some studies suggest smoking may increase these risks. During installation or handling: (1) work in outdoor areas with ample ventilation; (2) minimise dust when cutting by using either 'Score and Snap' knife, fibre cement shears or, where not feasible, use a HardieBlade™ Saw Blade and dust-reducing circular saw attached to a HEPA vacuum; (3) warn others in the immediate area to avoid breathing dust; (4) wear a properly-fitted, approved dust mask or respirator (e.g. P1 or P2) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposures. During clean-up, use HEPA vacuums or wet cleanup methods — never dry sweep. For further information, refer to our installation instructions and Safety Data Sheets available at www.jameshardie.co.nz.

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

James Hardie recommended safe working practices

CUTTING OUTDOORS

1. Position cutting station so wind will blow dust away from the user or others in working area.
2. Use one of the following methods based on the required cutting rate:

BEST

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and HEPA vacuum extraction.

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade.

SANDING/REBATING/DRILLING/OTHER MACHINING

When sanding, rebating, drilling or machining you should always wear a P1 or P2 dust mask and warn others in the immediate area.

IMPORTANT NOTES

1. For maximum protection (lowest respirable dust production), James Hardie recommends always using "Best" — level cutting methods where feasible.
2. NEVER use a power saw indoors.
3. NEVER use a circular saw blade that does not carry the HardieBlade™ logo.
4. NEVER dry sweep — Use wet suppression or HEPA vacuum.
5. NEVER use grinders.
6. ALWAYS follow tool manufacturers' safety recommendations.

P1 or P2 respirators should be used in conjunction with above cutting practices to further reduce dust exposures. Additional exposure information is available at www.jameshardie.co.nz to help you determine the most appropriate cutting method for your job requirements. If concern still exists about exposure levels or you do not comply with the above practices, you should always consult a qualified industrial hygienist or contact James Hardie for further information.

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Working instructions

Refer to recommended Safe Working Practices before starting any cutting or machining of product.

HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw connected to a HEPA vacuum is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.



Hole-forming

For smooth clean cut circular holes:

Mark the centre of the hole on the sheet.

Pre-drill a pilot hole.

Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.

For irregular holes:

Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face.



Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.

Storage and handling

All James Hardie building products should be stored to avoid damage, with edges and corners of the sheets protected from chipping.

James Hardie building products must be installed in a dry state and be protected from rain during transport and storage. The product must be laid flat under cover on a smooth level surface clear of the ground to avoid exposure to water or moisture, etc.

Quality

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

12 Product sizes

Table 6

Linea Weatherboard and Axent Trim sizes									
						Coverage Information			
Product	Length (mm)	Width (mm)	Thickness (mm)	End Details	Effective Cover (mm)	No. of planks/ metre height (approx.)	Mass kg/lineal m (approx. at EMC)	Mass kg/m ² (approx. at EMC)	Weight/ packs (60 units/ pack)
Linea Weatherboard 135	4200*	135	16	T & G	105	9.5	2.62	25.70	660.00
Linea Weatherboard 150	4200*	150	16	T & G	120	8.3	3.1	24.93	781.00
Linea Weatherboard 180	4200*	180	16	T & G	150	6.7	3.57	23.92	899.00
Axent Trim 84mm	2600	84	16	Square	N/A	N/A	1.6	N/A	N/A
Axent Trim 100mm	2600	100	16	Square	N/A	N/A	1.9	N/A	N/A

*Length is 4200mm plus 5mm for the tongue and groove making overall length 4205mm

*The effective thickness of finished Linea Weatherboard on the wall at the lap is approximately 93 to 95 mm

NOTE: All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

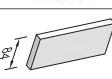
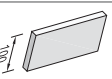
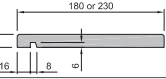
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13 Accessories

Table 7

Accessories/Tools supplied by James Hardie			
Accessories	Description	Size (mm)	Code
	External corner soaker 90° for Linea Weatherboards 180mm - Aluminium - Copper - Stainless Steel	200 long	301186 301188 301197
	External corner soaker 135° for Linea Weatherboards 180mm Aluminium	200 long	301178
	External corner soaker 90° for Linea Weatherboards 150mm - Aluminium - Stainless Steel	170 long	302820 302821
	External corner soaker 90° for Linea Weatherboards 135mm - Aluminium - Stainless Steel	155 long	301185 301196
	External Slimline Box Corner Mould Etched primed aluminium extrusion used to create external corner	2700 long 4000 long	301195 305809
	Box Corner 'Z' Flashing	2700 long	301203
	Internal 'W' Mould 90° Etched primed aluminium extrusion used to create 90° internal corner	2700 long 4000 long	301184 305807
	Internal 'W' Mould 135° Etched primed aluminium extrusion used to create 135° internal corner	2700 long	301183
	Vent Strip PVC moulding used as vermin proofing	3000 long	302490
	JH Corner Under Flashing 50 x 50mm PVC moulding used as under flashing for internal and external corners	3000 long	303745
	Axent Trim 84mm	84 x 2600 long	401943
	Axent Trim 100mm	100 x 2600 long	401930
	HardieFlex™ nail - 5kg	60 x 3.15mm	302782
	HardieFlex™ nail - 5kg	60 x 3.15mm	302784
	HardieBlade™ Saw Blade Diamond tip fibre cement circular saw blade. Spacers not included	4 tooth - 184mm	300660
	HardieBlade™ Saw Blade Diamond tip fibre cement circular saw blade. Spacers not included	6 tooth - 254mm	303375
	Axent Fascia - 180mm - 230mm	4200 long	401843 402230

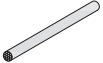
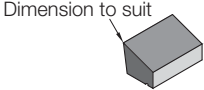
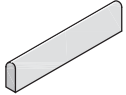
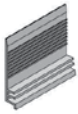
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Table 8

Accessories not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with its Linea Weatherboard and Axent Trim. James Hardie does not supply these products. There may also be some other accessories required depending upon the application. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description	Size (MM)	Material/ appearance
	Head flashing Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.	To suit	Etch Primed Aluminium/Powder Coated
	D head or RoundDrive Nail Gun nail for concealed fixing Linea Weatherboard.	50 x 2.87 60 x 3.15	Hot Dip Galvanised Stainless Steel
	HardieFlex™ Hot Dip Galv. Nails For fixing cavity battens.	40 x 2.8mm	Hot Dip Galvanised
	Jolt Head Nail for face fixing to Linea Weatherboard. Hot Dip Galvanised or 316 Stainless Steel	50 x 2.8mm 60 x 3.15mm 75 x 3.15mm 90 x 4.0mm	Self colour
	Joint sealant Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information.	Tube	Sika, Holdfast
	PEF Rod	Polyethylene foam	Sika or similar
	Flexible tape A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information. e.g. Tyvek®, Marshall Innovations or similar.	Proprietary tape to adhere to flexible underlay	Tyvek, Marshall Innovations or similar
	Flashing Material as per Table 20, 'E2/AS1'		Flashing Fabricator
	Planted Sill		H3.1 minimum Treated Timber Timber Merchant or cut on site
	Titanium Coated High Speed Drill Bit. For pre-drilling prior to face fixing with jolt head.	3.0mm 3.5mm	
	Timber Scriber To scribe beside window, site cut to suit.	As required	H3.1 minimum Treated Timber Timber Merchant or cut on site
	Fibre Cement Cutting Blade Diamond tip 305mm diameter circular saw blade to fit drop saw.	305mm	Diamond Tipped
	Meter Box Refer Electrical Suppliers		
	Cant Strip Redway Developments 03 358 5775 Predrill the weatherboards when fixing using Redway Development Cant/Vent Strips	To suit	uPVC
	Inseal 3109 Sealing Strip.	5 x 3mm x 25mm	Black Compressible Foam
	CRC Builders Fill Two part exterior grade fill to finish over jolt head nails.		

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14 Details

Various details outlined in the following table are available on Pages 15 to 42.

Table 9

Details				
Description	Direct fixed		Timber Cavity Batten Construction	
	Figure	Page	Figure	Page
Foundation detail and soffit detail	Figure 1	15		
Weatherboard fixing	Figure 2	15	Figure 30	30
Boxed corner	Figure 3 & 4	16	Figure 31	31
Mitre corner	Figure 5	17	Figure 32	31
Aluminium box corner	Figure 6	17	Figure 33	31
External corner soaker	Figure 7	18	Figure 34	32
Internal corner	Figure 8	18	Figure 35	32
Internal 90° aluminium 'W' mould corner	Figure 9	19	Figure 36	33
Internal 135° aluminium 'W' mould corner	Figure 10	19	Figure 37	33
Window sill with facings			Figure 39	34
Window sill with sill tray and facings	Figure 11	20		
Window door and head with facings	Figure 12	20	Figure 40	35
Window door and jamb with facings	Figure 13	21	Figure 41	35
Window door and sill without facings	Figure 14	21	Figure 42	35
Window door and head without facings	Figure 15	22	Figure 43	36
Window door and jamb without facings	Figure 16	22	Figure 44	36
Head flashing termination	Figure 17	23	Figure 45	37
One piece apron flashing joint	Figure 18	23	Figure 46	37
Pipe penetration	Figure 19	24	Figure 48	38
Meter box at head	Figure 20	24	Figure 49	39
Meter box at sill	Figure 21	25	Figure 50	39
Meter box at jamb	Figure 22	25	Figure 51	40
Timber cavity fix meter box			Figure 52	41
Deck junction	Figure 23	26	Figure 61	47
Cantilevered timber deck junction	Figure 24	27	Figure 62	47
Sloping soffit to weatherboard junction	Figure 25	27	Figure 59	46
Timber cavity batten fixing			Figure 27	28
Foundation detail			Figure 28	29
Soffit detail			Figure 29	29
Batten layout at window opening			Figure 38	34
One piece gutter/wall junction			Figure 47	38
Floating lap over floor joist			Figure 53	42
Drainage joint			Figure 54	43
Enclosed deck balustrade to wall			Figure 55	43
Enclosed balustrade to wall			Figure 56	44
Enclosed deck	Figure 26	28	Figure 57	44
Parapet flashing			Figure 58	45
Sloping soffit and wall junction			Figure 60	46
Door sill support detail			Figure 63	48
Junction between Linea® Weatherboard and fascia board			Figure 64	49
Enclosed roof to wall intersection			Figure 65	50

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Figure 1: Direct fix foundation detail and soffit detail

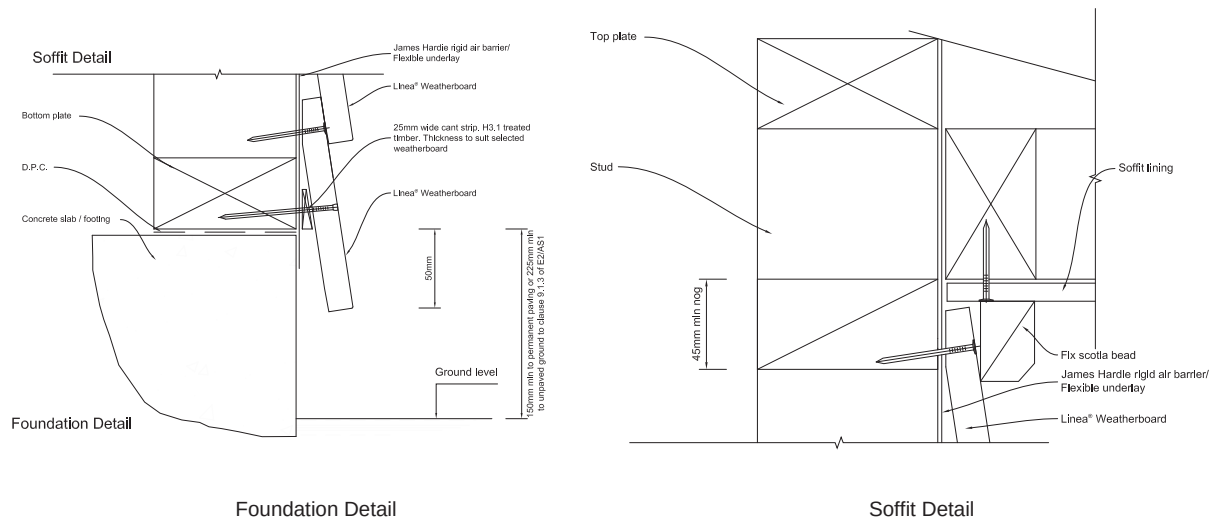


Figure 2: Direct fix weatherboard fixing

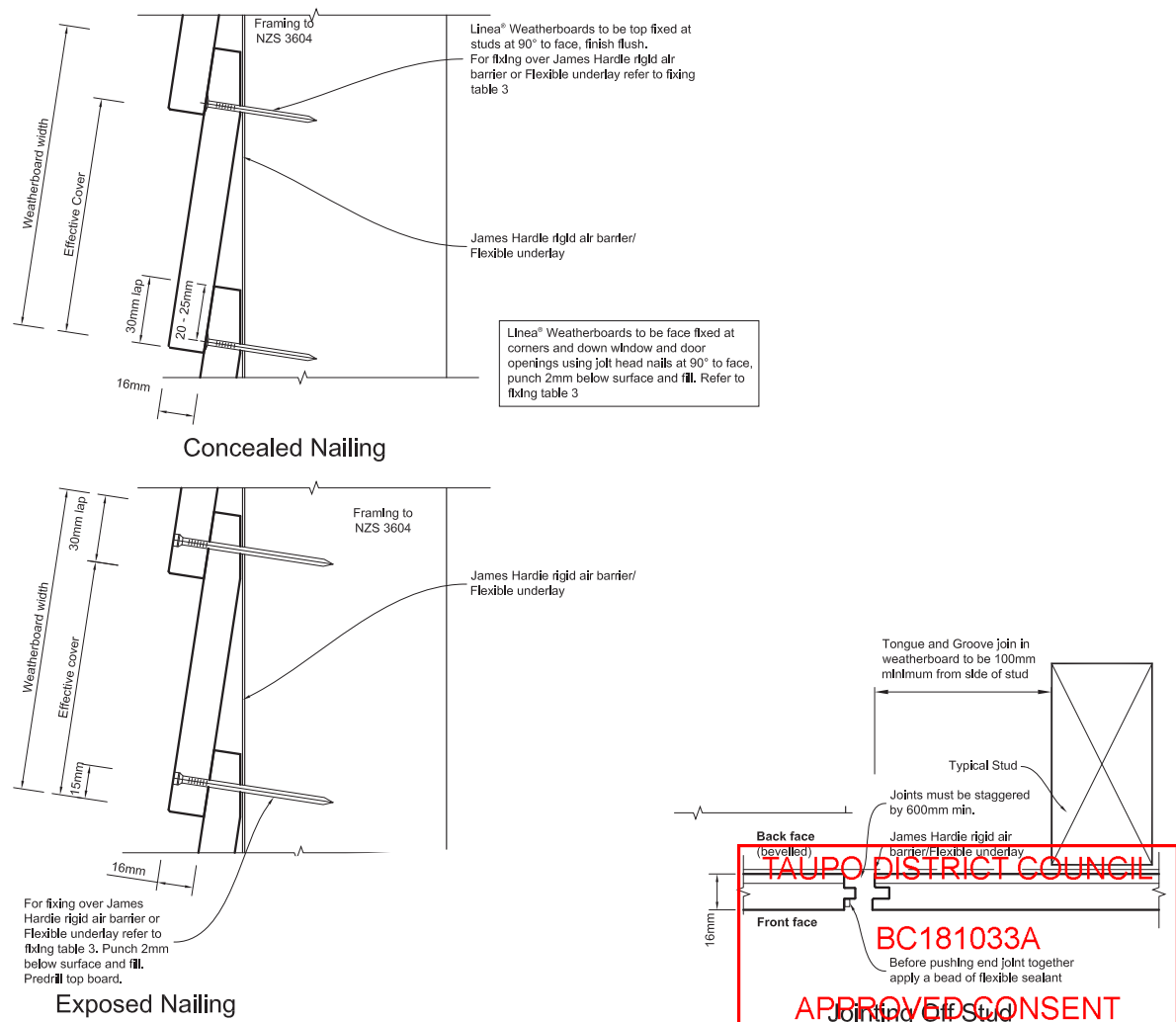


Figure 3: Direct fix boxed corner - Option 1

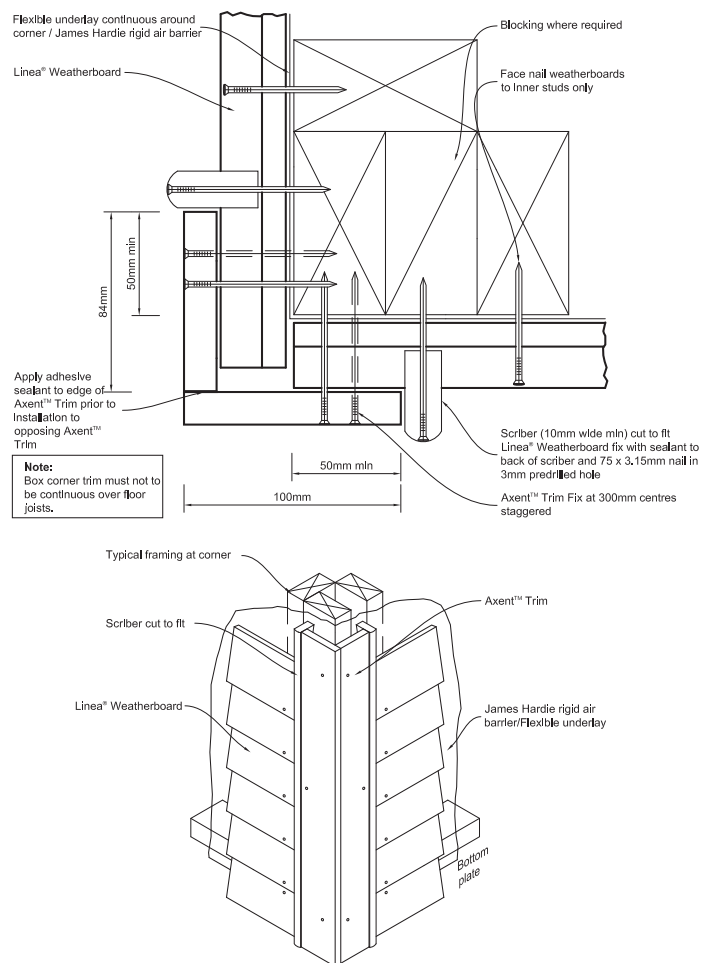


Figure 4: Direct fix boxed corner - Option 2

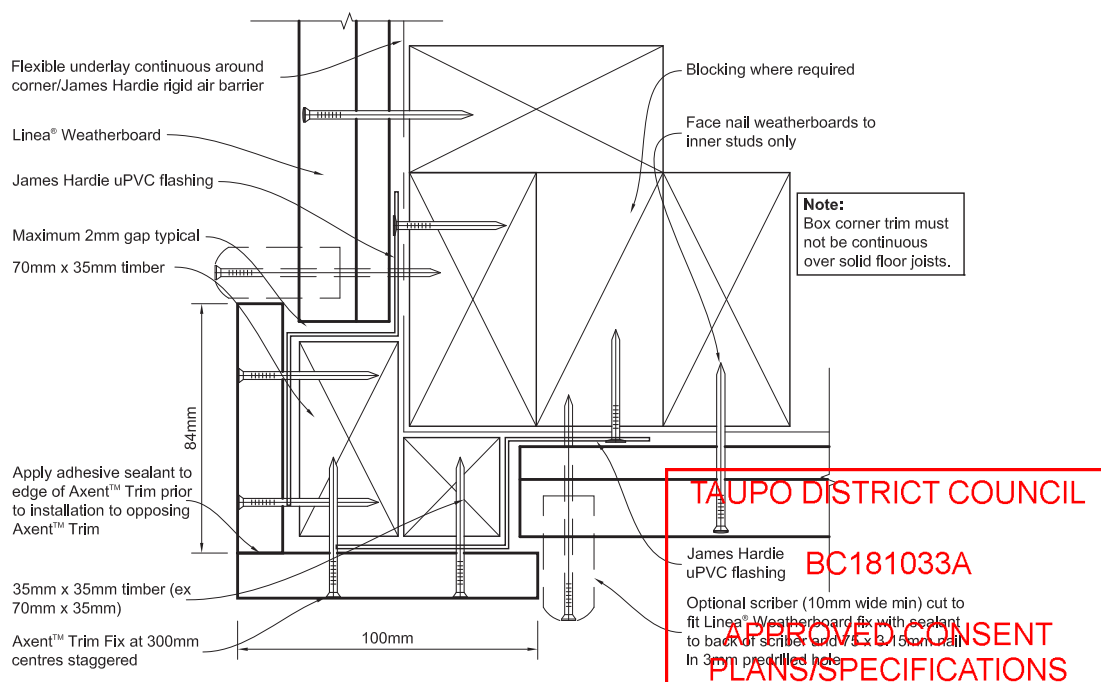


Figure 5: Direct fix mitre corner

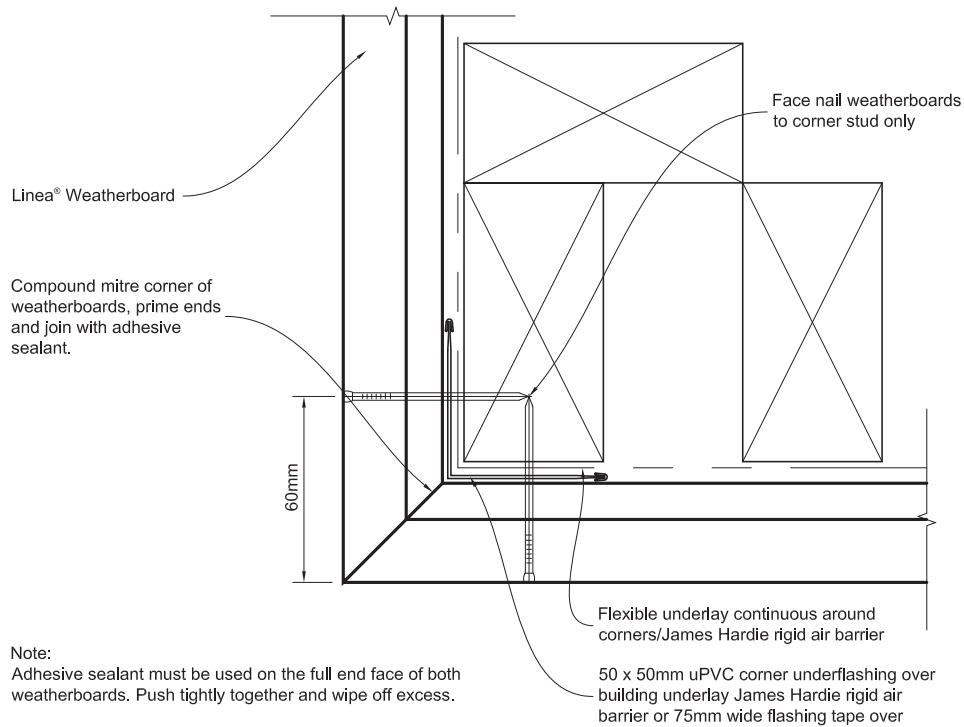
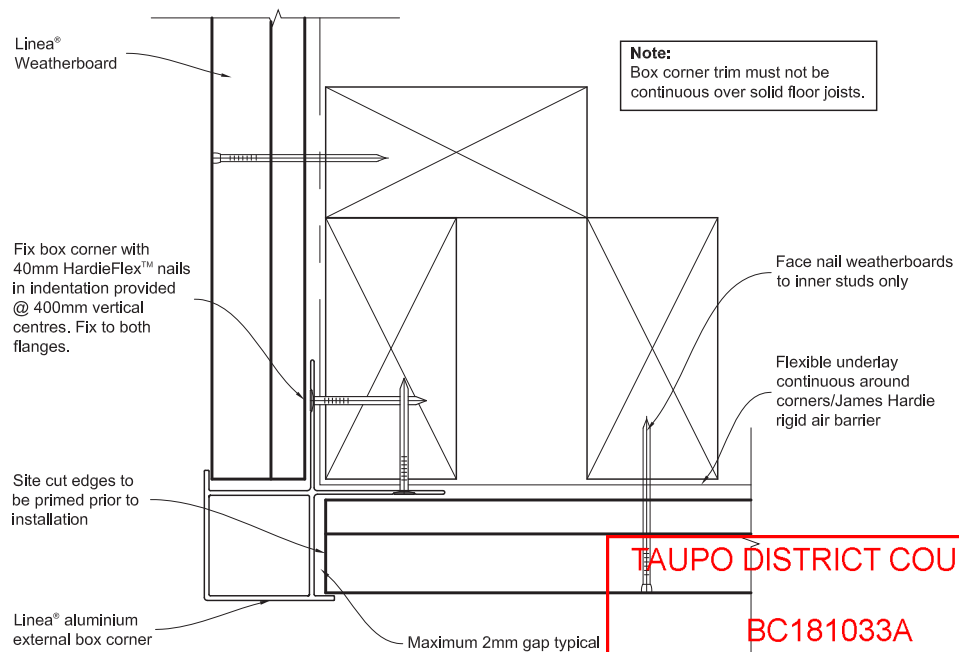


Figure 6: Direct fix aluminium box corner

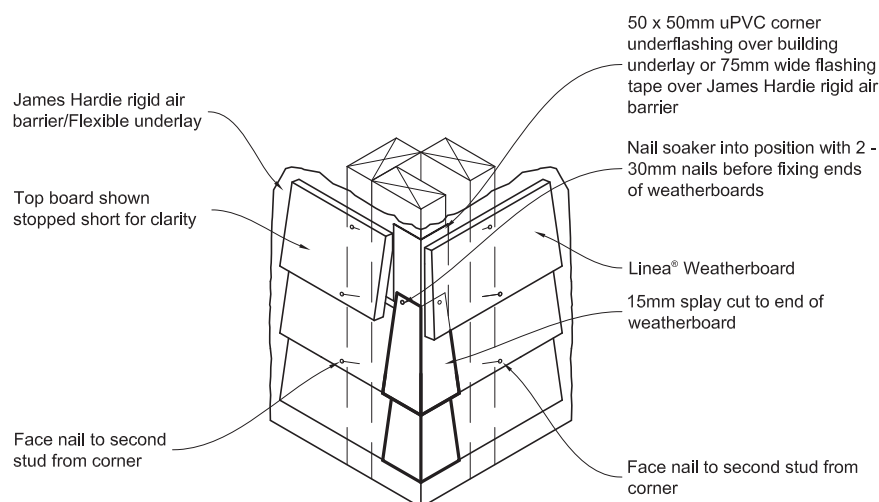


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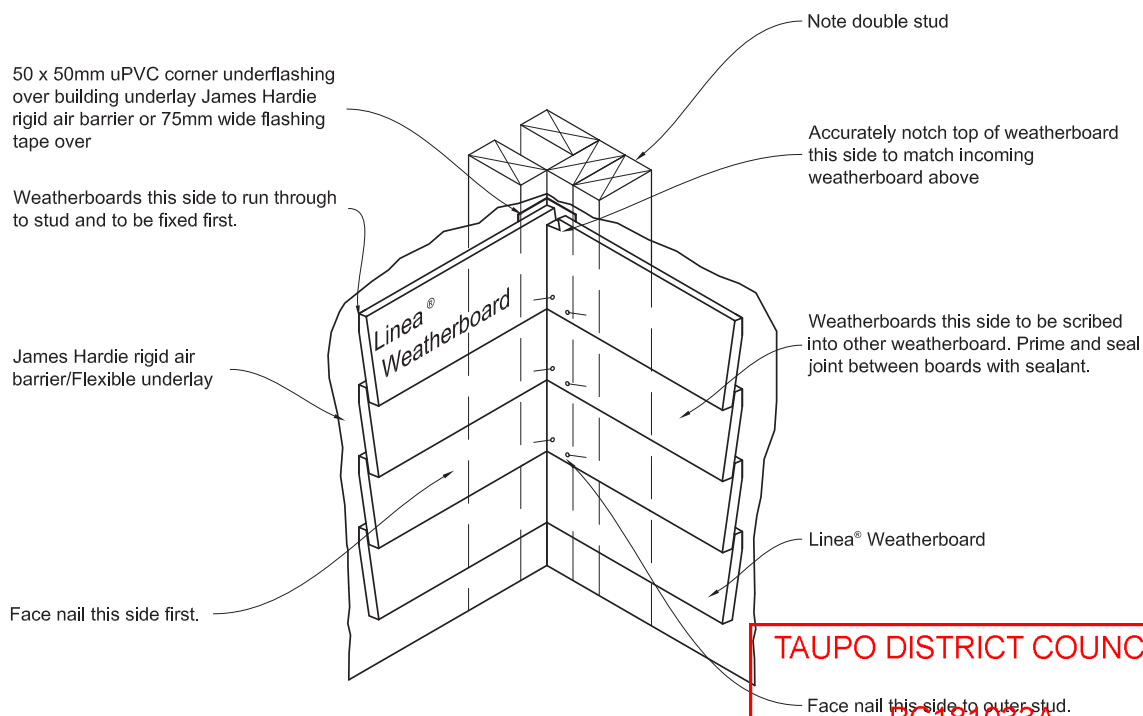
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Figure 7: Direct fix external corner soaker



Soaker material	Nail material
Copper	Copper or phosphor bronze
Aluminium	Hot dip galvanised
Stainless steel	Stainless steel

Figure 8: Direct fix internal corner



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Figure 9: Direct fix internal 90° aluminium 'W' mould corner

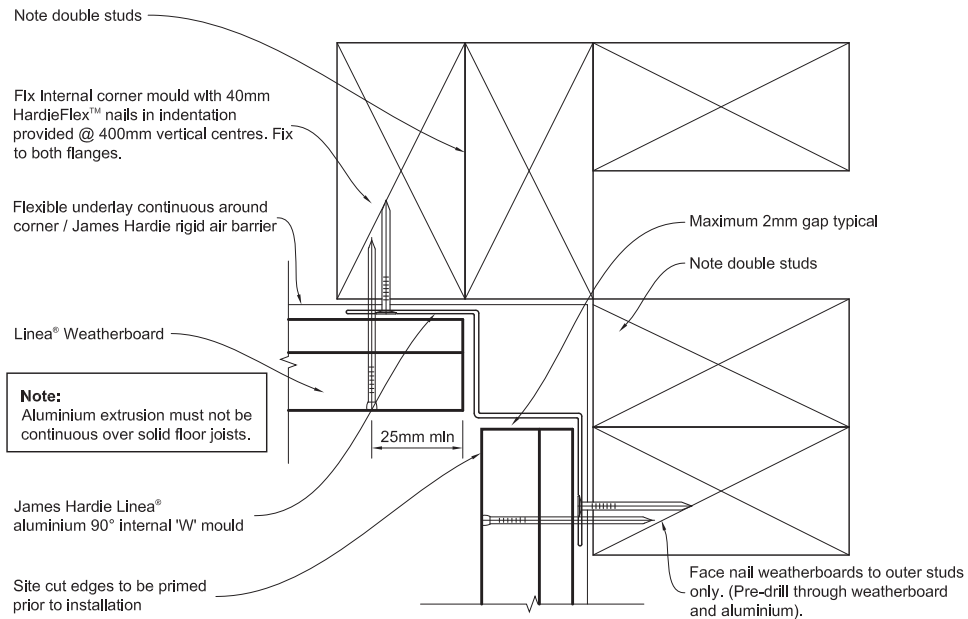
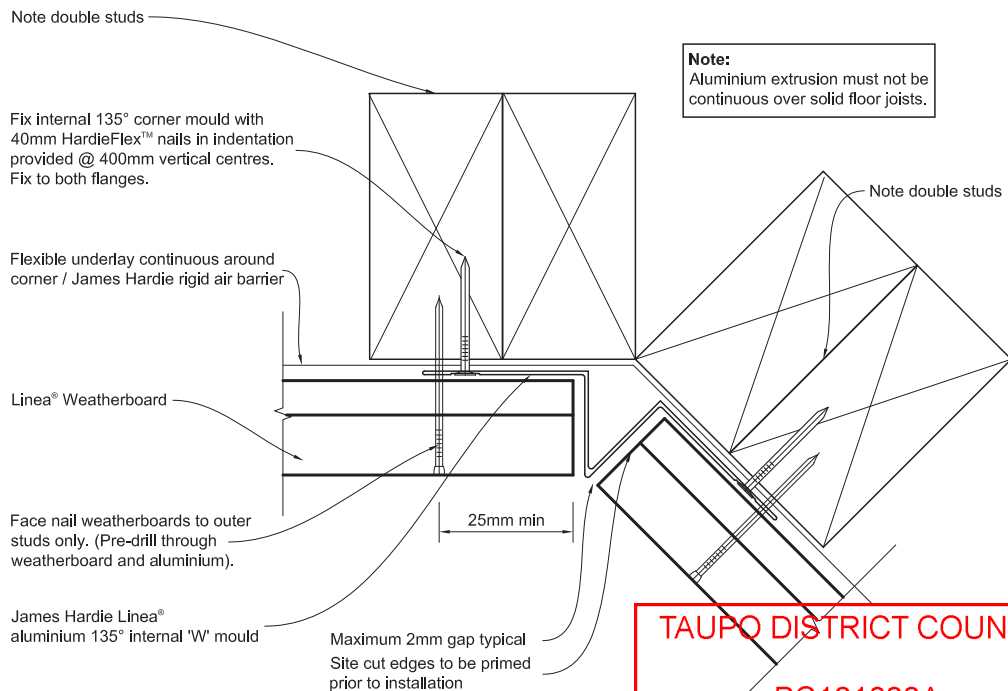


Figure 10: Direct fix internal 135° aluminium 'W' mould corner

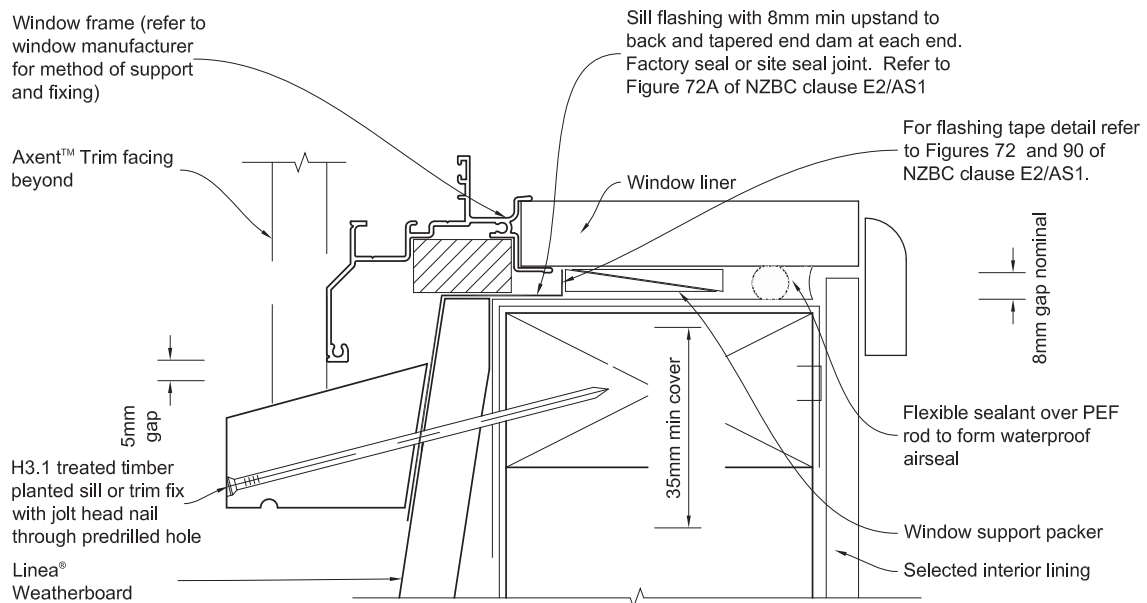


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Figure 11: Direct fix window sill flashing sill tray and facings

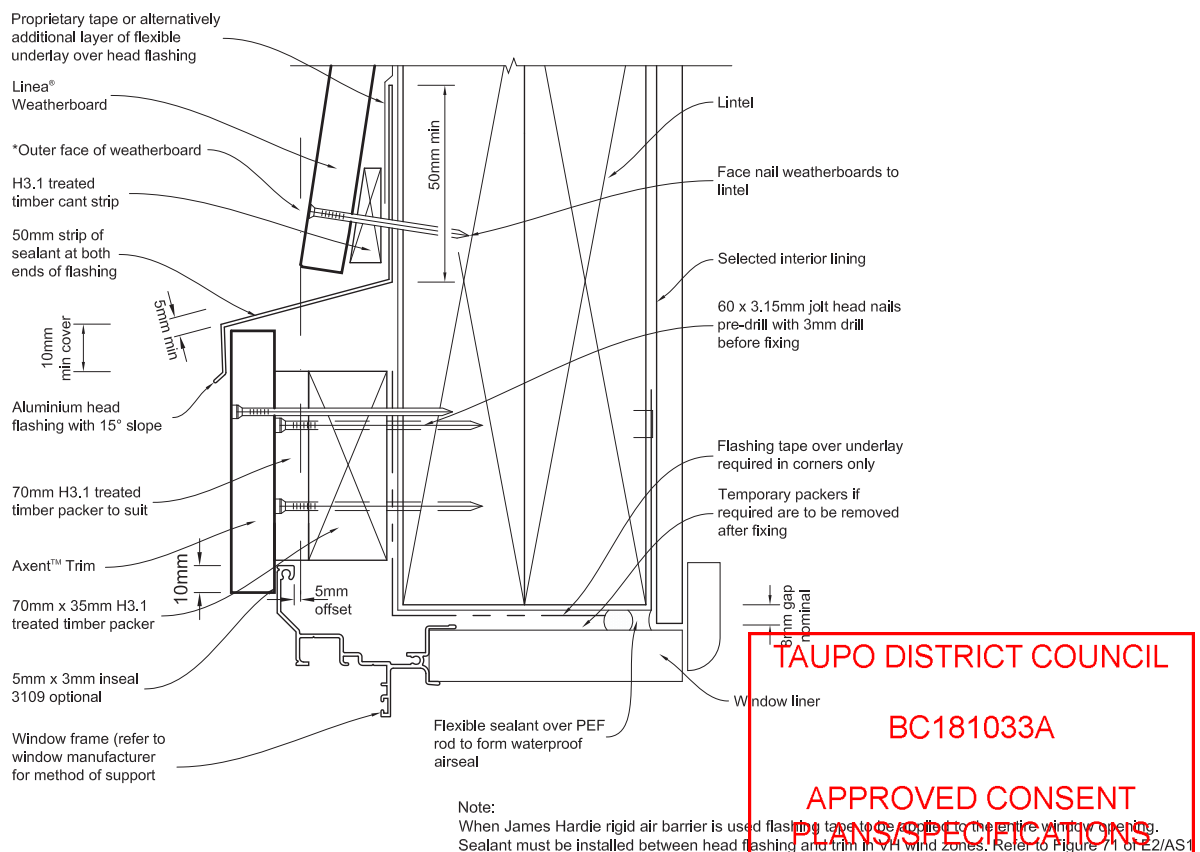


General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC clause E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay/James Hardie rigid air barrier and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

Figure 12: Direct fix window head and door with facings



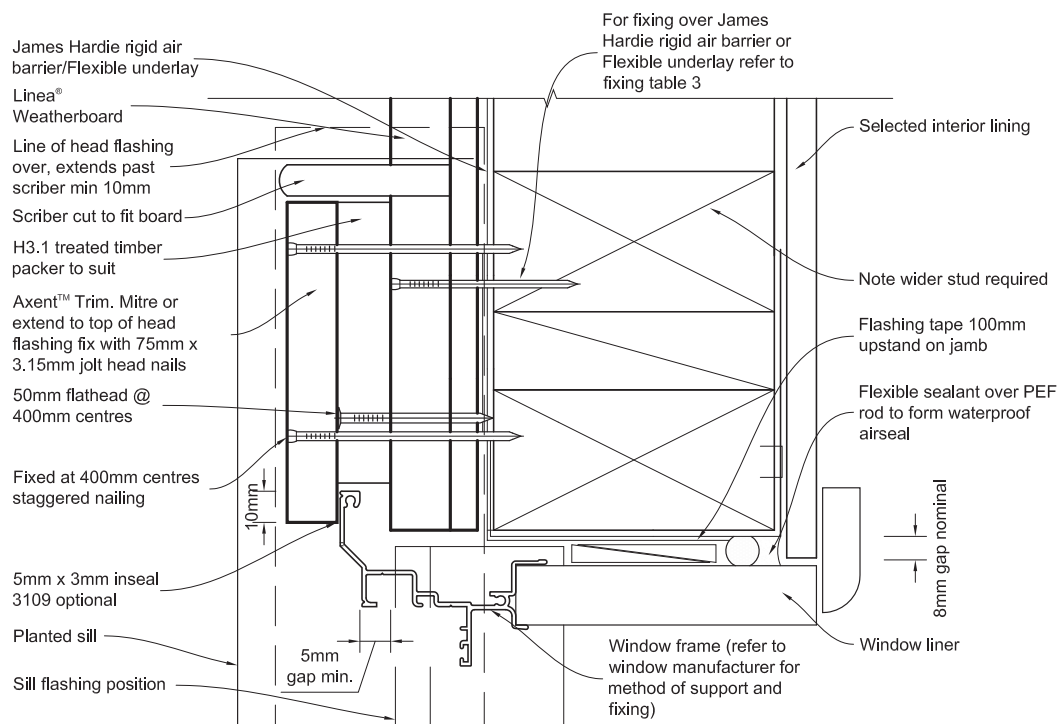
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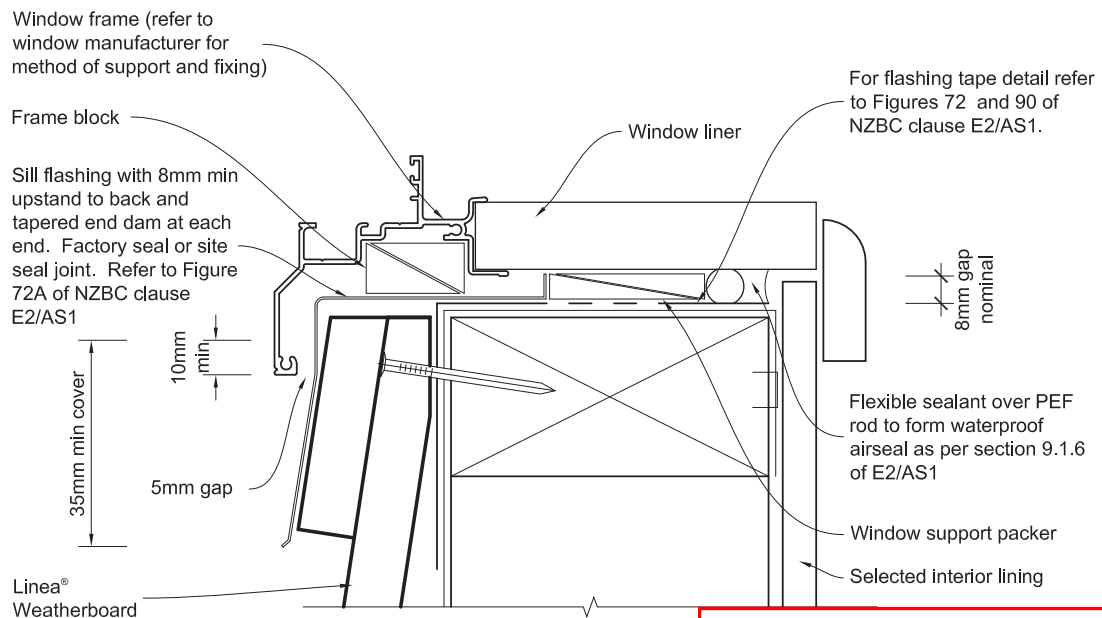
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Figure 13: Direct fix window and door jamb with facings



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.

Figure 14: Direct fix window and door sill without facings



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3602 and Table 20 of NZBC clause E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay/James Hardie rigid air barrier and other materials with which it comes into contact.

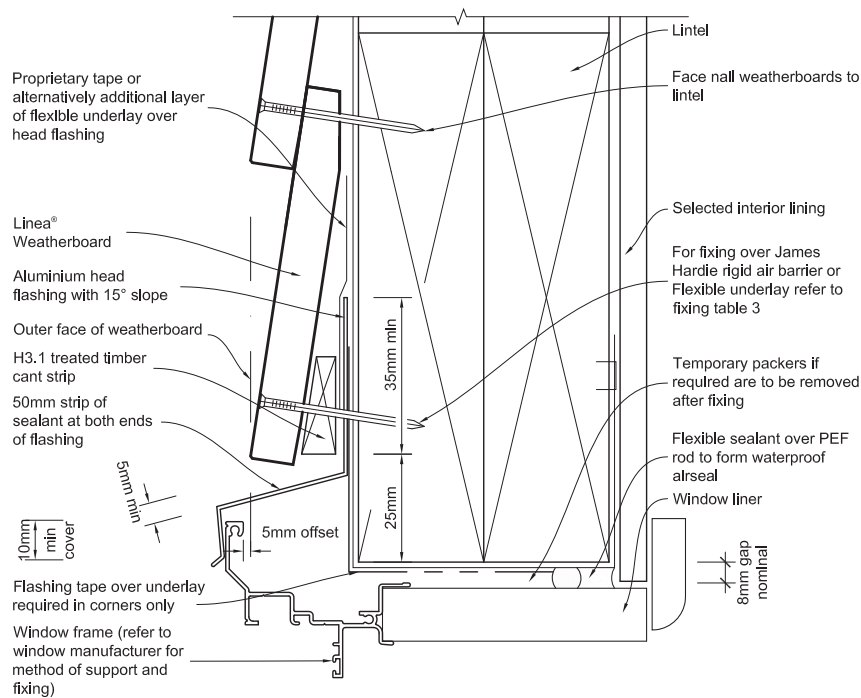
Refer to the manufacturer or supplier for technical information for these materials.

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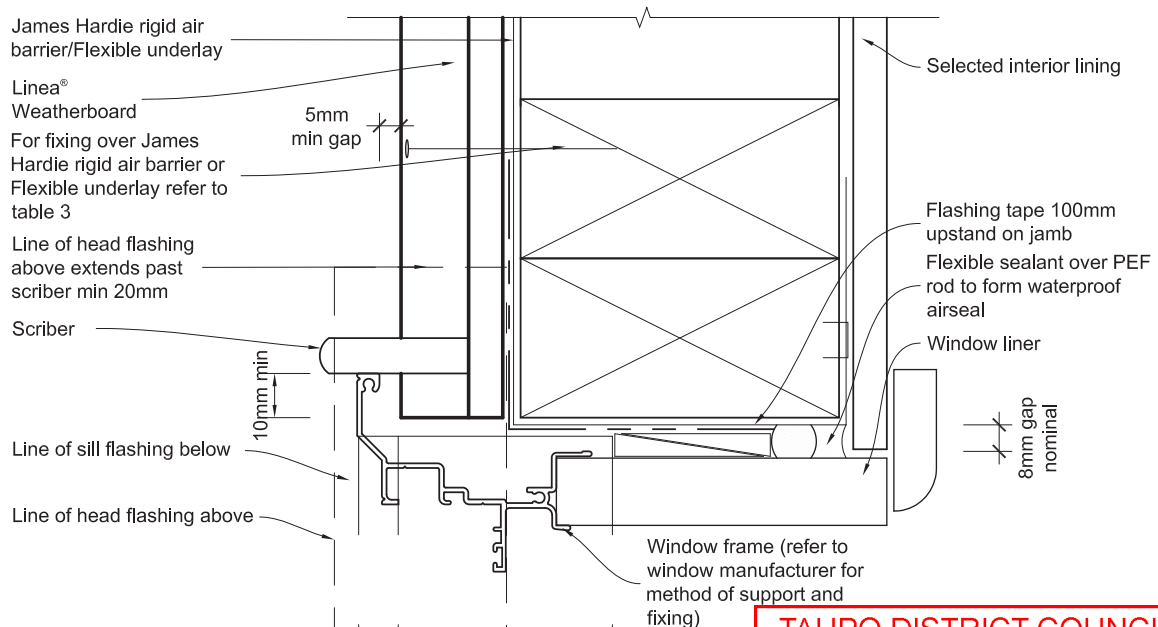
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Figure 15: Direct fix window and door head without facings



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.
Sealant must be installed between head flashing and window flange in VH wind zones. Refer Figure 71 of E2/AS1

Figure 16: Direct fix window and door jamb without facings



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire window opening.
Alternatively window jamb can be formed as per E2/AS1 with jamb battens.

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Figure 17: Direct fix head flashing termination

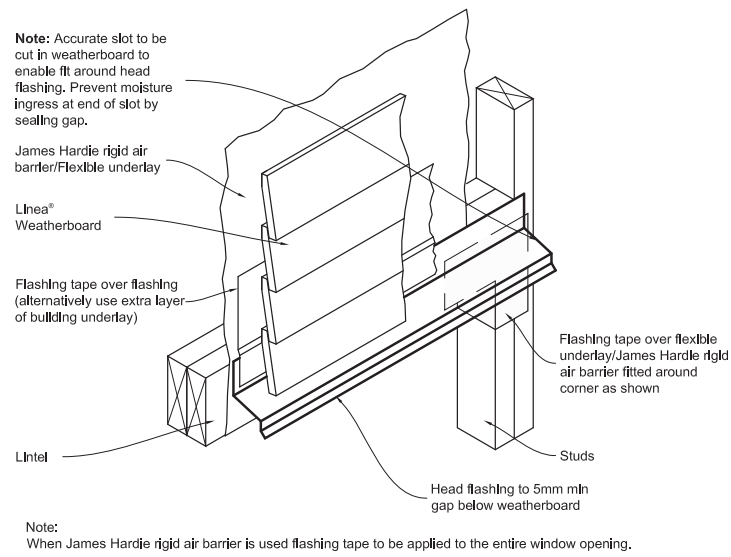
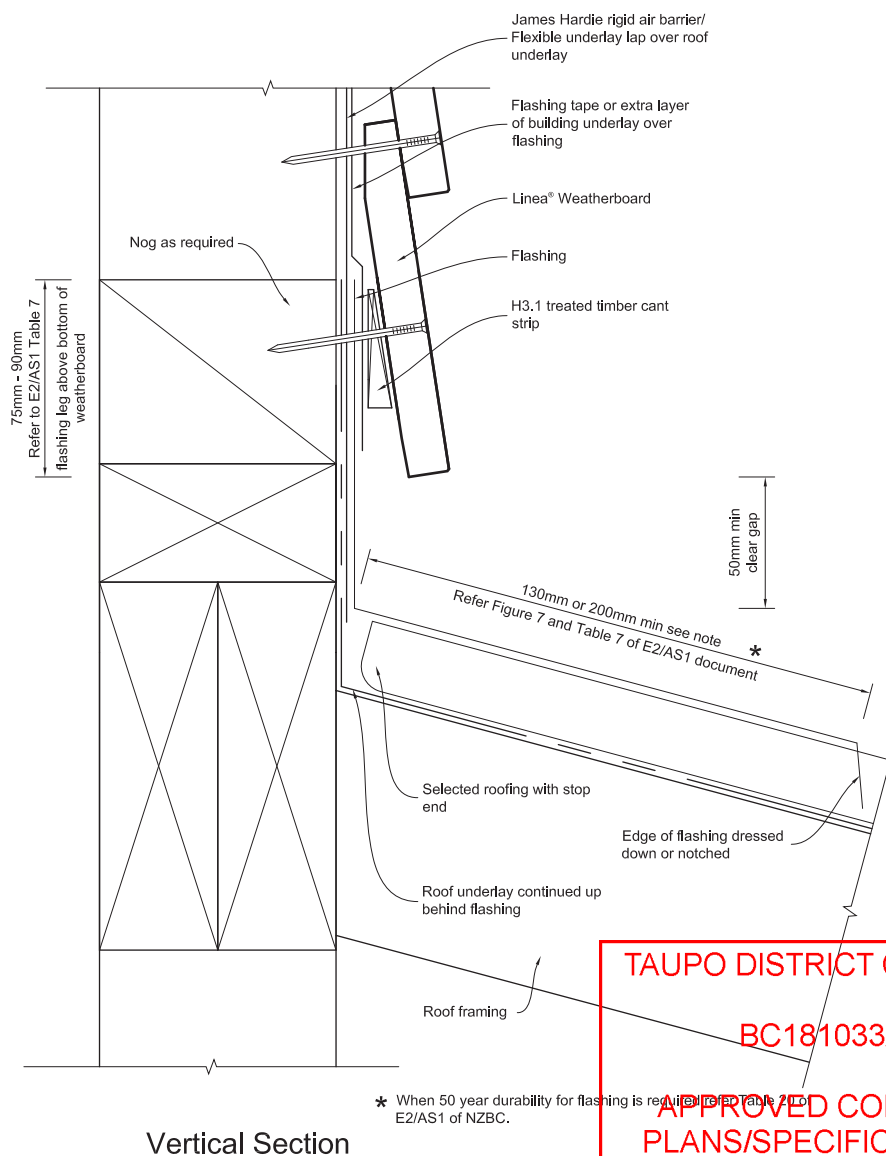


Figure 18: Direct fix one piece apron flashing joint



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Figure 19: Direct fix pipe penetration

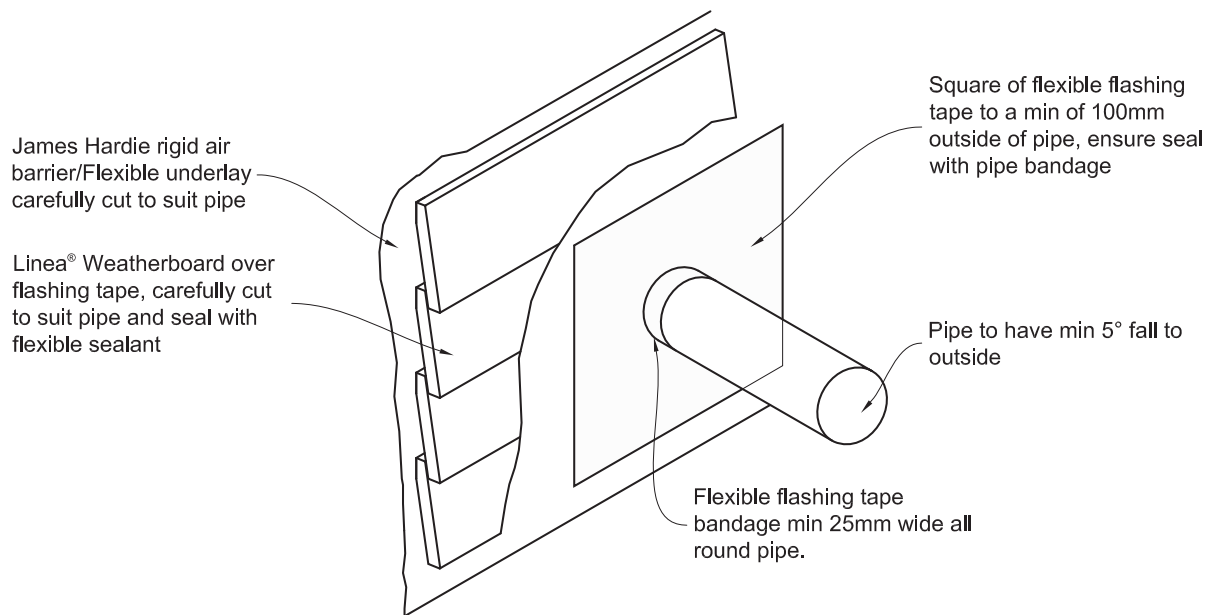
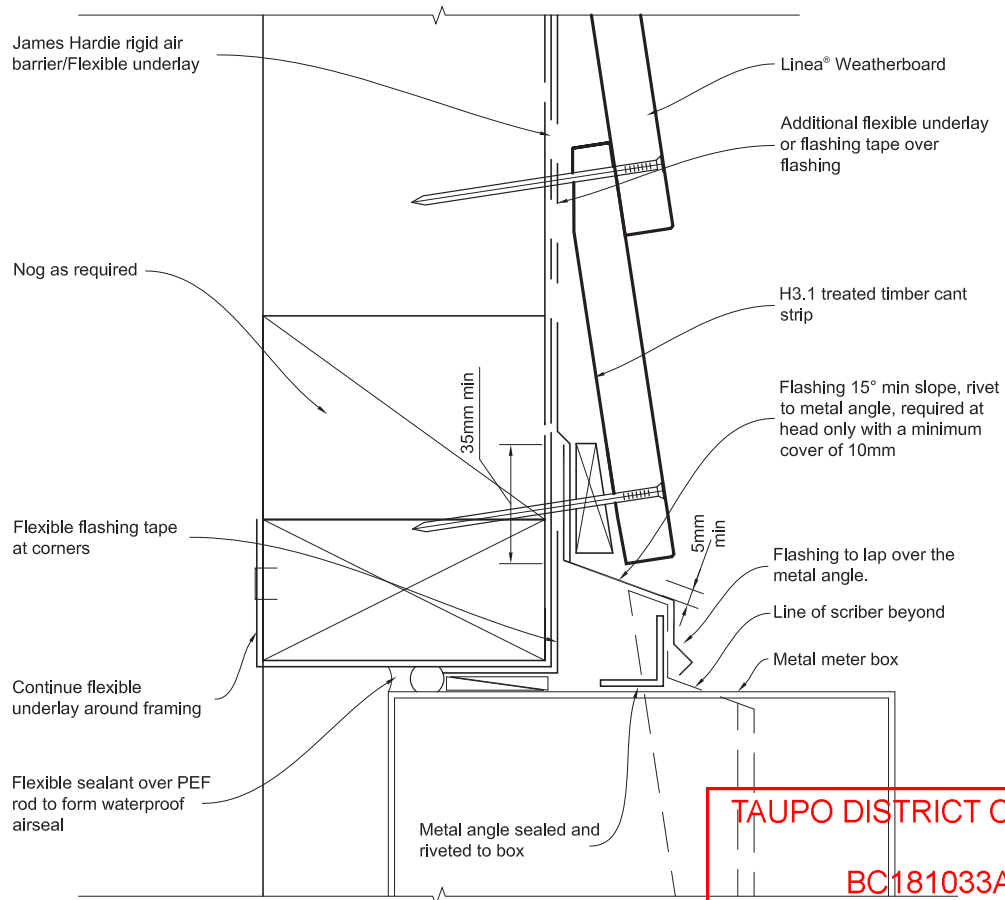


Figure 20: Direct fix meter box at head



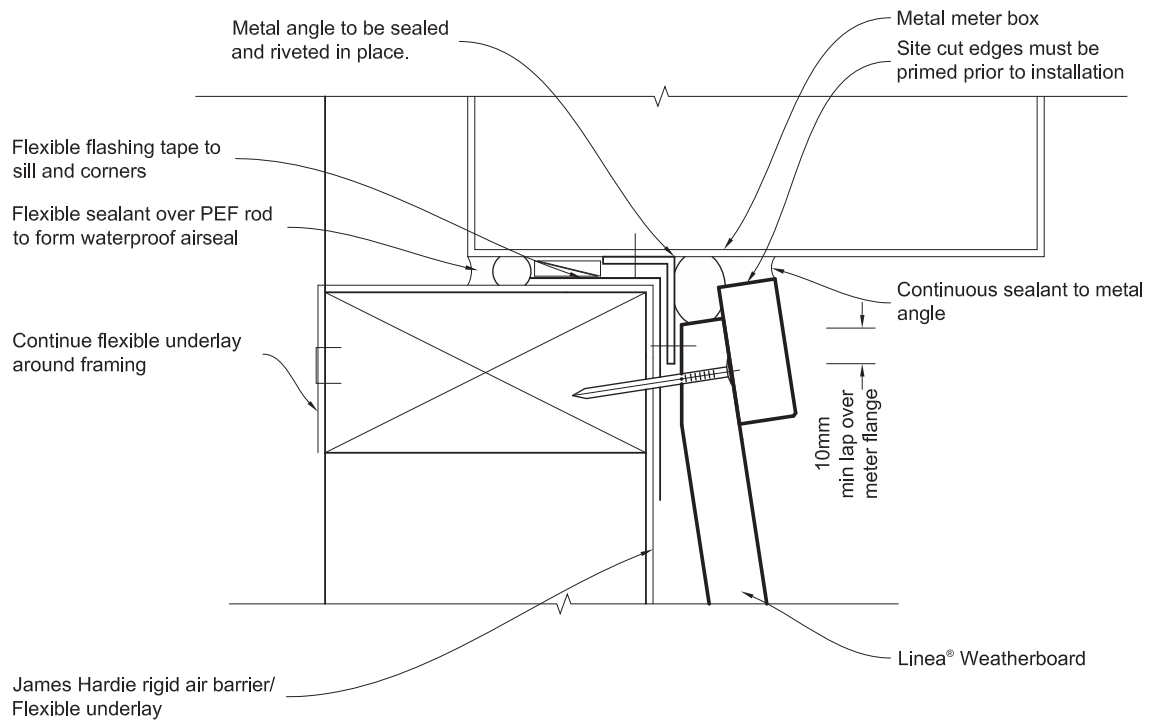
Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire opening.

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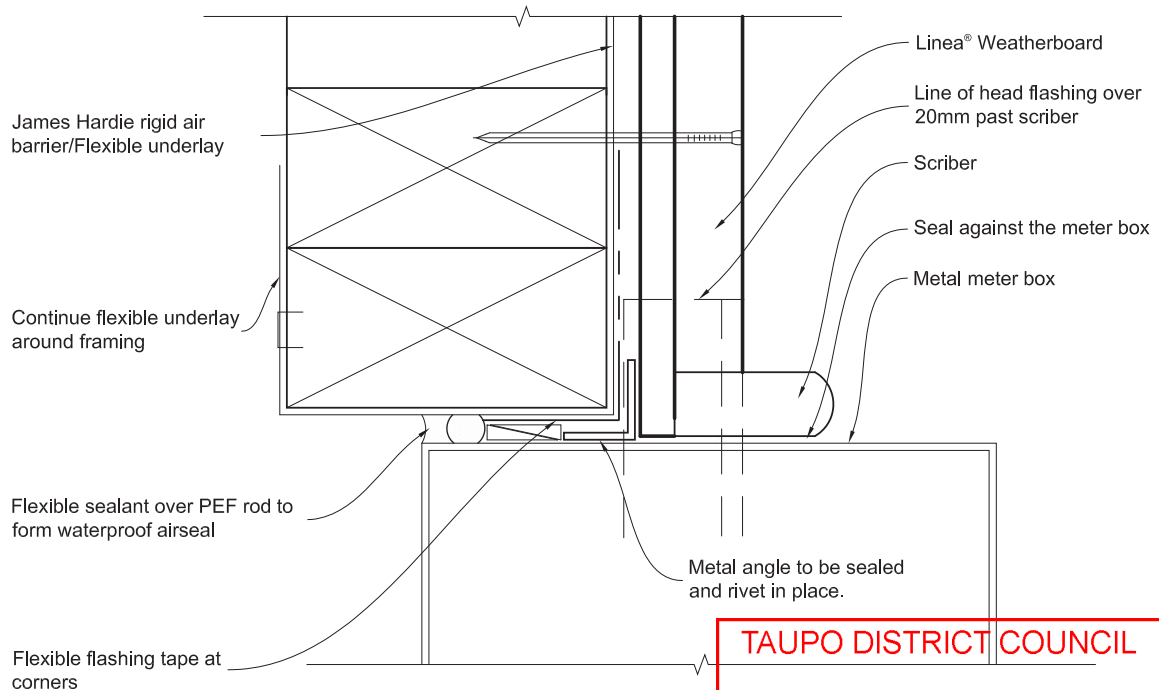
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Figure 21: Direct fix meter box at sill



Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire opening.

Figure 22: Direct fix meter box at jamb



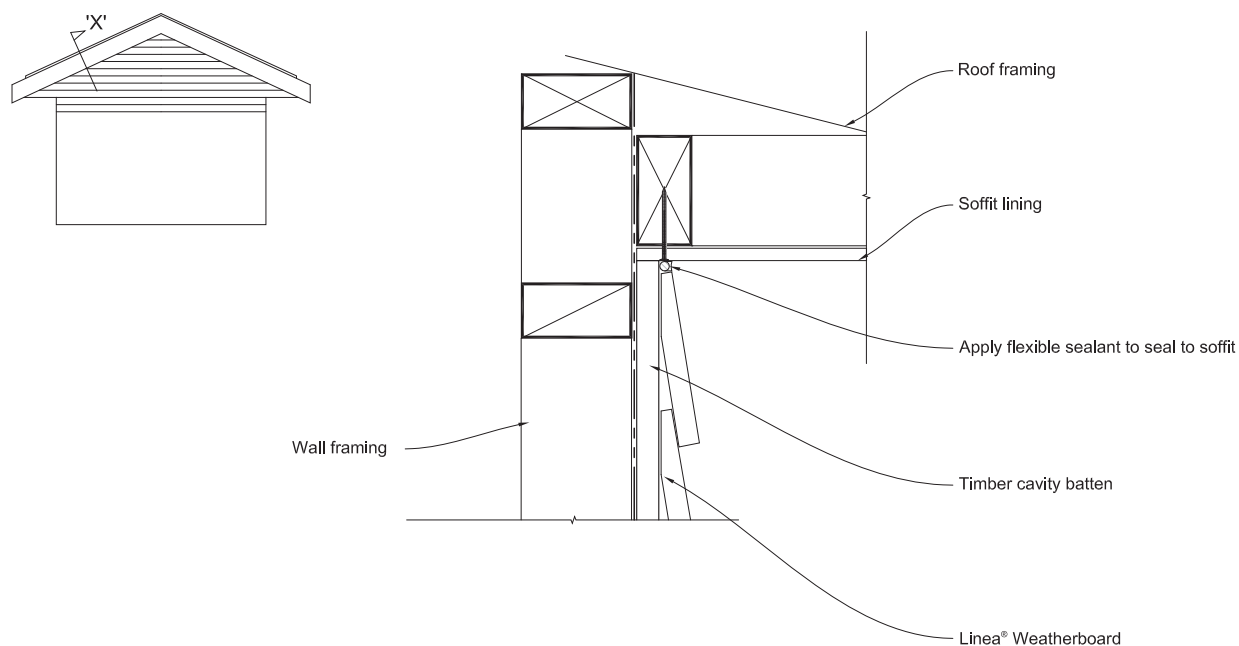
Note:
When James Hardie rigid air barrier is used flashing tape to be applied to the entire opening.

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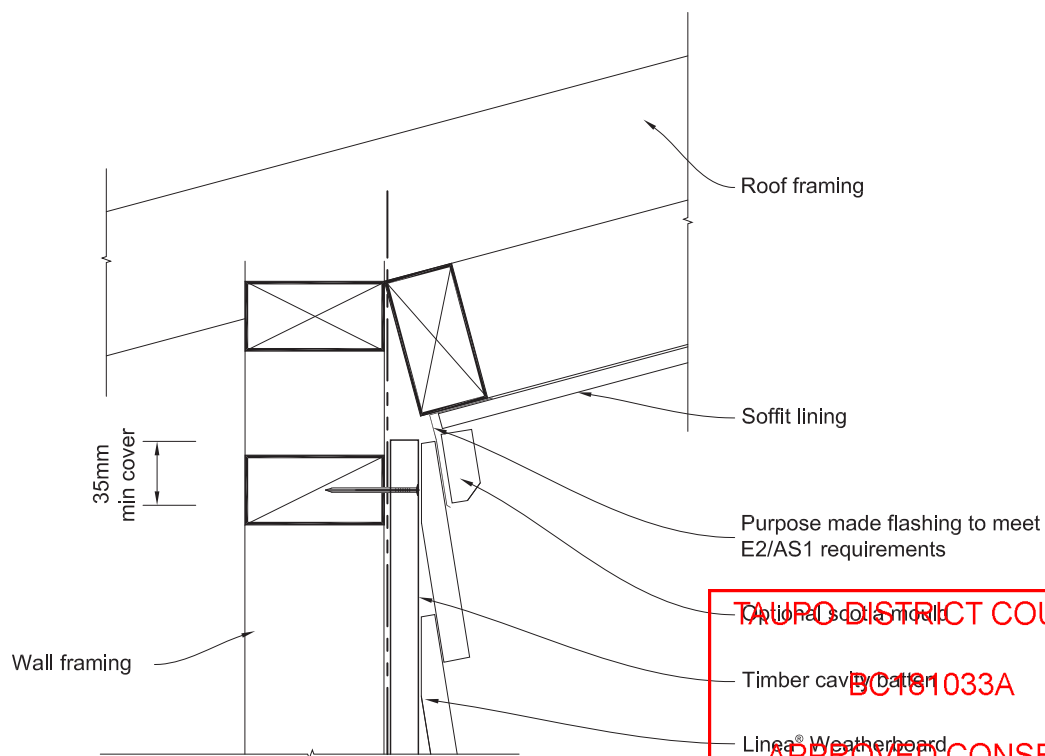
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Figure 59: Linea® Weatherboard junction (section 'X') cavity to cable



The Linea® Weatherboard must be neat cut and silicone sealed to angle of soffit
Alternatively a scotia can be scribed and sealed to Linea® Weatherboard and the soffit lining

Figure 60: Linea® Weatherboard sloping soffit and wall junction



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Product Warranty

Linea®
WEATHERBOARD

April 2016

Warranty: James Hardie New Zealand ("James Hardie") warrants for a period of 25 years from the date of purchase that the Linea® Weath®rboard (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the Axent™ Trim and accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("The NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested the performance of Linea® Weath®rboard when installed in accordance with the Linea® Weath®rboard technical specification, in accordance with the standards and verification methods required by the NZBC and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design) James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

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BRANZ Appraised

Appraisal No. 446 [2010]

LINEA® WEATHERBOARD DIRECT FIXED CLADDING

Appraisal No. 446 [2010]

Amended 01 March 2016



BRANZ Appraisals

Technical Assessments of products
for building and construction.



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Product

- 1.1 Linea® Weatherboard is a bevelbacked fibre cement weatherboard, which is designed to be used as part of an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.
- 1.2 Linea® Weatherboard Direct Fixed Cladding consists of Linea® Weatherboards applied direct to the external wall framing over a building underlay. The cladding incorporates secondary seals behind all internal and external corners, flashings for window, door and meter box penetrations, as well as air seals to all wall penetrations.
- 1.3 The cladding system is finished with a latex paint system.

Scope

- 2.1 Linea® Weatherboard Direct Fixed Cladding has been appraised as an external wall cladding for buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
 - constructed with timber framing complying with the NZBC; and,
 - with a risk score of 0-12, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
 - situated in NZS 3604 Wind Zones up to, and including Very High.
- 2.2 Linea® Weatherboard must only be installed horizontally on vertical surfaces.
- 2.3 Linea® Weatherboard Direct Fixed Cladding is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *[The Appraisal of Linea® Weatherboard Direct Fixed Cladding relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone.]*

[Note: Linea® Weatherboard can be used to provide structural bracing and fire resistance rated construction, but these aspects have not been assessed by this Appraisal and are outside its scope.]

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Building Regulations

New Zealand Building Code (NZBC)

- 3.1 **In the opinion of BRANZ, Linea® Weatherboard Direct Fixed Cladding if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Linea® Weatherboard Direct Fixed Cladding meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 9.1 - 9.3.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years and B2.3.2. Linea® Weatherboard Direct Fixed Cladding meets these requirements. See Paragraphs 10.1 and 10.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.7. Linea® Weatherboard Direct Fixed Cladding meets this requirement. See Paragraph 12.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Linea® Weatherboard Direct Fixed Cladding meets this requirement. See Paragraphs 14.1 - 14.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Linea® Weatherboard Direct Fixed Cladding meets this requirement and will not present a health hazard to people.

- 3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

- 4.1 Linea® Weatherboards are bevelback weatherboards with a tongue and groove at each end for jointing. The weatherboards are pre-primed with an acrylic primer on the front face and both edges. Linea® Weatherboards are 16 mm thick and are available 135 mm, 150 mm and 180 mm wide. All boards are supplied 4200 mm long.
- 4.2 Linea® Weatherboards are manufactured from a reduced density cellulose fibre cement formulation. The boards are formed, cut to length and then cured by high-pressure autoclaving. After autoclaving, a bevel is cut on the back face of the weatherboards, the front edge at the bottom of the board is chamfered and the ends are tongue and grooved for jointing. Linea® Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

Accessories

- 4.3 Accessories used with Linea® Weatherboard Direct Fixed Cladding which are supplied by James Hardie New Zealand are:
- **Axent™ Trim** - a 16 mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Axent™ Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 84 mm and 100 mm wide by 2600 mm long.
 - **Z-flashings** - boxed corner Z-flashing for use with Axent™ Trim boxed corners. The Z-flashing is available in grey uPVC in 2700 mm lengths.
 - **External and internal corner mouldings** - chromate treated aluminium external box corner, 90° internal corner 'W' mould and 135° internal corner 'W' mould. The mouldings are available in 2700 mm and 4000 mm lengths.
 - **Corner soakers** - 90° soakers are available for 135 mm, 150 mm and 180 mm Linea® Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.

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- 4.4 Accessories used with Linea® Weatherboard Direct Fixed Cladding which are supplied by the building contractor are:
- **Flexible wall underlay** – building paper complying with NZBC Acceptable Solution E2/AS1, Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
 - **Rigid wall underlay** – Plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.
 - **Flexible sill, head and jamb flashing tape** – flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
 - **Joinery sill and head flashings** – folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.
 - **Planted sill and scribes** – timber treated to Hazard Class H3.1, pre-primed before installation.
 - **Window and door trim cavity air seal** – air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
 - **Flexible sealant** – sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
 - **Linea® Weatherboard fixings** – 40 x 2.8 mm flat head hot-dip galvanised HardieFlex nails or stainless steel ring shank HardieFlex nails [for concealed nailing], and 60 x 3.15 mm jolt head hot-dip galvanised nails or stainless steel ring shank nails [for face nailing].
 - **Axent™ Trim fixings** – 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolt head nails and stainless steel ring shank jolt head nails.

[Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680].

Paint System Specification

- 4.5 Paint systems are not supplied by James Hardie Zealand and have not been assessed, therefore they are outside the scope of this Appraisal.
- 4.6 All exposed faces, including top edges at sills and all bottom edges of Linea® Weatherboard, Axent™ Trim and accessories must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by James Hardie New Zealand or the building contractor, whether on site or off site, is under the control of the building contractor. Linea® Weatherboards must be stacked flat, off the ground and supported on a level platform. They must be kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Weatherboards must always be carried on edge.
- 5.2 Accessories must be stored so they are kept clean, dry and undamaged. All accessories must be used within the maximum storage period recommended by the manufacturer.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Linea® Weatherboard. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

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Design Information

Framing

Timber Treatment

- 7.1 Timber wall framing behind Linea® Weatherboards must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

- 7.2 Studs must be provided at maximum 600 mm centres. Nogs must be fitted flush between the studs at maximum 1200 mm centres.
- 7.3 Timber framing must comply with NZS 3604 or be to a specific design using NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604.
- 7.4 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *[If Linea® Weatherboards are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.]*
- 7.5 Timber wall framing must have a maximum moisture content of 18% before the weatherboards are painted.

General

- 8.1 At ground level the bottom edge of Linea® Weatherboards must be kept clear of paved surfaces, such as footpaths, by a minimum of 100 mm and unpaved surfaces by 175 mm in accordance with NZBC Acceptable Solution E2/AS1, Table 18. The ground clearances to finished floor levels as set out in NZS 3604 must be adhered to.
- 8.2 At deck or low pitch roof/wall junctions, the bottom edge of Linea® Weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 50 mm.
- 8.3 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for wind zones up to and including Very High. Unlined gables and walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Where rigid underlays are used, the fixing lengths must be increased by a minimum of the thickness of the underlay.
- 8.4 Where Linea® Weatherboard Direct Fixed Cladding abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Structure

Mass

- 9.1 The mass of the 135 mm wide Linea® Weatherboard when installed on the wall is 25.7 kg/m² at equilibrium moisture content [EMC]. The mass of the 150 mm wide board is 24.9 kg/m² at EMC and the mass of the 180 mm wide board is 23.9 kg/m² at EMC. Linea® Weatherboard Direct Fixed Cladding is therefore considered a light wall cladding in terms of NZS 3604.

Impact Resistance

- 9.2 Linea® Weatherboards will resist impacts likely to be encountered in normal residential use. The likelihood of impact damage to the cladding when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers provided for vulnerable areas.

Wind Zones

- 9.3 Linea® Weatherboard Direct Fixed Cladding is suitable for use on buildings situated in all Wind Zones of NZS 3604, up to, and including Very High.

Durability

Serviceable Life

- 10.1 Linea® Weatherboard Direct Fixed Cladding installations are expected to have a serviceable life of at least 50 years provided the paint coating system is maintained in accordance with this Appraisal to ensure the Linea® Weatherboards and fixings remain dry in service. Linea® Weatherboards must be painted within 3 months of fixing.
- 10.2 Coastal locations can be very corrosive to fasteners, especially locations within distances of up to 500 m from the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets, and otherwise as shown in NZS 3604 Figure 4.2. These coastal locations are defined in NZS 3604 as Zone D. To achieve a 50 year serviceable life in Zone D, Linea® Weatherboards must be fixed with stainless steel fasteners. Fasteners outside Zone D may be hot-dip galvanised steel.
- 10.3 Microclimatic conditions, including geothermal hot spots, industrial contamination and corrosive atmospheres, and contamination from agricultural chemicals or fertilisers can convert mildly corrosive atmosphere into aggressive environments for fasteners. The fixing of Linea® Weatherboards in areas subject to microclimatic conditions requires specific design in accordance with NZS 3604, Paragraph 4.2.4, and is outside the scope of this Appraisal.

Maintenance

- 11.1 Regular maintenance is essential for the Linea® Weatherboards to continue to meet the NZBC durability performance provision and to maximise their serviceable life.
- 11.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint coating system, flashings and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress must be repaired immediately. Sealant and paint coatings must be repaired in accordance with the sealant or paint coating manufacturer's instructions.
- 11.3 Regular cleaning [at least annually] of the paint coating surface is recommended to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Paint systems must be recoated at approximately 7-15 yearly intervals in accordance with the paint manufacturer's instructions.
- 11.4 Minimum ground clearances as set out in this Appraisal must be maintained at all times during the life of the cladding. *[Failure to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of Linea® Weatherboards.]*

Control of External Fire Spread

- 12.1 Linea® Weatherboard has a peak heat release rate of less than 100 kW/m² and a total heat released of less than 25 MJ/m² in accordance with NZBC Acceptable Solution C/AS1, Table 5.1. Linea® Weatherboard is suitable for use on buildings with a SH Risk Group classification, at any distance to the relevant boundary. Linea® Weatherboard is also suitable for use where a non combustible material is specified. When Linea® Weatherboard is finished with a paint coating of not more than 1.0 mm in thickness, the exterior surface finishes requirements of NZBC Acceptable Solutions C/AS2 – C/AS6, Paragraph 5.8.1 do not apply in accordance with NZBC Acceptable Solutions C/AS2 – C/AS6, Paragraph 5.8.2 a).

Prevention of Fire Occuring

- 13.1 Linea® Weatherboard is considered a non-combustible material and need not be separated from heat sources such as fire places, heating appliances, flues and chimneys. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from fire places, heating appliances, flues and chimneys in accordance with the requirements of Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1.

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External Moisture

- 14.1 Linea® Weatherboard Direct Fixed Cladding, when installed in accordance with this Appraisal and the Technical Literature will prevent the penetration of moisture that could cause undue dampness or damage to building elements.
- 14.2 Linea® Weatherboard Direct Fixed Cladding allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet code compliance with Clause E2.3.6.
- 14.3 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Appraisal and are the responsibility of the designer for compliance with the NZBC.

Internal Moisture

- 15.1 Buildings must be constructed with an adequate combination of thermal resistance and ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

Water Vapour

- 15.2 Linea® Weatherboard Direct Fixed Cladding is not a barrier to the passage of water vapour, and when installed in accordance with the Technical Literature and this Appraisal will not create a risk of moisture damage resulting from condensation.

Installation Information

Installation Skill Level Requirements

- 16.1 Installation of Linea® Weatherboard and accessories supplied by James Hardie New Zealand and the building contractor must be completed by tradespersons with an understanding of bevelback weatherboard installation, in accordance with instructions given within the Linea® Weatherboard Technical Literature and this Appraisal.

System Installation

Building Underlay and Flexible Sill and Jamb Tape Installation

- 17.1 The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of Linea® Weatherboard Direct Fixed Cladding. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75mm minimum at horizontal joints and 150mm minimum over studs at vertical joints. Generic rigid sheathing materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall underlay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

Linea® Weatherboard Installation

- 17.2 Linea® Weatherboards may be cut on site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.
- 17.3 Weatherboards must be dry prior to installation. Before the weatherboards are installed, cut ends exposed to the exterior such as at aluminium box corners or internal corners must be sealed with an acrylic sealer to reduce the absorbency of the fibre cement.

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- 17.4 Linea® Weatherboards must be installed starting at the bottom of the wall. A cant strip (H3.1 treated timber or fibre cement) must be fixed behind the bottom course of weatherboards to ensure the weatherboards are set at the correct angle. The cant strip must be continuous around the perimeter of the building. The bottom course of weatherboards must overhang the bottom plate by a minimum of 50 mm.
- 17.5 Before the weatherboards are installed, the corner detail must be prepared to suit the selected option, e.g. external box corner, corner soaker. The necessary flashings, including window flashings, must be installed before commencing weatherboard fixing.
- 17.6 The first course of weatherboards must be full length, i.e. 4200 mm and commence from an external corner. Jointing of Linea® Weatherboards is made off the stud using the pre-cut tongue and groove joint. Tongue and groove joints may be located centrally between the studs, but must be no closer than 100 mm to the edge of a stud. A bead of sealant must be applied to the front side of the tongue before the corresponding board is inserted. Subsequent courses of weatherboards must be installed so that the tongue and groove joints are staggered by 600 mm minimum from joints in the previous course.
- 17.7 Linea® Weatherboards must have a minimum lap of 30 mm, and should be set out so as near to a full board as possible will finish under and over windows and doors and at the top of the wall. A storey rod can be used to accurately position weatherboard courses.
- 17.8 Linea® Weatherboards must be fixed to each stud using concealed fixings behind the lap of the boards or face nailing, except that face nailing must be provided at all corners and vertical edges of openings.
- 17.9 Concealed fixing must be carried out using 40 x 2.8 mm hot-dip galvanised or stainless steel Hardieflex nails depending on the location - see Paragraph 10.2. Nails must be fixed 25 mm from the top edge of the board and must be driven flush with the board surface.
- 17.10 Face nailing must be carried out using 60 x 3.15 mm hot-dip galvanised or stainless steel jolt-head nails depending on the location - see Paragraph 10.2. Nails must be fixed 15 mm up from the bottom of the board and punched a maximum of 2 mm below the surface of the board. When stainless steel nails are used, the top board at each lap must be pre-drilled.
- 17.11 Linea® Weatherboards can be hand or gun nailed. Nails must not be closer than 25 mm to the end of the board when hand nailing, or closer than 50 mm when gun nailing. *[Note: Gun nailing must only be used for concealed nailing.]*

Aluminium Joinery Installation

- 17.12 Aluminium joinery and associated head and sill flashings must be installed by the building contractor in accordance with the Technical Literature. A 7.5 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.
- 17.13 After installing the window and door joinery, Axent™ Trim, planted sills and scribes may be installed in accordance with the Technical Literature to provide additional weatherproofing for the joinery/weatherboard junction.

Inspections

- 17.14 The Technical Literature must be referred to during the inspection of Linea® Weatherboard Direct Fixed Cladding installations.

Finishing

- 17.15 The paint coating manufacturer's instructions must be followed at all times for application of the paint finish. Linea® Weatherboards and trim must be clean and dry before commencing painting.

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Health and Safety

- 18.1 Cutting of Linea® Weatherboard must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.
- 18.2 When power tools are used for cutting, grinding or forming holes, health and safety measures as set out in the Technical Literature must be observed because of the amount of dust generated.
- 18.3 Safe use and handling procedures for Linea® Weatherboard and the components that make up the cladding system are provided in the relevant manufacturer's Technical Literature.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 19.1 The following testing has been completed by BRANZ:
 - BRANZ expert opinion on NZBC E2 code compliance for Linea® Weatherboard Direct Fixed Cladding was based on testing and evaluation of all details within the scope and as stated within this Appraisal. Linea® Weatherboard Direct Fixed Cladding was tested to AS/NZS 4284 with a BRANZ-designed extension. The testing was completed in three stages; the first being the standard AS/NZS 4284 test, the second being the modified AS/NZS 4284 test with defects introduced in the test panel, and the third being the modified AS/NZS 4284 test with the internal linings and building underlay removed. The testing assessed the performance of the foundation detail, window head, jamb and sill details, internal and external corners. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of NZBC Acceptable Solution E2/AS1 for direct fixed weatherboard claddings.
 - Uniform wind face load tests to simulate wind pressures on 12 mm thick Linea® Weatherboards were carried out by BRANZ, and the results were used in assessing 16 mm thick Linea® Weatherboard.
 - Cone Calorimeter testing to determine the peak rate of heat release and total heat release of Linea® Weatherboard was completed by BRANZ. The testing was carried out in accordance with AS/NZS 3837.
- 19.2 Linea® Weatherboards have been tested by a James Hardie NATA accredited laboratory in accordance with AS/NZS 2908.2. The testing covered: soak-dry, bending strength, warm water soaking, heat/rain, freeze/thaw and apparent density. The test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 19.3 Testing has been carried out by James Hardie New Zealand to determine the modulus of rupture and inter-laminar bond strength of carbonated and non-carbonated Linea® Weatherboard. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 20.1 Weathertightness, structural, fire and durability opinions have been provided by BRANZ technical experts.
- 20.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.
- 20.3 The manufacturer's Technical Literature has been examined by BRANZ and found to be satisfactory.

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Quality

- 21.1 The manufacture of Linea® Weatherboard has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 21.2 The quality of materials, components and accessories supplied by James Hardie New Zealand is the responsibility of James Hardie New Zealand. The quality control system of James Hardie New Zealand has been assessed and registered as meeting the requirements of ISO 9001: 2008.
- 21.3 Quality on site is the responsibility of the installer.
- 21.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the building underlay, Linea® Weatherboard and accessories in accordance with the instructions of James Hardie New Zealand.
- 21.5 Building owners are responsible for the maintenance of Linea® Weatherboard Direct Fixed Cladding in accordance with the instructions of James Hardie New Zealand.

Sources of Information

- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2908.2: 2000 Cellulose-cement products - Flat sheet.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- AS/NZS 4284: 2008 Testing of building facades.
- AS/NZS 4534: 1998 Zinc and zinc/aluminium-alloy coatings on steel wire.
- AS/NZS 4680: 2006 Hot-dip galvanized [zinc] coatings on fabricated ferrous articles.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4211: 2008 Specification for performance of windows.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 [Amendment 5, 1 August 2011].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 31 January 2012.

This Appraisal has been amended to update clause changes as required by the introduction of NZS 3604: 2011 and NZBC Acceptable Solution E2/AS1 Third Edition, Amendment 5.

Amendment No. 2, dated 30 October 2013.

This Appraisal has been amended to change the Appraisal Holder, change the Product Name and to update clause changes as required by the introduction of NZBC Fire Clauses C1 – C6 Protection from Fire and A3 Building Importance Levels.

Amendment No. 3, dated 01 March 2016.

This Appraisal has been amended to remove the term Scyon®.

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In the opinion of BRANZ, **Linea® Weatherboard Direct Fixed Cladding** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **James Hardie New Zealand**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **James Hardie New Zealand:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **James Hardie New Zealand**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **James Hardie New Zealand** or any third party.

For BRANZ



Pieter Burghout
Chief Executive

Date of Issue:
14 September 2010

TAUPO DISTRICT COUNCIL

BC181033A

**APPROVED CONSENT
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CERTIFICATE OF CONFORMITY

This product Certificate is issued under Section 269 of the Building Act 2004 for:

James Hardie Linea® Weatherboard Direct Fixed and Cavity Cladding



Page 1 of 2



Product Description

1. Linea® Weatherboard is a 16 mm thick bevelback fibre cement weatherboard, which is designed to be used as part of an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.
2. Linea® Weatherboard Direct Fixed Cladding consists of Linea® Weatherboards applied direct to the external wall framing over a building underlay. Linea® Weatherboard Cavity Cladding consists of Linea® Weatherboards fixed over timber battens to form the cavity. Both cladding methods incorporate secondary protection behind all internal and external corners, flashings for window, door and meter box penetrations as well as air seals to all wall penetrations.
3. Linea® Weatherboard cladding is finished with a latex paint system.

Product purpose and use

1.0 Direct Fixed Construction Method:

1.1 Linea® Weatherboard Direct Fixed Cladding has been assessed as an external wall cladding for buildings within the following scope:

- the scope limitations of New Zealand Building Code (NZBC) Acceptable Solution E2/AS1, Paragraph 1.1; and,
- timber-framed construction complying with the NZBC; and,
- with a risk score of 0-12, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604:2011 Wind Zones up to, and including Very High.

2.0 Cavity Construction Method:

2.1 Linea® Weatherboard Cavity Cladding has been assessed as an external wall cladding for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- timber-framed construction complying with the NZBC; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604:2011 Wind Zones up to, and including Extra High.

2.2 Linea® Weatherboard Cavity Cladding has also been assessed for weathertightness and structural wind loading when used as an external horizontally fixed wall cladding solution for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- constructed with timber framing complying with the NZBC; and,
- situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.

3.0 General

3.1 Linea® Weatherboard Direct Fixed and Cavity Cladding must only be installed horizontally on vertical surfaces.

3.2 Linea® Weatherboard Direct Fixed and Cavity Cladding is certified for use with aluminium window and door joinery that is installed with vertical jamps and horizontal heads and sills. (This certification of Linea® Weatherboard Direct Fixed and Cavity Cladding relies on the joinery meeting the requirements of NZS 4211:2008 including amendment 1 for the relevant Wind Zone or design wind pressure.)

4.0 Exclusions

4.1 Linea® Weatherboard Direct Fixed Cladding and Linea® Weatherboard Cavity Cladding can be used to provide structural bracing and fire resistance rated construction, but these aspects have not been assessed and are outside scope of this

CodeMark Certification Body		29/9/2010	24/8/2016	29/9/2019	GM-CM30018-RevG
Global-Mark Pty Ltd, Suite 4.07, 32 Delhi Road, North Ryde NSW 2113, Australia Tel: +61 (0)2 9886 0222 www.Global-Mark.com.au	Herve Michoux Managing Director	Date of issue	Last update	Date of next re-certification	Certificate Number

The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expertise of the JAS-ANZ Building Adviser Council. This certificate is issued by Global-Mark Pty Limited, an independent certification body accredited by the product certification accreditation body (JAS-ANZ) appointed by the Chief Executive of the Ministry of Business Innovation and Employment under the Building Act 2004. The Ministry of Business Innovation and Employment does not in any way warrant, guarantee, or represent that the building method or product is the subject of this certificate conforms with the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product. The Ministry of Business Innovation and Employment disclaims, to the extent permitted by law, all liability (including negligence) for claims of losses, expenses, damages, and costs arising as a result of the use of the building method(s) or product(s) referred to in this certificate. This Certificate may only be reproduced in its entirety.

It is advised to check that this Certificate of Conformity is currently valid and not withdrawn, suspended or superseded by a later issue by referring to the Ministry of Business Innovation and Employment website, <http://www.mbie.govt.nz/>
New Zealand Building Code (NZBC) references the Building Code in force at the time of issuing the product certificate.

CERTIFICATE OF CONFORMITY

This product Certificate is issued under Section 269 of the Building Act 2004 for:

James Hardie Linea® Weatherboard Direct Fixed and Cavity Cladding



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Certificate.

Certificate holder

James Hardie New Zealand,
PO Box 12 070, Penrose, New Zealand, Tel: 0800 808 868, www.jameshardies.co.nz

Compliance with the New Zealand Building Code (NZBC):

Linea® Weatherboard if designed, used, installed and maintained in accordance with the scope of this Certificate, the statements and conditions of the supporting Appraisals and the Linea® Weatherboard Technical Specification, dated April 2016 including installation details 1 to 65, will meet the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2, B1.3.4 (b), (c), (d) and (e) for the relevant physical conditions of B1.3.3 (a), (f), (h), (j) and (q). Linea® Weatherboard Direct Fixed Cladding and Linea® Weatherboard Cavity Cladding meet the requirements.

Clause B2 DURABILITY: Performance B2.3.1(b) 15 years and B2.3.2. Linea® Weatherboard Direct Fixed Cladding and Linea® Weatherboard Cavity Cladding meet these requirements.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.7 (a). Linea® Weatherboard Direct Fixed Cladding and Linea® Weatherboard Cavity Cladding contribute to meeting this requirement.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Linea® Weatherboard Direct Fixed Cladding and Linea® Weatherboard Cavity Cladding meet this requirement.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Linea® Weatherboard Direct Fixed Cladding and Linea® Weatherboard Cavity Cladding meet this requirement and will not present a health hazard to people.

Subject to the following conditions and limitations:

1. Certificate holder will notify Global-Mark Pty Ltd in accordance with Regulation 15 of the Building (Product Certification) Regulations 2008
2. Subject to regular inspection for soil movement, earthquake or other structural impact or user damage.
3. Maintaining the validity of and compliance with the BRANZ Appraisal No. 446 (2010) (Amended 01 March 2016) Linea® Weatherboard Direct Fixed Cladding and BRANZ Appraisal No. 447 (2010) (Amended 01 March 2016) Linea® Weatherboard Cavity Cladding.
4. Linea® Weatherboard Cavity Cladding can only be used with the ancillary components as described in BRANZ Appraisal No. 446 (2010) (Amended 01 March 2016) Linea® Weatherboard Direct Fixed Cladding and BRANZ Appraisal No. 447 (2010) (Amended 01 March 2016) Linea® Weatherboard Cavity Cladding, where these components are substituted with alternative products, these applications fall outside the scope of this Certification.

Design Conditions:

1. Product specification and incorporation of the Linea® Weatherboard claddings into the building design shall be carried out by a designer / architect / engineer or a building professional who:
 - Is qualified to design the buildings covered under the 'Scope' of use of this product.
 - Has ready access to the relevant technical specifications, NZBC, Standards, details and other information related to the cladding method, including the current version of the James Hardie Technical Specification for Linea® Weatherboard as noted within this Certificate.
2. Only joinery compliant with the requirements of NZS 4211:2008 including amendment 1 for the relevant Wind Zone or wind pressure shall be used with Linea® Oblique Weatherboard Cavity Cladding. The use of joinery not meeting this requirement fall outside the scope of this certificate.

Product Installation Conditions:

1. Installation shall be carried out by a Licensed Building Practitioner (LBP) holding a Carpentry class license, or tradespersons with experience in bevelback weatherboard external wall cladding installation who are supervised by a LBP holding a Carpentry class license.
2. Installation shall be undertaken in accordance with all relevant technical information related to the selected installation method, including information contained within the current version of the James Hardie Technical Specification for Linea® Weatherboard (dated April 2016), and the relevant BRANZ Appraisal.

End of the records

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Fireplace Installation

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escea.

Installation / Service Instructions

DL850 / DL1100
Gas Fireplaces

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Important:

The appliance shall be installed in accordance with;

- This installation instruction booklet
- Local gas fitting regulations
- Municipal building codes
- Electrical wiring regulations
- Any other relevant statutory regulations.
- AS/NZS 5601:2010 Gas Installations

**WARNING:**

This appliance must be installed by a qualified person.

Do not modify this appliance.

This appliance is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.

Young children should be supervised to ensure that they do not play with the appliance.

Failure to follow these instructions could cause a malfunction of the heater, which could result in death, serious bodily injury, and/or property damage. Failure to follow these instructions may also void your fire insurance and/or warranty.

Who can install this product:

Installation must be carried out by a registered installer who, on completion of the installation, must issue a:

AUS: Certificate of Compliance

NZ: Certificates that comply with the latest legislation

in accordance with national and/or local codes. If these are not issued then the Escea warranty may be void.

Warranty Repair and Annual Servicing:

Warranty repair work must be carried out by a recognized Escea Gas Fire Technician. It is recommended that recognized Escea Gas Fire Technicians are also used to carry out annual servicing requirements (particularly during the warranty period). For contact details of recognized Escea Gas Fire Technicians in your area, please contact the retailer from whom the appliance was purchased.

The heater must be installed according to these instructions and in compliance with all relevant building, gas fitting, electrical and other statutory regulations (e.g. AS/NZS 5601). Any shortcomings in the appliance and flue installation will be the responsibility of the installer, and Escea will not be accountable for any such failings or their consequences.

Manufactured by: Escea Ltd, PO Box 5277 Dunedin NZ, Ph: +64 3 478 8220

For contact details of your local escea distributor or dealer please visit:

www.escea.com

info@escea.com

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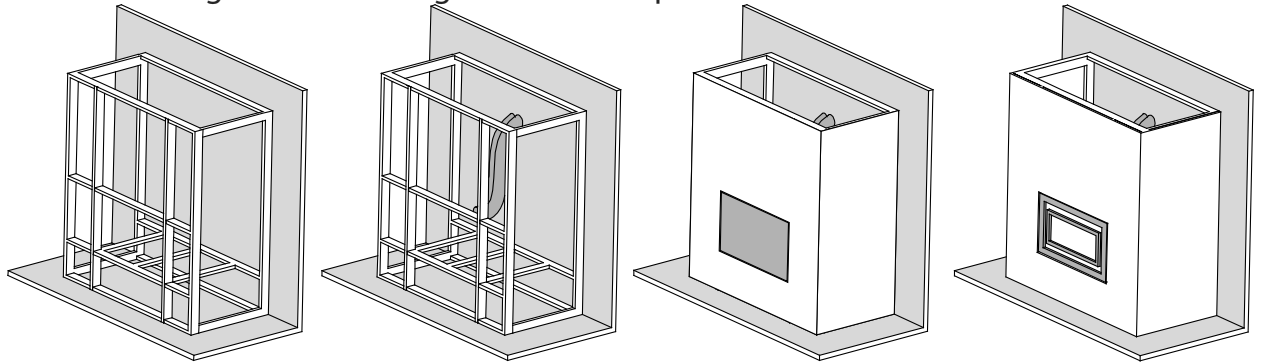
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A Installation Process and Product Description

A1 Recommended Installation Process:

The following diagram illustrates the steps required to install your gas fire..

The sequence in which you choose to do these tasks will vary depending on your individual scenario. Please read these instructions fully before proceeding with the installation. Leave the installation of the fascia panels until the very end of the installation and commissioning to avoid damage to the fascia panels.



Create the Cavity	Install electrical / gas connections and flue system	Install appliance and finish cavity	Finish installation, fit fascia and test appliance
Section B	Section C, D	Section E	Section F

A2 Product Description:

The Escea DL series gas fire is a room sealed gas appliance designed to be built into a cavity. These appliances are flued using collinear flexible aluminium flue (with PolyPro flue extensions in some installations) connected to a powerflue.

The user will control their fire with the Radio Frequency (RF) remote that will normally be left in its wall mount cradle. In addition to the RF remote the appliance has a single auxiliary On/Off button on the unit. When not in operation it is in a standby mode unless it is physically isolated from the mains supply.

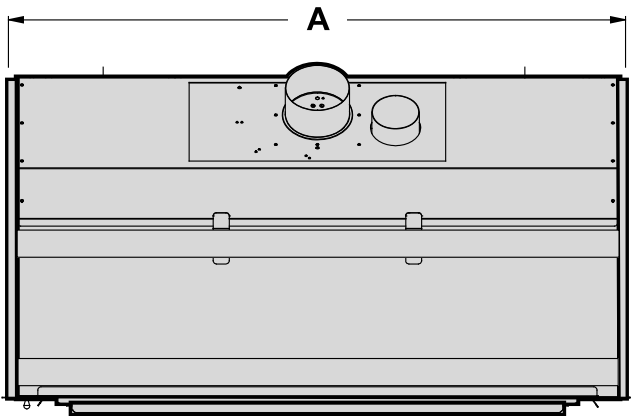
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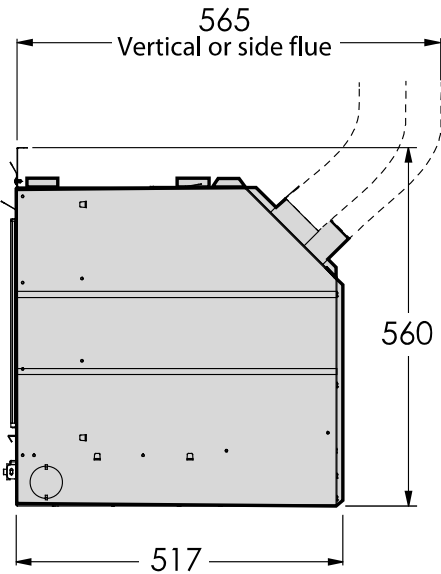
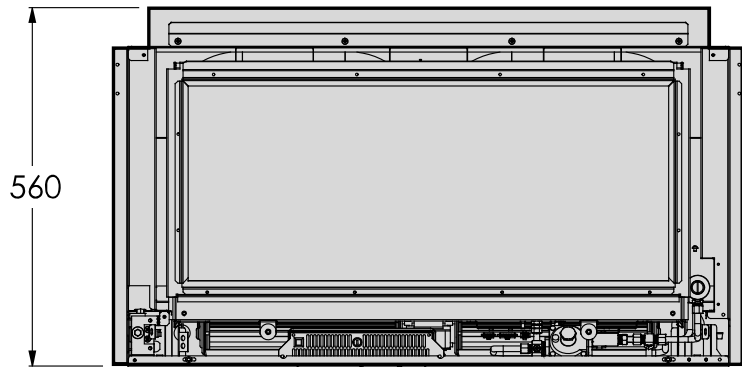
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A3 Product Dimensions:

All dimensions are in mm



	DL850	DL1100
A	959	1259



B Creating the Cavity

B1 Cavity Shape:

The DL850/DL1100 is suitable for both timber framed and masonry cavities. The cavity shape is dependant on two things:

- The flue configuration (section B2)
- The fascia (section B4)

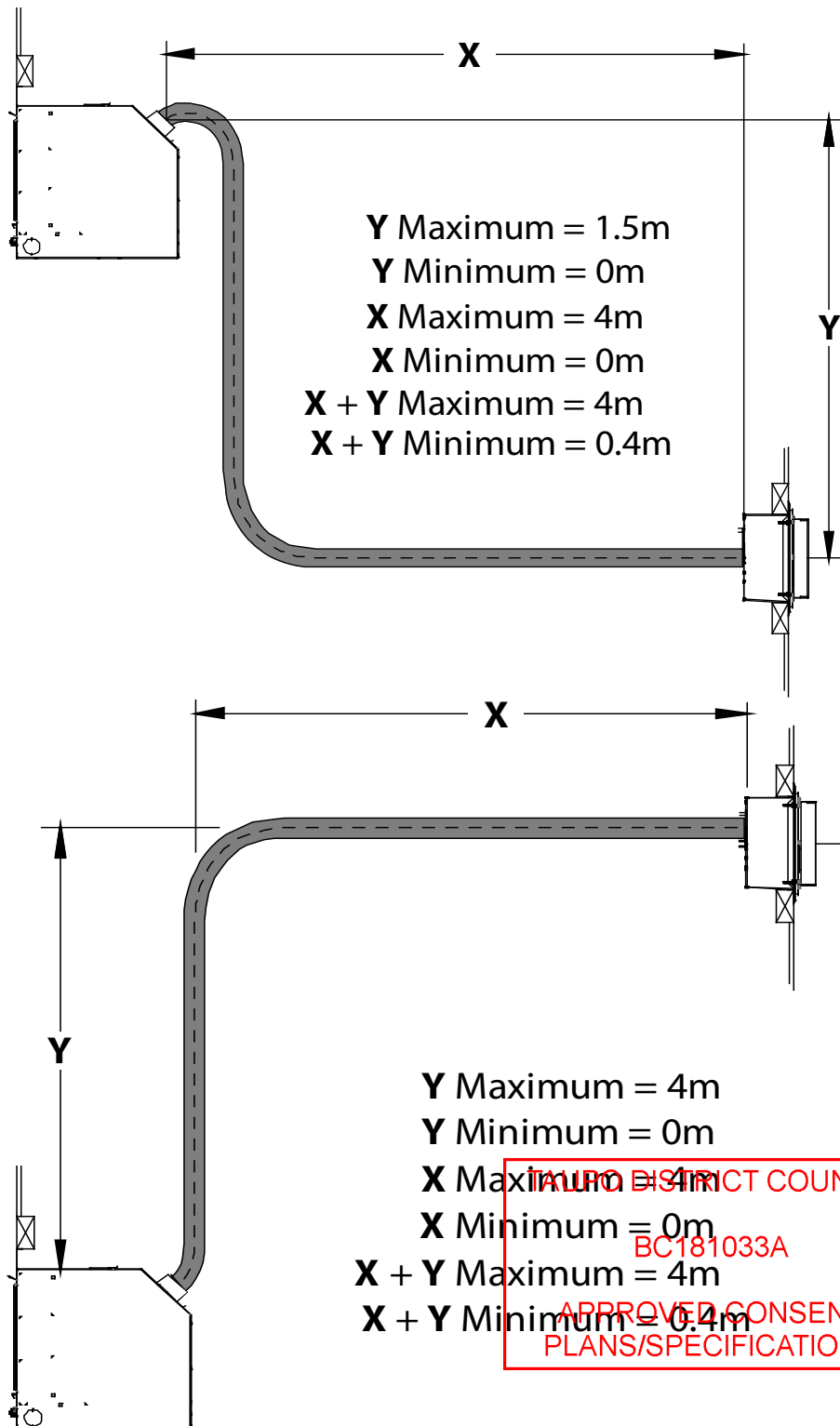
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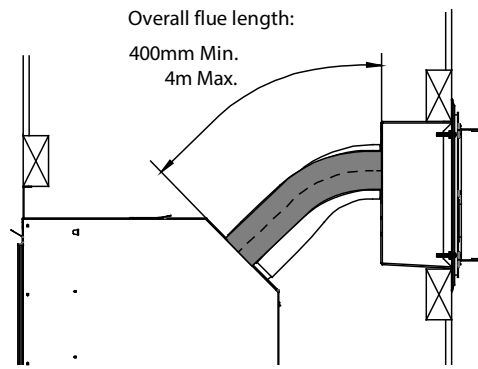
B2 Flue Configuration (If less than 4 m flue length is required):

If your flue system is less than 4m long (as shown in diagrams below), then a simple aluminium flexible flue is required. If you wish to install a longer flue run, up to 12m, see section B3.

Horizontally Terminated: *(utilizes the escea horizontal power flue enclosure kit)*

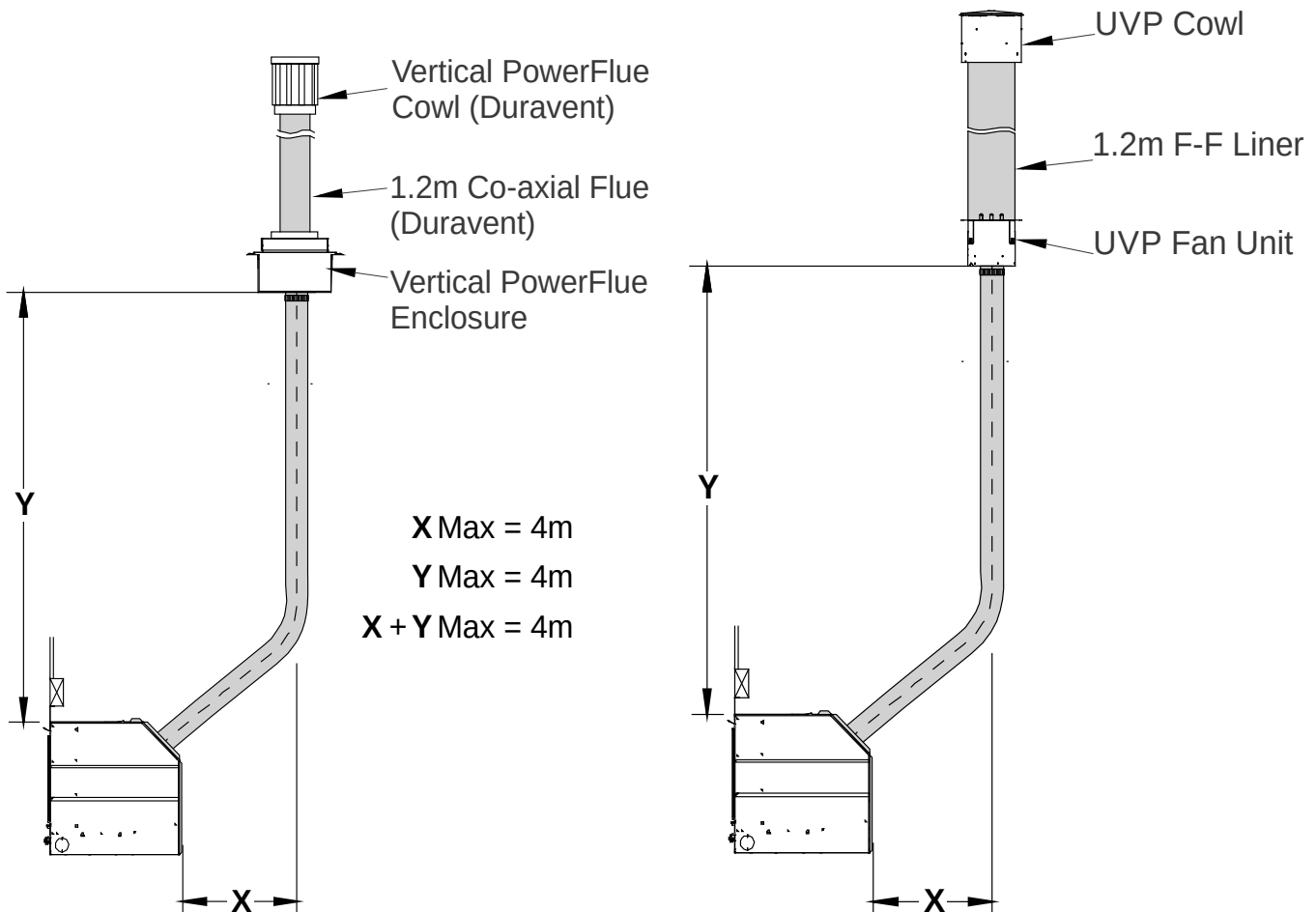
The horizontal offset of the terminal can be any amount up to the total flue length listed below. Please consult with Escea's technical staff if your intended flue configuration steps outside of the bounds of the flue configurations shown below.





Vertically Terminated:

(utilizes the escea vertical power flue enclosure kit)



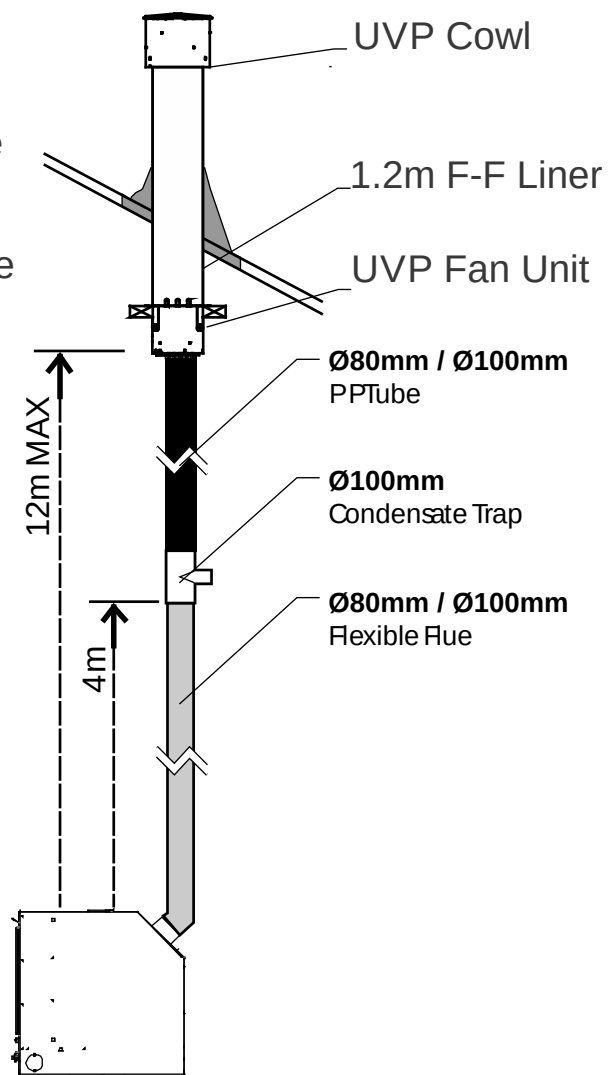
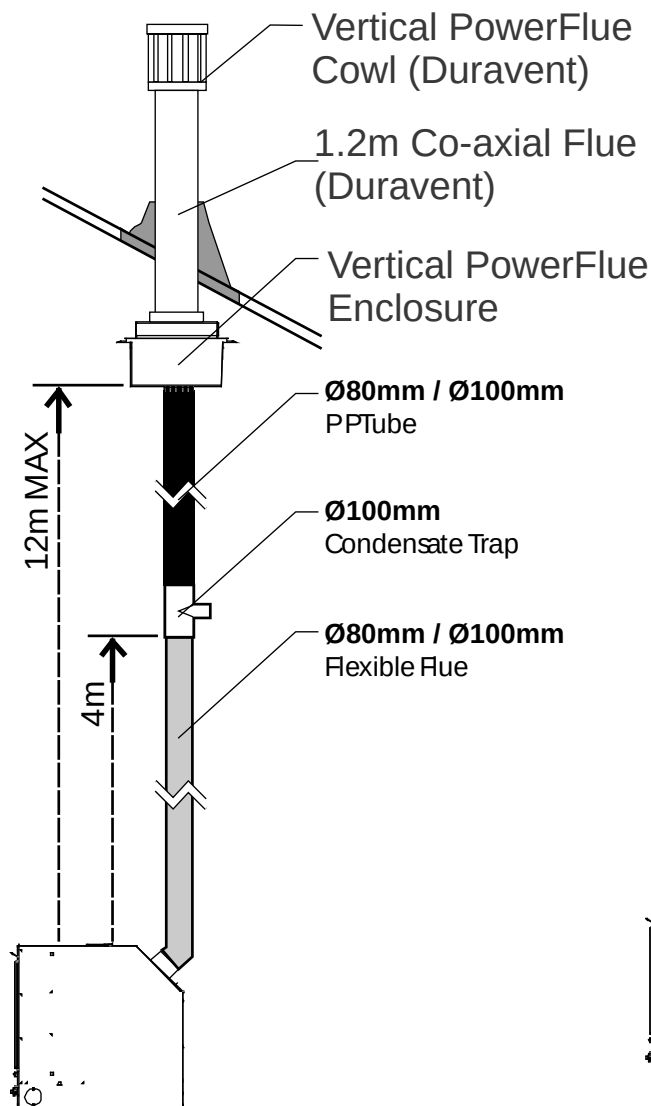
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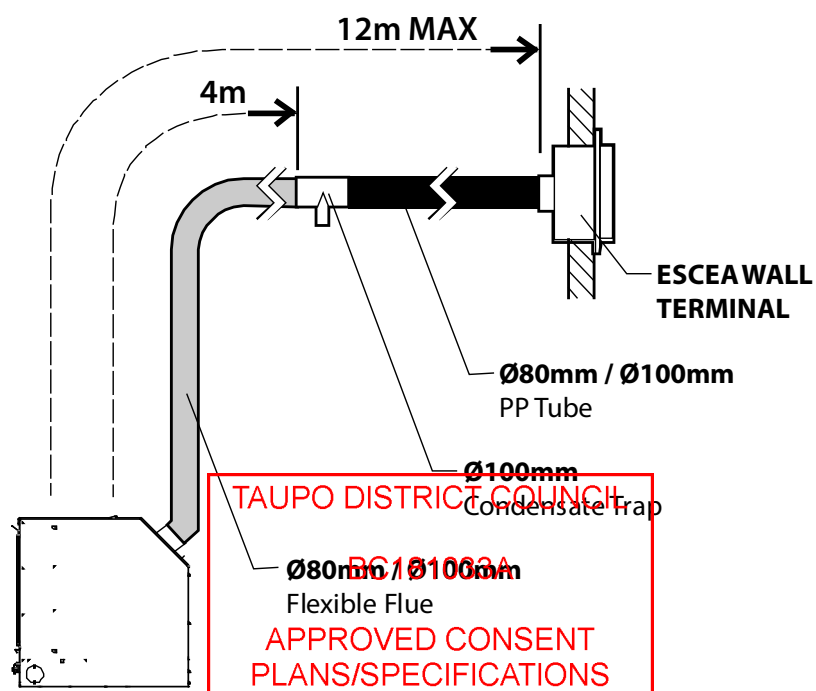
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B3 Flue Configuration (If more than 4m flue length is required):

If your flue system is greater than 4m long (as shown in diagrams below), then a flexible flue with condensate trap and rigid PP tube flue lengths is required.



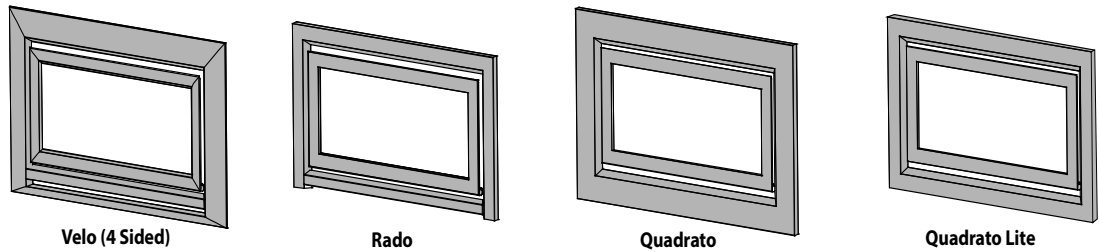
For further information and detail on PolyPro (Rigid) flue and condensate traps, see the documentation supplied with the flue components.



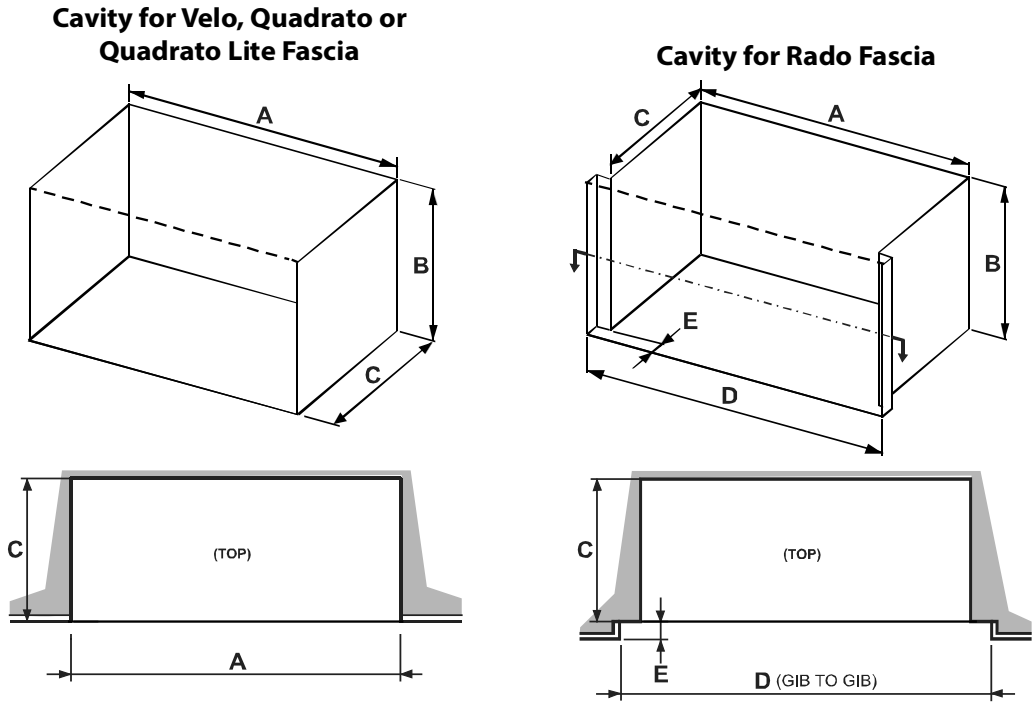
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B4 Fascia:

The cavity shape is dependent on the fascia type. There are four fascia types available with the DL850 and DL1100:



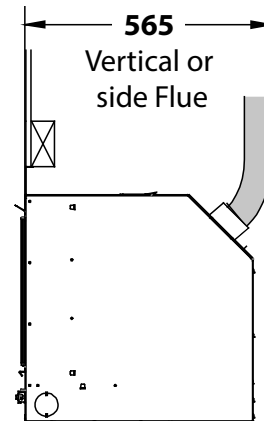
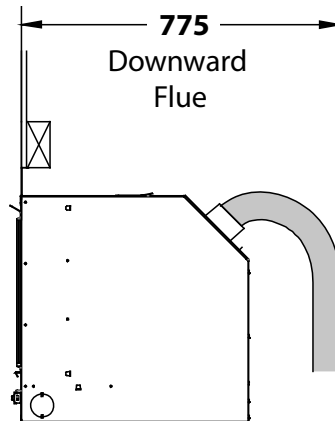
The **Velo**, **Quadrato** and **Quadrato Lite** fascias sit proud of the finished wall surface and have a simple cavity shape. The cavity may be constructed from combustible materials. The **Rado** fascia sits flush with, or inset from, the finished wall surface and has a more complex cavity shape. **The cavity framing and wall facing for a minimum of 300mm directly above the Rado fascia must be constructed from non-combustible materials.** Please check the style of fascia before commencing the building of the cavity to the dimensions shown below. The cavity for Velo, Quadrato and Quadrato Lite fascias may be constructed from combustible timber framing materials. Note: It is not necessary to line the sides, top or back of the cavity.



Ideal Cavity Dimensions (mm):							
DL850:	A	B (min)	B (max)	C (min)	D	E (min)	E (max)
Velo / Quadrato / Quadrato Lite	965	560	575	565	-	-	-
Rado	965	585	590	565	995	30	130
DL1100:							
Velo / Quadrato / Quadrato Lite	1265	560	575	565	-	-	-
Rado	1265	585	590	565	1295	30	130

NOTE: The final cavity size and shape should account for the flue direction as shown on following page.

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B5 Cavity Base:

This appliance **MUST** be fully supported on its base. The base must extend over the entire area of the underside of the appliance. The base must also be levelled to prevent vibration from possible fan imbalance. The base of the cavity must be strong enough to support the total product weight, which is approximately 65kg (DL850) and 80kg (DL1100), depending on fuel bed.

B6 Hearth:

The base of the appliance must be installed a minimum of 100mm off the floor, unless the appliance is being installed at floor level in which case a hearth is required, made from non-combustible material and must extend no less than 300mm from the front of the fire. This hearth should be at least as wide as the fire's outer fascia and no less than 10mm thick. Raised hearths can be any size but must also be constructed from non-combustible materials.

QUADRATO or QUADRATO LITE FASCIA ONLY: The fascia must not be installed flush against a hearth as the fireplace draws air from the lower surface of the fascia. As such the fascia must be raised a minimum of 25mm from a hearth.

The floor in front of this hearth will still get warm so if the floor covering is vinyl, nylon carpet or another heat sensitive material then we recommend extending the hearth to 450mm from the fire. A raised hearth can be of any size but must be constructed from non-combustible materials. **NOTE:** *If the hearth is to be covered with tiles or some other veneer then the fire must be installed so that the base of the appliance is level with the finished top surface of the hearth.*

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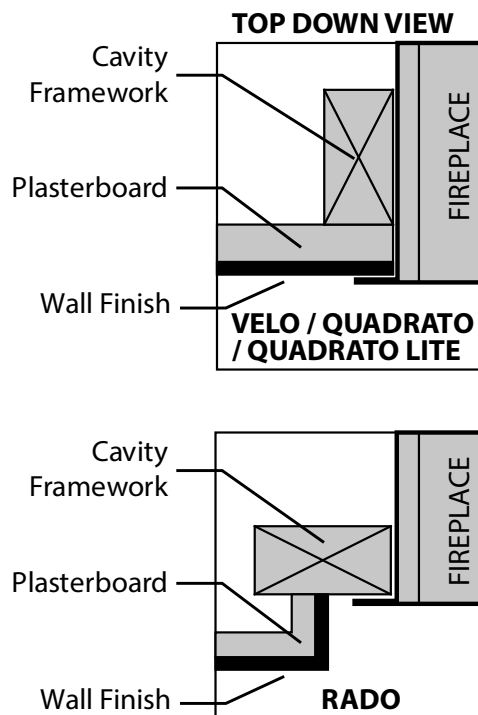
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B7 Wall Linings:

The front mounting flanges of the appliance must be on top of the finished wall surface in order for the fascia panels to mount properly. Take into account any plaster board, tiles or any other finishing surface that may be intended for the finished wall surface. Wall finishing materials must not encroach upon the minimum cavity clearances given in section 2.2. The wall board that lines the outside of this opening can be normal dry wall (plaster board) and does not need to be non-combustible.

Note: The temperature of the wall lining directly above the heater does get warm and hence may discolour paint finishes that are susceptible to temperature damage or distort vinyl wall coverings. For durability of finishes and surfaces you should contact the relevant manufacturer for their specification.



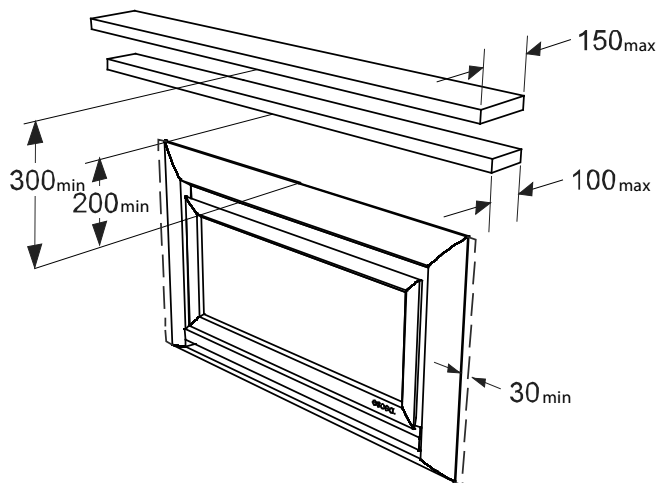
The cavity framing and wall facing for a minimum of 300mm directly above the Rado fascia must be constructed from non-combustible materials.

For more detail on cavity construction, view the "Drawings for Architects" in the technical section of the Escea website.

B8 Mantle Clearance:

Please refer to the diagram to the right. Mantles or protruding ledges mounted above the heater that are made from combustible materials, must not extend outside of the dimensions shown.

Except for Rado fascias, maintain a 30mm clearance around the fascia to ensure ease of fascia removal. NB: No clearance is needed underneath Velo Three Sided or Rado Fascias



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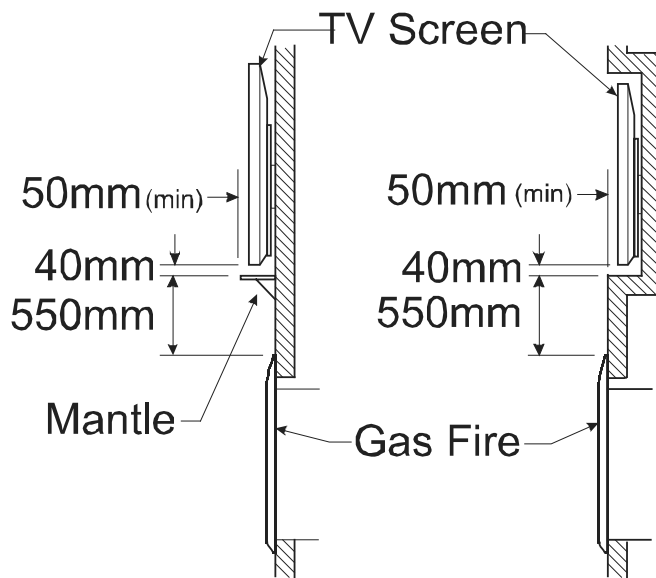
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B9 Television Clearances:

The following are the recommended minimum clearances for the location of any electrical equipment (such as Plasma TV, LCD TV or home theatre) above an Escea DL Series gas fire. Use either a shelf or mantle below your TV screen or alternatively you can construct a recess to mount your TV screen into.

Note: The above television clearance recommendations are to be treated as a suggestion of a suitable installation only. It is the responsibility of the end user to check the installation instructions of their electrical appliances to ensure that the location in relation to the gas fire is suitable. Escea in no way guarantees or takes responsibility that the above installation suggestion will be suitable for all electrical or home entertainment appliances.

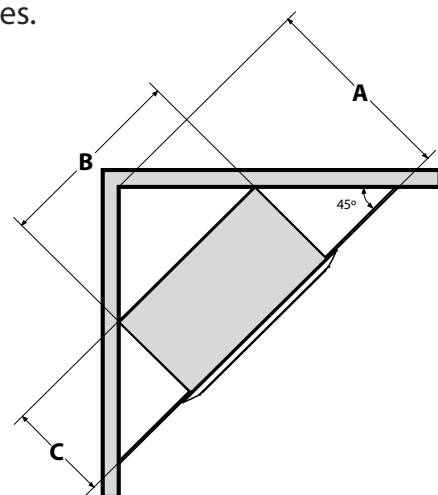


B10 Corner Installations:

If a cavity is to be created in a corner, the following drawing gives the minimum sized interior wall dimensions.

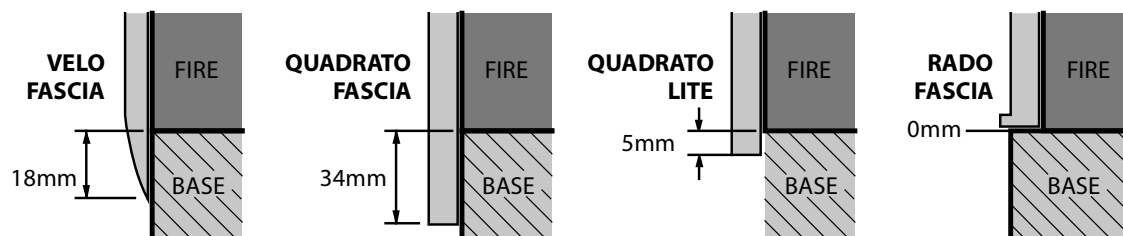
Minimum corner install dimensions (mm):

	DL850	DL1100
A	970	1145
B	960	1260
C	510	510



B11 Distance from Fireplace base to Fascia base:

The following side-on views show the measurement from the base of the fireplace to the base of the Fascia.



END OF SECTION B

By the end of this section, you should have:

- ☐ A framed, but un-lined, cavity sized to suit your fascia and flue configuration
- ☐ Provision for sufficient access to the powerflue for future servicing

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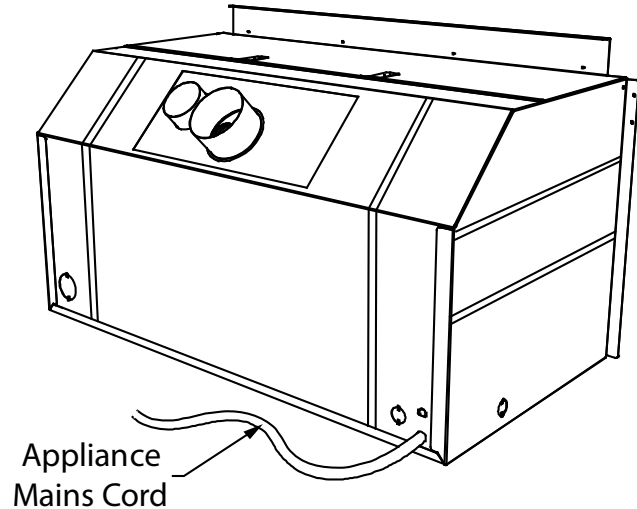
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C Installing the Electricity and Gas to the Appliance

C1 Power Supply:

Whilst the cavity is being created consideration should be given to appropriate location of a standard 3 pin, EARTHED 230/240V power outlet. This must be within 1.0m of the rear bottom left hand corner of the appliance.

IMPORTANT: Locating the power outlet within the cavity makes the installation very neat but the provision **MUST** be made to be able to switch the power supply off and on (electrical isolation switch) and **MUST** be accessible after the heater has been installed. This is normally done by means of a separate switch which must be located adjacent to the appliance as per AS/NZS 5601.1.2010. This will allow service technicians to isolate the power supply before performing service work on the appliance.



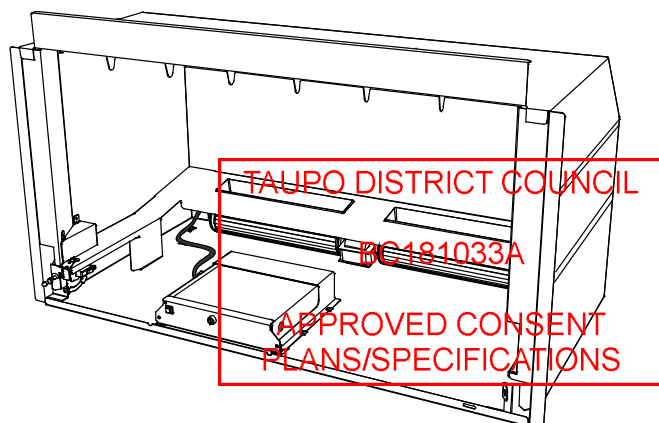
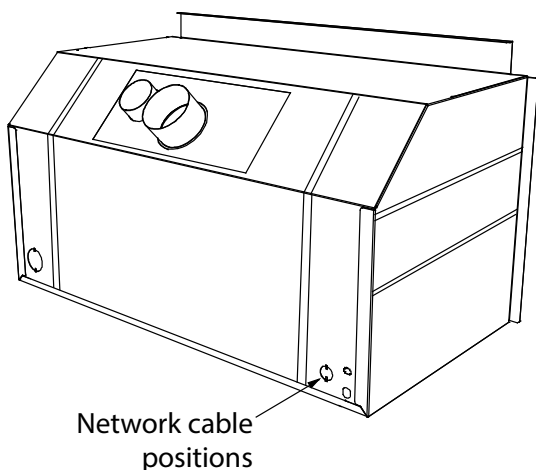
This appliance must not be located directly below a socket outlet.

This appliance will draw a maximum of 2 Amps from a 230/240V supply. No additional power supply is required for the power flue.

An electrical wiring diagram is located underneath the electronic tray, and also in the rear of this manual (Service section)

C2 Network Cable:

If the appliance is to be wired to a home automation system or internet router/network is being installed then provision must be made for the network cable to get to the control tray. A plastic plug is provided on the rear left of the appliance for a network cable to pass through the chassis and reach the control tray. Allow enough slack in the network cable to ensure the electronic tray can still be removed from the appliance. See Section E2 for final connection of the network cable.

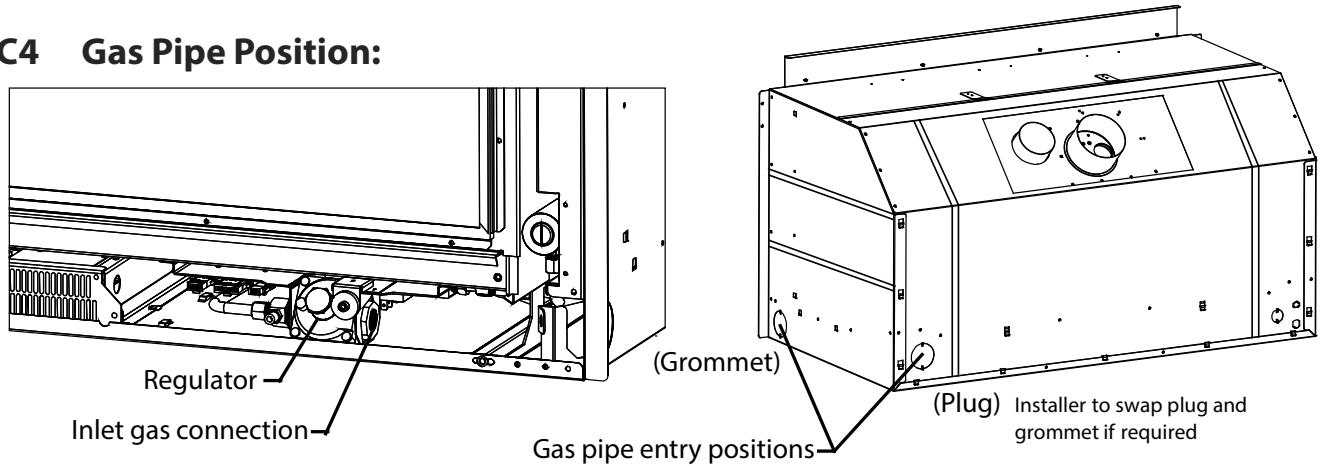


C3 Gas Pipe Sizing:

Gas pipe should be sized as per the requirements of AS/NZS 5601. The pipe sizing must be sufficient to deliver the following volume of gas to the heater with all other gas appliances in the home running at the same time:

DL850 Gas Consumption = 38MJ/hr
DL1100 Gas Consumption = 42MJ/hr

C4 Gas Pipe Position:



The DL850 / DL1100 has 2 possible entry points for gas pipe, on the rear right corner and the front right. Each is sealed by either a plastic grommet or plastic plug. If you wish to use the rear exit location, you may swap the grommet and plug positions.

The gas connection on the appliance is a ½" female BSP at the very front right of the appliance. This section of the piping will need to be flexible to allow for pipe disconnection and firebox removal.

C5 Gas Isolating Valve:

It is recommended that a gas isolating valve be installed as close to the regulator on the gas inlet side as possible with easy access if the fascia is removed. This will allow for easier servicing in the future.

C6 Pressure Test Point:

As per AS/NZS 5601, a pressure test point shall be provided by the installer prior to the inlet of the appliance

END OF SECTION C

By the end of this section, you should have:

- ☐ An unlined cavity with a standard three pin 230/240V AC supply that the appliance can be plugged into
- ☐ An electrical isolating switch that is accessible once the appliance is installed
- ☐ A suitably sized gas supply to the right hand side of the appliance with a pressure test point, ready to be connected once installed
- ☐ Network cable installed, ready for plugging into appliance (if being connected to internet router/network)

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D Installing the flue

For Horizontally terminated flue, see section D1. For Vertically terminated flue, see section D5.

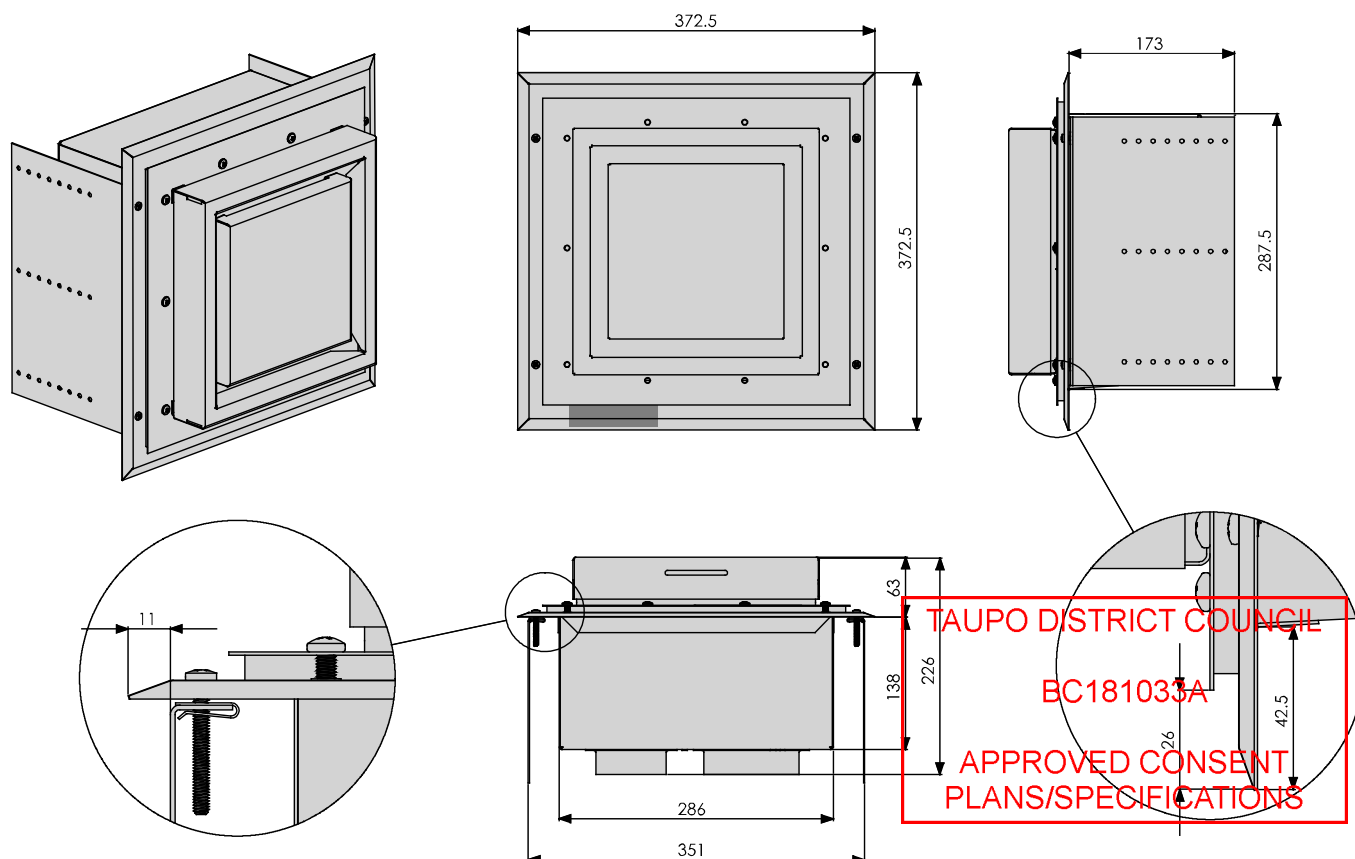
D1 Horizontal Powerflue Description

Note: The appliance is designed only to operate using the approved flexible or PolyPro flue supplied by Escea. Other brands of flue may not fit, and this will affect the appliance warranty.

The Horizontal Powerflue Wall Terminal must be installed in the correct orientation. This allows for the correct operation of the flue system and prevents the ingress of rain.

The Horizontal Powerflue Wall Terminal must be weather-tight when installation is complete to prevent damage to the dwelling. It must be installed by a suitably qualified person.

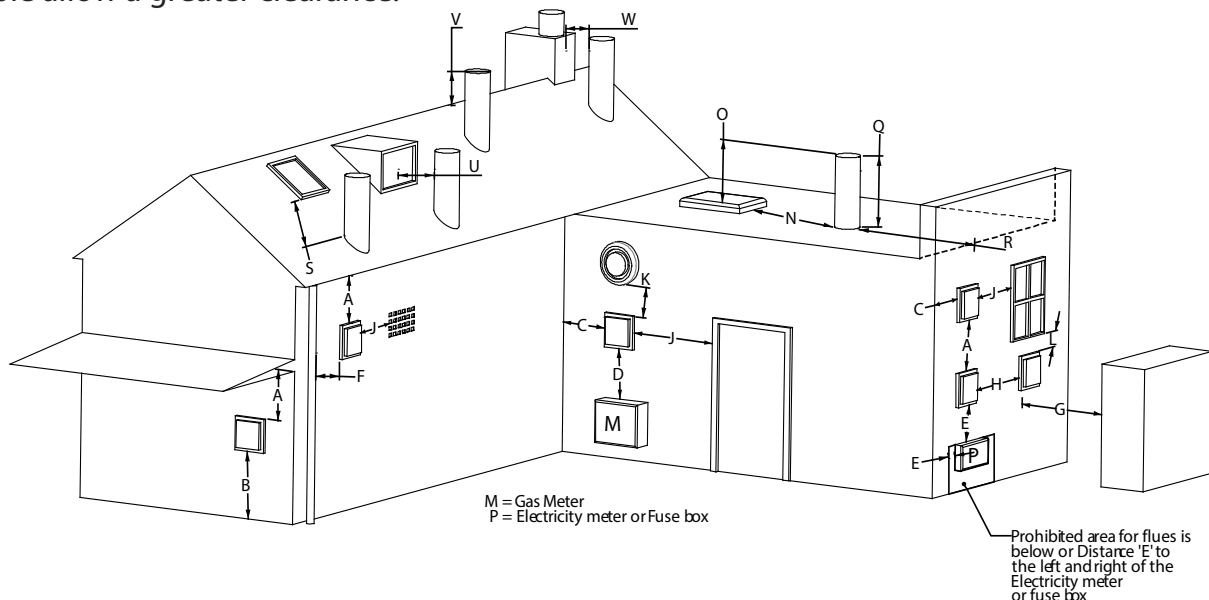
For flexible aluminium flue, access to the powerflue from the outside must be provided for servicing, and this should be taken into consideration when installing in tall buildings. For PolyPro flue installations, internal and external access is required.



D2 Installing in Accordance with Relevant Codes:

The location of the Powerflue Terminal must be installed in accordance with AS/NZS 5601 and any other relevant building codes. If possible, avoid installing the Powerflue Terminal in areas exposed to high winds and extreme weather.

Some of the minimum clearances for a fan assisted terminal are listed below; please refer to AS/NZS 5601 Gas installation standard for full guidance on the design of the flue system. Where possible allow a greater clearance.



A	Below eaves, balconies and other projections	200mm
B	From the floor, above a balcony or other surface	300mm
C	From a return wall or external corner	300mm
D	From a gas meter or regulator vent	1000mm
E	From electricity meter or fuse box	500mm
F	From a drain pipe or soil stack	75mm
G	Horizontally from any building structure or obstruction	500mm
H	From any other flue terminal or combustion air intake	300mm
J	Horizontally from any openable window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
K	From a mechanical air inlet or spa blower	1000mm
L	Vertically below any openable window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
N	Horizontally from a roof light	600mm
O	Vertically from a roof light	500mm
Q	Vertically from a flat roof	500mm
R	Horizontally from a vertical structure	500mm
S	Below a roof window	2000mm
T	Above or either side of a roof window	600mm
U	From a dormer window	1500mm
V	Above the apex of the roof (see note 1 on following page)	300mm
W	From an open flue	1500mm

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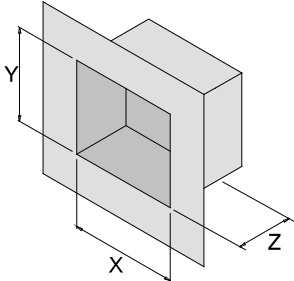
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Notes:

- 1) Should the flue not extend past the apex, the top of the flue should extend at least 400mm from the roof (or 500mm in regions with heavy snow).
- 2) The installation of a flue into a carport is not recommended.
- 3) The flue terminal will get very hot when in use. Precautions should be taken to protect people and animals from injury.

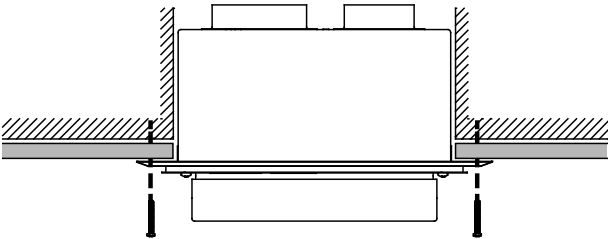
D3 Creating the Hole in the Outside Wall

When cutting the hole in the outside wall, be mindful of how the installation Horizontal Powerflue Wall Terminal will be finished, the installation must be weatherproof.

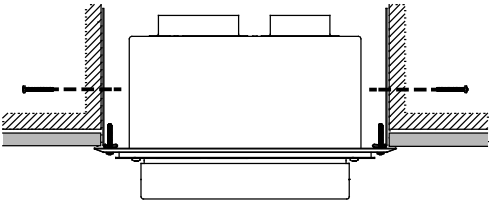


Ideal hole/cavity size for Horizontal Powerflue		
	Without Side Brackets	With Side Brackets
X	298mm	360mm
Y	298mm	298mm
Z	175mm Excluding allowance for flue which exits here	

The Horizontal Powerflue Wall Terminal can be attached to the wall in two ways,
A) From the front of the terminal:



B) By attaching the optional Wall Terminal Installation Brackets to the sides of the cavity and attaching the Horizontal Powerflue Wall Terminal to these, from the front:



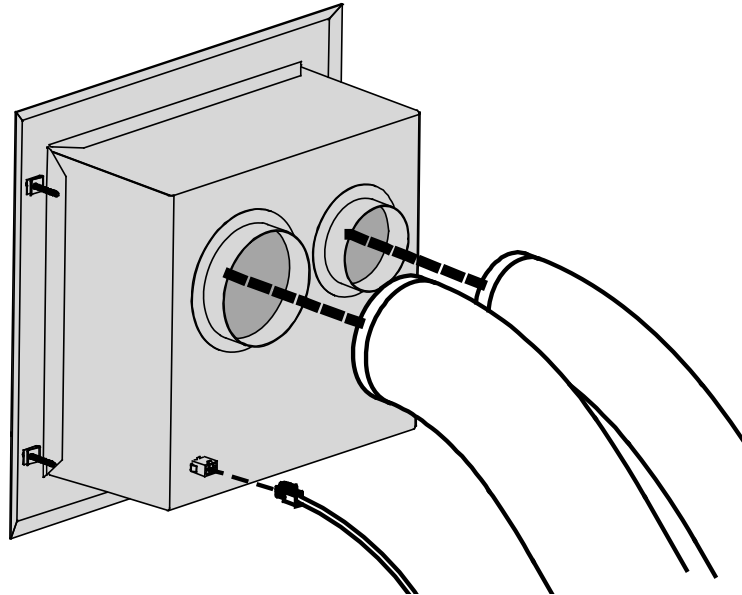
D4 Installing the Horizontal Powerflue Wall Terminal

Attach the Ø100mm and Ø75mm flexible aluminium flues to the spigots on the rear of the Horizontal Powerflue Wall Terminal using the hose band clamps supplied. Plug the powerflue electrical cable into the back of the Horizontal Powerflue Wall Terminal.

For information on the PolyPro flue , see the installation manual which is supplied with the flue components.

Ensure that the electrical cable is firmly secured to the wall terminal or building to prevent damage or disconnection if pulled

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Fit the Horizontal Powerflue Wall Terminal into the hole and fix in place, making sure the installation is sealed appropriately to prevent the ingress of water from outside the wall cladding.

NOTE: It is the responsibility of the installer to ensure the Horizontal Powerflue Wall Terminal is installed to all relevant building codes to ensure weather tightness. This may necessitate the use of appropriate flashing material where appropriate.

IMPORTANT: Ensure that flashings do not restrict the air intake slot around the periphery of the cowl

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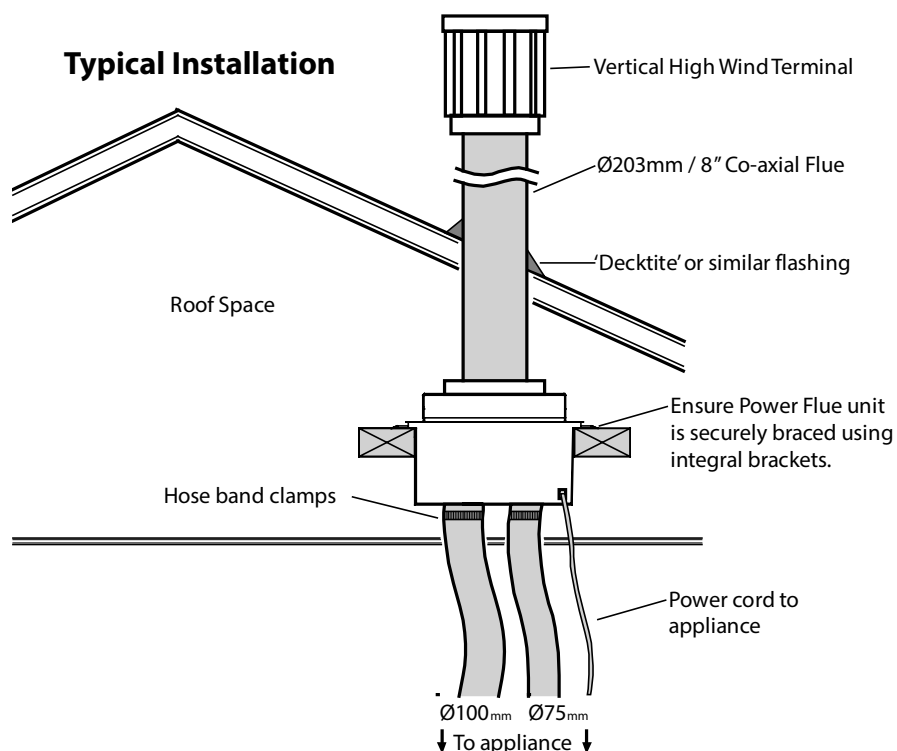
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D5 Internal Vertical Power Flue (Duravent)

The Vertically terminated flue kit is intended for use within an accessible roof space or accessible 'chimney' construction. **Service access must be provided.**

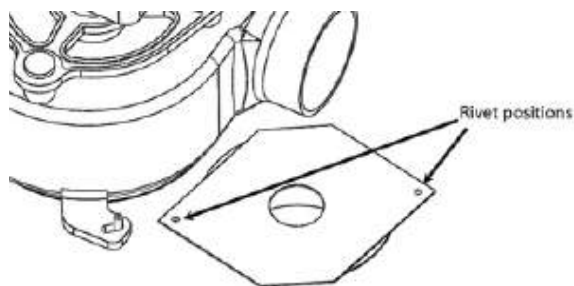
Ensure installation complies with relevant building codes and regulations.



D6 Installation the restrictor plate (Internal Vertical Power Flue Only) (Duravent)

Every Internal Vertical Power Flue(Duravent) must have the restrictor plate fitted when installing a DL850 or DL1100. To do this:

- ☐ Remove the powerflue lid, remove the screw that secures the elbow & then slide the elbow off.
- ☐ Attach the restrictor centrally over the air inlet as shown using the two rivets provided.
- ☐ Replace the elbow, replace the screw, and then replace and secure the lid.



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D7 Installing the Universal Vertical Powerflue (Internal Install)

Note: For information regarding an external install of the UVP, go to section D8.

The UVP Internal configuration is designed to have the fan, mounted within the roof space of the house, and the vertical $\varnothing 225\text{mm}$ diameter liner, containing a $\varnothing 100\text{mm}$ flexi, penetrate through the roof. The UVP internal conversion kit comes with 1200mm liner which is specific to the internal installation and must always be used.

Note: The flue setup must comply with section B2 or B3.

Use standard methods to flash the roof penetration. the installation must be weather proof and conform to all local council standards including powered flue termination rules.

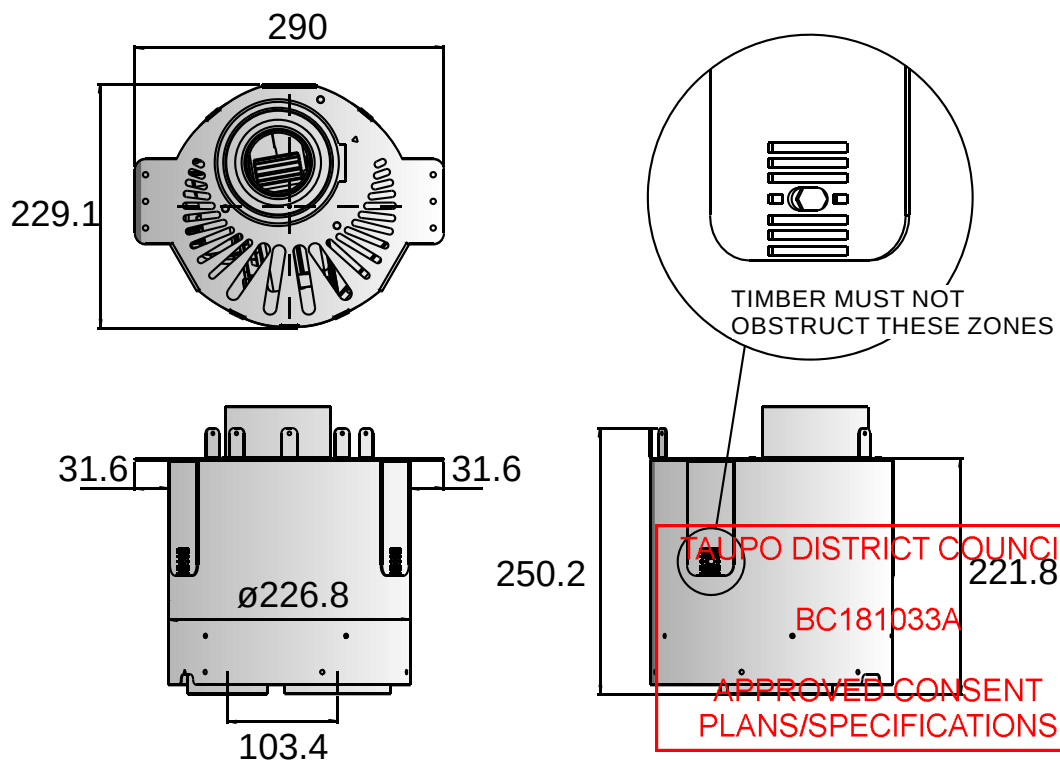
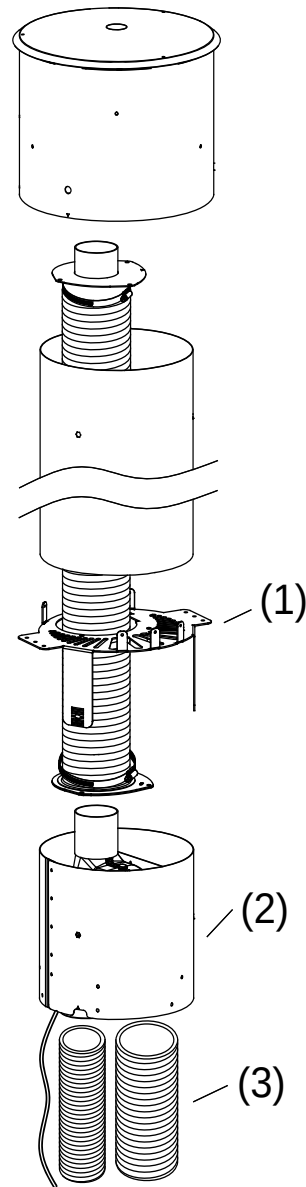
Mount the fan mount bracket(1) to the roof framing and strapping using timber ensuring that the flue is rigid and vertical. Ensure that the mounting timber does not obstruct access to the 3 x M5 screw threads on the side of the fan unit.

Aim to have the fan enclosure(2) mounted as high as possible, mainly to allow sufficient fall for condensation drainage if the flexi-flue is to run horizontally.

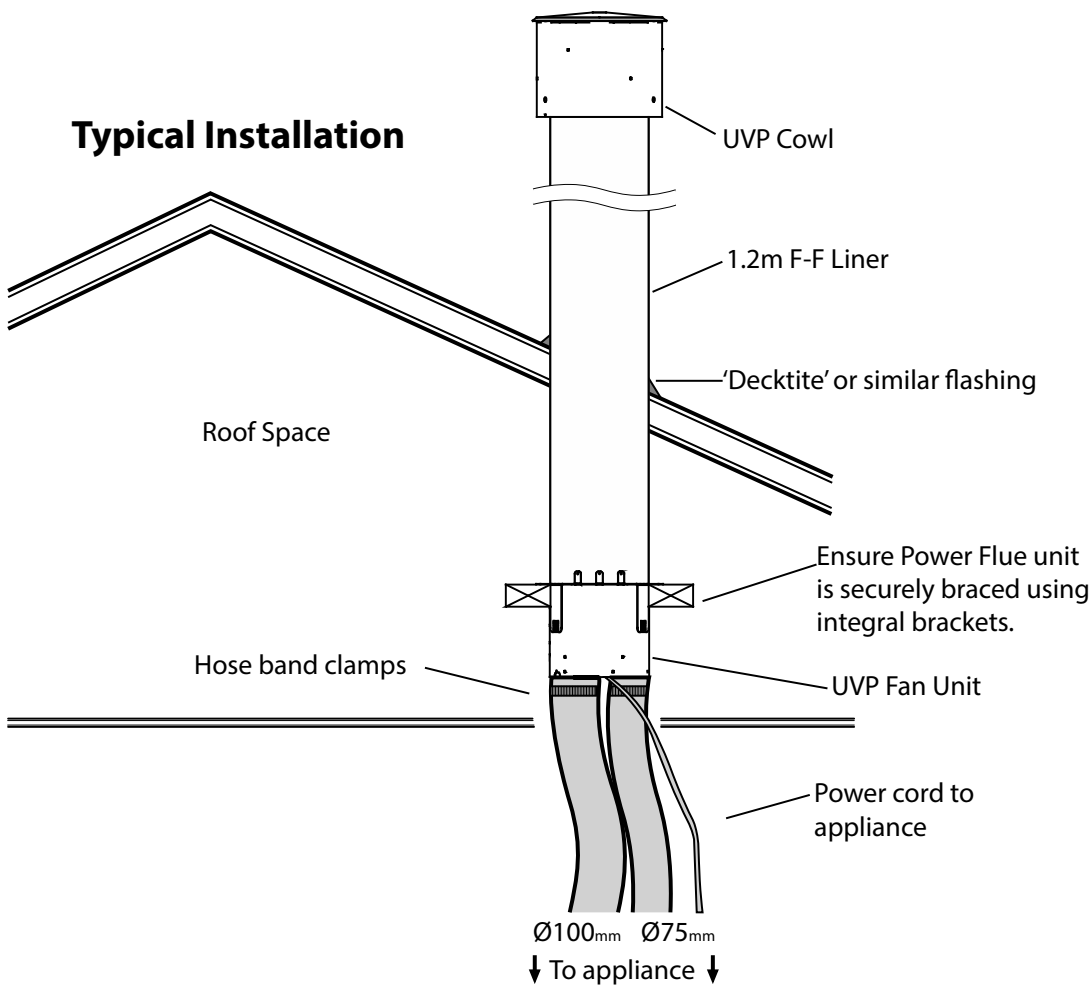
Ensure there is sufficient space below fan enclosure(2) to have access to fit the flexi-flue tubes(3) and allow flowing bends if required.

Note: The UVP-Internal and the flexi flue connections must be installed in a location accessible for service or replacement, a service hatch or removable flashing to allow access may be required.

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. **ENSURE** the $\varnothing 25\text{mm}$ restriction plate is installed on the Inlet.



The UVP-Internal kit is intended for use within an accessible roof space or ‘chimney’ construction. Service access must be provided.
Ensure installation complies with relevant building codes and regulations



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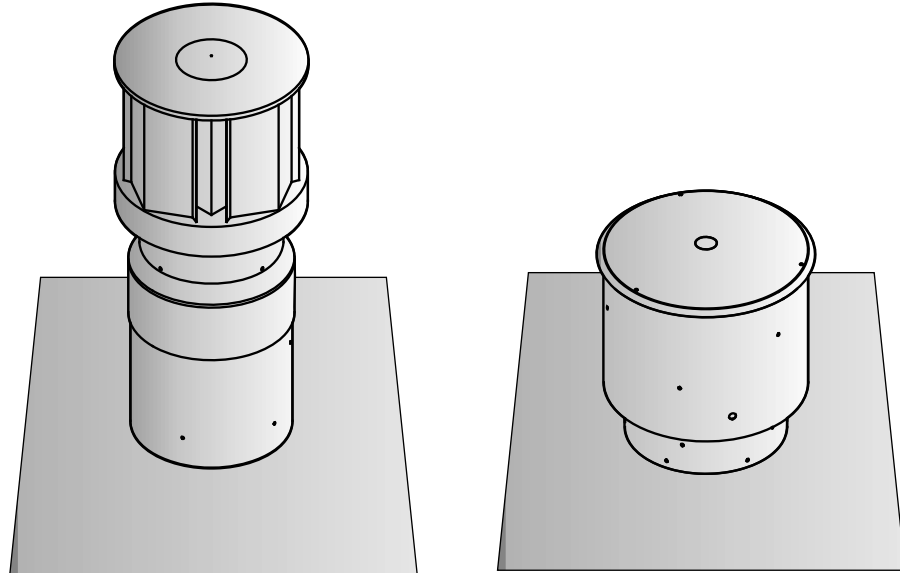
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D8 Installing an External Vertical Powerflue (EVP or UVP)

Note: For information regarding an internal install of the UVP, go to section D7.

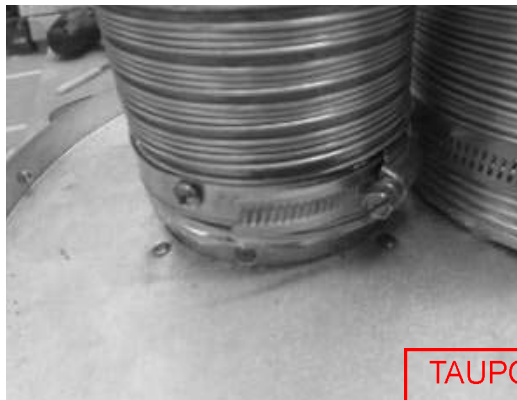
The EVP and UVP are designed to have the enclosure containing the fan unit mounted externally.

The cowl surround should be fixed in place as shown.



Depending on the kit purchased, mount the EVP/UVP kit to the top of a chimney flashing plate or penetrate the roof with an optional flue liner accessory and fit the EVP or UVP kit over the flue liner; sealing the penetration with a dectite or similar flashing. Ensure the terminal is vertical and rigidly mounted and the flexi flue attached below is fixed to the terminal spigots using the supplied hose clamps and is held in place by drilling 3 holes and screwing 3 self tapping screws evenly around each hose band clamp (as shown in the picture below).

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. **ENSURE** the Ø25mm restriction plate is installed on the Inlet.



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D9 Running the Flue

Run the Ø100mm and Ø75mm flexible aluminium hoses from the cavity to the rear of where the Horizontal or Vertical Powerflue Terminal will be installed. **The flue system for the DL850 / DL1100 is zero rated, so no spaces are required between the flue and any timber framing.** Allow enough stretch in the flexible aluminium flue to allow it to be able to protrude through the wall/ceiling to enable it to be connected to the Powerflue Terminal. The flue should be expanded at each end in order for the flue to be attached to the fire / powerflue.

For information on running the PolyPro flue, see the installation manual which is supplied with the flue components.

It is advisable to secure the flexi flue at regular intervals to prevent vibration and movement. Steel wire or 'builders strapping' may be used for this purpose.

Note: The flexible flue is shipped in a 'compressed' form. Extend it to your desired length by stretching (up to 4m maximum per length).

D10 Running the Powerflue Electrical Cable

Note: The Horizontal Powerflue Wall Terminal is powered from the appliance, and must be connected to the appliance with the supplied electrical cable only.

Run the electrical cable from the cavity where the appliance will be installed to the hole in the outside wall. Ensure it is not draped over, or in contact with, the outer shell of the appliance or the flues and kept clear from any other possible heat sources, sharp edges, or moisture. Fix it appropriately and allow enough cable looped to be able to pull both the appliance and the Horizontal Powerflue Wall Terminal out from their installed positions.

END OF SECTION D

By the end of this section, you should have:

- ☐ A weather-tight installed Horizontal Powerflue Wall Terminal with clearance as specified by AS/NZ5601
- ☐ Reasonable access to the outside face for maintenance purposes
- ☐ Flue attached to the rear of the Horizontal Powerflue Wall Terminal leading back to the appliance
- ☐ The electrical cable from the Horizontal Powerflue Wall Terminal attached to the rear of the installation and run back to the appliance cavity in an electrically safe manner

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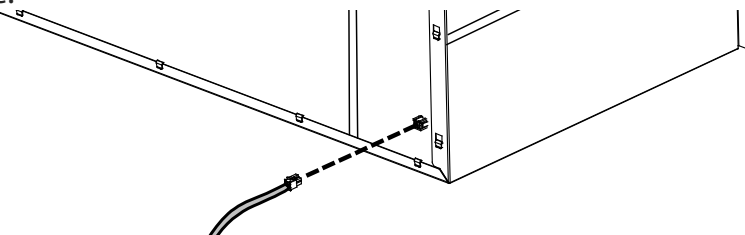
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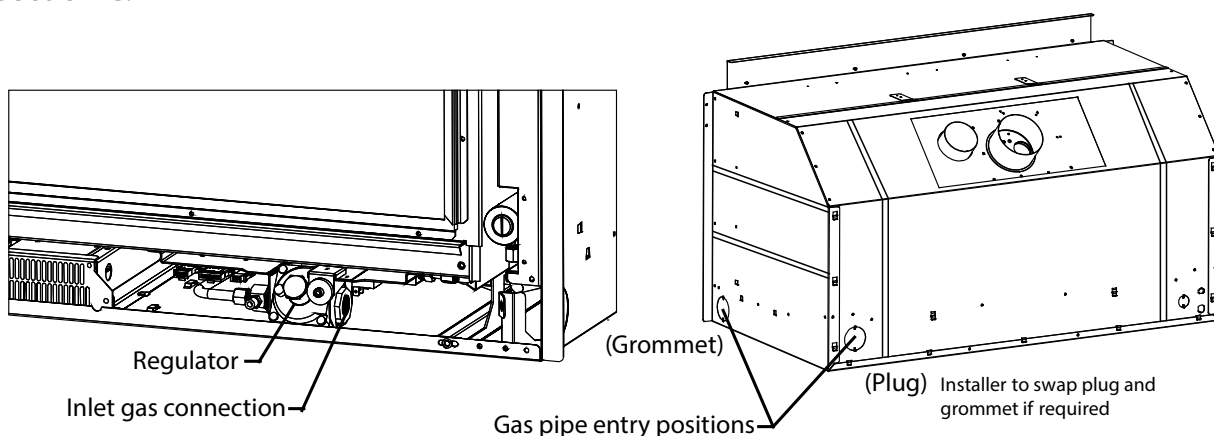
E Installing the Appliance

E1 Installation

Note: Ensure the wall has been lined and finished (plastered/painted/covered) before starting the appliance install. Plug the powerflue electrical cable into the appliance in the back right hand side.



With the appliance electrical cord plugged into the outlet in the cavity, carefully place the appliance on the cavity base and push it into the cavity. Bring the gas connection through the outer shell of the appliance and connect it to the regulator on the bottom right hand side of the appliance. The gas pipe should have already been tested as per section C.



Note: If using rear entry for gas pipe (shown above), re-use the plug from the side entry position.

Note: The regulator that is supplied with the fire **MUST NOT BE REMOVED**. Removal of the regulator, or replacing it with one not intended for use with an Escea fire, will void the limited appliance warranty.

E2 Connecting the Network Cable

If a network cable is being installed for a wired connection to an internet router/network (as per Section C2) then bring the cable through the chassis as described earlier and attach it to the correct socket inside the electronic tray.

Remove the electronic tray by unscrewing the two screws at the front and pulling the tray forward and over the lip in the front of the chassis. Unscrew the four screws in the top and remove the lid. Bring the network cable through the side of the tray and plug it into the network socket. Replace the lid and electronic tray by reversing the steps above. Ensure the network cable does not interfere with the pressure switch hoses beneath the firebox and does not rest against the firebox bottom surface.



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E3 Connecting the Flue

Remove the lid of the appliance by removing the two screws on either side of the top front of the appliance.

If there is not enough room to reach into the cavity the appliance may need to be pulled forward slightly out of the cavity. Stretch out the last 300mm of the flues, and reach through into the cavity and connect both the inlet flue (Ø75mm) and the exhaust flue (Ø100mm) to their respective spigots on the rear of the appliance. Orientate and position the hose band clamps to provide easy access from the front of the appliance. Tighten the flue onto the spigots by the use of the hose clamps (provided). Ensure the flue connection is as sound as possible and that the flue connection is air tight.

E4 Fixing the Appliance to the Base and Wall:

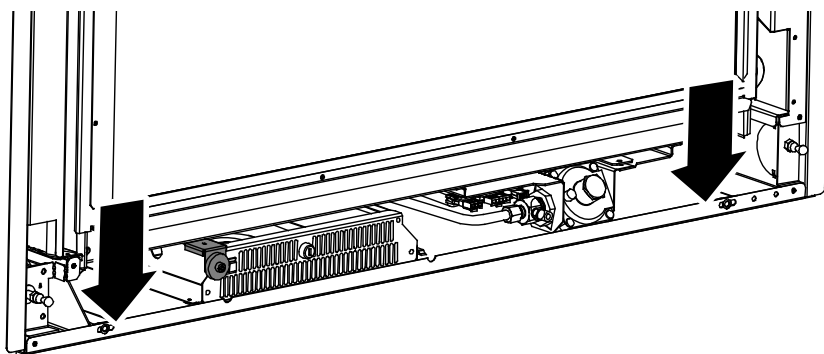
There are several ways that the appliance can be fixed against movement: It is a requirement that this appliance be securely fastened to the wall and base.

Note: It is important that the outer fascia is used during this process to ensure that the appliance is located in the appropriate position within the cavity.

E5 Fixing Appliance to Base:

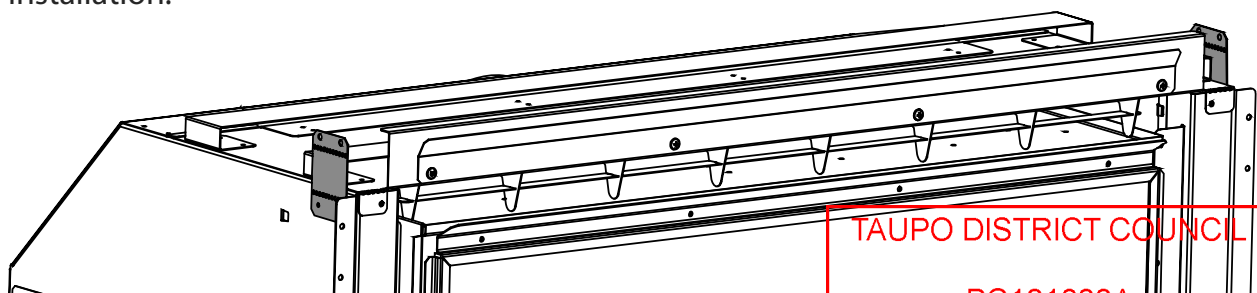
The Appliance has several holes along the front edge of the base panel that have been provided to allow installers to screw the appliance to the floor. Because of a lack of access for drilling it may be necessary to mark the appropriate location for these screws and then remove the appliance and drill holes into hard flooring.

Alternatively a socket set can be used to drive in hex headed screws.



E6 Fixing Appliance to Wall:

The installer must also fix the appliance to the sides of the cavity using the brackets on the side of the appliance shown below. These flanges can be bent to accommodate the installation.



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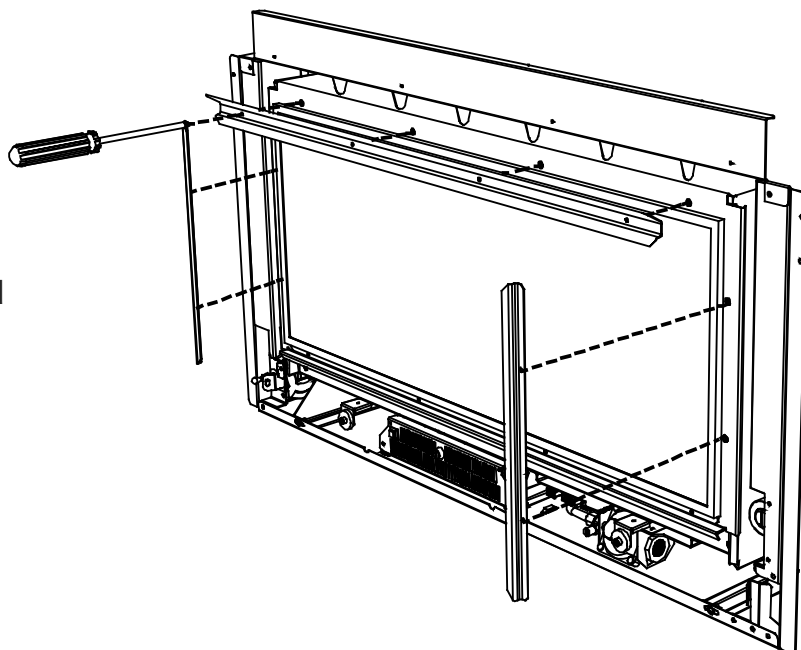
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E7 Removing the Glass

Unscrew the top glass retainer bracket and the two side glass retainer brackets. Take care that the glass does not fall forward at this stage.

Pull the top of the glass toward you slightly and lift the glass out of the bottom glass retainer. You may need to tilt the glass to achieve this.

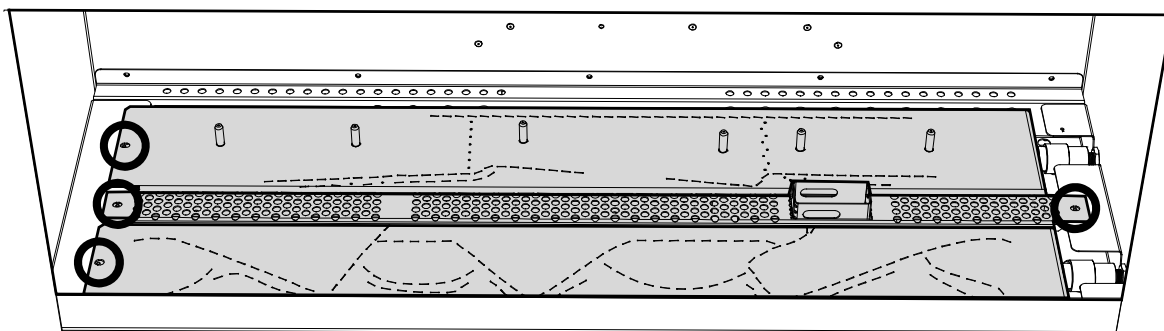
Place the glass carefully aside. Note that the fibreglass tape around the glass can mark carpet and furnishings.



E8 Converting the Appliance Gas Type

This appliance has been factory set to operate on Natural Gas only. To convert the appliance to operate on **propane or ULPG**, proceed as follows:

- ☐ Remove the small perforated shroud on the right hand side of the firebox.
- ☐ Remove the 2 screws securing the burners in place and lift out the burners as shown.
- ☐ Remove the 2 screws securing the pilot guard shown below and lift it out.



Jets	DL850 Front	DL850 Rear	DL1100 Front	DL1100 Rear
NG	Ø2.45mm	Ø2.3mm	Ø2.6mm	Ø2.6mm
Propane	Ø1.4mm	Ø1.3mm	Ø1.4mm	Ø1.3mm
ULPG	Ø1.2mm	Ø1.1mm	Ø1.3mm	Ø1.2mm

- ☐ Remove the front burner jet and replace with the correct jet as stated in the above table.
- ☐ Remove the 2 screws securing the Pilot Cover Plate and slide these out as shown on following page.
- ☐ Remove the 4 screws securing the pilot bracket and lift out the bracket and pilot hood assembly.
- ☐ Remove (un screw) the existing pilot jet and replace with the jet marked in the conversion kit.

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☐ Refit the pilot bracket / Hood assembly and pilot cover plates. **NOTE: Ensure the orientation of the pilot gas ports is as shown in section E9.**

☐ Remove the aeration collars from both burners

☐ Refit the pilot guard and then burners.

☐ Turn the restrictor indicator to the vertical position as shown.

☐ Remove the regulator screw cap and screw out the nylon adjuster screw to remove the existing spring.

☐ Replace the spring with the blue spring supplied in the conversion kit and reassemble the regulator

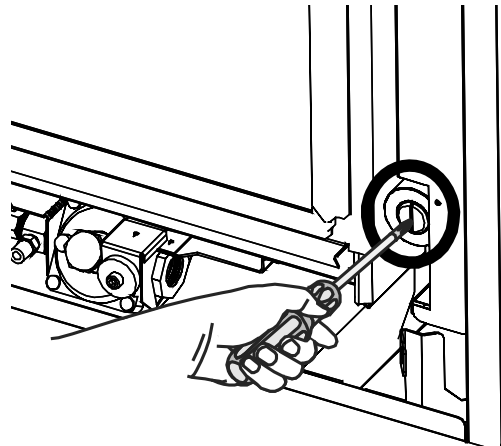
☐ Adjust operating pressure to **2.3kPa for DL1100**

(Propane / ULPG) and the DL850 (Propane) OR

2.6kPa for DL850 (ULPG) by turning the nylon adjuster screw whilst the appliance is running on maximum.

☐ Adhere the Conversion label over the top of the Natural Gas data on the appliance data plate.

☐ Adhere the 'Propane' or 'ULPG' label over the top of the existing Natural Gas label on the side of the appliance (if accessible).



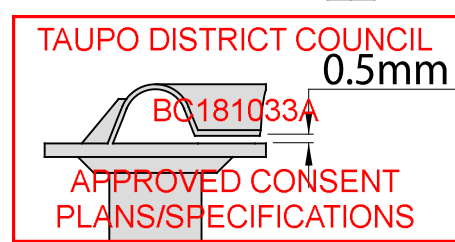
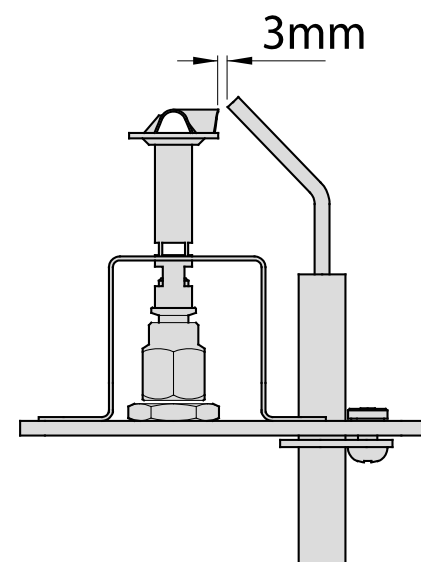
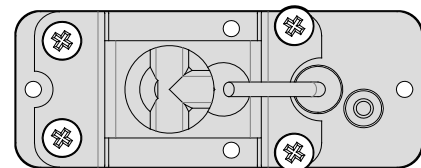
E9 Checking the Pilot Ignition

The placement of the electrode is CRITICAL to the operation of the fire. The gap is factory set but in the event that the electrode or pilot hood have moved during installation or the fire is having trouble lighting or staying lit then below is a guide to electrode placement. Ensure no logs, coals, stones or pieces of Crystalight have worked their way around the pilot guard and are touching the electrode or pilot hood.

If the appliance has difficulty igniting, ensure that the pilot hood has the correct gap for the gas to escape from using feeler gauges.

Ensure there is not an excessive carbon build up on either the electrode or the pilot hood. Clean them if necessary.

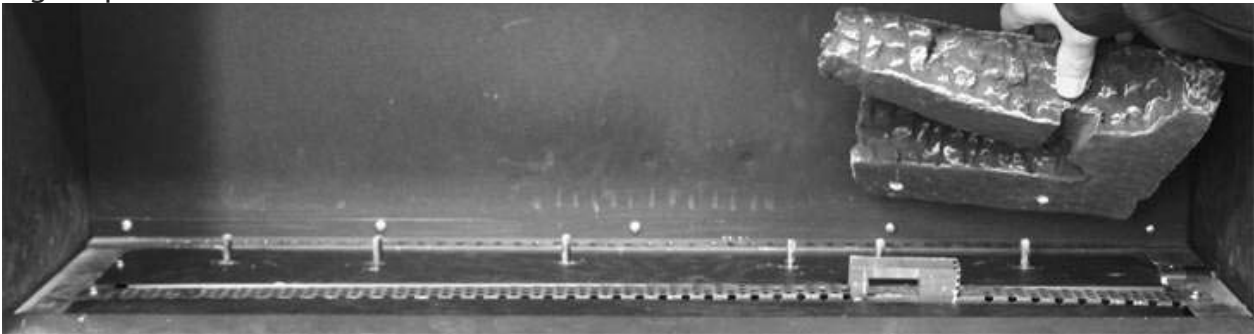
As shown below, check (and if necessary, set) the gap between the 3 pilot ports to 0.5mm



E10 Log Fuel Bed Installation

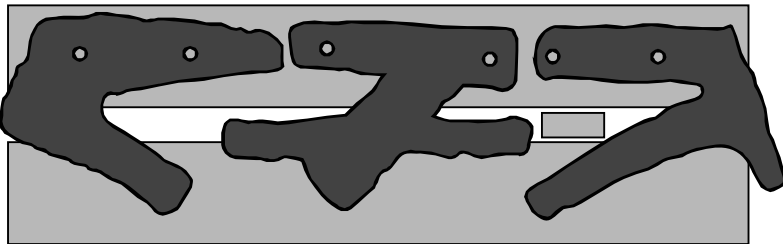
Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Starting at the right hand side, place the 'v' shaped log in place, using the pins on the rear burner to line up with the holes in the base of the log. Ensure the port pattern follows the log shape:

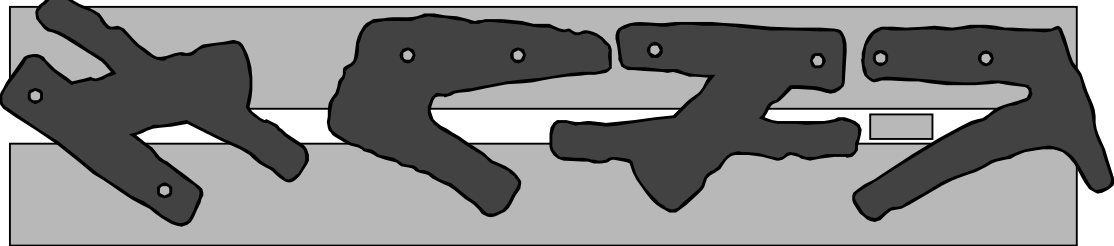


Place the other logs using the same method as above, using the diagrams below to ensure correct log placement

DL850



DL1100

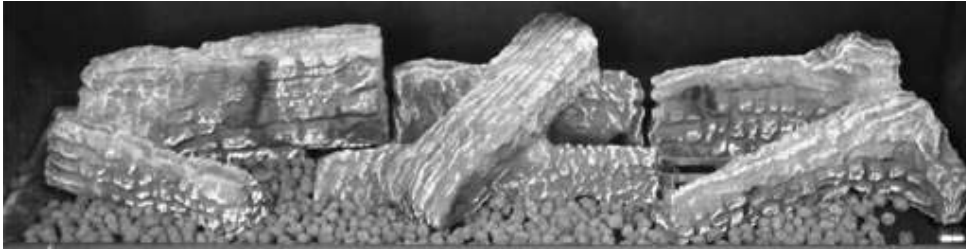


Pour the supplied 'embers' into all the visible gaps around the front of the logs, being careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard. If possible keep the area where the pilot hood flame is directed at the burner ports clear.

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Replace the glass and the three glass retainers.

Note: Improper positioning of logs may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper log placement is not covered under warranty.

E11 River Stone or Coal (Pebbles) Fuel Bed Installation

Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Place all the River Stones or Coals in a single layer atop the burners, covering the entire area. Be careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard, and if possible keep the area where the pilot hood flame is directed at the burner ports clear to aid reliable ignition.



Replace the glass and the three glass retainers.

Note: Improper positioning of Stones/Coals/Pebbles may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper Stone/Coal/Pebble placement is not covered under warranty.

E12 Crystalight Fuel Bed Installation

Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Place all the Crystalight pieces in a SINGLE LAYER atop the burners, covering the entire area. Be careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard, and if possible keep the area where the pilot hood flame is directed at the burner ports clear. Replace the glass and the three glass retainers.

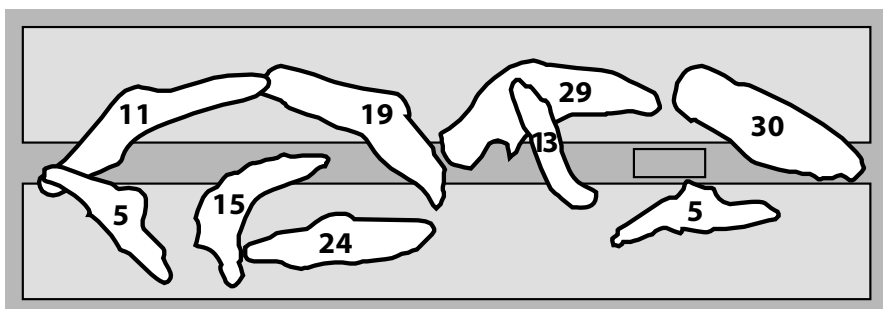
Note: Improper positioning of Crystalight may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper Crystalight placement is not covered under warranty.

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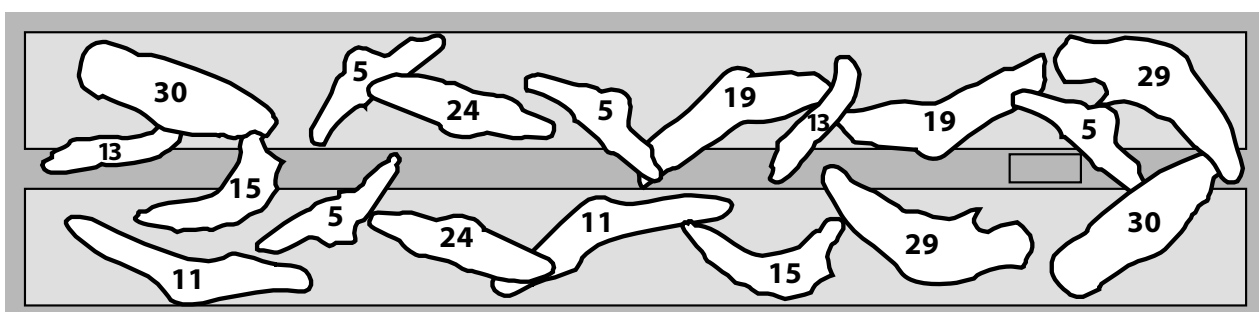
E13 Crystalight and Driftwood Fuel Bed Installation

As per E12, and then once Crystalight has been evenly spread across the base of the firebox place the supplied driftwood on top of the Crystalight as shown:

DL850



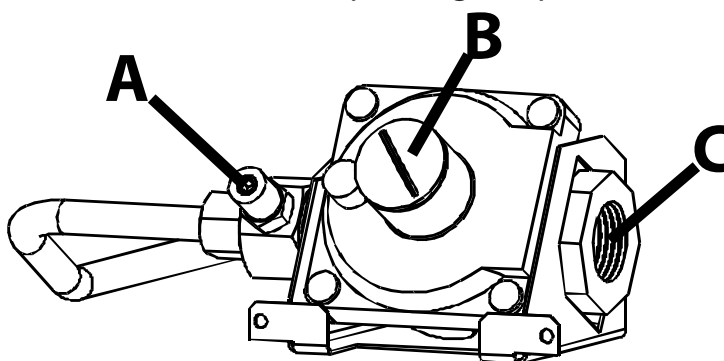
DL1100



E14 Checking the Operating Pressure

WARNING: The regulator that is supplied with the fire **MUST NOT BE REMOVED**. Removal of the regulator, or replacing it with one not intended for use with an Escea fire, will void the limited appliance warranty.

Check the operating pressure at the regulator located at the front RH corner of the appliance. This is best done before the fascia panels have been fitted to avoid fascia damage. A pressure test point is available for the operating test pressure (as shown below).



A = Operating Pressure test point

B = Pressure adjustment screw (To access first remove metal cap)

C = Inlet gas connection (1/2" Female BSPT)

☐ Check the inlet pressure to the appliance. Attach manometer tube to the first test point upstream of the appliance (typically at the gas utility meter or auto change device for a propane bottle station)

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☐ Run the heater on full (both burners running) and measure inlet pressure with all the other gas appliances in the building running. If pressure does not fall within the maximum or minimum pressures listed on the table below then reassess installation pipe size or upstream regulator settings.

☐ Remove the operating pressure test point screw. Connect manometer tube and measure pressure with heater running on full (both burners running) and with all the other gas appliances in the building running.

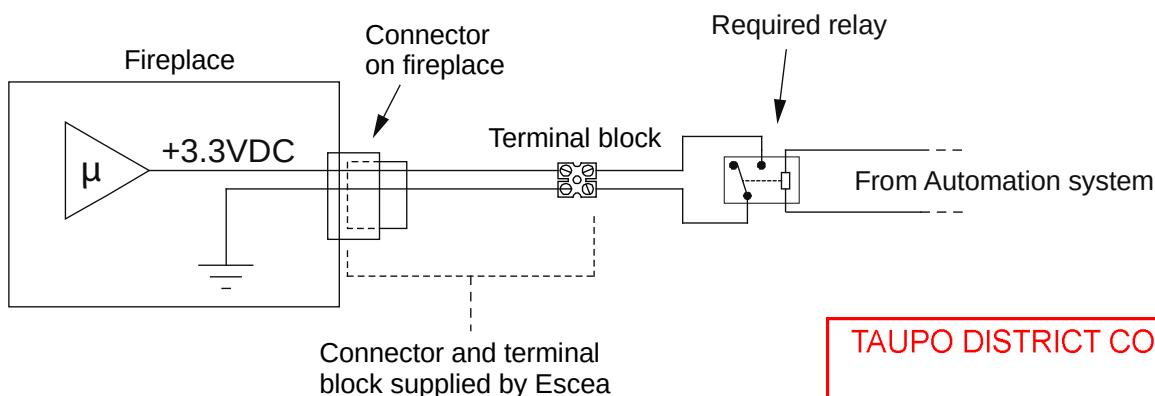
☐ If the appliance has not had a gas type conversion on installation, then the appliance regulator pressure has been factory set to 1.0kPa. Please check that the operating pressure is exactly as listed and if not, adjust the screw in the centre of the regulator until the pressure is correct.

☐ Replace operating test point screw and leak test both test points.

	Operating Pressures	Propane	Natural Gas	ULPG
DL850	Minimum inlet pressure	2.75kPa	1.13kPa	2.75kPa
	Maximum inlet pressure	5.0kPa	5.0kPa	5.0kPa
	Operating pressure	2.30kPa	1.0kPa	2.60kPa
DL1100	Minimum inlet pressure	2.75kPa	1.13kPa	2.75kPa
	Maximum inlet pressure	5.0kPa	5.0kPa	5.0kPa
	Operating pressure	2.30kPa	1.0kPa	2.30kPa

E15 Home Automation Setup

Escea D-Series fireplaces have a simple interface for connection to a home automation system. Simply put this allows the fireplace to be woken up and started and then shut down. The “Close to wake” connection shown is essentially taking one of the 3.3 volt DC pins on the fireplace micro controller and pulling it down to ground. In order to isolate the fireplace from the automaton system a relay needs to be used as shown. This allows you to use any nominal voltage to drive the relay while keeping the fireplaces 3.3V supply isolated.



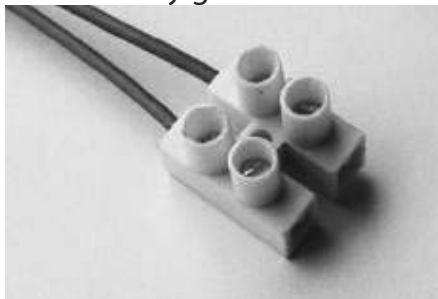
Note: you will need to match the relay coil voltage with the voltage from your automaton system.

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The Home Automation connection can be found inside the DL850 and DL1100 electronic tray (for access instructions see section E2). The socket is shown to the right and can be identified by green wires.



Home Automation Operation:

Relay closed

The fireplace will start in a medium setting until it receives a signal from the remote control unit (up to 4 minutes). Once the remote has communicated with the fireplace it will turn on and begin operating the fireplace thermostatically. The remote will use whatever temperature the user has previously set and cannot be altered by the home automation system. The fireplace will continue to operate while the relay is closed.

Note: If the fireplace cannot communicate with the remote controller within 10 minutes of the relay contact closure then the fireplace will shut down and return to standby. The remote controller is required to be operating within range of the fireplace for its safe operation.

Relay open

If the fireplace was operating with a closed relay then upon opening the relay contacts the fireplace will shut down and return the remote controller to its standby mode when it next updates (up to 4 minutes). While the relay is open the fireplace will be in standby mode and available for manual operation by the user.

END OF SECTION E

By the end of this section, you should have:

- ☐ The appliance installed in the cavity
- ☐ The appliance fixed to the cavity base and wall lining
- ☐ The appliance plugged into a mains electricity supply
- ☐ The selected fuel bed installed and glass in place
- ☐ The appliance gas supply attached and pressure tested with all other gas appliances running
- ☐ Checked that the appliance ignites reliably and safely at least three times

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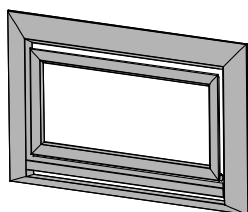
F Fitting the Fascia and Finishing Installation

F1 Fitting the Fascia Panels:

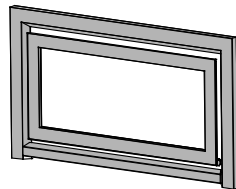
To avoid scratches or knocks to the fascia panels of this heater they must be fitted at the complete conclusion of the installation process. It may be necessary to use the outer fascia to initially locate the heater but then remove it again so that there is no chance of damage. Use the soft gloves provided whenever handling the fascia.

Never, ever rub the fascia panels. Refer to cleaning instructions supplied with fascia.

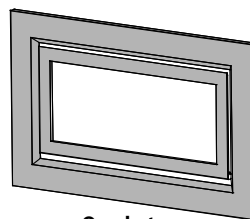
There are four fascia types available with the DL850 / DL1100:



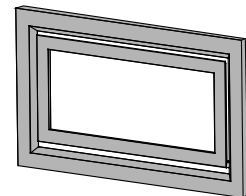
Velo (4 Sided)



Rado



Quadrato



Quadrato Lite

The fascia installation will depend on the fascia and cavity type. For:

Velo Four Sided, see section **F2**

Quadrato / Quadrato Lite, see section **F3**

Rado, see section **F4**

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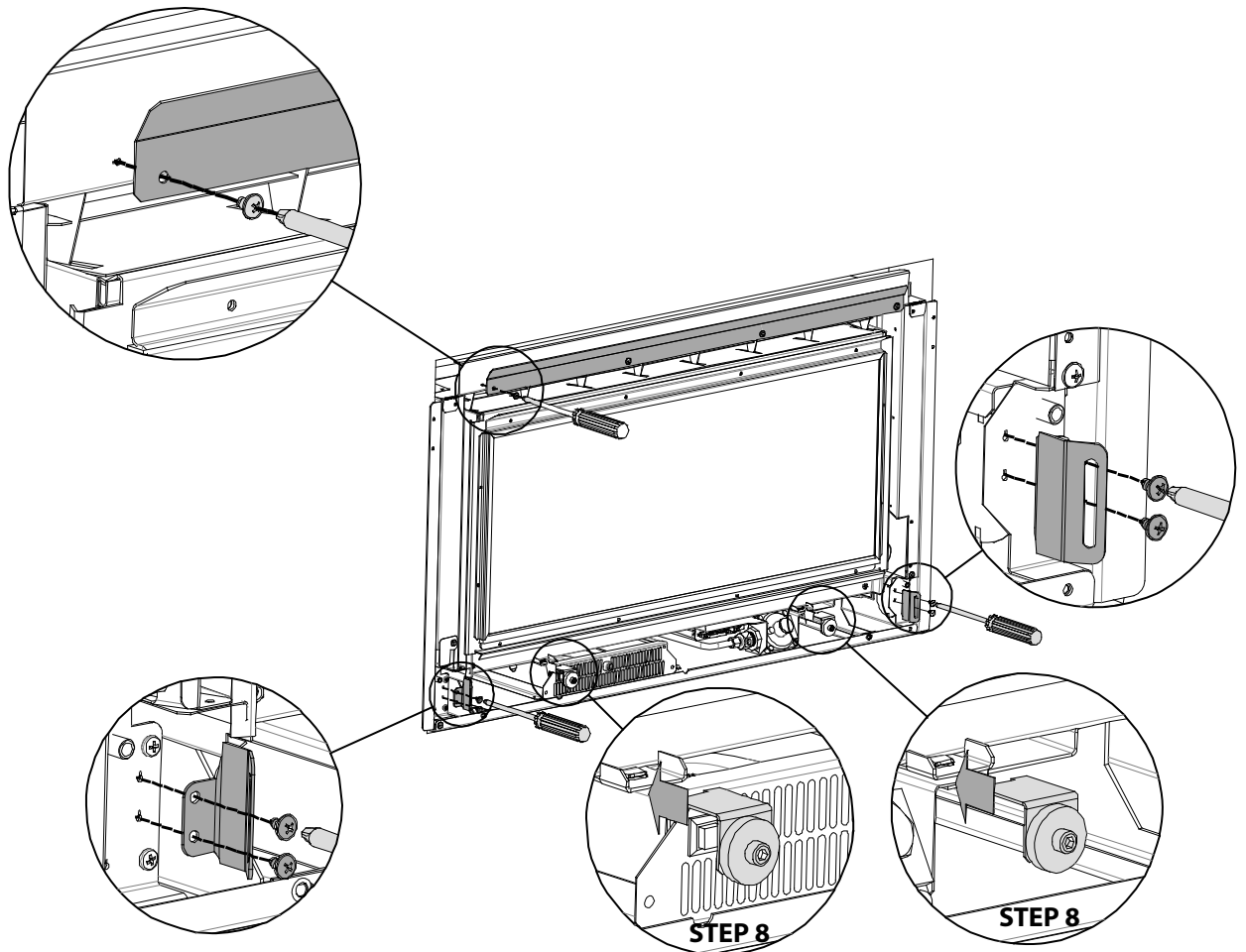
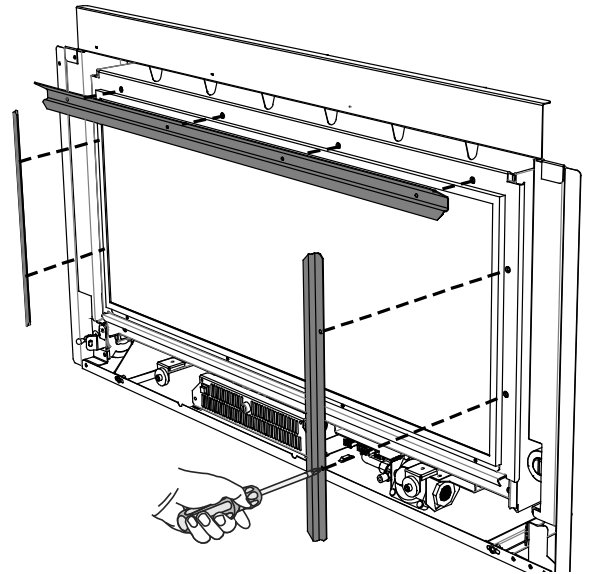
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F2 Fitting the Velo Four Sided Fascia Panels

Step 1: Ensure the glass and all glass retainers are securely fitted. Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

Step 2: Attach the Velo Outer Fascia Bracket to the top lid as shown below:

Step 3: Fit the Velo Outer Fascia brackets to the bottom left and right sides of the appliance as shown.



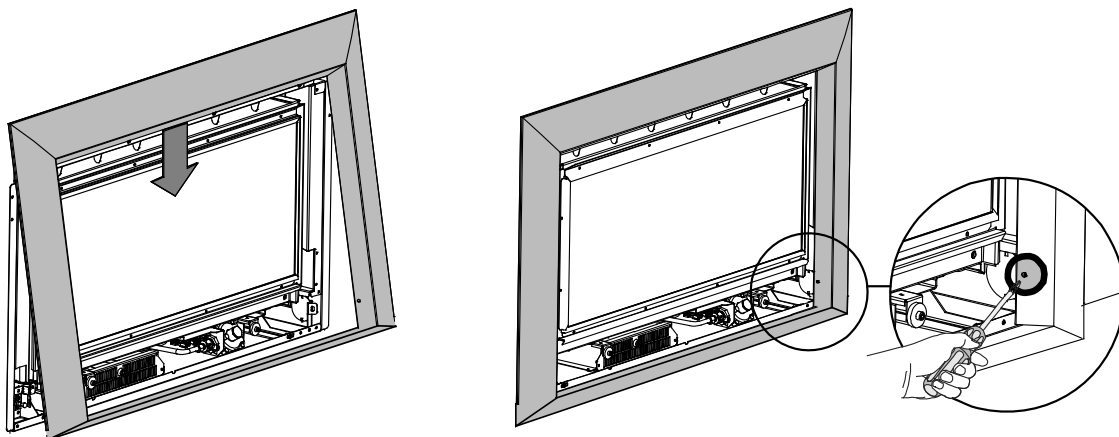
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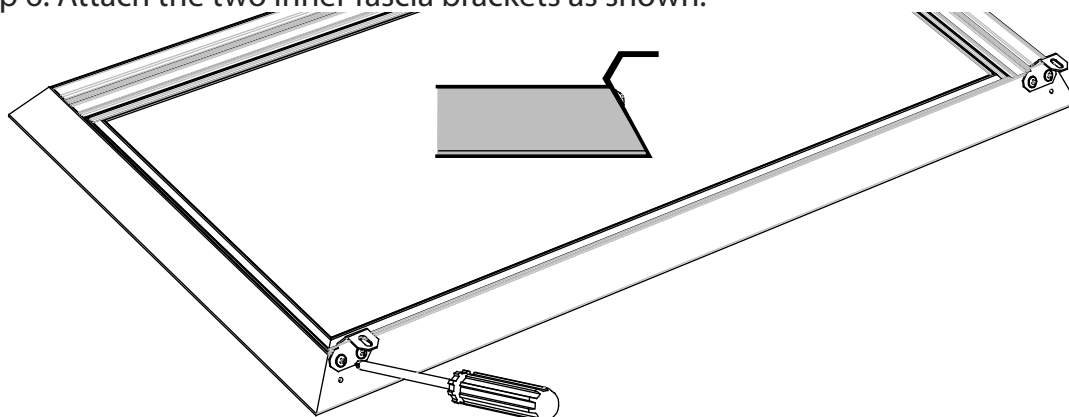
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Step 4: Wearing the fabric gloves supplied with your fascia kit, hang the Outer Fascia from the Velo Outer Fascia Bracket attached to the top lid as shown

Step 5: Check that the Outer Fascia is centred on the chassis. Screw the Outer Fascia to the chassis at the bottom left and right of the Outer Fascia as shown

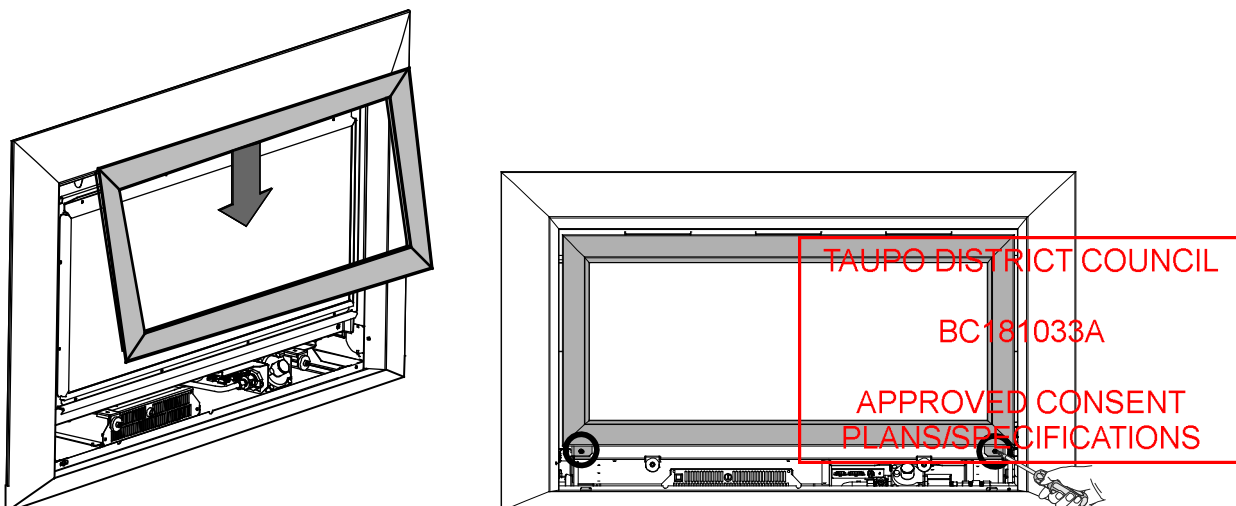


Step 6: Attach the two inner fascia brackets as shown:

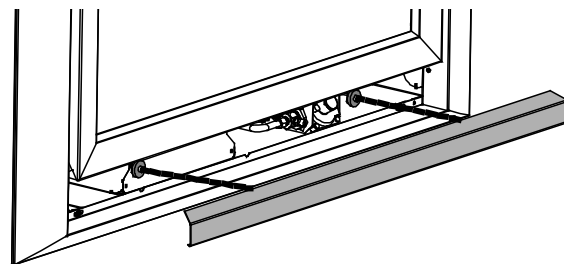


Step 7: Hang the Inner Fascia from the metal bracket on the front of the firebox. Centre the Inner Fascia relative to the Outer Fascia.

Step 8: Screw the Inner Fascia to the bottom left and right of the firebox as shown



Step 9: Push the supplied magnet brackets into position. Place the bottom fascia trim onto the magnets. If this panel does not fit, adjust the outer fascia side to side or the appliance in/out until the trim fits well.



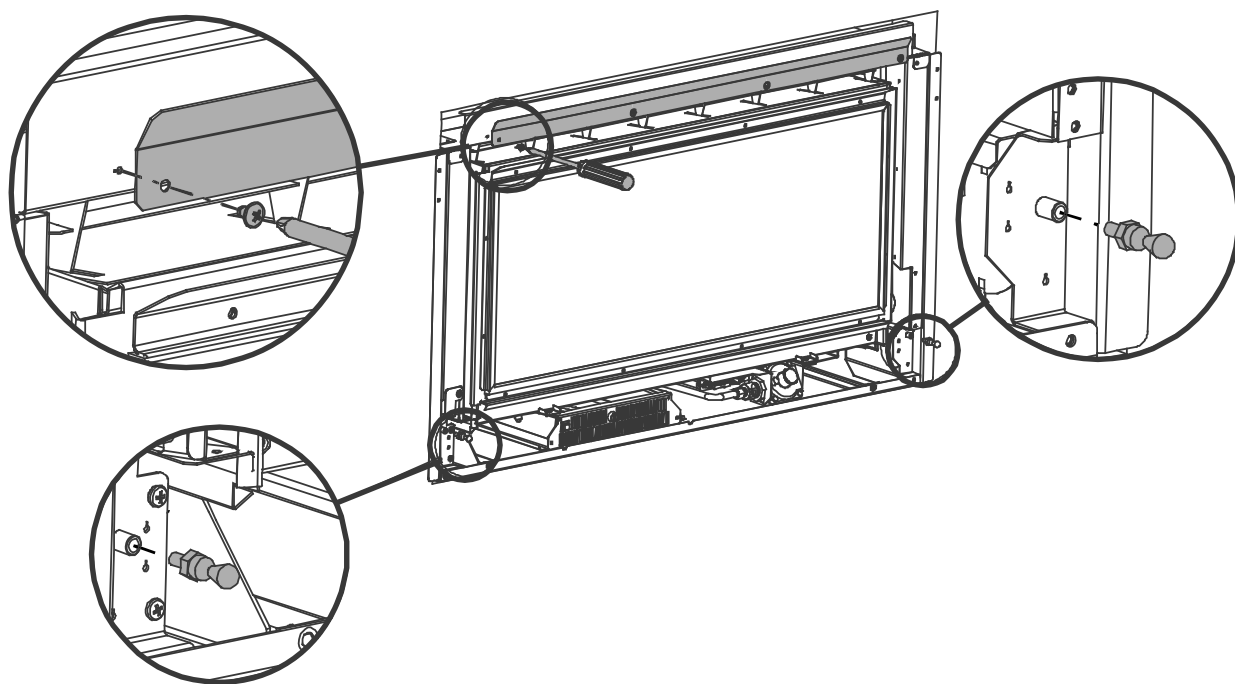
F3 Fitting the Quadrato or Quadrato Lite Fascia Panels

Step 1: Ensure the glass and all glass retainers are securely fitted

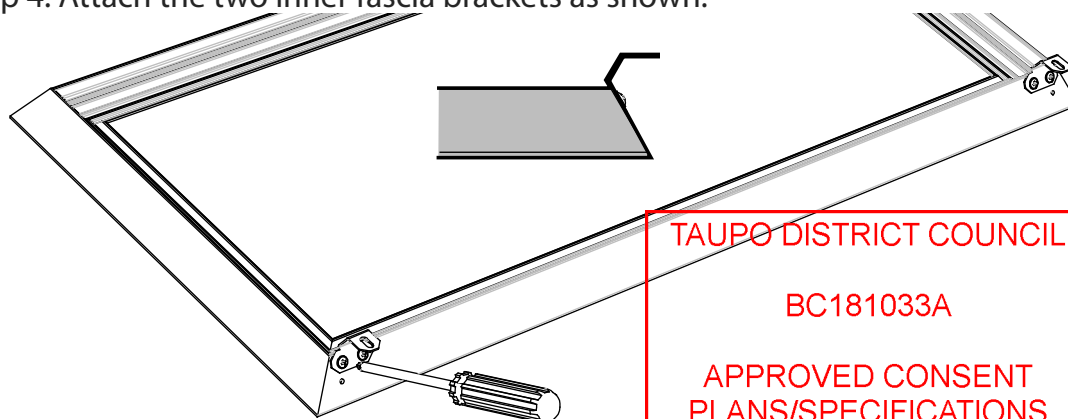
Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

Step 2: Attach the Outer Fascia Bracket to the top lid as shown below

Step 3: Screw the two Outer Fascia studs into the two brackets at the bottom left and right of the appliance as shown below.



Step 4: Attach the two inner fascia brackets as shown:



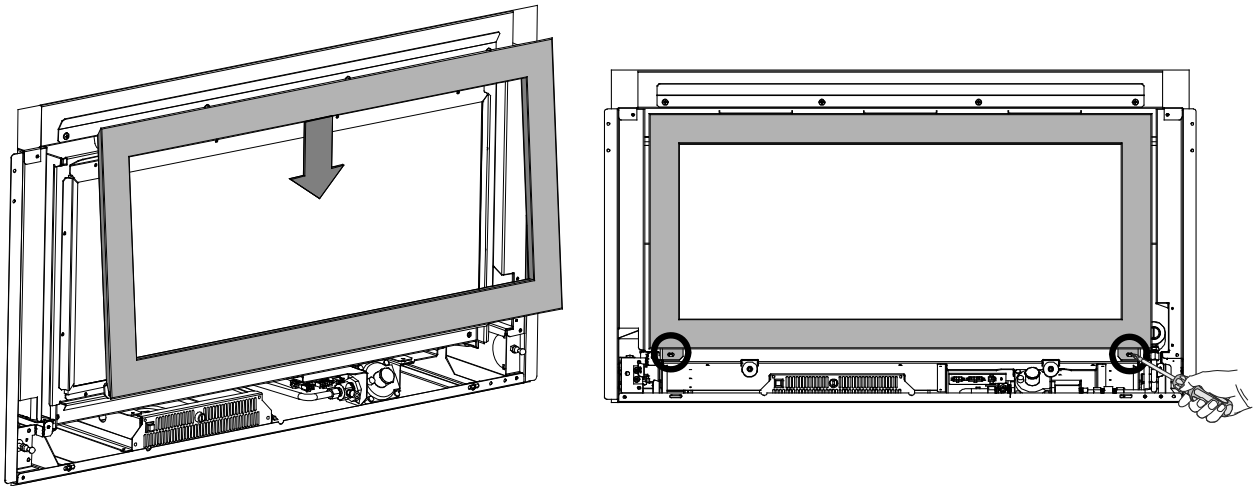
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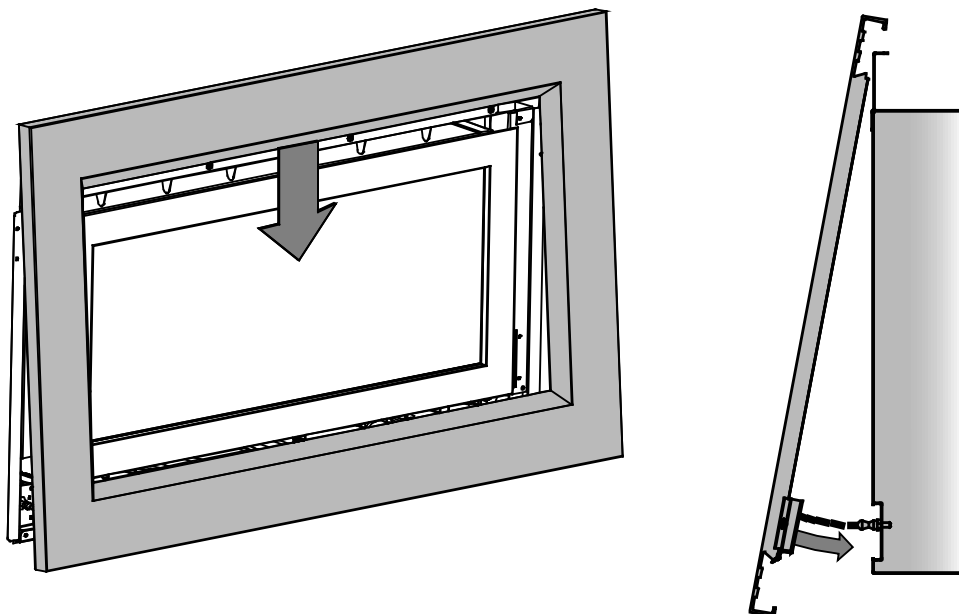
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Step 5: Hang the Inner Fascia from the metal bracket on the front of the firebox.

Step 6: Screw the Inner Fascia to the bottom left and right of the firebox as shown below.



Step 7: The Outer Fascia is now fitted over the top of the Inner Fascia. Hang the Outer Fascia (larger one) from the 30 degree flange at the top of the fireplace, being very careful not to damage either the Inner or Outer Fascias as there is not a lot of room to fit the Outer over the Inner. Once the Fascia is hung on this flange and clear of the Inner Fascia it will swing down and press firmly into place.



TAKE CARE: When securing the outer fascia, ensure it does not hit the inner fascia.

Step 8: Once it has clipped onto the fireplace check that the Fascia is parallel with the wall. The fascia installation is now complete.

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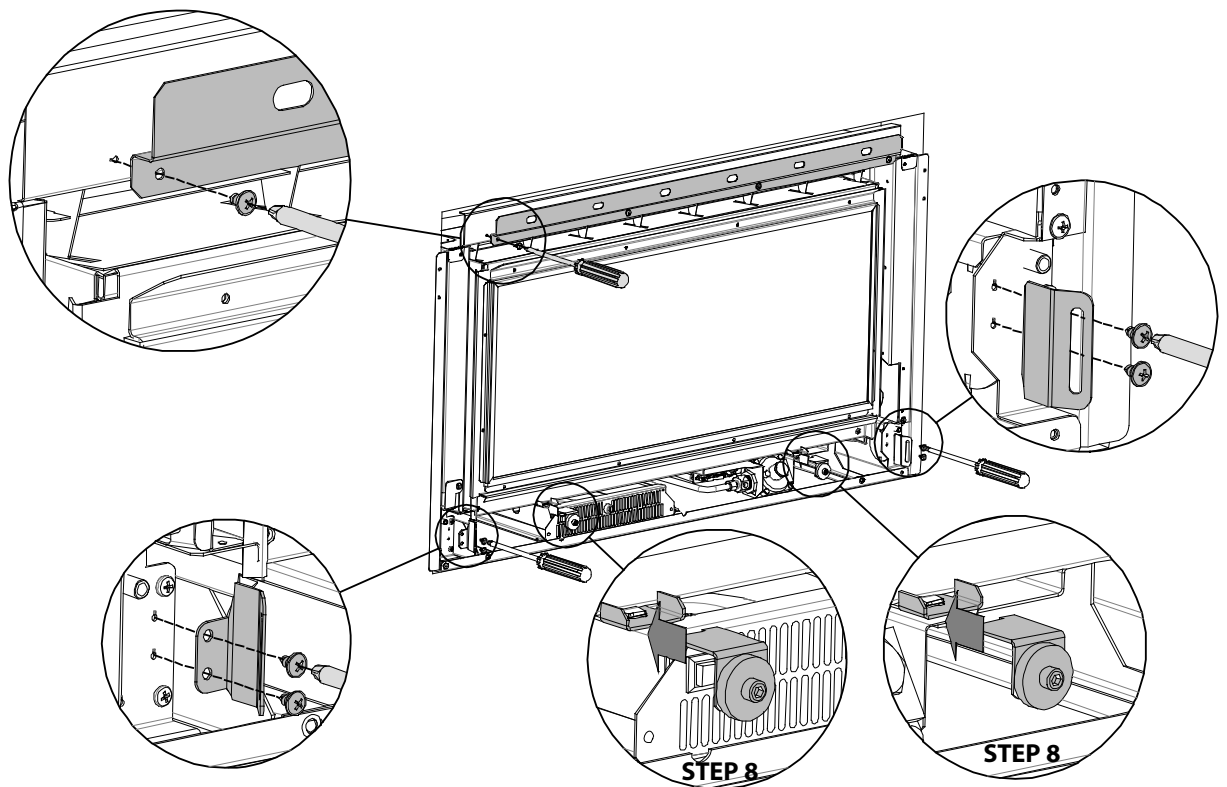
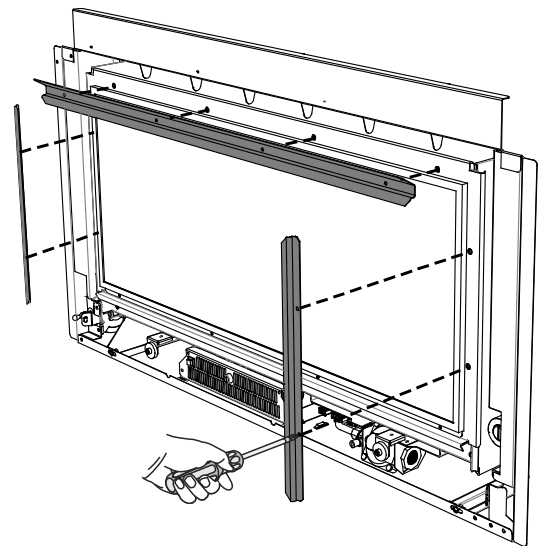
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F4 Fitting the Rado Fascia Panels

Step 1: Ensure the glass and all glass retainers are securely fitted. Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

Step 2: Attach the Rado Outer Fascia Bracket to the top lid as shown below. Note: Ensure the correct orientation of the bracket. If the bracket is installed upside down, the fascia will not fit.

Step 3: Fit the Rado Outer Fascia brackets to the bottom left and right sides of the appliance as shown below.

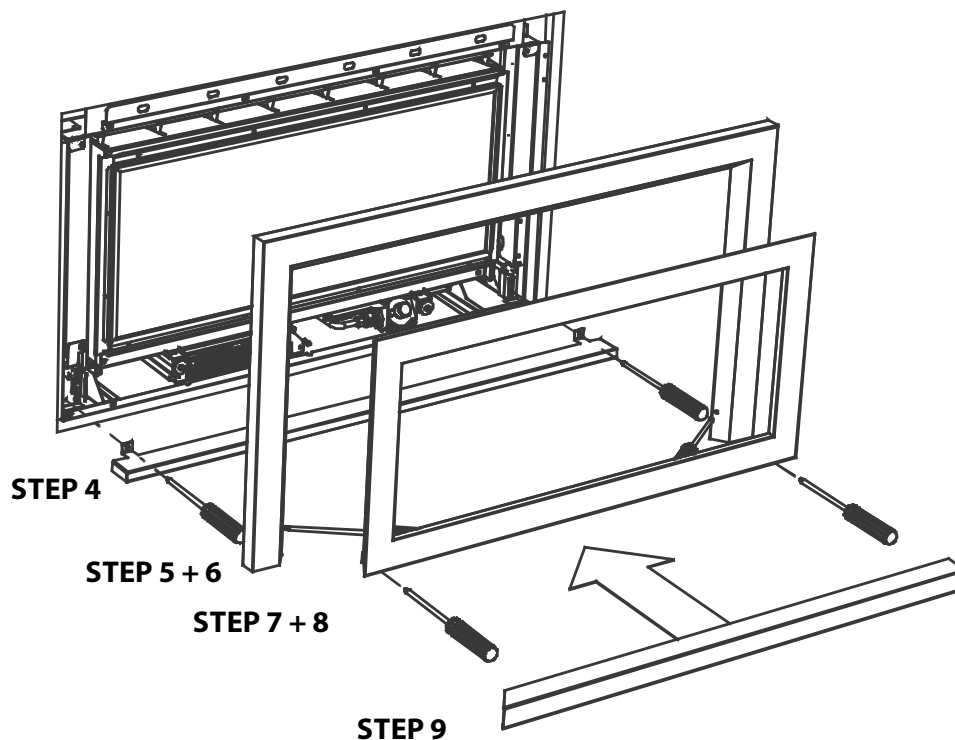


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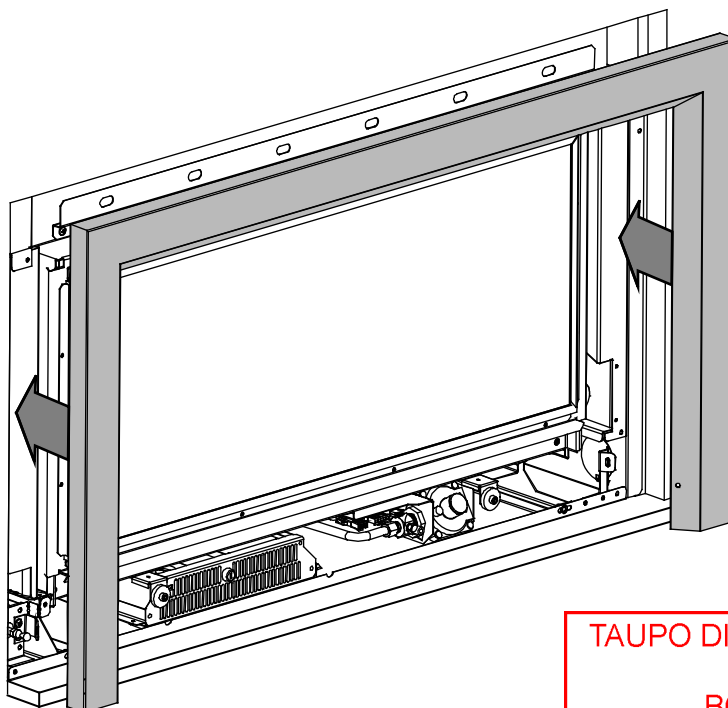
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Step 4: Attach the lower foot to the fascia by screwing it in the positions shown below.



Step 5: Hang the Outer Fascia from the magnet bracket attached to the top of the fire-box. Insert the fascia so that it is parallel with the front of the gas fireplace. The Hex-nuts attaching the magnets to the fascia will locate in the holes on the magnet bracket, securing the Outer Fascia in the correct position. If this fascia does not fit, check to make sure the magnet bracket installed above is in the correct orientation.



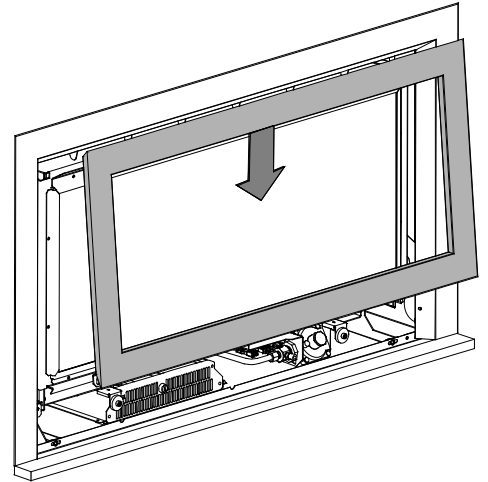
Step 6: Fit the two screws at the base of each side of this fascia. The heater may have to be adjusted in or out of the cavity to ensure fascia fits correctly.

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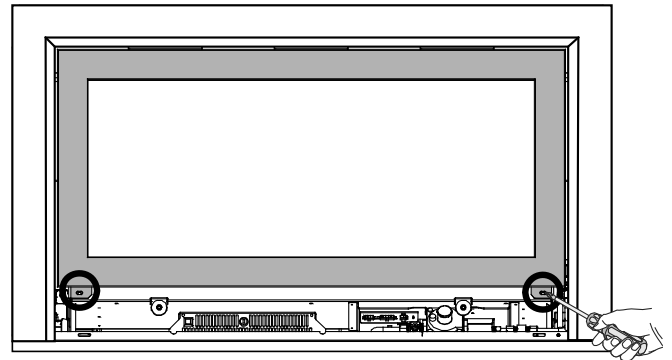
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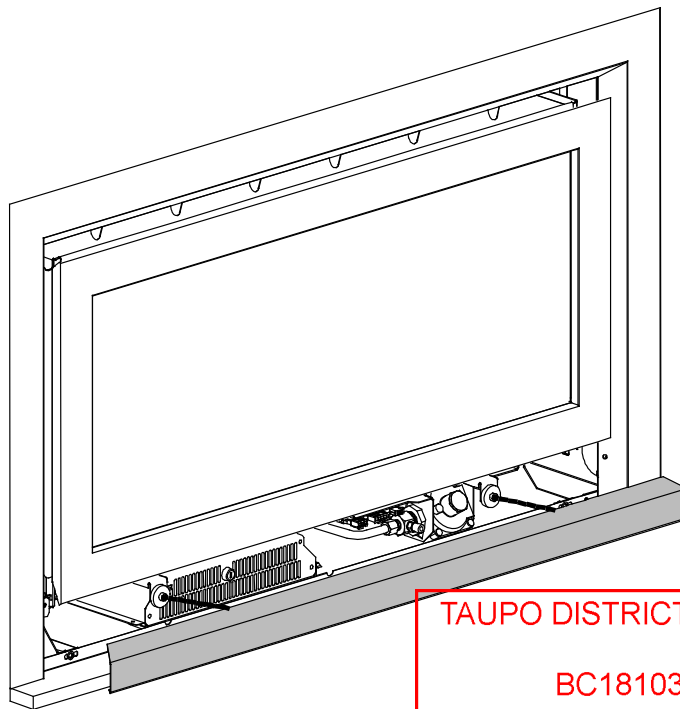
Step 7: Attach the inner fascia brackets to the Inner Fascia as per the instruction page supplied with the fascia. Hang the top edge of the Inner Fascia from the lip that extends at 45 degrees from the top of the firebox. This fascia is attached to the fire at its base by two screws. Leave the screws loose enough to be able to adjust the Inner Fascia.



Step 8: Check that the Inner Fascia is centred. If this panel is not centred, adjust the Inner Fascia side to side until the spaces on either side are even. Tighten the screws to fix the Inner Fascia in place.



Step 9: Push the supplied magnet brackets into position. Place the bottom fascia trim onto the magnets. If this panel does not fit, adjust the outer fascia side to side or the appliance in/out until the trim fits well.



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F5 **Locating Wall Mount Cradle for Wireless Control:**

The appliance’s remote contains the thermostat that will sense the room temperature and communicate this back to the heater via radio frequency.
A wall mount cradle has been provided for the wireless control and where possible the control should be housed in this cradle.

The location of this cradle should be decided by taking into account the following factors;

- Simple, convenient access for the user
- Away from air flow and drafts through the room
- The parts of the room that people are likely to spend time
- Away from direct sun light
- A suitable distance away from the heater.
- Ideally 1.2m to 1.5m from the floor

The radio frequency signal will go through some walls but for best results Escea suggest that the cradle position is between 1 and 5 metres away from the heater.

Please ensure that cradle is screwed firmly onto the wall using the screws provided.

F6 **Operating the Appliance for the First Time:**

Remove the battery cover on the rear of the remote. Insert the new “AA” size batteries, paying attention to the polarity.
You should now see on the display of the remote the time showing “0:00”.

To turn the fire on, press the “POWER” button once, and within a few seconds the appliance will begin its startup sequence.

NOTE: The appliance begins its startup with a thirty second pre-start purge, where the combustion fan runs on its own to clear the firebox before it tries to ignite. During the pre-purge the remote will alternately show the remote’s “Set” temperature and a rotating segment indicator to show that the fire is in start up mode and will try to ignite.

When the appliance has lit, set the room temperature by pressing the ‘plus’ or ‘minus’ button repeatedly until the display is showing the desired temperature. The remote will then revert back to the ‘current’ room temperature 30 seconds after making the change.

Run the appliance on full for an hour with the windows and doors open in the dwelling. This will ensure any running-in smells have the chance to dissipate.

The appliance is turned off by pressing the “POWER” button once more. The remote will display the time only.

Run the appliance again and check the operation of the thermostat by increasing and reducing the set temperature. Check the Flame Effect function and the Fan Boost functions work correctly.

For further operation instructions please refer to the User Guide.

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F7 Normal Operating Sounds and Smells:

Note: Each time the fire is lit from cold the glass may fog up with condensation. This is normal and the condensation will disappear within a few minutes once the glass heats up.

Sounds

It is possible that you will hear some sounds from your gas appliance. This is perfectly normal due to the fact that there are various types of materials used within your appliance. Listed below are some examples. These are all normal operating sounds and should not be considered as defects in your appliance.

- **Fan:**
Escea gas appliances use electric fans to push heated air further into the room. It is not unusual for the fan to make a “whirring” sound when ON. This sound will increase or decrease in volume depending on the speed setting of your fan.
- **Gas Control Valve:**
As the gas control valves turn ON and OFF, a dull clicking sound may be audible, this is the normal operation of a valve. When the fire is switched off after being run for a while, there may be popping and fluttering noises as the residual gas in the burners burns away. These are normal and should be no cause for concern.
- **Unit Body/Firebox:**
Different types and thicknesses of steel will expand and contract at different rates resulting in some “cracking” and “ticking” sounds being heard throughout the heating and cool down processes.

Smells:

The first few times the unit is operated, the unit may release an odour and the flames will appear orange caused by the curing of the paint, the burning off of the starch in the gas logs and the oils in the metal. This is a temporary curing process which will disappear with use.

F8 Cleaning the glass

A deposit on the inside of the glass, caused by the starch in the logs, may appear as a build up after several uses. If this film is not removed, it will bake on and may become difficult to remove. When the glass is cold, remove it and clean the inside with a non-abrasive cleaner.

DO NOT ATTEMPT TO CLEAN THE GLASS WHILE IT IS HOT. NEVER OPERATE THE UNIT WITH THE GLASS REMOVED.

END OF SECTION F

By the end of this section, you should have:

- ☐ A completely fitted fascia
- ☐ The remote control mounted on its cradle on a wall
- ☐ Operated the fire and verified that it lights reliably and safely
- ☐ Run the appliance on full for an hour with the doors & windows open
- ☐ Checked the operation of the thermostat, Flame Rect & Fan Boost functions

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PLANNING & BUILDINGS

G Installation Checklist

Go through the following checklist to ensure you have installed the appliance correctly

- ☐ Correctly sized cavity to suit your fascia and flue configuration
- ☐ Correct clearances to combustibles and mantles around the fascia
- ☐ An electrical isolating switch to the appliance, accessible after finished installation
- ☐ Correctly sized gas supply with a pressure test point, ensuring adequate supply with all other gas appliances in the dwelling running
- ☐ A weather-tight installed Horizontal or Vertical Powerflue Terminal with clearance as specified by AS/NZ5601
- ☐ Reasonable access to the outside face of the Horizontal Powerflue Wall Terminal for maintenance purposes OR
- ☐ Access to the Vertical Power Flue Enclosure for maintenance purpose
- ☐ Flue attached to the rear/bottom of the Powerflue Terminal leading back to the appliance
- ☐ The electrical cable from the Powerflue Terminal attached to the rear of the installation and run back to the appliance cavity in an electrically safe manner
- ☐ The appliance fixed to the cavity base and wall lining
- ☐ The appliance plugged into a mains electricity supply
- ☐ All gas joints and pressure points leak tested, and soapy water and drop tests completed on gas pipework
- ☐ Gas type conversion process carried out if required
- ☐ Log, coal, river stone or crystalight fuel bed correctly installed
- ☐ Glass correctly fitted
- ☐ A completely fitted fascia
- ☐ The remote control mounted on its cradle on a wall
- ☐ Operated the fire and verified that it lights reliably and safely
- ☐ Run the appliance on full for an hour with the doors & windows open
- ☐ Appliance functions checked, including thermostat operation, Flame Effect and Fan Boost
- ☐ Dwelling owner shown how to operate the appliance correctly
- ☐ Warranty card filled in with installer details and appliance serial number
- ☐ User Guide made available for end user
- ☐ Plumbing Industry Commission Compliance Certificate given to end user

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F

G

SERVICE

IMPORTANT:

- This appliance must be serviced every 12 months.
- Any service operation should be carried out only by a suitably qualified and trained person.
- Gas and electricity supply **MUST** be isolated before any service operation is carried out on this appliance.
- This manual should be left with the appliance.
- **DO NOT MODIFY THIS APPLIANCE.**

S1 Error Codes:

This gas fire has been designed to show error codes to help explain and identify any fault situation that occurs. These codes will appear on the wireless remote control in the form of a large letter "E" with a number beside it. Codes can normally be reset by turning the heater off then on again at the mains power wall switch.

The following table shows what each code means and possible ways to rectify the situation. In the case of persistent or repeated shutdown errors, action must be taken immediately to find and repair the fault.

Error Code	Suggestion action
 Electronics Over Temp	• Excess lint and dust build-up on the front of the controller tray. • Possibly fascia panels installed incorrectly resulting in restricted air flow. • Room air fans may be slowed or stalled. Remove firebox, check that fans are plugged in, cleaned, and free turning Note: This error has a permanent lock out and will require the unit to be reset after the initial error (turning the power to the fire off "at the wall" then on again after a few seconds).
 Flame Failure or Power Flue trip	The fire has tried to light three times and failed. • Check gas supply and check other gas appliances to see if they are affected. If you have two separate propane cylinders, switch over to the full bottle or contact your gas supplier. You may need to retry igniting the fire a few times after re-establishing gas supply. • Check the electrode placement in relation to the pilot flame. Ensure it is well enveloped in flame as per the diagram in the installation instructions. Ensure no small coals have dropped onto the ignition electrodes between the burners. • Check that the fan inside the powerflue wall terminal is running during startup. This fan may need servicing if it is slowed or stalled.



Appliance Over Temperature Sensor Trip

The bimetallic snap disk mounted on the spigot seal plate at the rear of the fire has tripped. The possible causes for this could include:

- Possibly fascia panels installed incorrectly resulting in restricted air flow at the top of the fire.
- Room air fans may be slowed or stalled. Remove firebox, check that fans are plugged in, cleaned, and free turning
- The gas regulator being set too high resulting in excess heat build-up.
- The inlet flue not being connected and the appliance drawing warm air from the cavity. Check flues are securely connected at both ends.



Valve Solenoid Check Failure

The valve solenoids have failed the pre-ignition test. This is to detect a faulty valve solenoid. However, it is possible a wire has dislodged.

- Check that the connections to each solenoid are secure and in place. It may be that the connections on the ends of the wires need to be tightened a little (e.g. with a pair of pliers) to ensure a robust connection to the valve terminal.
- Disconnect and reconnect the firebox connectors ensuring they are firmly pushed into place.
- It could also be that one of the solenoids on the valve inside the fire has failed. If this is the case the valve will need to be replaced.



Remote Cannot communicate with fire

The remote cannot communicate with the fire. Reasons for this could include:

- The fire being turned off "at the wall" i.e. a loss of power to the fire or the remote is outside of its effective radio frequency range (too far away from the fire). Typical remote range is 1m to 5m.
- Ensure there is power to the fire by pressing the auxiliary on/off (red) button on the fire, then press the on/off button on the remote to clear the error.



Combustion Air Flow Error

- Check whether the pressure switch is activating at startup (there is an orange indicator LED in the control tray which should be lit). If not check the pressure switch electrical connection is correct.
- Check that the hoses are connected at both ends. Ensure the hoses are not kinked.
- Ensure the pressure switch is mounted vertically and the diaphragm is operational. The grey hose should be connected to the low pressure port and the translucent to the high pressure port
- Check that both flues are securely connected at both ends to the appliance and the powerflue wall terminal and that the flue is not damaged

S2 Serial Number:

The serial number for the fire can be found in two places. The first is in the battery compartment of the wireless remote under the batteries. The second is on the data stickers on the chassis under the firebox on the left hand side.

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SERVICE

S3 Checking Operating Pressure:

See section E14 of this manual.

S4 Cleaning the Log Set and Glass:

NEVER RUB THE FASCIA. The outside of the fascia's must only be cleaned with a clean damp cloth, dry off after cleaning. The high temp silver powder coating that is used on Escea fascia parts contains certain amounts of aluminium that when rubbed too hard will oxidise leaving a black smudge that cannot be removed. Always clean when cold.

This is a service procedure that will need to be carried out whenever soot builds up on logs and/or inside of glass. If soot build up becomes excessive or regular then one of the following actions may be required;

- Reset gas pressure, pressure may be too high;
- Reposition log set so that front edge of each log is just behind each row of holes in burner top;
- Clear any blockage from primary air port of burner;
- Check flue tube is not damaged or disconnected.

For diagrams and further info on removing your fascia, reverse the steps found in section F.

- Remove fascia bottom panel by pulling it off the magnets that retain it to the fire. Remove the 2 screws holding the inner fascia, lift off the inner fascia by pulling the base of the inner fascia out and lifting it up and off.
- Unscrew the side and top glass retainers and remove them. Take care that the glass does not fall forwards at this stage.
- Lift out glass and place it carefully aside.
- Take out fuel bed and gently brush any soot from log with a soft hearth brush. The burner tops can be vacuumed to remove any excess material.
- Clean the inside and outside of glass with normal glass cleaning products. Use a CLEAN DRY cloth only. Stubborn marks may be cleaned with a ceramic glass cleaner.
- Replace in opposite order and test run heater.

S5 Servicing the Horizontal Powerflue Wall Terminal

If the Horizontal Powerflue Wall Terminal needs servicing, the fan can be accessed from the outside of the installation.

Ensure the power to the Horizontal Powerflue Wall Terminal is off by disconnecting the power to the appliance inside. If the appliance has been running, allow the terminal to cool before attempting to service it.

Undo the ten screws holding the outer cowl in place and pull the whole plate and cowl

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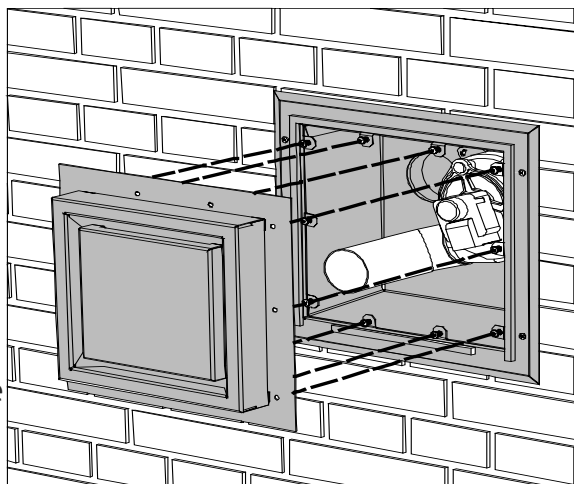
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directly outwards. Note: Be careful of any flashing that may have been installed above the terminal.

Removing this plate gives complete access to the fan for servicing or replacement.

Check that all the seals are still intact. Check the fan electrical terminals, motor and impellor are not corroded. Ensure there is no signs of leakage in or around the terminal.

When reassembling the terminal, line up the round silicon grommets with the outlet tube of the fan and push the cowl back into place. Ensure all seals are still in place and replace all of the screws to hold the cowl in the correct position.

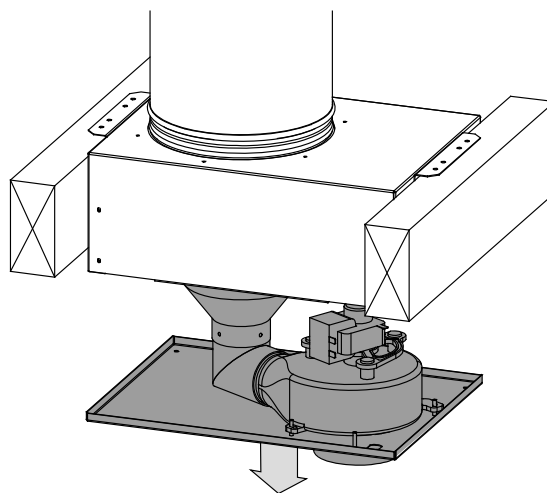


Servicing a vertical Powerflue:

If the vertical Powerflue needs servicing the fan can be accessed without disturbing the final twin walled flue length or roof terminal.

To gain access to the fan and electrical terminals remove the eight screws that hold the base of the Powerflue to the lid, making sure to support the base while removing the screws.

Note: When inspecting or working on the Powerflue take care not to damage the two flexible flue pipes that connect to the Powerflue base.



Once the base has been removed clean away any dust or debris found and check that the fan electrical terminals, motor and impellor are not corroded. Also check for signs of leakage in or around the Powerflue.

When reassembling the Powerflue support the base under the lid and replace the 8 securing screws. After assembly check that the two flexible flue pipes are sealed and not damaged and that the twin walled final flue length and roof terminal are still sealed.

Note : Take care not to trap any wires between the base and lid of the Powerflue when reassembling.

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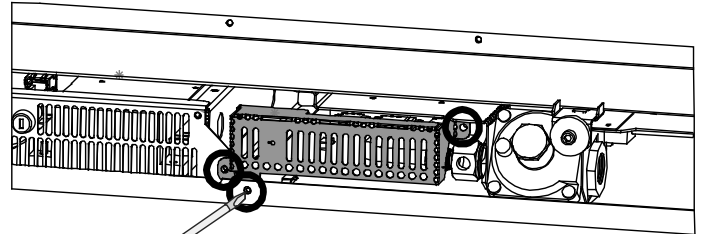
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S6 Removing or Cleaning Fan

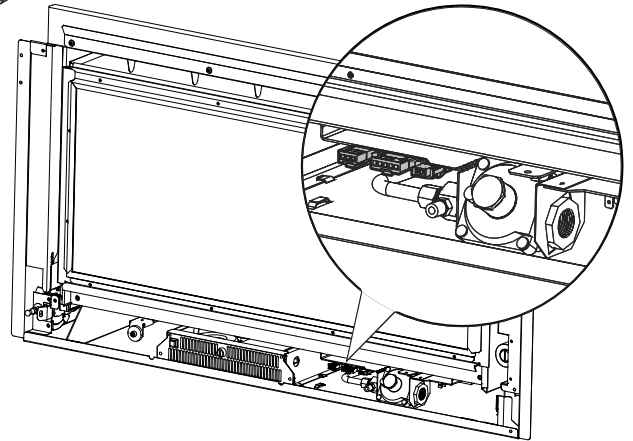
As part of regular service procedure, it is recommended that the fan is removed for cleaning. Dust will build up on the fan rotor and in the cavity where the fan is located. This can be removed by the service person using a hearth brush and a vacuum cleaner. ISOLATE THE POWER AND GAS SUPPLY TO THE FIRE BEFORE COMMENCING THIS PROCEDURE

Step 1: Remove the inner/outer fascia, front glass, and log set as described in section S4.

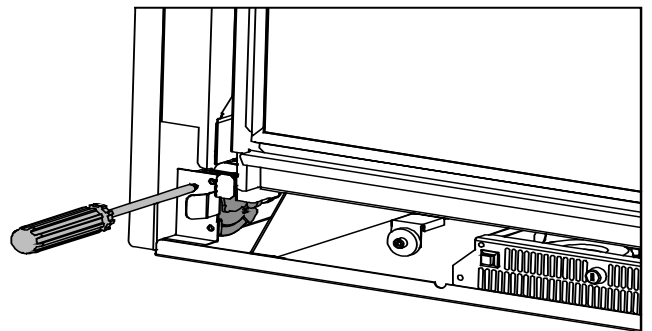
Step 2: Remove the guard covering the electrical connections and earth lead by removing the 3 screws.



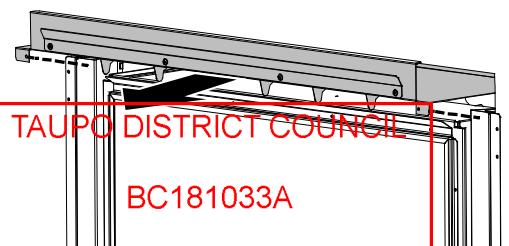
Step 2: Disconnect the gas supply from the fire and unplug the three wiring looms connecting the valve and spark electrode on the bottom right of the fire box. Unscrew the earth strap



Step 3: Remove the 2 screws holding the pressure switch bracket. Carefully pull the switch out and remove the hoses from the rear of it.



Step 5: Remove outer shell top by removing the screws in each corner and sliding out.

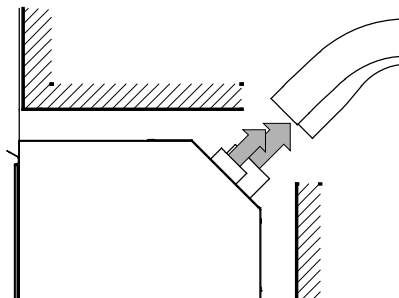


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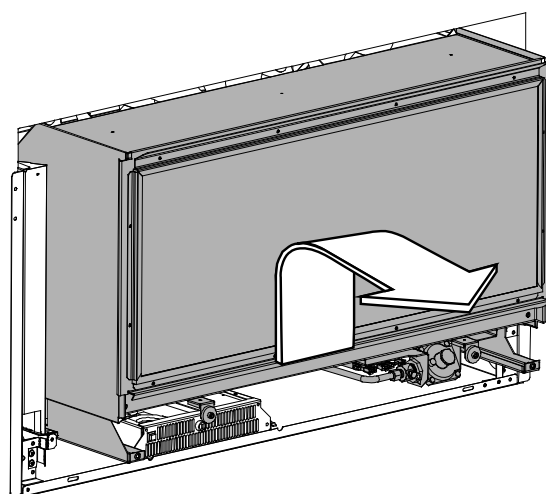
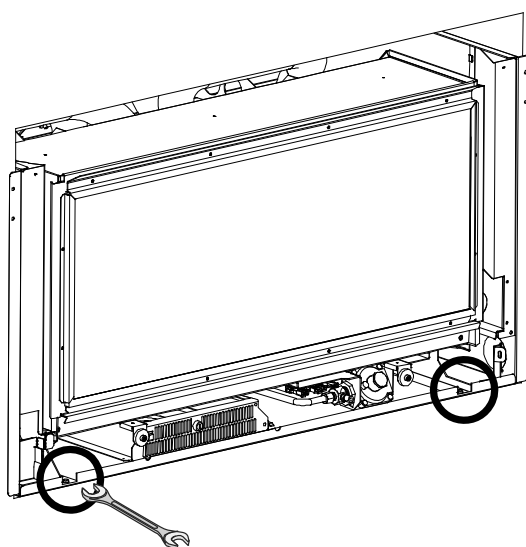
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Step 6: Reach in and loosen the clamps holding the flexible inlet and outlet tubes and detach them from the fire.



Step 7: Remove firebox from heater by taking out the screws from the bottom corners, lifting the firebox over the chassis lip and pulling firebox directly outwards (as shown).

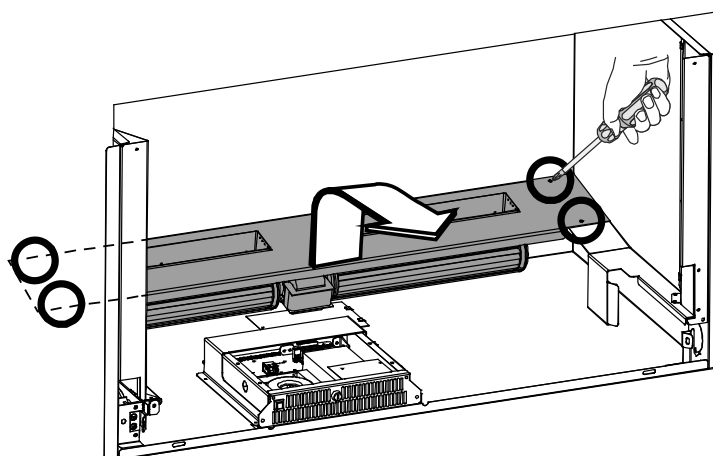
Note: Proceed with caution as the firebox assembly is heavy. Be aware of the components on the underside of the firebox that could easily be damaged.



Step 8: Take out the 4 screws on top of fan plate assembly.

Step 9: Unplug wires lift the fan unit up and out to fully remove fan assembly.

Step 10: Clean fans, removing all dust build up.



Step 11: Replace fan assembly and firebox by repeating these steps in reverse order.

NOTE:

- ☐ Ensure the earth strap is reconnected (Screwed) into the electrical guard (step 2)
- ☐ Ensure the Pressure Switch hoses are connected to the correct hoses with no kinks or restrictions. These can be identified by an "H" (high) and "L" (low) labelled on the hoses and the pressure switch. (step 3)

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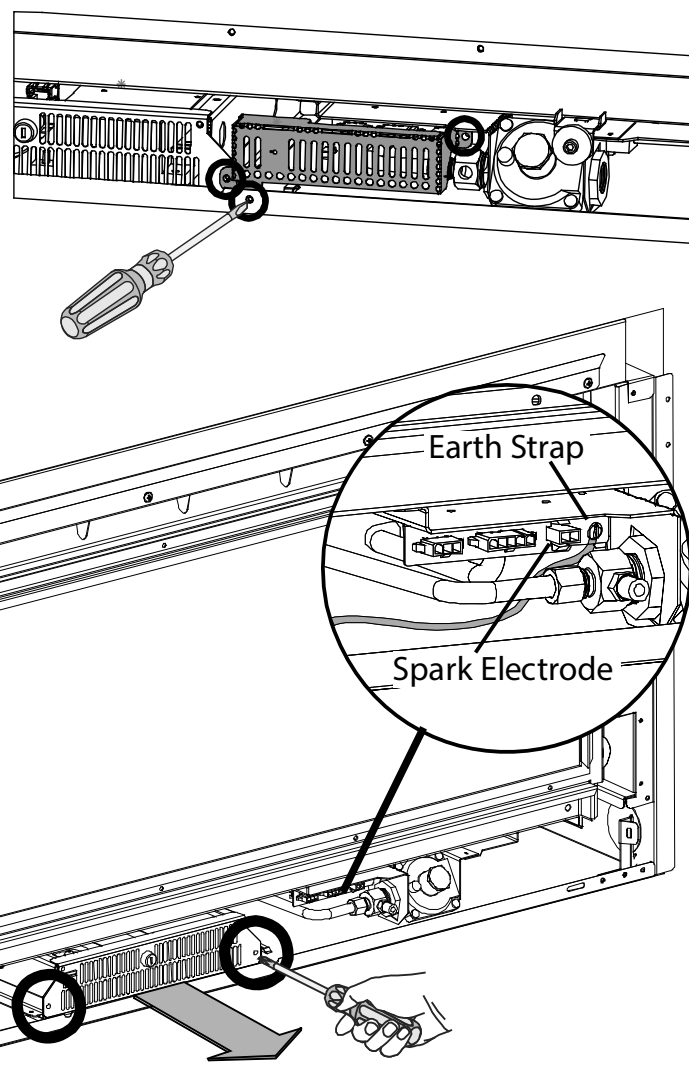
S7 Replacing Electronic Drawer

ISOLATE THE POWER TO THE FIRE BEFORE THIS PROCEDURE.

All of the electronic components of the heater have been located on a removable drawer. This drawer is located under the firebox, near the front left of the appliance. On the back of the drawer are two large connectors that unplug as the drawer is removed.

Remove the protective grill from in front of the electrical connections (shown in first diagram) and unplug electrode wire from firebox and remove screw holding earth strap to firebox. Take out the two screws at each end of the electronic drawer and pull drawer outwards and up slightly to clear the chassis lip. If an ethernet / network cable is connected the lid of the drawer will have to be removed and the cable unplugged before the drawer is completely extracted from the fire.

Reverse this procedure to refit. Ensure drawer is fully seated into the draw housing.

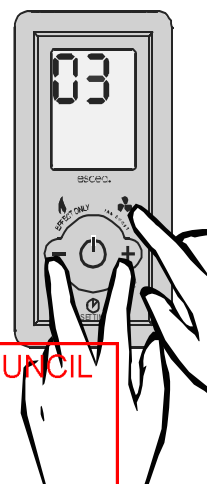


S8 Replacing a Wireless Control:

If the wireless control becomes lost or damaged, a new one can be ordered from any Escea retail agent. When you have the new remote, the following procedure needs to be followed to "teach" the remote to only communicate with that fire.

1. Ensure the fire and remote are set to "Off" (only the time is displayed on the remote).

2. While the remote is in its "OFF" mode with only the time showing on the display, press the MINUS (4), PLUS (8) and FAN BOOST (7) buttons simultaneously (as shown right) until the characters "03" light up on the display. Release the buttons and the remote will count down and display "GO". The screen will then display all characters. This will put the remote into test mode and the two digits should begin counting from 0 to 99 repeatedly.



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3. Press and hold the – (minus) button until the two large temperature digits reading 00 start to flash slowly. Release the – (minus) button. The remote control is now ready to be addressed to the fire.

4. Press and hold the red auxiliary on/off button (found on the front face of the fireplaces electronic drawer, shown on the left with an arrow) for a minimum of eight seconds, or until the two large temperature digits start counting upwards from 00 to 99 repeatedly on the remote control.

Note: Pressing the red auxiliary button on/off button will start the fire. Once the remote control is counting the fire can be turned off by pressing the red auxiliary button again.

5. Press the large power button in the middle of the remote control to exit the test mode and return to normal operation. The remote should only be displaying the time. Check the fire will start using the remote control by pressing the large power button. Turn it off again using the remote control.

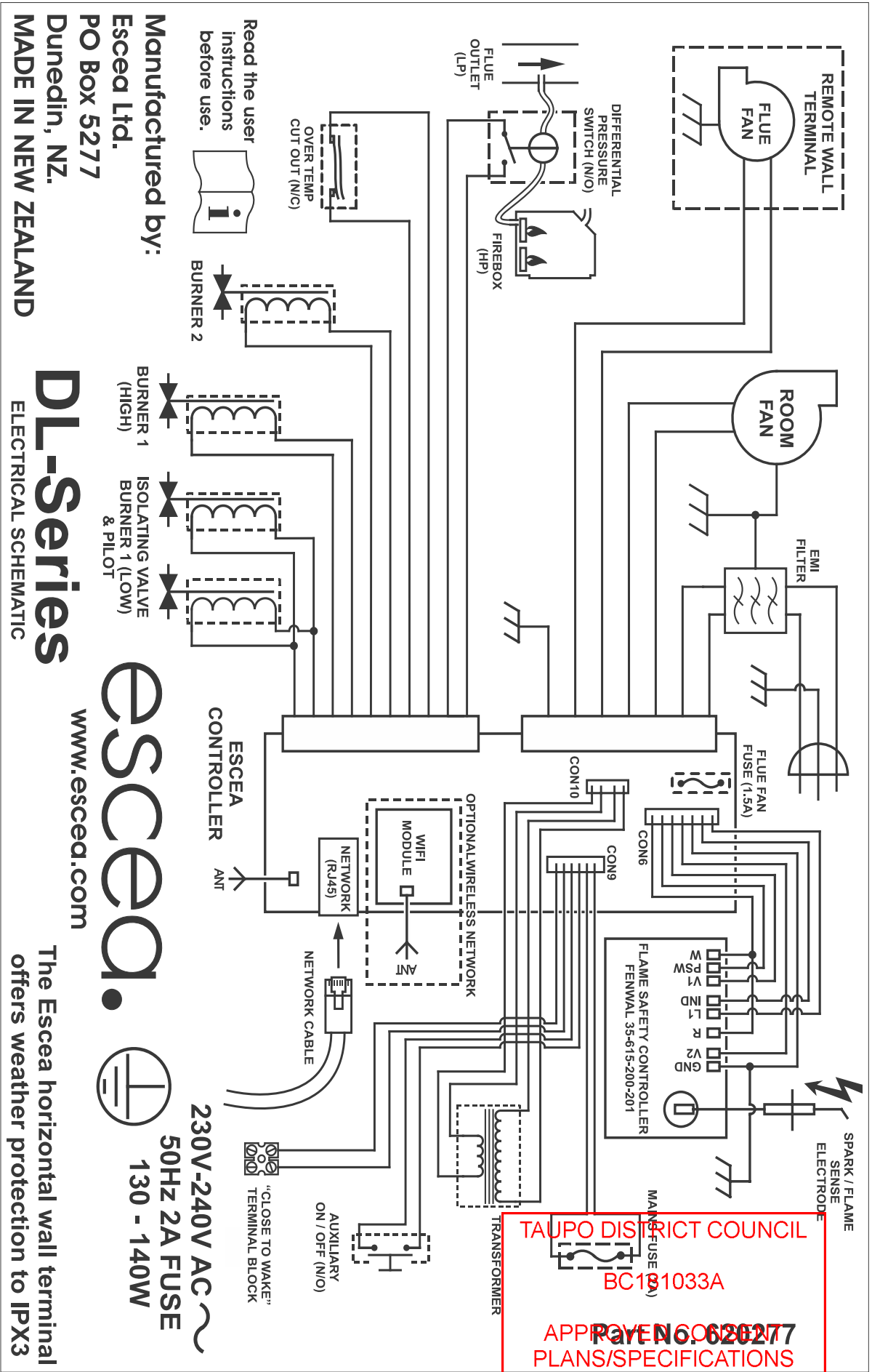
6. The fire is now re-addressed to the remote control.

S9 Annual service procedure:

- ☐ Isolate power and gas supply to fire.
- ☐ Remove front glass and clean inside of glass.
- ☐ Remove fuel bed and brush off any soot.
- ☐ Clean electrode and pilot hood of any carbon build up and ensure correct gaps between electrode and pilot hood
- ☐ Remove burners and blow compressed air through the burner ports.
- ☐ Remove jets and clean injector hole with solvent.
- ☐ Remove firebox to give access to fan, brush and vacuum any dust build up from fan blades.
- ☐ Vacuum any dust from the cavity that houses the fan and from the underside of the fire box around the valve and solenoids.
- ☐ If the gas piping includes a flexible hose connected to the regulator, check the hose for signs of wear (discolouration, loss of flexibility, cuts, worn covers, cracks, crushing, kinking, flattening or loose end fittings) and replace if worn, or more than five years old.
- ☐ Test all joints for gas tightness.
- ☐ Reassemble heater and check that operating pressure is correct. 2.3kPa Propane, 1.0kPa Natural Gas with all burners running.
- ☐ Check glass sealing tape and replace if necessary.
- ☐ Check to make sure that flue system is intact and not in any way blocked.
- ☐ Trial heater with several start/stop cycles and trial fan-boost, flame effect only and thermostat modes to ensure that all modes function correctly.
- ☐ Check and set the gap between the 3 pilot parts to 0.5mm as per diagram in section E9

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S10 Wiring Diagram:



PROMINA

Product Information

PROMINA is a non-combustible matrix engineered mineral board, used for soffits, one way boundary external fire wall, sub floor spaces, built-in fireplaces, and internal partitioning.

1. Product composition

PROMINA sheets consist of the following:

- Portland cement
- Calcium silicate
- Lime and mineral fillers
- Functional additives

It does not contain inorganic fibres or formaldehyde.

2. Production method

PROMINA sheets are manufactured on a FLOW ON machine and are autoclaved at high temperature and pressure. PROMINA is produced in Asia by the Etex Group, the most global manufacturer of calcium silicate sheets with production facilities in 40 different countries.

PROMINA is manufactured under a quality management system certified in accordance with ISO9001: 2000 Certification and in accordance with the environmental standards of ISO 14001.

3. Dimensions and tolerances

Standard thickness: 9 mm

Length: 2400 mm

Width: 1200 mm

Tolerances

	After cutting
Thickness	- 0.5 / + 1.0 mm
Length and width	⁺ / ₋ 5.0 mm
Squareness	1.0 mm / m

4. Weight

Thickness	Weight
9 mm	Approx 9.7 kg/m ²

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5. Colours

PROMINA is beige in colour and is coloured through-out.

6. Technical properties (average values)

Density		: 1000 kg/m ³
Bending strength ₃ (24h immersed in water)	//	: 7.5 N/mm ²
	T	: 5.2 N/mm ²
Modulus of elasticity		: > 3,800 N/mm ²
Moisture movement (30-90%, mean)		: 1.6 mm/m
Thermal expansion coefficient		: 7.5*10 ⁻⁶ m/mK
Thermal conductivity coefficient		: 0.136 W/mK
Reaction to fire according to AS/NZS1530: Part1		: Incombustible
Reaction to fire according to BS476: Part4		: Incombustible
Surface spread of flame to AS/NZS1530: Part3		: Ignitability = 0, Spread of flame=0, Heat evolved=0, Smoke developed=0
Surface spread of flame to BS476: Part 7		: Class 1

7. Advantages

- No flame spread, no fume development, no toxic gasses
- Resistant to high temperatures
- Resistant to the effects of humidity: PROMINA will not physically deteriorate when used in damp or humid conditions
- Resistant to fungus, bacteria, insects, vermin, etc.
- Resistant to many chemicals
- Environmentally friendly, no harmful gas emissions
- High dimensional stability
- One surface is semi-smooth and will accept a wide range of architectural finishes

8. Working guidelines

Cutting:

- Hand circular saw (with rail), slow rotation with tungsten carbide-tipped blade or fast rotation with a fluted diamond cutting blade without teeth. A diamond tipped blade can be used in either dry or wet state, but caution has to be taken that when cutting wet, a cement slurry is generated that has to be drained and the sheet and equipment will have to be cleaned.
- Jigsaw with tungsten carbide-tipped tooth cutting blade
- Conventional woodworking equipment can be used but have in general wear faster.
- Pacific Build Supply Ltd operates a CNC waterjet cutting machine in Auckland that facilitates the cutting of intricate designs with minute tolerances. Please contact Pacific Build Supply Ltd for more information.

At all times, cutting should be carried out in well ventilated spaces, using dust extraction. Operators should take precautions and wear protective and respiratory gear at all times.

Edge finish:

- Fine emery cloth or sanding block when the cut is rough.

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Drilling:

- For holes: carbide-tipped twist drill (or completely in carbide) with a 60° or 80° nose angle
- For round apertures: cup drill or circular cutter, carbide-tipped
- The sheet should be supported around the hole to be drilled (e.g. by a wooden surface).
- Cutting and drilling must take place in a dry environment.

Fixing accessories:

The method and choice of fixing accessories (e.g. stainless steel, galvanized steel, cadmium plated steel) is dependent on the application and the environment.

1) Screwing in timber construction:

- Use drywall screws SUREFAST N°6 x 30 mm
- The PROMINA sheets need to be pre-drilled not less than 12 mm from the edge and at 50 mm and 100 mm from the edges at sheet corners (see detail).
- Do not overdrive the screws. The optimum is to have the screw head at 0.5 mm below the surface of the sheet.
- Variable-speed screw guns can be used with a maximum speed of 2,500 rpm and fitted with a depth gauge.
- Use the fixing patterns as specified by Pacific Build Supply Ltd.

2) Nailing in timber construction:

- Stainless steel clouts 40 x 2.8 mm.
- Distance to edge is min 12 mm and 50 mm and 100 mm from the edges at the sheet corners.
- Nails cannot be overdriven into the sheet. The optimum is to have the nail head flush with the sheet surface.

Caulking:

- Only use Promaseal Intumescent Mastic.

Health and safety aspects:

While the sheets are being processed, dust can be released which can irritate airways and eyes. It is recommended that a minimum P2 dust mask and safety goggles be worn. Appropriate dust extraction or proper ventilation should be used depending on the room in which the work is being carried out or the equipment being used. Long-term exposure to dust can be harmful to health.

9. Maintenance and cleaning

For minor soiling, washing with a mild household detergent or soft soap solution followed by rinsing with clear water. PROMINA's surface is porous and cleaning requires rather chemical than mechanical ways to clean. No abrasive products or tools shall be used to clean the surface. Please consult the Pacific Build Supply cleaning instructions for more specific cleaning advice.

10. Handling

The sheets are packed on pallets. They must be kept dry during transport. The sheets must be horizontally stacked on a flat surface. The sheets must always be sufficiently supported so that they do not sag. The sheets must be stored in a dry ventilated space. If the sheets are stored outside, they must always be protected against rain by a tarpaulin or plastic sheet. If the sheets do become wet in the packing, all packaging must be removed and the sheets must be wiped dry and placed in a way that they can dry completely. A sheet must always be lifted from a stack by two people and then be carried on edge.

11. Guarantee

The guarantee and the guarantee conditions are available on request from Pacific Build Supply Ltd,

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Trade name: **PROMINA® 60**

1. Identification of the product and of the company

Product name: PROMINA® 60
Intended Product use: Suitable for internal and semi-exposed external non-load-bearing applications such as ceiling linings, soffits, etc.
Company: Comp : Promat International (Asia Pacific) Ltd.
Address : Unit 19-02-01, Level 2, PNB Damansara,
No. 19, Lorong Dungun, Damansara Heights,
50490 Kuala Lumpur, Malaysia.
Tel # : +60(3)-2095 5111
Fax# : +60(3)-2095 6111
E-mail address: info@promat-ap.com

2. Composition / Information on ingredients

Description: Silicate Fire Protective Board, in large dimensions, for universal applications in preventive fire protection and in technical high temperature insulation.

Chemical characterisation This product is a manufactured article, not a substance nor a preparation.
It is manufactured from a combination of cement, sand, cellulose and selected fillers. Asbestos-free autoclaved product.

3. Hazard Identification

Indication of the hazards: The installed product in its final application: no hazards known.

When machining (drilling, cutting, sanding, etc.) the product: airborne dust can be released.

- As with most types of nuisance dust, excessive inhalation of dust may cause irritation of the airways.
- Eye contact with dust may lead to transient eye irritation or inflammation.
- Prolonged skin contact may lead to skin irritation.
- Long term hazards: see section 11

Specific risk information for humans and environment: see section 7 and 8

4. First aid measures

Inhalation: Remove to fresh air
Ingestion: Drink plenty of water
Skin contact: Rinse the skin thoroughly with water

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SAFETY DATA SHEET

Promat

Issued: 25/07/2007

Trade name: **PROMINA® 60**

Eye contact:

Do not rub the eye, flush copiously for at least 15 minutes. If eye irritation or inflammation persists, seek medical advice.

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Trade name: **PROMINA® 60****5. Fire fighting measures**

Additional Information: The product is non-combustible, according to the standards such as AS 1530.1, BS 476: Part 4, etc.

6. Accidental spill / release measures

Methods for cleaning up: Shovel up small pieces. Dampen down any dust before putting into open skips

7. Handling and storage

Handling: Instructions for handling and machining
-Dust, generated during machining and processing must be exhausted and the regulatory occupational exposure limits for total and respirable dust must be respected.
-Work in a well ventilated area.
-Use tools with appropriate dust exhaust equipment.
-When total dust concentration is higher than occupational exposure limits (refer to local regulations), or when dust extraction is not available, use individual respiratory protective equipment.
-Collect dust with a vacuum cleaner or soak with water before sweeping up.

Storage: Store in dry, covered and frost proof area.

8. Exposure controls / Personal protection

When machining (drilling, cutting, sanding, etc.) boards, respect Occupational Exposure Limits for inhalable and respirable dust and for respirable quartz dust.
Check the latest Occupational Exposure Limits (OEL) for airborne contaminants that are applicable in your country.

Typical Occupational Exposure Limits (8hrs TWA) on the date of issue of this document are:

In mg/m ³	Fraction	COUNTRY (3)					
		AUS	CHN	HK	INDIA	MY	SG
Particles NOR (1)	Inhalable	10		10		10	10
	Respirable		4	4			5
Quartz (2)	Respirable	0.2	0.5	0.1		0.1	0.1

- (1) Particles NOR: particles not otherwise classified or regulated (nuisance dust).
Applies for all other components in the product.
(2) Quartz – CAS number: 14808 - 60 - 7
(3) Country abbreviations on basis of IANA (Internet Assigned Numbers Authority)

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Trade name: **PROMINA® 60**

Engineering controls:	Ensure vacuum dust exhaust with correct filter when using motorised machining tools.
Personal protection:	Avoid breathing dusts. Avoid eye and skin contact. Wear personal protective equipment appropriate to the task. (See below)
- Respiratory protection:	Use approved individual respirators (e.g. disposable P2 types) whenever occupational exposure levels are or can be foreseen to be exceeded.
- Eye protection:	Use safety glasses whenever tools are used and dusts are produced.
- Skin protection:	Use working clothes and gloves to protect against mechanical injury and direct skin contact.

9. Physical and chemical properties

Appearance:	Rigid self supporting board with smooth upper surface
Colour:	light beige or grey
Odour:	None

Important safety parameters:

Boiling point / boiling range:	N.A.
Melting point / melting range:	N.A.
Flash point:	N.A.
Flammability (solid, gaz):	N.A.
Flammability temperature:	N.A.
Auto-flammability:	N.A.
Explosive properties (danger and limits):	N.A.
Oxidizing properties:	N.A.
Vapour pressure:	N.A.
Relative density:	ca. 950kg/m ³
Solubility:	
- water solubility:	Insoluble
- fat solubility:	N.A.
pH value:	9
Partition coefficient (n-octanol/water):	N.A.
Viscosity:	N.A.

10. Stability and reactivity Nothing to report**11. Toxicological information**

Acute toxicity:	Calcium Silicates boards are not expected to have significant acute toxicity. Apart from mild skin, throat, airway or eye irritation, workers producing these boards have reported no significant health complaints.
	- As with most types of nuisance dust, excessive inhalation of dust may cause irritation of the airways. - Eye contact with dust may lead to transient eye irritation or inflammation. - Prolonged skin contact may lead to skin irritation.

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Trade name: **PROMINA® 60****Further information:**

Inhalation of excessive concentrations of quartz-containing dust can be hazardous for health. This risk will be minimal if correct working practices are observed and applied. (Refer to Section 8)

12. Ecological information

Nothing to report.

13. Disposal considerations**Product disposal:**

Handle as construction industry waste and dispose in accordance with local legislation.

Packaging disposal:

Dispose according to local legislation.

14. Transport information**Road transport:**

Product is not classified as dangerous.

Inland shipping transport:

Product is not classified as dangerous.

Sea shipping transport:

Product is not classified as dangerous.

Air transport:

Product is not classified as dangerous.

15. Regulatory information**Labelling according to EEC – Directives:**

The Product is a manufactured article, not a substance nor a preparation. Therefore the EU Directive on classification and labelling 67/548EEC is not applicable.

Danger indication: not applicable

Symbol: not applicable

R – sentence: not applicable

S – sentence: not applicable

16. Other information

The recommendations for use and installation of PROMINA® 60, of various fire protection systems, have to be followed as indicated in the Promat Handbook.

The health and safety information contained herein is believed to be accurate and correct based on our current knowledge at the date of issue and no liability can be accepted for any loss, injury or damage resulting from its use. It is intended as a guide for the safe handling, storage and use under normal conditions, but does not necessarily refer to the particular requirements of a customer when further advice should be obtained.

This data sheet and the information it contains is not intended to supersede any terms or conditions of sale and does not constitute a specification. Nothing contained herein is to be construed as a recommendation for use in violation of any patent or applicable laws or regulations.

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Hot Water Heating System

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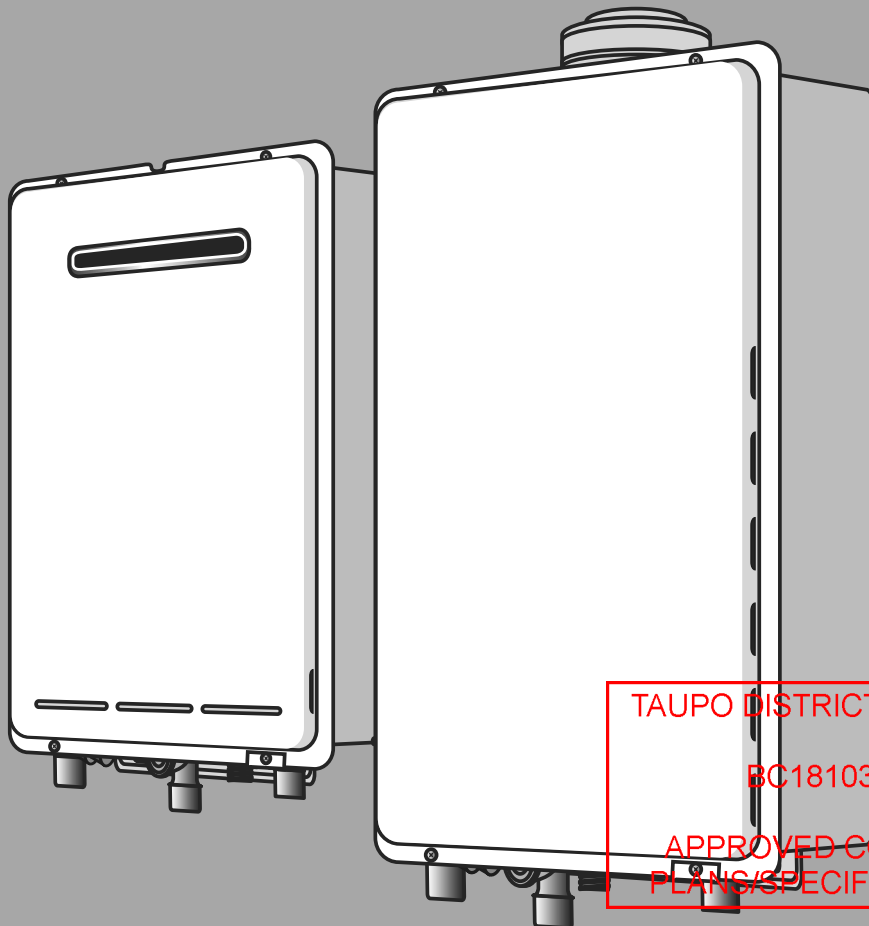
Rinnai

Installation guide

Continuous flow water heaters



Models: VT16-26, HD200, HDi200, HD250, EF24, EF250, EFi250



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Important:

This appliance must be installed in accordance with:

- Manufacturer's installation instructions
- Current AS/NZS3000, AS/NZS3500, AS/NZS 5601.1 and G12/AS1
- Local regulations and municipal building codes

For use with Natural Gas or Universal LPG as indicated on the appliance.

Not suitable as a spa or swimming pool heater.

Rinnai continuous flow internal water heaters ('i' models) must be installed with an approved Rinnai flue system.

Appliance must be installed, commissioned and serviced by an authorised person, being in New Zealand a licensed gasfitter, in accordance with these instructions and all applicable local rules and regulations.

Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624)

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Before installation

Check for damage

Unpack the appliance and flue components (if applicable) and check for damage. DO NOT install any damaged items.

Check components and gas type

Check all components have been supplied and that you have the correct gas type.

Read these instructions before starting

Read these instructions to get an overview of the steps required before starting the installation. Failure to follow these instructions could cause a malfunction of the appliance. This could result in serious injury and property damage.

Solar installations

For Rinnai continuous flow water heaters used in solar installations, refer 'Recommended Solar System Layout'.

EF models are heavy

The Rinnai Infinity EF models are 32 kg. Please use care when lifting and seek assistance if required.

Applicable models

These installation instructions apply to the following Rinnai continuous flow water heaters.

Rinnai Infinity VT16	External	REU-VR1620WG	Model number Note: The model number is written on the data plate on the left hand side of the appliance.
Rinnai Infinity VT20	External	REU-VR2024WG	
Rinnai Infinity VT24	External	REU-VR2426WG	
Rinnai Infinity VT26	External	REU-VR2626WG	
Rinnai Infinity HD200	External	REU-VRM2632WC	
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG	
Rinnai Infinity HD250	External	REU-VR3237WG	
Rinnai Infinity EF24	External	REU-K2430WG	
Rinnai Infinity EF250	External	REU-KM3237WD	
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD	

i = internal—these must be installed with an approved Rinnai flue system

For nominated gas consumption, gas pressures, and gas types please refer to the data plate on the left hand side of the appliance.

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Appliance location

Installation in environments free from corrosive compounds

Air surrounding the water heater, venting and vent termination(s) is used for combustion and must be free from compounds that cause corrosion of internal components. These include corrosive compounds that are found in aerosol sprays, detergents, bleaches, cleaning solvents, oil based paints/varnishes, and refrigerants. Therefore Rinnai recommends outdoor models be used for these locations where possible. The water heater, venting and vent termination(s) should not be installed in any areas where the air may contain these corrosive compounds. Chemicals that are corrosive in nature should not be stored or used near the water heater or vent termination.

Damage and repair due to corrosive compounds in the air is not covered by warranty.

If it is necessary for a water heater to be located in areas which may contain corrosive compounds, Rinnai strongly recommends the following:

Indoor (internal) water heaters

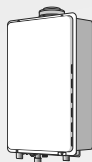
- DO NOT install in areas where contaminated air is present.
- Consider, before installation, where air has the ability to travel within the building.
- Where possible, install the heater in a sealed closet so that it is free of contaminated indoor air.

Outdoor (external) water heaters and vent terminations of indoor (internal) water heaters

- Install as far away as possible from exhaust vent hoods
- Install as far away as possible

from air inlet vents—corrosive fumes may be released through these vents when air is not being run through them

Internal models



Internal models are designed for indoor installations only. They may be installed in an enclosure if the requirements of

AS/NZS 5601.1 are satisfied.

An enclosure is defined as a compartment, enclosed area or partitioned off space primarily used for the installation of the appliance.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed in roof spaces or elevated structures, specific requirements apply. Refer to AS/NZS 5601.1 for details.

Catch pan



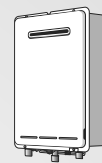
It is important that a suitably drained catch pan is fitted where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

This appliance **MUST** be used with the appropriate Rinnai flue system.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

Manufacturer's instructions for model REU-KM3237FFUD (EFi250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

External models



External models are designed for outdoor installations only. They must be located in an above ground open-air situation with natural ventilation, without stagnant areas, and where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

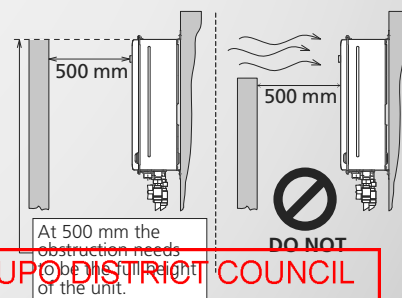
They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

Manufacturer's instructions for model REU-KM3237WD (EF250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

Horizontal obstructions

AS/NZS 5601 stipulates a minimum horizontal clearance of 500 mm between a building structure and obstruction facing the terminal. At 500 mm the obstruction needs to be the full height of the unit (as shown), and not a partial obstruction. A partial obstruction of less than 1 m could result in wind pushing flue gases back into the flue terminal.

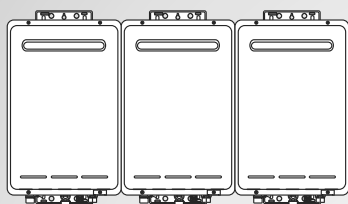


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When multiple units of the same model are installed on the same vertical face, with the flue terminals at the same height, they can be installed next to each other (as shown).



All models

This appliance must be placed as close as possible to the most frequently used hot water outlet or outlets to minimise the delay for hot water delivery.

For installations where the distance between the water heater and the outlets is considerable, a flow and return system can be used to minimise the waiting time for hot water delivery. Alternatively, multiple appliances can be strategically placed to serve different outlets. Contact Rinnai for further information.

An AC 230 V, 10 Amp, earthed power point must be provided adjacent to the appliance. For outdoor installations, this power point must be weatherproof. It must be clear of the gas and water connections to the appliance and also the flue exhaust and water pressure relief valve. The power cord of the appliance is 1.5 m long.

All appliances must be installed to ensure access can be gained without hazard or undue difficulty for inspection, repair, renewal or operational purposes. Sufficient clearances shall allow access to and removal of all serviceable components.

Appliances should not be mounted higher than 3.5 m above the ground or floor level unless the customer can arrange permanent and safe access or can provide another means of access such as scissor or boom lifts.

Clearances from combustible materials

The appliance can be mounted directly against the wall or structure. There is no need to use non-combustible sheeting or leave an air gap between the appliance back panel and the wall or structure for the purposes of meeting the temperature hazard requirements of AS/NZS 5601.

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General installation information

Catch pan

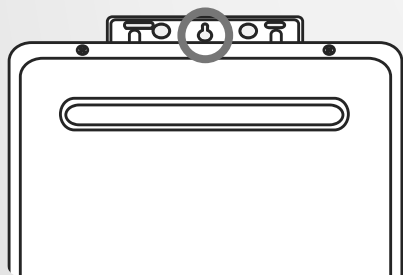
It is important a suitably drained catch pan is fitted (especially for internal units) where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

Mounting the appliance

Refer 'Connections and Fittings' for individual appliance weights. The wall or structure on which these units are to be mounted must be capable of supporting these weights and the associated pipe work.

Ensure suitable fixing screws or bolts are used to secure the units to the walls, in accordance with AS/NZS 5601.1. Wooden plugs shall not be used.

The top bracket has a keyhole slot (circled below) so the appliance can be positioned by hanging it on one screw while the other screws are secured.



Circuit diagrams

Refer to commissioning sheet supplied with the appliance (inside front cover of appliance).

Pipe sizing



Refer 'Connections and Fittings' for appliance gas consumption. If the gas pipe sizing is insufficient the customer will not get the full performance benefit. Gas pipe sizing must consider the gas input to this appliance as well as all the other gas appliances in the premises. The gas meter and regulator must be specified for this gas rate.

An approved sizing chart such as the one in AS/NZS 5601.1, or proprietary system manufacturer guide should be used.

Water pipe sizing and layout should be performed in accordance with AS/NZS 3500. All hot water pipe work should be insulated to optimise performance and energy efficiency.

Water supply



Refer 'Connections and Fittings' for applicable water pressures. Approved pressure limiting valves may be required if the stated maximum rated water supply pressures are exceeded. To achieve the rated flow, the stated minimum water supply pressures must be supplied. The water heaters will operate at lower pressures but will not achieve the rated flow.

Water chemistry and impurity limits are stated in our detailed warranty statement. Most metropolitan water supplies fall within these requirements. If you are unsure about the quality of the water, please contact Rinnai and we will provide you with the details of an authorised agency who are able to test your water for compliance to Rinnai standards. If sludge or foreign matter is present in the water supply, a suitable filter or strainer should be incorporated in the water supply to the water heater.

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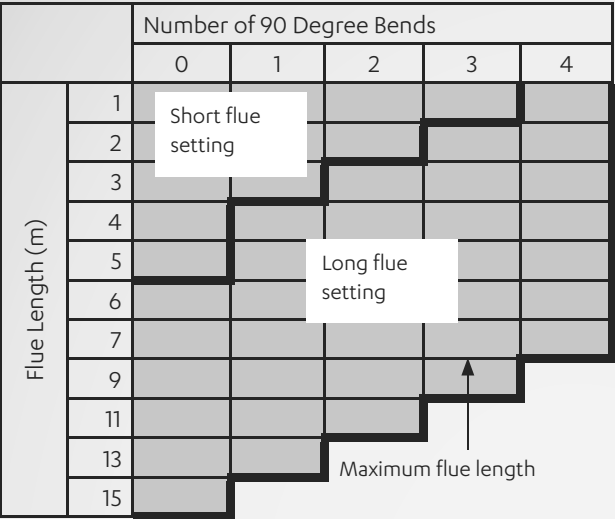
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Flued (internal) water heaters

This water heater must be fitted with the appropriate Rinnai flue system.

The chart below highlights the maximum flue length and number of bends. It also shows the difference between a short and long flue—this is important if changing settings (DIP switches).



Refer to separate Rinnai flue guide for further details.

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Water delivery temperature

Local regulations and/or requirements of AS/NZS3500.4 must be considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of these areas may be limited to 55 °C or less.

If the appliance is to deliver water primarily for the purposes of personal hygiene in an early childhood centre, school, nursing home or similar facility as defined in AS/NZS3500.4 a Temperature Limiting Device (TLD), such as a Tempering Valve may be required (even if the appliance is set to 55 °C or less). For these types of applications contact Rinnai.

Requirements for Rinnai continuous flow units installed without controllers

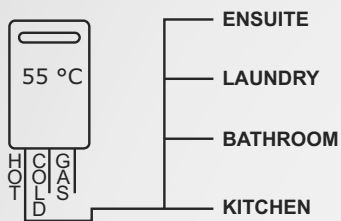


Diagram 1 - 55 °C Appliance

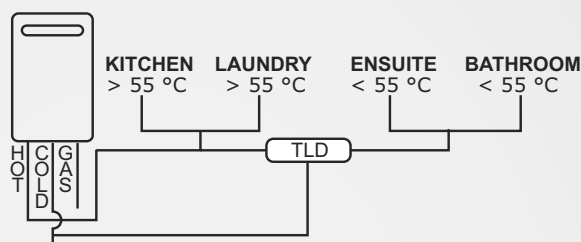


Diagram 2 - Not a 55 °C Appliance
(TLD = Temperature Limiting Device)

When the continuous flow unit is set to deliver water at a temperature higher than 55 °C, it will be necessary to fit a Temperature Limiting Device for delivery to areas used for the purposes of personal hygiene.

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Connections and fittings

Models	Gas consumption MJ/h	Water Supply kPa		Weight kg	Fittings			Condensate
		Min.	Max.		Hot	Cold	Gas	
VT16 external REU-VR1620WG	125	120	1000	15	R $\frac{1}{2}$ (15 mm)	R $\frac{1}{2}$ (15 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT20 external REU-VR2024WG	160	160	1000	16	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT24 external REU-VR2426WG	188	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT26 external REU-VR2626WG	199	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD200 external REU-VRM2632WC	199	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HDi200 internal REU-VR2632FFUG	195	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD250 external REU-VR3237WG	249	200	1000	29	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
EF24 external REU-K2430WG	162	240	1000	27	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EF250 external REU-KM3237WD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EFi250 internal REU-KM3237FFUD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)

Service connection points

These dimensions are NOT an indication of the pipe sizes required.

An approved full flow isolation valve and disconnection union **MUST** be fitted to the cold water inlet. A non-return valve is not required unless required by local regulations.

Isolation valves must be fitted so the appliance can be removed.

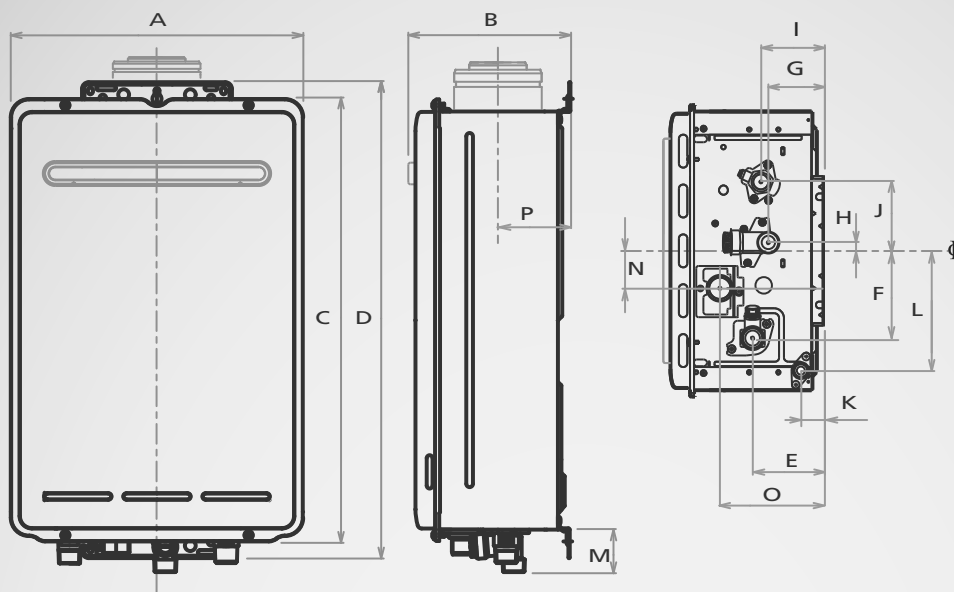
Purge gas and cold water supply lines to remove air and swarf before final connection of the appliance. Swarf in the gas or water supplies may cause damage.

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Dimensions: VT and HD models



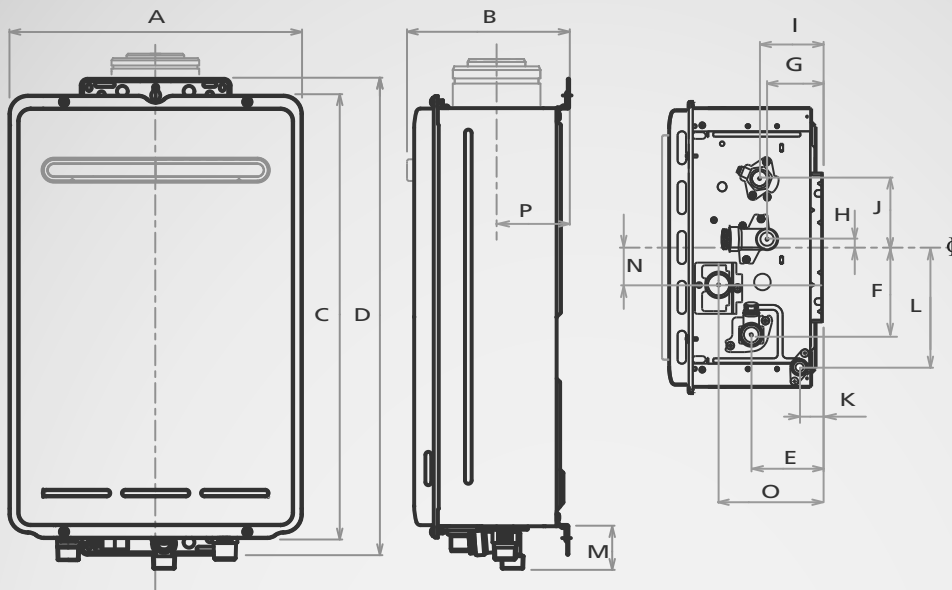
Dimensions table (mm)		VT16 external (REU-VR1620WG)	VT20 external (REU-VR2024WG)	VT24 external (REU-VR2426WG)	VT26 external (REU-VR2626WG)	HD200 external (REU-VRM2632WC)	HDi200 internal (REU-VR2632FFUG)	HD250 external (REU-VR3237WG)
A	Width	350	350	350	350	350	350	470
B	Depth	194	194	194	194	250	235~275	244
C	Height - unit	530	530	530	530	600	600	600
D	Height - including brackets	571	571	571	571	636	641	644
E	Hot water outlet (from wall)	87	87	87	87	95	91~131	115
F	Hot water outlet (from centre)	105	105	105	105	110	110	61
G	Cold water inlet (from wall)	68	68	68	68	74	70~110	99
H	Cold water inlet (from centre)	10	10	10	10	27*	27*	52
I	Gas connection (from wall)	77	77	77	77	103	99~139	61
J	Gas connection (from centre)	83	83	83	83	89	89	110
K	Condensate outlet (from wall)	-	-	-	-	-	-	-
L	Condensate outlet (from centre)	-	-	-	-	-	-	-
M	Gas: Length gas connection (from base)	40	40	40	40	41	41	41
	Cold: Length of cold water inlet (from base)	50	50	50	50	51	51	51
	Hot: Length of hot water outlet (from base)	39	39	39	39	42	42	42
N	Electrical connection (from centre)	45	45	45	45	21**	21**	21**
O	Electrical connection (from wall)	128	128	128	128	160	160~200	100
P	Flue spigot centre line (from wall)	-	-	-	-	-	95~135	-
* This measurement is to the left of the centre line								
** This measurement is to the right of the centre line								
HDi200, height of flue spigot from base of unit approx. 85 mm								

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Dimensions: EF models



Dimensions table (mm)		EF24 external (REU-K2430WG)	EF250 external (REU-KM3237WD)	EFi250 internal (REU-KM3237FFUD)
A	Width	350	470	470
B	Depth	277	283.1	257~307
C	Height - unit	600	654	654
D	Height - including brackets	644	721.6	721.6
E	Hot water outlet (from wall)	164.5	115	110~150
F	Hot water outlet (from centre)	100	100	100
G	Cold water inlet (from wall)	83	79.6	74.6~114.6
H	Cold water inlet (from centre)	53*	27.2	27.7
I	Gas connection (from wall)	70.5	104	99~139
J	Gas connection (from centre)	25	103.2	103.2
K	Condensate outlet (from wall)	33	137.6	132.6~172.6
L	Condensate outlet (from centre)	132	195	195
M	Gas: Length gas connection (from base)	51	40.2	40.2
	Cold: Length of cold water inlet (from base)	62	50.2	50.2
	Hot: Length of hot water outlet (from base)	41	41.2	41.2
	Condensate connection length (from base)	24	22.4	22.4
N	Electrical connection (from centre)	10**	49	49
O	Electrical connection (from wall)	175	200	139~179
P	Flue spigot centre line (from wall)	-	-	139~179

* This measurement is to the left of the centre line

** This measurement is to the right of the centre line

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EF250 models: Earthing the unit

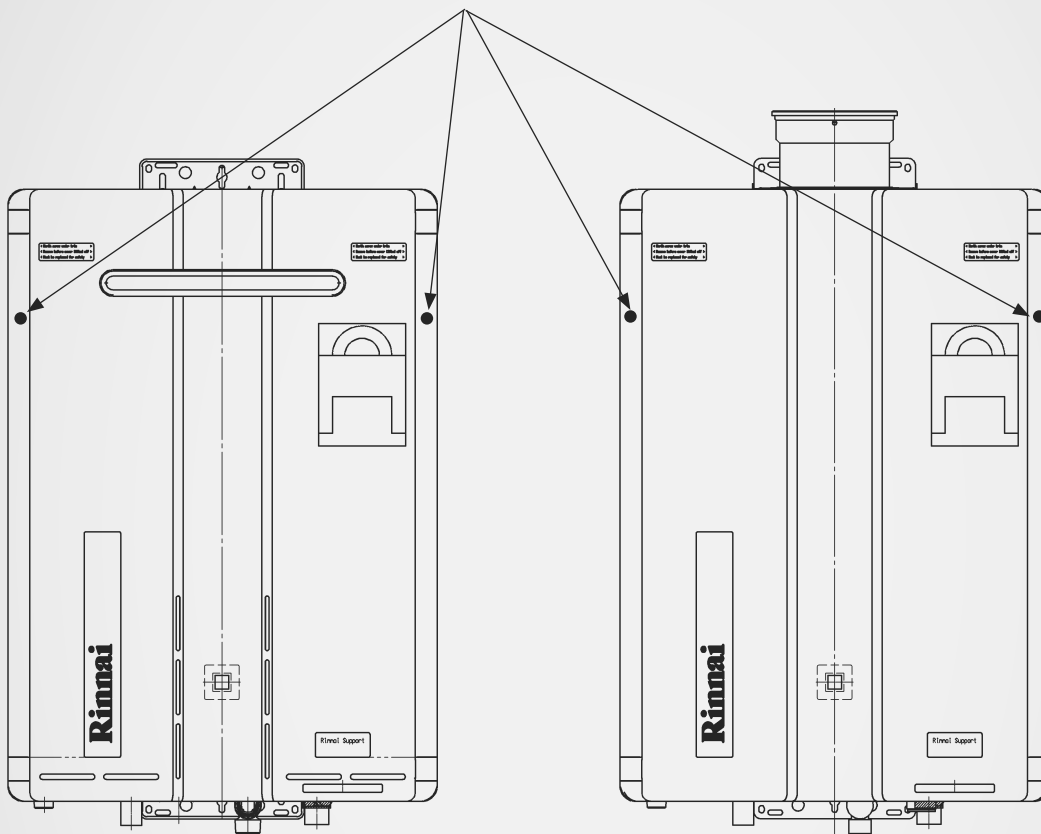
Removing the cover and earthing the unit

For the Rinnai condensing continuous flow water heaters (EF250 & EFi250), the earthing screws are located under the side trim, refer image below. First remove the trim and then the earthing screws before lifting off the cover.



For safe operation of the appliance the earthing screws **MUST** be replaced.

Earthing screws located under side trim



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EF models: Condensate drain

The Rinnai Infinity EF water heaters generate condensate continuously at a rate of up to five litres per hour as a by-product of a highly efficient gas burner. Condensate must be drained via a pipe to a suitable discharge point.

As condensate is a by-product of gas combustion it is mildly acidic. For this reason copper tube and fittings **MUST NOT** be used as it will corrode. Instead Rinnai recommend plastic pipes and fittings.

Important considerations for the condensate drain pipe

Content of AS3500.4.2003 section 5.12 'Temperature/Pressure Relief and Expansion Control Valve Drain Lines' has been used as a guide in preparing these considerations.

- A. Water heater drain outlet connection, ½ " (15 mm) BSP male.
- B. PE ½ "BSP (15 mm) female to barbed ignition system connector (13-19 mm) or equivalent plastic fitting.
- C. Drain pipe and fittings to match (B).
- D. Continuous fall of at least 2° from water heater to discharge point, length and bends in accordance with 'Maximum length and changes of direction greater than 45°'.
- E. Suitable points of discharge are deemed to be sewers or pits. **DO NOT** discharge onto electrical connections, earth stakes, copper pipes, concrete paths, or into a pond.

Maximum length and changes of direction greater than 45°

Length and changes of direction				
Max. length (m)	9	8	7	6
Max. changes of direction (> 45°)	3	4	5	6

Installation of a condensate drain

Point of discharge from each drain line shall be located so the release of condensate does not cause a nuisance, is readily discernible and incurs no risk of building damage. There shall be no tap, valve or other restrictions in any line. Each line shall fall continuously from the valve to the approved point of discharge.

Drain lines shall not discharge into a storage water heater safe tray. The end of the condensate drain line shall be:

- Not lower than 200 mm, or higher than 300 mm above an unpaved surface; or
- Not lower than 75 mm, or higher than 300 mm above a gravel pit, and not less than 100 mm in diameter in a paved surface.

Where discharging over a tundish or gully trap, drain lines shall have an air gap of a size at least twice the diameter of a drain line.

Joining of condensate drain lines

Condensate drain lines from multiple water heaters may be joined together provided they conform with the installation requirements stated on this page.

Common stack discharge

Where individual heaters are installed in a multistory building, the condensate drain lines may discharge into a common stack subject to the following:

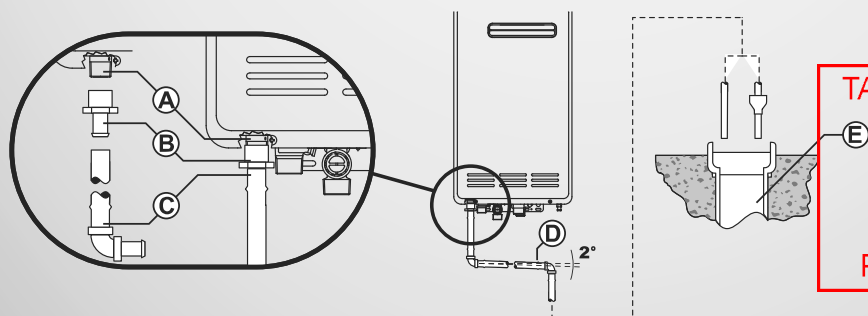
- Drained to a tundish having a discharge line that is not less than the common stack, directly connected to a fixture trap, and installed in a connection with any adjacent soil or waste stack.
- Discharge point of the common stack is readily visible and does not cause any nuisance.
- Common stack is vented by extending the pipe upwards, above the roof level.

Tundish drain lines

The drain line from any tundish shall be not less than DN 20 or less than one size larger than that of the largest drain line discharging into the tundish. Tundish drain lines shall comply with the installation requirements above.

Areas subject to freezing

In areas where water pipes are prone to freezing, the drain pipe from any valve shall be insulated and not exceed 300 mm in length. It shall discharge into a tundish through an air gap of not less than 50 mm and not exceed 150 mm measured from the outlet of the tundish to the rim of the tundish.



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Controllers - general information

Water controllers are available as an optional extra. Universal (Compact), Deluxe, and Wireless controllers can be used together.

Maximum number of controllers

A maximum of four water controllers can be fitted with the following limitations:

- Max. of one Kitchen Deluxe controller (MV-100V)
- Max. of two Bathroom Deluxe controllers (BC-100V)

Only one controller can be set to deliver 55 °C, this cannot be a Bathroom Deluxe controller.

This next section refers to wired controllers. For details on wireless controllers refer to separate instructions.

Important

Others manufacturers' controllers are not compatible with Rinnai Infinity continuous flow water heaters.

Installation of controllers

Do not install controllers:

- near a heat source such as, a cook top, stove or oven—heat, steam, smoke, or hot oil may cause damage
- in direct sunlight
- outdoors unless protection from dust ingress and sunlight are provided
- against a metal wall unless in accordance with AS3000

Positioning

Controllers must be installed in shaded and clean locations. They should be fitted out of reach of children (suggested height 1.5 m). The Compact and Bathroom Deluxe Controllers are water resistant, however, durability is improved when positioned outside the shower recess or at least 400 mm above the highest part of a sink, basin or bath.

Water controller cables

Water controllers operate at extra low voltage (12 Volts DC) which is supplied from the water heater. Controllers come with 15 m of electrical cable. The appliance end of the controller cables are fitted with spade terminals.

Extension cabling is available as an accessory from Rinnai. Alternatively, a two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used.

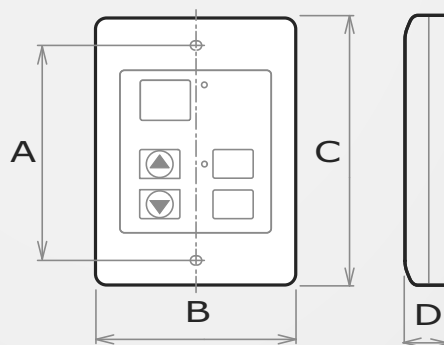
Maximum individual cable runs:

One controller	= 100 m
Two controllers	= 50 m*
Three plus controllers	= 20 m*

* per controller

Water controller cables are not polarity sensitive.

Dimensions



Dim.	Description	Compact (MC-91)	Kitchen Deluxe (MC-100V)	Bathroom Deluxe (BC-100V)
A	Distance between mounting holes	83	83	181
B	Width	90	128	105
C	Height	120	120	97
D	Depth	20	20	22

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Controllers - Universal (Compact)

Fitting the Universal (Compact) controller

1. Determine the most suitable position for the controller.
2. Drill three holes as shown (Fig. 1 and Fig. 2) for securing screws and one to provide cable access.

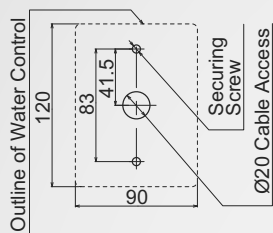


Fig.1

3. When running cable through the access hole ensure the connector and the end of the cable is located nearest to the controller (Fig. 2).

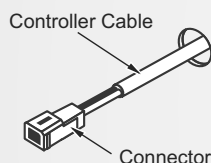


Fig.2

4. Carefully remove the face plate from the controller using the screwdriver (Fig. 3).

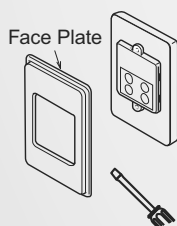


Fig.3

5. Fix the controller to the wall using appropriate fittings as shown (Fig. 4).

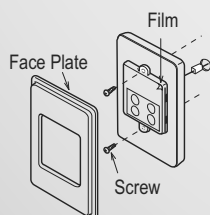


Fig.4

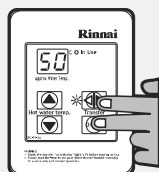
6. Remove protective plastic from the controller face as shown (Fig. 4) and replace the face plate.

Optional programming of the Universal controller

Step one

Are four controllers connected?
If NO—refer to step two. If YES, activate the fourth controller as follows.

1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).



2. Check display on all four controllers is displaying a temperature when switched on. If any controller displays two dashes, repeat above step.



Step two

1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).
2. When the controller fitted in the kitchen is switched on it will be possible to select temperatures higher than 50 °C (at this controller). If not repeat above step.

If the kitchen controller is swapped repeat the programming procedure.

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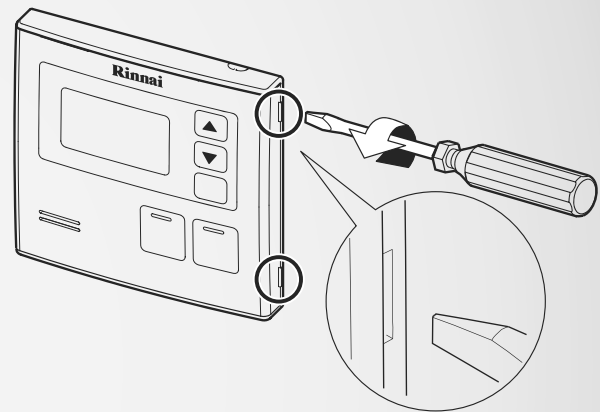
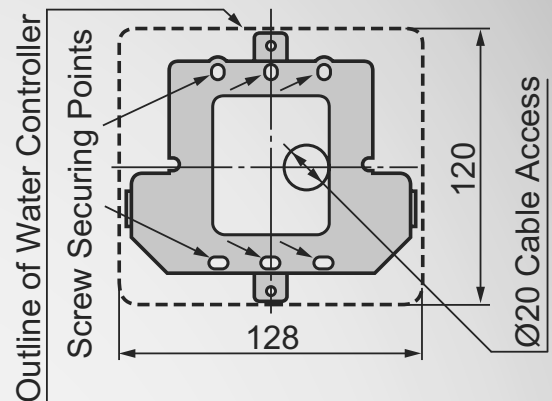
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Controllers - Kitchen Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Use the wall mounting bracket as a template to mark and drill three holes, locating the cable access hole as shown.
3. Fix the mounting bracket to the wall using the appropriate fixings.
4. Run the water controller cable through the hole in the wall.
5. Carefully remove the face plate from the controller using a screwdriver as shown.
6. Connect the controller cable to the kitchen water controller. At this point cables from other controllers (if fitted) may also be connected to the kitchen water terminals, eliminating the need for multiple cable runs directly to the water heater. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the water controllers.
7. Fasten water controllers to wall mounting bracket. Avoid the use of impact drills and over-tightening of fixings as this may damage the controllers.
8. Remove the protective plastic from the controller face and replace the face plate.



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Controllers - Bathroom Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Mark and drill three holes, locating the cable access hole as shown (Fig.1).
3. When running a cable through the access hole ensure the connector end of the cable is located nearest to the controller (Fig.2).
4. Affix the double sided self-adhesive seal to the back of the controller (Fig.3).
5. Carefully remove the face plate from the controller. Do this by placing your thumbs on the front digital display while hooking your fingers behind the top plate and gently push down as shown (Fig.4). Do not use a screwdriver as this may damage the controller.
6. Connect the cable to the bathroom controller. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the controller.
7. Fix bathroom controller to the wall using appropriate fixings. Avoid the use of impact drills and over-tightening of fixings as this may damage the controller.
8. Remove the protective plastic from the controller face and replace the face plate.

Outline of Water Controller

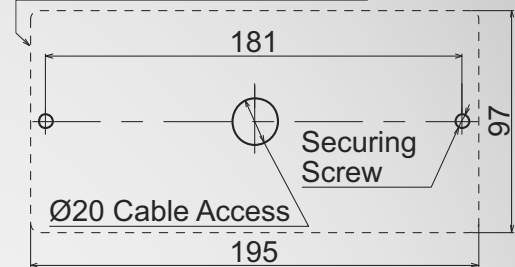


Fig.1

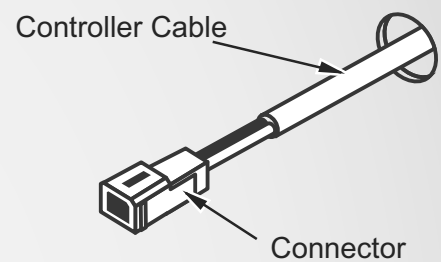


Fig.2

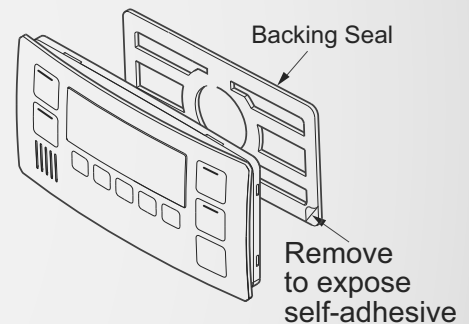


Fig.3

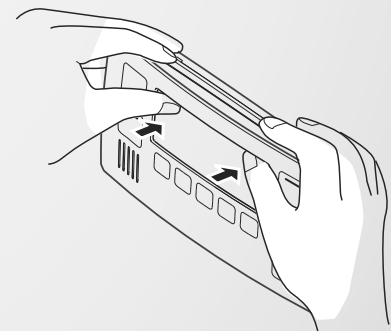


Fig.4

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Controllers - communication cables

Communication cables connect the water heater to the water controllers and operate at an extra low voltage (12 Volts DC) which is supplied from the water heater. Communication cables are supplied with the water controllers (15 m) and are fitted with spade terminals for connection to the water heater.

Up to two cables can be connected to the cable connector at the water heater. Extension cables are available from Rinnai. Alternatively two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used (refer maximum individual cable lengths on p. 15).



Do not attempt to connect cables to the cable connector at the water heater unless the electric power supply to the water heater is switched off otherwise damage to electrical components may occur.

To connect up to two cables to the cable connector

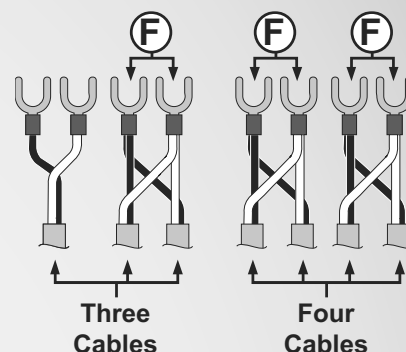
1. Turn off power supply and unplug water heater from the power point.
2. Remove retaining screw of the cable connector at the base of the appliance.

3. Swing the cable connector door open. Thread the cable through the weather seal of the cable access hole (B) in the direction shown allowing sufficient cable length so the cable sheath can be secured with the cable clamp (C) supplied with the transceiver.

4. Loosen screw terminals (D) and (E) and connect cable spade connectors to these terminals and re-tighten. Polarity is not important, either wire colour can be connected to either terminal.
5. Return the cable connector to the original position taking care not to damage cable wires in the process and replace the retaining screw.

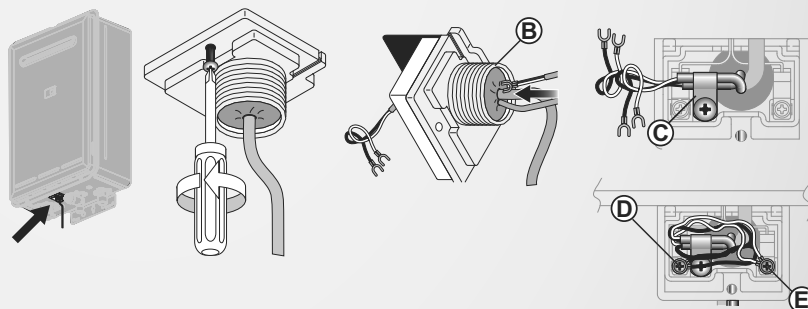
Connecting three to four controllers

1. Repeat steps 1-3 for connecting up to two controllers.
2. To connect three to four controllers, separate all the cables to be fitted into pairs. Cut off the existing spade connectors from each pair and re-terminate each pair into a new spade connector (F) so there are only two sets of spade connectors. Four spade connectors in total to be terminated.
3. Repeat steps 4 and 5 for connecting up to two controllers.

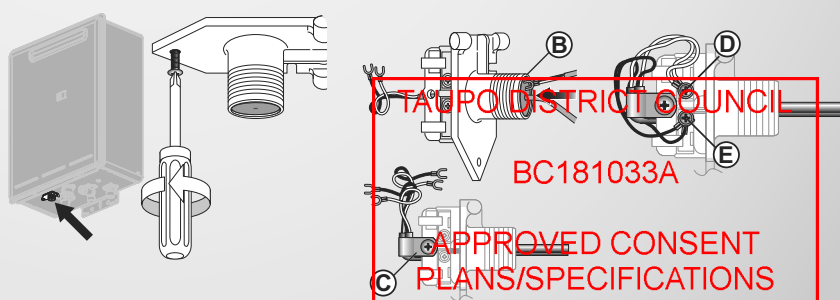


Spade connectors are available from your local electrical supplier.

Cable connector for VT26, VT24, VT20, and VT16



Cable connector for HD250, HD200, HDi200, and EF models



Commissioning



The appliance operation must be tested after installation. Ensure building occupants do not have access to the hot water outlets during this procedure.

Testing

1. Before final connection of the water heater, purge the gas and hot and cold water supply lines. Swarf in the gas or water supplies may cause damage.
2. Turn on the gas and water supplies and test for leaks (gas and water) near the unit.
3. Isolate gas supply. Remove test point screw located on the gas inlet and attach pressure gauge.
4. Turn the power on at the power point socket and turn on the gas.
5. If water controllers are fitted ensure they are on. Select the maximum delivery temperature and open all available hot water taps including the shower. If water controllers are not fitted, open all available hot water taps.
6. Operate all other gas appliances at their maximum gas rate.
7. With all gas appliances operating on maximum, the pressure should read between 1.0-3.5 kPa (NG) or 2.75-3.5 kPa (ULPG). If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the responsibility of the installer to check the gas meter, service regulator and pipe work for correct operation and sizing. The gas regulator on the appliance is electronically controlled and factory preset. Under

normal circumstances it does not need adjustment during installation.

8. Close all hot water outlets.
9. Inspect and clean the strainer located on the cold water inlet connection. This may need to be repeated to ensure the strainer remains clear, especially on new installations.
10. If water controllers are fitted, it is necessary to test their operation through the complete range of functions (refer operation guide).
11. Confirm hot water delivery temperatures using a thermometer. If controllers are fitted, ensure temperatures exceeding 55 °C cannot be selected on bathroom controllers.
12. After testing is completed, explain to the customer how to operate the water heater and water controllers (if fitted). Ensure your details are entered in the customer operation guide (Installer details).

Gas pressure setting

The gas regulator on the appliance is electronically controlled and factory preset. Under normal circumstances it does not need adjustment during installation. Make adjustments only if the unit is not operating correctly and all other causes for incorrect operation have been eliminated. Instructions for gas pressure setting are in the instruction pocket located inside the appliance front cover.

Commissioning checklist

Commission the unit in accordance with the Commissioning Checklist supplied with the appliance (inside front cover of appliance). Ensure you leave the completed checklist with the customer.

If the appliance can not be adjusted to perform correctly call 0800 RINNAI (0800 746 624) for assistance.

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Recommended solar system layout

Rinnai continuous flow water heaters configured for solar systems produce hot water at 75 °C and are not suitable for use with water controllers. The household water supply **MUST** be protected by a suitable tempering valve.

Installation

Rinnai continuous flow water heaters in solar installations are only suitable as gas boosters in solar hot water systems. These models produce water at higher than normal temperatures and must be connected to the hot water supply by use of a suitable tempering valve.

Install a Rinnai continuous flow water heater using a flow diversion valve as shown. Remember 'B to Boiler' when setting up the flow diversion valve.

The water heater must be set to 75 °C (refer dip switch settings on following pages).

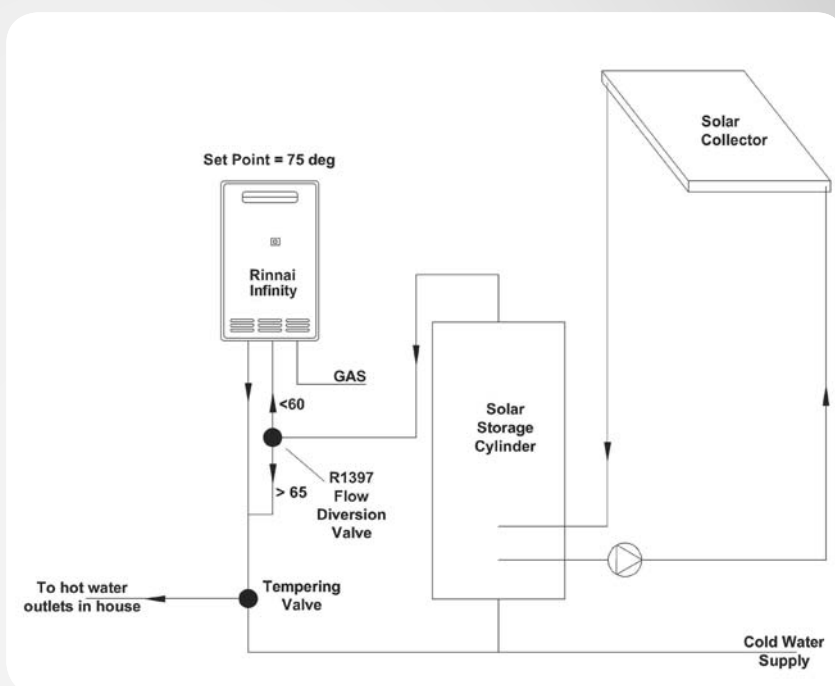
Rinnai water controllers cannot be used with Rinnai Infinity solar units as the hot water does not always pass through the Rinnai Infinity, and the Rinnai Infinity dip switch setting of 75 °C is unable to be adjusted.

System configuration to protect for Legionella

If the system is configured according to the details above it will meet the requirements of the Acceptable Solution G12/AS2 for protection against Legionella. Section 3.5.2 states:

b) the instantaneous water heater must heat all water passing through it to not less than 70 °C.

Recommended system layout using a Rinnai Continuous Flow water Heater and Flow Diversion Valve



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DIP switch settings

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DIP switch settings - important

DIP switch settings must only be changed by a licensed gasfitter. They have been provided as there may be a requirement to change the temperature of the water delivered from the water heater.



Care must be taken when changing the temperature settings as the DIP switches are small and can be easily switched or bumped into the wrong position. Please use this information carefully and fully check the operation of the water heater before leaving site including the temperature of the water delivered.

The cover of the water heater will need to be removed to carry out this operation. As this will expose live mains voltage wiring **please disconnect the power supply before removing the front cover.**

We wish to draw your attention to the requirements of the New Zealand Building Code and compliance document G12. This requires that water delivered to sanitary fixtures be no more than 55 °C. Increasing the water heater set temperature will therefore require that you protect all sanitary fixtures to which the appliance is plumbed with suitable tempering valves or similar.

Rinnai will accept no liability for issues arising out of the use of this DIP switch information.

If you have any doubts about the performance of the water heater please contact Rinnai by phoning 0800 TO RINNAI (0800 86 746 624).

The setting of water temperatures in domestic model Infinity units (white cases) to greater than 55 °C (with the exception of units set to 75 °C in domestic solar installations) will reduce the warranty period. Refer to warranty

information in the Operation Guide for further information.

The following pages detail DIP switch settings for the specific Rinnai continuous flow water heaters listed. They ARE NOT applicable for older models.

Legend for DIP switch settings (black indicates position of switch)



Short and long flues

Reference to what is a short and long flue can be found on page 8.

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DIP switch settings



Applicable models and REU numbers

Rinnai Infinity VT16	External	REU-VR1620WG
Rinnai Infinity VT20	External	REU-VR2024WG
Rinnai Infinity VT24	External	REU-VR2426WG
Rinnai Infinity VT26	External	REU-VR2626WG
Rinnai Infinity EF24	External	REU-K2430WG

DIP switch 1: Upper SW (8P)

SW No.	Note						
1		Off					
2	Fixed temperature (with controllers)	Off	Fixed temperature	On	With controllers		
3	Temperature settings	See Chart A					
4							
5							
6		Off					
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.
8		Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	not to be used	40	40
On	On	On	not to be used	55	75

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	ULPG	On	NG
2,3,4	Model settings	See Chart B			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	VT26 (VR2626WG) and EF24 (K2430WG)
Off	On	Off	VT24 (VR2426WG)
Off	Off	On	VT20 (VR2024WG)
Off	On	On	VT16 (VR1620WG)

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DIP switch settings



Applicable models and REU numbers

Rinnai Infinity HD200	External	REU-VRM2632WC
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG
Rinnai Infinity HD250	External	REU-VR3237WG

DIP switch 1: Upper SW (8P)

SW No.	Note							
1	HDi200	Flue setting	Off	Long flue (p. 8)			On	Short flue (p. 8)
	HD200, HD250	Model setting	Off					
2	Fixed temperature (with controllers)		Off	Fixed temperature			On	With controllers
3	Temperature settings		See Chart A					
4								
5								
6			Off					
7	Gas pressure		Off	Normal	On	Forced min.	On	Forced max.
8			Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	85, 95 ¹	40	40
On	On	On	85	55	75

¹ 95 °C setting only available for HD250 model

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	ULPG	On	NG
2,3,4	Model settings	See Chart B			
5,6	Not in use	Off			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	HD250 (VR3237WG)
Off	Off	On	HD200 (VRM2632WC)
Off	On	On	HDi200 (VR2632FFUG)

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DIP switch settings



Applicable models and REU numbers

Rinnai Infinity EF250	External	REU-KM3237WD
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD

DIP switch 1: Upper SW (8P)

SW No.	Note						
1	Flue settings	Off	EF250 Ext & EFi250 Int long flue (p. 8)			On	EFi250 Internal short flue (p. 8)
2	Fixed temperature (with controllers)	Off	Fixed temperature			On	With controllers
3	Temperature settings	See Chart A					
4							
5							
6	Not in use	Factory setting is 'Off'					
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.
8		Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	95	40	40
On	On	On	85	55	75

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type settings	Off	ULPG	On	NG
2		Off		Off	
3	Type settings	Off	External	Off	Internal
4		Off		On	
5	Automatic return	Off	Inactive	On	Active
6	External device	Off	S-BMS	On	AH

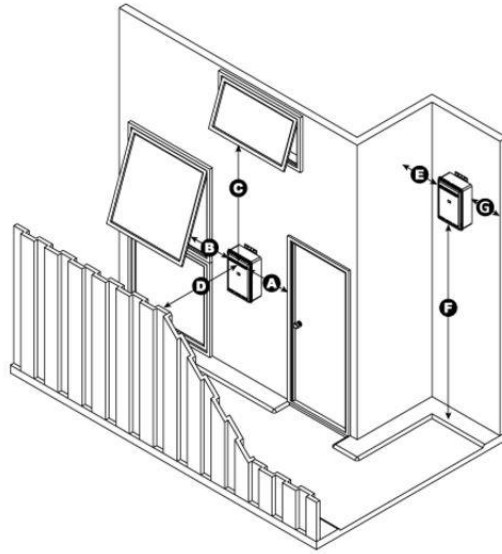
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General clearances

The following diagram has been provided to assist you in determining where (and if) an external continuous flow water heater can be positioned. If in doubt, prior to purchase, consult a licensed gasfitter.



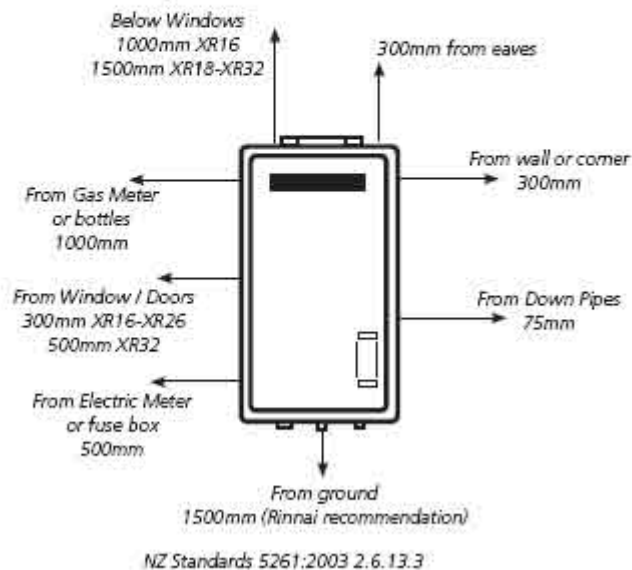
Dimension	Infinity VT models Infinity HD200 models Infinity EF models	Infinity HD250 models
A	Min. 300 mm	Min. 500 mm
B	Min. 300 mm	Min. 500 mm
C	Min. 1.5 m	Min. 1.5 m
D	Min. 500 mm	Min. 500 mm
E	Min. 300 mm	Min. 300 mm
F	Min. 300 mm*	Min. 300 mm*
G	Min. 300 mm	Min. 300 mm

Clearance below eaves, balconies, and other projections, for all models is 300 mm.

* Rinnai recommend 1.5 m to give enough clearance for the pipe work, and to safely expel flue gases.

Installation Clearances

External Model diagram



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Waterproofing Systems

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Technical Data Sheet

Dampfix Gold

Water Based Polyurethane Liquid Waterproofing Membrane

DESCRIPTION

One part, highly elastic, Class 3, water-based polyurethane waterproofing membrane system that meets the requirements of AS3740 by complying with AS/NZ 4858.

This Technical Data Sheet may be revised, as appropriate, to comply with changes to relevant Australian and New Zealand Standards, reflect changes in Industry best practice in waterproofing procedures or include improvements to current technologies.

The Applicator is advised to reference the latest Technical Data Sheet issue, before commencing application, by visiting www.bostik.co.nz and following the Technical Data sheet links or by contacting Bostik Customer Service on 0508 222 272.

The **Bostik Dampfix Gold** waterproofing membrane system is specifically formulated for application on graded substrates that provide positive falls to drainage outlets. Overlaying tiling systems must comply with Guide to the Installation of Ceramic Tiles - AS3958.1).

This is a 2-coat system applied over primed porous & non-porous substrates. It is not recommended as a membrane system in immersed applications (such as pools or spas)



FEATURES

- ✓ Class 3, high elasticity.
- ✓ Fast drying.
- ✓ Recoat in 2 hours @ 20° C & 50% RH
- ✓ Early access for following trades.
- ✓ Tile next day in most conditions.
- ✓ May be tiled directly onto with approved ASA adhesives
- ✓ Reinforced with clump free fibres.
- ✓ No mixing.
- ✓ High resistance to detergents & bleach.
- ✓ Will not re-emulsify after curing.
- ✓ Does not embrittle with age.
- ✓ Excellent adhesion to concrete; rendered masonry; wet area plasterboard; FC sheet & plywood.
- ✓ Can be applied to damp substrates, i.e. no free water
- ✓ Brush, roller or trowel applied.
- ✓ Flood Test in 72 hours.

RECOMMENDED USES

- ✓ As a waterproofing membrane to internal wet area shower, bathroom, kitchen, laundry & toilet areas to AS/NZ 3740.
- ✓ As a waterproofing membrane to external balconies, rooftops & podium levels to AS/NZ 4654.2.
- ✓ All applications to be covered by tile or other surface wearing and protective systems by following trades.
- ✓ Suitable for concrete; cement rendered masonry; FC sheeting; water resistant plasterboard; and structural plywood (Type A Stamped "APPROVED CONSSENT TO AS/NZS 2269-2004) substrates.

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Dampfix Gold

APPLICATION INSTRUCTIONS

IMPORTANT NOTES

- The following instruction steps as detailed in this Technical Data Sheet may not be applicable in every application. They are provided as a guide to meet the requirements of AS/NZ3740 and AS/NZ4654.2.
- It is recommended that the installation should be carried out by a Bostik ASA trained Dampfix waterproofing course applicator.
- Bostik Technical Division must approve any modification or variances to this technical data sheet in writing followed by the issuance of an amended Technical Data Sheet.
- Wherever appropriate, the application must comply with AS/NZ 3740 'Waterproofing of Internal Wet Areas in residential buildings' & AS/NZ 4654.2 "Waterproofing membrane systems for exterior use – Above ground level".
- This product is specially formulated for brush, roller or trowel application to both small and large areas.
- A wet film gauge must be used regularly to ensure that minimum wet film builds are achieved for each coat.
- All vertical terminations, including perimeter walls, hobs and penetrations etc. must be of adequate height to satisfy AS/NZ 3740 for internal applications & AS/NZ 4654.2 for external applications.
- The minimum film build requirements are identical for horizontal applications and must be applied without slump or deformation when cured.
- Apply bond breaker joint to all horizontal/vertical junctions, e.g. wall/floor, wall/wall, hob/ floor, hob/wall & shower set downs etc., prior to all membrane applications (see note on suitable sealants).
- Allow 72 hours before flood testing the installed **Dampfix Gold** system.

Suitable Sealants

ASA silicones or Bostik Industrial Silicone are suitable sealants for use as bond breakers.

Correct bond breaker selection and installation is vital to overall membrane performance. Using an unsuitable sealant can increase the risk of failure and must be avoided. **Contact Bostik for advice if unsure or if considering products not listed above.**

SUBSTRATE PREPARATION

- Read precautions prior to applying any component of the waterproofing system.
- Commencement of membrane system installation shall be taken as acceptance of the substrate suitability and preparation by the applicator.
- Check that the surface of all substrates to be coated are: structurally sound, clean, dry or damp with no free surface water, smooth and free of voids & protrusions, oils, grease, curing compounds, coatings, adhesive residues and are uncontaminated by preceding trade activities.
- Check that all composite substrates, such as wall & floor sheets are fully supported and installed to the manufacturer's instructions.
- Where platform floor sheeting, in particular particleboard, is installed check manufacturer's specification for suitability in wet area applications and ensure that protective coatings do not impair membrane adhesion.
- New concrete and render must have cured for a minimum 28 days.
- Sand & cement screeds and polymer modified renders must have cured for a minimum 7 days.
- Substrates that are not smooth or free of voids and protrusions must be ground and vacuumed clean. All remaining voids must be repaired using, **Bostik UL-Ultrafine**, making sure to follow instructions for preparation, application and curing time. Refer to **Bostik UL-Ultrafine** Technical Data Sheet
- **Bostik Multiprime** must be applied as a primer coat on all applications to porous substrates, e.g. concrete, screeds, renders. Refer **Bostik Multiprime** Technical Data Sheet.
- **Bostik N40** primer must be applied using "2 cloth method" on all applications to dry rigid plastic & metallic non-porous substrates, e.g., UPVC drainage outlets and penetrations, aluminium angle water stops, brass, copper and galvanised penetrations, stainless steel drains and gutters etc. Refer **Bostik N40** Technical Data Sheet.
- 2 coats of **Bostik Moisture Seal** must be used to seal concrete slabs subject to a hydrostatic head of pressure from the negative side. **Bostik Moisture Seal** must be clean, dry and smooth immediately prior to the application of **Bostik Dampfix Gold**. Refer **Bostik Moisture Seal** Technical Data Sheet.



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Dampfix Gold

- Membranes should not be applied until all preparation steps have been completed.
- **Dampfix Gold** is not recommended for use in swimming pools, ponds or spas.

CRACKS & JOINT SEALING

CONCRETE & MASONRY SUBSTRATES

- Static cracks up to 2mm in width, i.e. cracks that do not move or continue to propagate, must be filled with **Bostik Dampfix Gold** or **Bostik UL-Ultrafine** after substrate priming and prior to the first full coat of **Bostik Dampfix Gold**.
- Static cracks greater than 2mm and less than 4 mm in width, i.e., cracks that do not move or continue to propagate, must be filled with **Bostik UL-Ultrafine** after substrate priming and prior to the first full coat of membrane.
- Cracks greater than 2mm that are subject to movement or propagation must be referred to the builder or engineer for structural assessment and method of rectification to perform as an expansion joint.
- Expansion joints must be a minimum 6mm in width and require a backer rod installed prior to the installation of a suitable sealant (see note on page 2) at a width: depth ratio of 2:1. See "Expansion Joints" below.

FLOOR & WALL SHEET JOINS

- All floor and wall sheets must be installed to sheet manufacturer's specification and primed with **Bostik Multiprime**.
- Internal or external sheet floor systems, suitable for wet area applications, require sealant application to seal sheet joints at the time of installation to comply with manufacturer's instructions. The Waterproofer must confirm that the sealant used is compatible with all **Bostik Dampfix Gold membrane** system components.
- Floor sheet joints that use Polyurethane sealants at installation must have cured for a minimum 7 days prior to the application of the membrane.
- All sheet joints must be isolated from the membrane by a min 25mm wide bond breaker tape that covers the entire width & length of the sheet joint.
- As floor sheet joints are more prone to movement over joist supports, apply an extra 1000-micron (1.0 mm) wet coat of **Bostik Dampfix Gold** extending a minimum 35mm either side of the bond breaker tape. A further 2 full coats, at 1000 microns each, must be applied to the remaining area to be waterproofed.

EXPANSION JOINTS

- All expansion joints must be isolated from the membrane by a minimum 25mm wide bond breaker tape that covers the entire width & length of the joint.
- An extra 1000-micron (1.0 mm) wet coat of membrane extending a minimum 35mm either side of the bond breaker tape must be applied as an extra coat. A further 2 full coats, at 1000 microns wet coat each, is required to the remaining area to be waterproofed.

PRIMING

POROUS SUBSTRATE

- A porous or absorbent substrate will allow a bead of water to easily soak into, and wet out, the surface of the substrate.
- To avoid pin holing **Bostik Multiprime** must be stirred and not shaken if colour separation is evident. Colour separation will not affect the performance of **Bostik Multiprime**.
- **Bostik Multiprime** must be applied as a primer coat on all **Bostik Dampfix Gold** applications to porous substrates.
- Refer **Bostik Multiprime** Technical Data Sheet.

NON-POROUS SUBSTRATE

- A non-porous or impervious substrate will cause a bead of water to be retained on the surface of the substrate as a raised droplet. The droplet does not easily soak into the surface of the substrate.
- **Concrete that is overworked or burnished** at the time of placement can present, when cured, as a non-porous substrate that will not easily absorb a bead of water. Mechanical abrasion, such as captive



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Dampfix Gold

shot blasting or vacuumed grinding is required to open substrate pores prior to the application of **Multiprime** primer.

- **Rigid plastic and metallic substrates** require **Bostik N40** primer applied using the “2 cloth method” e.g., uPVC drainage outlets & penetrations, aluminium angle water stops, brass, copper or galvanised penetrations, stainless steel drains & gutters etc. Refer **Bostik N40** Technical Data Sheet.
- **“Two Cloth Method”** -
 - o Dampen a clean & dry cloth with N40 primer and spread evenly over the non-porous substrate using a cleaning/rubbing action.
 - o With a second clean & dry cloth, immediately wipe all primer residues off with a buffing action.
 - o Allow the substrate to dry for a minimum of 5 minutes before installing a suitable sealant (see note on page 2) and/or **Bostik Dampfix Gold** membrane.
 - o Do not leave the primer longer than 4 hours before applying sealant/membrane.
 - o Re-prime if 4 hours has elapsed without applying sealant/membrane.
 - o Clean & Re-prime if the primed surface is contaminated with excavation spoil, water, condensation, dust or other contaminants before sealant or membrane can be applied.

NB: For pre-treated surfaces, contact Bostik Technical Division for P.A.T.S. Service.

APPLICATION

MOIST OR DAMP SURFACES

- Membrane must be applied to a primed substrate.
- **Multiprime** can be applied to damp porous substrates, i.e. with no free water on the surface.
- **N40 Primer** must **not** be applied to a damp non-porous substrate.
- **Multiprime** must be used as a primer coat to porous substrates, e.g., concrete, renders, FC sheet, water resistant plasterboard & external grade plywood.
- **Dampfix Gold** is not a vapour barrier and is not designed to stop a negative hydrostatic head of pressure. Where a substrate is subject to a hydrostatic head of pressure from the negative side **Moisture Seal** must be applied and allowed to fully cure before the application of **Dampfix Gold** system. Refer **Moisture Seal** Technical Data Sheet.

BOND BREAKER & MEMBRANE INSTALLATION

- Internal wet area installation must comply with the minimum requirements of AS/NZ3740 Section 3, “Installation”. As a guide, refer pages 12 to 33.
- External wet area installation must comply with the minimum requirements of AS/NZ4654.2, Section 2, “Design and Installation”. As a guide, refer pages 7 to 30.
- When installing bond breakers only use sealants that have been approved for use in writing by Bostik. See the note on suitable sealants on pg 2 for more details or if unsure, contact Bostik before work commences.
- Bond breaker is to be installed over the dry primer coat where a bond breaker joint is required, e.g. to internal corners and changes in direction of substrate plane, such as wall/floor; wall/wall; hob/wall junctions, pipe penetrations, tap bodies, water stops, drainage outlets or similar.
- Bond breaker joints must be a minimum 12mm x 12mm coved bead of sealant applied by caulking gun continuously into all changes of substrate plane, such as, wall/floor, hob/floor, hob/wall and wall/wall corners to the minimum termination height required by AS/NZ3740 or AS/NZ4654.2 as applicable.
- The sealant must bridge all gaps and holes with a minimum 6mm contact onto the adjacent substrates.
- All bond breaker joint sealant profiles must be a minimum 6mm in depth at the mid point of the joint.
- Substrate gaps at drainage outlets, flashings, and water stops, nail/screw holes etc must also be sealed using sealant prior to membrane application.
- Applied, sealant must be spatula tooled smooth around fittings and at all changes of substrate plane to a minimum 12mm x 12mm coved joint. The sealant must be a minimum 6mm in depth at the mid point of the bond breaker joint and extend a minimum 6mm on either side of the joint or gap.
- Apply membrane as soon as the bond breaker joint can be over coated without deformation of the coved sealant profile.

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APPLICATION OF THE MEMBRANE

- Can be applied using a brush, roller or trowel.
- Should not be applied in excess of 2mm thick per coat.
- This is a 2-coat system.
- The 2nd coat should be applied perpendicular to the 1st coat.
- Each coat must be applied at a uniform minimum 1000 microns in thickness to achieve a total wet film thickness of 2.0mm.
- A wet film gauge should be used to regulate adequate membrane coverage during application of each coat. **(Refer table on page 5.)**
- As a further guide a 15Lt pail, applied at 1.0 litre/m² (1000 microns) will cover approx. 15m² per coat.
- A 15Lt pail will cover approx. 7.5m² in 2 coats.

MEMBRANE PROTECTION

- Membrane should be protected throughout the application process and during the initial 24-hour cure period by the placement of signs and barriers to deny access by following trades.
- Further temporary protection sheets must be installed securely, to protect the cured dry film from damage by following trades, until a protective screed or finished floor system is installed.

MEMBRANE RECOATING AND/OR REPAIR

RECOATING

- The surface must be cleaned free of all tile adhesive residue, surface dust and any form of contamination or substrate irregularity.
- The surface of membrane must be washed down with diluted **Bostik Sugar Soap**, thoroughly rinsed and allowed to dry.

REPAIRING

- The adjacent **Dampfix Gold** membrane must be sound with minimum dry film thickness of 1.2mm that is fully adhered to the substrate.
- Membrane must be thoroughly cleaned of all foreign material and left free of all cleaning agent residue, dust or contamination.
- Ensure that any exposed porous and non-porous substrates are correctly prepared, primed and sealed.
- Apply 2 coats of membrane as per "Coverage" instructions.
- Ensure that the membrane repair overlaps the existing membrane by a minimum 100mm.
- A consistent minimum 1.2mm dry film thickness is required over both previously coated and uncoated repair areas. **(Refer "Coverage" table below)**

COVERAGE

- **Bostik Dampfix Gold** is a min 2-coat system
- Each coat must be applied at 1.0 litre / m² or 1000-microns (1.0mm) thick resulting in a total wet film thickness of 2.0mm after 2 coats.
- A minimum of 2 hours should be allowed between coats.
- The 2nd coat should be applied perpendicular to the 1st coat.
- Extra coats may be applied if required at the same rate of 1000 microns (1mm thick) per coat.
- Do not thin with water or add fillers.
- The regular use of a wet film gauge during application is recommended to ensure correct wet film build per coat.
- The dry film thickness, after 2 coats should be a minimum of 1200-microns (1.2mm thick).

- Each 15Lt pail will cover depending on substrate conditions:
 - o 15m² / coat.
 - o 7.5 m² / 2 coats.

Application	Wet Film Thickness	Dry Film Thickness
1 st Coat	1000 microns (1.0mm)	600 microns (0.6mm)
2 nd Coat	1000 microns (1.0mm)	600 microns (0.6mm)
Total Film Thickness after 2 coats	2000 microns (2.0mm)	1200 microns (1.2mm)

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Dampfix Gold

PRECAUTIONS

- **Must not** be installed directly on wet, contaminated, or friable substrates.
- Minimum dry film thickness after 2 coats is 1.2mm
- Regular checks with a wet film gauge during the application of each coat are advised.
- Do not apply any component of the system when air or substrate temperatures are below 5° C.
- Cold damp conditions will adversely effect application properties and slow rate of curing.
- Do not apply Bostik Dampfix Gold when air and substrate temperature is greater than 35°C or below 5°C .
- Membrane should not be used as an exposed finish or as top coating exterior membrane.
- When used in areas subject to ambient conditions below freezing special installation precautions must be taken. Contact Bostik for advice before commencing work.
- All 4654.1 **external** membrane applications covered with a reinforced tile bed or screed must be separated from the membrane by a minimum one layer of 200um plastic sheet as a separation layer in accordance with AS3958.1 - 3.3.2.3.
- The installation of protection board and ballast, such as river pebbles or similar loose laid unbound coverings, must be isolated from the membrane by a compatible drainage cell and filter fabric system.
- Must not be applied directly over lightweight concrete.
- Hobs constructed of autoclaved aerated blocks, e.g. Hebel, must be saturated with 2 coats of Multiprime to consolidate and seal the substrate. This is to prevent pin holing of the membrane and provide enough strength to support tiling of the hob.
- Autoclaved aerated block walls must be rendered prior to the application of the waterproofing system.
- Should not be used in constantly submerged applications such as swimming pools, ponds & spas.
- Not designed to withstand negative side substrate head of pressure.
- Use only suitable sealants (see note on page 2). Incorrect sealants will significantly increase the risk of failure.
- Any intended application of membrane outside of recommended installation should be referred to Bostik Technical Services for approval.
- Protect contents of pail from excessive heat, and freeze/thaw prior to use.
- Contact Bostik prior to work commencing if there is any uncertainty regarding suitability, installation or any other matters related to the system (including bond breakers).

BOSTIK CO-OPERATIVE TEST PROGRAM

Bostik offers a service in which a programme has been established to eliminate potential field problems by pre-testing Bostik membranes with samples of the building materials to which the membrane will be applied. This service is available on large projects where pre-application testing will aid in determining the proper method to achieve optimum adhesion. Consult a Bostik representative for further information

PAINTABILITY

Bostik Dampfix Gold is paintable. Refer paint supplier recommendations.

PROPERTIES

Colour	Gold or Grey
Appearance	Smooth, brush/roller grade paste
Shore "A" Hardness	Approx 60
Elongation	>900%
Minimum Dry Film Thickness	1.2mm
2mm Crack Bridging	Pass
Volume Solids	Approx 60%
Packaging	15L & 4L pails

Tensile Strength	1.5 – 2.0 MPa
Dry Time per coat	2 hours @ 25°C & 50% RH (min 2 coats)
Dry time following Trades	24 hours @ 25°C & 50% RH
SG	Approx 1.3
Minimum Wet Film	1.0mm / coat
Membrane Rating	Class 1
Moisture Vapour Transmission Rate	1.24 grams / m ² / 24hours
Flammability	Not Flammable



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Dampfix Gold

Complies with AS3740 by meeting all requirements of AS/NZ4858
Wet Area Membranes

STORAGE & SHELF LIFE

Store between 5°C and 30°C. If stored, unopened within these temperature ranges, this product has a shelf life of **12 months**. Protect from excessive heat, moisture and freeze/thaw.

HEALTH & SAFETY

SEE THE MATERIAL SAFETY DATA SHEET FOR ADDITIONAL INFORMATION.

TECHNICAL SERVICES TOLL FREE NUMBER: 0508 222 272 (Land lines only)

MSDS can be downloaded from www.bostik.co.nz

Clean-Up

Warm soapy water will remove **Dampfix Gold** from tools and equipment prior to full cure

PACKAGING

15 Litre & 4 Litre pails

VOC – 23 g/Lt

PRODUCT DETAILS

ITEM NO	ITEM NAME	Colour	SIZE
30804399	DAMPFIX GOLD	Yellow	4L
30804461	DAMPFIX GOLD	Yellow	15L

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Author: WK
Division: Construction
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BRANZ Appraised
Appraisal No. 745 [2017]

DAMPFIX GOLD INTERIOR WATERPROOFING MEMBRANE

Appraisal No. 745 [2017]

This Appraisal replaces BRANZ
Appraisal No. 745 [2011]



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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Product

- 1.1 Dampfix Gold Interior Waterproofing Membrane is a liquid-applied waterproofing membrane for use under ceramic or stone tile finishes in internal wet areas.

Scope

- 2.1 Dampfix Gold Interior Waterproofing Membrane has been appraised for use as a waterproofing membrane for internal wet areas of buildings, within the following scope:
- on floor substrates of concrete, flooring grade particleboard, plywood, compressed fibre cement sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
 - when protected from physical damage by ceramic or stone tile finishes; and,
 - where floors are designed and constructed such that deflections do not exceed 1/360th of the span.
- 2.2 The use of Dampfix Gold Interior Waterproofing Membrane on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Movement and control joints in the substrate must be carried through the membrane and tile finish. The design and construction of the substrate and movement and control joints is specific to each building, and is therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.4 The ceramic or stone tile finishes are outside the scope of this Appraisal.
- 2.5 The membrane must be installed by trained applicators, approved by Bostik New Zealand Limited.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Dampfix Gold Interior Waterproofing Membrane if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years and B2.3.2. Dampfix Gold Interior Waterproofing Membrane meets this requirement. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Dampfix Gold Interior Waterproofing Membrane meets this requirement. See Paragraphs 11.1- 11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Dampfix Gold Interior Waterproofing Membrane meets this requirement and will not present a health hazard to people.

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Technical Specification

4.1 Materials supplied by Bostik New Zealand Limited are as follows:

- **Dampfix Gold Interior Waterproofing Membrane** - An elastomeric, one-part, water-based, fibre reinforced polyurethane waterproofing membrane. It is supplied as a gold colour in 15 litre pails.
- **ASA Multiprime** - A synthetic latex based primer for a variety of porous substrates. It is supplied as an opaque pink liquid in 1, 5 and 20 litre containers.
- **Bostik Ultra NP Primer 2 Part** - A two part water based epoxy primer for non-porous substrates. It is supplied in a 4 litre kit and is a uniform greenish colour when mixed.
- **ASA Neutral Cure Silicone** - A flexible, neutral cure silicone for use as an expansion joint filler or bondbreaker. It is supplied as a white or coloured paste in 300 ml cartridges.

Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Dampfix Gold Interior Waterproofing Membrane. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 Dampfix Gold Interior Waterproofing Membrane is for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 The membrane must be protected from physical damage by the application of ceramic or stone tile finishes.
- 7.3 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ Good Practice Guide - Tiling.
- 7.4 Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported.
- 7.5 Timber framing supporting the substrates must be constructed such that deflections do not exceed 1/360th of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

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Substrates

Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with the sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used.
- 8.2 The plywood must be laid with the face grain at right angles to the floor joists. Joists must be at 400 mm centres maximum and the edges of the sheets must be supported with blocking or framing. The plywood must be fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres along the sheet edges and 200 mm centres to all framing through the body of the sheets.

Fibre Cement Compressed Sheet/ Fibre Cement Sheet Tile Underlay

- 8.3 Fibre cement compressed sheet must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Fibre cement sheet tile underlay must be suitable for use in internal wet areas. Installation must be in accordance with the instructions of the manufacturer.

Particleboard

- 8.4 Particleboard must be specified for the end use in accordance with NZS 3602.

Concrete and Concrete Masonry

- 8.5 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229, and concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

- 8.6 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be suitable for use in internal wet areas.
- 8.7 Fibre cement sheet must be suitable for use in wet areas and comply with the requirements of AS/NZS 2908.2
- 8.8 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

Durability

Serviceable Life

- 9.1 The Dampfix Gold Interior Waterproofing Membrane, when subjected to normal conditions of environment and use, is expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design serviceable life of 15-25 years.

Maintenance

- 10.1 No maintenance of the membrane will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grout and sealant.
- 10.2 In the event of damage to the membrane, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.
- 10.3 Drainage outlets must be maintained to operate effectively, and ceramic or stone tile finishes must be kept clean.

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Internal Moisture

- 11.1 Dampfix Gold Interior Waterproofing Membrane is impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Dampfix Gold Interior Waterproofing Membrane is suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of compliance for containment of overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.1.
- 11.3 Surfaces must be finished with ceramic or stone tile finishes. A means of compliance to NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 [b], 3.1.2 [b] and 3.3.1 [b].
- 11.4 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes and drainage flanges must be provided and the floor must fall to the outlet.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, BRANZ Good Practice Guide – Tiling, and flooring and wallboard manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must flash over the membrane a minimum of 30 mm.
- 11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms.

Installation Information

Installation Skill Level Requirement

- 12.1 Installation of substrates must always be carried out in accordance with the Dampfix Gold Interior Waterproofing Membrane Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.
- 12.2 Installation and finishing of components and accessories supplied by Bostik New Zealand Ltd and its approved applicators must be completed by trained applicators, approved by Bostik New Zealand Ltd.

Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of concrete substrates must be 75% or less before membrane application. Concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.
- 13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have a bond breaker installed as set out in the Technical Literature.
- 13.4 All substrates must be primed and the primer allowed to cure before the membrane is installed. Refer to the membrane supplier for primer specification.

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Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 10°C or above 35°C.
- 14.2 Dampfix Gold Interior Waterproofing Membrane must be thoroughly stirred before application.
- 14.3 The membrane must be applied in a minimum of two coats to give a total dry film thickness of 1.0 mm. Subsequent coats must be applied at an opposite direction to the previous coat.
- 14.4 Application can be made by roller (medium/long nap), brush (long bristle), or a rubber or plastic float.
- 14.5 Clean up may be undertaken with water.

Tiling

- 15.1 The membrane must be fully cured before tiling. The cured membrane must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide - Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer and Bostik New Zealand Limited.

Inspections

- 16.1 Critical areas of inspection are:
 - Construction of substrates, including crack control and installation of bond breakers and movement control joints.
 - Moisture content of the substrate prior to the application of the membrane.
 - Acceptance of the substrate by the membrane installer prior to application of the membrane.
 - Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness.
 - Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

Health and Safety

- 17.1 Safe use and handling procedures for the membrane are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 18.1 The following testing of Dampfix Gold Interior Waterproofing Membrane has been undertaken by BRANZ: Testing to AS/NZS 4858 Appendix A including effect of bleach, detergent and water on tensile and elongation, cyclic movement resistance and water absorption.
- 18.2 The following testing of Dampfix Gold Interior Waterproofing Membrane was undertaken by the Commonwealth Scientific Industrial Research Organisation (CSIRO) Australia: Durability testing to AS/NZS 4858 Appendix A including effect of bleach, detergent and water on tensile and elongation, water vapour transmission to ASTM E96-92, water absorption to AS 3558.1 and cyclic movement resistance.
- 18.3 Testing of Dampfix Gold Interior Waterproofing Membrane has been undertaken by Thor Specialties Pty Limited for fungi resistance to the requirements of ASTM G21.
- 18.4 The above test methods and results have been reviewed by BRANZ and found to be satisfactory.

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Other Investigations

- 19.1 An assessment was made of the durability of the Dampfix Gold Interior Waterproofing Membrane by BRANZ technical experts.
- 19.2 Site inspections have been carried out by BRANZ to examine the practicability of installation.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 20.1 The manufacture of the membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 20.2 The quality management system of the membrane's manufacturer has been assessed and found to be satisfactory.
- 20.3 The quality of supply of the membrane system materials to the market is the responsibility of Bostik New Zealand Limited.
- 20.4 Quality on site is the responsibility of trained applicators, approved by Bostik New Zealand Limited.
- 20.5 Designers are responsible for the building design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Bostik New Zealand Limited and this Appraisal.
- 20.6 Building owners are responsible for the maintenance of the tiling or stone finishing systems in accordance with the instructions of Bostik New Zealand Limited.

Sources of Information

- AS 3558.1 - 1999 Methods of testing plastics and composite materials sanitary plumbing and fixtures - Determination of water absorption characteristics.
- AS 3740 - 2010 Waterproofing of domestic wet areas.
- AS 3958.1 - 2007 Guide to the installation of ceramic tiles.
- ASTM E96-92 Standard test methods for water vapour transmission of materials.
- ASTM G21-96 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- AS/NZS 2908.2: 2000 Cellulose-cement products - flat sheet.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2269: 2012 Plywood - Structural.
- AS/NZS 4858 - 2004 Wet area membranes.
- BRANZ Bulletin Number 585. Measuring Moisture in Timber and Concrete, June 2015
- BRANZ Good Practice Guide Tiling - April 2015.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3602: 2003 Timber and wood-based products for use in buildings.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of concrete masonry structures.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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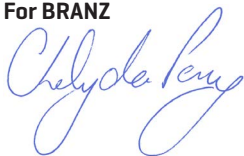
In the opinion of BRANZ, **Dampfix Gold Interior Waterproofing Membrane** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Bostik New Zealand Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Bostik New Zealand Ltd:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Bostik New Zealand Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Bostik New Zealand Ltd** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:
22 August 2017

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+RibRaft®

TECHNICAL
MANUAL



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This document contains design and installation information. A variation to any of the information given requires specific engineering design and is hence beyond the scope of this document.

The Firth RibRaft® Floor System can be constructed for all slab-on-ground concrete floors for domestic or residential buildings that fall within the scope of NZS 3604:2011 “Timber Framed Buildings” and Clause 3 “Scope” of Section 1 of this Manual. The design and installation details in this Manual shall be used to design and construct such a floor.

The Firth RibRaft® Floor System is covered by the MBIE Codemark®. This is conditional on the system being used as described in CertMark Australasia certification decision, which in turn requires design in accordance with Section 1 and installation in accordance with Section 2 of this Manual and on site verification in accordance with Section 3.

Note that a MBIE Codemark® means that if this Manual is rigidly followed the relevant Building Control Authority will automatically provide a building permit without the need for producer statements. To comply with the Manual does mean that Firth Certified Concrete® must be used.

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THIS MANUAL CONSISTS OF 3 SECTIONS:

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Contains information
principally useful for
the specifier or
building designer

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person on site installing
the Firth RibRaft®
Floor system

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SECTION

3 VERIFICATION

Describes the required
verification checks

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SECTION: DESIGN INFORMATION

1

1.0 THIS SECTION OF THIS MANUAL CONTAINS DESIGN INFORMATION NOT REQUIRING SPECIFIC ENGINEERING INPUT FOR THE FIRTH RIBRAFT® FLOOR SYSTEM (THE SYSTEM). FULL INFORMATION ON THE INSTALLATION PROCEDURES IS DESCRIBED IN SECTION 2 OF THIS MANUAL (INSTALLATION INFORMATION). WHERE STANDARDS ARE REFERENCED IN THIS MANUAL, THESE SHALL INCLUDE THE LATEST AMENDMENTS.

2.0 TECHNICAL INFORMATION

2.1 Overview

The Firth RibRaft® Floor System is a reinforced concrete waffle raft floor slab-on-ground. Typically it consists of an 85mm thick slab supported by a grid of ribs normally 100mm wide at 1200mm x 1200mm centres. The overall depth is 305mm. Edge beams and ribs under load bearing walls are 300mm wide to provide for the extra load carried by these members. Where heating coils of less than 25mm diameter are embedded in the topping, the slab concrete thickness shall be 110mm meaning the overall thickness is 330mm. Where the top floor surface is honed to provide a decorative finish, a slab thickness of 100mm (before honing) should be specified.

2.2 Pods

Firth RibRaft® polystyrene pods 1100mm square and 220mm thick are placed directly on levelled ground and are arranged in such a way as to form a reinforced concrete floor slab with a grid of reinforced concrete ribs and edge beams when concrete is placed onto them. Pods may be cut to suit specific architecture layout and also to accommodate services. 300mm thick pods are available if needed for deeper edge beams and internal ribs.

2.3 Steel

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m², a lower characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 200mm centres, and ductility class L or E, hereafter referred to "mesh". The presence of Class E reinforcing bars in the ribs and beams provides adequate ductility of the system which allows the use of class L mesh. Typically the topping mesh reinforcement will be 665 mesh (class L) or SE62 ductile mesh, each being equally applicable. The reinforcing bars in the ribs and edge beams shall conform to AS/NZS 4671:2001 "Steel Reinforcing Materials". Specifically designed spacers are used to position the polystyrene pods and the rib and edge beam reinforcing steel bars in a secure manner until the concrete is placed. The reinforcing mesh is held in place by mesh chairs. Conventional timber or steel formwork is used to form the edge of the slab.

2.4 Concrete

One of the following Firth concrete products shall be used in the system:

- 1) Raftmix: a 20MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size or as a structural (non-pump) mix
- 2) Raftmix25: a 25MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size or as a structural (non-pump) mix. This mix shall be specified for buildings constructed in the 'sea spray zone' (i.e. within 500m of the sea including harbours, river mouths, estuaries or inlets, on offshore islands and elsewhere defined as exposure zone D in 4.2.3.3 of NZS3604).

3.0 SCOPE

This Clause sets out the limitations that apply to the use of the system to ensure that specific engineering input is not required. The concrete floor slab for buildings or ground conditions that do not meet this scope must be subjected to specific engineering design to comply with the requirements of the New Zealand Building Code.

3.1 Structure Limitations

Specific engineering input shall not be required only where the structure supported by the system complies with the following criteria:

- > The structure supported by the system is constructed in a location where the Seismic Hazard Factor Z (defined in NZ1170.5) is less than or equal to 0.45 (refer to Figure 6).
- > The system is laid level, or has a maximum step of 600mm detailed in accordance with this Manual.
- > The structure supported by the system has no basement, part basement or foundation walls.
- > The total height from the lowest ground level to the highest point of the roof shall not exceed 10m.
- > The structure supported by the system has a roof pitch limited to 60 degrees maximum from the horizontal.
- > The maximum height of a single or top storey is 4.8m and any other storey is 3m.
- > Only ground floor walls of the structure supported by the system are permitted to be "heavy external walls" (as defined in Clause 3.3).
- > The roof truss span shall be less than or equal to 12m when the roof and ceiling loads are supported entirely by the external walls. Where internal support of roof trusses is used the footings below point loads identified by the truss designer shall comply with this Manual.
- > Where internal load bearing walls are used to support the roof or floors, the loaded dimensions stated in Tables 8.2 and 14.10 of NZS3604:2011 shall apply, and the load bearing wall shall be supported on a 300mm wide load bearing rib as detailed in this Manual.
- > Floors may be of unlimited size provided that the maximum dimension between free joints shall not exceed 30m. Where free joints are required they should be detailed in accordance with this Manual.

3.2 Live Loading

The live loading cases of structures covered by these designs are:

- > 1.5kPa and 3.0kPa as per NZS3604 "Timber Framed Buildings".
- > 13kN concentrated load in garage over area of 0.3 x 0.3m (vehicle limited to 2500kg gross).

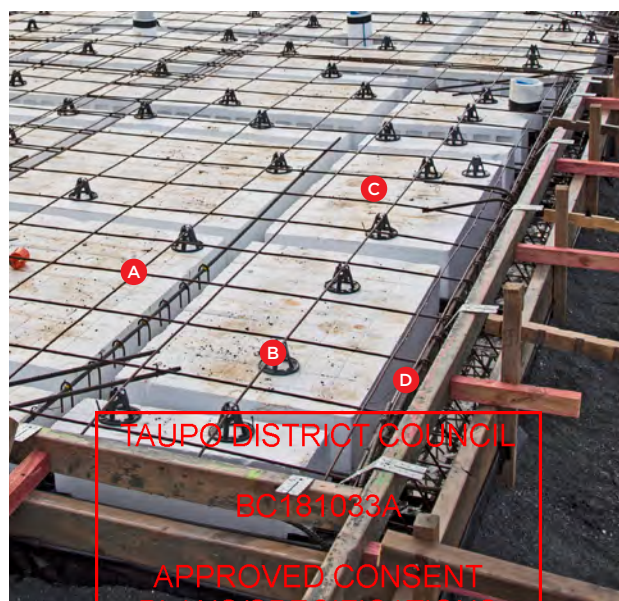
3.3 Snow Loading

Open ground snow loading as defined in NZS3604 of up to 2kPa.

3.4 Dead Loading for Use with This Manual

The dead load cases of structures covered by these designs are:

- > Light external walls with total mass not exceeding 60kg/m² – e.g. timber framing with weather boards and interior wall linings.
- > Heavy external walls with total mass greater than 60kg/m² but not exceeding 290kg/m² – e.g. timber framing with masonry veneer or partially filled 20 series masonry blocks.
- > Internal walls with total mass not exceeding 45kg/m² – e.g. timber framing and linings.
- > Light roofs with total mass not exceeding 45kg/m² – e.g. ceiling linings and metal roof, including framing.
- > Heavy roofs with total mass greater than 45kg/m² but not exceeding 85kg/m² – e.g. ceiling lining and concrete tiles or slates, including framing.
- > Mid-floors with total mass not exceeding 60kg/m² – e.g. timber framing and flooring, including ceiling linings.
- > Heavy internal walls and/or load bearing internal walls supported on a load bearing rib.



The RibRaft® System

- A** Steel mesh reinforcing **B** Firth 300mm spacer
- C** Firth RibRaft® polystyrene pods **D** Steel reinforcing

3.5 Foundation Requirement for Different Building Types

The designs given in this Manual are limited to where the system supports Building Types as described in Table 1. The classification of wall and roof weights are as detailed in Clause 3.4 of this Section. Single and two storey shall be as defined in NZS 3604:2011.

Table 1 Foundation Type Identifier

NUMBER OF STORES	ROOF	GROUND FLOOR EXTERNAL WALLS	SECOND STOREY EXTERNAL WALLS	1.5KPA LIVE LOAD & UP TO 1KPA SNOW LOAD	3KPA LIVE LOAD & /OR 2KPA SNOW LOAD
SINGLE STOREY	Light	Light		A	A
	Heavy	Light		A	B
	Light	Heavy		B	B
	Heavy	Heavy		C	C
DOUBLE STOREY	Light	Light	Light	C	D
	Heavy	Light	Light	D	E
	Light	Heavy	Light	D	E
	Heavy	Heavy	Light	E	G

3.6 Foundation Soils

The system may be used when the supporting ground meets the definitions of “good ground” given in Section 3 of NZS 3604:2011 (as modified by B1 of the Building Compliance Documents). In addition, the system shall not be used for damp sites i.e. where it can be reasonably expected that the ground water level could come within 600mm of the underside of the system. The acceptability of the ground shall be verified in accordance with Clause 3.1.3 of NZS 3604:2011.

Solutions for soils prone to liquefaction or expansive soils are available using the Firth RibRaft® technology, however these are outside the scope of this Manual and require specific engineering design.

Where the ultimate bearing capacity required of the supporting ground is verified by Scala Penetrometer testing in accordance with Clause 3.3 of NZS3604:2011 or for cohesive soils using a calibrated shear vane in accordance with the NZGS Guideline for Hand Held Shear Vane Test, the bearing capacity shall exceed the values in Table 2 for the proposed building type. For scala penetrometer testing, the bearing capacity shall be considered adequate when the number of blows per 300mm depth of penetration below the underside of the system at each test site exceeds the values given in Table 2 below.

For RibRaft® foundations compliance with Table 2 allows ultimate bearing capacities of less than 300kPa. However, with the exception of bearing capacity all other requirements in NZS3604:2011 for “good ground” shall be complied with.

Table 2 Scala Penetrometer Blows Required and Ultimate Bearing Capacity

FOUNDATION TYPE	ULTIMATE BEARING CAPACITY (KPA)	MIN. BLOWS PER 300MM DEPTH FOR SCALA TESTING
A	140	4
B	175	5
C	210	6
D	240	7
E	275	8
G	Good ground	9

3.7 Flow Diagrams

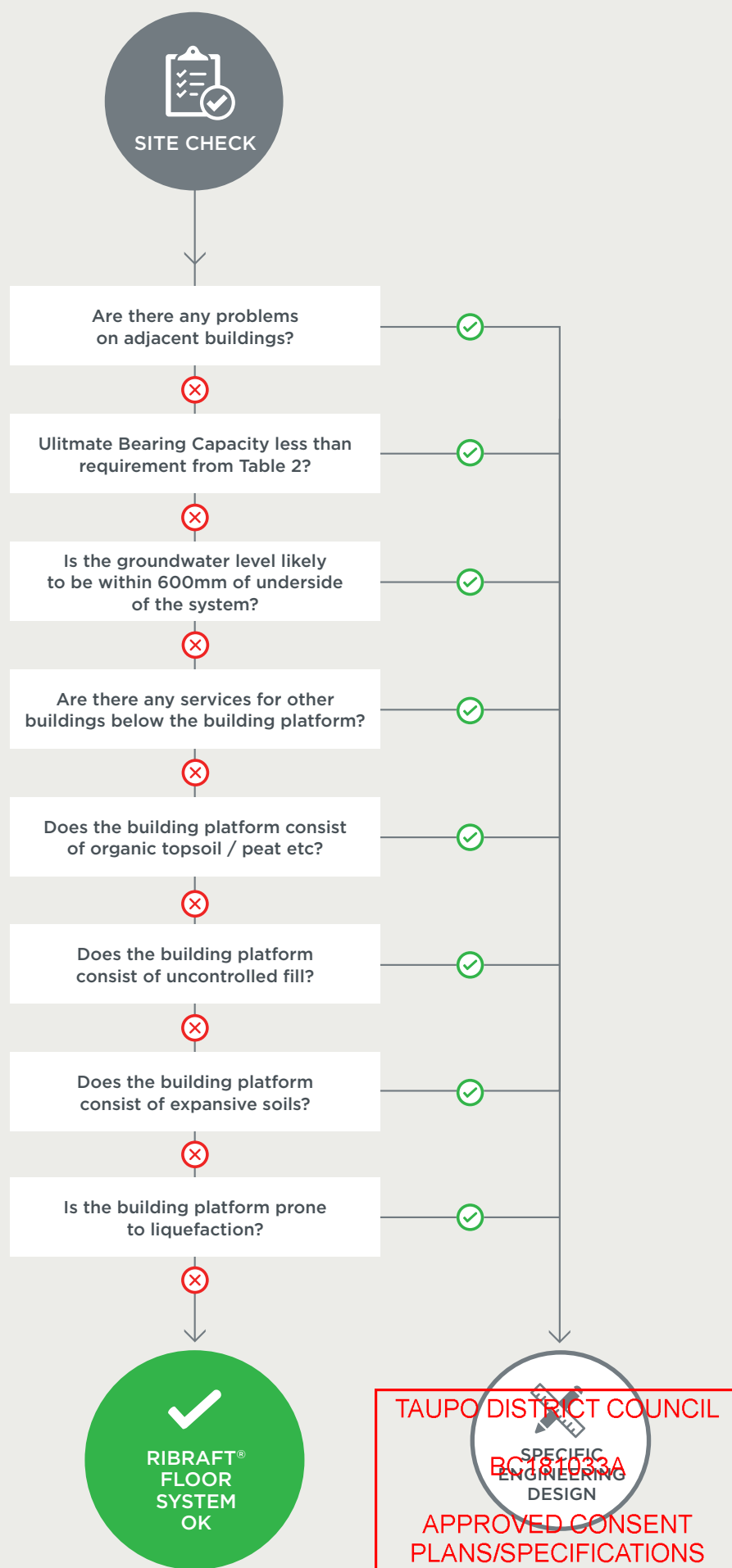
The flow diagrams on the following pages (adapted from NZS3604:2011) will help in determining whether the non-specific details for the system can be used for the purposes of the concrete floor slab construction. There are two checks in the process. The first is to determine whether the proposed building complies with the requirements set out in this Manual (Building Check), and the second is to determine whether the site complies with the requirements set out in this Manual (Site Check).

(Note: NZS3604:2011 provides for parts of buildings to be considered as individual buildings. Please Note: This applies to all parts of the building where slab-on-ground is being considered and where the part of the building can be considered as an individual building under NZS3604:2011).

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Figure 2 Building Check
Flow Diagram



4.0 CONSTRUCTION DETAILS

Standard construction details for the system are provided here for buildings that fall within the below scope.

4.1 Pod Layout

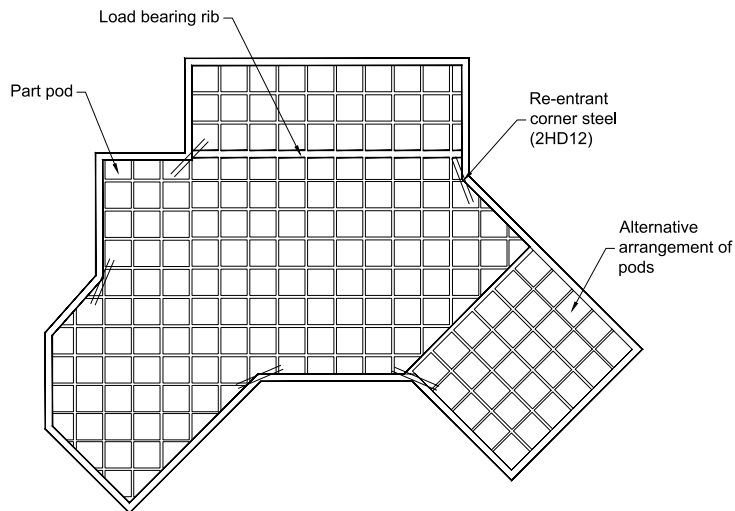
RibRaft® polystyrene pods supplied by Firth (1100 x 1100 x 220mm thick) shall be placed on levelled ground and arranged in a waffle pattern. The pods are used as void formers while the concrete is curing. These pods are an integral component of the system and shall not be substituted.

Pods shall be placed so as to provide the necessary spacing between the edge beams and ribs as described below. The first rib out from the edge beam shall have a maximum clear separation of 1100mm however in all other cases the centre to centre distance between the ribs, whether they are 100mm or 300mm wide, shall be 1200mm. In the case of 100mm ribs this centre to centre spacing is achieved by the 1100mm square pods however between 100mm and 300mm ribs, or between two 300mm ribs, the pods shall be cut down to suit. Pods may be cut down to size but shall not be added to, where this is necessary to suit the building layout, penetrations or orientation of beams and ribs.

Figure 3 shows a typical layout of the pods and ribs. Note the part pods around the edge, where the building shape dictates, and adjacent to the 300mm rib.

Firth suggests that when drawing the building plan, a generic RibRaft® grid (100mm wide ribs at 1200mm centres) is set out using the corner of the building as a starting point. The location of any load bearing ribs, or point loads greater than 10kN, are identified and pods cut to establish 300mm wide ribs or foundation pads as described in this Manual. The most cost effective solution being a simple grid layout which requires minimum cutting of the pods. Ribs can be used at less than 1200mm centres, however it is more cost effective to use the 1200mm centres wherever practicable.

Figure 3 Typical RibRaft® Plan



4.2 Edge Beam Width and Reinforcement

Edge beams around the perimeter of the floor slab shall be 300mm to provide bearing capacity for external load bearing walls, and contain 2-HD12 bars (Grade 500E) as bottom steel and 1-HD12 bar (Grade 500E) in the top. This top bar shall be tied to the underside of the reinforcement mesh. Refer Figure 5, below for construction details. The edge beam shall be rebated for brick veneers where necessary as shown in Figure 5(C).

4.3 Internal Ribs (non load bearing) Width and Reinforcement

Each standard internal rib shall be 100mm wide and shall contain 1-HD12 steel bar (Grade 500E) held in place at the bottom of the rib by a Firth spacer. Refer Figure 5E for construction details.

4.4 Internal Ribs (load bearing) Width and Reinforcement

For all load bearing walls and heavy internal walls, the pods shall be cut to create a 300mm wide rib directly under the load bearing wall, with 2-HD12 (Grade 500E) steel bars as bottom steel. Refer Figure 5(D) for construction details under load bearing walls. Where the load bearing ribs meet and terminate at an edge beam or internal rib the bottom reinforcement from the load bearing rib shall be bent into the adjacent rib and tied together. The reinforcement shall lap for at least 720mm.

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4.5 Point Loads

Truss manufacturers often support the roof trusses internally which are described on the truss manufactures drawings as falling into various ultimate limit state categories. Table 3 summaries when individual footings are required below the reactions, and the form these should take.

Table 3 Foundation Requirements for Individual Point Loads

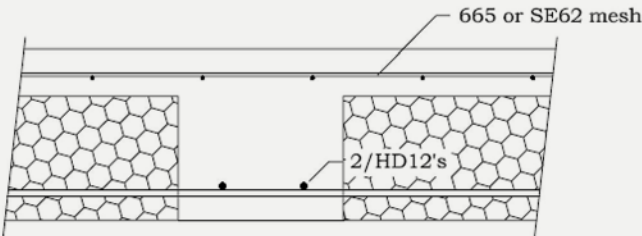
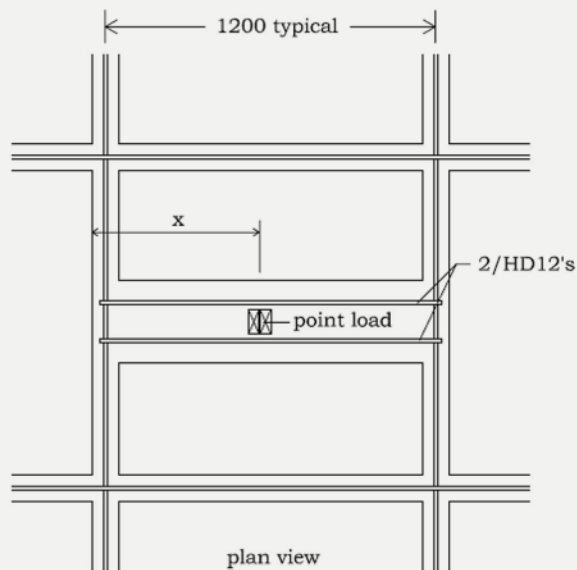
FOUNDATION OPTIONS BELOW POINT LOAD:		
ULTIMATE LIMIT POINT LOAD REACTION	PAD OPTION, GOOD GROUND	BEAM OPTION, BEARING CAPACITY GREATER THAN 140KPA ⁽³⁾
Up to 10kN	No thickening required	No thickening required
Up to 20 kN	375x375 pad ⁽¹⁾	300mm wide load under point load as detailed in Figure 5
Up to 30kN	450x450 pad ⁽²⁾	300mm wide load under point load as detailed in Figure 5

Notes
(1) Pad thickness to match depth of pods plus topping (bears on ground not polystyrene) and reinforced with 5
(2) Pad thickness to match depth of pods plus topping (bears on ground not polystyrene) and reinforced with 5
(3) Refer section 3.6 for confirmation of bearing capacity. With exception of bearing capacity all other requirements in NZS3604 for good ground shall be complied with.

Figure 4 Details for Beam Option Thickening Under Point Loads

ULTIMATE LIMIT LOAD P FROM TRUSS DESIGNER	MINIMUM EDGE DISTANCE X IN MM
20kN	200 *
30 kN	400 *

* If minimum edge distances cannot be achieved extend thickening to next 100mm ribs



sect A - A
refer detail D
figure 5 of Firth
Roofing Manual

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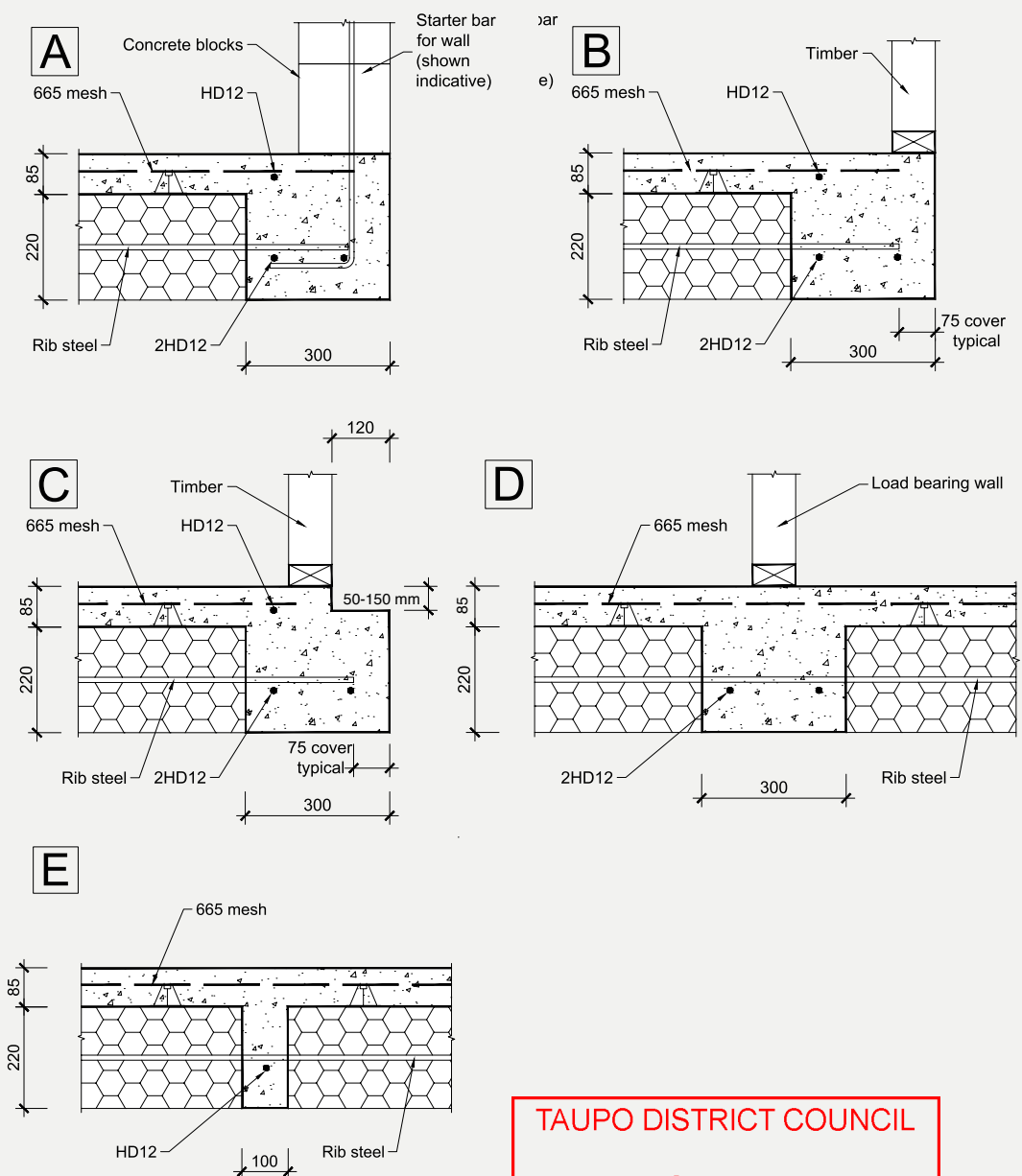
4.6 Mesh Reinforcement

The entire floor slab shall be reinforced with 665 mesh supported on 40mm mesh chairs sitting on the polystyrene pods.

4.7 Re-entrant Corners

In order to limit the width of cracking at the re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover from the internal corner - refer Figure 3.

Figure 5
Standard RibRaft®
Construction Details



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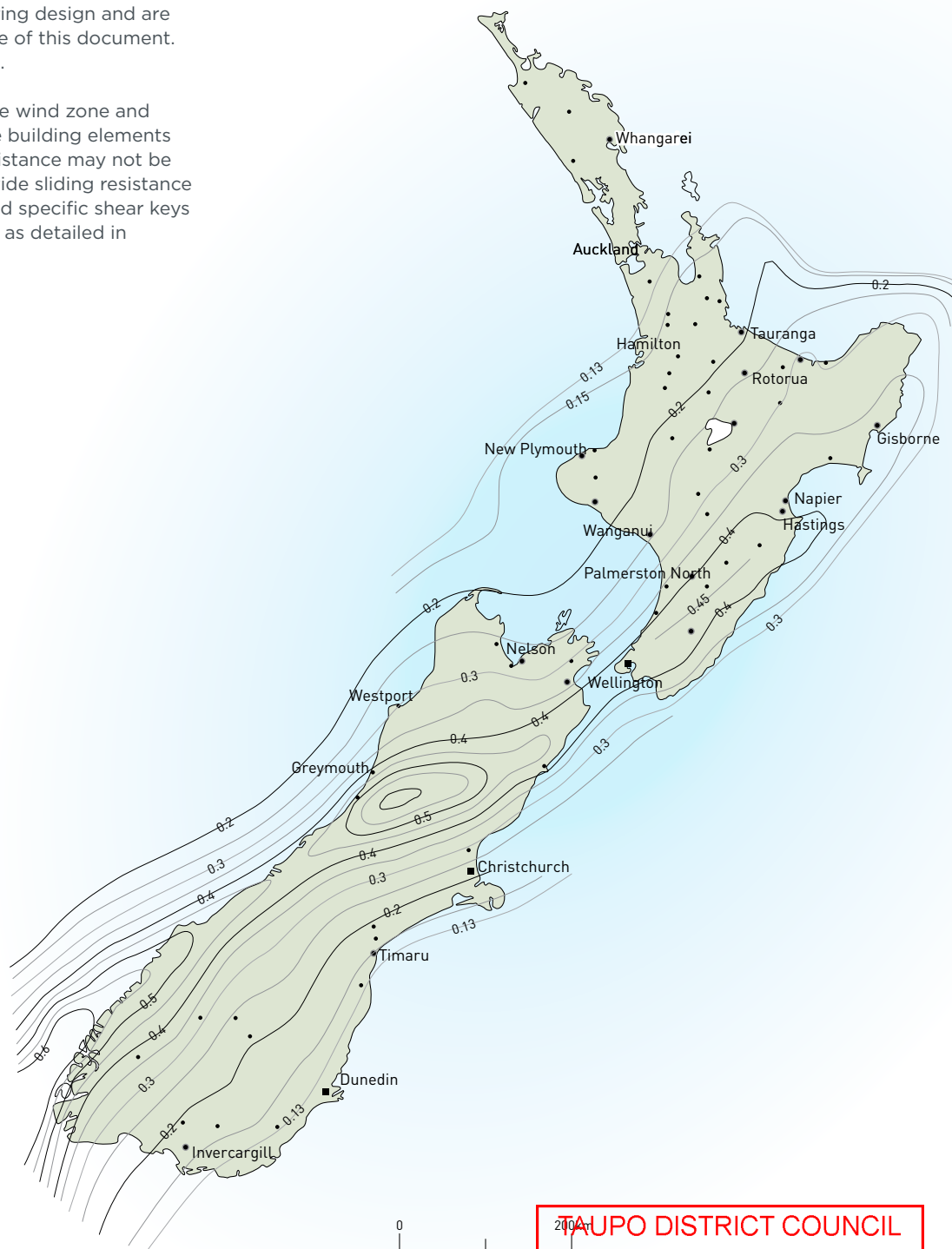
5.0 LATERAL RESISTANCE

5.1 Earthquake Resistance

Unlike conventional foundation systems, the Firth RibRaft® system is not embedded into the ground. Sliding resistance to horizontal seismic loads is provided by frictional contact with the soil. In locations where the Seismic Hazard Factor Z is greater than 0.45, shear keys maybe required to resist seismic loads. Such buildings require specific engineering design and are outside the scope of this document. Refer to Figure 6.

Depending on the wind zone and the weight of the building elements this frictional resistance may not be sufficient to provide sliding resistance to wind loads, and specific shear keys may be required, as detailed in Clause 5.2.

Figure 6
Seismic Hazard
Factor Z to
NZS 1170.5



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5.2 Wind Resistance

The building's bracing demand from wind loading shall be assessed from Section 5 of NZS 3604:2011 for both directions (i.e. along and across the building). The bracing capacity of the system must exceed the greater of the bracing demands determined.

The bracing capacity of the system shall be determined as the sum of the bracing capacity provided by frictional resistance (i.e. friction between the system and the ground) and the bracing capacity provided by the shear keys (if any) necessary to meet the requirements of Clause 5.2.

The bracing capacity provided by frictional resistance shall be determined from Table 4 depending on the building type, roof weight, and floor live loading. The bracing capacity provided by the shear keys shall be the sum of the bracing capacity of the individual shear keys determined as follows. If the shear key is in clay, each shear key shall be considered to contribute 170 BU's. If the shear key is in sand, each shear key shall be considered to contribute 200 BU's. If the bracing capacity of the system, determined from the frictional resistance and the shear keys as described above, is less than the bracing demand further shear keys shall be added until the bracing demand is met.

BUILDING TYPE	ROOF TYPE	GROUND FLOOR EXTERNAL WALLS	SECOND STOREY EXTERNAL WALLS	BU's PROVIDED PER 100M ² 1.5KPA	FOR LIVE LOADING OF: 3.0KPA
Single Storey	Light	Light		1630	1746
Single Storey	Heavy	Light		1737	1857
Single Storey	Light	Heavy		1802	1922
Single Storey	Heavy	Heavy		1909	2029
Double Storey	Light	Light	Light	2163	2403
Double Storey	Heavy	Light	Light	2270	2510
Double Storey	Light	Heavy	Light	2335	2575
Double Storey	Heavy	Heavy	Light	2442	2682

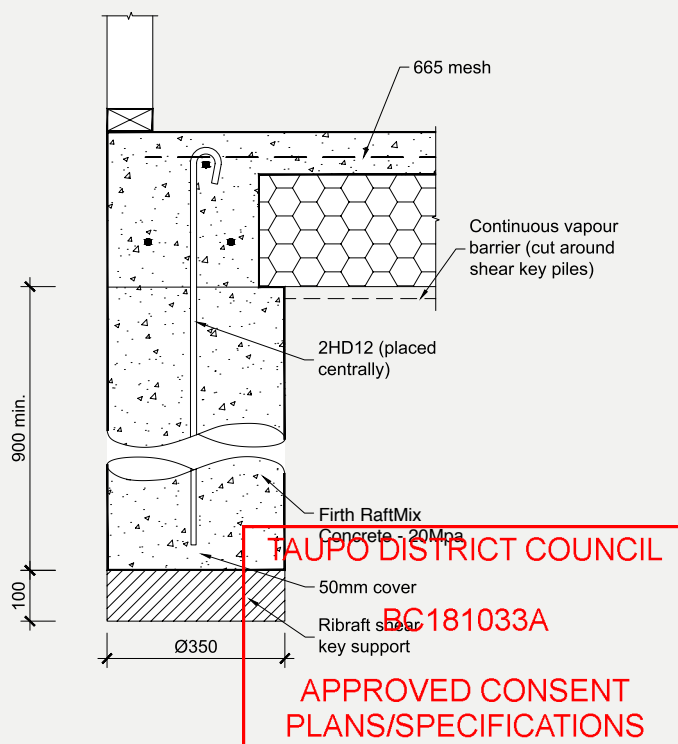
Table 4 Bracing Capacity Provided By Frictional Resistance Per 100m² Of Ground Floor Area

5.3 Shear Keys

Shear key piles required by Clause 5.2 must be uniformly distributed around the perimeter of the building, and be located at the edge beam/internal rib junction. Where a shear key is required, the minimum number of shear keys shall be two per floor plan. Where two shear keys are used they shall be placed at diagonally opposite ends of the floor plan.

Construction details of the shear keys shall be as shown on Figure 7. Shear keys shall be a minimum of 900mm long. The holes shall be over-drilled at least 100mm and a polystyrene RibRaft® Shear Key Support placed into the bottom of each hole. This will support only the plastic (wet) concrete and then allow movement of the shear key if settlement of the supporting ground occurs. The effective end bearing of the shear keys is therefore eliminated.

Figure 7 RibRaft® Shear Key



5.4 Design Example For Lateral Resistance Calculation

The following is a short example to demonstrate the process of determining whether shear piles are required.

Consider a 180m² single storey home with a light roof located in Palmerston North in a VH wind zone as defined by NZS3604. Assume the building height is 6m with 3m above the eaves. The length for across wind considerations is 15m and the width (along wind) is 12m.

First consider seismic actions. From Figure 6 the seismic hazard factor is 0.4. Since this is less than 0.45 shear keys will not be required for earthquake resistance.

Now consider wind loading. Table 5.5 of NZS3604 requires 95 bracing units per meter (BU/m) across the building and 90 BU/m along. As it's a very high wind zone these figures need to be increased by a factor of 1.3.

The BU demand for across building wind is therefore = $95 \times 1.3 \times 15 = 1853\text{BU}$
The BU demand along the building = $90 \times 1.3 \times 12 = 1404\text{BU}$

From Table 4 for a single storey light weight roof with 1.5kPa live load the capacity is 1150BU per 100m². Therefore for 180m² the capacity is 2070BU. As the capacity (2070) is greater than the demand (1853) no shear keys are required.

If the demand had exceeded the capacity then any shortfall can be provided by supplying shear keys in accordance with Section 5.3 with each shear key providing the BU specified in Section 5.2.

6.0 OTHER DESIGN DETAILS

6.1 R-Values

The insulation performance of a building element is measured by the "R-Value". The schedule method is the simplest method to achieve compliance with Clause H1 of the Building Code. Using this method the minimum R-Values required for floors are R1.3 for light timber frame construction, and typically R1.5 for masonry construction. R-values of R1.3 can be used for masonry construction if glazing with greater insulation is used (refer NZBC, Clause H1). If in-floor heating is used the minimum required R-Value is increased to R1.9, and the resistance to thermal movement into the room must be one tenth of that to the outside environment.

The fourth edition of H1 (amendment 3, January 2017) states that "Concrete slab-on-ground floors are deemed to achieve a construction R-value of 1.3, unless a higher R-value is justified by calculation or physical testing". RibRaft® is therefore a deemed to comply solution however in some instances designers may wish to determine the R-value as part of the design process. There are numerous methods for calculating R-values for slabs on ground, with many of the processes giving quite different R-values. NZBC clause H1 prescribed that an "Acceptable methods for determining the thermal resistance (R-values) of building elements are contained in NZS 4214."

The R-values provided in this Manual use the NZS4214 methodology.

If the R-value calculation is required to demonstrate compliance with the Building Code, then the NZS4214 methodology is probably the best alternative due to its reference in H1. However, more technically robust calculation methodologies exist and where the R-values are important, for example heated floors, use can be made of the BRANZ Home Insulation Guide. For these instances edge insulation is also recommended.

When slab edge insulation is specified, it is recommended that Firth HotEdge® is used as it has been designed to be compatible with Firth RibRaft®.

The R-Value of a concrete floor is dependent on the floor area to perimeter ratio, and the details of the floor perimeter. The R-Value for various solutions are illustrated below. The R-Values have been independently calculated using NZS4214:2006 "Methods of Determining the Total Thermal Resistance of Parts of Buildings," though modified for perimeter heat loss using recommendations from the Building Research Establishment.

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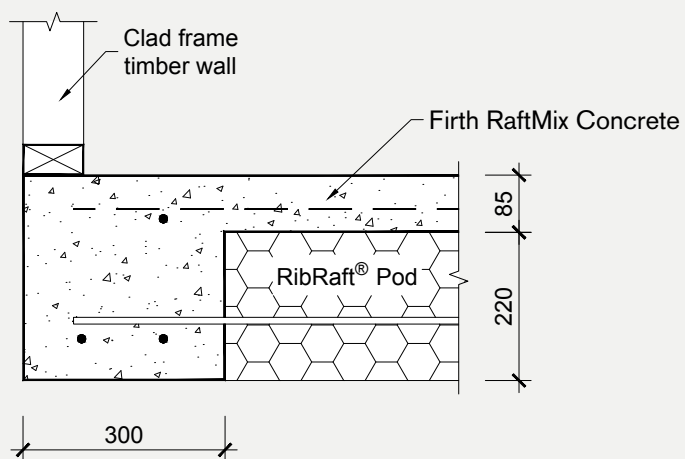


Figure 8
RibRaft® R Values
For 90mm Thick
Walls On The
Floor Edge

	FLOOR AREA TO PERIMETER RATIO M ² /M										
	1.00	1.25	1.50	1.75	2.00	2.25	2.5	2.75	3.0	3.5	4.00
R-Value m ² °C/W	1.28	1.40	1.52	1.64	1.75	1.86	1.97	2.07	2.17	2.38	2.57

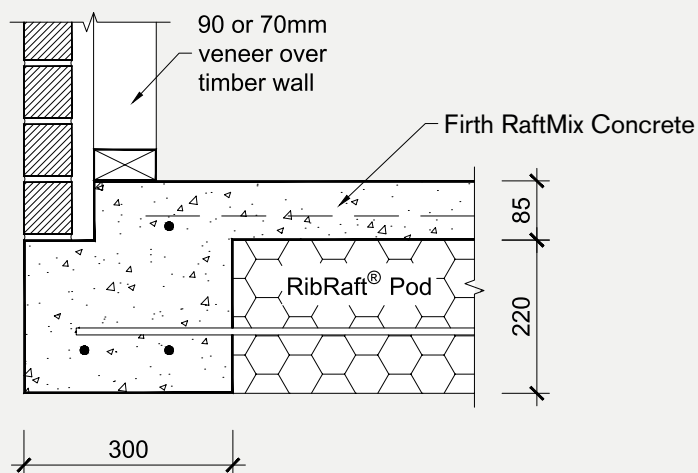


Figure 9
RibRaft® R Values
For 70-90mm
Thick Veneer,
Cavity, and
90mm Walls.

	FLOOR AREA TO PERIMETER RATIO M ² /M									
	1.25	1.50	1.75	2.00	2.25	2.5	2.75	3.0	3.5	4.00
R-Value m ² °C/W	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84

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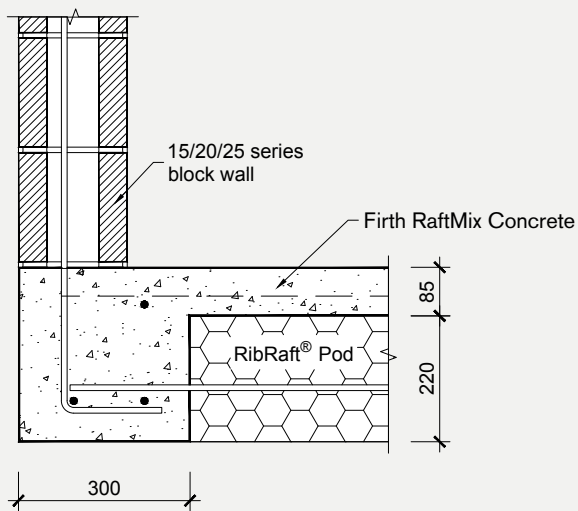


Figure 10
RibRaft® R Values
For Various
Thicknesses
Of Masonry Walls

	BLOCK	FLOOR AREA TO PERIMETER RATIO M ² /M									
		1.25	1.50	1.75	2.00	2.25	2.5	2.75	3.0	3.5	4.00
R-Value m ² °C/W	15 SERIES	1.48	1.60	1.73	1.85	1.96	2.08	2.19	2.30	2.51	2.72
	20 SERIES	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84
	25 SERIES	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95

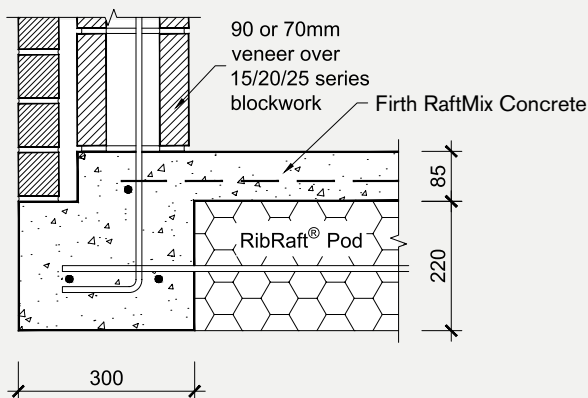


Figure 11
RibRaft® R-Values
For 70-90mm Thick
Veneer, Cavity, And
Various Thickness
Masonry Walls

	BLOCK	FLOOR AREA TO PERIMETER RATIO M ² /M									
		1.25	1.50	1.75	2.00	2.25	2.0	2.75	3.0	3.5	4.00
R-Value m ² °C/W	15 SERIES	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95
	20 SERIES	1.64	1.78	1.92	2.06	2.19	2.32	2.44	2.56	2.81	3.04
	25 SERIES	1.69	1.83	1.98	2.11	2.25	2.38	2.51	2.64	2.88	3.12

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6.2 Shrinkage Control

Shrinkage control joints reduce the risk of unwanted cracks, and their placement needs to be carefully considered where uncontrolled cracking could be unacceptable. Two types are described here: saw cut joints (which are tied joints), and free joints.

6.2.1 Saw Cut Joints

Saw cuts are located at positions in which the concrete is likely to crack due to stresses induced by restrained shrinkage. The aim of providing them is for the concrete to crack at the bottom of the saw cut thus minimizing the potential for a visible crack wandering over the surface. The level of reinforcement provided in a RibRaft® mean that cracks have no structural implications being only an aesthetics issue. Factors to consider are the type of floor finish, the location of ribs and ground beams, underfloor heating, and the effect of piles restraining shrinkage.

Preference should be given to using early entry saws which are used immediately after finishing. Shrinkage control joints cut using diamond blades shall be cut as early as possible which is typically within 24 hours of hardening in summer, and 48 hours in winter. They shall be cut to a depth of 25mm. Shrinkage control joints do not guarantee elimination of all visible or unwanted cracks but should minimise number.

Joints shall be positioned to coincide with major changes in floor plan. Where concrete is to be exposed, for example in a garage, or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 5m. Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 1.5:1. Shrinkage control joints shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib, then the joint shall be located directly above one edge of that rib.

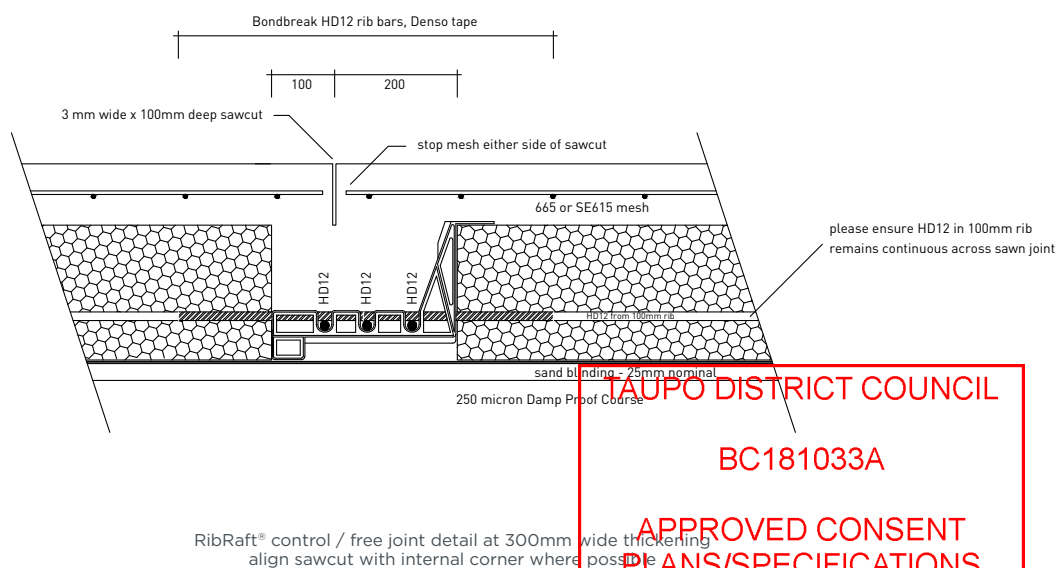
In order to limit the width of cracks at re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 3.

6.2.2 Free Joints

Where the length of the floor exceeds 30m a free joint shall be provided as detailed in Figure 12. Movement, shrinkage and thermal, will occur over this joint so it shall be positioned to minimize the impact of this movement on floor coverings and wall elements.

Where the bottom of the RibRaft® is not flat (for example the floor incorporates a step down), free joints shall be provided if the distance from the step down to edge of slab exceeds 15m.

Figure 12
Free Joint
Details



6.3 Services Detailing

Two options exist for running service, both of which are appropriate, however some regional Building Control Authorities and Builders have clear preferences. The options being within slab, or under slab. Experience from the Christchurch earthquakes shows that the most seismically robust solution is for services to run within the plane of the pods (within slab).

6.3.1 Within Slab Running of Services

Pipes services can be run within the plane of the pods either exiting out of the side of the perimeter ring beam or going underground at the edge beam. Pipes shall be laid at a fall to comply with NZBC G13/AS1. For pipe up to 65mm diameter the minimum gradient is typically 1 in 40, while for 100mm pipes it's 1 in 60, however greater falls may be required dependent upon the required number of discharge units. Table 5 provides distances from the edge of the slab to pipe surface penetration to achieve minimum pipe gradients. A 300mm pod alternative is often used where the proposed positioning of the service means minimum required gradients cannot be achieved. Where gradients cannot be achieved with a 300mm pod, then service will require to be run under the slab.

Pipes shall be located to pass perpendicular to the ribs and beams and shall not be laid along the length of ribs or beams. Pods are cut as required to achieve the required fall and position. Pipes shall be laid to ensure 15mm concrete cover between pipe and reinforcement in the perimeter beam. All pipes in contact with concrete shall be lagged with an impermeable material of at least 6mm thickness.

Table 5 Maximum Distance From Exterior To Entrance Point Of Plumbing Pipes

PIPE DIAMETER (ID)MM	GRADIENT	MAXIMUM DISTANCE TO EDGE WITH 220MM THICK POD	MAXIMUM DISTANCE TO EDGE WITH 300MM THICK POD
40	1 in 40	3400	6600
50	1 in 40	3000	6200
65	1 in 40	2400	5600
100	1 in 60	1200	4400

6.3.2 Under Slab Running Of Services

For this option, services ducts shall be conveyed underground to their plan location then brought up through the polystyrene pod and the concrete floor slab, within the limitation imposed by Table 8. Services shall not be placed within any concrete except to cross that section of concrete i.e. services shall not run along ribs or edge beams. In accordance with AS/NZS3500.4:2015 pipes penetrating through concrete shall be:

- > Installed at right angles to the slab surface.
- > Lagged with an impermeable material for the full depth of the concrete penetration.
- > Lagging must be at least 6mm thick.

The maximum diameter of the services shall be as outlined in Table 6.

Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in Figure 13, services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in Figure 15 at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

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Table 6 Maximum Diameter Of Pipe Services

ELEMENT	VERTICAL SERVICE	HORIZONTAL SERVICE
300mm wide edge beam	50mm nominal bore pipe	100mm NB pipe
500mm localized wide edge beam (1)	100mm NB pipe	100mm NB pipe
300mm wide internal load bearing rib	50 NB pipe	100mm NB pipe
100mm wide internal rib	Nil	100mm NB pipe
Slab	100 NB pipe, or for large services 450mm square see also Note 3	Nil

Notes:

- (1) For situations where a 100mm diameter pipe is required to pass vertically through the edge beam, the edge beam shall be locally increased in width to a minimum of 500mm wide. This shall be achieved by keeping flush the outside face of the edge beam and removing 200mm from the pod. The width shall remain at 500mm for a distance of 600mm beyond the service pipe. Refer to Figure 15 for details.
- (2) Where a gas pipe line runs through the RibRaft® floor system, in addition to the requirements above, the pipeline shall enter the building through the outside face of the perimeter foundation beam and be located in the plane of the pods. The aim being to ensure that damage to the gas pipe will most likely occur outside the building envelope should movement occur between the ground and RibRaft® in a large earthquake.
- (3) Larger penetrations or voids up to 450mm square (e.g. for shower waste/traps) are permitted through the slab provided all the conditions of this paragraph are met. These openings shall be trimmed with 1 HD12 (Grade 500E) bar 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall not be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower will ensure that the void is sealed/covered).

A pictorial of some of the above requirements is illustrated in Figure 13 and 14.

Figure 13 Example of Detailing Requirements For Services

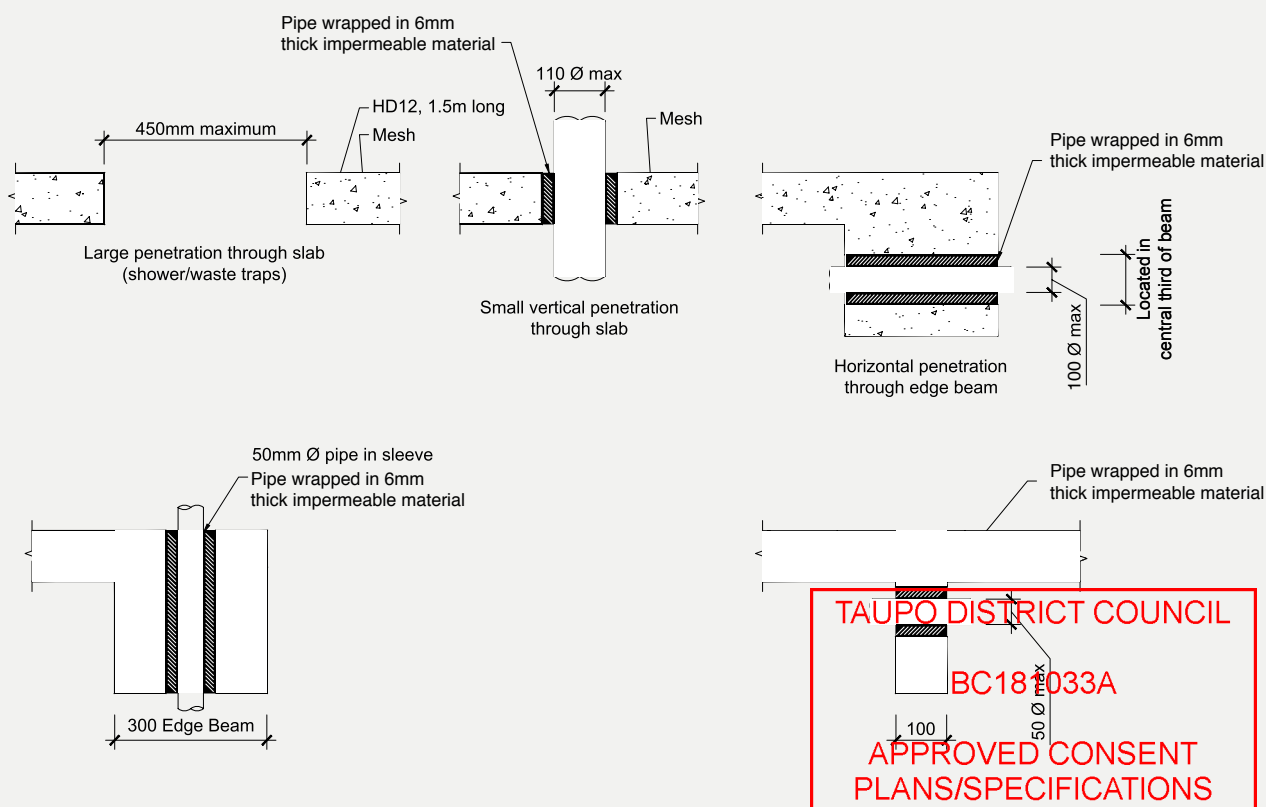
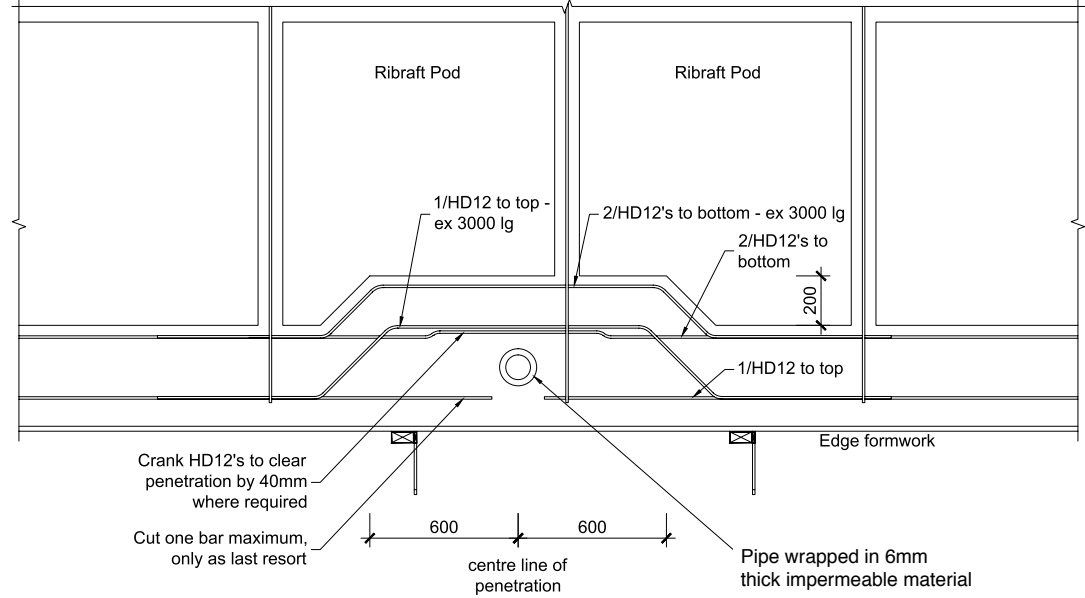


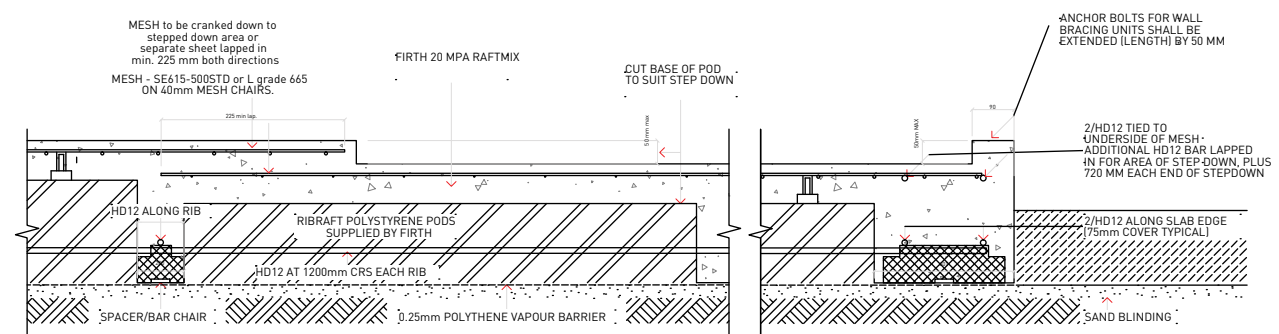
Figure 14
Localised Increase
In Width At Edge
Beam Where
Vertical Service Up
To 100mm Diameter
Are Required



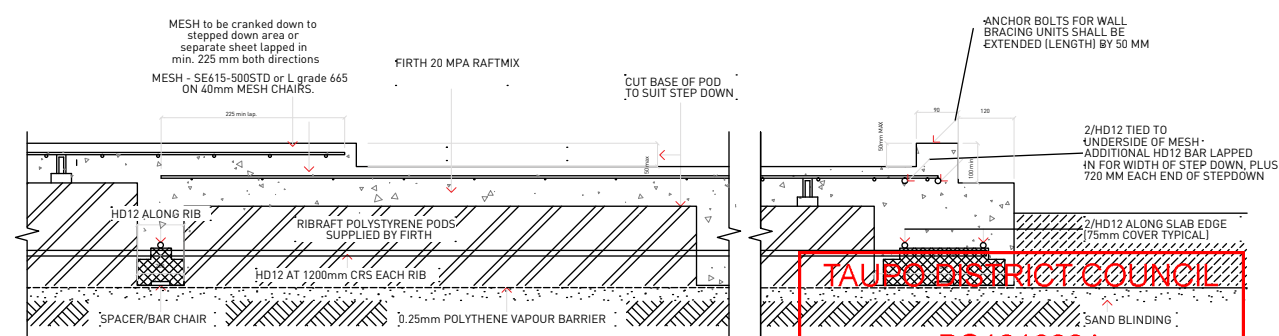
6.3.3 Recesses for Showers

Where showers are rebated up to 50mm into the RibRaft® concrete topping, the details specified shall be in accordance with Figure 15.

Figure 15 Details where recesses of up to 50mm are required for rebated showers



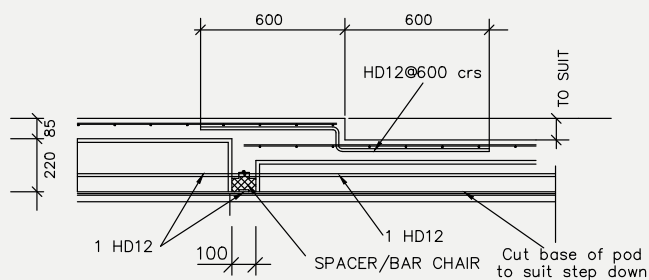
RIB RAFT FLOOR - SET-DOWN DETAIL FOR MAX. 50mm REBATED SHOWER



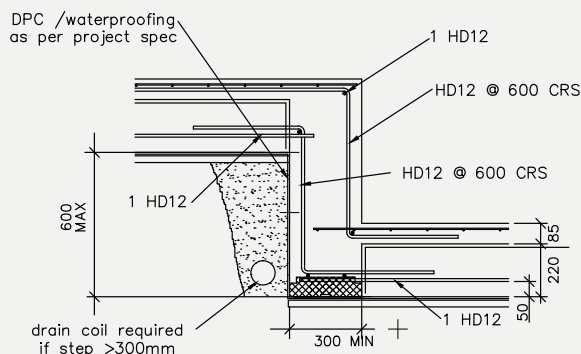
RIB RAFT FLOOR - SET-DOWN DETAIL FOR MAX. 50mm REBATED SHOWER

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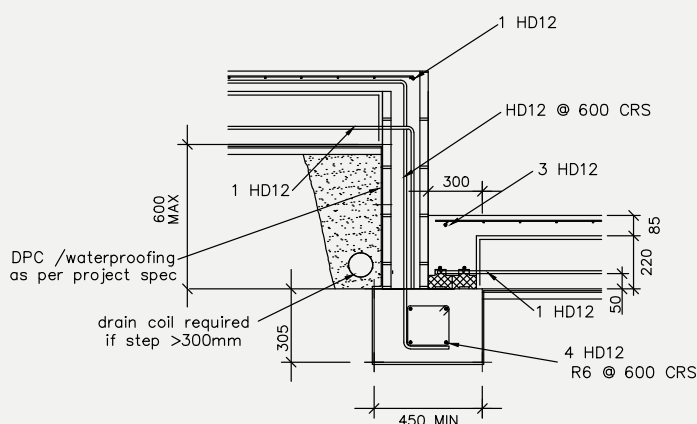
Figure 16 Details where step downs are required in the floor



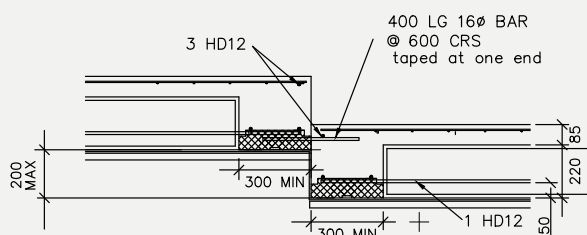
7
S2
SET-DOWN
DETAIL FOR STEP
UP TO 100mm
1:20



9
S2
SET-DOWN DETAIL
IN CONCRETE
FOR STEP LESS
THAN 600mm
1:20



8
S2
SET-DOWN DETAIL
IN MASONRY
FOR STEP LESS
THAN 600mm
1:20



10
S2
SET-DOWN
DETAIL FOR STEP
100 TO 200mm
FOR SEPARATELY
POURED SLABS
1:20

6.3.4 Step Down Of Up To 600mm In The RibRaft® Floor

Where the site topography requires a step down in the slab, steps of upto 600mm can be accommodated using one of the details provided in Figure 16. A step down in the RibRaft® floor system anchors the floor in that location with respect to volume changes associated with drying shrinkage. As required by 6.2.2, a free joint shall be provided if the distance from the step down to the slab edge exceeds 15m.

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SECTION: INSTALLATION INFORMATION

2

1.0 THIS SECTION DETAILS THE INSTALLATION INFORMATION REQUIRED FOR THE FIRTH RIBRAFT® FLOOR SYSTEM (THE SYSTEM). FULL INFORMATION ON THE DESIGN PROCEDURES NOT REQUIRING SPECIFIC ENGINEERING INPUT, AND REQUIREMENTS FOR THE SITE ASSESSMENT ARE DESCRIBED IN SECTION 1 OF THIS MANUAL (DESIGN INFORMATION). WHERE STANDARDS ARE REFERENCED IN THIS MANUAL THESE SHALL INCLUDE THE LATEST AMENDMENTS.



2.0 SITE REQUIREMENTS

2.1 General

The site requirements of this Manual are concerned solely with the soil conditions under or immediately adjacent to the system. If a site does not comply with this Manual, the system shall be subject to specific engineering design.

This Section shall only apply for building sites such that:

- > The ground is as specified in Section 1 of this Manual;
- > Any system erected at the top of a slope (whether fill compacted in accordance with NZS4431, or natural ground) shall be located as shown in Figure 1 so that the finished ground is always outside the dashed line shown. (The vertical distance, V, shall be measured to 50mm below the underside of the slab).

Where the finished ground does not comply with Figure 1, the slope shall be retained by a specifically designed retaining wall.

2.2 Temporary Excavations

No excavation shall take place at a location or in a manner where the stability of the foundation material is likely to be compromised. The backfilled material shall match the compaction and strength of, and have similar properties to, the surrounding material. The sides of the excavation shall be propped as necessary.

Temporary excavations shall be open for no longer than 48 hours and shall take place only above the critical depth line as shown on Figure 2. Should temporary excavations be required below this line, specific engineering design is required.

2.3 Surface Water

Surface water from the site shall not flow across the slab platform. For example, on cut and fill sites the ground uphill from the system shall be graded to direct any surface run-off away from the system as shown in Figure 3.

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Figure 1
Relationship
Of RibRaft®
To Sloping
Ground Surface

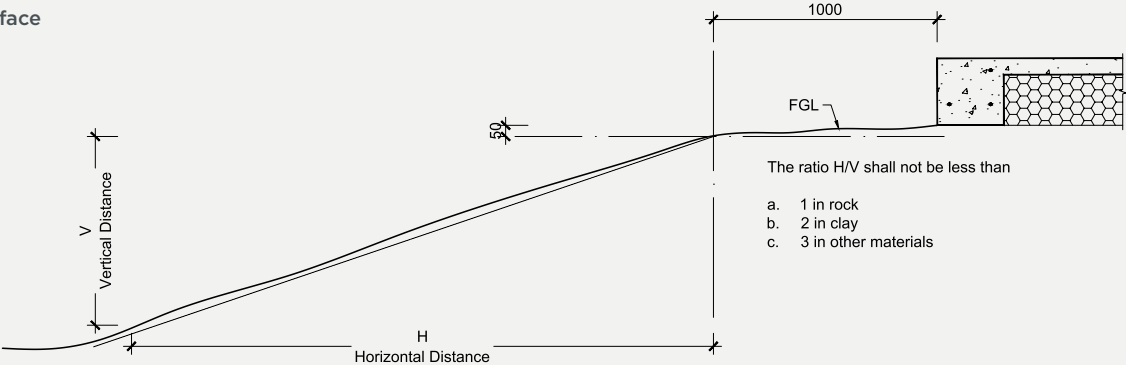


Figure 2
Temporary
Excavation
Limited

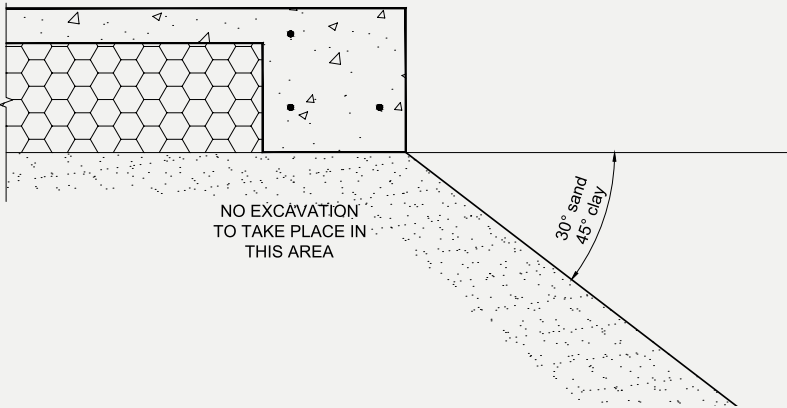
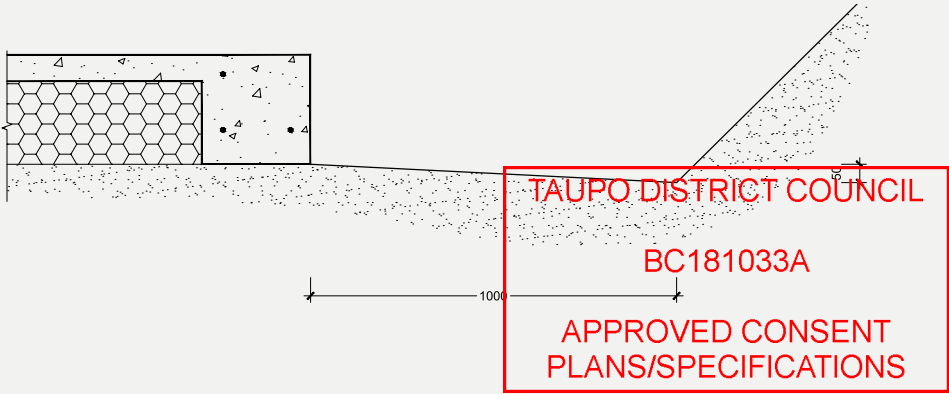


Figure 3
Site Grading



3.0 INSTALLATION PROCEDURE

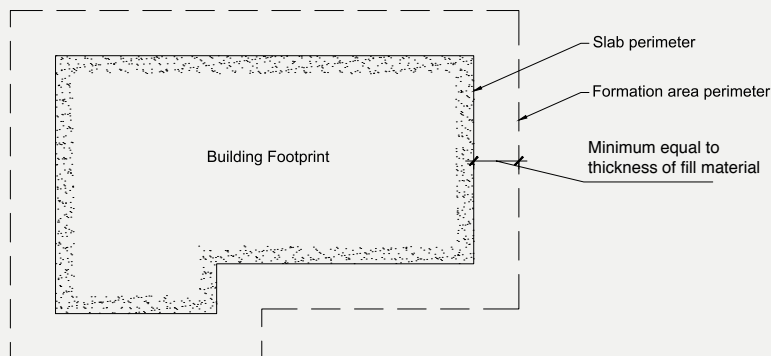
3.1 Site Preparation

All vegetation, topsoil and other organic or deleterious material shall be removed from the area to be covered by the building (formation area) prior to commencing construction of the system.

3.2 Earthworks

The formation area shall be cut or filled to a level approximately 330mm below finished floor level. Where fill is required to achieve this level, the fill shall be certified by a geotechnical engineer (outside the scope of this Manual) or shall be granular fill in accordance with Clause 7.5.3 of NZS 3604:2011 "Timber Framed Buildings". The formation area shall also extend a distance equal to the thickness of the fill material beyond the slab perimeter as shown in Figure 4. The installer shall confirm the acceptability of the ground over the entire building platform before proceeding with the construction. Refer to Clause 3.5 of Section 1 (Design Information) for requirements.

Figure 4 Plan of Formation Area



3.3 Shear Keys

Where shear keys are required, the holes shall be drilled following the site clearing and earthworks, in accordance with Clause 4 in this section, and prior to the construction of the system commencing.

3.4 Plumbing and Services

Plumbing and services required beneath the system should preferably be conveyed underground to their plan location then brought up through the system. The trenching, placing, and bedding of the pipes/ducts and the backfilling of the trenches shall conform to the requirements of the consent documentation. Services shall not run along ribs or edge beams. The maximum diameters of the services shall be as dictated in Clause 6.3 of Section 1.

Where required, the services can be installed by removing unnecessary polystyrene and placing pipes within the pod depth. All pipes shall be held firmly in place and have temporary end covers. Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in Figure 14 (Section 1) services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in Figure 13 (section 1) at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

Where the services pass through the top of the pods, the opening shall be sealed to prevent materials entering the

subfloor cavities. (This can be achieved with Denso tape and a type of easily compressible foam.)

Larger penetrations or voids that are required, up to 450mm square (e.g. for shower waste/traps), shall be installed in accordance with all the conditions of this paragraph. These openings shall be trimmed with 1 HD12 bar (Grade 500E) 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower ensure that the pods are sealed/covers are

Where a recess of up to 50mm is required in the topping to provide a rebate for a shower, the construction details shall be as shown in Figure 15 (Section 1).

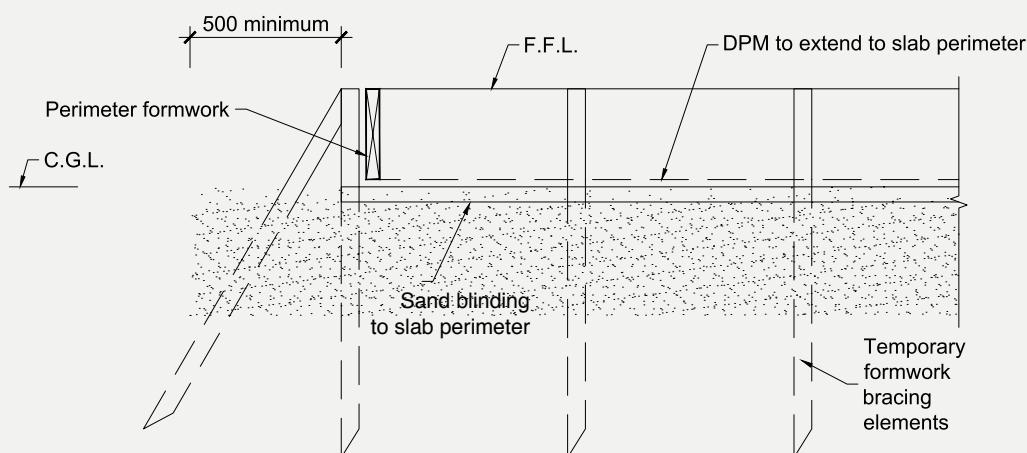
3.5 Sand Blinding

A layer of sand shall be placed, screeded and compacted over the building platform, extending to the outside edge of the perimeter foundation, refer Figure 5. The maximum thickness of this blinding layer shall be 50mm. The surface shall be level and a minimum of 305mm below finished floor level. A small plate compactor, vibrating roller or similar, should be used to compact the sand blinding layer. When the building platform is clay, it is essential that the blinding sand is compacted onto a clay surface that has not been softened by construction activities. If the clay has been softened (i.e. has a muddy surface layer due to construction activities), remove the softened material from under the RibRaft® ribs before placing the sand. If excavation lowers the clay surface to more than 50mm below the underside of the RibRaft®, fill shall be placed in accordance with Clause 7.5.3 of NZS 3604:2011 "Timber Framed Buildings". The sand is required to be level to ensure that pods remain stable throughout the installation of the system.

3.6 Damp Proof Membrane

The damp proof membrane (DPM) material shall be polyethylene sheet in accordance with NZS 3604:2011. The DPM shall be laid over the entire building platform directly on top of the sand blinding layer, extending to the outside of the edge beam – refer Figure 5 below. The joints shall be lapped not less than 150mm and sealed with pressure sensitive tape not less than 50mm wide. All penetrations of the DPM by plumbing and services or punctures during construction shall also be sealed with pressure sensitive tape. The DPM may extend beyond the edge of the slab i.e. underneath the formwork, or may be folded and stapled up the inside of the formwork. The minimum requirement is that the DPM extends to the outside of the edge beam. It is very important that the DPM is not bunched up at the formwork. The installer shall ensure a square and tidy finish at the underside and at all corners of the edge beam.

Figure 5 Sand blinding / DPM / Formwork Details



3.7 Edge Formwork

The edge formwork shall be constructed ensuring that the requirements of NZS 3109:1997 "Concrete Construction" are adhered to. The formwork shall be adequately supported and braced to prevent any buckling or warping. If the wall is to be constructed in masonry veneer, formwork for a masonry veneer rebate should be adequately fixed to the perimeter formwork.

Thorough cleaning of re-useable formwork and the use of release agents enhances the life and performance of formwork and maintains a quality surface finish.

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3.8 Laying the Pods and Spacers

The Firth RibRaft® polystyrene pods shall be laid out over the DPM in a regular waffle pattern ensuring direct contact with the ground across the entire pod. The edge beam shall be formed using the Firth approved 300mm spacers (refer Figure 9). These shall be placed at a maximum of 1200mm centres along the perimeter of the slab and one per pod or part pod. Ribs supporting a load bearing wall shall be formed using a minimum of one Firth approved 300mm spacer along the edge of each pod or part pod.

Except where a 300mm wide rib is required, each pod or part pod shall always be separated by 100mm using a minimum of one Firth approved 100mm spacer along each edge of each pod or part pod. The ribs in both directions shall form a waffle pattern throughout the slab. It is essential that the ribs and edge beams are straight when the concrete is poured, i.e. the pods need to be lined up. Figure 6 shows a detailed layout of the pods and spacers.

Figure 6
Detailed layout
of Pods and
spacers (mesh
and top steel omitted
for clarity)

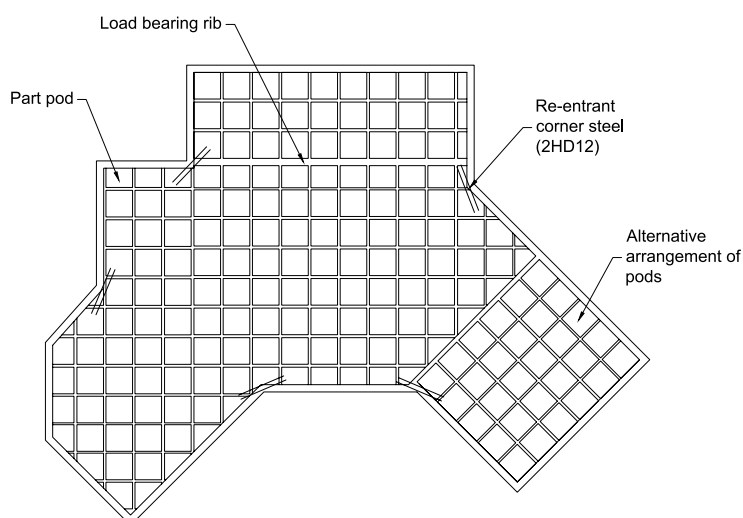
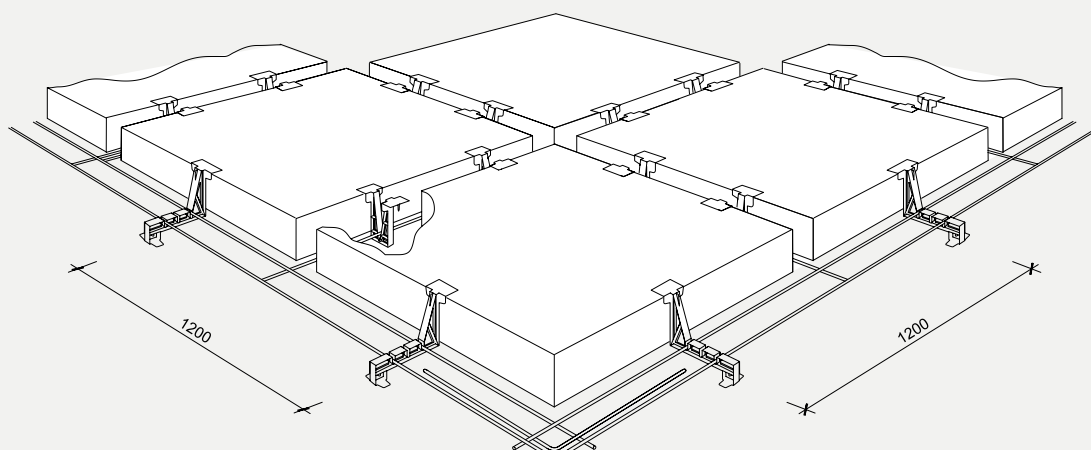


Figure 7 Typical Pod And Rib Layout

Where the shape of the house plan dictates, it may be more practical to consider the floor to be made up of different segments. The pods in each segment shall be in a regular waffle pattern – refer right hand side of Figure 7. Where these segments meet, the pods shall be cut to suit and the ribs made to join. The non right-angle rib junctions created by this approach are acceptable.

Alternatively, it is also acceptable to keep the orientation of the pods constant throughout the plan and have non right-angle junctions between the ribs and edge beam – refer left hand side of Figure 7.

As can be seen from Figure 7, it is not necessary for the pods to line up perfectly with the edge beam. It is acceptable to cut the pods (i.e. use part pods).

3.9 Reinforcing Steel

Reinforcing bars shall conform to NZS 4671:2001 “Steel Reinforcing Materials”. All bars shall be of deformed type (Grade 500E). All bends shall be made cold without fracture and in accordance with the bend diameters given in NZS 3109 “Concrete Construction”. Welded lap joints are not permitted.

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m, a lower characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 200mm centres, and ductility class L or E, hereafter referred to as “mesh”. The presence of Class E reinforcing bars in the ribs and beams provides adequate ductility of the system which allow the use of class L mesh. Typically the topping mesh 400 x 400mm will be 665 mesh (class L) or SE62 ductile mesh, each being equally applicable.

Figure 10 shows the standard layout of the spacers and the steel in the edge beam and the standard ribs.

3.9.1 Edge Beam Steel

Two edge beam reinforcing bars shall be placed in the bottom of the edge beam and supported in the correct position by the Firth spacers, as shown in Figure 10. One edge beam bar shall be tied below the mesh at the perimeter of the area covered by the polystyrene pods as shown in Figure 10.

All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). Tying of the edge beam steel is only required at corners. Figure 8 shows the layout for the edge beam bottom steel bars at the corner. The inner bottom bars and the top bars shall cross each other and extend to 75mm from the outside face of the edge beam as shown. These bars shall be tied together where they cross. For solutions using veneer rebates the top bars shall terminate 50mm from the inside face of the rebate and be tied where they cross.

3.9.2 Rib Steel

Rib reinforcing steel shall be placed in the bottom of the internal ribs and supported in the correct position by the Firth or Wilton Joubert spacers (WJ). Figure 9 shows the detail of the Firth and WJ spacers, and Figure 10 shows a detailed section identifying how the steel is located in the spacers. The 300mm spacer shall be used for the 300mm wide internal ribs. These spacers ensure that cover to DPM below the base is greater than 45mm and cover to the exterior perimeter is 75mm.

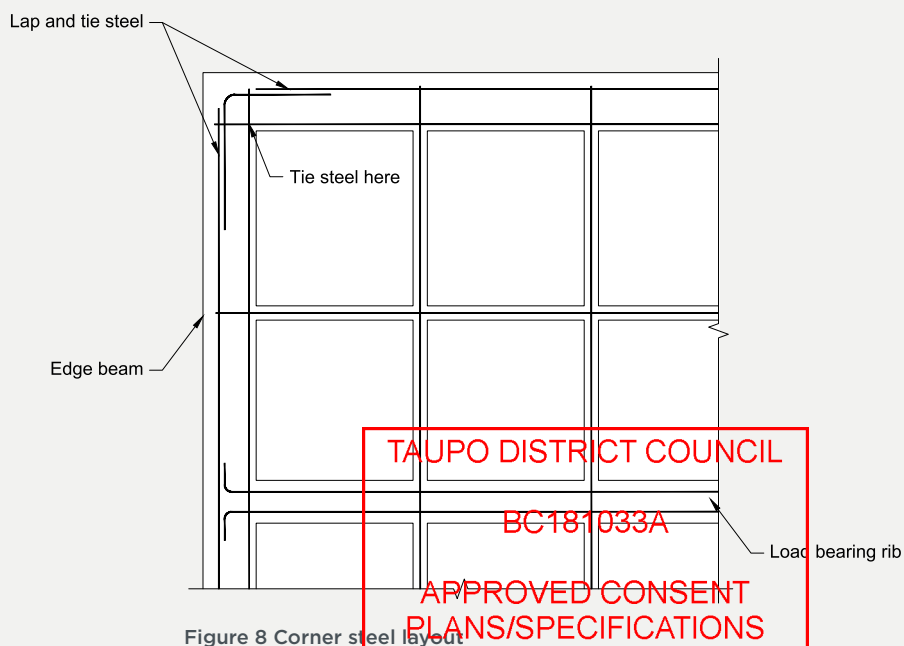
All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). At junctions with the edge beam, each rib steel bar shall sit on top of the edge beam bars, and extend to the outermost bar. The 75mm cover to the edge of the beam shall still be allowed for. One HD12 bar (Grade 500E) shall be placed in the bottom of each 300mm wide rib. For perimeter 300mm ribs a HD12 bar is also required in the top at the beam.

3.9.3 Mesh Reinforcing

Mesh reinforcing shall be placed over the pods and supported on 40mm mesh chairs spaced at a minimum of 1200mm centres, with at least two mesh chairs placed per pod and at least one per part pod. At laps the overlap of the outermost cross wires of the sheets shall be the spacing of the wires plus 50mm.

3.9.4 Re-entrant Corner Steel

Two HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner as detailed in Figure 7 (this steel is to help reduce the width of cracks that may develop at this location)



3.10 Concrete Installation

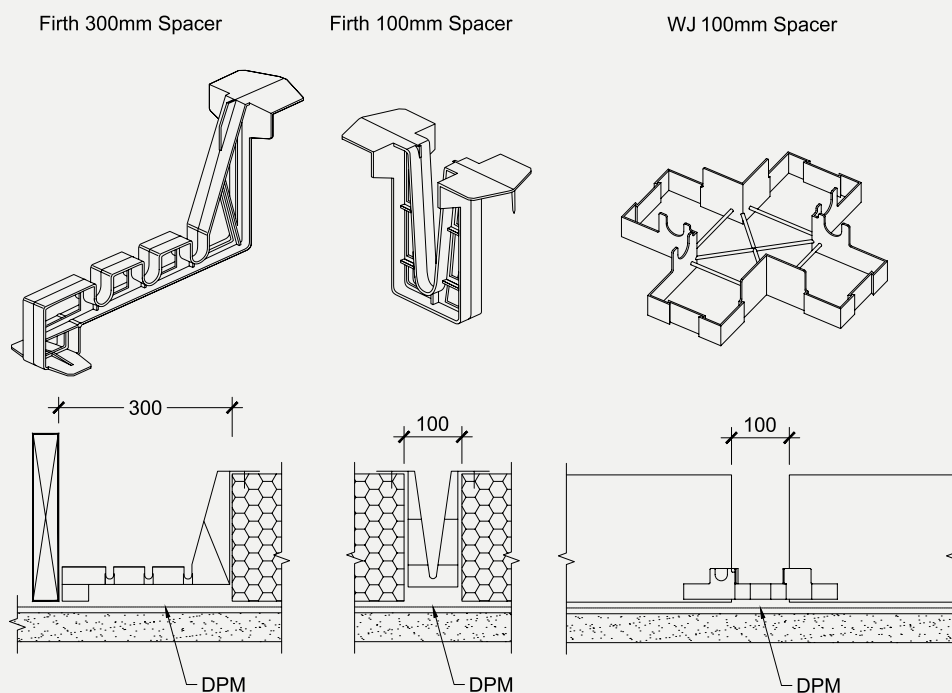
To comply with this manual, Firth Certified Concrete® must be used. Concrete placing, finishing and curing shall be in accordance with NZS 3109:1997, Clause 7.

3.10.1 Placing

Only Raftmix or Raftmix25 concrete supplied by Firth Industries, shall be used in the floor. These two different concrete mixes shall be used in the following instances:

- > Raftmix – a 20MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix
- > Raftmix25 – a 25MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix. This mix shall be specified for buildings constructed in the ‘sea spray zone’ (i.e. within 500m of the sea including harbors, within 100m of tidal estuaries or inlets, on offshore islands and elsewhere defined as exposure Zone D in 4.2.3.3 of NZS3604).

Figure 9
Spacer
Details



The concrete supplied by Firth shall be poured in such a way to ensure that the pods remain in position during placing (Firth recommends that small amounts of concrete be placed on top of the pods prior to the ribs being filled). The concrete shall be compacted with the use of an immersion vibrator around all steel and into all corners of the formwork.

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3.10.2 Finishing

Screeding with the aid of a level shall commence immediately after compaction. Unless specifically installed as a screeding datum, the top of the formwork shall not be assumed as level and thus shall not be used for screeding purposes. Final finishing with a trowel shall take place after all the bleed water has evaporated. The edge of the slab and rebates shall be tooled to prevent chipping of the top of the slab.

Early age care of the slab shall be in accordance with good trade practice appropriate for the weather conditions – refer CCANZ website sections if further guidance is required:

www.ccanz.org.nz/page/Early-Age-Crack-Control.aspx

www.ccanz.org.nz/page/Hot-and-Cold-Weather-Concreting.aspx

Early Age Crack Control

Hot and Cold Weather Concreting

The surface shall be a blemish-free surface to class U3 finish (Refer NZS 3114:1987 “Specification for Concrete Finishes”).

3.10.3 Curing

Proper curing of the concrete must take place immediately after finishing the concrete. One of the following methods of curing is recommended:

- > Ponding or continuous sprinkling of water.
- > Placing a wet covering or plastic membrane over the slab.
- > The use of liquid membrane curing compounds. However if these are used, they must be compatible with any subsequent applied surfacing.

3.11 Shrinkage Control Joints

Shrinkage control joints reduce the risk of unwanted cracks, and their placement needs to be carefully considered where uncontrolled cracking could be unacceptable. Two types are described here: saw cut joints (which are tied joints), and free joints.

3.11.1 Saw Cut Joints

Saw cuts are located at positions in which the concrete is likely to crack due to stresses induced by restrained shrinkage. The aim of providing them is for the concrete to crack at the bottom of the saw cut thus minimizing the potential for a visible crack wandering over the surface. The level of reinforcement provided in a RibRaft® means that cracks have no structural implications being only an aesthetics issue. Factors to consider are the type of floor finish, the location of ribs and ground beams, underfloor heating and the effect of piles restraining shrinkage.

When warm sunny days are followed by cool nights, the change in temperature can cause cracking. Hence preference should be given to using early entry saws which are used immediately after finishing. Shrinkage control joints cut using diamond blades shall be cut as early as possible which is typically within 24 hours of hardening in summer, and 48 hours in winter. They shall be cut to a depth of 25mm. Shrinkage control joints do not guarantee to eliminate all visible or unwanted cracks.

Joints shall be positioned to coincide with major changes in floor plan. Where concrete is to be exposed, for example in a garage, or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 5m. Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 1.5:1. Shrinkage control joints shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib, then the joint shall be located directly above one edge of that rib.

In order to limit the width of cracks at re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2 HD12 bars (grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 7.

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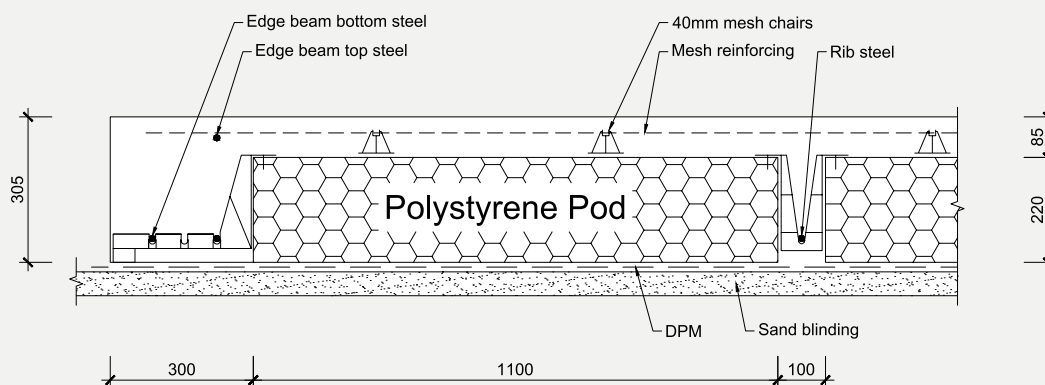
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3.11.2 Free Joints

Where the length of the floor exceeds 30m a free joint shall be provided as detailed in Section 1, Figure 12. Movement, shrinkage and thermal, will occur over this joint so it shall be positioned to minimize the impact of this movement on floor coverings and wall elements.

Where the bottom of the RibRaft® is not flat (for example the floor incorporates a step down), free joints shall be provided if the distance from the step down to edge of slab exceeds 15m.

Figure 10 Detailed Section



3.12 Removal of Formwork

The formwork shall not be removed prior to 12 hours after the slab has been finished. No installation loads are to be placed on the system before adequate curing has taken place.

3.14 Landscaping/Paving

Landscaping and/or paving adjacent to the slab shall be kept as a minimum the specified distance below finished floor level as required by NZS 3604:2011. The landscaping shall allow for large trees to be kept sufficiently away from the edge of the slab. This is to prevent the tree roots from disturbing the soil moisture conditions under the slab. As a guide, trees should be as far away from the edge of the slab as they are tall when fully grown.

3.13 Masonry Veneer

Where the building is to be clad with masonry veneer, the rebate in the edge beam shall be waterproofed with a bituminous sealer due to the possibility of ponding of water. Firth recommends a Flintcote® or equivalent coating on both the vertical and horizontal faces of the rebate.

3.15 Ongoing Maintenance

The building owner shall ensure that the ground surrounding the system be maintained so that the integrity of the system is not jeopardised. In other words, at no time shall the ground immediately adjacent to the system be allowed to settle away to expose the underside of the slab.

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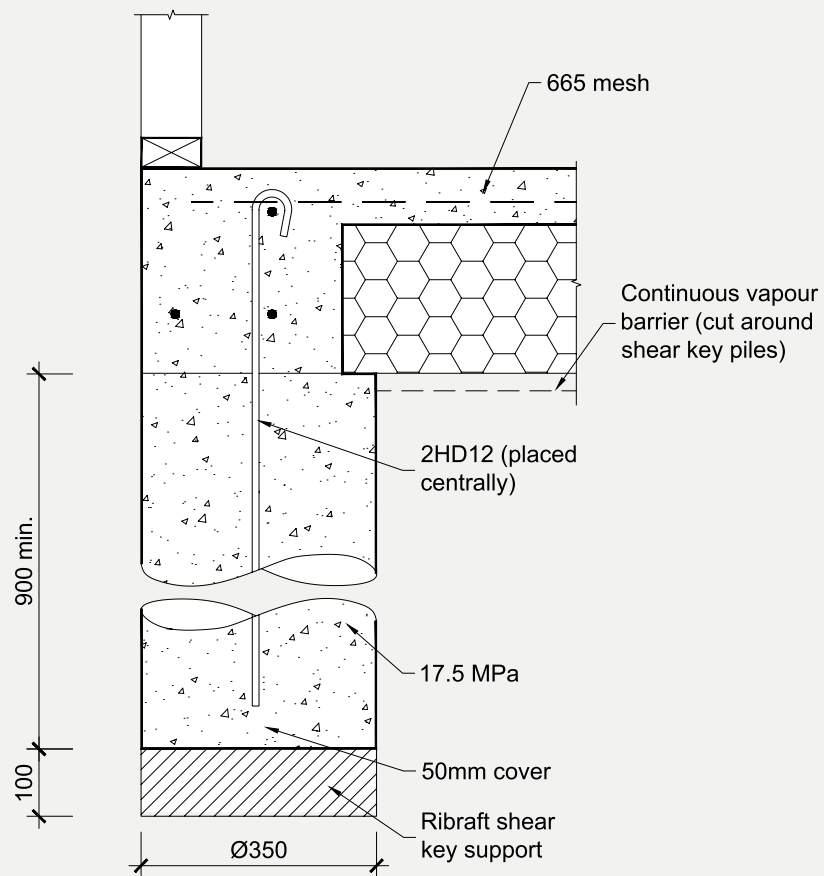
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4.0 SHEAR KEYS

Shear keys, if required, shall be provided to conform to the requirements of Section 1 of this Manual. Holes for the shear keys shall be drilled at least 1000mm deep. Into the bottom of each hole a RibRaft® Shear Key Support shall be placed. Every precaution shall be taken to ensure that the shear key support is laid level and at the base of the hole. The minimum depth of concrete placed on the support shall be 900mm. Refer to Figure 11 for construction details.

The connection steel (2HD12 Grade 500E) shall be secured in place and held during pouring to ensure the bars are correctly located. The concrete for the shear keys can be placed separately to the rest of the floor and shall be finished level to the top of the sand blinding layer, or poured in one pour with the RibRaft® floor. If poured separately the top surface of the shear key shall be finished rough to ensure a good join to the Firth Raftmix concrete in the system and the DPM shall be neatly cut around the shear keys.

Figure 11 Shear Pile Construction Detail



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SECTION: VERIFICATION

3

1.0 DESIGN

Verification that the design complies with the structural limitation outlined in this Manual is the responsibility of the designer, and shall be confirmed by the Building Control Authority issuing the Building Consent. Solutions outside the limitations outlined in this Manual will require specific engineering design.

2.0 CONSTRUCTION

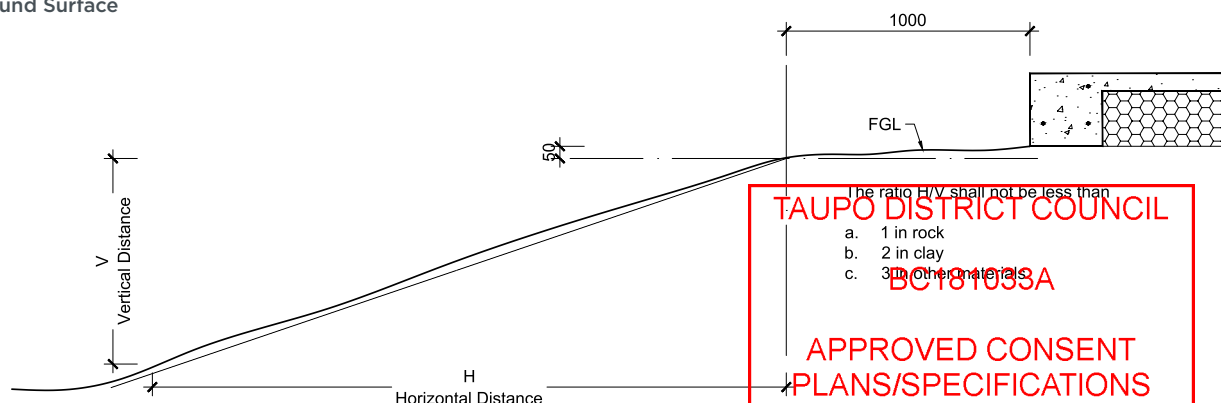
The RibRaft® foundation system has been designed to accommodate structures complying with the non specific design standards NZS3604 or NZS4229. With these types of structures the Building Control Authority specifies the inspections required and often conducts these. A similar construction verification process shall be applied to the RibRaft® system.

To assist inspection the following check list has been prepared for structures complying with the limitation:

PRE-POUR INSPECTION CHECK LIST

- ☐ GOOD GROUND CONFIRMED AS PER NZS3604, CLAUSE 3.1.3. OR SCALA OR SHEAR VANES TESTS CONFIRM ADEQUATE BEARING CAPACITY.
- ☐ VEGETATION, TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL REMOVED.
- ☐ PROXIMITY TO SLOPE-GROUND SURFACE IS ALWAYS ABOVE DASH LINE SHOWN IN FIGURE 1.
- ☐ SHEAR PILES (WHERE REQUIRED) IN PLACE AND REINFORCEMENT PROTRUDING.
- ☐ FORMATION AREA EXTENDS AT LEAST THE DEPTH OF GRANULAR FILL BEYOND BUILDING FOOTPRINT.
- ☐ STEPS IN THE FORMATION ARE DETAILED IN ACCORDANCE WITH THIS MANUAL.

Figure 1
Relationship of
RibRaft® To Sloping
Ground Surface



PRE-LAYOUT INSPECTION CHECK LIST: DAMP PROOF MEMBRANE IN PLACE

PERIMETER FOUNDATION	☐ WIDTH 300MM ⁽¹⁾ ☐ REINFORCEMENT 2 X HD12 BOTTOM, 1 X HD12 TOP ☐ FIRTH SUPPLIED SPACER USED AT 1.2M MAXIMUM CENTRES
INTERNAL RIBS	☐ WIDTH 100MM ☐ REINFORCEMENT 1 X HD12 ☐ FIRTH SUPPLIED SPACER, MAX SPACING OF ONE PER POD OR PART POD
LOAD BEARING RIBS	☐ WIDTH 300MM ☐ REINFORCEMENT 2 X HD12 BOTTOM ☐ FIRTH SUPPLIED SPACER, MAX SPACING OF ONE PER POD OR PART POD
PODS	☐ FIRTH SUPPLIED RIBRAFT® POD
MESH	☐ 40MM CHAIRS, 1.2M MAX CENTRES, MIN TWO PER POD OR ONE PER PART POD ☐ MESH IN PLACE AND 665 OR SE62 ☐ MESH LAPS OVERLAP OF OUTERMOST CROSSWIRE = MESH SPACING + 50MM
REINFORCEMENT	☐ 2 X HD12 BARS 1.2M LONG PROVIDED AT RE-ENTRANT CORNERS ☐ LAPS FOR 12MM REINFORCEMENT MINIMUM OF 720MM
CONCRETE	☐ COVER TO PODS MINIMUM OF 85MM OR 110MM IF INFLOOR HEATING USED. ☐ FIRTH RAFTMIX ORDERED
SERVICE PENETRATIONS	☐ NO REINFORCEMENT (WITH EXCEPTION OF MESH) CUT TO ALLOW PASSAGE OF SERVICE PIPES. REFER CLAUSE 6.3 OF SECTION 1 FOR EXCEPTIONS ☐ PIPES WRAPPED WITH MINIMUM 6MM THICKNESS OF IMPERMEABLE COMPRESSIBLE MATERIAL WHERE IN CONTACT WITH CONCRETE ☐ DIAMETER/SIZE OF PENETRATIONS AS PER TABLE 6, SECTION 1 OF THIS MANUAL

(1) At locations of service penetrations the width of the perimeter foundation maybe locally increased. Refer Figure 14 Section 1 for details.

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CONCRETE & MASONRY PRODUCTS: A SUSTAINABLE BUILDING OPTION & SOLUTION

- | | |
|---|---|
| ✓ Environmentally compliant manufacturing plants | ✓ Most wash water returned from construction sites |
| ✓ Surplus water and some aggregates recycled | ✓ Highly durable, low maintenance buildings and no rot |
| ✓ Low transport impacts | ✓ High degree of noise control |
| ✓ Leftover concrete returned from construction sites | ✓ Inherent fire resistance |
| ✓ Passive solar heated thermal mass makes completed buildings more energy-efficient | ✓ Overall longer effective building life |
| | ✓ Demolished concrete can be recycled as hard fill or aggregate |

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0800 FIRTH 1 (347841)
FIRTH.CO.NZ



CERTIFICATE OF CONFORMITY

This is to certify that

Firth Ribraff® Floor System



Complies with the New Zealand Building Code:

1. B1.3.1, B1.3.2 & B1.3.3 - Structure
2. B2.3.1(a) - Durability
3. E2.3.3 - External Moisture
4. F2.3.1 - Hazardous Building Materials
5. H1.3.1 - Energy Efficiency (Refer to limitation c)

Product Purpose or Use

The Firth Ribraff® Floor System is a method of concrete floor construction, suitable for all slab-on ground concrete floors for domestic or residential buildings, which fall within the scope of NZS 3604:2011 – Timber-framed buildings.

Subject to the following Conditions & Limitations:

- a. Must be installed in accordance with the [Firth Ribraff® Technical Manual FIR0586 Dated October 2018](#).
- b. Specified products must be supplied by Firth Industries or a Firth Industries approved supplier.
- c. The energy efficiency rating of the Firth Ribraff® Floor System relates only to the floor.
- d. Nothing in this document should be construed as a warranty or guarantee by CMI, and the only applicable warranties will be those provided by the Certificate Holder.
- e. The certificate holder must maintain compliance with the conditions set out in Section 15 of the Building (Product Certification) Regulations 2008.

Product Description

The Firth Ribraff® Floor System comprises of polystyrene pods, steel reinforcing rods, plastic spacers and Firth Ribraff® concrete.

Refer A1 below for further detail.

Certificate Holder

Fletcher Concrete and Infrastructure Ltd.

T/A Firth Industries
NZBN: 9429037777548
585 Great South Road
Penrose Auckland NZ 1061
Ph: 0800 800 576
W: www.firth.co.nz

Certification Body

CertMark International Pty Ltd

ABN 90 111 217 568
JAS-ANZ Accreditation No. Z4450210AK
PO Box 321 Tauranga 2121
+64 (0) 9 571 8246
www.CertMark.org

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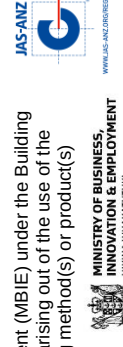
Date of Issue

CM40015-I02-R00

Certificate Number

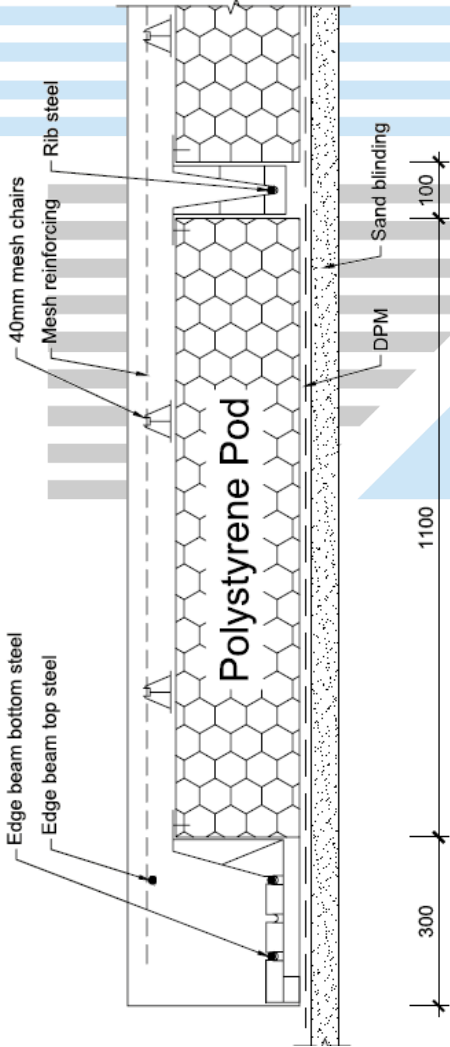

John Thorpe
CertMark International Pty Ltd

- This certificate is issued by an independent certification body accredited by the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation & Employment (MBIE) under the Building Act 2004. MBIE does not in any way warrant, guarantee, or represent that the building method or product the subject of this certificate conforms to the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product. MBIE disclaims, to the extent permitted by law, all liability (including negligence) for claims of losses, expenses, damages, and costs arising as a result of the use of the building method(s) or product(s) referred to in this certificate
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A1 Product or System Specification

Typically, the Firth RibRaft® Floor System consists of an 85mm thick slab supported by a grid of ribs normally 100mm wide at 1200mm x 1200mm centres. The overall depth is 305mm. Edge beams and ribs under load bearing walls are 300mm wide to provide for the extra load carried by these members. Where heating coils of less than 25mm diameter are embedded in the topping, the slab concrete thickness shall be 110mm meaning the overall thickness is 330mm. Where the top floor surface is honed to provide a decorative finish, a slab thickness of 100mm (before honing) should be specified.



Components

Pods	Firth RibRaft® polystyrene pods 1100mm square and 220mm thick are placed directly on levelled ground and are arranged in such a way as to form a reinforced concrete floor slab with a grid of reinforced concrete ribs and edge beams when concrete is placed onto them. Pods may be cut to suit specific architecture layout and also to accommodate services. 300mm thick pods are available if needed for deeper edge beams and internal ribs.
Steel	Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m ² , a lower characteristic stress of 500MPa, or a configuration of orthogonal bars between 150 to 200mm centres, and ductility class L or E, hereafter referred to as "mesh". The presence of Class E reinforcing bars in the ribs and beams provides adequate ductility of the system which allows the use of class L mesh. Typically, the topping mesh reinforcement will be 665 mesh (class L) or SE62 ductile mesh, each being equally applicable. The reinforcing bars in the ribs and edge beams shall conform to AS/NZS 4671:2001 "Steel Reinforcing Materials". Specifically designed spacers are used to position the polystyrene pods and the rib and edge beam reinforcing steel bars in a secure manner until the concrete is placed. The reinforcing mesh is held in place by mesh chairs. Conventional timber or steel formwork is used to form the edge of the slab.
Concrete	One of the following Firth concrete products shall be used in the system: 1. Firth Pumpmix: a 20MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix. 2. Firth Rammix25: a 25MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix. This mix shall be specified for buildings constructed in the 'sea spray zone' (i.e. within 500m of the sea including harbours, within 100m of tidal estuaries or inlets, on offshore islands and elsewhere defined as exposure zone D in 4.2.3.3 of NZS 3604:2011).

Source: Firth RibRaft® Technical Manual FIR0586 Dated October 2018.

A2 Installation Requirements

The Firth RibRaft® Floor System must be constructed in accordance with [Manufacturers Technical Manual \(FIR0586\) Dated October 2018](#).

A3 Other Relevant Technical Data

The Firth RibRaft® Floor System, if designed, installed, used and maintained in accordance with the statements and conditions of this Certificate of Conformity, will meet the following provisions of the New Zealand Building Code (NZBC):

Clause(s)	Compliance
B1.3.1, B1.3.2 & B1.3.3	Engineering Opinions, based on testing and load calculations, confirm the systems compliance with B1.3.1, B1.3.2 & B1.3.3.
B2.3.1(a)	Durability of 50 years has been confirmed.
E2.3.3	Reliance is placed on the 0.25 polythene membrane placed beneath the pods to provide sufficient resistance to vapour transmission from the ground into the substructure and building as detailed in NZS 3604:2011; therefore, compliance has been demonstrated.
F2.3.1	The system has been confirmed as non-hazardous.
H1.3.1	R-values confirm compliance of the system to H1.3.1.

Structural Limitations

Specific engineering input shall not be required only where the structure supported by the system complies with the following criteria:

- The structure supported by the system is constructed in a location where the Seismic Hazard Factor Z (defined in NZS 1170.5:2004 "Structural design actions, Part 5: Earthquake Actions") is less than or equal to 0.45.
- The system is laid level or has a maximum step of 600mm as detailed in [Manufacturers Technical Manual \(FIR0586\) Dated October 2018](#).
- The structure supported by the system has no basement, part basement or foundation walls.
- The total height from the lowest ground level to the highest point of the roof shall not exceed 10m.
- The structure supported by the system has a roof pitch limited to 60o maximum from the horizontal.
- The maximum height of a single or top storey is 4.8m and any other storey is 3m.
- Only ground floor walls of the structure supported by the system are permitted to be "heavy external walls" (as defined in Clause 3.3 of the [Firth RibRaft® Technical Manual FIR0586 Dated October 2018](#)).
- The roof truss span shall be less than or equal to 12m when the roof and ceiling loads are supported entirely by the external walls. Where internal support of roof trusses is used the footings below point loads identified by the truss designer shall comply with this Manual.
- Where internal load bearing walls are used to support the roof or floors, the loaded dimensions stated in Tables 8.2 and 14.10 of NZS 3604:2011 shall apply, and the load bearing wall shall be supported on a 300mm wide load bearing rib as detailed in the Firth RibRaft® Technical Manual FIR0586 Dated October 2018.
- Floors may be of unlimited size provided that the maximum dimension between free joints shall not exceed 30m. Where free joints are required they should be detailed in accordance with NZS 3604:2011.

Source: [Firth RibRaft® Technical Manual FIR0586 Dated October 2018](#).

- This certificate is issued by an independent certification body accredited by the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation & Employment (MBIE) under the Building Act 2004. MBIE does not in any way warrant, guarantee, or represent that the building method or product the subject of this certificate conforms to the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product. MBIE disclaims, to the extent permitted by law, all liability (including negligence) for claims of losses, expenses, damages, and costs arising as a result of the use of the building method(s) or product(s) referred to in this certificate
- It is advised to check that this Certificate of Conformity is currently valid and not withdrawn, suspended or superseded by a later issue by referring to the MBIE website, www.mbie.govt.nz
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Basis of CodeMark Certification

CMI has followed the following procedures for certifying the Firth RibRaft® Floor System;

- Testing and assessment of the Firth RibRaft® Floor System;
- Assessing a quality plan for the Firth RibRaft® Floor System that conforms to ISO 10005:2018 and the CodeMark Scheme Rules Version 2009.1;
- By reviewing testing of samples supplied to ascertain whether or not the product meets the performance requirements specified on this certificate; and
- Conducting site audits of the factory to verify compliance of the Firth RibRaft® Floor System.

B2 Sources of Information

- OPUS; Report 10-524A91.00; B2 Durability; May 2010.
- OPUS; Report; Seismic Shear Key; June 2006.
- Holmes Consulting Group; Structural Peer Review; September 2010.
- Holmes Consulting Group; Structural Review; May 2012.
- eCubed Building Workshop Ltd; Thermal Performance Report.
- Arbitration New Zealand; Report on compliance with the NZBC; December 2011.
- NZS 4214:2006 - Methods of determining the total thermal resistance of parts of buildings.
- AS/NZS 4671:2001 "Steel Reinforcing Materials".
- NZS 3604:2011 "Timber Framed Buildings".
- NZS 3109:1997 "Concrete Construction".
- NZS 1170.5:2004 Earthquake actions – New Zealand.

The Certificate Holder has chosen not to make the above listed reports publicly available, as they are considered commercial in confidence.

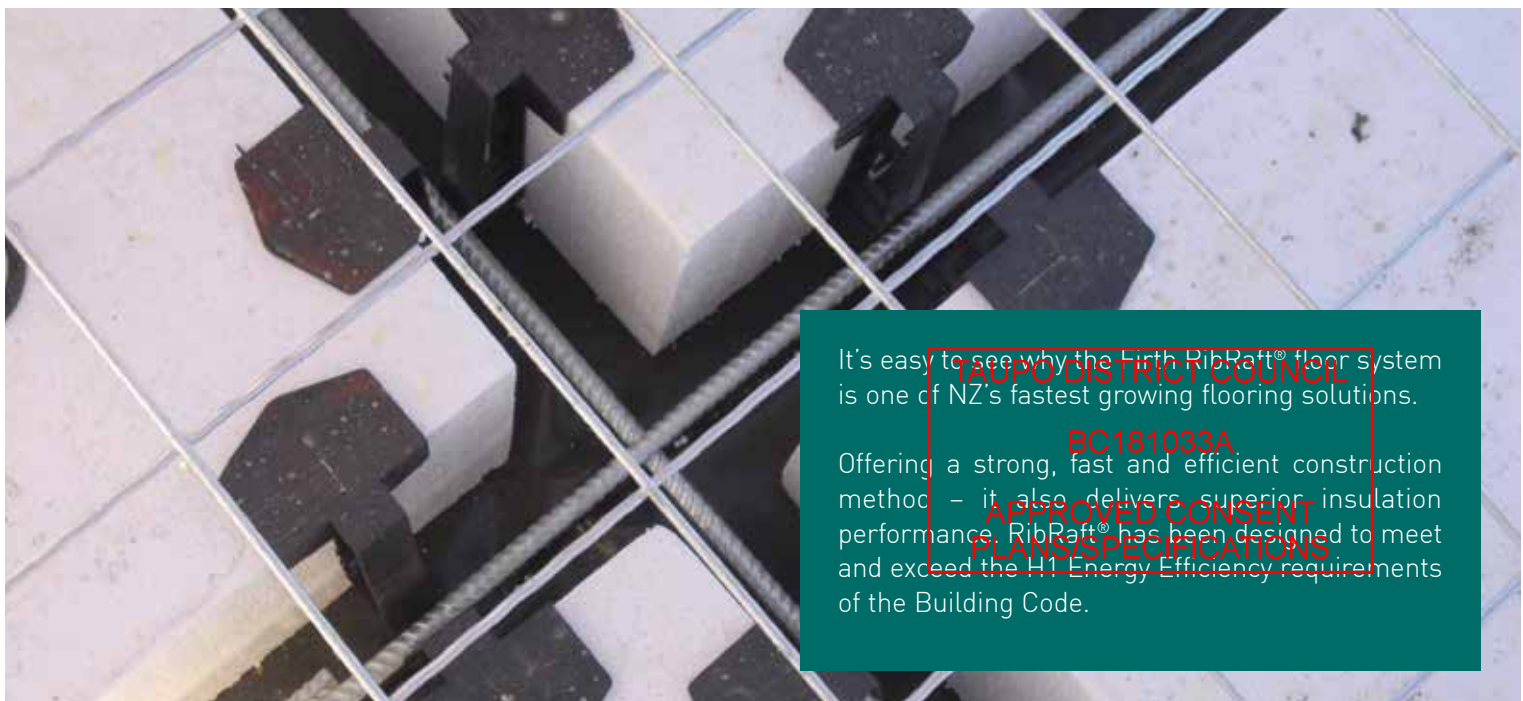
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SUPERIOR FLOOR INSULATION DESIGN SOLUTIONS



It's easy to see why the Firth RibRaft® floor system is one of NZ's fastest growing flooring solutions.

BC181033A

Offering a strong, fast and efficient construction method – it also delivers superior insulation performance. RibRaft® has been designed to meet and exceed the H1 Energy Efficiency requirements of the Building Code.

NZ BUILDING CODE REQUIREMENTS

In 2007, changes were made to Clause H1 (Energy Efficiency) of the Building Code.

The **Schedule Method** is the simplest method to achieve compliance under the Code. Using this method, the minimum R-values required for floors are:

R 1.3 m² °C/W

R 1.5 m² °C/W

}

Depending on the
glazing R- value

While the Schedule Method is simple and quick, the **Calculation Method** offers greater flexibility as it allows low R-values in some elements of the construction to be offset against higher R-values in other building elements such as floors.

THE SUPERIOR SOLUTION

The insulation performance of a concrete floor is dependent upon a number of physical factors including:

- the floor structure
- the concrete mix used in the floor structure
- the ratio of the interior surface area to external perimeter area of the floor
- the thickness of the exterior wall placed on top of the perimeter of the floor
- the positioning and properties of specific insulation elements in the floor design

The Firth RibRaft® floor system - consisting of proprietry RibRaft® polystyrene pods, plastic spacers and RaftMix™ concrete - has been further developed to meet and exceed the insulation requirements of Clause H1 of the Code.

That’s the reason why RibRaft® offers such a superior solution. Where RibRaft® floors have higher R-values than required by the Schedule Method, there is now an opportunity to have less insulation in the other building elements by using the Calculation Method.

RIBRAFT® R-VALUE DESIGN SOLUTIONS

The following wall, floor and floor area:perimeter ratio construction details describe a range of floor R-values which can only be achieved using the proprietary RibRaft® system.

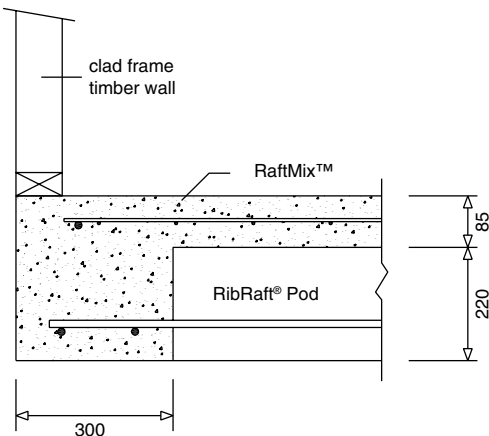
SOLUTION 1

All RibRaft® Floors

All RibRaft® floors are acceptable under the Code which assumes a minimum of R 1.3 m² °C/W.

SOLUTION 2

RibRaft® Floors with a 90mm Frame Timber Clad External Wall



IMPORTANT NOTES:

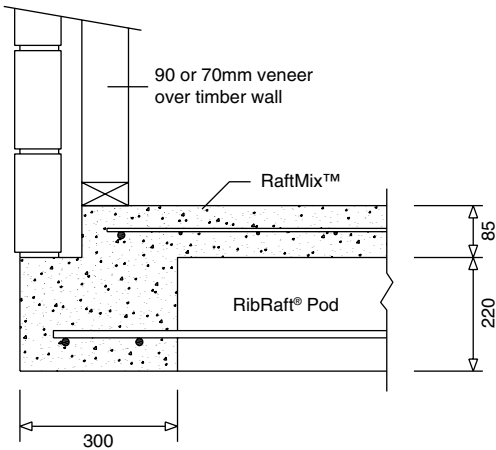
1. The R-values in the following tables only apply to RibRaft® floors which have been constructed with RaftMix™ and RibRaft® pods and spacers.
2. The R-values below are calculated in accordance with NZS 4214:2006 "Methods of Determining the Total Thermal Resistance of Parts of Buildings".

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	Floor Area To Perimeter Ratio m ² /m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m ² °C/W	1.48	1.52	1.64	1.75	1.86	1.97	2.07	2.17	2.38	2.57

SOLUTION 3

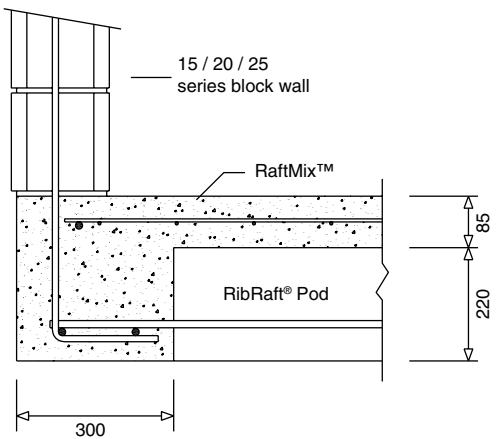
RibRaft® Floors with a 90mm Timber Frame and 70-90mm Veneer Wall with Cavity



	Floor Area To Perimeter Ratio m²/m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m² °C/W	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84

SOLUTION 4

RibRaft® Floors with a Firth Standard or HotBloc® Masonry External Wall



	Block	Floor Area To Perimeter Ratio m²/m									
		1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m² °C/W	15 series	1.48	1.60	1.73	1.85	1.96	2.08	2.19	2.30	2.51	2.72
	20 series	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84
	25 series	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95

SOLUTION 5

RibRaft® Heated Floors

Where in-floor heating is used, the combination of RaftMix™ and RibRaft® pods ensures that $(R_{IN})/(R_{OUT})$ is always less than 0.1. The R-value of the floor can

be established from the above tables. The Building Code requires that the floor has a **R-value not less than 1.9 m² °C/W**.

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DESIGN AND CONSTRUCTION

RibRaft® design and construction details can be found in the 'Firth RibRaft® Flooring Solutions' brochure and the 'Firth RibRaft® Floor System Manual'. These publications are available at www.firth.co.nz or by phoning 0800 800 576.



SUSTAINABILITY: THE FIRTH CONCRETE & CONCRETE MASONRY SUSTAINABILITY LIFECYCLE

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- ☒ Most wash water returned from construction sites
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- ☒ High degree of noise control
- ☒ Inherent fire resistance
- ☒ Overall longer effective building life
- ☒ Demolished concrete can be recycled as hard fill or aggregate

For more on Firth's contribution to building a sustainable tomorrow today, visit www.firth.co.nz or call us on 0800 800 576 for our free brochure.

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SYNTHETIC WALL UNDERLAY

The ultimate wrap, all walls, all systems

Watergate Plus 295 is a fire retardant, absorbent, breathable wall underlay. It is a white composite Non-woven polypropylene, specifically designed as a wall underlay behind exterior wall cladding. Watergate Plus 295 also offers a high degree of water resistance, with a high level of water vapour permeability.

ADVANTAGES

- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding direct fixed to framing.
- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding installed over an 18mm minimum drained cavity.
- » Is suitable for use in all Wind Zones of NZS 3604 up to, and including, "Very High", when used as standalone flexible underlay, and Extra High when used as a flexible underlay over a rigid wall underlay.
- » Will provide temporary weather protection during construction. (Max 60 Days).
- » Can be used as a non-rigid backing material for Stucco Plaster.*
- » May be used as a slip layer over rigid backing for Stucco Plaster.*
- » Is fire retardant.*
- » Unaffected by LOSP treated timber.
- » Is suitable as an air barrier in unlined walls.

* Refer technical specifications

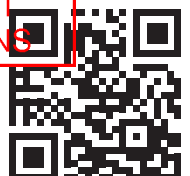
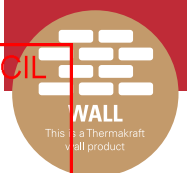


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For additional details and latest specifications www.thermakraft.co.nz or scan QR code.

BRANZ Appraised
Appraisal No.695 [2017]

Thermakraft Watergate Plus 295 – Technical Specification

Fire Retardant | Breathable | Absorbent | Non Woven | Wall Underlay

Thermakraft Watergate Plus 295 can be used as a wall underlay on timber and steel framed buildings within the following scope:

- » The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, with regards to building height and floor plan area; and,
- » With absorbent wall claddings directly fixed to timber and steel framing; and,
- » With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- » With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity;
- » With masonry veneer in accordance with NZS 3604, NZBC Acceptable Solution E2/AS1 for timber framed buildings, or specific engineering design for steel framed buildings; and,
- » Situated in NZS3604 Building Wind Zones up to, and including 'Very High' when used as a standalone flexible underlay, and "Extra High" when used as a flexible underlay over a rigid wall underlay.
- » Can be used as a non-rigid backing material for Stucco Plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1 Paragraph 9.3.5.1. The Underlay must be supported with 75mm galvanized mesh, or Thermakraft Stud Strap at 150mm centres run across cavity battens to limit deflection to a maximum of 5mm.
- » May also be used as a slip layer over rigid backing for Stucco Plaster in accordance with the requirements of NZBC E2/AS1 Paragraph 9.3.3(b).
- » Refer BRANZ Appraisal No 695 (2010) for full details.
- » May be used with LOSP treated timber.
- » Is suitable as an air barrier in unlined wall spaces.
- » Is suitable to be used in conjunction with thermal breaks on steel framed buildings.
- » Is suitable for direct fixing behind metal cladding.

Flammability Index

Thermakraft Watergate Plus 295 Wall Underlay has an AS 1530 Part 2 Flammability Index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Limitations

- » Must not be used as a roof underlay.

Durability

Meets the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture (E2.3.2), and F2 Hazardous Building Materials F2.3.1, providing

- » It is not damaged.
- » Installed in accordance with instruction guide.
- » Is not left exposed for more than 60 days.
- » Installed by or under guidance of Licensed Building Practitioners.
- » Is compatible with cladding system used.

Table 1: NZBC E2/AS1 wall underlay requirements

NZBC E2/AS1 TABLE 23 (NZS2295) WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 100gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 20mm	Pass
Air Resistance	≥ 0.1 MN.s/m ³	295 can be used as an air barrier

Roll Dimensions

WIDTH (MM)	LENGTH (M)	M ²
1370	18.5	25
1370	37.0	50
1370	73.0	100
2740	18.5	50
2740	36.5	100

*M² is the roll size for actual coverage, allow for laps and joins.



For additional details and latest specifications www.thermakraft.co.nz



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The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website.



BRANZ Appraised

Appraisal No. 695 [2017]

WATERGATE-PLUS 295 FIRE RETARDANT WALL UNDERLAY

Appraisal No. 695 [2017]

This Appraisal replaces BRANZ
Appraisal No. 695 [2010]



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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Product

- 1.1 Watergate-Plus 295 is a fire retardant, flexible synthetic wall underlay for use under direct fixed and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured from coated, non-woven polyolefin and is coloured white.

Scope

Flexible Wall Underlay

- 2.1 Watergate-Plus 295 has been appraised for use as a flexible wall underlay for timber and steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with direct fixed absorbent and non-absorbent wall claddings; or,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; or,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or to a specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Very High.

Use over Rigid Wall Underlay

- 2.2 Watergate-Plus 295 has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or to a specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Extra High.

Specific Design

- 2.3 Watergate-Plus 295 has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Watergate-Plus 295 into their design in accordance with the declared properties and the instructions of Thermakraft Limited.

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Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Watergate-Plus 295, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, B2.3.1 (b), 15 years and B2.3.2. Watergate-Plus 295 meets these requirements. See Paragraphs 9.1 and 9.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.4 (c). Watergate-Plus 295 meets this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Watergate-Plus 295 will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Watergate-Plus 295 meets this requirement and will not present a health hazard to people.

Technical Specification

- 4.1 Watergate-Plus 295 is a white, 112 g/m² non-woven, microporous polyolefin fabric underlay.
- 4.2 The product is supplied in rolls 1.370 m wide x 54.8 and 30 m long and 2.740 m wide x 30 and 18.5 m long. The product is printed with the Watergate-Plus 295 logo repeated along the length of the roll and is labelled with the marketing or construction company's name. The rolls are wrapped in clear polythene film.

Accessories

- 4.3 Accessories used with Watergate-Plus 295 which are supplied by the installer are:
- Fixings - staples, clouts, screws or proprietary underlay fixings, or other temporary fixings to attach the wall underlay to the framing.
 - Wall underlay support - polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

- 5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Watergate-Plus 295. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

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Design Information

- 7.1 Watergate-Plus 295 is intended for use as an alternative to conventional building papers which are fixed over timber or steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain. Refer to Table 1 for material properties.
- 7.2 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.
- 7.3 Watergate-Plus 295 must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.
- 7.4 Watergate-Plus 295 is suitable for use as an air barrier where walls are not lined, such as attic spaces at gable ends, in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 [c].
- 7.5 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5. Wall underlay support options include polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens.

Table 1: NZBC E2/AS1, Table 23 [NZS 2295] Requirements

NZBC E2/AS1, Table 23 [NZS 2295] Wall Underlay Properties	Property Performance Requirement	Actual Property Performance
Absorbency	$\geq 100 \text{ g/m}^2$	Pass
Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Water Resistance	$\geq 20 \text{ mm}$	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Edge tear and tensile strength	Edge tear [Average]: Machine direction = 110 N Cross direction = 91 N Tensile strength [Average]: Machine direction = 2.09 kN/m Cross direction = 1.78 kN/m
Air Barrier	Air resistance: $\geq 0.1 \text{ MN s/m}^3$	Pass. Watergate-Plus 295 can be used as an air barrier.

Claddings

- 7.6 Watergate-Plus 295 is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23 on timber framed buildings, including non-absorbent wall claddings such as vinyl and metal-based weatherboards in direct fixed situations. Watergate-Plus 295 is suitable for use under cavity based wall claddings as an absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings.

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Stucco Plaster

- 7.7 Watergate-Plus 295 is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm.
- 7.8 Watergate-Plus 295 may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3.1 [b].

Structure

- 8.1 Watergate-Plus 295 is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a stand-alone flexible wall underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid wall underlays.

Durability

- 9.1 Watergate-Plus 295 meets code compliance with NZBC Clause B2.3.1 [a], not less than 50 years for wall underlays used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, and code compliance with NZBC Clause B2.3.1 [b], 15 years for wall underlays used where the cladding durability requirement is 15 years.

Serviceable Life

- 9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Watergate-Plus 295 is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

- 10.1 Watergate-Plus 295 has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 [b], for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to Watergate-Plus 295 from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 12.1 Watergate-Plus 295 must be used behind claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.
- 12.2 Watergate-Plus 295, when installed in accordance with the Technical Literature and this Appraisal will assist in the total cladding systems compliance with NZBC Clause E2.

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Installation Information

Installation Skill Level Requirements

- 13.1 Installation must always be carried out in accordance with the Watergate-Plus 295 Technical Literature and this Appraisal, by or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.

Underlay Installation

- 14.1 Watergate-Plus 295 must be fixed to all framing members at maximum 300 mm centres with large-head clouts 20 mm long, 6-8 mm staples, self drilling screws or proprietary underlay fixings. The underlay must be pulled taut over the framing before fixing.
- 14.2 Watergate-Plus 295 must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 150 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.
- 14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the underlay by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut underlay must be folded inside the opening and stapled to the penetration framing. Excess underlay may be cut off flush with the internal face of the wall frame.
- 14.4 Watergate-Plus 295 can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.
- 14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.
- 14.6 Any damaged areas of Watergate-Plus 295, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

- 14.7 The Technical Literature must be referred to during the inspection of Watergate-Plus 295 installations.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 15.1 The following tests have been carried out on Watergate-Plus 295 in accordance with NZBC Acceptable Solution E2/AS1, Table 23: tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6, pH of extract in accordance with AS/NZS 1301.421s and air resistance to BS 6538.3. A range of these tests were completed before and after Watergate-Plus 295 was exposed to ultra-violet light.
- 15.2 The flammability Index of Watergate-Plus 295 has been evaluated in accordance with AS/NZS 1530.2.

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Other Investigations

- 16.1 A durability opinion has been given by BRANZ technical experts.
- 16.2 An evaluation of the expected performance of Watergate-Plus 295 in direct contact with metal wall cladding has been completed by BRANZ.
- 16.3 The practicability of installation of Watergate-Plus 295 has been assessed by BRANZ and found to be satisfactory.
- 16.4 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

- 17.1 The manufacture of Watergate-Plus 295 has not been examined by BRANZ, but details of the methods adopted for quality control and the quality of the materials used, have been obtained and found to be satisfactory.
- 17.2 The quality of supply to the market is the responsibility of Thermakraft Limited.
- 17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall underlay into their design in accordance with the instructions of Thermakraft Limited.
- 17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

Sources of Information

- AS 1530.2: 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp - Cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays - Materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays - Methods of test - Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays - Methods of test - Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays - Methods of test - Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays - Methods of test - Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays - Methods of test - Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, permeable building underlays
- NZS 3604: 2011 Timber-framed buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 [Amendment 7, 01 January 2017].
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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In the opinion of BRANZ, **Watergate-Plus 295 Fire Retardant Wall Underlay** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Thermakraft Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Thermakraft Limited**:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Thermakraft Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Thermakraft Limited** or any third party.

For BRANZ



Chelydra Percy
Chief Executive

Date of Issue:
21 September 2017

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Thermakraft™

THERMAKRAFT 215

Thermakraft 215 self-supporting roof and wall underlay is an absorbent, breathable underlay specifically designed for use in Domestic and Commercial buildings. Suitable as a roof and wall underlay with all cladding types, where Fire Retardancy is NOT required.

- ✓ Versatile building Underlay, designed for use in residential and commercial roof and wall applications.
- ✓ Reduces wind entry into wall and roof cavities, improving thermal efficiency of bulk insulation. Can be used as a vapour control layer, and improve thermal performance if installed and taped on the warm side of bulk insulation.
- ✓ High water resistance provides for temporary weather protection prior to installation of cladding, and acts as a secondary layer of water protection during its serviceable life.
- ✓ Highly water vapour permeable, allowing excess water vapour that may otherwise condense in the wall structure to escape.
- ✓ Lap line printed.



Self-Supporting



High Water Barrier



Breathable



Absorbent



ROOF



WALL

THERMAKRAFT 215

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ROOF AND WALL UNDERLAY

TECHNICAL SPECIFICATIONS

NZBC E2/AS1 ROOF UNDERLAY REQUIREMENTS

NZBC E2/AS1 TABLE 23 ROOF UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 150gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 100mm	Pass

NZS2295:2206 CLASSIFICATION

Flammability Index		Non Fire Retardant
Wind Zone	R2	Up to Very High
NZS2295:2006	R2	Self Support

NOTE:

For wall cavity systems, NZBC Acceptable Solution E2/AS1 Paragraph 9.1.5.5 requires where stud spacing's are greater than 450mm centres, an intermediate means of restraining the building underlay and insulation from bulging into the drained cavity shall be installed. An acceptable means of achieving this is by fixing with Thermakraft Stud Strap horizontally at 300mm centres.

Thermakraft 215 complies with the requirements of NZBC E2/AS1 Table 23. Is suitable for use in the following:

- With absorbent wall claddings directly fixed to timber and steel framing; and,
- With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity; and,
- With masonry veneer in accordance with NZS 3604; and,
- Situated in NZS3604 Building Wind Zones up to, and including 'Very High' (wall); and,
- As a ROOF underlay Self-supporting when run horizontally at pitches 3° and greater. When run vertically at pitches >3° and <10° degrees, 215 must be supported. Support recommended at very low pitches; and,
- As a roof underlay suitable for use with all Roofing materials; and
- Is suitable as an air barrier in unlined wall spaces.

Flammability Index
Thermakraft 215
is not fire retardant.



Roll Dimensions:
1250mm x 20m (25m²)
1250mm x 40m (50m²)
M2 is the roll size for actual coverage, allow for laps and joins.

DURABILITY

For Thermakraft 215 to meet the Performance Requirements of NZBC Clause B2, Durability B2.3.1 (a) 50 years and B2.3.1 (b) 15 years, E2 External Moisture providing:

- Installed in accordance to the Application and Installation Guidelines.
- Run length no greater than 10 meters.
- Is not left exposed for more than (7 days) roof.
- Is not left exposed for more than (28 days) wall.
- When used with LOSP treated timber, inspection must be carried out to ensure that the solvent in the LOSP treated timber has sufficient time to dry out (typically 7 days after the treatment process under the suitable environment conditions).
- Installed by or under guidance of Licensed Building Practitioners.
- Installed in accordance with the Roofing Code of Practice.



For additional details and latest specifications www.thermakraft.co.nz



TAUPO DISTRICT COUNCIL
Customer Service 0800 806 595

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Thermakraft™ THERE IS NO SUBSTITUTE

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Fax +64 9 273 3726 Email info@thermakraft.co.nz www.thermakraft.co.nz

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The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website.

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Project specification BC181033A - A2649355



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OF THE BUILDING ACT 2004 AND IT'S
REGULATIONS. A FULL (PRINTED) COPY OF
DRAWINGS AND SPECIFICATIONS ARE TO
BE RETAINED ON SITE IN GOOD ORDER
AND PRODUCED UPON REQUEST.

JTDesign Architecture Ltd

AS AMENDED

18 Mar 2020

PROJECT SPECIFICATION

TAUPO DISTRICT COUNCIL

Blomquist Residence

18 Penny Grove

Nukuhau

Taupo

Issued for Construction

JT18105

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PROJECT OVERVIEW

Scope

New single storey residential dwelling with three bedrooms and attached double garage.

Address

Site Address	18 Penny Grove
Suburb	Nukuhau
City	Taupo
Lot #	226
DP #	522262

Site Conditions

Wind Zone	H - High Wind Speed
Earthquake Zone	Zone 2
Exposure Zone	Zone B - Low
Snow Loading Zone	Zone N0

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1 PRELIMINARIES & GENERAL

1.1 Project Overview

1.1.1 Contract Documents

1.1.1.1 Contract Documents

The Contract Documents are complementary and comprise this Specification, the accompanying drawings, the NZ Standards Contract together with Schedules as specified below, any written documentation clarifications issued during tendering/estimating, any manufacturer/supplier information issued with this Specification, any list of agreed Subcontractors, the contract establishment letter and any other relevant correspondence, and any Site Instructions or additional details or instructions issued as Variations. (The NZ Standards Contract will be emailed upon request). These Project Specific Conditions supersede the Standard Conditions where they are in conflict. Refer any ambiguity or apparent discrepancy within or between any Contract Documents to the Architect/Designer, whose interpretation shall be binding on all parties.

Ensure that all Trades are aware of all Conditions and that subcontract prices are accepted on this basis, and in a form acceptable to the Registered Master Builders Federation or the Certified Builders Association. Ensure that all persons engaged on the works are aware of all items in this specification and on the drawings that may in any way affect their section of the works.

1.1.2 Site

1.1.2.1 Site

Relevant site conditions are believed to be correctly represented in the Contract Documents, however the Contractor (and Subcontractors where appropriate) are requested to inspect the site to ascertain for themselves the nature and extent of the works and the rights and interests that may be interfered with in the execution of the works, as no claims for additional payment will be recognised on the grounds of insufficient description.

1.1.3 Adjacent Owners

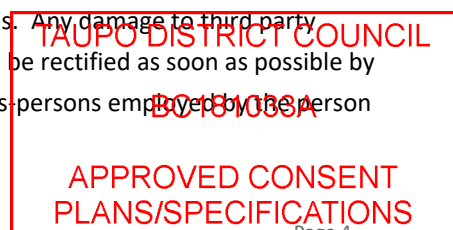
1.1.3.1 Adjacent Owners

Carry out whatever actions or precautions are required to avoid or to absolutely minimise noise, dirt, dust, access, etc. inconvenience or disruption of any nature to the adjacent owners or tenants. Indemnify the Principal against any claims arising from this source.

1.1.4 Protection

1.1.4.1 Protection

Take all appropriate precautions to protect all third party property, services, etc., and indemnify the Principal against any claims arising from the construction operations. Any damage to third party property caused by construction activities or failure to protect shall be rectified as soon as possible by the person causing the damage, or by appropriately qualified trades persons employed by the person responsible for the damage if necessary.



Suspend operations during weather which would affect the quality of work in progress. Secure the works as soon as possible against adverse weather, dust and vandals. Avoid structural damage that is caused by overloading.

Adequately protect all finished work and maintain until the date of Practical Completion. Each trade shall protect the work of all other trades, and each trade is responsible for making good any damage they cause to finished works. Arrange special protection as required for windows and doors, finished timber work, plumbing fittings and hardware, cabinets and other joinery, and similar items.

1.1.5 Responsibility

1.1.5.1 Responsibility

The Contractor will be held responsible for the full period of his legal responsibility in connection with this Contract for ensuring that all work execution, materials, and fittings, are completely in accordance with Contract requirements.

The Contractor is responsible to the Principal for the appropriateness and fitness, in relation to a reasonable expectation or requirement, of all of the materials and workmanship incorporated into the works by himself or his subcontractors; for this reason few specific guarantees are required in these contract documents. The terms and conditions of any warranty or guarantee required or provided shall not in any way negate the minimum remedies available under common law as if no warranty or guarantee had been furnished.

No apparent expression of the Architect's/Designer's reasonable satisfaction shall be deemed to be acceptance of defective materials or workmanship within the terms of the Contract or to be an authority for any Variation except where such Variation is authorised as provided for in the Contract. Instructions that are given verbally are deemed to be instructions for proper execution of the works and do not involve extra charges.

Workmanship in all trades is required to be equal to or better than recognised good trade practice. The Contractor shall provide all necessary setting out information and component dimensions for subcontractors and shall check and be responsible for the accuracy of their work.

Should any tradesperson consider that the surface finish or general conditions of previous work are unsatisfactory to ensure a proper finish for their own work thereon, that tradesperson shall give immediate notice to the Contractor or Architect/Designer as appropriate and shall not proceed until all necessary improvements have been made. Failing such notice the trade concerned will not be relieved of responsibility for a poor finish due to such unsatisfactory condition.

Specialist Finishes Subcontractors are responsible for ensuring that substrates are completely appropriate for them to achieve first class results, and to this end shall, in sufficient time, instruct the Contractor with regard any fixings, primings, sealings or whatever for the substrate that vary in any way from the substrate manufacturer's standard recommendations. The Contractor shall advise the Architect/Designer with regard these variances, and not proceed until the Architect/Designer has agreed to them.

The Contractor and all Subcontractors affected shall be jointly and severally responsible for completion of the whole of the works in a completely watertight condition and shall therefore examine all details to be satisfied that this condition can be achieved. If any detail is considered unsatisfactory the Architect/Designer shall be notified immediately and he/she will then either

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interpret the detail to the Contractor's satisfaction, or accept responsibility for watertightness at the points in question, always assuming reasonable workmanship.

Ensure that all materials or items incorporated into any particular construction or finish are compatible and that their individual use is approved by the manufacturers and/or suppliers of the other parts of the system.

For all electronic/electrical/mechanical operating systems all work and all necessary materials and items incidental to the primary item specified, that are incorporated into the works, shall be such as to leave a neat, efficient, easily maintained and robust installation, completely in accordance with all of the recommendations of the primary items' manufacturers. Where appropriate, source all parts of a system from a single supplier or manufacturer.

1.1.6 Specification

1.1.6.1 Specification

This Specification covers contract administration, standards, materials quality, workmanship and the scope of works only: the exact nature of the works and all specialist items, descriptions, etc., are contained on the drawings, which also take full precedence.

All clauses in all specification sections apply to their full extent and meaning to the entire Contract. Trade sections and paragraphs have been introduced into this specification for reference only and it shall not be construed that each trade section is a complete segregation of the materials and labour of that trade. The onus is on all trades to be conversant with any and all clauses which in any way affect their work.

(Be aware that the 'scope' noted in the 'Project Overview', and scope and general extent clauses within this specification, are included to provide a general indication only and must NOT be interpreted as schedules of quantities - the exact nature and extent of all aspects of the works are shown on the drawings).

1.1.7 Standards

1.1.7.1 Standards

New Zealand Standards (NZS), Australian Standards (AS), Joint Standards (AS/NZS), British Standards (BS), Acts of Parliament, Regulations made thereunder, Codes of Practice, and any specific Manufacturer's Instructions or Manufacturer's Recommendations that are referred to in these Contract Documents shall all be deemed to be the latest published edition thereof at the time of drawings issue, and shall be followed by the Contractor and all Subcontractors to the full extent applicable consistent with the intent of this Contract. Documents cited within other cited publications are deemed to form part of this specification.

Where Standards have a number of Divisions, e.g. AS/NZS 3500.1, AS/NZS 3500.2, etc., each of the Divisions relevant to this project is deemed to form part of this specification.

Retain current copies of significant cited documents and manufacturer's technical literature on the site.

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1.1.8 Authorities and Charges

1.1.8.1 Authorities and Charges

Comply with all relevant provisions of the NZ Building Code, and with all relevant territorial or statutory authority regulations, by-laws, obligations, etc. Give all required notices.

The Principal has obtained a Land Use Consent. The Principal has applied for and paid for the Project Information Memoranda, the Building Consent and other approvals required for the works to start. The PIM and Building Consent will be forwarded to the Contractor as quickly as possible after they are issued by the Territorial Authority. Note: It is an offence under the Building Act to carry out work not in accordance with a Building Consent.

Should the Building Consent be subject to any conditions which modify the requirements of the Contract Documents in any way, the Architect/Designer reserves the right to negotiate any or all of these modifying conditions with the Building Consent Authority. If after these negotiations additional work is required, it will be handled as a Variation to the Contract.

1.1.9 Code Compliance Certificate

1.1.9.1 Code Compliance Certificate

The Principal will apply for the Code Compliance Certificate (CCC) and any other licenses or approvals for the building to be used. However, Practical Completion will NOT be certified until the CCC inspection has occurred and any additional works required by the local Building Consent Authority have been completed. To this end it is recommended that the Contractor obtains all required certificates, guarantees, as-built drawings, etc., required for the CCC application as work proceeds, to facilitate application for the CCC as soon as the works are completed. For his part, the Principal hereby undertakes to apply for the CCC within one day of all required material being in hand. Likewise, the Contractor should have capacity available to attend as quickly as possible to any items identified by the Building Consent Authority as being required prior to the issue of the CCC.

1.1.10 Co-ordination of the Works

1.1.10.1 Co-ordination of the Works

Co-ordinate the works of all trades to ensure efficient progress of the works. Ensure that all holes, sleeves, penetrations, supports, etc., that are required for services are correctly incorporated as work proceeds. Identify and sufficiently forward-notify the appropriate persons of all deadlines for the supply of fittings, components, information, etc.

1.1.11 Documents Interpretation

1.1.11.1 Documents Interpretation

Except where they are clearly to the contrary, all dimensions are deemed to be to the bare surface of concrete, masonry, timber framing or other basic construction material. All figured dimensions take precedence over scaled sizes. Where any detail is included in more than one drawing the larger scale detail takes precedence. Where any ambiguity exists refer to the Architect/Designer for interpretation.

The word 'provide' and the word 'fix' used separately in the Documents shall be taken to mean 'provide and fix' unless otherwise stated.

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When the term 'allow' occurs in the Documents, except with reference to Monetary Allowances, the cost of the item shall be at the risk of the Contractor.

The terms 'approved', 'directed', and 'selected' when used in the Documents refers to the approval, direction or selection of or by the Architect/Designer. Please give adequate notice of when these decisions are required. 'Architect/Designer' shall mean the Architect or Designer, their representative or any Consulting Engineer engaged by the Architect/Designer.

1.1.12 Work Shown and Mentioned

1.1.12.1 Work Shown and Mentioned

The Contract Documents show the extent and nature of the works but there is no warranty expressed or implied that they show each and every minor detail or item required to be included by the Contractor. Should any material, structural member, fixing, or item or work appear to be inadequately described, yet obviously necessary for the neat, strong and satisfactory completion of the work, it shall be incorporated into the Contract Works.

1.1.13 Site Safety

1.1.13.1 Site Safety

Comply with all of the requirements of the New Zealand Building Code, and in particular with Approved Documents F1 - F5 inclusive. Comply with all relevant Worksafe NZ Approved Codes of Practice and Information and Guidance requirements, particularly those for construction and building maintenance. Comply with any other relevant safety legislation and/or regulations.

Take all practical steps to make the site and the contract works safe and to provide and maintain a safe working environment. Ensure that all those working on or visiting the site are aware of the site safety rules and are not unnecessarily exposed to hazards.

In compliance with the Health and Safety in Employment Act 1992 the Contractor shall have:

- a). A safety programme that shall include selection and training standards, monitoring of compliance, safety performance measures and safety rules.
- b). A safety register to record accidents, injuries, operational safety, ACC claims, and so forth.
- c). A health and safety plan specific to the contract works, which will address methods of identifying and controlling hazards, protective clothing and equipment to be used, staff training and supervisory requirements, management of subcontractors and their staff, and restricted areas and site security.

Notify the Ministry of Business, Innovation and Employment in writing of the Certified Safety Supervisor responsible for safety aspects of the works.

Scaffolding shall comply with all Statutory and Local Authority Regulations, with the Ministry of Business, Innovation and Employment's 'Best Practice Guidelines for Scaffolding', with AS/NZS 1576 (Scaffolding equipment), AS/NZS 4576 (Guidelines for Scaffolding), and AS/NZS 4994 (Roof edge scaffolding), shall be maintained for the duration, and shall be removed on completion.

The use of ballistic fixings must absolutely comply with all relevant safety recommendations at all times. No rubbish fires are allowed on site. Portable/personal disc/tape players, radios and iPods must not be used anywhere on the site. No smoking on site, except in the designated location in

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accordance with the Smoke Free Environments Act 1990, the location of which will be determined by the Contractor, with the approval of the Principal.

1.1.14 Variations

1.1.14.1 Variations

The Architect/Designer will issue Site Instructions (SI) to amend or clarify the works. Upon receipt of a SI the Contractor shall immediately notify the Architect/Designer if he believes there are price or timing adjustment implications. The Architect/Designer will then issue a Variation Price Request (VPR) for pricing of the possible Variation by the Contractor, within the time stipulated, or within 10 days if no time is stipulated. If the Contractor does not return the VPR within the time stipulated the Architect/Designer will assess it at reasonable rates. Once agreement is reached on price and/or timing a Variation Order (VO) for the item will be issued. Note that works covered by a SI or a VPR must NOT be actioned until the VO is issued.

When a Variation is contemplated and timing does not allow SI and VPR action the Contractor is to advise, and record in the site diary, an estimate of price and timing implications. If accepted by the Architect/Designer, a VO will be issued immediately. The Contractor shall then co-operate with the Architect/Designer to establish agreed pricing.

Claims for Variations neither priced nor estimated prior to being put in hand (but considered valid) will be incorporated into Progress Payment Certificates or the Draft Final Accounts as claimed and accepted but with a proviso allowing 5 (five) days for written objections by either the Principal or the Contractor, to any aspect of them, for further consideration.

The Main Contractor's Variations Margin agreed pre-contract will be the maximum accepted for any trade unless higher rates are nominated pre-contract and are accepted. The Main Contractor's agreed Variations Margin shown shall be deemed to include all preliminary and general costs, overheads, variation processing costs, and profit. If no margin is given, a 5% overall margin will be applied.

Note that 'loss of anticipated profit' claims consequent upon reduction of works extent will NOT be recognized, and that the cost of processing Variations is deemed to be included in the P & G Allowance.

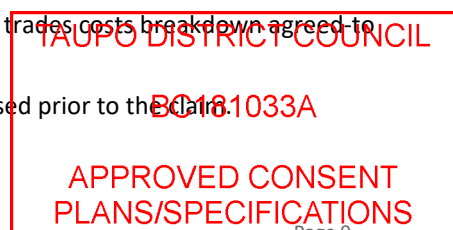
Also note that for Variations pricing all materials shall be charged at the actual net invoiced cost plus margin; i.e. recognised 'Trade Price', volume discounted where appropriate.

1.1.15 Progress Claims

1.1.15.1 Progress Claims

Progress Claims shall be in writing, shall be in accordance with the requirements of the Construction Contracts Act 2002, and shall include all of the following:

- The overall amount claimed.
- The percentage completion and amount claimed for each Subcontractor. For accurate claim verification please ensure that this breakdown exactly matches the trades costs breakdown agreed to pre-contract.
- The total Contract Sum Adjustment for any/all Variations authorised prior to the claim.
- Items covered by Monetary Allowances listed separately.



- And, if specifically requested, confirmation that amounts previously claimed on behalf of Subcontractors, certified by the Architect/Designer, and paid by the Principal, have actually been paid to the Subcontractor (apart from normal retentions).

Note that retentions will be held exactly in accordance with the Conditions of Contract.

1.1.16 Cleaning and Completion

1.1.16.1 Cleaning and Completion

Clear construction debris and rubbish from the works at regular intervals, and additionally if so instructed by the Architect/Designer. Clean each space thoroughly before commencing any finishing works.

In preparation for the Practical Completion inspection carry out the following:

- Clean the works thoroughly, removing all debris, surplus materials, splashes, marks, temporary markings, etc. (All cleaning methods and materials shall be as recommended by the manufacturer of the item being cleaned).
- Remove protective wrappings and coverings unless otherwise directed.
- Touch up minor painting faults, carefully matching colour, and brushing out edges. Repaint any badly marked surfaces back to suitable break-lines.
- Adjust, ease and/or lubricate as required all doors, drawers, controls and other moving parts to ensure their efficient operation.
- Any other works required to leave all spaces ready for immediate occupation and all electronic/electrical/mechanical systems fully operational.
- Clean out all spoutings, gutters, downpipes, and gullies and flush out all drains.
- Clean all sanitary appliances and check all aspects of the water services.
- Thoroughly re-inspect all aspects of the works (and have any defects fully rectified) to be certain that the works are completely ready for the Practical Completion inspection - if an unreasonable number of items are noted by the Architect/Designer during the inspection it will be terminated and then rescheduled for at least a week forward to allow proper completion to be achieved. (Note that a Code Compliance Certificate must be obtained before Practical Completion will be certified. Obtain all required certificates, guarantees, as-built drawings, etc., as work proceeds to enable the CCC application to be submitted as soon as construction is completed).

2 CONCRETE

2.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

2.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3124:1987(NZS)	Specification for concrete construction for minor works
3604:2011(NZS)	Timber-framed buildings
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
4671:2001(AS/NZS)	Steel reinforcing materials

2.3 Materials

2.3.1 Damp Proof Membrane

2.3.1.1 Polythene DPM

Polythene damp proof membrane shall be 0.25mm thick and shall be continuous under slabs on grade or fill and under foundations. All joints lapped 200mm and continuously sealed with pressure sensitive tape. Tape seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

2.3.2 Reinforcement

2.3.2.1 Grade

Reinforcing grades are identified by bar diameters prefixed with letters thus:

D indicates Grade 300E deformed bar

R indicates Grade 300E plain round bar

HD indicates Grade 500E deformed bar

HR indicates Grade 500E plain round bar

RB indicates Grade 500 Reidbar (uniquely deformation patterned bars)

2.3.2.2 Quality

Imported reinforcing steel will not be accepted without the prior approval of the Engineer.

Reinforcing free of loose rust, mill scale, dirt, paint, oil, etc. and stored clear of the ground. Accurately place reinforcing and tie securely to prevent displacement during pouring of concrete. Tie wires must not project into specified concrete cover. Welding of reinforcing is not permitted unless specifically approved by the Engineer.

2.3.2.3 Installation

All terminal ends of reinforcing bars shall be hooked. Intersecting walls, beams and foundations shall contain return longitudinal reinforcement, as detailed for the intersecting members, all to NZS 3109 unless shown otherwise on the drawings.

2.3.2.4 Continuous

Unless detailed otherwise all bars assumed to be continuous, with lap lengths not shown otherwise to be 40 diameters for grade 300 steel, 60 diameters for grade 500 steel, 250mm for mesh. Bars shall generally have minimum bends of five times their diameter.

2.3.2.5 Supports

Support slab steel at 1 metre maximum centres. Use plastic spacers for fairface concrete. Co-operate with others to accurately place all block/brick starters, as the bending of starters to the core position will not be permitted.

2.3.3 Concrete Cover

2.3.3.1 Concrete Cover

Concrete cover not shown otherwise to be:

- Foundations - 75mm where poured against ground, 50mm elsewhere.
- Beams and columns - 40mm (for main reinforcing).
- Slabs - 50mm where poured on ground, 40mm where exposed to weather, 30mm elsewhere.
- Walls - 40mm where exposed or against ground, 30mm elsewhere.

2.4 Ribraft Concrete Floors

2.4.1 Scope

Supply the required/selected Firth RibRaft components and construct the concrete on-ground floor slab as shown on the drawings. All aspects of this work shall be in accordance with the Firth RibRaft Technical Manual (check www.firth.co.nz or call 0800 800576 for the latest edition), a copy of which must be held on site (and referenced for any aspect where there is the slightest uncertainty), the RibRaft Floor System CodeMark Certificate of Conformity - [Certificate No:CMA-CM40015 \(Rev3\)](#), and as shown on the drawings.

No Substitutions are permitted for Firth RibRaft Floor System.

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2.4.2 Selections

2.4.2.1 220mm Pod Thickness - Non-specific Design

Pods thickness: 220mm

DPM: as per NZS 3604:2011

Slab thickness above pods: 85mm

Slab finish: U3

2.4.3 Installation

2.4.3.1 Installation

All RibRaft installation work shall be carried out by experienced and competent tradesmen, familiar with the techniques and materials specified, in accordance with Firth RibRaft Technical Manual and as shown on the drawings. All handling, preparatory blinding DPM, formwork and reinforcing, and concreting and finishing techniques shall be exactly as recommended by Firth Industries Ltd.

Notify the BCA for inspection of the excavation and of the Ribraft slab ready for pouring, and keep whatever records or test results they may require.

Check that all topsoil etc. has been removed from the RibRaft slab location and that the excavated (or hardfill made-up where necessary) platform is level and approximately 330mm below the required finished floor level. Co-ordinate with other trades to ensure that any wastewater drains or other piped or wired service lines are correctly incorporated (and fully operationally tested as appropriate) as work proceeds.

Place and compact any hardfill or basecourse required by the Engineer for specific design. Blind the surface with up to 50mm of sand, and compact (and adjust if necessary) to accurately level, carrying the sand blinding to at least 500mm beyond the RibRaft perimeter. (Install shear key piles if required or specified).

Lay the specified DPM over the entire platform and extending at least 200mm beyond the RibRaft perimeter, with strips lapped 150mm and 50mm PVC adhesive tape sealed, and any services penetrations tape sealed. Tape repair any damage to the DPM as soon as it occurs, and re-inspect/repair just before pouring. Construct the slab perimeter formwork as specified above and as detailed, including edge rebates and any slab cut-outs required.

Unload and handle components carefully to avoid any damage, and keep them clean until installed. Place the RibRaft pods in the grid pattern as shown on the layout plan, with Firth 300mm spacers to the perimeter and under loadbearing walls, and Firth 100mm spacers between all other pods. Neatly cut pods as required to infill where the shape or size of the slab does not match the 1.2m pods module.

Reinforce as specified and as noted on the drawings, ensuring the bars are positioned in the spacer lugs, install plumbing waste pipes etc. as required, and then install the reinforcing mesh over the top of the pods, seated on mesh chairs, and install the re-entrant corner steel (Grade 500E) across internal corners as noted. Install starters as detailed for any subsequent masonry walls ensuring accurate positioning (as bending to masonry core positions is not acceptable).

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Pour Firth RaftMix (or pump Firth RaftMix Pump), and vibrate and screed and finish as specified, and cure and install shrinkage control joints as specified or noted.

Remove trade debris from the area progressively; on completion leave the works area completely clean.

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3 CARPENTRY

3.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

3.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1491:1996(AS/NZS)	Finger jointed structural timber
1859.1:2017(AS NZS)	Reconstituted wood-based panels - Specifications - Part 1: Particleboard
1859.2:2017(AS NZS)	Reconstituted wood-based panels - Specifications - Part 2: Dry process fibreboard
2269.2:2007(AS/NZS)	Plywood - Structural - Determination of structural properties - Evaluation methods
2270:2006(AS/NZS)	Plywood and blockboard for interior use
2271:2004(AS/NZS)	Plywood and blockboard for exterior use
2295:2006(NZS)	Pliable, permeable building underlays
2588:2018(AS NZS)	Gypsum plasterboard
2589:2017(AS/NZS)	Gypsum linings - Application and finishing
2904:1995(AS/NZS)	Damp-proof courses and flashings
2908.2:2000(AS/NZS)	Cellulose-cement products - Flat sheets
3602:2003(NZS)	Timber and wood-based products for use in building
3603:1993(NZS)	Timber Structures Standard
3604:2011(NZS)	Timber-framed buildings
3617:1979(NZS)	Specification for profiles of weatherboards, fascia boards, and flooring
3618:1984(NZS)	Mechanical stress grading of timber
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber
4200.1:2017(AS NZS)	Pliable building membranes and underlays - Part 1: Materials
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4389:2015(AS/NZS)	Roof safety mesh
4859.1:2018(AS NZS)	Thermal insulation materials for buildings - Part 1: General criteria and technical provisions

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AS/NZS 2269.0:2012	Plywood ² - Structural - Part 0: Specifications
AS/NZS 2269.1:2012	Plywood - Structural - Part 1: Determination of structural properties - Test methods
NZBC B2	Durability
NZBC E2	External moisture
NZBC E2/AS1	External Moisture
NZBC E3	Internal Moisture

3.3 General

This section includes the receiving, stacking and storage of all Carpenter's materials and the fabrication, erection and fixing of all framing, sheathings and finishing timbers, including all work incidental to neatly finishing in other trades and all temporary work and temporary bracing.

The Carpenter shall attend upon all trades, and shall supply and fix all obviously necessary but not specifically mentioned fixings and materials.

3.4 Bostik Sealants

3.4.1 Scope

3.4.1.1 Scope

Supply and install the selected Bostik Sealants and Adhesives, complete with accessories, to the works as identified on the drawings and described below. All aspects of this work shall be in complete accordance with Bostik sealants and adhesives guides and technical manuals, (check 0508 222 777 for the latest editions), and other relevant product manufacturer's recommendations, and as shown on the drawings.

No substitutions are permitted for Bostik Sealants or Adhesives.

3.4.2 Interior Sealants - Wet Areas

3.4.2.1 Wet Area Installations

Bostik Kitchen & Bathroom Silicone to shower, bath, and basin floor and wall joints.

Location:

3.4.2.2 Wet Area Shower Panel Adhesive

Bostik Gold Ultra to joints between acrylic shower panel and timber frame.

Location:

3.4.3 Installation

3.4.3.1 Installation

Co-operate with other trades to ensure that all other associated works, fittings and fixturers are completed and installed to specification and as shown on the drawings.

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All sealant and adhesive work, including preparation, shall be carried out by experienced and competent applicators, familiar with the techniques and materials specified, approved by the manufacturer. All substrate and surface preparation, sealing and adhesive accessories and materials, application techniques, and clean-up shall be exactly as recommended by Bostik and as noted on the drawings. Apply continuous sealant beads to the required depth and tool finish neatly with clean edges. Remove any masking tape, clean contaminated surfaces as recommended by the manufacturer leaving sealant beads undamaged and surrounding surfaces clean.

Issue to the Main Contractor a copy of the Bostik specific maintenance requirements together with the Bostik NZ Ltd 10 Year Warranty for the completed works.

3.5 Timber Framing

3.5.1 Scope

3.5.1.1 Scope

Supply and install timber framing to the floors, walls, roofs, and other timber framed elements, as identified and detailed on the drawings. All aspects of this work shall be in accordance with NZS 3604, product manufacturers' recommendations, and as shown on the drawings and the specification.

3.5.2 Workmanship

3.5.2.1 Workmanship

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All work shall be carried out to current best trade practise by experienced and competent tradesmen, familiar with the materials and installation techniques, in accordance with NZS 3604 and as shown on the drawings.

3.5.2.2 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installing timber framing.

Co-ordinate with other trades to install timber framing as required.

3.5.3 Timber Framing

3.5.3.1 Timber Grade and Quality

Unless otherwise noted or specified on the drawings or specification all framing timber shall be minimum structural grade SG 8 Radiata pine in accordance with NZS 3622.

Framing timber shall be seasoned or kiln dried, and be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required, and shall have a moisture content of between 12% and 18% before installation.

Do not use damaged, faulty or defective materials.

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3.5.3.2 Timber Treatment

Timber framing shall be appropriately treated against moisture and/or insect decay by a member of the NZ Timber Industry Federation Inc. Preservative treatment shall be to the requirements of NZS 3602 as an absolute minimum, and treated framing shall be identified and marked accordingly. Carefully manage treated framing during installation to avoid accidental use of timber with a lower performance or durability treatment than that required or specified.

3.5.3.3 Storage & Handling

Check timber framing upon delivery and reject sub-standard or damaged material. Store timber framing dry under cover, fillet stacked and well clear of the ground, and protect from damage, moisture, and contamination. Ensure all appropriate personal protection equipment is worn at all times when handling and cutting treated framing.

3.5.3.4 Framing Installation

All timber framing members, including all dawning, strutting, blocking, bracing etc, shall be sized, setout, fitted and fixed to the requirements of NZS 3604 and as shown on the drawings to accommodate structural loadings, cladding and lining setout and support, and the installation of other building components, fixtures and fittings.

All framing shall be erected without deviation, true to line, level, angle and plumb, and evenly aligned and square, and within the tolerances allowed in NZS 3604 Table 2.1. Framing members accurately cut, lapped, housed, joined, and seated so as to provide full contact over the bearing surfaces.

Temporarily prop, brace, tie, and secure framing members and elements as required until the framing is complete and self supporting. Leave in place for safety purposes as long as required.

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

3.5.3.5 Concrete Separation

Separate timber framing with an approved continuous damp proof course when in direct contact with concrete or masonry. Ensure that the DPC material is compatible with the timber treatment. Free draining separations to external vertical faces shall be 12mm minimum and as noted on the drawings.

3.5.3.6 Timber Re-treatment

All cut or drilled surfaces of H4 and H5 treated timber framing shall be flood coat re-treated, with a suitable product recommended by the original treatment plant, before installation.

3.5.3.7 Edge Notching and Centre Holes

The notching, checking, and boring of framing members shall be in strict accordance with the requirements of NZS 3604.

Avoided checking and cutting where possible and keep to such dimensions so as not to prejudice the purpose for which the member is used. Keep edge notching to a minimum and where possible use

centrally bored holes instead.

Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the lining's fixing reach.

3.5.3.8 Framing Protection

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

3.5.3.9 Built-up Framing Members

Except for jack studs, bottom plates and top plates, framing members may be substituted with built-up members in accordance with the limitations of NZS 3604 2.4.4.7 with the prior approval of the Architect/Designer only.

3.5.4 Steel Fixings

3.5.4.1 Fastenings and Connectors

Unless otherwise noted or specified timber framing fastenings and connectors shall be as specified in the relevant fixing schedules of NZS 3604 or have an equivalent capacity as specified therein. Timber framing connectors and fixings shall comply with the product information as required in NZS 3604 2.4.6, and shall be used and installed in accordance with the manufacturer's recommendations. Pre-drill nail holes in split-prone framing as necessary.

3.5.4.2 Durability of Fixings & Fastenings

Unless otherwise noted or specified the minimum durability of timber framing fixings and fastenings, excluding nails and screws, shall comply with the durability requirements of NZS 3604 Table 4.1. Galvanised steel fixing components, excluding nails and screws, shall have galvanised coating masses in accordance with NZS 3604 Table 4.2.

Unless noted or specified otherwise the materials for nails and screws shall be as given in NZS 3604 Table 4.3.

Steel fixings and fastenings in contact with timber treated with copper based timber preservatives (H3.2 or higher) shall be in accordance with NZS 3604 4.4.4.

Stainless steel nails shall be minimum Grade 304 unless otherwise specified or noted.

3.5.4.3 Bolts and Coachscrews

Unless specified or shown otherwise all bolted and coach screwed connections shall be M12 or M16 in accordance with the relevant fixing requirements given in NZS 3604.

Bolted and coach screwed connections shall have either a 50mm x 3mm square, or a 55mm x 3mm round, washer to each head and nut for M12 and M16 fixings. Washers shall be of the same material and durability as the bolt or coach screw.

3.5.5 Wall Framing

3.5.5.1 Plates

Top and bottom plates shall be to the dimensions and layout shown on the drawings. Unless specified or shown otherwise top and bottom plates shall be fixed in accordance with NZS 3604 7.5.12 and

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Tables 8.18 and 8.19, true to line and level or angle.

Joints in top plates shall be made over a stud or over blocking between studs, and all top plate connections shall be in accordance with NZS 3604 8.7.3. Form all holes and edge notches in top and bottom plates in accordance with NZS 3604 8.7.5.

3.5.5.2 Studs

Studs shall be to the dimensions and spacings shown on the drawings, and installed true to line and plumb in both directions between top and bottom plates.

Unless noted otherwise non-load bearing wall studs shall be to the spacings given in NZS 3604 Table 8.4, stud width as shown on the drawings.

Form all holes and edge notches in studs in accordance with NZS 3604 8.5.1.5. Do not notch, check, cut, or bore holes in the middle third of any trimming stud.

Should the need arise studs shall be straightened in accordance with NZS 3604 8.5.3 with prior approval from the Architect/Designer only.

3.5.5.3 Lintels

Lintels shall be to the dimensions and locations shown on the drawings and DesignIT calcs where laminated veneer lintels are specified, and installed true to line and level, and shall be supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud, and secured against uplift in accordance with NZS 3604 8.6.1.8 as required.

The thickness of a lintel may be made from two or more members, where each member is the length of the lintel, in accordance with NZS 3604 2.4.4.7.

3.5.5.4 Sill & Head Trimmers

Unless specified or shown otherwise sill and head trimmers to openings shall be the same width as the wall stud and to the thickness given in NZS 3604 Table 8.15, and installed at the required opening height true to line and level, and supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud.

3.5.5.5 Dwangs

Dwangs shall be the same width and thickness as the wall stud, and installed at the centres noted on the drawings, and accurately cut and fixed in place true to line and level and flush with stud edges. Dwangs fixed in accordance with NZS 3604 Table 8.19.

3.5.6 Posts

3.5.6.1 Timber Posts

Timber posts shall be to the sizes and locations shown on the drawings, and installed true to line and plumb each way, and supported at the base by steel post brackets as detailed.

Base bracket brand name & type: Bowmac bracket or similar approved

3.5.7 Roof Framing

3.5.7.1 Rafters

All rafters (including hip, valley and jack rafters) shall be to the dimensions, spacings, pitch, and layout shown on the drawings.

Rafters shall be aligned and paired at the required spacings to ridge boards, ridge beams, hip rafters and valley rafters, and as shown on the drawings, and installed parallel, true to line, pitch and plane, and fixed in accordance with NZS 3604 Table 10.1.

Any required jointing of rafters shall be made over supports shown on the drawings only.

Unless shown otherwise rafter seating to top plates, beams, and lintels shall have a minimum bearing of 32mm without reducing the rafter depth to less than 65mm, or 80%, at the birds mouth.

Extend rafter ends to form eaves where possible or scab a 90x45 member to side of rafter as detailed on the drawings and in accordance with NZS 3604 10.2.1.14.

Fly rafters and outriggers installed to form gable verges as detailed on the drawings and in accordance with NZS 10.2.1.15.3

3.5.7.2 Valley Boards

Valley boards shall be sized to the dimensions and installed to the supporting framing as detailed on the drawings.

3.5.7.3 Ceiling Joists

Unless specified or shown otherwise ceiling joists shall be to the dimensions and spacings given in NZS 3604 Table 10.3.

Ceiling joists shall be installed parallel true to line and plane, and shall be joined directly over framing supports and lapped minimum 300mm, or butted and flitched, in accordance with NZS 3604 10.2.1.6.5.

Do not support ceiling joists from a strutting beam.

3.5.7.4 Purlins

Purlins shall be to the dimensions and spacings shown on the drawings and as required by the cladding material, and fixed to rafters and/or trusses in accordance with NZS 3604 Table 10.10, or 10.11, or clause 10.2.1.15.1(b).

Purlins on their flat shall be continuous over a minimum of two spans.

Provide all necessary blocking and lateral support to purlins laid on edge in accordance with NZS 3604 10.2.1.16.6, and as detailed.

Extend purlins to form gable verges as detailed and in accordance with NZS 3604 10.2.1.15.

3.5.7.5 Roof Trusses

Roof trusses shall be Specific Engineering Design (SED) in accordance with NZBC B1/VM1 and manufactured by an accredited fabricator, and shall comply with all aspects of NZS 3604 10.2.2. Roof trusses shall be fabricated to meet the specific design requirements of the roof including, but not limited to; roof layout, pitch, and details, in accordance with the drawings and specification.

Roof trusses shall be supported and fixed to the truss fabricators specifications but shall be no less than that required by NZS 3604 Tables 10.14 and 10.15. Roof trusses shall be braced as shown on the drawings and in accordance with NZS 3604 10.3.

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3.5.7.6 Roof Bracing

Roof bracing shall be as shown on the drawings and in accordance with NZS 3604 10.3 and 10.4 as necessary.

3.5.8 Ceiling Framing

3.5.8.1 Ceiling Framing

Ceiling framing shall be to the dimensions, layout, spacings, and details shown on the drawings, and shall be installed true to line, level and plane, and securely fixed in accordance with NZS 3604 Table 13.3.

3.6 Workmanship & Materials

3.6.1 Workmanship

3.6.1.1 Supervision

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. It is the main contractor's responsibility to ensure that the construction of all structural timber complies in all respects with the drawings and the specification.

All non-restricted building work shall be carried out by or under the direct supervision of competent tradespersons, suitably qualified for the work undertaken, and in accordance with the best and latest trade practice.

3.6.1.2 Timberwork

All timber shall be worked and cut to be true and square and free from wind and warp with all joints matching and mating to a proper contact fit over the full surface of the joint. All connections whether nailed screwed, glued, mortised or dovetailed shall be accurately made and properly executed to provide sound satisfactory connections for the class of work required.

Timber containing unacceptable defect or distortion shall not be cramped to provide mating at connections but shall be discarded and replaced by true defect-free timber before connections are made. Distribute any acceptable defects in timber so as not to impair the strength or the appearance of the finished work. Do not cut studs across the grain to straighten them.

The checking and cutting away of timbers shall be avoided where possible and shall be limited to such dimensions as will not prejudice the purpose for which the timber is used. Observe NZS 3604 restrictions on holing and checking of timber joists and beams. Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the linings/claddings fixings reach.

Neatly punch exposed nailing to the diameter of the nail head below the surface. Completely remove bruises and tool marks, and replace all split timbers and hammer-marked finishing timbers.

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Fit a 3-ply bituminous DPC or a single layer high impact polyethylene DPC at all timber to concrete junctions to provide complete separation. Ensure that the DPC material is compatible with the timber treatment.

Clean out framing voids before fixing sheathings or linings. Ensure framing voids are fully vermin proofed to the exterior. Build in as necessary all required flashings (supplied by others) to windows, doors, roof edges, etc.

3.6.1.3 Wall Underlay

Install a flexible heavyweight building paper or breathable/absorbent wall underlay behind all exterior wall claddings, fixed horizontally, with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.

Fix wall underlay at maximum 300mm centres, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings, fixed through nylon vertical strapping at every stud in exposed locations. Provide additional fasteners fixed through the underlay around framed openings. Cut window and door openings just prior to joinery installation; cut underlay at 45° angle away from each corner and return full framing depth and fasten to inside of frame.

Finish wall underlay at edges as detailed, and return full framing depth into window and door openings. Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with wall underlay manufacturer's requirements and as shown on the drawings.

For drained cavity construction to framed walls without a rigid wall underlay and where the studs are at greater than 450mm centres, restrain the underlay with nylon strapping to prevent the underlay from bulging into the cavity space.

Any damaged underlay shall be made good by lapping in a new section.

Do not leave wall underlays exposed before covering with wall cladding for more than the manufacturer's recommended duration.

3.6.1.4 Roof Underlay

Install heavyweight building paper or breathable/absorbent roof underlay behind roof cladding as detailed, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned in a manner that prevents sagging or ponding.

R1 class roof underlays shall be fully supported on nylon straps or non-corrosive netting/mesh; R2 class self-supporting underlays shall be laid to maximum 1200mm span between adjacent supports. Run roof underlay horizontally or vertically up the roof slope on roof pitches above 10° pitch, and horizontally on roof pitches 10° or less.

Fix roof underlay at maximum 300mm centres to purlins, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or proprietary underlay fixings.

For tiled roofs, lay the roof underlay over the anti-ponding board and non-corrosive support netting/mesh, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Finish roof underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45° angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with the underlay manufacturer's requirements and as detailed. Roof underlay must be separated from

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chimneys and flues in accordance with the requirements of the NZBC C1-C6 Acceptable Solutions. Any damaged underlay shall be made good by lapping in a new section. Do not leave roof underlays exposed before covering with the roof cladding for more than the manufacturer's recommended duration.

3.6.1.5 Window Installation

Prepare window and external door framing openings for joinery installation by neatly cutting the building wrap at 45° into corners, returning turning the wrap through the frame depth and fixing to the inside face.

Over-flash the underlay along the sill with a flexible flashing tape, installed full frame depth and length of the opening, returned minimum 100mm up the jambs, and with minimum 50mm return over the outside edge.

Over-flash the underlay at head/lintel corners with a flexible flashing tape, extending minimum 100mm each way from the corner, full frame depth, and with minimum 50mm return over the outside face.

Install external joinery frames with metal flashings as detailed and/or as required to completely weatherproof all frame-to-cladding junctions.

Unless shown otherwise, head flashings shall be carried minimum 75mm up behind claddings, extended at 15° out over the joinery head or facing board and returned down to cover the joinery or facing board minimum 10mm and finished with a 5mm, 45° 'kick out' drip-edge.

Neatly dress down the head flashings at the ends of the facings - for drained cavity construction, also form up-turned stop-ends in-line with the outside edge of cavity above.

Install metal (as specified) head flashings, fixed over the wall underlay, with the flashing upstand over-flashed minimum 50mm with a flexible flashing tape against the underlay, or with an additional piece of underlay extended over and lapped behind the underlay above, behind the inter-storey flashing or sill flashing above, or to the underside of the eaves.

Unless shown otherwise, sill flashings, where required, shall have a minimum 5° slope, minimum 8mm rear upstand with sealed sloping stop-ends, and be carried down minimum 35mm over the lower cladding and finished with a 5mm, 45° 'kick out' drip-edge.

Take delivery of window and door joinery. Check substrates for correct profile and alignment and that the joinery is fabricated to the correct wall construction set-out and depth. Set shims or pack as necessary to install joinery exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim, etc.

Install neat sealant beads as detailed or required.

After joinery installation, install closed cell backing rods as required and expanding foam seal the gap between the opening substrate and joinery liners/reveals (all round, from the inside).

On completion ensure that all sashes and doors neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating smoothly, without binding, to the required functionality.

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3.6.1.6 Joinery Installation

Take delivery of all scheduled joinery items (doors, cabinets, shelves, etc.) and install in the positions shown, accurately aligned, true to level, plumb and square, and securely fastened as noted and in accordance with best trade practice and with due regard for adjacent linings, finishes and trim, and anticipated movements.

Cabinets scribed and/or recessed packers scribed to adjacent surfaces as detailed or directed. Protect all installed Joinery from damage including surface marking and contamination, dirt and dust, and moisture until completion. Do not use Joinery items for working supports or platforms or for storage of materials or tools and equipments.

On completion ensure that joinery item doors and drawers all neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating to the required functionality.

3.6.2 Timber

3.6.2.1 Timber Materials

All timber shall be graded in accordance with NZS 3631 - Structural Grade MSG8 or better for all framing timber - (to meet the requirements of Table 2.3 of NZS 3603 for mechanically graded timber), and Dressing Grade for all finishing timber. Timber that is deemed below standard, in the opinion of the Architect/Designer, shall be removed from the site.

All non-durable timber, including components in manufactured items, shall be appropriately treated against moisture and/or insect decay by a member of the NZ Timber Industry Federation Inc.

Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required.

Ensure that similar timbers with different treatment levels are carefully managed during construction to avoid accidental use of an H1 treated item where H3 hazard class treatment is required by the NZS 3602.

Do not use LOSP (light organic solvent-based preservative) treated timber that has not adequately 'flashed-off'.

Ensure that all cut or drilled surfaces of H4 and H5 hazard class treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation.

All timber shall be seasoned or kiln dried, to the stable moisture content, be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required and the location in the finished construction. All framing timber shall have a moisture content between 12% and 18 % before being installed. If the use of inadequately seasoned timber results in damage or opening joints in the finished building the timber shall be replaced. Fixing of internal linings shall be delayed after closing in until the timber framing has dried back below 20% moisture content and to allow for the maximum settling of substrates.

All kiln dried, dressed and/or finishing timbers shall be stacked under cover on delivery to the site, and all timber shall be full to the nominal sizes shown or specified, subject only to normal cutting and dressing tolerances.

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All finishing timber shall have machine marks, stains and roughness removed and shall be sanded smooth.

Ensure that enclosed surfaces and ends of paint-finished exterior finishing timbers are fully primed before fixing. If this trade (Carpentry) carries out the priming it shall be to the specification and standard required of the Painter.

Unless specified otherwise, exposed framing timbers shall be unfinished to the exterior, and be fine bandsawn milled, treated with a minimum of discolouration, handled carefully at all times to avoid surface damage, and delivered free of crayon or pencil or other markings. Hazard class treatment markings shall be on the ends, NOT on the faces.

3.6.2.2 Other Materials

Materials shall be delivered to site with the packaging and labelling intact, shall be of the same type, finish or colour to maintain continuity, shall be stored, and conditioned if required, in accordance with manufacturer's recommendations, and shall be protected from damage, contamination, and moisture - as appropriate.

Handle all materials in accordance with best practice and the manufacturer's requirements, and in a manner that prevents damage or deterioration to the material. Do not use damaged or defective materials or products, or products that are beyond their designated shelf life.

3.6.3 Laminated Veneer Lumber

3.6.3.1 Laminated Veneer Lumber

Laminated Veneer Lumber (LVL) shall comply with AS/NZS 4357.0. Each piece of structural LVL shall be branded at least once with the manufacturer's logo and a registered brand or marking that clearly identifies the structural properties that apply to the product and its limitations on end use; all in conjunction with associated published literature.

Structural properties identified in the associated published literature shall be:

- details of marking specific to the product
- veneer details
- physical properties including
 - modulus of elasticity
 - bending stress
 - tension stress parallel to grain
 - compression stress perpendicular to grain
 - compression stress parallel to grain
 - shear stress
- joint group
- density
- dimensional tolerances
- adhesives used
- limitations on end use

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The storage and handling of LVL shall comply with Appendix A of AS/NZS 4357.0. In particular:

- LVL should be kept dry during storage and transit
- LVL should be stacked on bearers well clear of the ground and arranged so that their supporting surfaces are in the one plane
- Bearers should be spaced sufficiently close so that LVL spanning between them does not deflect excessively under its own weight.
- Bearers or spacers within a stack should be located near direct vertical alignment
- Care should be taken in lifting and handling LVL in order to avoid mechanical damage
- Wrapping should avoid and prevent entrapment of moisture
- LVL should not be used in high humidity conditions or exposed to the weather.

3.6.4 Proprietary Sheet Bracing Systems

3.6.4.1 Proprietary Sheet Bracing Systems

Proprietary sheet bracing systems to walls, ceilings and sub-floor foundations shall be installed in strict accordance with the manufacturer's technical literature and design guides. No materials specified in the manufacturer's technical literature and design guide can be substituted without the written approval from the Architect/Designer.

3.6.5 Proprietary Roof Trusses

3.6.5.1 Proprietary Roof Trusses

Roof trusses shall be of proprietary design, complying with the requirements of NZS 3603, NZS 3604, and AS/NZS 1170, and manufactured by suitably qualified fabricators.

Make allowance for all notching and holing to timber members to accommodate roof bracing etc., in the design of member sections of the roof trusses. Allow for all additional rafters, purlins, fixings and bracing necessary to complete the roof framing system with all accessories and incidental items necessary for proper installation even where not specifically shown on the drawings.

Proprietary roof trusses shall be designed to carry all imposed gravity and lateral loads. Refer to the approved design drawings for truss set-out and specified design loads. Roof trusses are assumed to be generally at 900mm centres spanning clear between walls or roof beams as shown on the drawings. The Main Contractor is responsible for the design of proprietary roof trusses, including their layout and interaction with and dependence on adjoining elements.

Provide all necessary design information and shop drawings for all proprietary roof trusses to be incorporated in the works for review prior to fabrication.

Provide Producer Statements from a Chartered Professional Engineer covering the design and construction of the roof trusses. Provide all information required by the Territorial Authority for the purpose of obtaining a Building Consent.

3.6.6 Fixings

3.6.6.1 Nails

Comply with the requirements of NZS 3604 Section 2.4.4 and the Nailing Schedules of NZS 3604 as applicable. Unless noted or specified on the drawings or elsewhere in this specification, all nails fixing

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exterior timbers shall be Grade 304 or 316 stainless steel. Nails that will be covered with plaster or any similar material shall be hot-dipped galvanised, unless noted or specified otherwise.

Finishing brads to all finishing timbers shall be set out neatly and punched to the diameter of the nail below the surface. Bore slightly undersize holes for nailing that could cause splitting of the timber.

Power-driven staples are completely unacceptable in finishing timbers.

3.6.6.2 Screws

Screw fastenings shall be of suitable gauge, head type, thread design, and length to provide secure fastening into the substrate material, and be suitable for the assembly/construction of the fixed item/element and the substrate material.

Unless noted or specified otherwise, screws exposed to the exterior shall be Grade 304/316 stainless steel or hot-dipped galvanised, and hot-dipped galvanised or similar corrosion resistant for damp situations.

Self-drilling screws shall be in accordance with AS 3566 for fastener type and corrosion resistance class.

Unless noted or specified otherwise, screws fixing hardware or similar shall be of the same material and finish as the hardware. Except where raised head screws are shown or specified, screws shall be countersunk flush or recessed where stopped/filled.

3.6.6.3 Bolts

Where bolts are used they shall be complete with nuts and washers unless specified otherwise. All bolts, nuts and washers are to be hot-dipped galvanised finish unless noted otherwise. The diameter of a hole for a bolt shall not be less than the bolt diameter nor exceed it by 1.5mm.

For the following bolt diameters use washer sizes as below unless noted otherwise on the drawings:

up to M8 - 25 x 25 x 1.5mm

up to M12 - 50 x 50 x 3mm

up to M20 - 65 x 65 x 5mm

up to M20 - 75 x 75 x 6mm

Round washers may be used providing they are of a thickness and area not less than those specified above.

Unless noted otherwise on the drawings, holding down bolts shall be M12 galvanised, spaced at maximum 900mm centres and within maximum 300mm from each end of the timber, set minimum 150mm into concrete, and located centrally on the timber.

Framing - timber/timber and timber/steel - Unless noted otherwise on the drawings, M16, hot-dipped galvanised, hexagonal head mild steel and with 50 x 50 x 3mm washers.

Timber/concrete (dry situations) - Unless noted otherwise on the drawings, Ramset Trubolts, T12140 at maximum 900mm centres - for damp or exterior situations use stainless steel Trubolts.

Bolts shall be tightened until the washer just indents the timber surface. Exposed bolts shall be re-tightened just prior to Practical Completion to remove any slack consequent on timber shrinkage.

Allow to countersink bolt heads and nuts as necessary to clear linings.

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3.6.6.4 Framing Hardware

Proprietary timber framing hardware and fixings, including multigrips, joist shoes, Z nails, gang nails and similar hardware, may be used where specifically approved, or where required on the drawings or by NZS 3604 schedules, in accordance with the manufacturer's requirements.

Proprietary timber framing structural brackets and ties, including post and bearer brackets, beam supports, angle brackets, tie cleats and similar hardware, shall be as noted on the drawings and installed in accordance with the manufacturer's requirements.

Refer to Metalwork or Structural Steel section of this specification for specific design engineered fabricated steel components that connect structural timber framing.

3.6.6.5 Adhesives

Aliphatic PVA for dry timber applications - all other adhesives for timber jointing are subject to specific approval or as specified. Check surfaces are in appropriate condition to receive adhesive, and that adhesives are used strictly in accordance with the manufacturer's instructions. Clamp adhesive-jointed timber connections and check alignment of members before the adhesive has set.

3.6.7 Sealants

3.6.7.1 Sealants

For critical joints such as primary water/weatherproofing seals, precast panels primary seals, structural floor slab control joints, structural glazing, immersion or hydrostatic pressure seals, etc., either use the sealant noted on the drawings or obtain a reputable sealant manufacturer's recommendation for the precise situation, and submit the manufacturer's specifications covering all relevant criteria and characteristics of the proposed sealant, primers, joint surfaces preparation, etc. to the Architect/Designer for review and confirmation to proceed.

If so requested, additionally submit a sample of the proposed sealant made up into a demonstration joint, incorporating the same materials, preparation, finish tooling, etc. After confirmation to proceed with the proposed sealant install a sample joint to approval, length approximately 2% of the overall length of the joints required, with a minimum length of two metres; when accepted this joint becomes the quality control sample for all subsequent similar joints.

For less critical joints such as those in covered or protected situations, and bathroom and kitchen ceramics and sanitaryware etc., either use the sealant noted on the drawings or select the sealant from a reputable manufacturer's range for the substrate materials involved, with due regard for the flexibility required, acid or neutral curing, mould resistance, paintability or clear or standard colours, slumping characteristics, temperature range expected, etc. - silicone, polymer or polyurethane sealants are anticipated.

For all simple gap-filling and draught sealing situations, either use the sealant noted on the drawings or select from a reputable manufacturer's range for a paintable acrylic sealant with good adhesion characteristics for the substrates involved - pay particular care in the sealant selection where bare metal, polycarbonate, polystyrene or similar substrates or where bituminous-based membranes are adjacent or where exposure to solvents is possible.

All joint surfaces preparation and priming and all sealant application work shall be exactly in accordance with the sealant manufacturer's recommendations, and carried out by competent and experienced applicators familiar with the materials and techniques required.

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Ensure that the sealant is being used within the manufacturer's stated design parameters, particularly with regard joint design and anticipated cyclic movement.

Check that the joint faces are sound, completely dry, and frost free, clean and free of dirt, rust, oil, grease, laitance, etc., and they are primed to suit the surface porosity - particularly for critical locations.

Insert a polyethylene tape slip layer at the back of the joint or a closed cell polyethylene PEF backer rod where required and to the sealant manufacturer's recommendations. Mask off joint edges where a clean straight finish line is required.

Check the toxicity of the selected sealant and handle it appropriately. Check that the temperature during sealant installation is within the manufacturer's guidelines.

Apply the sealant and tool the filled joint's surface smooth and even, utilising a lubricant as necessary and strictly within the manufacturer's guidelines.

Remove any masking tape immediately after tooling, clean up all adjacent surfaces using the recommended cleaning agents as required, and protect the finished joint until the sealant has properly cured.

3.6.8 Interior Finishing Trim

All interior finishing trim shall be cut to the exact dimensions and fine sanded smooth, and with lightly sanded arrisses, and all fixed with plated finishing pins. Machine staple fixing is NOT acceptable.

Note that even traces of planer marks are unacceptable on architraves. Margins between interior trim and other elements shall be exactly even, and all mitres shall be exact and tight.

3.6.9 Garage Door

3.6.9.1 Garage Door - option 2

Garage door(s) as shown and noted on the drawings, installed complete with automatic opening door gear including integrated light(s), wall switch and two remote car activators per door.

3.6.10 Sundry Items

3.6.10.1 Sundry General

Supply and install, complete with all normal incidentals, and in total compliance with the item manufacturer's recommendations and instructions and with all of the appropriate preceding clauses:

3.7 James Hardie Eaves & Soffits

3.7.1 Scope

3.7.1.1 4.5mm HardieFlex Eaves Lining

Supply and install James Hardie 4.5mm thick HardieFlex Eaves Lining as a fibre-cement sheet lining material to the eaves and soffits identified on the drawings, complete with all accessories. The sheets are to be finished with a paint system. All aspects of this work shall be in complete accordance with James Hardie Eaves And Soffits Installation Manual (check www.jameshardie.co.nz or call 0800 808 868 for the latest edition) and other relevant product manufacturers' recommendations.

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3.7.2 Co-operation

3.7.2.1 Co-operation

Co-ordinate with other trades to ensure that the panels correctly allow for fascia and wall cladding installation and associated flashings etc., and that services penetrations are correctly handled to maintain full weathertightness and sheet integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

3.7.3 Preparation

3.7.3.1 Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. The fascia and framing shall be in true alignment, complete and suitable for the sheets, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that any hold-downs from the roof framing to the wall framing are correctly installed.

Check that the building underlay or rigid air barrier to the wall framing has been installed in full accordance with the manufacturer's requirements and the drawings. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flashings etc that will enable the sheets and all accessories to be installed.

3.7.4 Flexible Sealant

3.7.4.1 SIKA Silaflex MS

Flexible silicone sealant to be SIKA Silaflex MS. Use to seal the sheets and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

3.7.5 Workmanship

3.7.5.1 Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with James Hardie Eaves And Soffits Installation Manual and other relevant product manufacturers' recommendations.

3.7.6 Delivery & Handling

3.7.6.1 Delivery & Handling

Carry all sheets on edge. Stack sheets flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm crs maximum). Keep sheets and accessories dry at all times. Avoid damage to sheet edges, ends, and surfaces. Keep uPVC flashings etc. out of direct sunlight, and store all accessories on flat and avoid damage. All installers to be familiar with and comply with the James Hardie Safe Working Practices in

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the Installation Manual, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished sheets or accessories.

3.7.7 Installation

3.7.7.1 Installation General

Install the sheets to the framing in accordance with the Installation Manual, complete with all accessories eg. mouldings, sealant, underflashings, etc.

Ensure that all cut edges of panels are primed prior to installation with Dulux Primacryl, Resene Quick Dry, or similar. Ensure that the bottom edge of the fascia forms a drip edge of 15mm minimum to the sheet. Seal around services penetrations to maintain weathertightness and air pressure resistance.

3.7.7.2 Timber Trim Details

Install H3.1 finger-jointed pine timber trim, scribes, eaves moulds, etc. to complete the sheet junctions as shown on the drawings.

3.7.8 Fixings

3.7.8.1 HardieFlex Sheet 4.5mm, Durability Zone B or C

Fix sheets with galvanised nails in accordance with James Hardie requirements.

3.7.8.2 Timber Trim, Durability Zone B, C, or D

Fix timber trim accessories with jolt-head galvanised nails in accordance with James Hardie requirements, punched below the surface and flushed with exterior grade builders fill.

3.7.9 Completion

3.7.9.1 HardieFlex Sheet

Ensure that the sheets have been fixed correctly, that all joints and accessories have been completed correctly, and that all penetrations have been taped correctly. Check that no damage has occurred to any installed sheet element or associated component, replace as necessary. Ensure that the sheets are painted within 90 days of the sheet installation, complete with all accessories and flashings. Hand over a copy of the latest edition of the James Hardie HardieFlex Eaves Lining Product Warranty to the client. Hand over a copy of the latest James Hardie Eaves And Soffits Installation Manual to the client for their maintenance information.

3.8 GIB® Plasterboard Sheets

3.8.1 Scope

3.8.1.1 Scope

Supply and install the selected GIB® Plasterboard sheets, complete with all accessories, as sheet lining material to the walls, ceilings and other elements identified on the drawings. All aspects of this work shall be in complete accordance with Winstone Wallboards Ltd technical literature and installation guidelines (call Winstone Helpline on 0800 100 442 or check www.gib.co.nz for the latest editions) and other relevant product manufacturers' recommendations.

Substitution of any specified GIB® system, GIB® System component or GIB® plasterboard is not permitted.

3.8.2 Performance

3.8.2.1 GIB® plasterboard as a Component of a 'General' Wall or Ceiling Lining Element

To the areas noted on the drawings as 'General Plasterboard Wall or Ceiling Lining', comply with all relevant aspects of the [GIB® Site Guide \(2014\)](#) publication, complete with all recommended components and accessories, and other relevant manufacturers recommendations.

3.8.2.2 GIB® plasterboard as a Component of a Wet Area Element

Wet Area Plasterboard Linings - GIB Aqualine® Wet Area Systems. To the areas noted as 'Wet Area' on the drawings, additionally comply with all relevant aspects of the [GIB Aqualine® Wet Area Systems \(2007\)](#) publication, [BRANZ Appraisal No.427 \(2007\)](#), and other relevant product manufacturers' recommendations. Refer to separate specification GIB Aqualine® Wet Area Systems.

3.8.2.3 GIB® plasterboard as a Component of a Bracing Element (Timber Framing)

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the [GIB EzyBrace® Systems \(2016\)](#) publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, [BRANZ Appraisal No.928 \(2016\)](#), and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

3.8.3 GIB Plasterboard

3.8.3.1 GIB® Standard, 10mm

GIB® Standard plasterboard, 10mm thick.

Location: To all dry area walls unless otherwise noted on plans

3.8.3.2 GIB® Standard, 13mm

GIB® Standard plasterboard, 13mm thick.

Location: To all dry area ceilings unless otherwise noted on plans

3.8.3.3 GIB Aqualine®, 10mm

GIB Aqualine® plasterboard, 10mm thick.

Location: To all wet area walls - refer to latest version of GIB site guide

3.8.3.4 GIB Aqualine, 13mm

GIB Aqualine® plasterboard, 13mm thick.

Location: To all wet area ceilings - refer to latest version of GIB site guide

3.8.3.5 GIB Braceline® / GIB Noiseline®, 10mm

GIB Braceline® / GIB Noiseline® plasterboard, 10mm thick.

Location: Refer to bracing plans and calculations for locations

3.8.4 Fixings

3.8.4.1 GIB® Grabber® Screws

Fix sheets with adhesive and GIB® Grabber® drywall screws in accordance with Winstone Wallboards Ltd requirements.

3.8.4.2 GIBFix® All-Bond Adhesive

GIBFix® All-Bond adhesive. Use to adhere the sheets and accessories to the framing in accordance with Winstone Wallboards Ltd requirements.

3.8.5 Level of Plasterboard Finish

3.8.5.1 Level of Finish

To the areas noted as a specific Level of Finish (3-5) on the drawings, additionally comply with all relevant aspects of Winstone Wallboards Ltd literature and AS/NZS 2589, complete with all system accessories, and other relevant product manufacturers' recommendations.

NOTE: Unless stated otherwise, Level 4 is the default Level of Finish.

3.8.5.2 Control Joints

To the areas noted as 'control joint', comply with all relevant aspects of Winstone Wallboards Ltd literature and AS/NZS 2589.

3.8.6 Co-operation

3.8.6.1 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to ensure that appropriate clearances are allowed from adjacent internal linings, fixtures, products, and associated services, etc, that the sheets correctly allow for door and window installation, and that services penetrations are correctly handled to maintain sheet integrity.

3.8.7 Workmanship

3.8.7.1 Workmanship

All installation work shall be carried out by experienced tradesmen familiar with the techniques and materials specified and in accordance with the current requirements of Winstone Wallboards Ltd.

3.8.8 Delivery & Handling

3.8.8.1 Delivery & Handling

Store GIB® plasterboard sheets undercover inside a watertight building and keep sheets dry at all times. Stack sheets flat on a dry level surface in accordance with Winstone Wallboards Ltd

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recommendations. Avoid damage to sheet edges, ends, and surfaces. Carry all sheets on edge. Do not use damaged or faulty sheets.

3.8.9 Preparation

3.8.9.1 Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and otherwise in accordance with the specified Level of Finish and Winstone Wallboards Ltd requirements. Framing shall be plumb and in true alignment, complete and suitable for the sheets, and maximum moisture content 18% or as recommended by Winstone Wallboards Ltd. Ensure that the framing is true to line and plane and with no projections due to structural and bracing bracketry etc. Ensure that all framing brackets, plates, braces and hold-downs etc. are correctly installed.

Check that the building has been completely finished to all penetrations including doors, windows, services, etc so that the sheets can be installed without being affected by any weather conditions. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flooring, setout of services, etc. that will enable the sheets and accessories to be installed. Clear building debris and rubbish from framing voids and keep clean until GIB sheet linings are installed.

3.8.10 Installation

3.8.10.1 Installation

Install the sheets, complete with all accessories, to the framing in accordance with the relevant Winstone Wallboards Ltd recommendations and literature, and as noted and detailed on the drawings.

3.8.11 Completion

3.8.11.1 Completion

Ensure that the sheets have been cut, fitted and joined, and fixed correctly. Check for damage and replace as necessary.

Clean up thoroughly on completion and remove all waste and rubbish from site.

Provide a copy of the Winstone Wallboards Ltd maintenance requirements to the owner.

3.9 Thermakraft Underlay, DPM & DPC

3.9.1 Scope

3.9.1.1 Scope

Supply and install Thermakraft Underlays and Membranes, as specified herein, to the locations identified on the drawings, complete with all accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Thermakraft Ltd technical information and installation requirements (check www.thermakraft.co.nz, or call 0800 806 595 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the design drawings.

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No substitutions are permitted for the specified products from Thermakraft Ltd.

3.9.1.2 Extent of Work

The following is a list and a general description of the extent of the Thermakraft Underlays and Membranes works, which are more specifically defined in the contract documents, required for the completion of the contract works:

3.9.2 Requirements

3.9.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

3.9.2.2 Warranty

Thermakraft Ltd Product Warranty:

- 15 Years Warranty - for all Thermakraft warranted products installed, according to the warranty conditions.
- Provide the Thermakraft Ltd Product Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

3.9.2.3 Substitutions

Thermakraft Ltd products shall be as specified herein and as indicated on the approved drawings. The substitution of Thermakraft branded products for alternative brands is not permitted under any circumstances.

The substitution of a specified Thermakraft product for an alternative Thermakraft branded product by the Contractor shall only be permitted with the Contract Administrator's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative Thermakraft branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

3.9.3 Damp-Proof Membrane

3.9.3.1 Thermathene Black (250µm)

Thermathene Black (250µm). A 250 micron thick (0.25mm), tear resistant, polyethylene film sheet concrete underlay. Coloured black.

Installed over nominal 10mm (max. 25mm) thick compacted sand blinding layer, over a properly prepared base course, as a moisture vapour barrier under concrete slabs on-ground (prior to concreting), in accordance with the manufacturer's requirements and as shown on the drawings.

All joints lapped 200mm and continuously sealed with Thermakraft White General Purpose Tape.

Tape-seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

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Installed Location: As per drawings

3.9.4 Damp-Proof Course

3.9.4.1 Supercourse 500 DPC

[Supercourse 500 DPC](#). A 0.75mm thick, high-impact, single-layer Polyethylene film, embossed on both sides. Available in 50mm 75mm, 90mm, 100mm, 150mm, 200mm, 250mm, 300mm, 400mm, 500mm and 1000mm roll widths. Supercourse 500 DPC is suitable for use as a separation barrier between most incompatible and dissimilar materials.

Used as a general damp proof course (DPC) for separating timber and wood-based products and metal from concrete, masonry, brick, and stone surfaces, and as a moisture barrier.

Also used as a concealed flashing behind brick veneer cladding in accordance with NZS 4229 and NZBC E2/AS1.

Installed in accordance with the manufacturer's requirements, [BRANZ Appraisal No.329 \(2016\)](#), and as shown on the drawings.

3.9.5 Wall Underlay

3.9.5.1 Watergate Plus 295 - Synthetic Wall Underlay

[Watergate Plus 295](#). A fire-retardant, absorbent, breathable, composite non-woven polyolefin synthetic underlay. Nominal weight 110g/m².

Installed as a standalone flexible underlay over timber or steel wall framing in accordance with the manufacturer's requirements and [BRANZ Appraisal No.695 \(2017\)](#), in NZS 3604 Wind Zones up to and including 'Very High'.

Installed as a flexible underlay over a rigid air barrier in accordance with NZBC E2/AS1 9.1.7.2 to the manufacturer's requirements and [BRANZ Appraisal No.695 \(2017\)](#), in NZS 3604 Wind Zones up to and including 'Extra High'.

Watergate Plus can be used with absorbent and non-absorbent direct-fixed wall claddings, and absorbent and non-absorbent wall claddings over a 20mm drained cavity, and masonry veneer cladding over a drained cavity in accordance with NZBC E2/AS1 and [BRANZ Appraisal No.695 \(2017\)](#).

Do not leave Watergate Plus 295 exposed on walls for more than a total of 60 days before covering.

Installed Location: All external walls and as noted on drawings

3.9.6 Roof Underlay

3.9.6.1 Thermakraft 215 - Bitumen Building Paper

[Thermakraft 215 Building Paper](#). A self-supporting, absorbent, breathable, bituminous impregnated non-synthetic underlay (non-fire retardant). Heavy class, nominal weight 400g/m².

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Installed as a roof underlay over timber or steel roof framing in accordance with the manufacturer's requirements and as shown on the drawings.

Thermakraft 215 Building Paper roof underlay can be used directly under direct-fixed roof claddings, or directly under roof tile battens in accordance with Thermakraft requirements.

Thermakraft 215 Building Paper roof underlay must be installed in a manner that prevents ponding of water. Provide additional support at no more than 300mm centres when Thermakraft 215 Building paper is installed on roofs with slopes less than 10°.

Do not leave Thermakraft 215 Building Paper exposed on roofs for more than a total of 7 days before covering.

Installed Location: Under all roofs unless otherwise noted on drawings

3.9.7 Underlay Support

3.9.7.1 Thermakraft Thermastrap 201 Strap

[Thermakraft Thermastrap 201](#). A 19mm wide x 0.4mm thick polythene embossed strap. For use as a support for non-self support roof underlays, and to restrict the bellowing of flexible wall underlays in drained cavities. Suitably tensioned when installed to avoid any sagging and to keep the flexible underlay in a flat plane. Installed at right angles to roof purlins or wall studs, at maximum 300mm centres.

Application/Use: to all roofs below 10 degree roof pitch

3.9.7.2 Thermakraft Stud Strap

[Thermakraft Stud Strap](#). A 25mm wide x 0.4mm thick polypropylene woven and coated strap. For use as a support for non-self support roof underlays, and to restrict the bellowing of flexible wall underlays in drained cavities. Suitably tensioned when installed to avoid any sagging and to keep the flexible underlay in a flat plane. Installed at right angles to roof purlins or wall studs, at maximum 300mm centres.

Application/Use:

3.9.8 Underlay Penetration Seals

3.9.8.1 Multi-Fit Penetration Seals

[Thermakraft Multi-Fit Penetration Seals](#). A range of pipe and service penetration seals consisting of soft, flexible EPDM membrane with a self-adhesive flange.

Multi-Fit Penetration Seals are part of the Thermakraft membrane system, and are a patented airtight solution for round or rectangular pipes, cables or conduits when passing through underlay barriers.

Pipe seals accommodate pipe diameters from 15mm up to 110mm. Cable seals accommodate cable diameters from 7mm up to 22mm, and 80mm trunking.

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Installed in accordance with the manufacturer's requirements and [BRANZ Appraisal No.942 \(2017\)](#), with stand-alone flexible wall underlay over timber or steel wall framed walls on buildings situated in NZS 3604 Wind Zones up to and including 'Very High'.

Installed in accordance with the manufacturer's requirements and [BRANZ Appraisal No.942 \(2017\)](#), with flexible wall underlay used over a rigid wall underlay on buildings situated in NZS 3604 Wind Zones up to and including 'Extra High'.

3.9.9 Co-operation

3.9.9.1 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to install Thermakraft Underlays, DPMs, and DPCs as required.

3.9.10 Workmanship

3.9.10.1 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

All cutting, joining, and fixing techniques shall be exactly as recommended by the manufacturer, and carried out with the use of suitable tools and equipment appropriate for the application. All work shall be such as to leave a neat, efficient, and weathertight installation.

3.9.11 Delivery & Handling

3.9.11.1 Delivery & Handling

Store underlay rolls on end, undercover, on a flat, clean and dry surface. Keep stored materials dry, out of direct sunlight, and protected from damage and contamination at all times.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the product.

Do not use damaged or defective materials, or products that are beyond their designated shelf life.

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform with all relevant [WorkSafe NZ](#) Guidelines and Codes of Practice - including the [OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry](#), as well as the [Best practice guidelines for working on roofs](#) for roofing installations.

3.9.12 Preparation

3.9.12.1 General

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades has been completed to specification and as shown on the approved drawings.

Do not commence installation until all necessary preliminary works by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades is complete.

Supporting timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content of 20% at the time of cladding installation. Allow LOSP treated timber to sufficiently flash-off before installing Thermakraft building underlays and foils.

Supporting light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. Comply with the light structural steel framing fabricator's specifications and requirements for fixing cladding and roofing components.

Supporting heavy steel structures shall comply with NZS 3404.

3.9.12.2 Under-Slab Basecourse

Under-Slab Basecourse - prior to laying under-slab DPM, check all aspects of preparatory works, including but not limited to:

- Check that the under-slab basecourse has been correctly laid and compacted as specified.
- Check that the surface has been properly prepared and compacted to the required standard, and is smooth and flat.
- Ensure any sand blinding is free of aggregate, sharp protrusions.
- Ensure the final surface is free of hollows and ponded water prior to laying the DPM.

3.9.12.3 Wall Framing

Wall Framing - prior to wall underlay installation check all aspects of preparatory works, including but not limited to:

- Check that wall framing has been completed as shown on the drawings, complies with the relevant design and construction standards.
- Check that framing is securely fixed, true to line and plane, is plumb and level where required, and is trimmed at edges, openings and penetrations as required.
- Check that there are no projections due to structural bracing and bracketry etc.
- Check that the required clearances from ground, deck, balcony or lower roof to the bottom edge of the underlay/cladding are in accordance with NZBC E2/AS1.

3.9.12.4 Roof Structure

Roof Structure - prior to roof underlay installation check all aspects of preparatory works, including but not limited to:

- Check that the supporting purlins or battens are set-out to the required set-out and spacings, are

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straight and true to line and plane, and are securely fixed.

- Check that all barge and fascia boards have been installed to the correct line and plane with all edge blocking complete and secure.
- Check that valley gutter and hidden gutter framing is to the required dimensions with solid backing supports securely fixed, true to line and plane.
- Check that internal gutter membrane linings are complete, and dressed back and adhered to a solid substrate along the roof edge as shown on the approved drawings.
- Check that all trimming for roof penetrations, all roof/wall junction blocking, and all necessary work by other trades is complete.
- Check that solid sarking required for fully-supported roofing is complete and securely fixed in accordance with the approved drawings.
- Check that any required anti-ponding boards for tiled roofs have been correctly installed to a minimum 5° (1:12) fall to the eaves gutter.

3.9.13 Installation - Wall Underlay

3.9.13.1 Watergate Plus 295 Wall Underlay

Watergate Plus 295 Wall Underlay shall be installed, printed face out, to the exterior face of the wall framing, run horizontally, starting from the bottom edge and finishing at the top edge, extending 35mm below the bottom plate or bearer, and lapped such that any water will be shed to the outside of the underlay with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.

Fix at maximum 300mm centres, with 6-8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings. Provide additional fasteners fixed through Thermakraft Stud Strap around framed openings before cutting Watergate Plus 295 at openings.

Cut window and door openings just prior to joinery installation; cut underlay at 45° angle away from each corner and return full framing depth and fasten to inside of frame. Install Thermakraft Corner Moulded flashings and Thermakraft Window Flashing Tape over the underlay at opening corners and along sill trimmers in accordance with Thermakraft requirements.

For drained cavity wall construction where studs are at greater than 450mm centres, install Thermakraft Stud Strap horizontally at 300mm centres to prevent bulk insulation from pushing the underlay into the cavity space.

Finish Watergate Plus 295 underlay at edges as detailed.

Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with Thermakraft requirements and as shown on the drawings.

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3.9.14 Installation - Roof Underlay

3.9.14.1 Thermakraft 215 Building Paper

Thermakraft 215 Building Paper shall be installed without support on roofs with slopes 10° or greater (unless specified otherwise), run horizontally across the roof slope and over the purlins, starting from the gutter/lowest point up to the ridge/highest point, extending maximum 20mm into gutters, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned without sagging.

The maximum run length shall be no greater than 10 metres.

Fix at maximum 300mm centres to purlins, with 8-12mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary grippers.

For tiled roofs, lay Thermakraft 215 over the anti-ponding board and rafters/trusses, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Finish Thermakraft 215 along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45° angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with Thermakraft requirements and as detailed. Leave underlay minimum 50mm distance clear of the outer liner of flue stacks.

3.9.15 Completion

3.9.15.1 Completion

Check that all underlays have been installed correctly and are properly supported, and that all underlay edges, joins and ends are correctly finished prior to closing off with claddings - all in accordance with Thermakraft installation requirements.

Check installed membranes and underlays for defective work and damage - replace and/or repair as necessary to the required standard.

Leave all of this work complete, and free of defects, and to the required standard in accordance with the manufacturer's warranty requirements.

Issue to the Owner a copy of the Thermakraft maintenance requirements and the Thermakraft product warranties for the installed products.

3.10 Axon Panel

3.10.1 Scope

3.10.1.1 Cavity Construction with CLD Structural Cavity Battens

Supply and install Axon Panels as a fibre-cement panel cladding material to the walls identified on the drawings, complete with all accessories. The panels are to be finished with a paint system.

All aspects of this work shall be in complete accordance with the [Axon Panel Technical Specification](#) (check www.jameshardie.co.nz, or call 0800 808 868 for the latest edition) and other relevant product manufacturers' recommendations. Use the Axon Panel Installation Checklist at all relevant stages of the work.

3.10.2 Co-operation

Co-ordinate with other trades to ensure that appropriate clearances are allowed from roofing products and associated flashings etc., that the panels correctly allow for door and window installation, and that services penetrations are correctly handled to maintain full weathertightness and panel integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

3.10.3 Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. Framing shall be plumb and in true alignment, complete and suitable for the panels, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that the bottom plate hold-downs are correctly installed.

Check that the building underlay or rigid air barrier has been installed in full accordance with the manufacturer's requirements and the drawings, and completely finished to all penetrations including doors, windows, services, etc. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flashings etc that will enable the panels and all accessories to be installed.

Check that the ground levels are sloping away from the building so that there will be no ponding water against the building, and that the ground will be remain clear of the panels by at least 100mm at all times in accordance with E2/AS1.

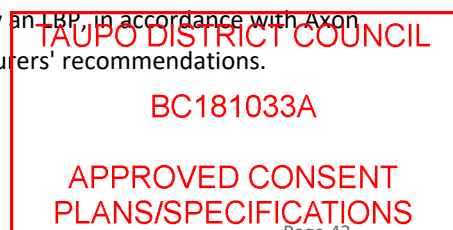
3.10.4 Sealants

Flexible silicone sealant to be SIKa Silaflex MS. Use to seal the panels and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

Polyurethane adhesive sealant to be SIKa Sikaflex 11FC. Use to adhere the panels to the CLD Structural Cavity Battens and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with jointing and texture finishes.

3.10.5 Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with Axon Panel Technical Specification and other relevant product manufacturers' recommendations.



3.10.6 Delivery & Handling

Carry all panels on edge. Stack panels flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm c/s maximum). Keep panels and accessories dry at all times. Avoid damage to panel edges, ends, and surfaces. Keep uPVC flashings etc out of direct sunlight, and store all accessories on flat and avoid damage to any. All installers to be familiar with and comply with the James Hardie Safe Working Practices in the Technical Specification, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished panels or accessories.

3.10.7 Installation

Fix uPVC vent strip through the building underlay or rigid air barrier. Ensure that the openings in the vent strip are kept clear and unobstructed at all times. Fix CLD Structural Cavity Battens through the building underlay or rigid air barrier to the framing. Install the panels to the CLD Structural Cavity Battens in accordance with the Technical Specification, complete with all accessories. Install Scyon mould accessories to complete the installation.

Ensure that all cut edges of CLD Structural Cavity Battens are primed prior to installation with Dulux Acraprime 501/1 sealer or Resene Quick Dry.

Ensure that all cut edges of panels are primed prior to installation with Dulux 1 Step Prep, Resene Quick Dry, or similar. Ensure that the bottom edge of the panel overhangs below the bottom plate by 50mm, and is clear of the ground surface by at least 100mm; the finished ground clearance shall be in accordance with E2/AS1. Seal around services penetrations to maintain weathertightness and air pressure resistance.

3.10.8 Horizontal Joint & Drainage Joint

Horizontal joints to be formed on cavity batten framing with aluminium 'h' mould. Ensure that the panels are not fixed to the floor joists.

Horizontal drainage joints to be formed at floor joist with folded Z-flashing as per E2/AS1 requirements. Ensure the panels are not fixed to the floor joists.

3.10.9 Batten Fixings

Fix CLD Structural Cavity Battens and other accessories with galvanised nails in accordance with Axon Panel requirements.

3.10.10 Panel Fixings

Fix panels and accessories to the CLD Structural Cavity Battens with Grade 304 stainless steel nails and adhesive sealant in accordance with Axon Panel requirements.

3.10.11 Completion

Complete the Axon Panel Installation Checklist and hand over a copy to the client.

Ensure that the panels have been fixed correctly, that all vertical joints and accessories have been completed correctly, and that all penetrations have been taped correctly.

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Check that no damage has occurred to any installed panel element or associated component, replace as necessary.

Check that no dirt has been mounded up within 175mm of the panels, and maintain the clearance.

Ensure that the panels are painted within 90 days of the sheet installation, complete with all accessories and flashings.

Hand over a copy of the latest edition of the Axon Panel Product Warranty to the client.

Hand over a copy of the latest Axon Panel Maintenance Schedule to the client.

3.11 Linea Weatherboard

3.11.1 Scope

Supply and install Linea 180mm Weatherboards as a fibre-cement weatherboard cladding material to the walls identified on the drawings, complete with all accessories. The Linea Weatherboards are to be finished with a paint system. All aspects of this work shall be in complete accordance with the [James Hardie Linea Weatherboard Technical Specification](#) (check www.jameshardie.co.nz, or call 0800 808 868 for the latest edition), Linea BRANZ Appraisals, and other relevant product manufacturers' recommendations.

James Hardie Linea Weatherboard Direct Fixed and Cavity Cladding is CodeMark assured with the NZ Building Code: [CodeMark Certificate of Conformity No:GM-CM30018 \(Rev G\)](#), issued by Global-Mark Pty Ltd.

3.11.2 Co-operation

Co-ordinate with other trades to ensure that appropriate clearances are allowed from roofing products and associated flashings etc, that the panels correctly allow for door and window installation, and that services penetrations are correctly handled to maintain full weathertightness and panel integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

3.11.3 Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. Framing shall be plumb and in true alignment, complete and suitable for the weatherboards, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that the bottom plate hold-downs are correctly installed.

Check that the building underlay or rigid air barrier has been installed in full accordance with the manufacturer's requirements and the drawings, and completely finished to all penetrations including doors, windows, services, etc. Check junctions to all other building elements and ensure that all

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necessary works have been completed eg. flashings etc that will enable the weatherboards and all accessories to be installed.

Check that the ground levels are sloping away from the building so that there will be no ponding water against the building, and that the ground will remain clear of the weatherboards by at least 100mm at all times in accordance with E2/AS1.

3.11.4 Sealants

Flexible silicone sealant to be SIKA Silaflex MS. Use to seal the weatherboards and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

3.11.5 Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with Linea Weatherboards Technical Specification and other relevant product manufacturers' recommendations.

3.11.6 Delivery & Handling

Carry all boards on edge. Stack boards flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm crs maximum). Keep boards and accessories dry at all times. Avoid damage to board edges, ends, and surfaces. Keep uPVC flashings etc out of direct sunlight, and store all accessories on flat and avoid damage. All installers to be familiar with and comply with the James Hardie Safe Working Practices in the Installation Manual, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished weatherboards or accessories.

3.11.7 Installation

Install the Linea Weatherboards through the building underlay or rigid air barrier to the framing in accordance with the Technical Specification and [BRANZ Appraisal No.446 \(2010\)](#), complete with all accessories eg. corner mouldings, cant strip, sealant, soakers, etc. Weatherboard end joints are to be formed off framing with a tongue & groove joint and sealant.

Ensure that all cut edges of weatherboards are primed prior to installation with Dulux 1 Step Prep, Resene Quick Dry, or similar. Ensure that the bottom edge of the weatherboard overhangs below the bottom plate by 50mm, and is clear of the ground surface by at least 100mm; the finished ground clearance shall be in accordance with E2/AS1. Install flexible flashing tape to all junctions and penetrations (including cables etc), with the addition of a pipe bandage for pipes to maintain weathertightness and air pressure resistance, and seal around.

Install H3.1 finger-jointed pine timber trim, scribes, eaves moulds, etc to complete the weatherboard junctions as shown on the drawings. Fix with jolt-head galvanised nails punched below the surface and flushed with exterior builder's fill.

3.11.8 Fixings

Fix weatherboards and accessories with galvanised nails using the concealed nailing method in accordance with James Hardie requirements.

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Fix soakers with nails in accordance with James Hardie requirements.

Optional face nail as required in accordance with James Hardie requirements.

Fix corners and vertical edges of openings with galvanised nails using the face nailing method in accordance with James Hardie requirements.

Fix timber trim with jolt-head galvanised nails punched below the surface and flushed with exterior grade builders fill.

3.11.9 Completion

Ensure that the Linea Weatherboards have been fixed correctly, that all vertical joints and accessories have been completed correctly, and that all penetrations have been taped correctly. Check that no damage has occurred to any installed weatherboard element or associated component, replace as necessary. Check that no dirt has been mounded up within 175mm of the weatherboards, and maintain the clearance. Ensure that the weatherboards are painted within 90 days of the sheet installation, complete with all accessories and flashings. Hand over a copy of the latest edition of the Linea Weatherboard Product Warranty to the client. Hand over a copy of the latest Linea Weatherboard Maintenance Schedule to the client.

4 ROOFING

4.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

4.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1397:1993(AS/NZS)	Steel sheet and strip - hot-dipped, zinc-coated or aluminium/zinc-coated
1562.1:1992(AS)	Design and installation of sheet roof and wall cladding. Part 1: Metal
2295:2006(NZS)	Pliable, permeable building underlays
3604:2011(NZS)	Timber-framed buildings

4.3 COLORSTEEL®

4.3.1 Scope

4.3.1.1 Inland - Moderate (ISO C2)

Supply the selected Colorsteel roofing and install on the areas identified on the Roof Plan. All aspects of the work shall be in complete accordance with NZ Steel 'Installers Guide' (check 0800 100 523 for the latest edition) and any other relevant Product Manufacturers Recommendations.

4.3.2 Product

4.3.2.1 Colorsteel Endura
COLORSTEEL® Endura™.

Colour:

4.3.3 Profile

4.3.3.1 Corrugated 0.40mm
Corrugated 0.40 BMT x G550.

Location:

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4.3.4 Qualifications

4.3.4.1 Qualifications

All installation work shall be carried out by experienced and competent tradesmen who are familiar with the techniques and materials specified. All handling and fixing techniques, and all jointing and sealing materials and techniques, shall be exactly as recommended by New Zealand Steel.

4.3.5 Co-operation

4.3.5.1 Co-operation

Co-operate with other trades to ensure that roof framing has appropriate spacings, alignments and fixings, and is in accordance with NZS3604, and coordinate to ensure that all timber members required for ridges, hips, valleys, barge, penetrations, junctions with vertical faces, etc. are correctly in place.

Note and co-ordinate with the installer of the rainwater system specified above. Handle roofing without scratching, distortion or other damage, store on even bearers, and keep dry until installed. Ensure that each section of roof is waterproofed as soon as possible after preparatory work is complete; allow to carry out the works in several operations if necessary to comply with this condition.

4.3.6 Installation

4.3.6.1 Installation

Set-out the roofing sheets exactly square to building axis and maintain this accurate setout throughout the works, and set-out to lap sheets away from the prevailing wind.

Install the underlay running up and down the slope with minimum 300mm side laps. Do NOT install any fixings to the underlay (to avoid dissimilar metals/electrolysis) - install the underlay length by length as the roofing proceeds and ensure it is taut and evenly lapped when the roofing screws are installed.

4.3.7 Fixings

4.3.7.1 Fixing

Screw fix, screws to comply with AS3566 (Self-drilling construction screws) Class 3 or 4. (Do NOT use stainless steel screws). Use only low carbon (

4.3.8 Flashings

4.3.8.1 Flashings

Ridges, hips, and barge flashings etc. shall all be matching Colorsteel, and as detailed. Soft zinc flashing edges very neatly dressed down where required, plumbing penetrations custom flexible rubber flashed (fully sealed), and instruct the Plumber that no copper (or brass) pipes are to discharge on to the roof.

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4.3.9 Protection

4.3.9.1 Protection

Protect the coated surface from damage at all times; replace the whole sheet where a significant depth of the coating has been damaged. Completely clean off all drill and power saw swarf and pop-rivet shanks as the work proceeds (at least daily, and keep them and other rubbish out of the spoutings). Remove trade debris from the roof and from the site progressively, and on completion leave the roof and rainwater system completely clean.

Do not use black lead pencils for marking Colorsteel - permanent marking may result. Observe NZ Steel's recommendations where flues discharge above roofs, and for the installation of solar heating panels. Do NOT weld Colorsteel. NO abrasive disc cutters, no soldering, no lead head nails or lead edged flashings, no touch-up paints, and do not slide tools down the roof.

4.3.10 Maintenance

4.3.10.1 Maintenance

Advise owner to minimize walking on the roof, and to use soft-sole shoes during maintenance access. Advise owner re maintenance of unwashed surfaces, and to light detergent wash the whole roof every three to five years. Advise owner that any leaf build-up gutter protection system that traps water will invalidate the roofing warranty.

5 ALUMINIUM JOINERY

5.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

5.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1865:1997(AS/NZS)	Aluminium and aluminium alloys - Drawn wire, rod, bar and strip
2208:1996(AS/NZS)	Safety glazing materials in buildings
4211:2008(NZS)	Specification for performance of windows
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
AS/NZS 1231	Aluminium, anodic coatings
AS/NZS 1866	Aluminium / alloys - extruded sections
AS/NZS 4666:2012	Insulating glass units

5.3 Aluminium Windows

5.3.1 Alternatives

5.3.1.1 Alternatives Option 1

The materials and elements specified indicate the required standards for these works. Alternatives which are equal to or superior to these materials and elements may be tendered for approval.

Thermal performance (NZBC H1/AS1) must be as required to meet the Designer's Thermal Evaluation.

5.3.2 Installation Type

5.3.2.1 Timber Frame Installation - Direct Fix

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.

Check framing alignment, and that window openings are square and the correct size for fitting tolerances.

Prepare framing openings by neatly cutting the building wrap at 45° into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape,

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stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the sill flashing, extending from an upstand lip behind the line of the aluminium frame out to lap a minimum of 35mm down over the top of the cladding, sloping at 15° unless the glazing weight requires the frame be blocked up for support. (If the flashing is level for blocking-up the sill, upstand its ends to create 'dams' as shown in E2/AS1).

Set shims or pack as necessary and install the frames exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15° down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm, before finishing with a 5mm 45° 'kick out'. Seal between head flashing and cladding at the ends as detailed. Install jamb flashings/sealant or scribes as detailed.

After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

5.3.2.2 Timber Frame Installation - Cavity Construction

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.

Check framing alignment, and that window openings are square and the correct size for fitting tolerances.

Prepare framing openings by neatly cutting the building wrap at 45° into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape, stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the WANZ extruded aluminium support bar with built in drainage and ventilation to NZBC E2, to provide continuous support to the window unit. Install the head cavity closer, positioned to provide a 15mm drip edge to the cladding.

Set shims or pack as necessary and install the frames exactly true and square, blocked-up off the support bar as required. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15° down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm before finishing with a 5mm 45° 'kick out'. Upstand the head flashing ends as detailed. Install jamb flashings/ sealant or scribes as detailed.

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After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

5.3.3 Interior Finish

5.3.3.1 Architraved

Architraved.

5.3.4 Reveal

5.3.4.1 Timber Finger Jointed - 19mm

Timber reveals for paint finish with all sides primed.

5.3.5 Glass Platform

5.3.5.1 Double Glazed

Double Glazed.

5.3.6 Finish

5.3.6.1 Powder Coated Aluminium - Matt

Polyester powder coating in accordance with Wanz Powder Coating Quality Assurance System and AAMA 2603-98 performance is required.

5.3.7 Hardware

5.3.7.1 Colour Matched Hardware

Hardware colour matched to Aluminium Joinery: confirm with owner prior to manufacture of joinery

Hinges, stays, catches, fasteners, latches, locks and furniture as offered by the window and door manufacturer. Key alike all lockable window hardware able to be keyed alike.

Account for all keys and deliver separately to the site manager. Factory fit all required and scheduled hardware.

5.3.8 Workmanship

5.3.8.1 Workmanship

These windows will be manufactured in workshops containing all mechanical equipment appropriate for the work, and by experienced and competent tradesmen who are familiar with the techniques and materials specified.

The manufacturer will co-ordinate with other trades to establish the exact sizes for all frames before fabrication. Frames and sashes will be fabricated true, square, rigid, and 'out of wind', with all joints strongly mechanically fixed, and with mitres tight and fully sealed. Potential thermal, wind and seismic movements will be accommodated within the construction. All cavities will drain to the exterior, and all drilling swarf etc. will be removed during fabrication.

Stays, hinges, running gear and glazing will be installed as scheduled (the Designer will be notified if any scheduled hardware of fixing position appears to be inappropriate for this project).

Hardware will be fixed true to line and position, and adjusted and oiled as required for correct operation.

Glass will be cut true and square, sized to provide correct edge clearances, blocked into place as required, and all units will be delivered either pressure fit, pocket glaze, or beaded/wedged, unless site glazing is required. Glazing gaskets will be compatible with all adjacent materials, and cut 1% over-length to absolutely avoid stretching during installation. Frames will be braced etc. as necessary for transportation to the site.

Flashings as detailed will be supplied. Flashing materials will be compatible with the windows.

5.3.9 Delivery and Installation

5.3.9.1 Delivery and Installation

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and the construction principles that are embodied in the Acceptable Solutions.

Arrange for delivery of windows to the site only when a suitable storage situation is available for them, handle the windows in accordance with the manufacturers requirements, avoid any frame distortion, avoid rubbing damage, avoid contact with concrete, plaster, mud etc. and keep them dry. Retain protective coverings for as long as possible, and remove them at completion.

Experienced and competent tradesmen who are familiar with the techniques and materials specified shall carry out all installation work. Fix in accordance with the manufacturer's instructions. Take utmost care to avoid damage to anodized or powder coated surfaces - correction of any such disfigurement requires written authority - replace any badly damaged items.

Use fixings compatible with the materials involved, as recommended by the windows manufacturer and to comply with the DWP requirements, basically aluminium or Type 316 stainless steel where exposed externally; galvanized to AS/NZS 4680, 610g/m2, may be used where not exposed.

Thoroughly check all preparatory work to openings prior to installation, including wrap, corner seal tapes, adjacent cladding, pre-installed flashings, etc. as appropriate. Use inert barriers or coatings to prevent contact between dissimilar metals or between aluminium and concrete.

Install flashings as detailed and supplied by the windows manufacturer, installed tightly and neatly with absolute minimum tolerances, with head weathering jamb, jamb weathering sill, and sill open (draining) to exterior. Except where the window is recessed all head flashings shall extend 30mm minimum beyond the frame.

Air-seal all frame perimeters to adjacent structure to a depth of 15 - 20mm with expanding foam or appropriate sealant including a PEF rod at head, sill and jambs to retard the spread of sealant.

Weather-seal frame jambs etc. to adjacent surfaces (or to each other) as detailed or as required by the windows manufacturer, to achieve a fully watertight installation. In preparation for sealant the joints shall be clean, dry, and primed if necessary. Insert closed cell polyethylene backer rods or a polyethylene tape slip layer if required. Mask adjacent surfaces if appropriate, install the sealant fully in accordance with the sealant manufacturers recommendations, and finish to even smooth surfaces.

Remove trade debris progressively, appropriately clean any affected adjacent surfaces, thoroughly clean the windows, check that all hardware is in full working order, and provide safety indication of the glass for the balance of adjacent works.

6 GLAZING

6.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

6.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.0:2002 SUPP1(AS/NZS)	Structural design actions - General principles - Commentary
1170.5:2004(NZS)	Structural design actions - Earthquake actions - New Zealand
2208:1996(AS/NZS)	Safety glazing materials in buildings
3604:2011(NZS)	Timber-framed buildings
4211:2008(NZS)	Specification for performance of windows
4223.1:2008(NZS)	Code of practice for glazing in buildings - Glass selection and glazing
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4223.4:2008(NZS)	Glazing in buildings - Part 4: Wind, dead, snow, and live actions
4223.SUPP1:2008(NZS)	Code of practice for glazing in buildings - Supplement 1 to NZS 4223.1:2008 and NZS 4223.4:2008
4232.2:1988(NZS)	Performance criteria for fire resisting enclosures - Part 2: Fire resisting glazing systems
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
4668:2000 (AS/NZS)	Glossary of terms used in the glass and glazing industry
AS/NZS 4666:2012	Insulating glass units

6.3 Non-Structural Glazing

6.3.1 Scope

6.3.1.1 Scope

Supply and install the selected glass products to the windows, doors, curtain wall systems, roofs and canopies, balustrades and barriers, partitions and screens, and other non-structural glazing elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the glass manufacturer's installation requirements and recommendations, other relevant product manufacturers' recommendations, and as shown on the drawings.

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6.3.2 Co-operation

6.3.2.1 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Co-ordinate with other trades for all necessary holes and cut-outs etc. for glass mounted hardware, fittings and fixtures, and to install all glass and glazed elements as required.

6.3.3 Workmanship

6.3.3.1 Workmanship

All installation work shall be carried out by experienced and competent tradesmen familiar with the products specified and installation techniques, to the manufacturer's requirements and recommendations, and the requirements of the relevant Glazing Standards, and to the layout and details shown on the drawings.

Handle and store glass in accordance with the manufacturer's recommendations.

Provide temporary safety markings to all glass panes as the installation work progresses.

Finish all external glazing wind and watertight.

Do not use damaged, marked or faulty materials.

6.3.4 Glass Type

6.3.4.1 Clear Float Glass

Clear Float Glass: Clear annealed float glass, in accordance with NZS 4223, to the locations identified on the drawings.

Manufacturer, brand name & type: TBC

6.3.4.2 Obscure Patterned Glass

Obscure Patterned Glass: Surface patterned obscure glass, in accordance with NZS 4223, to the locations identified by the home owner.

Manufacturer, brand name & type: TBC

6.3.4.3 Toughened Safety Glass

Toughened Safety Glass: Toughened Grade 'A' Safety Glass, in accordance with AS/NZS 2208 and NZS 4223, to the locations identified on the drawings. All cutting and drilling and other processing requirements shall be done prior to toughening. Install safety glass in accordance with the manufacturer's recommendations and NZS 4223.

Manufacturer, brand name & type: TBC

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6.3.5 Insulating Glass Units

6.3.5.1 Insulated Glass Units (IGU's)

Insulating Glass Units. Sealed, gas filled, insulating glass units manufactured and installed in accordance with AS/NZS 4666, and the Insulating Glass Manufacturers' Association recommendations, to the locations identified on the drawings.

Manufacturer, brand name & type: TBC

External Glass, type & thickness:

Space width and Gas:

Internal Glass, type & thickness:

6.3.6 Components & Accessories

6.3.6.1 Aluminium Framed Glazing

Provide all necessary glazing components and accessories including glazing tape, setting and distance blocks, sealants, gaskets, etc., to complete aluminium framed glazing as required.

6.3.7 Installation

6.3.7.1 Aluminium, Double Glazed (IGU's)

Install Insulated Glass Units into aluminium frames in accordance with the glazing manufacturer's recommendations and NZS 4223, and as detailed.

6.3.8 Completion

6.3.8.1 Completion

Check that all glass has been installed correctly to the required standard and as shown on the drawings. Check for damage and surface marking and replace as necessary. Clean off and remove all temporary safety markings, as programmed and when instructed, and leave glass trade clean.

Remove all rubbish and waste material from site.

Issue to the Owner a copy of the Glass Manufacturer's maintenance requirements and all necessary Manufacturer Warranties.

7 INSULATION

7.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

7.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3604:2011(NZS)	Timber-framed buildings
4220:1982(NZS)	Code of practice for energy conservation in non-residential buildings
4243.1:2007(NZS)	Energy efficiency - Large buildings - Building thermal envelope
4246:2016(NZS)	Energy efficiency - Installing bulk thermal insulation in residential buildings
4859.1:2018(AS NZS)	Thermal insulation materials for buildings - Part 1: General criteria and technical provisions

7.3 Thermal Insulation

7.3.1 Scope

7.3.1.1 Scope

Supply and install the selected products as thermal insulation to the specified R-values, complete with all accessories, to the floors, walls, ceilings, roofs, and other thermally insulated building elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the product manufacturer's technical literature and installation requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

7.3.2 Co-operation

7.3.2.1 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Co-ordinate with other trades to install all thermal insulation as required.

7.3.3 Workmanship

7.3.3.1 Workmanship

All installation work shall be carried out by experienced and competent tradesmen, familiar with the specified products and installation techniques, in accordance with the manufacturer's installation requirements, and as noted and detailed on the drawings.

Store and handle products in accordance with the manufacturer's recommendations. Keep dry and

protect from damage. Do not compress fibre insulation bales, do not use damaged or faulty insulation products and accessories.

The building must be completely enclosed and water tight before installation commences with the exception of roof insulation when installed with roofing. Ensure the moisture content of timber framing is no greater than 18% prior to installing insulation to timber framed elements. Always maintain the full insulation thickness to ensure the required thermal values are achieved. Do not install insulation pads or blankets into closed cavities that are less than the stated insulation nominal thickness.

7.3.4 Product

7.3.4.1 Glass Fibre Pads

Glass fibre thermal insulating pads.

Manufacturer, brand name & type: Pink Batts or similar approved

R-Value: refer to H1 calculations

Location: refer to H1 calculations

7.3.4.2 Glass Fibre Blanket

Glass fibre thermal insulating blanket.

Manufacturer, brand name & type: Pink Batts or similar approved

R-Value: refer to H1 calculations

Location: refer to H1 calculations

7.3.5 Installation

7.3.5.1 Wall Insulation - Glass Fibre Pads

Install glass fibre insulation pads, complete with accessories, friction fitted between wall studs and dwangs etc. and held in place in accordance with the manufacturer's installation recommendations. Completely fill the framing voids, leave no gaps at the edges or at penetrations etc, and maintain full insulation pad thickness. Support external wall insulation with vertical strapping tape at 400mm centres to the outside face, stainless steel stapled to the framing.

7.3.5.2 Ceiling Insulation - Glass Fibre Blanket

Install glass fibre insulation blanket, complete with accessories, friction fitted between the ceiling framing over the ceiling lining in accordance with the manufacturer's installation recommendations. Leave no gaps along the insulation blanket edges and joints, and at the ceiling perimeter/wall junction. Refer to the electrical fitting manufacturer's installation recommendations for insulation separation requirements around their recessed electrical fittings. Separate ceiling insulation 200mm from recessed light fittings and other recessed electrical fittings where no fittings manufacturers installation information is available and product does not have a CA, IC or ICF rating.

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7.3.6 Completion

7.3.6.1 Completion

Check that all insulation has been installed correctly and is correctly supported and that all edges, joins and ends are fully closed without gaps. Check for damage and faults and repair or replace as necessary. Collect and remove from site all rubbish and waste material.

Issue to the Owner a copy of any product maintenance requirements and a copy of the Thermal Insulation Product and Installation Warranties for the completed works.

8 TILING

8.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

8.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3103:1991(NZS)	Specification for sands for mortars and plasters
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
4858:2004(AS/NZS)	Wet area membranes

8.3 Workmanship

8.3.1 Co-operation

8.3.1.1 Co-operation

Co-operate with the Contractor and other Subcontractors to ensure that substrates are completely appropriate for the tiling required, particularly with regard to concrete surface finish, the use of retarders, release agents or curing compounds, and with regard fixing and finishing of sheet substrates and their support.

8.3.2 Workmanship

8.3.2.1 Sequence

Delay tiling to allow maximum curing and settling and initial creep of the substrates, particularly to load bearing structural elements.

8.3.2.2 Qualifications

All work by competent and experienced tilers. Co-ordinate with other trades and instruct them as necessary to ensure appropriate substrate conditions to assure first class tiling results.

8.3.2.3 Preparation

Protect all adjacent surfaces from damage or staining during tiling: arrange any making good or cleaning required as instructed by the Architect/Designer. Wash down and remove form work release agents, slab curing compounds, and surface retarders. Clean down with mould killer, etching agents, or wire brush as required. Grind off high spots if required. Ensure that the moisture content of substrates is appropriate.

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8.3.2.4 Set-out

Set out tiles as detailed or for even margins with patterns to register in all directions. The finished surfaces shall be true and even and with lines accurate, level and plumb, or to even falls as noted, and finished flush with adjoining work as appropriate. Cut edges to the manufacturers instructions, and stone arris where the cut edges are not concealed under adjoining work.

8.3.2.5 Installation

No retempering of partially set or dried mortar, adhesive or grout. Prior to grouting rake out any excess bedding material. Grout shall be coloured as directed, placed full depth, and finish tooled to a dense, uniform surface. Clean excess grout off tiles and adjacent surfaces.

8.3.2.6 Control Joints

Form control joints at tiling edges abutting concrete or masonry, within the tiled surface to give a maximum panel dimension of 2m, and over any control joints in the substrate. Rake control joints full depth to the substrate as work proceeds, mask edges and clean out just prior to placing filler, and fill full depth and flush. Clean excess filler off the tiles or other surfaces.

8.3.2.7 Completion

On completion thoroughly clean the full tiled surfaces, and lightly buff where appropriate. Protect finished work from subsequent damage.

8.3.2.8 Exterior Tiling

No exterior tiling during inclement weather.

8.4 Materials**8.4.1 Materials****8.4.1.1 Adhesives & Grouts**

All adhesives/beddings/grouts shall be selected for each specific tile/substrate situation, selected as the best readily available, and each is subject to approval by the Architect/Designer (who may require appropriate manufacturers information for consideration prior to approval).

8.4.1.2 Standards

Water, cement, sand and sand particle size grading, all exactly to the relevant NZS requirements.

8.4.1.3 Crack Control

Crack control joint filler as recommended by the tiles supplier, with the colours selected from the standard range.

Materials shall be from the same batch for even type and colour, and shall be delivered with their packaging and labeling intact.

8.4.1.4 Requirements

Store in dry areas, machine mix all materials to the manufacturers requirements, and do not mix proprietary materials.

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8.4.2 Tiles/Scope

8.4.2.1 Delivery & Handling

All tiles true to shape, free of warp, and accurate in dimensions to facilitate laying with minimum joint width. All tiles true to samples and free of imperfections. Tiles from the same batch where possible, and delivered with the original packaging and labeling intact. Tiles handled and stored carefully to preserve edges.

8.4.2.2 Setout

The exact setout will be notified with the tile(s) selection.

9 PAINTING & DECORATING

9.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

9.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2310:2002(AS/NZS)	Glossary of paint and painting terms
2311:2017(AS/NZS)	Guide to the painting of buildings
3750.0:2008(AS/NZS)	Paints for steel structures - Introduction and list of Standards
AS 1580	Methods of test for paints
BRANZ IB 257	Wood primers
NZBC E3	Internal Moisture
NZS 7702	Colours for specific purposes

9.3 General

9.3.1 Alternatives

9.3.1.1 Alternatives - Option 1

The materials specified in this section or on the drawings indicate the required standards for these works. Alternatives which are considered equal to or superior to these may be tendered for approval (in writing, and they must NOT be used unless they are approved in writing).

9.3.2 Co-operation

9.3.2.1 Co-operation

Co-operate with all trades and attend upon Concretor, Joiner, Carpenter, etc. to ensure that the surfaces provided by these trades are completely suitable for the Painter works that are required.

9.3.3 Preparation

9.3.3.1 Preparation

No painting or varnishing or other surface coating work shall be undertaken unless the surfaces to be coated are in a correct and proper condition to ensure first class results.

Inspect the works of other trades on which Painter work is scheduled and report to the Main Contractor and the Architect/Designer any defects or irregularities that would affect the permanency or finish of the painting work, and do not proceed until the defects or irregularities have been

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completely rectified. Failure to examine and report will be construed as an acceptance that all preparatory works are completely satisfactory.

This clause does not relieve the Painter of any of the usual preparatory work to surfaces customarily performed by this trade.

Clean down all surfaces with sugar soap, strippers, mould killers, etching agents, etc. as required. Sand or rub all sharp edges off exterior timbers and other materials as appropriate before painting. Finish rub down ALL surfaces. Ensure that the moisture content of all substrates is appropriate. Remove locks, fastenings, and similar hardware before painting and refix on completion. Remove all electrical switch and power plates before painting and refix them on completion. Mask adjacent surfaces as required to a true line and remove the masking on completion. Dust and wipe down all surfaces for Painter work and completely remove all dust, rubbish, dirt etc. from areas involved immediately prior to commencement. To each area of the works complete all surface preparation before applying paint to any surface.

9.3.4 Protection

9.3.4.1 Protection

Take adequate precautions to prevent paint spots falling on prefinished or similar surfaces, and extreme care to keep absorbent materials (e.g. cedar, sawn framing, decking, paving) completely clean during all adjacent painting work. Correction of any such disfigurement shall be to the Architect/Designer's approval.

9.3.5 Qualifications

9.3.5.1 Qualifications - Option 2

All work by the Painting Subcontractor shall be of the highest reasonable standard, and executed by experienced and competent tradesmen to the Architect/Designer's approval.

9.3.6 Workmanship

9.3.6.1 Workmanship

Strictly adhere to all Manufacturers' instructions.

Strictly observe Manufacturers' requirements with regard to surface and air temperatures for painting. No work shall be carried out on surfaces that are not completely dry, and no external work shall be carried out during damp or wet conditions.

In all finishes any irregularities or brushmarks or dust etc. in each preceding coat shall be rubbed down to provide a smooth clean surface for the following coat. Each coat shall be finished over all surfaces before a further coat is applied, and each coat shall be completely dry before subsequent coats. Finish broad areas before painting trim, paint ceilings before walls and walls before joinery, trim and other items.

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Each coat and the full completed system shall be of uniform finish, colour, texture and sheen, shall have proper covering of thin edges, corners, end grain etc. and shall be free of blemishes such as runs, sags, fat edges, entrained hairs, brush marks, starved patches etc.

9.3.7 General

9.3.7.1 General

The schedules indicate the general extent of the works to be carried out but are in no way exhaustive in their description of the actual items for painter work. Complete all work necessary for the proper and entire completion of the works. All items and portions of items reasonably inferable but not specifically mentioned are deemed included, i.e. cupboard interiors, the top and bottom of doors, unseen cabinetry tops, etc. All doors shall have equal painter work on ALL surfaces.

Where timber work is specified for priming before fixing the priming shall be thoroughly brushed in to all surfaces, and all exterior timber work for paint finishing shall be fully primed within one week of fixing. Should more than one month elapse between priming and undercoating the timber shall be fully reprimed.

Stopping up work shall be carried out immediately the priming or sealing coat is dry, and shall be solidly placed to finish clean and dry. Stopping tinted to match the timber for clear finished work.

9.3.8 Materials

9.3.8.1 Materials

All Painter materials shall be ready mixed and delivered in unopened containers. Materials shall be used only for the purpose and in the manner intended by the manufacturer; any apparent scheduled discrepancy in this respect shall be referred to the Architect/Designer immediately for clarification.

Where surfaces are specified to be finished in a particular manner or material, all preparatory work, priming, or undercoating, that is necessary to ensure a proper finish shall be provided, irrespective of any apparent omission herein.

In water splash or wet areas that require a paint finish the paint must be gloss or semi-gloss finish as per NZBC E3/AS1 3.1.2.

Thinning shall only be to manufacturer's specification. Thoroughly stir as required to lift any settled pigment and ensure the paint is homogeneous. Paints shall be factory or shop tinted to the colour required. Undercoats shall be fully tinted to match the final colour scheduled. All paints shall have the finished film thickness that is specified by the manufacturer (checked by monitoring the coverage per litre).

9.3.9 Completion

9.3.9.1 Completion

Allow to touch up to approval any Painter work which is damaged during the finishing works of other trades. Replace all hardware, remove all masking, covers, containers etc., thoroughly clean all

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affected surfaces, and leave all spaces ready for immediate occupation. Avoid scratching or abrading glass or hardware during any cleaning.

10 PLUMBING

10.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

10.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1221:1997(AS/NZS)	Fire hose reels
1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1477:2017(AS NZS)	PVC pipes and fittings for pressure applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
2032:2006(AS/NZS)	Installation of PVC pipe systems
2033:2008(AS/NZS)	Installation of polyethylene pipe systems
2492:2007(AS/NZS)	Cross-linked polyethylene (PE-X) pipes for pressure applications
2537.1:2011(AS/NZS)	Mechanical jointing fittings for use with crosslinked polyethylene (PE-X) for pressure applications - Part 1: Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - General
2642.2:2008(AS/NZS)	Polybutylene pipe systems - Polybutylene (PB) pipe for hot and cold water applications
2712:2007(AS/NZS)	Solar and heat pump water heaters - Design and construction
3500.1:2018(AS NZS)	Plumbing and drainage Part 1: Water services
3500.2:2018(AS NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.3:2018(AS NZS)	Plumbing and drainage Part 3: Stormwater drainage
3500.4:2018(AS NZS)	Plumbing and drainage Part 4: Heated water services
3501:1976(NZS)	Specification for copper tubes for water, gas, and sanitation
4121:2001(NZS)	Design for access and mobility: Buildings and associated facilities
4305:1996(NZS)	Energy efficiency - Domestic type hot water systems
4517:2010(NZS)	Fire sprinkler systems for houses
4541:2007(NZS)	Automatic fire sprinkler systems
4602:1988(NZS)	Low pressure copper thermal storage electric water heaters
4603:1985(NZS)	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems)
4606.1:1989(NZS)	Storage water heaters - General requirements

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4607:1989(NZS)	Installation of thermal storage electric water heaters: valve-vented systems
4613:1986(NZS)	Domestic solar water heaters
4614:1986(NZS)	Installation of domestic solar water heating systems
4617:1989(NZS)	Tempering (3-port mixing) valves
4692.1:2005(AS/NZS)	Electric water heaters - Energy consumption, performance and general requirements
4766:2006(AS/NZS)	Polyethylene storage tanks for water and chemicals
5262:2003(NZS)	Gas appliance safety
5601.1:2013(AS/NZS)	Gas installations - Part 1: General installations
7602:1977(NZS)	Specification for polyethylene pipe (Type 5) for cold water services
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
7646:1978(NZS)	Specification for polyethylene pipes and fittings for gas reticulation
AS/NZS 1596	LP gas handling and storage
AS/NZS 2053	Specification for unplasticized PVC conduit and fittings for electrical wiring
AS/NZS 3500.5:2012	Plumbing and drainage - Part 5: Housing installations
NZBC G12	Water Supplies
NZBC G13	Foul Water

10.3 General

Carry out all works necessary to leave the water, waste, vent and soil systems serving the sanitary fittings and the plumbing hardware shown on the drawings or specified below in correct working order complete with all ancillary systems (safetrays, floor drains, overflows, relief valves, etc.) required, and with all normal incidentals customarily installed by this trade.

Comply with the Building Code, Territorial Authority By-laws and statutory authority Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange for all tests and pay all fees and customary charges in connection with the required works.

10.4 Workmanship

10.4.1 Co-operation

10.4.1.1 Co-operation

Co-operate with all other trades. Attend upon Concretor, Drainlayer and Carpenter to set out the exact positions of pipe runs before adjacent work is put in hand, and to ensure that all pipes, sleeves, fixings, flashings etc. are correctly incorporated into the structure as construction proceeds.

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10.4.2 Workmanship

10.4.2.1 Qualifications

All plumbing work shall be carried out by, or under the direct control of, properly qualified tradesmen, and shall be to recognised high standards.

10.4.2.2 Winter Conditions

Observe best local trade practice to avoid problems which arise from freezing winter conditions.

10.4.2.3 Cutting & Checking Timber

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials only to approval. Install seismic restraints to storage tanks and HWCs.

10.4.2.4 Weatherseal

Weatherseal wherever pipes, screws, bolts or other fastenings penetrate an external surface, and particularly roofing; seal with gaskets, flashings (and overflashings if necessary) or mastic as appropriate - any damage that results from failure of such seals will be made good at the Plumber's expense.

10.4.2.5 Protection

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Plumber's expense.

10.4.3 Pipework

10.4.3.1 Joints

Joints between pipes of different materials shall always be to the approval of the TA Plumbing Inspector.

10.4.3.2 Pipework Set-out

Pipework set-out neatly with a minimum number of bends, and more or less parallel to and at right angles to structural elements - avoid diagonal piping.

10.4.3.3 Concealed & Exposed Pipework

All internal pipework shall be concealed except where otherwise is either shown or approved. Exposed pipework shall be accurately and neatly run. Arrange all pipework (and particularly traps) in a manner which will allow maximum future accessibility for repairs or maintenance. Arrange for access panels to any primary maintenance positions, and install conveniently located isolating valves for each group of fittings. Wingbacks securely and squarely fixed. Crox unions usually acceptable only at the final connection to fittings. Install white plastic flanges where pipes penetrate linings in visible locations.

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10.4.3.4 Marked Positions

Where pipes are covered with nail fixed linings and trim ensure that their positions are marked on the linings to minimise the risk of subsequent nailings penetrating the pipe. Any such damage shall be rectified immediately, with all consequential damage made good.

10.4.3.5 Fixing Pipework

Set pipework out in straight runs to even gradients. Fix all pipes to the structure sufficiently to fully support and to prevent sagging or vibration. Clips and saddles shall be the same material as the pipe. Exterior pipes on stand-off brackets. Fixings to the exterior or damp locations shall all be hot dip galvanized unless otherwise noted. Sleeves for pipes or drains penetrating concrete or masonry shall be uPVC, 20mm minimum larger internal diameter than the external diameter of the pipe, finished flush with concrete or masonry, and packed and mastic sealed.

10.4.3.6 During Construction

Close open ends of the systems during construction to prevent the entry of foreign matter.

10.4.4 Temperature Movement

10.4.4.1 Thermal Issues

All work shall respect in full all probable thermal movements - layouts, fixings and jointings shall be arranged to allow thermal movement without risk of prejudice to watertight conditions, or risk of damage from straining of the pipes which will generate failures.

In particular, observe best local trade practice to avoid problems arising from freezing conditions.

10.4.5 Excavation

10.4.5.1 Excavation Requirements

Allow to carry out all excavation that is required to suit the services installed by this trade. Check for other services before excavation. Trenches true to line and level, base of trenches clear of loose material, and shore trenches as required to suit the ground conditions. Backfilling shall be carried out by this trade, and be to the requirements specified in Siteworks.

10.4.6 Testing

10.4.6.1 Services Testing

All plumbing services shall be completed in stages which will allow for proper testing under normal working pressures prior to the application of insulation, concealment or other enclosure. All leaks remedied and retested. On completion the whole of the plumbing services to be subjected to full operational tests in the presence of the plumbing inspector, with any defects revealed in these tests properly remedied.

10.4.7 Warranties

10.4.7.1 Warranties Submittal

Warranty cards and manufacturer's guarantees for all items supplied and installed by this trade shall be correctly filled in and handed over at Practical Completion.

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10.5 Materials

10.5.1 Materials

10.5.1.1 Materials Quality

Materials shall be delivered with packaging and labeling intact. Incidentals (jointing compounds, PTFE tape, seals, washers, silfos, solvent cements, etc.) shall be completely appropriate for the application involved. The use of imperfect items or items damaged in any way is always subject to approval.

10.5.2 Materials Separation

10.5.2.1 Materials Separation

Separate dissimilar metals in any circumstances which could produce contact or electrolytic action by a water film, with thick plastic tape, bituminous felt or other inert material. Pipes in contact with or built into concrete or masonry shall be fully spiral wrapped in Denso tape or equal.

10.6 Systems

10.6.1 Wastes & Vents

10.6.1.1 Sizes & Falls

All traps sized to AS 3500.2. Wastes and vents all uPVC. Wastes shall be to AS 3500.2 falls as a minimum. Vents shall be generally as indicated, but avoid where permissible in compliance with AS 3500.2, or shall be combined above the flood level of the fittings.

10.6.1.2 Bird-proof Domes

Fit bird proof domes to all vents.

10.6.2 Cold Water System

10.6.2.1 Supply From Existing Toby

All cold water supply pipework shall be polybutylene, arranged and fixed so that all joints are in a fully 'relaxed' condition, without any stress or tension.

Lay on a 20mm main from the existing toby along the route designated by the plumber to the connection position designated by the plumber (pipe depth, protection, backfilling, signal strip etc. to comply with all Supply Authority requirements). At the connection position take a branch feed off for the hosecocks (and reticulate to the positions shown and install angle hosecocks) and toilet cisterns and then take the main feed through an accessibly positioned cleanable in-line sediment and dirt filter.

Primary distribution from the water filter shall be in 20mm piping, with water pipe sizes to individual fixtures sized to suit clause 5.3.1 of NZBC G12/AS1. Install conveniently located isolating valves to turn off each group of fittings, and install a small isolating valve alongside each toilet cistern not integrally fitted with one. (Note that these isolating valves and the hosecocks are not covered by the Plumbing Hardware Prime Cost Sum).

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10.6.3 Hot Water System

10.6.3.1 Gas Instant Hot Water Device

Supply the gas instant hot water device complete with a wall recess box as noted on the drawings and install it where shown on the plan and elevation.

Install pressure relief valves, cold water expansion valves, flow control valves, pressure limit valves, and non-return/isolating valves as required to leave the hot water systems in full design operational order.

Install a tempering valve to control the hot water temperature at any sanitary fixture used for personal hygiene at not more than 55°C.

Flush all pipework before making the final connections. Lag the main distribution pipes full length with wall pipe insulation.

Showers shall have priority feeds, without 'tees', and the pipework layout shall ensure that the showers temperature and pressure remain as even as possible.

10.6.4 Gas Fitting

10.6.4.1 Scope

Is included in the Plumbing trade, although all work must be carried out by Registered Gasfitters, and be in complete accordance with all relevant Regulations and standards and be in full accordance with best trade practice.

Obtain all necessary permits and pay all fees. If necessary obtain a Dangerous Goods Licence for the storage installation in the name of the Owner; and if the Owner's signature is required forward all relevant papers to the Architect/Designer.

10.6.4.2 Testing & Compliance

Test the full systems to all relevant requirements; if any faults are discovered rectify them and then re-test the full system.

Check that all necessary flues comply in all respects with the regulations and the item manufacturer's requirements.

10.7 Elements

10.7.1 Sanitary Fittings

10.7.1.1 Sanitary Fittings - Option 1

Supply and fix all of the sanitary fittings as scheduled on the drawings. All fittings checked on delivery for 'perfect' condition, and all fittings plain white. Supply and fix all normal accessories that are not usually supplied with the fitting.

The Plumber is responsible for fittings from delivery until Practical Completion of the contract.

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10.7.2 Flashings

10.7.2.1 Responsibility

Ridges, hips, barges, valleys, aprons etc. flashings all supplied and installed by the Roofer. Metal windows flashings (those installed during windows installation ONLY) will be supplied by the windows subcontractor and installed by the Carpenter. All other flashings including wall penetration flashings, soakers, etc. that are required to leave the building completely water and weathertight are the Plumber's responsibility.

10.7.2.2 Flashings Fabrication

All flashings shall be machine folded to profiles as shown or required, incorporating capillary breaks where appropriate, shall be formed in one piece where possible, and lead or other soft edged where required. Stop ends, external angles, junctions etc. soldered or sealed and blind riveted as appropriate.

10.7.2.3 Materials - Option 1

All flashings 1mm powder coated aluminium unless otherwise noted. Supply the flashings to appropriate trades for building in as work proceeds, with all flashings neatly dressed to substrates.

11 DRAINLAYING

11.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

11.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
2032:2006(AS/NZS)	Installation of PVC pipe systems
3500.2:2018(AS NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.3:2018(AS NZS)	Plumbing and drainage Part 3: Stormwater drainage
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
AS/NZS 1547:2012	On-site domestic wastewater management
BS 5572	Code of practice for sanitary pipework
NZBC G13	Foul Water

11.3 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals.

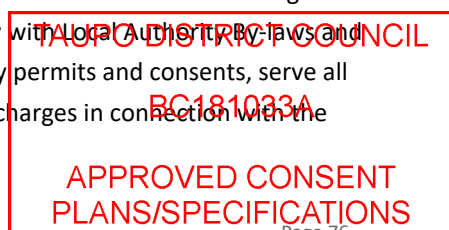
Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

11.4 Workmanship

11.4.1 General

11.4.1.1 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals. Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.



11.4.2 Co-operation

11.4.2.1 Co-operation

Cooperate with all trades and attend upon the Concretor and Plumber to set out exact pipe runs before any adjacent work is put in hand and ensure that all sleeves etc. are correctly incorporated as work proceeds.

11.4.3 Materials

11.4.3.1 Materials

All pipes and other materials shall comply with the appropriate Standards, and shall be protected from damage of any kind until installation is complete. All incidentals appropriate for the applications involved. Concrete shall be 17.5MPa and as specified under Concretor, Mortar shall be as specified in Blocklayer.

11.4.4 Workmanship

11.4.4.1 Workmanship

All drainlaying shall be carried out by, or under direct control of, properly qualified tradesmen, and shall be to recognised high standards. Ensure cast-in items are installed when required so that no delay is caused by this trade. Adequately protect all adjacent surfaces - clean down to remove dirt etc., and any damage shall be made good by the appropriate trade at the Drainlayer's expense.

On completion of drainlaying clean up full area affected by this trade to the condition it was in before drainlaying commenced.

Site is to be returned as close as possible to its present condition on completion of the contract.

11.4.5 Excavation

11.4.5.1 Excavation

As required for sewer and stormwater. Check for other service lines before excavation - the Drainlayer is responsible for making good any damage. Trenches true to line and with even gradients between gullies, soil stack terminations or downpipes, etc.

Keep the bottom of trenches clear of loose material. All pipes shall be laid in appropriate bedding material, compacted as required. Shore trenches if required to suit ground conditions. Backfilling shall be by this trade, to the standards required in Siteworks.

11.5 Elements

11.5.1 Drainlaying

11.5.1.1 Drainlaying

Commence drainlaying at the low end of even fall sections of drains and proceed in a continuous sequence to the fittings connections.

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Sumps, gullies, etc. solidly bedded. Lay 110 (ODmm) uPVC drains to connect gullies, sumps, stacks, and downpipes through to the street edge connections.

Junctions and bends shall have an inspection point as shown on the drawings and as required by NZS3500.2. Temporarily seal the open ends of incomplete drains to prevent entry of foreign matter. Make appropriate provision for any anticipated differential settlement. Place signal strip above all drains.

Ensure that stormwater drains are very accurately positioned so that downpipes can drop directly into them, without offsets.

11.5.2 Soakage Pits

11.5.2.1 Soakage Pits

Where shown on the site plan, Soakage Pits shall be dimensioned and filled in accordance with best local trade practice, and to the complete satisfaction of the Territorial Authority Inspector.

11.5.3 Testing

11.5.3.1 Testing

The sewer and stormwater systems shall both be fully tested to the approval of the Territorial Authority Inspector before being covered in. If any defects show rectify and then fully retest.

11.5.4 As Built Drawings

11.5.4.1 As Built Drawings

During drainlaying plot the location of all bends and changes in direction and all cleaning access positions. Locate each item by two diagonal measures from structure corners, etc. and record on a blank plan copy (supplied by Architect/Designer when requested).

Note that Practical Completion of the contract will not be certified until this as-built drawing has been produced (made available to the Contractor in time for the Code Compliance Certificate application).

12 ELECTRICAL

12.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

12.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1125:2001(AS/NZS)	Conductors in insulated electric cables and flexible cords
2201.1:2007(AS/NZS)	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
2293.2:2019(AS NZS)	Emergency lighting and exit signs for buildings - Part 2: Routine service and maintenance
3000:2007(AS/NZS)	Electrical installations (known as the Australia/New Zealand Wiring Rules)
3085.1:2004(AS/NZS)	Telecommunications installations - Basic requirements
3191:2008(AS/NZS)	Electrical flexible cords
5000.1:2005(AS/NZS)	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV
60227.5:2003(AS/NZS)	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Flexible cables (cords)
60335.2.30:2015(AS NZS)	Household and similar electrical appliances - Safety - Part 2.30: Particular requirements for room heaters
60335.2.35:2004(AS NZS)	Household and similar electrical appliances - Safety - Particular requirements for instantaneous water heaters
60898.1:2004(AS/NZS)	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Circuit-breakers for a.c. operation
61009.1:2015(AS/NZS)	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules
6104:1981(NZS)	Specification for emergency electricity supply in buildings
AS/NZS 2053	Specification for unplasticized PVC conduit and fittings for electrical wiring
AS/NZS 3012	Electrical installations - Construction and demolition sites
AS/NZS 3018	Domestic electrical installations
AS/NZS 3100	Requirements for electrical apparatus
AS/NZS 3439	Electrical switchgear and controlgear
AS/NZS 3947	Low-voltage switchgear
AS/NZS 60598	Luminaires - Particular requirements - Recessed luminaires

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NZEC 54	Recessed luminaires
NZS 1989	Plugs and socket outlets
NZS 6206	Electric meter boxes

12.3 Workmanship

12.3.1 General

12.3.1.1 Scope

Supply and install all materials, including all necessary minor and incidental items, for proper completion of all of the electrical services specified or shown on the drawings. The contract will not be deemed to be complete until the Electrician has provided an Electrical Certificate of Compliance in accordance with NZEC 11 (made available to the Contractor in time for the Code Compliance Certificate application).

12.3.1.2 Required Tasks

Obtain all necessary permits and consents, serve all notices and pay all fees in and customary charges connection with the works.

12.3.1.3 Position of Items (Edit)

The position of switches, light and power outlets and other fittings, although shown specifically in some instances, are in general only shown diagrammatically. The exact location of each of these items will be as directed on site by the Architect/Designer and home owner; the Electrician shall give reasonable notice of when this information is required. Items positioned in contravention of this shall be repositioned if directed, including rewiring if necessary, all at the Electrician's expense.

Unless drawn (on 1:20 wall elevations) or specified otherwise the mounting height to the centreline of the following items above the floor shall be:

- 1000mm for lighting switches;
- 2000mm for wall mounted lights;
- 2100mm for the bayonet of pendant lights;
- 300mm for power points, except at benches.

(Notify the Architect/Designer if either the actual fitting or mounting position seem to make the mounting height noted above inappropriate).

12.3.1.4 Warranties Submittal

Warranty cards and manufacturers guarantees for items supplied and installed by this trade shall be filled in correctly and handed over at Practical Completion. Arrange all circuits to obtain an optimum balance of the system, and check and reconnect where necessary to achieve this on completion. Leave the works clean and tidy and in full operational order.

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12.3.2 Co-operation

12.3.2.1 Co-operation

Co-operate with all other trades and attend upon the Concretor and Carpenter to set out all required penetrations and to ensure that all wiring and fittings are correctly incorporated as work proceeds. The Carpenter will provide and fix all necessary dwangs and timber supports in locations determined by the Electrician.

12.3.3 Workmanship

12.3.3.1 Qualifications

All electrical work shall be carried out by, or under the direct control of, registered tradesmen, and shall be to recognized high standards. All work shall be such as to leave a neat, efficient and robust installation. Neatly label switchboards to identify each circuit.

12.3.3.2 Cutting & Checking Timber

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604: 2011 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials shall be only to approval.

12.3.3.3 Protection

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Electrician's expense.

12.3.4 Wiring

12.3.4.1 Wiring Quality

Joints within cable runs will not normally be accepted. TPS cable shall be adequately supported, and clipped at regular intervals. At terminations all strands of conductors shall be fully secured in a terminal block or clamped under a screw head washer; do not cut away any strands. Wiring which terminates in enclosed fittings and/or where subject to heat liable to cause deterioration, shall be high temperature type, with the tails made off with heat resisting sleeves, to protect the permanent wiring.

12.3.4.2 Wiring Cable

Wire lights in 1.5mm 3 core - 7.5 amps loading max per circuit (allow for 100w to all light fittings unless identified otherwise).

Wire power outlets in 2.5mm 3 core - 7 maximum GPO singles or doubles per circuit. Assess power outlets for specific equipment and allow accordingly.

12.3.4.3 Conceal Wiring

Conceal all wiring except as noted on drawings or below. All wiring cast into concrete shall be run in conduit pipes. All cables shall be stranded (single core is unacceptable).

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12.3.4.4 Wiring Layout

Wire more or less parallel to and at right angles to the structural elements - avoid any diagonal wiring. Layout of the principal distribution wiring shall be to approval. Position all wires to minimise the risk of damage from subsequent nailing of linings etc.

12.3.4.5 Wiring in Timber Framing

Generally, do not run TPS horizontally within timber walls except in the area up to 300mm above floor. Wire in the ceiling framing and drop vertically to outlets and switches.

12.3.4.6 Exterior Lighting Wiring

Wire exterior lighting in screened cable.

12.4 Systems

12.4.1 Earth

12.4.1.1 Earth

Provide a driven main earth suitable for the full installation, close to the meterboard, complying fully with all appropriate regulations and to the complete approval of a certified inspector. Bond all exposed metals, including light fittings and piped services and provide earth conductors for the entire system. Sheathing to any neutral screened cables may be used for earthing.

12.4.2 Mains

12.4.2.1 Mains, Single Phase, Underground

Install a neutral screened 16mm main cable underground (depth, cover/protection, backfilling, signal strip etc. to comply with all relevant regulations) from the grid connection position to the meterboard, positioned where shown on the drawings, and make appropriate arrangements for the grid connection. Install pilot as required. The meterboard shall be metalclad with a meter reading window, recessed maximum depth into the wall and at 2m to the top of the board, with the meters and water heater controllers by the supply company nominated by the Principal. Install all switches and fuses that are necessary. From the meterboard run (route to approval) a neutral screened 16mm main plus controllers etc. to the switchboard.

12.5 Materials & Control

12.5.1 Materials

12.5.1.1 Material Quality

All materials delivered with packaging and labeling intact. All required incidentals (insulating tape, seals, fixings, etc.) shall be completely appropriate for the application involved. The use of items damaged in any way is subject to approval in each instance.

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12.5.2 Switchboard

12.5.2.1 Single Switchboard

The switchboard shall be an appropriate size standard PDL DBF series board installed fully recessed where shown and at 2m to the top of the board. Install appropriate sized MCB's for all circuits, including a minimum of two power and one lighting RCDs as required to cover all outlets.

12.6 Elements

12.6.1 Appliances

12.6.1.1 Appliances - Option 2

All appliances are exactly identified on the drawings notes. Main Contractor will establish, in consultation with the Plumber and Electrician, which of them will be supplied by each of these trades.

The Electrician shall supply appliances that are his responsibility, install them exactly in accordance with their manufacturer's instructions, and protect them until completion.

12.6.2 Light Fittings

12.6.2.1 Light Fittings - Option 1

Generally light fittings are identified as to type on the drawing, and will be supplied by the Principal. Take delivery, install in accordance with any directions supplied and protect until Practical Completion.

All light fittings and fixtures are to be confirmed by the home owner

12.6.3 Tele Communications

12.6.3.1 Workmanship

Workmanship shall be recognised best trade practice, and in accordance with the manufacturers' recommendations. All work shall be by competent and experienced operatives.

12.6.4 Other Wired Services

12.6.4.1 Other Wired Services

Co-operate with all other trades to ensure that the following services are installed complete and in accordance with their manufacturer's recommendations with all normal or necessary incidentals and with all wiring concealed.

The installation of the following are to be confirmed with the home owner:

- SKY TV.
- Garage door operating mechanisms.
- Gas hot water supply unit installed complete by the Plumber - supply electrical feed and connect.
- Wall mounted fan heaters.
- Front door bell - supply and install.

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- Kitchen, laundry and wet areas air exhaust fans and ducting as noted - supply and install.
- Under-tile electric heating to the bathroom and shower room complete with thermostat control installed where shown. Supply and install (immediately prior to tiles installation) exactly to the suppliers recommendations.
- Heated towel rails to bathroom and shower room.
- Heat pump
- Supply a Heavy Duty TV Aerial (suitable for TV1, 2, and 3, Sky, and all local and community TV stations) and install on the roof ridges where directed, stayed against wind, and with all connections compatible with the roofing and waterproof. Feed to the outlets shown with the complete system exactly to aerial suppliers recommendations.
- Heating.

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Checklist

Reference Number:	REF200230446
Submitted On:	25/02/2020 11:46
Submitted By:	willie robinson
Status:	Accepted

Office Use Only

PIM Required?	N/A
Compliance Schedule?	N/A
Restricted Building Work?	Yes
Fast track amendment?	No
Building Category	Residential 1

General Documentation Required

Owner authorisation provided	N/A
Form 2A Certificate of Design Work	Pass
All drawings must meet the minimum requirements of the technical drawings standard AS/NZS1100 with a minimum font size of Microsoft Word text size 8. Index provided for plans and specifications.	Pass
Are you applying for owner/builder exemption? If yes, the appropriate documentation including Form 2B is to be supplied	N/A
All documents including photocopies must be legible	Pass
All plans are to be titled and dated (or version number)	Pass

Legal Documentation Required

Evidence of ownership provided.	N/A
Vetting Officer Comments	Updated CT not required

Elevations

North, South, East and West elevations.	Pass
Cladding systems, roofing type and any other relevant details	Pass

Specifications &Other Documentation

Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.)	Pass
Structure	Yes
Flashing details for openings, change of cladding, internal/external corners.	Pass
Framing, connections, bracing layout, details and calculations.	Pass
Fixing details including wind fixings and structure to floor/foundation.	Pass

2020-03-18 Required items for building consent - A2663027



GREAT LAKE TAUPŌ
Taupō District Council

REQUIRED ITEMS FOR BUILDING CONSENT BC 181033A

*Below is a list of council inspections **assessed to be required** to ensure the work complies with the building consent & Building Code, and to satisfy the requirements of Sections 90 & 94(1)(a) of the Building Act 2004.*

Additional inspections may be required where missing from the list, where “part” inspections are only undertaken, or where failed inspections need to re-checked. These will be charged out as additional inspections before CCC is issued. Any queries, please talk to your council inspector.

All inspections noted below are to be signed off by Taupō District Council building control staff before the application for CCC. The order of inspections is indicative but may vary for each consent.

For Inspection Bookings call (07) 376 0899, or...
Try our “GoBuild” App available from Play Store & Apple App Store.



Inspections Required

The following inspections are required:

Advice Notes

#Amendments are to be read in conjunction with the approved consent documents and all associated conditions and endorsements.



GREAT LAKE TAUPŌ
Taupō District Council

Building Consent

Section 51, Building Act 2004

BC No: 181033A

The Building

Street address of building: 18 Penny Grove, Taupo

Legal description of land where building is located: Lot 226 DP 522262

Valuation number: 0730164819

Building name: N/A

Location of building within site/block number: N/A

Level/unit number: N/A

The Owner

Name of owner: Penny Homes Limited

Contact person: Unknown

Mailing address: 11 Jarden Mile, Kukuahu, Taupo 3330

Street address/registered office: Unknown

Phone number: **Landline:** Unknown **Mobile:** 027 5334252 **Daytime:** Unknown **After hours:** Unknown

Facsimile number: Unknown

Email address: willie@pennyhomes.co.nz

Website: Unknown

First point of contact for communications with the council/building consent authority:

As above

Building Work

The following building work is authorised by this building consent:

3 bedroom house - change of cladding

This building consent:

- Is issued under section 51 of the Building Act 2004.
- Does not relieve the owner of the building (or proposed building) of any duty or responsibility under any other Act relating to or affecting the building (or proposed building).
- Also does not permit the construction, alteration, demolition, or removal of the building (or proposed building) if that construction, alteration, demolition, or removal would be in breach of any other Act.

This building consent is issued subject to the following conditions and advice notes:

1. **Condition: It is a condition of this consent that agents authorized by the building consent authority for the purposes of section 90 of the Building Act 2004 are entitled, at all times during normal working hours or while building work is being done, to inspect -**
 - (a) land on which building work is being or is proposed to be carried out; and
 - (b) building work that has been or is being carried out on or off the building site; and
 - (c) any building.
2. **#Amendments are to be read in conjunction with the approved consent documents and all associated conditions and endorsements.**

When all building work authorised by this building consent is complete, electronic application should be made to Taupo District Council for a **CODE COMPLIANCE CERTIFICATE** and submit the documentation requested as part of this consent. This application and documentation must be submitted and approved prior to booking the final inspection. If no application has been made, Taupo District Council must decide whether to issue the CCC after 2 years of the building consent being granted.

Compliance Schedule

A compliance schedule is not required for the building.

Attachments

Copies of the following documents are attached to this building consent:

- Approved Plans and Specifications
- Required items sheet attached to front of plans including a list of the inspections required (*Section 90*)

Signature: _____



Dean Southey

Building Inspections and Processing Manager

On behalf of: Taupo District Council

Date: 20 March 2020

Building Consent granted 20/03/2020 - A2665291

Date: Fri, 20 Mar 2020 3:52:42 AM (UTC)
Sent: Fri, 20 Mar 2020 3:52:33 AM (UTC)
Subject: Building Consent granted for 18 Penny Grove, Taupo
From: buildingconsents <buildingconsents@taupo.govt.nz>
To: willie@pennyhomes.co.nz; Tech Support <businesssupport@taupo.govt.nz>;

REF200230446

This email is to advise that the consent for the proposed works has been granted for 18 Penny Grove, Taupo. The approved documentation will be **ready for collection after 3.30pm** from the Taupo Council Office at 46 Horomatangi Street, Taupo.

Please note that the granted consent documents have also been uploaded to your application online but are only able to be accessed via the below link by the person who submitted the application.

[Click Here](#) to access the online portal. Select the 'My Account' tab and enter your log in details. Then in the 'Submitted Applications' section, select the application you wish to view. The granted building consent documents are located in the 'Files' section of your application summary screen.

A copy of the approved plans and documents are **required to be onsite for all inspections**, please ensure that the plans are printed to the originally drawn scale, failure to do so will result in a failed inspection.

Please be sure to save a copy of these approved documents as they may not always be available through the online portal.

Kind regards,
Building Consent Team, Taupo District Council

GoGet Inspection Audit Report

Consent No: **181033A**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **3 bedroom house - change of cladding**

Inspection Type: **Prefloor/Subfloor Plumbing & Drainage**
Inspection Outcome: **Pass**
Inspected By: **Peter Kay**
Inspection Date: **29 April 2020 2:54 PM**
Duration: **0 minutes**

Inspection Element	Status
General	Pass
Verify drainlayer's registration	Pass
Previous inspections	N/A
Approved building consent documents or as-laid plan on site?	N/A
Conditions of consent (if any) are met and consent documents on site	N/A
Appropriate materials being used	N/A
Drainage	N/A
Correct location, type, sizes, cover, and gradients	N/A
Adequate support and protection where required	N/A
Under test water or air	N/A
On Site Wastewater System	N/A
Plumbing	N/A
Outcome of Inspection	Pass
Approved	Pass
Further Inspection Required (Recheck Required)	N/A
Required documents not yet received	N/A



Taken at 1:39 PM on Wednesday 29/04/2020



Taken at 1:39 PM on Wednesday 29/04/2020



Taken at 1:39 PM on Wednesday 29/04/2020



Taken at 1:41 PM on Wednesday 29/04/2020

SITE NOTICE

Consent No: **181033**
Applicant: **Penny Homes Limited**
Valuation Ref: **0730164819**
Site Address: **18 Penny Grove, Taupo**
Work Type: **3 bedroom house - change of cladding**
Building Category: **Residential Level 1**

Date Printed: **29 April 2020**

Inspection Type:

Inspection Outcome: **Pass**

Inspected By: **Peter Kay**

Inspection Date: **29 April 2020**

Passed Items

General

Verify drainlayer's registration

Outcome of Inspection

Approved

Project Appendix

Addendum of Materials & Finishes

E2-AS1 Risk Matrix

Truss Design

CHH DesignIT Calculations

Bracing Calculations

Insulation Calculations

Cladding Manufacturers Specification

Fireplace Installation

Hot Water Heating System

Waterproofing Systems

Other Items Relevant to this Project

Addendum of Materials & Finishes

Specification



PENNY HOMES LIMITED SPECIFICATIONS OF PROPOSED NEW HOME FOR:

Lot 226 Penny Grove

FLOOR AREA: 173.68m²
DATE PREPARED: Friday, 28 September, 2018

Preliminary Information

Quote and Contracts	Provide for the construction of the dwelling in accordance with the following specifications, the annexed plans and building contracts.
General Specification	Where there is a contradiction between any of the documents then this specification shall take first precedence and the plans second precedence.
Additional Clauses	Any items altered or crossed out or any changes that may be made to this specification by the client and/or the builder must be initialled by both parties.

General

Insurances	Builders risk insurance throughout build.
Interior Design	Exterior and Interior colour consultation Included. Allowance for four consultations.
Clean	Commercial Clean prior to possession included
Master Build Guarantee	10 Year Premium Guarantee with the full cover outlined in the guarantee
Plans	Full Working Drawings Included
Building Consent	Included
Resource Consent	Excluded
Surveying	Boundary peg location excluded – to be treated as a client variation if boundary pegs are not present
Engineer	Excluded: To be treated as a variation. Should an Engineers report be required, this will incur an additional cost as will any findings made by the Engineer.
Geotech	Geotech Report not included – to be treated as client variation
Site Works	Our quotation and contracts provides for foundation excavation and site cut for a slab on grade foundation as per NZ S3604 Standards.
Foundation	Pod floor system - 85mm thick 20MPa concrete slab reinforced with SE62 500 E Grade ductile mesh over 1100sq x 220 deep EPS Pods on 0.25mm Polythene vapour barrier
Timber Framing	90 x 45 Kiln Dried H1.2 timber framing with studs and dwangs at NZS3604 centres or to suit stud height and loading and cladding requirements. H1.2 to all bottom plates with trussed roof framing H1.2. Truss plan to be supplied by recognized manufacturer including fixings and structural requirements. All exterior timber shall be H3 treated, suitable for paint finish only unless otherwise noted.
Interior Walls	90 x 45 H1.2 Kiln-dried framing with studs and dwangs at NZS3604 centres or to suit stud height and loading and lining requirements. All framing SG8 unless otherwise noted.
Stud Height	2.550m Stud height throughout.
Ceiling Battens	35mm Rondo Metal Ceiling Battens on Clips

Exterior Materials

Roof	Corrugated Longrun Colorsteel (Std NZ Colours)
Cladding	James Hardie - Axon Panel with 133mm centred grooves Cedar cladding options - Herman Pacific Bevel Back Weatherboards
Fascia/Barge Gutter Profile Downpipes Soffit Lining	Cedar - Ex 200 x 40mm Coloursteel 1/4 Round 80mm PVC – Painted 4.5mm Hardiflex
Windows/Doors	Powder Coated Aluminum (Standard NZ Colours) with tinted glass in windows. Double glazing to all windows including garage. Obscure glass to wet areas
Obscure Areas Window Hardware Window Liners	Bathroom and ensuite areas. Coloured to match joinery Pine H3 Paint Quality
Front Door Front Door Handle Front Door Side Lights	Fibreglass FV front entrance door Windsor 7025 round pull handle with 1248 Mortice Lock Included as per plan
Garage Door	Windsor Coloursteel Sectional Door, Steel Range 2125 x 4830- Auto Opener with two remotes
Drainage	Sewer and Stormwater connected at road boundary or Council laterals. Work outside net site area not included. Stormwater connected to soakholes as per plan Note: Driveway sumps included - as per plan
Soakholes	Concrete lined soakholes positioning may vary from plan due to site access and storm water layout. Soakholes depths are depenant on watertable levels, easements and ground conditions
Water	20mm Mains supply connected at road Boundary. Work outside net site area not included.
Clothesline Letter box	Sun King Retracting 6 Line or Folding Frame Line Courteney's A4 Cedar Letterbox

Interior Materials

Insulation	R2.8 Wall Batts / R3.6 Ceiling Batts Including garage
Internal Wall Lining	10mm Standard Gib Board
Ceiling Lining	13mm Standard Gib Board
Internal Wet Areas	10mm Aqualine Gib Board on walls and 13mm Aqualine Gib Board on ceiling
Gib Stopping	Grade 4 Paint finish
Painting	Exterior – Soffits- Acrylic Ceilings – Flat Acrylic Architraves, Skirting and Scotia – Semigloss enamel Doors – Sprayed acrylic enamel Interior Walls – Low Sheen Finish. Semi Gloss Finish to water splashback areas Please Note: The interior painting covers the same colour throughout the home with one contrasting colour for ceilings, doors, skirting and sills. Extras may be incurred if different colours are requested in different rooms or feature walls are required. Gloss lacquer or extra height doors are charged as additional cost.
Scotia	Square stop
Architraves	60mm x 12mm MDF and 60mm x 10mm FJ Pine to Wet Areas
Architrave Profile	Single Bevelled
Skirting	60mm x 12mm MDF and 60mm x 10mm Tiles to Wet Areas 100mm
Skirting Profile	Single Bevelled
Doors	MDF ' U' Groove Hollow Core - 35mm
Door Height	1980mm
Door Furniture	Windsor Astron Range (Brushed Nickel/ Satin Chrome)
Door Stops	Windsor 5229 Door stop
Interior Door Liners	MDF - Flat for Architrave
Wardrobes/Shelves	Dimensions as per plan - single shelf with wardrobe rail. HWC/Linen Cupboard - Provides for 4 shelves
Vacuum System	Not Included
Window Treatments	No allowance for window treatments

Flooring

Floor Tiles	To supply and lay standard tile range to Bathroon , ensuite , entry , dining , sitting and kitchen areas 45 m2 Tile supply allowance: \$50 m2
Bath Tiling	To supply and lay standard tile to bath front, shelf and splash☐ Tile supply allowance: \$50 m2
Carpets	To supply and install PHL Range Carpets on 10mm Underlay to: Bedrooms, Hallway, Living and Wardrobes as per plan.

Plumbing and Bathroom

Plumbing

Exterior	3 x Exterior Taps
Laundry	Aquatica E6200 Laundry Tub - with Door E6200 (560 x 560)
Hot Water	Rinnai Infinity 26L external NG continuous hot water system (no controller)

Gas Services	Supply Gas pipe work, connection fee and certification
--------------	--

Bathroom

Bath	Sorrento II Bath 1670 x 760 Grohe Bauline Shower Mixer Progetto - Tube 170mm wall mount bath spout round
Shower	Tiled Shower 1m x 1 m , 2 sided - Tiles to ceiling . Tile Allowance \$50 m ² . 2 sides glass panel with glass door. 100mm square chrome on brass adjustable floor grate. Tiled recess 400w x 300h
Vanity	Grohe - Bauline Series Shower Mixer & Grohe New Tempesta 4 Spray Slide
Tapware	Robertson - Studio Plus Wall Hung Vanity 900 mm - 1 Drw - White or Coloured
Toilet	Grohe Bauline Basin Mixer Robertson Agencies – Cygnet - Neu Square BTW Vitreous China Toilet Suite with soft close Seat
Toilet Roll Holder	Robertson Agencies Europa Plus Spare
Bathroom Mirror	Frameless mirror above vanity

Ensuite

Shower	Tiled Shower 1 m x 1m - 2 sided - Tiles to ceiling . Tile Allowance \$50 m ² . 2 sides with glass panel and a glass door. 100mm square chrome on brass adjustable floor grate. Tiled recess 400w x 300h
Vanity	Grohe Bauline Shower Mixer and Grohe New Tempesta 4 Spray Slide Shower Robertson - Studio Plus Wall Hung Vanity 900mm - 1 Drw - White or Coloured Laminex
Tapware	Grohe - Bauline Series Basin Mixer
Toilet	Robertson Agencies – Cygnet - Neu Square BTW Vitreous China Toilet Suite with soft close Seat
Toilet Roll Holder	Robertson Agencies Europa Plus Spare Toilet Roll Holder
Ensuite Mirror	Frameless mirror above vanity

Kitchen & Appliances

Kitchen	PC Sum \$15,000 for supply and installation of kitchen by PHL preferred supplier. Including splashback and benchtop.
Cabinets	Cabinets constructed of 16mm prefinished MUF (moisture resistant) with 1mm black or white edging.
Cupboards	Cupboard doors, drawer fronts and fixed panels constructed from 18mm Melteca/Melamine with 2mm PVC edging.
Drawers	All drawers fitted with Hettich Sensys Soft Closing hinges on doors and Hettich Soft Closing Drawers
Handles	PHL range of handles fitted to all doors and drawers
Benchtop	40mm Engineered Stone Benchtop included in kitchen PC Sum
Sink	Pero 800 Single sink or Pero 1080 1 1/2 sink
Rangehood	Fitting of Rangehood and Ducting Included
Splashback	Included in Kitchen PC Sum
Sink Mixer	Grohe Bauline Kitchen Mixer
Kitchen Appliances	Westinghouse Range
Oven	Westinghouse Single Wall Oven S/S - WVE616S
Cooktop	Westinghouse 60cm Gas Cooktop S/S - WHG644SA
Rangehood	Westinghouse Integrated Rangehood - EFG750X/A
Dishwasher	Westinghouse Freestanding Dishwasher - S/S - WSF67251S
Insinkerator	Parex Emerson E20 .55hp Insinkerator

Electrical

Note: Some electrical appliances will require their own "Switched Light Circuit", "Single plug", "Direct All quantities should be finalised on site. Adjustments to cost will be forwarded after selection by invoice and treated as an extra or credit.

Temporary Power	Builders supply included
Power to Site	16mm Neutral Screen connected from Lot Boundary to House site. Work outside net site area not included.
Prewire	As per Electrical Plan. A prewire walk through is completed with Owner, Electrician and Penny Homes representative to note any variations required by owner. Included as Client Variation
Lights/ Power	LED Recessed Downlights as per Electrical Plan. Wall and specialty lights - Supplied by Owner
Switch Gear	PDL Iconic Series, Power points and switches as per electrical plan
Phones/TV	As per Electrical Plan. All connection fees by Owner
Sky	Reticulate for Sky TV – 1 point only. Connection fees and aerials by Owner
Heated Towel Rail Under Tile Heat Pad Fans	Goldair GLTR7C 7 Bar Stainless Steel to Bathroom and Ensuite Heat Pads to bathroom and ensuite areas. Manrose Inline Fans to bathroom and ensuite areas.
Bathroom Heater	Not Included
Alarm	Not Included
Gas Fire	Escea DL850 – Gas Fire (inbuilt) – Black Bevelled Fascia - Includes zero clearance and one standard flue kit only. No mantle/hearth has been included. NG.
Ventilation System	Not Included

Landscaping

Cobble Paving	Supply and lay 36m ² Firth Flagstone Pavers as per plan (standard colour range). Any extra cobbles laid will be charged at \$94 m ²
Concrete Paving	Exposed Aggregate Supply and lay 43 m² of exposed aggregate concrete to: Driveway and Entry. Any extra exposed aggregate will be charged at \$83 m² Note: Extra Drainage grills or cesspits (if required), traffic management costs or washoff extraction costs will be an additional cost of the driveway. (Any mowing strips/garden edging will be an additional cost and will be quoted separately to the driveway).
Fence	1.8m high steel framed panel fence (std colours) - Total . Areas 34m. North , South fence to finish in line with front of dwelling. To the East boundry fence 19.5 m.
Plants	To the Value of \$ 1000
Turf	Hydroseeding – including the required topsoil. Lawn in such areas as are designated on the Site Plan. The hydroseeding will be sown in accordance with best industry practice having regard to local soil and climatic conditions at the time of application. Note: between the months May and August, conditions to successfully grow lawn are substantially less. The Vendor/Builder shall not have ongoing responsibility to nurture maintain or repair the designated hydroseeded area.

Proposal Summary

OUR PRICE TO CONSTRUCT PROPOSED NEW HOME FOR:

Lot 226 Penny Grove
0

Our price for construction to the above specification	\$0
Master Build Guarantee	\$0
Land Purchase Price	\$0
Land and Home Package Price	\$0

Please note our quoted price includes GST and is subject to the listed exclusions and PC Sums.

Optional Extras

Masterbuild Guarantee options:

10 Year Standard Guarantee - opting out of any cover for loss of deposit, non-completion and remedial works	\$0
10 Year Standard Guarantee with the full cover outlined in the guarantee document	\$0

Exclusions and PC Sums

Our Quotations and Contracts Exclude:

Resource Consents
Engineering Costs for Plan Detail
Valuations/Surveying Fees
Any allowance for street crossing

Window Treatments
Telephone, TV and Sky Connection fees
Wall Lights or Specialty Lights

All costs incurred for additional piling or foundation work found necessary through the existence of poor

PROVISIONAL COST SUMS

Provisional Cost Sums (PC Sums) means a sum included in the contract price for carrying out or providing a defined part of the contract works.

The PC Sums as listed below are inclusive of GST and are net sums, meaning the builder shall have provided for all other costs, margins, charges or allowances elsewhere within the contract sum – unless specified.

PC SUMS OUTLINED IN CONTRACT

Kitchen	Including splashback and benchtop	\$15,000
Exposed Aggragate		43m2.
Cobbles Flasstone		36m2
Gardens/Shrubs		\$1,000

You may obtain your own quotations for the supply of goods contained or works required under the PC Sums.

Please ensure you are aware of the final cost prior to authorising work to proceed or purchasing material contained within the PC Sums.

E2-AS1 Risk Matrix

NZBC E2/AS1 - BUILDING ENVELOPE RISK MATRIX

WALL NUMBER: NORTH	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:	Total risk score:								2
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

WALL NUMBER: SOUTH	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:	Total risk score:								2
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

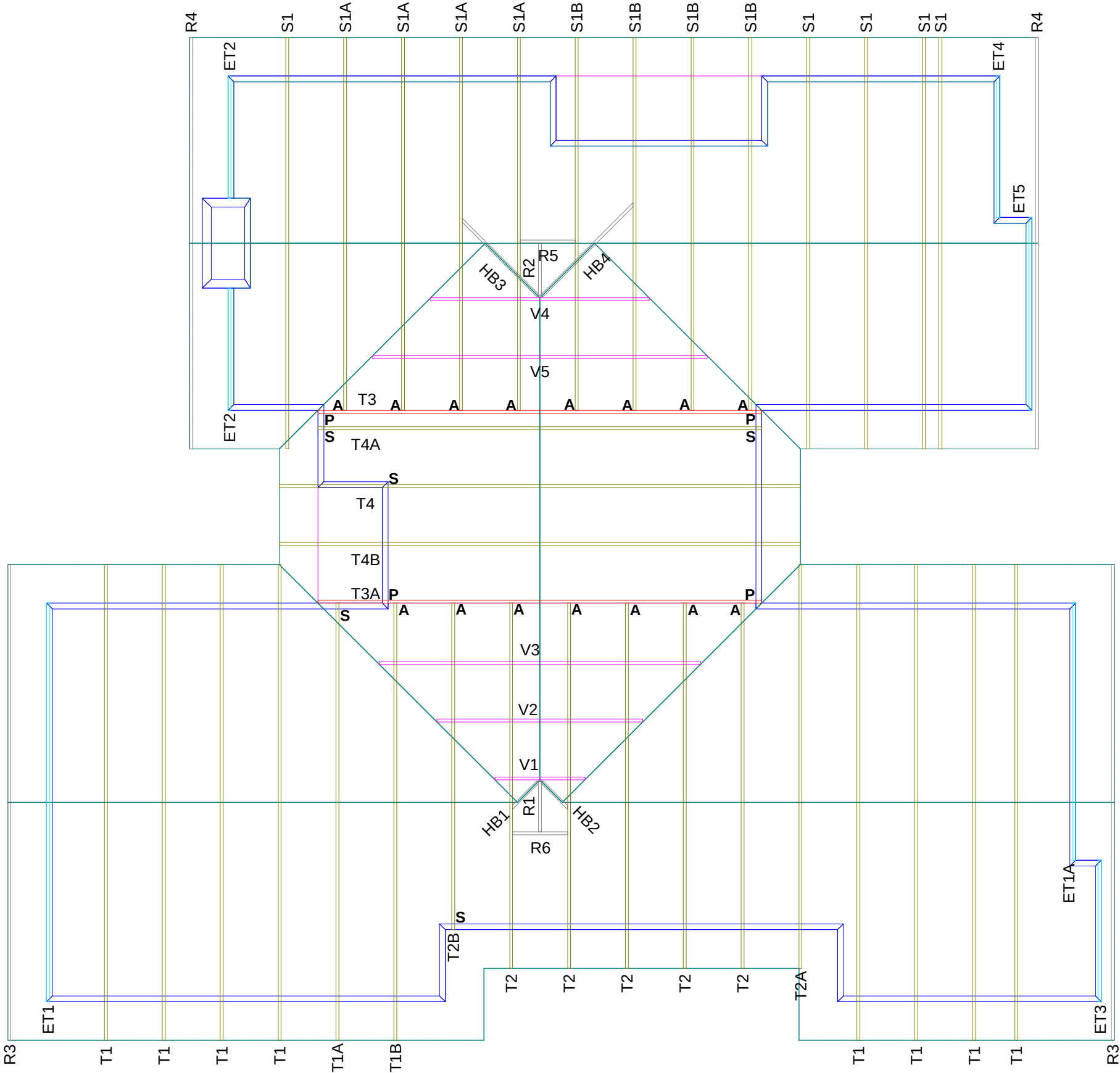
WALL NUMBER: WEST	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0	0	1		2		5		0
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:	Total risk score:								2
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

WALL NUMBER: EAST	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Risk factor									
Wind zone (per NZS3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall junctions	0	0	1		3		5		0
Eave width	0		1		2		5	5	5
Envelope complexity	0		1	1	3		6		1
Decks	0	0	2		4		6		0
Notes:	Total risk score:								7
James Hardie Axon Panel over cavity and Herman Pacific bevel back weatherboards direct fixed									

Truss Design

BUILDABLE CONSENT LAYOUT

For valley/saddle truss fixing unless stated otherwise use a pair of wire dogs at 900mm centres for up to and including a very high wind zone.
Or a pair of CT200's at 900mm centres for extra high wind zone.
This fixing is to meet the minimum requirements as per NZS3604.



CARTERS
Carters Manufacturing New Plymouth
(06) 7595472

JOB No 279060C1

Client: PENNY HOMES LTD
Job: 18 Penny Grove
Site: Nukuhau
Taupo

Pitch: 25.0deg
Roof Type: Galv Iron .5mm
Overhang: 600mm
Wind Area: High
Roof Snow: 0.000kPa

Trusses and rafters at 900 mm
max centres unless stated otherwise.
This layout is to be read in conjunction
with the Architectural plans.

DRAWN Warren Dravitsk 19 Sep,2018

FIXINGS

- A = 47x90 Joist Hanger
- B = 47x120 Joist Hanger
- C = CT200 (pair)
- D = 47x190 Joist Hanger
- E = 95x165 Joist Hanger
- F = SH-140 Split Hanger
- G = SH-180 Split Hanger
- H = SH-220 Split Hanger
- J = 2x6kN Strap (12kN Total)
- K = 6kN Strap
- L = Multigrip (single)
- M = Multigrips (pair)
- N = Nailon Plate (200x100)
- P = 16kN Pack
- Q = 9kN Pack
- S = CPC 40 Single Cleat
- T = CPC 40 Short (pair)
- U = CPC 80 Single Cleat
- V = 16kN Uplift
- W= 24kN Uplift
- X = 25kN Uplift
- Y = 35kN Uplift
- Z = 45kN Uplift

Unless otherwise indicated, all specified truss
fixings are to use L/Lok product nail fasteners
(as per the MiTek On-site Guide) when the
choice of using screws or nails is optional.

All truss to frame fixings require 2 additional
2/90x3.15dia skew nails.

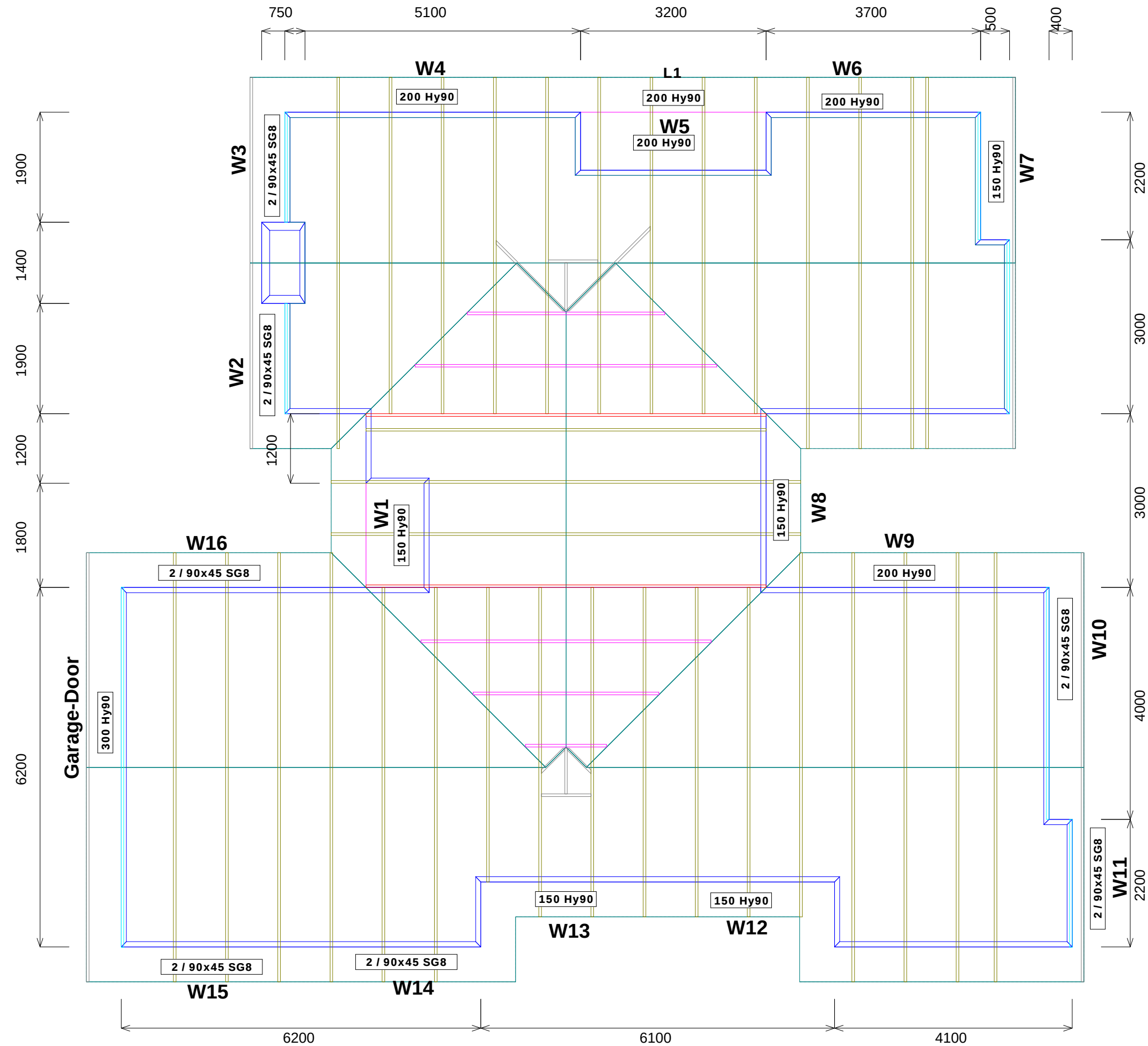
All truss fixings not indicated as above must
have 2 wire dogs for cross joints and
2/90x3.15dia nails for butt joints.

Fixings shown are for fixing trusses to the top
plate. Any other point load uplift fixings down
through the framing stud to top plate, stud to
bottom plate, bottom plate to floor remain the
responsibility of the architect / draughtsman.



If metal ceiling battens on clips are used, 90x45 SG8 bottom chord restraints are required at 1800mm centres fixed with 2/90x3.15dia nails (skew nails if on edge).
All gable trusses are designed to suit cladding manufacturer's framing requirements.
If a gable truss requires a windbeam brace, the type of MiTek brace will be noted as such on the layout.

BUILDABLE CONSENT
LAYOUT



All internal walls shown hatched on this layout are considered to be loadbearing
Lintel fixing specification remains the responsibility of the architect / draughtsperson

CARTERS
Carters Manufacturing New Plymouth
(06) 7595472

JOB No 279060C1

Client: PENNY HOMES LTD
Job: 18 Penny Grove
Site: Nukuhau
Taupo

Pitch: 25.0deg
Roof Type: Galv Iron .5mm
Overhang: 600mm
Wind Area: High
Roof Snow: 0.000kPa

Trusses and rafters at 900 mm
max centres unless stated otherwise.
This layout is to be read in conjunction
with the Architectural plans.

DRAWN Warren Dravitsk 19 Sep,2018

Ultimate Limit
State Loads

Notification of point loaded lintels
or point loads on internal walls
where the downward load is
higher than 8kN (85mm raft type slab)
or 10kN (100mm standard slab), or
the upward load is greater than 10kN.

Any roof loads as stated on this
layout over 16kN up or down are
outside the scope of NZS3604, and
the architect / draughtsperson is
responsible for the design to transfer
the loads to the ground.

The lintels have been sized using
one of the following:

hy90, hyONE and hySPAN lintels
have been sized using the designIT
for houses - New Zealand series 6
software.

GANGLAM and FLITCH BEAMS
have been sized using the MiTek
Beam Program V1.10 June 2011.

Any treated LVL product is H1.2, which
satisfies the minimum treatment
requirement of NZS3602.

Unless otherwise stated the timber grade
for all lintels is SG8. Lintels not shown
are to be selected as per NZS3604: 2011.





MiTek New Zealand Limited

Correspondence from : **AUCKLAND**
40 Neales Road, East Tamaki 2013
PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

CHRISTCHURCH
14 Pilkington Way, Wigram 8042
PO Box 8387, Riccarton 8440
Phone: 03 348 8691
Fax: 03 348 0314

www.mitek.nz.co.nz

MiTek 20/20 Engineering 4.7.184.0

Printed: 11:45:16 19 Sep 2018

PRODUCER STATEMENT for MiTek 20/20® TRUSS DESIGN - Version 4.7

ISSUED BY: **MiTek New Zealand Limited**

TO: **CARTERS**

IN RESPECT OF: **MiTek® Truss Designs**

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **279060C1** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek 20/20® truss design program has been developed by MiTek New Zealand Limited for the design of MiTek® timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20® are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1/VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution, to satisfy the requirements of Clauses B1 and B2 of the New Zealand Building Code.

On behalf of MiTek New Zealand Limited, and subject to:

- i) All proprietary products meeting their performance specification requirements
- ii) The provision of adequate roof bracing and overall building stability
- iii) Correct selection and placement of GANG-NAIL connector plates
- iv) Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
- v) The design being undertaken by the accredited fabricator under the terms of the software licence
- vi) Timber is graded to the requirements of NZS 3603:1993
- vii) Minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

I believe on reasonable grounds that the trusses, if constructed in accordance with the MiTek 20/20® truss design and shop drawings, will comply with the relevant provisions of the New Zealand Building Code.

MiTek New Zealand Limited holds a current policy of Professional Indemnity Insurance no less than \$500,000.

On behalf of MiTek New Zealand Limited,

Date: Wednesday, 19 September 2018

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)
TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

Job: 279060C1

Client: PENNY HOMES LTD
Phone:Site: 18 Penny Grove
Nukuhau
TaupoDescription:
Building Consent No.:
MiTek 20/20 Engineering 4.7.184.0

MiTek New Zealand Limited.

Phone:

Printed: 11:45:16 19 Sep 2018

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **CARTERS**, being licensed to use the MiTek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MiTek 20/20® TRUSS DESIGN DATA

The MiTek 20/20® computer design for this job is based on the following design parameters entered into the program. The Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek® trusses.

Job Details		Importance Level :	2	Design Working Life :	50 years
Roof Truss					
Timber Group:	MSG8 DDP H1.2	Pitch:	25.000 deg	Nominal Overhang:	600 mm
Roof		Ceiling		Wind	
Material:	Galv Iron .5mm	Material:	Gib Board 13mm	Area:	High (44.0 m/s)
Dead Load:	0.210 kPa	Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Restraints:	900 mm centres	Restraints:	600 mm centres		
Live Load:	Qur = 0.250 kPa Qc = 1.100 kN	Live Load:	Qc = 1.400 kN		

The minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003. The timber for these MiTek® trusses shall be graded to the requirements of NZS 3603:1993. Proprietary fixings and timber connectors shall be selected in accordance with NZS3604:2011 Section 4 - Durability.

MiTek® Truss List

Legend: * = detail only, ? = input only, ✕ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required
GB = gable brace required

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
T3	1	6900	25.000	900	S1B	4	5200	25.000	900	V5	1	5200	25.000	900
T3A	1	6900	25.000	900	T1	8	6200	25.000	900	*HB1	1	592	18.248	900
T4	1	6900	25.000	900	T1A	1	6200	25.000	900	*HB2	1	599	18.249	900
T4A	1	6900	25.000	900	T1B	1	6200	25.000	900	*HB3	1	1695	18.249	900
ET1	1	6209	25.000	900	T2	5	5080	25.000	900	*HB4	1	2041	18.249	900
ET1A	1	4004	25.000	900	T2A	1	5080	25.000	900	*R1	1	787	25.000	900
ET2	2	1900	25.000	900	T2B	1	5080	25.000	900	*R2	1	823	25.000	900
ET3	1	2204	25.000	900	T4B	1	6900	25.000	900	*R3	2	7400	25.000	900
ET4	1	2200	25.000	900	V1	1	1400	25.000	900	*R4	2	6400	25.000	900
ET5	1	3000	25.000	900	V2	1	3200	25.000	900	*R5	1	855	0.000	900
S1	4	5200	25.000	900	V3	1	5000	25.000	900	*R6	1	855	0.000	900
S1A	4	5200	25.000	900	V4	1	3400	25.000	900					

Total quantity : 58

The computer design input has been carried out by:

MiTek 20/20 Software Operator: Warren Dravitski

MiTek Candidate Number and Qualifications: Trainee Detailer

Accredited Fabricator:



Wednesday, 19 September 2018

Job: 279060C1

Client: PENNY HOMES LTD
Phone:Site: 18 Penny Grove
Nukuhau
TaupoDescription:
Building Consent No.:
MiTek 2020 Engineering 4.7.184.0

MiTek New Zealand Limited.

Phone:

Printed: 11:45:23 19 Sep 2018

**TRUSS BEARINGS EXCEEDING 8KN REPORT -
Ultimate Limit State Loads****MiTek® Truss List**Legend: ? = input only, ~~xxx~~ = failed design, Ø = non certified, Unmarked trusses = designed successfully

Critical Trusses	Qty	Span (mm)	Joint	Bearing Reactions (kN)	
				Down	Uplift
T3	1	6900	A	8.091	8.566
			G	8.900	8.956
T3A	1	6900	A	8.077	8.125
			N	9.599	8.624

Note:

1) Select appropriate Slab Thickening Detail from the MiTek 'Internal Load Bearing On Concrete Floor Slabs' brochure.

DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and Laserframe components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:

NZS 3603:1993 Timber Structures Standard.

NZS 3604:2011 Timber-framed buildings.

AS 1720.1:2010 Timber structures. Part 1: Design methods.

AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings

AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.

AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.

AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 3 May 2017

For further information or advice contact:

Carter Holt Harvey LVL Ltd,
173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Facsimile: 0800 808 132
Email: designit@chhwoodproducts.co.nz
Web: <http://www.chhwoodproducts.co.nz>

Specifier details:

Specifier:	W Dravitski
Business name:	Napier Manufacturing
Address:	Taupo 4312
Email:	Warren.Dravitski@carters.co.nz

Project & site details:

Project:	279060C1
Site address:	18 Penny Grove Taupo
Design wind zone	High
Snow loading	Design snow zone: N1, Altitude: 100 m (sub-alpine), Ground snow load, $S_g^{1,2} = 0.0$ kPa

1. designIT does not include any allowance for the effects of drifting and sliding of snow.
2. Snow loads are applied to roofed over structures only, the design of exposed floors/decks are not covered by designIT.

MEMBER DESIGN DETAILS

Member 1

1) Member code and description

W1 - Lintels - In single or upper storey load bearing walls

- 2) Date prepared 19 September 2018
- 3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.6 m
Roof load width 'RLW'	4.5 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.3 mm	1.5 mm (long term)	3.5
Live load - $\Psi_S Q$	6.4 mm	0.5 mm	13.9
Wind load - W_S	8.0 mm	1.4 mm	5.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-2.9
1.2G + 1.5Q	0.80	-4.5
1.2G + W_u + $\Psi_c Q$	1.00	-6.4
0.9G + W_u	1.00	4.1

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 2

- 1) Member code and description W2-W3 - Lintels - In single or upper storey load bearing walls

- 2) Date prepared 19 September 2018

- 3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	3.0 mm	0.2 mm (long term)	14.5
Live load - $\Psi_S Q$	3.6 mm	0.1 mm	59.8
Wind load - W_s	4.5 mm	0.2 mm	24.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.5
1.2G + W_u + $\Psi_c Q$	1.00	-0.8
0.9G + W_u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 3

1) Member code and description W4 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	3.1 m
Roof load width 'RLW'	3.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	10.0 mm	6.7 mm (long term)	1.5
Live load - $\Psi_S Q$	12.4 mm	1.9 mm	6.4
Wind load - W_s	15.5 mm	5.9 mm	2.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3} End kN ⁴
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1.35G	0.60	-3.8
1.2G + 1.5Q	0.80	-5.9
1.2G + W _u + $\Psi_c Q$	1.00	-8.3
0.9G + W _u	1.00	5.2

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 4

1) Member code and description W5-W6 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.8 m
Roof load width 'RLW'	3.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	9.3 mm	4.2 mm (long term)	2.2
Live load - $\Psi_S Q$	11.2 mm	1.2 mm	9.1
Wind load - W _s	14.0 mm	3.7 mm	3.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-3.4
1.2G + 1.5Q	0.80	-5.3
1.2G + W _u + $\Psi_c Q$	1.00	-7.5
0.9G + W _u	1.00	4.7

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 5

1) Member code and description W7 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.5 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.0 mm	0.2 mm (long term)	24.6
Live load - $\Psi_S Q$	6.0 mm	0.1 mm	119.0
Wind load - W_S	7.5 mm	0.2 mm	49.3

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.6
1.2G + W_u + $\Psi_c Q$	1.00	-0.9
0.9G + W_u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 6

1) Member code and description W8 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.7 m
Roof load width 'RLW'	4.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.7 mm	1.9 mm (long term)	3.0
Live load - $\Psi_S Q$	6.8 mm	0.6 mm	12.1
Wind load - W_s	8.5 mm	1.7 mm	5.0

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-3.2
1.2G + 1.5Q	0.80	-4.9
1.2G + W_u + $\Psi_c Q$	1.00	-7.0
0.9G + W_u	1.00	4.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 7

1) Member code and description W9 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	2.8 m
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	9.3 mm	4.8 mm (long term)	2.0
Live load - $\Psi_S Q$	11.2 mm	1.4 mm	8.0
Wind load - W_s	14.0 mm	4.2 mm	3.3

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-3.9
1.2G + 1.5Q	0.80	-6.0
1.2G + W_u + $\Psi_c Q$	1.00	-8.5

0.9G + W _u	1.00	5.4
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8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 8

1) Member code and description W10-W11 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	0.6 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	3.0 mm	0.2 mm (long term)	14.5
Live load - $\Psi_S Q$	3.6 mm	0.1 mm	59.8
Wind load - W _s	4.5 mm	0.2 mm	24.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3} End kN ⁴
1.35G	0.60	-0.4
1.2G + 1.5Q	0.80	-0.5
1.2G + W _u + $\Psi_c Q$	1.00	-0.8
0.9G + W _u	1.00	0.5

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 9

1) Member code and description W12-W13 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	1.7 m
Roof load width 'RLW'	3.5 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 150 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	5.7 mm	1.4 mm (long term)	3.9
Live load - $\Psi_S Q$	6.8 mm	0.4 mm	15.9
Wind load - W_S	8.5 mm	1.3 mm	6.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-2.4
1.2G + 1.5Q	0.80	-3.8
1.2G + W_u + $\Psi_c Q$	1.00	-5.3
0.9G + W_u	1.00	3.4

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 10

1) Member code and description

W14-W15-W16 - Lintels - In single or upper storey load bearing walls

2) Date prepared

19 September 2018

3) Serviceability criteria

AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	0.9 m
Roof load width 'RLW'	4.1 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 2/90 x 45 SG8 Laserframe
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m ³

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	3.0 mm	1.3 mm (long term)	2.3
Live load - $\Psi_S Q$	3.6 mm	0.4 mm	8.8
Wind load - W_s	4.5 mm	1.2 mm	3.6

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-2.3
1.2G + 1.5Q	0.80	-3.6
1.2G + W_u + $\Psi_c Q$	1.00	-5.1
0.9G + W_u	1.00	3.3

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 11

1) Member code and description Garage-Door - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	4.9 m
Roof load width 'RLW'	1.0 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 300 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - $G + \Psi_L Q^*$	10.0 mm	4.3 mm (long term)	2.3
Live load - $\Psi_S Q$	15.0 mm	1.0 mm	15.7
Wind load - W_s	24.5 mm	2.9 mm	8.5

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k_1^1	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-1.9
1.2G + 1.5Q	0.80	-2.7
1.2G + W_u + $\Psi_c Q$	1.00	-3.6

0.9G + W _u	1.00	1.7
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8) Installation requirements

- Provide at least 30 mm bearing at end supports

Member 12

1) Member code and description L1 - Lintels - In single or upper storey load bearing walls

2) Date prepared 19 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Span	3.3 m
Roof load width 'RLW'	1.4 m
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Nominal wall thickness	90 mm

5) Member specification

Size, stress grade/product	Use 200 x 90 hy90
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Long term load - G + $\Psi_L Q^*$	10.0 mm	3.7 mm (long term)	2.7
Live load - $\Psi_S Q$	13.2 mm	1.0 mm	13.4
Wind load - W _s	16.5 mm	3.0 mm	5.5

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3}
		End kN ⁴
1.35G	0.60	-1.7
1.2G + 1.5Q	0.80	-2.6
1.2G + W _u + $\Psi_c Q$	1.00	-3.5
0.9G + W _u	1.00	2.0

8) Installation requirements

- Provide at least 30 mm bearing at end supports

Notes for interpretation of serviceability data

1. 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720. Deflections calculated using this methodology cannot therefore be usefully compared with deflections calculated using other methods, eg GLTAA design methodology.
2. Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631
SG grades - mechanically graded to AS/NZS 1748
GL grades for glulam to AS 1328
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)

Average + 100%
Average + 43%
Average + 33%
Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

3. The limits referred are those specified in AS 1720.3 for the stated load case.

4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements of AS 1720.3

Notes for interpretation of reaction data

1. Duration of load factor 'k₁' for strength as per NZ 3603:1993
 2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
 3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
 4. End reaction includes allowance for overhang/cantilever where one has been designed
-

CHH DesignIT Calculations

DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and Laserframe components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:

NZS 3603:1993 Timber Structures Standard.

NZS 3604:2011 Timber-framed buildings.

AS 1720.1:2010 Timber structures. Part 1: Design methods.

AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings

AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.

AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.

AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 3 May 2017

For further information or advice contact:

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173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Facsimile: 0800 808 132
Email: designit@chhwoodproducts.co.nz
Web: <http://www.chhwoodproducts.co.nz>

Specifier details:

Specifier:	Shaune
Business name:	JT Design Architecture Ltd
Address:	Level 1, 32 Tuwharetoa Street Taupo
Email:	shaune@jtdesign.co.nz

Project & site details:

Project:	New Residence
Reference:	JT18105
Site address:	18 Penny Grove, Taupo
Design wind zone	High
Snow loading	Design snow zone: N0

MEMBER DESIGN DETAILS

Member 1

- 1) Member code and description** JS1 - Jamb studs - In single or upper storey load bearing walls
- 2) Date prepared** 23 September 2018

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Opening width	4800 mm
Stud height	2610 mm
Roof type and mass	Light roof and ceiling - 40 kg/m ²
Roof load width 'RLW'	1.5 m

5) Member specification

Size, stress grade/product	Use 3/90 x 45 hyCHORD
Material type	Structural Laminated Veneer Lumber to AS/NZS 4357

6) Serviceability

Load case	Limit ³ on average deflection ²	Estimated average deflection ²	Rigidity ratio ⁴
Wind load - W _s *	17.4 mm	9.6 mm	1.8

*Critical serviceability load case

See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

Load case	k ₁ ¹	Limit States Design Reaction ^{2,3}	
		End kN ⁴	Horizontal kN
1.35G	0.60	-2.2	
1.2G + 1.5Q	0.80	-3.5	
1.2G + W _u + Ψ _c Q	1.00	-5.7	2.6
0.9G + W _u	1.00	0.9	2.1

8) Installation requirements

- Jamb studs to be nogged at maximum 1350 mm
- Notching of the jamb studs not permitted
- Nail Laminate studs in accordance with NZS 3604 Clause 2.4.4.7
- Provide 2 full length studs plus 1 secondary Jamb Stud to Detail H19

Notes for interpretation of serviceability data

1. 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720. Deflections calculated using this methodology cannot therefore be usefully compared with deflections calculated using other methods, eg GLTAA design methodology.
2. Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631	Average + 100%
SG grades - mechanically graded to AS/NZS 1748	Average + 43%
GL grades for glulam to AS 1328	Average + 33%
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)	Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

3. The limits referred are those specified in AS 1720.3 for the stated load case.

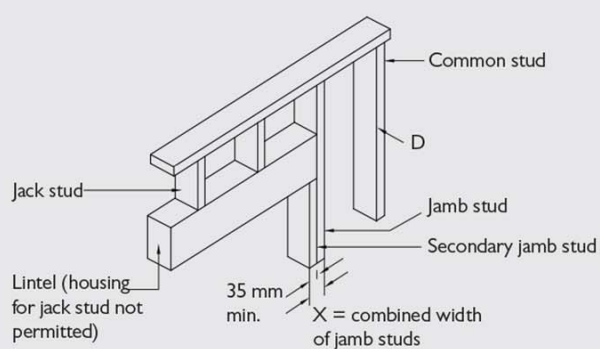
4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements of AS 1720.3

Notes for interpretation of reaction data

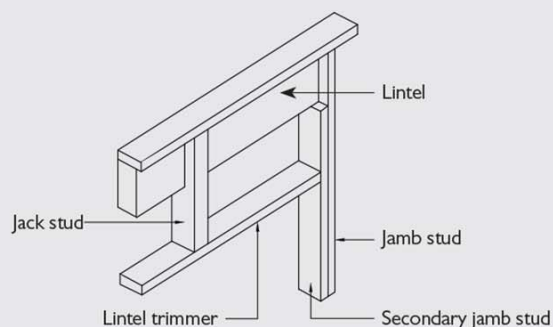
1. Duration of load factor 'k1' for strength as per NZ 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
4. End reaction includes allowance for overhang/cantilever where one has been designed

Detail H19: Multiple Stud Configuration

Lintels having breadth greater than half stud depth



Lintel directly below top plate



Bracing Calculations

Demand Calculation Sheet

Job Details

Name:	New Residence
Street and Number:	18 Penny Grove
Lot and DP Number:	Lot: 226 / DP: 522262
City/Town/District:	Taupo
Designer:	Shaune
Company:	JT Design Architecture
Date:	Sunday, 16 September 2018

Building Specification

Number of Storeys	1
Floor Loading	2 kPa
Foundation Type	Slab
	Single
Cladding Weight	Light
Roof Weight	Light
Room in Roof Space	No
Roof Pitch (degrees)	25
Roof Height above Eaves (m)	2.2
Building Height to Apex (m)	4.7
Ground to Lower Floor (m)	0.2
Average Stud Height (m)	2.6
Building Length (m)	16.4
Building Width (m)	14.4
Building Plan Area (m²)	173.68

Building Location

Wind Zone = High

Wind Region	A
Lee Zone	No
Ground Roughness	Open
Site Exposure	Exposed
Topography Class	T1

Earthquake Zone 2

Soil Type	D & E (Deep to Very Soft)
Annual Prob. of Exceedance:	1 in 500 (NZS3604:2011 Default)

Bracing Units required for Wind

	Along	Across
Single Level	723	775

Bracing Units required for Earthquake

	Along & Across
Single Level	674



Single Level Along Resistance Sheet

Job Name: New Residence

									Wind	EQ
									Demand	
									723	674
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	837 116%	759 113%
a	1	0.90		2.6	GS1-N	GIB®	52	49		
	2	0.90		2.6	GS1-N	GIB®	52	49		
	3	0.40		2.6	GS1-N	GIB®	20	21		
	4	0.40		2.6	GS1-N	GIB®	20	21		
									144 OK	141 OK
b	1	1.40		2.6	GS1-N	GIB®	89	78		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	1.20		2.6	GS1-N	GIB®	76	66		
									197 OK	176 OK
c	1	1.30		2.6	GS1-N	GIB®	83	72		
	2	1.20		2.6	GS1-N	GIB®	76	66		
	3	1.20		2.6	GS1-N	GIB®	76	66		
									236 OK	205 OK
d	1	1.30		2.6	GS1-N	GIB®	83	72		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	0.60		2.6	GS1-N	GIB®	32	32		
	4	1.80		2.6	GS1-N	GIB®	115	100		
									261 OK	236 OK

Single Level Across Resistance Sheet

Job Name: New Residence

									Wind	EQ
									Demand	
									775	674
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1137 147%	1066 158%
m	1	0.50		2.6	BLP-H	GIB®	59	64		
	2	0.50		2.6	BLP-H	GIB®	59	64		
									118 OK	128 OK
n	1	0.40		2.6	BL1-H	GIB®	33	37		
	2	0.40		2.6	BL1-H	GIB®	33	37		
	3	0.40		2.6	BL1-H	GIB®	33	37		
	4	0.40		2.6	BL1-H	GIB®	33	37		
									131 OK	148 OK
o	1	1.10		2.6	GS1-N	GIB®	68	61		
	2	1.10		2.6	GS1-N	GIB®	68	61		
									136 OK	121 OK
p	1	1.00		2.7	GS1-N	GIB®	58	53		
	2	1.80		2.6	GS1-N	GIB®	115	100		
									172 OK	153 OK
q	1	1.00		2.7	GS1-N	GIB®	58	53		
	2	0.60		2.6	GS1-N	GIB®	32	32		
	3	0.60		2.6	GS1-N	GIB®	32	32		
	4	2.00		2.6	GS1-N	GIB®	127	111		
									248 OK	228 OK
r	1	2.80		2.6	GS1-N	GIB®	178	155		
	2	2.40		2.6	GS1-N	GIB®	153	133		
									331 OK	288 OK

GIB EzyBrace® Systems specification GS1-N

Specification code	Minimum length (m)	Lining requirement
GS1-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard to one side only

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75 x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and 600mm centres thereafter.

External Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for external wall bottom plate fixing.

WALL LINING

- Any 10mm or 13mm GIB® plasterboard lining.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

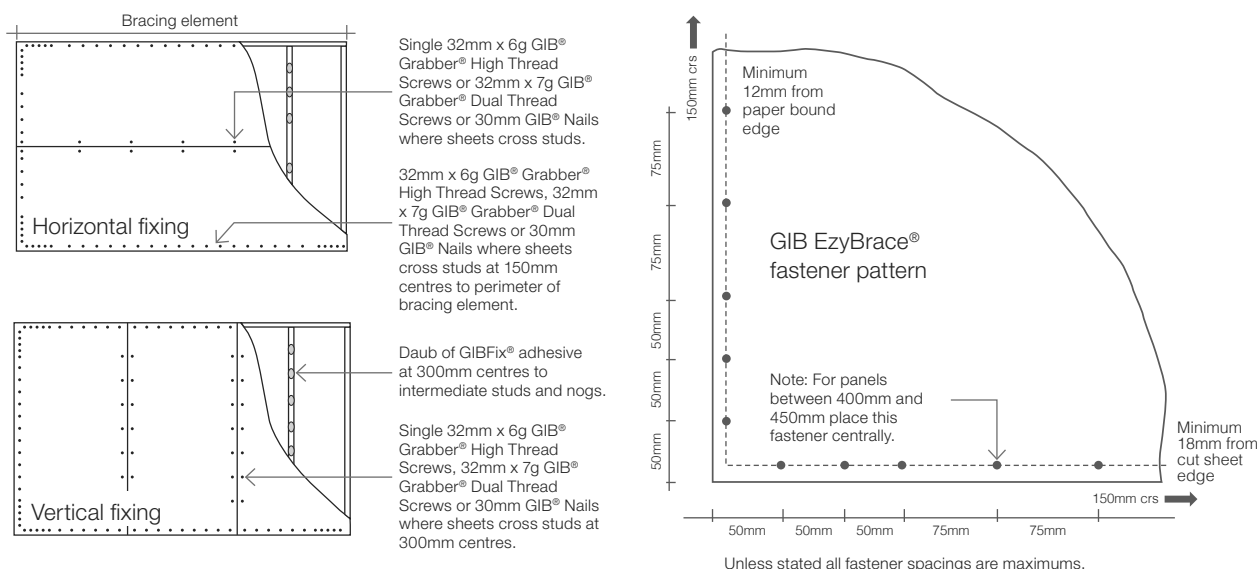
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BL1-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BL1-H	0.4	10mm or 13mm GIB Braceline® to one side only	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or
Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline®
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

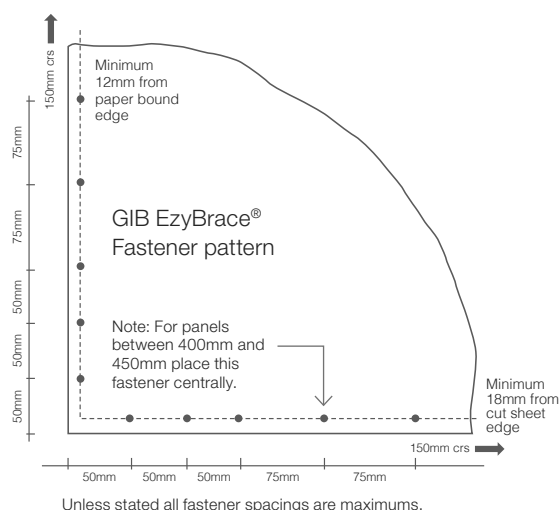
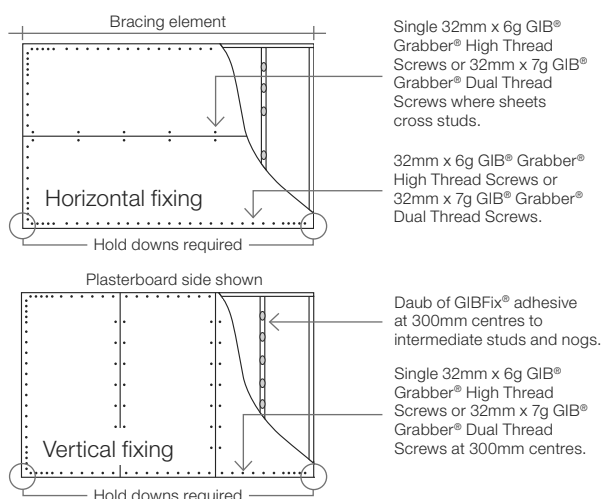
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm from maximum each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the sheet joint. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BLP-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLP-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure; B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB® HandiBrac is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of AS/NZ 2269/0 :2012.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZS 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally.
- Plywood is to be fixed vertically with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

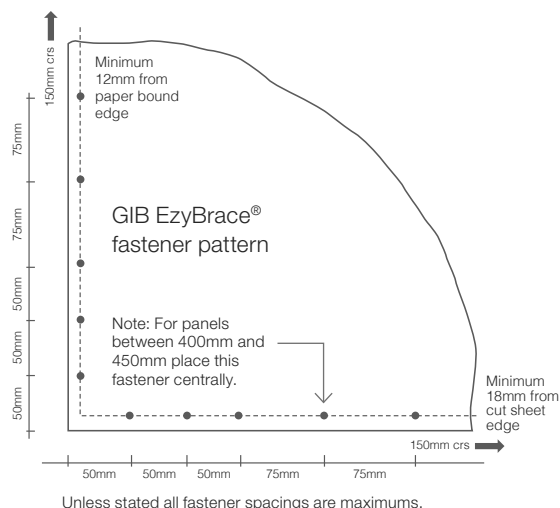
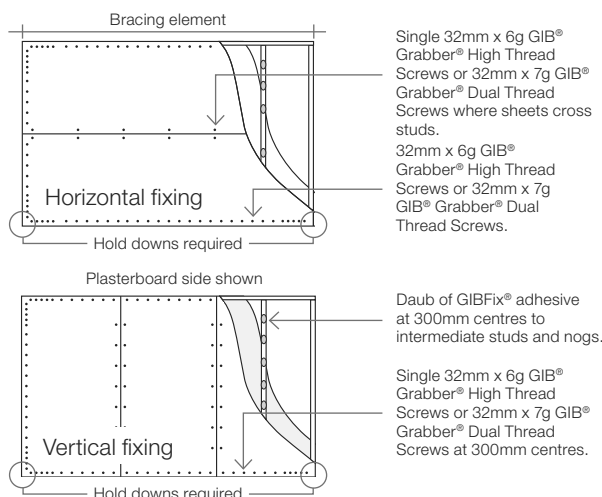
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

GIB® Plasterboard side: 50,100,150, 225, 300mm from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.

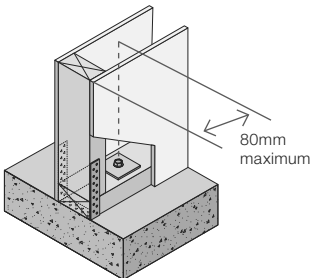
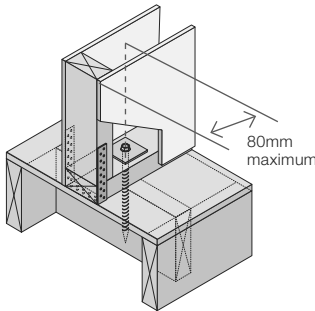
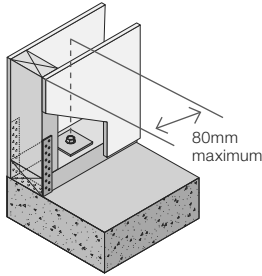
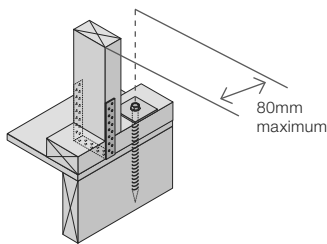
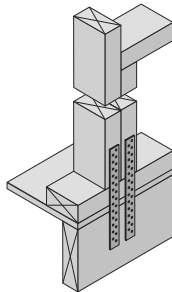


In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

Bracing strap installation

Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard and

positioned in such a way that the corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the corner fastenings to be installed without having to penetrate the bracing strap.

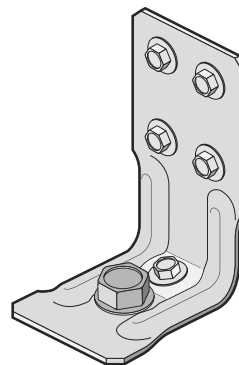
Concrete floor		Timber floor	
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.			
Internal wall			
			
GEB004		GEB005	
External wall			
			
GEB006		GEB007	
Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library .		2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Block to nog fixed with 3/100 x 3.75mm nails to stud.	
			
		GEB008	
Hold-down fastener requirements			
Concrete floor		Timber floor	
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.		12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element	

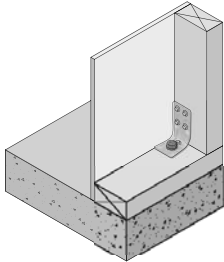
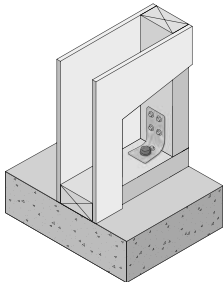
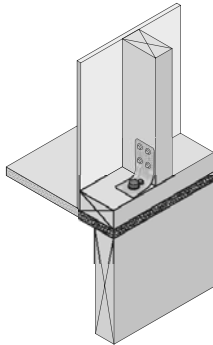
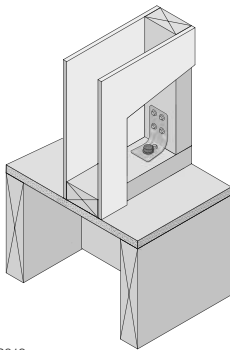
GIB HandiBrac® installation

Developed in conjunction with MiTek™, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs. The GIB HandiBrac® is a substitute for bottom plate hold-down straps.

- Quick and easy to fit.
- May be fitted at any stage before lining.
- Framing face is clear to allow flush lining.
- Easily inspected.

The GIB HandiBrac® with BOWMAC® blue head screw bolt is suitable for timber and concrete floors constructed in accordance with NZS 3604:2011.



Concrete floor		Timber floor	
External walls	Internal walls	External walls	Internal walls
 GEB009 Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.	 GEB010 Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.	 GEB011 Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.	 GEB012 Position GIB HandiBrac® in the centre of floor joist or full depth solid block.
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.		12 x 150mm galvanised coach screw or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.	

Insulation Calculations

INSULATION CALCULATION BASIC DATA AND DETERMINATION OF METHOD

This calculation is valid for buildings of non-solid construction only

PROJECT: New Residence - 18 Penny Grove, Taupo
CLIMATE ZONE: 3

BASIC DATA TABLE:

	WALL & GLASS AREAS				
LINE #	WALL	WALL AREA (m²)	GLASS AREA (m²)		
1	NORTH	45.89	21.78		
2	EAST	40.83	6.93		
3	SOUTH	45.68	4.24		
4	WEST	40.81	5.66		
	TOTAL AREAS	(m²)	(m²)	%	
5	N,E,S,W	173.21	38.61	22.29	<=30%
6	E,S,W ONLY	127.32	16.83	13.22	<=30%
7	TOTALS	173.21	38.61	22.29	<=30%
		(m²)	PERIMETER (m)		RATIO
8	TOTAL ROOF AREA (INC SKYLIGHT)	128.24	N/A		N/A
9	FLOOR AREA	127.36			N/A
11	SKYLIGHT AREA		N/A		<=1.5m²
12	LOUVRES/GLAZING AREA		N/A		<3m²
13	ACTUAL WALL AREA	134.60	N/A		N/A
14	ACTUAL ROOF AREA	128.24	N/A		N/A

CONCLUSION OF METHOD:

DO CALCULATIONS COMPLY WITH SCHEDULE METHOD?

Yes/No?

Yes

USE CALCULATION METHOD FOR OTHER REASONS?

Yes/No?

No

USE CALCULATION METHOD FOR THE FOLLOWING REASONS:

1	
2	
3	

WALL AREAS:		CONSTRUCTION DESCRIPTION	R-VALUE
1	=	Axon Panel on cavity over 90x45mm studs at 400mm centres.	2.18
	INSULATION	R2.8 insulation to frame cavity	
2	=	Bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres.	2.19
	INSULATION	R2.8 insulation to frame cavity	
3	=	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres.	2.27
	INSULATION	R2.8 insulation to frame cavity	
4	=		
	INSULATION		
5	=		
	INSULATION		
6	=		
	INSULATION		

Note: Similar highlighted values in the 'Window Areas' calculation box below indicate windows which are in that particular wall type.

WALL AREAS				WINDOW AREAS				STUD HEIGHT WALL LENGTH
NORTH (m²)	EAST (m²)	SOUTH (m²)	WEST (m²)	NORTH (m²)	EAST (m²)	SOUTH (m²)	WEST (m²)	
12.84	2.61	2.61	4.93	4.56	2.99	2.12	3.20	
8.82	6.17	3.65	3.13	5.74	2.12	2.12	1.23	
9.19	8.04	10.72	5.01	5.74	0.91		1.23	
1.50	8.30	10.23	4.18	5.74	0.91			
12.50	10.44	14.35	5.01					
1.04	5.27	1.80	2.61					
		2.32	2.92					
			8.12					
			4.90					
45.89	40.83	45.68	40.81	21.78	6.93	4.24	5.66	TOTALS

cont...

ROOF AREAS

ROOF AREAS:			PLAN AREA (m²)	SLOPE ANGLE (°)	ACTUAL AREA	R-VALUE
1	=	Profiled metal on trusses at 900mm centres	70.36		70.36	3.37
	INSULATION	R3.6 insulation to roof space				
2	=	Profiled metal on scissor trusses at 900mm centres	57.00	10.00	57.88	3.35
	INSULATION	R3.6 insulation to roof space				
3	=					
	INSULATION					
4	=					
	INSULATION					
5	=					
	INSULATION					
TOTALS			127.36		128.24	

FLOOR AREAS AND PERIMETER DIMENSIONS:

FLOOR AREAS:			PLAN AREA (m²)	PERIMETER (m)	RATIO	R-VALUE
1	=	85mm thick Firth Ribraft concrete slab on ground	127.36	65.98	1.93	1.30
	INSULATION	220mm deep polystyrene pod system				
2	=					
	INSULATION					
3	=					
	INSULATION					
4	=					
	INSULATION					
5	=					
	INSULATION					
TOTALS			127.36			

CONCLUSION:

PROPOSED R-VALUES			
LOCATION	COMPONENT	R-VALUE ACHIEVED	INSULATION DESCRIPTION & REFERENCE
WALLS	Axon Panel on cavity over 90x45mm studs at 400mm centres.	2.18	R2.8 insulation to frame cavity
			<i>Refer to Design Navigator Calculations in Appendix</i>
	Bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres.	2.19	R2.8 insulation to frame cavity
			<i>Refer to Design Navigator Calculations in Appendix</i>
ROOFS	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres.	2.27	R2.8 insulation to frame cavity
			<i>Refer to Design Navigator Calculations in Appendix</i>
	Profiled metal on trusses at 900mm centres	3.37	R3.6 insulation to roof space
			<i>Refer to Design Navigator Calculations in Appendix</i>
FLOOR	Profiled metal on scissor trusses at 900mm centres	3.35	R3.6 insulation to roof space
			<i>Refer to Design Navigator Calculations in Appendix</i>
	85mm thick Firth Ribraft concrete slab on ground	1.30	220mm deep polystyrene pod system
			<i>Refer to Manufacturers Spec in Appendix</i>
GLAZING	Aluminium joinery with double glazed windows	0.26	Standard aluminium joinery with double glazed windows
			<i>Refer to Branz House Insulation Guide Fifth Edition</i>



Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#).

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel.

- Floors ☐
- Walls ☒
- Roofs ☐

Axon Panel on cavity over 90mm timber framing

2.18 m²C/W

Type: Wall: Timber Frame with vented Cavity ▼

Timber Frame with vented Cavity view detail

external surface 0.03

Cladding : Fibre cement board 1470 9mm
R-value: 0.04

Air Barrier : Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 400mm, dwangs @ 800mm
Wall Frame Area: 17.9%
Cavity Area: 82.1%

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

Framing :
R-value: 0.75

Insulation : 2.8

still Airgap: none

R-value: 0.00

Wall Lining : Gypsum plasterboard 10mm
R-value: 0.04

internal surface 0.09

Print Page

Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction) [i](#):

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets [i](#):

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8





Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#)

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel .

- Floors ☐
- Walls ☒
- Roofs ☐

Weatherboards direct fixed over 90mm timber framing 2.19 m²°C/W

Type: Wall: Timber Frame (direct fixed cladding) ▼

Timber Frame (direct fixed Cladding) view detail

external surface 0.03

Cladding : Bevelled weatherboard without building paper ▼
R-value: 0.14

Air Barrier : Building paper ▼
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 400mm, dwangs @ 800mm ▼
Wall Frame Area: 17.9% Cavity Area: 82.1%
Framing : Insulation : 2.8
R-value: 0.75
still Airgap: none ▼
R-value: 0.00

Wall Lining : Gypsum plasterboard 10mm ▼
R-value: 0.04

internal surface 0.09

Print Page

Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8





Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#).

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel.

- Floors ☐
- Walls ☒
- Roofs ☐

Internal 90mm timber framed wall GIB lining both sides

2.27 m²C/W

Type: Wall: Timber Frame (direct fixed cladding) ▼

Timber Frame (direct fixed Cladding) view detail

external surface 0.03

Cladding : Gypsum plasterboard 10mm into still air (garage, etc.) ▼
R-value: 0.10

Air Barrier : none ▼
R-value: 0.00

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm ▼
Wall Frame Area: 14.4% Cavity Area: 85.6%

Framing :
R-value: 0.75

Insulation : 2.8

still Airgap: none ▼
R-value: 0.00

Wall Lining : Gypsum plasterboard 10mm ▼
R-value: 0.04

internal surface 0.09

Print Page

Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction) [i](#):

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets [i](#):

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8





Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#)

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel .

Floors ☐

Walls ☐

Roofs ☒

3.37 m²C/W

Type:

Timber framed Roof, direct fixed or battened flat Ceiling

external surface 0.03

Roofing :

R-value: 0.01

Insulation :

Timber Frame & Cavity :

Roof Frame Area: 5.0%

Cavity Area: 95.0%

Roof space (still air) 0.11

Roof space (still air) 0.11

Framing :
R-value: 0.75

Insulation : 3.6

Roof Lining :

R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights

Ceiling Area Number of Clearance from lamp holder side

[m²]: downlights: [m]:

Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8



Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "iso-thermal planes" method, the same method as used in NZS4214:2006.

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it or use the [Design Navigator message board](#) .

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel .

Floors

Walls ☐

Roofs

Profiled metal on scissor trusses at 900mm centres	3.35	$\text{m}^2\text{C/W}$
Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling ▼		
Timber framed Roof, direct fixed or battened flat Ceiling view detail		
external surface 0.03		
Roofing : Corrugate iron with building paper ▼		
<i>R-value: 0.01</i>		
Insulation : 		
Timber Frame & Cavity :		
90mm rafters or joists @ 900mm, battens covered with insulation ▼		
<i>Roof Frame Area: 5.0%</i> <i>Cavity Area: 95.0%</i>		
Roof space (still air) 0.11	Roof space (still air) 0.11	
Framing : <i>R-value: 0.75</i>	Insulation : 	
Roof Lining : Hardboard 6mm ▼		
<i>R-value: 0.04</i>		
internal surface 0.09		
Non-IC-rated recessed downlights		
Ceiling Area [m ²]: 	Number of downlights: 	Clearance from lamp holder side [m]: i

Print Page

Current NZS4218:2009 Schedule Method minimum R-value Targets (non-solid construction)

	Zone 1	Zone 2	Zone 3
Roof	R-2.9	R-2.9	R-3.3
Wall	R-1.9	R-1.9	R-2.0
Floor	R-1.3	R-1.3	R-1.3
Glazing (vertical)	R-0.26	R-0.26	R-0.26
Glazing (skylights)	R-0.26	R-0.26	R-0.31

Australian Building Code Targets

	All Zones except NSW	NSW
Roof	R-4.1	R-6.3
Wall	R-2.9	R-3.8



Cladding Manufacturers Specification



James Hardie
a smarter way™

Axon®
PANEL



Technical Specification

MARCH 2017 | NEW ZEALAND

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WE VALUE YOUR FEEDBACK

To continue with the development of our products and systems, we value your input. Please send any suggestions, including your name, contact details, and relevant sketches to:

Ask James Hardie™

Fax 0800 808 988

literaturefeedback@jameshardie.co.nz

THIS TECHNICAL SPECIFICATION
IS FOR AXON® PANEL DIRECT
FIXED AND FIXED TO CLD®
STRUCTURAL CAVITY BATTEN.

1 Application and scope

1.1 APPLICATION

Axon® Panel is manufactured by James Hardie using an advanced lightweight cement composite. Base composition is portland cement, ground sand, cellulose fibre and water. Axon Panel has vertical grooves along the panel. It is classified as lightweight wall cladding suitable for residential and light commercial buildings using timber framing.

- Axon Panel is ideal for achieving feature walls in areas such as gable ends and entrance ways.
- Axon Panel is primed on the face to take a suitable paint finish in any colour.
- Axon Panel 133 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres.
- Axon Panel 133 Grained - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres. Between the grooves is a look of traditional wood-grain texture.
- Axon Panel 400 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 400mm centres.

Specifier

If you are a specifier or other responsible party for a project, ensure that the information in this document is appropriate for the application you are planning and that you undertake specific design and detailing for areas which fall outside the scope of these specifications.

Installer

If you are an installer ensure that you follow the design, moisture management principles, associated details and material selection provided by the designer. All of the details provided in this document must be read in conjunction with this specification.

Make sure your information is up to date

When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or you need more information, visit www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

1.2 SCOPE

The scope of this specification for the use of Axon Panel is limited to buildings which fall within the scope limitations of 'Acceptable Solution E2/AS1 paragraph 1.1' of the New Zealand Building Code (NZBC).

This document is intended for use by architects, designers and specifiers who may be involved with the specification of Axon Panel.

This manual covers the use of Axon Panel for both construction methods i.e. direct fixed to framing or cavity construction, used in external walls of timber framed buildings up to 2.5kPa.

Please refer to E2/AS1 for further information regarding the selection of construction methods to be used for fixing claddings.

1.3 DETAILS

Various Axon Panel figures are provided in the Details section of this document. This specification and details in dwg, dxf, jpg and pdf file format are also available for download at www.jameshardie.co.nz.

All dimensions shown are in millimetres unless noted otherwise.

1.4 SPECIFIC DESIGN

For use of Axon Panel outside this published scope, the architect, designer or engineer must undertake specific design.

For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

2 Design

2.1 COMPLIANCE

Axon Panel complies with E2 of the NZBC as an alternate solution.

Axon Panel cladding has been tested as per E2/VM1 of the NZBC and it passes the test performance requirements. Axon Panel also complies with durability requirements of 'B2' clause of the NZBC.

2.2 RESPONSIBILITY

The specifier or other party responsible for the project must run through a risk matrix analysis to determine which construction method is to be used. The designer must also ensure that the figures published in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this specification. The designers should ensure that the intent of their design meets the requirements of the NZBC.

All New Zealand Standards referenced in this manual are current edition and must be complied with.

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution E1/AS1 'Surface Water'.

Foundations design must comply with the requirements of NZS 3604 'Timber-framed Buildings' or be as per specific engineering design.

The grade of adjacent finished ground must slope away from the building to avoid any possibility of water accumulation in accordance with the NZBC requirements.

2.4 SURFACE CLEARANCES

The clearance between the bottom edge of cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building.

Axon Panel must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZS 3604.

Axon Panel must have a minimum clearance of 100mm from paved ground, and 175mm from unpaved ground. On roofs and decks, the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground. Refer Figures 3 and 18.

2.5 MOISTURE MANAGEMENT

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled.

Walls must include those provisions as required by the NZBC Acceptable Solution E2/AS1 'External Moisture'. In addition all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in external walls, must comply with the requirements of relevant standards and the NZBC.

For further guidance on designing for weathertightness refer to BRANZ Ltd, and the Ministry of Business Innovation and Employment (MBIE) updates on the following websites respectively, www.branz.co.nz and www.building.govt.nz

2.6 STRUCTURE

2.6.1 Timber framing

Timber-framed buildings must be designed in accordance with NZS 3604 (Timber-framed Buildings). When the framing is provided as per the specific engineering design, the framing stiffness must be either equivalent to or more than the stiffness requirements of NZS 3604.

For timber frame walls longer than 12m it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections etc.

2.6.2 Wind loading

Axon Panel is suitable for use in all wind zones in New Zealand up to and including EH as defined in NZS 3604.

A specific design is required for all situations where the buildings falls outside the scope of NZS 3604 and E2/AS1.

2.7 BRACING

Axon Panel direct fixed can be used to achieve structural bracing when fixed with stainless steel HardieFlex™ nails. For further information refer to the James Hardie Bracing Design Manual.

Axon Panel installed to CLD Structural Cavity Battens as per this specification cannot be used to achieve structural bracing. However, bracing can be achieved by using James Hardie rigid air barrier board installed direct to framing instead of a flexible underlay or by using Villaboard® Lining bracing system on the internal face.

2.8 FIRE RATED WALLS

Axon Panel when direct fixed with HardieFlex nails to external walls can achieve fire ratings up to 60/60/60 to comply with C/AS1 of the NZBC when the walls are constructed in accordance with the current James Hardie 'Fire and Acoustic Design Manual'.

When using Axon Panel fixed to CLD Structural Cavity Battens, a fire rating of up to 60 minutes can be achieved using RAB® Board in conjunction with the fire rated system requirements as specified in the James Hardie 'Fire and Acoustic Design Manual'. Ask James Hardie on 0800 808 868 for further information.

Axon Panel is classified as a non-combustible material suitable for use on walls close to boundary.

2.9 ENERGY EFFICIENCY

External walls constructed as per this technical specification using Axon Panel, bulk insulation, where the area of glazing is 30% or less of the total wall area comply with the requirements for walls in the NZBC Acceptable Solution H1/AS1 (NZBC Clause H1 Energy Efficiency), Replacement Table 1. To meet thermal insulation requirements for the construction, the bulk insulation as specified in Table-1 must be used. This insulation may be substituted with insulations having higher R-values. The thermal insulation of a wall gets affected when the depth of the timber framing is increased or decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and using an internal lining material such as James Hardie Villaboard® Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate Zone	Construction R-Value Requirement	Minimum R-Value of Insulation Required
1 and 2	1.9 m² °C/W	#R2.0
3	2.0 m² °C/W	#R2.2
Total construction R-Value depends on the insulation material used and the framing ratio. The insulation material R-Values specified in this table are for studs spaced at 600mm c/c and nogs spaced at 800mm c/c.		
# To achieve higher R-Values of construction the wall insulation material must be replaced with an insulation material having higher R-Values to suit the requirements.		
For further guidance on insulation requirements refer to the current edition of 'House Insulation Guide' published by BRANZ.		

3 Framing

3.1 GENERAL

This Axon Panel technical specification is only suitable for timber-framed buildings. Other framing materials are subject to a specific engineering design.

3.2 TIMBER FRAMING

3.2.1 Dimensions

A minimum 45mm wide stud is required.

3.2.2 Structural grade

Minimum timber grade requirement is No. 1 framing grade or MSG6 as per NZS 3604. The grading of timber must comply with the AS/NZS 1748 and NZS 3631 requirements.

3.2.3 Durability

The external framing must be treated to a minimum H1.2 treatment. Refer to the NZBC Acceptable Solution B2/AS1 'Durability' for further information about the durability requirements.

For timber treatment and allowable moisture content information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round Sawn Timber) for minimum timber treatment selection and treatment requirements.

Also refer to the framing manufacturer's literature for further guidance on timber selection. Framing must be protected from moisture at site in accordance with the recommendation of the framing manufacturers.

3.2.4 Frame construction

The framing must fully support all panel edges. The framing must be rigid and not rely on the cladding panel for stability.

Timber framing sizes and its set-out must comply with NZS 3604 and as specified in this specification.

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must comply with the minimum timber sizes stipulated for wall frames in Section 8 of the NZS 3604.

For timber frame walls longer than 12m, it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections generated by loadings etc.

3.3 STEEL FRAMING

Refer to James Hardie Steel Frame Technical Specification about the installation of Axon Panel to steel frame.

3.4 CONSTRUCTION METHODS

3.4.1 Direct fixed

For direct fixed construction method the following framing is required:

- Studs at 600mm c/c maximum
- A minimum 45mm stud width is required at vertical panel joints
- Nogs/dwangs are required at 1200mm c/c maximum.

3.4.2 CLD Structural Cavity Batten

For cavity construction method the following framing is required:

- When studs are spaced at 600mm centres maximum, the nogs/dwangs must be provided at 800mm centres maximum
- When studs are spaced at 400mm centres then the nogs/dwangs may be provided at 1200mm centres
- An extra stud is required in internal corners. Refer to Figure 21.

3.5 TOLERANCES

In order to achieve the required performance and an acceptable wall finish, it is imperative that framing is straight and true.

Framing tolerances must comply with the requirements of NZS 3604. All framing shall be made flush.

4 Preparation

4.1 FLEXIBLE UNDERLAY OR HOMERAB PRE-CLADDING

Flexible underlay or HomeRAB® Pre-Cladding must be provided as per the requirements of the NZBC Acceptable Solution E2/AS1 'External Moisture' and NZS 3604. The flexible underlay must comply with Table 23 of E2/AS1 and AS/NZS 4200.1. The flexible underlay must be fixed in accordance with E2/AS1, NZS 3604 and AS/NZS 4200.2 and the underlay manufacturer's recommendations.

Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC Acceptable Solution E2/AS1 Table 23. For attached garages, flexible underlays must be selected in accordance with the NZBC Acceptable Solution E2/AS1, paragraph 9.1 3.4. HomeRAB Pre-Cladding is suitable for use in these applications. It must be installed in accordance with the James Hardie Rigid Air Barriers installation manual.

4.2 RIGID AIR BARRIER

For EH wind zone or Specific Engineering Design projects where the wind pressures are higher than 1.5kPa (ULS), RAB Board (6mm) must be used. Refer to the James Hardie rigid air barriers installation manual for information regarding its installation. For buildings within the scope NZS 3604 HomeRAB Pre-Cladding Lining (4.5mm) or flexible underlays can be used.

4.3 VENT STRIP

The James Hardie uPVC cavity vent strip must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. James Hardie uPVC vent strip has an opening area of 1000mm²/m length.

4.4 FLASHING

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to panel installation. Please refer to moisture management requirements in Clause 2.5. The flexible underlay or RAB Board must be appropriately taped around the penetrations and lapped/taped to flashings. Materials must be lapped in such a way that water tracks down to the exterior of a building. James Hardie will assume no responsibility for water infiltration within the wall due to poor installation of flashings or flexible underlays. The selected flashing materials must comply with the durability requirements of the NZBC. For information refer to Table 20 of clause E2 of the NZBC.

When using a James Hardie rigid air barrier board the entire framing around window opening must be sealed with a flashing tape. The tape must be finished over the face of James Hardie rigid air barrier board. The flashing tapes like SUPER-STICK Building Tape® by Marshall Innovations or 3M™ All Weather Flashing Tape 8067 by 3M™ are recommended for use with James Hardie rigid air barrier board. Refer to the tape manufacturer's literature for further information regarding their installation.

4.5 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Axon Panel which meet the requirements of E2 'External Moisture', an approved document of the NZBC. Refer to Figures 8 to 10 and 24 to 26.

5 Batten installation

Note: This specification is not for timber cavity battens. Refer to separate technical specification from James Hardie.

5.1 CLD STRUCTURAL CAVITY BATTENS

Buildings with a risk score of 7-20 calculated in accordance with Table 2 of Acceptable Solution E2/AS1 of the NZBC, require Axon Panel to be installed on a cavity. CLD Structural Cavity Battens provide airspace between the frame and the panel and are used to fix cladding into them.

CLD Structural Cavity Battens are made of a low density fibre cement formulation which enables them to have extra strength and durability. CLD Structural Cavity Batten is sealed on all sides and is suitable to fix Axon Panel installed as per this technical specification, and it can withstand the design wind pressures exerted on a cladding within the scope of NZS 3604.

The CLD Structural Cavity Battens are made 2450mm long and 19mm thick. The battens are fully sealed on all sides.

5.2 BATTEN LAYOUT

CLD Structural Cavity Battens must be fixed to the wall framing over flexible underlay or James Hardie rigid air barrier. The smoother face of batten should face towards the cladding.

CLD Structural Cavity Battens are suitable to withstand wind pressures up to 2.5kPa (ULS). For batten fixing, refer to section 5.4. Ensure the battens are straight and provide a flat surface to fix Axon Panel to. Site cut ends of battens must be sealed on site with Dulux® Acraprime 501/1 sealer or Resene Quick Dry.

The battens are run continuously over the studs but they must not be run continuously over the floor joists. There must be a 15mm gap between the battens at floor joist level to allow for structural shrinkages and deflections. Refer to Figure 27.

CLD Structural Cavity Battens can be butt jointed over the studs within the floor height. The batten ends must be cut between 20° to 45° and be installed in a way that the butt joint deflects the moisture to the exterior. The ends must be sealed and jointed with the adhesive sealant before butting them together. Refer to Figure 23.

The designer must ensure that the CLD Structural Cavity Battens are not used in situations where design wind pressures are above 2.5kPa (ULS).

CLD Structural Cavity Battens must always be at least 300mm in length.

5.3 INTERMEDIATE SUPPORT

Where studs are at 600mm centres an intermediate means of restraining the flexible underlay and insulation from bulging into the cavity shall be installed. An acceptable method to achieve this is using a:

- 75mm galvanised mesh; or
- polypropylene tape at 300mm centres fixed horizontally and drawn taut.

No intermediate supports are required:

- when studs are spaced at 400mm centres; or
- when RAB Board instead of flexible underlays are used.

5.4 BATTEN FASTENERS

The CLD Structural Cavity Batten must be fixed to the framing as specified in Table 2. The fasteners must be driven at a minimum distance of 50mm from the batten ends.

Table 2

Batten fixing				
Fixing Type	Framing	Basic Wind Pressure kPa (ULS)	Batten centres max. (mm)	Fixings centres max. (mm)
65mm x 2.8mm RoundDrive ring shank nail hot dip galv./ s.steel	Timber	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200
50mm x 9-10g Countersunk head steel screw class 3/4	*Steel 0.55 to 1.6mm BMT	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200

For fastener durability information, refer to Clause 6.2 of this document.

CLD Structural Cavity Battens less than 400mm in height must have fixings at maximum 150mm centres.

Battens must be fixed over studs.

6 Panel fixing

6.1 GENERAL

Axon Panel must be kept dry and under cover whilst in storage or during the installation. Every endeavour must be made to keep framing dry once panel fixing commences. All site-cut panel edges must be sealed prior to installation.

- The shiplap jointing of panels is only suitable for vertical fixing of panels.
- Do not fix in the groove of Axon Panel.
- Ensure the sheets are from the same batch.
- It is recommended to fix from the centre of the panel and work outwards.
- Do not overdrive fasteners.
- Fixings must be finished flush with the panel surface.

6.2 FASTENER DURABILITY

Fasteners must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing material to be used in relation to exposure conditions and are summarised in Table 3.

Table 3

Exposure conditions and nail selection prescribed by NZS 3604		
NAIL MATERIAL		
Zone D*	Zone C* outside sea spray zone, Zone B and Geothermal hot spots	Bracing — All Zones
Grade 316 Stainless	Hot-dipped galvanised or Grade 316 stainless	Grade 316 Stainless

*(Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made). Microclimate conditions as detailed in NZS 3604, paragraph 4.2.4 require SED.

Also refer to the NZBC Acceptable Solution E2/AS1 Table 20 and 21 for information regarding the selection of suitable fixing materials and their compatibility with other materials.

6.3 FASTENER — TYPE, SIZE AND LAYOUT

6.3.1 Direct fix

Axon Panel must be fixed to framing using the fixings as specified in Table 4 below and follow the edge distance required for nails as shown in the details. Refer to Figures 2 and 4.

Table 4

Panel fixing		
DIRECT FIXED TO FRAME USING HARDIEFLEX NAILS OVER FLEXIBLE UNDERLAY		
40 x 2.8mm HardieFlex nails.	Fix @ 200mm centres to all framing. Stud width 45mm min. required at vertical joint.	
DIRECT FIXED TO FRAME USING BRAD NAIL OVER FLEXIBLE UNDERLAY		
ND 50 stainless steel straight brad nail	Up to 1.5kPa (Up to and including VH wind zone)	Fix 150mm c/c on panel edges and intermediate framing

Notes:

1. Brad nail fixing method is only suitable up to very high wind speed zones. Do not use this method for EH wind zones described in NZS 3604 or SED projects.
2. Nails must be finished flush with panel surface.
3. Special fixing arrangements are required for bracing and fire-resistance rated wall systems.

For more information Ask James Hardie on 0800 808 868.

When fixing the panels using nail guns, refer to the nail gun manufacturer for information about nails and the type of nail gun to be used.

Note: Do not use 'D' head nails.

6.3.2 CLD Structural Cavity Batten Method

This panel fixing method can be used up to 2.5kPa wind pressure. Axon Panel is only fixed into the CLD Structural Cavity Batten as per this method.

Adhesive sealant

A polyurethane adhesive sealant Seal N Flex-1 manufactured by Bostik or SikaFlex 11FC by Sika are recommended for use in the installation of these products. Apply a 6mm continuous bead of this adhesive sealant over the face of the CLD Structural Cavity Batten before fixing the Axon Panel. Refer to Figure 19, 20 and 21.

When using external box corner flashing, use a 10mm thick bead of adhesive over the aluminium box corner flanges. Refer to Figure 22.

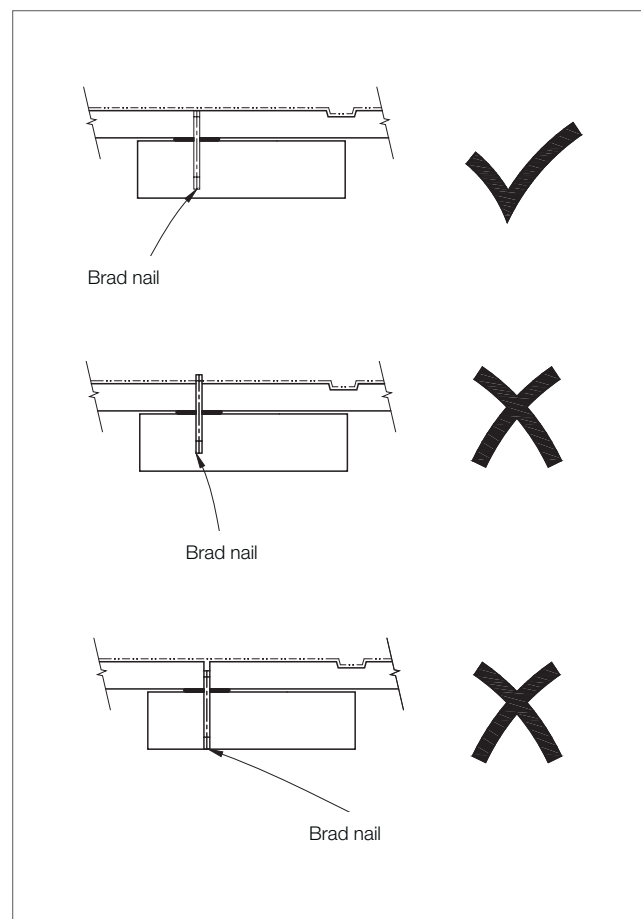
Note: Do not use excessive adhesive.

6.3.3 Cavity construction using timber cavity battens

When fixing Axon Panel using timber cavity battens, these details are available at www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

6.4 PANEL LAYOUT

All panel edges must be supported by the framing. The shiplap joint must be formed vertically. The framing centers must be checked before the panel installation.



Fix Axon Panel to CLD Structural Cavity Battens using one of the following fixings specified in Table 5. The edge distance at panel corner must be minimum 75mm vertically from panel corners. Refer Figure 17.

Table 5

Axon Panel Fixing		
Types of fixings to be used with adhesive sealants	Suitable up to Basic Wind Pressure kPa (ULS)	Fixing to CLD Structural Cavity Battens c/c (mm)
C-25 straight 'T'- Head stainless steel brad nail	1.5 (Up to and including VH wind zone)	150
25 x 2.5mm annular threaded fibre cement nail	2.5 (> VH wind zone)	200
25mm x 10g counter sunk screw class 3/4 or stainless steel	2.5 (> VH wind zone)	200

Notes:

1. Brad nail fixing method is only suitable up to 1.5kPa.
2. Nails must be finished flush with panel surface.

7 Jointing

7.1 GENERAL

Axon Panels are fixed to form a shiplap joint at vertical edges. The panels have factory-made edges to suit this jointing.

7.2 VERTICAL JOINT

Direct fixed

Axon Panels are shiplap jointed keeping a gap of 1-2mm between the panels. A 50mm wide 3259 Inseal sealing tape is used under the joint over the face of the timber stud where direct fixed construction method is used. A flexible sealant must be applied to the full length of the shiplap joint before the panels are jointed. The edge distance for a HardieFlex nail must be 18mm min. Refer to Figure 4.

Cavity construction

Fix the CLD Structural Cavity Batten over the studs and it runs behind the entire length of the shiplap joint with a 50mm overhang below the bottom plate and finishes flush with the bottom edge of panel. Refer to Figures 16 and 17. The vertical shiplap joint is formed along the centre line of the batten. A bead of sealant is applied to the vertical edge of the Axon Panel to seal the shiplap joint before fixing the panels. Refer to Figure 19. The edge distance for a brad nail must be 16mm and 18mm. Refer Figures 14 and 19.

8 Finishing

7.3 HORIZONTAL JOINT

At floor joist levels a horizontal joint must be provided to accommodate the movement resulting from timber joist shrinkage and settlement. A JH 9mm panel aluminium horizontal 'h' mould is used to form a horizontal joint. Use the aluminium 'h' mould jointer to cover over the butt joint of 'h' mould. A purpose made metal 'Z' flashing or a James Hardie uPVC flashing could also be used to flash the horizontal joint. Refer to Figures 11, 12 and 27.

7.4 EXTERNAL CORNER

A JH 9mm panel aluminium box corner mould is used to form the external box corner. The site-cut sheet edges must be sealed before butting them into the box corner. Refer to Figure 7.

Do not run the box corner flashing continuously over the floor joist. On a two storey construction the aluminium box corner is finished under the aluminium 'h' mould. A uPVC corner under flashing must be used under the box corner when in this situation. Refer to Figure 12.

For CLD Structural Cavity Batten external corner refer to Figure 22.

The bead of adhesive must be 10mm thick to accommodate for the thickness of the aluminium.

7.5 INTERNAL CORNER

Direct fixed internal corner is formed using a uPVC corner under flashing or an 80mm wide Inseal sealing strip behind the panel edges. The joint is filled with the flexible sealant. Refer to Figure 6.

For CLD Structural Cavity Batten internal corner joint detail refer to Figure 21.

7.6 FLASHING MATERIAL DURABILITY

Please refer to Table 20 of E2/AS1 of the NZBC regarding the durability requirements of various flashing materials.

8.1 PREPARATION

Painting of Axon Panel is mandatory to meet the durability requirements of the NZBC and 15 year James Hardie product warranties. Axon Panel must be dry and free of any dust or grime before painting. The panels must be painted within 90 days of their installation. There is no restriction on the LRV of paint to be applied on the Axon Panel.

When using uPVC flashings, dark colours should be avoided as it will affect the durability of uPVC flashing. The LRV of paint must be above 40% when using uPVC flashings.

Dark paints can be used when using the aluminium flashings.

Panels are pre-primed and are suitable for site applied acrylic paints. Pre-finished panels can also be installed using exposed head fasteners.

In order to seal cut edges or sanded patches, Dulux 1 Step, Resene quick dry, Taubmans Underproof Acrylic Primer Undercoat or a similar product should be applied. The primer should be compatible with the paint to be used.

Where panels are fixed with brad nails, the nail heads must be finished flush with panel surface. The nail gun should be set to nail "proud" of the panel surface and nail heads to be manually finished flush with surface. The nail heads can be skimmed over with an exterior grade 2 part builders fill if required. The skimmed area must be primed prior to site-applied finishing.

For site-applied finishes where brad nails are used. James Hardie recommends an undercoat and a minimum of two coats of acrylic paint. Follow the paint manufacturer's recommendations to prepare the surface and to adequately cover and conceal the panel fixings.

8.2 FLEXIBLE SEALANT

All sealants used must comply with the relevant requirements of the NZBC. Their application and usage must be in accordance with manufacturer's instructions. Check with sealant manufacturer prior to coating over sealants. Some sealant manufacturers do not recommend coating over their products.

9 Storage and handling

When storing Axon Panel, boards must be laid flat on a smooth level surface. Edges and corners must be protected from chipping.

To ensure optimum performance, store panels under cover and keep dry prior to fixing. If the panels become wet, allow them to dry thoroughly before fixing.

Do not carry panels on the flat, carry in the vertical position to avoid excessive bending.

10 Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*
- Re-applying of exterior protective finishes if necessary**
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants that may provide a means of moisture entry beyond the exterior cladding.
- Cleaning out gutters, blocked pipes and overflows as required
- Pruning back vegetation that is close to or touching the building
- The clearance between the bottom edge of Axon Panel and the finished ground must always be maintained.

*Do not use a water blaster to wash down the cladding.

*In extreme coastal conditions or sea spray zones, wash every 3-4 months.

**Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.

11 Product information

11.1 MANUFACTURING AND CLASSIFICATION

Axon Panel is an advanced lightweight cement composite building product. The basic composition is portland cement, ground sand, cellulose fibre and water. The panels are easily identified by the name 'Axon Panel' printed at regular intervals on the back face of panel.

CLD Structural Cavity Battens are manufactured using a low density fibre cement formulation. The basic composition is Portland cement, ground sand, cellulose fibre and water and proprietary additives. The battens are sealed on all sides.

Axon Panel is manufactured to AS/NZS 2908.2 'Cellulose-Cement Products Part 2: Flat Sheets' (ISO 8336 'Fibre Cement Flat Panels') standards in New Zealand. James Hardie New Zealand is an ISO 9001 'Telarc' certified manufacturer.

Axon Panel is classified Type A, Category 3 in accordance with AS/NZS 2908.2 "Cellulose-Cement Products".

For Safety Data Sheets (SDS) visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

11.2 PRODUCT MASS

Axon Panel is manufactured in 9.0mm thickness and has a mass of 12.1kg/m² at EMC.

Axon Panel cladding is defined as a Light Weight Wall Cladding (not exceeding 30kg/m²) as per NZS 3604.

11.3 DURABILITY

11.3.1 General

Axon Panel installed as per this technical specification will meet the durability requirements for claddings as required under clause 'B2-Durability' of the NZBC.

11.3.2 Resistance to moisture/rotting

Axon Panel has demonstrated resistance to permanent moisture induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Heat Rain (Clause 6.5).
- Water Permeability (Clause 8.2.2).
- Warm Water (Clause 8.2.4).
- Soak Dry (Clause 8.2.5).

11.3.3 Control of External Fire Spread

Axon Panel is assessed as per Appendix C C7.1.1 and is classified as 'Non-Combustible Material' which is suitable for use as external wall cladding and complies with requirements of Paragraph 5.4 of the NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of Acceptable Solutions C/AS2 to C/AS6 of the NZBC.

11.3.4 Alpine regions

In regions subject to freeze/thaw conditions, Axon Panel must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions must be protected where snow drifts over winter are expected.

The Axon Panel has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

12 Safe working practices

STAY HEALTHY WHEN WORKING WITH BUILDING PRODUCTS CONTAINING CRYSTALLINE SILICA

Crystalline Silica

What is it? Why and when is it a health hazard?

Crystalline Silica is

- Commonly known as sand or quartz
- Found in many building products e.g. concrete, bricks, grout, wallboard, ceramic tiles, and all fibre cement materials

Why is Crystalline Silica a health hazard?

- Silica can be breathed deep into the lungs when present in the air as a very fine (respirable) dust
- Exposure to silica dust without taking the appropriate safety measures to minimise the amount being breathed in, can lead to a potentially fatal lung disease – silicosis – and has also been linked with other diseases including cancer. Some studies suggest that smoking may increase these risks.
- The most hazardous dust is the dust you cannot see!

When is Crystalline Silica a health hazard?

- It's dangerous to health if safety protocols to control dust are not followed when cutting, drilling or rebating a product containing crystalline silica.
- Products containing silica are harmless if intact (e.g. an un-cut sheet of wall board).

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS AND INSTALLATION INSTRUCTIONS WHEN WORKING WITH JAMES HARDIE PRODUCTS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

AVOID BREATHING IN CRYSTALLINE SILICA DUST!

Safe working practices

- 👎 NEVER use a power saw indoors or in a poorly ventilated area
- 👎 NEVER dry sweep
- 👍 ALWAYS use M Class extractor unit as a minimum and always hose down with water/wet wipe for clean up
- 👎 NEVER use grinders
- 👍 ALWAYS use a circular sawblade specifically designed to minimise dust creation when cutting fibre cement – preferably a sawblade that carries the HardieBlade™ logo or one with at least equivalent performance.
- 👍 ALWAYS follow tool manufacturers' safety recommendations
- 👍 ALWAYS expose only the minimum required depth of blade for the thickness of fibre cement to be cut
- 👍 ALWAYS wear an approved properly-fitted, approved dust mask (P1 or P2) or respirator

Use one of the following methods based on the required cutting rate:

BEST

- Score and snap knife
- Hand guillotine
- Fibreshear

BETTER

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and M Class extractor unit.

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade

Working outdoors

- 👍 Make sure you work in a well ventilated area
- 👍 Position cutting station so wind will blow dust away from yourself and others in the working area
- 👍 Cut products with either a 'Score or snap' knife or fibre cement shears or, when not feasible, use a HardieBlade™ Saw Blade (or equivalent) and a dust-reducing circular saw attached to a M Class extractor unit
- 👍 When sawing, sanding, rebating, drilling or machining fibre cement products, always:
 - Wear your P1 or P2 mask (correctly fitted in accordance with manufacturers' instructions) and when others are close by, ask them to do the same
 - If you are not clean shaven, then use a powered air respirator with a loose fitting head top.
 - Wear safety glasses
 - Wear hearing protection
 - When others are close by, ask them to do the same.

Working indoors

- 👎 Never cut using a circular saw indoors
- 👍 Position cutting station in a well ventilated area
- 👍 Cut ONLY using a score and snap knife, hand guillotine or fibreshears (manual, electric or pneumatic)
- 👍 Make sure you clean up BUT never dry sweep. Always hose down with water/wet wipe or use an M Class extractor unit

IF CONCERN STILL EXISTS ABOUT EXPOSURE LEVELS OR YOU DO NOT COMPLY WITH THE ABOVE PRACTICES, YOU SHOULD ALWAYS CONSULT A QUALIFIED INDUSTRIAL HYGIENIST.

Working Instructions

- Refer to Recommended Safe Working Practices before starting any cutting or machining of product.



HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.

Hole-Forming

For smooth clean cut circular holes:

- Mark the centre of the hole on the sheet.
- Pre-drill a 'pilot' hole.
- Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.



For irregular holes:

- Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face.
- Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.

STORAGE & DELIVERY

Keeping products and people safe

Off loading

- James Hardie products should be off-loaded carefully by hand or by forklift.
- James Hardie products should not be rolled or dumped off a truck during the delivery to the jobsite.

Storage

James Hardie products should be stored:

- in their original packaging
- under cover where possible or otherwise protected with a waterproof covering to keep products dry
- off the ground – either on a pallet or adequately supported on timber or other spacers
- flat so as to minimise bending

James Hardie products must not be stored:

- directly on the ground
- in the open air exposed to the elements

JAMES HARDIE IS NOT RESPONSIBLE FOR DAMAGE DUE TO IMPROPER STORAGE AND HANDLING.

TIPS FOR SAFE AND EASY HANDLING

Weatherboard products

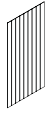
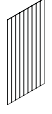
- Do not lift planked products flat and in the middle
- Carry the products on the edge
- If only one person is carrying the product, hold it in the middle and spread arms apart to better support the product
- If two people are carrying the plank, hold it near each end and on edge
- Exercise care when handling weatherboard products to avoid damaging the edges/corners

Sheet products

- Carry with two people
- Hold near each end and on edge
- Exercise care when handling sheet products to avoid damaging the edges/corners

13 Product sizes and accessories

Table 7

Axon Panel information					
Product	Description	Thickness	Size		Product Code
	Axon Panel 133 Smooth Is a shiplot jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m ²	9	Length	Width	
			2450	1200	403780
			2750	1200	403781
	Axon Panel 133 Grained Is a shiplot jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m ²	9	3000	1200	403782
			2450	1200	404510
			2750	1200	404511
	Axon Panel 400 Smooth Is a shiplot jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 400mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m ²	9	3000	1200	404512
			2450	1200	404414
			2750	1200	404415
			3000	1200	404416

Note: The actual width of the panel is 1203mm. All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

Table 8

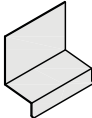
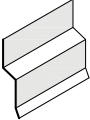
Accessories/tools supplied by James Hardie			
Accessories	Description	Quantity/Size (approx)	Code
	CLD Structural Cavity Batten 19mm thick fibre cement cavity batten installed over RAB Board or a flexible underlay. Axon Panels are fixed to the battens.	19 x 70mm, 2450mm long	403870
	JH 9mm Panel Aluminium External Box Corner A box corner mould to form the external joints. 9mm etch primed.	2450mm long	304509
		2750mm long	304510
		3000mm long	305150
		4000mm long	305808
	JH 9mm Panel Aluminium Horizontal 'h' Mould A horizontal flashing to flash the horizontal joints. 9mm etch primed.	3000mm long	304508
	Aluminium 'h' Mould Jointer A jointer to cover the butt joint of 'h' mould.	100mm long	304512
	uPVC Corner Under Flashing A 50 x 50mm corner under flashing for internal and external joints.	3000mm long	303745
	uPVC Vent Strip Used to provide protection from vermin entering cavity space.	3000mm long	302490
	Annular Threaded Nail 25 x 2.5mm nail.	500gm	300390
	INSEAL® 3259 Tape Black 50mm tape to be used under the vertical shiplot joint. Black 80mm tape to be used at corners.	50m roll	300767
			300769
	CLD Batten Corner Flashing Aluminium Used at internal corner sealant joints at floor joist level.		304652
Tools			
	HardieBlade™ Saw Blade Diamond tip 184mm diameter fibre cement circular saw blade. Spacers not included.	Each	300660

NOTE: uPVC 'h' mould and jointer accessories are also available from James Hardie.

Table 9

Accessories/tools not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with Axon Panel. James Hardie does not supply these products and does not provide a warranty for their use. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description
	Flexible Underlay To comply with Table 23 of E2/AS1.
	Flexible Tape A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information. e.g. Tyvek®, Protecto or Thermakraft or similar.
	Joint Sealant Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information. e.g. Sika Silaflex MS, Sika AT Façade, Bostik Seal N Flex-1 or similar
	Head Flashing Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.
	Flashing Material as per Table 20, 'E2/AS1'
	HardieFlex™ Hot Dip Galv and Stainless Steel 316 nails For fixing panels direct to framing. 40 x 2.8mm
	C-25 Stainless Steel Brad Nails 304SS brad nails used to install Axon Panels to the CLD Structural Cavity Battens used in a straight bradder. Paslode: (09) 477 3000
	ND 50 Stainless Steel Brad Nails Used to install Axon Panel direct fix to timber framing. Used in a straight bradder.
	65 x 2.87mm RoundDrive Ring Shank Nail For fixing CLD Structural Cavity Battens to the framing. Paslode: (09) 477 3000
	Bostik Seal N Flex-1 'Seal N Flex-1' Polyurethane adhesive sealant manufactured by BOSTIK for applying between the panels and battens, Refer to section 5 for more information. BOSTIK: ALK: (09) 579 6253, WGTN: (04) 567 5119, CHCH: (03) 366 2583.
	Sika Sikaflex 11FC Sika: 0800 SIKANZ (0800 745 269)
	200mm wide Polypropylene DPC Product used over flexible underlay at external and internal corners. ie. Super Course 500

14 Details

The following generic details have been provided in this document for both direct fixed and cavity construction methods.

Table 10

Details				
Description	Direct Fixed		CLD Structural Cavity Batten Construction	
	Figure No.	Page No.	Figure No.	Page No.
Typical framing setout	Figure 1	16	Figure 15	25
Typical panel nail fixing setout	Figure 2	17	Figure 17	27
	Figure 13	24		
Foundation detail	Figure 3	18	Figure 18	28
Vertical shiplap joint	Figure 4	18	Figure 19	29
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Figure 1: Direct fixed typical framing setout

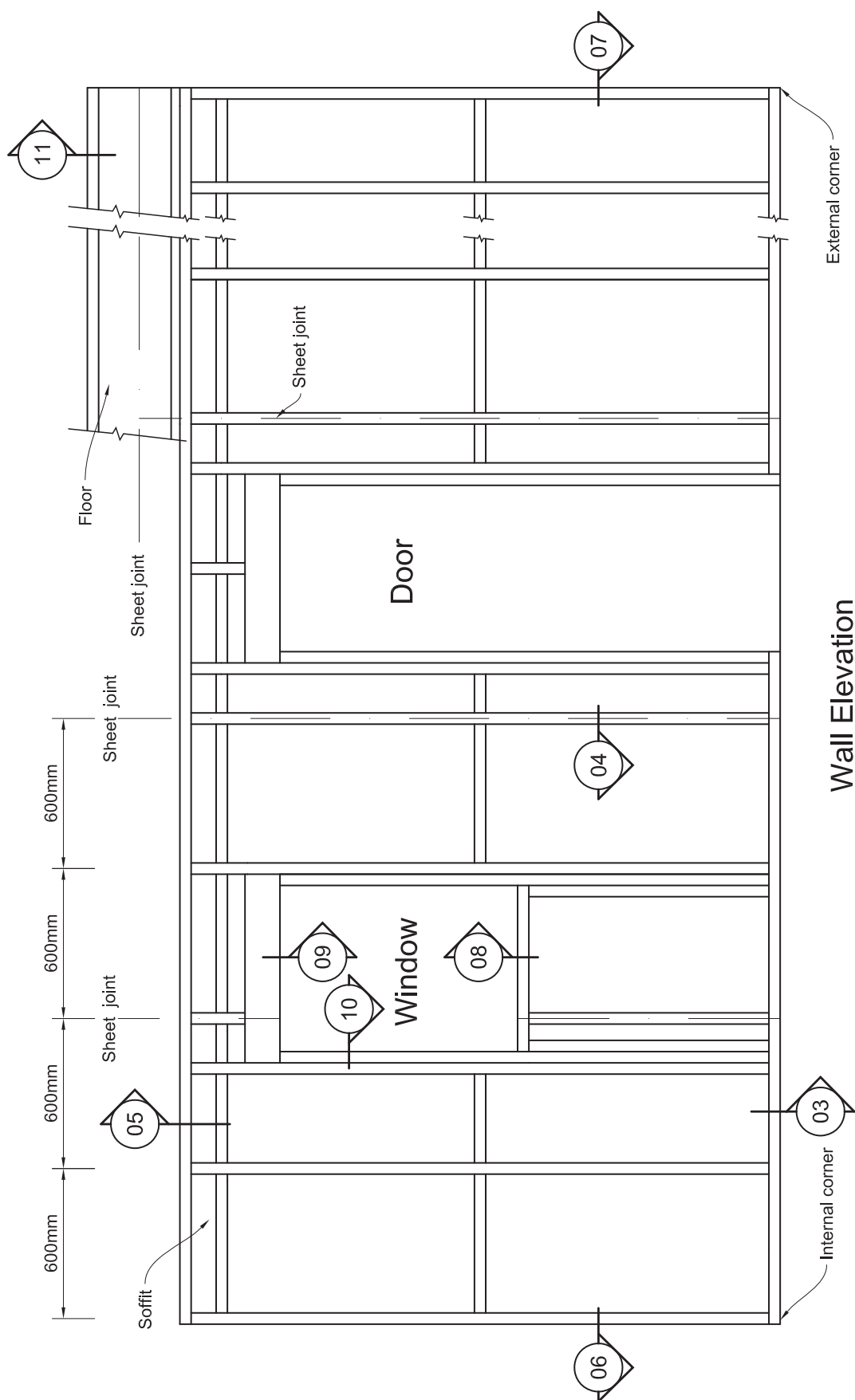
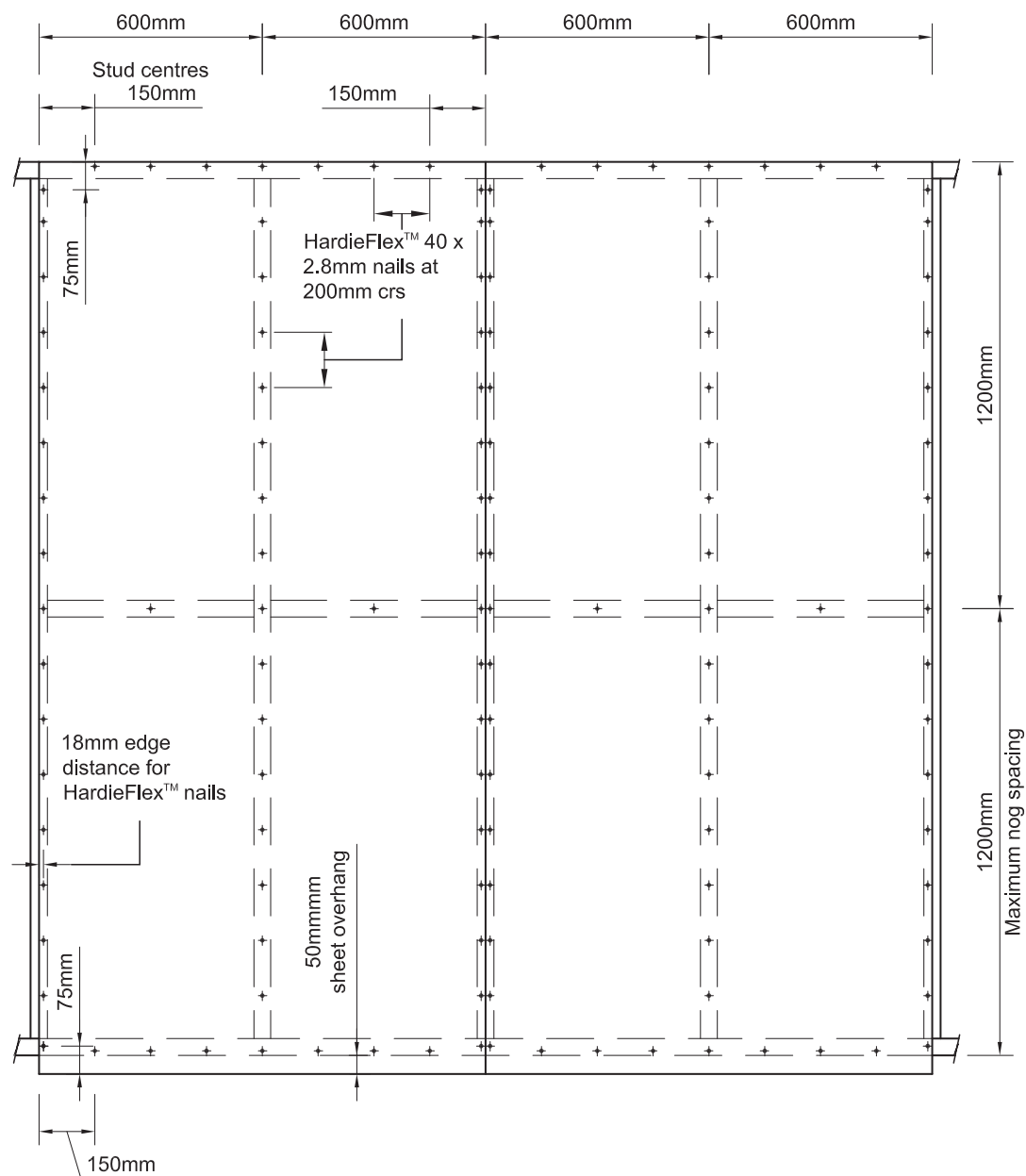
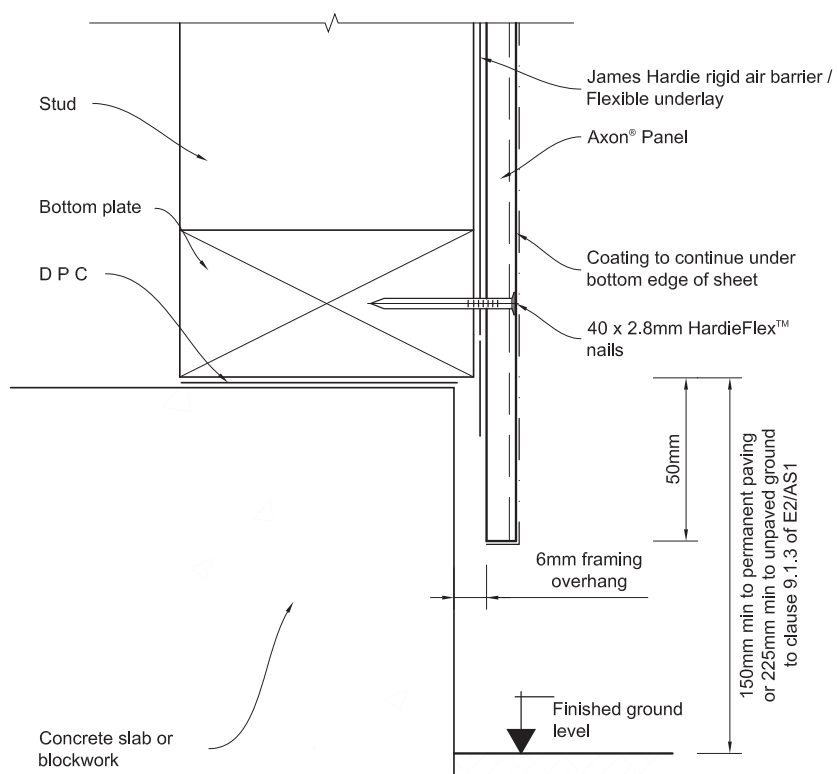


Figure 2: Direct fixed typical panel HardieFlex nail fixing setout



Note: When studs spaced at 400mm centres using Axon® Panel 400, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.

Figure 3: Direct fixed foundation detail



Note: Refer to Section 2.4 for further information

Figure 4: Vertical shiplap joint — HardieFlex nail

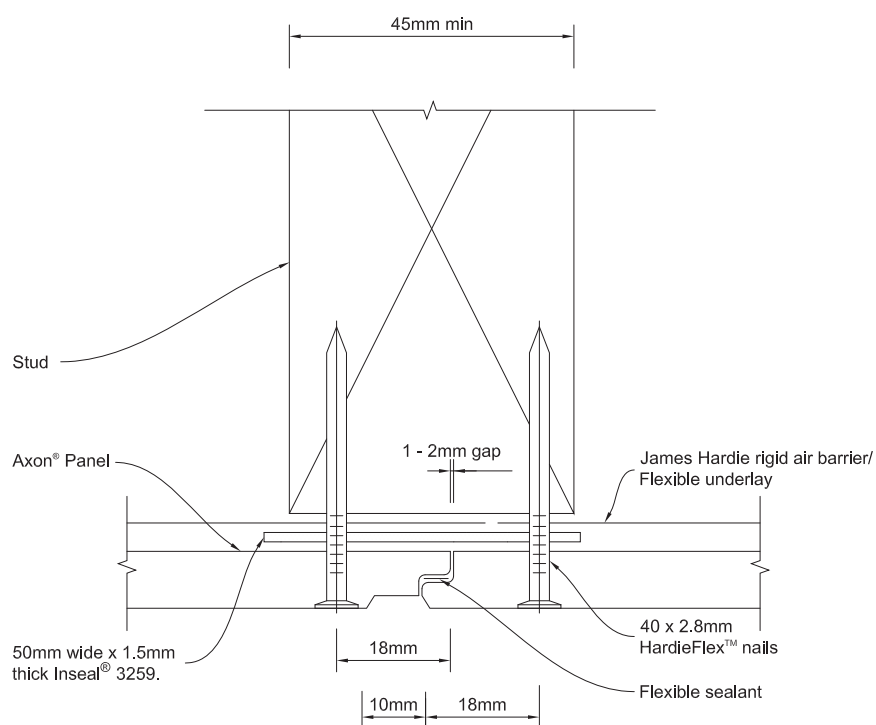


Figure 5: Soffit detail

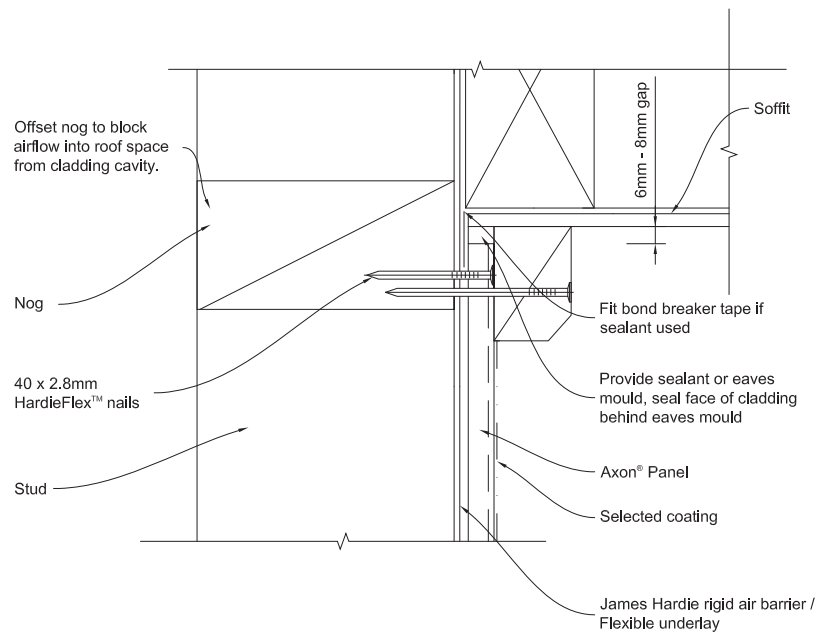


Figure 6: Internal corner detail

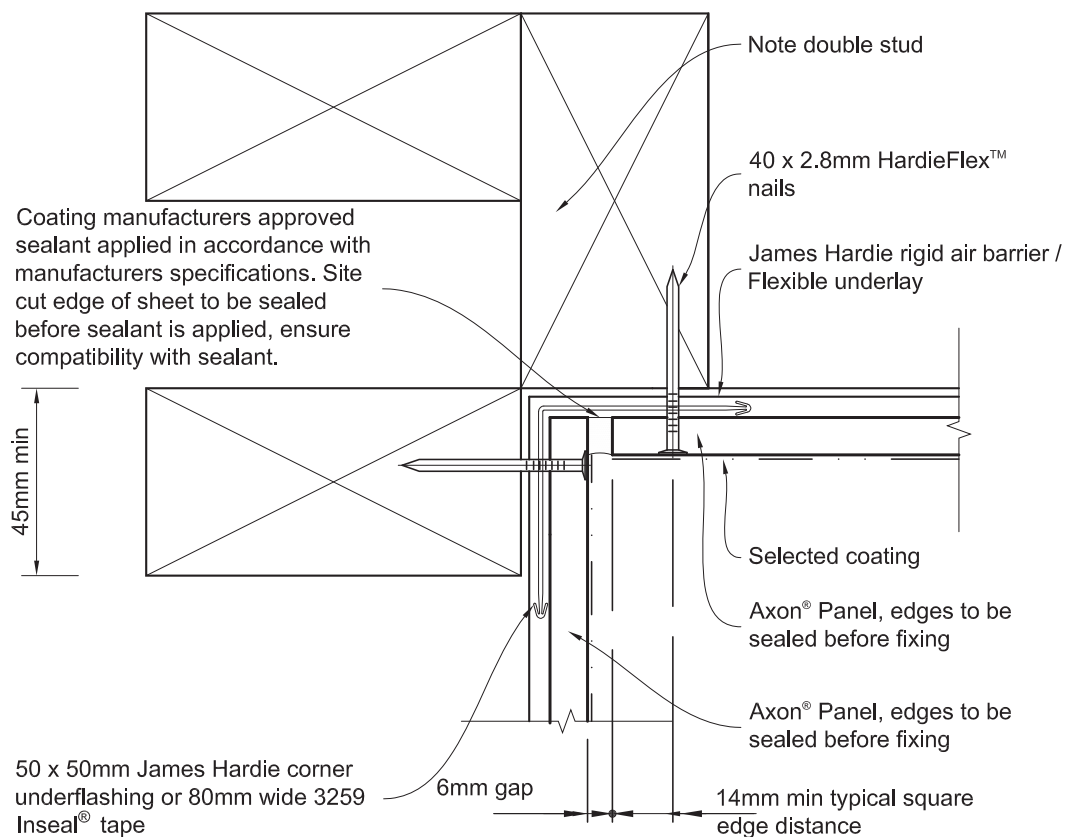


Figure 7: External corner detail

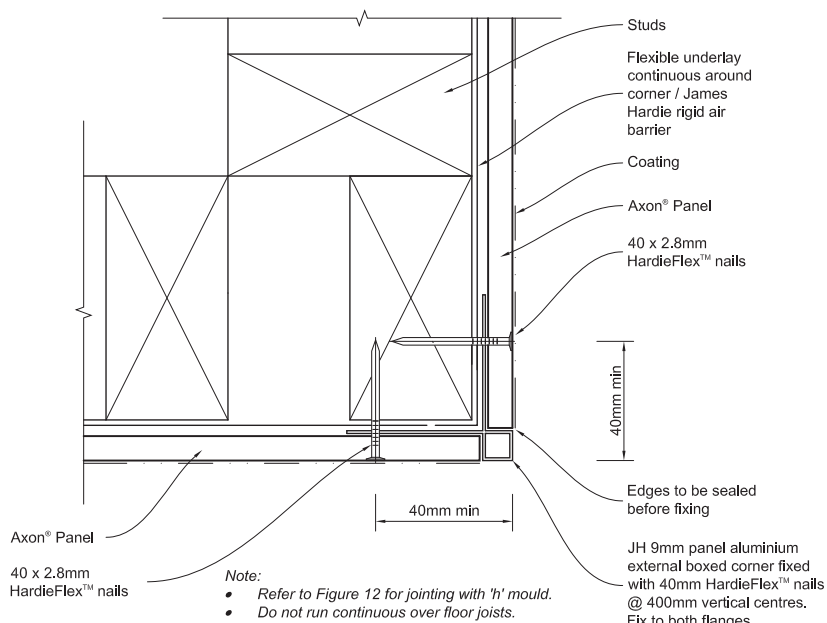
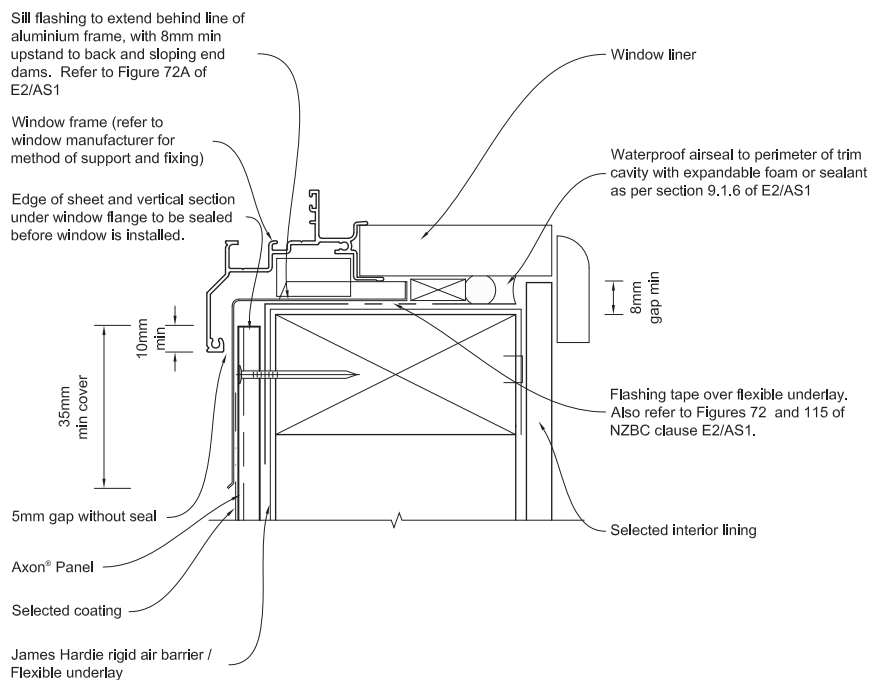


Figure 8: Section at sill



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

Figure 9: Window jamb

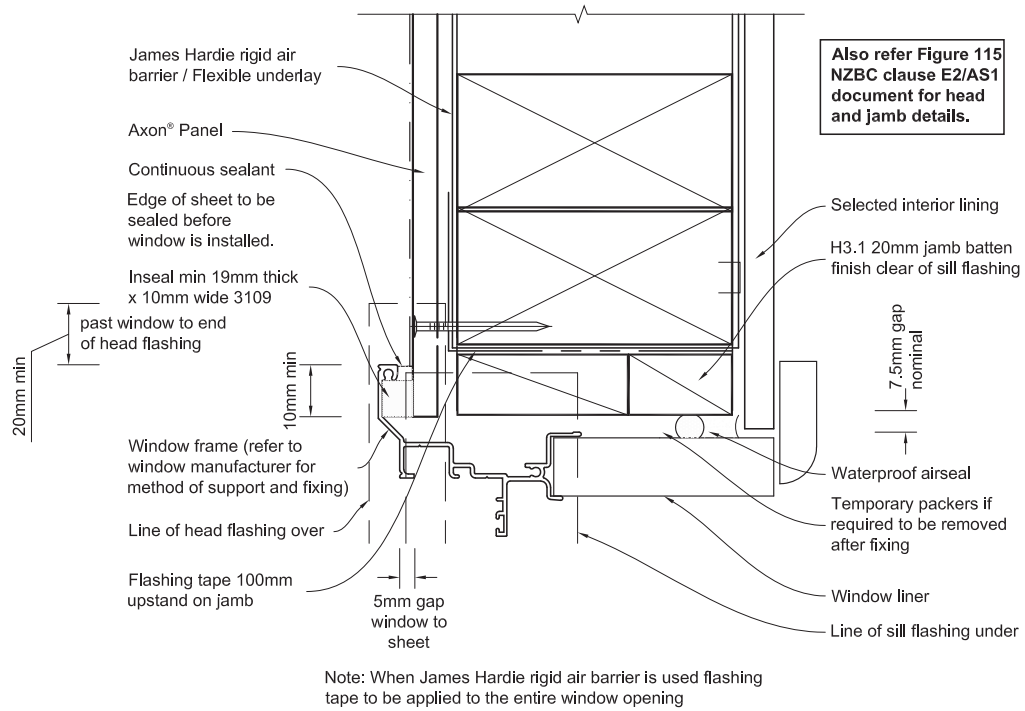


Figure 10: Window head

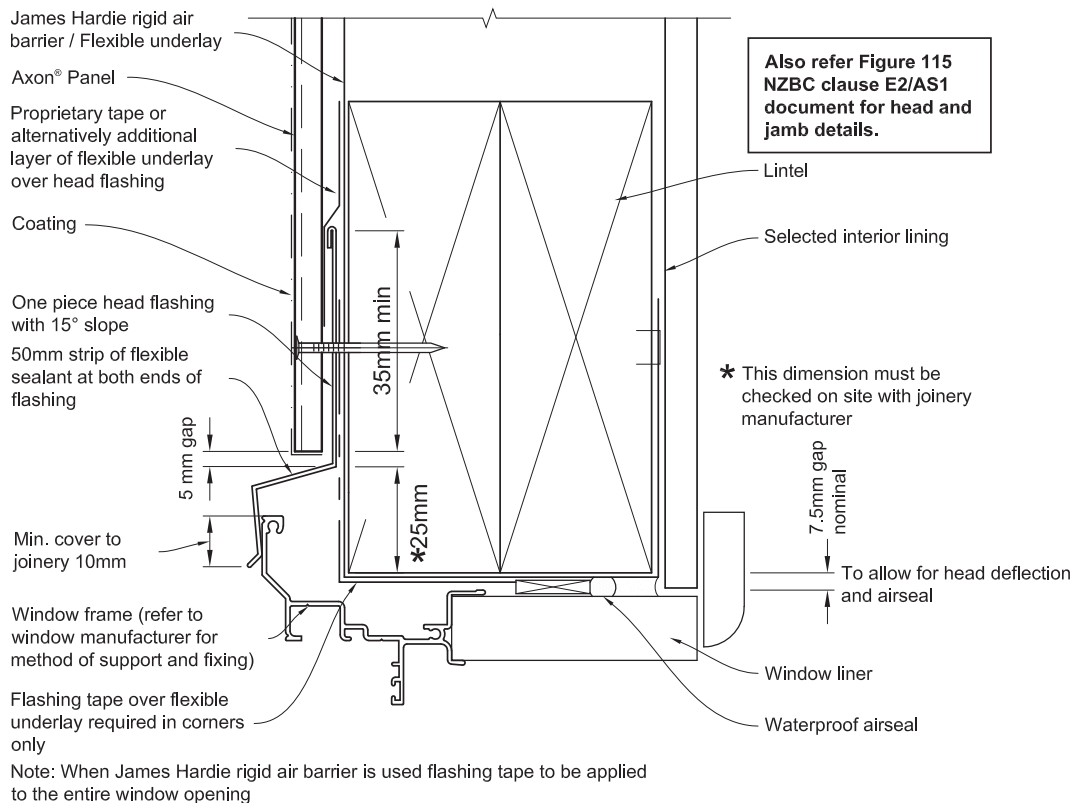


Figure 11: Horizontal joint detail

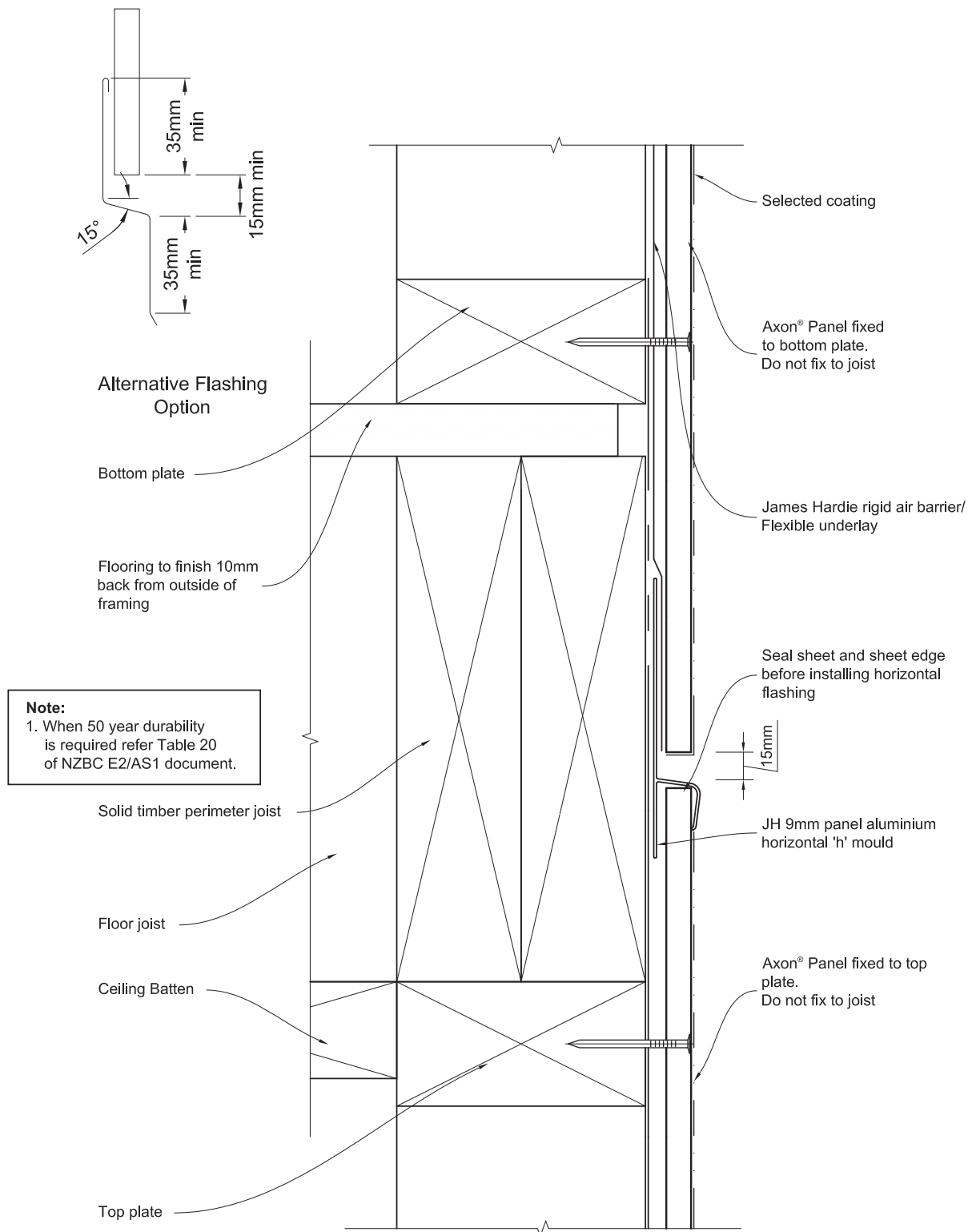


Figure 12: Corner at 'h' mould joint detail

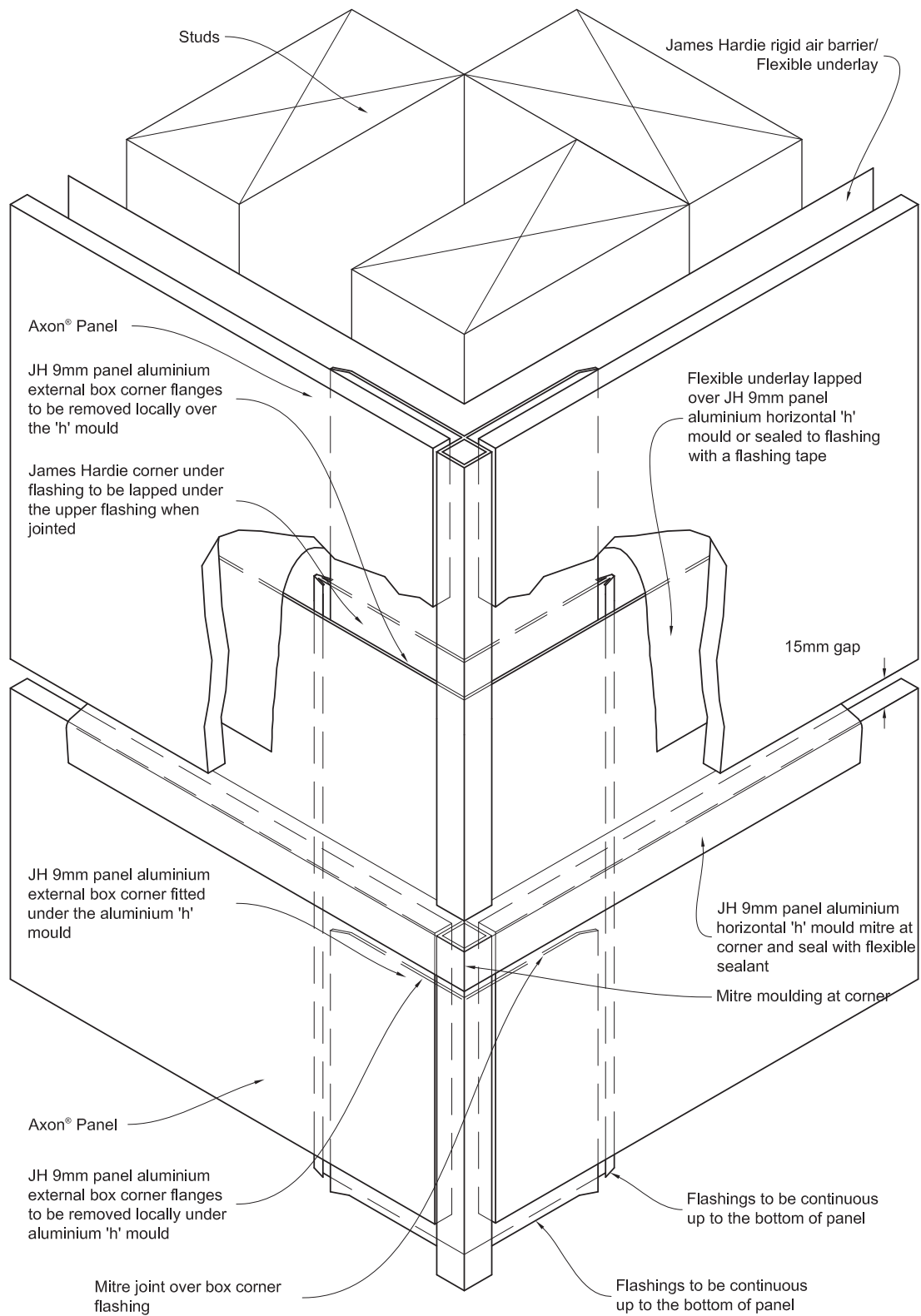


Figure 13: Direct fixed typical panel brad nail fixing setout

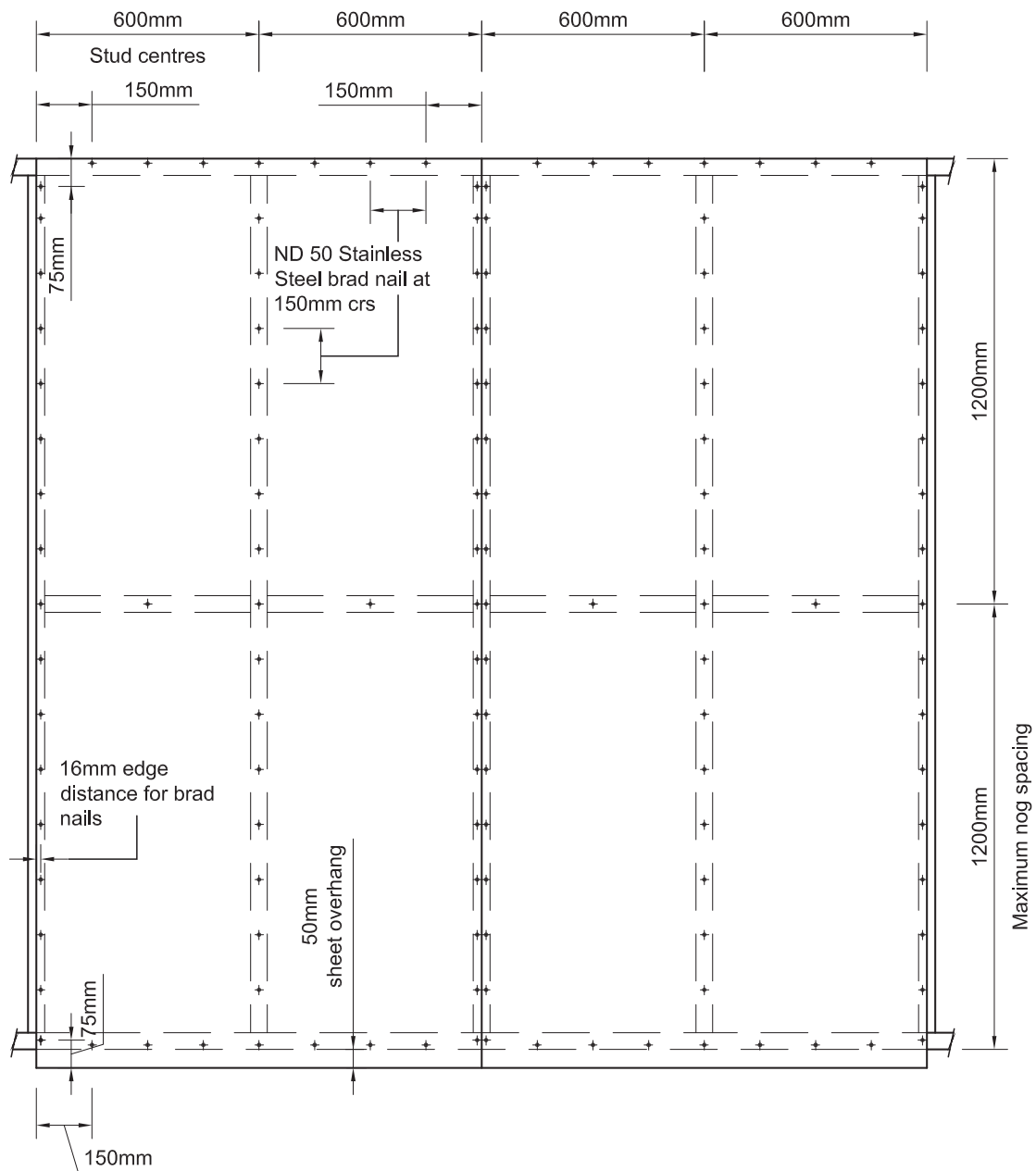


Figure 14: Shiplap joint — brad nail

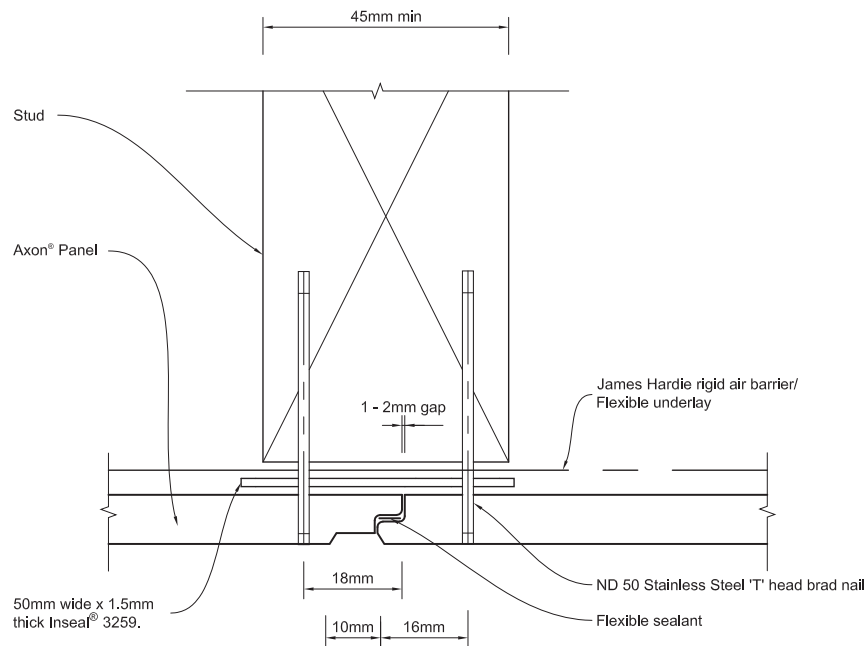


Figure 15: Framing setout

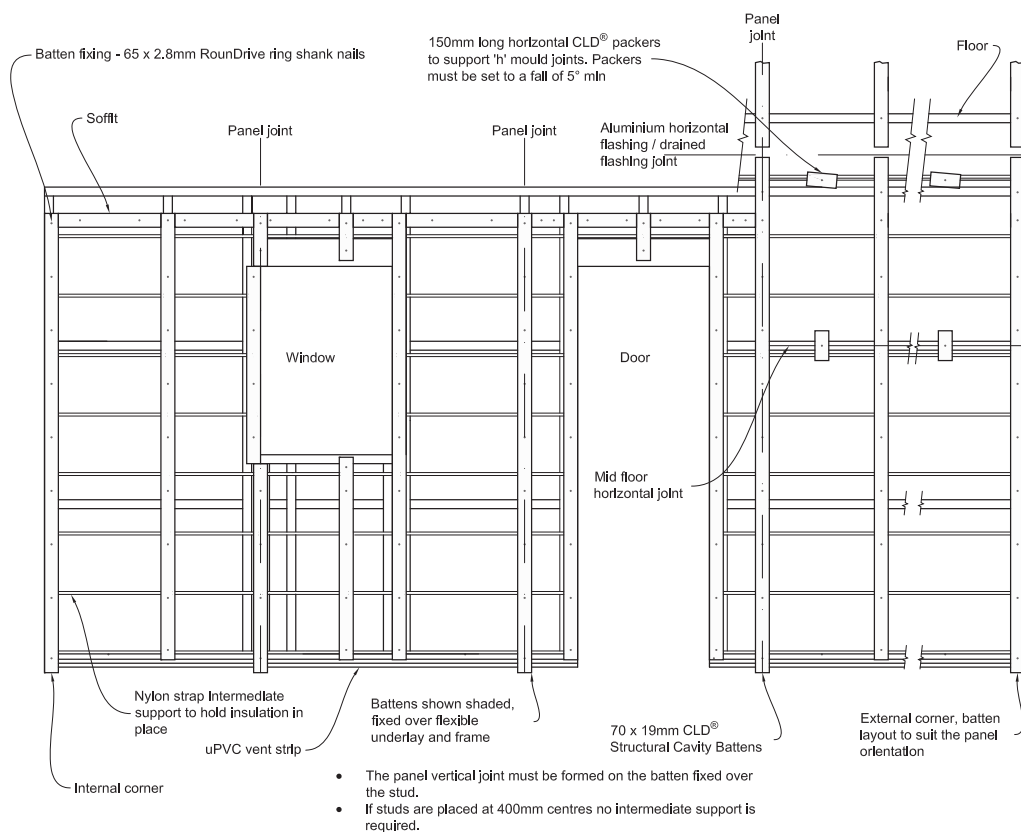


Figure 16: Batten fixing setout

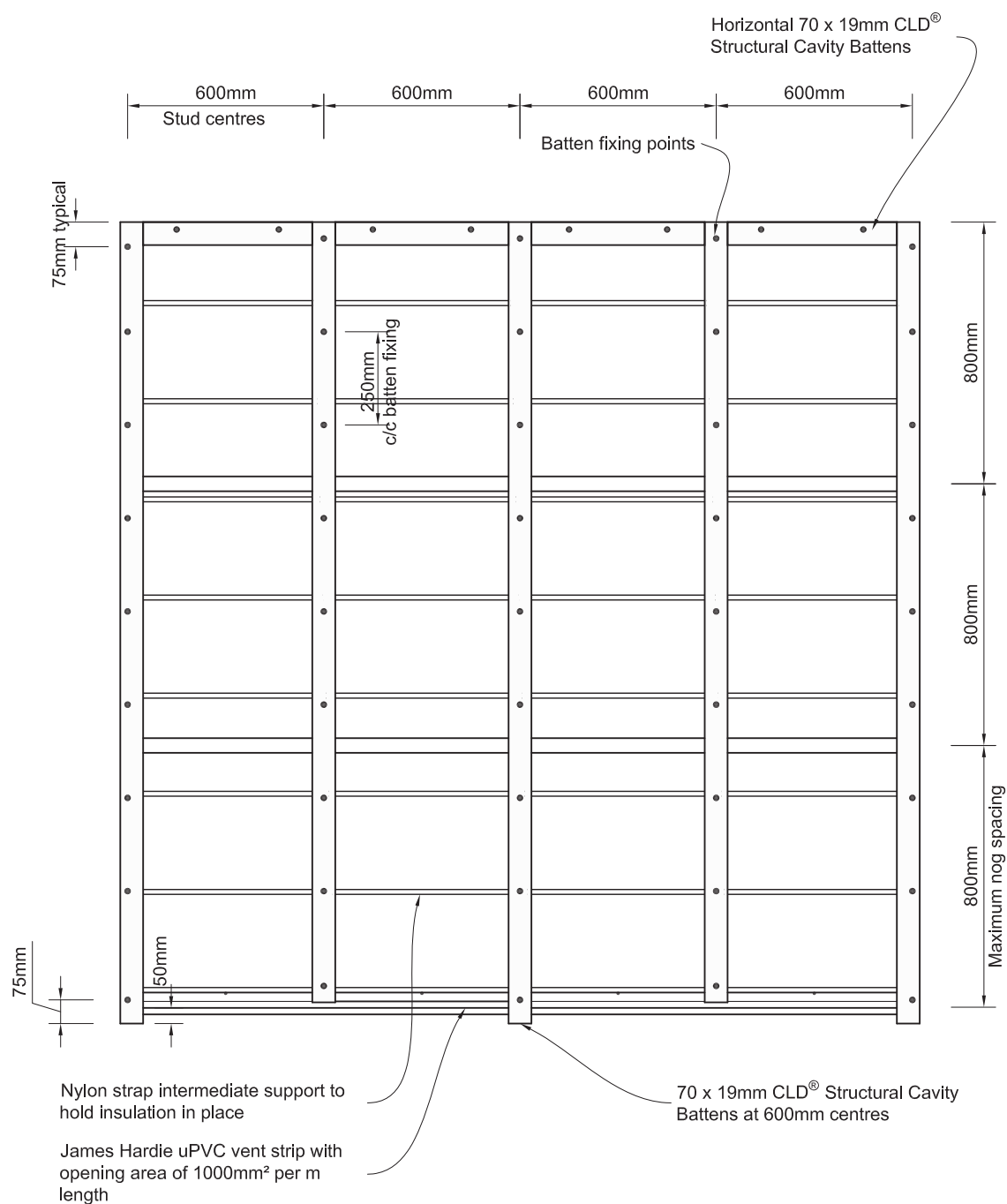
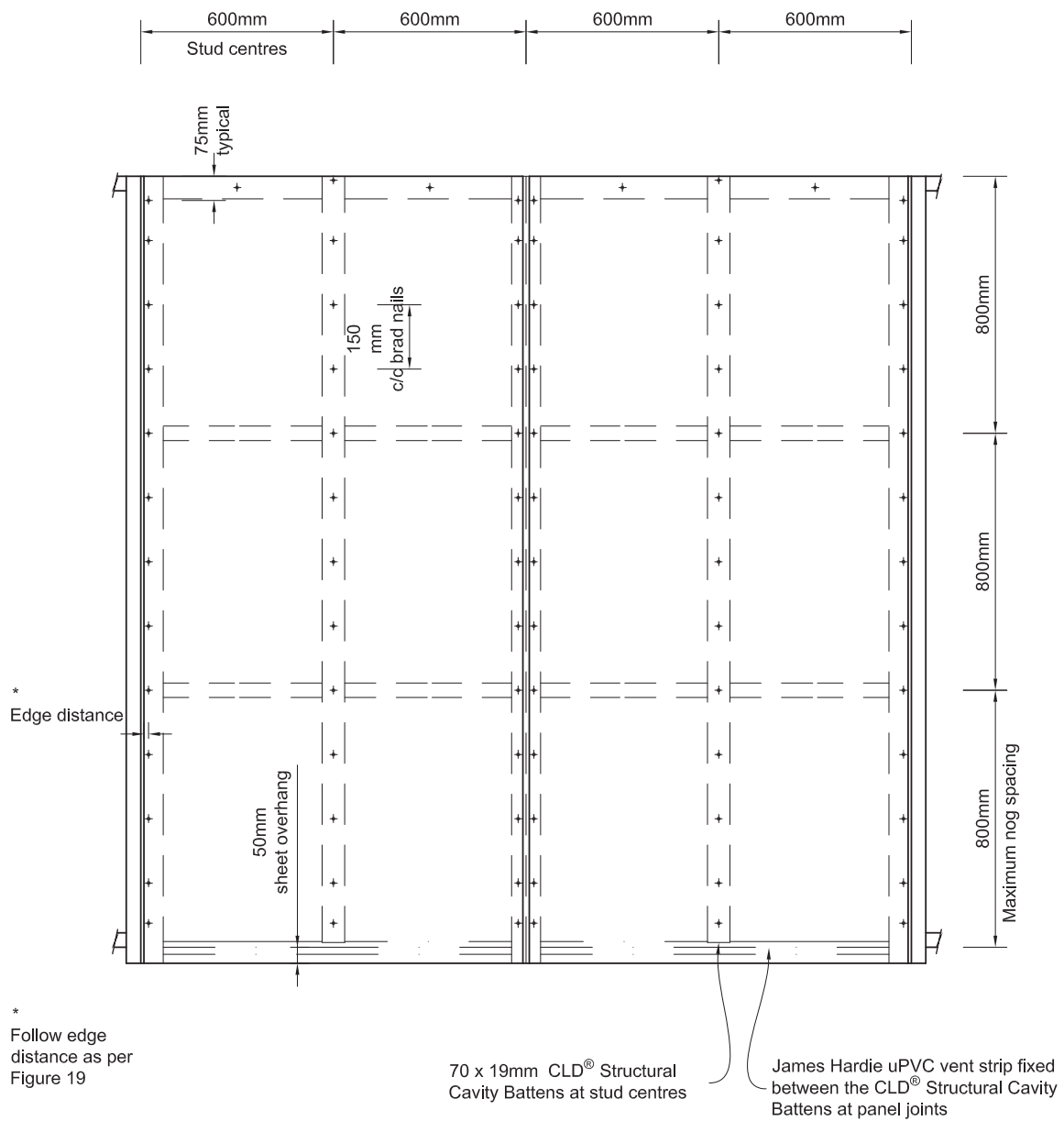
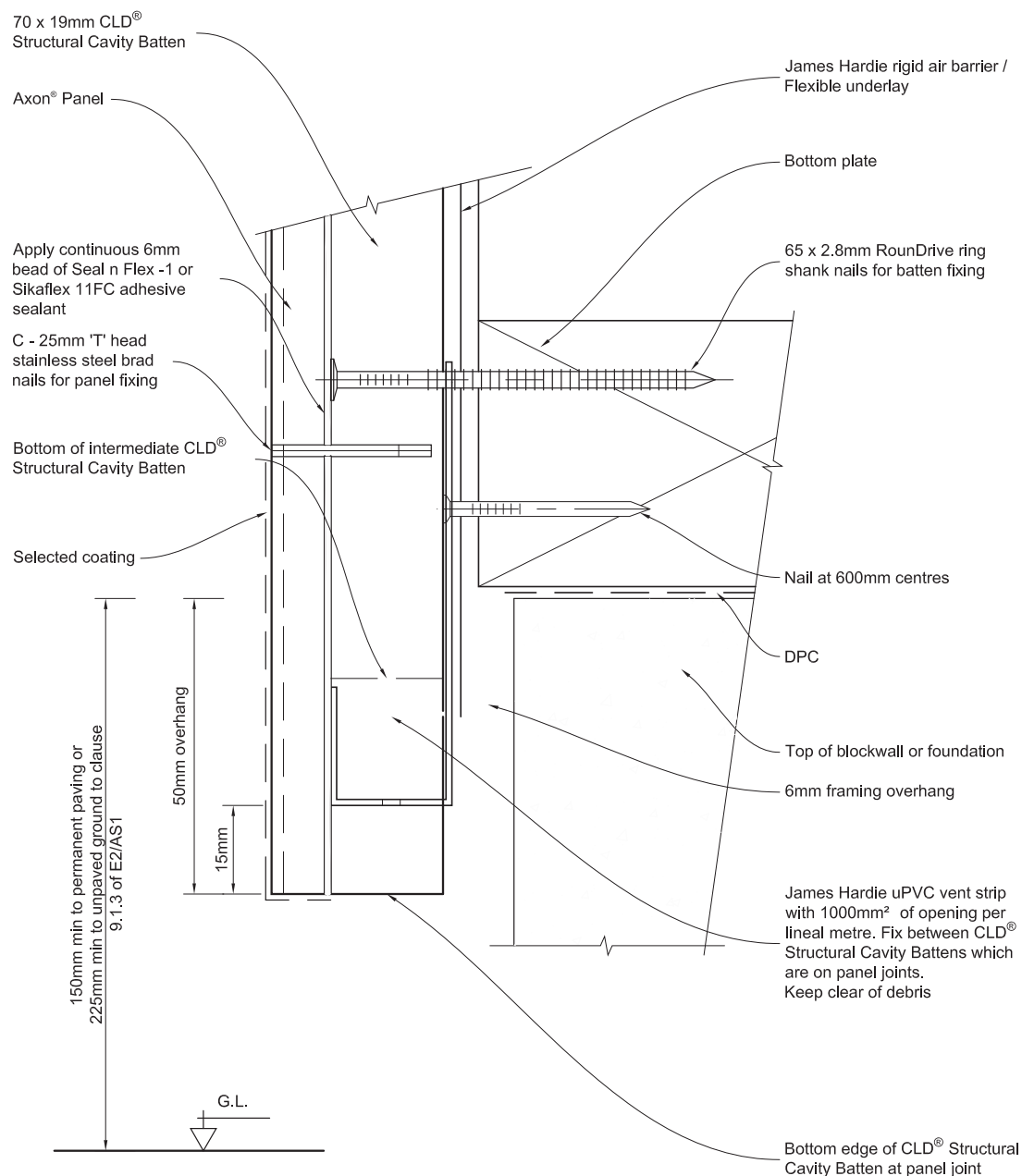


Figure 17: Sheet fixing setout



Note: When studs spaced at 400mm centres using Axon® Panel 400, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.

Figure 18: Foundation detail



Notes:

- Check panel extends past bottom plate as specified in Architects specification (50mm min).
- uPVC Vent strip must remain level and secure during construction. Cut and fix uPVC vent strip between CLD[®] Structural Cavity Battens fixed under the panel joints.
- Check vent strip is free from site debris.

Figure 19: Vertical shiplap joint

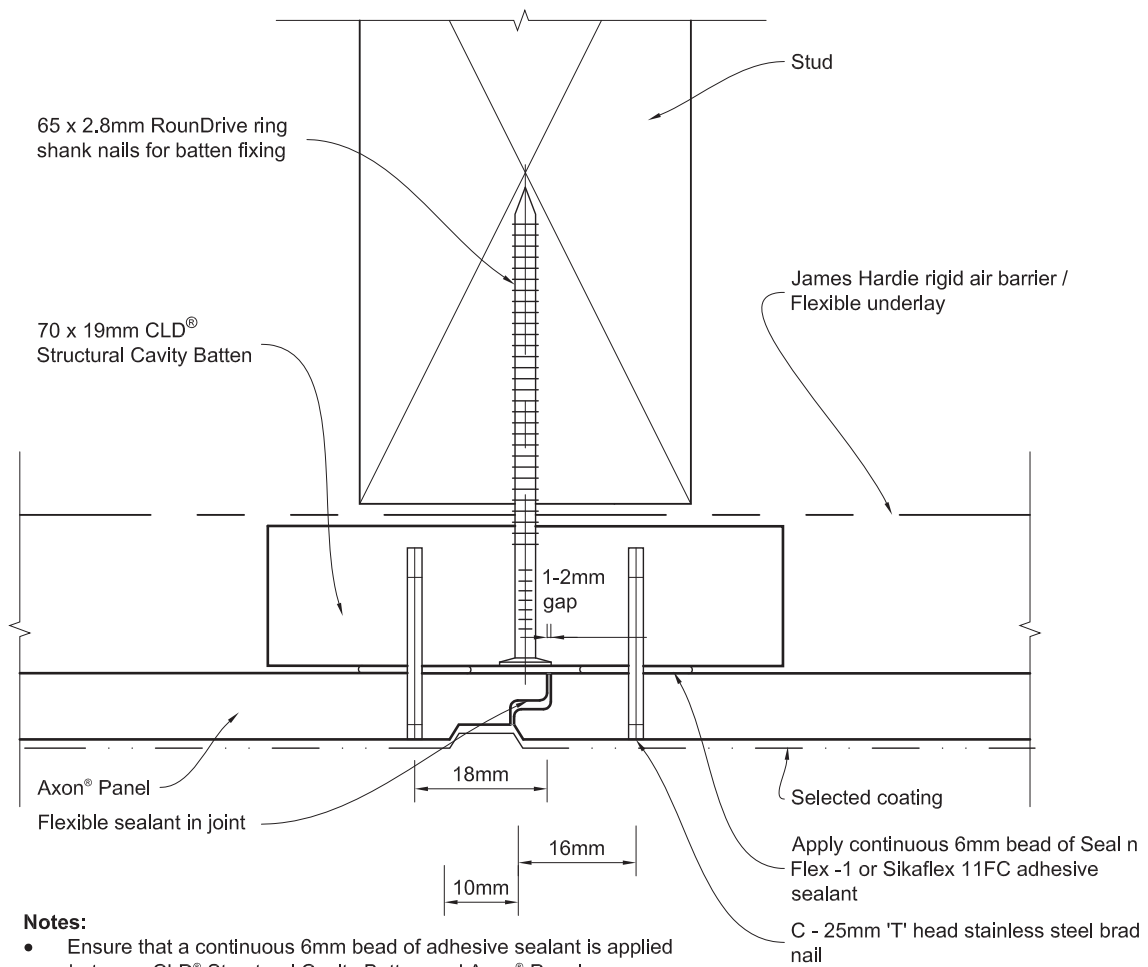


Figure 20: Intermediate stud fixing

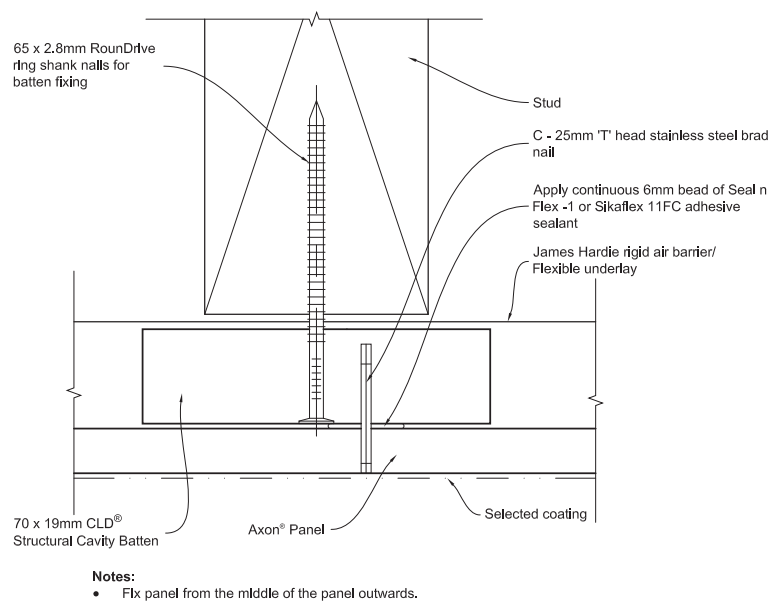


Figure 21: Internal corner

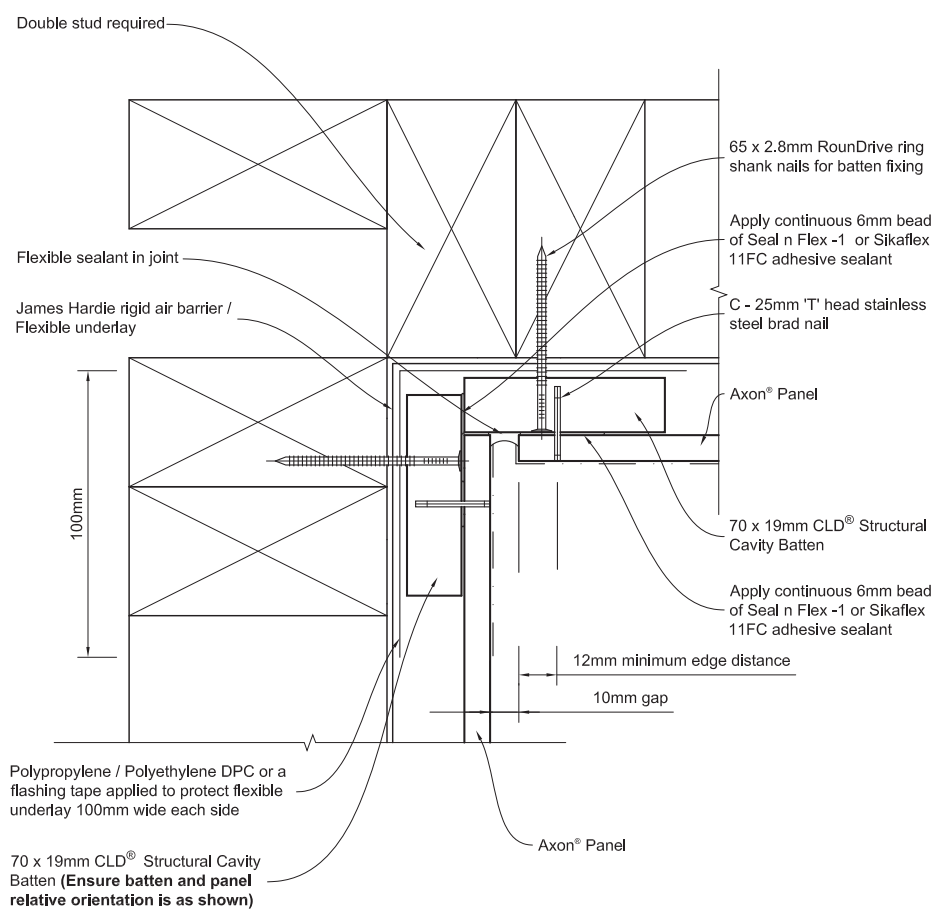


Figure 22: External corner

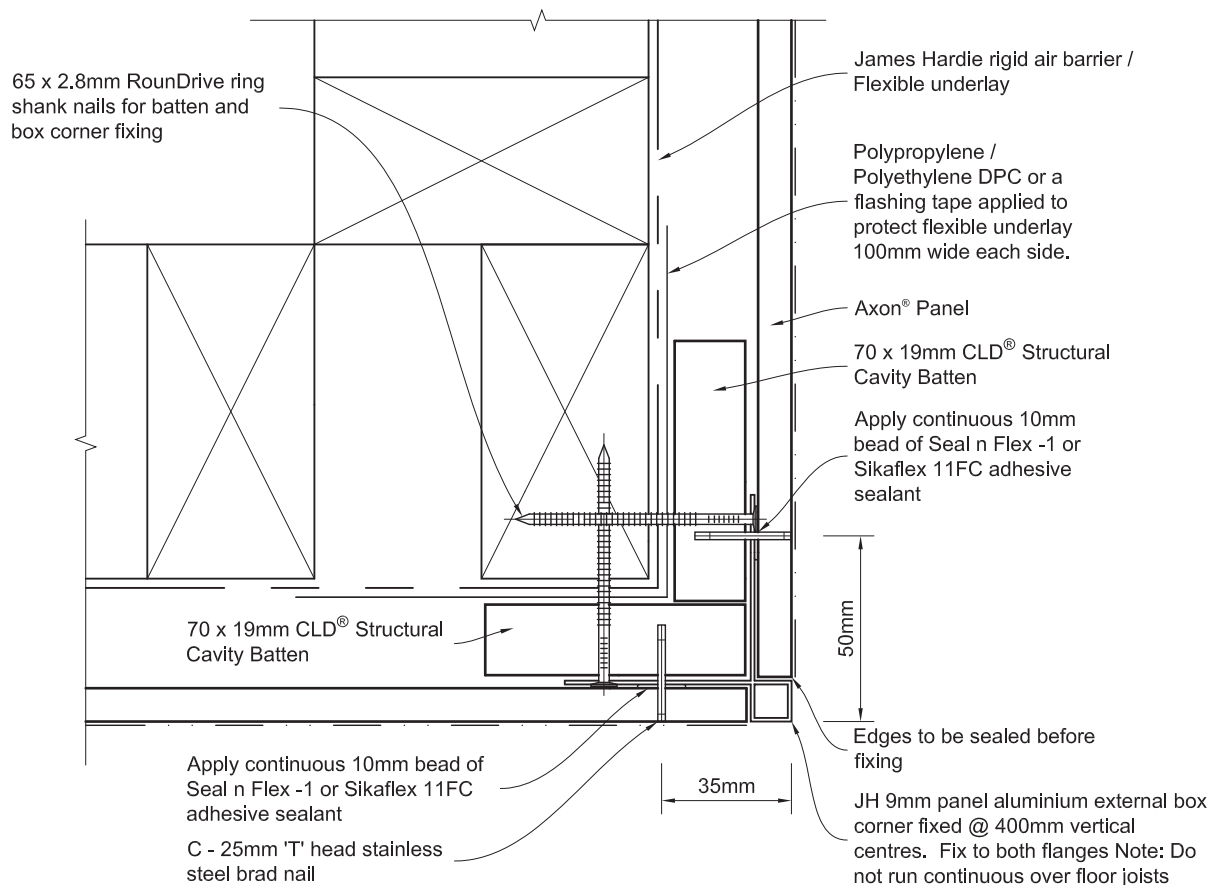


Figure 23: Jointing of CLD Structural Cavity Batten

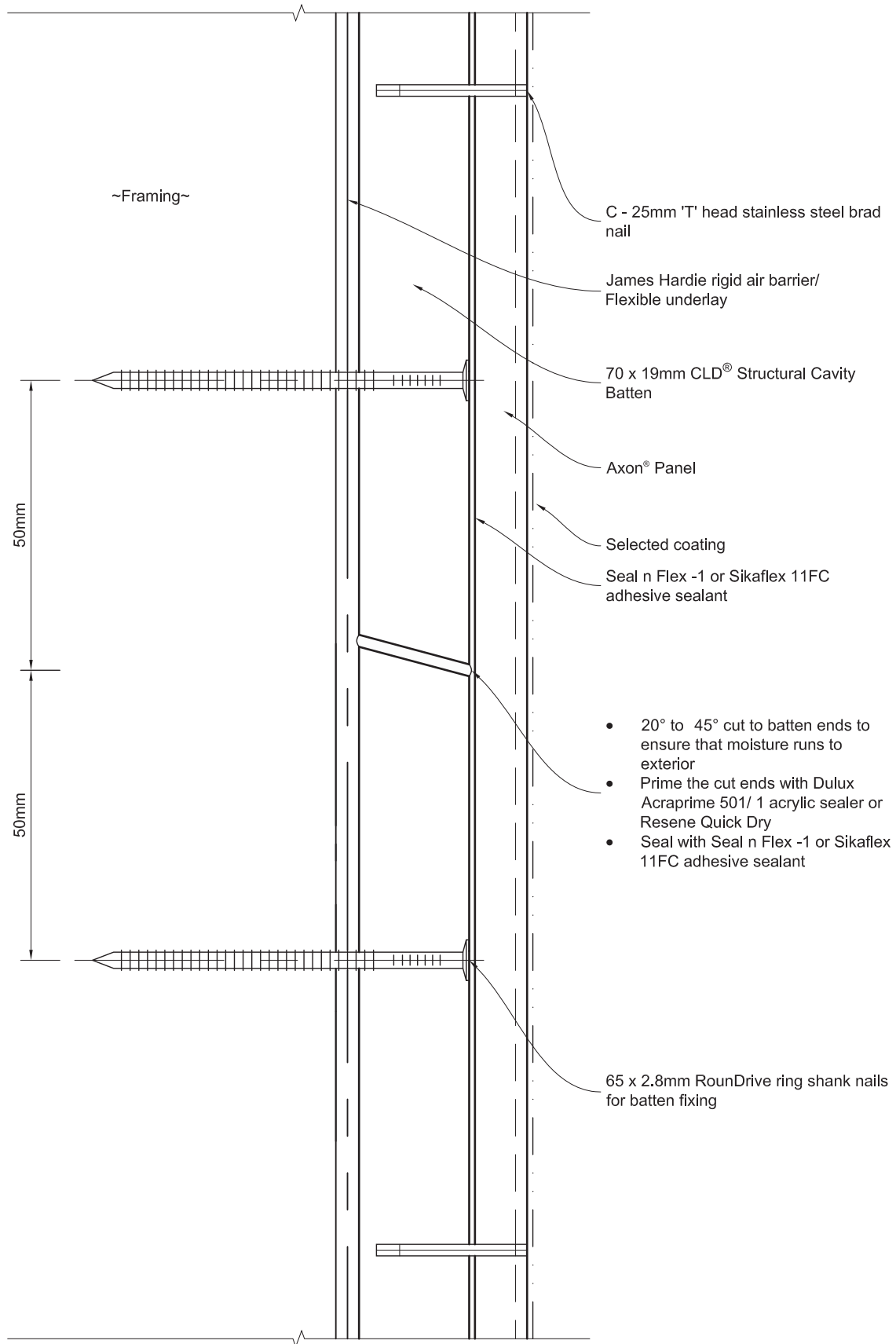
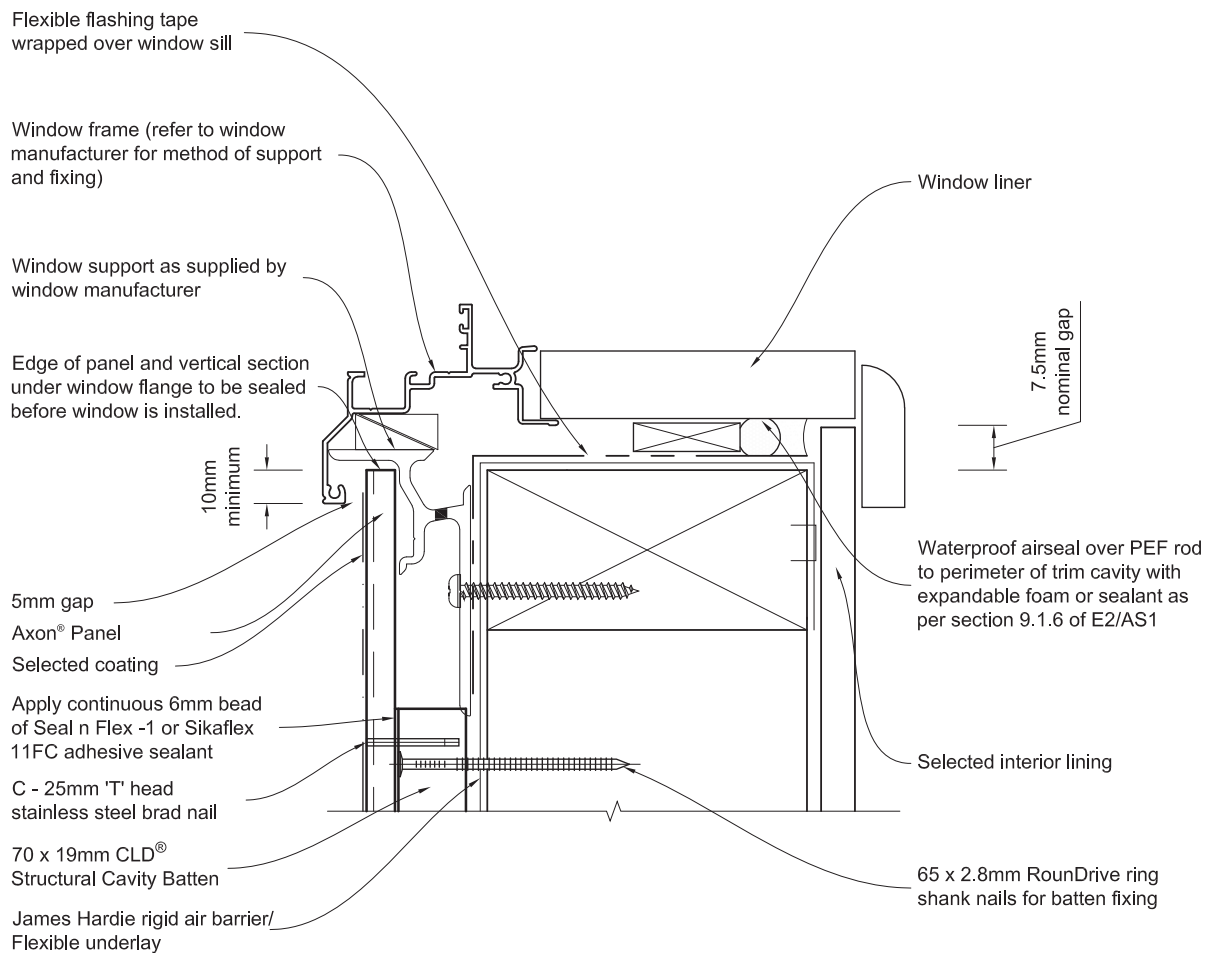


Figure 24: Window sill



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

Figure 25: Window jamb

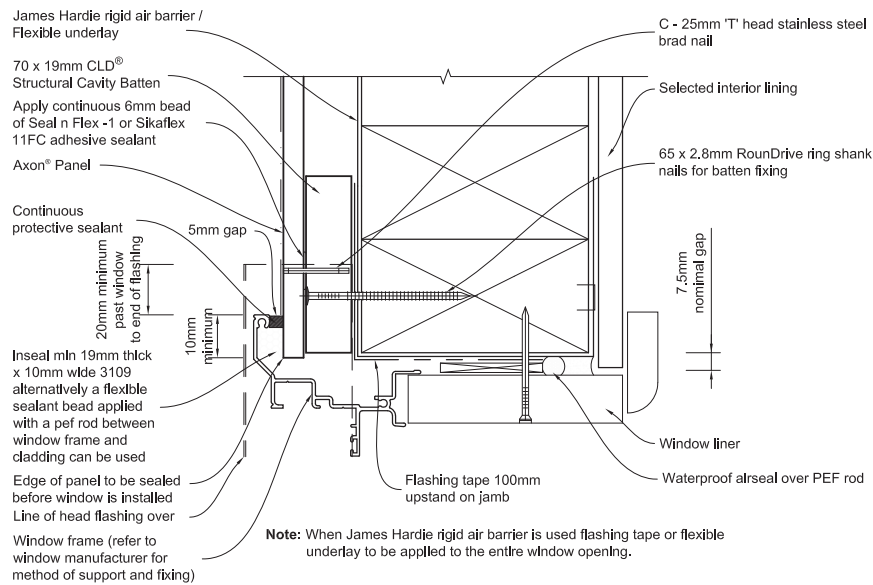


Figure 26: Window head

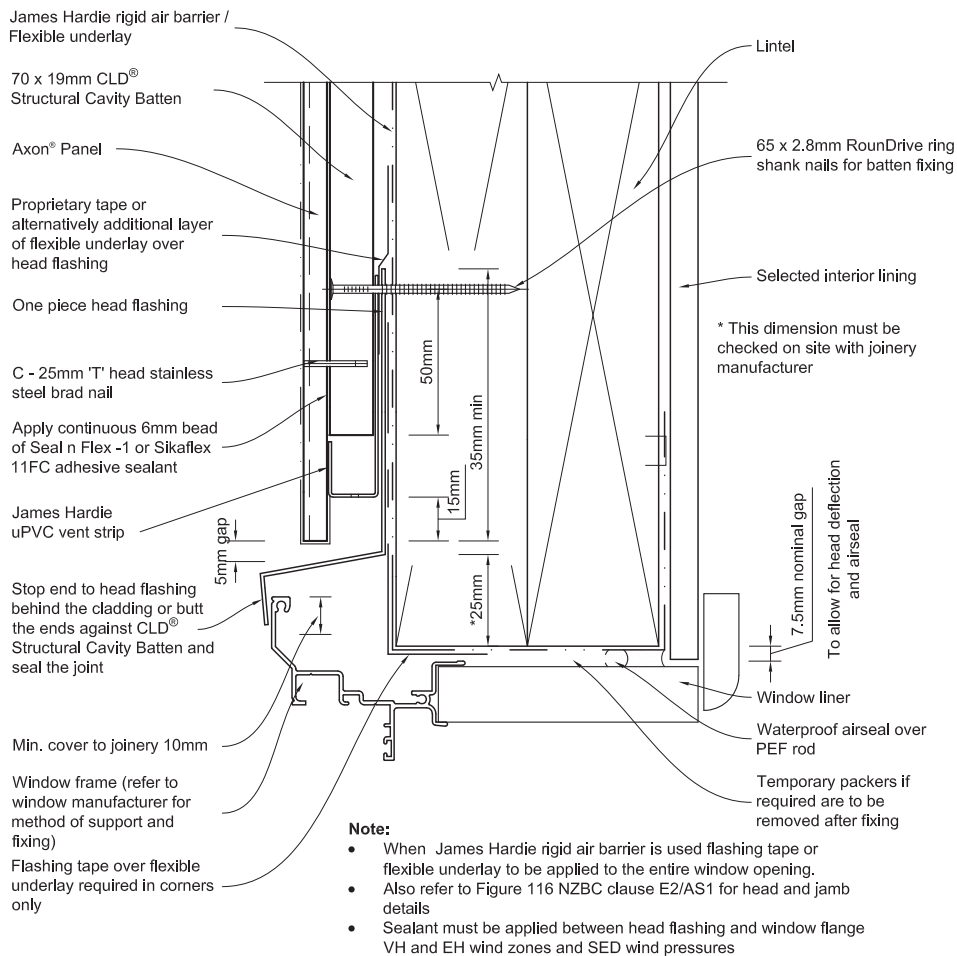


Figure 27: Window head with facings

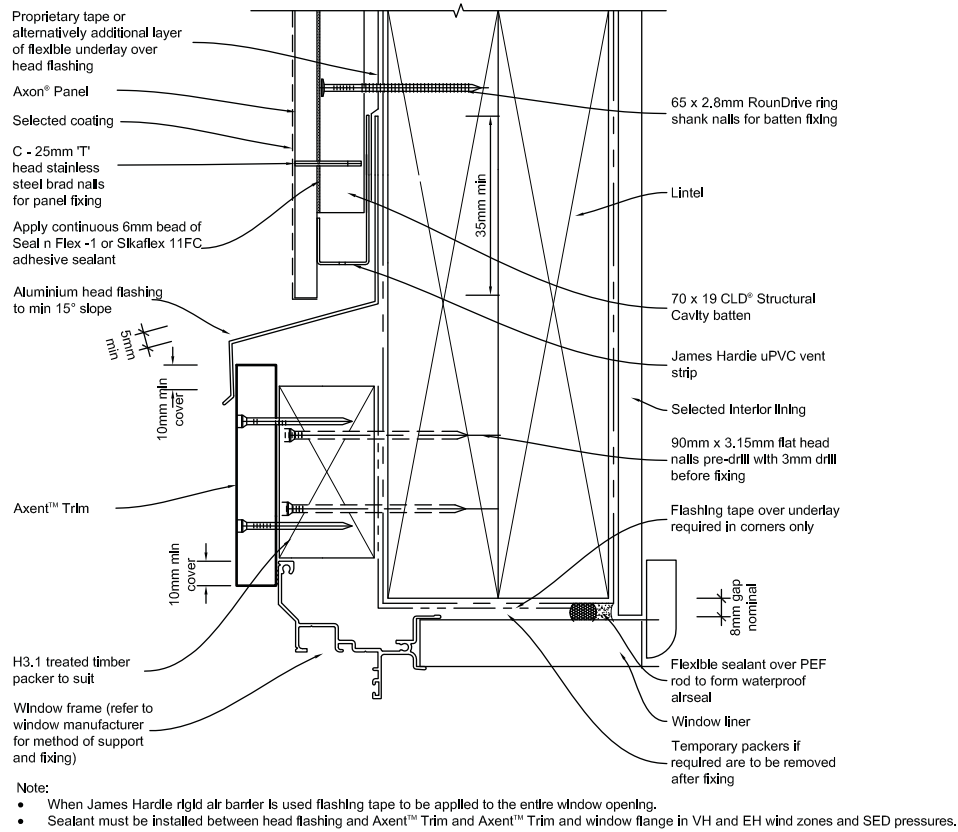


Figure 28: Window jamb with facings

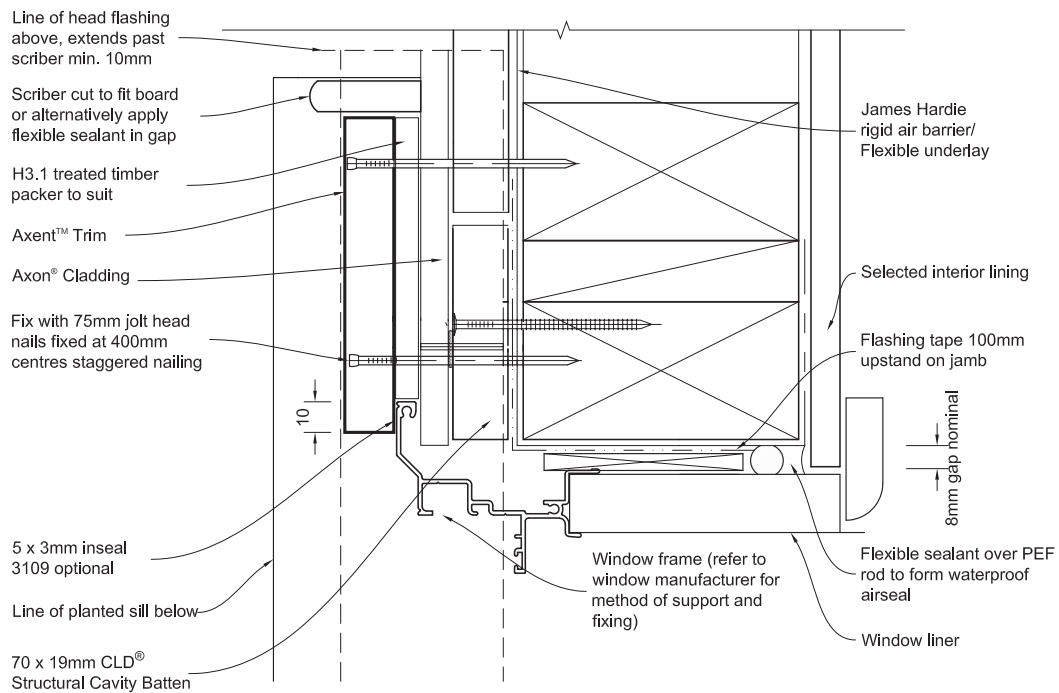
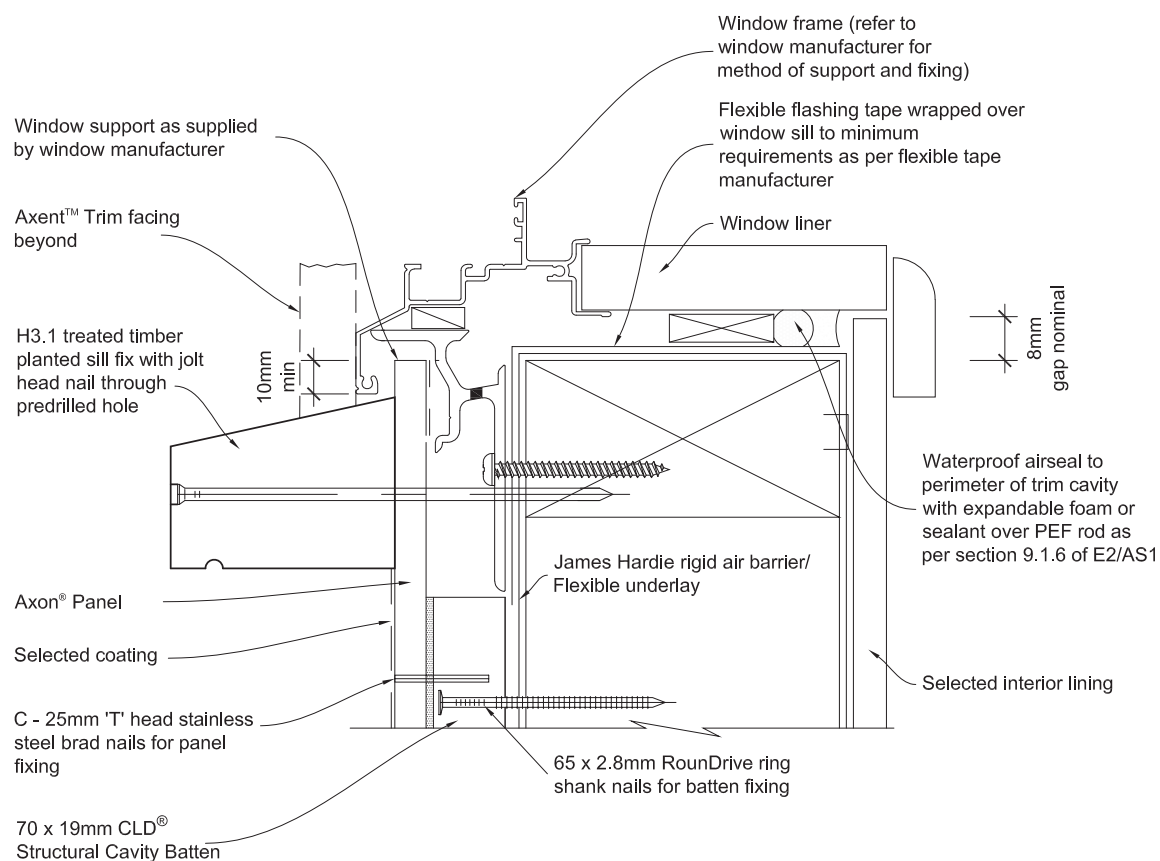


Figure 29: Window sill with planted sill



General notes for materials selection

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS1.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.
4. When James Hardie rigid air barriers are used flashing tape to be applied to the entire opening.

Refer to the manufacturer or supplier for technical information for these materials.

Figure 30: Horizontal joint at floor joist

Seal n Flex -1 or Sikaflex
11FC adhesive sealant
between panel and batten
omitted for clarity

James Hardie rigid air barrier /
Flexible underlay

70 x 19mm CLD® Structural
Cavity Batten

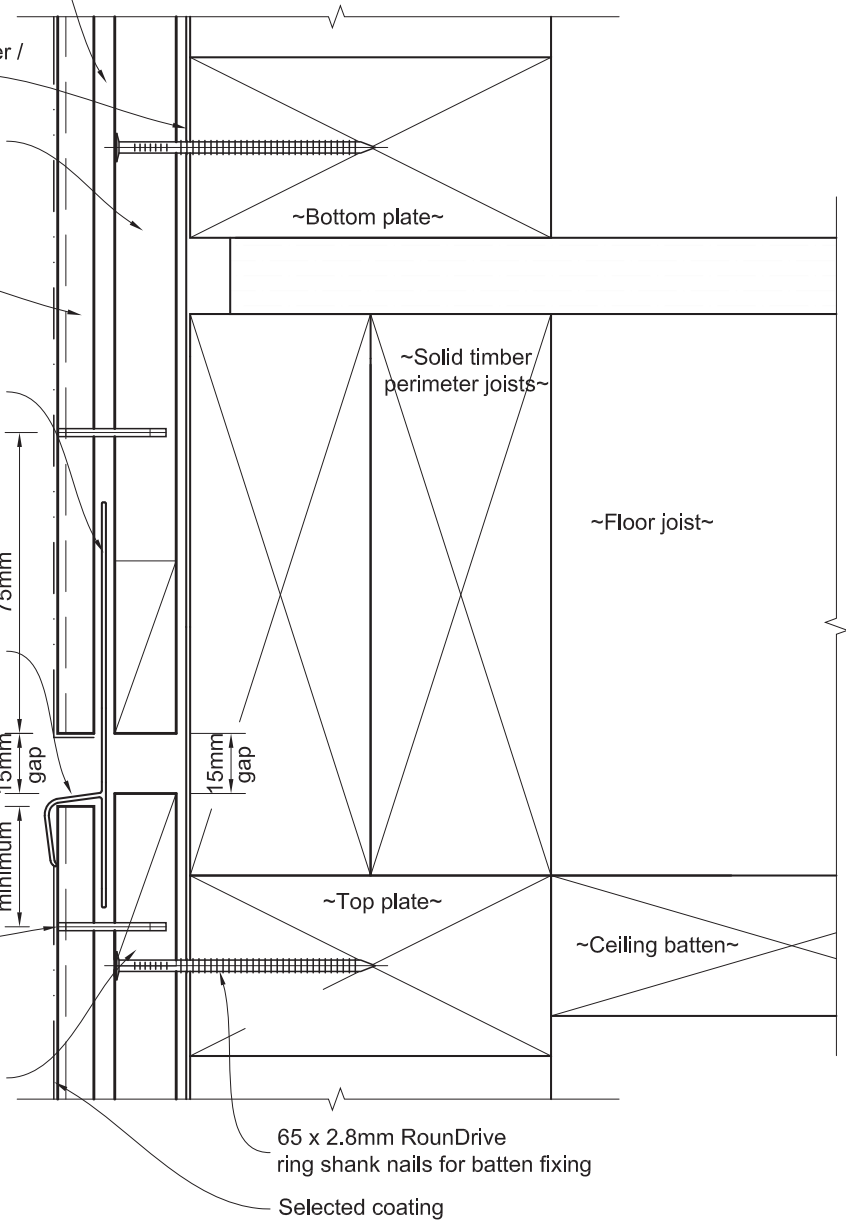
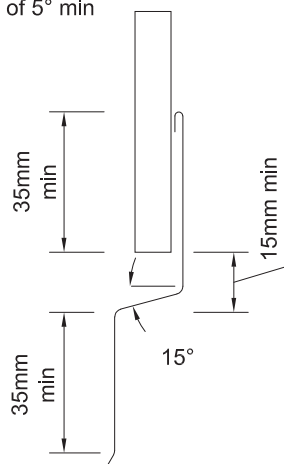
Axon® Panel

JH 9mm panel aluminium
horizontal 'h' mould.

Seal sheet and sheet edge
before installing horizontal
flashing

C - 25mm 'T' head
stainless steel brad nail

150mm long horizontal
CLD® packers optional
between vertical battens
when battens are fixed over
studs at 600mm apart.
Packers must be set to a fall
of 5° min



Alternative Flashing Option

Note:

1. When 50 year durability is required refer Table 20
of NZBC E2/AS1 document.

Figure 31: Horizontal joint in tall wall

Seal n Flex -1 or Sikaflex 11FC adhesive sealant between panel and batten omitted for clarity

James Hardie rigid air barrier / Flexible underlay

70 x 19mm CLD[®] Structural Cavity Batten

Axon[®] Panel

JH 9mm panel aluminium horizontal 'h' mould.

Seal sheet and sheet edge before installing horizontal flashing

10mm gap

C - 25mm 'T' head stainless steel brad nail

150mm long vertical CLD[®] packers optional between vertical battens when battens are fixed over studs at 600mm apart.

65 x 2.8mm RounDrive ring shank nails for batten fixing

Selected coating

Figure 32: Soffit detail

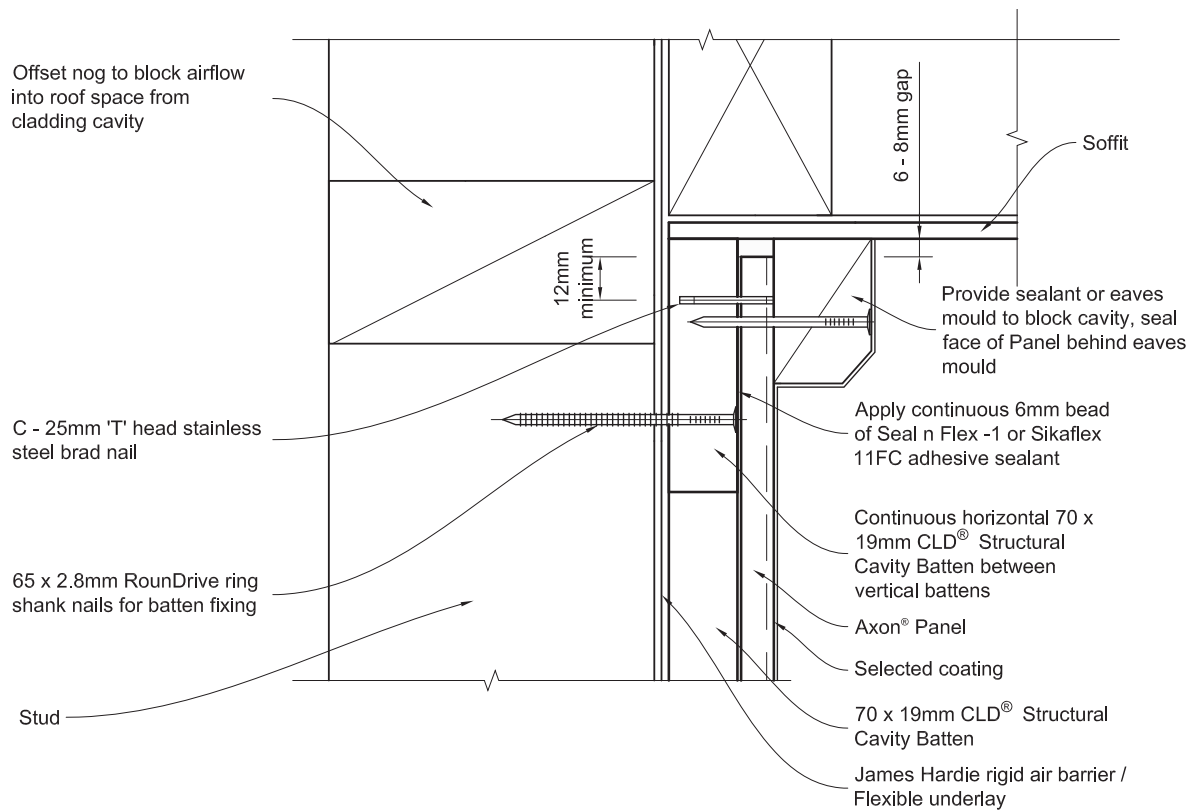


Figure 33: External corner at 'h' mould joint detail

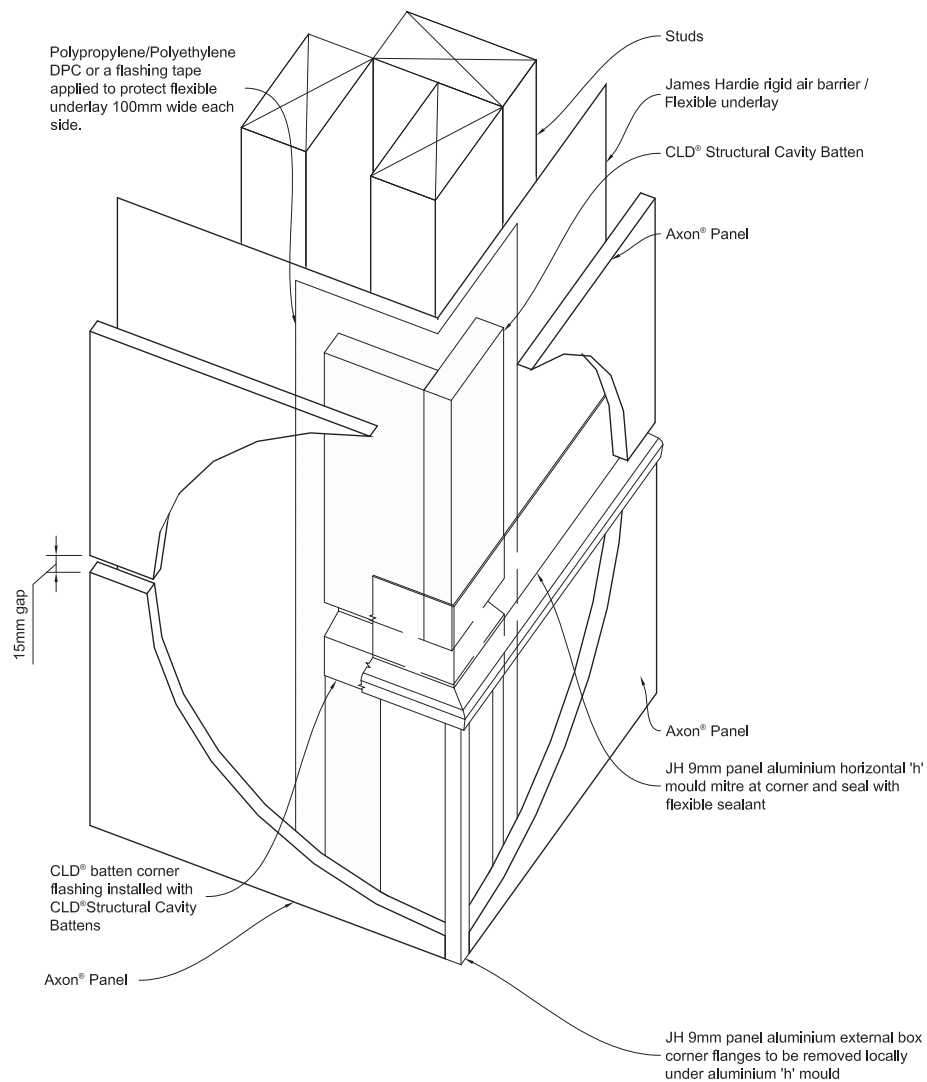


Figure 34: Cavity pipe penetration

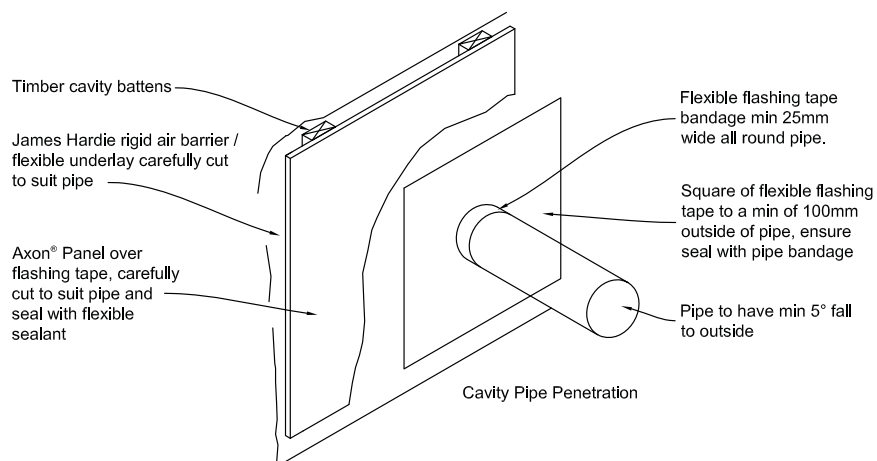


Figure 35: Internal corner at 'h' mould joint detail

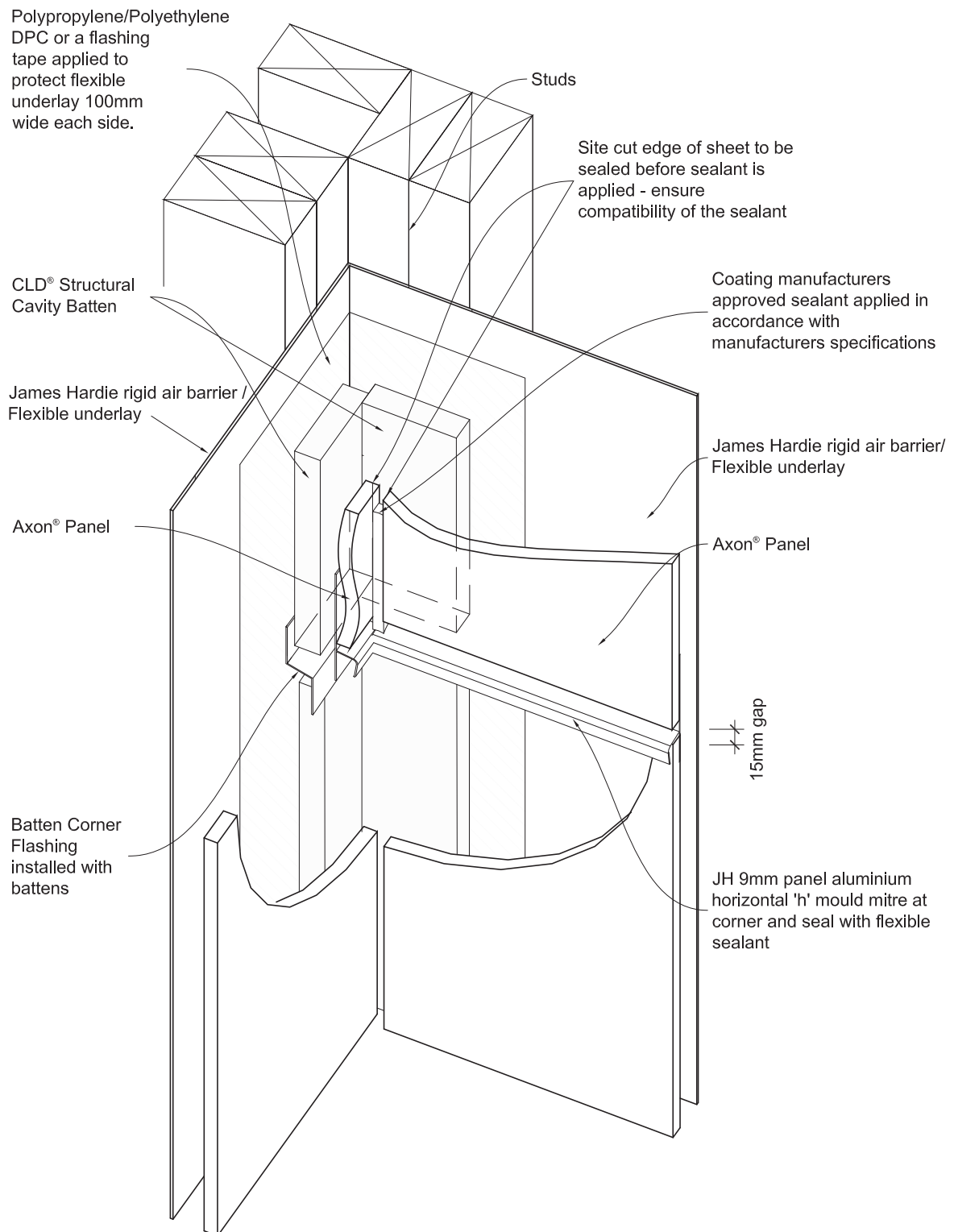


Figure 36: Aluminium 'h' mould joiner

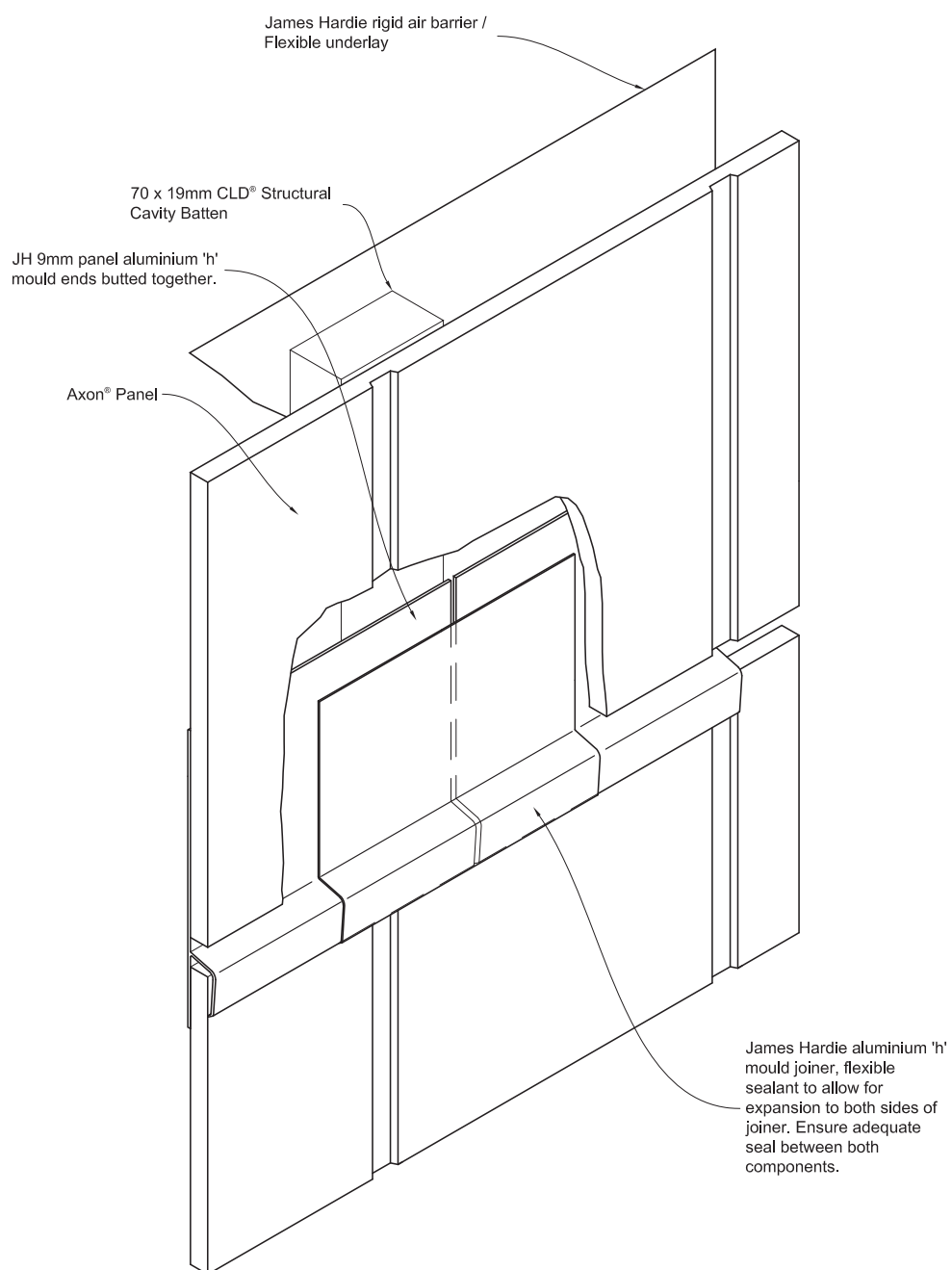
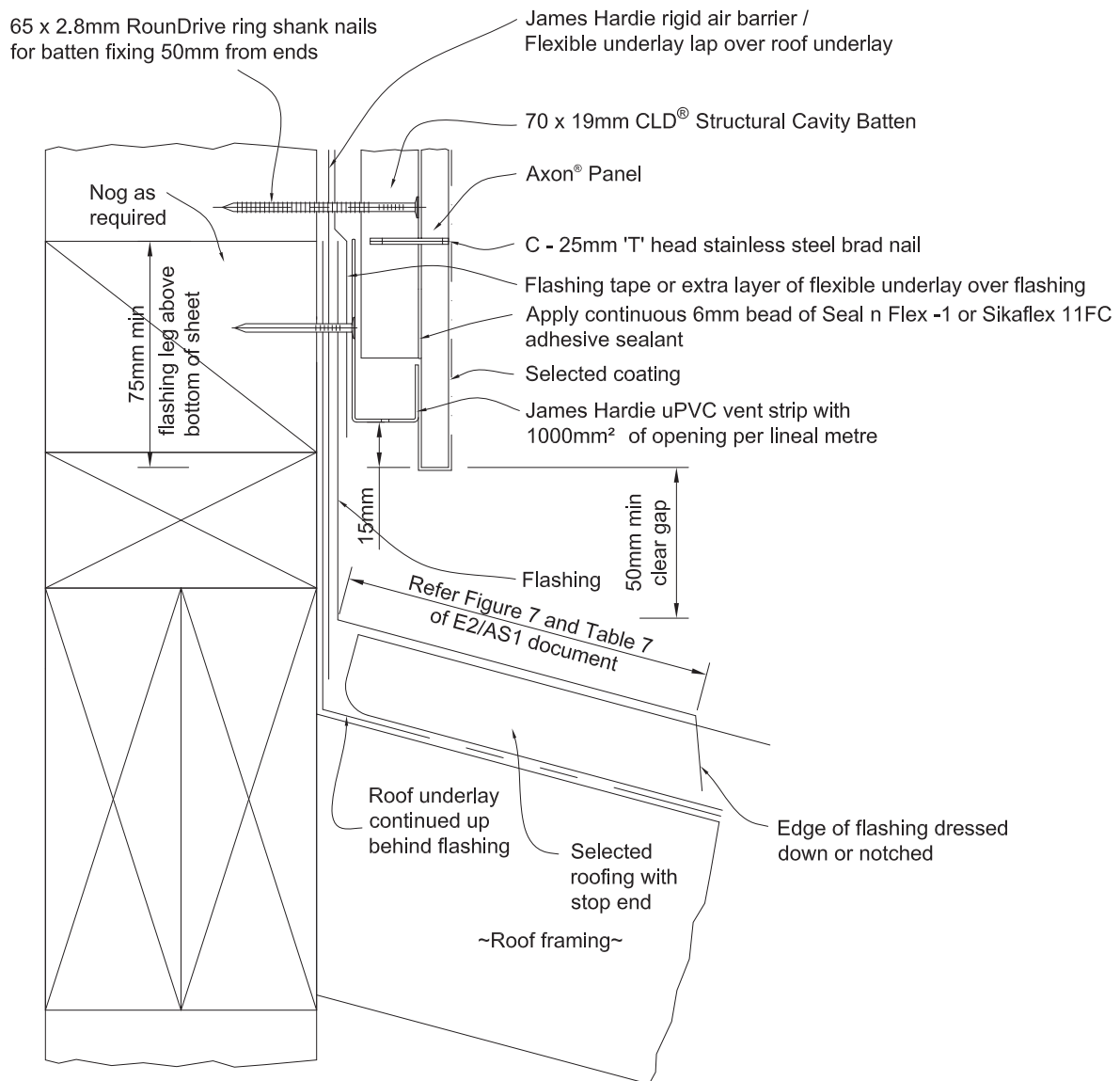
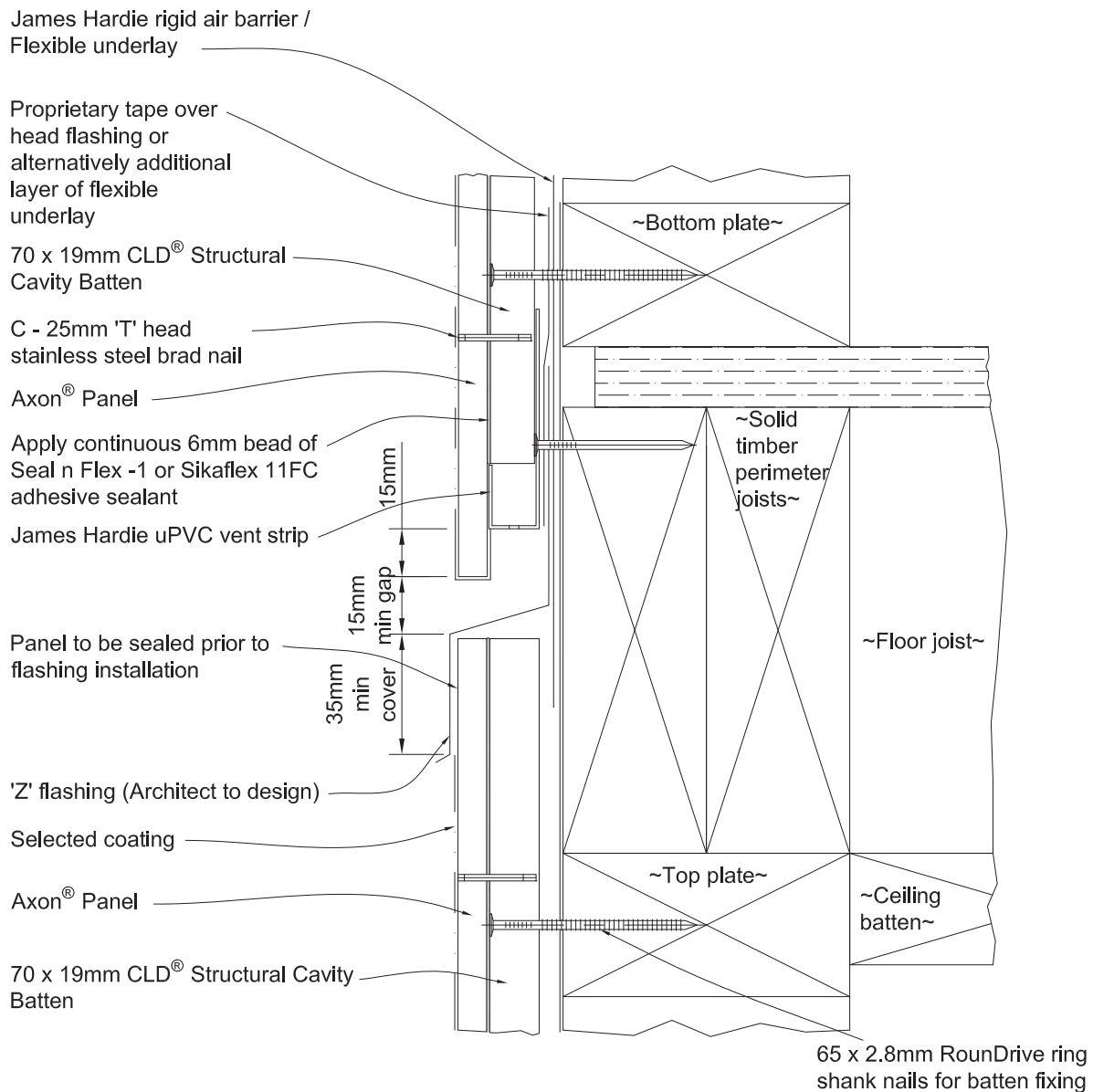


Figure 37: One piece apron flashing joint



When 50 year durability for flashing is required refer Table 20 NZBC E2/AS1 document.

Figure 38: Drained flashing joint at floor joist



Step 1

- Check Architect's plans for the type of flashing to be used.

Step 2

- Check fixing centres and edge distances.
- If top fixings are to be hidden by the Z flashing they will need to be fixed and sealed before the Z flashing is installed.
- Cut edges need to be primed with sealer.

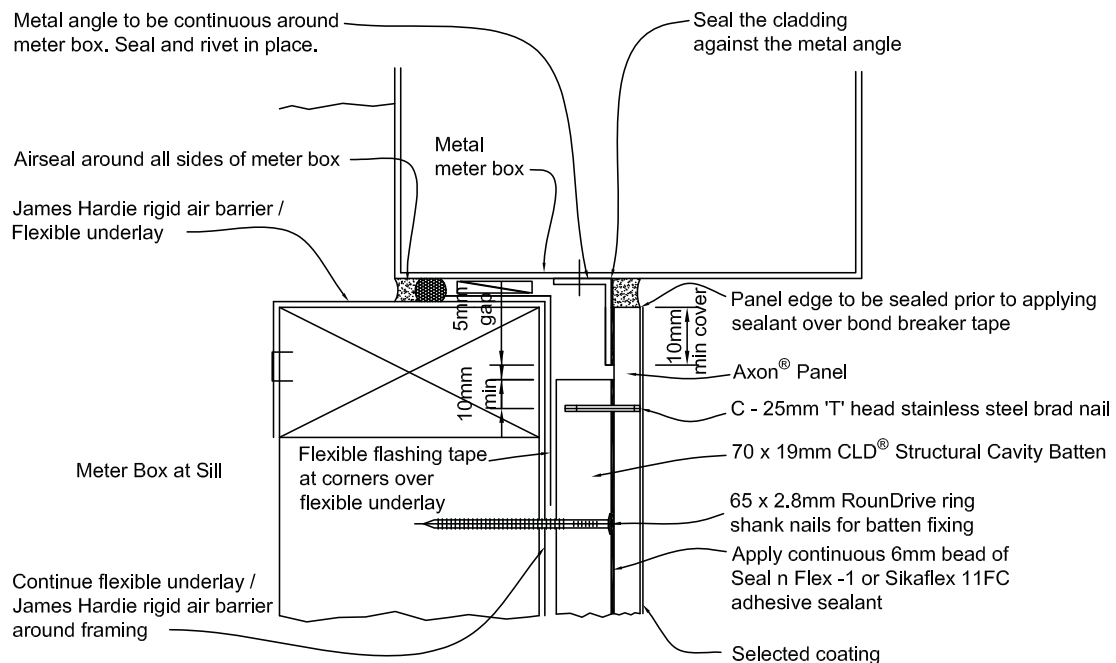
Step 3

- When 50 year durability is required refer Table 20 E2/AS1.

Step 4

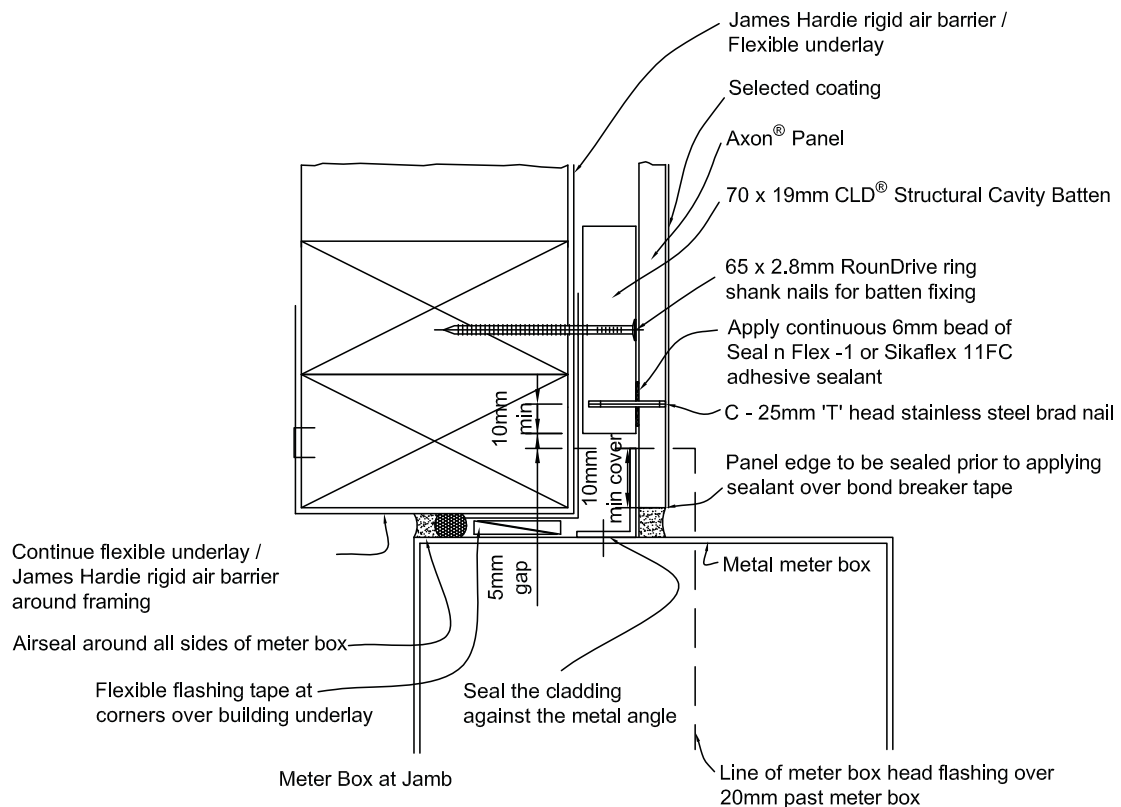
- The flashing to be placed in the centre of the floor joists. Do not fix CLD® Structural Cavity Battens or panels into floor joists.

Figure 39: Meter box at sill



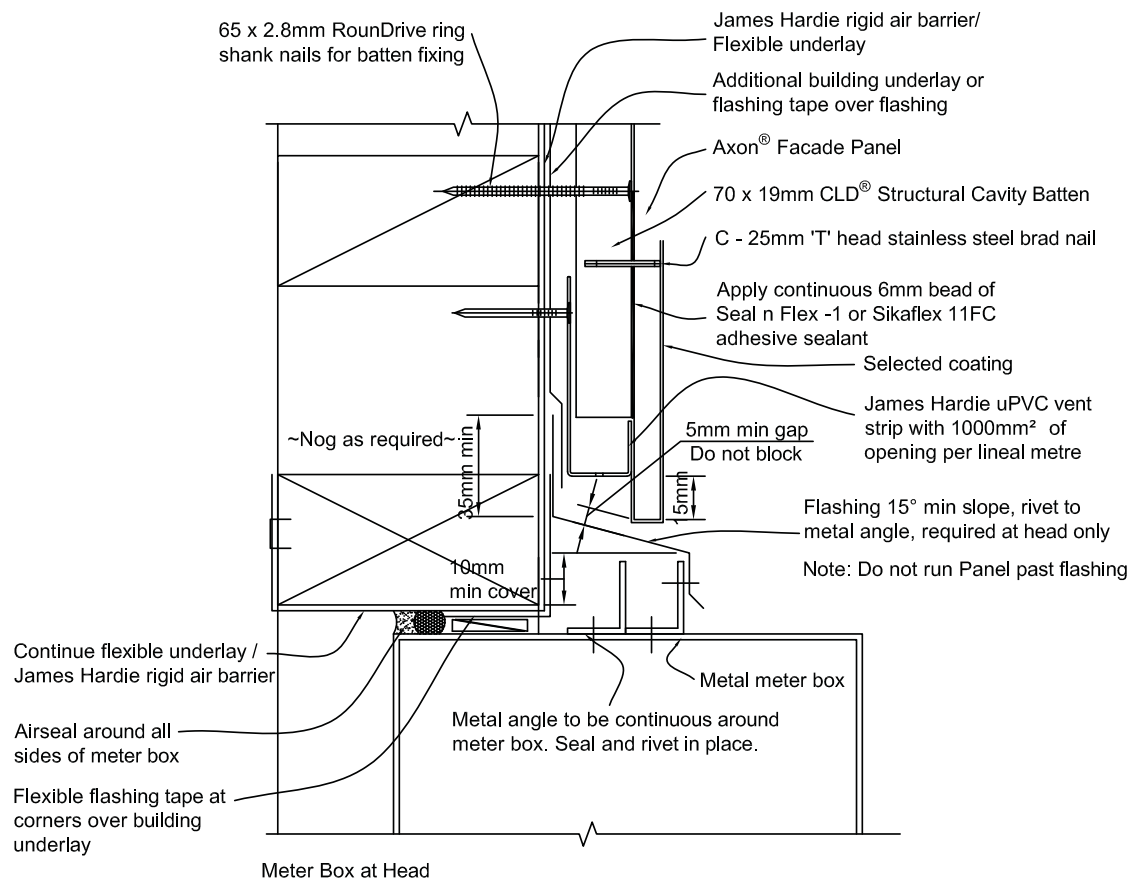
Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box sill.

Figure 40: Meter box at jamb



Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box jamb.

Figure 41: Meter box at head



Note: When James Hardie rigid air barrier is used flashing tape or flexible underlay to be applied to the entire meter box head.

Figure 42: Garage door jamb

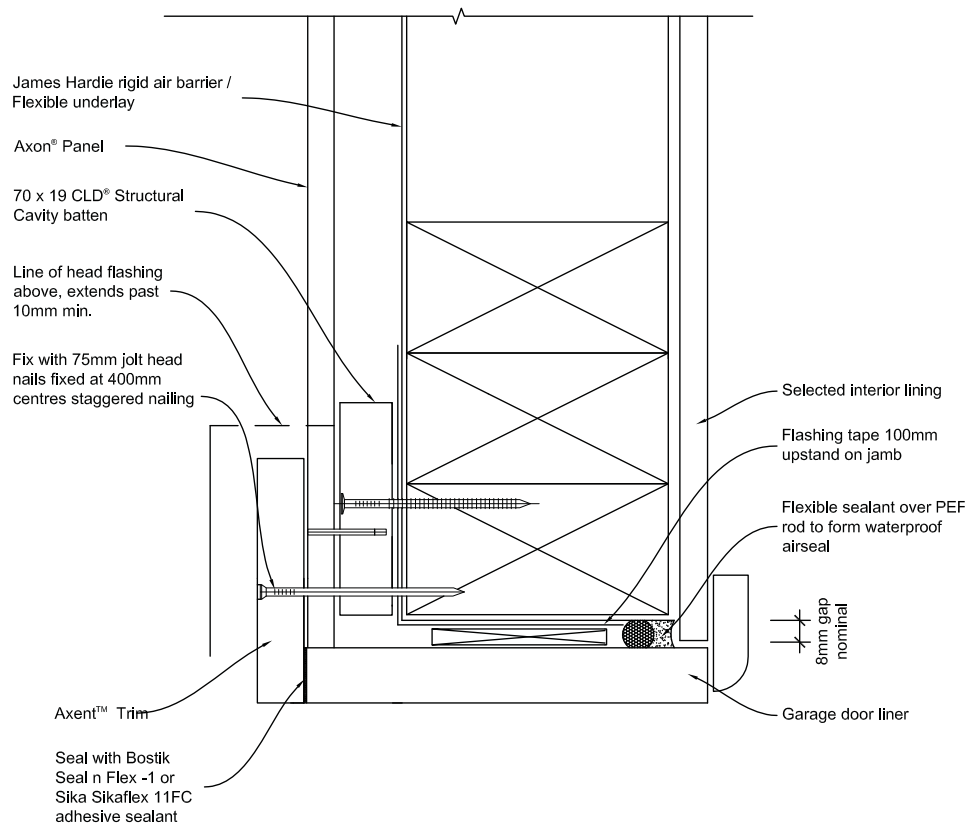
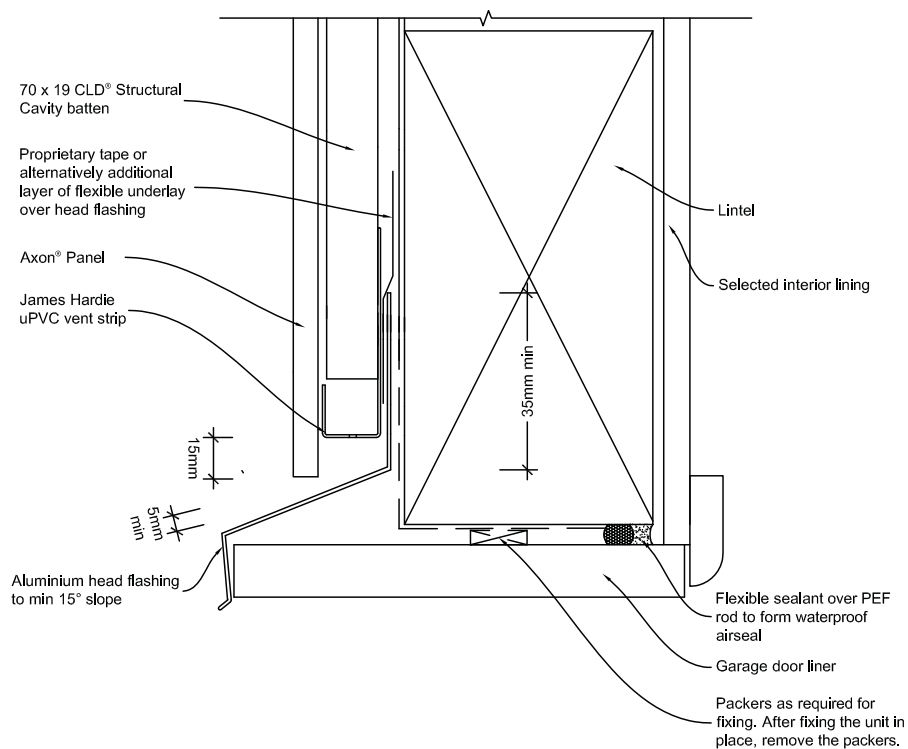
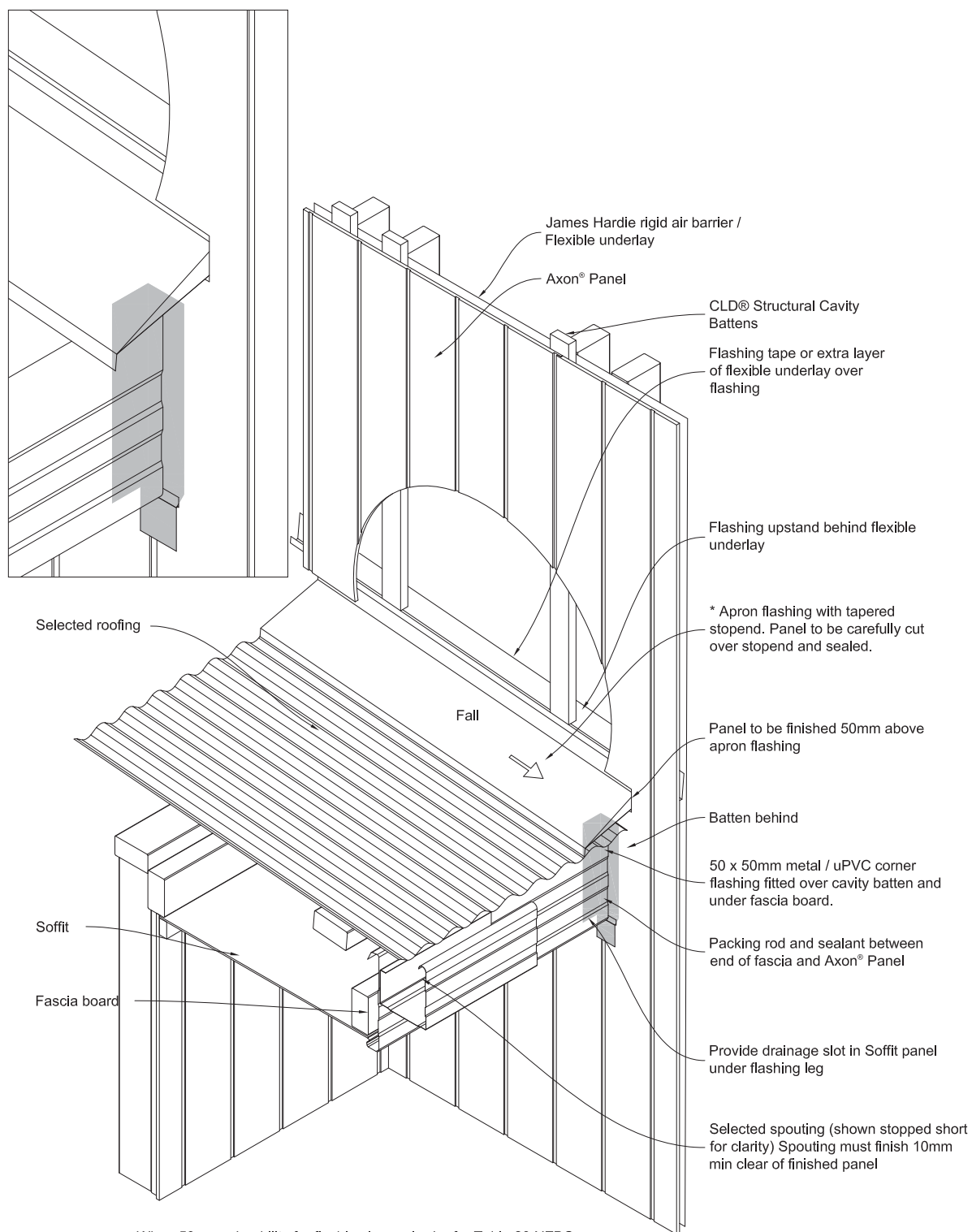


Figure 43: Garage door head



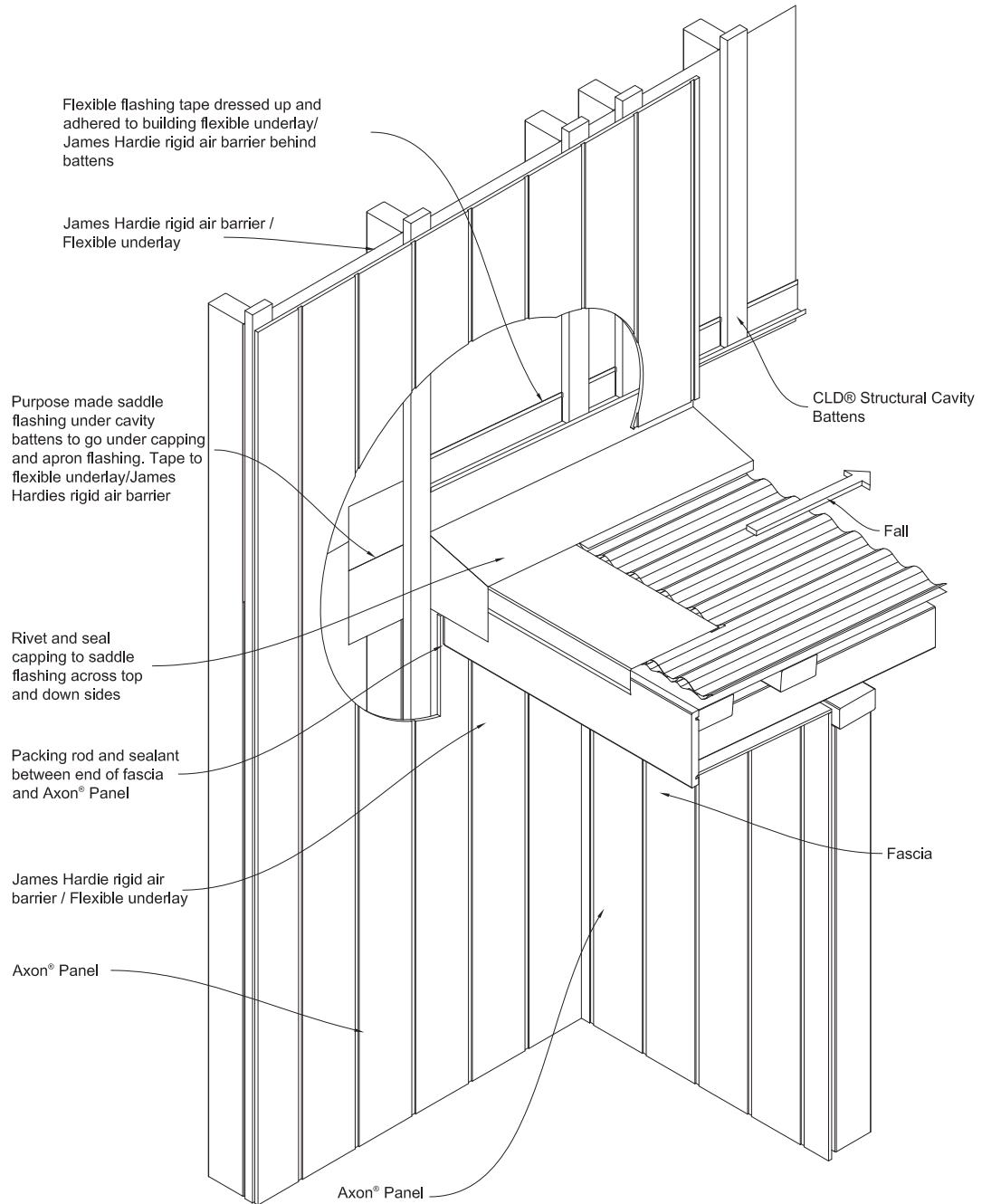
Sealant must be applied between head flashing and door liner in VH and EH wind zones and SED wind pressures.

Figure 44: Junction between Axon Panel and fascia board



* When 50 year durability for flashing is required refer Table 20 NZBC E2/AS1 document.

Figure 45: Enclosed roof to wall intersection



Product Warranty

Axon®
PANEL

March 2017

James Hardie New Zealand ("James Hardie") warrants for a period of 15 years from the date of purchase that the Axon® Panel and CLD Structural Cavity Battens (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested/assessed the performance of the Axon® Panel when installed in accordance with the Axon® Panel technical specification, in accordance with the standards and verification methods required by the NZBC and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design) James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

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Bevelback and Rebated Bevelback Weatherboard **Direct Fix System**

Installation Specifications

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2.0	Design Information	2
3.0	Installation Information	3
4.0	Maintenance	4
5.0	Health & Safety	4

Premium timbers that don't cost the earth

Auckland
110 Foundry Rd, Silverdale.
PO Box 35-209, Browns Bay,
Auckland 0753
p. 09 421 9840 **f.** 09 426 7638

Wellington
160 Gracefield Rd, Seaview.
PO Box 38-123, Wellington Mail Centre,
Lower Hutt 5045
p. 04 586 9674 **f.** 04 586 9675

Christchurch
27 Nga Mahi Road, Sockburn.
PO Box 8822, Riccarton,
Christchurch 8440
p. 03 341 2163 **f.** 03 341 2173

Bevelback and Rebated Bevelback Weatherboard Direct Fix System

Installation Specifications

1.0 General Information

1.1 Introduction

The Hermpac Bevelback and Rebated Bevelback Weatherboard System is an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

The cladding system consists of horizontally fixed Hermpac Bevelback and Rebated Bevelback weatherboards, flashings and accessories and is finished with a premium penetrating oil stain or paint finish to Hermpac specifications.

1.2 Hermpac Bevelback and Rebated Bevelback Weatherboards

Hermpac Bevelback and Rebated Bevelback weatherboards are manufactured from Canadian Coastal Western Red Cedar. Selected profiles are manufactured from DuraLarch (oil/stain or paint finish) or Ashin-Dura (paint finish only).

The weatherboard lap and rebate profiles are in accordance with NZS 3617 and BRANZ Bulletin 411. The weatherboards are minimum 18.5mm thick and are available in a range of widths and face profiles. They are supplied as a random length supply. Select lengths are outside of the general specification and are available by special contract.

1.3 Accessories

Accessories supplied by Hermpac for use with the Hermpac Bevelback and Rebated Bevelback System include:

- Hermpac cover battens – HP201 (69 x 18mm) and HP202 (90 x 19mm).
- Hermpac internal corner mould – HP110 (39 x 39mm).
- Hermpac eaves moulding – HP32 (40 x 27mm), HP33 (26 x 15mm) or HP7 (30 x 18mm) bevelled profile.
- Hermpac scribes – HP11 – HP18, with bevelled or radiused edges supplied (cut to suit as required).
- Hermpac weatherboard fixings – (oil stain finish) – silicon bronze, Grade 316 stainless steel annular grooved Hermpac Crown Head, Rose Head or Flat Head nails. The nail shank must be minimum 3.25mm diameter and the length must allow minimum 30mm penetration of the wall frame.
- Hermpac weatherboard fixings – (paint finish) – grade 316 stainless steel annular grooved Hermpac Jolt Head nails. The nail shank must be minimum 3.25mm diameter and the length must allow minimum 35mm penetration of the wall frame.
- Hermpac cover batten fixings – 50 x 2.8mm silicon bronze, Grade 316 stainless steel annular grooved Hermpac Crown Head, Rose Head or Flat Head nails for stain finish or Grade 316 stainless steel annular grooved Jolt Head nails for paint finish.
- Hermpac scribe fixings – length to suit scribe size (minimum 50 x 2.8mm) stainless steel annular grooved Crown Head, Rose Head or Flat Head nails for stain finish or Jolt Head nails for paint finish.
- Hermpac flat and corner soakers – 90° soakers available in copper, stainless steel or etch primed aluminium.
- Hermpac soaker fixings – 19 x 1.6mm silicon bronze or stainless steel Rose Head or Flat head nails.
- Hermpac aluminium flashings – widths to suit specified corners – 2.4m and 3.0m lengths.

1.4 Handling and Storage

Hermpac Bevelback and Rebated Bevelback weatherboards must be stacked flat and true, clear of the ground by a minimum of 150mm and supported on dry and clean timber bearers at maximum 900mm centres.

The weatherboards must be kept dry at all times either by storing within an enclosed building or when stored externally an additional secondary cover to the plastic wrapping is required. Care must be taken to avoid damage to edges, ends and the weatherboard surfaces.

2.0 Design Information

2.1 Design Responsibility

The Specifier for the project must ensure that the details in this literature are suitable for the intended application and that additional detailing is provided for specific design or any areas that fall outside the scope and specifications of this literature.

2.2 Scope

This specification covers the use of the Hermpac Bevelback and Rebated Bevelback Weatherboard System as an external horizontally fixed wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable System E2/AS1, Paragraph 1.1; and,
- constructed with timber framing complying with the NZBC; and,
- with a risk score of 0-12 calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Building Wind Zones up to, and including 'Very High'.

CedarOne or painted weatherboards fixed with Grade 316 stainless steel annular grooved Jolt Head nails are limited to use in NZ 3604 Wind Zones up to, and including Medium where studs are at 600mm centres maximum, and NZS 3604 Wind Zones High and Very High where studs are at 400mm centres maximum.

For applications which are outside the scope of this literature and details which are not in this literature the specifier must ensure that the design meets the relevant performance requirements of the NZBC.

Hermpac recommends that professional design advice is sought in these circumstances.

2.3 Building Regulations

The Hermpac Bevelback and Rebated Bevelback Weatherboard System is designed, used and installed in accordance with the statements and conditions of this literature, will meet the following provisions of the New Zealand Building Code:

- Clause B1 Structure
- Clause B2 Durability
- Clause E2 External Moisture
- Clause F2 Hazardous Building Materials

2.4 Ground Clearances

The finished floor level must have a minimum clearance to paved or unprotected ground as required by NZS 3604:2011.

Hermpac weatherboards must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZBC Acceptable Solution E2/AS1, Table 18.

The bottom edge of the Hermpac Bevelback and Rebated Bevelback Weatherboard System must finish a minimum of 100mm above paved surfaces or 175mm above unprotected ground.

At deck or low pitch roof/wall junctions, the bottom edge of the Hermpac weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 35mm.

2.5 Structure & Framing

Timber wall framing behind the Hermpac Bevelback and Rebated Bevelback Weatherboard System must be treated

Bevelback and Rebated Bevelback Weatherboard Direct Fix System

Installation Specifications

as required by NZS 3602:2003 Timber and wood-based products for use in building.

Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. Use of timber framing must be in accordance with framing manufacturer's specifications.

In all cases, studs must be at maximum 600mm centres, with nogs/dwangs fitted flush between the studs at maximum 800mm centres. Note: For CedarOne or painted weatherboards fixed with Grade 316 stainless steel annular grooved Jolt Head nails, studs must be at a maximum 600mm centres for NZS 3604 Wind Zones up to, and including Medium, and 400mm centres maximum for NZS 3604 Wind Zones High and Very High.

2.6 Framing Tolerances

In order to achieve an acceptable wall finish, it is imperative that framing is straight and true. Framing tolerances must comply with the requirements of NZS 3604:2011.

2.7 Wall Underlay

The Hermpac Bevelback and Rebated Bevelback Weatherboard System must be installed over wall underlay complying with NZBC Acceptable Solution E2/AS1, Table 23, or other BRANZ Appraised breather-type membranes.

Unlined gables and walls must incorporate a rigid sheathing or an air barrier fixed to the framing, which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. Where rigid sheathings are used, the fixing length must be increased by a minimum of the thickness of the sheathing.

2.8 Hermpac Bevelback and Rebated Bevelback Weatherboards

Hermpac Bevelback weatherboards must be overlapped a minimum of 32mm. Hermpac Rebated Bevelback weatherboards must be overlapped a minimum of 25mm with an expansion gap of 2 mm at the overlap between boards. Hermpac Bevelback and Rebated Bevelback profiles are all manufactured in accordance with BRANZ Bulletin 411 (Refer to E2/AS1 page 106, paragraph 9.4.1.1).

The weatherboards shall be pre-coated with the selected coating (prior to site delivery and installation) by Hermpac associate Machinecoat (NZ) Ltd, by the flood coat inundation method or in-line spray coat system (subject to coating type selected).

Pre-finished Bevelback and Rebated Bevelback weatherboards shall be over-coated and maintained in accordance with the coating manufacturer's specification. All cut ends and/or uncoated surfaces shall be double coated during installation to protect against the penetration of moisture, post installation.

The weatherboards shall be fixed to the studs at maximum 600mm centres using Hermpac weatherboard fixings (refer to Section 1.3 of this specification).

External corners shall be weatherproofed by the use of corrosion resistant corner flashings and cover battens HP201 and HP202 with Hermpac scribes, or Hermpac corner soakers.

Internal corners shall be weatherproofed by the use of corrosion resistant internal corner flashings along with internal mouldings eg. Hermpac profile HP110.

3.0 Installation Information

3.1 System Installation

This section of the literature should be read in conjunction with the installation details.

The selected wall underlay and flexible sill and jamb tape system must be installed in accordance with the underlay and tape manufacturer's instructions prior to the installation of the rest of the Hermpac Bevelback and Rebated Bevelback weatherboard system. The wall underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75mm minimum at horizontal joints and 150mm minimum over studs at vertical joints.

Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed timber wall framing in the opening is protected. All penetrations through the wall underlay must be sealed and joints sealed or lapped 150 mm.

Where the studs are at greater than 450mm centres, a wall underlay support, e.g. polypropylene strap, 75mm galvanised mesh or galvanised wire must be installed over the wall underlay at maximum 300mm horizontal centres, to prevent the wall underlay bulging into the drainage cavity.

3.1.1 Aluminium Joinery Installation

Aluminium joinery and associated head flashings must be installed in accordance with the window manufacturer's instructions. A 7.5-10mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6 after the joinery has been secured in place.

3.1.2 Hermpac Bevelback and Rebated Bevelback Weatherboard Installation

Hermpac Bevelback and Rebated Bevelback weatherboards must not be wet prior to installation. The back, face and edges of the Hermpac Bevelback and Rebated Bevelback weatherboards must be sealed prior to installation with an exterior grade oil-based penetrating stain or paint.

During installation, cut ends and edges and all fresh cuts or exposed timber must be double sealed with the same oil stain or paint.

Before the weatherboards are installed, the corner detail must be prepared to suit the selected option, e.g. external box corner, external corner moulding etc. The necessary flashings must be installed before commencing weatherboard fixing.

The first course of weatherboards must be full length and commence from an external corner. The first weatherboard must be installed level to assist with the installation of subsequent weatherboards. The weatherboards must overhang the bottom plate by a minimum of 50mm.

Immediately prior to installing the weatherboards over the internal and external corner flashings, a continuous bead of sealant must be applied to the face of the flashing along the fixing line.

Hermpac Bevelback weatherboards must be overlapped a minimum of 32mm.

Hermpac Rebated Bevelback weatherboards must be overlapped a minimum of 25mm with an expansion gap of 2mm at the overlap. For best practice use the Hermpac clinch nail to restrain the top of the weatherboard lap at every stud.

Hermpac Bevelback and Rebated Bevelback weatherboards must be pre-drilled on a slight up-slope, with a hole slightly smaller than that of the nail to reduce the risk of moisture entry.

Fix each weatherboard with one nail per board at every stud. Fixing must be carried out using silicon bronze or Grade 316 stainless steel annular grooved Hermpac Crown Head, Rose Head or Flat Head nails. The nail shank must be minimum 3.25mm diameter and the length must allow minimum 30mm penetration of the wall frame.

Bevelback and Rebated Bevelback Weatherboard **Direct Fix System**

Installation Specifications

Note: For CedarOne or painted weatherboards, use Grade 316 Stainless Steel annular grooved Jolt Head nails and allow minimum 35mm penetration of the wall frame. Punch nails 2mm below the weatherboard surface, prime nail holes and fill prior to sanding and finishing.

The fixing must be located 35-40mm above the bottom edge of the weatherboard, be located no closer than 32mm from the end of the board (where practical), and the head of the nail must finish flush onto the surface of the weatherboard, not into or below the surface.

Fix weatherboards in full lengths where possible. Where joints are unavoidable, scarf the weatherboard at 30° over a stud and fix as per drawn detail.

3.1.3 Boxed Corners, Cover Battens and Mouldings

External and internal corners must be finished in accordance with the installation detailing.

3.1.4 Finishing

At least two coats of an exterior grade quality oil-based penetrating stain must be used over the front face of the Hermpac Bevelback and Rebated Bevelback weatherboards to protect the weatherboards and give the desired finish colour to the exterior walls. The stain must be recommended for use as a wall cladding stain by the manufacturer and must be brush or Machinecoat NZ Ltd applied. Hermpac recommends the use of oil based stains manufactured by Wood-X and Resene.

Follow the stain manufacturer's instructions at all times for application of the stain finish. To ensure a top quality paint finish:

To ensure a top quality paint finish:

1. Any sharp edges should be removed to provide a radius to aid in uniform paint film coverage.
2. Use a premium alkyd oil or acrylic based primer to envelope prime all cut ends and bare timber surfaces twice.
3. Punch nail holes and prime promptly after punching.
4. Fill holes with a suitable filler and allow to dry.
5. When filler is fully dry and cured, sand area smooth.
6. Apply one coat of an alkyd oil or acrylic based primer to sanded area and allow to fully dry before sanding lightly.
7. Ensure surface is clean and free from any chalking, dirt, dust, mould or other contaminants prior to painting top coats.
8. Apply two coats of premium high quality 100% exterior grade acrylic to surface allowing adequate time for drying between coats.

Timber is a natural product and for best results use a colour with a LRV of 40-45 or above. Please consult with us for a specific recommendation minimum for your chosen timber.

Follow the paint manufacturer's instructions at all times for application of the paint finish.

Refer to Section 4.0 for maintenance requirements.

4.0 Maintenance

Building owners are responsible for the maintenance of the Weatherboards. Annual inspections must be made to ensure that all aspects of the cladding system, including flashings remain in a weatherproof condition. Any damaged areas or areas showing signs of

deterioration which would allow water ingress, must be repaired immediately. Sealant, coatings, flashings or the weatherboards must be repaired in accordance with the relevant manufacturer's instructions.

Regular cleaning (at least annually) of the surface finish with water and a mild detergent is recommended to remove grime, dirt and organic growth, to maximise the life and appearance of the cladding.

Recoating of the stain finish will be necessary throughout the life of the cladding system. Re-staining must be carried out every 2-3 years in accordance with the stain manufacturer's instructions. Re-staining will be required more frequently on exposed northern and western facing walls. When re-staining, care must be taken to ensure bottom edges are well covered and penetrated with the stain.

Recoating of the paint finish will be necessary throughout the life of the cladding system. Re-coating must be carried out every 7-10 years in accordance with the paint manufacturer's instructions. When re-coating, care must be taken to ensure bottom edges are well covered and penetrated with the paint.

5.0 Health & Safety

Cutting of Hermpac Bevelback and Rebated Bevelback weatherboards must be carried out in well ventilated areas and dust masks, eye and hearing protection must be worn.



Hermpac

For further information please contact us
technical@hermpac.co.nz

Auckland
09 421 9840

Wellington
04 586 9674

Christchurch
03 341 2163

Fireplace Installation



escea.

Installation / Service Instructions

DL850 / DL1100
Gas Fireplaces

Important:

The appliance shall be installed in accordance with;

- This installation instruction booklet
- Local gas fitting regulations
- Municipal building codes
- Electrical wiring regulations
- Any other relevant statutory regulations.
- AS/NZS 5601:2010 Gas Installations

**WARNING:**

This appliance must be installed by a qualified person.

Do not modify this appliance.

This appliance is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.

Young children should be supervised to ensure that they do not play with the appliance.

Failure to follow these instructions could cause a malfunction of the heater, which could result in death, serious bodily injury, and/or property damage. Failure to follow these instructions may also void your fire insurance and/or warranty.

Who can install this product:

Installation must be carried out by a registered installer who, on completion of the installation, must issue a:

AUS: Certificate of Compliance

NZ: Certificates that comply with the latest legislation

in accordance with national and/or local codes. If these are not issued then the Escea warranty may be void.

Warranty Repair and Annual Servicing:

Warranty repair work must be carried out by a recognized Escea Gas Fire Technician. It is recommended that recognized Escea Gas Fire Technicians are also used to carry out annual servicing requirements (particularly during the warranty period). For contact details of recognized Escea Gas Fire Technicians in your area, please contact the retailer from whom the appliance was purchased.

The heater must be installed according to these instructions and in compliance with all relevant building, gas fitting, electrical and other statutory regulations (e.g. AS/NZS 5601). Any shortcomings in the appliance and flue installation will be the responsibility of the installer, and Escea will not be accountable for any such failings or their consequences.

Manufactured by: Escea Ltd, PO Box 5277 Dunedin NZ, Ph: +64 3 478 8220

For contact details of your local escea distributor or dealer please visit:

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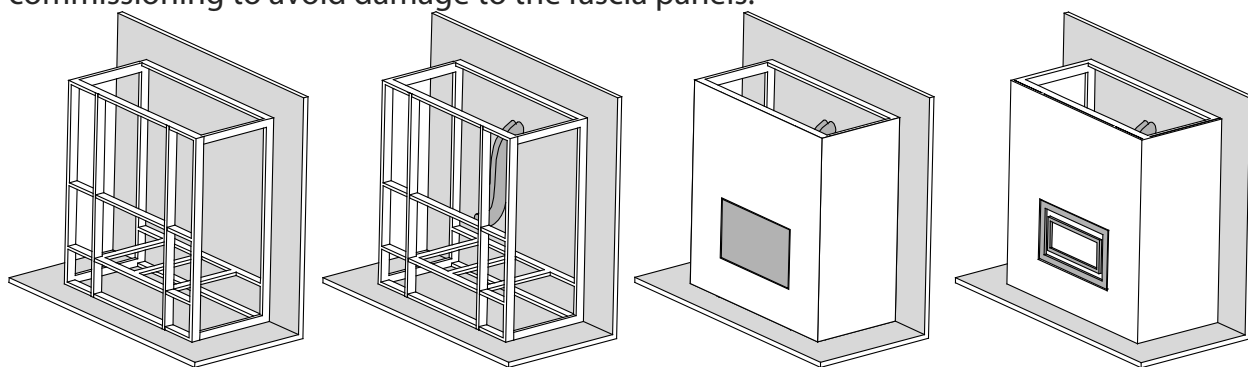
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A Installation Process and Product Description

A1 Recommended Installation Process:

The following diagram illustrates the steps required to install your gas fire..

The sequence in which you choose to do these tasks will vary depending on your individual scenario. Please read these instructions fully before proceeding with the installation. Leave the installation of the fascia panels until the very end of the installation and commissioning to avoid damage to the fascia panels.



Create the Cavity	Install electrical / gas connections and flue system	Install appliance and finish cavity	Finish installation, fit fascia and test appliance
Section B	Section C, D	Section E	Section F

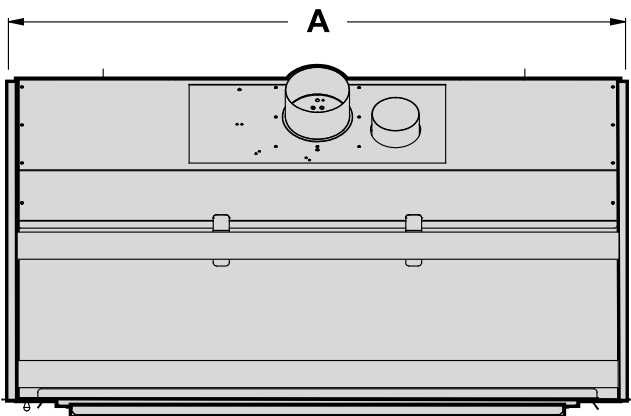
A2 Product Description:

The Escea DL series gas fire is a room sealed gas appliance designed to be built into a cavity. These appliances are flued using collinear flexible aluminium flue (with PolyPro flue extensions in some installations) connected to a powerflue.

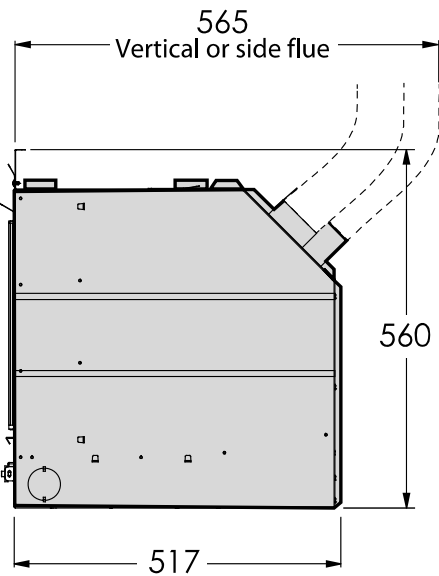
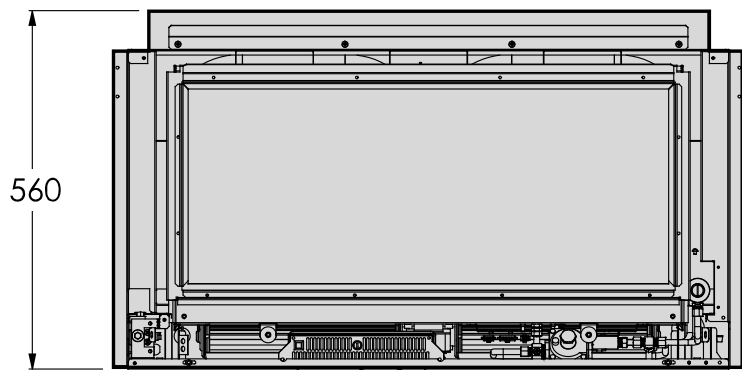
The user will control their fire with the Radio Frequency (RF) remote that will normally be left in its wall mount cradle. In addition to the RF remote the appliance has a single auxiliary On/Off button on the unit. When not in operation it is in a standby mode unless it is physically isolated from the mains supply.

A3 Product Dimensions:

All dimensions are in mm



	DL850	DL1100
A	959	1259



B Creating the Cavity

B1 Cavity Shape:

The DL850/DL1100 is suitable for both timber framed and masonry cavities. The cavity shape is dependant on two things:

- The flue configuration (section B2)
- The fascia (section B4)

A

B

C

D

E

F

G

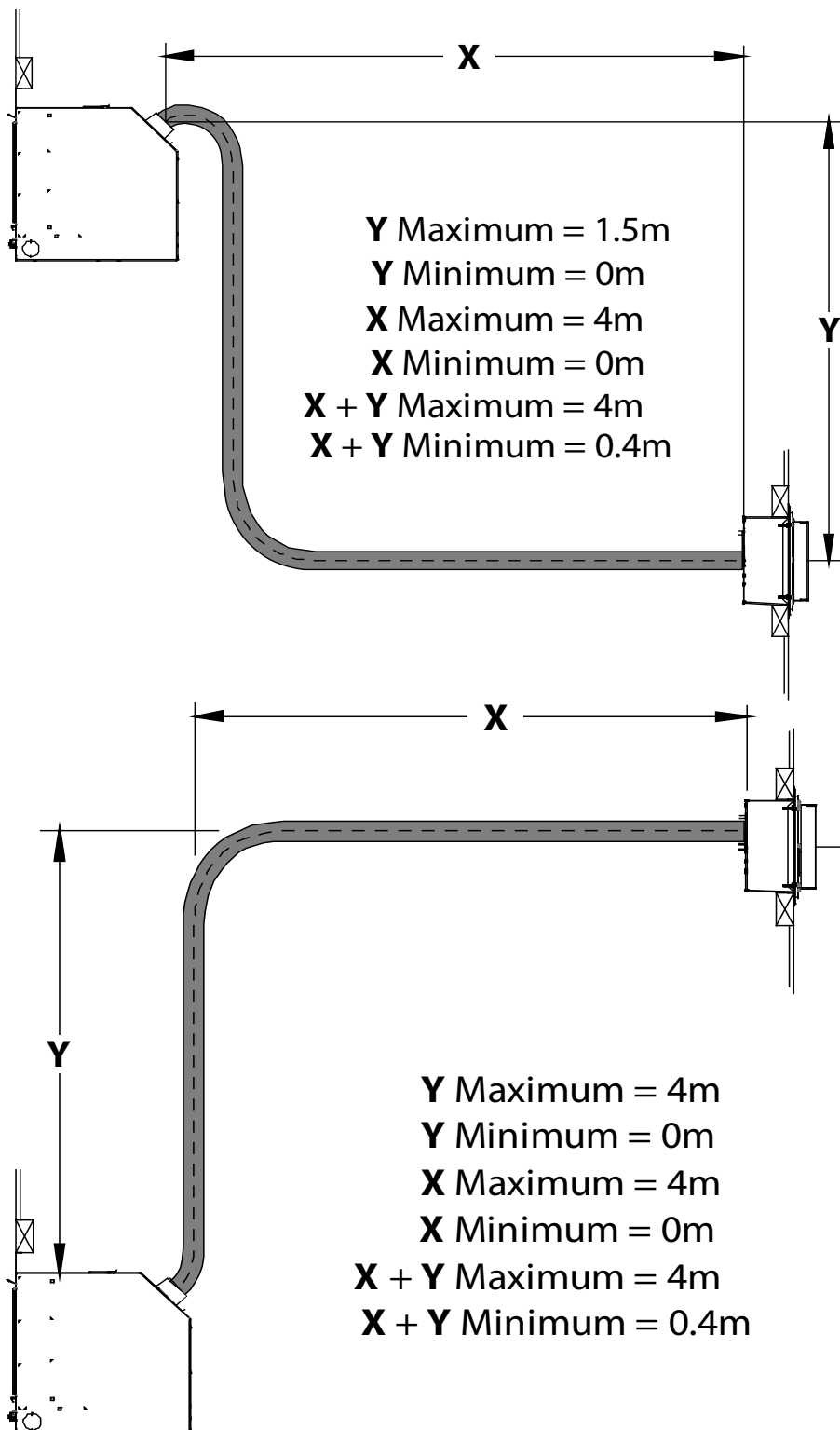
SERVICE

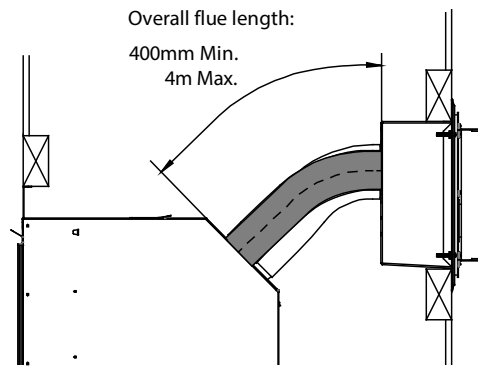
B2 Flue Configuration (If less than 4 m flue length is required):

If your flue system is less than 4m long (as shown in diagrams below), then a simple aluminium flexible flue is required. If you wish to install a longer flue run, up to 12m, see section B3.

Horizontally Terminated: *(utilizes the escea horizontal power flue enclosure kit)*

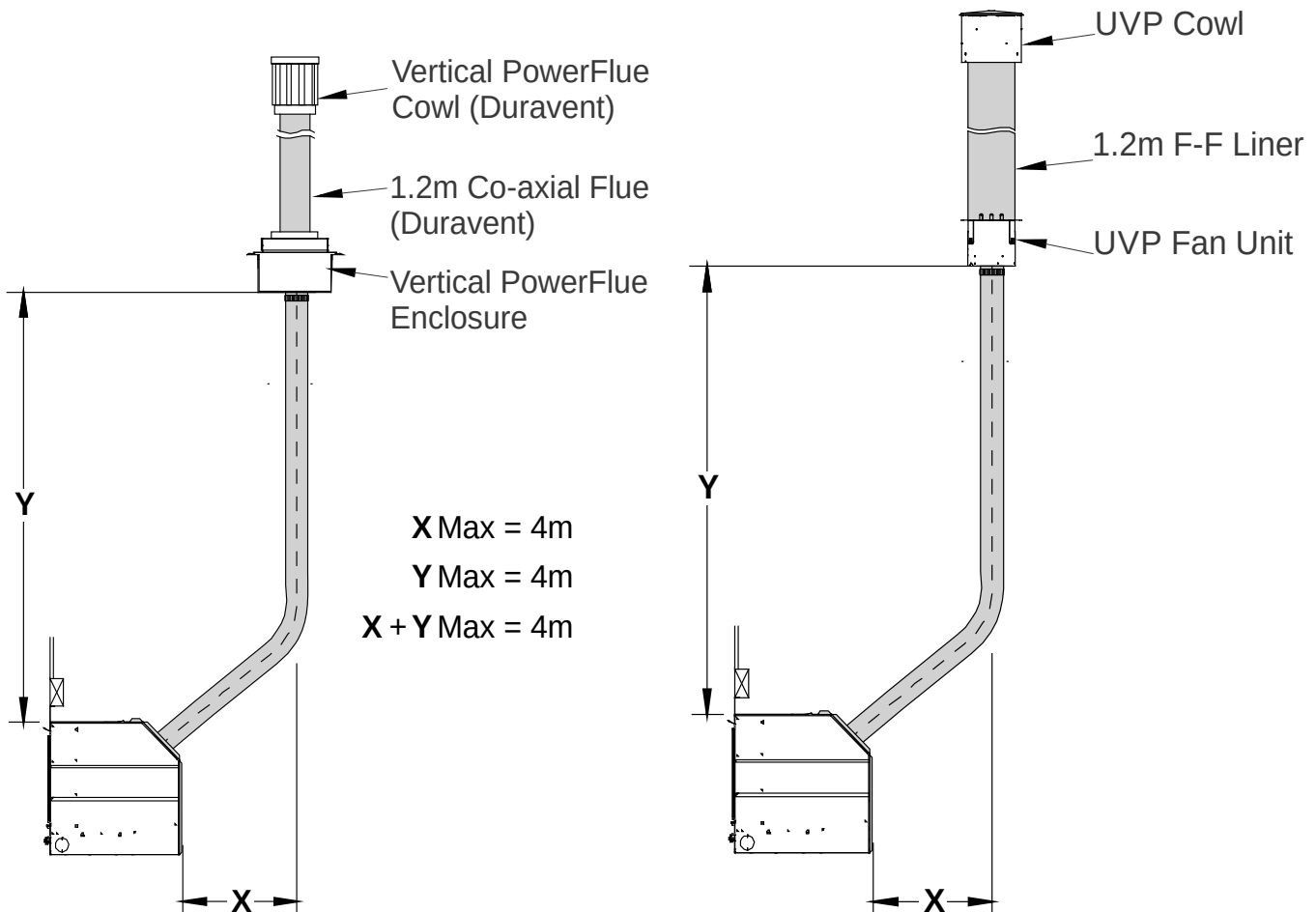
The horizontal offset of the terminal can be any amount up to the total flue length listed below. Please consult with Escea's technical staff if your intended flue configuration steps outside of the bounds of the flue configurations shown below.





Vertically Terminated:

(utilizes the escea vertical power flue enclosure kit)



A

B

C

D

E

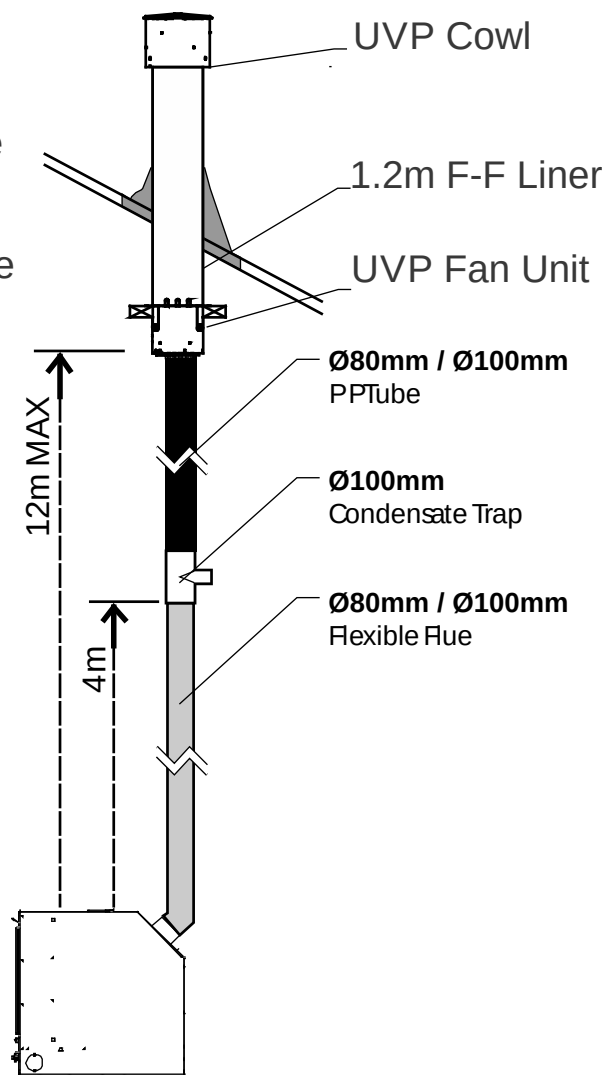
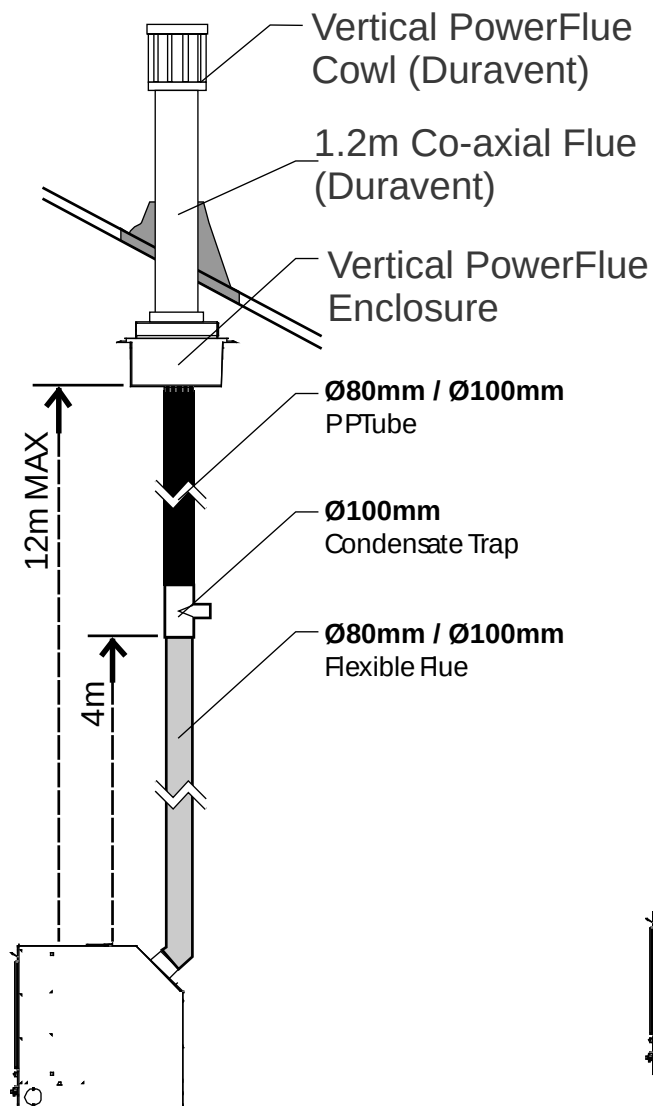
F

G

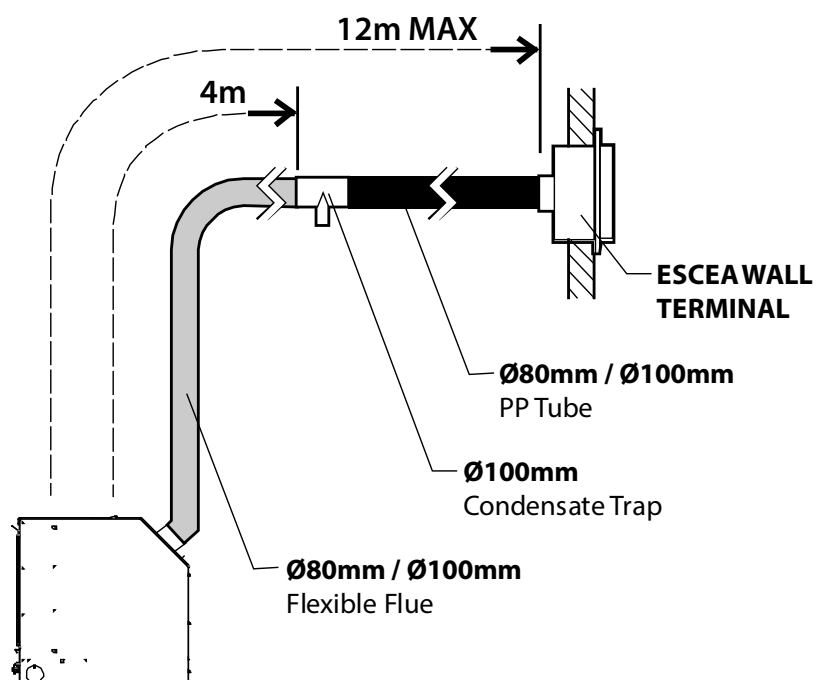
SERVICE

B3 Flue Configuration (If more than 4m flue length is required):

If your flue system is greater than 4m long (as shown in diagrams below), then a flexible flue with condensate trap and rigid PP tube flue lengths is required.

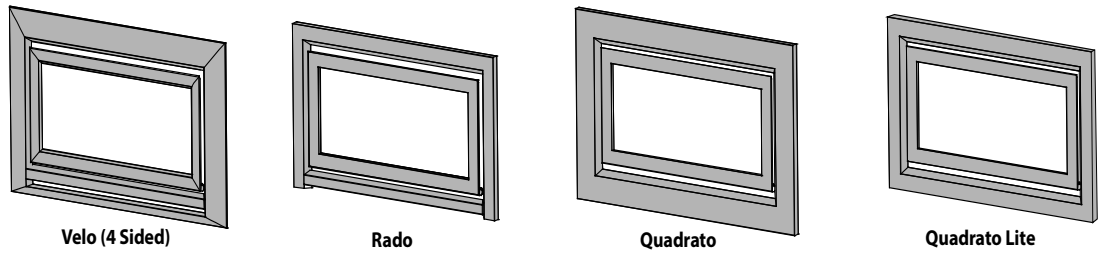


For further information and detail on PolyPro (Rigid) flue and condensate traps, see the documentation supplied with the flue components.

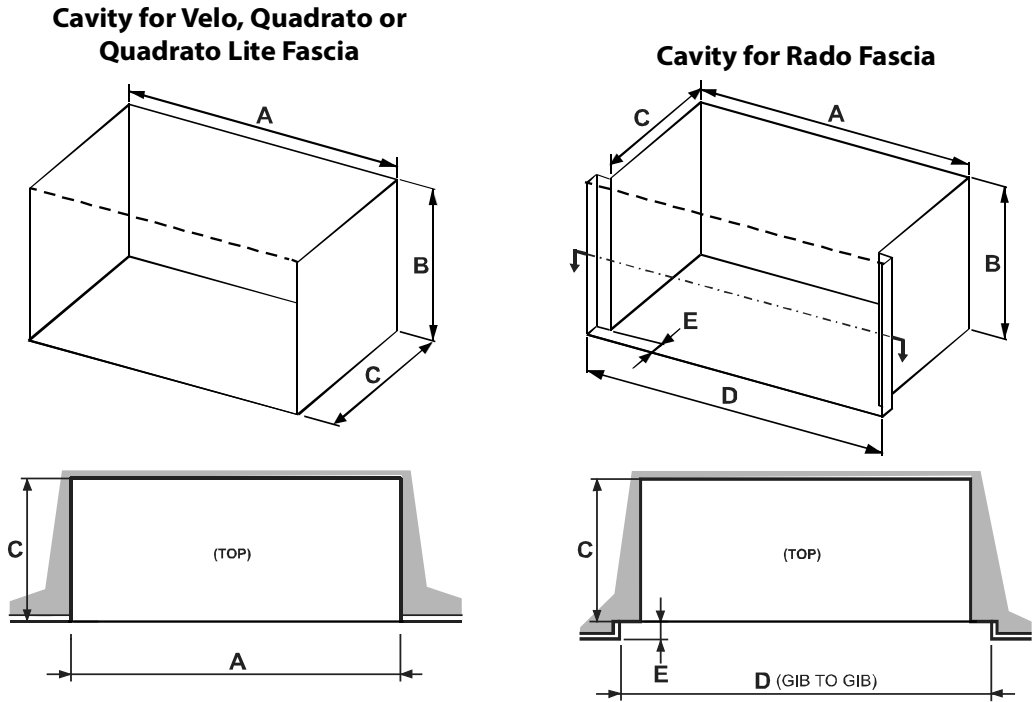


B4 Fascia:

The cavity shape is dependent on the fascia type. There are four fascia types available with the DL850 and DL1100:

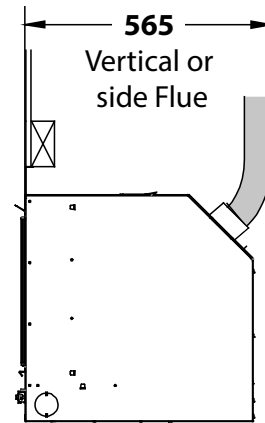
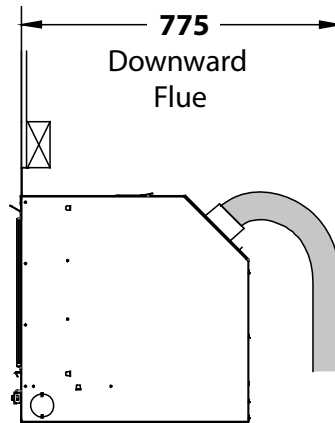


The **Velo**, **Quadrato** and **Quadrato Lite** fascias sit proud of the finished wall surface and have a simple cavity shape. The cavity may be constructed from combustible materials. The **Rado** fascia sits flush with, or inset from, the finished wall surface and has a more complex cavity shape. **The cavity framing and wall facing for a minimum of 300mm directly above the Rado fascia must be constructed from non-combustible materials.** Please check the style of fascia before commencing the building of the cavity to the dimensions shown below. The cavity for Velo, Quadrato and Quadrato Lite fascias may be constructed from combustible timber framing materials. Note: It is not necessary to line the sides, top or back of the cavity.



Ideal Cavity Dimensions (mm):							
DL850:	A	B (min)	B (max)	C (min)	D	E (min)	E (max)
Velo / Quadrato / Quadrato Lite	965	560	575	565	-	-	-
Rado	965	585	590	565	995	30	130
DL1100:							
Velo / Quadrato / Quadrato Lite	1265	560	575	565	-	-	-
Rado	1265	585	590	565	1295	30	130

NOTE: The final cavity size and shape should account for the flue direction as shown on following page.



B5 Cavity Base:

This appliance **MUST** be fully supported on its base. The base must extend over the entire area of the underside of the appliance. The base must also be levelled to prevent vibration from possible fan imbalance. The base of the cavity must be strong enough to support the total product weight, which is approximately 65kg (DL850) and 80kg (DL1100), depending on fuel bed.

B6 Hearth:

The base of the appliance must be installed a minimum of 100mm off the floor, unless the appliance is being installed at floor level in which case a hearth is required, made from non-combustible material and must extend no less than 300mm from the front of the fire. This hearth should be at least as wide as the fire's outer fascia and no less than 10mm thick. Raised hearths can be any size but must also be constructed from non-combustible materials.

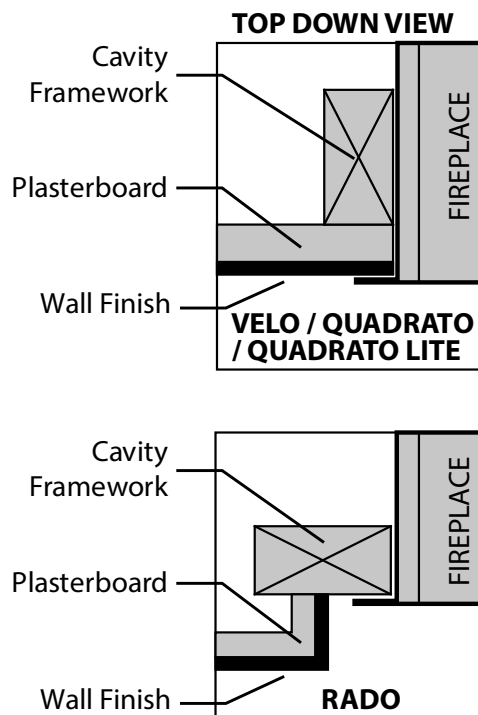
QUADRATO or QUADRATO LITE FASCIA ONLY: The fascia must not be installed flush against a hearth as the fireplace draws air from the lower surface of the fascia. As such the fascia must be raised a minimum of 25mm from a hearth.

The floor in front of this hearth will still get warm so if the floor covering is vinyl, nylon carpet or another heat sensitive material then we recommend extending the hearth to 450mm from the fire. A raised hearth can be of any size but must be constructed from non-combustible materials. **NOTE:** *If the hearth is to be covered with tiles or some other veneer then the fire must be installed so that the base of the appliance is level with the finished top surface of the hearth.*

B7 Wall Linings:

The front mounting flanges of the appliance must be on top of the finished wall surface in order for the fascia panels to mount properly. Take into account any plaster board, tiles or any other finishing surface that may be intended for the finished wall surface. Wall finishing materials must not encroach upon the minimum cavity clearances given in section 2.2. The wall board that lines the outside of this opening can be normal dry wall (plaster board) and does not need to be non-combustible.

Note: The temperature of the wall lining directly above the heater does get warm and hence may discolour paint finishes that are susceptible to temperature damage or distort vinyl wall coverings. For durability of finishes and surfaces you should contact the relevant manufacturer for their specification.



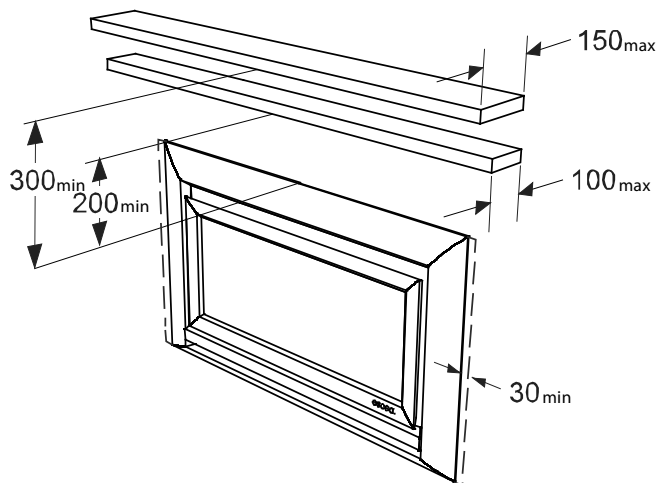
The cavity framing and wall facing for a minimum of 300mm directly above the Rado fascia must be constructed from non-combustible materials.

For more detail on cavity construction, view the "Drawings for Architects" in the technical section of the Escea website.

B8 Mantle Clearance:

Please refer to the diagram to the right. Mantles or protruding ledges mounted above the heater that are made from combustible materials, must not extend outside of the dimensions shown.

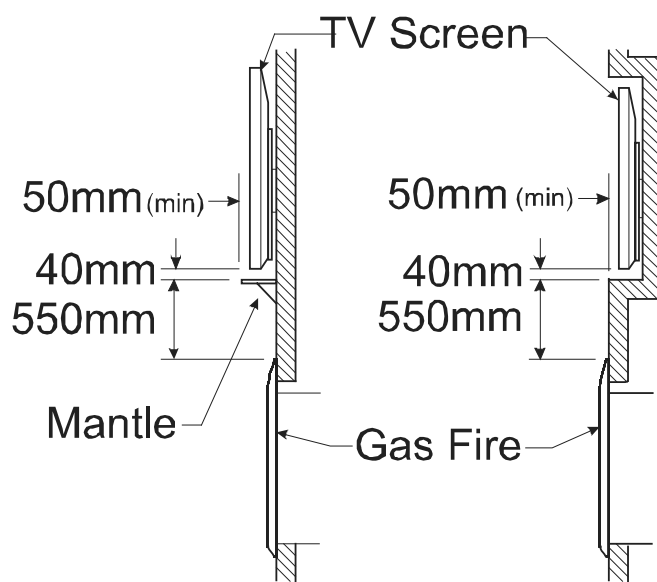
Except for Rado fascias, maintain a 30mm clearance around the fascia to ensure ease of fascia removal. NB: No clearance is needed underneath Velo Three Sided or Rado Fascias



B9 Television Clearances:

The following are the recommended minimum clearances for the location of any electrical equipment (such as Plasma TV, LCD TV or home theatre) above an Escea DL Series gas fire. Use either a shelf or mantle below your TV screen or alternatively you can construct a recess to mount your TV screen into.

Note: The above television clearance recommendations are to be treated as a suggestion of a suitable installation only. It is the responsibility of the end user to check the installation instructions of their electrical appliances to ensure that the location in relation to the gas fire is suitable. Escea in no way guarantees or takes responsibility that the above installation suggestion will be suitable for all electrical or home entertainment appliances.

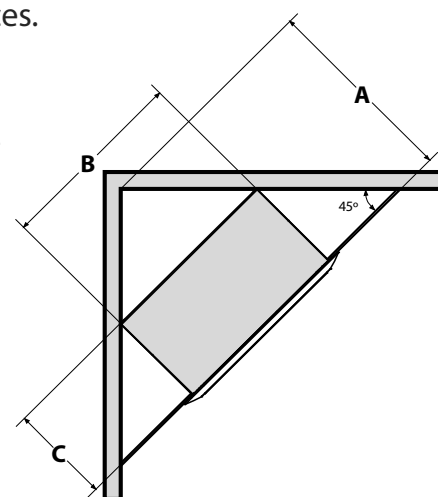


B10 Corner Installations:

If a cavity is to be created in a corner, the following drawing gives the minimum sized interior wall dimensions.

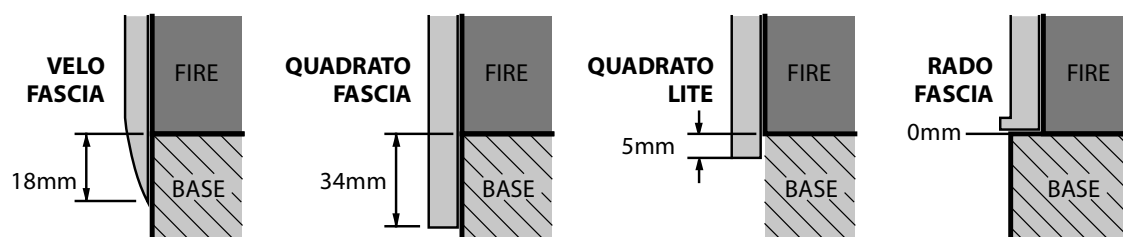
Minimum corner install dimensions (mm):

	DL850	DL1100
A	970	1145
B	960	1260
C	510	510



B11 Distance from Fireplace base to Fascia base:

The following side-on views show the measurement from the base of the fireplace to the base of the Fascia.



END OF SECTION B

By the end of this section, you should have:

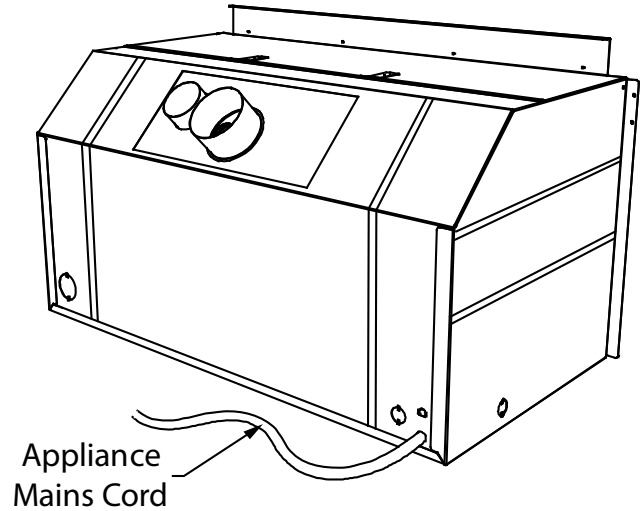
- ☐ A framed, but un-lined, cavity sized to suit your fascia and flue configuration
- ☐ Provision for sufficient access to the powerflue for future servicing

C Installing the Electricity and Gas to the Appliance

C1 Power Supply:

Whilst the cavity is being created consideration should be given to appropriate location of a standard 3 pin, EARTHED 230/240V power outlet. This must be within 1.0m of the rear bottom left hand corner of the appliance.

IMPORTANT: Locating the power outlet within the cavity makes the installation very neat but the provision **MUST** be made to be able to switch the power supply off and on (electrical isolation switch) and **MUST** be accessible after the heater has been installed. This is normally done by means of a separate switch which must be located adjacent to the appliance as per AS/NZS 5601.1.2010. This will allow service technicians to isolate the power supply before performing service work on the appliance.



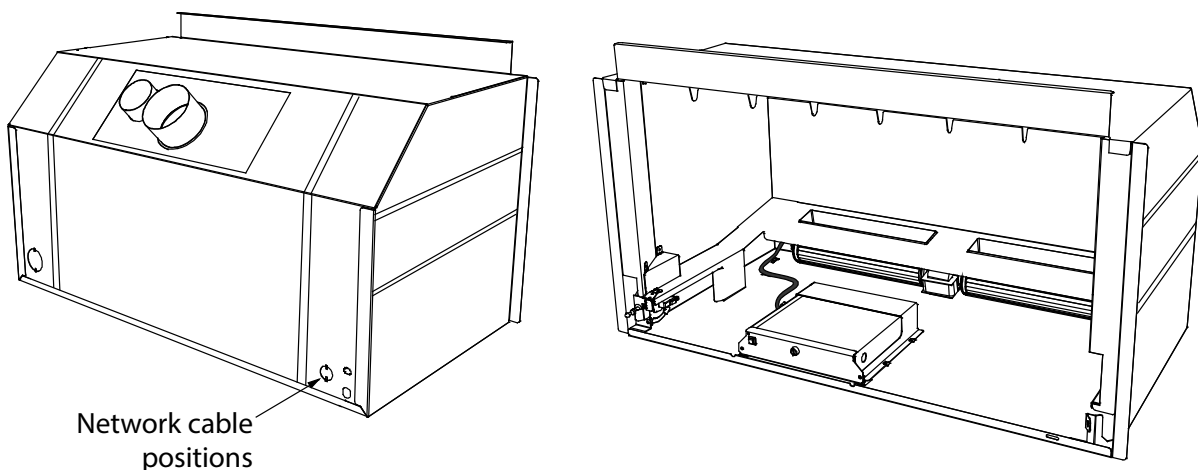
This appliance must not be located directly below a socket outlet.

This appliance will draw a maximum of 2 Amps from a 230/240V supply. No additional power supply is required for the power flue.

An electrical wiring diagram is located underneath the electronic tray, and also in the rear of this manual (Service section)

C2 Network Cable:

If the appliance is to be wired to a home automation system or internet router/network is being installed then provision must be made for the network cable to get to the control tray. A plastic plug is provided on the rear left of the appliance for a network cable to pass through the chassis and reach the control tray. Allow enough slack in the network cable to ensure the electronic tray can still be removed from the appliance. See Section E2 for final connection of the network cable.



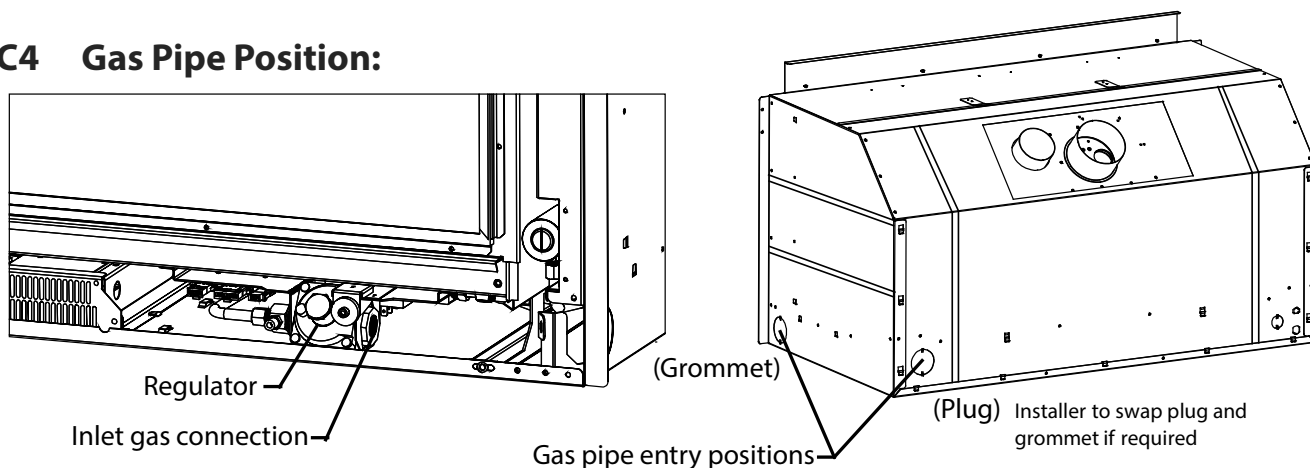
C3 Gas Pipe Sizing:

Gas pipe should be sized as per the requirements of AS/NZS 5601. The pipe sizing must be sufficient to deliver the following volume of gas to the heater with all other gas appliances in the home running at the same time:

DL850 Gas Consumption = 38MJ/hr

DL1100 Gas Consumption = 42Mj/hr

C4 Gas Pipe Position:



The DL850 / DL1100 has 2 possible entry points for gas pipe, on the rear right corner and the front right. Each is sealed by either a plastic grommet or plastic plug. If you wish to use the rear exit location, you may swap the grommet and plug positions.

The gas connection on the appliance is a ½" female BSP at the very front right of the appliance. This section of the piping will need to be flexible to allow for pipe disconnection and firebox removal.

C5 Gas Isolating Valve:

It is recommended that a gas isolating valve be installed as close to the regulator on the gas inlet side as possible with easy access if the fascia is removed. This will allow for easier servicing in the future.

C6 Pressure Test Point:

As per AS/NZS 5601, a pressure test point shall be provided by the installer prior to the inlet of the appliance

END OF SECTION C

By the end of this section, you should have:

- ☐ An unlined cavity with a standard three pin 230/240V AC supply that the appliance can be plugged into
- ☐ An electrical isolating switch that is accessible once the appliance is installed
- ☐ A suitably sized gas supply to the right hand side of the appliance with a pressure test point, ready to be connected once installed
- ☐ Network cable installed, ready for plugging into appliance (if being connected to internet router/network)

D Installing the flue

For Horizontally terminated flue, see section D1. For Vertically terminated flue, see section D5.

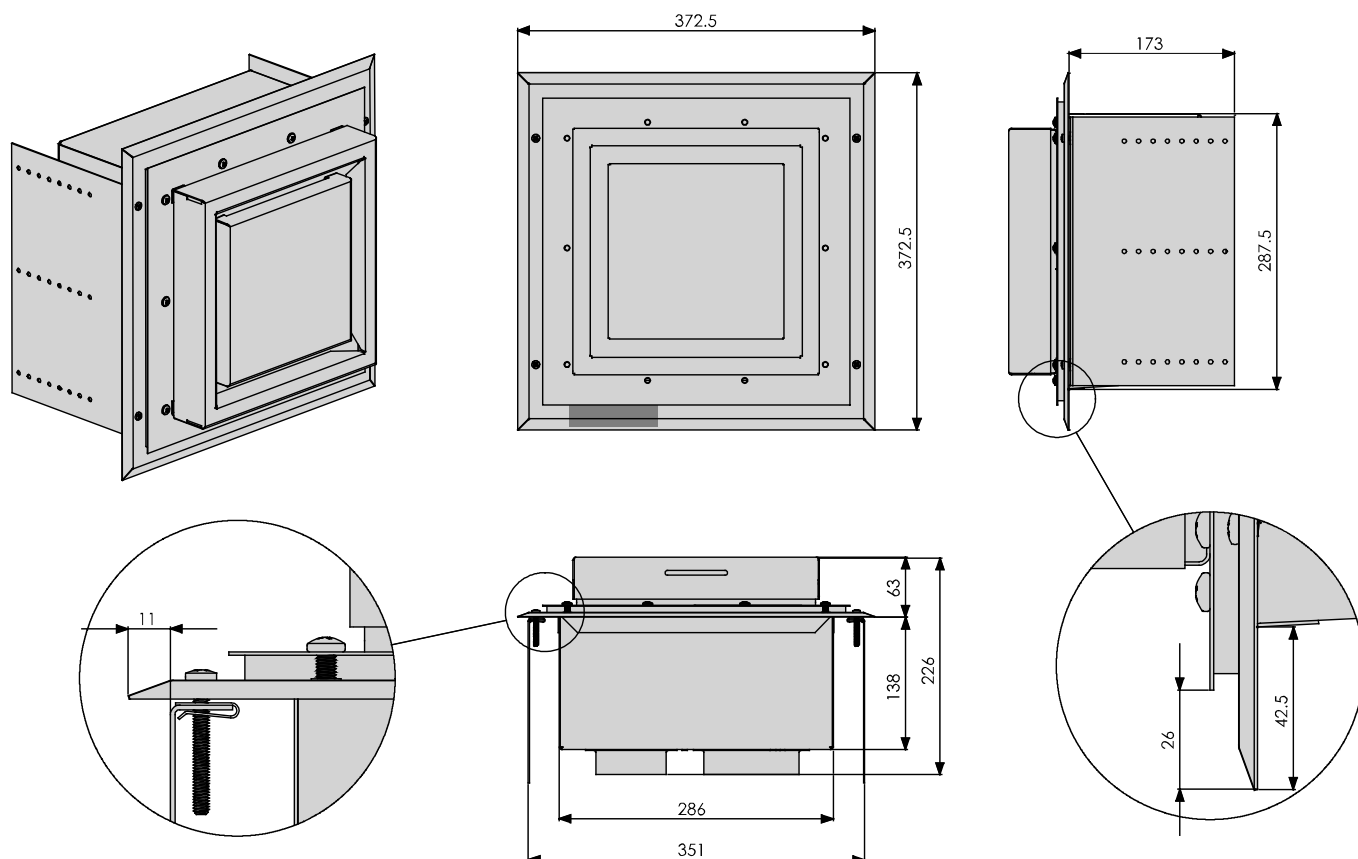
D1 Horizontal Powerflue Description

Note: The appliance is designed only to operate using the approved flexible or PolyPro flue supplied by Escea. Other brands of flue may not fit, and this will affect the appliance warranty.

The Horizontal Powerflue Wall Terminal must be installed in the correct orientation. This allows for the correct operation of the flue system and prevents the ingress of rain.

The Horizontal Powerflue Wall Terminal must be weather-tight when installation is complete to prevent damage to the dwelling. It must be installed by a suitably qualified person.

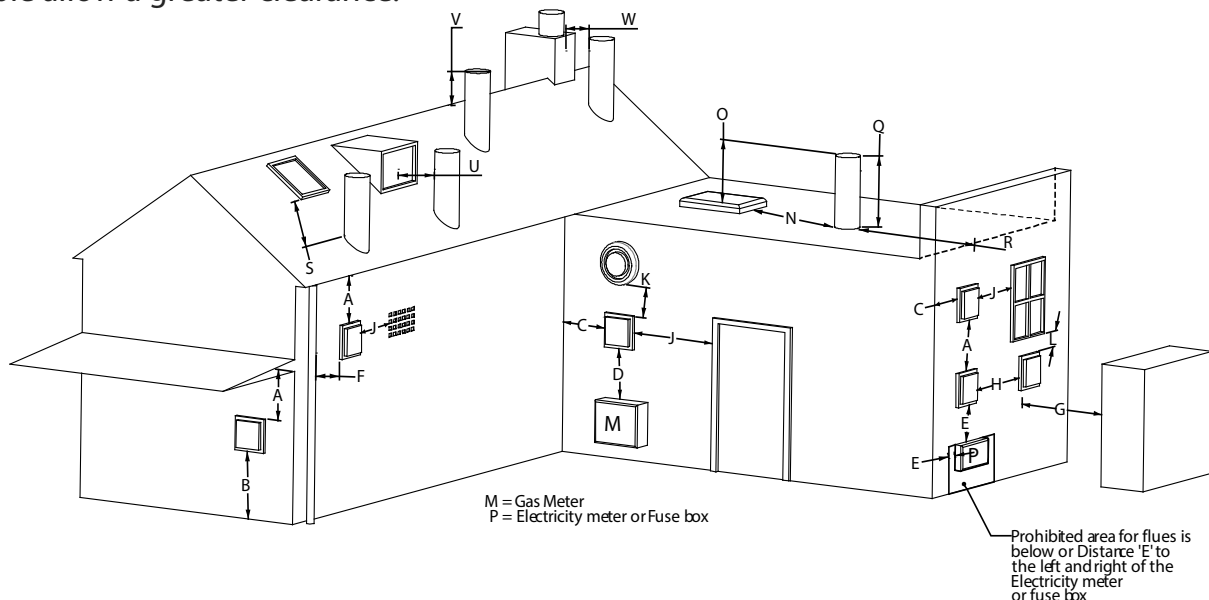
For flexible aluminium flue, access to the powerflue from the outside must be provided for servicing, and this should be taken into consideration when installing in tall buildings. For PolyPro flue installations, internal and external access is required.



D2 Installing in Accordance with Relevant Codes:

The location of the Powerflue Terminal must be installed in accordance with AS/NZS 5601 and any other relevant building codes. If possible, avoid installing the Powerflue Terminal in areas exposed to high winds and extreme weather.

Some of the minimum clearances for a fan assisted terminal are listed below; please refer to AS/NZS 5601 Gas installation standard for full guidance on the design of the flue system. Where possible allow a greater clearance.



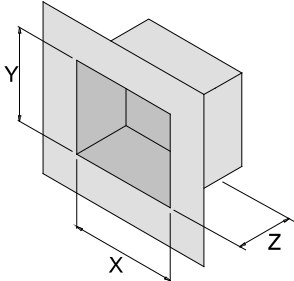
A	Below eaves, balconies and other projections	200mm
B	From the floor, above a balcony or other surface	300mm
C	From a return wall or external corner	300mm
D	From a gas meter or regulator vent	1000mm
E	From electricity meter or fuse box	500mm
F	From a drain pipe or soil stack	75mm
G	Horizontally from any building structure or obstruction	500mm
H	From any other flue terminal or combustion air intake	300mm
J	Horizontally from any openable window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
K	From a mechanical air inlet or spa blower	1000mm
L	Vertically below any openable window, door, non-mechanical air inlet, or any other opening into a building with the exception of sub floor ventilation	300mm
N	Horizontally from a roof light	600mm
O	Vertically from a roof light	500mm
Q	Vertically from a flat roof	500mm
R	Horizontally from a vertical structure	500mm
S	Below a roof window	2000mm
T	Above or either side of a roof window	600mm
U	From a dormer window	1500mm
V	Above the apex of the roof (see note 1 on following page)	300mm
W	From an open flue	1500mm

Notes:

- 1) Should the flue not extend past the apex, the top of the flue should extend at least 400mm from the roof (or 500mm in regions with heavy snow).
- 2) The installation of a flue into a carport is not recommended.
- 3) The flue terminal will get very hot when in use. Precautions should be taken to protect people and animals from injury.

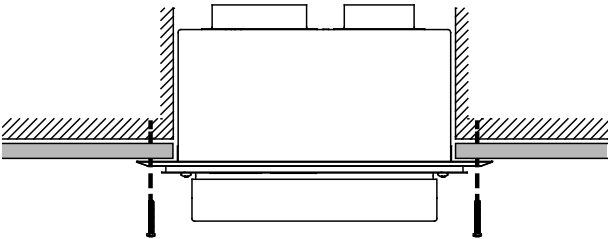
D3 Creating the Hole in the Outside Wall

When cutting the hole in the outside wall, be mindful of how the installation Horizontal Powerflue Wall Terminal will be finished, the installation must be weatherproof.

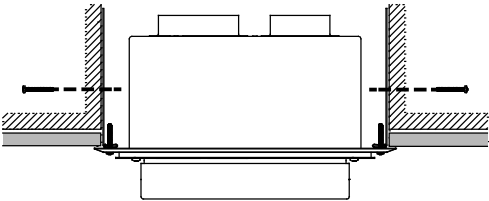


Ideal hole/cavity size for Horizontal Powerflue		
	Without Side Brackets	With Side Brackets
X	298mm	360mm
Y	298mm	298mm
Z	175mm Excluding allowance for flue which exits here	

The Horizontal Powerflue Wall Terminal can be attached to the wall in two ways,
A) From the front of the terminal:



B) By attaching the optional Wall Terminal Installation Brackets to the sides of the cavity and attaching the Horizontal Powerflue Wall Terminal to these, from the front:

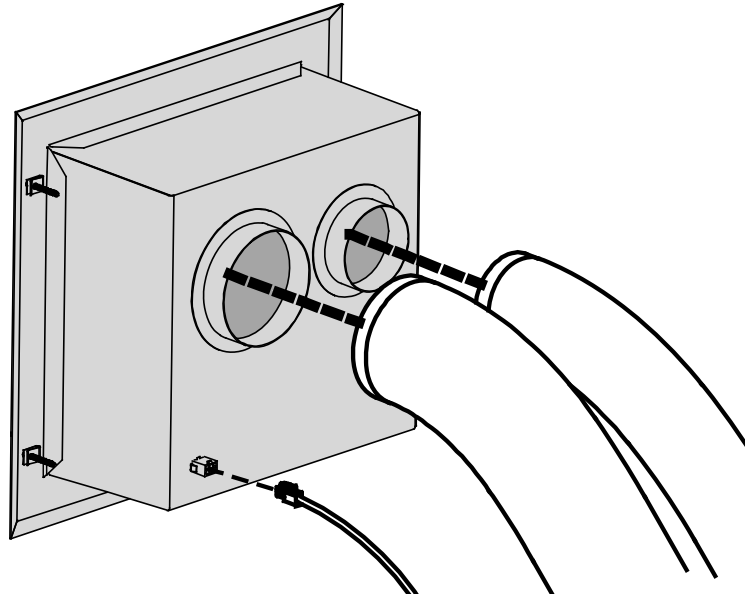


D4 Installing the Horizontal Powerflue Wall Terminal

Attach the Ø100mm and Ø75mm flexible aluminium flues to the spigots on the rear of the Horizontal Powerflue Wall Terminal using the hose band clamps supplied. Plug the powerflue electrical cable into the back of the Horizontal Powerflue Wall Terminal.

For information on the PolyPro flue , see the installation manual which is supplied with the flue components.

Ensure that the electrical cable is firmly secured to the wall terminal or building to prevent damage or disconnection if pulled



Fit the Horizontal Powerflue Wall Terminal into the hole and fix in place, making sure the installation is sealed appropriately to prevent the ingress of water from outside the wall cladding.

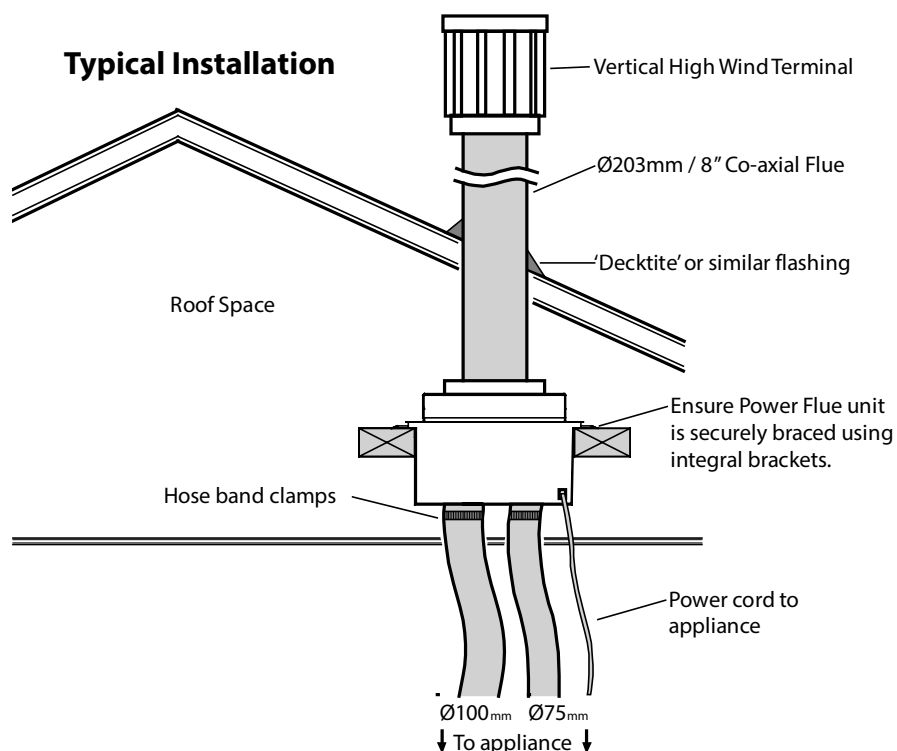
NOTE: It is the responsibility of the installer to ensure the Horizontal Powerflue Wall Terminal is installed to all relevant building codes to ensure weather tightness. This may necessitate the use of appropriate flashing material where appropriate.

IMPORTANT: Ensure that flashings do not restrict the air intake slot around the periphery of the cowl

D5 Internal Vertical Power Flue (Duravent)

The Vertically terminated flue kit is intended for use within an accessible roof space or accessible 'chimney' construction. **Service access must be provided.**

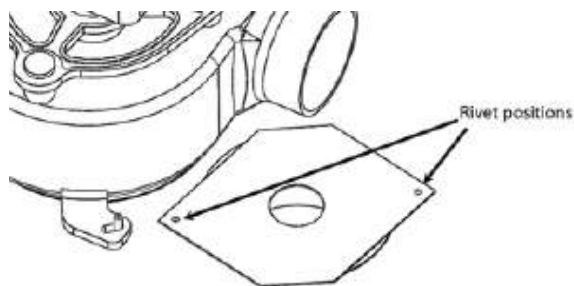
Ensure installation complies with relevant building codes and regulations.



D6 Installation the restrictor plate (Internal Vertical Power Flue Only) (Duravent)

Every Internal Vertical Power Flue (Duravent) must have the restrictor plate fitted when installing a DL850 or DL1100. To do this:

- ☐ Remove the powerflue lid, remove the screw that secures the elbow & then slide the elbow off.
- ☐ Attach the restrictor centrally over the air inlet as shown using the two rivets provided.
- ☐ Replace the elbow, replace the screw, and then replace and secure the lid.



D7 Installing the Universal Vertical Powerflue (Internal Install)

Note: For information regarding an external install of the UVP, go to section D8.

The UVP Internal configuration is designed to have the fan, mounted within the roof space of the house, and the vertical $\varnothing 225\text{mm}$ diameter liner, containing a $\varnothing 100\text{mm}$ flexi, penetrate through the roof. The UVP internal conversion kit comes with 1200mm liner which is specific to the internal installation and must always be used.

Note: The flue setup must comply with section B2 or B3.

Use standard methods to flash the roof penetration. the installation must be weather proof and conform to all local council standards including powered flue termination rules.

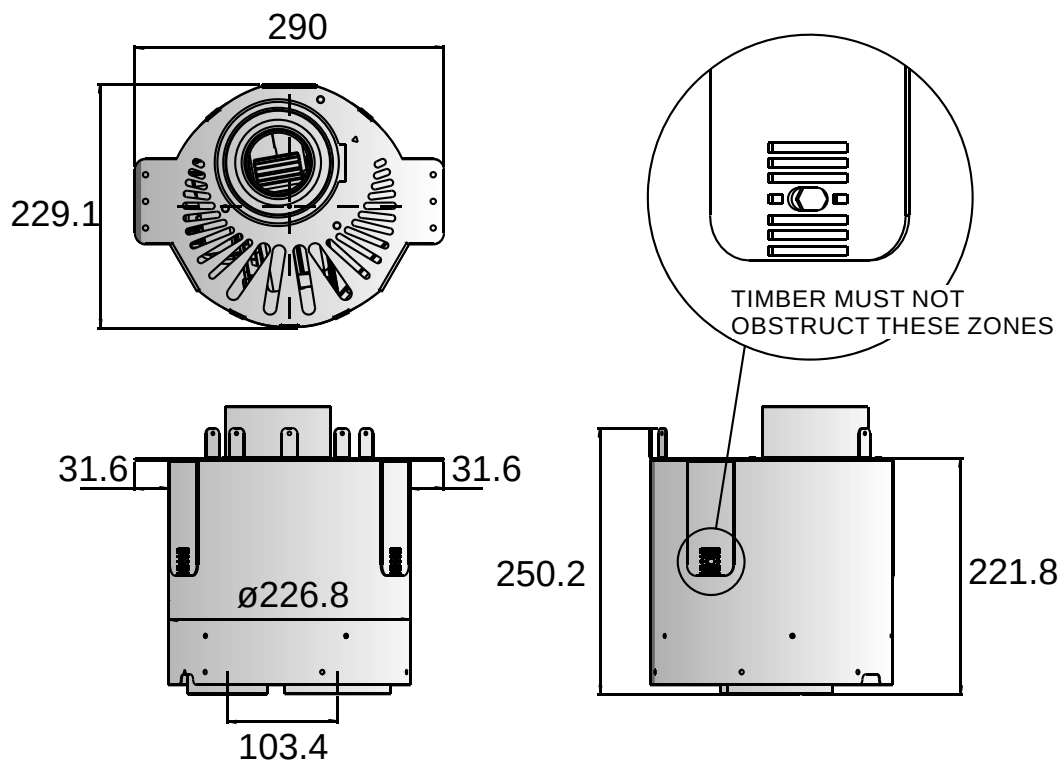
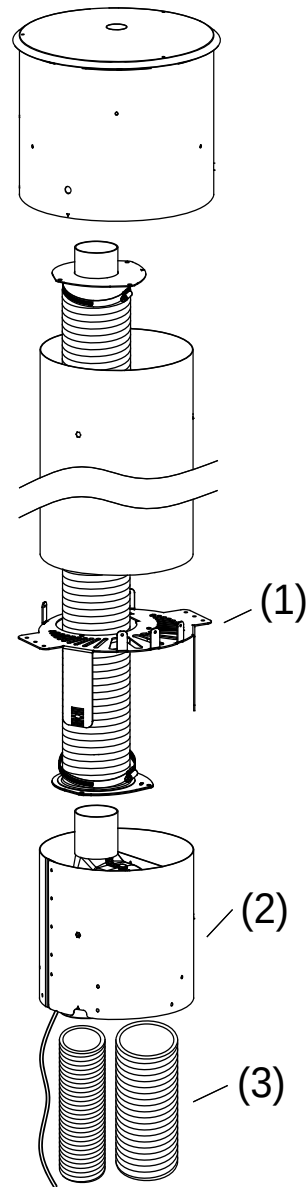
Mount the fan mount bracket(1) to the roof framing and strapping using timber ensuring that the flue is rigid and vertical. Ensure that the mounting timber does not obstruct access to the 3 x M5 screw threads on the side of the fan unit.

Aim to have the fan enclosure(2) mounted as high as possible, mainly to allow sufficient fall for condensation drainage if the flexi-flue is to run horizontally.

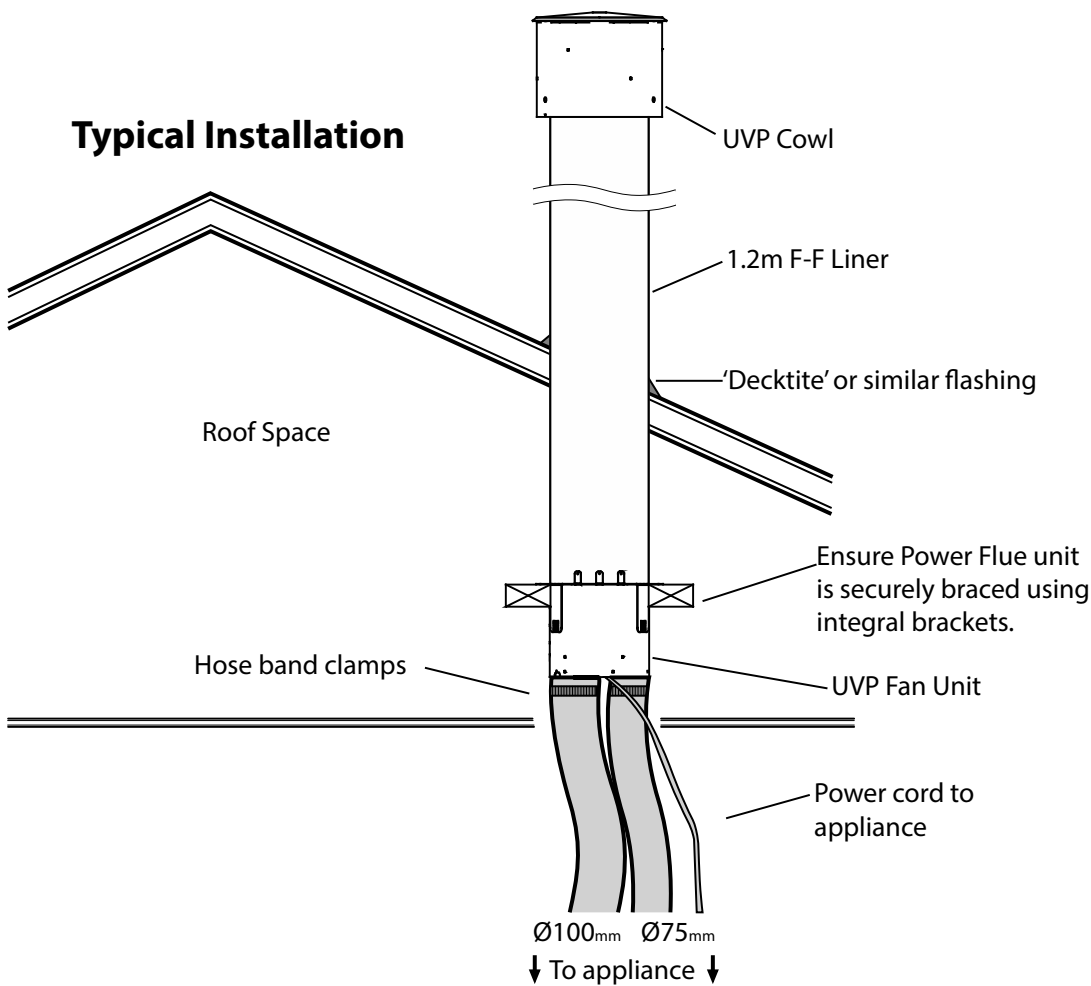
Ensure there is sufficient space below fan enclosure(2) to have access to fit the flexi-flue tubes(3) and allow flowing bends if required.

Note: The UVP-Internal and the flexi flue connections must be installed in a location accessible for service or replacement, a service hatch or removable flashing to allow access may be required.

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. **ENSURE** the $\varnothing 25\text{mm}$ restriction plate is installed on the Inlet.



The UVP-Internal kit is intended for use within an accessible roof space or ‘chimney’ construction. Service access must be provided.
Ensure installation complies with relevant building codes and regulations

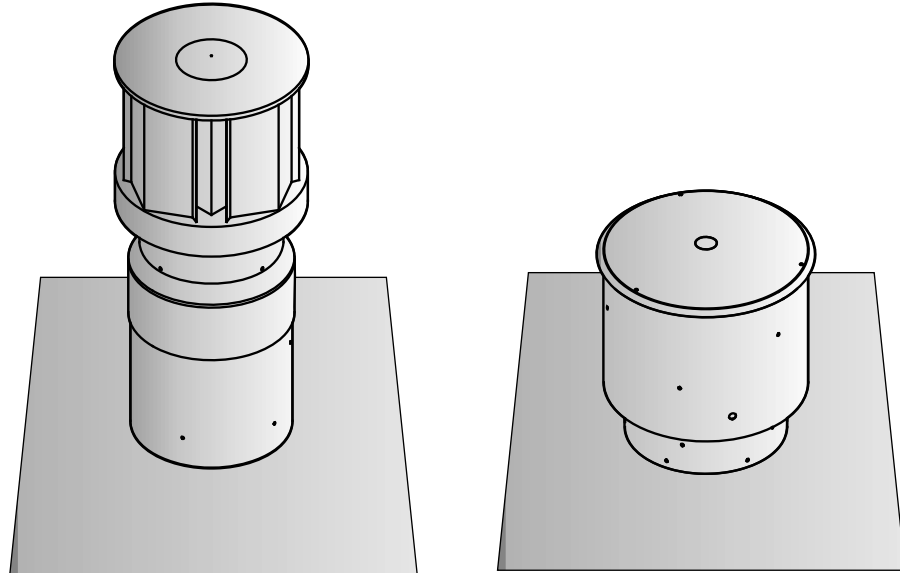


D8 Installing an External Vertical Powerflue (EVP or UVP)

Note: For information regarding an internal install of the UVP, go to section D7.

The EVP and UVP are designed to have the enclosure containing the fan unit mounted externally.

The cowl surround should be fixed in place as shown.



Depending on the kit purchased, mount the EVP/UVP kit to the top of a chimney flashing plate or penetrate the roof with an optional flue liner accessory and fit the EVP or UVP kit over the flue liner; sealing the penetration with a decktite or similar flashing. Ensure the terminal is vertical and rigidly mounted and the flexi flue attached below is fixed to the terminal spigots using the supplied hose clamps and is held in place by drilling 3 holes and screwing 3 self tapping screws evenly around each hose band clamp (as shown in the picture below).

Note: When installing the unit onto a flue liner, ensure the length of flue liner above the roof is the minimum required length. **ENSURE** the Ø25mm restriction plate is installed on the Inlet.



D9 Running the Flue

Run the Ø100mm and Ø75mm flexible aluminium hoses from the cavity to the rear of where the Horizontal or Vertical Powerflue Terminal will be installed. **The flue system for the DL850 / DL1100 is zero rated, so no spaces are required between the flue and any timber framing.** Allow enough stretch in the flexible aluminium flue to allow it to be able to protrude through the wall/ceiling to enable it to be connected to the Powerflue Terminal. The flue should be expanded at each end in order for the flue to be attached to the fire / powerflue.

For information on running the PolyPro flue, see the installation manual which is supplied with the flue components.

It is advisable to secure the flexi flue at regular intervals to prevent vibration and movement. Steel wire or 'builders strapping' may be used for this purpose.

Note: The flexible flue is shipped in a 'compressed' form. Extend it to your desired length by stretching (up to 4m maximum per length).

D10 Running the Powerflue Electrical Cable

Note: The Horizontal Powerflue Wall Terminal is powered from the appliance, and must be connected to the appliance with the supplied electrical cable only.

Run the electrical cable from the cavity where the appliance will be installed to the hole in the outside wall. Ensure it is not draped over, or in contact with, the outer shell of the appliance or the flues and kept clear from any other possible heat sources, sharp edges, or moisture. Fix it appropriately and allow enough cable looped to be able to pull both the appliance and the Horizontal Powerflue Wall Terminal out from their installed positions.

END OF SECTION D

By the end of this section, you should have:

- ☐ A weather-tight installed Horizontal Powerflue Wall Terminal with clearance as specified by AS/NZ5601
- ☐ Reasonable access to the outside face for maintenance purposes
- ☐ Flue attached to the rear of the Horizontal Powerflue Wall Terminal leading back to the appliance
- ☐ The electrical cable from the Horizontal Powerflue Wall Terminal attached to the rear of the installation and run back to the appliance cavity in an electrically safe manner

A

B

C

D

E

F

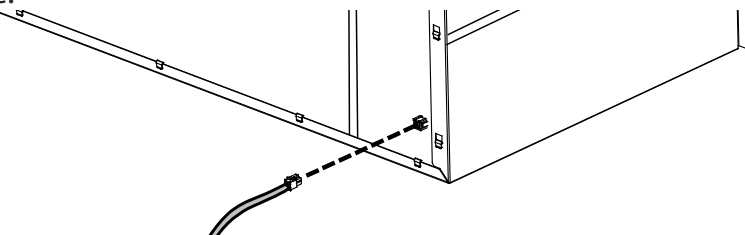
G

SERVICE

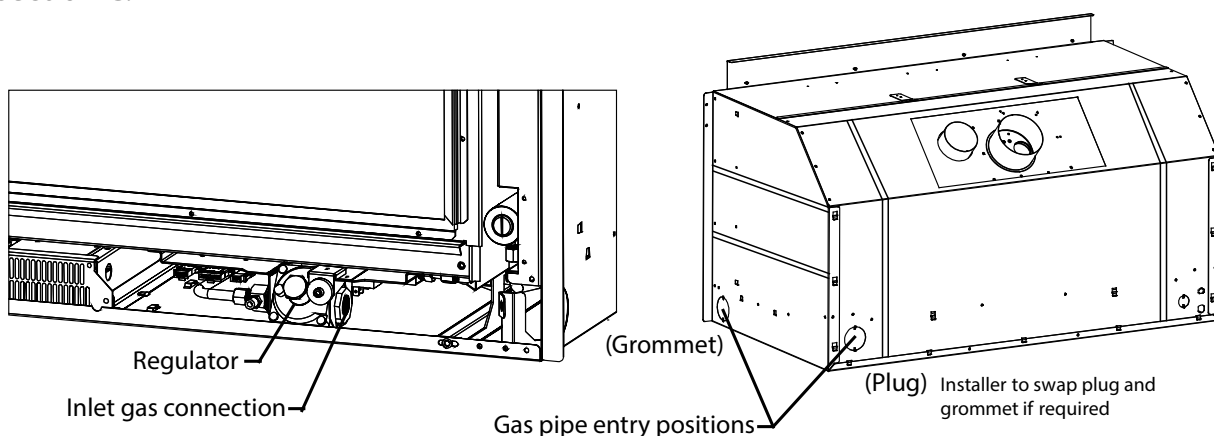
E Installing the Appliance

E1 Installation

Note: Ensure the wall has been lined and finished (plastered/painted/covered) before starting the appliance install. Plug the powerflue electrical cable into the appliance in the back right hand side.



With the appliance electrical cord plugged into the outlet in the cavity, carefully place the appliance on the cavity base and push it into the cavity. Bring the gas connection through the outer shell of the appliance and connect it to the regulator on the bottom right hand side of the appliance. The gas pipe should have already been tested as per section C.



Note: If using rear entry for gas pipe (shown above), re-use the plug from the side entry position.

Note: The regulator that is supplied with the fire **MUST NOT BE REMOVED**. Removal of the regulator, or replacing it with one not intended for use with an Escea fire, will void the limited appliance warranty.

E2 Connecting the Network Cable

If a network cable is being installed for a wired connection to an internet router/network (as per Section C2) then bring the cable through the chassis as described earlier and attach it to the correct socket inside the electronic tray.



Remove the electronic tray by unscrewing the two screws at the front and pulling the tray forward and over the lip in the front of the chassis. Unscrew the four screws in the top and remove the lid. Bring the network cable through the side of the tray and plug it into the network socket. Replace the lid and electronic tray by reversing the steps above. Ensure the network cable does not interfere with the pressure switch hoses beneath the firebox and does not rest against the firebox bottom surface.

E3 Connecting the Flue

Remove the lid of the appliance by removing the two screws on either side of the top front of the appliance.

If there is not enough room to reach into the cavity the appliance may need to be pulled forward slightly out of the cavity. Stretch out the last 300mm of the flues, and reach through into the cavity and connect both the inlet flue (Ø75mm) and the exhaust flue (Ø100mm) to their respective spigots on the rear of the appliance. Orientate and position the hose band clamps to provide easy access from the front of the appliance. Tighten the flue onto the spigots by the use of the hose clamps (provided). Ensure the flue connection is as sound as possible and that the flue connection is air tight.

E4 Fixing the Appliance to the Base and Wall:

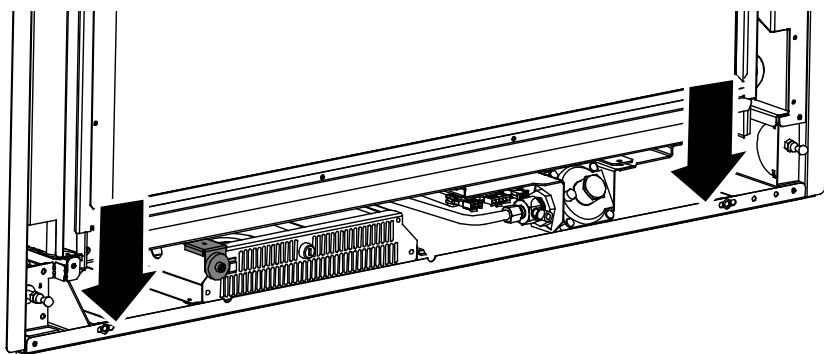
There are several ways that the appliance can be fixed against movement: It is a requirement that this appliance be securely fastened to the wall and base.

Note: It is important that the outer fascia is used during this process to ensure that the appliance is located in the appropriate position within the cavity.

E5 Fixing Appliance to Base:

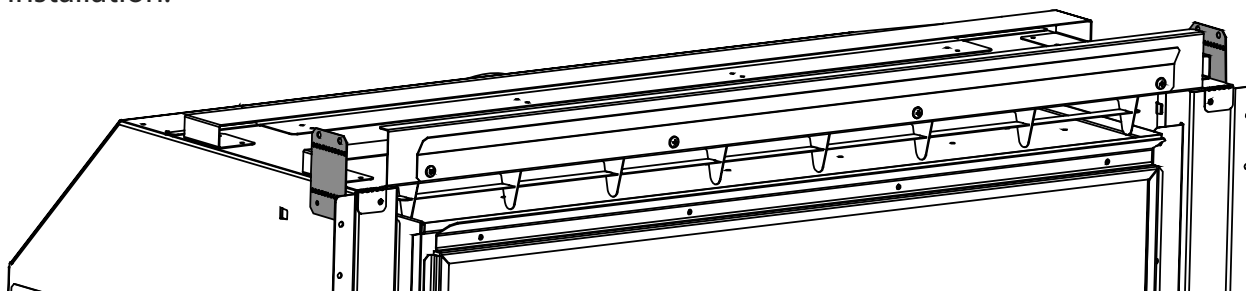
The Appliance has several holes along the front edge of the base panel that have been provided to allow installers to screw the appliance to the floor. Because of a lack of access for drilling it may be necessary to mark the appropriate location for these screws and then remove the appliance and drill holes into hard flooring.

Alternatively a socket set can be used to drive in hex headed screws.



E6 Fixing Appliance to Wall:

The installer must also fix the appliance to the sides of the cavity using the brackets on the side of the appliance shown below. These flanges can be bent to accommodate the installation.

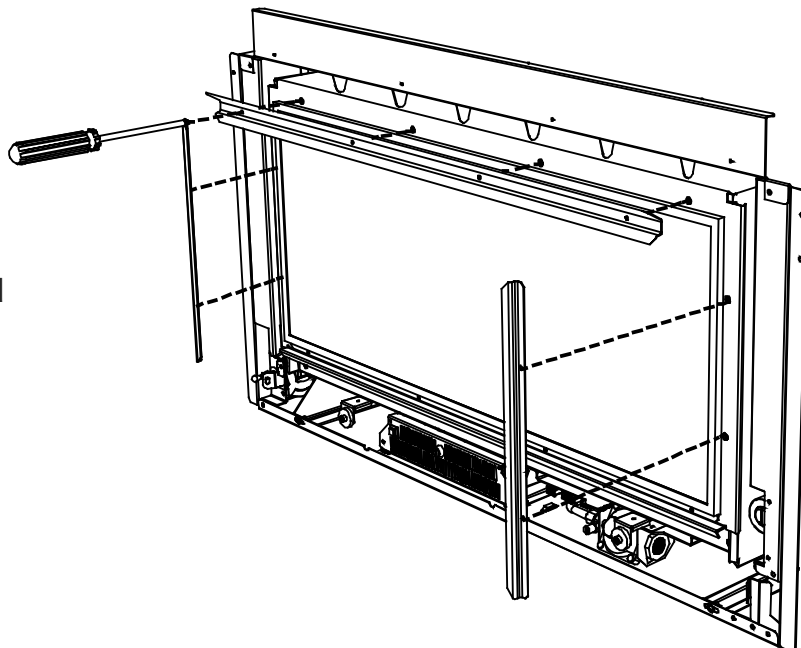


E7 Removing the Glass

Unscrew the top glass retainer bracket and the two side glass retainer brackets. Take care that the glass does not fall forward at this stage.

Pull the top of the glass toward you slightly and lift the glass out of the bottom glass retainer. You may need to tilt the glass to achieve this.

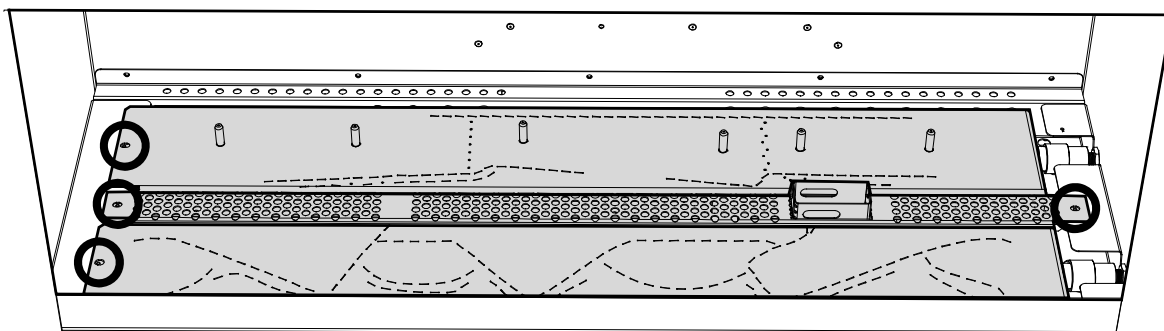
Place the glass carefully aside. Note that the fibreglass tape around the glass can mark carpet and furnishings.



E8 Converting the Appliance Gas Type

This appliance has been factory set to operate on Natural Gas only. To convert the appliance to operate on **propane or ULPG**, proceed as follows:

- ☐ Remove the small perforated shroud on the right hand side of the firebox.
- ☐ Remove the 2 screws securing the burners in place and lift out the burners as shown.
- ☐ Remove the 2 screws securing the pilot guard shown below and lift it out.



Jets	DL850 Front	DL850 Rear	DL1100 Front	DL1100 Rear
NG	Ø2.45mm	Ø2.3mm	Ø2.6mm	Ø2.6mm
Propane	Ø1.4mm	Ø1.3mm	Ø1.4mm	Ø1.3mm
ULPG	Ø1.2mm	Ø1.1mm	Ø1.3mm	Ø1.2mm

- ☐ Remove the front burner jet and replace with the correct jet as stated in the above table.
- ☐ Remove the 2 screws securing the Pilot Cover Plates and slide these out as shown on following page.
- ☐ Remove the 4 screws securing the pilot bracket and lift out the bracket and pilot hood assembly.
- ☐ Remove (un screw) the existing pilot jet and replace with the jet marked red supplied in the conversion kit.

☐ Refit the pilot bracket / Hood assembly and pilot cover plates. **NOTE: Ensure the orientation of the pilot gas ports is as shown in section E9.**

☐ Remove the aeration collars from both burners

☐ Refit the pilot guard and then burners.

☐ Turn the restrictor indicator to the vertical position as shown.

☐ Remove the regulator screw cap and screw out the nylon adjuster screw to remove the existing spring.

☐ Replace the spring with the blue spring supplied in the conversion kit and reassemble the regulator

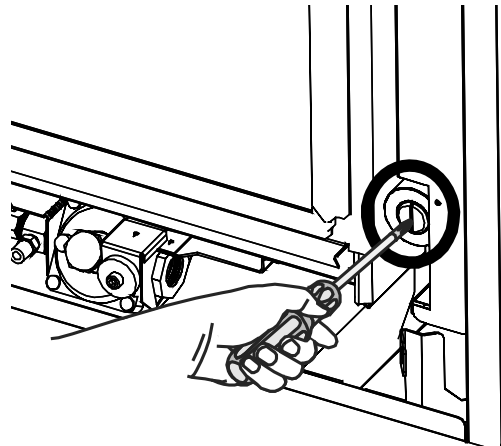
☐ Adjust operating pressure to **2.3kPa for DL1100**

(Propane / ULPG) and the DL850 (Propane) OR

2.6kPa for DL850 (ULPG) by turning the nylon adjuster screw whilst the appliance is running on maximum.

☐ Adhere the Conversion label over the top of the Natural Gas data on the appliance data plate.

☐ Adhere the 'Propane' or 'ULPG' label over the top of the existing Natural Gas label on the side of the appliance (if accessible).



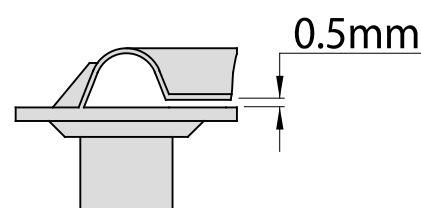
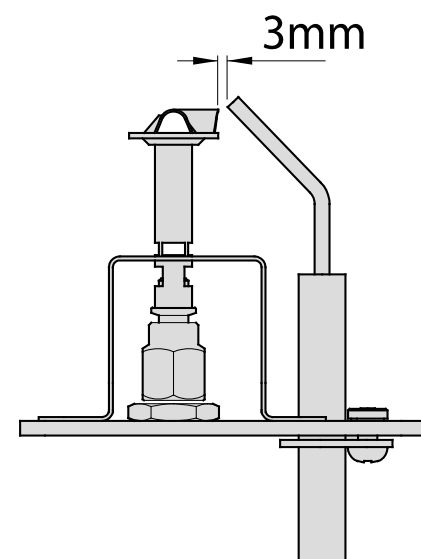
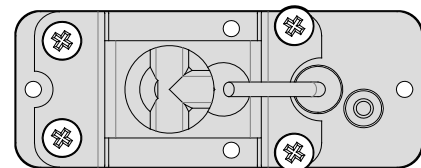
E9 Checking the Pilot Ignition

The placement of the electrode is CRITICAL to the operation of the fire. The gap is factory set but in the event that the electrode or pilot hood have moved during installation or the fire is having trouble lighting or staying lit then below is a guide to electrode placement. Ensure no logs, coals, stones or pieces of Crystalight have worked their way around the pilot guard and are touching the electrode or pilot hood.

If the appliance has difficulty igniting, ensure that the pilot hood has the correct gap for the gas to escape from using feeler gauges.

Ensure there is not an excessive carbon build up on either the electrode or the pilot hood. Clean them if necessary.

As shown below, check (and if necessary, set) the gap between the 3 pilot ports to 0.5mm



E10 Log Fuel Bed Installation

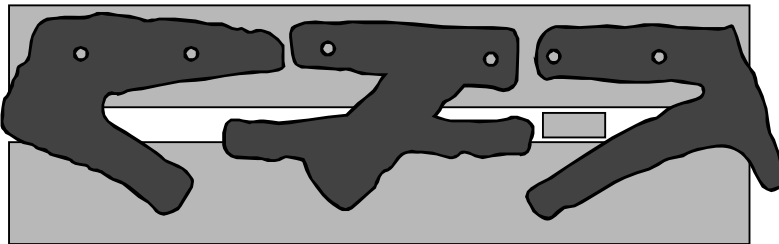
Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Starting at the right hand side, place the 'v' shaped log in place, using the pins on the rear burner to line up with the holes in the base of the log. Ensure the port pattern follows the log shape:

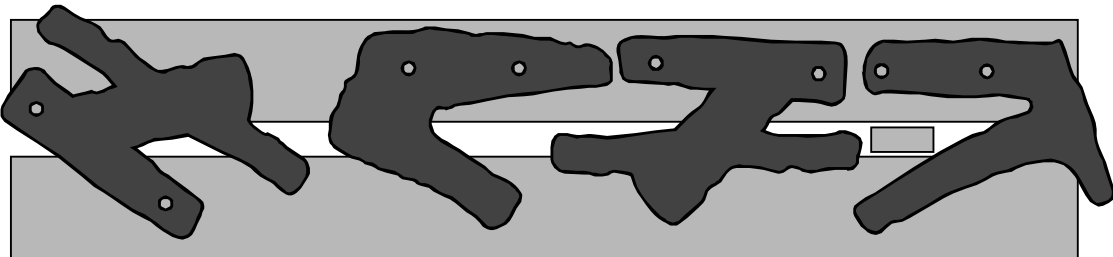


Place the other logs using the same method as above, using the diagrams below to ensure correct log placement

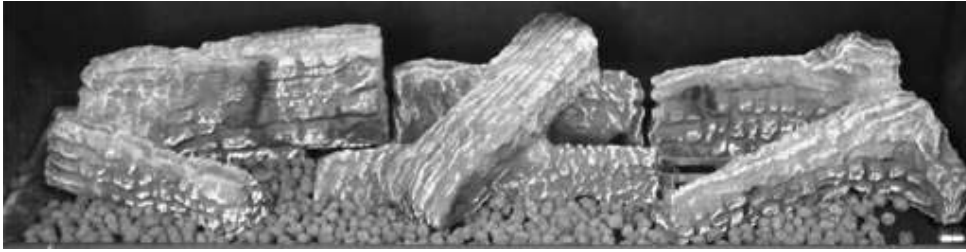
DL850



DL1100



Pour the supplied 'embers' into all the visible gaps around the front of the logs, being careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard. If possible keep the area where the pilot hood flame is directed at the burner ports clear.



Replace the glass and the three glass retainers.

Note: Improper positioning of logs may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper log placement is not covered under warranty.

E11 River Stone or Coal (Pebbles) Fuel Bed Installation

Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

Place all the River Stones or Coals in a single layer atop the burners, covering the entire area. Be careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard, and if possible keep the area where the pilot hood flame is directed at the burner ports clear to aid reliable ignition.



Replace the glass and the three glass retainers.

Note: Improper positioning of Stones/Coals/Pebbles may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper Stone/Coal/Pebble placement is not covered under warranty.

E12 Crystalight Fuel Bed Installation

Note: There are several types of fuel bed for the DL850 and DL1100. Please check which fuel bed you have been supplied with and follow the installation instructions for that fuel bed carefully.

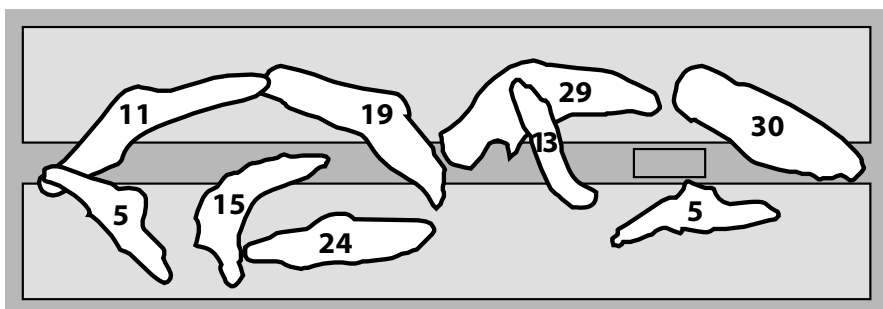
Place all the Crystalight pieces in a SINGLE LAYER atop the burners, covering the entire area. Be careful to avoid letting any fall down between the pilot head, spark electrode and pilot guard, and if possible keep the area where the pilot hood flame is directed at the burner ports clear. Replace the glass and the three glass retainers.

Note: Improper positioning of Crystalight may create carbon build-up and will alter the unit's performance. Malfunctioning due to improper Crystalight placement is not covered under warranty

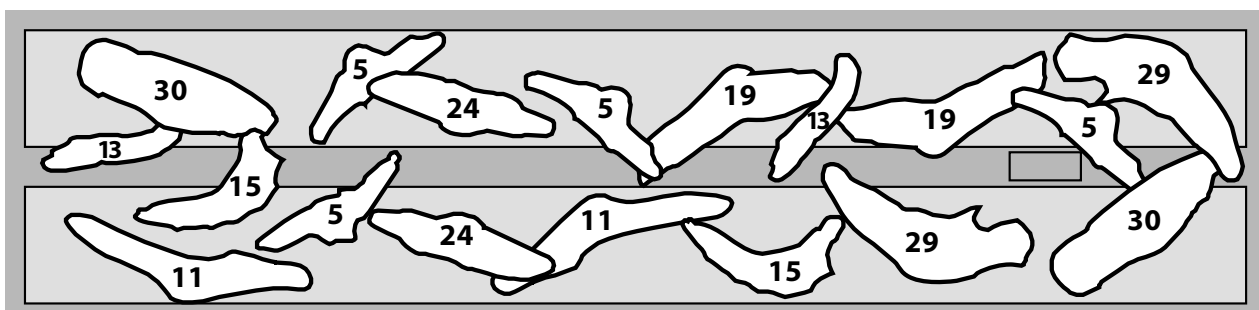
E13 Crystalight and Driftwood Fuel Bed Installation

As per E12, and then once Crystalight has been evenly spread across the base of the firebox place the supplied driftwood on top of the Crystalight as shown:

DL850



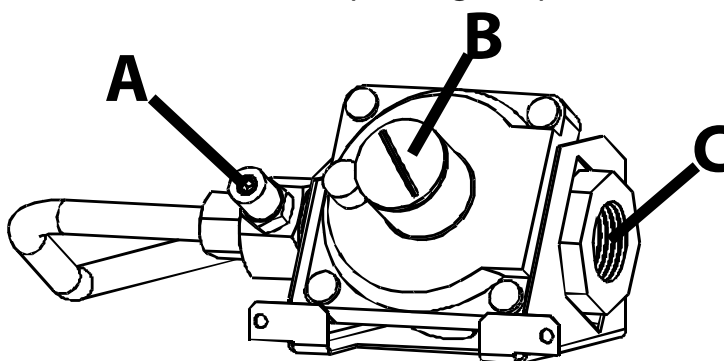
DL1100



E14 Checking the Operating Pressure

WARNING: The regulator that is supplied with the fire **MUST NOT BE REMOVED**. Removal of the regulator, or replacing it with one not intended for use with an Escea fire, will void the limited appliance warranty.

Check the operating pressure at the regulator located at the front RH corner of the appliance. This is best done before the fascia panels have been fitted to avoid fascia damage. A pressure test point is available for the operating test pressure (as shown below).



A = Operating Pressure test point

B = Pressure adjustment screw (To access first remove metal cap)

C = Inlet gas connection (1/2" Female BSPT)

☐ Check the inlet pressure to the appliance. Attach manometer tube to the first test point upstream of the appliance (typically at the gas utility meter or auto change device for a propane bottle station)

□ Run the heater on full (both burners running) and measure inlet pressure with all the other gas appliances in the building running. If pressure does not fall within the maximum or minimum pressures listed on the table below then reassess installation pipe size or upstream regulator settings.

□ Remove the operating pressure test point screw. Connect manometer tube and measure pressure with heater running on full (both burners running) and with all the other gas appliances in the building running.

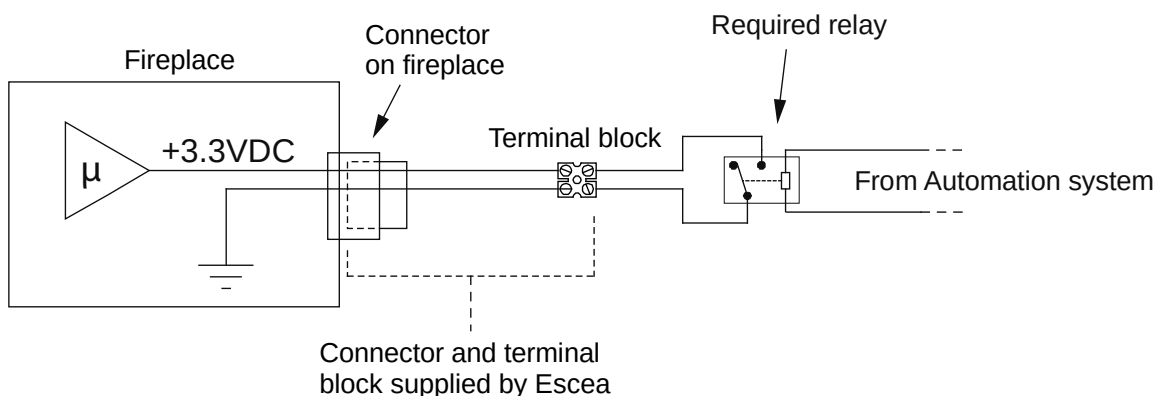
□ If the appliance has not had a gas type conversion on installation, then the appliance regulator pressure has been factory set to 1.0kPa. Please check that the operating pressure is exactly as listed and if not, adjust the screw in the centre of the regulator until the pressure is correct.

□ Replace operating test point screw and leak test both test points.

	Operating Pressures	Propane	Natural Gas	ULPG
DL850	Minimum inlet pressure	2.75kPa	1.13kPa	2.75kPa
	Maximum inlet pressure	5.0kPa	5.0kPa	5.0kPa
	Operating pressure	2.30kPa	1.0kPa	2.60kPa
DL1100	Minimum inlet pressure	2.75kPa	1.13kPa	2.75kPa
	Maximum inlet pressure	5.0kPa	5.0kPa	5.0kPa
	Operating pressure	2.30kPa	1.0kPa	2.30kPa

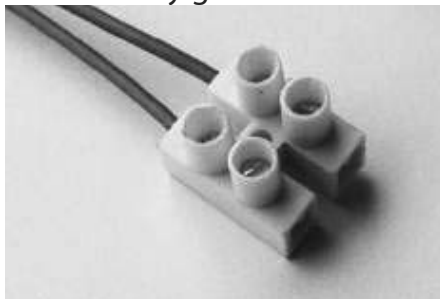
E15 Home Automation Setup

Escea D-Series fireplaces have a simple interface for connection to a home automation system. Simply put this allows the fireplace to be woken up and started and then shut down. The “Close to wake” connection shown is essentially taking one of the 3.3 volt DC pins on the fireplace micro controller and pulling it down to ground. In order to isolate the fireplace from the automaton system a relay needs to be used as shown. This allows you to use any nominal voltage to drive the relay while keeping the fireplaces 3.3V supply isolated.



Note: you will need to match the relay coil voltage with the voltage from your automaton system.

The Home Automation connection can be found inside the DL850 and DL1100 electronic tray (for access instructions see section E2). The socket is shown to the right and can be identified by green wires.



Home Automation Operation:

Relay closed

The fireplace will start in a medium setting until it receives a signal from the remote control unit (up to 4 minutes). Once the remote has communicated with the fireplace it will turn on and begin operating the fireplace thermostatically. The remote will use whatever temperature the user has previously set and cannot be altered by the home automation system. The fireplace will continue to operate while the relay is closed.

Note: If the fireplace cannot communicate with the remote controller within 10 minutes of the relay contact closure then the fireplace will shut down and return to standby. The remote controller is required to be operating within range of the fireplace for its safe operation.

Relay open

If the fireplace was operating with a closed relay then upon opening the relay contacts the fireplace will shut down and return the remote controller to its standby mode when it next updates (up to 4 minutes). While the relay is open the fireplace will be in standby mode and available for manual operation by the user.

END OF SECTION E

By the end of this section, you should have:

- ☐ The appliance installed in the cavity
- ☐ The appliance fixed to the cavity base and wall lining
- ☐ The appliance plugged into a mains electricity supply
- ☐ The selected fuel bed installed and glass in place
- ☐ The appliance gas supply attached and pressure tested with all other gas appliances running
- ☐ Checked that the appliance ignites reliably and safely at least three times

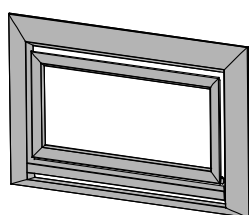
F Fitting the Fascia and Finishing Installation

F1 Fitting the Fascia Panels:

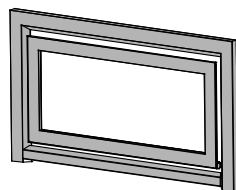
To avoid scratches or knocks to the fascia panels of this heater they must be fitted at the complete conclusion of the installation process. It may be necessary to use the outer fascia to initially locate the heater but then remove it again so that there is no chance of damage. Use the soft gloves provided whenever handling the fascia.

Never, ever rub the fascia panels. Refer to cleaning instructions supplied with fascia.

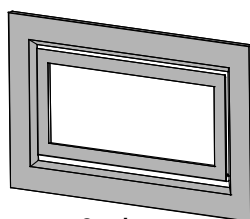
There are four fascia types available with the DL850 / DL1100:



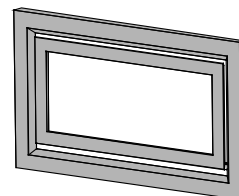
Velo (4 Sided)



Rado



Quadrato



Quadrato Lite

The fascia installation will depend on the fascia and cavity type. For:

Velo Four Sided, see section **F2**

Quadrato / Quadrato Lite, see section **F3**

Rado, see section **F4**

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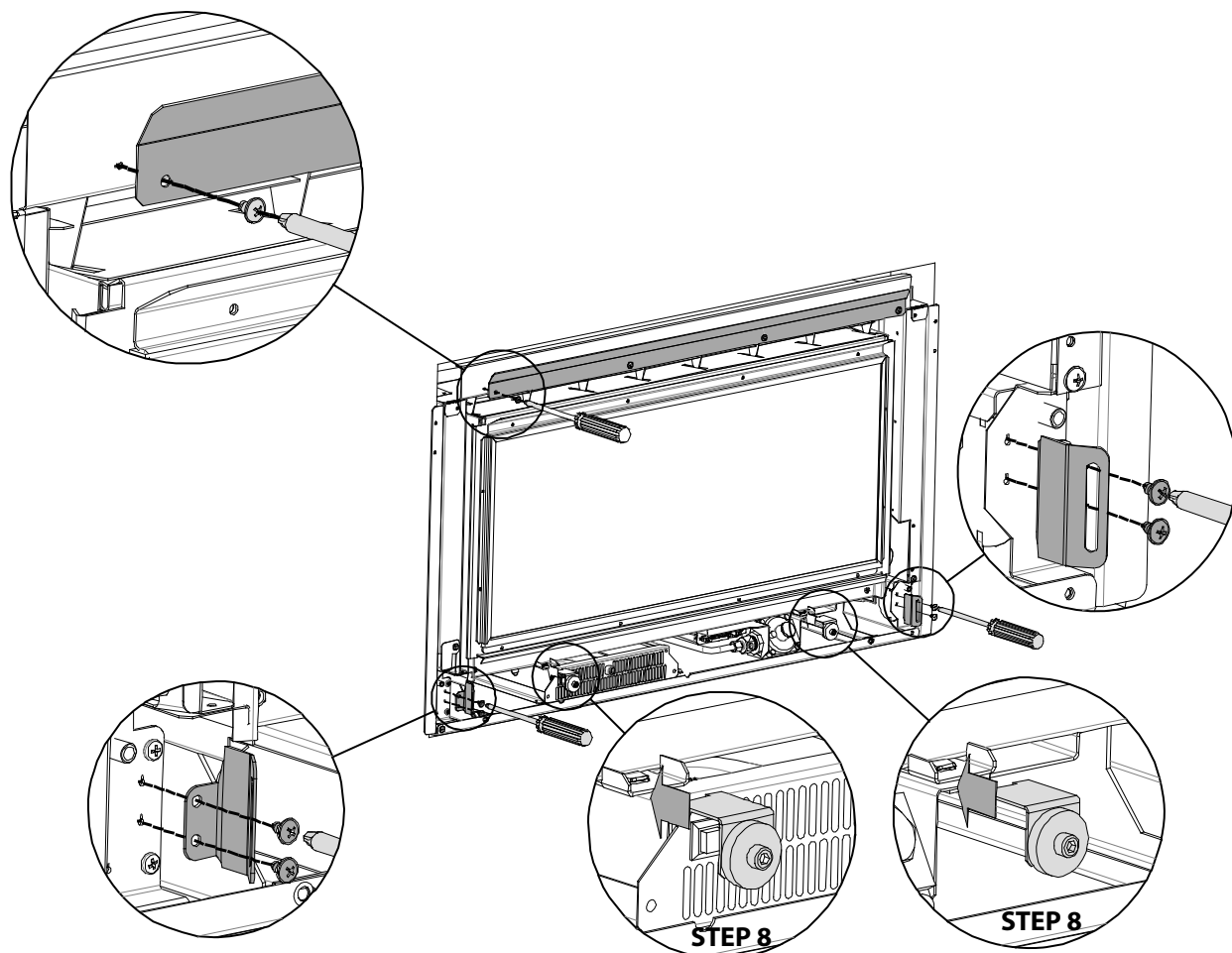
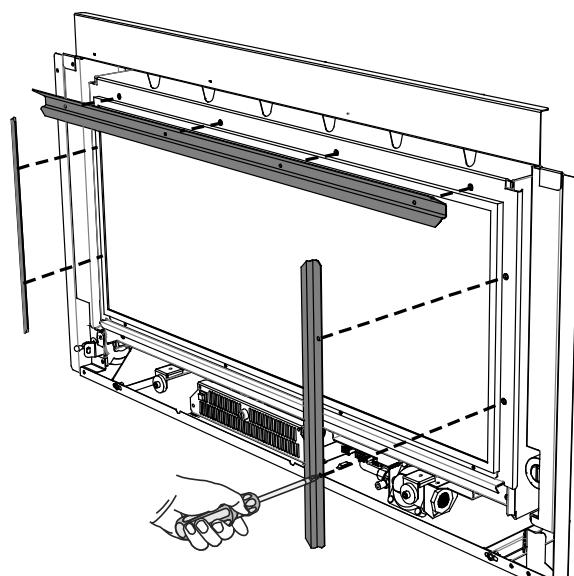
SERVICE

F2 Fitting the Velo Four Sided Fascia Panels

Step 1: Ensure the glass and all glass retainers are securely fitted. Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

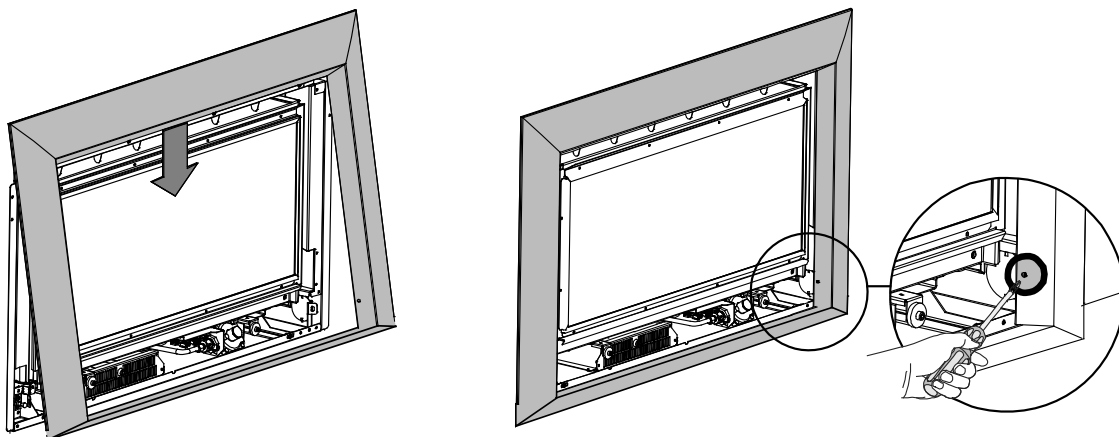
Step 2: Attach the Velo Outer Fascia Bracket to the top lid as shown below:

Step 3: Fit the Velo Outer Fascia brackets to the bottom left and right sides of the appliance as shown.

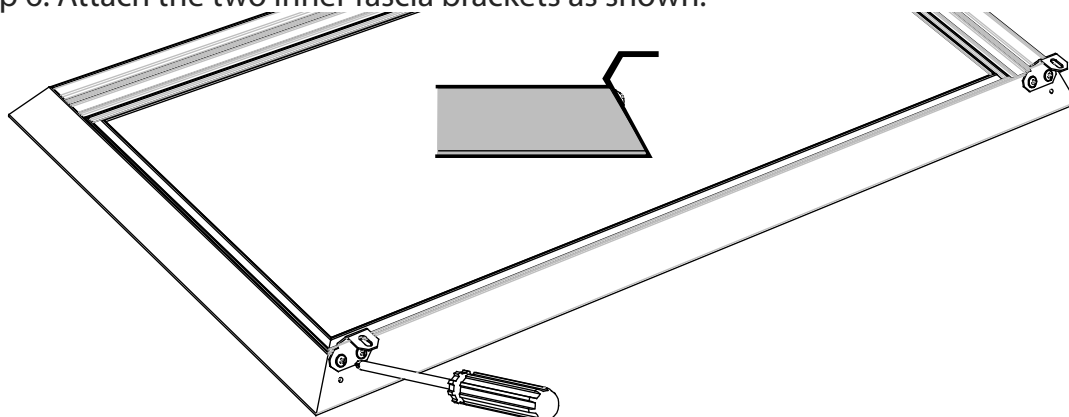


Step 4: Wearing the fabric gloves supplied with your fascia kit, hang the Outer Fascia from the Velo Outer Fascia Bracket attached to the top lid as shown

Step 5: Check that the Outer Fascia is centred on the chassis. Screw the Outer Fascia to the chassis at the bottom left and right of the Outer Fascia as shown

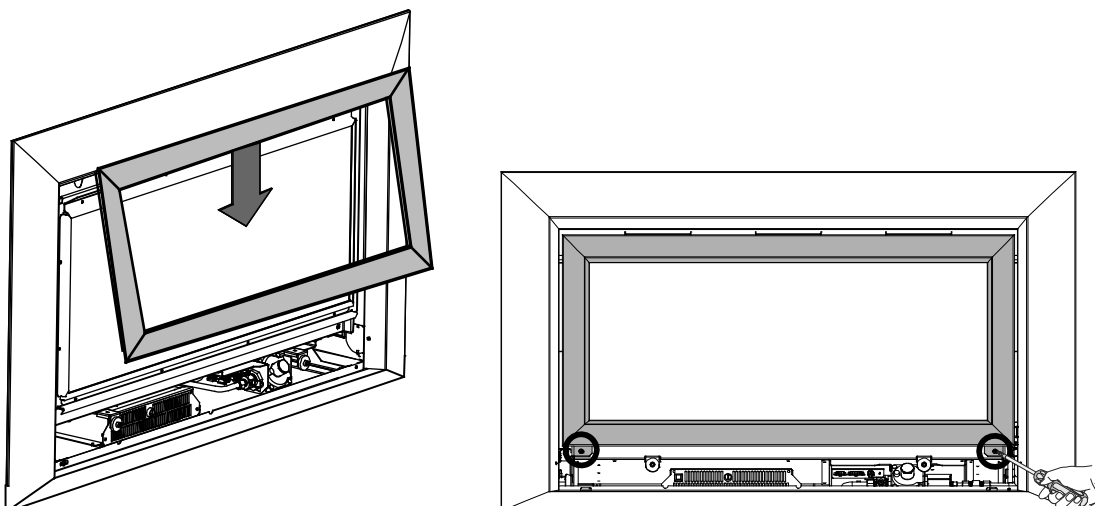


Step 6: Attach the two inner fascia brackets as shown:

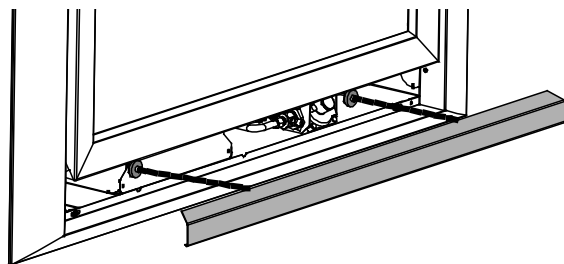


Step 7: Hang the Inner Fascia from the metal bracket on the front of the firebox. Centre the Inner Fascia relative to the Outer Fascia.

Step 8: Screw the Inner Fascia to the bottom left and right of the firebox as shown



Step 9: Push the supplied magnet brackets into position. Place the bottom fascia trim onto the magnets. If this panel does not fit, adjust the outer fascia side to side or the appliance in/out until the trim fits well.



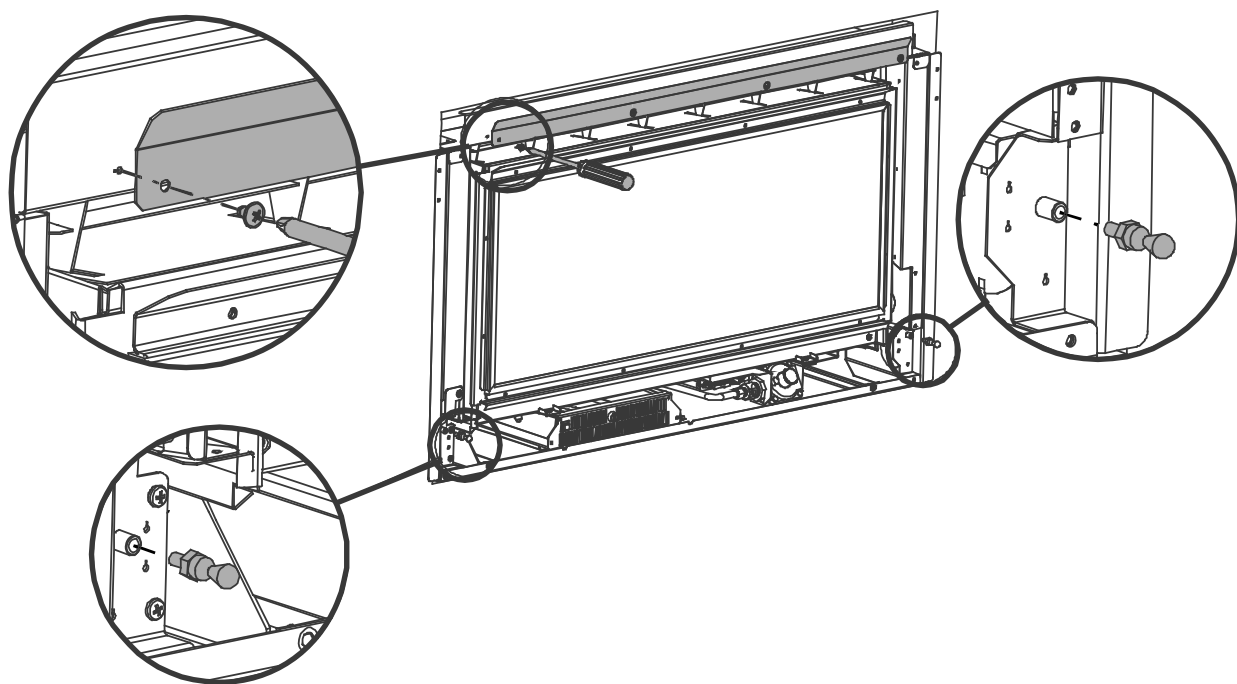
F3 Fitting the Quadrato or Quadrato Lite Fascia Panels

Step 1: Ensure the glass and all glass retainers are securely fitted

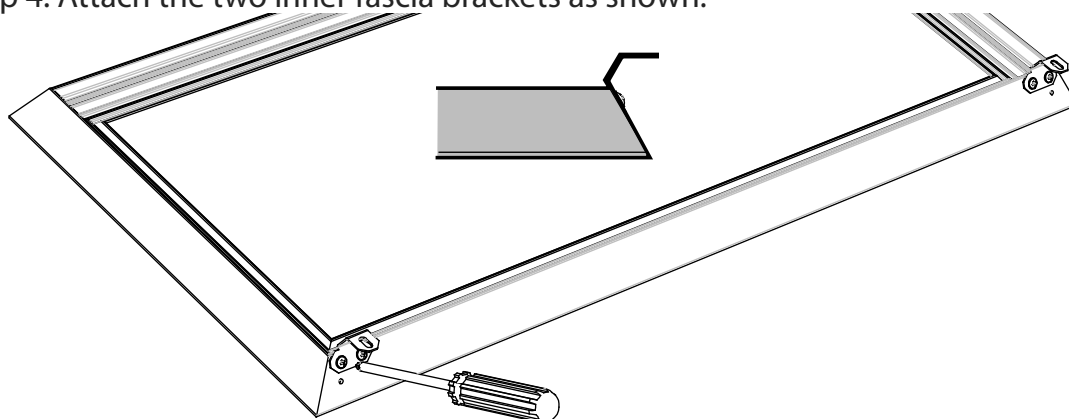
Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

Step 2: Attach the Outer Fascia Bracket to the top lid as shown below

Step 3: Screw the two Outer Fascia studs into the two brackets at the bottom left and right of the appliance as shown below.

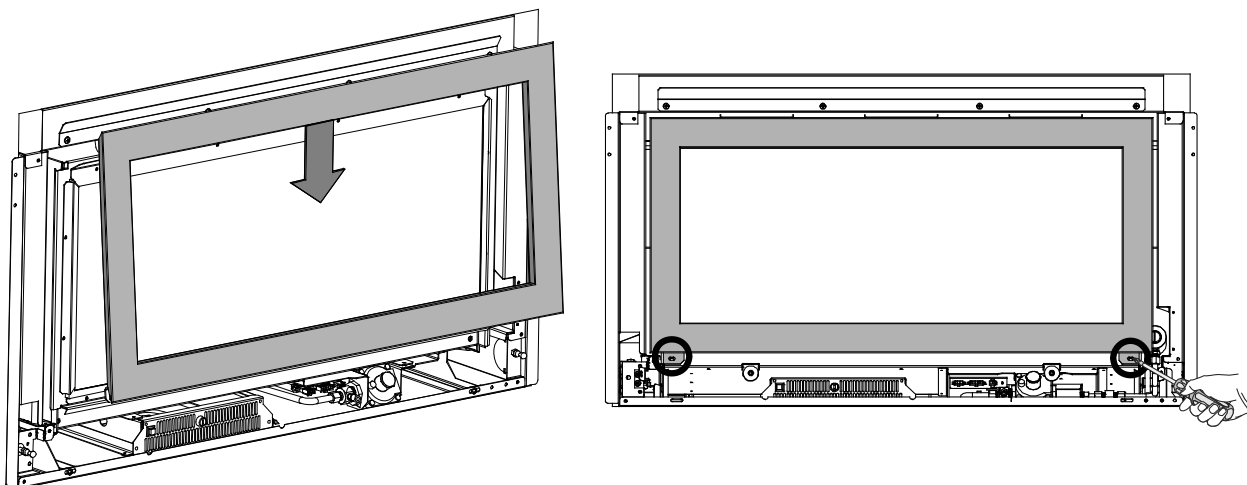


Step 4: Attach the two inner fascia brackets as shown:

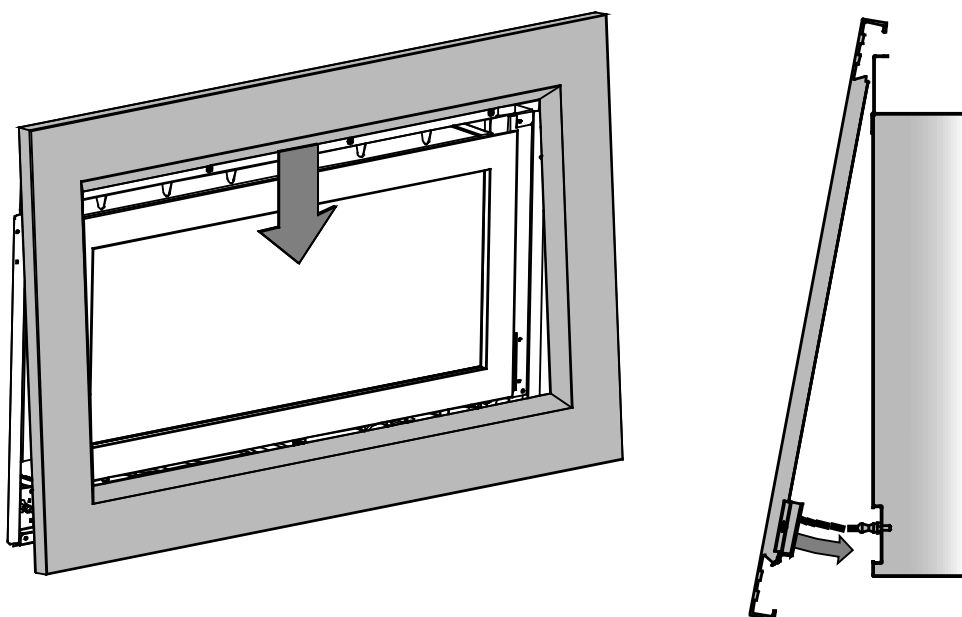


Step 5: Hang the Inner Fascia from the metal bracket on the front of the firebox.

Step 6: Screw the Inner Fascia to the bottom left and right of the firebox as shown below.



Step 7: The Outer Fascia is now fitted over the top of the Inner Fascia. Hang the Outer Fascia (larger one) from the 30 degree flange at the top of the fireplace, being very careful not to damage either the Inner or Outer Fascias as there is not a lot of room to fit the Outer over the Inner. Once the Fascia is hung on this flange and clear of the Inner Fascia it will swing down and press firmly into place.



TAKE CARE: When securing the outer fascia, ensure it does not hit the inner fascia.

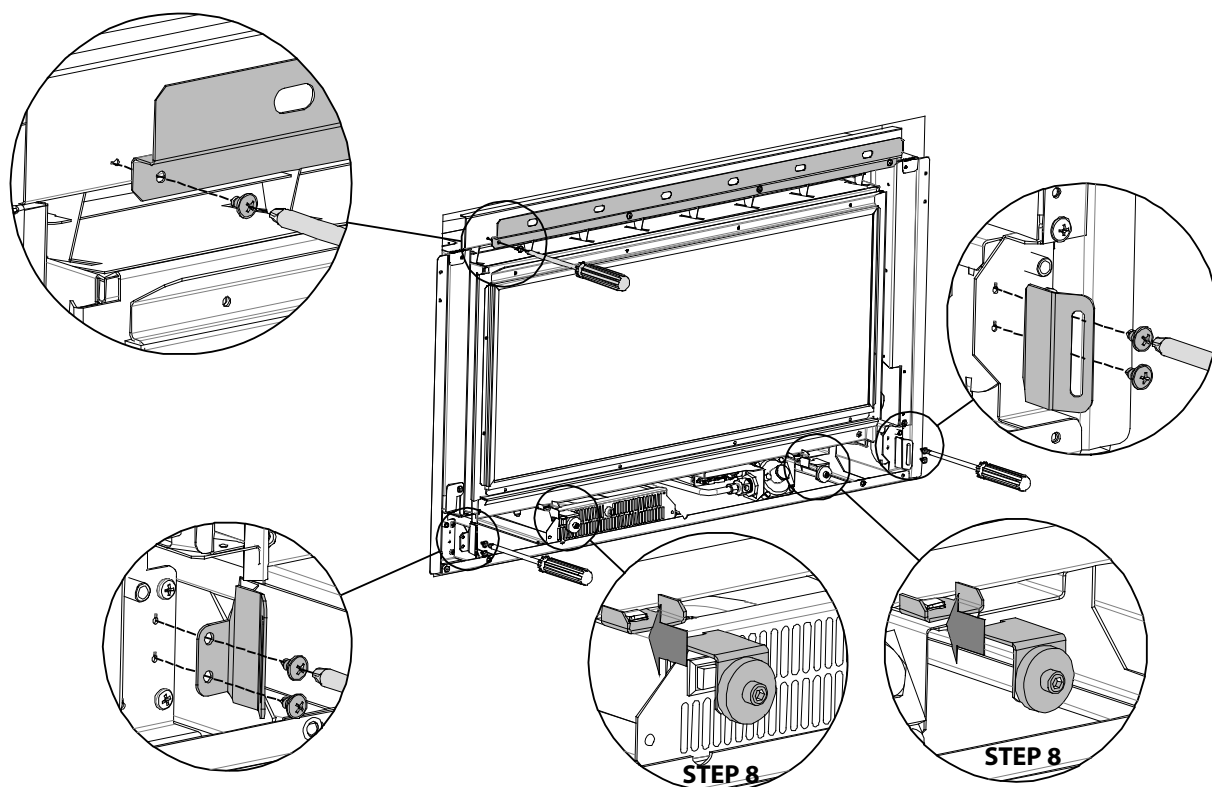
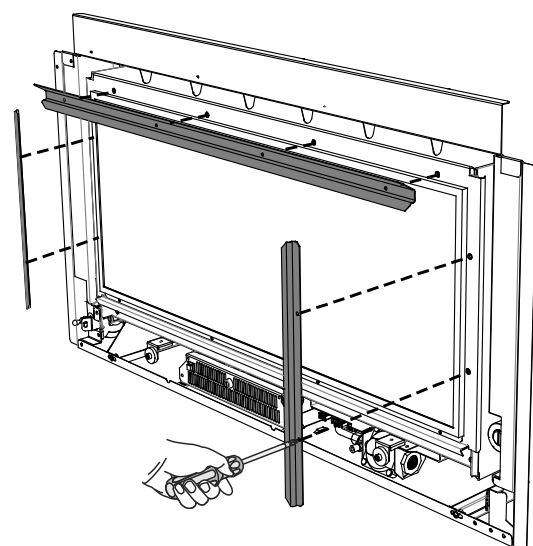
Step 8: Once it has clipped onto the fireplace check that the Fascia is parallel with the wall. The fascia installation is now complete.

F4 Fitting the Rado Fascia Panels

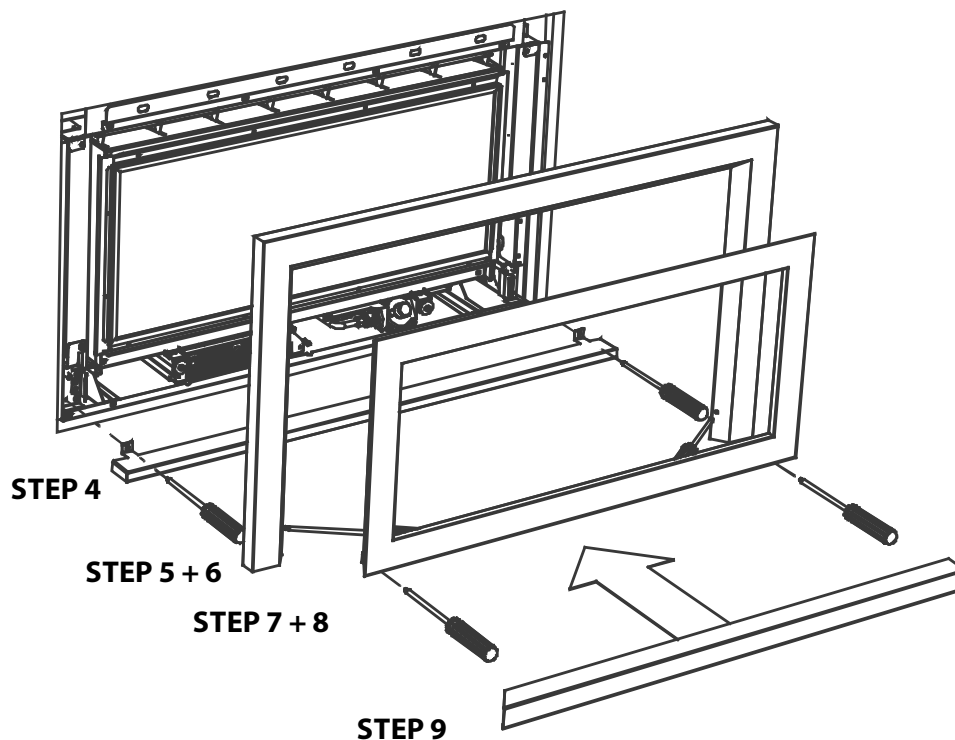
Step 1: Ensure the glass and all glass retainers are securely fitted. Note: If the glass gasket requires a replacement, call your nearest Escea agent who will ensure the part is replaced with the correct type. In the event that the glass is broken by impact, purchase the replacement from an authorised Escea agent only.

Step 2: Attach the Rado Outer Fascia Bracket to the top lid as shown below. Note: Ensure the correct orientation of the bracket. If the bracket is installed upside down, the fascia will not fit.

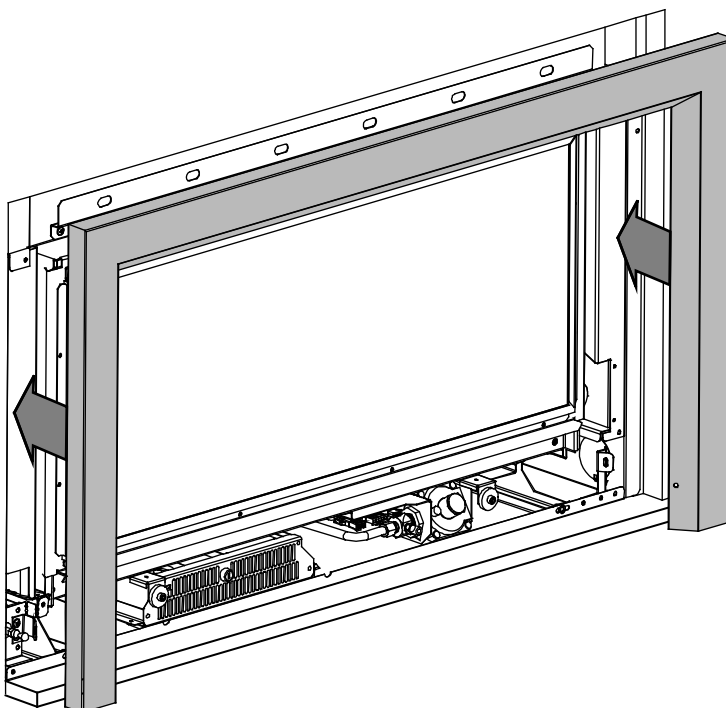
Step 3: Fit the Rado Outer Fascia brackets to the bottom left and right sides of the appliance as shown below.



Step 4: Attach the lower foot to the fascia by screwing it in the positions shown below.

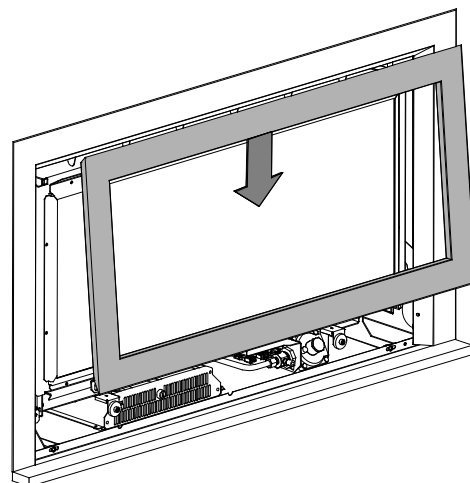


Step 5: Hang the Outer Fascia from the magnet bracket attached to the top of the fire-box. Insert the fascia so that it is parallel with the front of the gas fireplace. The Hex-nuts attaching the magnets to the fascia will locate in the holes on the magnet bracket, securing the Outer Fascia in the correct position. If this fascia does not fit, check to make sure the magnet bracket installed above is in the correct orientation.

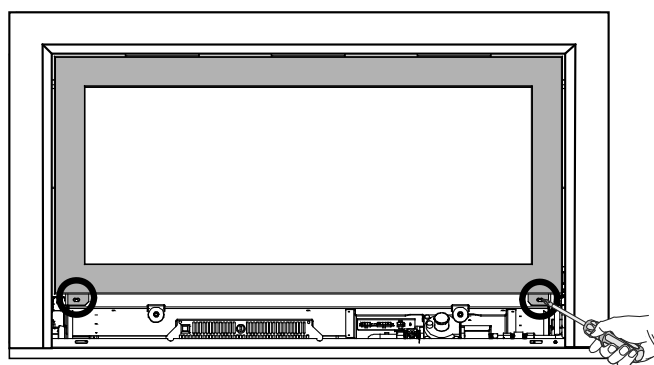


Step 6: Fit the two screws at the base of each side of this fascia. The heater may have to be adjusted in or out of the cavity to ensure fascia fits correctly.

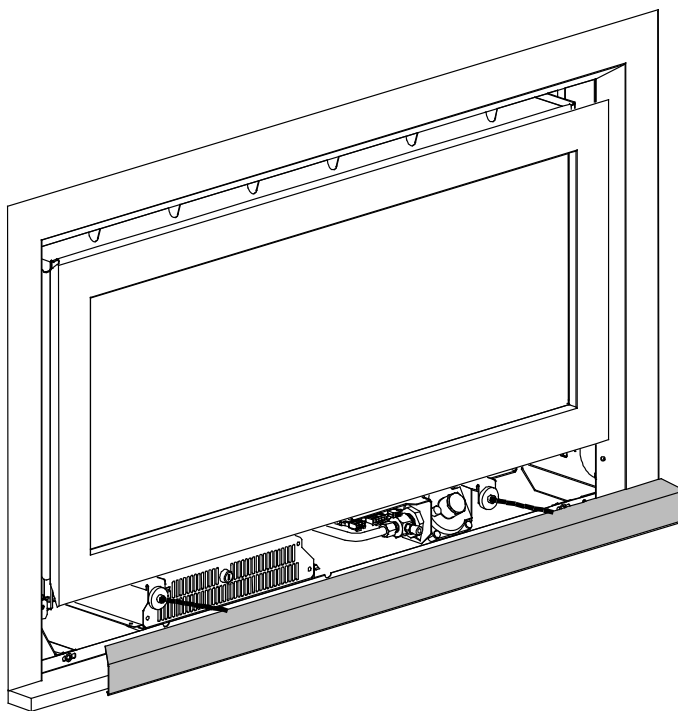
Step 7: Attach the inner fascia brackets to the Inner Fascia as per the instruction page supplied with the fascia. Hang the top edge of the Inner Fascia from the lip that extends at 45 degrees from the top of the firebox. This fascia is attached to the fire at its base by two screws. Leave the screws loose enough to be able to adjust the Inner Fascia.



Step 8: Check that the Inner Fascia is centred. If this panel is not centred, adjust the Inner Fascia side to side until the spaces on either side are even. Tighten the screws to fix the Inner Fascia in place.



Step 9: Push the supplied magnet brackets into position. Place the bottom fascia trim onto the magnets. If this panel does not fit, adjust the outer fascia side to side or the appliance in/out until the trim fits well.



F5 **Locating Wall Mount Cradle for Wireless Control:**

The appliance’s remote contains the thermostat that will sense the room temperature and communicate this back to the heater via radio frequency.
A wall mount cradle has been provided for the wireless control and where possible the control should be housed in this cradle.

The location of this cradle should be decided by taking into account the following factors;

- Simple, convenient access for the user
- Away from air flow and drafts through the room
- The parts of the room that people are likely to spend time
- Away from direct sun light
- A suitable distance away from the heater.
- Ideally 1.2m to 1.5m from the floor

The radio frequency signal will go through some walls but for best results Escea suggest that the cradle position is between 1 and 5 metres away from the heater.

Please ensure that cradle is screwed firmly onto the wall using the screws provided.

F6 **Operating the Appliance for the First Time:**

Remove the battery cover on the rear of the remote. Insert the new “AA” size batteries, paying attention to the polarity.
You should now see on the display of the remote the time showing “0:00”.

To turn the fire on, press the “POWER” button once, and within a few seconds the appliance will begin its startup sequence.

NOTE: The appliance begins its startup with a thirty second pre-start purge, where the combustion fan runs on its own to clear the firebox before it tries to ignite. During the pre-purge the remote will alternately show the remote’s “Set” temperature and a rotating segment indicator to show that the fire is in start up mode and will try to ignite.

When the appliance has lit, set the room temperature by pressing the ‘plus’ or ‘minus’ button repeatedly until the display is showing the desired temperature. The remote will then revert back to the ‘current’ room temperature 30 seconds after making the change.

Run the appliance on full for an hour with the windows and doors open in the dwelling. This will ensure any running-in smells have the chance to dissipate.

The appliance is turned off by pressing the “POWER” button once more. The remote will display the time only.

Run the appliance again and check the operation of the thermostat by increasing and reducing the set temperature. Check the Flame Effect function and the Fan Boost functions work correctly.

For further operation instructions please refer to the User Guide.

F7 Normal Operating Sounds and Smells:

Note: Each time the fire is lit from cold the glass may fog up with condensation. This is normal and the condensation will disappear within a few minutes once the glass heats up.

Sounds

It is possible that you will hear some sounds from your gas appliance. This is perfectly normal due to the fact that there are various types of materials used within your appliance. Listed below are some examples. These are all normal operating sounds and should not be considered as defects in your appliance.

- **Fan:**
Escea gas appliances use electric fans to push heated air further into the room. It is not unusual for the fan to make a “whirring” sound when ON. This sound will increase or decrease in volume depending on the speed setting of your fan.
- **Gas Control Valve:**
As the gas control valves turn ON and OFF, a dull clicking sound may be audible, this is the normal operation of a valve. When the fire is switched off after being run for a while, there may be popping and fluttering noises as the residual gas in the burners burns away. These are normal and should be no cause for concern.
- **Unit Body/Firebox:**
Different types and thicknesses of steel will expand and contract at different rates resulting in some “cracking” and “ticking” sounds being heard throughout the heating and cool down processes.

Smells:

The first few times the unit is operated, the unit may release an odour and the flames will appear orange caused by the curing of the paint, the burning off of the starch in the gas logs and the oils in the metal. This is a temporary curing process which will disappear with use.

F8 Cleaning the glass

A deposit on the inside of the glass, caused by the starch in the logs, may appear as a build up after several uses. If this film is not removed, it will bake on and may become difficult to remove. When the glass is cold, remove it and clean the inside with a non-abrasive cleaner.

DO NOT ATTEMPT TO CLEAN THE GLASS WHILE IT IS HOT. NEVER OPERATE THE UNIT WITH THE GLASS REMOVED.

END OF SECTION F

By the end of this section, you should have:

- ☐ A completely fitted fascia
- ☐ The remote control mounted on its cradle on a wall
- ☐ Operated the fire and verified that it lights reliably and safely
- ☐ Run the appliance on full for an hour with the doors & windows open
- ☐ Checked the operation of the thermostat, Flame Effect & Fan Boost functions

G Installation Checklist

Go through the following checklist to ensure you have installed the appliance correctly

- ☐ Correctly sized cavity to suit your fascia and flue configuration
- ☐ Correct clearances to combustibles and mantles around the fascia
- ☐ An electrical isolating switch to the appliance, accessible after finished installation
- ☐ Correctly sized gas supply with a pressure test point, ensuring adequate supply with all other gas appliances in the dwelling running
- ☐ A weather-tight installed Horizontal or Vertical Powerflue Terminal with clearance as specified by AS/NZ5601
- ☐ Reasonable access to the outside face of the Horizontal Powerflue Wall Terminal for maintenance purposes OR
- ☐ Access to the Vertical Power Flue Enclosure for maintenance purpose
- ☐ Flue attached to the rear/bottom of the Powerflue Terminal leading back to the appliance
- ☐ The electrical cable from the Powerflue Terminal attached to the rear of the installation and run back to the appliance cavity in an electrically safe manner
- ☐ The appliance fixed to the cavity base and wall lining
- ☐ The appliance plugged into a mains electricity supply
- ☐ All gas joints and pressure points leak tested, and soapy water and drop tests completed on gas pipework
- ☐ Gas type conversion process carried out if required
- ☐ Log, coal, river stone or crystalight fuel bed correctly installed
- ☐ Glass correctly fitted
- ☐ A completely fitted fascia
- ☐ The remote control mounted on its cradle on a wall
- ☐ Operated the fire and verified that it lights reliably and safely
- ☐ Run the appliance on full for an hour with the doors & windows open
- ☐ Appliance functions checked, including thermostat operation, Flame Effect and Fan Boost
- ☐ Dwelling owner shown how to operate the appliance correctly
- ☐ Warranty card filled in with installer details and appliance serial number
- ☐ User Guide made available for end user
- ☐ Plumbing Industry Commission Compliance Certificate given to end user

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SERVICE

IMPORTANT:

- This appliance must be serviced every 12 months.
- Any service operation should be carried out only by a suitably qualified and trained person.
- Gas and electricity supply **MUST** be isolated before any service operation is carried out on this appliance.
- This manual should be left with the appliance.
- **DO NOT MODIFY THIS APPLIANCE.**

S1 Error Codes:

This gas fire has been designed to show error codes to help explain and identify any fault situation that occurs. These codes will appear on the wireless remote control in the form of a large letter "E" with a number beside it. Codes can normally be reset by turning the heater off then on again at the mains power wall switch.

The following table shows what each code means and possible ways to rectify the situation. In the case of persistent or repeated shutdown errors, action must be taken immediately to find and repair the fault.

Error Code	Suggestion action
 Electronics Over Temp	• Excess lint and dust build-up on the front of the controller tray. • Possibly fascia panels installed incorrectly resulting in restricted air flow. • Room air fans may be slowed or stalled. Remove firebox, check that fans are plugged in, cleaned, and free turning Note: This error has a permanent lock out and will require the unit to be reset after the initial error (turning the power to the fire off "at the wall" then on again after a few seconds).
 Flame Failure or Power Flue trip	The fire has tried to light three times and failed. • Check gas supply and check other gas appliances to see if they are affected. If you have two separate propane cylinders, switch over to the full bottle or contact your gas supplier. You may need to retry igniting the fire a few times after re-establishing gas supply. • Check the electrode placement in relation to the pilot flame. Ensure it is well enveloped in flame as per the diagram in the installation instructions. Ensure no small coals have dropped onto the ignition electrodes between the burners. • Check that the fan inside the powerflue wall terminal is running during startup. This fan may need servicing if it is slowed or stalled.



Appliance Over Temperature Sensor Trip

The bimetallic snap disk mounted on the spigot seal plate at the rear of the fire has tripped. The possible causes for this could include:

- Possibly fascia panels installed incorrectly resulting in restricted air flow at the top of the fire.
- Room air fans may be slowed or stalled. Remove firebox, check that fans are plugged in, cleaned, and free turning
- The gas regulator being set too high resulting in excess heat build-up.
- The inlet flue not being connected and the appliance drawing warm air from the cavity. Check flues are securely connected at both ends.



Valve Solenoid Check Failure

The valve solenoids have failed the pre-ignition test. This is to detect a faulty valve solenoid. However, it is possible a wire has dislodged.

- Check that the connections to each solenoid are secure and in place. It may be that the connections on the ends of the wires need to be tightened a little (e.g. with a pair of pliers) to ensure a robust connection to the valve terminal.
- Disconnect and reconnect the firebox connectors ensuring they are firmly pushed into place.
- It could also be that one of the solenoids on the valve inside the fire has failed. If this is the case the valve will need to be replaced.



Remote Cannot communicate with fire

The remote cannot communicate with the fire. Reasons for this could include:

- The fire being turned off "at the wall" i.e. a loss of power to the fire or the remote is outside of its effective radio frequency range (too far away from the fire). Typical remote range is 1m to 5m.
- Ensure there is power to the fire by pressing the auxiliary on/off (red) button on the fire, then press the on/off button on the remote to clear the error.



Combustion Air Flow Error

- Check whether the pressure switch is activating at startup (there is an orange indicator LED in the control tray which should be lit). If not check the pressure switch electrical connection is correct.
- Check that the hoses are connected at both ends. Ensure the hoses are not kinked.
- Ensure the pressure switch is mounted vertically and the diaphragm is operational. The grey hose should be connected to the low pressure port and the translucent to the high pressure port
- Check that both flues are securely connected at both ends to the appliance and the powerflue wall terminal and that the flue is not damaged

S2 Serial Number:

The serial number for the fire can be found in two places. The first is in the battery compartment of the wireless remote under the batteries. The second is on the data sticker on the chassis under the firebox on the left hand side.

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SERVICE

S3 Checking Operating Pressure:

See section E14 of this manual.

S4 Cleaning the Log Set and Glass:

NEVER RUB THE FASCIA. The outside of the fascia's must only be cleaned with a clean damp cloth, dry off after cleaning. The high temp silver powder coating that is used on Escea fascia parts contains certain amounts of aluminium that when rubbed too hard will oxidise leaving a black smudge that cannot be removed. Always clean when cold.

This is a service procedure that will need to be carried out whenever soot builds up on logs and/or inside of glass. If soot build up becomes excessive or regular then one of the following actions may be required;

- Reset gas pressure, pressure may be too high;
- Reposition log set so that front edge of each log is just behind each row of holes in burner top;
- Clear any blockage from primary air port of burner;
- Check flue tube is not damaged or disconnected.

For diagrams and further info on removing your fascia, reverse the steps found in section F.

- Remove fascia bottom panel by pulling it off the magnets that retain it to the fire. Remove the 2 screws holding the inner fascia, lift off the inner fascia by pulling the base of the inner fascia out and lifting it up and off.
- Unscrew the side and top glass retainers and remove them. Take care that the glass does not fall forwards at this stage.
- Lift out glass and place it carefully aside.
- Take out fuel bed and gently brush any soot from log with a soft hearth brush. The burner tops can be vacuumed to remove any excess material.
- Clean the inside and outside of glass with normal glass cleaning products. Use a CLEAN DRY cloth only. Stubborn marks may be cleaned with a ceramic glass cleaner.
- Replace in opposite order and test run heater.

S5 Servicing the Horizontal Powerflue Wall Terminal

If the Horizontal Powerflue Wall Terminal needs servicing, the fan can be accessed from the outside of the installation.

Ensure the power to the Horizontal Powerflue Wall Terminal is off by disconnecting the power to the appliance inside. If the appliance has been running, allow the terminal to cool before attempting to service it.

Undo the ten screws holding the outer cowl in place and pull the whole plate and cowl

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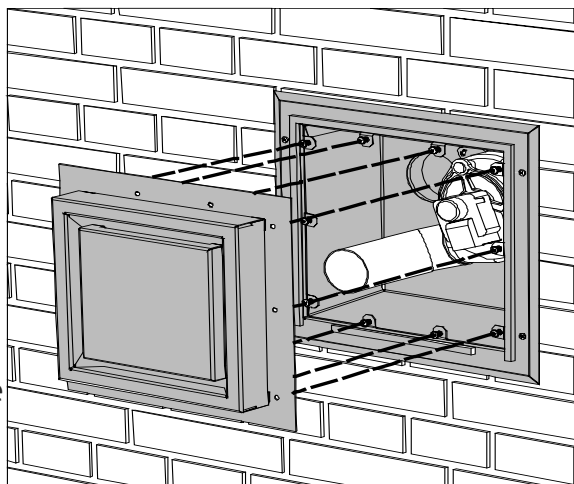
SERVICE

directly outwards. Note: Be careful of any flashing that may have been installed above the terminal.

Removing this plate gives complete access to the fan for servicing or replacement.

Check that all the seals are still intact. Check the fan electrical terminals, motor and impellor are not corroded. Ensure there is no signs of leakage in or around the terminal.

When reassembling the terminal, line up the round silicon grommets with the outlet tube of the fan and push the cowl back into place. Ensure all seals are still in place and replace all of the screws to hold the cowl in the correct position.

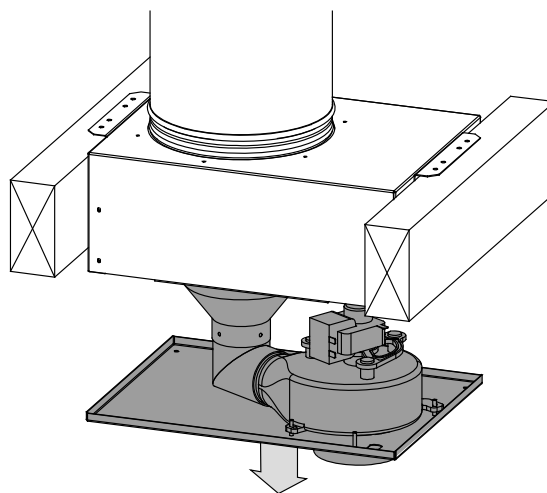


Servicing a vertical Powerflue:

If the vertical Powerflue needs servicing the fan can be accessed without disturbing the final twin walled flue length or roof terminal.

To gain access to the fan and electrical terminals remove the eight screws that hold the base of the Powerflue to the lid, making sure to support the base while removing the screws.

Note: When inspecting or working on the Powerflue take care not to damage the two flexible flue pipes that connect to the Powerflue base.



Once the base has been removed clean away any dust or debris found and check that the fan electrical terminals, motor and impellor are not corroded. Also check for signs of leakage in or around the Powerflue.

When reassembling the Powerflue support the base under the lid and replace the 8 securing screws. After assembly check that the two flexible flue pipes are sealed and not damaged and that the twin walled final flue length and roof terminal are still sealed.

Note : Take care not to trap any wires between the base and lid of the Powerflue when reassembling.

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G

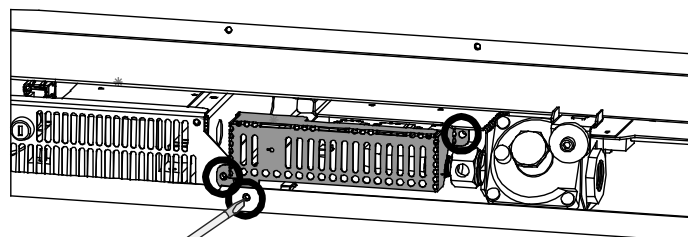
SERVICE

S6 Removing or Cleaning Fan

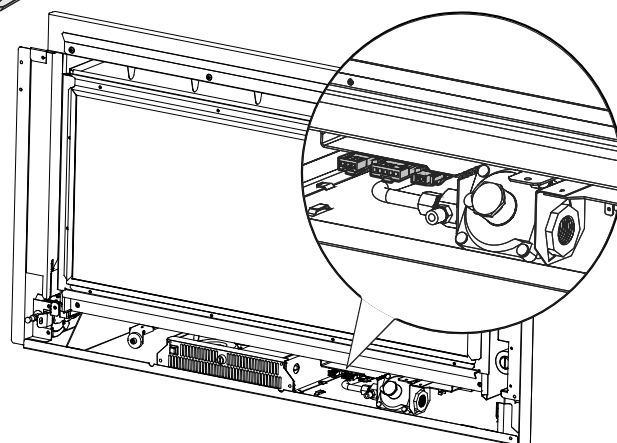
As part of regular service procedure, it is recommended that the fan is removed for cleaning. Dust will build up on the fan rotor and in the cavity where the fan is located. This can be removed by the service person using a hearth brush and a vacuum cleaner. ISOLATE THE POWER AND GAS SUPPLY TO THE FIRE BEFORE COMMENCING THIS PROCEDURE

Step 1: Remove the inner/outer fascia, front glass, and log set as described in section S4.

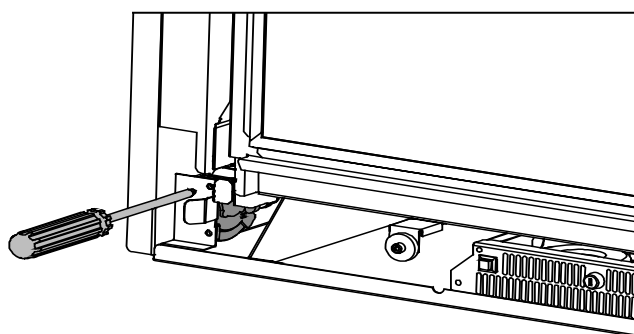
Step 2: Remove the guard covering the electrical connections and earth lead by removing the 3 screws.



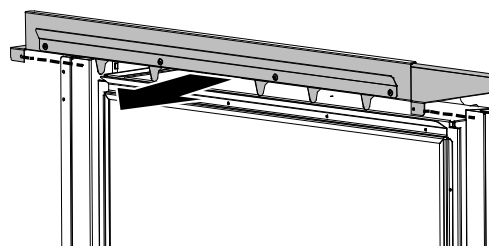
Step 2: Disconnect the gas supply from the fire and unplug the three wiring looms connecting the valve and spark electrode on the bottom right of the fire box. Unscrew the earth strap



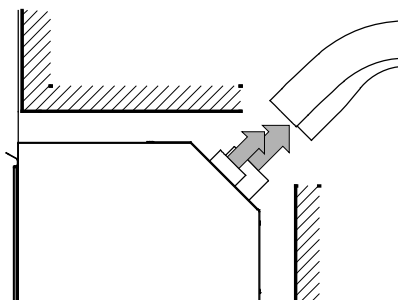
Step 3: Remove the 2 screws holding the pressure switch bracket. Carefully pull the switch out and remove the hoses from the rear of it.



Step 5: Remove outer shell top by removing the screws in each corner and sliding out.

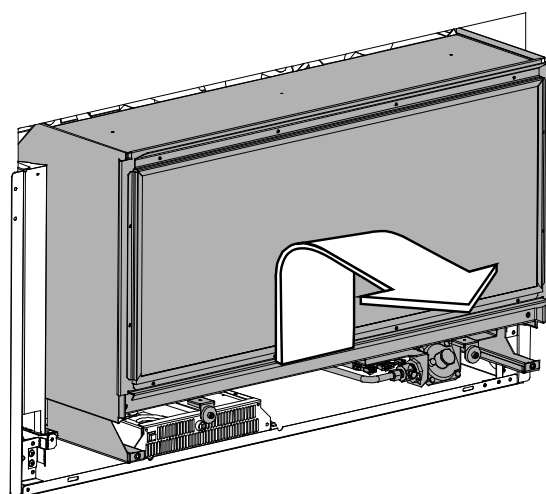
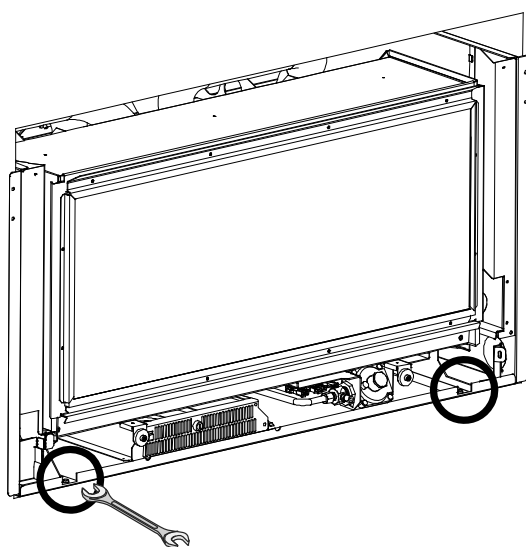


Step 6: Reach in and loosen the clamps holding the flexible inlet and outlet tubes and detach them from the fire.



Step 7: Remove firebox from heater by taking out the screws from the bottom corners, lifting the firebox over the chassis lip and pulling firebox directly outwards (as shown).

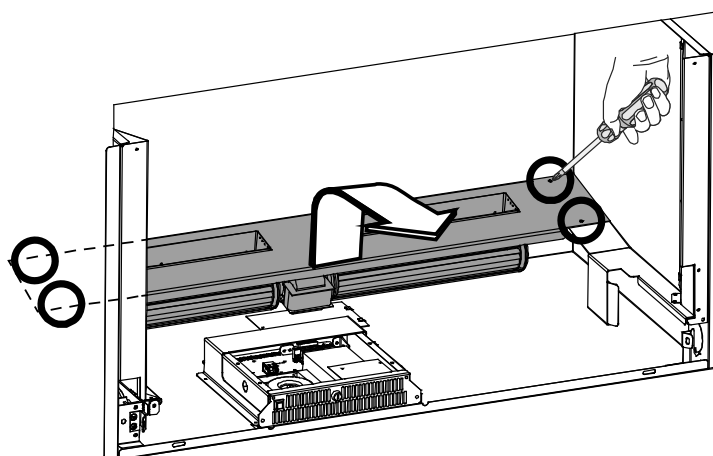
Note: Proceed with caution as the firebox assembly is heavy. Be aware of the components on the underside of the firebox that could easily be damaged.



Step 8: Take out the 4 screws on top of fan plate assembly.

Step 9: Unplug wires lift the fan unit up and out to fully remove fan assembly.

Step 10: Clean fans, removing all dust build up.



Step 11: Replace fan assembly and firebox by repeating these steps in reverse order.

NOTE:

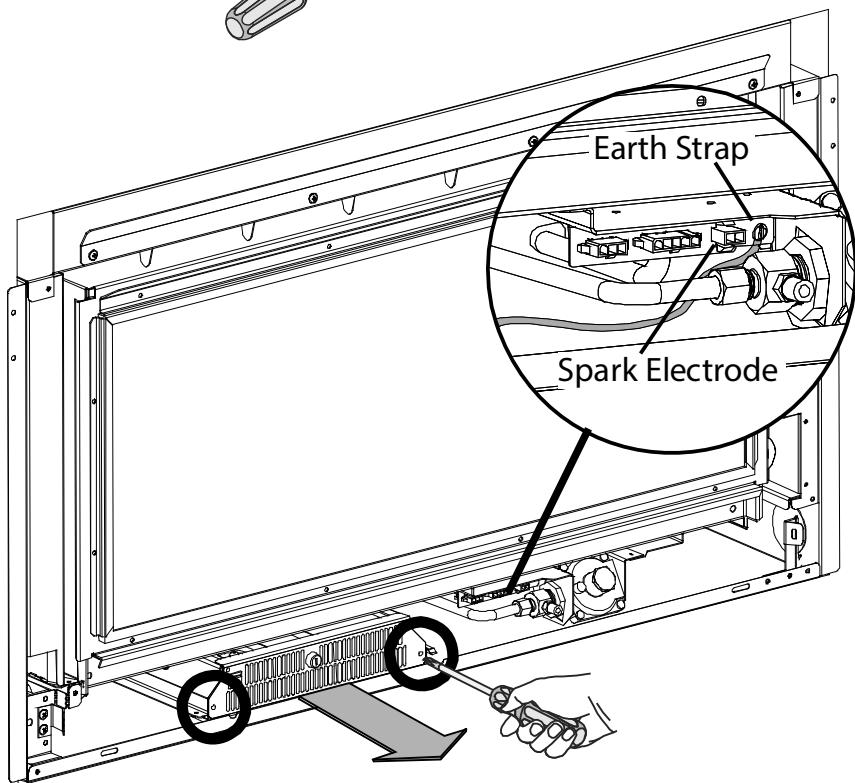
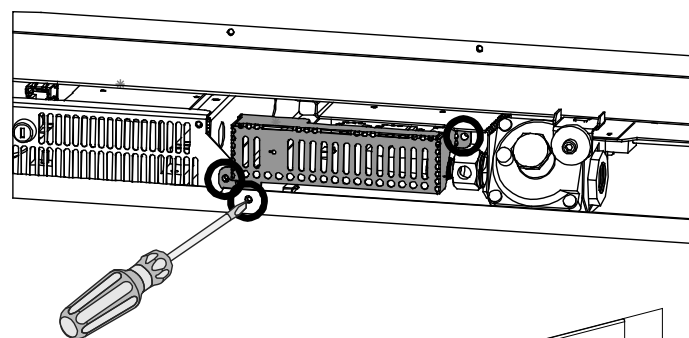
- ☐ Ensure the earth strap is reconnected (Screwed) into the electrical guard (step 2)
- ☐ Ensure the Pressure Switch hoses are connected to the correct nozzles without any kinks or restrictions. These can be identified by an "H" (high) and "L" (low) labelled on the hoses and the pressure switch. (step 3)

S7 Replacing Electronic Drawer

ISOLATE THE POWER TO THE FIRE BEFORE THIS PROCEDURE.

All of the electronic components of the heater have been located on a removable drawer. This drawer is located under the firebox, near the front left of the appliance. On the back of the drawer are two large connectors that unplug as the drawer is removed.

Remove the protective grill from in front of the electrical connections (shown in first diagram) and unplug electrode wire from firebox and remove screw holding earth strap to firebox. Take out the two screws at each end of the electronic drawer and pull drawer outwards and up slightly to clear the chassis lip. If an ethernet / network cable is connected the lid of the drawer will have to be removed and the cable unplugged before the drawer is completely extracted from the fire. Reverse this procedure to refit. Ensure drawer is fully seated into the draw housing.

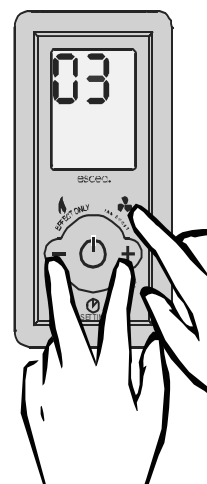


S8 Replacing a Wireless Control:

If the wireless control becomes lost or damaged, a new one can be ordered from any Escea retail agent. When you have the new remote, the following procedure needs to be followed to "teach" the remote to only communicate with that fire.

1. Ensure the fire and remote are set to "Off" (only the time is displayed on the remote).

2. While the remote is in its "OFF" mode with only the time showing on the display, press the MINUS (4), PLUS (8) and FAN BOOST (7) buttons simultaneously (as shown right) until the characters "03" light up on the display. Release the buttons and the remote will count down and display "GO". The screen will then display all characters. This will put the remote into test mode and the two big temperature digits should begin counting from 0 to 99 repeatedly.



3. Press and hold the – (minus) button until the two large temperature digits reading 00 start to flash slowly. Release the – (minus) button. The remote control is now ready to be addressed to the fire.

4. Press and hold the red auxiliary on/off button (found on the front face of the fireplaces electronic drawer, shown on the left with an arrow) for a minimum of eight seconds, or until the two large temperature digits start counting upwards from 00 to 99 repeatedly on the remote control.

Note: Pressing the red auxiliary button on/off button will start the fire. Once the remote control is counting the fire can be turned off by pressing the red auxiliary button again.

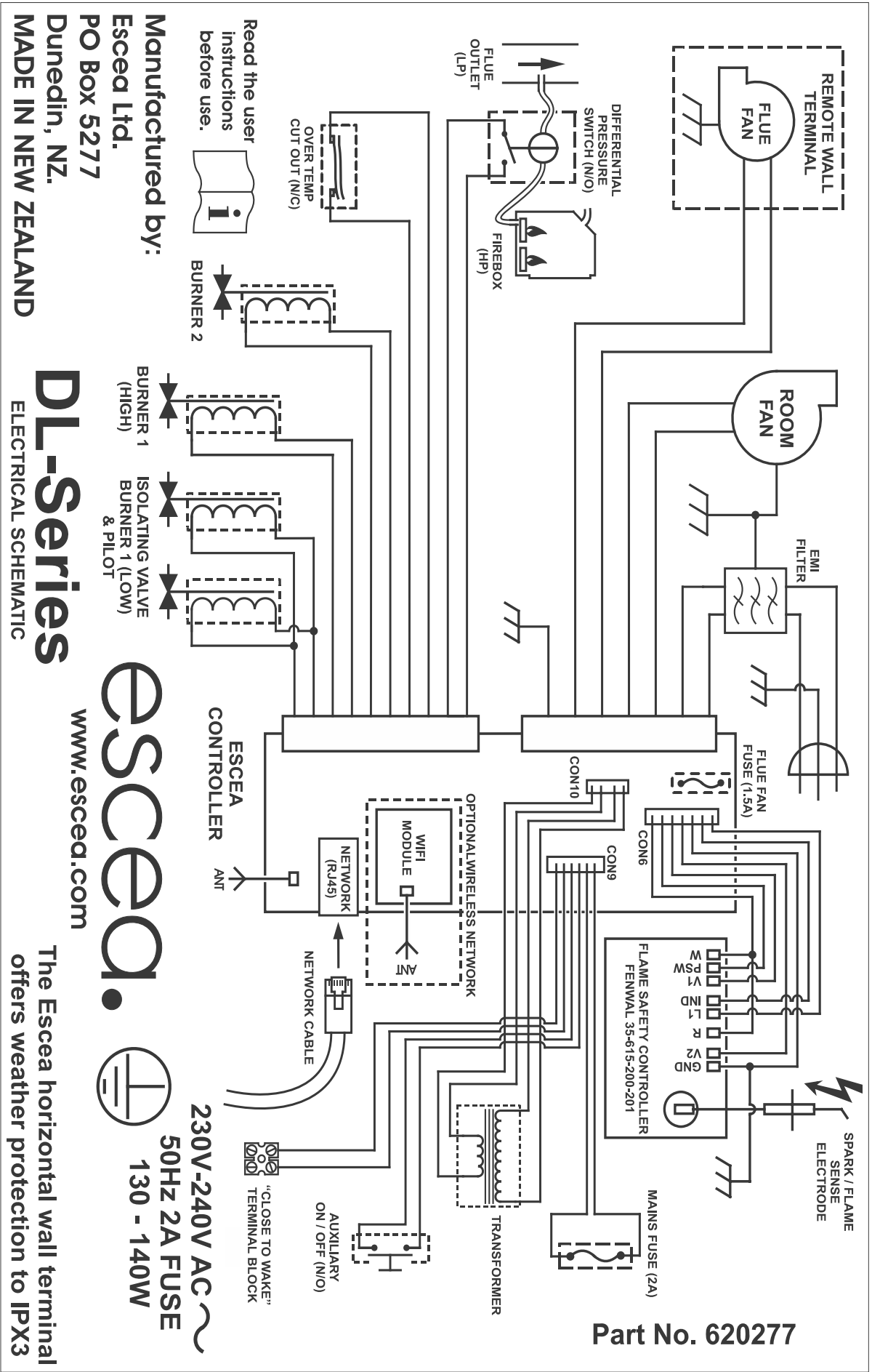
5. Press the large power button in the middle of the remote control to exit the test mode and return to normal operation. The remote should only be displaying the time. Check the fire will start using the remote control by pressing the large power button. Turn it off again using the remote control.

6. The fire is now re-addressed to the remote control.

S9 Annual service procedure:

- ☐ Isolate power and gas supply to fire.
- ☐ Remove front glass and clean inside of glass.
- ☐ Remove fuel bed and brush off any soot.
- ☐ Clean electrode and pilot hood of any carbon build up and ensure correct gaps between electrode and pilot hood
- ☐ Remove burners and blow compressed air through the burner ports.
- ☐ Remove jets and clean injector hole with solvent.
- ☐ Remove firebox to give access to fan, brush and vacuum any dust build up from fan blades.
- ☐ Vacuum any dust from the cavity that houses the fan and from the underside of the fire box around the valve and solenoids.
- ☐ If the gas piping includes a flexible hose connected to the regulator, check the hose for signs of wear (discolouration, loss of flexibility, cuts, worn covers, cracks, crushing, kinking, flattening or loose end fittings) and replace if worn, or more than five years old.
- ☐ Test all joints for gas tightness.
- ☐ Reassemble heater and check that operating pressure is correct. 2.3kPa Propane, 1.0kPa Natural Gas with all burners running.
- ☐ Check glass sealing tape and replace if necessary.
- ☐ Check to make sure that flue system is intact and not in any way blocked.
- ☐ Trial heater with several start/stop cycles and trial fan-boost, flame effect only and thermostat modes to ensure that all modes function correctly.
- ☐ Check and set the gap between the 3 pilot parts to 0.5mm as per diagram in section E9

S10 Wiring Diagram:



The Escea horizontal wall terminal offers weather protection to IPX3

PROMINA

Product Information

PROMINA is a non-combustible matrix engineered mineral board, used for soffits, one way boundary external fire wall, sub floor spaces, built-in fireplaces, and internal partitioning.

1. Product composition

PROMINA sheets consist of the following:

- Portland cement
- Calcium silicate
- Lime and mineral fillers
- Functional additives

It does not contain inorganic fibres or formaldehyde.

2. Production method

PROMINA sheets are manufactured on a FLOW ON machine and are autoclaved at high temperature and pressure. PROMINA is produced in Asia by the Etex Group, the most global manufacturer of calcium silicate sheets with production facilities in 40 different countries.

PROMINA is manufactured under a quality management system certified in accordance with ISO9001: 2000 Certification and in accordance with the environmental standards of ISO 14001.

3. Dimensions and tolerances

Standard thickness: 9 mm

Length: 2400 mm

Width: 1200 mm

Tolerances

	After cutting
Thickness	- 0.5 / + 1.0 mm
Length and width	+/- 5.0 mm
Squareness	1.0 mm / m

4. Weight

Thickness	Weight
9 mm	Approx 9.7 kg/m ²

5. Colours

PROMINA is beige in colour and is coloured through-out.

6. Technical properties (average values)

Density		: 1000 kg/m ³
Bending strength ₃ (24h immersed in water)	//	: 7.5 N/mm ²
	T	: 5.2 N/mm ²
Modulus of elasticity		: > 3,800 N/mm ²
Moisture movement (30-90%, mean)		: 1.6 mm/m
Thermal expansion coefficient		: 7.5×10^{-6} m/mK
Thermal conductivity coefficient		: 0.136 W/mK
Reaction to fire according to AS/NZS1530: Part1		: Incombustible
Reaction to fire according to BS476: Part4		: Incombustible
Surface spread of flame to AS/NZS1530: Part3		: Ignitability = 0, Spread of flame=0, Heat evolved=0, Smoke developed=0
Surface spread of flame to BS476: Part 7		: Class 1

7. Advantages

- No flame spread, no fume development, no toxic gasses
- Resistant to high temperatures
- Resistant to the effects of humidity: PROMINA will not physically deteriorate when used in damp or humid conditions
- Resistant to fungus, bacteria, insects, vermin, etc.
- Resistant to many chemicals
- Environmentally friendly, no harmful gas emissions
- High dimensional stability
- One surface is semi-smooth and will accept a wide range of architectural finishes

8. Working guidelines

Cutting:

- Hand circular saw (with rail), slow rotation with tungsten carbide-tipped blade or fast rotation with a fluted diamond cutting blade without teeth. A diamond tipped blade can be used in either dry or wet state, but caution has to be taken that when cutting wet, a cement slurry is generated that has to be drained and the sheet and equipment will have to be cleaned.
- Jigsaw with tungsten carbide-tipped tooth cutting blade
- Conventional woodworking equipment can be used but have in general wear faster.
- Pacific Build Supply Ltd operates a CNC waterjet cutting machine in Auckland that facilitates the cutting of intricate designs with minute tolerances. Please contact Pacific Build Supply Ltd for more information.

At all times, cutting should be carried out in well ventilated spaces, using dust extraction. Operators should take precautions and wear protective and respiratory gear at all times.

Edge finish:

- Fine emery cloth or sanding block when the cut is rough.

Drilling:

- For holes: carbide-tipped twist drill (or completely in carbide) with a 60° or 80° nose angle
- For round apertures: cup drill or circular cutter, carbide-tipped
- The sheet should be supported around the hole to be drilled (e.g. by a wooden surface).
- Cutting and drilling must take place in a dry environment.

Fixing accessories:

The method and choice of fixing accessories (e.g. stainless steel, galvanized steel, cadmium plated steel) is dependent on the application and the environment.

1) Screwing in timber construction:

- Use drywall screws SUREFAST N°6 x 30 mm
- The PROMINA sheets need to be pre-drilled not less than 12 mm from the edge and at 50 mm and 100 mm from the edges at sheet corners (see detail).
- Do not overdrive the screws. The optimum is to have the screw head at 0.5 mm below the surface of the sheet.
- Variable-speed screw guns can be used with a maximum speed of 2,500 rpm and fitted with a depth gauge.
- Use the fixing patterns as specified by Pacific Build Supply Ltd.

2) Nailing in timber construction:

- Stainless steel clouts 40 x 2.8 mm.
- Distance to edge is min 12 mm and 50 mm and 100 mm from the edges at the sheet corners.
- Nails cannot be overdriven into the sheet. The optimum is to have the nail head flush with the sheet surface.

Caulking:

- Only use Promaseal Intumescent Mastic.

Health and safety aspects:

While the sheets are being processed, dust can be released which can irritate airways and eyes. It is recommended that a minimum P2 dust mask and safety goggles be worn. Appropriate dust extraction or proper ventilation should be used depending on the room in which the work is being carried out or the equipment being used. Long-term exposure to dust can be harmful to health.

9. Maintenance and cleaning

For minor soiling, washing with a mild household detergent or soft soap solution followed by rinsing with clear water. PROMINA's surface is porous and cleaning requires rather chemical than mechanical ways to clean. No abrasive products or tools shall be used to clean the surface. Please consult the Pacific Build Supply cleaning instructions for more specific cleaning advice.

10. Handling

The sheets are packed on pallets. They must be kept dry during transport. The sheets must be horizontally stacked on a flat surface. The sheets must always be sufficiently supported so that they do not sag. The sheets must be stored in a dry ventilated space. If the sheets are stored outside, they must always be protected against rain by a tarpaulin or plastic sheet. If the sheets do become wet in the packing, all packaging must be removed and the sheets must be wiped dry and placed in a way that they can dry completely. A sheet must always be lifted from a stack by two people and then be carried on edge.

11. Guarantee

The guarantee and the guarantee conditions are available on request from Pacific Build Supply Ltd,

Trade name: PROMINA® 60

1. Identification of the product and of the company

Product name:	PROMINA® 60
Intended Product use:	Suitable for internal and semi-exposed external non-load-bearing applications such as ceiling linings, soffits, etc.
Company	Comp : Promat International (Asia Pacific) Ltd. Address : Unit 19-02-01, Level 2, PNB Damansara, No. 19, Lorong Dungun, Damansara Heights, 50490 Kuala Lumpur, Malaysia. Tel # : +60(3)-2095 5111 Fax# : +60(3)-2095 6111 E-mail address: info@promat-ap.com

2. Composition / Information on ingredients

Description:	Silicate Fire Protective Board, in large dimensions, for universal applications in preventive fire protection and in technical high temperature insulation.
Chemical characterisation	This product is a manufactured article, not a substance nor a preparation. It is manufactured from a combination of cement, sand, cellulose and selected fillers. Asbestos-free autoclaved product.

3. Hazard Identification

Indication of the hazards:	The installed product in its final application: no hazards known. When machining (drilling, cutting, sanding, etc.) the product: airborne dust can be released. - As with most types of nuisance dust, excessive inhalation of dust may cause irritation of the airways. - Eye contact with dust may lead to transient eye irritation or inflammation. - Prolonged skin contact may lead to skin irritation. - Long term hazards: see section 11
Specific risk information for humans and environment:	see section 7 and 8

4. First aid measures

Inhalation:	Remove to fresh air
Ingestion:	Drink plenty of water
Skin contact:	Rinse the skin thoroughly with water

SAFETY DATA SHEET

Promat

Issued: 25/07/2007

Trade name: **PROMINA[®] 60**

Eye contact:

Do not rub the eye, flush copiously for at least 15 minutes. If eye irritation or inflammation persists, seek medical advice.

Trade name: **PROMINA® 60****5. Fire fighting measures**

Additional Information: The product is non-combustible, according to the standards such as AS 1530.1, BS 476: Part 4, etc.

6. Accidental spill / release measures

Methods for cleaning up: Shovel up small pieces. Dampen down any dust before putting into open skips

7. Handling and storage

Handling: Instructions for handling and machining
-Dust, generated during machining and processing must be exhausted and the regulatory occupational exposure limits for total and respirable dust must be respected.
-Work in a well ventilated area.
-Use tools with appropriate dust exhaust equipment.
-When total dust concentration is higher than occupational exposure limits (refer to local regulations), or when dust extraction is not available, use individual respiratory protective equipment.
-Collect dust with a vacuum cleaner or soak with water before sweeping up.

Storage: Store in dry, covered and frost proof area.

8. Exposure controls / Personal protection

When machining (drilling, cutting, sanding, etc.) boards, respect Occupational Exposure Limits for inhalable and respirable dust and for respirable quartz dust.
Check the latest Occupational Exposure Limits (OEL) for airborne contaminants that are applicable in your country.

Typical Occupational Exposure Limits (8hrs TWA) on the date of issue of this document are:

In mg/m ³	Fraction	COUNTRY (3)					
		AUS	CHN	HK	INDIA	MY	SG
Particles NOR (1)	Inhalable	10		10		10	10
	Respirable		4	4			5
Quartz (2)	Respirable	0.2	0.5	0.1		0.1	0.1

- (1) Particles NOR: particles not otherwise classified or regulated (nuisance dust).
Applies for all other components in the product.
(2) Quartz – CAS number: 14808 - 60 - 7
(3) Country abbreviations on basis of IANA (Internet Assigned Numbers Authority)

Trade name: **PROMINA® 60**

Engineering controls:	Ensure vacuum dust exhaust with correct filter when using motorised machining tools.
Personal protection:	Avoid breathing dusts. Avoid eye and skin contact. Wear personal protective equipment appropriate to the task. (See below)
- Respiratory protection:	Use approved individual respirators (e.g. disposable P2 types) whenever occupational exposure levels are or can be foreseen to be exceeded.
- Eye protection:	Use safety glasses whenever tools are used and dusts are produced.
- Skin protection:	Use working clothes and gloves to protect against mechanical injury and direct skin contact.

9. Physical and chemical properties

Appearance:	Rigid self supporting board with smooth upper surface
Colour:	light beige or grey
Odour:	None

Important safety parameters:

Boiling point / boiling range:	N.A.
Melting point / melting range:	N.A.
Flash point:	N.A.
Flammability (solid, gaz):	N.A.
Flammability temperature:	N.A.
Auto-flammability:	N.A.
Explosive properties (danger and limits):	N.A.
Oxidizing properties:	N.A.
Vapour pressure:	N.A.
Relative density:	ca. 950kg/m ³
Solubility:	
- water solubility:	Insoluble
- fat solubility:	N.A.
pH value:	9
Partition coefficient (n-octanol/water):	N.A.
Viscosity:	N.A.

10. Stability and reactivity

Nothing to report

11. Toxicological information

Acute toxicity:	Calcium Silicates boards are not expected to have significant acute toxicity. Apart from mild skin, throat, airway or eye irritation, workers producing these boards have reported no significant health complaints. - As with most types of nuisance dust, excessive inhalation of dust may cause irritation of the airways. - Eye contact with dust may lead to transient eye irritation or inflammation. - Prolonged skin contact may lead to skin irritation.
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Trade name: **PROMINA® 60**

Further information:	Inhalation of excessive concentrations of quartz-containing dust can be hazardous for health. This risk will be minimal if correct working practices are observed and applied. (Refer to Section 8)
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12. Ecological information	Nothing to report.
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13. Disposal considerations

Product disposal:	Handle as construction industry waste and dispose in accordance with local legislation.
Packaging disposal:	Dispose according to local legislation.

14. Transport information

Road transport:	Product is not classified as dangerous.
Inland shipping transport:	Product is not classified as dangerous.
Sea shipping transport:	Product is not classified as dangerous.
Air transport:	Product is not classified as dangerous.

15. Regulatory information**Labelling according to EEC – Directives:**

The Product is a manufactured article, not a substance nor a preparation. Therefore the EU Directive on classification and labelling 67/548EEC is not applicable.

Danger indication: not applicable	Symbol: not applicable
	R – sentence: not applicable
	S – sentence: not applicable

16. Other information

The recommendations for use and installation of PROMINA® 60, of various fire protection systems, have to be followed as indicated in the Promat Handbook.

The health and safety information contained herein is believed to be accurate and correct based on our current knowledge at the date of issue and no liability can be accepted for any loss, injury or damage resulting from its use. It is intended as a guide for the safe handling, storage and use under normal conditions, but does not necessarily refer to the particular requirements of a customer when further advice should be obtained.

This data sheet and the information it contains is not intended to supersede any terms or conditions of sale and does not constitute a specification. Nothing contained herein is to be construed as a recommendation for use in violation of any patent or applicable laws or regulations.

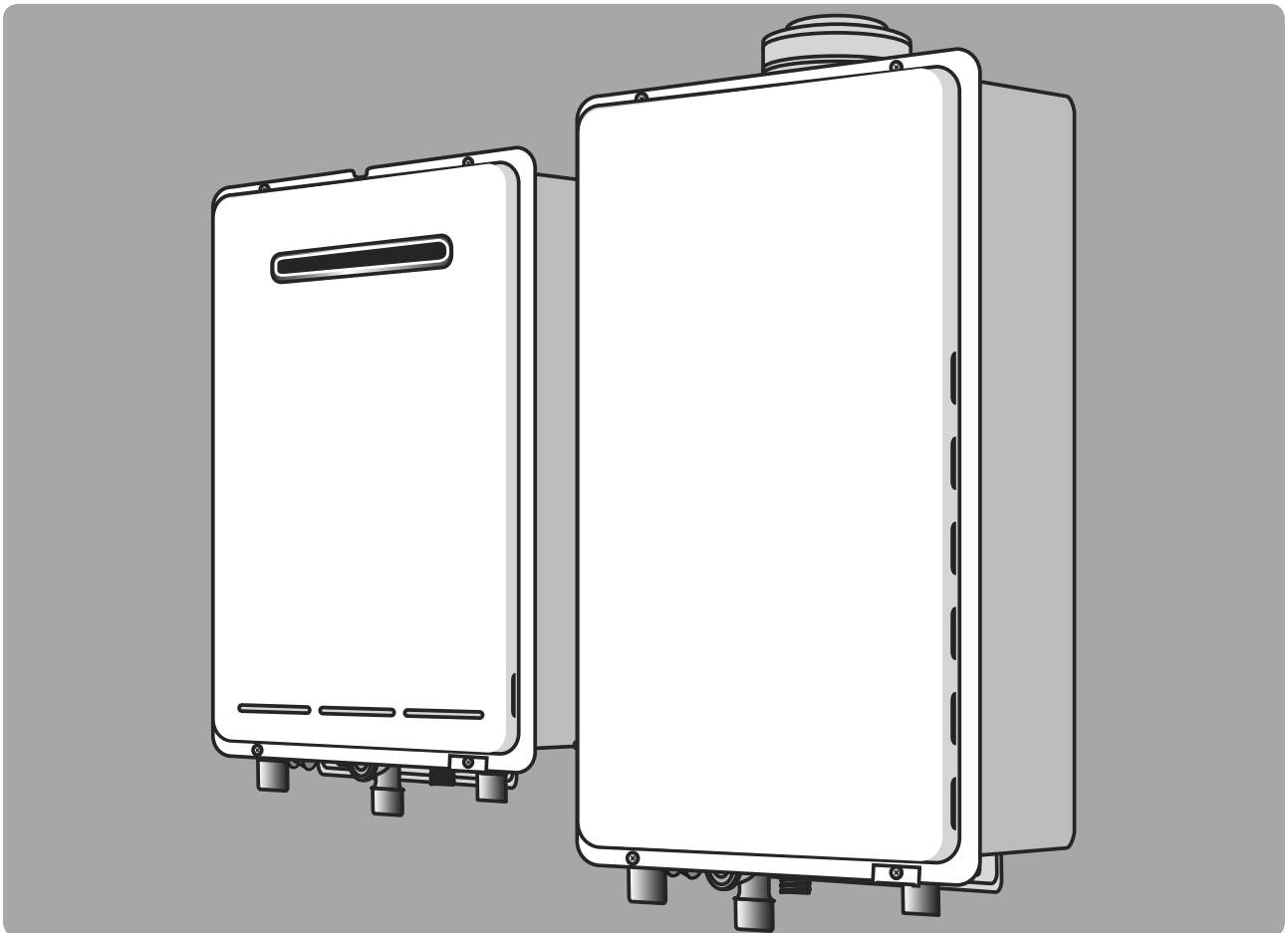
Hot Water Heating System

Rinnai

Installation guide

Continuous flow water heaters

Models: VT16-26, HD200, HDi200, HD250, EF24, EF250, EFi250



Important:

This appliance must be installed in accordance with:

- Manufacturer's installation instructions
- Current AS/NZS3000, AS/NZS3500, AS/NZS 5601.1 and G12/AS1
- Local regulations and municipal building codes

For use with Natural Gas or Universal LPG as indicated on the appliance.

Not suitable as a spa or swimming pool heater.

Rinnai continuous flow internal water heaters ('i' models) must be installed with an approved Rinnai flue system.

Appliance must be installed, commissioned and serviced by an authorised person, being in New Zealand a licensed gasfitter, in accordance with these instructions and all applicable local rules and regulations.

Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624)

Rinnai New Zealand Limited
105 Pavilion Drive, Mangere, Auckland
PO Box 53177, Auckland Airport, Auckland 2150

Phone: (09) 257 3800, Fax: (09) 257 3899
Email: info@rinnai.co.nz
Web: www.rinnai.co.nz, www.youtube.com/rinnainz

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Before installation

Check for damage

Unpack the appliance and flue components (if applicable) and check for damage. DO NOT install any damaged items.

Check components and gas type

Check all components have been supplied and that you have the correct gas type.

Read these instructions before starting

Read these instructions to get an overview of the steps required before starting the installation. Failure to follow these instructions could cause a malfunction of the appliance. This could result in serious injury and property damage.

Solar installations

For Rinnai continuous flow water heaters used in solar installations, refer 'Recommended Solar System Layout'.

EF models are heavy

The Rinnai Infinity EF models are 32 kg. Please use care when lifting and seek assistance if required.

Applicable models

These installation instructions apply to the following Rinnai continuous flow water heaters.

Rinnai Infinity VT16	External	REU-VR1620WG	Model number Note: The model number is written on the data plate on the left hand side of the appliance.
Rinnai Infinity VT20	External	REU-VR2024WG	
Rinnai Infinity VT24	External	REU-VR2426WG	
Rinnai Infinity VT26	External	REU-VR2626WG	
Rinnai Infinity HD200	External	REU-VRM2632WC	
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG	
Rinnai Infinity HD250	External	REU-VR3237WG	
Rinnai Infinity EF24	External	REU-K2430WG	
Rinnai Infinity EF250	External	REU-KM3237WD	
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD	

i = internal—these must be installed with an approved Rinnai flue system

For nominated gas consumption, gas pressures, and gas types please refer to the data plate on the left hand side of the appliance.

Appliance location

Installation in environments free from corrosive compounds

Air surrounding the water heater, venting and vent termination(s) is used for combustion and must be free from compounds that cause corrosion of internal components. These include corrosive compounds that are found in aerosol sprays, detergents, bleaches, cleaning solvents, oil based paints/varnishes, and refrigerants. Therefore Rinnai recommends outdoor models be used for these locations where possible. The water heater, venting and vent termination(s) should not be installed in any areas where the air may contain these corrosive compounds. Chemicals that are corrosive in nature should not be stored or used near the water heater or vent termination.

Damage and repair due to corrosive compounds in the air is not covered by warranty.

If it is necessary for a water heater to be located in areas which may contain corrosive compounds, Rinnai strongly recommends the following:

Indoor (internal) water heaters

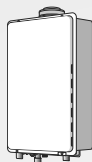
- DO NOT install in areas where contaminated air is present.
- Consider, before installation, where air has the ability to travel within the building.
- Where possible, install the heater in a sealed closet so that it is free of contaminated indoor air.

Outdoor (external) water heaters and vent terminations of indoor (internal) water heaters

- Install as far away as possible from exhaust vent hoods
- Install as far away as possible

from air inlet vents—corrosive fumes may be released through these vents when air is not being run through them

Internal models



Internal models are designed for indoor installations only. They may be installed in an enclosure if the requirements of

AS/NZS 5601.1 are satisfied.

An enclosure is defined as a compartment, enclosed area or partitioned off space primarily used for the installation of the appliance.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed in roof spaces or elevated structures, specific requirements apply. Refer to AS/NZS 5601.1 for details.

Catch pan



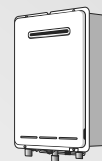
It is important that a suitably drained catch pan is fitted where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

This appliance **MUST** be used with the appropriate Rinnai flue system.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

Manufacturer's instructions for model REU-KM3237FFUD (EFi250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

External models



External models are designed for outdoor installations only. They must be located in an above ground open-air situation with natural ventilation, without stagnant areas, and where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

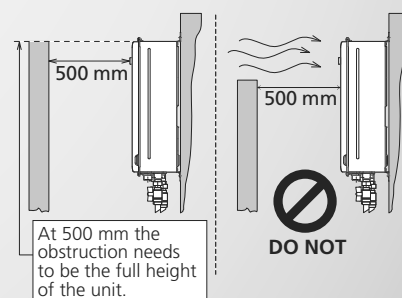
They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards.

The location of the flue terminal must comply with AS/NZS 5601.1 Fig. 6.2.

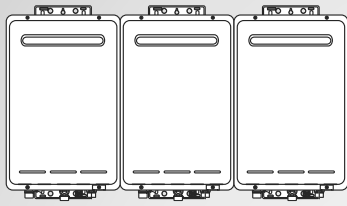
Manufacturer's instructions for model REU-KM3237WD (EF250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

Horizontal obstructions

AS/NZS 5601 stipulates a minimum horizontal clearance of 500 mm between a building structure and obstruction facing the terminal. At 500 mm the obstruction needs to be the full height of the unit (as shown), and not a partial obstruction. A partial obstruction of less than 1 m could result in wind pushing flue gases back into the flue terminal.



When multiple units of the same model are installed on the same vertical face, with the flue terminals at the same height, they can be installed next to each other (as shown).



All models

This appliance must be placed as close as possible to the most frequently used hot water outlet or outlets to minimise the delay for hot water delivery.

For installations where the distance between the water heater and the outlets is considerable, a flow and return system can be used to minimise the waiting time for hot water delivery. Alternatively, multiple appliances can be strategically placed to serve different outlets. Contact Rinnai for further information.

An AC 230 V, 10 Amp, earthed power point must be provided adjacent to the appliance. For outdoor installations, this power point must be weatherproof. It must be clear of the gas and water connections to the appliance and also the flue exhaust and water pressure relief valve. The power cord of the appliance is 1.5 m long.

All appliances must be installed to ensure access can be gained without hazard or undue difficulty for inspection, repair, renewal or operational purposes. Sufficient clearances shall allow access to and removal of all serviceable components.

Appliances should not be mounted higher than 3.5 m above the ground or floor level unless the customer can arrange permanent and safe access or can provide another means of access such as scissor or boom lifts.

Clearances from combustible materials

The appliance can be mounted directly against the wall or structure. There is no need to use non-combustible sheeting or leave an air gap between the appliance back panel and the wall or structure for the purposes of meeting the temperature hazard requirements of AS/NZS 5601.

General installation information

Catch pan

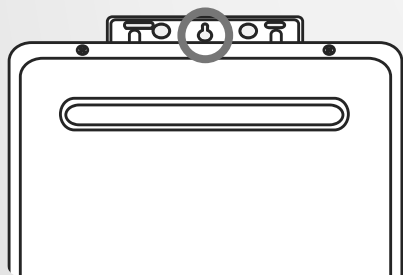
It is important a suitably drained catch pan is fitted (especially for internal units) where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

Mounting the appliance

Refer 'Connections and Fittings' for individual appliance weights. The wall or structure on which these units are to be mounted must be capable of supporting these weights and the associated pipe work.

Ensure suitable fixing screws or bolts are used to secure the units to the walls, in accordance with AS/NZS 5601.1. Wooden plugs shall not be used.

The top bracket has a keyhole slot (circled below) so the appliance can be positioned by hanging it on one screw while the other screws are secured.



Circuit diagrams

Refer to commissioning sheet supplied with the appliance (inside front cover of appliance).

Pipe sizing



Refer 'Connections and Fittings' for appliance gas consumption. If the gas pipe sizing is insufficient the customer will not get the full performance benefit. Gas pipe sizing must consider the gas input to this appliance as well as all the other gas appliances in the premises. The gas meter and regulator must be specified for this gas rate.

An approved sizing chart such as the one in AS/NZS 5601.1, or proprietary system manufacturer guide should be used.

Water pipe sizing and layout should be performed in accordance with AS/NZS 3500. All hot water pipe work should be insulated to optimise performance and energy efficiency.

Water supply



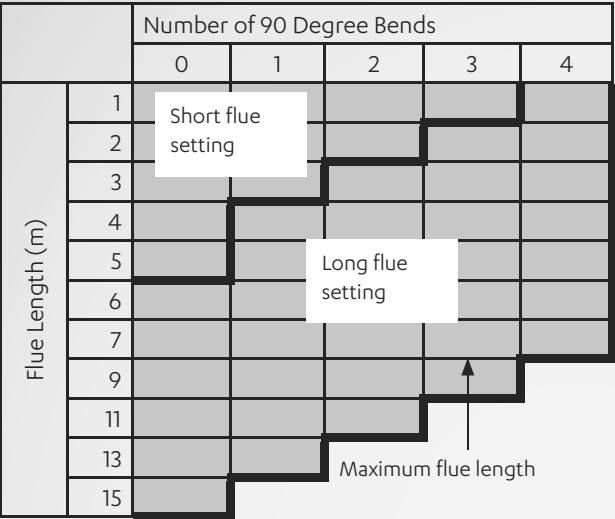
Refer 'Connections and Fittings' for applicable water pressures. Approved pressure limiting valves may be required if the stated maximum rated water supply pressures are exceeded. To achieve the rated flow, the stated minimum water supply pressures must be supplied. The water heaters will operate at lower pressures but will not achieve the rated flow.

Water chemistry and impurity limits are stated in our detailed warranty statement. Most metropolitan water supplies fall within these requirements. If you are unsure about the quality of the water, please contact Rinnai and we will provide you with the details of an authorised agency who are able to test your water for compliance to Rinnai standards. If sludge or foreign matter is present in the water supply, a suitable filter or strainer should be incorporated in the water supply to the water heater.

Flued (internal) water heaters

This water heater must be fitted with the appropriate Rinnai flue system.

The chart below highlights the maximum flue length and number of bends. It also shows the difference between a short and long flue—this is important if changing settings (DIP switches).



Refer to separate Rinnai flue guide for further details.

Water delivery temperature

Local regulations and/or requirements of AS/NZS3500.4 must be considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of these areas may be limited to 55 °C or less.

If the appliance is to deliver water primarily for the purposes of personal hygiene in an early childhood centre, school, nursing home or similar facility as defined in AS/NZS3500.4 a Temperature Limiting Device (TLD), such as a Tempering Valve may be required (even if the appliance is set to 55 °C or less). For these types of applications contact Rinnai.

Requirements for Rinnai continuous flow units installed without controllers

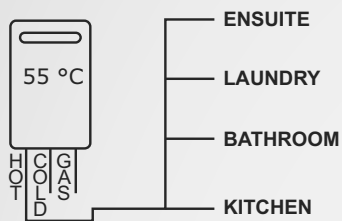


Diagram 1 - 55 °C Appliance

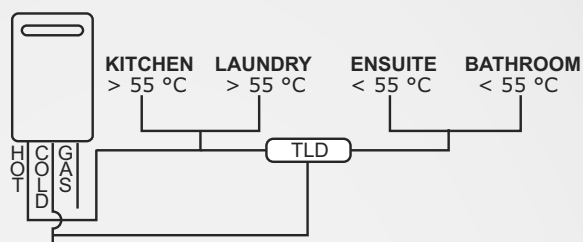


Diagram 2 - Not a 55 °C Appliance
(TLD = Temperature Limiting Device)

When the continuous flow unit is set to deliver water at a temperature higher than 55 °C, it will be necessary to fit a Temperature Limiting Device for delivery to areas used for the purposes of personal hygiene.

Connections and fittings

Models	Gas consumption MJ/h	Water Supply kPa		Weight kg	Fittings			Condensate
		Min.	Max.		Hot	Cold	Gas	
VT16 external REU-VR1620WG	125	120	1000	15	R $\frac{1}{2}$ (15 mm)	R $\frac{1}{2}$ (15 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT20 external REU-VR2024WG	160	160	1000	16	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT24 external REU-VR2426WG	188	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT26 external REU-VR2626WG	199	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD200 external REU-VRM2632WC	199	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HDi200 internal REU-VR2632FFUG	195	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD250 external REU-VR3237WG	249	200	1000	29	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
EF24 external REU-K2430WG	162	240	1000	27	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EF250 external REU-KM3237WD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EFi250 internal REU-KM3237FFUD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)

Service connection points

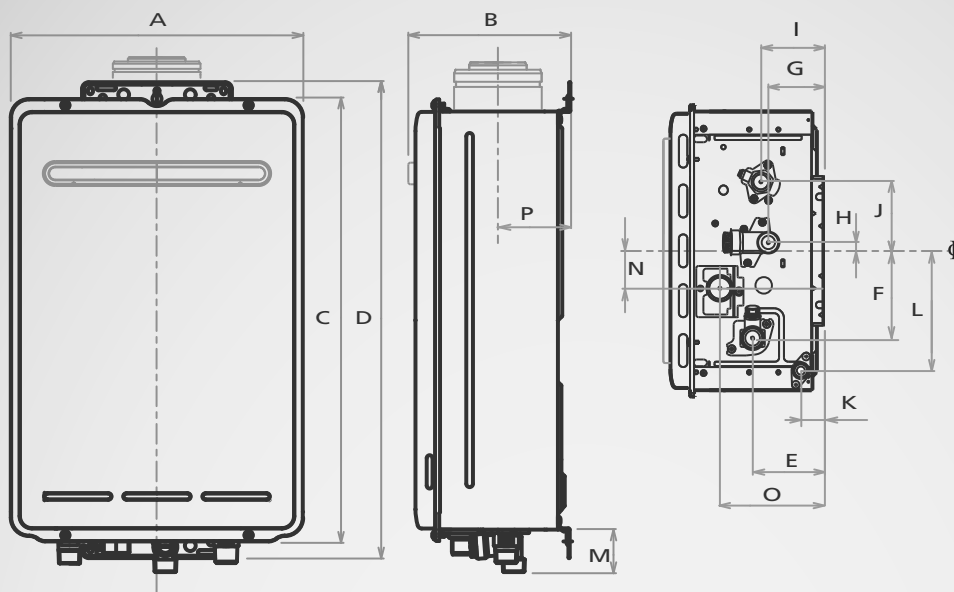
These dimensions are NOT an indication of the pipe sizes required.

An approved full flow isolation valve and disconnection union **MUST** be fitted to the cold water inlet. A non-return valve is not required unless required by local regulations.

Isolation valves must be fitted so the appliance can be removed.

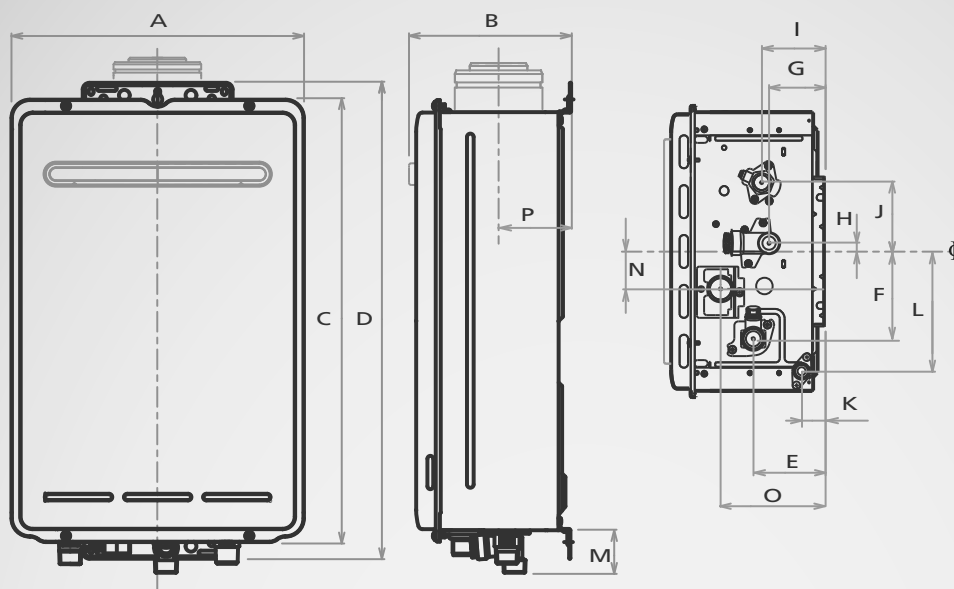
Purge gas and cold water supply lines to remove air and swarf before final connection of the appliance. Swarf in the gas or water supplies may cause damage.

Dimensions: VT and HD models



Dimensions table (mm)		VT16 external (REU-VR1620WG)	VT20 external (REU-VR2024WG)	VT24 external (REU-VR2426WG)	VT26 external (REU-VR2626WG)	HD200 external (REU-VRM2632WC)	HDi200 internal (REU-VR2632FFUG)	HD250 external (REU-VR3237WG)
A	Width	350	350	350	350	350	350	470
B	Depth	194	194	194	194	250	235~275	244
C	Height - unit	530	530	530	530	600	600	600
D	Height - including brackets	571	571	571	571	636	641	644
E	Hot water outlet (from wall)	87	87	87	87	95	91~131	115
F	Hot water outlet (from centre)	105	105	105	105	110	110	61
G	Cold water inlet (from wall)	68	68	68	68	74	70~110	99
H	Cold water inlet (from centre)	10	10	10	10	27*	27*	52
I	Gas connection (from wall)	77	77	77	77	103	99~139	61
J	Gas connection (from centre)	83	83	83	83	89	89	110
K	Condensate outlet (from wall)	-	-	-	-	-	-	-
L	Condensate outlet (from centre)	-	-	-	-	-	-	-
M	Gas: Length gas connection (from base)	40	40	40	40	41	41	41
	Cold: Length of cold water inlet (from base)	50	50	50	50	51	51	51
	Hot: Length of hot water outlet (from base)	39	39	39	39	42	42	42
N	Electrical connection (from centre)	45	45	45	45	21**	21**	2**
O	Electrical connection (from wall)	128	128	128	128	160	160~200	100
P	Flue spigot centre line (from wall)	-	-	-	-	-	95~135	-
* This measurement is to the left of the centre line								
** This measurement is to the right of the centre line								
HDi200, height of flue spigot from base of unit approx. 85 mm								

Dimensions: EF models



Dimensions table (mm)		EF24 external (REU-K2430WG)	EF250 external (REU-KM3237WD)	EFi250 internal (REU-KM3237FFUD)
A	Width	350	470	470
B	Depth	277	283.1	257~307
C	Height - unit	600	654	654
D	Height - including brackets	644	721.6	721.6
E	Hot water outlet (from wall)	164.5	115	110~150
F	Hot water outlet (from centre)	100	100	100
G	Cold water inlet (from wall)	83	79.6	74.6~114.6
H	Cold water inlet (from centre)	53*	27.2	27.7
I	Gas connection (from wall)	70.5	104	99~139
J	Gas connection (from centre)	25	103.2	103.2
K	Condensate outlet (from wall)	33	137.6	132.6~172.6
L	Condensate outlet (from centre)	132	195	195
M	Gas: Length gas connection (from base)	51	40.2	40.2
	Cold: Length of cold water inlet (from base)	62	50.2	50.2
	Hot: Length of hot water outlet (from base)	41	41.2	41.2
	Condensate connection length (from base)	24	22.4	22.4
N	Electrical connection (from centre)	10**	49	49
O	Electrical connection (from wall)	175	200	195~235
P	Flue spigot centre line (from wall)	-	-	139~179
* This measurement is to the left of the centre line				
** This measurement is to the right of the centre line				

EF250 models: Earthing the unit

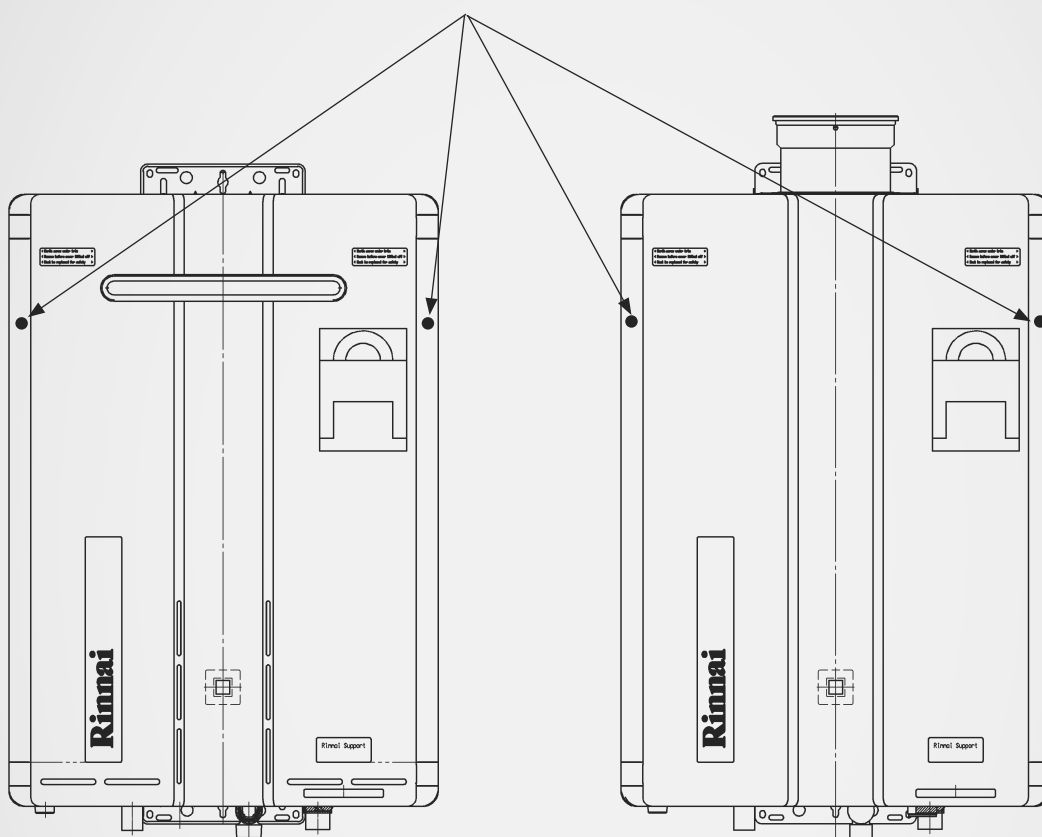
Removing the cover and earthing the unit

For the Rinnai condensing continuous flow water heaters (EF250 & EFi250), the earthing screws are located under the side trim, refer image below. First remove the trim and then the earthing screws before lifting off the cover.



For safe operation of the appliance the earthing screws **MUST** be replaced.

Earthing screws located under side trim



EF models: Condensate drain

The Rinnai Infinity EF water heaters generate condensate continuously at a rate of up to five litres per hour as a by-product of a highly efficient gas burner. Condensate must be drained via a pipe to a suitable discharge point.

As condensate is a by-product of gas combustion it is mildly acidic. For this reason copper tube and fittings **MUST NOT** be used as it will corrode. Instead Rinnai recommend plastic pipes and fittings.

Important considerations for the condensate drain pipe

Content of AS3500.4.2003 section 5.12 'Temperature/Pressure Relief and Expansion Control Valve Drain Lines' has been used as a guide in preparing these considerations.

- A. Water heater drain outlet connection, ½ " (15 mm) BSP male.
- B. PE ½ "BSP (15 mm) female to barbed ignition system connector (13-19 mm) or equivalent plastic fitting.
- C. Drain pipe and fittings to match (B).
- D. Continuous fall of at least 2° from water heater to discharge point, length and bends in accordance with 'Maximum length and changes of direction greater than 45°'.
- E. Suitable points of discharge are deemed to be sewers or pits. **DO NOT** discharge onto electrical connections, earth stakes, copper pipes, concrete paths, or into a pond.

Maximum length and changes of direction greater than 45°

Length and changes of direction				
Max. length (m)	9	8	7	6
Max. changes of direction (> 45°)	3	4	5	6

Installation of a condensate drain

Point of discharge from each drain line shall be located so the release of condensate does not cause a nuisance, is readily discernible and incurs no risk of building damage. There shall be no tap, valve or other restrictions in any line. Each line shall fall continuously from the valve to the approved point of discharge.

Drain lines shall not discharge into a storage water heater safe tray. The end of the condensate drain line shall be:

- Not lower than 200 mm, or higher than 300 mm above an unpaved surface; or
- Not lower than 75 mm, or higher than 300 mm above a gravel pit, and not less than 100 mm in diameter in a paved surface.

Where discharging over a tundish or gully trap, drain lines shall have an air gap of a size at least twice the diameter of a drain line.

Joining of condensate drain lines

Condensate drain lines from multiple water heaters may be joined together provided they conform with the installation requirements stated on this page.

Common stack discharge

Where individual heaters are installed in a multistory building, the condensate drain lines may discharge into a common stack subject to the following:

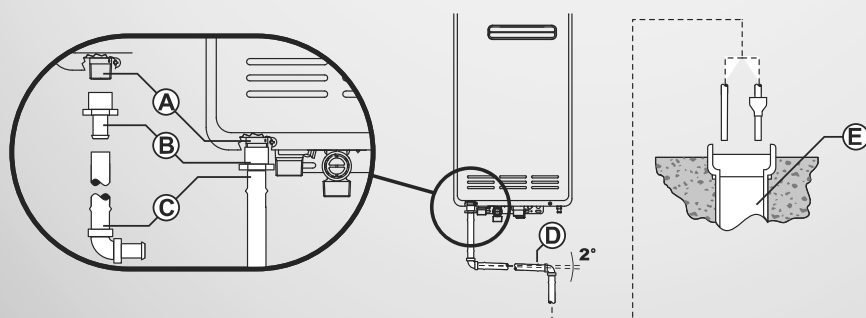
- Drained to a tundish having a discharge line that is not less than the common stack, directly connected to a fixture trap, and installed in a connection with any adjacent soil or waste stack.
- Discharge point of the common stack is readily visible and does not cause any nuisance.
- Common stack is vented by extending the pipe upwards, above the roof level.

Tundish drain lines

The drain line from any tundish shall be not less than DN 20 or less than one size larger than that of the largest drain line discharging into the tundish. Tundish drain lines shall comply with the installation requirements above.

Areas subject to freezing

In areas where water pipes are prone to freezing, the drain pipe from any valve shall be insulated and not exceed 300 mm in length. It shall discharge into a tundish through an air gap of not less than 75 mm and not exceed more than 150 mm measured from the outlet of the drain pipe to the rim of the tundish.



Controllers - general information

Water controllers are available as an optional extra. Universal (Compact), Deluxe, and Wireless controllers can be used together.

Maximum number of controllers

A maximum of four water controllers can be fitted with the following limitations:

- Max. of one Kitchen Deluxe controller (MV-100V)
- Max. of two Bathroom Deluxe controllers (BC-100V)

Only one controller can be set to deliver 55 °C, this cannot be a Bathroom Deluxe controller.

This next section refers to wired controllers. For details on wireless controllers refer to separate instructions.

Important

Others manufacturers' controllers are not compatible with Rinnai Infinity continuous flow water heaters.

Installation of controllers

Do not install controllers:

- near a heat source such as, a cook top, stove or oven—heat, steam, smoke, or hot oil may cause damage
- in direct sunlight
- outdoors unless protection from dust ingress and sunlight are provided
- against a metal wall unless in accordance with AS3000

Positioning

Controllers must be installed in shaded and clean locations. They should be fitted out of reach of children (suggested height 1.5 m). The Compact and Bathroom Deluxe Controllers are water resistant, however, durability is improved when positioned outside the shower recess or at least 400 mm above the highest part of a sink, basin or bath.

Water controller cables

Water controllers operate at extra low voltage (12 Volts DC) which is supplied from the water heater. Controllers come with 15 m of electrical cable. The appliance end of the controller cables are fitted with spade terminals.

Extension cabling is available as an accessory from Rinnai. Alternatively, a two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used.

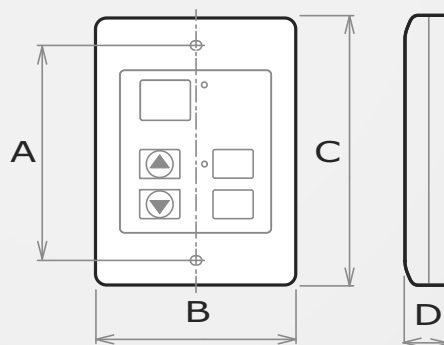
Maximum individual cable runs:

One controller	= 100 m
Two controllers	= 50 m*
Three plus controllers	= 20 m*

* per controller

Water controller cables are not polarity sensitive.

Dimensions



Dim.	Description	Compact (MC-91)	Kitchen Deluxe (MC-100V)	Bathroom Deluxe (BC-100V)
A	Distance between mounting holes	83	83	181
B	Width	90	128	195
C	Height	120	120	97
D	Depth	20	20	22

Controllers - Universal (Compact)

Fitting the Universal (Compact) controller

1. Determine the most suitable position for the controller.
2. Drill three holes as shown (Fig. 1 and Fig. 2) for securing screws and one to provide cable access.

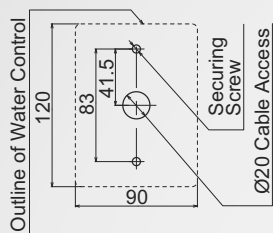


Fig.1

3. When running cable through the access hole ensure the connector and the end of the cable is located nearest to the controller (Fig. 2).

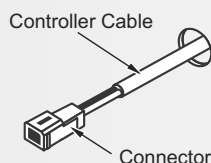


Fig.2

4. Carefully remove the face plate from the controller using the screwdriver (Fig. 3).

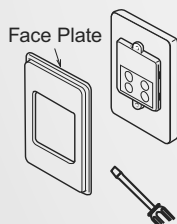


Fig.3

5. Fix the controller to the wall using appropriate fittings as shown (Fig. 4).

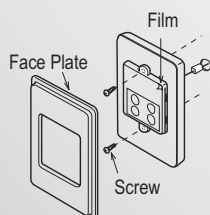


Fig.4

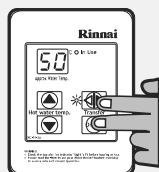
6. Remove protective plastic from the controller face as shown (Fig. 4) and replace the face plate.

Optional programming of the Universal controller

Step one

Are four controllers connected?
If NO—refer to step two. If YES, activate the fourth controller as follows.

1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).



2. Check display on all four controllers is displaying a temperature when switched on. If any controller displays two dashes, repeat above step.



Step two

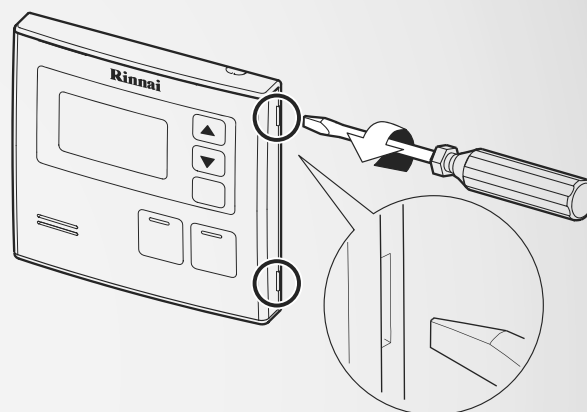
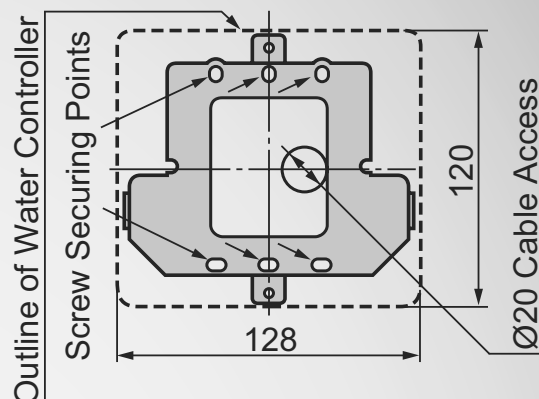
1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).
2. When the controller fitted in the kitchen is switched on it will be possible to select temperatures higher than 50 °C (at this controller). If not repeat above step.

If the kitchen controller is swapped repeat the programming procedure.

Controllers - Kitchen Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Use the wall mounting bracket as a template to mark and drill three holes, locating the cable access hole as shown.
3. Fix the mounting bracket to the wall using the appropriate fixings.
4. Run the water controller cable through the hole in the wall.
5. Carefully remove the face plate from the controller using a screwdriver as shown.
6. Connect the controller cable to the kitchen water controller. At this point cables from other controllers (if fitted) may also be connected to the kitchen water terminals, eliminating the need for multiple cable runs directly to the water heater. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the water controllers.
7. Fasten water controllers to wall mounting bracket. Avoid the use of impact drills and over-tightening of fixings as this may damage the controllers.
8. Remove the protective plastic from the controller face and replace the face plate.



Controllers - Bathroom Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Mark and drill three holes, locating the cable access hole as shown (Fig.1).
3. When running a cable through the access hole ensure the connector end of the cable is located nearest to the controller (Fig.2).
4. Affix the double sided self-adhesive seal to the back of the controller (Fig.3).
5. Carefully remove the face plate from the controller. Do this by placing your thumbs on the front digital display while hooking your fingers behind the top plate and gently push down as shown (Fig.4). Do not use a screwdriver as this may damage the controller.
6. Connect the cable to the bathroom controller. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the controller.
7. Fix bathroom controller to the wall using appropriate fixings. Avoid the use of impact drills and over-tightening of fixings as this may damage the controller.
8. Remove the protective plastic from the controller face and replace the face plate.

Outline of Water Controller

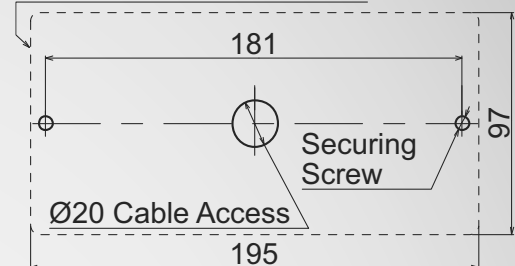


Fig.1

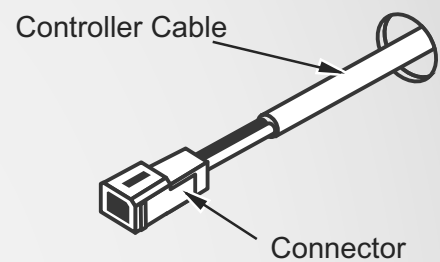


Fig.2

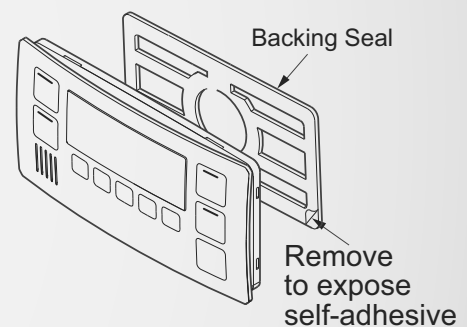


Fig.3

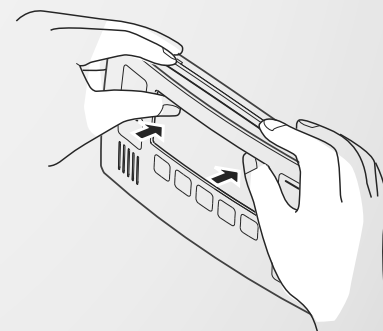


Fig.4

Controllers - communication cables

Communication cables connect the water heater to the water controllers and operate at an extra low voltage (12 Volts DC) which is supplied from the water heater. Communication cables are supplied with the water controllers (15 m) and are fitted with spade terminals for connection to the water heater.

Up to two cables can be connected to the cable connector at the water heater. Extension cables are available from Rinnai. Alternatively two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used (refer maximum individual cable lengths on p. 15).



Do not attempt to connect cables to the cable connector at the water heater unless the electric power supply to the water heater is switched off otherwise damage to electrical components may occur.

To connect up to two cables to the cable connector

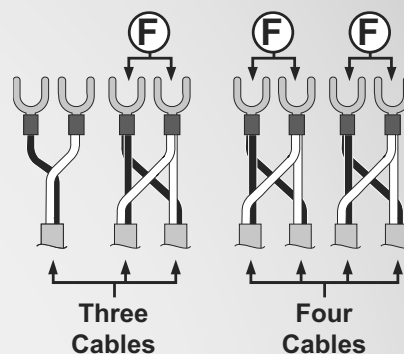
1. Turn off power supply and unplug water heater from the power point.
2. Remove retaining screw of the cable connector at the base of the appliance.

3. Swing the cable connector door open. Thread the cable through the weather seal of the cable access hole (B) in the direction shown allowing sufficient cable length so the cable sheath can be secured with the cable clamp (C) supplied with the transceiver.

4. Loosen screw terminals (D) and (E) and connect cable spade connectors to these terminals and re-tighten. Polarity is not important, either wire colour can be connected to either terminal.
5. Return the cable connector to the original position taking care not to damage cable wires in the process and replace the retaining screw.

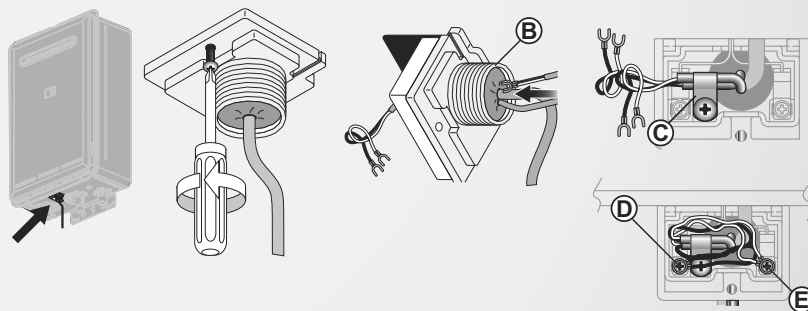
Connecting three to four controllers

1. Repeat steps 1-3 for connecting up to two controllers.
2. To connect three to four controllers, separate all the cables to be fitted into pairs. Cut off the existing spade connectors from each pair and re-terminate each pair into a new spade connector (F) so there are only two sets of spade connectors. Four spade connectors in total to be terminated.
3. Repeat steps 4 and 5 for connecting up to two controllers.

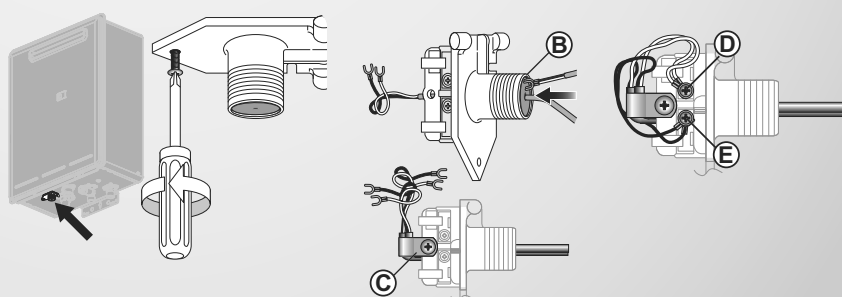


Spade connectors are available from your local electrical supplier.

Cable connector for VT26, VT24, VT20, and VT16



Cable connector for HD250, HD200, HDi200, and EF models



Commissioning



The appliance operation must be tested after installation. Ensure building occupants do not have access to the hot water outlets during this procedure.

Testing

1. Before final connection of the water heater, purge the gas and hot and cold water supply lines. Swarf in the gas or water supplies may cause damage.
2. Turn on the gas and water supplies and test for leaks (gas and water) near the unit.
3. Isolate gas supply. Remove test point screw located on the gas inlet and attach pressure gauge.
4. Turn the power on at the power point socket and turn on the gas.
5. If water controllers are fitted ensure they are on. Select the maximum delivery temperature and open all available hot water taps including the shower. If water controllers are not fitted, open all available hot water taps.
6. Operate all other gas appliances at their maximum gas rate.
7. With all gas appliances operating on maximum, the pressure should read between 1.0-3.5 kPa (NG) or 2.75-3.5 kPa (ULPG). If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the responsibility of the installer to check the gas meter, service regulator and pipe work for correct operation and sizing. The gas regulator on the appliance is electronically controlled and factory preset. Under

normal circumstances it does not need adjustment during installation.

8. Close all hot water outlets.
9. Inspect and clean the strainer located on the cold water inlet connection. This may need to be repeated to ensure the strainer remains clear, especially on new installations.
10. If water controllers are fitted, it is necessary to test their operation through the complete range of functions (refer operation guide).
11. Confirm hot water delivery temperatures using a thermometer. If controllers are fitted, ensure temperatures exceeding 55 °C cannot be selected on bathroom controllers.
12. After testing is completed, explain to the customer how to operate the water heater and water controllers (if fitted). Ensure your details are entered in the customer operation guide (Installer details).

Gas pressure setting

The gas regulator on the appliance is electronically controlled and factory preset. Under normal circumstances it does not need adjustment during installation. Make adjustments only if the unit is not operating correctly and all other causes for incorrect operation have been eliminated. Instructions for gas pressure setting are in the instruction pocket located inside the appliance front cover.

Commissioning checklist

Commission the unit in accordance with the Commissioning Checklist supplied with the appliance (inside front cover of appliance). Ensure you leave the completed checklist with the customer.

If the appliance can not be adjusted to perform correctly call 0800 RINNAI (0800 746 624) for assistance.

Recommended solar system layout

Rinnai continuous flow water heaters configured for solar systems produce hot water at 75 °C and are not suitable for use with water controllers. The household water supply **MUST** be protected by a suitable tempering valve.

Installation

Rinnai continuous flow water heaters in solar installations are only suitable as gas boosters in solar hot water systems. These models produce water at higher than normal temperatures and must be connected to the hot water supply by use of a suitable tempering valve.

Install a Rinnai continuous flow water heater using a flow diversion valve as shown. Remember 'B to Boiler' when setting up the flow diversion valve.

The water heater must be set to 75 °C (refer dip switch settings on following pages).

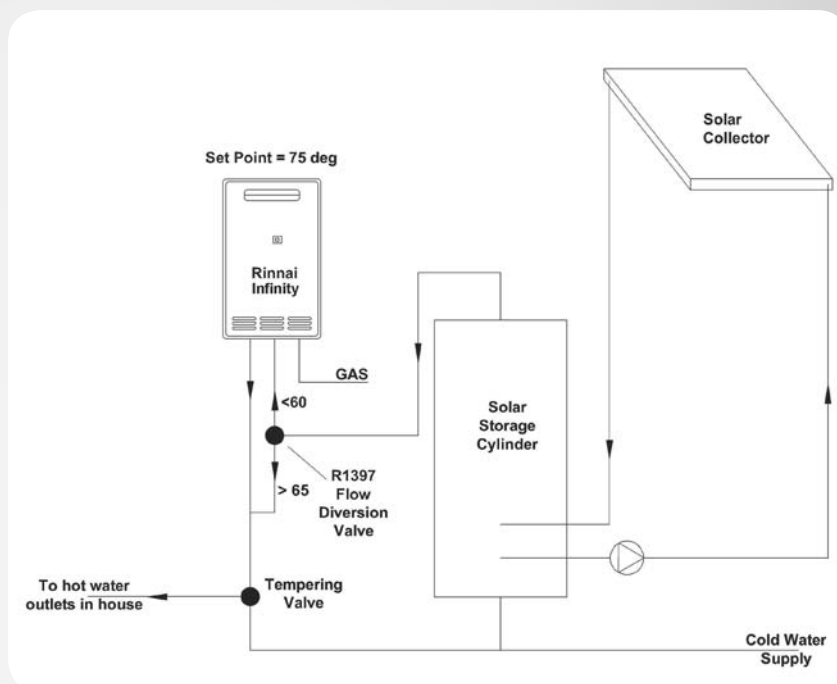
Rinnai water controllers cannot be used with Rinnai Infinity solar units as the hot water does not always pass through the Rinnai Infinity, and the Rinnai Infinity dip switch setting of 75 °C is unable to be adjusted.

System configuration to protect for Legionella

If the system is configured according to the details above it will meet the requirements of the Acceptable Solution G12/AS2 for protection against Legionella. Section 3.5.2 states:

b) the instantaneous water heater must heat all water passing through it to not less than 70 °C.

Recommended system layout using a Rinnai Continuous Flow water Heater and Flow Diversion Valve



DIP switch settings

DIP switch settings - important

DIP switch settings must only be changed by a licensed gasfitter. They have been provided as there may be a requirement to change the temperature of the water delivered from the water heater.



Care must be taken when changing the temperature settings as the DIP switches are small and can be easily switched or bumped into the wrong position. Please use this information carefully and fully check the operation of the water heater before leaving site including the temperature of the water delivered.

The cover of the water heater will need to be removed to carry out this operation. As this will expose live mains voltage wiring **please disconnect the power supply before removing the front cover.**

We wish to draw your attention to the requirements of the New Zealand Building Code and compliance document G12. This requires that water delivered to sanitary fixtures be no more than 55 °C. Increasing the water heater set temperature will therefore require that you protect all sanitary fixtures to which the appliance is plumbed with suitable tempering valves or similar.

Rinnai will accept no liability for issues arising out of the use of this DIP switch information.

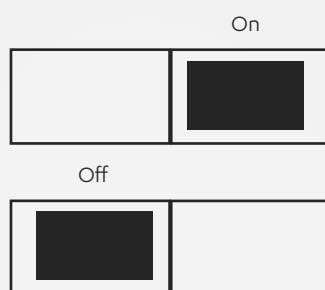
If you have any doubts about the performance of the water heater please contact Rinnai by phoning 0800 TO RINNAI (0800 86 746 624).

The setting of water temperatures in domestic model Infinity units (white cases) to greater than 55 °C (with the exception of units set to 75 °C in domestic solar installations) will reduce the warranty period. Refer to warranty

information in the Operation Guide for further information.

The following pages detail DIP switch settings for the specific Rinnai continuous flow water heaters listed. They ARE NOT applicable for older models.

Legend for DIP switch settings (black indicates position of switch)



Short and long flues

Reference to what is a short and long flue can be found on page 8.

DIP switch settings



Applicable models and REU numbers

Rinnai Infinity VT16	External	REU-VR1620WG
Rinnai Infinity VT20	External	REU-VR2024WG
Rinnai Infinity VT24	External	REU-VR2426WG
Rinnai Infinity VT26	External	REU-VR2626WG
Rinnai Infinity EF24	External	REU-K2430WG

DIP switch 1: Upper SW (8P)

SW No.	Note						
1		Off					
2	Fixed temperature (with controllers)	Off	Fixed temperature			On	With controllers
3	Temperature settings	See Chart A					
4							
5							
6		Off					
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.
8		Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	not to be used	40	40
On	On	On	not to be used	55	75

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	ULPG	On	NG
2,3,4	Model settings	See Chart B			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	VT26 (VR2626WG) and EF24 (K2430WG)
Off	On	Off	VT24 (VR2426WG)
Off	Off	On	VT20 (VR2024WG)
Off	On	On	VT16 (VR1620WG)

DIP switch settings



Applicable models and REU numbers

Rinnai Infinity HD200	External	REU-VRM2632WC
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG
Rinnai Infinity HD250	External	REU-VR3237WG

DIP switch 1: Upper SW (8P)

SW No.	Note							
1	HDi200	Flue setting	Off	Long flue (p. 8)			On	Short flue (p. 8)
	HD200, HD250	Model setting	Off					
2	Fixed temperature (with controllers)		Off	Fixed temperature			On	With controllers
3	Temperature settings		See Chart A					
4								
5								
6			Off					
7	Gas pressure		Off	Normal	On	Forced min.	On	Forced max.
8			Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	85, 95 ¹	40	40
On	On	On	85	55	75

¹ 95 °C setting only available for HD250 model

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	ULPG	On	NG
2,3,4	Model settings	See Chart B			
5,6	Not in use	Off			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	HD250 (VR3237WG)
Off	Off	On	HD200 (VRM2632WC)
Off	On	On	HDi200 (VR2632FFUG)

DIP switch settings



Applicable models and REU numbers

Rinnai Infinity EF250	External	REU-KM3237WD
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD

DIP switch 1: Upper SW (8P)

SW No.	Note							
1	Flue settings	Off	EF250 Ext & EFi250 Int long flue (p. 8)			On	EFi250 Internal short flue (p. 8)	
2	Fixed temperature (with controllers)	Off	Fixed temperature			On	With controllers	
3	Temperature settings	See Chart A						
4								
5								
6	Not in use	Factory setting is 'Off'						
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.	
8		Off		Off		On		

Chart A: Temperature settings

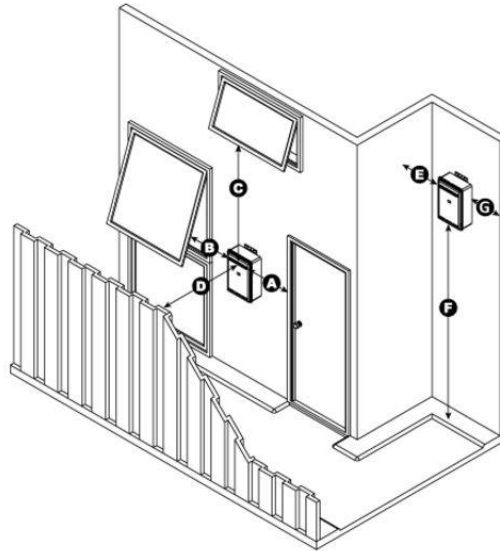
DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	95	40	40
On	On	On	85	55	75

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type settings	Off	ULPG	On	NG
2		Off		Off	
3	Type settings	Off	External	Off	Internal
4		Off		On	
5	Automatic return	Off	Inactive	On	Active
6	External device	Off	S-BMS	On	AH

General clearances

The following diagram has been provided to assist you in determining where (and if) an external continuous flow water heater can be positioned. If in doubt, prior to purchase, consult a licensed gasfitter.



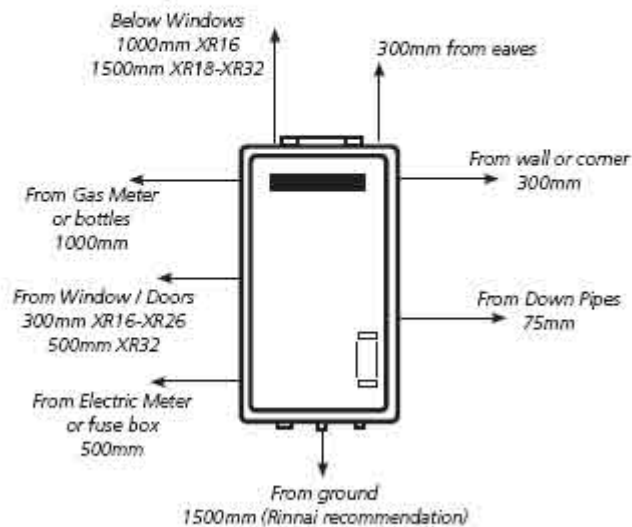
Dimension	Infinity VT models Infinity HD200 models Infinity EF models	Infinity HD250 models
A	Min. 300 mm	Min. 500 mm
B	Min. 300 mm	Min. 500 mm
C	Min. 1.5 m	Min. 1.5 m
D	Min. 500 mm	Min. 500 mm
E	Min. 300 mm	Min. 300 mm
F	Min. 300 mm*	Min. 300 mm*
G	Min. 300 mm	Min. 300 mm

Clearance below eaves, balconies, and other projections, for all models is 300 mm.

* Rinnai recommend 1.5 m to give enough clearance for the pipe work, and to safely expel flue gases.

Installation Clearances

External Model diagram



NZ Standards 5261:2003 2.6.13.3

Waterproofing Systems



Technical Data Sheet

Dampfix Gold

Water Based Polyurethane Liquid Waterproofing Membrane

DESCRIPTION

One part, highly elastic, Class 3, water-based polyurethane waterproofing membrane system that meets the requirements of AS3740 by complying with AS/NZ 4858.

This Technical Data Sheet may be revised, as appropriate, to comply with changes to relevant Australian and New Zealand Standards, reflect changes in Industry best practice in waterproofing procedures or include improvements to current technologies.

The Applicator is advised to reference the latest Technical Data Sheet issue, before commencing application, by visiting www.bostik.co.nz and following the Technical Data sheet links or by contacting Bostik Customer Service on 0508 222 272.

The **Bostik Dampfix Gold** waterproofing membrane system is specifically formulated for application on graded substrates that provide positive falls to drainage outlets. Overlaying tiling systems must comply with Guide to the Installation of Ceramic Tiles - AS3958.1).

This is a 2-coat system applied over primed porous & non-porous substrates. It is not recommended as a membrane system in immersed applications (such as pools or spas)



FEATURES

- ✓ Class 3, high elasticity.
- ✓ Fast drying.
- ✓ Recoat in 2 hours @ 20° C & 50% RH
- ✓ Early access for following trades.
- ✓ Tile next day in most conditions.
- ✓ May be tiled directly onto with approved ASA adhesives
- ✓ Reinforced with clump free fibres.
- ✓ No mixing.
- ✓ High resistance to detergents & bleach.
- ✓ Will not re-emulsify after curing.
- ✓ Does not embrittle with age.
- ✓ Excellent adhesion to concrete; rendered masonry; wet area plasterboard; FC sheet & plywood.
- ✓ Can be applied to damp substrates, i.e. no free water
- ✓ Brush, roller or trowel applied.
- ✓ Flood Test in 72 hours.

RECOMMENDED USES

- ✓ As a waterproofing membrane to internal wet area shower, bathroom, kitchen, laundry & toilet areas to AS/NZ 3740.
- ✓ As a waterproofing membrane to external balconies, rooftops & podium levels to AS/NZ 4654.2.
- ✓ All applications to be covered by tile or other surface wearing and protective systems by following trades.
- ✓ Suitable for concrete; cement rendered masonry; FC sheeting; water resistant plasterboard; and structural plywood (Type A Stamped "PAA JAS-ANZ" to AS/NZS2269-2004) substrates.



Dampfix Gold

APPLICATION INSTRUCTIONS

IMPORTANT NOTES

- The following instruction steps as detailed in this Technical Data Sheet may not be applicable in every application. They are provided as a guide to meet the requirements of AS/NZ3740 and AS/NZ4654.2.
- It is recommended that the installation should be carried out by a Bostik ASA trained Dampfix waterproofing course applicator.
- Bostik Technical Division must approve any modification or variances to this technical data sheet in writing followed by the issuance of an amended Technical Data Sheet.
- Wherever appropriate, the application must comply with AS/NZ 3740 'Waterproofing of Internal Wet Areas in residential buildings' & AS/NZ 4654.2 "Waterproofing membrane systems for exterior use – Above ground level".
- This product is specially formulated for brush, roller or trowel application to both small and large areas.
- A wet film gauge must be used regularly to ensure that minimum wet film builds are achieved for each coat.
- All vertical terminations, including perimeter walls, hobs and penetrations etc. must be of adequate height to satisfy AS/NZ 3740 for internal applications & AS/NZ 4654.2 for external applications.
- The minimum film build requirements are identical for horizontal applications and must be applied without slump or deformation when cured.
- Apply bond breaker joint to all horizontal/vertical junctions, e.g. wall/floor, wall/wall, hob/ floor, hob/wall & shower set downs etc., prior to all membrane applications (see note on suitable sealants).
- Allow 72 hours before flood testing the installed **Dampfix Gold** system.

Suitable Sealants

ASA silicones or Bostik Industrial Silicone are suitable sealants for use as bond breakers.

Correct bond breaker selection and installation is vital to overall membrane performance. Using an unsuitable sealant can increase the risk of failure and must be avoided. **Contact Bostik for advice if unsure or if considering products not listed above.**

SUBSTRATE PREPARATION

- Read precautions prior to applying any component of the waterproofing system.
- Commencement of membrane system installation shall be taken as acceptance of the substrate suitability and preparation by the applicator.
- Check that the surface of all substrates to be coated are: structurally sound, clean, dry or damp with no free surface water, smooth and free of voids & protrusions, oils, grease, curing compounds, coatings, adhesive residues and are uncontaminated by preceding trade activities.
- Check that all composite substrates, such as wall & floor sheets are fully supported and installed to the manufacturer's instructions.
- Where platform floor sheeting, in particular particleboard, is installed check manufacturer's specification for suitability in wet area applications and ensure that protective coatings do not impair membrane adhesion.
- New concrete and render must have cured for a minimum 28 days.
- Sand & cement screeds and polymer modified renders must have cured for a minimum 7 days.
- Substrates that are not smooth or free of voids and protrusions must be ground and vacuumed clean. All remaining voids must be repaired using, **Bostik UL-Ultrafine**, making sure to follow instructions for preparation, application and curing time. Refer to **Bostik UL-Ultrafine** Technical Data Sheet
- **Bostik Multiprime** must be applied as a primer coat on all applications to porous substrates, e.g. concrete, screeds, renders. Refer **Bostik Multiprime** Technical Data Sheet.
- **Bostik N40** primer must be applied using "2 cloth method" on all applications to dry rigid plastic & metallic non-porous substrates, e.g., UPVC drainage outlets and penetrations; aluminium angle water stops, brass, copper and galvanised penetrations, stainless steel drains and gutters etc. Refer **Bostik N40** Technical Data Sheet.
- 2 coats of **Bostik Moisture Seal** must be used to seal concrete slabs subject to a hydrostatic head of pressure from the negative side. **Bostik Moisture Seal** must be clean, dry and smooth immediately prior to the application of **Bostik Dampfix Gold**. Refer **Bostik Moisture Seal** Technical Data Sheet.



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Dampfix Gold

- Membranes should not be applied until all preparation steps have been completed.
- **Dampfix Gold** is not recommended for use in swimming pools, ponds or spas.

CRACKS & JOINT SEALING

CONCRETE & MASONRY SUBSTRATES

- Static cracks up to 2mm in width, i.e. cracks that do not move or continue to propagate, must be filled with **Bostik Dampfix Gold** or **Bostik UL-Ultrafine** after substrate priming and prior to the first full coat of **Bostik Dampfix Gold**.
- Static cracks greater than 2mm and less than 4 mm in width, i.e., cracks that do not move or continue to propagate, must be filled with **Bostik UL-Ultrafine** after substrate priming and prior to the first full coat of membrane.
- Cracks greater than 2mm that are subject to movement or propagation must be referred to the builder or engineer for structural assessment and method of rectification to perform as an expansion joint.
- Expansion joints must be a minimum 6mm in width and require a backer rod installed prior to the installation of a suitable sealant (see note on page 2) at a width: depth ratio of 2:1. See "Expansion Joints" below.

FLOOR & WALL SHEET JOINS

- All floor and wall sheets must be installed to sheet manufacturer's specification and primed with **Bostik Multiprime**.
- Internal or external sheet floor systems, suitable for wet area applications, require sealant application to seal sheet joints at the time of installation to comply with manufacturer's instructions. The Waterproofer must confirm that the sealant used is compatible with all **Bostik Dampfix Gold membrane** system components.
- Floor sheet joints that use Polyurethane sealants at installation must have cured for a minimum 7 days prior to the application of the membrane.
- All sheet joints must be isolated from the membrane by a min 25mm wide bond breaker tape that covers the entire width & length of the sheet joint.
- As floor sheet joints are more prone to movement over joist supports, apply an extra 1000-micron (1.0 mm) wet coat of **Bostik Dampfix Gold** extending a minimum 35mm either side of the bond breaker tape. A further 2 full coats, at 1000 microns each, must be applied to the remaining area to be waterproofed.

EXPANSION JOINTS

- All expansion joints must be isolated from the membrane by a minimum 25mm wide bond breaker tape that covers the entire width & length of the joint.
- An extra 1000-micron (1.0 mm) wet coat of membrane extending a minimum 35mm either side of the bond breaker tape must be applied as an extra coat. A further 2 full coats, at 1000 microns wet coat each, is required to the remaining area to be waterproofed.

PRIMING

POROUS SUBSTRATE

- A porous or absorbent substrate will allow a bead of water to easily soak into, and wet out, the surface of the substrate.
- To avoid pin holing **Bostik Multiprime** must be stirred and not shaken if colour separation is evident. Colour separation will not affect the performance of **Bostik Multiprime**.
- **Bostik Multiprime** must be applied as a primer coat on all **Bostik Dampfix Gold** applications to porous substrates.
- Refer **Bostik Multiprime** Technical Data Sheet.

NON-POROUS SUBSTRATE

- A non-porous or impervious substrate will cause a bead of water to be retained on the surface of the substrate as a raised droplet. The droplet does not easily soak into the surface of the substrate.
- **Concrete that is overworked or burnished** at the time of placement can present, when cured, as a non-porous substrate that will not easily absorb a bead of water. Mechanical abrasion, such as captive





Dampfix Gold

shot blasting or vacuumed grinding is required to open substrate pores prior to the application of **Multiprime** primer.

- **Rigid plastic and metallic substrates** require **Bostik N40** primer applied using the “2 cloth method” e.g., uPVC drainage outlets & penetrations, aluminium angle water stops, brass, copper or galvanised penetrations, stainless steel drains & gutters etc. Refer **Bostik N40** Technical Data Sheet.
- **“Two Cloth Method”** -
 - o Dampen a clean & dry cloth with N40 primer and spread evenly over the non-porous substrate using a cleaning/rubbing action.
 - o With a second clean & dry cloth, immediately wipe all primer residues off with a buffing action.
 - o Allow the substrate to dry for a minimum of 5 minutes before installing a suitable sealant (see note on page 2) and/or **Bostik Dampfix Gold** membrane.
 - o Do not leave the primer longer than 4 hours before applying sealant/membrane.
 - o Re-prime if 4 hours has elapsed without applying sealant/membrane.
 - o Clean & Re-prime if the primed surface is contaminated with excavation spoil, water, condensation, dust or other contaminants before sealant or membrane can be applied.

NB: For pre-treated surfaces, contact Bostik Technical Division for P.A.T.S. Service.

APPLICATION

MOIST OR DAMP SURFACES

- Membrane must be applied to a primed substrate.
- **Multiprime** can be applied to damp porous substrates, i.e. with no free water on the surface.
- **N40 Primer** must **not** be applied to a damp non-porous substrate.
- **Multiprime** must be used as a primer coat to porous substrates, e.g., concrete, renders, FC sheet, water resistant plasterboard & external grade plywood.
- **Dampfix Gold** is not a vapour barrier and is not designed to stop a negative hydrostatic head of pressure. Where a substrate is subject to a hydrostatic head of pressure from the negative side **Moisture Seal** must be applied and allowed to fully cure before the application of **Dampfix Gold** system. Refer **Moisture Seal** Technical Data Sheet.

BOND BREAKER & MEMBRANE INSTALLATION

- Internal wet area installation must comply with the minimum requirements of AS/NZ3740 Section 3, “Installation”. As a guide, refer pages 12 to 33.
- External wet area installation must comply with the minimum requirements of AS/NZ4654.2, Section 2, “Design and Installation”. As a guide, refer pages 7 to 30.
- When installing bond breakers only use sealants that have been approved for use in writing by Bostik. See the note on suitable sealants on pg 2 for more details or if unsure, contact Bostik before work commences.
- Bond breaker is to be installed over the dry primer coat where a bond breaker joint is required, e.g. to internal corners and changes in direction of substrate plane, such as wall/floor; wall/wall; hob/wall junctions, pipe penetrations, tap bodies, water stops, drainage outlets or similar.
- Bond breaker joints must be a minimum 12mm x 12mm coved bead of sealant applied by caulking gun continuously into all changes of substrate plane, such as, wall/floor, hob/floor, hob/wall and wall/wall corners to the minimum termination height required by AS/NZ3740 or AS/NZ4654.2 as applicable.
- The sealant must bridge all gaps and holes with a minimum 6mm contact onto the adjacent substrates.
- All bond breaker joint sealant profiles must be a minimum 6mm in depth at the mid point of the joint.
- Substrate gaps at drainage outlets, flashings, and water stops, nail/screw holes etc must also be sealed using sealant prior to membrane application.
- Applied, sealant must be spatula tooled smooth around fittings and at all changes of substrate plane to a minimum 12mm x 12mm coved joint. The sealant must be a minimum 6mm in depth at the mid point of the bond breaker joint and extend a minimum 6mm on either side of the joint or gap.
- Apply membrane as soon as the bond breaker joint can be over coated without deformation of the coved sealant profile.



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Dampfix Gold

APPLICATION OF THE MEMBRANE

- Can be applied using a brush, roller or trowel.
- Should not be applied in excess of 2mm thick per coat.
- This is a 2-coat system.
- The 2nd coat should be applied perpendicular to the 1st coat.
- Each coat must be applied at a uniform minimum 1000 microns in thickness to achieve a total wet film thickness of 2.0mm.
- A wet film gauge should be used to regulate adequate membrane coverage during application of each coat. **(Refer table on page 5.)**
- As a further guide a 15Lt pail, applied at 1.0 litre/m² (1000 microns) will cover approx. 15m² per coat.
- A 15Lt pail will cover approx. 7.5m² in 2 coats.

MEMBRANE PROTECTION

- Membrane should be protected throughout the application process and during the initial 24-hour cure period by the placement of signs and barriers to deny access by following trades.
- Further temporary protection sheets must be installed securely, to protect the cured dry film from damage by following trades, until a protective screed or finished floor system is installed.

MEMBRANE RECOATING AND/OR REPAIR

RECOATING

- The surface must be cleaned free of all tile adhesive residue, surface dust and any form of contamination or substrate irregularity.
- The surface of membrane must be washed down with diluted **Bostik Sugar Soap**, thoroughly rinsed and allowed to dry.

REPAIRING

- The adjacent **Dampfix Gold** membrane must be sound with minimum dry film thickness of 1.2mm that is fully adhered to the substrate.
- Membrane must be thoroughly cleaned of all foreign material and left free of all cleaning agent residue, dust or contamination.
- Ensure that any exposed porous and non-porous substrates are correctly prepared, primed and sealed.
- Apply 2 coats of membrane as per "Coverage" instructions.
- Ensure that the membrane repair overlaps the existing membrane by a minimum 100mm.
- A consistent minimum 1.2mm dry film thickness is required over both previously coated and uncoated repair areas. **(Refer "Coverage" table below)**

COVERAGE

- **Bostik Dampfix Gold** is a min 2-coat system
- Each coat must be applied at 1.0 litre / m² or 1000-microns (1.0mm) thick resulting in a total wet film thickness of 2.0mm after 2 coats.
- A minimum of 2 hours should be allowed between coats.
- The 2nd coat should be applied perpendicular to the 1st coat.
- Extra coats may be applied if required at the same rate of 1000 microns (1mm thick) per coat.
- Do not thin with water or add fillers.
- The regular use of a wet film gauge during application is recommended to ensure correct wet film build per coat.
- The dry film thickness, after 2 coats should be a minimum of 1200-microns (1.2mm thick).
- Each 15Lt pail will cover depending on substrate conditions:
 - o 15m² / coat.
 - o 7.5 m² / 2 coats.

Application	Wet Film Thickness	Dry Film Thickness
1 st Coat	1000 microns (1.0mm)	600 microns (0.6mm)
2 nd Coat	1000 microns (1.0mm)	600 microns (0.6mm)
Total Film Thickness after 2 coats	2000 microns (2.0mm)	1200 microns (1.2mm)





Dampfix Gold

PRECAUTIONS

- **Must not** be installed directly on wet, contaminated, or friable substrates.
- Minimum dry film thickness after 2 coats is 1.2mm
- Regular checks with a wet film gauge during the application of each coat are advised.
- Do not apply any component of the system when air or substrate temperatures are below 5° C.
- Cold damp conditions will adversely effect application properties and slow rate of curing.
- Do not apply Bostik Dampfix Gold when air and substrate temperature is greater than 35°C or below 5°C .
- Membrane should not be used as an exposed finish or as top coating exterior membrane.
- When used in areas subject to ambient conditions below freezing special installation precautions must be taken. Contact Bostik for advice before commencing work.
- All 4654.1 **external** membrane applications covered with a reinforced tile bed or screed must be separated from the membrane by a minimum one layer of 200um plastic sheet as a separation layer in accordance with AS3958.1 - 3.3.2.3.
- The installation of protection board and ballast, such as river pebbles or similar loose laid unbound coverings, must be isolated from the membrane by a compatible drainage cell and filter fabric system.
- Must not be applied directly over lightweight concrete.
- Hobs constructed of autoclaved aerated blocks, e.g. Hebel, must be saturated with 2 coats of Multiprime to consolidate and seal the substrate. This is to prevent pin holing of the membrane and provide enough strength to support tiling of the hob.
- Autoclaved aerated block walls must be rendered prior to the application of the waterproofing system.
- Should not be used in constantly submerged applications such as swimming pools, ponds & spas.
- Not designed to withstand negative side substrate head of pressure.
- Use only suitable sealants (see note on page 2). Incorrect sealants will significantly increase the risk of failure.
- Any intended application of membrane outside of recommended installation should be referred to Bostik Technical Services for approval.
- Protect contents of pail from excessive heat, and freeze/thaw prior to use.
- Contact Bostik prior to work commencing if there is any uncertainty regarding suitability, installation or any other matters related to the system (including bond breakers).

BOSTIK CO-OPERATIVE TEST PROGRAM

Bostik offers a service in which a programme has been established to eliminate potential field problems by pre-testing Bostik membranes with samples of the building materials to which the membrane will be applied. This service is available on large projects where pre-application testing will aid in determining the proper method to achieve optimum adhesion. Consult a Bostik representative for further information

PAINTABILITY

Bostik Dampfix Gold is paintable. Refer paint supplier recommendations.

PROPERTIES

Colour	Gold or Grey
Appearance	Smooth, brush/roller grade paste
Shore "A" Hardness	Approx 60
Elongation	>900%
Minimum Dry Film Thickness	1.2mm
2mm Crack Bridging	Pass
Volume Solids	Approx 60%
Packaging	15L & 4L pails

Tensile Strength	1.5 – 2.0 MPa
Dry Time per coat	2 hours @ 25°C & 50% RH (min 2 coats)
Dry time following Trades	24 hours @ 25°C & 50% RH
SG	Approx 1.3
Minimum Wet Film	1.0mm / coat
Membrane Rating	Class 3
Moisture Vapour Transmission Rate	1.24 grams / m2 / 24hours
Flammability	Non-flammable



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Dampfix Gold

Complies with AS3740 by meeting all requirements of AS/NZ4858
Wet Area Membranes

STORAGE & SHELF LIFE

Store between 5°C and 30°C. If stored, unopened within these temperature ranges, this product has a shelf life of **12 months**. Protect from excessive heat, moisture and freeze/thaw.

HEALTH & SAFETY

SEE THE MATERIAL SAFETY DATA SHEET FOR ADDITIONAL INFORMATION.

TECHNICAL SERVICES TOLL FREE NUMBER: 0508 222 272 (Land lines only)

MSDS can be downloaded from www.bostik.co.nz

Clean-Up

Warm soapy water will remove **Dampfix Gold** from tools and equipment prior to full cure

PACKAGING

15 Litre & 4 Litre pails

VOC – 23 g/Lt

PRODUCT DETAILS

ITEM NO	ITEM NAME	Colour	SIZE
30804399	DAMPFIX GOLD	Yellow	4L
30804461	DAMPFIX GOLD	Yellow	15L

This datasheet is for the general help of users. It is provided in good faith. The data is current and accurate to the best of our knowledge. Differing materials, substrates, environments, site conditions, and product storage, handling and application may affect results. Users should carry out tests to decide the product's suitability for purpose. This data sheet and the properties of the product may change without notice. Users, suppliers and retailers should check that the data sheets they have are the latest. To the maximum extent permitted by law, Bostik disclaims all warranties in relation to manufacture and use of the product. Bostik is not liable for representations made by users, suppliers or retailers about the product. Bostik is not liable for any loss or damage resulting from incorrect, careless, or negligent use or storage of the product, including use of out of date product. Any liability arising from use of the product is limited to the replacement or purchase price of the product. Bostik does not exclude rights and remedies that cannot be excluded by legislation, for example under the Consumer Guarantees Act 1993. Sale of the product by Bostik is subject to the Bostik New Zealand Limited Conditions and Terms of Sale. For more information on Bostik, products, and conditions of use and sale visit www.bostik.co.nz



Product: Dampfix Gold
Issue Date: 25/11/2014
Issue No.
Author: WK
Division: Construction
Total Pages: 7



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BRANZ Appraised
Appraisal No. 745 [2017]

DAMPFIX GOLD INTERIOR WATERPROOFING MEMBRANE

Appraisal No. 745 [2017]

This Appraisal replaces BRANZ
Appraisal No. 745 [2011]



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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Product

- 1.1 Dampfix Gold Interior Waterproofing Membrane is a liquid-applied waterproofing membrane for use under ceramic or stone tile finishes in internal wet areas.

Scope

- 2.1 Dampfix Gold Interior Waterproofing Membrane has been appraised for use as a waterproofing membrane for internal wet areas of buildings, within the following scope:
- on floor substrates of concrete, flooring grade particleboard, plywood, compressed fibre cement sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
 - when protected from physical damage by ceramic or stone tile finishes; and,
 - where floors are designed and constructed such that deflections do not exceed 1/360th of the span.
- 2.2 The use of Dampfix Gold Interior Waterproofing Membrane on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Movement and control joints in the substrate must be carried through the membrane and tile finish. The design and construction of the substrate and movement and control joints is specific to each building, and is therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.4 The ceramic or stone tile finishes are outside the scope of this Appraisal.
- 2.5 The membrane must be installed by trained applicators, approved by Bostik New Zealand Limited.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Dampfix Gold Interior Waterproofing Membrane if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 [b], 15 years and B2.3.2. Dampfix Gold Interior Waterproofing Membrane meets this requirement. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Dampfix Gold Interior Waterproofing Membrane meets this requirement. See Paragraphs 11.1- 11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Dampfix Gold Interior Waterproofing Membrane meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 Materials supplied by Bostik New Zealand Limited are as follows:

- **Dampfix Gold Interior Waterproofing Membrane** - An elastomeric, one-part, water-based, fibre reinforced polyurethane waterproofing membrane. It is supplied as a gold colour in 15 litre pails.
- **ASA Multiprime** - A synthetic latex based primer for a variety of porous substrates. It is supplied as an opaque pink liquid in 1, 5 and 20 litre containers.
- **Bostik Ultra NP Primer 2 Part** - A two part water based epoxy primer for non-porous substrates. It is supplied in a 4 litre kit and is a uniform greenish colour when mixed.
- **ASA Neutral Cure Silicone** - A flexible, neutral cure silicone for use as an expansion joint filler or bondbreaker. It is supplied as a white or coloured paste in 300 ml cartridges.

Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Dampfix Gold Interior Waterproofing Membrane. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 Dampfix Gold Interior Waterproofing Membrane is for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 The membrane must be protected from physical damage by the application of ceramic or stone tile finishes.
- 7.3 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ Good Practice Guide - Tiling.
- 7.4 Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported.
- 7.5 Timber framing supporting the substrates must be constructed such that deflections do not exceed $1/360^{\text{th}}$ of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

Substrates

Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with the sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used.
- 8.2 The plywood must be laid with the face grain at right angles to the floor joists. Joists must be at 400 mm centres maximum and the edges of the sheets must be supported with blocking or framing. The plywood must be fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres along the sheet edges and 200 mm centres to all framing through the body of the sheets.

Fibre Cement Compressed Sheet/ Fibre Cement Sheet Tile Underlay

- 8.3 Fibre cement compressed sheet must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Fibre cement sheet tile underlay must be suitable for use in internal wet areas. Installation must be in accordance with the instructions of the manufacturer.

Particleboard

- 8.4 Particleboard must be specified for the end use in accordance with NZS 3602.

Concrete and Concrete Masonry

- 8.5 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229, and concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

- 8.6 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be suitable for use in internal wet areas.
- 8.7 Fibre cement sheet must be suitable for use in wet areas and comply with the requirements of AS/NZS 2908.2
- 8.8 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

Durability

Serviceable Life

- 9.1 The Dampfix Gold Interior Waterproofing Membrane, when subjected to normal conditions of environment and use, is expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design serviceable life of 15-25 years.

Maintenance

- 10.1 No maintenance of the membrane will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grout and sealant.
- 10.2 In the event of damage to the membrane, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.
- 10.3 Drainage outlets must be maintained to operate effectively, and ceramic or stone tile finishes must be kept clean.

Internal Moisture

- 11.1 Dampfix Gold Interior Waterproofing Membrane is impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Dampfix Gold Interior Waterproofing Membrane is suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of compliance for containment of overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.1.
- 11.3 Surfaces must be finished with ceramic or stone tile finishes. A means of compliance to NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 [b], 3.1.2 [b] and 3.3.1 [b].
- 11.4 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes and drainage flanges must be provided and the floor must fall to the outlet.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, BRANZ Good Practice Guide – Tiling, and flooring and wallboard manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must flash over the membrane a minimum of 30 mm.
- 11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms.

Installation Information

Installation Skill Level Requirement

- 12.1 Installation of substrates must always be carried out in accordance with the Dampfix Gold Interior Waterproofing Membrane Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.
- 12.2 Installation and finishing of components and accessories supplied by Bostik New Zealand Ltd and its approved applicators must be completed by trained applicators, approved by Bostik New Zealand Ltd.

Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of concrete substrates must be 75% or less before membrane application. Concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.
- 13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have a bond breaker installed as set out in the Technical Literature.
- 13.4 All substrates must be primed and the primer allowed to cure before the membrane is installed. Refer to the membrane supplier for primer specification.

Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 10°C or above 35°C.
- 14.2 Dampfix Gold Interior Waterproofing Membrane must be thoroughly stirred before application.
- 14.3 The membrane must be applied in a minimum of two coats to give a total dry film thickness of 1.0 mm. Subsequent coats must be applied at an opposite direction to the previous coat.
- 14.4 Application can be made by roller [medium/long nap], brush [long bristle], or a rubber or plastic float.
- 14.5 Clean up may be undertaken with water.

Tiling

- 15.1 The membrane must be fully cured before tiling. The cured membrane must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide – Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer and Bostik New Zealand Limited.

Inspections

- 16.1 Critical areas of inspection are:
 - Construction of substrates, including crack control and installation of bond breakers and movement control joints.
 - Moisture content of the substrate prior to the application of the membrane.
 - Acceptance of the substrate by the membrane installer prior to application of the membrane.
 - Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness.
 - Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

Health and Safety

- 17.1 Safe use and handling procedures for the membrane are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 18.1 The following testing of Dampfix Gold Interior Waterproofing Membrane has been undertaken by BRANZ: Testing to AS/NZS 4858 Appendix A including effect of bleach, detergent and water on tensile and elongation, cyclic movement resistance and water absorption.
- 18.2 The following testing of Dampfix Gold Interior Waterproofing Membrane was undertaken by the Commonwealth Scientific Industrial Research Organisation (CSIRO) Australia: Durability testing to AS/NZS 4858 Appendix A including effect of bleach, detergent and water on tensile and elongation, water vapour transmission to ASTM E96-92, water absorption to AS 3558.1 and cyclic movement resistance.
- 18.3 Testing of Dampfix Gold Interior Waterproofing Membrane has been undertaken by Thor Specialties Pty Limited for fungi resistance to the requirements of ASTM G21.
- 18.4 The above test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 19.1 An assessment was made of the durability of the Dampfix Gold Interior Waterproofing Membrane by BRANZ technical experts.
- 19.2 Site inspections have been carried out by BRANZ to examine the practicability of installation.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 20.1 The manufacture of the membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 20.2 The quality management system of the membrane's manufacturer has been assessed and found to be satisfactory.
- 20.3 The quality of supply of the membrane system materials to the market is the responsibility of Bostik New Zealand Limited.
- 20.4 Quality on site is the responsibility of trained applicators, approved by Bostik New Zealand Limited.
- 20.5 Designers are responsible for the building design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Bostik New Zealand Limited and this Appraisal.
- 20.6 Building owners are responsible for the maintenance of the tiling or stone finishing systems in accordance with the instructions of Bostik New Zealand Limited.

Sources of Information

- AS 3558.1 - 1999 Methods of testing plastics and composite materials sanitary plumbing and fixtures - Determination of water absorption characteristics.
- AS 3740 - 2010 Waterproofing of domestic wet areas.
- AS 3958.1 - 2007 Guide to the installation of ceramic tiles.
- ASTM E96-92 Standard test methods for water vapour transmission of materials.
- ASTM G21-96 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- AS/NZS 2908.2: 2000 Cellulose-cement products - flat sheet.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2269: 2012 Plywood - Structural.
- AS/NZS 4858 - 2004 Wet area membranes.
- BRANZ Bulletin Number 585. Measuring Moisture in Timber and Concrete, June 2015
- BRANZ Good Practice Guide Tiling - April 2015.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3602: 2003 Timber and wood-based products for use in buildings.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of concrete masonry structures.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



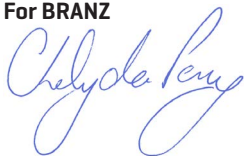
In the opinion of BRANZ, **Dampfix Gold Interior Waterproofing Membrane** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Bostik New Zealand Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Bostik New Zealand Ltd:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Bostik New Zealand Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Bostik New Zealand Ltd** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

22 August 2017

Other Items Relevant to this Project



RIBRAFT® TECHNICAL MANUAL

CBI 3100/3111/3112/4711

JAN 2012



INSTRUCTIONS ON THE USE OF THIS MANUAL

This Manual consists of three Sections:

Section 1: Firth RibRaft Floor System Design Information

Section 2: Firth RibRaft Floor System Installation Information

Section 3: Firth RibRaft Floor System Verification

Section 1 contains information principally useful for the specifier or building designer. Section 2 is primarily aimed at the person on site installing the Firth RibRaft Floor system. While Section 3 describes the required verification checks.

This document contains design and installation information. A variation to any of the information given requires specific engineering design and is hence beyond the scope of this document.

Firth RibRaft Floor System can be constructed for all slab-on-ground concrete floors for domestic or residential buildings that fall within the scope of NZS 3604:2011 “Timber Framed Buildings” and Clause 3 “Scope” of Section 1 of this Manual. The design and installation details in this Manual shall be used to design and construct such a floor.

The Firth RibRaft Floor System is covered by the DBH Codemark®. This is conditional on the system being used as described in CertMark Australasia certification decision, which in turn requires design in accordance with Section 1 and installation in accordance with Section 2 of this Manual and on site Verification in accordance with Section 3.

Note that a DBH Codemark means that if this manual is rigidly followed the relevant Building Control Authority will automatically provide a building permit without the need for producer statements. To comply with the manual does mean that Firth Concrete must be used.

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FIRTH RIBRAFT FLOOR SYSTEM

SECTION 1: DESIGN INFORMATION

1 GENERAL

This Section of this Manual contains design information not requiring specific engineering input for the Firth RibRaft Floor System (the system). Full information on the installation procedures is described in Section 2 of this Manual (Installation Information). Where Standards are referenced in this manual, these shall include the latest amendments.

2 TECHNICAL DESCRIPTION

2.1 Overview

The Firth RibRaft Floor System is a reinforced concrete waffle raft floor slab-on-ground. It consists of an 85mm thick slab supported by a grid of ribs normally 100mm wide at 1200mm x 1200mm centres. The overall depth is 305mm. Edge beams and ribs under load bearing walls are 300mm wide to provide for the extra load carried by these members. Where heating coils of less than 25mm diameter are embedded in the topping, the slab concrete thickness shall be 110mm meaning the overall thickness is 330mm.

2.2 Pods

Firth RibRaft polystyrene pods 1100mm square and 220mm thick are placed directly on levelled ground and are arranged in such a way as to form a reinforced concrete floor slab with a grid of reinforced concrete ribs and edge beams when concrete is placed onto them. Pods may be cut to suit specific architecture layout and also to accommodate services. [300mm thick pods are available if needed for deeper edge beams and internal ribs for construction following specific engineering design. Such uses are outside the scope of this document.]

2.3 Steel

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m², a lower

characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 300mm centres, and ductility class L or E, hereafter referred to as “665 mesh, or mesh”. The reinforcing bars in the ribs and edge beams shall conform to AS/NZS 4671:2001 “Steel Reinforcing Materials”. Specifically designed spacers are used to position the polystyrene pods and the rib and edge beam reinforcing steel bars in a secure manner until the concrete is placed. The reinforcing mesh is held in place by mesh chairs. Conventional timber or steel formwork is used to form the edge of the slab.

2.4 Concrete

One of the following Firth concrete products shall be used in the system:

- 1) Raftmix – a 20MPa 100mm slump structural mix available in either a 13mm or more usually a 19mm nominal aggregate size. This mix is normally placed in the floor straight from the concrete truck chute and if necessary by wheelbarrow over planks set up over the pods.
- 2) Raftmix Pump – a 20MPa 100mm slump pump mix available in either a 13mm or more commonly a 19mm nominal aggregate size. The selection of aggregate size may be determined either by the capability of the available concrete pump or by the concrete placer's preference.

The exception being for buildings constructed in the ‘sea spray zone’ (i.e. within 500m of the sea including harbours, within 100m of tidal estuaries or inlets, on offshore islands and elsewhere as defined as exposure zone D in 4.2.3.3 of NZS3604) in which case one of the following Firth concrete products shall be used in the system:

- 1) Raftmix25 – a 25MPa 100mm slump structural mix available in either a 13mm or more usually a 19mm nominal aggregate size. This mix is normally placed in the floor straight from the concrete truck chute

and if necessary by wheelbarrow over planks set up over the pods.

- 2) Raftmix Pump25 – a 25MPa 100mm slump pump mix available in either a 13mm or more commonly a 19mm nominal aggregate size. The selection of aggregate size may be determined either by the capability of the available concrete pump or by the concrete placer's preference.

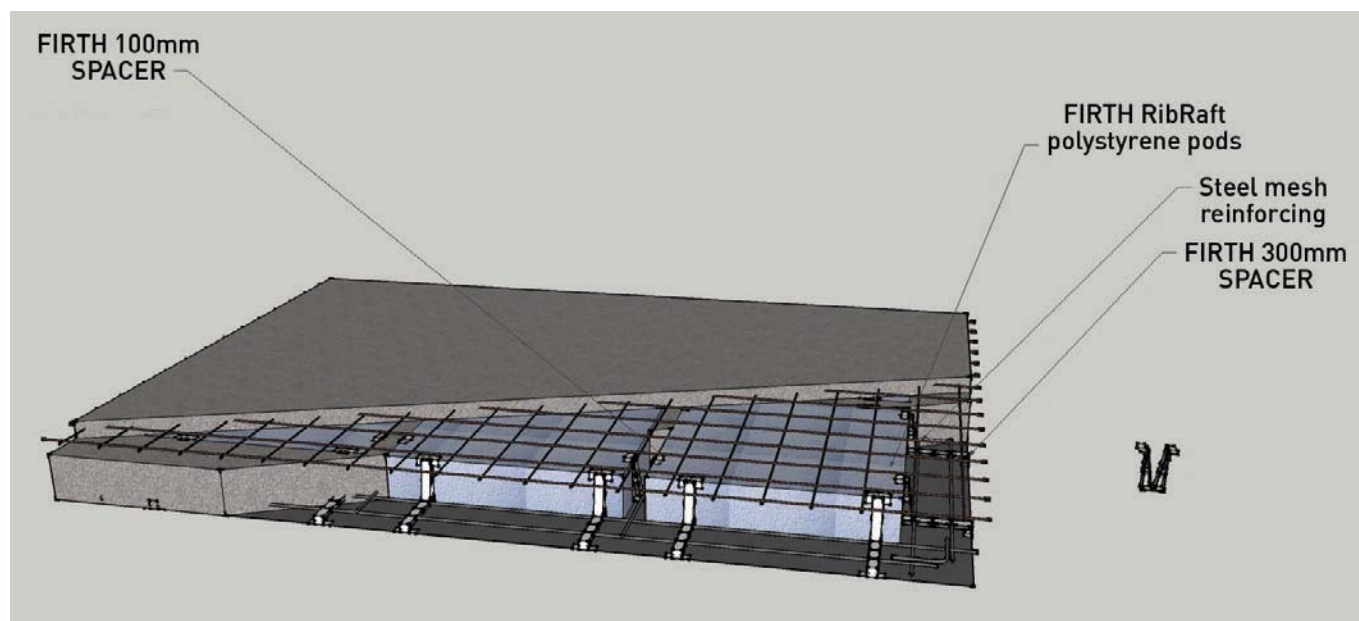


Figure 1 *The RibRaft System*

3 SCOPE

This Clause sets out the limitations that apply to the use of the system to ensure that specific engineering input is not required. The concrete floor slab for buildings or ground conditions that do not meet this scope must be subjected to specific engineering design to comply with the requirements of the New Zealand Building Code.

3.1 Structure Limitations

Specific engineering input shall not be required only where the structure supported by the system complies with the following criteria:

- The structure supported by the system is constructed in a location where the Seismic Hazard Factor Z (defined in NZ1170.5) is less than or equal to 0.45 (refer to figure 6).
- The system is laid level, and is not stepped.
- The structure supported by the system has no basement, part basement or foundation walls.
- The total height from the lowest ground level to the highest point of the roof shall not exceed 10m.
- The structure supported by the system has a roof pitch limited to 60 degrees maximum from the horizontal.
- The maximum height of each storey of the structure supported by the system is 3m.
- Only ground floor walls of the structure supported by the system are permitted to be "heavy external walls" (as defined in Clause 3.3).
- The roof truss span shall be less than or equal to 12m when the roof and ceiling loads are supported entirely by the external walls.
- Where internal load bearing walls are used to support the roof or floors, the loaded dimensions stated in Tables 8.2 and 14.10 of NZS3604:2011 shall apply, and the load bearing wall shall be supported on a 300mm wide load bearing rib as detailed in this manual.
- Floors may be of unlimited size provided that the maximum dimension between free joints shall not exceed 30m. Where free joints are required they should be detailed in accordance with NZS3604:2011.

3.2 Live Loading

The live loading cases of structures covered by these designs are:

- 1.5kPa and 3.0kPa as per NZS 3604:2011 "Timber Framed Buildings".
- 13kN concentrated load in garage over area of 0.3 x 0.3m (vehicle limited to 2500kg gross).

3.3 Dead Loading For Use With This Manual

The dead load cases of structures covered by these designs are:

- Light external walls with total mass not exceeding 60kg/m² – e.g. timber framing with weather boards and interior wall linings.
- Heavy external walls with total mass greater than 60kg/m² but not exceeding 290kg/m² – e.g. timber framing with masonry veneer or partially filled 20 series masonry blocks.
- Internal walls with total mass not exceeding 45kg/m² – e.g. timber framing and linings.
- Light roofs with total mass not exceeding 45kg/m² – e.g. ceiling linings and metal roof, including framing.
- Heavy roofs with total mass greater than 45kg/m² but not exceeding 85kg/m² – e.g. ceiling lining and concrete tiles or slates, including framing.
- Mid-floors with total mass not exceeding 60kg/m² – e.g. timber framing and flooring, including ceiling linings.
- Heavy internal walls and/or load bearing internal walls supported on a load bearing rib.

3.4 Building Types

The designs given in this Manual are limited to where the system supports Building Types A to D as described in Table 1. The classification of wall weights is as detailed in Clause 3.3 of this Section. Single and two storey shall be as defined in NZS 3604:2011.

Table 1 *Building Identifier*

Building Type	Description	Ground Floor External Walls	Second Storey External Walls
A	Single Storey	Light	
B	Single Storey	Heavy	
C	Two Storey	Light	Light
D	Two Storey	Heavy	Light

3.5 Foundation Soils

The system may be used when the supporting ground meets the definitions of "good ground" given in Section 3 of NZS 3604:2011: (as modified by B1 of the Building Compliance Documents). In addition, the system shall not be used for damp sites i.e. where it can be reasonably expected that the ground water level could come within 600mm of the underside of the system. The acceptability of the ground shall be verified in accordance with Clause 3.1.3 of NZS 3604:2011.

Where the ultimate bearing capacity required of the supporting ground is verified by Scala Penetrometer testing in accordance with Clause 3.3 of NZS 3604:2011. The bearing capacity shall be considered adequate when the number of blows per 300mm depth of penetration below the underside of the system at each test site, exceeds the values given in Table 2 below. For RibRaft foundations compliance with Table 2 allows ultimate bearing capacities of less than 300kPa. However, with the exception of bearing capacity all other requirements in NZS3604:2011 for "good ground" shall be complied with.

Table 2 *Scala Penetrometer Blows Required For Determining Ultimate Bearing Capacity*

Building Type	Min. blows per 300mm depth
A	6
B	7
C	8
D	9

3.6 Flow Diagrams

The flow diagrams on the following pages (adapted from NZS 3604:2011) will help in determining whether the non-specific details for the system can be used for the purposes of the concrete floor slab construction. There are two checks in the process. The first is to determine whether the proposed building complies with the requirements set out in this Manual (Building Check), and the second is to determine whether the site complies with the requirements set out in this Manual (Site Check).

(Note: NZS 3604:2011 provides for parts of buildings to be considered as individual buildings. These flow diagrams apply to those parts of the building where slab-on-ground is being considered and where the part of the building can be considered as an individual building under NZS 3604:2011).

Figure 2 *Building Check Flow Diagram*

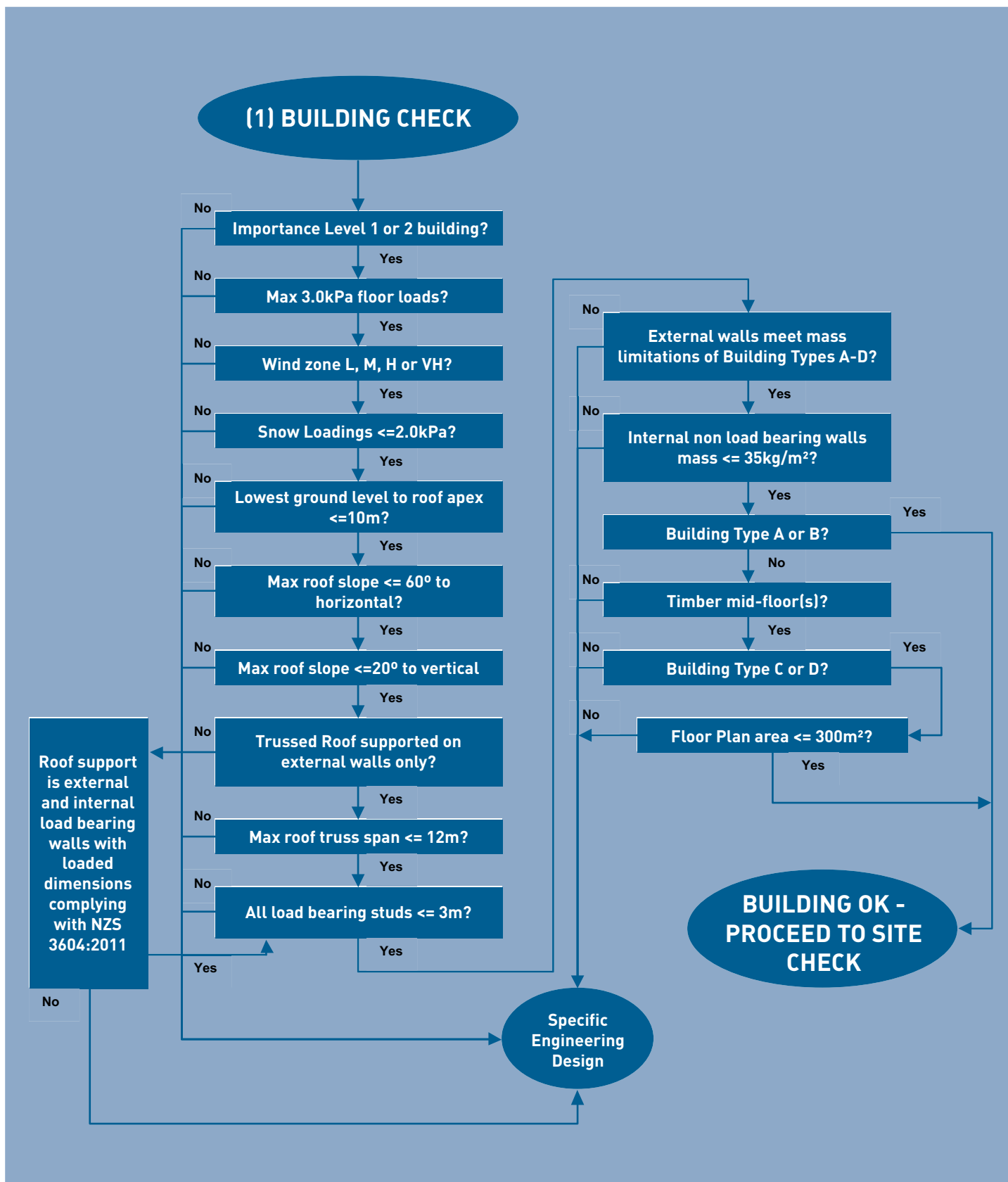
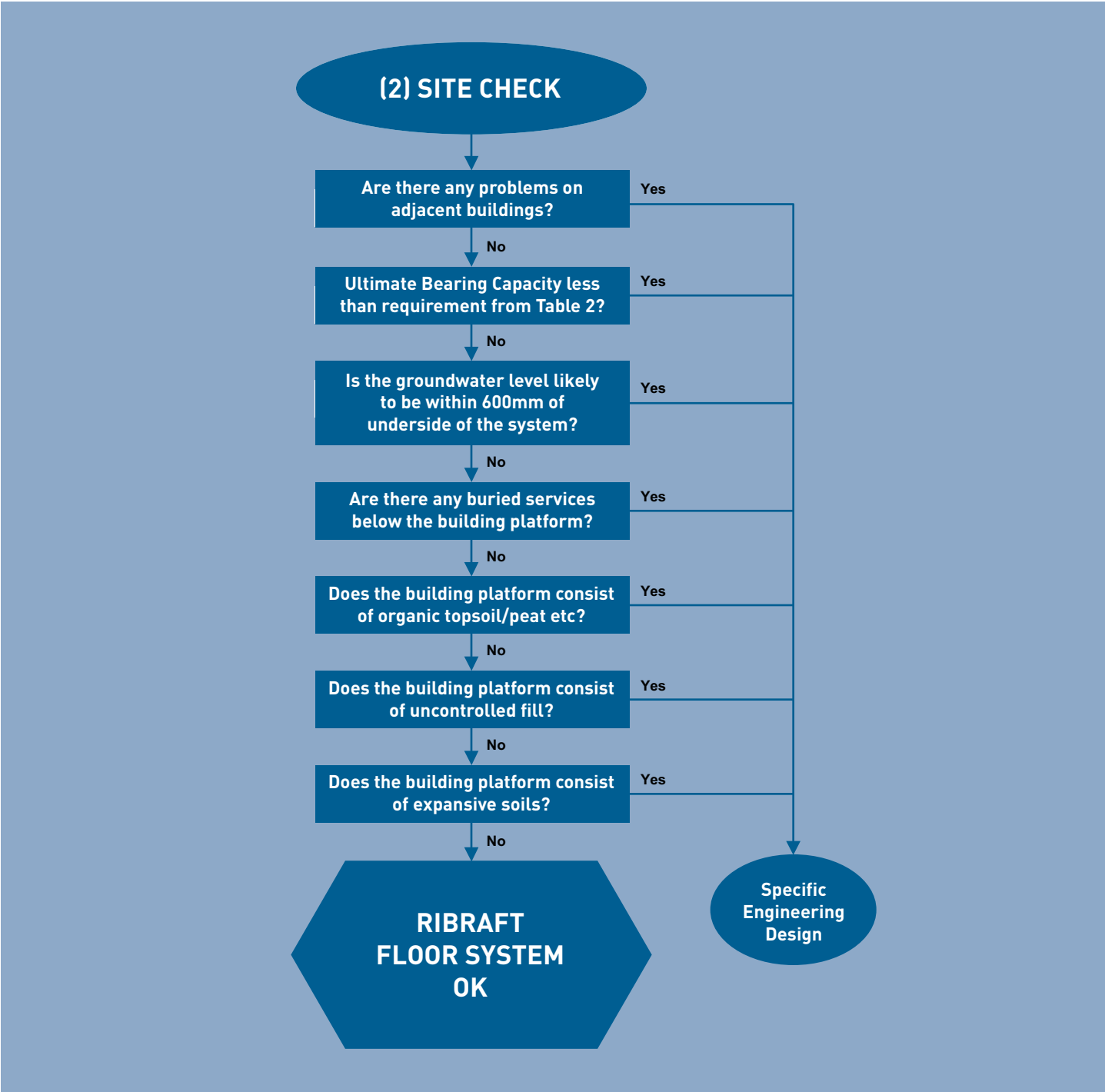


Figure 3 Site Check Flow Diagram



4 CONSTRUCTION DETAILS

Standard construction details for the system are provided here for buildings that fall within the above scope.

4.1 Pod Layout

RibRaft polystyrene pods supplied by Firth (1100 x 1100 x 220mm thick) shall be placed on levelled ground and arranged in a waffle pattern. The pods are used as void formers while the concrete is curing. These pods are an integral component of the system and shall not be substituted.

Pods shall be placed so as to provide the necessary spacing between the edge beams and ribs as described below. The first rib out from the edge beam shall have a maximum clear separation of 1100mm however in all other cases the centre to centre distance between the ribs, whether they are 100mm or 300mm wide, shall be 1200mm. In the case of 100mm ribs this centre to centre spacing is achieved by the 1100mm square pods however between 100mm and 300mm ribs, or between two 300mm ribs, the pods shall be cut down to suit. Pods may be cut down to size but shall not be added to, where this is necessary to suit the building layout,

penetrations or orientation of beams and ribs.

Figure 4 below shows a typical layout of the pods and ribs. Note the part pods around the edge, where the building shape dictates, and adjacent to the 300mm rib.

Firth suggests that when drawing the building plan, a generic RibRaft grid (100mm wide ribs at 1200mm centres) is set out using the corner of the building as a starting point. The location of any load bearing ribs are identified and pods cut to establish 300mm wide ribs. The most cost effective solution being a simple grid layout which requires minimum cutting of the pods. Ribs can be used at less than 1200mm centres, however it is more cost effective to use the 1200mm centres wherever practicable.

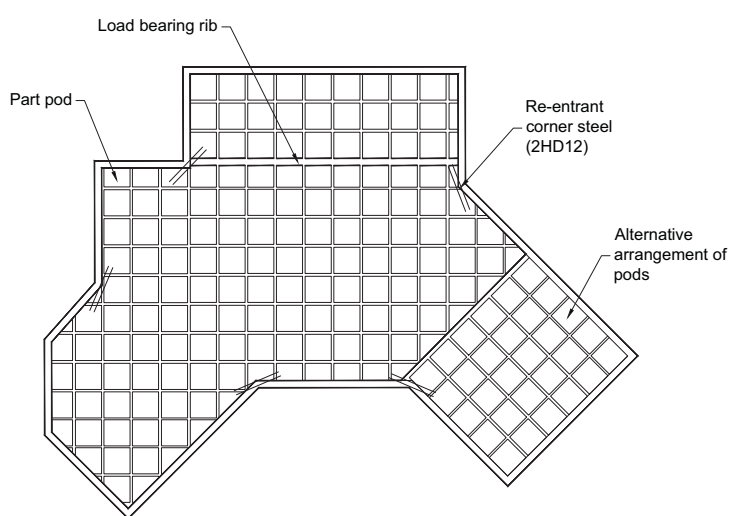


Figure 4 Typical RibRaft Plan

4.2 Edge Beam Width and Reinforcement

Edge beams around the perimeter of the floor slab shall be 300mm to provide bearing capacity for external load bearing walls, and contain 2-HD12 bars (Grade 500E) as bottom steel and 1-HD12 bar (Grade 500E) in the top. This top bar shall be tied to the underside of the reinforcement mesh. Refer Figure 5, below for construction details. The edge beam shall be rebated for brick veneers where necessary as shown in Figure 5(C).

4.3 Internal Ribs (non load bearing) Width and Reinforcement

Each standard internal rib shall be 100mm wide and shall contain 1-HD12 steel bar (Grade 500E) held in place at the bottom of the rib by a Firth spacer. Refer Figure 5E for construction details.

4.4 Internal Ribs (load bearing) Width and Reinforcement

For all load bearing walls and heavy internal walls, the pods shall be cut to create a 300mm wide rib directly under the load bearing wall, with 2-HD12 (Grade 500E) steel bars as bottom steel. Refer Figure 5(D) for construction details under load bearing walls.

Where the load bearing ribs meet and terminate at an edge beam or internal rib the bottom reinforcement from the load bearing rib shall be bent into the adjacent rib and tied together. The reinforcement shall lap for at least 720mm.

4.5 Mesh Reinforcement

The entire floor slab shall be reinforced with 665 Mesh supported on 40mm mesh chairs sitting on the polystyrene pods.

4.6 Re-entrant Corners

In order to limit cracking at the re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover from the internal corner – refer Figure 4.

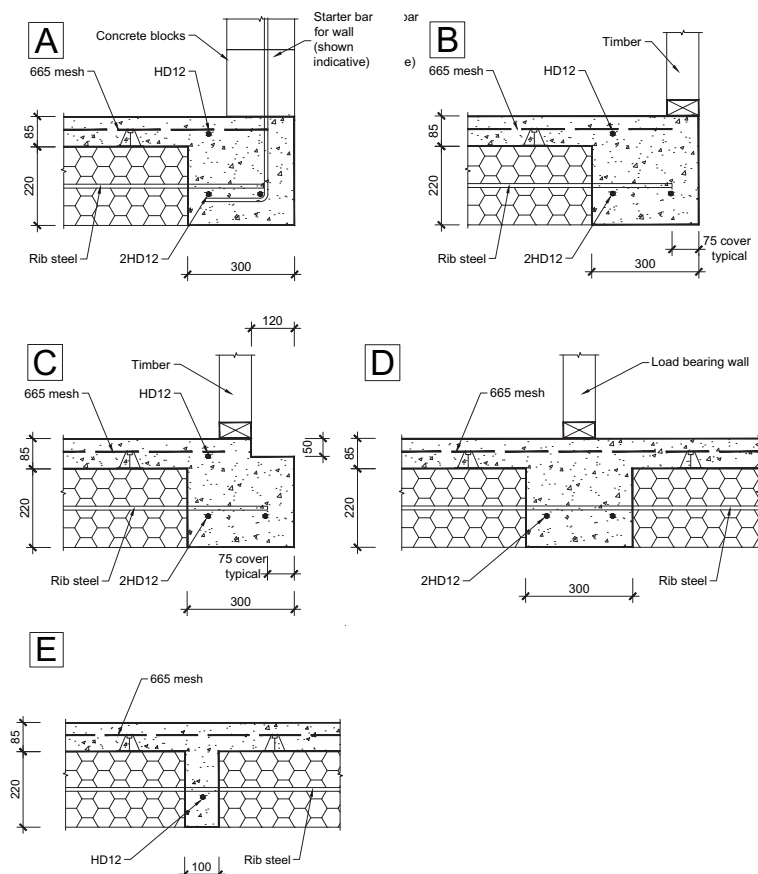


Figure 5 Standard RibRaft Construction Details

5 LATERAL RESISTANCE

5.1 Earthquake Resistance

Unlike conventional foundation systems, the Firth RibRaft system is not embedded into the ground. Sliding resistance to horizontal seismic loads is provided by frictional contact with the soil.

In locations where the Seismic Hazard Factor, Z is greater than 0.45, shear keys may be required to resist seismic loads. Such buildings require specific engineering design and are outside the scope of this document. Refer to figure 6.

Depending on the wind zone and the weight of the building elements this frictional resistance may not be sufficient to provide sliding resistance to wind loads, and specific shear keys may be required, as detailed in clause 5.2.

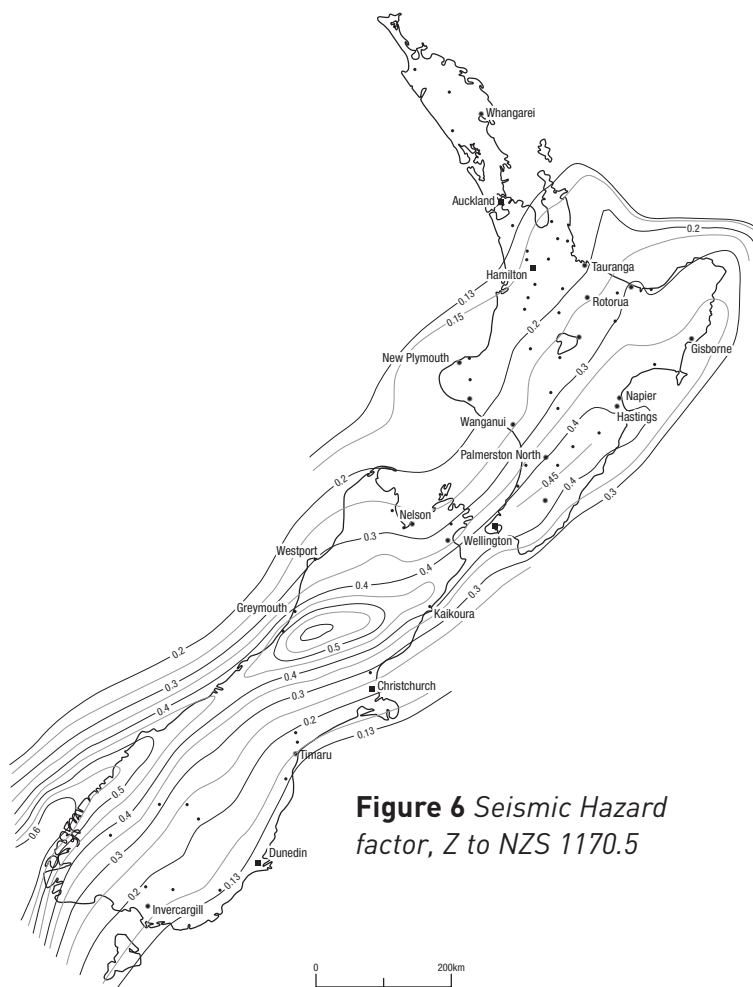


Figure 6 Seismic Hazard factor, Z to NZS 1170.5

For the purposes of this Manual, the ground shall be classified as clay or sand according to the following descriptions:

Clay: retains shape when moulded under hand pressure; may stick to boots and hands; cracks and becomes hard, but retains shape, when dried in direct sunlight; and when dug with a spade the cut vertical surface stands.

Sand: Individual particles visible to the unaided eye; when dry will run through the fingers and forms a conical mound if poured; when moist quickly dries out under direct sunlight; and when dug with a spade the vertical surface does not stand for long.

5.2 Wind Resistance

The building's bracing demand from wind loading shall be assessed from Section 5 of NZS 3604:2011 for both directions (i.e. along and across the building). The bracing capacity of the system must exceed the greater of the bracing demands determined.

The bracing capacity of the system shall be determined as the sum of the bracing capacity provided by frictional resistance (i.e. friction between the system and the ground) and the bracing capacity provided by the shear keys (if any) necessary to meet the requirements of Clause 5.2.

The bracing capacity provided by frictional resistance shall be determined from Table 6 depending on the building type, roof weight, and floor live loading.

The bracing capacity provided by the shear keys shall be the sum of the bracing capacity of the individual shear keys determined as follows. If the shear key is in clay, each shear key shall be considered to contribute 170 BU's. If the shear key is in sand, each shear key shall be considered to contribute 200 BU's.

If the bracing capacity of the system, determined from the frictional resistance and the shear keys as described above, is less than the bracing demand further shear keys shall be added until the bracing demand is met.

Building Type	Roof Type	BUs provided per 100m ² for live loading of:	
		1.5kPa	3.0kPa
A	Light	1150	1267
A	Heavy	1267	1383
B	Light	1800	1917
B	Heavy	1917	2033
C	Light	1617	1833
C	Heavy	1717	1950
D	Light	2267	2483
D	Heavy	2367	2600

Table 6 Bracing Capacity provided by Frictional Resistance per 100m² of ground floor area.

5.3 Shear Keys

Shear key piles required by Clause 5.2 must be uniformly distributed around the perimeter of the building, and be located at the edge beam/internal rib junction. Where a shear key is required, the minimum number of shear keys shall be two per floor plan. Where two shear keys are used they shall be placed at diagonally opposite ends of the floor plan.

Construction details of the shear keys shall be as shown on Figure 7 below. Shear keys shall be a minimum of 900mm long. The holes shall be over-drilled at least 100mm and a polystyrene RibRaft Shear Key Support placed into the bottom of each hole. This will support only the plastic (wet) concrete and then allow movement of the shear key if settlement of the supporting ground occurs. The effective end bearing of the shear keys is therefore eliminated.

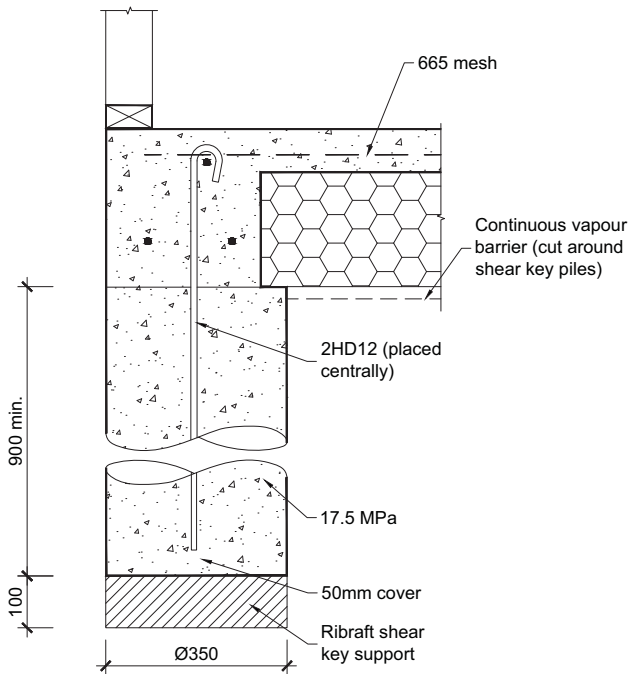


Figure 7 RibRaft Shear Key

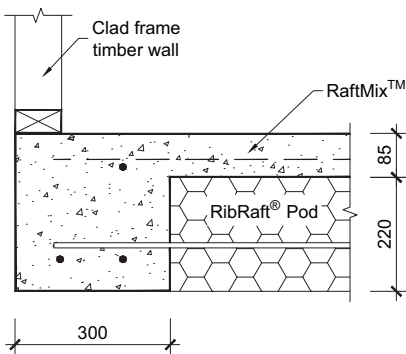
6 OTHER DESIGN DETAILS

6.1 R-Values

The insulation performance of a building element is measured by the “R-Value”. The schedule method is the simplest method to achieve compliance with Clause H1 of the Building Code. Using this method the minimum R-Values required for floors are R1.3 for light timber frame construction, and typically R1.5 for masonry construction. R values of R1.3 can be used for masonry construction if glazing with greater insulation is used (refer NZBC, Clause H1). If in-floor heating is used the

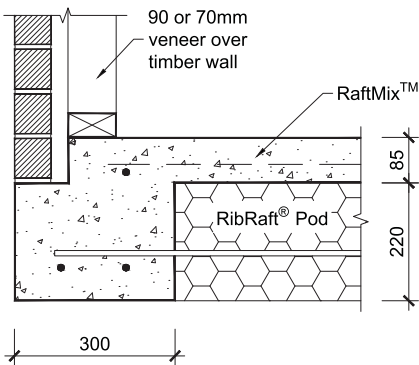
minimum required R-Value is increased to R1.9, and the resistance to thermal movement into the room must be one tenth of that to the outside environment.

The R-Value of a RibRaft floor is dependent on the floor area to perimeter ratio, and the details of the floor perimeter. The R-Value for various solutions are illustrated below. The R-Values have been independently calculated using NZS4214:2006 “Methods of Determining the Total Thermal Resistance of Parts of Buildings,” though modified for perimeter heat loss using recommendations from the Building Research Establishment.



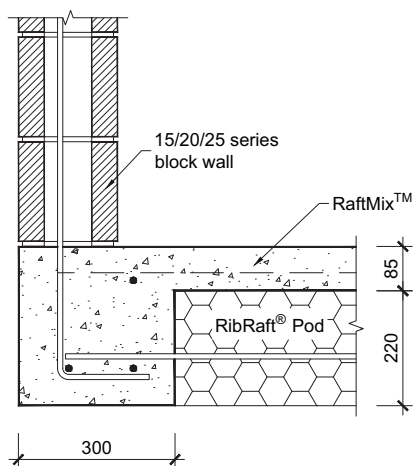
R-value m ² °C/W	Floor Area To Perimeter Ratio m ² /m									
	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	4.00
	1.39	1.51	1.63	1.74	1.85	1.96	2.07	2.18	2.28	2.68

Figure 8 RibRaft R-Values for 90mm thick walls on the floor edge.



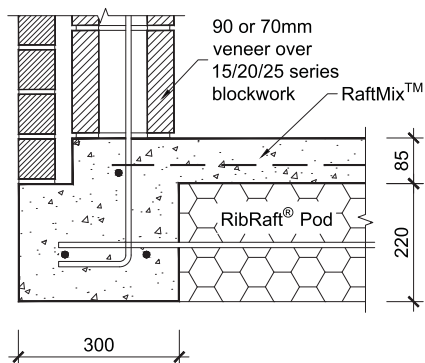
R-value m ² °C/W	Floor Area To Perimeter Ratio m ² /m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84

Figure 9 RibRaft R-Values for 70-90mm thick veneer, cavity, and 90mm walls.



	Block	Floor Area To Perimeter Ratio m ² /m										
		1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m ² °C/W	15 series	1.46	1.59	1.71	1.84	1.96	2.07	2.19	2.30	2.41	2.63	2.84
	20 series	1.52	1.66	1.79	1.92	2.04	2.17	2.29	2.40	2.52	2.75	2.93
	25 series	1.57	1.72	1.85	1.99	2.12	2.24	2.37	2.49	2.61	2.85	3.08

Figure 10 RibRaft R-Values for various thicknesses of masonry walls.



	Block	Floor Area To Perimeter Ratio m ² /m									
		1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m ² °C/W	15 series	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95
	20 series	1.64	1.78	1.92	2.06	2.19	2.32	2.44	2.56	2.81	3.04
	25 series	1.69	1.83	1.98	2.11	2.25	2.38	2.51	2.64	2.88	3.12

Figure 11 RibRaft R-Values for 70-90mm thick veneer, cavity, and various thicknesses of masonry walls.

6.2 Shrinkage Control

Shrinkage control joints reduce the risk of unwanted cracks, and their placement needs to be carefully considered where cracking could be unacceptable. Factors to consider are the type of floor finish, the location of ribs and ground beams, underfloor heating and the effect of piles restraining shrinkage. Shrinkage control joints shall be saw cut after hardening. The saw cuts shall be cut to a depth of 25mm and shall be cut no later than 24 hours. The shrinkage control joints shall be positioned to coincide with major changes in floor plan. Where the concrete is to be exposed, or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 6m.

Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 2:1.

Shrinkage control joints shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib then the joint shall be located directly above one edge of the 300mm rib.

Supplementary reinforcing using 2-HD12 bars (Grade 500E) shall be used at all re-entrant corners as shown on Figure 4. These bars shall be 1200mm long, 200mm apart, tied to the top of the mesh, with 50mm side cover and shall not be placed across any shrinkage control joints.

6.3 Services Detailing

Ideally, services ducts shall be conveyed underground to their plan location then brought up through the polystyrene pod and the concrete floor slab, but this may not always be possible. Services shall not be placed within any concrete except to cross that section of concrete i.e. services shall not run along ribs or edge beams.

The maximum diameter of the services shall be as outlined in Table 7.

Table 7 Maximum Diameter of Pipe Services

Element	Vertical Services	Horizontal Services
300mm wide edge beam	50mm in a duct 50mm larger diameter than pipe	50mm in a duct 50mm larger diameter than pipe unless detailed as per note 2
500mm localised wide edge beam ⁽¹⁾	100mm in a duct 50mm larger diameter than pipe	50mm in a duct 50mm larger diameter than pipe, see note 2
300mm wide internal load bearing rib	50mm in a duct 50mm larger diameter than pipe	50mm in a duct 50mm larger diameter than pipe, see note 2
100mm wide internal rib	Nil	50mm in a duct 50mm larger diameter than pipe, see note 2
Slab	110mm in a duct 50mm larger diameter than pipe or for large services 450mm square ⁽⁴⁾ see also note 2.	Nil

Notes

(1) For situations where a 100mm diameter pipe is required to pass through the edge beam, the edge beam shall be locally increased in width to a minimum of 500mm wide. This shall be achieved by keeping flush the outside face of the edge beam and removing 200mm from the pod. The width shall remain at 500mm for a distance of 600mm beyond the service pipe. Refer to figure 12 for details.

(2) The need for a duct 50mm larger than the service diameter can be deleted when the pipe work does not cross the interface between the bottom of the RibRaft system and the ground at any point along its length. An example would be services laid within the plane of the pods and passing through the edge beam and discharging to a gully trap or similar. In these cases the diameter of the service can be increased to a maximum of 100mm and a service duct is not required. The pipe work shall be wrapped in denso tape where it crosses concrete elements to prevent adhesion between the concrete and pipe work.

(3) Where a gas pipe line runs through the RibRaft floor system, in addition to the requirements above, the pipeline shall enter the building through the outside face of the perimeter foundation beam and be located in the plane of the pods. The aim being to ensure that damage to the gas pipe will most likely occur outside the building envelope should movement occur between the ground and RibRaft in a large earthquake.

(4) Larger penetrations or voids up to 450mm square (e.g. for shower waste/traps) are permitted through the slab provided all the conditions of this paragraph are met. These openings shall be trimmed with 1 HD12 (Grade 500E) bar 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under

the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall not be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower will ensure that the void is sealed/covered).

Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in figure 12, services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in figure 12 at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

Except as noted in table 7, all services shall be placed centrally within an opening 50mm greater in diameter than the service duct/pipe, where they pass through the system. This is to allow seismic tolerances to reduce the probability of shearing of the services during a seismic event. Where the services pass through the slab, the opening shall be sealed to prevent materials entering the subfloor cavities. (This can be achieved with Denso tape

and a type of easily compressible foam). A pictorial of some of the above requirements is illustrated in figure 12:

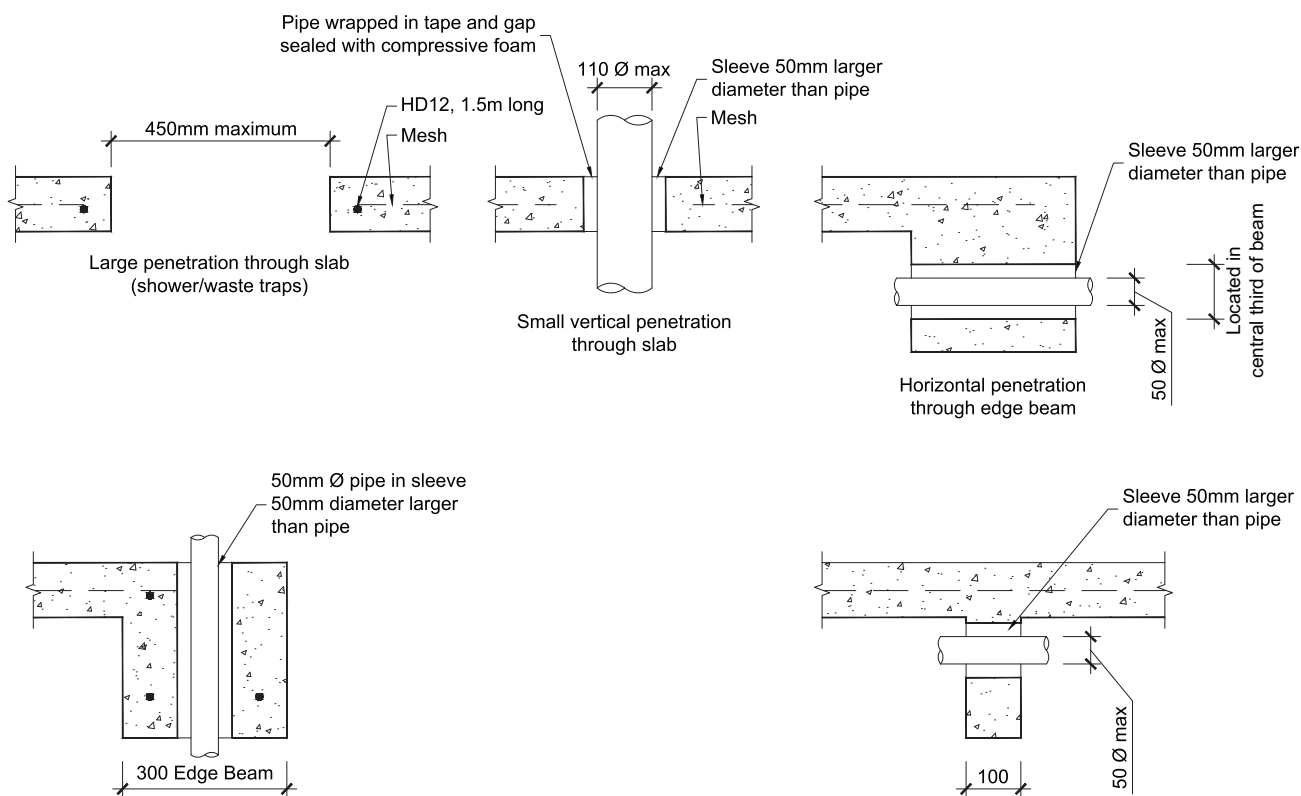


Figure 12 Example of detailing requirements for services

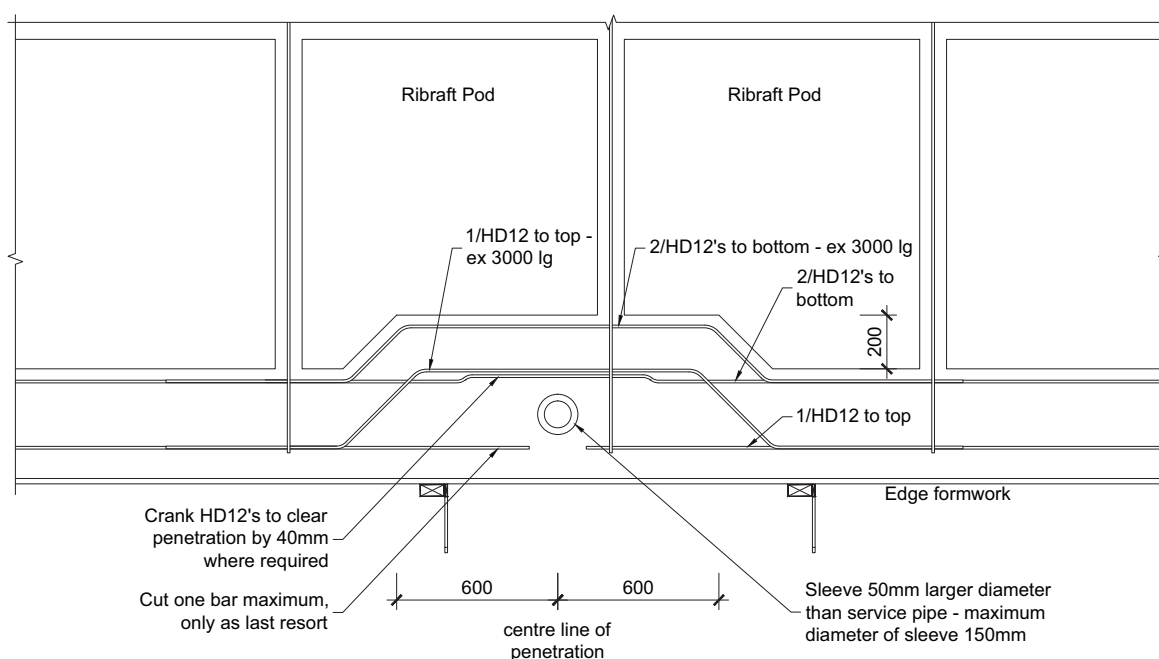


Figure 13 Localised increase in width at edge beam where vertical services up to 100mm diameter are required

FIRTH RIBRAFT FLOOR SYSTEM

SECTION 2:

INSTALLATION INFORMATION

1 GENERAL

This Section details the installation information required for the Firth RibRaft Floor System (the system). Full information on the design procedures not requiring specific engineering input, and requirements for the site assessment are described in Section 1 of this Manual (Design Information). Where standards are referenced in this manual these shall include the latest amendments.

2 SITE REQUIREMENTS

2.1 General

The site requirements of this Manual are concerned solely with the soil conditions under or immediately adjacent to the system. If a site does not comply with this Manual, the system shall be subject to specific engineering design.

This Section shall only apply for building sites such that:

- The ground is as specified in Section 1 of this Manual;
- Any system erected at the top of a slope (whether fill compacted in accordance with NZS4431, or

natural ground) shall be located as shown in Figure 1 so that the finished ground is always outside the dashed line shown. (The vertical distance, V, shall be measured to 50mm below the underside of the slab).

Where the finished ground does not comply with Figure 1, the slope shall be retained by a specifically designed retaining wall.

2.2 Temporary Excavations

No excavation shall take place at a location or in a manner where the stability of the foundation material is likely to be compromised. The backfilled material shall match the compaction and strength of, and have similar properties to, the surrounding material. The sides of the excavation shall be propped as necessary.

Temporary excavations shall be open for no longer than 48 hours and shall take place only above the critical depth line as shown on Figure 2. Should temporary excavations be required below this line, specific engineering design is required.

2.3 Surface Water

Surface water from the site shall not flow across the slab platform. For example, on cut and fill sites the

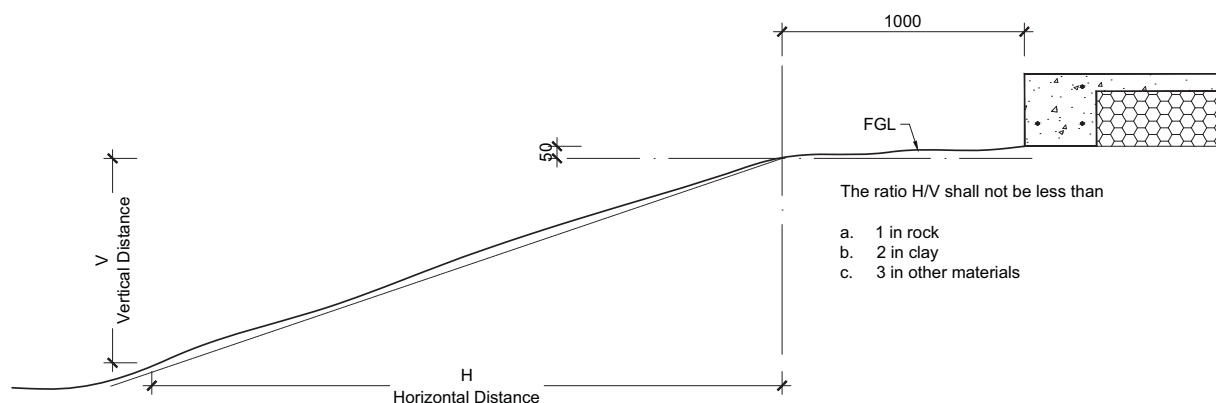


Figure 1 Relationship of RibRaft to Sloping Ground Surface

ground uphill from the system shall be graded to direct any surface run-off away from the system as shown in Figure 3.

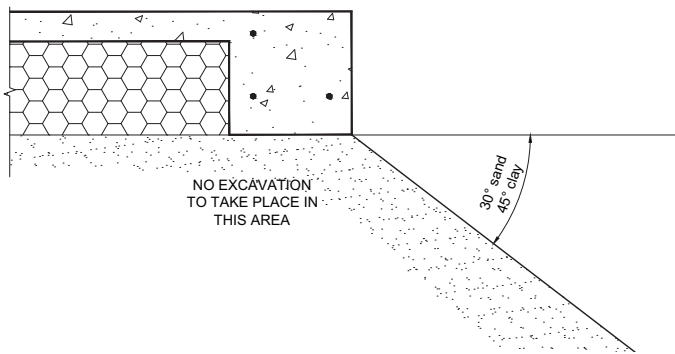


Figure 2 *Temporary Excavation Limited*

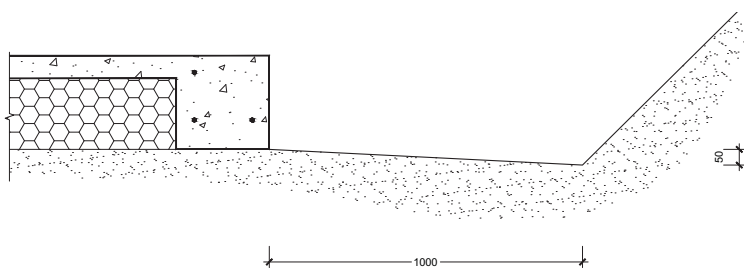


Figure 3 *Site Grading*

3.1 Site Preparation

All vegetation, topsoil and other organic or deleterious material shall be removed from the area to be covered by the building (formation area) prior to commencing construction of the system.

3.2 Earthworks

The formation area shall be cut or filled to a level approximately 330mm below finished floor level. Where fill is required to achieve this level, the fill shall be certified by a geotechnical engineer (outside the scope of this Manual) or shall be granular fill in accordance

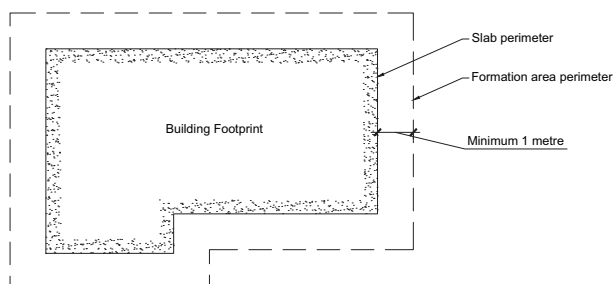


Figure 4 *Plan of Formation Area*

with Clause 7.5.3 of NZS 3604:2011 "Timber Framed Buildings". The formation area shall also extend a minimum of 1000mm beyond the slab perimeter as shown in Figure 4 below. The installer shall confirm the acceptability of the ground over the entire building platform before proceeding with the construction. Refer to Clause 3.5 of Section 1 (Design Information) for requirements.

3.3 Shear Keys

Where shear keys are required, the holes shall be drilled following the site clearing and earthworks, in accordance with Clause 4 below, and prior to the construction of the system commencing.

3.4 Plumbing and Services

Plumbing and services required beneath the system should preferably be conveyed underground to their plan location then brought up through the system. The trenching, placing, and bedding of the pipes/ducts and the backfilling of the trenches shall conform to the requirements of the consent documentation. Services shall not be placed within any concrete except to cross that section of concrete i.e. services shall not run along ribs or edge beams. The maximum diameters of the services/ducts shall be as dictated in clause 6.3 of Section 1.

Where required, the services can be installed by removing unnecessary polystyrene and placing pipes within the pod depth. All pipes shall be held firmly in place and have temporary end covers. Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in figure 12 (section 1) services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in figure 12 (section 1) at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

Except as noted in 6.3 of section 1, services shall be placed centrally within an opening 50mm greater in diameter than the service duct/pipe, where they pass through the system. This is to allow seismic tolerances to prevent shearing of the services during a seismic event. Where the services pass through the top of the system, the opening shall be sealed to

prevent materials entering the subfloor cavities. (This can be achieved with Denso tape and a type of easily compressible foam).

Larger penetrations or voids that are required, up to 450mm square (e.g. for shower waste/traps), shall be installed in accordance with all the conditions of this paragraph. These openings shall be trimmed with 1 HD12 bar (Grade 500E) 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall not be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower will ensure that the void is sealed/covered).

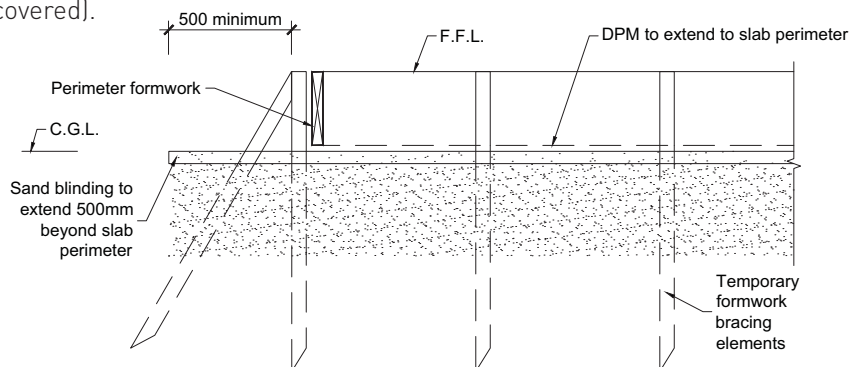


Figure 5 Sand Blinding/DPM/Formwork Details

3.5 Sand Blinding

A layer of sand shall be placed, screeded and compacted over the building platform, extending to at least 500mm beyond the system perimeter – refer Figure 5. The maximum thickness of this blinding layer shall be 50mm. The surface shall be level and a minimum of 305mm below finished floor level. A small plate compactor, vibrating roller or similar, should be used to compact the sand blinding layer. When the building platform is clay, it is essential that the blinding sand is compacted onto a clay surface that has not been softened by construction activities. If the clay has been softened (i.e. has a muddy surface layer due to construction activities), remove the softened material

from under the RibRaft ribs before placing the sand. If excavation lowers the clay surface to more than 50mm below the underside of the RibRaft, fill shall be placed in accordance with Clause 7.5.3 of NZS 3604:2011 “Timber Framed Buildings”. *The sand is required to be level to ensure that pods remain stable throughout the installation of the system.*

3.6 Damp Proof Membrane

The damp proof membrane (DPM) material shall be polyethylene sheet in accordance with NZS 3604:2011. The DPM shall be laid over the entire building platform directly on top of the sand blinding layer, extending to the outside of the edge beam – refer Figure 5 below. The joints shall be lapped not less than 150mm and sealed with pressure sensitive tape not less than 50mm wide. All penetrations of the DPM by plumbing and services or punctures during construction shall also be sealed with pressure sensitive tape. The DPM may extend beyond the edge of the slab i.e. underneath the formwork, or may be folded and stapled up the inside of the formwork. The minimum requirement is that the DPM extends to the outside of the edge beam. It is very important that the DPM is not bunched up at the formwork. The installer shall ensure a square and tidy finish at the underside and at all corners of the edge beam.

3.7 Edge Formwork

The edge formwork shall be constructed ensuring that the requirements of NZS 3109:1997 “Concrete Construction” are adhered to. The formwork shall be adequately supported and braced to prevent any buckling or warping. If the wall is to be constructed in masonry veneer, formwork for a masonry veneer rebate should be adequately fixed to the perimeter formwork.

Thorough cleaning of re-useable formwork and the use of release agents enhances the life and performance of formwork and maintains a quality surface finish.

3.8 Laying the Pods and Spacers

The Firth RibRaft polystyrene pods shall be laid out over the DPM in a regular waffle pattern ensuring direct contact with the ground across the entire pod. The edge beam shall be formed using the Firth approved 300mm spacers (refer figure 9). These shall be placed at a maximum of 1200mm centres along the perimeter of the slab and one per pod or part pod. Ribs supporting a load bearing wall shall be formed using a minimum of one Firth approved 300mm spacer along the edge of each pod or part pod.

Except where a 300mm wide rib is required, each pod or part pod shall always be separated by 100mm using a minimum of one Firth approved 100mm spacer along each edge of each pod or part pod. The ribs in both directions shall form a waffle pattern throughout the slab. It is essential that the ribs and edge beams are straight when the concrete is poured, i.e. the pods need to be lined up. Figure 6 shows a detailed layout of the pods and spacers.

Where the shape of the house plan dictates, it may be more practical to consider the floor to be made up of different segments. The pods in each segment shall be in a regular waffle pattern – refer right hand side of Figure 7. Where these segments meet, the pods shall be cut to suit and the ribs made to join. The non right-angle rib junctions created by this approach are acceptable.

Alternatively, it is also acceptable to keep the orientation of the pods constant throughout the plan and have non right-angle junctions between the ribs and edge beam – refer left hand side of Figure 7.

As can be seen from Figure 7, it is not necessary for the pods to line up perfectly with the edge beam. It is acceptable to cut the pods (i.e. use part pods).

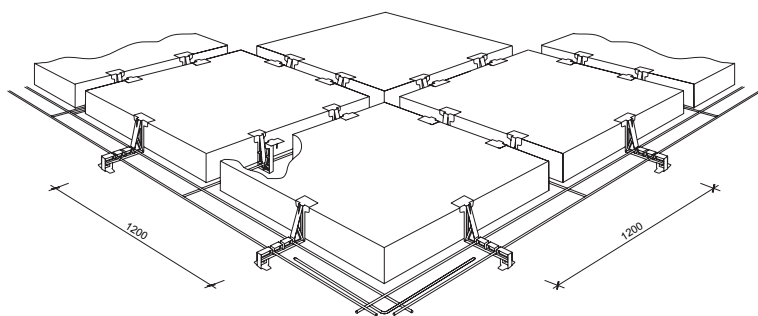


Figure 6 Detailed Layout of Pods and Spacers
(mesh and top steel omitted for clarity)

3.9 Reinforcing Steel

Reinforcing bars shall conform to NZS 4671:2001 “Steel Reinforcing Materials”. All bars shall be of deformed type (Grade 500E). All bends shall be made cold without fracture and in accordance with the bend diameters given in NZS 3109 “Concrete Construction”. Welded lap joints are not permitted.

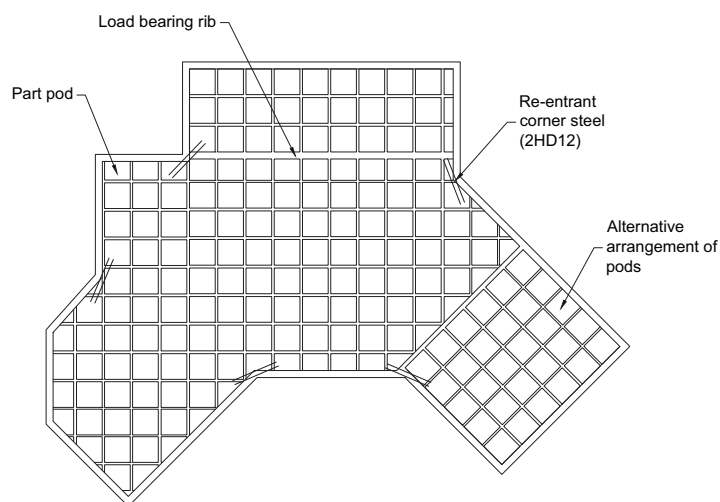


Figure 7 Typical Pod and Rib Layout

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m², a lower characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 300mm centres, and ductility class L or E, hereafter referred to as “665 mesh, or mesh”.

Figure 10 shows the detailed layout of the spacers and the steel in the edge beam and the standard ribs.

3.9.1 Edge Beam Steel

Two edge beam reinforcing bars shall be placed in the bottom of the edge beam and supported in the correct position by the Firth spacers, as shown in Figure 10. One edge beam bar shall be tied below the mesh at the perimeter of the area covered by the polystyrene pods as shown in Figure 10.

All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). Tying of the edge beam steel is only required at corners. Figure 8 shows the layout for the edge beam bottom steel bars at the corner. The inner bottom bars and the top bars shall cross each other and extend to 75mm from the outside face of the edge beam as shown. These bars shall be tied together where they cross.

3.9.2 Rib Steel

Rib reinforcing steel shall be placed in the bottom of the internal ribs and supported in the correct position by the Firth or Wilton Joubert spacers (WJ). Figure 9 shows the detail of the Firth and WJ spacers, and Figure 10 shows a detailed section identifying how the steel is located in the spacers. The 300mm spacer shall be used for the 300mm wide internal ribs. These spacers ensure that cover to DPM below the base is greater than 45mm and cover to the exterior perimeter is 75mm.

All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). At the junction with the edge beam, each rib steel bar shall sit on top of the edge beam bars, and extend to the outermost bar. The 75mm cover to the edge of the beam shall still be allowed for. One HD12 bar (Grade 500E) shall be placed in each 100mm wide rib and two HD12 bars (Grade 500E) shall be placed in the bottom of each 300mm wide rib. For perimeter 300mm Ribs a HD12 bar is also required in the top at the beam.

3.9.3 Mesh Reinforcing

665 Mesh reinforcing shall be placed over the pods and supported on 40mm mesh chairs spaced at a minimum of 1200mm centres, with at least two mesh chairs placed per pod and at least one per part pod. The mesh shall be lapped 225mm minimum and tied at all laps.

3.9.4 Re-entrant Corner Steel

Two HD12 bars (Grade 500E), 1200mm long shall be placed across the corner, tied to the top of the mesh at re-entrant corners at 200mm centres, with 50mm cover from the internal corner as detailed in Figure 7 (this steel is to control cracking at this potential weak point).

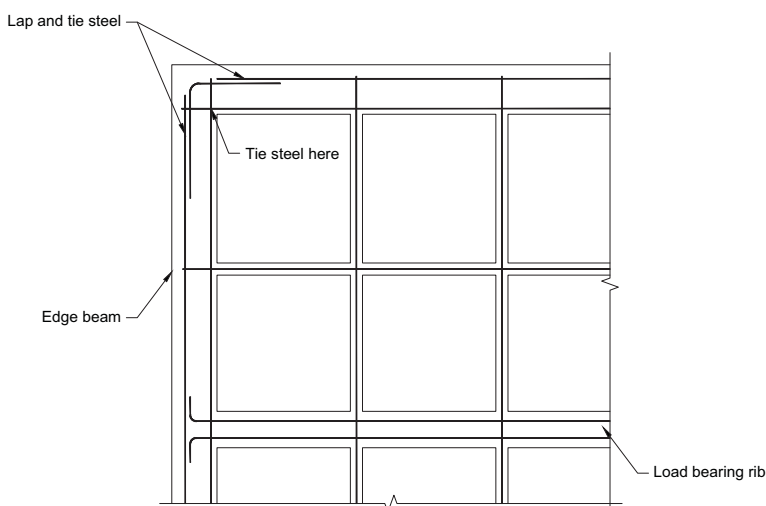


Figure 8 Corner Steel Layout

3.10 Concrete Installation

Concrete placing, finishing and curing shall be in accordance with NZS 3109:1997, Clause 7.

3.10.1 Placing

Only Firth Raftmix, Raftmix Pump, Raftmix25 or Raftmix Pump25 concrete shall be used in the floor.

These two different concrete mixes shall be used in the following instances:

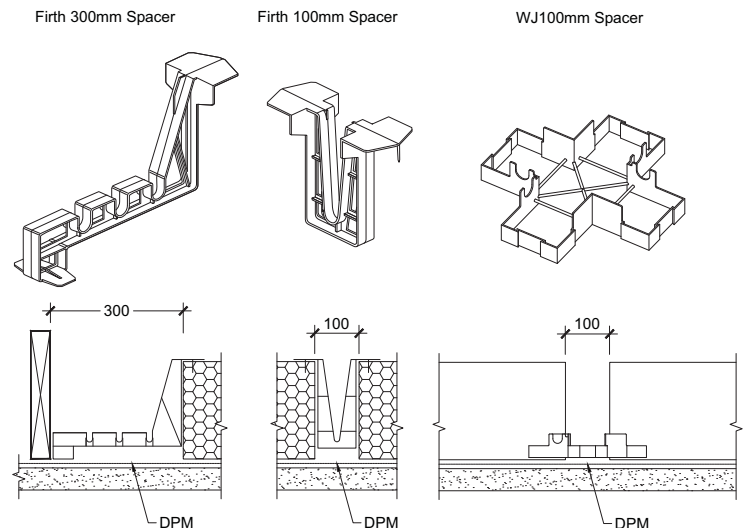


Figure 9 Spacer Details

- Raftmix – For placement in the floor directly from the concrete truck chute.
- Raftmix Pump – For placement in the floor by concrete pump.

Refer 2.4 of Section 1 for locations where RaftMix 25/ Raftmix 25 Pump is required.

The concrete supplied by Firth shall be poured in such a way to ensure that the pods remain in position during placing (Firth recommends that small amounts of concrete be placed on top of the pods prior to the ribs being filled). The concrete shall be compacted with the use of an immersion vibrator around all steel and into all corners of the formwork.

3.10.2 Finishing

Screeding with the aid of a level shall commence immediately after compaction. Unless specifically installed as a screeding datum, the top of the formwork shall not be assumed as level and thus shall not be used for screeding purposes. Final finishing with a trowel shall take place after all the bleed water has

evaporated. The edge of the slab and rebates shall be tooled to prevent chipping of the top of the slab.

Early age care of the slab shall be in accordance with good trade practice appropriate for the weather conditions. The surface shall be a blemish free surface to class U3 finish (refer NZS 3114:1987 "Specification for Concrete Finishes").

3.10.3 Curing

Proper curing of the concrete must take place immediately after finishing the concrete. One of the following methods of curing is recommended:

- Ponding or continuous sprinkling of water.
- Placing a wet covering or plastic membrane over the slab.
- The use of liquid membrane curing compounds.

When warm sunny days are followed by cool nights, the change in temperature can cause cracking. Immediate and continuous wet curing to reduce the maximum temperature and/or raise the minimum temperature can reduce the risk of this type of cracking.

3.11 Shrinkage Control Joints

Shrinkage control joints shall be saw cut after hardening. The saw cut shall be cut to a depth of 25mm and shall be cut no later than 24 hours in summer, or 48 hours in winter. The shrinkage control joints shall be positioned to coincide with major changes in floor plan. Where the concrete is to be exposed or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 6m. Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 2:1.

Shrinkage control joint shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib then the joint shall be located directly above one edge of the 300mm rib. Supplementary reinforcing bars shall not be placed across any shrinkage control joints.

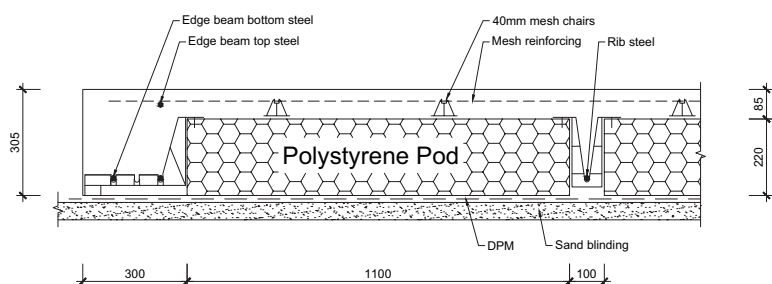


Figure 10 Detailed Section

3.12 Removal of Formwork

The formwork shall not be removed prior to 12 hours after the slab has been finished. No installation loads are to be placed on the system before adequate curing has taken place.

3.13 Masonry Veneer

Where the building is to be clad with masonry veneer, the rebate in the edge beam shall be waterproofed with a bituminous sealer due to the possibility of ponding of water. Firth recommends a Flintcote® or equivalent coating on both the vertical and horizontal faces of the rebate.

3.14 Landscaping/Paving

Landscaping and/or paving adjacent to the slab shall be kept as a minimum the specified distance below finished floor level as required by NZS 3604:2011. The landscaping shall allow for large trees to be kept sufficiently away from the edge of the slab. This is to prevent the tree roots from disturbing the soil moisture conditions under the slab. As a guide, trees should be as far away from the edge of the slab as they are tall when fully grown.

3.15 Ongoing Maintenance

The building owner shall ensure that the ground surrounding the system be maintained so that the integrity of the system is not jeopardised. In other words, at no time shall the ground immediately adjacent to the system be allowed to settle away to expose the underside of the slab.

This can also be ensured by maintaining the landscaping or providing a paved surface or similar around the edge of the building.

4 SHEAR KEYS

Shear keys, if required, shall be provided to conform to the requirements of Section 1 of this Manual. Holes for the shear keys shall be drilled at least 1000mm deep. Into the bottom of each hole a RibRaft Shear Key Support shall be placed. Every precaution shall be taken to ensure that the shear key support is laid level and at the base of the hole. The minimum depth of concrete placed on the support shall be 900mm. Refer to Figure 11 for construction details.

The connection steel (2HD12 Grade 500E) shall be secured in place and held during pouring to ensure

the bars are correctly located. The concrete for the shear keys shall be placed separately to the rest of the floor and shall be finished level to the top of the sand blinding layer. The top surface of the shear key shall be finished rough to ensure a good join to the Raftmix concrete in the system and the DPM shall be neatly cut around the shear keys.

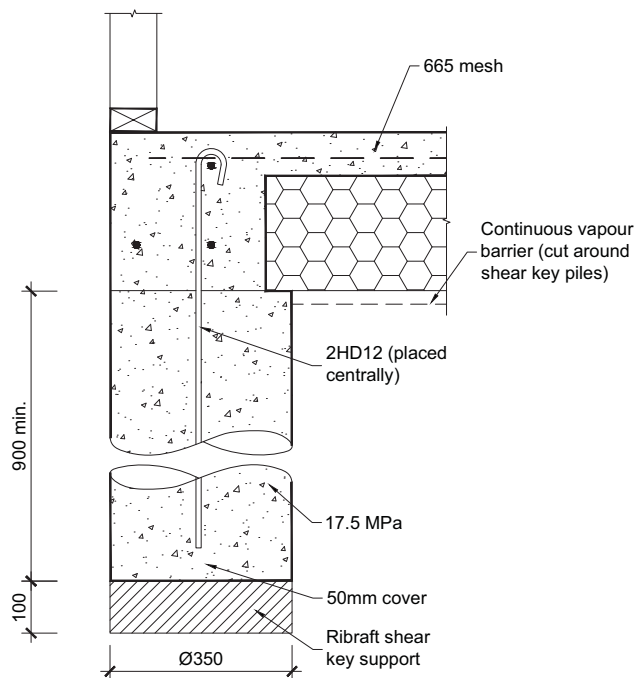


Figure 11 *Shear Pile Construction Detail*

FIRTH RIBRAFT FLOOR SYSTEM

SECTION 3: VERIFICATION

1 DESIGN

Verification that the design complies with the structural limitation outlined in this Manual is the responsibility of the designer, and shall be confirmed by the Building Control Authority issuing the Building Consent. Solutions outside the limitations outlined in this Manual will require specific engineering design.

2 CONSTRUCTION

The RibRaft foundation system has been designed to accommodate structures complying with the non specific design standards NZS3604 or NZS4229. With these types of structures the Building Control Authority specifies the inspections required and often conducts these. A similar construction verification process shall be applied to the RibRaft system.

To assist inspection the following checklist has been prepared for structures complying with the limitation:

Pre-pour Inspection Check list

Confirmed	
Good Ground confirmed as per NZS3604, clause 3.1.3.	
Vegetation, topsoil, organic or deleterious material removed.	
Proximity to slope-ground surface is always above dash line shown in figure 1.	
Shear piles (where required) in place and reinforcement protruding.	
Formation area extends at least 1m beyond building footprint.	
No steps in the formation.	

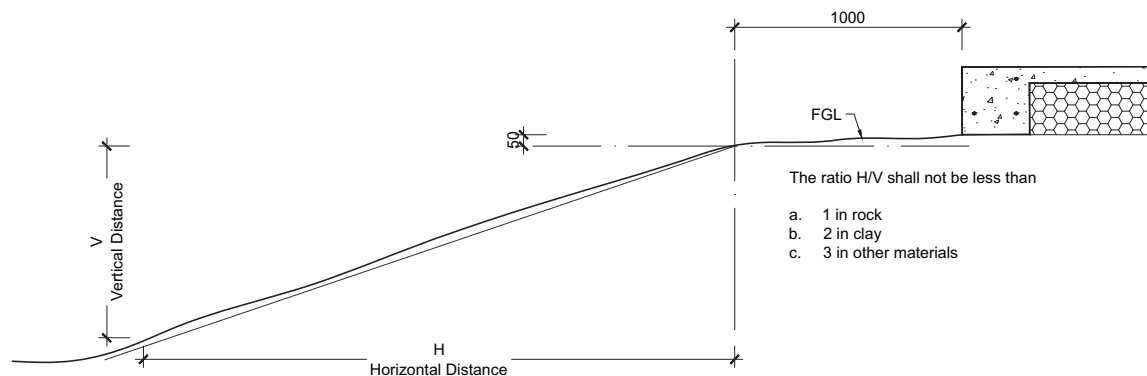
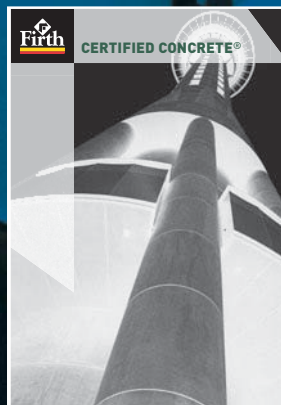


Figure 1 Relationship of RibRaft to Sloping Ground Surface

Pre-layout Inspection Check list

Confirmed	
Damp proof membrane in place.	
Perimeter foundation	Width 300mm ⁽¹⁾ .
	Reinforcement 2 x HD12 bottom, 1 x HD12 top.
	Firth supplied spacer used at 1.2m maximum centres.
Internal Ribs	Width 100mm.
	Reinforcement 1 x HD12.
	Firth supplied spacer, max spacing of one per pod or part pod.
Load Bearing ribs	Width 300mm.
	Reinforcement 2 x HD12 bottom.
	Firth supplied spacer, max spacing of one per pod or part pod.
Pods	Firth supplied RibRaft pod.
Mesh	40mm chairs, 1.2m max centres, min two per pod or one per part pod.
	Mesh in place and 665 or equivalent area.
	Mesh laps minimum of 225mm.
Reinforcement	2 x HD12 bars 1.2m long provided at re-entrant corners.
	Laps for 12mm reinforcement minimum of 720mm.
Concrete	Cover to pods minimum of 85mm or 110mm if infloor heating used.
	Firth Raftmix ordered.
Service penetrations	No reinforcement (with exception of mesh) cut to allow passage of service pipes. Refer clause 6.3 of Section 1 for exceptions.
	Diameter of opening for services 50mm greater than service pipe. Refer clause 6.3 of Section 1 for exceptions.
	Diameter/size of penetrations as per Table 7, Section 1 of this manual.

(1) At locations of service penetrations the width of the perimeter foundation may be locally increased. Refer figure 12 section 1 for details.



SUSTAINABILITY: THE FIRTH CONCRETE & CONCRETE MASONRY SUSTAINABILITY LIFECYCLE

- ✓ Environmentally compliant manufacturing plants
- ✓ Surplus water and some aggregates recycled
- ✓ Low transport impacts
- ✓ Leftover concrete returned from construction sites
- ✓ Passive solar heated thermal mass makes completed buildings more energy-efficient

- ✓ Most wash water returned from construction sites
- ✓ Highly durable, low maintenance buildings and no rot
- ✓ High degree of noise control
- ✓ Inherent fire resistance
- ✓ Overall longer effective building life
- ✓ Demolished concrete can be recycled as hard fill or aggregate

For more on Firth's contribution to building a sustainable tomorrow today, visit www.firth.co.nz or call us on 0800 800 576 for our free brochure.

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CERTIFICATE OF CONFORMITY

This is to certify that



RibRaft® Floor System



Product Description

The RibRaft® Floor System comprises of polystyrene pods, steel reinforcing rods, plastic spacers and Firth RaftMix concrete.

Product Purpose or Use

The RibRaft® Floor System is a method of concrete floor construction, offering an insulated floor with a quick, practical and efficient construction method.

Certificate Holder

Fletcher Concrete and Infrastructure Ltd

T/A Firth Industries

NZBN: 942903777548

585 Great South Road

Penrose Auckland NZ 1061

Ph: 0800 800 576

W: www.firth.co.nz

Certification Body

CertMark International Pty Ltd

T/A CertMark New Zealand

ABN: 80 111 217 568

JAS-ANZ Accreditation No. Z4450210AK

PO Box 321 Tuakau 2121

www.CertMark.org

Complies with the Building Code of New Zealand:

1. NZBC Clause B1 Structure: B1.3.1, B1.3.2 & B1.3.3.
2. NZBC Clause B2 Durability: B2.3.1 (a).
3. NZBC Clause E2 External Moisture: E2.3.3.
4. NZBC Clause F2 Hazardous Building Materials: F2.3.1.
5. NZBC Clause H1 Energy Efficiency: H1.3.1. Refer to limitation c.

Subject to the following Conditions & Limitations:

- a. Must be installed in accordance with the RibRaft® Technical Manual (CBI3100/3111/3112/4711) (Jan 12).
- b. Specified products must be supplied by Firth Industries or an approved agency.
- c. The energy efficiency rating of the RibRaft® Floor System relates only to NZS 4214:2006 - Methods of determining the total thermal resistance of parts of buildings and is applicable only to the thermal efficiency of the floor system.
- d. This certification relates only the clauses of the NZBC as contained herein. Consequently the following clauses are excluded from the certification: C-E1-E3 these clauses are outside the scope of this Certificate. The need for compliance with the requirements of excluded clause in the use of the subject product are to be determined by the regulatory authority (building certifier or building surveyor).
- e. This certification relates only to the product that is described above, and has to be read, considered and used as a whole document — it may be considered misleading and will be incomplete to be selective.
- f. For further information contact the certificate holder.

Originally issued under CMNZ-2012-0522
Initially Issued 22/05/2012

22/05/2014

CMA-CM40015 (Rev3)

Date of Issue

Certificate Number

John Thorpe

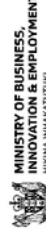
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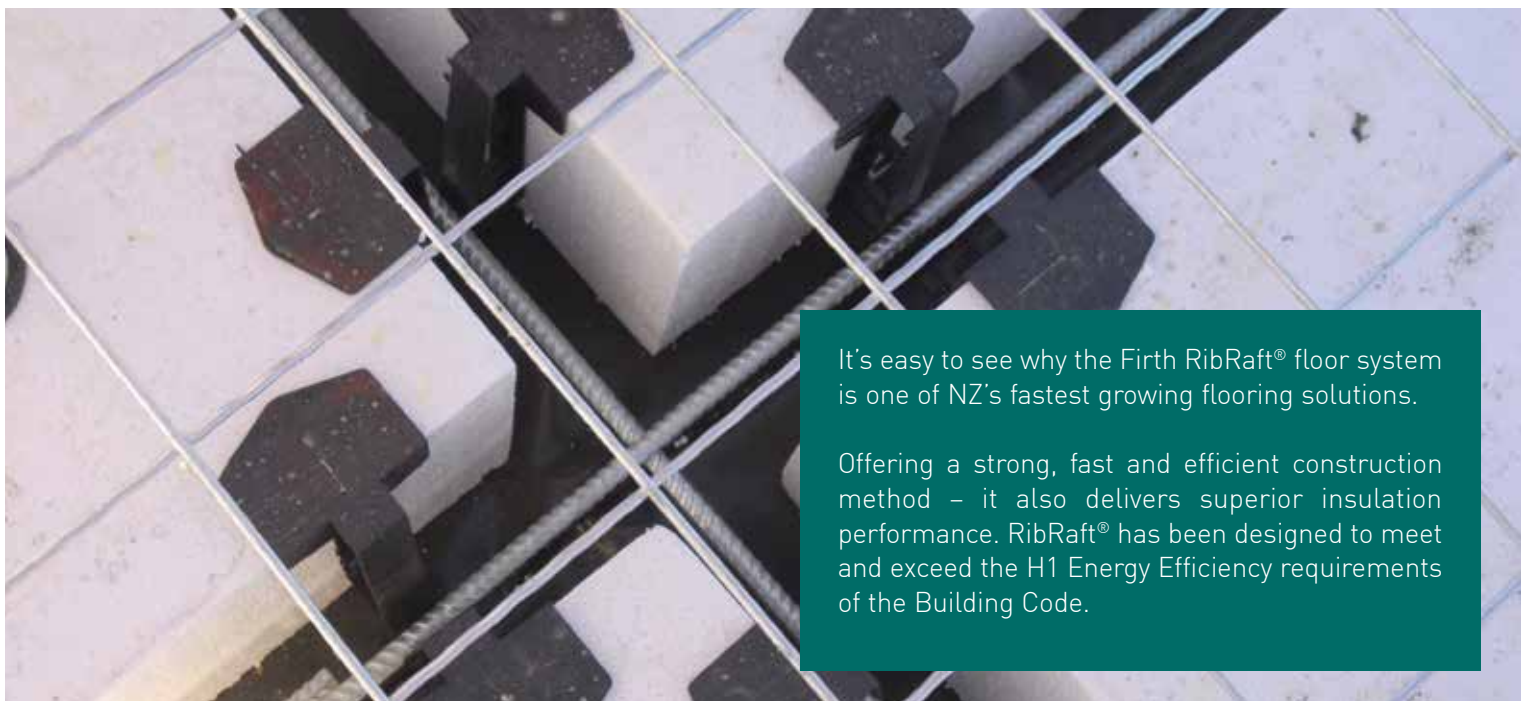
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SUPERIOR FLOOR INSULATION DESIGN SOLUTIONS



It's easy to see why the Firth RibRaft® floor system is one of NZ's fastest growing flooring solutions.

Offering a strong, fast and efficient construction method – it also delivers superior insulation performance. RibRaft® has been designed to meet and exceed the H1 Energy Efficiency requirements of the Building Code.

NZ BUILDING CODE REQUIREMENTS

In 2007, changes were made to Clause H1 (Energy Efficiency) of the Building Code.

The **Schedule Method** is the simplest method to achieve compliance under the Code. Using this method, the minimum R-values required for floors are:

$$\left. \begin{array}{l} R \ 1.3 \text{ m}^2 \text{ }^{\circ}\text{C/W} \\ R \ 1.5 \text{ m}^2 \text{ }^{\circ}\text{C/W} \end{array} \right\} \begin{array}{l} \text{Depending on the} \\ \text{glazing R- value} \end{array}$$

While the Schedule Method is simple and quick, the **Calculation Method** offers greater flexibility as it allows low R-values in some elements of the construction to be offset against higher R-values in other building elements such as floors.

THE SUPERIOR SOLUTION

The insulation performance of a concrete floor is dependent upon a number of physical factors including:

- the floor structure
- the concrete mix used in the floor structure
- the ratio of the interior surface area to external perimeter area of the floor
- the thickness of the exterior wall placed on top of the perimeter of the floor
- the positioning and properties of specific insulation elements in the floor design

The Firth RibRaft® floor system - consisting of propriety RibRaft® polystyrene pods, plastic spacers and RaftMix™ concrete - has been further developed to meet and exceed the insulation requirements of Clause H1 of the Code.

That's the reason why RibRaft® offers such a superior solution. Where RibRaft® floors have higher R-values than required by the Schedule Method, there is now an opportunity to have less insulation in the other building elements by using the Calculation Method.

RIBRAFT® R-VALUE DESIGN SOLUTIONS

The following wall, floor and floor area:perimeter ratio construction details describe a range of floor R-values which can only be achieved using the proprietary RibRaft® system.

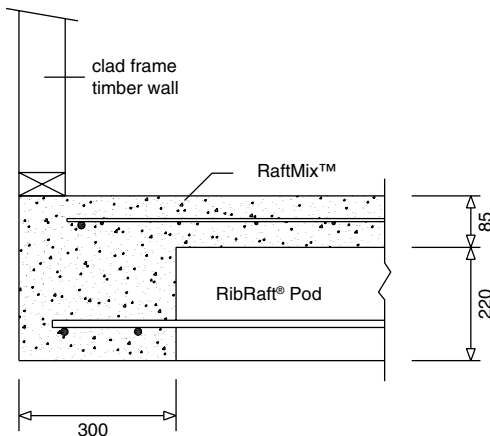
SOLUTION 1

All RibRaft® Floors

All RibRaft® floors are acceptable under the Code which assumes a minimum of $R \ 1.3 \text{ m}^2 \text{ }^{\circ}\text{C/W}$.

SOLUTION 2

RibRaft® Floors with a 90mm Frame Timber Clad External Wall



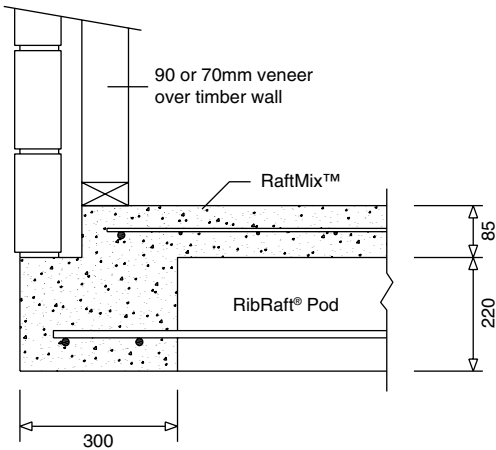
IMPORTANT NOTES:

1. The R-values in the following tables only apply to RibRaft® floors which have been constructed with RaftMix™ and RibRaft® pods and spacers.
2. The R-values below are calculated in accordance with NZS 4214:2006 "Methods of Determining the Total Thermal Resistance of Parts of Buildings".

	Floor Area To Perimeter Ratio m ² /m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m ² °C/W	1.48	1.52	1.64	1.75	1.86	1.97	2.07	2.17	2.38	2.57

SOLUTION 3

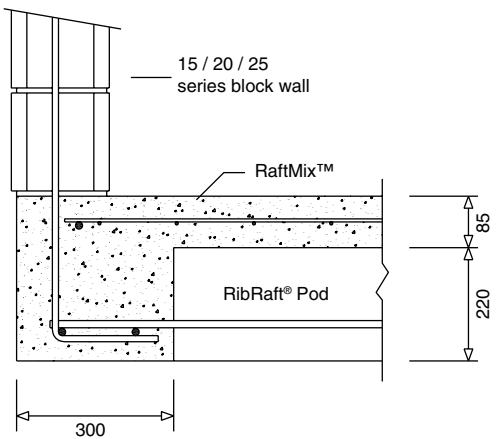
RibRaft® Floors with a 90mm Timber Frame and 70-90mm Veneer Wall with Cavity



	Floor Area To Perimeter Ratio m²/m									
	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m² °C/W	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84

SOLUTION 4

RibRaft® Floors with a Firth Standard or HotBloc® Masonry External Wall



	Block	Floor Area To Perimeter Ratio m²/m									
		1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00
R-value m² °C/W	15 series	1.48	1.60	1.73	1.85	1.96	2.08	2.19	2.30	2.51	2.72
	20 series	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84
	25 series	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95

SOLUTION 5

RibRaft® Heated Floors

Where in-floor heating is used, the combination of RaftMix™ and RibRaft® pods ensures that $(R_{IN})/(R_{OUT})$ is always less than 0.1. The R-value of the floor can

be established from the above tables. The Building Code requires that the floor has a **R-value not less than 1.9 m² °C/W**.

DESIGN AND CONSTRUCTION

RibRaft® design and construction details can be found in the 'Firth RibRaft® Flooring Solutions' brochure and the 'Firth RibRaft® Floor System Manual'. These publications are available at www.firth.co.nz or by phoning 0800 800 576.



SUSTAINABILITY: THE FIRTH CONCRETE & CONCRETE MASONRY SUSTAINABILITY LIFECYCLE

- ☒ Environmentally compliant manufacturing plants
- ☒ Surplus water and some aggregates recycled
- ☒ Low transport impacts
- ☒ Leftover concrete returned from construction sites
- ☒ Passive solar heated thermal mass makes completed buildings more energy-efficient

- ☒ Most wash water returned from construction sites
- ☒ Highly durable, low maintenance buildings and no rot
- ☒ High degree of noise control
- ☒ Inherent fire resistance
- ☒ Overall longer effective building life
- ☒ Demolished concrete can be recycled as hard fill or aggregate

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SYNTHETIC WALL UNDERLAY

The ultimate wrap, all walls, all systems

Watergate Plus 295 is a fire retardant, absorbent, breathable wall underlay. It is a white composite Non-woven polypropylene, specifically designed as a wall underlay behind exterior wall cladding. Watergate Plus 295 also offers a high degree of water resistance, with a high level of water vapour permeability.

ADVANTAGES

- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding direct fixed to framing.
- » Can be used as a wall underlay on timber and steel framed buildings with absorbent and non-absorbent wall cladding installed over an 18mm minimum drained cavity.
- » Is suitable for use in all Wind Zones of NZS 3604 up to, and including, "Very High", when used as standalone flexible underlay, and Extra High when used as a flexible underlay over a rigid wall underlay.
- » Will provide temporary weather protection during construction. (Max 60 Days).
- » Can be used as a non-rigid backing material for Stucco Plaster.*
- » May be used as a slip layer over rigid backing for Stucco Plaster.*
- » Is fire retardant.*
- » Unaffected by LOSP treated timber.
- » Is suitable as an air barrier in unlined walls.

* Refer technical specifications



For additional details and latest specifications www.thermakraft.co.nz or scan QR code.



BRANZ Appraised
Appraisal No.695 [2017]



Thermakraft Watergate Plus 295 – Technical Specification

Fire Retardant | Breathable | Absorbent | Non Woven | Wall Underlay

Thermakraft Watergate Plus 295 can be used as a wall underlay on timber and steel framed buildings within the following scope:

- » The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, with regards to building height and floor plan area; and,
- » With absorbent wall claddings directly fixed to timber and steel framing; and,
- » With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- » With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity;
- » With masonry veneer in accordance with NZS 3604, NZBC Acceptable Solution E2/AS1 for timber framed buildings, or specific engineering design for steel framed buildings; and,
- » Situated in NZS3604 Building Wind Zones up to, and including 'Very High' when used as a standalone flexible underlay, and "Extra High" when used as a flexible underlay over a rigid wall underlay.
- » Can be used as a non-rigid backing material for Stucco Plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1 Paragraph 9.3.5.1. The Underlay must be supported with 75mm galvanized mesh, or Thermakraft Stud Strap at 150mm centres run across cavity battens to limit deflection to a maximum of 5mm.
- » May also be used as a slip layer over rigid backing for Stucco Plaster in accordance with the requirements of NZBC E2/AS1 Paragraph 9.3.3(b).
- » Refer BRANZ Appraisal No 695 (2010) for full details.
- » May be used with LOSP treated timber.
- » Is suitable as an air barrier in unlined wall spaces.
- » Is suitable to be used in conjunction with thermal breaks on steel framed buildings.
- » Is suitable for direct fixing behind metal cladding.

Flammability Index

Thermakraft Watergate Plus 295 Wall Underlay has an AS 1530 Part 2 Flammability Index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Limitations

- » Must not be used as a roof underlay.

Durability

Meets the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture (E2.3.2), and F2 Hazardous Building Materials F2.3.1, providing

- » It is not damaged.
- » Installed in accordance with instruction guide.
- » Is not left exposed for more than 60 days.
- » Installed by or under guidance of Licensed Building Practitioners.
- » Is compatible with cladding system used.

Table 1: NZBC E2/AS1 wall underlay requirements

NZBC E2/AS1 TABLE 23 (NZS2295) WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 100gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 20mm	Pass
Air Resistance	≥ 0.1 MN.s/m ³	295 can be used as an air barrier

Roll Dimensions

WIDTH (MM)	LENGTH (M)	M ²
1370	18.5	25
1370	37.0	50
1370	73.0	100
2740	18.5	50
2740	36.5	100

*M² is the roll size for actual coverage, allow for laps and joins.



For additional details and latest specifications www.thermakraft.co.nz



BRANZ Appraised
Appraisal No.695 [2017]



Thermakraft Ltd 11 Turin Place, East Tamaki, Auckland, New Zealand
P.O.Box 58-112, Botany, Auckland 2163 **Phone** 0800 806 595 or +64 9 273 3727
Fax +64 9 273 3726 **Email** info@thermakraft.co.nz **www.thermakraft.co.nz**

INTELLIGENT MEMBRANES FOR THE BUILDING INDUSTRY

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website.



BRANZ Appraised

Appraisal No. 695 [2017]

WATERGATE-PLUS 295 FIRE RETARDANT WALL UNDERLAY

Appraisal No. 695 [2017]

This Appraisal replaces BRANZ
Appraisal No. 695 [2010]



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



Thermakraft Limited

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BRANZ

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Product

- 1.1 Watergate-Plus 295 is a fire retardant, flexible synthetic wall underlay for use under direct fixed and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured from coated, non-woven polyolefin and is coloured white.

Scope

Flexible Wall Underlay

- 2.1 Watergate-Plus 295 has been appraised for use as a flexible wall underlay for timber and steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with direct fixed absorbent and non-absorbent wall claddings; or,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; or,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or to a specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Very High.

Use over Rigid Wall Underlay

- 2.2 Watergate-Plus 295 has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or to a specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Extra High.

Specific Design

- 2.3 Watergate-Plus 295 has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Watergate-Plus 295 into their design in accordance with the declared properties and the instructions of Thermakraft Limited.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Watergate-Plus 295, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, B2.3.1 (b), 15 years and B2.3.2. Watergate-Plus 295 meets these requirements. See Paragraphs 9.1 and 9.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.4 (c). Watergate-Plus 295 meets this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Watergate-Plus 295 will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Watergate-Plus 295 meets this requirement and will not present a health hazard to people.

Technical Specification

- 4.1 Watergate-Plus 295 is a white, 112 g/m² non-woven, microporous polyolefin fabric underlay.
- 4.2 The product is supplied in rolls 1.370 m wide x 54.8 and 30 m long and 2.740 m wide x 30 and 18.5 m long. The product is printed with the Watergate-Plus 295 logo repeated along the length of the roll and is labelled with the marketing or construction company's name. The rolls are wrapped in clear polythene film.

Accessories

- 4.3 Accessories used with Watergate-Plus 295 which are supplied by the installer are:
- Fixings – staples, clouts, screws or proprietary underlay fixings, or other temporary fixings to attach the wall underlay to the framing.
 - Wall underlay support – polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

- 5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Watergate-Plus 295. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

- 7.1 Watergate-Plus 295 is intended for use as an alternative to conventional building papers which are fixed over timber or steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain. Refer to Table 1 for material properties.
- 7.2 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.
- 7.3 Watergate-Plus 295 must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.
- 7.4 Watergate-Plus 295 is suitable for use as an air barrier where walls are not lined, such as attic spaces at gable ends, in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 [c].
- 7.5 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5. Wall underlay support options include polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens.

Table 1: NZBC E2/AS1, Table 23 [NZS 2295] Requirements

NZBC E2/AS1, Table 23 [NZS 2295] Wall Underlay Properties	Property Performance Requirement	Actual Property Performance
Absorbency	$\geq 100 \text{ g/m}^2$	Pass
Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Water Resistance	$\geq 20 \text{ mm}$	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Edge tear and tensile strength	Edge tear [Average]: Machine direction = 110 N Cross direction = 91 N Tensile strength [Average]: Machine direction = 2.09 kN/m Cross direction = 1.78 kN/m
Air Barrier	Air resistance: $\geq 0.1 \text{ MN s/m}^3$	Pass. Watergate-Plus 295 can be used as an air barrier.

Claddings

- 7.6 Watergate-Plus 295 is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23 on timber framed buildings, including non-absorbent wall claddings such as vinyl and metal-based weatherboards in direct fixed situations. Watergate-Plus 295 is suitable for use under cavity based wall claddings as an absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings.

Stucco Plaster

- 7.7 Watergate-Plus 295 is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm.
- 7.8 Watergate-Plus 295 may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3.1 [b].

Structure

- 8.1 Watergate-Plus 295 is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a stand-alone flexible wall underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid wall underlays.

Durability

- 9.1 Watergate-Plus 295 meets code compliance with NZBC Clause B2.3.1 [a], not less than 50 years for wall underlays used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, and code compliance with NZBC Clause B2.3.1 [b], 15 years for wall underlays used where the cladding durability requirement is 15 years.

Serviceable Life

- 9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Watergate-Plus 295 is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

- 10.1 Watergate-Plus 295 has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 [b], for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to Watergate-Plus 295 from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 12.1 Watergate-Plus 295 must be used behind claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.
- 12.2 Watergate-Plus 295, when installed in accordance with the Technical Literature and this Appraisal will assist in the total cladding systems compliance with NZBC Clause E2.

Installation Information

Installation Skill Level Requirements

- 13.1 Installation must always be carried out in accordance with the Watergate-Plus 295 Technical Literature and this Appraisal, by or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.

Underlay Installation

- 14.1 Watergate-Plus 295 must be fixed to all framing members at maximum 300 mm centres with large-head clouts 20 mm long, 6-8 mm staples, self drilling screws or proprietary underlay fixings. The underlay must be pulled taut over the framing before fixing.
- 14.2 Watergate-Plus 295 must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 150 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.
- 14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the underlay by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut underlay must be folded inside the opening and stapled to the penetration framing. Excess underlay may be cut off flush with the internal face of the wall frame.
- 14.4 Watergate-Plus 295 can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.
- 14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.
- 14.6 Any damaged areas of Watergate-Plus 295, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

- 14.7 The Technical Literature must be referred to during the inspection of Watergate-Plus 295 installations.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 15.1 The following tests have been carried out on Watergate-Plus 295 in accordance with NZBC Acceptable Solution E2/AS1, Table 23: tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6, pH of extract in accordance with AS/NZS 1301.421s and air resistance to BS 6538.3. A range of these tests were completed before and after Watergate-Plus 295 was exposed to ultra-violet light.
- 15.2 The flammability Index of Watergate-Plus 295 has been evaluated in accordance with AS/NZS 1530.2.

Other Investigations

- 16.1 A durability opinion has been given by BRANZ technical experts.
- 16.2 An evaluation of the expected performance of Watergate-Plus 295 in direct contact with metal wall cladding has been completed by BRANZ.
- 16.3 The practicability of installation of Watergate-Plus 295 has been assessed by BRANZ and found to be satisfactory.
- 16.4 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

- 17.1 The manufacture of Watergate-Plus 295 has not been examined by BRANZ, but details of the methods adopted for quality control and the quality of the materials used, have been obtained and found to be satisfactory.
- 17.2 The quality of supply to the market is the responsibility of Thermakraft Limited.
- 17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall underlay into their design in accordance with the instructions of Thermakraft Limited.
- 17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

Sources of Information

- AS 1530.2: 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp - Cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays - Materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays - Methods of test - Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays - Methods of test - Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays - Methods of test - Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays - Methods of test - Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays - Methods of test - Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, permeable building underlays
- NZS 3604: 2011 Timber-framed buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 [Amendment 7, 01 January 2017].
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



In the opinion of BRANZ, **Watergate-Plus 295 Fire Retardant Wall Underlay** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Thermakraft Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Thermakraft Limited:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Thermakraft Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Thermakraft Limited** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

21 September 2017

THERMAKRAFT 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

APPLICATION AND INSTALLATION

Product Description	Thermakraft 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY is specifically designed for use in Domestic and Commercial type buildings. Thermakraft 215 is a breathable, absorbent bituminous wall and roofing underlay. Thermakraft 215 will provide the following functions: • Reduce wind entry into the cavity, thereby assisting the performance of thermal insulation. • Highly water vapour permeable, thereby allowing excess water vapour which might otherwise condense in the structure, to escape. • Provides a temporary protection against wind, dust, rain and other weathering elements until the external cladding is applied.				
Applications	Thermakraft 215 is suitable as a wall and roofing underlay where Fire Retardancy is NOT required, and with all cladding types. Thermakraft 215 is self-supporting to 1200mm rafter/purlin spacing. Thermakraft 215 can be used as an Air Barrier. Thermakraft 215 must not be left exposed to the elements for more than 7 days. Cladding on the same day is recommended. If Fire Retardancy (FI <5) is required, use Thermakraft CoverTek roof underlay				
Installation Roofing	Thermakraft 215 may be run unsupported vertically over purlins with a 150mm lap if roof pitch ≥ 8 degrees. May be run vertically at pitches $\geq 3-8$ degrees if supported Fix securely to purlins with 8mm staples or 20mm clouts. The membrane should be firmly laid to avoid excessive dishing between purlins.				
Control of Condensation	Thermakraft 215 may be run horizontally across rafter/trusses with a 150mm lap, for roof pitches ≥ 3 degrees. Fix securely with 8mm staples or 20mm clouts. In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation to prevent moisture build-up in the roof cavities. Factors which adversely affect the condensation risk in roofing systems include; <table> <tr> <td> • Humid, and/or cold climatic regions • Warm/Skillion roof construction • Low roof cavity air volume and restricted air movement • Omitting Vapour Control Layers • Ceiling penetrations and entry of warm air into roof cavities </td><td> • Occupancy activities which have high moisture loading on conditioned spaces • Low pitched roof • Bulk insulation • Building structures ability to naturally dry </td></tr> </table> Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer MRM Code of Practice for details.	• Humid, and/or cold climatic regions • Warm/Skillion roof construction • Low roof cavity air volume and restricted air movement • Omitting Vapour Control Layers • Ceiling penetrations and entry of warm air into roof cavities	• Occupancy activities which have high moisture loading on conditioned spaces • Low pitched roof • Bulk insulation • Building structures ability to naturally dry		
• Humid, and/or cold climatic regions • Warm/Skillion roof construction • Low roof cavity air volume and restricted air movement • Omitting Vapour Control Layers • Ceiling penetrations and entry of warm air into roof cavities	• Occupancy activities which have high moisture loading on conditioned spaces • Low pitched roof • Bulk insulation • Building structures ability to naturally dry				
Storage	Thermakraft 215 should be stored on end in dry conditions. Protect from the weather and direct sunlight.				
Roll Dimensions	<table> <tr> <td>1250mm x 40.0m = 50m²</td><td>20kg</td></tr> <tr> <td>1250mm x 20.0m = 25m²</td><td>10kg</td></tr> </table>	1250mm x 40.0m = 50m ²	20kg	1250mm x 20.0m = 25m ²	10kg
1250mm x 40.0m = 50m ²	20kg				
1250mm x 20.0m = 25m ²	10kg				

For more information regarding **Thermakraft COVERTEK₄₀₇ FIRE RETARDANT SELF SUPPORTING ABSORBENT BREATHABLE SYNTHETIC NON WOVEN ROOFING UNDERLAY** refer to the "DESIGNER and USER GUIDELINES" - Direct and Cavity Fix, or contact **Thermakraft Customer Services** on 0800 806 595.

THERMAKRAFT 215

BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

TECHNICAL SPECIFICATIONS

Technical Data

THERMAKRAFT 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY complies with the requirements of NZBC E2/AS1 Table 23.

Nominal Grammage 400g/m²

NZBC E2/AS1 TABLE 23 AS A WALL UNDERLAY REQUIREMENTS

NZBC E2/AS1 TABLE 23 WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥100gsm	Pass
Vapour Resistance	≤7 MN.s/g	Pass
pH of Extract	≥6 and ≤9	Pass
Shrinkage	≤0.5%	Pass
Water Resistance	≥100mm	Pass
Air Barrier	≥0.1 MN.s/m ³	Pass
Duty		Heavy

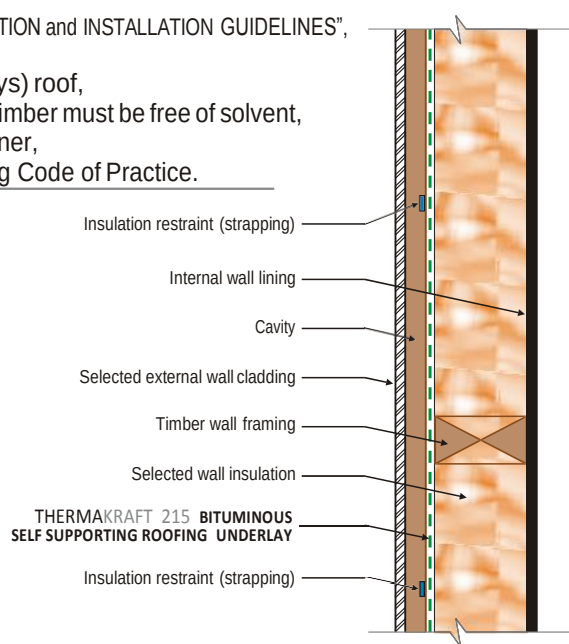
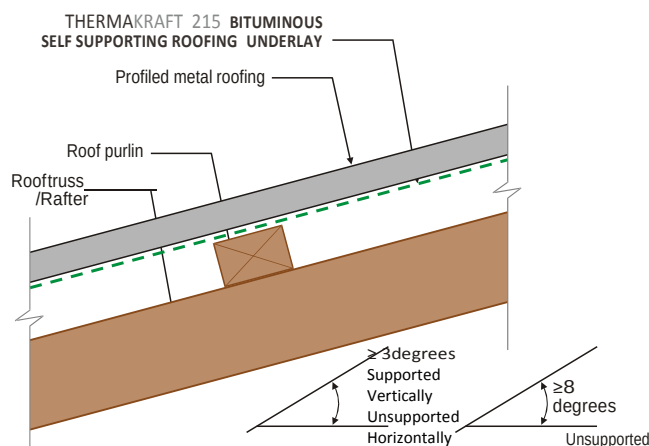
NZS2295:2006 Classification

Flammability Index		Non Fire Retardant
Wind Zone	R2	Up to Very High
NZS2295:2006 Classification	R2	Self Supporting

Durability/Limitations

For THERMAKRAFT 215 to meet the Performance Requirements of NZBC Clause B2, Durability B2.3.1(a) 50 years and B2.3.1(b) 15 years, E2 External Moisture, THERMAKRAFT 215:

- must be installed in accordance to the "APPLICATION and INSTALLATION GUIDELINES",
- run length no greater than 10 metres,
- is not left exposed for more than (7 days) roof,
- when used on LOSP treated timber, the timber must be free of solvent,
- installed by a licensed building practitioner,
- Installed in accordance with the Roofing Code of Practice.



The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards.

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Reference Number:	REF181127014
Submitted On:	22/11/2018 12:02
Submitted By:	David Park

Property Selection

Property ID	0730164819
Address	18 Penny Grove, Taupo
House Number	
Street	
Suburb	
Area Description	
Legal Description	Lot 226 DP 522262
Location	Map
Property Type	Residential
Valuation Number	
Property Ward	

Application & Project

Nature of application:	Residential
Application Info	Building Consent & Project Information Memorandum (PIM)
Project Information Memorandum	
Memo Available	• Alterations to land contours (e.g. digging out the site for a building platform) • New or altered connections to public utilities (e.g. Council sewer, stormwater or water mains) • Disposal of wastewater or stormwater • Building work over any existing drains or sewers or in close proximity to wells or water mains
Is there an existing PIM?	No
National Multi-Use Approval	No
Building name:	
Location of building within site/block number:	18 Penny Grove
Level/Unit number:	

Number of levels:	1
Floor area:	173.68
Current, lawfully established use:	Housing
Year first constructed:	
Add number of occupants per level and per use if more than one:	
Description of the building work:	New 3 bedroom dwelling.
Will the building work result in a change of use of the building?	No
Intended life of the building, if less than 50 years:	
List any previous building consents/PIMs for this project, if applicable:	
Estimated value of the building work on which the building levies will be calculated (including GST):	455000.00
Does the building/site have any cultural significance, or is a Marae?	No
Is there a new swimming pool or spa pool proposed for this project?	No
Will the building work include any restricted building work?	No
Type:	
Name:	
Company name:	
Address:	
Landline:	
Mobile:	
Email address:	
Accept TandC	Yes

Applicant Details

Privacy Statement	
Name of owner(s)	Penny Homes Ltd
Contact person	David Park
Mailing address	1 Jarden Mile, Nukkuhau, Taupo 3330
Street address/registered office	
Landline	
Mobile	027 4909129
Daytime	
After hours	
Fax	
Email address	david@pennyhomes.co.nz
Confirm email address	david@pennyhomes.co.nz
Website	
The following evidence of ownership is attached	Council to provide Certificate of Title (cost associated)
Does a consent notice exist for this property?	No
Is there an agent working on behalf of the applicant?	No
First point of contact for technical queries related to the processing of this application	Owner
The person specified below will be responsible for all debt associated with this building consent.	

In ticking this box I agree that I will pay, or arrange payment, of all fees payable in respect of this application. I acknowledge that a cancellation fee may be payable if this application is withdrawn before a building consent is issued

Yes

Please specify the billing details for this application

Owner

Building Code

For further information on the below Building Code Clauses please visit the following website address: https://www.building.govt.nz/building-code-compliance/

Please complete all applicable building code clauses

B1 Structure Yes

Please select all that apply to your project: •NZS3604

Please select all applicable verification methods •B1/VM1

Alternative solution? No

Waiver/Modification? No

Proposed Inspector Council

B2 Durability Yes

Please select all that apply to your project •B2/AS1

Please select all applicable verification methods •B2/VM1

Alternative solution? No

Waiver/Modification? No

Proposed Inspector Council

C1-C6 Fire Safety Classes Yes

Please select all that apply to your project •C/AS1

Please select all applicable verification methods •C/VM1

Proposed Inspector Council

D1 Access Routes Yes

Please select all that apply to your project •D1/AS1

Alternative Solution? No

Waiver/Modification? No

Proposed Inspector Council

D2 Mechanical Installation for Access N/A

E1 Surface Water Yes

Please select all that apply to your project •AS3500

Please select all applicable verification methods •E1/VM1

Alternative Solution? No

Waiver/Modification? No

Proposed Inspector Council

E2 External Moisture Yes

Please select all that apply to your project •E2/AS1

Please select all applicable verification methods •E2/VM1

Alternative Solution? No

Waiver/Modification? No

Proposed Inspector Council

E3 Internal Moisture	Yes
Please select all that apply to your project	• E3/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F1 Hazardous Agents on Site	N/A
F2 Hazardous Building Materials	Yes
Please select all that apply to your project	• F2/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F3 Hazardous Substances and Processes	N/A
F4 Safety from Falling	N/A
F5 Construction and Demolition Hazards	Yes
Please select all that apply to your project	• F5/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F6 Visibility in Escape Routes	N/A
F7 Warning Systems	Yes
Please select all that apply to your project	• F7/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
F8 Signs	N/A
G1 Personal Hygiene	Yes
Please select all that apply to your project	• G1/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
G2 Laundering	Yes
Please select all that apply to your project	• G2/AS1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
G3 Food Preparation and Prevention of Contamination	Yes
Please select all that apply to your project	• G3/AS1
Alternative Solution?	No
Waiver/Modifications?	No
Proposed Inspector	Council
G4 Ventilation	Yes
Please select all that apply to your project	• G4/AS1
Please select all that apply to your project	• G4/VM1

Alternative Solution?	No
Please upload supporting documents	No files uploaded
Waiver/Modification?	No
Proposed Inspector	Council
G5 Interior Environment	N/A
G6 Airbourne Impact Sound	N/A
G7 Natural Light	Yes
Please select all that apply to your project	• G7/AS1
Please select all that apply to your project	• G7/VM1
Alternative Solution?	No
Waiver/Modifications	No
Proposed Inspector	Council
G8 Artificial Light	N/A
G9 Electricity	Yes
Please select all that apply to your project	• G9/AS1
Please select all that apply to your project	• G9/VM1
Alternative Solution?	No
Waiver/Modification?	No
By certification only	
G10 Piped Services	Yes
Please select all that apply to your project	• G10/AS1
Please select all that apply to your project	• G10/VM1
Alternative Solution?	No
Waiver/Modification?	No
By certification only	
G11 Gas as an Energy Source	Yes
Please select all that apply to your project	• G11/AS1
Alternative Solutions?	No
Waiver/Modifications?	No
By certification only	
G12 Water Supplies	Yes
Please select all that apply to your project	• G12/AS1
Please select all that apply to your project	• G12/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council
G13 Foul Water	Yes
Please select all that apply to your project	• AS3500
Please select all that apply to your project	• G13/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	• Council
G14 Industrial Liquid Waste	N/A

G15 Solid Waste	N/A
H1 Energy Efficiency	Yes
Please select all that apply to your project	• H1/AS1
Please select all that apply to your project	• H1/VM1
Alternative Solution?	No
Waiver/Modification?	No
Proposed Inspector	Council

Compliance Schedule

SS16 - Cable Cars	Not Applicable
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Application Checklist

Use this checklist when finalising your building drawings/plans to assist you to lodge a complete application and to avoid delays in processing. Your application will be accepted based on this checklist to ensure that it has sufficient information to commence processing. All items on this checklist must be circled to show that they are either provided or are not applicable to your project (N/A).

Later additional information may be requested during the processing of your building consent to confirm compliance with the Building Act, Building Code, District Plan and any other relevant legislation. Processing time will be suspended until information is received.

General Documentation Required

Owner authorisation provided	N/A
Form 2A Certificate of Design Work	Yes
All drawings must meet the minimum requirements of the technical drawings standard AS/NZS1100 with a minimum font size of Microsoft Word text size 8. Index provided for plans and specifications.	Yes
Are you applying for owner/builder exemption? If yes, the appropriate documentation including Form 2B is to be supplied	N/A
All documents including photocopies must be legible	Yes
All plans are to be titled and dated (or version number)	Yes
Comments	

Legal Documentation Required

Evidence of ownership provided.	N/A
Comments	

Site/Location Plan

Site/Location Plan	Yes
North point	Yes
Road frontage indicated and street named	Yes
Location of all existing and proposed buildings	Yes
Distance of buildings to boundaries and distance between existing and proposed buildings including eaves and gutters.	Yes
Site levels and finished floor levels relative to Moturiki Datum survey point (if applicable)	Yes
Existing contours (proposed cut or fill also needs to be shown).	Yes
Building line restrictions and easements, if applicable	Yes

Site boundaries/exclusive area boundaries for cross lease properties and common areas clearly shown	Yes
Show calculations and percentage of net site coverage	Yes
Labelled points on boundaries where overshadowing is taken from.	Yes
Existing and proposed crossings/driveways, also showing berms and footpaths.	Yes
Sediment control plan	N/A
If building under or near transmission lines, please show transmission plan area or location of power lines.	N/A

Comments

Retaining Walls/Site Works

Retaining Walls/Site Works	N/A
Comments	

Foundation Plan

Foundation Plan	Yes
Foundation details	Yes
For timber floors and decks, show the location of piles, pile type, sub-floor bracing calculations, foundation perimeter walls and internal piling system where applicable.	N/A
Concrete floor details provided	Yes
Control joints shown/saw cuts.	Yes
Bearer layout for floors and decks	N/A
Access/ventilation to subfloor space.	N/A

Comments

Floor Plan

Floor Plan	Yes
Plan of all floors describing the function of each room	Yes
Show all doors, windows and ventilation including enclosed space ventilation	Yes
Stairs, handrails and decking shown showing dimensions and details	N/A
Smoke alarm positions shown	Yes
For additions and alterations, the existing shall be shown separately to the proposed and to the same scale for comparison	N/A
Chimneys and solid fuel heaters	Yes
Lintel sizes/beam sizes and proprietary systems.	Yes

Comments

Framing Plan/Bracing Plan

Framing Plan/Bracing Plan	Yes
Bracing calculations/details - type and fixings	Yes
Framing plan, including size, centres, grade and treatment of members.	Yes
Bottom plate, top plate, stud, lintel fixing details.	Yes
Floor joist layout for floors and decks.	N/A
Upper storey floor design, if applicable.	N/A

Comments

Roof Plan

Roof Plan	Yes
Roof plans and roof bracing.	Yes
Truss types/roof framing layout, design statement and manufacturers PS1.	Yes
Truss/Rafter and purlin fixings.	Yes

Comments

Specific Design Engineering

Specific Design Engineering	N/A
------------------------------------	-----

Comments

Elevations

Elevations	Yes
North, South, East and West elevations.	Yes
Overshadowing labelled to correspond with points on site plan shown on all elevations	Yes
Height from ground level to apex of building	Yes
Show existing finished ground levels/floor levels and proposed finished ground levels/floor levels (sub-floor ventilation and access).	Yes
Stairs, handrails and decking shown	N/A
Cladding systems, roofing type and any other relevant details	Yes
Window schedule	Yes
Roof pitch and chimneys (show height of chimney in relation to ridge)	Yes
Alterations to land contour, retaining, cut and fill and batters	Yes

Comments

Specifications &Other Documentation

Specifications and Other Documentation	Yes
Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.)	Yes
H1 calculations	Yes
E2 Risk Matrix	Yes
Natural hazard assessment report, where applicable (erosion, falling debris, subsidence, inundation, slippage).	Yes
If the building was built before 1 April 2000, provide an asbestos assessment in accordance with the Health and Safety at Work (Asbestos) Regulations 2016, and if necessary an asbestos management plan.	N/A

Comments

Plumbing &Drainage

Plumbing and Drainage	Yes
All existing SEWERS, sewer connections and sewer drains shown including Territorial Authority services	Yes
All existing STORMWATER drains and connections shown including Territorial Authority services	Yes
Proposed sewer and stormwater drains/soak holes, terminal vents shown.	Yes

Existing and proposed potable water supply.	N/A
All existing and proposed sanitary fittings including pipe sizes and gradients (isometric)	Yes
Wastewater design and on-site soil evaluation to show compliance with Waikato Regional Council rules.	N/A
Specifications for hot water heating system including seismic restraints.	Yes
Stormwater disposal design and calculations.	Yes

Comments

Swimming Pool/Spa Pool

Swimming Pool/Spa Pool	N/A
------------------------	-----

Comments

Fireplace

Solid Fuel Heater	N/A
-------------------	-----

Comments

Solar Heating

Solar Heating	N/A
---------------	-----

Comments

Cross Section

Cross sections	Yes
----------------	-----

Drawings showing constructional details of foundations, floor systems, wall, ceiling, stud heights and stud sizes, roof construction, balustrades and barriers.	Yes
---	-----

Surface finishes to wet areas (walls and floor to laundry, kitchen and bathroom).	Yes
---	-----

Location and type of insulation.	Yes
----------------------------------	-----

Details for all penetration in walls, roof (i.e. windows, doors, meter boards, skylights etc.)	Yes
--	-----

Cavity construction details, where applicable.	Yes
--	-----

Comments

Relocatable Buildings

Relocatable buildings	N/A
-----------------------	-----

Comments

Attachments

<u>Please ensure all documents are correctly and adequately named prior to uploading.</u>

Please upload the plans related to the proposed work as <u>one PDF (not as individual sheets):</u>	• JT18105 - 18 Penny Grove - BC Plans.pdf (3478645 bytes)
Please upload all generic specifications related to proposed works as <u>one PDF (not as individual sheets):</u>	• PROJECT SPECIFICATION - 18 Penny Grove.pdf (485045 bytes)
Please upload the project specific specifications related to proposed works as <u>one PDF (not as individual sheets):</u>	• PROJECT APPENDIX - 18 Penny Grove.pdf (14777319 bytes)
Please upload any additional documents not yet provided:	• LBP FORM 2A - 18 Penny Grove.pdf (355074 bytes)
Once issued I would like to receive my consent documentation by:	Pickup electronic copy - On a USB memory stick, extra \$10.00 fee

DRAWING CONTENTS

SHT

SITE & DRAINAGE PLAN	1
FOUNDATION PLAN	2
FLOOR PLAN	3
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FRAMING & FIXINGS PLAN	6
BRACING PLAN	7
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DETAILS	9-11
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AXON PANEL CLADDING DETAILS	13-17
BEVEL BACK CLADDING DETAILS	18-22

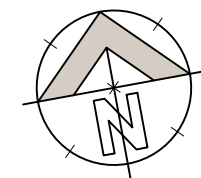
REVISION

-

NEW RESIDENCE

18 PENNY GROVE, TAUPŌ





LOT: 226
DP: 522262
AREA: 427m²

TOWN PLANNING INFORMATION:

Site Area: 427 sq.m
Floor Area: 173.68 sq.m
Additional Roof Area: 5.0 sq.m
Driveway as Coverage: 34 sq.m

Building Coverage: 173.68 + 5.0 = 178.68
178.68/427 = 41.8% (<50%)

Total Coverage: 178.68 + 34 = 212.68
212.68/427 = 49.8% (<75%)

Plot Ratio: 178.68/427 = 41.8% (<100%)

SITE PLAN AND DRAINAGE NOTES:

CONFIRM DEPTH AND POSITION OF PUBLIC SEWER CONNECTION BEFORE COMMENCING ANY EXCAVATIONS.

ALL PLUMBING AND DRAINAGE TO BE INSTALLED AND TESTED BY A REGISTERED TRADESPERSON IN ACCORDANCE WITH **AS/NZS3500.2** AND **NZBC E1/AS1** WHERE APPLICABLE. WATER SUPPLY TO **NZBC G12/AS1**.

CHECK ALL PIPE AND DRAIN DIAMETERS, AND GRADIENTS.

CHECK LOCATION OF EXISTING FIXTURES AND DRAINS ON SITE. REUSE WHERE POSSIBLE AND ACCEPTABLE.

EROSION & SEDIMENT CONTROL PLAN:

PROVIDE SILT FENCING AND OTHER METHODS OF SEDIMENT CONTROL LIKE MULCHING STRAW AS DETERMINED NECESSARY & APPLICABLE ON SITE.

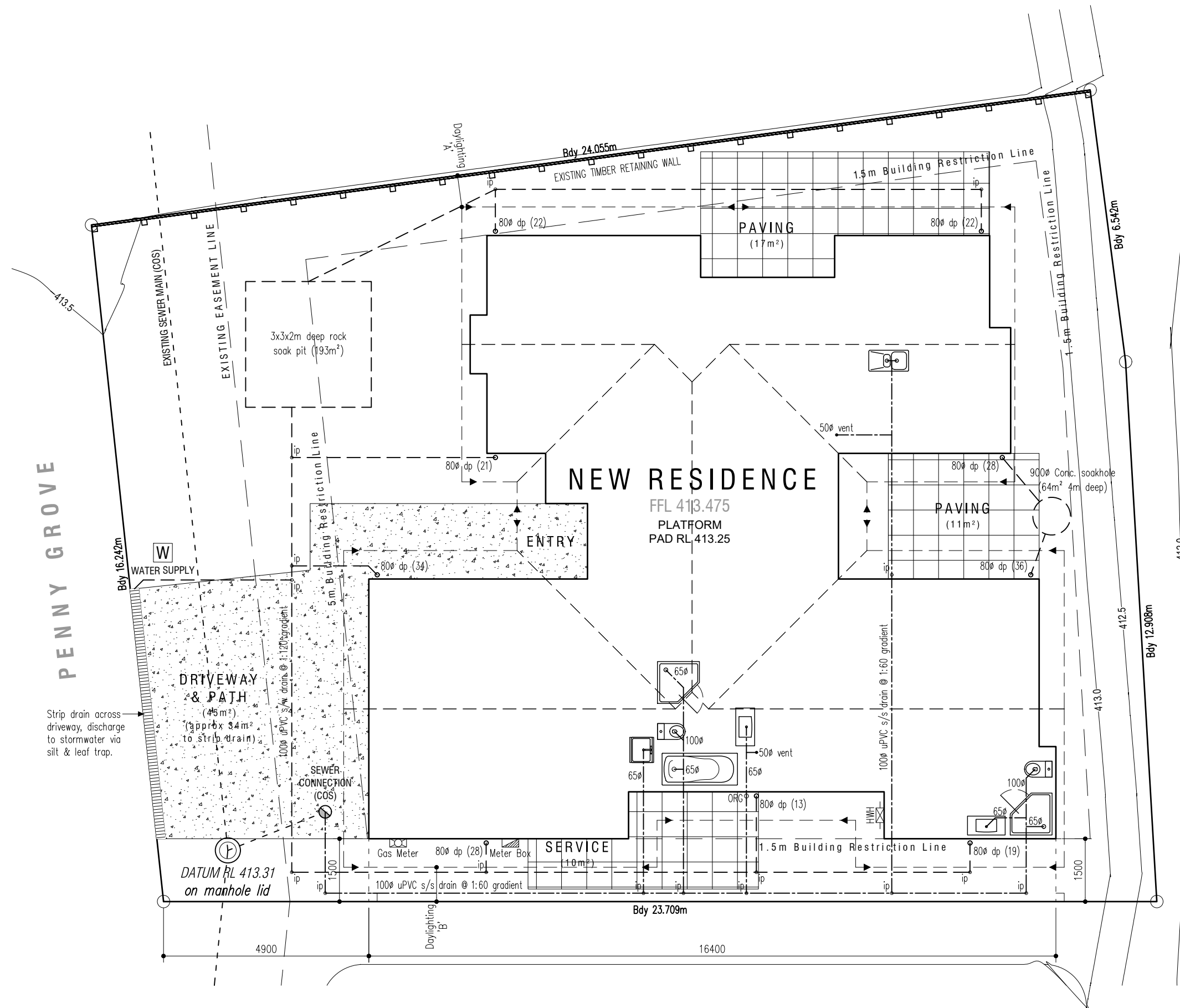
USE EROSION CONTROL TECHNIQUES TO PREVENT SEDIMENT GENERATION SUCH AS:

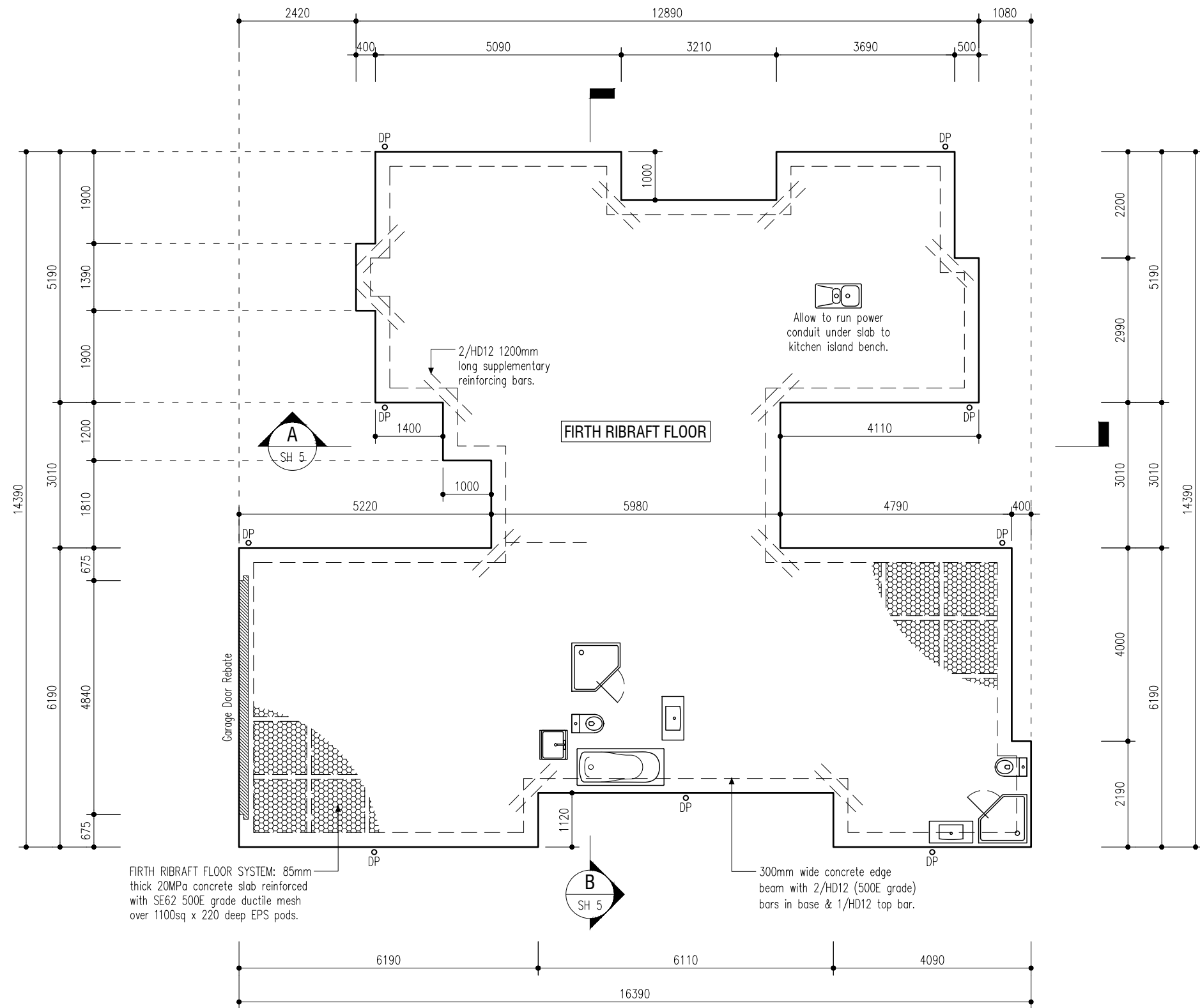
- REVEGETATION
- MINIMIZATION OF EARTHWORKS
- TIMING
- STAGING OF EARTHWORKS OPERATIONS

**AS/NZS 3500.2
MINIMUM TRAP & DISCHARGE PIPE SIZE ABOVE SLAB**

FIXTURE	FU's	PIPE Ø
Basin	1	40Ø
Shower	2	40Ø
Bath	4	40Ø
Kitchen Sink	3	65Ø
Laundry Tub	5	65Ø
WC Pan	4	100Ø

DRAIN SIZES AS SHOWN ON DRAWING





FOUNDATION PLAN NOTES:

REFER TO FIRTH RIBRAFT TECHNICAL MANUAL - JAN 2012 FOR FURTHER DESIGN AND CONSTRUCTION INFORMATION.

SHRINKAGE CONTROL JOINTS, IF REQUIRED, ARE TO BE INSTALLED AS PER FIRTH RIBRAFT TECHNICAL MANUAL.

CHECK DIMENSIONS AGAINST FINAL FRAMING PLAN PRIOR TO SETTING OUT FOUNDATION.

5mm FRAMING OVERHANG IS REQUIRED FOR AXON PANEL OVER CAVITY - AS DIMENSIONED ON FOUNDATION PLAN.

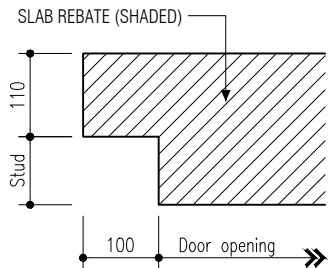
5mm FRAMING OVERHANG RECOMMENDED FOR BEVEL BACK WEATHERBOARD - AS DIMENSIONED ON FOUNDATION PLAN.

OVERALL DIMENSIONS ARE TO OUTSIDE EDGE OF FOUNDATION WITH REBATES DIMENSIONED SEPARATELY.

SLAB REBATES FOR FULL HEIGHT JOINERY:

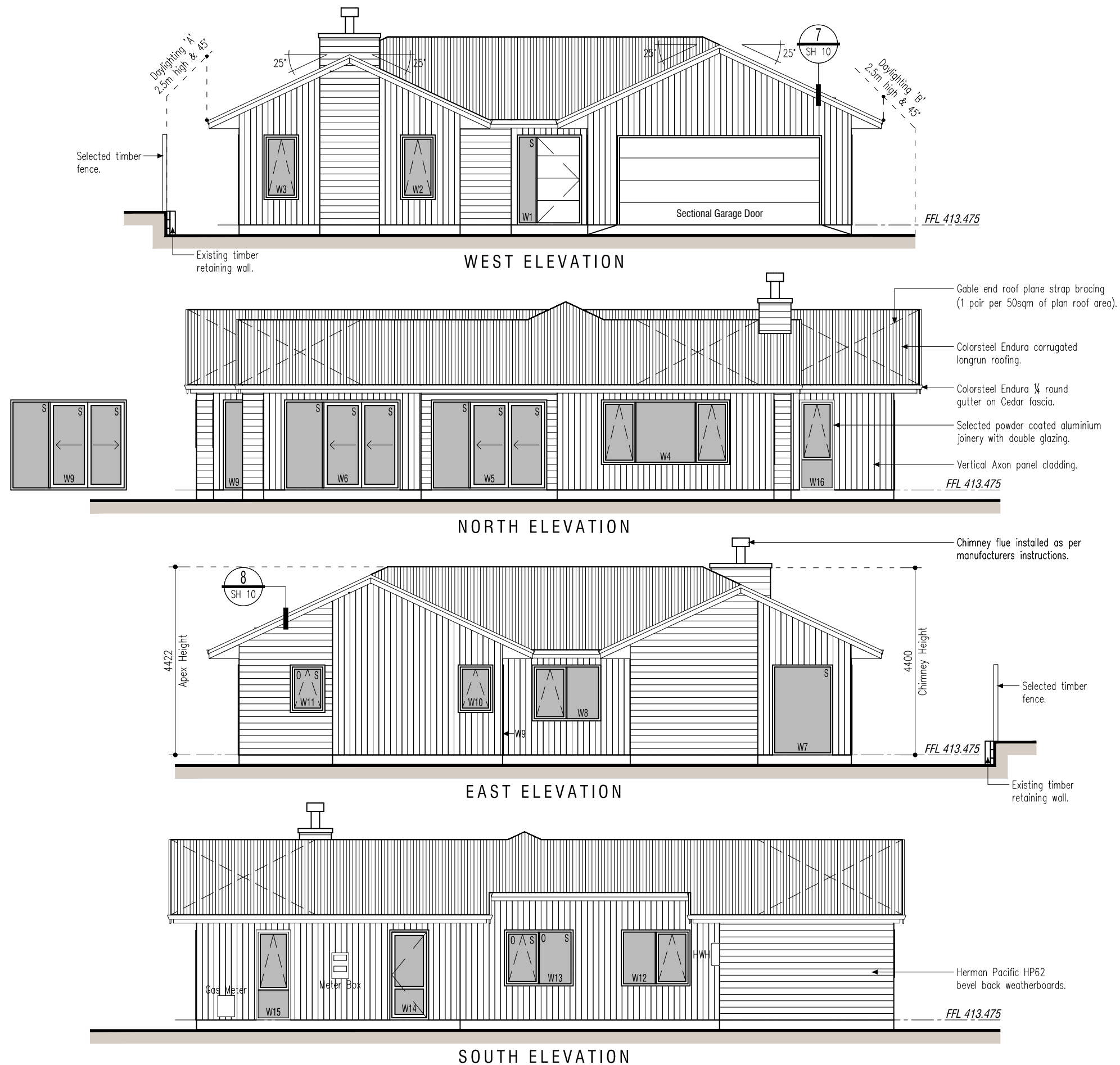
CONTRACTOR TO CONFIRM DOOR AND WINDOW JOINERY PROFILES WITH OWNER & JOINERY MANUFACTURER PRIOR TO SETTING OUT SLAB TO ALLOW FOR ACCURATE SLAB REBATES WHERE REQUIRED.

FLOOR COVERINGS NEED TO BE CONSIDERED IN ALL SITUATIONS TO ENSURE A FLUSH FINISH WITH THE JOINERY.



GARAGE DOOR REBATE DIAGRAM

	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: NEW RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: FOUNDATION PLAN CONSENT COPY REV -	SCALE: 1:100	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work	DATE: --/--/--	REVISION:	SHEET 2 OF: 22 JOB No. JT18105
				DRAWN: SK				
				DATE: Nov 2018				



ROOF BRACING:

LIGHT WEIGHT ROOF SHALL BE BRACED WITH ONE ROOF BRACE PER 50m² OF ROOF PLAN AREA WITH A MINIMUM OF 2 BRACES TO EACH RIDGE LINE.

LIGHT WEIGHT HIPPED ROOF SHALL BE BRACED WITH A MINIMUM OF 3 HIP OR VALLEY RAFTERS TO EACH RIDGE LINE.

HIP OR VALLEY RAFTERS THAT RUN FROM WALL TO RIDGE MAY BE COUNTED AS A ROOF PLANE BRACE.

REFER TO MITEK STRUCTURAL FIXINGS ON SITE GUIDE 2012 FOR ROOF PLANE AND ROOF SPACE BRACING OPTIONS.

GLAZING NOTES:

ALUMINIUM JOINERY MANUFACTURER TO SITE MEASURE OPENINGS PRIOR TO MANUFACTURE OF ALL JOINERY.

ALL JOINERY POWDERCOATED TO SELECTED COLOUR.

COLOUR MATCHED HARDWARE.

CONFIRM WITH OWNER PRIOR TO MEASURE UP ANY SPECIAL REQUIREMENTS FOR GLAZING E.G. LOW E GLASS.

GLAZING: STANDARD DOUBLE GLAZED, TINTED GLASS TO ALL WINDOWS.

ALL GLAZING UNITS TO SUIT HUMAN IMPACT REQUIREMENTS OF NZS4223:

S = GRADE A SAFETY GLAZING
O = OBSCURE GLAZING

	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: NEW RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: ELEVATIONS CONSENT COPY REV -	SCALE: 1:100	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work E&OE	DATE: --/--/--	REVISION:	SHEET 4 OF: 22 JOB No. JT18105
				DRAWN: SK				
				DATE: Nov 2018				

IF METAL CEILING BATTENS ON CLIPS ARE USED,
BOTTOM CHORD BRACING IS REQUIRED AT 1800mm
CENTRES, REFER TO TRUSS MANUFACTURERS
DESIGN.



IMPORTANT NOTE: trimming stud numbers shown are indicative only

TYPE B (external wall)
4.7kN

2/90x3.15 dia. plain steel wire
nails driven vertically into stud.

(ALTERNATIVE TO NZS3604:2011 TABLE 8.18)

To calculate the number of B type fixings required, divide the wall length by the stud centres, add 1 to this figure and locate this number of fixings as evenly as possible along the wall length. This figure includes the start and end studs in each wall length

Refer to NZS 3604:2011 Table 10.10 for purlin fixing requirements.

70x45mm H1.2 purlins - Achieve fixing *Type T (2.4kN)*
1/10g x 80mm long self drilling screw

Stud size and spacings as per NZS 3604:2011 Table 8.2 and Table 8.4. Typically:

External walls 90x45 H1.2 at 400mm crs.
Chimney external walls 140x45 H1.2 at 400mm crs.
Internal walls 90x45 H1.2 at 600mm crs.

Dwangs at 800mm crs. to all framing unless noted otherwise.

Refer to NZS 3604:2011 Fig. 8.5 and Table 8.5 to determine the number of trimming studs required for window and door openings.

As per DesignIT calculations and where indicated on plans:

JS1 - 3/90x45 HyCHORD trimming studs

BOTTOM PLATE TO STUD CONNECTION TO COMPLY
WITH NZS 3604:2011 table 8.19 AND AS REQUIRED FOR
LINTEL FIXINGS.

BOTTOM PLATE TO FLOOR SLAB CONNECTION AS PER
NZS 3604:2011 7.5.12 AND AS REQUIRED FOR LINTEL
FIXINGS.

PROPRIETARY ANCHORS SHALL HAVE A MINIMUM CAPACITY AS PER NZS3604:2011 7.5.12.3 & 7.5.12.4. INSTALL AS PER MANUFACTURERS INSTRUCTIONS.

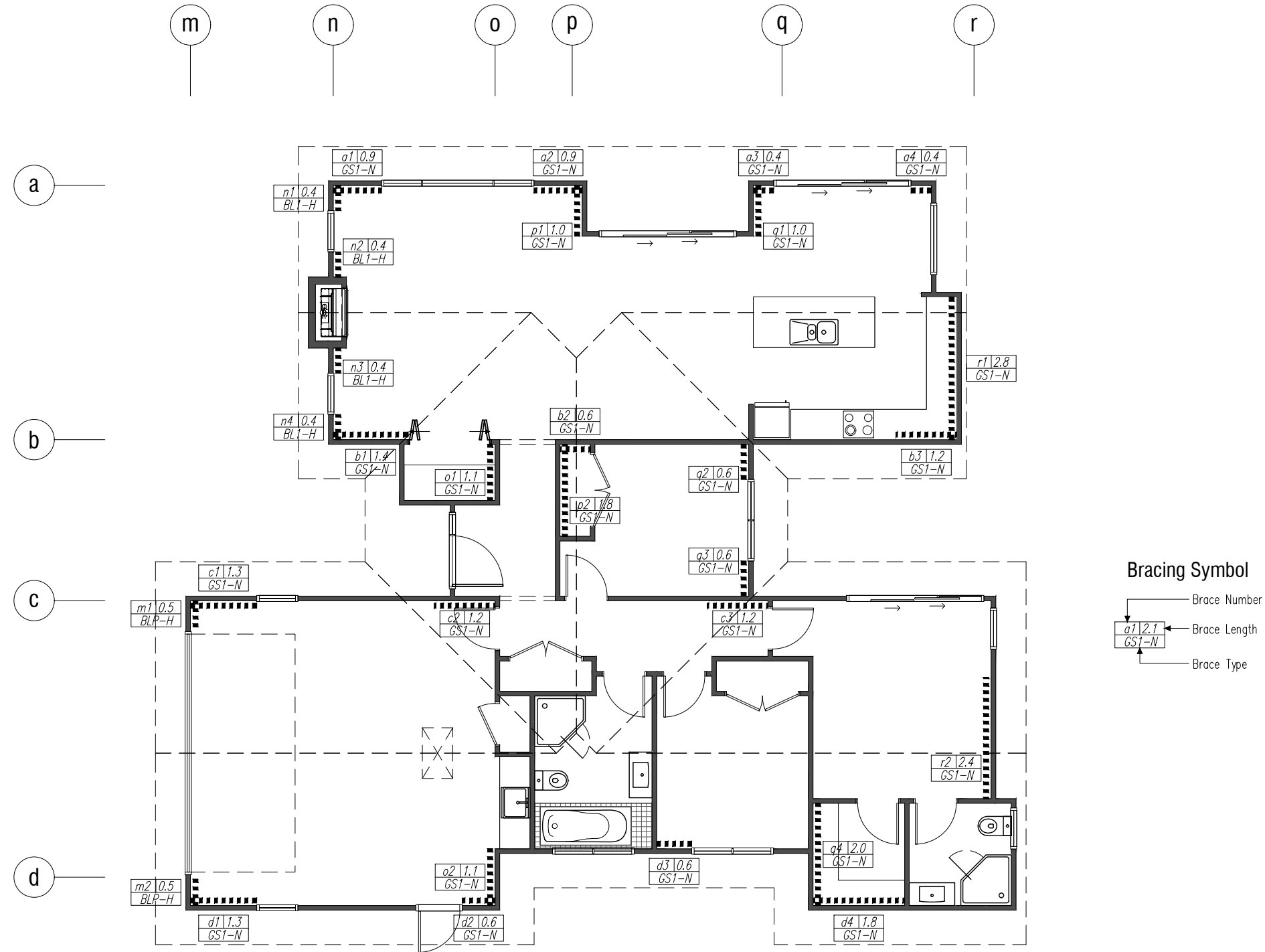
EXTERNAL WALLS: PROPRIETARY POST FIXED BOTTOM
PLATE ANCHORS @ 0.9m CTRS.

INTERNAL LOAD BEARING WALLS: PROPRIETARY POST
FIXED BOTTOM PLATE ANCHORS @ 0.9m CTRS.

INTERNAL WALLS: PROPRIETARY POST FIXED BOTTOM
PLATE ANCHORS @ 0.9m CTRS OR 8x75mm DRIVE PIN
& WASHER @ 0.6m CTRS.

ADDITIONAL FIXINGS AS REQUIRED BY BRACING
ELEMENTS.

ALL LINTELS SIZED BY CARTERS PRENAIL, REFER TO
CARTERS DRAWINGS FOR ROOF & LINTEL DESIGN.

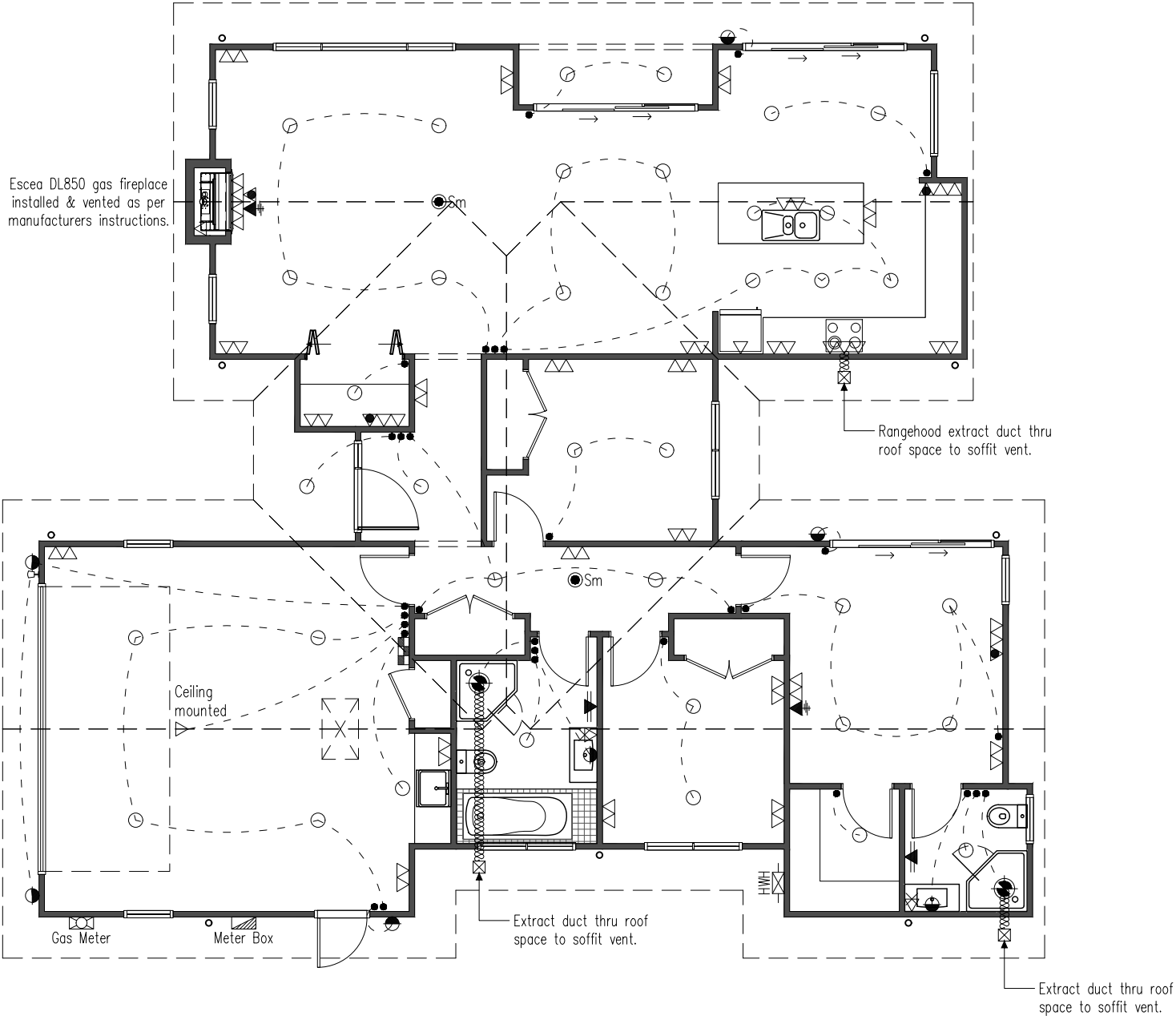


INSULATION TABLE

PROPOSED R-VALUES			
LOCATION	COMPONENT	R-VALUE ACHIEVED	INSULATION DESCRIPTION & REFERENCE
WALLS	Axon Panel on cavity over 90x45mm studs at 400mm centres.	2.18	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Bevel back weatherboards direct fixed over 90x45mm studs at 400mm centres.	2.19	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
	Internal framed wall GIB lining both sides of 90x45mm studs at 600mm centres.	2.27	R2.8 insulation to frame cavity <i>Refer to Design Navigator Calculations in Appendix</i>
ROOFS	Profiled metal on trusses at 900mm centres	3.37	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
	Profiled metal on scissor trusses at 900mm centres	3.35	R3.6 insulation to roof space <i>Refer to Design Navigator Calculations in Appendix</i>
FLOOR	85mm thick Firth Ribraft concrete slab on ground	1.30	220mm deep polystyrene pod system <i>Refer to Manufacturers Spec in Appendix</i>
GLAZING	Aluminium joinery with double glazed windows	0.26	Standard aluminium joinery with double glazed windows <i>Refer to Branz House Insulation Guide Fifth Edition</i>

INSULATION NOTES:

GARAGE NOT INCLUDED IN THERMAL ENVELOPE FOR INSULATION CALCULATIONS. INTERNAL GARAGE WALLS TO BE INSULATED WITH R2.8 BATTS AS PER REST OF HOUSE.



- LEGEND:
- Distribution Board
 - Meter Box
 - Gas Meter Box
 - Rinnai VT26 HWH
 - Light Sensor
 - Recessed LED light
 - Wall Mounted Light
 - Extract Fan
 - Smoke Detector
 - Power Outlet
 - Double Power Outlet
 - Earth Leakage point
 - Heated Towel Rail
 - Phone Outlet
 - Light Switch
 - TV Outlet

ELECTRICAL NOTES:

CHECK KITCHEN APPLIANCE POSITIONS AND TYPES BEFORE INSTALLATION WITH FINALIZED KITCHEN PLAN.

CHECK POSITIONS AND TYPES OF ALL FITTINGS PRIOR TO INSTALLATION.

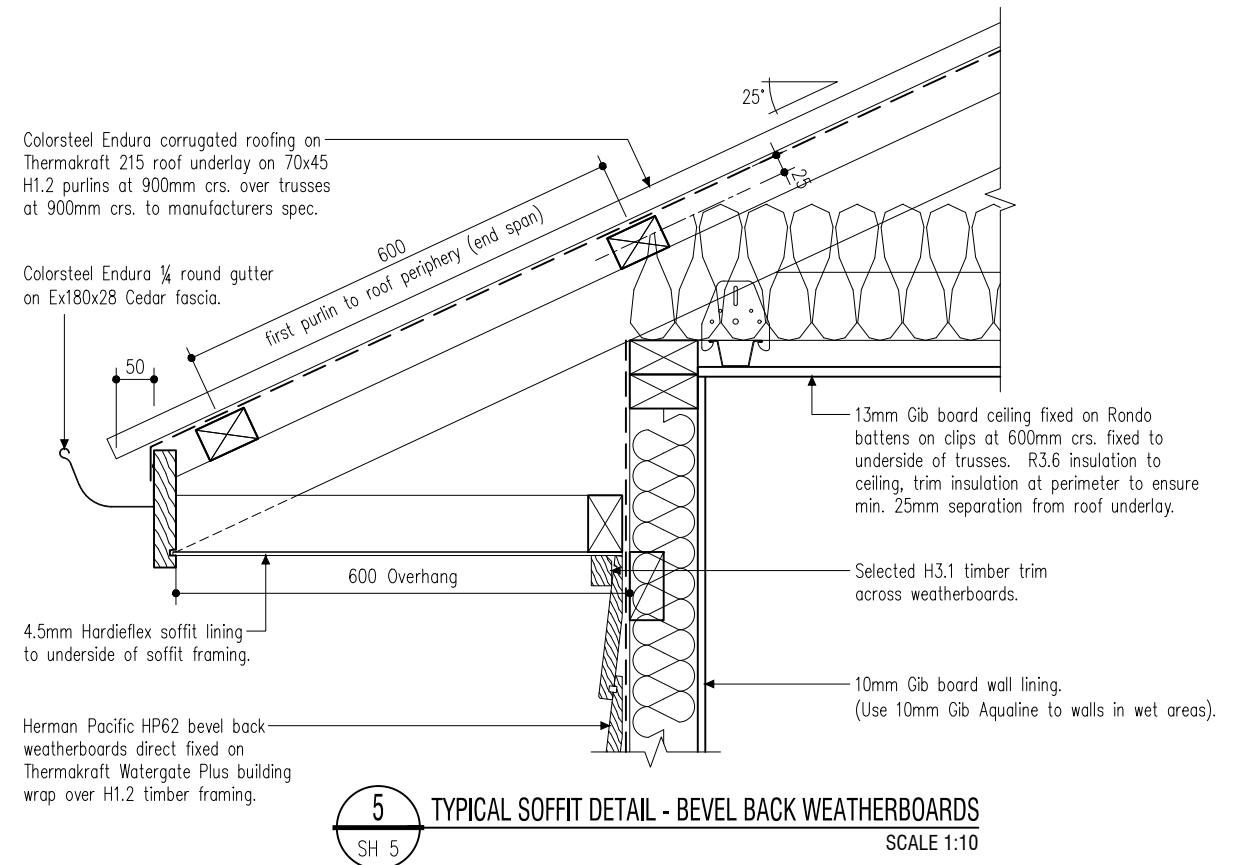
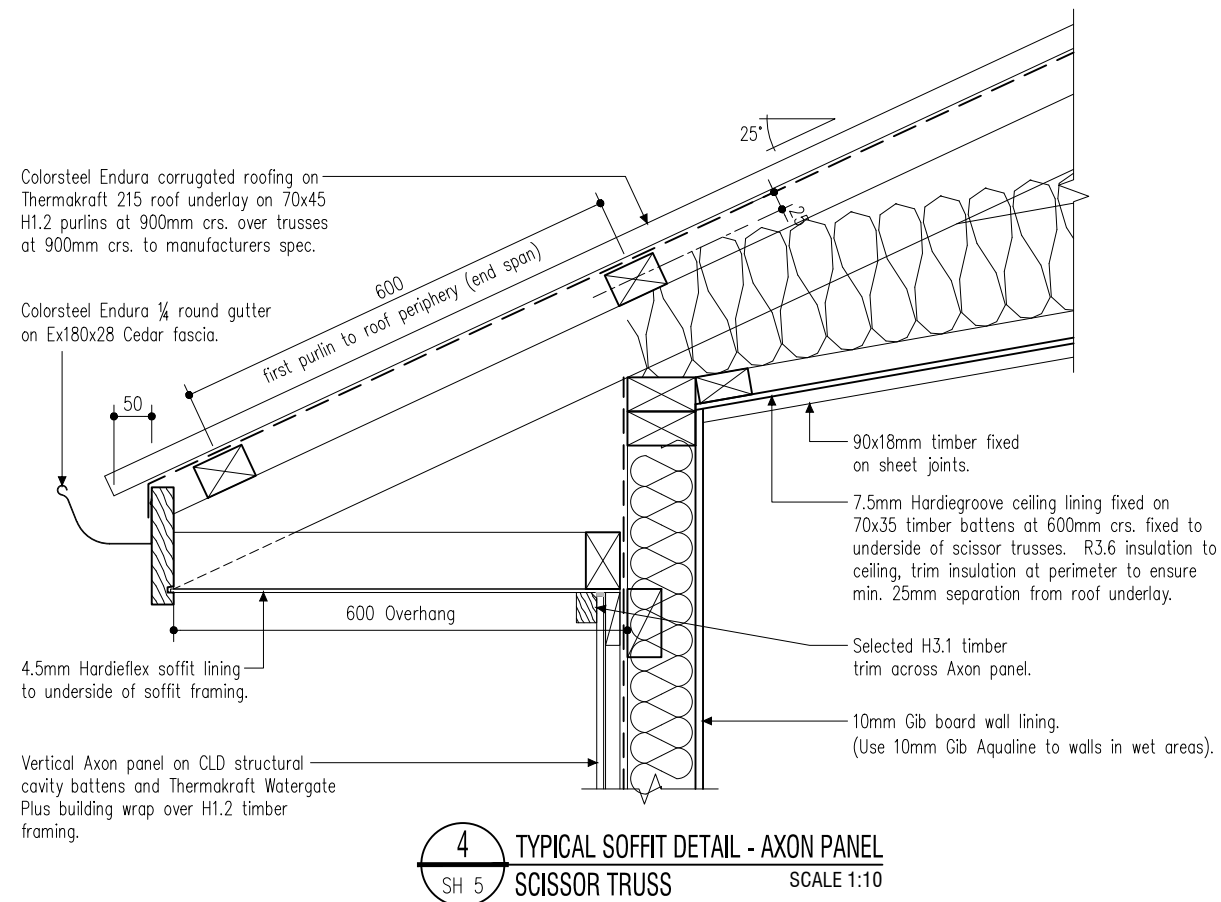
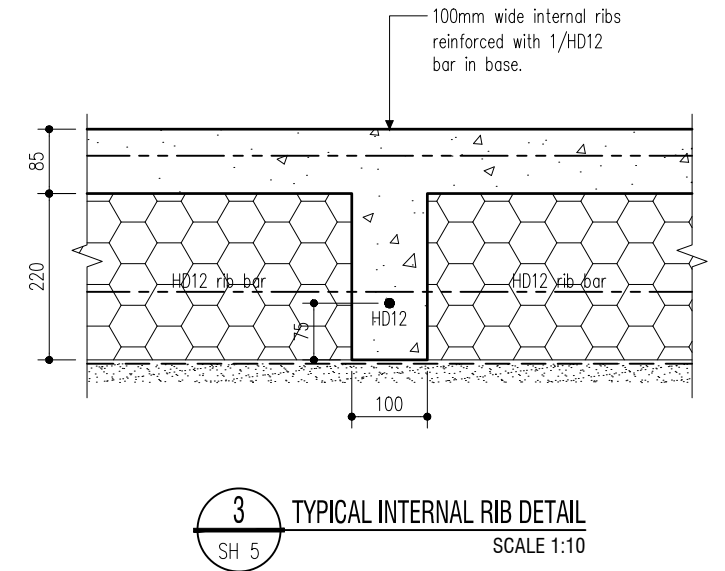
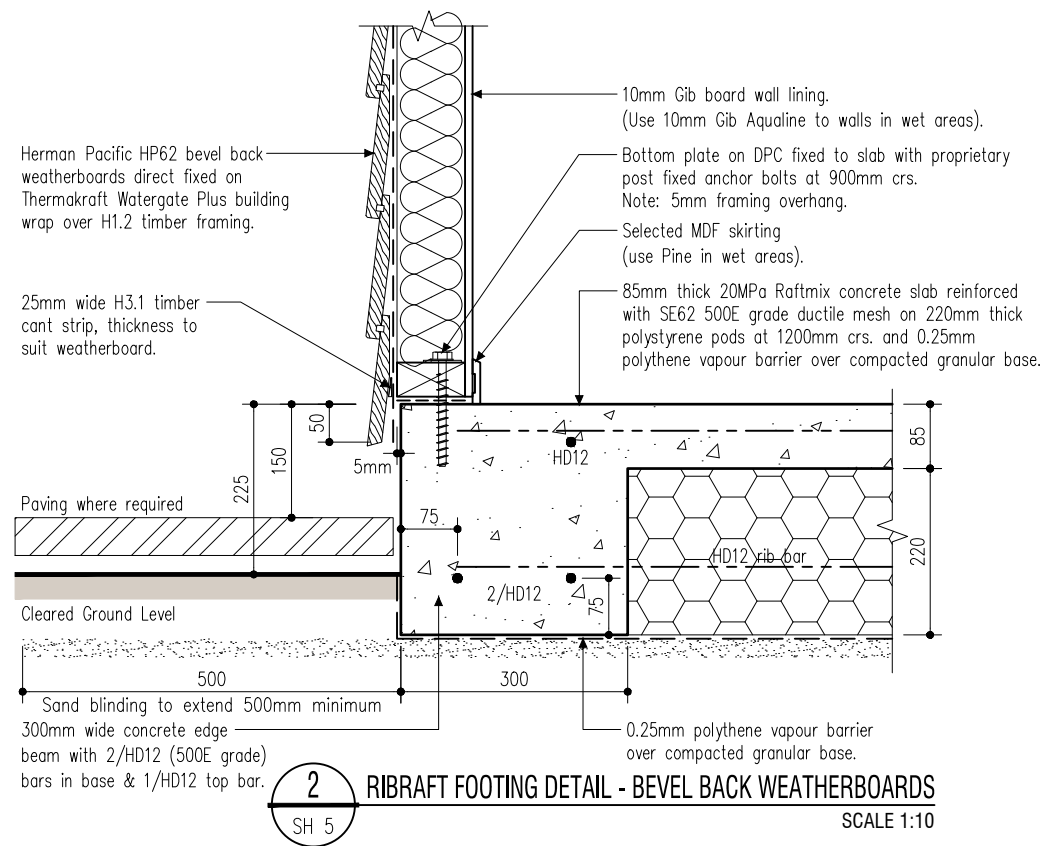
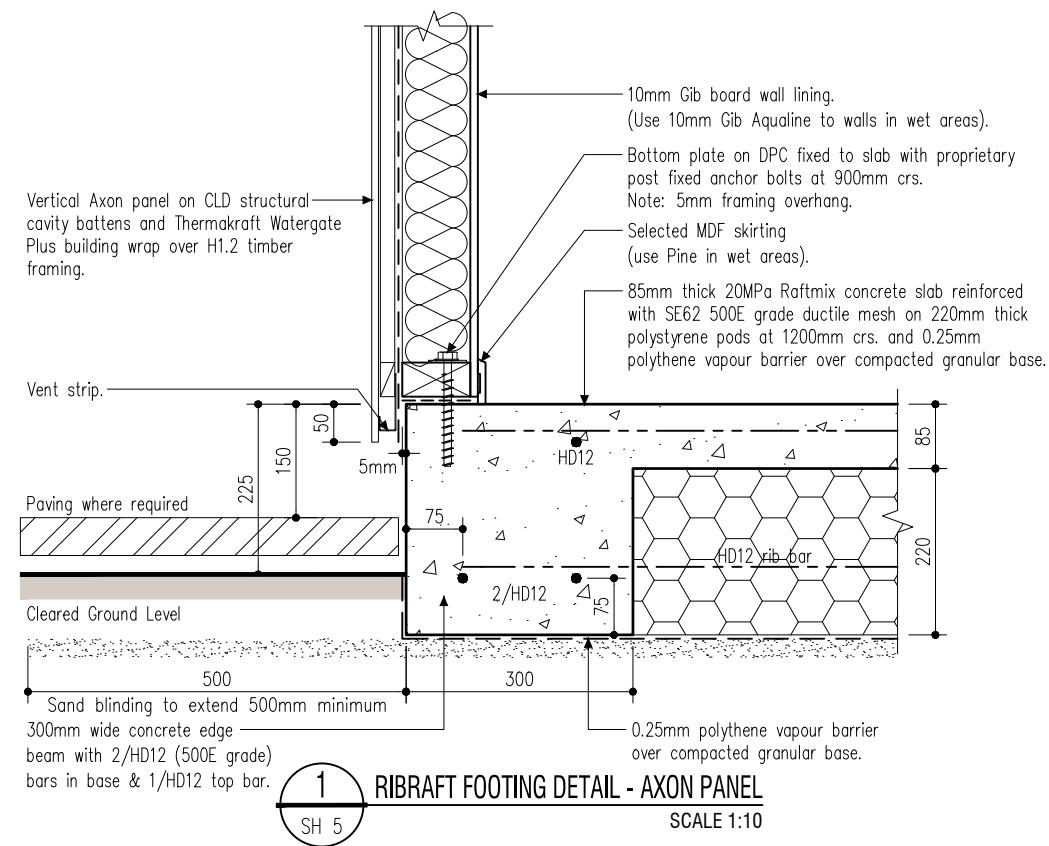
ALLOW PC SUMS FOR SPECIALIST FITTINGS WHERE APPLICABLE.

ALL RECESSED DOWNLIGHTS TO BE CA RATED. TYPES: ICF, IC, CA80, CA135.

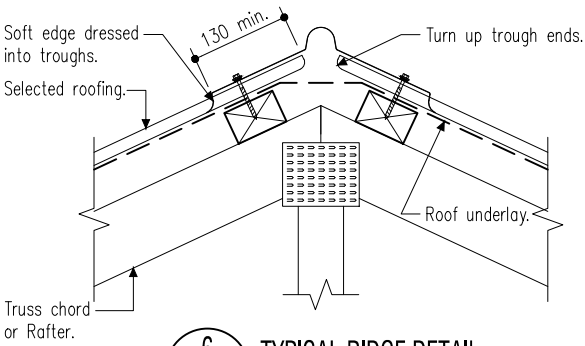
SMOKE ALARMS TO BE TYPE 1 WITH HUSH AND TEST FACILITY IN ACCORDANCE WITH NZBC F7/AS1.

CONFIRM THE FOLLOWING IF REQUIRED:

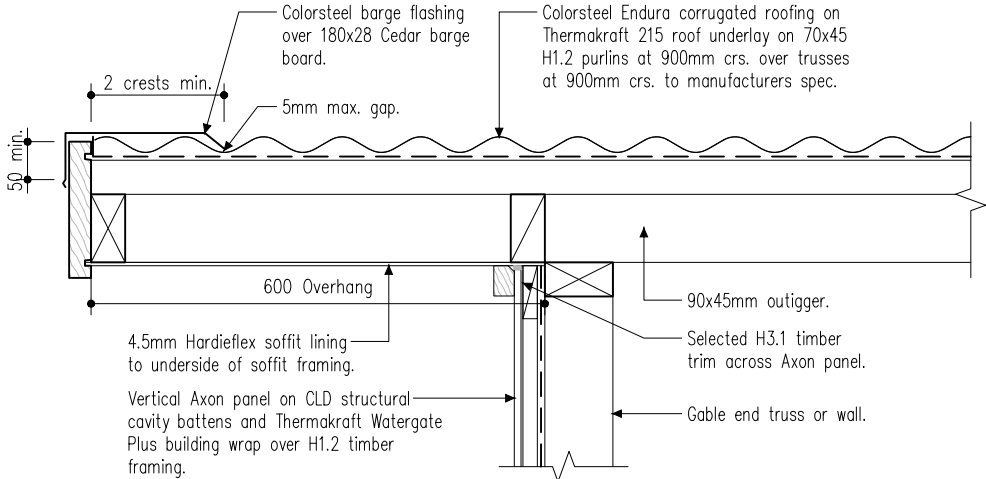
- UNDERTILE HEATING
- SPECIALIST FITTINGS
- MIRROR DEMISTERS
- AIRCONDITIONING SYSTEM IF APPLICABLE
- SECURITY SYSTEM
- DIMMERS TO SELECTED LIGHTS
- ENTRY CONTROL SYSTEM



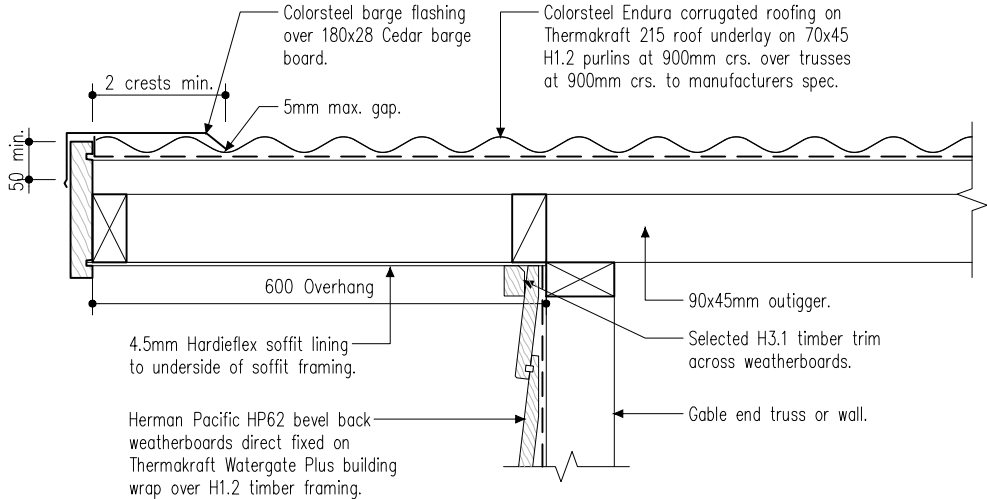
	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: NEW RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: DETAILS CONSENT COPY REV -	SCALE: 1:10	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work E&OE	DATE:	REVISION:	SHEET 9 OF: 22 JOB No. JT18105
				DRAWN: SK				
				DATE: Nov 2018				



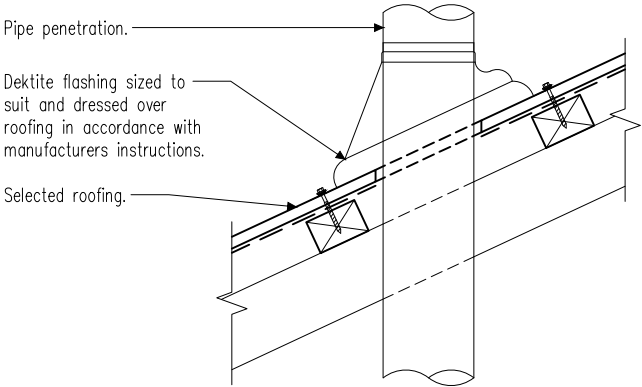
6 TYPICAL RIDGE DETAIL
SH 5 SCALE 1:10



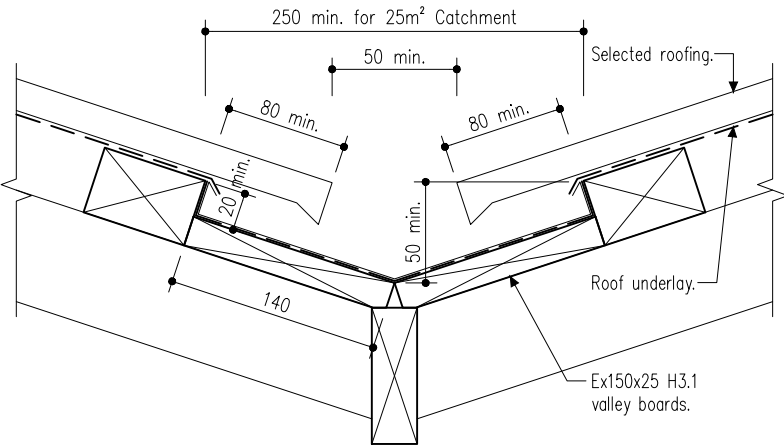
7 TYPICAL 600mm BARGE DETAIL - AXON PANEL
SH 4 SCALE 1:10



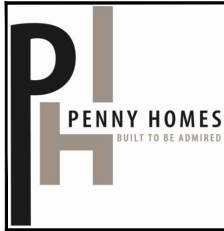
8 TYPICAL 600mm BARGE DETAIL - BEVEL BACK WEATHERBOARDS
SH 4 SCALE 1:10

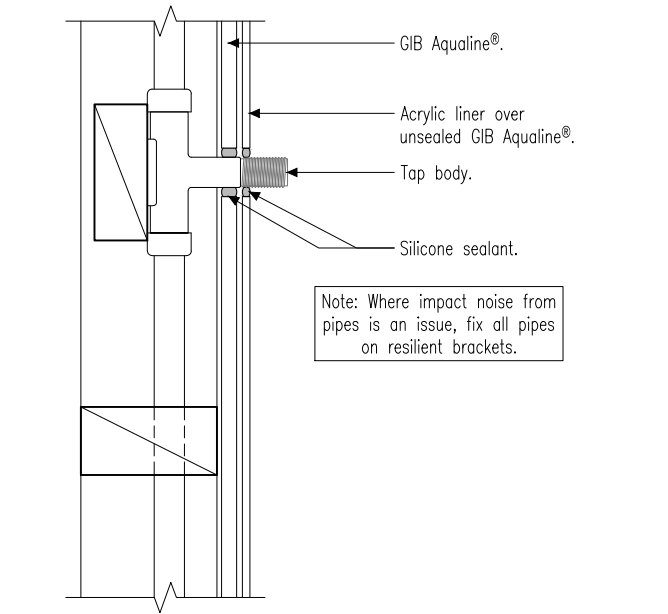


TYPICAL ROOF PENETRATION DETAIL
SCALE 1:10

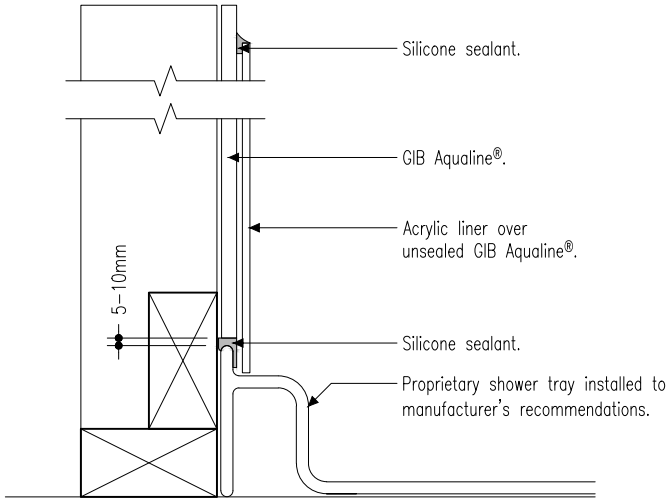


TYPICAL VALLEY GUTTER DETAIL
SCALE 1:5

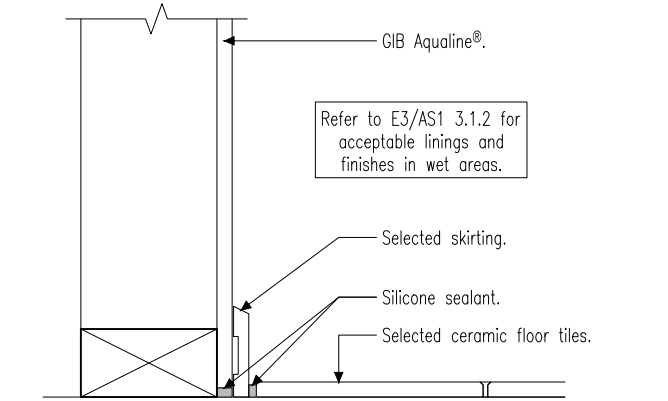
	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: NEW RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: DETAILS CONSENT COPY REV -	SCALE: 1:10 / 1:5	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work E&OE	DATE: --/--/----	REVISION:	SHEET 10 OF: 22 JOB No. JT18105
				DRAWN: SK				
				DATE: Nov 2018				



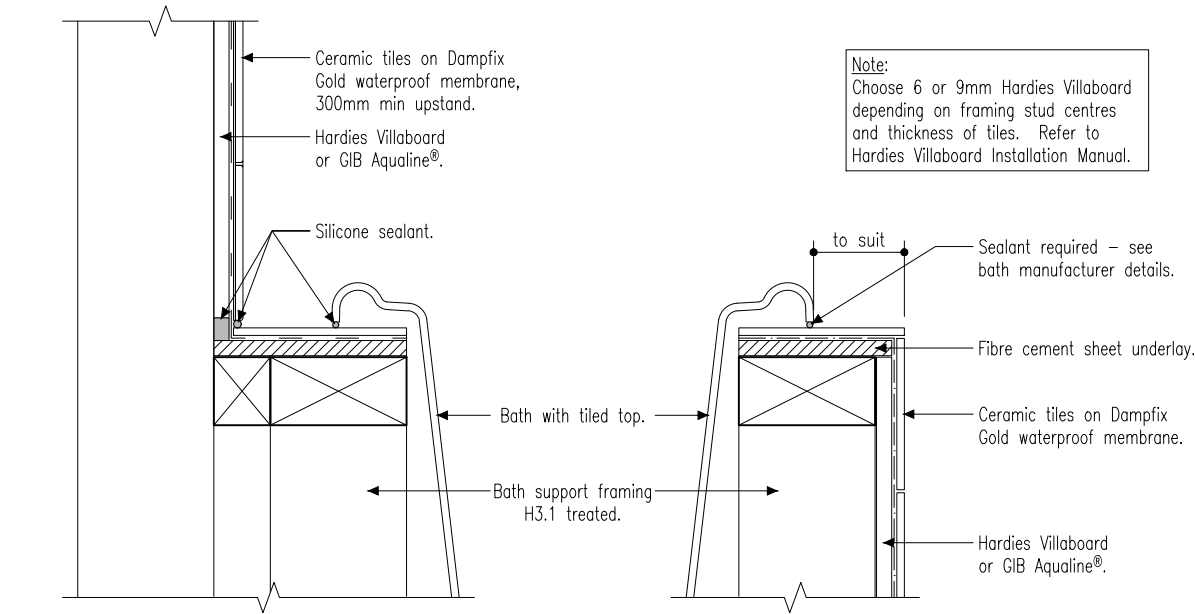
ACRYLIC LINER PENETRATION DETAIL
SCALE 1:5



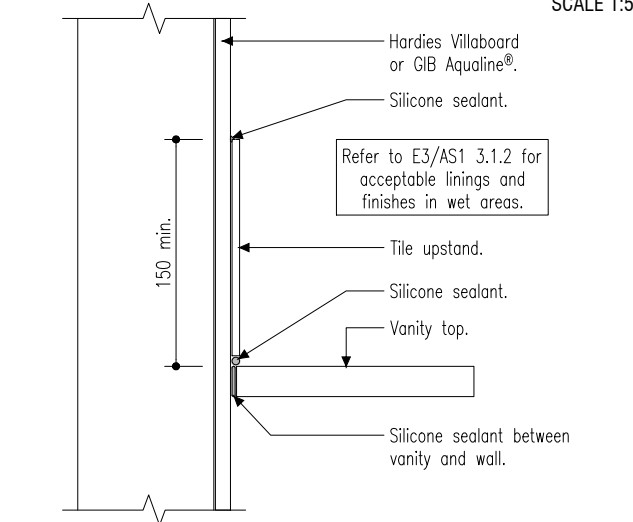
SHOWER WALL/TRAY DETAIL (ACRYLIC LINER & BASE)
SCALE 1:5



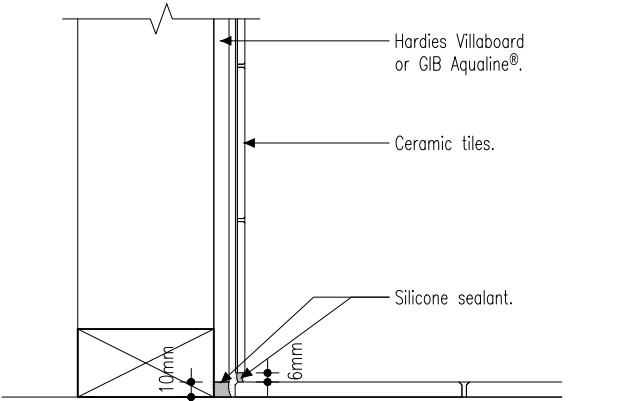
WALL/FLOOR DETAIL (GIB AQUALINE/TILED FLOOR)
SCALE 1:5



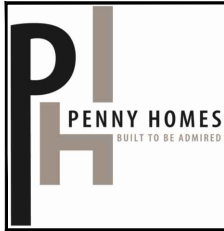
BATH EDGE DETAILS
SCALE 1:5

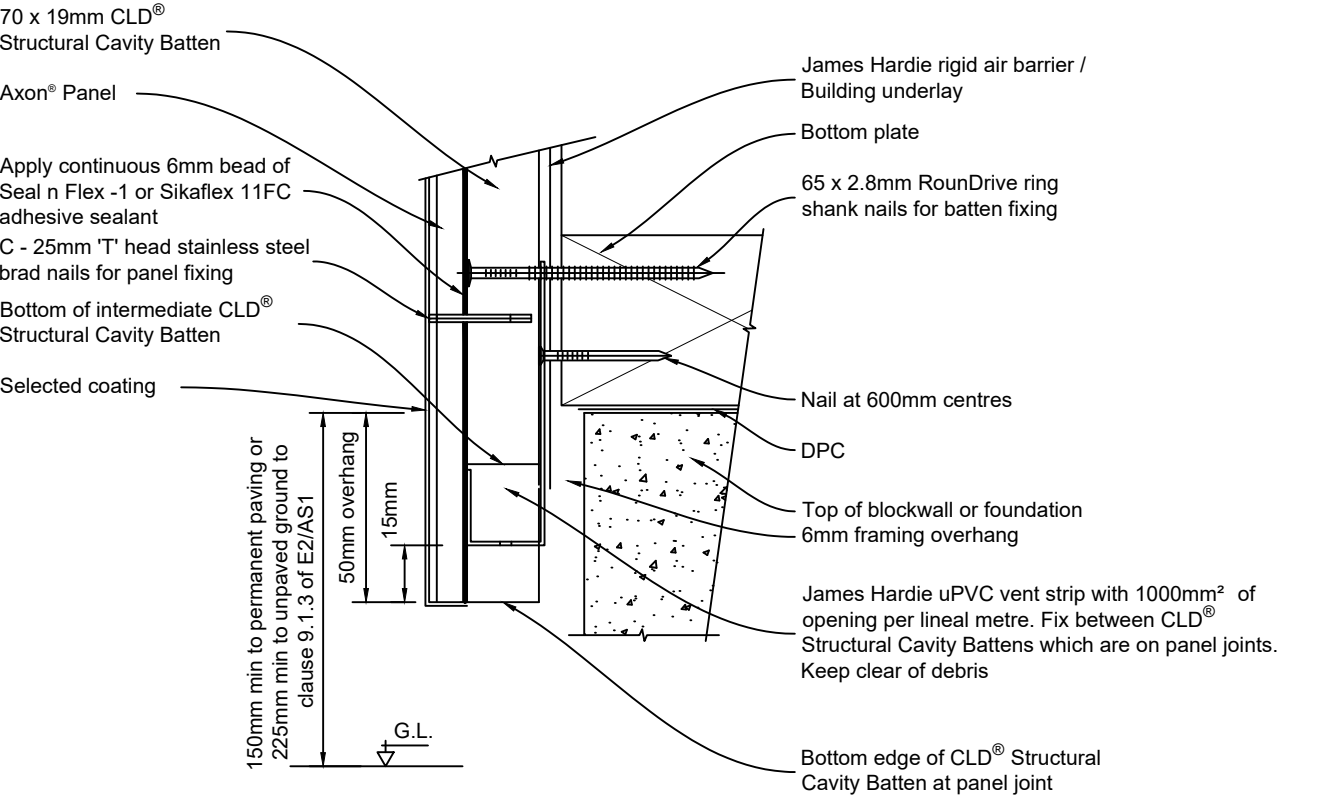


VANITY/KITCHEN BENCH TOP DETAIL
SCALE 1:5



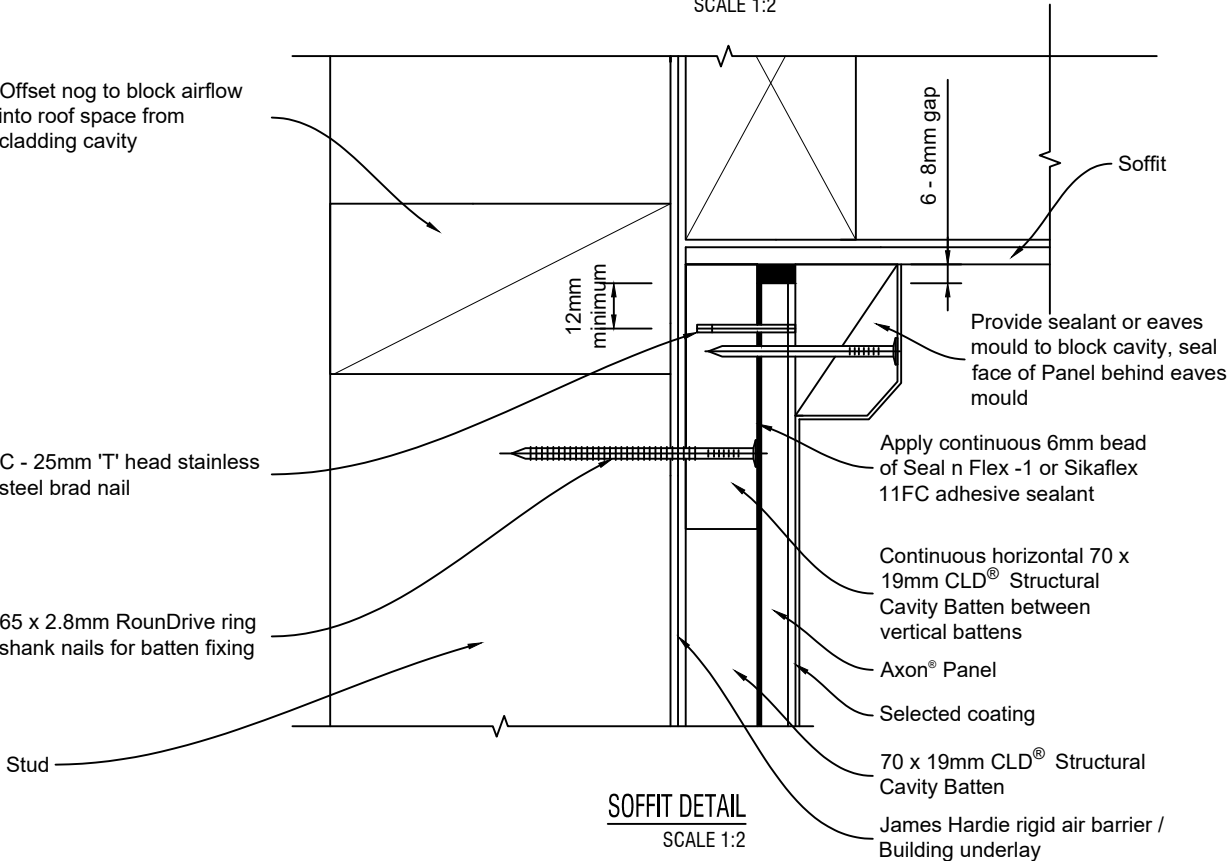
WALL/FLOOR DETAIL (CERAMIC TILES)
SCALE 1:5

	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: NEW RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: WET AREA DETAILS CONSENT COPY REV -	SCALE: 1:5	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work E&OE	DATE: --/--/--	REVISION: --	SHEET 12 OF: 22 JOB No. JT18105
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				DATE: Nov 2018				

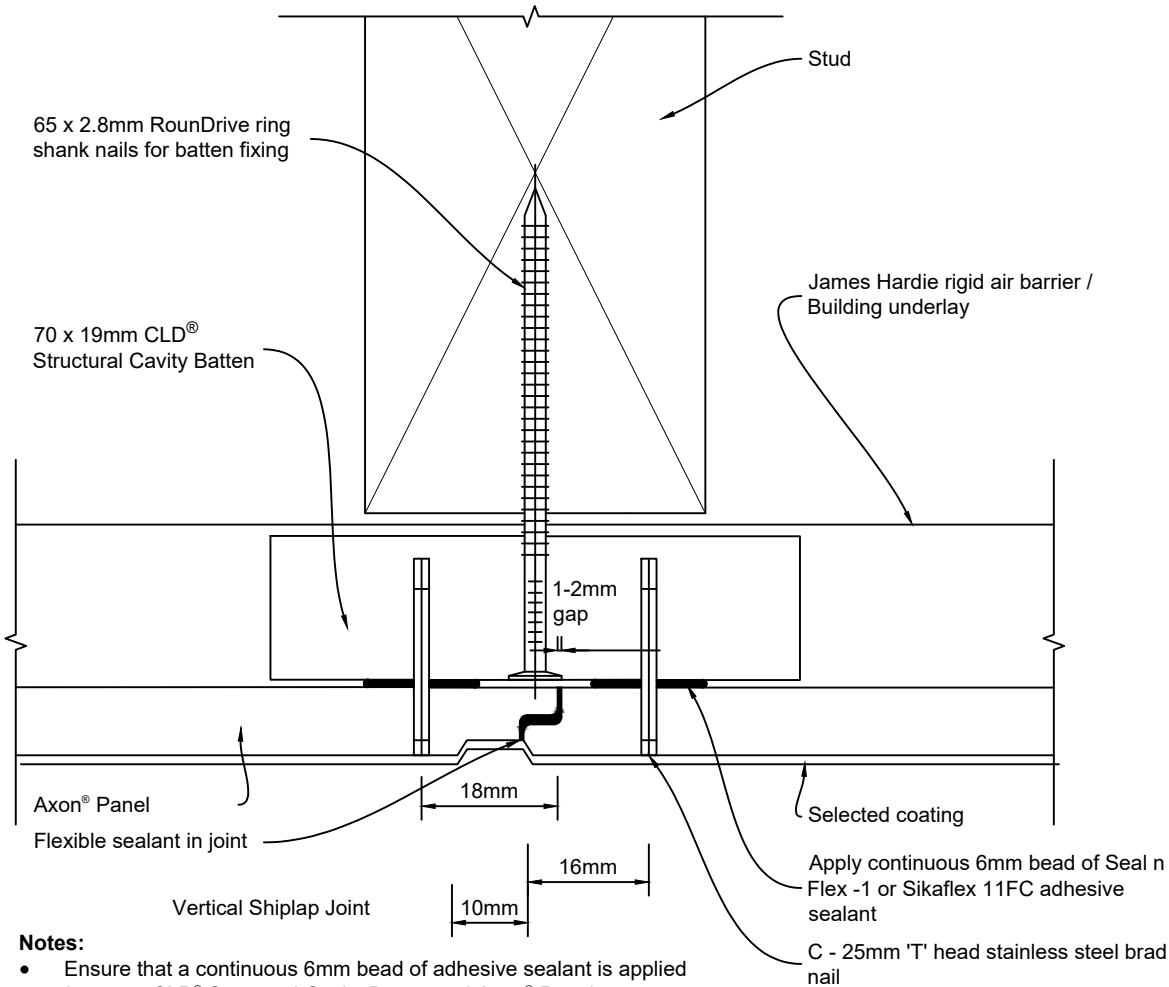


- Notes:**
- Check panel extends past bottom plate as specified in Architects specification (50mm min).
 - uPVC Vent strip must remain level and secure during construction. Cut and fix uPVC vent strip between CLD[®] Structural Cavity Battens fixed under the panel joints.
 - Check vent strip is free from site debris.

FOUNDATION DETAIL
SCALE 1:2



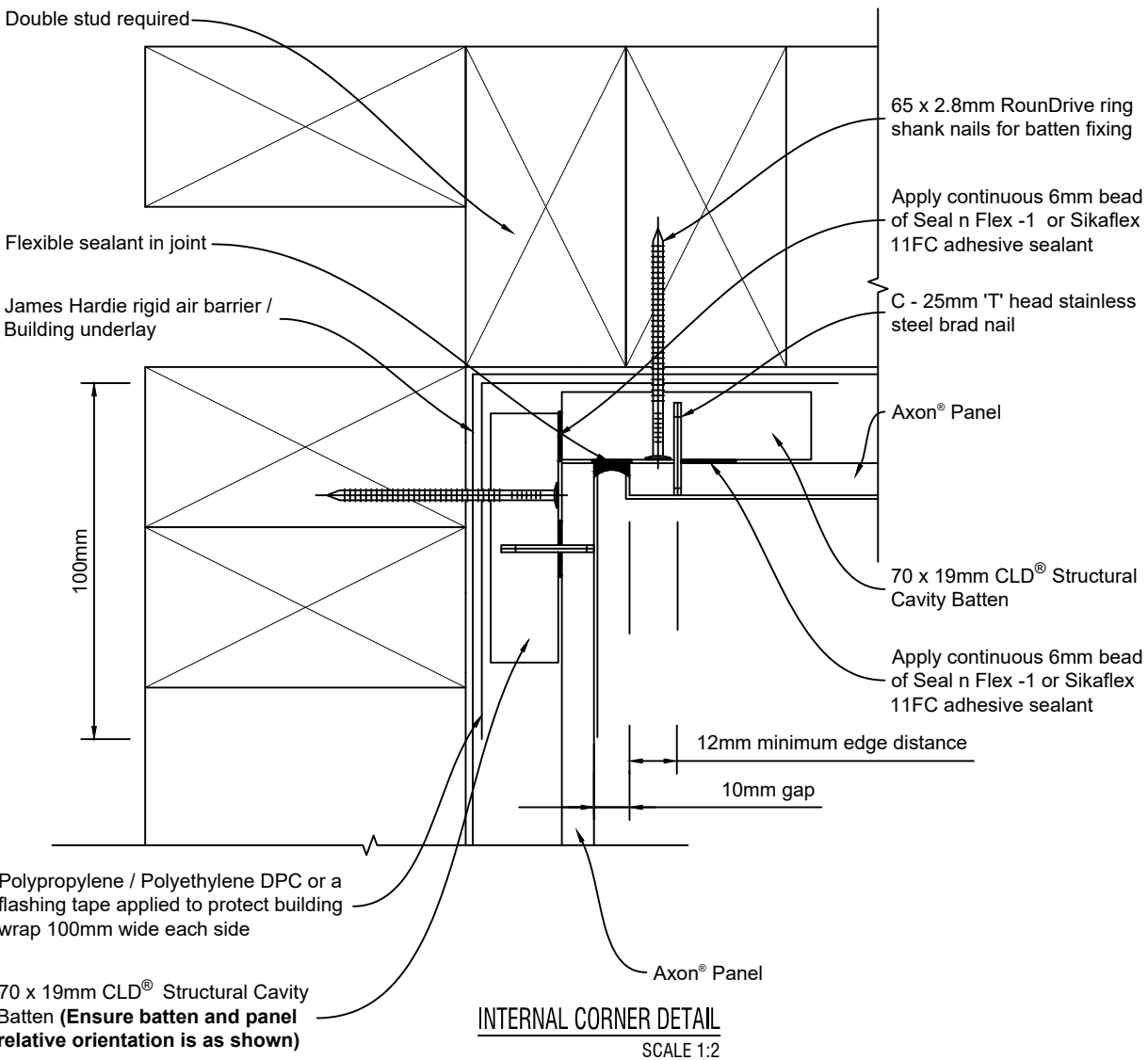
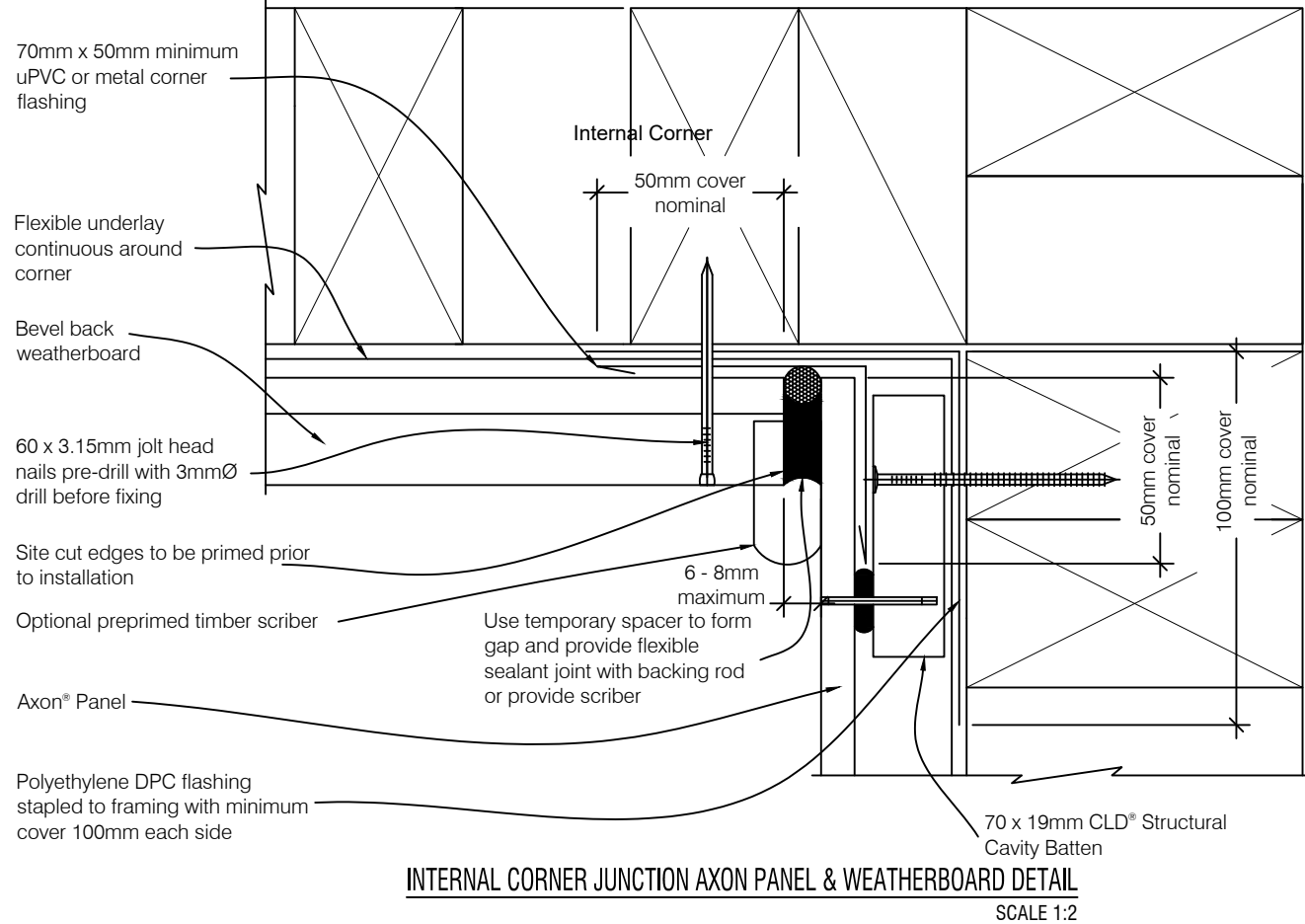
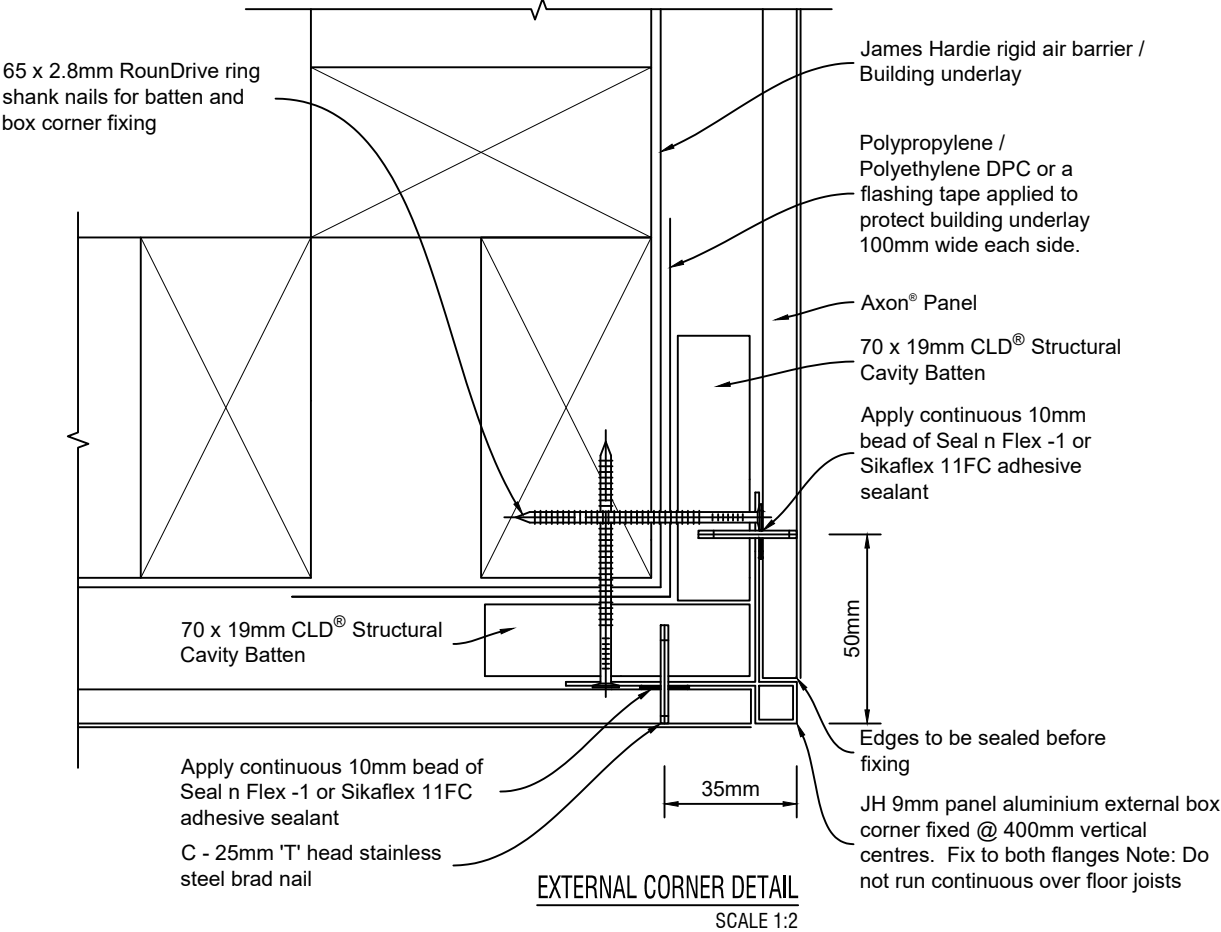
SOFFIT DETAIL
SCALE 1:2

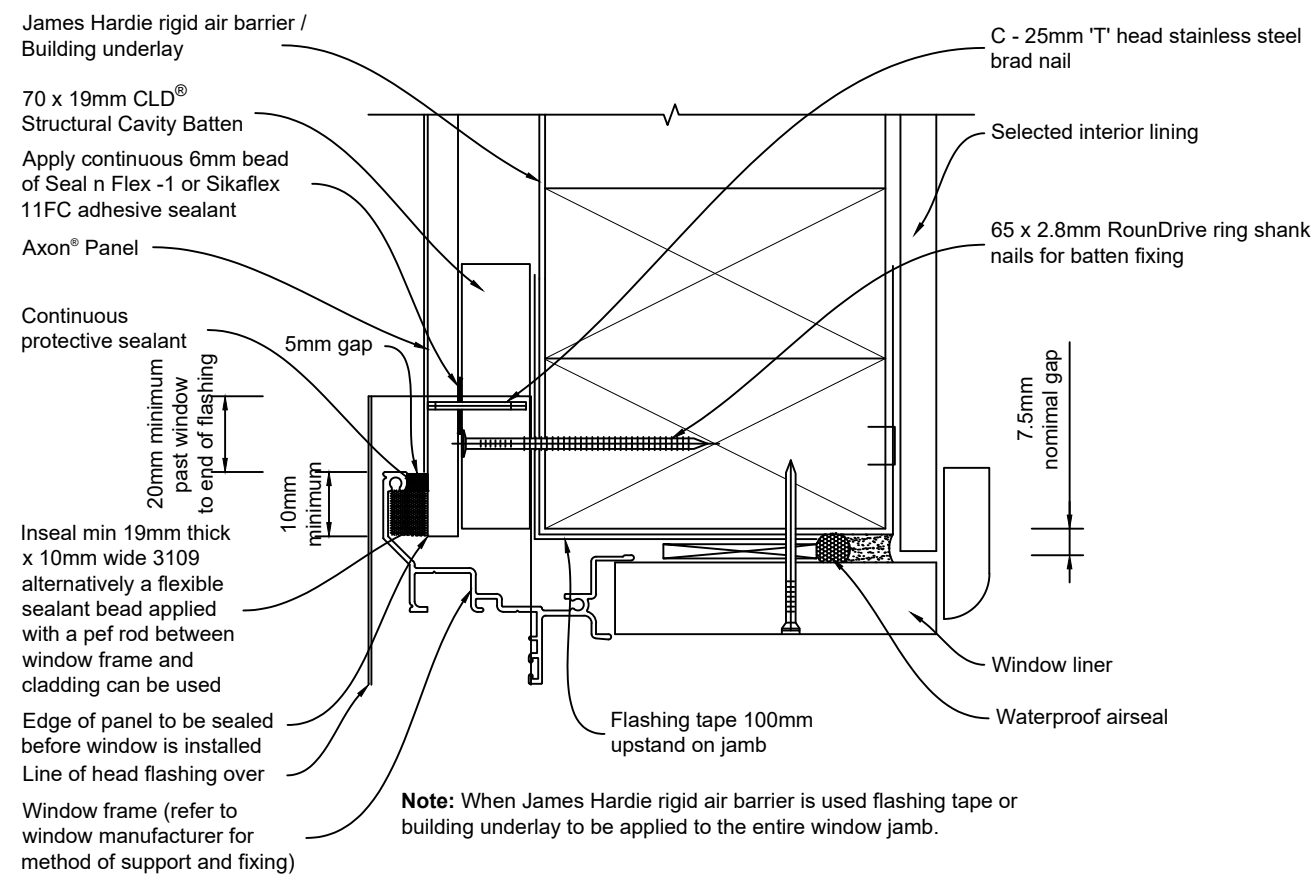


- Notes:**
- Ensure that a continuous 6mm bead of adhesive sealant is applied between CLD[®] Structural Cavity Batten and Axon[®] Panel.
 - Ensure that the required edge distance is maintained when fixing.
 - Seal cut edges with a primer compatible with final coatings.

SHIPLAP JOINT DETAIL
SCALE 1:1

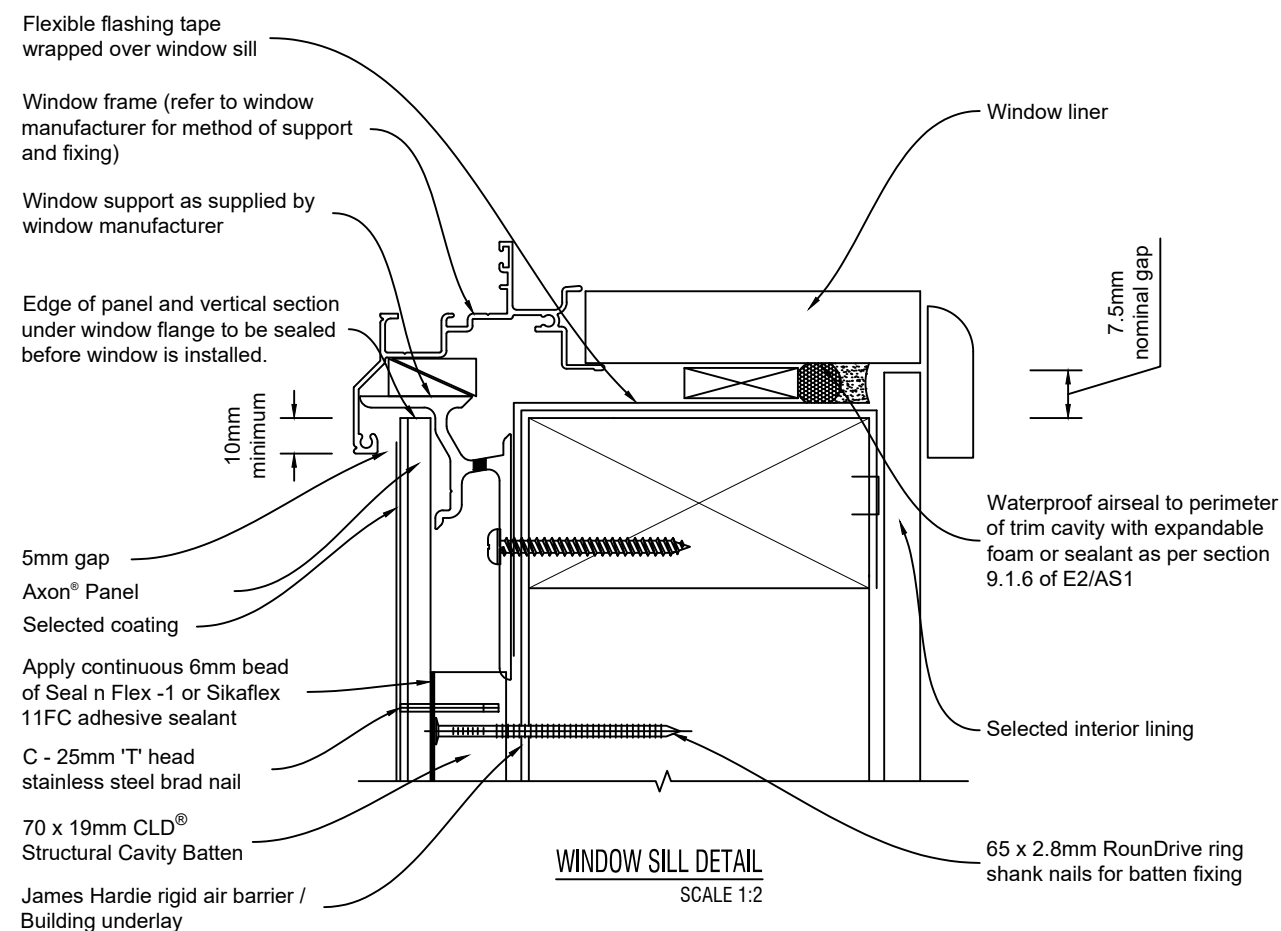
	Penny Homes Ltd	TITLE: NEW RESIDENCE	DRAWING: AXON PANEL CLADDING DETAILS	SCALE:	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE:	REVISION:	SHEET 13	
	PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz			1:2 / 1:1		--/--/--	--		OF:
	© Copyright			DRAWN: SK					22
	www.pennyhomes.co.nz			DATE: Nov 2018					JOB No. JT18105
		18 PENNY GROVE, TAUPO	CONSENT COPY REV -	All dimensions to be checked and verified by the Contractor before commencement of any work E&OE					



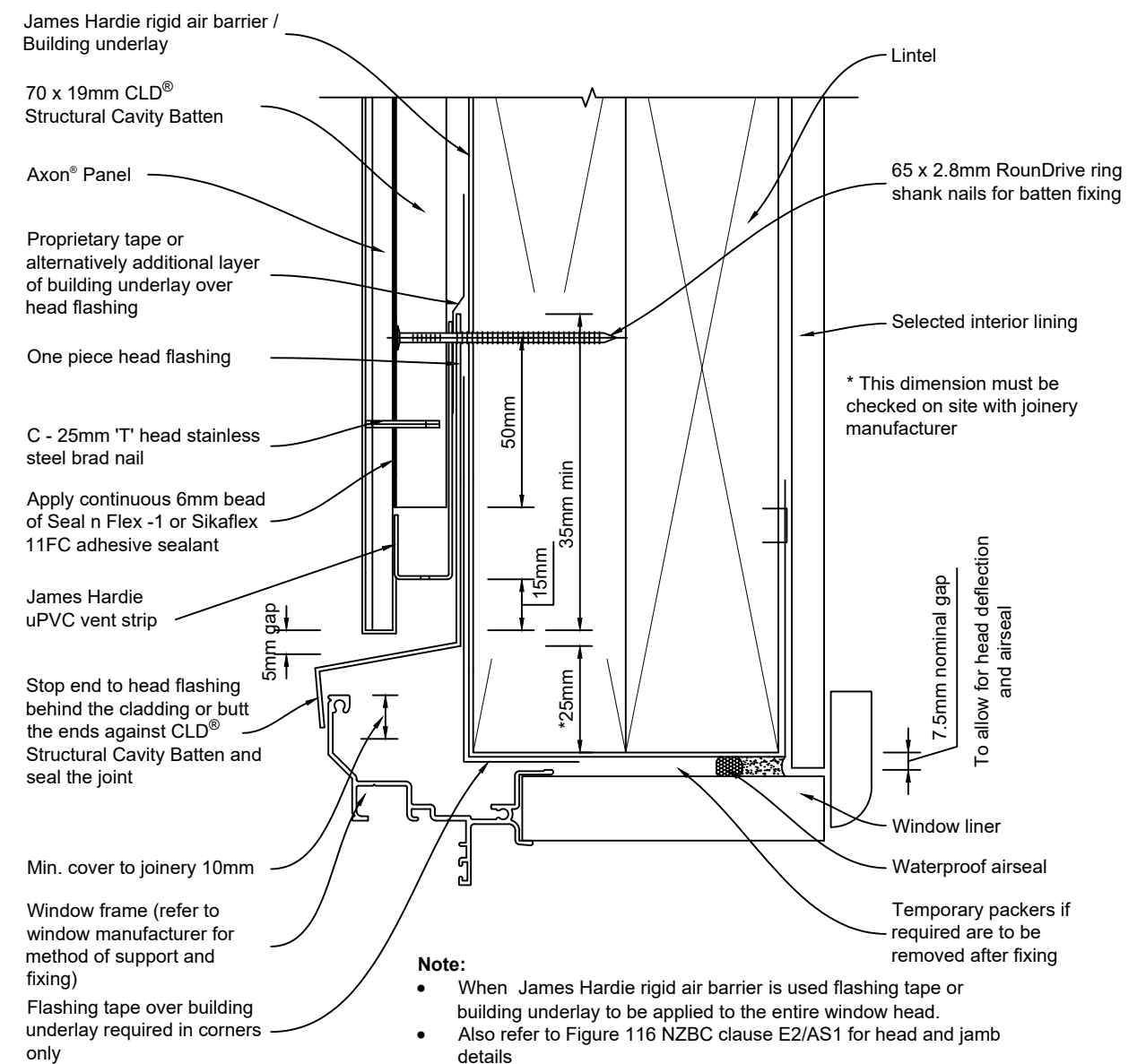


WINDOW JAMB DETAIL

SCALE 1:2

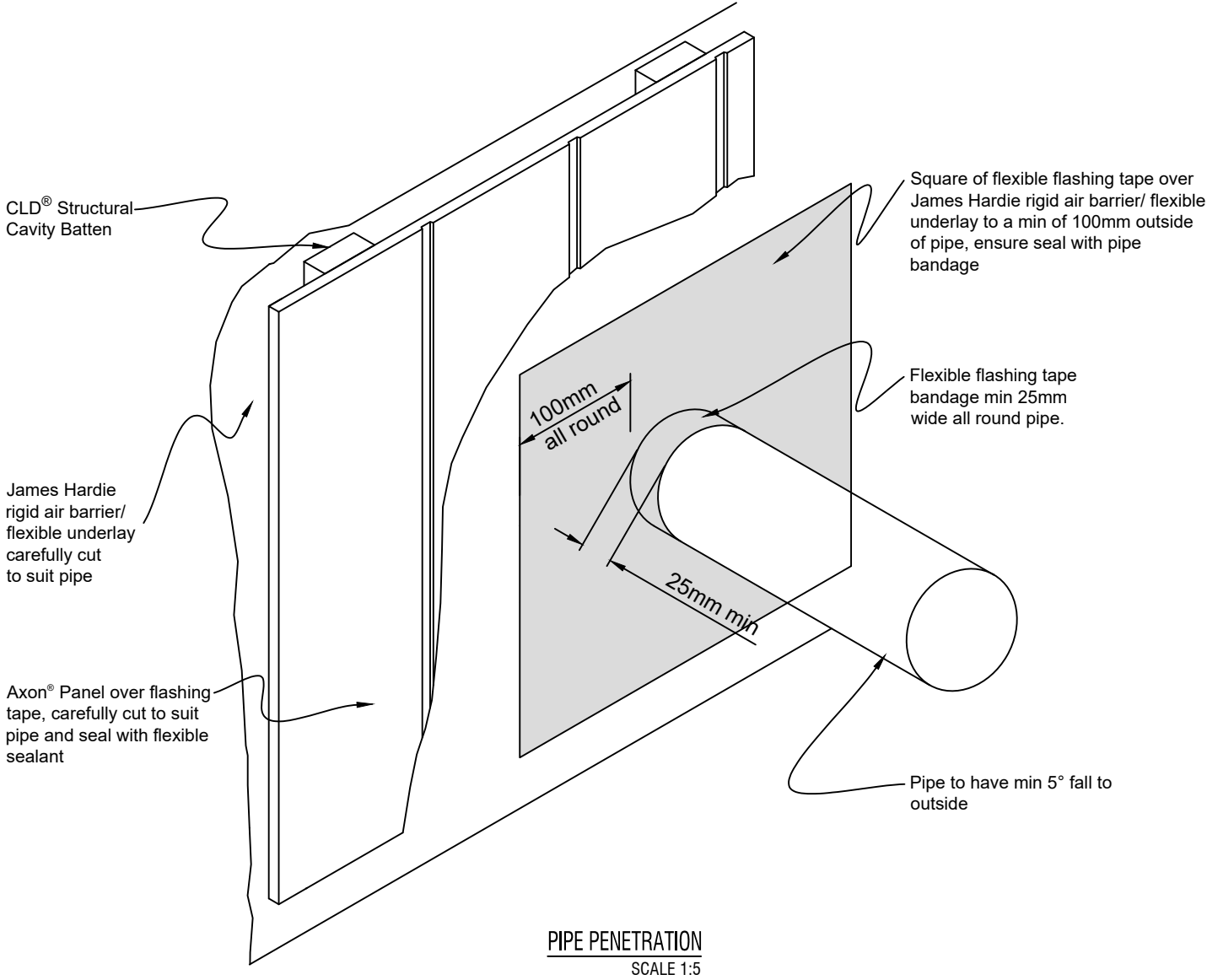


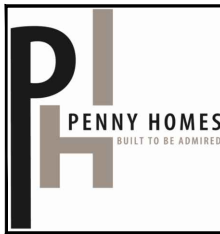
WINDOW SILL DETAIL
SCALE 1:2

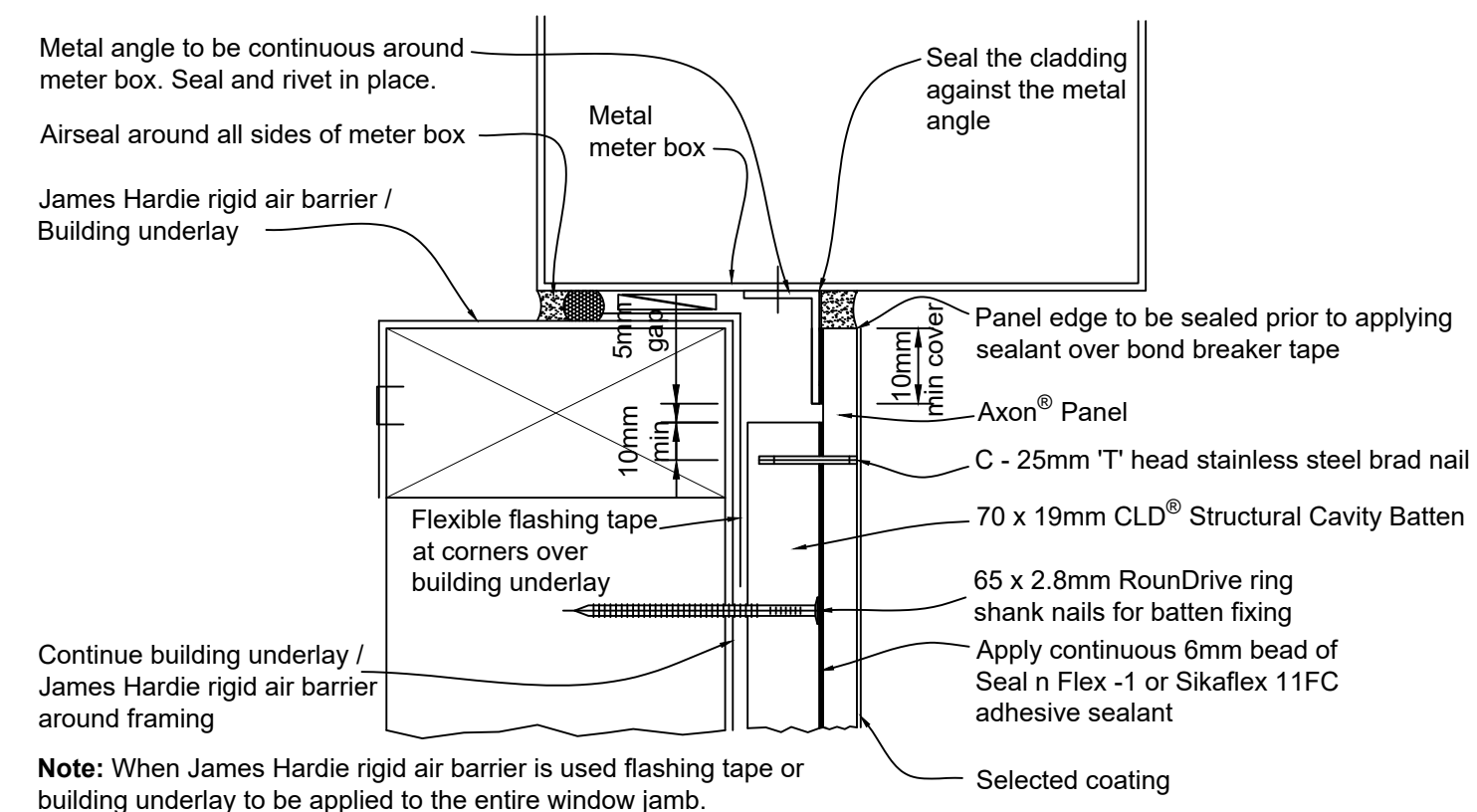


WINDOW HEAD DETAIL
SCALE 1:2

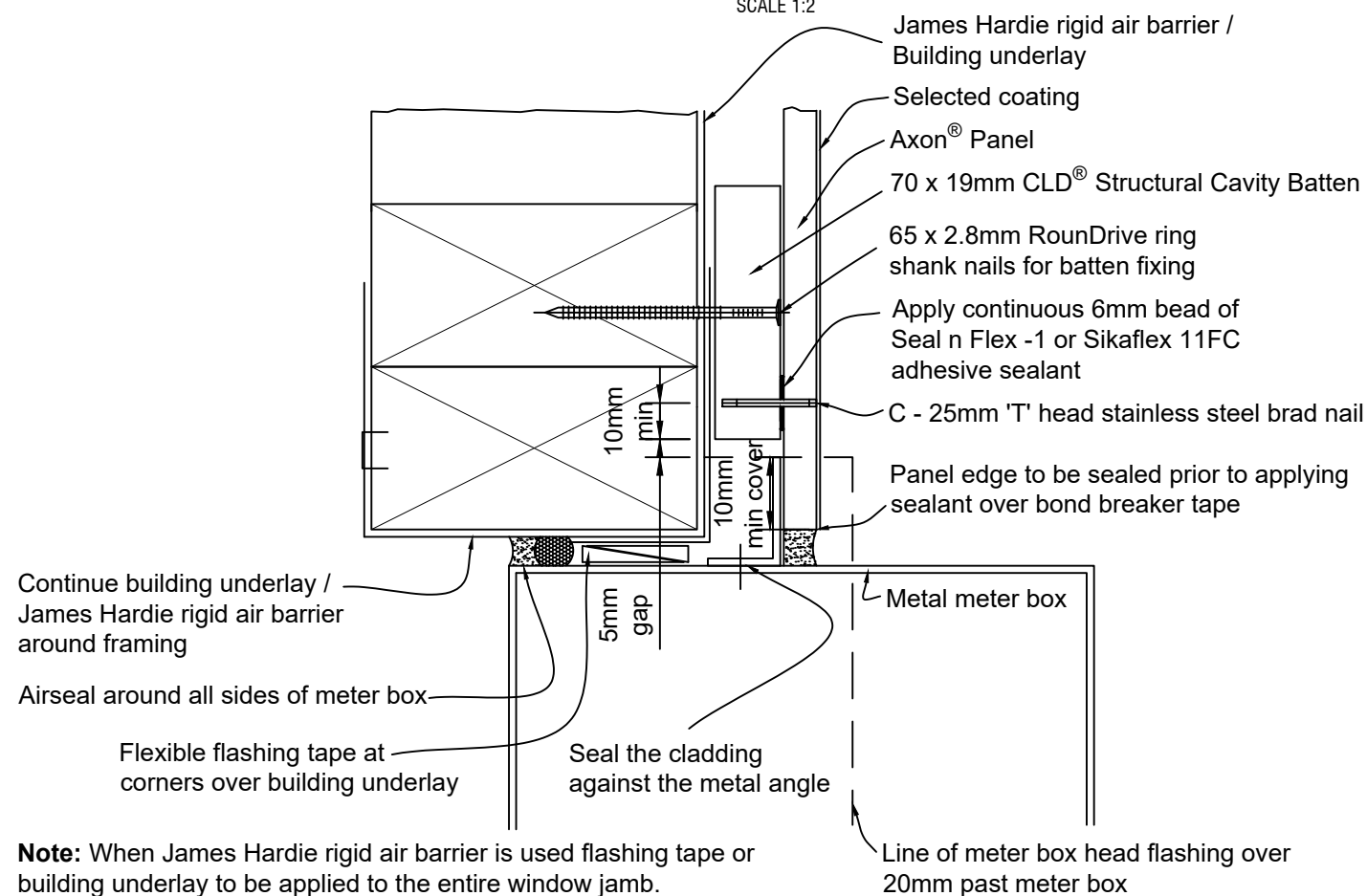
General notes for materials selection



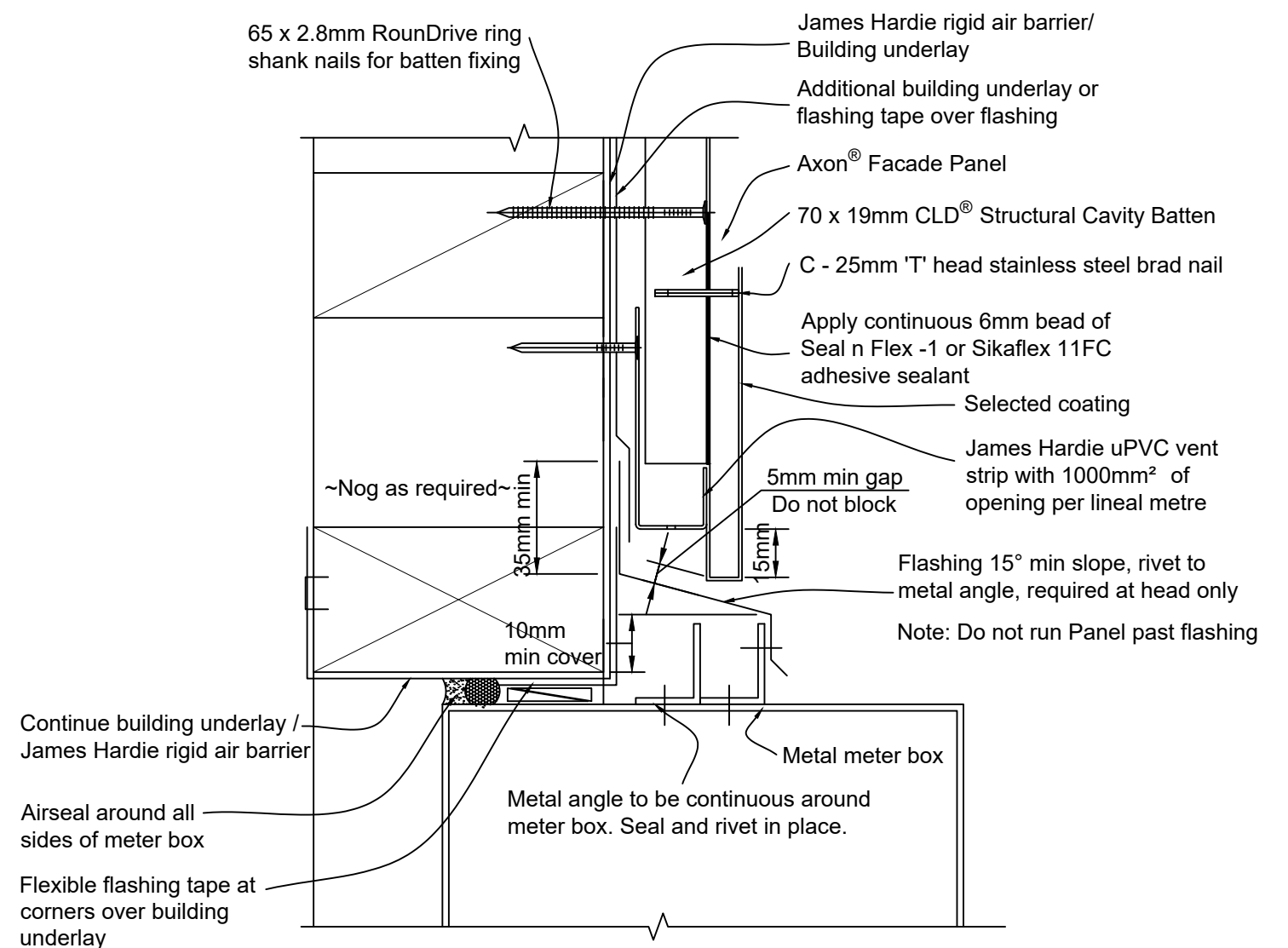
	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE:	NEW RESIDENCE	DRAWING:	AXON PANEL CLADDING DETAILS	SCALE:	1:5	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE:	REVISION:	SHEET 16 OF: 22 JOB No. JT18105
	www.pennyhomes.co.nz	18 PENNY GROVE, TAUPO	CONSENT COPY REV -	DRAWN:	SK	DATE:	Nov 2018		All dimensions to be checked and verified by the Contractor before commencement of any work E&OE		



METER BOX AT SILL
SCALE 1:2

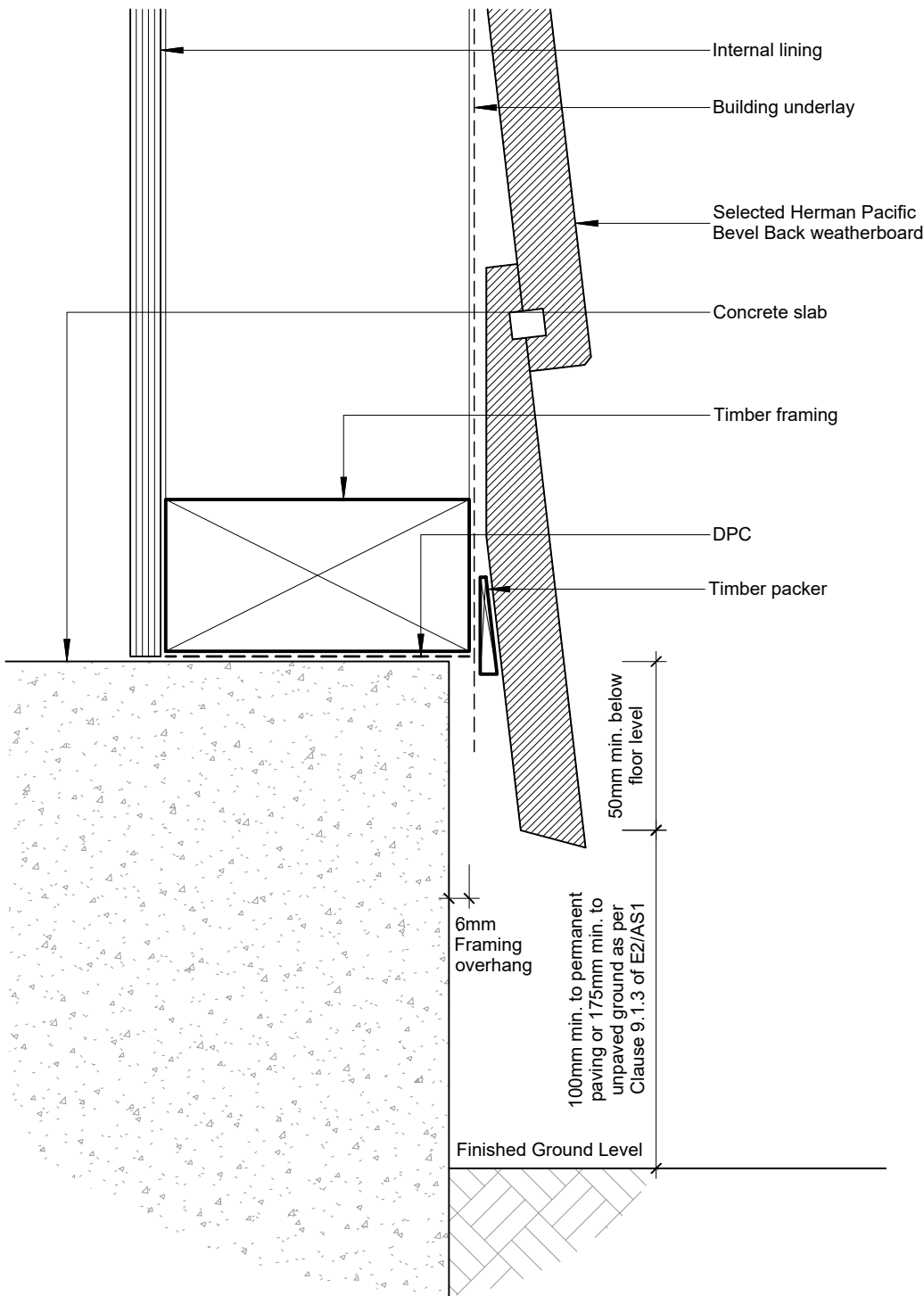


METER BOX AT JAMB
SCALE 1:2

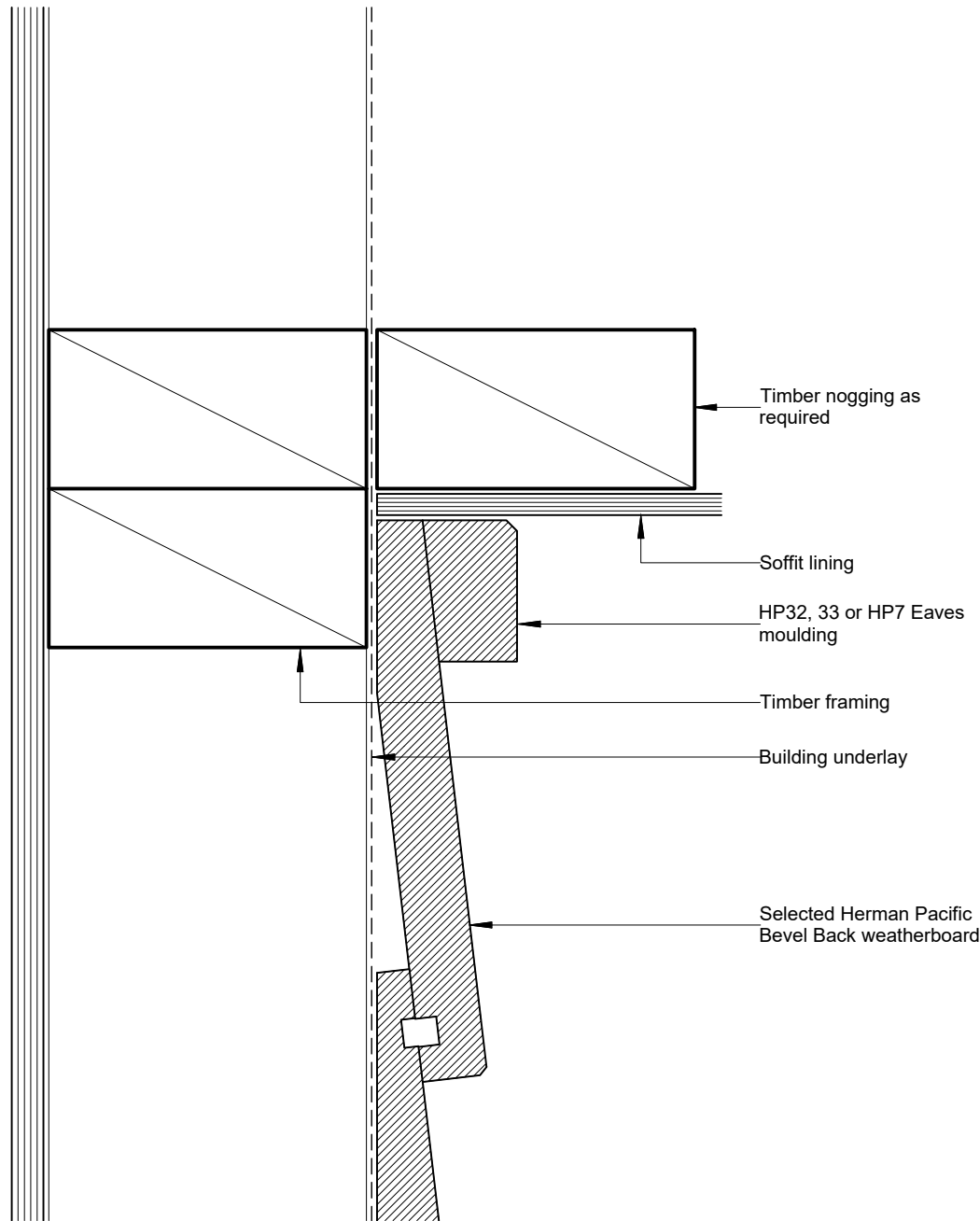


METER BOX AT HEAD
SCALE 1:2

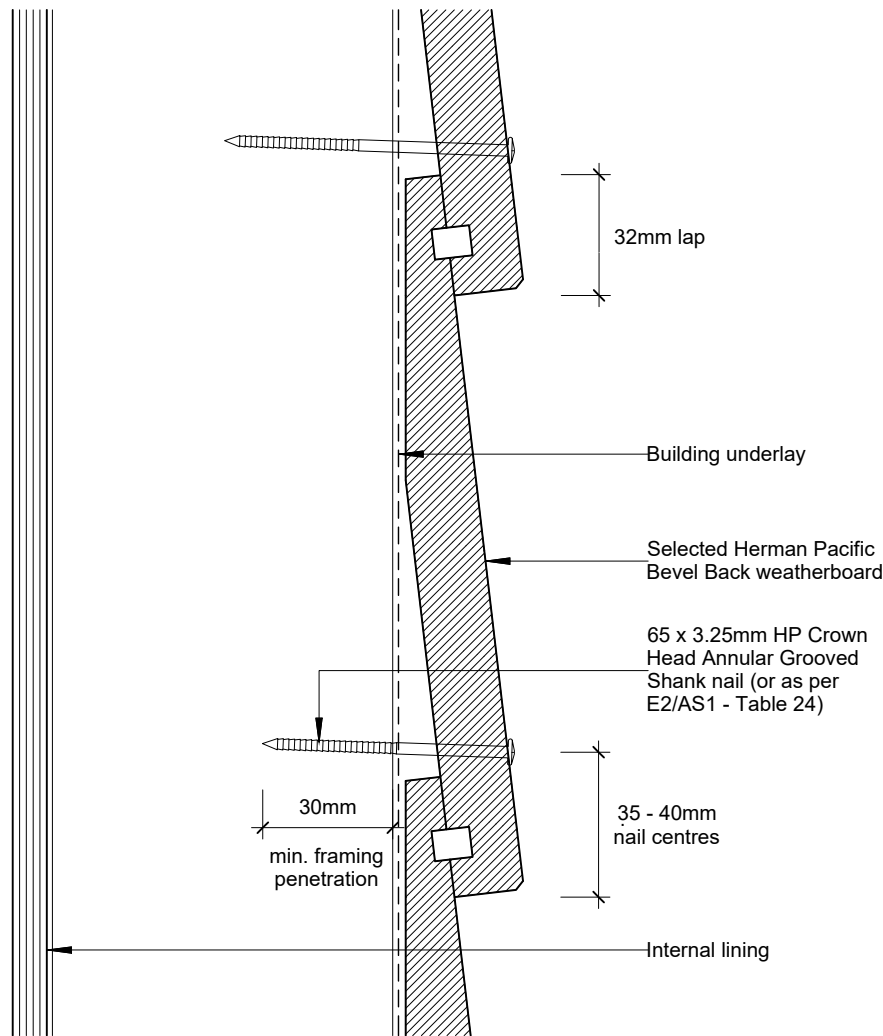
	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright www.pennyhomes.co.nz	TITLE: NEW RESIDENCE 18 PENNY GROVE, TAUPO	DRAWING: AXON PANEL CLADDING DETAILS CONSENT COPY REV -	SCALE: 1:2	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work	DATE: --/--/--	REVISION: 	SHEET 17 OF: 22 JOB No. JT18105
				DRAWN: SK				
				DATE: Nov 2018				
				E&OE				



FOUNDATION DETAIL
SCALE 1:2

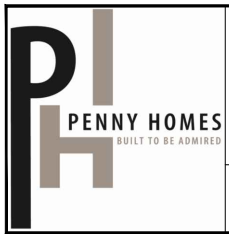


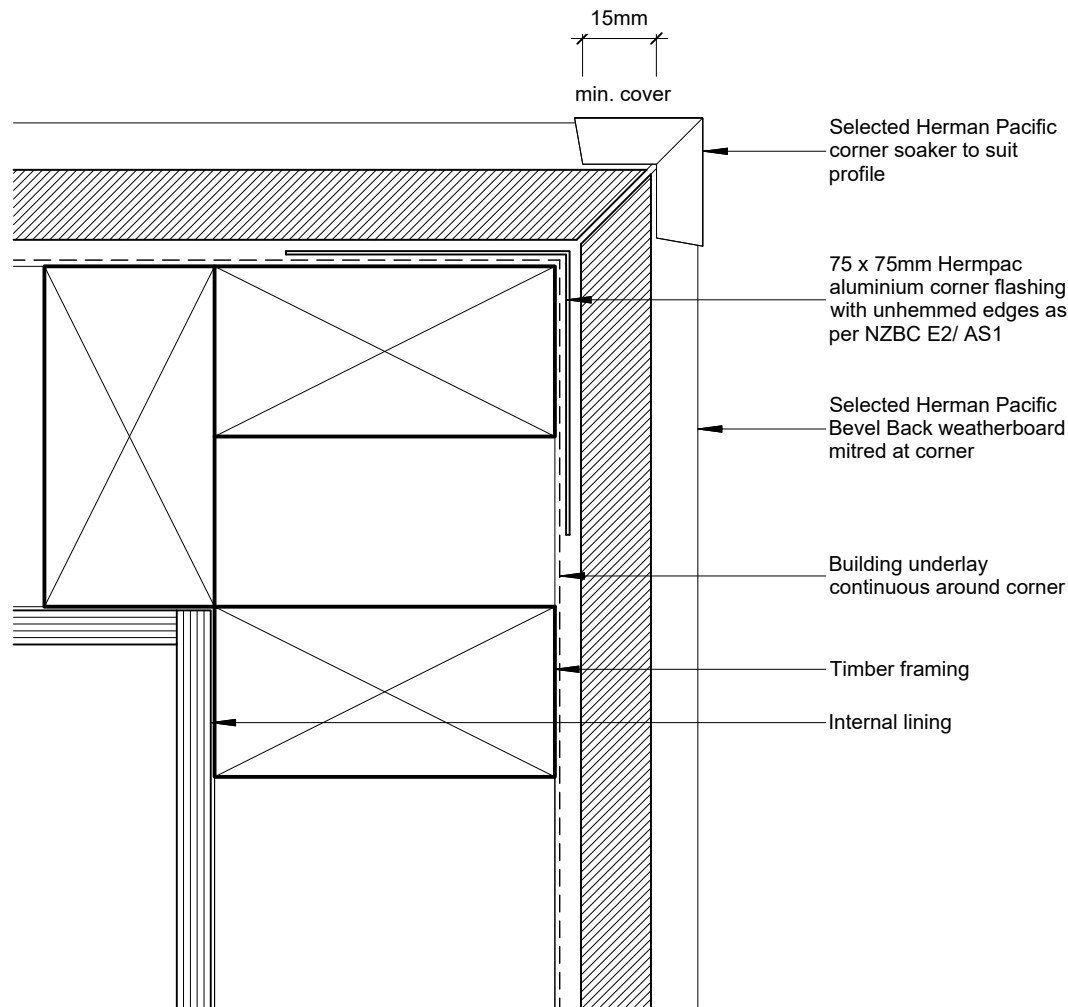
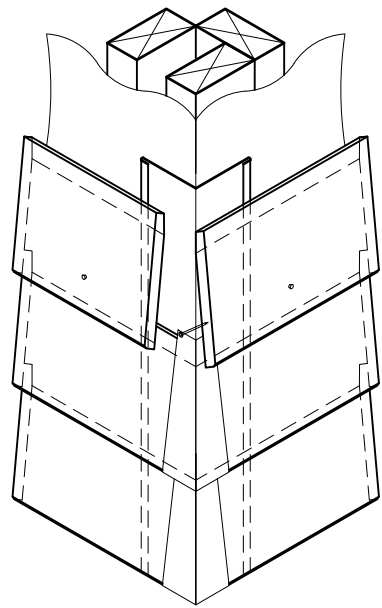
SOFFIT DETAIL
SCALE 1:2



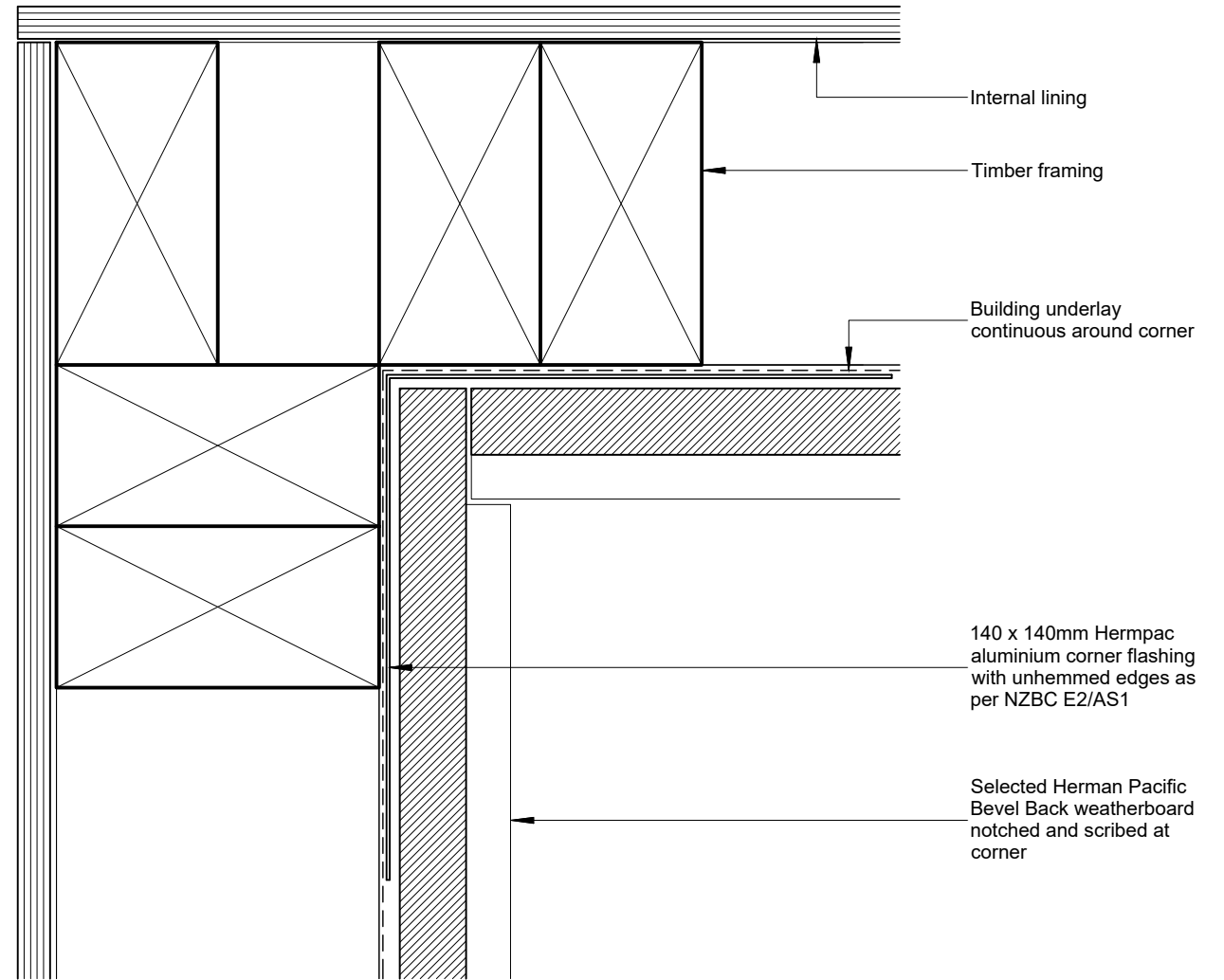
GENERAL FIXING DETAIL - STAIN FINISH
SCALE 1:2

- Notes:**
- All nail fixings pre-drilled minimum 1mm diameter smaller than the nail gauge.
 - All Herman Pacific timber products to be pre-coated & cut ends and edges and all fresh cut surfaces double coated and sealed before fixing.
 - All materials and fixtures are to comply with E2/AS1 Clause 2.2
 - For non-hemmed corner flashings, ensure a minimum 75mm cover to weatherboards beyond the point where BRANZ bulletin 411 compliant weatherboard lap or rebate combinations terminate at the corner junction. In Extra High Wind Zone and above, the 75mm cover requirement remains and hemmed edges must also be used.
 - Refer to NZBC Acceptable Solution E2/AS1 Table 21 for the separation requirements between CCA treated battens and metal flashings.

 PENNY HOMES BUILT TO BE ADMIRER	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE: NEW RESIDENCE	DRAWING: BEVEL BACK CLADDING DETAILS	SCALE: 1:2	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B All dimensions to be checked and verified by the Contractor before commencement of any work E&OE	DATE: --/--/--	REVISION: --	SHEET 18 OF: 22 JOB No. JT18105
	www.pennyhomes.co.nz	18 PENNY GROVE, TAUPO	CONSENT COPY REV -	DRAWN: SK				
				DATE: Nov 2018				

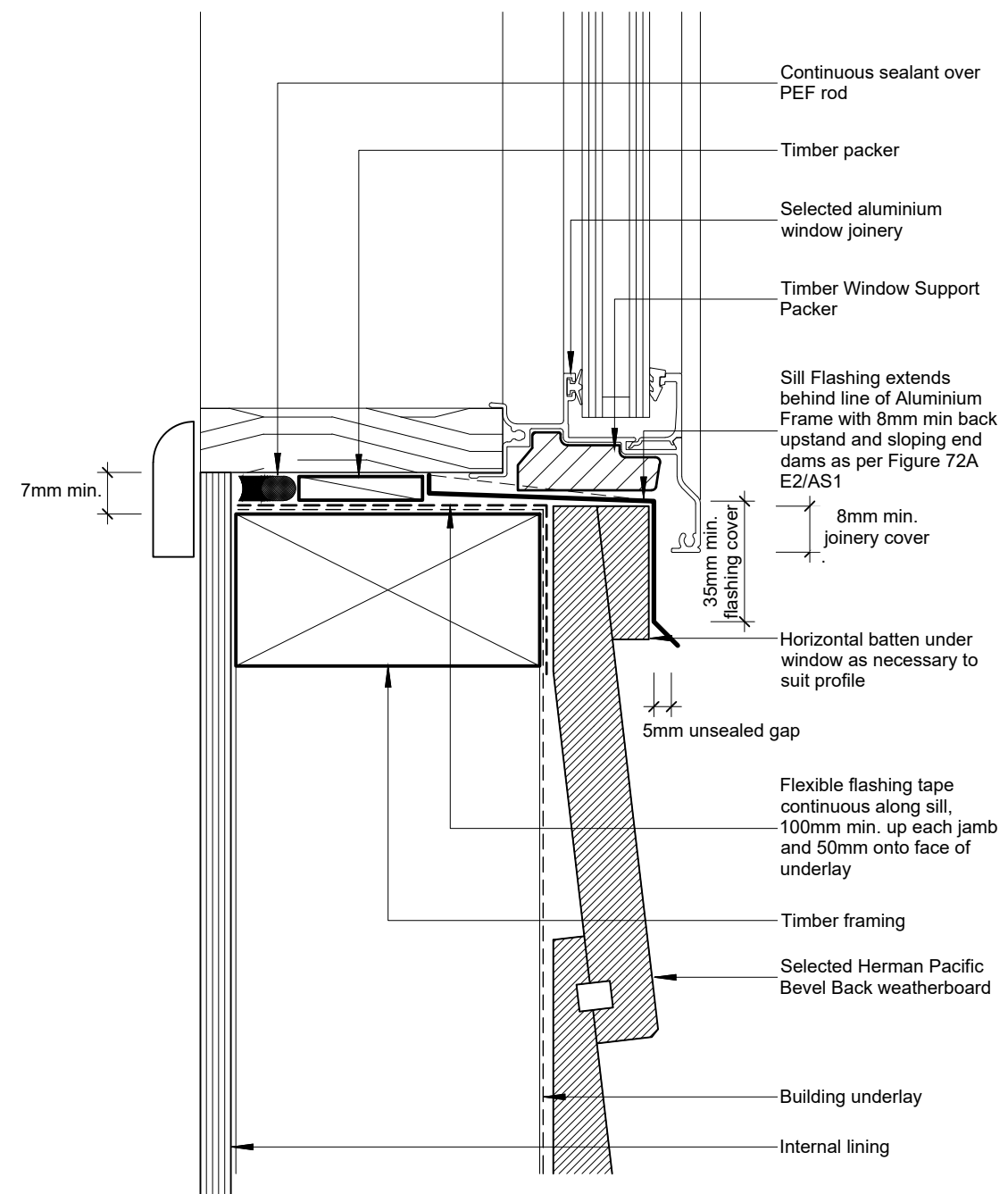


EXTERNAL CORNER DETAIL
SCALE 1:2



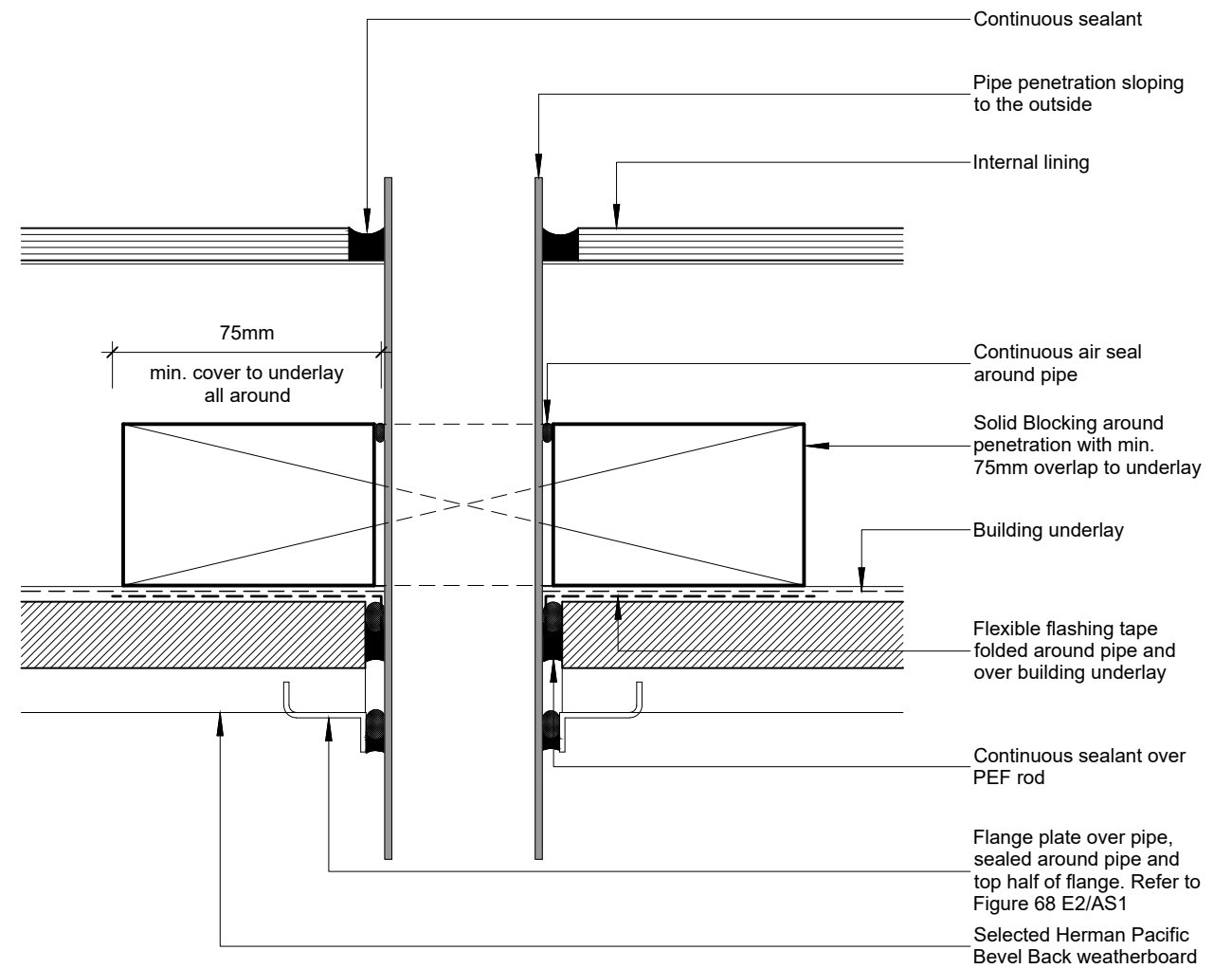
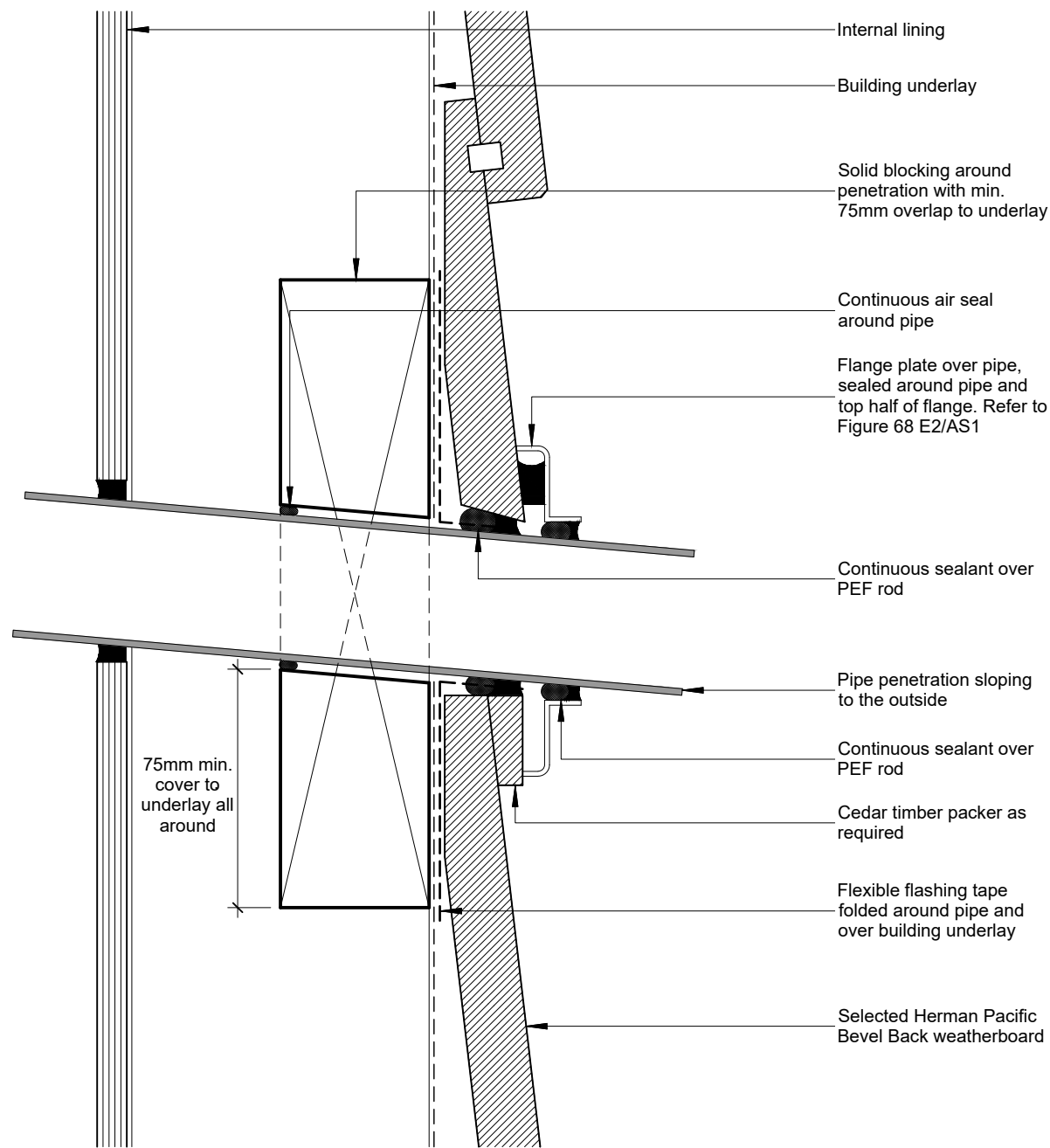
INTERNAL CORNER DETAIL
SCALE 1:2

	Penny Homes Ltd PO Box 708, Taupo ph 07 377 0154 fax 07 377 0155 email: john@pennyhomes.co.nz © Copyright	TITLE: NEW RESIDENCE	DRAWING: BEVEL BACK CLADDING DETAILS	SCALE: 1:2	NOTES: Wind Zone = High Eq Zone = 2 Exposure Zone = B	DATE: --/--/--	REVISION:	SHEET 19 OF: 22 JOB No. JT18105
	www.pennyhomes.co.nz	18 PENNY GROVE, TAUPO	CONSENT COPY REV -	DRAWN: SK		All dimensions to be checked and verified by the Contractor before commencement of any work E&OE		
				DATE: Nov 2018				



WINDOW SILL DETAIL
SCALE 1:2





PIPE PENETRATION
SCALE 1:2

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				DRAWN: SK				
				DATE: Nov 2018				
				E&OE				

Memorandum from LBP-Design BC181080 - A2359782

Memorandum from licensed building practitioner: Certificate of design work

Section 30C or Section 45, Building Act 2004

Please fill in the form as fully and correctly as possible.

If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING	
Street address: 18 Penny Grove	
Suburb: Nukuhau	
Town/City: Taupo	Postcode: 3330

THE OWNER	
Name(s):	
Mailing address: c/o Penny Homes Ltd	
Suburb:	PO Box/Private Bag: PO Box 708
Town/City: Taupo	Postcode: 3330
Phone number: 07 377 0154	Email address: willie@pennyhomes.co.nz

BASIS FOR PROVIDING THIS MEMORANDUM	
I am providing this memorandum in my role as the: Please tick the option that applies (✓)	
()	Sole designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project.
()	Lead designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and no other person will be providing any additional memoranda for the project.
(✓)	Lead designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design.
()	Specialist designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work.

IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK (RBW)			
I William James Thomson carried out / supervised the following design work that is restricted building work.			
Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
Tick (✓) if included	If appropriate, provide details of the restricted building work	Specify whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
PRIMARY STRUCTURE: B1			
All RBW design work relating to B1 ()		() Carried out () Supervised	
Foundations and subfloor framing (✓)	Concrete slab on ground to Firth Ribraft Floor System	() Carried out (✓) Supervised	Sheets 2 & 5
Walls (✓)	SG8 framing & fixings to NZS3604:2011 Lintels to DesignIT PS1	() Carried out (✓) Supervised	Sheets 3, 5 & 6
Roof (✓)	Truss layout	() Carried out (✓) Supervised	Truss manufacturers PS1
Columns and beams ()		() Carried out () Supervised	
Bracing (✓)	Gib Plasterboard sheet bracing to Gib Ezybrace	() Carried out (✓) Supervised	Sheet 7
Other ()		() Carried out () Supervised	
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2			
All RBW design work relating to E2 ()		() Carried out () Supervised	
Damp proofing (✓)	DPM under slab and DPC under framing	() Carried out (✓) Supervised	Sheets 5 & 9
Roof cladding or roof cladding system (✓)	Longrun metal roofing on self-supporting underlay	() Carried out (✓) Supervised	Sheets 5, 9 & 10
Ventilation system (for example, subfloor or cavity) (✓)	20mm drained cavity to Axon Panel cladding	() Carried out (✓) Supervised	Sheets 9 & 13 - 17
Wall cladding or wall cladding system (✓)	Axon Panel cladding on cavity Bevel back weatherboard direct fixed	() Carried out (✓) Supervised	Sheets 9 & 13 - 17 Sheets 9 & 18 - 22
Waterproofing ()		() Carried out () Supervised	
Other ()		() Carried out () Supervised	

FIRE SAFETY SYSTEMS: C1-C6			
Emergency warning systems, evacuation and fire service operation systems, suppression or control systems, or other	()	() Carried out () Supervised	
Note: The design of fire safety systems is only restricted building work when it involves small-to-medium apartment buildings as defined by the Building (Definition of Restricted Building Work) Order 2011.			

WAIVERS AND MODIFICATIONS	
Are waivers or modifications of the building code required? () Yes (✓) No	
If Yes, provide details of the waivers or modifications below:	
Clause (List relevant clause numbers of building code)	Waiver/modification required (Specify nature of waiver or modification of building code)

ISSUED BY	
Name: William James Thomson	LBP or Registration number: BP115814
The practitioner is a:	
(✓) Design LBP () Registered architect () Chartered professional engineer	
Design Entity or Company (optional): JTDesign Architecture Ltd.	
Mailing address (if different from below):	
Street address / Registered office: Level 1, 32 Tuwharetoa Street	
Suburb:	Town/City: Taupo
PO Box/Private Bag: P.O. Box 1267	Postcode: 3330
Phone number: 07 377 1998	Mobile: 0274 820 881
After Hours:	Fax:
Email address: james@jtdesign.co.nz	Website: www.jtdesign.co.nz

DECLARATION
I William James Thomson (<i>name of practitioner</i>), LBP, state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW: - Complies with the building code; or - Complies with the building code subject to any waiver or modification of the building code recorded on this form. Signature:  Date: 4/11/2018



JTDesign Architecture Ltd

P R O J E C T S P E C I F I C A T I O N

New Residence

18 Penny Grove

Nukuhau

Taupo

Issued for Construction

JT18105

PROJECT OVERVIEW

Scope

New single storey residential dwelling with three bedrooms and attached double garage.

Address

Site Address	18 Penny Grove
Suburb	Nukuhau
City	Taupo
Lot #	226
DP #	522262

Site Conditions

Wind Zone	H - High Wind Speed
Earthquake Zone	Zone 2
Exposure Zone	Zone B - Low
Snow Loading Zone	Zone N0

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1 PRELIMINARIES & GENERAL

1.1 Project Overview

1.1.1 Contract Documents

Contract Documents

The Contract Documents are complementary and comprise this Specification, the accompanying drawings, the NZ Standards Contract together with Schedules as specified below, any written documentation clarifications issued during tendering/estimating, any manufacturer/supplier information issued with this Specification, any list of agreed Subcontractors, the contract establishment letter and any other relevant correspondence, and any Site Instructions or additional details or instructions issued as Variations. (The NZ Standards Contract will be emailed upon request). These Project Specific Conditions supersede the Standard Conditions where they are in conflict. Refer any ambiguity or apparent discrepancy within or between any Contract Documents to the Architect/Designer, whose interpretation shall be binding on all parties.

Ensure that all Trades are aware of all Conditions and that subcontract prices are accepted on this basis, and in a form acceptable to the Registered Master Builders Federation or the Certified Builders Association. Ensure that all persons engaged on the works are aware of all items in this specification and on the drawings that may in any way affect their section of the works.

1.1.2 Site

Site

Relevant site conditions are believed to be correctly represented in the Contract Documents, however the Contractor (and Subcontractors where appropriate) are requested to inspect the site to ascertain for themselves the nature and extent of the works and the rights and interests that may be interfered with in the execution of the works, as no claims for additional payment will be recognised on the grounds of insufficient description.

1.1.3 Adjacent Owners

Adjacent Owners

Carry out whatever actions or precautions are required to avoid or to absolutely minimise noise, dirt, dust, access, etc. inconvenience or disruption of any nature to the adjacent owners or tenants. Indemnify the Principal against any claims arising from this source.

1.1.4 Protection

Protection

Take all appropriate precautions to protect all third party property, services, etc., and indemnify the Principal against any claims arising from the construction operations. Any damage to third party property caused by construction activities or failure to protect shall be rectified as soon as possible by the person causing the damage, or by appropriately qualified trades-persons employed by the person responsible for the damage if necessary.

Suspend operations during weather which would affect the quality of work in progress. Secure the

works as soon as possible against adverse weather, dust and vandals. Avoid structural damage that is caused by overloading.

Adequately protect all finished work and maintain until the date of Practical Completion. Each trade shall protect the work of all other trades, and each trade is responsible for making good any damage they cause to finished works. Arrange special protection as required for windows and doors, finished timber work, plumbing fittings and hardware, cabinets and other joinery, and similar items.

1.1.5 Responsibility

Responsibility

The Contractor will be held responsible for the full period of his legal responsibility in connection with this Contract for ensuring that all work execution, materials, and fittings, are completely in accordance with Contract requirements.

The Contractor is responsible to the Principal for the appropriateness and fitness, in relation to a reasonable expectation or requirement, of all of the materials and workmanship incorporated into the works by himself or his subcontractors; for this reason few specific guarantees are required in these contract documents. The terms and conditions of any warranty or guarantee required or provided shall not in any way negate the minimum remedies available under common law as if no warranty or guarantee had been furnished.

No apparent expression of the Architect's/Designer's reasonable satisfaction shall be deemed to be acceptance of defective materials or workmanship within the terms of the Contract or to be an authority for any Variation except where such Variation is authorised as provided for in the Contract. Instructions that are given verbally are deemed to be instructions for proper execution of the works and do not involve extra charges.

Workmanship in all trades is required to be equal to or better than recognised good trade practice. The Contractor shall provide all necessary setting out information and component dimensions for subcontractors and shall check and be responsible for the accuracy of their work.

Should any tradesperson consider that the surface finish or general conditions of previous work are unsatisfactory to ensure a proper finish for their own work thereon, that tradesperson shall give immediate notice to the Contractor or Architect/Designer as appropriate and shall not proceed until all necessary improvements have been made. Failing such notice the trade concerned will not be relieved of responsibility for a poor finish due to such unsatisfactory condition.

Specialist Finishes Subcontractors are responsible for ensuring that substrates are completely appropriate for them to achieve first class results, and to this end shall, in sufficient time, instruct the Contractor with regard any fixings, primings, sealings or whatever for the substrate that vary in any way from the substrate manufacturer's standard recommendations. The Contractor shall advise the Architect/Designer with regard these variances, and not proceed until the Architect/Designer has agreed to them.

The Contractor and all Subcontractors affected shall be jointly and severally responsible for completion of the whole of the works in a completely watertight condition and shall therefore examine all details to be satisfied that this condition can be achieved. If any detail is considered unsatisfactory the Architect/Designer shall be notified immediately and he/she will then either

interpret the detail to the Contractor's satisfaction, or accept responsibility for watertightness at the points in question, always assuming reasonable workmanship.

Ensure that all materials or items incorporated into any particular construction or finish are compatible and that their individual use is approved by the manufacturers and/or suppliers of the other parts of the system.

For all electronic/electrical/mechanical operating systems all work and all necessary materials and items incidental to the primary item specified, that are incorporated into the works, shall be such as to leave a neat, efficient, easily maintained and robust installation, completely in accordance with all of the recommendations of the primary items' manufacturers. Where appropriate, source all parts of a system from a single supplier or manufacturer.

1.1.6 Specification

Specification

This Specification covers contract administration, standards, materials quality, workmanship and the scope of works only: the exact nature of the works and all specialist items, descriptions, etc., are contained on the drawings, which also take full precedence.

All clauses in all specification sections apply to their full extent and meaning to the entire Contract. Trade sections and paragraphs have been introduced into this specification for reference only and it shall not be construed that each trade section is a complete segregation of the materials and labour of that trade. The onus is on all trades to be conversant with any and all clauses which in any way affect their work.

(Be aware that the 'scope' noted in the 'Project Overview', and scope and general extent clauses within this specification, are included to provide a general indication only and must NOT be interpreted as schedules of quantities - the exact nature and extent of all aspects of the works are shown on the drawings).

1.1.7 Standards

Standards

New Zealand Standards (NZS), Australian Standards (AS), Joint Standards (AS/NZS), British Standards (BS), Acts of Parliament, Regulations made thereunder, Codes of Practice, and any specific Manufacturer's Instructions or Manufacturer's Recommendations that are referred to in these Contract Documents shall all be deemed to be the latest published edition thereof at the time of drawings issue, and shall be followed by the Contractor and all Subcontractors to the full extent applicable consistent with the intent of this Contract. Documents cited within other cited publications are deemed to form part of this specification.

Where Standards have a number of Divisions, e.g. AS/NZS 3500.1, AS/NZS 3500.2, etc., each of the Divisions relevant to this project is deemed to form part of this specification.

Retain current copies of significant cited documents and manufacturer's technical literature on the site.

1.1.8 Authorities and Charges

Authorities and Charges

Comply with all relevant provisions of the NZ Building Code, and with all relevant territorial or statutory authority regulations, by-laws, obligations, etc. Give all required notices.

The Principal has obtained a Land Use Consent. The Principal has applied for and paid for the Project Information Memoranda, the Building Consent and other approvals required for the works to start. The PIM and Building Consent will be forwarded to the Contractor as quickly as possible after they are issued by the Territorial Authority. Note: It is an offence under the Building Act to carry out work not in accordance with a Building Consent.

Should the Building Consent be subject to any conditions which modify the requirements of the Contract Documents in any way, the Architect/Designer reserves the right to negotiate any or all of these modifying conditions with the Building Consent Authority. If after these negotiations additional work is required, it will be handled as a Variation to the Contract.

1.1.9 Code Compliance Certificate

Code Compliance Certificate

The Principal will apply for the Code Compliance Certificate (CCC) and any other licenses or approvals for the building to be used. However, Practical Completion will NOT be certified until the CCC inspection has occurred and any additional works required by the local Building Consent Authority have been completed. To this end it is recommended that the Contractor obtains all required certificates, guarantees, as-built drawings, etc., required for the CCC application as work proceeds, to facilitate application for the CCC as soon as the works are completed. For his part, the Principal hereby undertakes to apply for the CCC within one day of all required material being in hand. Likewise, the Contractor should have capacity available to attend as quickly as possible to any items identified by the Building Consent Authority as being required prior to the issue of the CCC.

1.1.10 Co-ordination of the Works

Co-ordination of the Works

Co-ordinate the works of all trades to ensure efficient progress of the works. Ensure that all holes, sleeves, penetrations, supports, etc., that are required for services are correctly incorporated as work proceeds. Identify and sufficiently forward-notify the appropriate persons of all deadlines for the supply of fittings, components, information, etc.

1.1.11 Documents Interpretation

Documents Interpretation

Except where they are clearly to the contrary, all dimensions are deemed to be to the bare surface of concrete, masonry, timber framing or other basic construction material. All figured dimensions take precedence over scaled sizes. Where any detail is included in more than one drawing the larger scale detail takes precedence. Where any ambiguity exists refer to the Architect/Designer for interpretation.

The word 'provide' and the word 'fix' used separately in the Documents shall be taken to mean 'provide and fix' unless otherwise stated.

When the term 'allow' occurs in the Documents, except with reference to Monetary Allowances, the cost of the item shall be at the risk of the Contractor.

The terms 'approved', 'directed', and 'selected' when used in the Documents refers to the approval, direction or selection of or by the Architect/Designer. Please give adequate notice of when these decisions are required. 'Architect/Designer' shall mean the Architect or Designer, their representative or any Consulting Engineer engaged by the Architect/Designer.

1.1.12 Work Shown and Mentioned

Work Shown and Mentioned

The Contract Documents show the extent and nature of the works but there is no warranty expressed or implied that they show each and every minor detail or item required to be included by the Contractor. Should any material, structural member, fixing, or item or work appear to be inadequately described, yet obviously necessary for the neat, strong and satisfactory completion of the work, it shall be incorporated into the Contract Works.

1.1.13 Site Safety

Site Safety

Comply with all of the requirements of the New Zealand Building Code, and in particular with Approved Documents F1 - F5 inclusive. Comply with all relevant Worksafe NZ Approved Codes of Practice and Information and Guidance requirements, particularly those for construction and building maintenance. Comply with any other relevant safety legislation and/or regulations.

Take all practical steps to make the site and the contract works safe and to provide and maintain a safe working environment. Ensure that all those working on or visiting the site are aware of the site safety rules and are not unnecessarily exposed to hazards.

In compliance with the Health and Safety in Employment Act 1992 the Contractor shall have:

- a). A safety programme that shall include selection and training standards, monitoring of compliance, safety performance measures and safety rules.
 - b). A safety register to record accidents, injuries, operational safety, ACC claims, and so forth.
 - c). A health and safety plan specific to the contract works, which will address methods of identifying and controlling hazards, protective clothing and equipment to be used, staff training and supervisory requirements, management of subcontractors and their staff, and restricted areas and site security.
- Notify the Ministry of Business, Innovation and Employment in writing of the Certified Safety Supervisor responsible for safety aspects of the works.

Scaffolding shall comply with all Statutory and Local Authority Regulations, with the Ministry of Business, Innovation and Employment's 'Best Practice Guidelines for Scaffolding', with AS/NZS 1576 (Scaffolding equipment), AS/NZS 4576 (Guidelines for Scaffolding), and AS/NZS 4994 (Roof edge scaffolding), shall be maintained for the duration, and shall be removed on completion.

The use of ballistic fixings must absolutely comply with all relevant safety recommendations at all times. No rubbish fires are allowed on site. Portable/personal disc/tape players, radios and iPods must not be used anywhere on the site. No smoking on site, except in the designated location in

accordance with the Smoke Free Environments Act 1990, the location of which will be determined by the Contractor, with the approval of the Principal.

1.1.14 Variations

Variations

The Architect/Designer will issue Site Instructions (SI) to amend or clarify the works. Upon receipt of a SI the Contractor shall immediately notify the Architect/Designer if he believes there are price or timing adjustment implications. The Architect/Designer will then issue a Variation Price Request (VPR) for pricing of the possible Variation by the Contractor, within the time stipulated, or within 10 days if no time is stipulated. If the Contractor does not return the VPR within the time stipulated the Architect/Designer will assess it at reasonable rates. Once agreement is reached on price and/or timing a Variation Order (VO) for the item will be issued. Note that works covered by a SI or a VPR must NOT be actioned until the VO is issued.

When a Variation is contemplated and timing does not allow SI and VPR action the Contractor is to advise, and record in the site diary, an estimate of price and timing implications. If accepted by the Architect/Designer, a VO will be issued immediately. The Contractor shall then co-operate with the Architect/Designer to establish agreed pricing.

Claims for Variations neither priced nor estimated prior to being put in hand (but considered valid) will be incorporated into Progress Payment Certificates or the Draft Final Accounts as claimed and accepted but with a proviso allowing 5 (five) days for written objections by either the Principal or the Contractor, to any aspect of them, for further consideration.

The Main Contractor's Variations Margin agreed pre-contract will be the maximum accepted for any trade unless higher rates are nominated pre-contract and are accepted. The Main Contractor's agreed Variations Margin shown shall be deemed to include all preliminary and general costs, overheads, variation processing costs, and profit. If no margin is given, a 5% overall margin will be applied.

Note that 'loss of anticipated profit' claims consequent upon reduction of works extent will NOT be recognized, and that the cost of processing Variations is deemed to be included in the P & G Allowance.

Also note that for Variations pricing all materials shall be charged at the actual net invoiced cost plus margin; i.e. recognised 'Trade Price', volume discounted where appropriate.

1.1.15 Progress Claims

Progress Claims

Progress Claims shall be in writing, shall be in accordance with the requirements of the Construction Contracts Act 2002, and shall include all of the following:

- The overall amount claimed.
- The percentage completion and amount claimed for each Subcontractor. For accurate claim verification please ensure that this breakdown exactly matches the trades costs breakdown agreed-to pre-contract.
- The total Contract Sum Adjustment for any/all Variations authorised prior to the claim.
- Items covered by Monetary Allowances listed separately.

- And, if specifically requested, confirmation that amounts previously claimed on behalf of Subcontractors, certified by the Architect/Designer, and paid by the Principal, have actually been paid to the Subcontractor (apart from normal retentions).

Note that retentions will be held exactly in accordance with the Conditions of Contract.

1.1.16 Cleaning and Completion

Cleaning and Completion

Clear construction debris and rubbish from the works at regular intervals, and additionally if so instructed by the Architect/Designer. Clean each space thoroughly before commencing any finishing works.

In preparation for the Practical Completion inspection carry out the following:

- Clean the works thoroughly, removing all debris, surplus materials, splashes, marks, temporary markings, etc. (All cleaning methods and materials shall be as recommended by the manufacturer of the item being cleaned).
- Remove protective wrappings and coverings unless otherwise directed.
- Touch up minor painting faults, carefully matching colour, and brushing out edges. Repaint any badly marked surfaces back to suitable break-lines.
- Adjust, ease and/or lubricate as required all doors, drawers, controls and other moving parts to ensure their efficient operation.
- Any other works required to leave all spaces ready for immediate occupation and all electronic/electrical/mechanical systems fully operational.
- Clean out all spoutings, gutters, downpipes, and gullies and flush out all drains.
- Clean all sanitary appliances and check all aspects of the water services.
- Thoroughly re-inspect all aspects of the works (and have any defects fully rectified) to be certain that the works are completely ready for the Practical Completion inspection - if an unreasonable number of items are noted by the Architect/Designer during the inspection it will be terminated and then rescheduled for at least a week forward to allow proper completion to be achieved.

(Note that a Code Compliance Certificate must be obtained before Practical Completion will be certified. Obtain all required certificates, guarantees, as-built drawings, etc., as work proceeds to enable the CCC application to be submitted as soon as construction is completed).

2 CONCRETE

2.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

2.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3101.1&2:2006(NZS)	Concrete Structures Standard
3104:2003(NZS)	Specification for concrete production
3109:1997(NZS)	Concrete construction
3112.1:1986(NZS)	Methods of test for concrete - Tests relating to fresh concrete
3114:1987(NZS)	Specification for concrete surface finishes
3121:2015(NZS)	Water and aggregate for concrete
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
3124:1987(NZS)	Specification for concrete construction for minor works
3604:2011(NZS)	Timber-framed buildings
4455.1:2008(AS/NZS)	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
4671:2001(AS/NZS)	Steel reinforcing materials

2.3 Materials

2.3.1 Damp Proof Membrane

Polythene DPM

Polythene damp proof membrane shall be 0.25mm thick and shall be continuous under slabs on grade or fill and under foundations. All joints lapped 200mm and continuously sealed with pressure sensitive tape. Tape seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

2.3.2 Reinforcement

Grade

Reinforcing grades are identified by bar diameters prefixed with letters thus:

D indicates Grade 300E deformed bar

R indicates Grade 300E plain round bar

HD indicates Grade 500E deformed bar

HR indicates Grade 500E plain round bar

RB indicates Grade 500 Rebar (uniquely deformation patterned bars)

Quality

Imported reinforcing steel will not be accepted without the prior approval of the Engineer.

Reinforcing free of loose rust, mill scale, dirt, paint, oil, etc. and stored clear of the ground. Accurately place reinforcing and tie securely to prevent displacement during pouring of concrete. Tie wires must not project into specified concrete cover. Welding of reinforcing is not permitted unless specifically approved by the Engineer.

Installation

All terminal ends of reinforcing bars shall be hooked. Intersecting walls, beams and foundations shall contain return longitudinal reinforcement, as detailed for the intersecting members, all to NZS 3109 unless shown otherwise on the drawings.

Continuous

Unless detailed otherwise all bars assumed to be continuous, with lap lengths not shown otherwise to be 40 diameters for grade 300 steel, 60 diameters for grade 500 steel, 250mm for mesh. Bars shall generally have minimum bends of five times their diameter.

Supports

Support slab steel at 1 metre maximum centres. Use plastic spacers for fairface concrete. Co-operate with others to accurately place all block/brick starters, as the bending of starters to the core position will not be permitted.

2.3.3 Concrete Cover

Concrete Cover

Concrete cover not shown otherwise to be:

- Foundations - 75mm where poured against ground, 50mm elsewhere.
- Beams and columns - 40mm (for main reinforcing).
- Slabs - 50mm where poured on ground, 40mm where exposed to weather, 30mm elsewhere.
- Walls - 40mm where exposed or against ground, 30mm elsewhere.

2.4 Ribraft Concrete Floors

2.4.1 Scope

Supply the required/selected Firth RibRaft components and construct the concrete on-ground floor slab as shown on the drawings. All aspects of this work shall be in accordance with the Firth RibRaft Technical Manual (check www.firth.co.nz or call 0800 800576 for the latest edition), a copy of which must be held on site (and referenced for any aspect where there is the slightest uncertainty), the RibRaft Floor System CodeMark Certificate of Conformity - [Certificate No:CMA-CM40015 \(Rev3\)](#), and as shown on the drawings.

No Substitutions are permitted for Firth RibRaft Floor System.

2.4.2 Selections

220mm Pod Thickness - Non-specific Design

Pods thickness: 220mm

DPM: as per NZS 3604:2011

Slab thickness above pods: 85mm

Slab finish: U3

2.4.3 Installation

Installation

All RibRaft installation work shall be carried out by experienced and competent tradesmen, familiar with the techniques and materials specified, in accordance with Firth RibRaft Technical Manual and as shown on the drawings. All handling, preparatory blinding DPM, formwork and reinforcing, and concreting and finishing techniques shall be exactly as recommended by Firth Industries Ltd.

Notify the BCA for inspection of the excavation and of the Ribraft slab ready for pouring, and keep whatever records or test results they may require.

Check that all topsoil etc. has been removed from the RibRaft slab location and that the excavated (or hardfill made-up where necessary) platform is level and approximately 330mm below the required finished floor level. Co-ordinate with other trades to ensure that any wastewater drains or other piped or wired service lines are correctly incorporated (and fully operationally tested as appropriate) as work proceeds.

Place and compact any hardfill or basecourse required by the Engineer for specific design. Blind the surface with up to 50mm of sand, and compact (and adjust if necessary) to accurately level, carrying the sand blinding to at least 500mm beyond the RibRaft perimeter. (Install shear key piles if required or specified).

Lay the specified DPM over the entire platform and extending at least 200mm beyond the RibRaft perimeter, with strips lapped 150mm and 50mm PVC adhesive tape sealed, and any services penetrations tape sealed. Tape repair any damage to the DPM as soon as it occurs, and re-inspect/repair just before pouring. Construct the slab perimeter formwork as specified above and as detailed, including edge rebates and any slab cut-outs required.

Unload and handle components carefully to avoid any damage, and keep them clean until installed. Place the RibRaft pods in the grid pattern as shown on the layout plan, with Firth 300mm spacers to the perimeter and under loadbearing walls, and Firth 100mm spacers between all other pods. Neatly cut pods as required to infill where the shape or size of the slab does not match the 1.2m pods module.

Reinforce as specified and as noted on the drawings, ensuring the bars are positioned in the spacer lugs, install plumbing waste pipes etc. as required, and then install the reinforcing mesh over the top of the pods, seated on mesh chairs, and install the re-entrant corner steel (Grade 500E) across internal corners as noted. Install starters as detailed for any subsequent masonry walls, ensuring accurate positioning (as bending to masonry core positions is not acceptable).

Pour Firth RaftMix (or pump Firth RaftMix Pump), and vibrate and screed and finish as specified, and cure and install shrinkage control joints as specified or noted.

Remove trade debris from the area progressively; on completion leave the works area completely clean.

3 CARPENTRY

3.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

3.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.2:2011(AS/NZS)	Structural design actions - Wind actions
1491:1996(AS/NZS)	Finger jointed structural timber
1859.1:2004(AS/NZS)	Reconstituted wood-based panels - Specifications - Particleboard
1859.2:2004(AS/NZS)	Reconstituted wood-based panels - Specifications - Dry-processed fibreboard
2269.2:2007(AS/NZS)	Plywood - Structural - Determination of structural properties - Evaluation methods
2270:2006(AS/NZS)	Plywood and blockboard for interior use
2271:2004(AS/NZS)	Plywood and blockboard for exterior use
2295:2006(NZS)	Pliable, permeable building underlays
2588:1998(AS/NZS)	Gypsum plasterboard
2589:2017(AS/NZS)	Gypsum linings - Application and finishing
2904:1995(AS/NZS)	Damp-proof courses and flashings
2908.2:2000(AS/NZS)	Cellulose-cement products - Flat sheets
3602:2003(NZS)	Timber and wood-based products for use in building
3603:1993(NZS)	Timber Structures Standard
3604:2011(NZS)	Timber-framed buildings
3617:1979(NZS)	Specification for profiles of weatherboards, fascia boards, and flooring
3618:1984(NZS)	Mechanical stress grading of timber
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber
4200.1:2017(AS/NZS)	Pliable building membranes and underlays - Part 1: Materials
4200.2:1994(AS/NZS)	Pliable building membranes and underlays - Installation requirements
4389:2015(AS/NZS)	Roof safety mesh
4859.1:2002(AS/NZS)	Materials for the thermal insulation of buildings - General criteria and technical provisions

AS/NZS 2269.0:2012	Plywood ² - Structural - Part 0: Specifications
AS/NZS 2269.1:2012	Plywood - Structural - Part 1: Determination of structural properties - Test methods
BRANZ BU411	Recommended timber cladding profiles
NZBC B2	Durability
NZBC E2	External moisture
NZBC E2/AS1	External Moisture
NZBC E3	Internal Moisture

3.3 General

This section includes the receiving, stacking and storage of all Carpenter's materials and the fabrication, erection and fixing of all framing, sheathings and finishing timbers, including all work incidental to neatly finishing in other trades and all temporary work and temporary bracing.

The Carpenter shall attend upon all trades, and shall supply and fix all obviously necessary but not specifically mentioned fixings and materials.

3.4 Bostik Sealants

3.4.1 Scope

Scope

Supply and install the selected Bostik Sealants and Adhesives, complete with accessories, to the works as identified on the drawings and described below. All aspects of this work shall be in complete accordance with Bostik sealants and adhesives guides and technical manuals, (check 0508 222 777 for the latest editions), and other relevant product manufacturer's recommendations, and as shown on the drawings.

No substitutions are permitted for Bostik Sealants or Adhesives.

3.4.2 Interior Sealants - Wet Areas

Wet Area Installations

Bostik Kitchen & Bathroom Silicone to shower, bath, and basin floor and wall joints.

Location:

Wet Area Shower Panel Adhesive

Bostik Gold Ultra to joints between acrylic shower panel and timber frame.

Location:

3.4.3 Installation

Installation

Co-operate with other trades to ensure that all other associated works, fittings and fixturers are completed and installed to specification and as shown on the drawings.

All sealant and adhesive work, including preparation, shall be carried out by experienced and competent applicators, familiar with the techniques and materials specified, approved by the manufacturer. All substrate and surface preparation, sealing and adhesive accessories and materials, application techniques, and clean-up shall be exactly as recommended by Bostik and as noted on the drawings. Apply continuous sealant beads to the required depth and tool finish neatly with clean edges. Remove any masking tape, clean contaminated surfaces as recommended by the manufacturer leaving sealant beads undamaged and surrounding surfaces clean.

Issue to the Main Contractor a copy of the Bostik specific maintenance requirements together with the Bostik NZ Ltd 10 Year Warranty for the completed works.

3.5 Timber Framing

3.5.1 Scope

Scope

Supply and install timber framing to the floors, walls, roofs, and other timber framed elements, as identified and detailed on the drawings. All aspects of this work shall be in accordance with NZS 3604, product manufacturers' recommendations, and as shown on the drawings and the specification.

3.5.2 Workmanship

Workmanship

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All work shall be carried out to current best trade practise by experienced and competent tradesmen, familiar with the materials and installation techniques, in accordance with NZS 3604 and as shown on the drawings.

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings prior to installing timber framing.

Co-ordinate with other trades to install timber framing as required.

3.5.3 Timber Framing

Timber Grade and Quality

Unless otherwise noted or specified on the drawings or specification all framing timber shall be minimum structural grade SG 8 Radiata pine in accordance with NZS 3622.

Framing timber shall be seasoned or kiln dried, and be straight and true and free from wind, warp and

distortion, and in lengths suitable for the members required, and shall have a moisture content of between 12% and 18% before installation.

Do not use damaged, faulty or defective materials.

Timber Treatment

Timber framing shall be appropriately treated against moisture and/or insect decay by a member of the NZ Timber Industry Federation Inc. Preservative treatment shall be to the requirements of NZS 3602 as an absolute minimum, and treated framing shall be identified and marked accordingly. Carefully manage treated framing during installation to avoid accidental use of timber with a lower performance or durability treatment than that required or specified.

Storage & Handling

Check timber framing upon delivery and reject sub-standard or damaged material.

Store timber framing dry under cover, fillet stacked and well clear of the ground, and protect from damage, moisture, and contamination.

Ensure all appropriate personal protection equipment is worn at all times when handling and cutting treated framing.

Framing Installation

All timber framing members, including all dunnage, strutting, blocking, bracing etc, shall be sized, setout, fitted and fixed to the requirements of NZS 3604 and as shown on the drawings to accommodate structural loadings, cladding and lining setout and support, and the installation of other building components, fixtures and fittings.

All framing shall be erected without deviation, true to line, level, angle and plumb, and evenly aligned and square, and within the tolerances allowed in NZS 3604 Table 2.1. Framing members accurately cut, lapped, housed, joined, and seated so as to provide full contact over the bearing surfaces.

Temporarily prop, brace, tie, and secure framing members and elements as required until the framing is complete and self supporting. Leave in place for safety purposes as long as required.

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

Concrete Separation

Separate timber framing with an approved continuous damp proof course when in direct contact with concrete or masonry. Ensure that the DPC material is compatible with the timber treatment.

Free draining separations to external vertical faces shall be 12mm minimum and as noted on the drawings.

Timber Re-treatment

All cut or drilled surfaces of H4 and H5 treated timber framing shall be flood coat re-treated, with a suitable product recommended by the original treatment plant, before installation.

Edge Notching and Centre Holes

The notching, checking, and boring of framing members shall be in strict accordance with the requirements of NZS 3604.

Avoided checking and cutting where possible and keep to such dimensions so as not to prejudice the purpose for which the member is used. Keep edge notching to a minimum and where possible use centrally bored holes instead.

Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the lining's fixing reach.

Framing Protection

Protect timber framing as required during installation against damage and moisture, and against significant variation of moisture content until ready for lining. Avoid ponding of water around floor plates.

Built-up Framing Members

Except for jack studs, bottom plates and top plates, framing members may be substituted with built-up members in accordance with the limitations of NZS 3604 2.4.4.7 with the prior approval of the Architect/Designer only.

3.5.4 Steel Fixings

Fastenings and Connectors

Unless otherwise noted or specified timber framing fastenings and connectors shall be as specified in the relevant fixing schedules of NZS 3604 or have an equivalent capacity as specified therein. Timber framing connectors and fixings shall comply with the product information as required in NZS 3604 2.4.6, and shall be used and installed in accordance with the manufacturer's recommendations. Pre-drill nail holes in split-prone framing as necessary.

Durability of Fixings & Fastenings

Unless otherwise noted or specified the minimum durability of timber framing fixings and fastenings, excluding nails and screws, shall comply with the durability requirements of NZS 3604 Table 4.1.

Galvanised steel fixing components, excluding nails and screws, shall have galvanised coating masses in accordance with NZS 3604 Table 4.2.

Unless noted or specified otherwise the materials for nails and screws shall be as given in NZS 3604 Table 4.3.

Steel fixings and fastenings in contact with timber treated with copper based timber preservatives (H3.2 or higher) shall be in accordance with NZS 3604 4.4.4.

Stainless steel nails shall be minimum Grade 304 unless otherwise specified or noted.

Bolts and Coachscrews

Unless specified or shown otherwise all bolted and coach screwed connections shall be M12 or M16 in accordance with the relevant fixing requirements given in NZS 3604.

Bolted and coach screwed connections shall have either a 50mm x 3mm square, or a 55mm x 3mm round, washer to each head and nut for M12 and M16 fixings. Washers shall be of the same material and durability as the bolt or coach screw.

3.5.5 Wall Framing

Plates

Top and bottom plates shall be to the dimensions and layout shown on the drawings. Unless specified or shown otherwise top and bottom plates shall be fixed in accordance with NZS 3604 7.5.12 and Tables 8.18 and 8.19, true to line and level or angle.

Joints in top plates shall be made over a stud or over blocking between studs, and all top plate connections shall be in accordance with NZS 3604 8.7.3. Form all holes and edge notches in top and bottom plates in accordance with NZS 3604 8.7.5.

Studs

Studs shall be to the dimensions and spacings shown on the drawings, and installed true to line and plumb in both directions between top and bottom plates.

Unless noted otherwise non-load bearing wall studs shall be to the spacings given in NZS 3604 Table 8.4, stud width as shown on the drawings.

Form all holes and edge notches in studs in accordance with NZS 3604 8.5.1.5. Do not notch, check, cut, or bore holes in the middle third of any trimming stud.

Should the need arise studs shall be straightened in accordance with NZS 3604 8.5.3 with prior approval from the Architect/Designer only.

Lintels

Lintels shall be to the dimensions and locations shown on the drawings and DesignIT calcs where laminated veneer lintels are specified, and installed true to line and level, and shall be supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud, and secured against uplift in accordance with NZS 3604 8.6.1.8 as required.

The thickness of a lintel may be made from two or more members, where each member is the length of the lintel, in accordance with NZS 3604 2.4.4.7.

Sill & Head Trimmers

Unless specified or shown otherwise sill and head trimmers to openings shall be the same width as the wall stud and to the thickness given in NZS 3604 Table 8.15, and installed at the required opening height true to line and level, and supported by a 45mm thick doubling stud or jack stud fixed to a trimming stud.

Dwangs

Dwangs shall be the same width and thickness as the wall stud, and installed at the centres noted on the drawings, and accurately cut and fixed in place true to line and level and flush with stud edges.

Dwangs fixed in accordance with NZS 3604 Table 8.19.

3.5.6 Posts

Timber Posts

Timber posts shall be to the sizes and locations shown on the drawings, and installed true to line and plumb each way, and supported at the base by steel post brackets as detailed.

Base bracket brand name & type: Bowmac bracket or similar approved

3.5.7 Roof Framing

Rafters

All rafters (including hip, valley and jack rafters) shall be to the dimensions, spacings, pitch, and layout shown on the drawings.

Rafters shall be aligned and paired at the required spacings to ridge boards, ridge beams, hip rafters and valley rafters, and as shown on the drawings, and installed parallel, true to line, pitch and plane, and fixed in accordance with NZS 3604 Table 10.1.

Any required jointing of rafters shall be made over supports shown on the drawings only.

Unless shown otherwise rafter seating to top plates, beams, and lintels shall have a minimum bearing of 32mm without reducing the rafter depth to less than 65mm, or 80%, at the birds mouth.

Extend rafter ends to form eaves where possible or scab a 90x45 member to side of rafter as detailed on the drawings and in accordance with NZS 3604 10.2.1.14.

Fly rafters and outriggers installed to form gable verges as detailed on the drawings and in accordance with NZS 10.2.1.15.3

Valley Boards

Valley boards shall be sized to the dimensions and installed to the supporting framing as detailed on the drawings.

Ceiling Joists

Unless specified or shown otherwise ceiling joists shall be to the dimensions and spacings given in NZS 3604 Table 10.3.

Ceiling joists shall be installed parallel true to line and plane, and shall be joined directly over framing supports and lapped minimum 300mm, or butted and flitched, in accordance with NZS 3604 10.2.1.6.5.

Do not support ceiling joists from a strutting beam.

Purlins

Purlins shall be to the dimensions and spacings shown on the drawings and as required by the cladding material, and fixed to rafters and/or trusses in accordance with NZS 3604 Table 10.10, or 10.11, or clause 10.2.1.15.1(b).

Purlins on their flat shall be continuous over a minimum of two spans.

Provide all necessary blocking and lateral support to purlins laid on edge in accordance with NZS 3604 10.2.1.16.6, and as detailed.

Extend purlins to form gable verges as detailed and in accordance with NZS 3604 10.2.1.15.

Roof Trusses

Roof trusses shall be Specific Engineering Design (SED) in accordance with NZBC B1/VM1 and manufactured by an accredited fabricator, and shall comply with all aspects of NZS 3604 10.2.2. Roof trusses shall be fabricated to meet the specific design requirements of the roof including, but not limited to; roof layout, pitch, and details, in accordance with the drawings and specification.

Roof trusses shall be supported and fixed to the truss fabricators specifications but shall be no less than that required by NZS 3604 Tables 10.14 and 10.15. Roof trusses shall be braced as shown on the drawings and in accordance with NZS 3604 10.3.

Roof Bracing

Roof bracing shall be as shown on the drawings and in accordance with NZS 3604 10.3 and 10.4 as necessary.

3.5.8 Ceiling Framing

Ceiling Framing

Ceiling framing shall be to the dimensions, layout, spacings, and details shown on the drawings, and shall be installed true to line, level and plane, and securely fixed in accordance with NZS 3604 Table 13.3.

3.6 Workmanship & Materials

3.6.1 Workmanship

Supervision

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. It is the main contractor's responsibility to ensure that the construction of all structural timber complies in all respects with the drawings and the specification.

All non-restricted building work shall be carried out by or under the direct supervision of competent tradespersons, suitably qualified for the work undertaken, and in accordance with the best and latest trade practice.

Timberwork

All timber shall be worked and cut to be true and square and free from wind and warp with all joints matching and mating to a proper contact fit over the full surface of the joint. All connections whether nailed screwed, glued, mortised or dovetailed shall be accurately made and properly executed to provide sound satisfactory connections for the class of work required.

Timber containing unacceptable defect or distortion shall not be cramped to provide mating at connections but shall be discarded and replaced by true defect-free timber before connections are made. Distribute any acceptable defects in timber so as not to impair the strength or the appearance of the finished work. Do not cut studs across the grain to straighten them.

The checking and cutting away of timbers shall be avoided where possible and shall be limited to such dimensions as will not prejudice the purpose for which the timber is used. Observe NZS 3604 restrictions on holing and checking of timber joists and beams. Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the linings/claddings fixings reach.

Neatly punch exposed nailing to the diameter of the nail head below the surface. Completely remove bruises and tool marks, and replace all split timbers and hammer-marked finishing timbers.

Fit a 3-ply bituminous DPC or a single layer high impact polyethylene DPC at all timber to concrete junctions to provide complete separation. Ensure that the DPC material is compatible with the timber treatment.

Clean out framing voids before fixing sheathings or linings. Ensure framing voids are fully vermin proofed to the exterior. Build in as necessary all required flashings (supplied by others) to windows, doors, roof edges, etc.

Wall Underlay

Install a flexible heavyweight building paper or breathable/absorbent wall underlay behind all exterior wall claddings, fixed horizontally, with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.

Fix wall underlay at maximum 300mm centres, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings, fixed through nylon vertical strapping at every stud in exposed locations. Provide additional fasteners fixed through the underlay around framed openings. Cut window and door openings just prior to joinery installation; cut underlay at 45° angle away from each corner and return full framing depth and fasten to inside of frame.

Finish wall underlay at edges as detailed, and return full framing depth into window and door openings. Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with wall underlay manufacturer's requirements and as shown on the drawings.

For drained cavity construction to framed walls without a rigid wall underlay and where the studs are at greater than 450mm centres, restrain the underlay with nylon strapping to prevent the underlay from bulging into the cavity space.

Any damaged underlay shall be made good by lapping in a new section.

Do not leave wall underlays exposed before covering with wall cladding for more than the manufacturer's recommended duration.

Roof Underlay

Install heavyweight building paper or breathable/absorbent roof underlay behind roof cladding as detailed, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned in a manner that prevents sagging or ponding.

R1 class roof underlays shall be fully supported on nylon straps or non-corrosive netting/mesh; R2 class self-supporting underlays shall be laid to maximum 1200mm span between adjacent supports. Run roof underlay horizontally or vertically up the roof slope on roof pitches above 10° pitch, and horizontally on roof pitches 10° or less.

Fix roof underlay at maximum 300mm centres to purlins, with 6mm - 8mm stainless steel staples or 20mm large-head galvanised clouts or proprietary underlay fixings.

For tiled roofs, lay the roof underlay over the anti-ponding board and non-corrosive support netting/mesh, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Finish roof underlay along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45° angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with the underlay manufacturer's requirements and as detailed. Roof underlay must be separated from

chimneys and flues in accordance with the requirements of the NZBC C1-C6 Acceptable Solutions. Any damaged underlay shall be made good by lapping in a new section. Do not leave roof underlays exposed before covering with the roof cladding for more than the manufacturer's recommended duration.

Window Installation

Prepare window and external door framing openings for joinery installation by neatly cutting the building wrap at 45° into corners, returning turning the wrap through the frame depth and fixing to the inside face.

Over-flash the underlay along the sill with a flexible flashing tape, installed full frame depth and length of the opening, returned minimum 100mm up the jambs, and with minimum 50mm return over the outside edge.

Over-flash the underlay at head/lintel corners with a flexible flashing tape, extending minimum 100mm each way from the corner, full frame depth, and with minimum 50mm return over the outside face.

Install external joinery frames with metal flashings as detailed and/or as required to completely weatherproof all frame-to-cladding junctions.

Unless shown otherwise, head flashings shall be carried minimum 75mm up behind claddings, extended at 15° out over the joinery head or facing board and returned down to cover the joinery or facing board minimum 10mm and finished with a 5mm, 45° 'kick out' drip-edge.

Neatly dress down the head flashings at the ends of the facings - for drained cavity construction, also form up-turned stop-ends in-line with the outside edge of cavity above.

Install metal (as specified) head flashings, fixed over the wall underlay, with the flashing upstand over-flashed minimum 50mm with a flexible flashing tape against the underlay, or with an additional piece of underlay extended over and lapped behind the underlay above, behind the inter-storey flashing or sill flashing above, or to the underside of the eaves.

Unless shown otherwise, sill flashings, where required, shall have a minimum 5° slope, minimum 8mm rear upstand with sealed sloping stop-ends, and be carried down minimum 35mm over the lower cladding and finished with a 5mm, 45° 'kick out' drip-edge.

Take delivery of window and door joinery. Check substrates for correct profile and alignment and that the joinery is fabricated to the correct wall construction set-out and depth. Set shims or pack as necessary to install joinery exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim, etc.

Install neat sealant beads as detailed or required.

After joinery installation, install closed cell backing rods as required and expanding foam seal the gap between the opening substrate and joinery liners/reveals (all round, from the inside).

On completion ensure that all sashes and doors neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating smoothly, without binding, to the required functionality.

Joinery Installation

Take delivery of all scheduled joinery items (doors, cabinets, shelves, etc.) and install in the positions shown, accurately aligned, true to level, plumb and square, and securely fastened as noted and in accordance with best trade practice and with due regard for adjacent linings, finishes and trim, and anticipated movements.

Cabinets scribed and/or recessed packers scribed to adjacent surfaces as detailed or directed. Protect all installed Joinery from damage including surface marking and contamination, dirt and dust, and moisture until completion. Do not use Joinery items for working supports or platforms or for storage of materials or tools and equipments.

On completion ensure that joinery item doors and drawers all neatly fit the openings with regular tolerances to all edges, and that all moving components and hardware are correctly adjusted and operating to the required functionality.

3.6.2 Timber*Timber Materials*

All timber shall be graded in accordance with NZS 3631 - Structural Grade MSG8 or better for all framing timber - (to meet the requirements of Table 2.3 of NZS 3603 for mechanically graded timber), and Dressing Grade for all finishing timber. Timber that is deemed below standard, in the opinion of the Architect/Designer, shall be removed from the site.

All non-durable timber, including components in manufactured items, shall be appropriately treated against moisture and/or insect decay by a member of the NZ Timber Industry Federation Inc. Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required. Ensure that similar timbers with different treatment levels are carefully managed during construction to avoid accidental use of an H1 treated item where H3 hazard class treatment is required by the NZS 3602.

Do not use LOSP (light organic solvent-based preservative) treated timber that has not adequately 'flushed-off'.

Ensure that all cut or drilled surfaces of H4 and H5 hazard class treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation.

All timber shall be seasoned or kiln dried, to the stable moisture content, be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required and the location in the finished construction. All framing timber shall have a moisture content between 12% and 18 % before being installed. If the use of inadequately seasoned timber results in damage or opening joints in the finished building the timber shall be replaced. Fixing of internal linings shall be delayed after closing in until the timber framing has dried back below 20% moisture content and to allow for the maximum settling of substrates.

All kiln dried, dressed and/or finishing timbers shall be stacked under cover on delivery to the site, and all timber shall be full to the nominal sizes shown or specified, subject only to normal cutting and dressing tolerances.

All finishing timber shall have machine marks, stains and roughness removed and shall be sanded smooth.

Ensure that enclosed surfaces and ends of paint-finished exterior finishing timbers are fully primed before fixing. If this trade (Carpentry) carries out the priming it shall be to the specification and standard required of the Painter.

Unless specified otherwise, exposed framing timbers shall be unfinished to the exterior, and be fine bandsawn milled, treated with a minimum of discolouration, handled carefully at all times to avoid surface damage, and delivered free of crayon or pencil or other markings. Hazard class treatment markings shall be on the ends, NOT on the faces.

Other Materials

Materials shall be delivered to site with the packaging and labelling intact, shall be of the same type, finish or colour to maintain continuity, shall be stored, and conditioned if required, in accordance with manufacturer's recommendations, and shall be protected from damage, contamination, and moisture - as appropriate.

Handle all materials in accordance with best practice and the manufacturer's requirements, and in a manner that prevents damage or deterioration to the material. Do not use damaged or defective materials or products, or products that are beyond their designated shelf life.

3.6.3 Laminated Veneer Lumber

Laminated Veneer Lumber

Laminated Veneer Lumber (LVL) shall comply with AS/NZS 4357.0. Each piece of structural LVL shall be branded at least once with the manufacturer's logo and a registered brand or marking that clearly identifies the structural properties that apply to the product and its limitations on end use; all in conjunction with associated published literature.

Structural properties identified in the associated published literature shall be:

- details of marking specific to the product
- veneer details
- physical properties including
 - modulus of elasticity
 - bending stress
 - tension stress parallel to grain
 - compression stress perpendicular to grain
 - compression stress parallel to grain
 - shear stress
- joint group
- density
- dimensional tolerances
- adhesives used
- limitations on end use

The storage and handling of LVL shall comply with Appendix A of AS/NZS 4357.0. In particular:

- LVL should be kept dry during storage and transit
- LVL should be stacked on bearers well clear of the ground and arranged so that their supporting surfaces are in the one plane
- Bearers should be spaced sufficiently close so that LVL spanning between them does not deflect excessively under its own weight.
- Bearers or spacers within a stack should be located near direct vertical alignment
- Care should be taken in lifting and handling LVL in order to avoid mechanical damage
- Wrapping should avoid and prevent entrapment of moisture
- LVL should not be used in high humidity conditions or exposed to the weather.

3.6.4 Proprietary Sheet Bracing Systems

Proprietary Sheet Bracing Systems

Proprietary sheet bracing systems to walls, ceilings and sub-floor foundations shall be installed in strict accordance with the manufacturer's technical literature and design guides. No materials specified in the manufacturer's technical literature and design guide can be substituted without the written approval from the Architect/Designer.

3.6.5 Proprietary Roof Trusses

Proprietary Roof Trusses

Roof trusses shall be of proprietary design, complying with the requirements of NZS 3603, NZS 3604, and AS/NZS 1170, and manufactured by suitably qualified fabricators.

Make allowance for all notching and holing to timber members to accommodate roof bracing etc., in the design of member sections of the roof trusses. Allow for all additional rafters, purlins, fixings and bracing necessary to complete the roof framing system with all accessories and incidental items necessary for proper installation even where not specifically shown on the drawings.

Proprietary roof trusses shall be designed to carry all imposed gravity and lateral loads. Refer to the approved design drawings for truss set-out and specified design loads. Roof trusses are assumed to be generally at 900mm centres spanning clear between walls or roof beams as shown on the drawings. The Main Contractor is responsible for the design of proprietary roof trusses, including their layout and interaction with and dependence on adjoining elements.

Provide all necessary design information and shop drawings for all proprietary roof trusses to be incorporated in the works for review prior to fabrication.

Provide Producer Statements from a Chartered Professional Engineer covering the design and construction of the roof trusses. Provide all information required by the Territorial Authority for the purpose of obtaining a Building Consent.

3.6.6 Fixings

Nails

Comply with the requirements of NZS 3604 Section 2.4.4 and the Nailing Schedules of NZS 3604 as applicable. Unless noted or specified on the drawings or elsewhere in this specification, all nails fixing

exterior timbers shall be Grade 304 or 316 stainless steel. Nails that will be covered with plaster or any similar material shall be hot-dipped galvanised, unless noted or specified otherwise.

Finishing brads to all finishing timbers shall be set out neatly and punched to the diameter of the nail below the surface. Bore slightly undersize holes for nailing that could cause splitting of the timber.

Power-driven staples are completely unacceptable in finishing timbers.

Screws

Screw fastenings shall be of suitable gauge, head type, thread design, and length to provide secure fastening into the substrate material, and be suitable for the assembly/construction of the fixed item/element and the substrate material.

Unless noted or specified otherwise, screws exposed to the exterior shall be Grade 304/316 stainless steel or hot-dipped galvanised, and hot-dipped galvanised or similar corrosion resistant for damp situations.

Self-drilling screws shall be in accordance with AS 3566 for fastener type and corrosion resistance class.

Unless noted or specified otherwise, screws fixing hardware or similar shall be of the same material and finish as the hardware. Except where raised head screws are shown or specified, screws shall be countersunk flush or recessed where stopped/filled.

Bolts

Where bolts are used they shall be complete with nuts and washers unless specified otherwise. All bolts, nuts and washers are to be hot-dipped galvanised finish unless noted otherwise. The diameter of a hole for a bolt shall not be less than the bolt diameter nor exceed it by 1.5mm.

For the following bolt diameters use washer sizes as below unless noted otherwise on the drawings:

up to M8 - 25 x 25 x 1.5mm

up to M12 - 50 x 50 x 3mm

up to M20 - 65 x 65 x 5mm

up to M20 - 75 x 75 x 6mm

Round washers may be used providing they are of a thickness and area not less than those specified above.

Unless noted otherwise on the drawings, holding down bolts shall be M12 galvanised, spaced at maximum 900mm centres and within maximum 300mm from each end of the timber, set minimum 150mm into concrete, and located centrally on the timber.

Framing - timber/timber and timber/steel - Unless noted otherwise on the drawings, M16, hot-dipped galvanised, hexagonal head mild steel and with 50 x 50 x 3mm washers.

Timber/concrete (dry situations) - Unless noted otherwise on the drawings, Ramset Trubolts, T12140 at maximum 900mm centres - for damp or exterior situations use stainless steel Trubolts.

Bolts shall be tightened until the washer just indents the timber surface. Exposed bolts shall be re-tightened just prior to Practical Completion to remove any slack consequent on timber shrinkage.

Allow to countersink bolt heads and nuts as necessary to clear linings.

Framing Hardware

Proprietary timber framing hardware and fixings, including multigrips, joist shoes, Z nails, gang nails and similar hardware, may be used where specifically approved, or where required on the drawings or by NZS 3604 schedules, in accordance with the manufacturer's requirements.

Proprietary timber framing structural brackets and ties, including post and bearer brackets, beam supports, angle brackets, tie cleats and similar hardware, shall be as noted on the drawings and installed in accordance with the manufacturer's requirements.

Refer to Metalwork or Structural Steel section of this specification for specific design engineered fabricated steel components that connect structural timber framing.

Adhesives

Aliphatic PVA for dry timber applications - all other adhesives for timber jointing are subject to specific approval or as specified. Check surfaces are in appropriate condition to receive adhesive, and that adhesives are used strictly in accordance with the manufacturer's instructions. Clamp adhesive-jointed timber connections and check alignment of members before the adhesive has set.

3.6.7 Sealants*Sealants*

For critical joints such as primary water/weatherproofing seals, precast panels primary seals, structural floor slab control joints, structural glazing, immersion or hydrostatic pressure seals, etc., either use the sealant noted on the drawings or obtain a reputable sealant manufacturer's recommendation for the precise situation, and submit the manufacturer's specifications covering all relevant criteria and characteristics of the proposed sealant, primers, joint surfaces preparation, etc. to the Architect/Designer for review and confirmation to proceed.

If so requested, additionally submit a sample of the proposed sealant made up into a demonstration joint, incorporating the same materials, preparation, finish tooling, etc. After confirmation to proceed with the proposed sealant install a sample joint to approval, length approximately 2% of the overall length of the joints required, with a minimum length of two metres; when accepted this joint becomes the quality control sample for all subsequent similar joints.

For less critical joints such as those in covered or protected situations, and bathroom and kitchen ceramics and sanitaryware etc., either use the sealant noted on the drawings or select the sealant from a reputable manufacturer's range for the substrate materials involved, with due regard for the flexibility required, acid or neutral curing, mould resistance, paintability or clear or standard colours, slumping characteristics, temperature range expected, etc. - silicone, polymer or polyurethane sealants are anticipated.

For all simple gap-filling and draught sealing situations, either use the sealant noted on the drawings or select from a reputable manufacturer's range for a paintable acrylic sealant with good adhesion characteristics for the substrates involved - pay particular care in the sealant selection where bare metal, polycarbonate, polystyrene or similar substrates or where bituminous-based membranes are adjacent or where exposure to solvents is possible.

All joint surfaces preparation and priming and all sealant application work shall be exactly in accordance with the sealant manufacturer's recommendations, and carried out by competent and experienced applicators familiar with the materials and techniques required.

Ensure that the sealant is being used within the manufacturer's stated design parameters, particularly with regard joint design and anticipated cyclic movement.

Check that the joint faces are sound, completely dry, and frost free, clean and free of dirt, rust, oil, grease, laitance, etc., and they are primed to suit the surface porosity - particularly for critical locations.

Insert a polyethylene tape slip layer at the back of the joint or a closed cell polyethylene PEF backer rod where required and to the sealant manufacturer's recommendations. Mask off joint edges where a clean straight finish line is required.

Check the toxicity of the selected sealant and handle it appropriately. Check that the temperature during sealant installation is within the manufacturer's guidelines.

Apply the sealant and tool the filled joint's surface smooth and even, utilising a lubricant as necessary and strictly within the manufacturer's guidelines.

Remove any masking tape immediately after tooling, clean up all adjacent surfaces using the recommended cleaning agents as required, and protect the finished joint until the sealant has properly cured.

3.6.8 Interior Finishing Trim

All interior finishing trim shall be cut to the exact dimensions and fine sanded smooth, and with lightly sanded arrisses, and all fixed with plated finishing pins. Machine staple fixing is NOT acceptable.

Note that even traces of planer marks are unacceptable on architraves. Margins between interior trim and other elements shall be exactly even, and all mitres shall be exact and tight.

3.6.9 Garage Door

Garage Door - option 2

Garage door(s) as shown and noted on the drawings, installed complete with automatic opening door gear including integrated light(s), wall switch and two remote car activators per door.

3.6.10 Sundry Items

Sundry General

Supply and install, complete with all normal incidentals, and in total compliance with the item manufacturer's recommendations and instructions and with all of the appropriate preceding clauses:

3.7 James Hardie Eaves & Soffits

3.7.1 Scope

4.5mm HardieFlex Eaves Lining

Supply and install James Hardie 4.5mm thick HardieFlex Eaves Lining as a fibre-cement sheet lining material to the eaves and soffits identified on the drawings, complete with all accessories. The sheets are to be finished with a paint system. All aspects of this work shall be in complete accordance with James Hardie Eaves And Soffits Installation Manual (check www.jameshardie.co.nz, or call 0800 808 868 for the latest edition) and other relevant product manufacturers' recommendations.

3.7.2 Co-operation

Co-operation

Co-ordinate with other trades to ensure that the panels correctly allow for fascia and wall cladding installation and associated flashings etc., and that services penetrations are correctly handled to maintain full weathertightness and sheet integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

3.7.3 Preparation

Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. The fascia and framing shall be in true alignment, complete and suitable for the sheets, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that any hold-downs from the roof framing to the wall framing are correctly installed.

Check that the building underlay or rigid air barrier to the wall framing has been installed in full accordance with the manufacturer's requirements and the drawings. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flashings etc that will enable the sheets and all accessories to be installed.

3.7.4 Flexible Sealant

SIKA Silaflex MS

Flexible silicone sealant to be SIKA Silaflex MS. Use to seal the sheets and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

3.7.5 Workmanship

Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with James Hardie Eaves And Soffits Installation Manual and other relevant product manufacturers' recommendations.

3.7.6 Delivery & Handling

Delivery & Handling

Carry all sheets on edge. Stack sheets flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm crs maximum). Keep sheets and accessories dry at all times. Avoid damage to sheet edges, ends, and surfaces. Keep uPVC flashings etc. out of direct sunlight, and store all accessories on flat and avoid damage. All installers to be familiar with and comply with the James Hardie Safe Working Practices in the Installation Manual, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished sheets or accessories.

3.7.7 Installation

Installation General

Install the sheets to the framing in accordance with the Installation Manual, complete with all accessories eg. mouldings, sealant, underflashings, etc.

Ensure that all cut edges of panels are primed prior to installation with Dulux Primacryl, Resene Quick Dry, or similar. Ensure that the bottom edge of the fascia forms a drip edge of 15mm minimum to the sheet. Seal around services penetrations to maintain weathertightness and air pressure resistance.

Timber Trim Details

Install H3.1 finger-jointed pine timber trim, scribes, eaves moulds, etc. to complete the sheet junctions as shown on the drawings.

3.7.8 Fixings

HardieFlex Sheet 4.5mm, Durability Zone B or C

Fix sheets with galvanised nails in accordance with James Hardie requirements.

Timber Trim, Durability Zone B, C, or D

Fix timber trim accessories with jolt-head galvanised nails in accordance with James Hardie requirements, punched below the surface and flushed with exterior grade builders fill.

3.7.9 Completion

HardieFlex Sheet

Ensure that the sheets have been fixed correctly, that all joints and accessories have been completed correctly, and that all penetrations have been taped correctly. Check that no damage has occurred to any installed sheet element or associated component, replace as necessary. Ensure that the sheets are painted within 90 days of the sheet installation, complete with all accessories and flashings. Hand over a copy of the latest edition of the James Hardie HardieFlex Eaves Lining Product Warranty to the client. Hand over a copy of the latest James Hardie Eaves And Soffits Installation Manual to the client for their maintenance information.

3.8 GIB® Plasterboard Sheets

3.8.1 Scope

Scope

Supply and install the selected GIB® Plasterboard sheets, complete with all accessories, as sheet lining material to the walls, ceilings and other elements identified on the drawings. All aspects of this work shall be in complete accordance with Winstone Wallboards Ltd technical literature and installation guidelines (call Winstone Helpline on 0800 100 442 or check www.gib.co.nz for the latest editions) and other relevant product manufacturers' recommendations.

Substitution of any specified GIB® system, GIB® System component or GIB® plasterboard is not permitted.

3.8.2 Performance

GIB® plasterboard as a Component of a 'General' Wall or Ceiling Lining Element

To the areas noted on the drawings as 'General Plasterboard Wall or Ceiling Lining', comply with all relevant aspects of the [GIB® Site Guide \(2014\)](#) publication, complete with all recommended components and accessories, and other relevant manufacturers recommendations.

GIB® plasterboard as a Component of a Wet Area Element

Wet Area Plasterboard Linings - GIB Aqualine® Wet Area Systems. To the areas noted as 'Wet Area' on the drawings, additionally comply with all relevant aspects of the [GIB Aqualine® Wet Area Systems \(2007\)](#) publication, [BRANZ Appraisal No.427 \(2007\)](#), and other relevant product manufacturers' recommendations. Refer to separate specification GIB Aqualine® Wet Area Systems.

GIB® plasterboard as a Component of a Bracing Element (Timber Framing)

Bracing Performance - GIB EzyBrace® Systems - Timber Framing. To the timber framed elements noted as 'Bracing' on the drawings, additionally comply with all relevant aspects of the [GIB EzyBrace® Systems \(2016\)](#) publication and GIB Ezybrace® Bracing Software according to the specified bracing unit rating, [BRANZ Appraisal No.928 \(2016\)](#), and other relevant product manufacturers' recommendations. Refer to separate specification GIB EzyBrace® Systems.

3.8.3 GIB Plasterboard

GIB® Standard, 10mm

GIB® Standard plasterboard, 10mm thick.

Location: To all dry area walls unless otherwise noted on plans

GIB® Standard, 13mm

GIB® Standard plasterboard, 13mm thick.

Location: To all dry area ceilings unless otherwise noted on plans

GIB Aqualine®, 10mm

GIB Aqualine® plasterboard, 10mm thick.

Location: To all wet area walls - refer to latest version of GIB site guide

GIB Aqualine, 13mm

GIB Aqualine® plasterboard, 13mm thick.

Location: To all wet area ceilings - refer to latest version of GIB site guide

GIB Braceline® / GIB Noiseline®, 10mm

GIB Braceline® / GIB Noiseline® plasterboard, 10mm thick.

Location: Refer to bracing plans and calculations for locations

3.8.4 Fixings

GIB® Grabber® Screws

Fix sheets with adhesive and GIB® Grabber® drywall screws in accordance with Winstone Wallboards Ltd requirements.

GIBFix® All-Bond Adhesive

GIBFix® All-Bond adhesive. Use to adhere the sheets and accessories to the framing in accordance with Winstone Wallboards Ltd requirements.

3.8.5 Level of Plasterboard Finish

Level of Finish

To the areas noted as a specific Level of Finish (3-5) on the drawings, additionally comply with all relevant aspects of Winstone Wallboards Ltd literature and AS/NZS 2589, complete with all system accessories, and other relevant product manufacturers' recommendations.

NOTE: Unless stated otherwise, Level 4 is the default Level of Finish.

Control Joints

To the areas noted as 'control joint', comply with all relevant aspects of Winstone Wallboards Ltd literature and AS/NZS 2589.

3.8.6 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to ensure that appropriate clearances are allowed from adjacent internal linings, fixtures, products, and associated services, etc, that the sheets correctly allow for door and window installation, and that services penetrations are correctly handled to maintain sheet integrity.

3.8.7 Workmanship

Workmanship

All installation work shall be carried out by experienced tradesmen familiar with the techniques and materials specified and in accordance with the current requirements of Winstone Wallboards Ltd.

3.8.8 Delivery & Handling

Delivery & Handling

Store GIB® plasterboard sheets undercover inside a watertight building and keep sheets dry at all times. Stack sheets flat on a dry level surface in accordance with Winstone Wallboards Ltd recommendations. Avoid damage to sheet edges, ends, and surfaces. Carry all sheets on edge. Do not use damaged or faulty sheets.

3.8.9 Preparation

Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and otherwise in accordance with the specified Level of Finish and Winstone Wallboards Ltd requirements. Framing shall be plumb and in true alignment, complete and suitable for the sheets, and maximum moisture content 18% or as recommended by Winstone Wallboards Ltd. Ensure that the framing is true to line and plane and with no projections due to structural and bracing bracketry etc. Ensure that all framing brackets, plates, braces and hold-downs etc. are correctly installed.

Check that the building has been completely finished to all penetrations including doors, windows, services, etc so that the sheets can be installed without being affected by any weather conditions. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flooring, setout of services, etc. that will enable the sheets and accessories to be installed. Clear building debris and rubbish from framing voids and keep clean until GIB sheet linings are installed.

3.8.10 Installation

Installation

Install the sheets, complete with all accessories, to the framing in accordance with the relevant Winstone Wallboards Ltd recommendations and literature, and as noted and detailed on the drawings.

3.8.11 Completion

Completion

Ensure that the sheets have been cut, fitted and joined, and fixed correctly. Check for damage and replace as necessary.

Clean up thoroughly on completion and remove all waste and rubbish from site.

Provide a copy of the Winstone Wallboards Ltd maintenance requirements to the owner.

3.9 Thermakraft Underlay, DPM & DPC

3.9.1 Scope

Scope

Supply and install Thermakraft Underlays and Membranes, as specified herein, to the locations identified on the drawings, complete with all accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with Thermakraft Ltd technical information and installation requirements (check www.thermakraft.co.nz, or call 0800 806 595 for the latest editions), other relevant product manufacturers' recommendations, and as shown on the design drawings.

No substitutions are permitted for the specified products from Thermakraft Ltd.

Extent of Work

The following is a list and a general description of the extent of the Thermakraft Underlays and Membranes works, which are more specifically defined in the contract documents, required for the completion of the contract works:

3.9.2 Requirements*Safety*

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

Warranty

[Thermakraft Ltd Product Warranty](#):

- 15 Years Warranty - for all Thermakraft warranted products installed, according to the warranty conditions.
- Provide the Thermakraft Ltd Product Warranty on the manufacturer's standard warranty form.
- Commence the warranty from the date of permanent installation.

Substitutions

Thermakraft Ltd products shall be as specified herein and as indicated on the approved drawings. The substitution of Thermakraft branded products for alternative brands is not permitted under any circumstances.

The substitution of a specified Thermakraft product for an alternative Thermakraft branded product by the Contractor shall only be permitted with the Contract Administrator's written authorisation, and shall be at no additional cost to the Principal. Should any resultant extra work and/or redesign work be required to accommodate alternative Thermakraft branded products to satisfy design, performance and compliance requirements, then the cost of these shall be borne by the Contractor.

3.9.3 Damp-Proof Membrane*Thermathene Black (250µm)*

[Thermathene Black](#) (250µm). A 250 micron thick (0.25mm), tear resistant, polyethylene film sheet concrete underlay. Coloured black.

Installed over nominal 10mm (max. 25mm) thick compacted sand blinding layer, over a properly prepared base course, as a moisture vapour barrier under concrete slabs on-ground (prior to concreting), in accordance with the manufacturer's requirements and as shown on the drawings.

All joints lapped 200mm and continuously sealed with Thermakraft [White General Purpose Tape](#).

Tape-seal around penetrations. Inspect immediately before pouring concrete and repair any holes or other damage.

Installed Location: As per drawings

3.9.4 Damp-Proof Course

Supercourse 500 DPC

[Supercourse 500 DPC](#). A 0.75mm thick, high-impact, single-layer Polyethylene film, embossed on both sides. Available in 50mm, 75mm, 90mm, 100mm, 150mm, 200mm, 250mm, 300mm, 400mm, 500mm and 1000mm roll widths. Supercourse 500 DPC is suitable for use as a separation barrier between most incompatible and dissimilar materials.

Used as a general damp proof course (DPC) for separating timber and wood-based products and metal from concrete, masonry, brick, and stone surfaces, and as a moisture barrier.

Also used as a concealed flashing behind brick veneer cladding in accordance with NZS 4229 and NZBC E2/AS1.

Installed in accordance with the manufacturer's requirements, [BRANZ Appraisal No.329 \(2016\)](#), and as shown on the drawings.

3.9.5 Wall Underlay

Watergate Plus 295 - Synthetic Wall Underlay

[Watergate Plus 295](#). A fire-retardant, absorbent, breathable, composite non-woven polyolefin synthetic underlay. Nominal weight 110g/m².

Installed as a standalone flexible underlay over timber or steel wall framing in accordance with the manufacturer's requirements and [BRANZ Appraisal No.695 \(2017\)](#), in NZS 3604 Wind Zones up to and including 'Very High'.

Installed as a flexible underlay over a rigid air barrier in accordance with NZBC E2/AS1 9.1.7.2 to the manufacturer's requirements and [BRANZ Appraisal No.695 \(2017\)](#), in NZS 3604 Wind Zones up to and including 'Extra High'.

Watergate Plus can be used with absorbent and non-absorbent direct-fixed wall claddings, and absorbent and non-absorbent wall claddings over a 20mm drained cavity, and masonry veneer cladding over a drained cavity in accordance with NZBC E2/AS1 and [BRANZ Appraisal No.695 \(2017\)](#).

Do not leave Watergate Plus 295 exposed on walls for more than a total of 60 days before covering.

Installed Location: All external walls and as noted on drawings

3.9.6 Roof Underlay

Thermakraft 215 - Bitumen Building Paper

[Thermakraft 215 Building Paper](#). A self-supporting, absorbent, breathable, bituminous impregnated non-synthetic underlay (non-fire retardant). Heavy class, nominal weight 400g/m².

Installed as a roof underlay over timber or steel roof framing in accordance with the manufacturer's requirements and as shown on the drawings.

Thermakraft 215 Building Paper roof underlay can be used directly under direct-fixed roof claddings, or directly under roof tile battens in accordance with Thermakraft requirements.

Thermakraft 215 Building Paper roof underlay must be installed in a manner that prevents ponding of water. Provide additional support at no more than 300mm centres when Thermakraft 215 Building paper is installed on roofs with slopes less than 10°.

Do not leave Thermakraft 215 Building Paper exposed on roofs for more than a total of 7 days before covering.

Installed Location: Under all roofs unless otherwise noted on drawings

3.9.7 Underlay Support

Thermakraft Thermastrap 201 Strap

[Thermakraft Thermastrap 201](#). A 19mm wide x 0.4mm thick polythene embossed strap. For use as a support for non-self support roof underlays, and to restrict the bellowing of flexible wall underlays in drained cavities. Suitably tensioned when installed to avoid any sagging and to keep the flexible underlay in a flat plane. Installed at right angles to roof purlins or wall studs, at maximum 300mm centres.

Application/Use: to all roofs below 10 degree roof pitch

Thermakraft Stud Strap

[Thermakraft Stud Strap](#). A 25mm wide x 0.4mm thick polypropylene woven and coated strap. For use as a support for non-self support roof underlays, and to restrict the bellowing of flexible wall underlays in drained cavities. Suitably tensioned when installed to avoid any sagging and to keep the flexible underlay in a flat plane. Installed at right angles to roof purlins or wall studs, at maximum 300mm centres.

Application/Use:

3.9.8 Underlay Penetration Seals

Multi-Fit Penetration Seals

[Thermakraft Multi-Fit Penetration Seals](#). A range of pipe and service penetration seals consisting of soft, flexible EPDM membrane with a self-adhesive flange.

Multi-Fit Penetration Seals are part of the Thermakraft membrane system, and are a patented airtight solution for round or rectangular pipes, cables or conduits when passing through underlay barriers.

Pipe seals accommodate pipe diameters from 15mm up to 110mm. Cable seals accommodate cable diameters from 7mm up to 22mm, and 80mm trunking.

Installed in accordance with the manufacturer's requirements and [BRANZ Appraisal No.942 \(2017\)](#), with stand-alone flexible wall underlay over timber or steel wall framed walls on buildings situated in NZS 3604 Wind Zones up to and including 'Very High'.

Installed in accordance with the manufacturer's requirements and [BRANZ Appraisal No.942 \(2017\)](#), with flexible wall underlay used over a rigid wall underlay on buildings situated in NZS 3604 Wind Zones up to and including 'Extra High'.

3.9.9 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to install Thermakraft Underlays, DPMs, and DPCs as required.

3.9.10 Workmanship

Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All installation work shall be carried out by experienced and competent tradespersons, familiar with the specified products and installation techniques, in accordance with the manufacturer's requirements, and to fully comply with all warranty requirements.

All cutting, joining, and fixing techniques shall be exactly as recommended by the manufacturer, and carried out with the use of suitable tools and equipment appropriate for the application. All work shall be such as to leave a neat, efficient, and weathertight installation.

3.9.11 Delivery & Handling

Delivery & Handling

Store underlay rolls on end, undercover, on a flat, clean and dry surface. Keep stored materials dry, out of direct sunlight, and protected from damage and contamination at all times.

Handle materials in accordance with the manufacturer's requirements and in a manner that prevents damage to or deterioration of the product.

Do not use damaged or defective materials, or products that are beyond their designated shelf life.

Installers shall be familiar with and comply with the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform with all relevant [WorkSafe NZ](#) Guidelines and Codes of Practice - including the [OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry](#), as well as the [Best practice guidelines for working on roofs](#) for roofing installations.

3.9.12 Preparation

General

Prior to installation, carry out all necessary inspections and preparatory work required, and ensure that all preliminary works by other trades has been completed to specification and as shown on the approved drawings.

Do not commence installation until all necessary preliminary works by others is complete and to the required standard. The commencement of work shall be deemed to indicate full acceptance by the installer that all preliminary works by other trades is complete.

Supporting timber framing shall comply with NZS 3604, or with NZS 3603 and AS/NZS 1170 for specific design, and have a maximum moisture content of 20% at the time of cladding installation. Allow LOSP treated timber to sufficiently flash-off before installing Thermakraft building underlays and foils.

Supporting light structural steel framing shall comply with the requirements of AS/NZS 4600 or the NASH Standard for Residential and Low-rise Steel Framing, Part 1: Design Criteria. Comply with the light structural steel framing fabricator's specifications and requirements for fixing cladding and roofing components.

Supporting heavy steel structures shall comply with NZS 3404.

Under-Slab Basecourse

Under-Slab Basecourse - prior to laying under-slab DPM, check all aspects of preparatory works, including but not limited to:

- Check that the under-slab basecourse has been correctly laid and compacted as specified.
- Check that the surface has been properly prepared and compacted to the required standard, and is smooth and flat.
- Ensure any sand blinding is free of aggregate, sharp protrusions.
- Ensure the final surface is free of hollows and ponded water prior to laying the DPM.

Wall Framing

Wall Framing - prior to wall underlay installation check all aspects of preparatory works, including but not limited to:

- Check that wall framing has been completed as shown on the drawings, complies with the relevant design and construction standards.
- Check that framing is securely fixed, true to line and plane, is plumb and level where required, and is trimmed at edges, openings and penetrations as required.
- Check that there are no projections due to structural bracing and bracketry etc.
- Check that the required clearances from ground, deck, balcony or lower roof to the bottom edge of the underlay/cladding are in accordance with NZBC E2/AS1.

Roof Structure

Roof Structure - prior to roof underlay installation check all aspects of preparatory works, including but not limited to:

- Check that the supporting purlins or battens are set-out to the required set-out and spacings, are

straight and true to line and plane, and are securely fixed.

- Check that all barge and fascia boards have been installed to the correct line and plane with all edge blocking complete and secure.
- Check that valley gutter and hidden gutter framing is to the required dimensions with solid backing supports securely fixed, true to line and plane.
- Check that internal gutter membrane linings are complete, and dressed back and adhered to a solid substrate along the roof edge as shown on the approved drawings.
- Check that all trimming for roof penetrations, all roof/wall junction blocking, and all necessary work by other trades is complete.
- Check that solid sarking required for fully-supported roofing is complete and securely fixed in accordance with the approved drawings.
- Check that any required anti-ponding boards for tiled roofs have been correctly installed to a minimum 5° (1:12) fall to the eaves gutter.

3.9.13 Installation - Wall Underlay

Watergate Plus 295 Wall Underlay

Watergate Plus 295 Wall Underlay shall be installed, printed face out, to the exterior face of the wall framing, run horizontally, starting from the bottom edge and finishing at the top edge, extending 35mm below the bottom plate or bearer, and lapped such that any water will be shed to the outside of the underlay with minimum 150mm horizontal laps and minimum 150mm vertical joint laps made over a stud, and kept taut without sagging or bulging.

Fix at maximum 300mm centres, with 6-8mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary fixings. Provide additional fasteners fixed through Thermakraft Stud Strap around framed openings before cutting Watergate Plus 295 at openings.

Cut window and door openings just prior to joinery installation; cut underlay at 45° angle away from each corner and return full framing depth and fasten to inside of frame. Install Thermakraft Corner Moulded flashings and Thermakraft Window Flashing Tape over the underlay at opening corners and along sill trimmers in accordance with Thermakraft requirements.

For drained cavity wall construction where studs are at greater than 450mm centres, install Thermakraft Stud Strap horizontally at 300mm centres to prevent bulk insulation from pushing the underlay into the cavity space.

Finish Watergate Plus 295 underlay at edges as detailed.

Install all necessary flexible flashing tapes to openings, around pipes, ducts and other services penetrating the underlay, parapet and balustrade junctions, along head flashings and inter-storey flashings when installed, as required to seal the underlay, in accordance with Thermakraft requirements and as shown on the drawings.

3.9.14 Installation - Roof Underlay

Thermakraft 215 Building Paper

Thermakraft 215 Building Paper shall be installed without support on roofs with slopes 10° or greater (unless specified otherwise), run horizontally across the roof slope and over the purlins, starting from the gutter/lowest point up to the ridge/highest point, extending maximum 20mm into gutters, with minimum 150mm side and end laps, lapped such that any water will be shed to the outside of the underlay, and sufficiently tensioned without sagging.

The maximum run length shall be no greater than 10 metres.

Fix at maximum 300mm centres to purlins, with 8-12mm stainless steel staples or 20mm large-head galvanised clouts or galvanised proprietary grippers.

For tiled roofs, lay Thermakraft 215 over the anti-ponding board and rafters/trusses, and fix at maximum 300mm centres to the rafters/trusses before the tile battens are installed.

Finish Thermakraft 215 along roof edges and junctions, valley gutters, and at the ridge as shown on the drawings. Carefully cut underlay at roof openings at 45° angle away from each corner and lap-tape closed to framed up-stands, ducts and other services penetrating the underlay in accordance with Thermakraft requirements and as detailed. Leave underlay minimum 50mm distance clear of the outer liner of flue stacks.

3.9.15 Completion

Completion

Check that all underlays have been installed correctly and are properly supported, and that all underlay edges, joins and ends are correctly finished prior to closing off with claddings - all in accordance with Thermakraft installation requirements.

Check installed membranes and underlays for defective work and damage - replace and/or repair as necessary to the required standard.

Leave all of this work complete, and free of defects, and to the required standard in accordance with the manufacturer's warranty requirements.

Issue to the Owner a copy of the Thermakraft maintenance requirements and the Thermakraft product warranties for the installed products.

3.10 Axon Panel

3.10.1 Scope

Cavity Construction with CLD Structural Cavity Battens

Supply and install Axon Panels as a fibre-cement panel cladding material to the walls identified on the drawings, complete with all accessories. The panels are to be finished with a paint system.

All aspects of this work shall be in complete accordance with the [Axon Panel Technical Specification](#) (check www.jameshardie.co.nz, or call 0800 808 868 for the latest edition) and other relevant product manufacturers' recommendations. Use the Axon Panel Installation Checklist at all relevant stages of the work.

3.10.2 Co-operation

Co-ordinate with other trades to ensure that appropriate clearances are allowed from roofing products and associated flashings etc., that the panels correctly allow for door and window installation, and that services penetrations are correctly handled to maintain full weathertightness and panel integrity.

Ensure that other trades are aware of the James Hardie Safe Working Practices.

3.10.3 Preparation

Check that the timber framing elements are in accordance with NZS 3604, or in accordance with NZS 3603 and AS/NZS 1170 for specific design, and in accordance with James Hardie requirements. Framing shall be plumb and in true alignment, complete and suitable for the panels, and maximum moisture content as per NZS 3602. Ensure that the framing is true in line with no projections due to structural and bracing bracketry etc. Ensure that the bottom plate hold-downs are correctly installed.

Check that the building underlay or rigid air barrier has been installed in full accordance with the manufacturer's requirements and the drawings, and completely finished to all penetrations including doors, windows, services, etc. Check junctions to all other building elements and ensure that all necessary works have been completed eg. flashings etc that will enable the panels and all accessories to be installed.

Check that the ground levels are sloping away from the building so that there will be no ponding water against the building, and that the ground will remain clear of the panels by at least 100mm at all times in accordance with E2/AS1.

3.10.4 Sealants

Flexible silicone sealant to be SIKa Silaflex MS. Use to seal the panels and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with selected finish.

Polyurethane adhesive sealant to be SIKa Sikaflex 11FC. Use to adhere the panels to the CLD Structural Cavity Battens and accessories in accordance with the sealant manufacturer's recommendations and to James Hardie requirements. Ensure sealant compatibility with jointing and texture finishes.

3.10.5 Workmanship

All installation work shall be carried out by an LBP, or supervised by an LBP, in accordance with Axon Panel Technical Specification and other relevant product manufacturers' recommendations.

3.10.6 Delivery & Handling

Carry all panels on edge. Stack panels flat on a level platform off the ground ie. use the supplied delivery pallet on level ground (if no pallet then evenly spaced bearers on level ground at 600mm c/s maximum). Keep panels and accessories dry at all times. Avoid damage to panel edges, ends, and surfaces. Keep uPVC flashings etc out of direct sunlight, and store all accessories on flat and avoid damage to any. All installers to be familiar with and comply with the James Hardie Safe Working Practices in the Technical Specification, to use appropriate safety gear, and in particular to be aware to avoid breathing silica dust. Do not use any damaged or blemished panels or accessories.

3.10.7 Installation

Fix uPVC vent strip through the building underlay or rigid air barrier. Ensure that the openings in the vent strip are kept clear and unobstructed at all times. Fix CLD Structural Cavity Battens through the building underlay or rigid air barrier to the framing. Install the panels to the CLD Structural Cavity Battens in accordance with the Technical Specification, complete with all accessories. Install Scyon mould accessories to complete the installation.

Ensure that all cut edges of CLD Structural Cavity Battens are primed prior to installation with Dulux Acraprime 501/1 sealer or Resene Quick Dry.

Ensure that all cut edges of panels are primed prior to installation with Dulux 1 Step Prep, Resene Quick Dry, or similar. Ensure that the bottom edge of the panel overhangs below the bottom plate by 50mm, and is clear of the ground surface by at least 100mm; the finished ground clearance shall be in accordance with E2/AS1. Seal around services penetrations to maintain weathertightness and air pressure resistance.

3.10.8 Horizontal Joint & Drainage Joint

Horizontal joints to be formed on cavity batten framing with aluminium 'h' mould. Ensure that the panels are not fixed to the floor joists.

Horizontal drainage joints to be formed at floor joist with folded Z-flashing as per E2/AS1 requirements. Ensure the panels are not fixed to the floor joists.

3.10.9 Batten Fixings

Fix CLD Structural Cavity Battens and other accessories with galvanised nails in accordance with Axon Panel requirements.

3.10.10 Panel Fixings

Fix panels and accessories to the CLD Structural Cavity Battens with Grade 304 stainless steel nails and adhesive sealant in accordance with Axon Panel requirements.

3.10.11 Completion

Complete the Axon Panel Installation Checklist and hand over a copy to the client.

Ensure that the panels have been fixed correctly, that all vertical joints and accessories have been completed correctly, and that all penetrations have been taped correctly.

Check that no damage has occurred to any installed panel element or associated component, replace as necessary.

Check that no dirt has been mounded up within 175mm of the panels, and maintain the clearance.

Ensure that the panels are painted within 90 days of the sheet installation, complete with all accessories and flashings.

Hand over a copy of the latest edition of the Axon Panel Product Warranty to the client.

Hand over a copy of the latest Axon Panel Maintenance Schedule to the client.

3.11 Weatherboard Cladding Systems

3.11.1 Scope

Horizontal Bevelback Weatherboard

Supply and install the Hermpac Bevelback Weatherboard Cavity System, as specified herein, to the walls identified on the drawings, complete with all accessories and trim. All aspects of this work shall be in complete accordance with the Hermpac product specifications and technical literature (check www.hermpac.co.nz, email: technical@hermpac.co.nz, or call 09 421 9840 for the latest editions), [BRANZ Appraisal No.663 \(2014\)](#), NZBC E2/AS1, other relevant product manufacturers' recommendations, and as shown on the drawings.

The Hermpac Bevelback Weatherboard Cavity System is CodeMark assured: [CodeMark Certificate of Conformity No. GM-CM30038-RevG](#), issued by Global-Mark Pty Ltd.

No substitutions or deletions are permitted for the Hermpac Bevelback Weatherboard Cavity System.

3.11.2 Timber Species & Grade

Western Red Cedar, Premium Clears No.1 - Bevelback Weatherboard

Hermpac Bevelback Weatherboard shall be manufactured from Canadian Coastal Western Red Cedar (*Thuja plicata*), [Premium Clears No.1 \(PC1\)](#) grade.

3.11.3 Weatherboard Profile

HP62 Standard Bevelback - 158mm Cover

HP62 Hermpac Standard Bevelback Weatherboard: 158mm cover, 190mm wide x 18.5mm thick.

Installed Location:

3.11.4 Weatherboard Finish & Coating

Bandsawn Face - Resene Waterborne Woodsman Oil Stain - Cedar Bevelback Weatherboard

The selected Hermpac Cedar Bevelback Weatherboard shall be manufactured with a Bandsawn Face (BSF), and pre-finished with Resene Waterborne Woodsman Penetrating Oil Stain to the specified colour, factory-applied by the Machinecoat Floodcoat coating system.

Colour:

3.11.5 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works, including membranes, flexible underlays, rigid air barriers, and trims and any other related works are completed in accordance with the Hermpac Cavity System Installation Specification and Construction Drawings.

Refer www.herpac.co.nz, email: technical@herpac.co.nz, or call 09 421 9840 for any technical assistance required, and ensure that current Hermpac technical literature is referenced and followed when installing Hermpac weatherboards.

Coordinate with trades the locations of pipes, outlets, cables, meter boards and other fittings installed by others, and to install Hermpac Weatherboard Cladding System as required.

3.11.6 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

Installation work shall be carried out by suitably qualified and experienced tradespersons, familiar with the specified products and the required construction and installation techniques, in accordance with the requirements of the Hermpac technical literature and associated BRANZ Appraisal, NZBC E2/AS1, and as noted and detailed on the approved construction drawings.

Upon completion of the installation, the installing LBP shall complete and sign a Restricted Building Work (RBW) memorandum and the associated Hermpac Weatherboard Cladding System Quality Assurance Check List. Issue a copy of the RBW document to the Building Consent Authority and to the Main Contractor.

All work shall be such as to leave a neat, efficient, robust and weathertight installation, to the required standard, free from damage and defects, including surface marking.

Make all necessary provisions to protect adjacent finished work and surfaces from damage during installation.

Refer www.herpac.co.nz, email: technical@herpac.co.nz, or call 09 421 9840 for any technical assistance required, and ensure that current Hermpac technical literature is referenced and followed when installing Hermpac weatherboards.

3.11.7 Delivery & Handling

Store weatherboards and accessories undercover, flat and true, clear of the ground by at least 150mm and supported on dry and clean timber bearers at maximum 900mm centres in accordance with Hermpac recommendations. Keep stored weatherboards and accessories dry and protected from damage and contamination, and free from bending or excessive compression.

Do not use damaged or defective weatherboards or accessories.

Dock any oversized knots, unacceptable or unrequired grade characteristic, or damaged areas of weatherboard. Do not install weatherboards during periods of wet weather. Double seal all cut ends and fresh cut timber with selected exterior coating.

Handle weatherboards in accordance with the manufacturer's recommendations and in a manner that prevents damage and surface marking.

Installers shall be familiar with, and comply with, the manufacturer's safe handling requirements and precautions for use, and shall use appropriate safety gear when handling materials.

Installers shall conform with all relevant [WorkSafe NZ](#) Guidelines and Codes of Practice - including the [Best practice guidelines for working at height in NZ](#), and the [OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry](#).

3.11.8 Preparation

Direct Fix over Flexible Underlay - Bevelback Weatherboard

Hermipac Bevelback Weatherboard Direct-Fixed over a Flexible Wall Underlay on Timber Framing - check all aspects of preparatory works, including, but not limited to:

- Check that the timber wall framing complies with NZS 3604, has studs at maximum 600mm centres and nogs/dwangs at maximum 800mm centres for horizontal cladding, is plumb and in true alignment, includes all blocking required for fixing at openings, joints, corners, soffits, etc., and has a maximum moisture content of 18% at the time of cladding installation.
- Check that the flexible wall underlay, as specified, has been installed in accordance with NZBC requirements and the manufacturer's recommendations, and with all finishing tapes, flashings etc. at windows, doors, corners and penetrations all correctly incorporated to provide a continuous seal.
- Check that all preparatory materials are lapped such that any water will run down to the exterior.

3.11.9 Installation

General Requirements

Install the specified Hermipac Weatherboard Cladding System, complete with accessories, in accordance with the Hermipac installation requirements and technical literature and as shown on the approved construction drawings.

Confirm the layout and location of all control joints; the layout of cavity battens; and any specific cladding detailing requirements prior to installation.

Ensure that all associated preliminary and preparatory works are completed to the required standard and specification, and as shown on the drawings.

Ensure that the current and up-to-date Hermipac installation and technical literature is readily available on site for reference during installation.

Weatherboard soaker and/or flashing material compatibility shall be in accordance with NZBC E2/AS1 2.2, and as shown on the drawings.

Ensure all cut ends and fresh timber is double coated and sealed in accordance with Hermpac requirements before fixing.

Refer to Fixing for fixing type and placement etc.

All internal and external weatherboard corner junctions, inter-storey junctions, and weatherboard trim and accessories, shall be constructed and installed to the details shown on the drawings.

Always keep Hermpac weatherboard cladding lines consistent and true along walls and around corners.

All flashings around windows, doors and other openings, at corner junctions, inter-storey junctions, soffit junctions, and pipe penetrations, shall be carefully constructed, fixed and finished to the details shown on the drawings.

Direct Fix over Flexible Underlay - Bevelback Weatherboard

Hermpac Bevelback Weatherboards direct-fixed to timber framing over a flexible wall underlay:

Back flash all internal and external corners with Hermpac aluminium corner flashings.

Carefully set-out and fix the base weatherboard to the timber studs, level along the base line, minimum 50mm, or as detailed, below the bottom plate or floor structure.

Install full length weatherboards where possible. From the base board upwards, level and true the weatherboards to the framing.

Where joints are unavoidable, scarf the weatherboards at 30° directly over a stud line, and fix weatherboard ends as specified and just clear of the scarf join.

Overlap, joint and fix direct-fixed Hermpac Bevelback Weatherboards in accordance with Hermpac installation requirements and as detailed on the drawings. NB: Ensure weatherboard end-grains are double coated.

3.11.10 Fixing

Crown Head Nail, Silicon Bronze - Cedar Bevelback Weatherboard

Fix Hermpac Cedar Bevelback Weatherboards with Silicon Bronze Annular Grooved Hermpac Crown Head Nails in accordance with Hermpac fixing requirements and as shown on the drawings.

The nail shank must be minimum 3.15mm diameter for cavity-fixed weatherboards, or 2.8mm diameter for direct-fixed weatherboards.

When fixing with crown head nails (used most often for an oil/stain finish), the nail length must allow minimum 30mm penetration of the wall frame.

All nail fixings shall be pre-drilled a maximum of 1mm diameter smaller than the nail gauge.

Ensure the weatherboards are set-out with an overlap of 32mm.

Single fix weatherboards at every fixing point, with nails driven in a slight upward slope, located 35-40mm from the bottom edge of the weatherboard, and no closer than 32mm from the end of the board.

Nails shall be set flush onto the board surface - not into or below the surface.

The hidden top lap must be restrained using the Hermpac Clinch Nail at every fixing point, with the nail shank flush against the top edge - the nail must not be fixed through the lap, refer to Hermpac details for correct placement.

3.11.11 Completion

Check that the specified Hermpac Weatherboard System has been correctly installed and fixed to the layout and details shown on the drawings; that all joints, associated trim and accessories finished correctly; and that all openings and penetrations have been properly flashed and sealed.

Check for damaged materials and defective work - carry out repairs as necessary to the required standard.

Ensure that the work of other trades does not negatively impact on or reduce the minimum clearances required by the NZ Building Code, between the cladding and ground, roof and/or deck junctures.

Leave all of this work complete and weathertight and to the required standard in accordance with Hermpac requirements and NZBC E2/AS1.

Leave the completed works and surrounding surfaces clean and free of debris and rubbish. Remove all rubbish and excess material from the site.

Complete and sign the Restricted Building Work (RBW) memorandum, and the Hermpac Weatherboard Cladding System Quality Assurance Check List. Issue a copy of the RBW document to the Building Consent Authority and to the Main Contractor.

Issue to the Owner a copy of the Hermpac Weatherboard Cladding System maintenance requirements.

4 ROOFING

4.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

4.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1397:1993(AS/NZS)	Steel sheet and strip - hot-dipped, zinc-coated or aluminium/zinc-coated
1562.1:1992(AS)	Design and installation of sheet roof and wall cladding. Part 1: Metal
2295:2006(NZS)	Pliable, permeable building underlays
3604:2011(NZS)	Timber-framed buildings

4.3 COLORSTEEL®

4.3.1 Scope

Inland - Moderate (ISO C2)

Supply the selected Colorsteel roofing and install on the areas identified on the Roof Plan. All aspects of the work shall be in complete accordance with NZ Steel 'Installers Guide' (check 0800 100 523 for the latest edition) and any other relevant Product Manufacturers Recommendations.

4.3.2 Product

Colorsteel Endura

COLORSTEEL® Endura™.

Colour:

4.3.3 Profile

Corrugated 0.40mm

Corrugated 0.40 BMT x G550.

Location:

4.3.4 Qualifications

Qualifications

All installation work shall be carried out by experienced and competent tradesmen who are familiar with the techniques and materials specified. All handling and fixing techniques, and all jointing and sealing materials and techniques, shall be exactly as recommended by New Zealand Steel.

4.3.5 Co-operation

Co-operation

Co-operate with other trades to ensure that roof framing has appropriate spacings, alignments and fixings, and is in accordance with NZS3604, and coordinate to ensure that all timber members required for ridges, hips, valleys, barge, penetrations, junctions with vertical faces, etc. are correctly in place.

Note and co-ordinate with the installer of the rainwater system specified above. Handle roofing without scratching, distortion or other damage, store on even bearers, and keep dry until installed. Ensure that each section of roof is waterproofed as soon as possible after preparatory work is complete; allow to carry out the works in several operations if necessary to comply with this condition.

4.3.6 Installation

Installation

Set-out the roofing sheets exactly square to building axis and maintain this accurate setout throughout the works, and set-out to lap sheets away from the prevailing wind.

Install the underlay running up and down the slope with minimum 300mm side laps. Do NOT install any fixings to the underlay (to avoid dissimilar metals/electrolysis) - install the underlay length by length as the roofing proceeds and ensure it is taut and evenly lapped when the roofing screws are installed.

4.3.7 Fixings

Fixing

Screw fix, screws to comply with AS3566 (Self-drilling construction screws) Class 3 or 4. (Do NOT use stainless steel screws). Use only low carbon (

4.3.8 Flashings

Flashings

Ridges, hips, and barge flashings etc. shall all be matching Colorsteel, and as detailed. Soft zinc flashing edges very neatly dressed down where required, plumbing penetrations custom flexible rubber flashed (fully sealed), and instruct the Plumber that no copper (or brass) pipes are to discharge on to the roof.

4.3.9 Protection

Protection

Protect the coated surface from damage at all times; replace the whole sheet where a significant depth of the coating has been damaged. Completely clean off all drill and power saw swarf and pop-rivet shanks as the work proceeds (at least daily, and keep them and other rubbish out of the spoutings). Remove trade debris from the roof and from the site progressively, and on completion leave the roof and rainwater system completely clean.

Do not use black lead pencils for marking Colorsteel - permanent marking may result. Observe NZ Steel's recommendations where flues discharge above roofs, and for the installation of solar heating panels. Do NOT weld Colorsteel. NO abrasive disc cutters, no soldering, no lead head nails or lead edged flashings, no touch-up paints, and do not slide tools down the roof.

4.3.10 Maintenance

Maintenance

Advise owner to minimize walking on the roof, and to use soft-sole shoes during maintenance access. Advise owner re maintenance of unwashed surfaces, and to light detergent wash the whole roof every three to five years. Advise owner that any leaf build-up gutter protection system that traps water will invalidate the roofing warranty.

5 ALUMINIUM JOINERY

5.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

5.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1734:1997(AS/NZS)	Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
1865:1997(AS/NZS)	Aluminium and aluminium alloys - Drawn wire, rod, bar and strip
2208:1996(AS/NZS)	Safety glazing materials in buildings
4211:2008(NZS)	Specification for performance of windows
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
AS/NZS 1231	Aluminium, anodic coatings
AS/NZS 1866	Aluminium / alloys - extruded sections
AS/NZS 4666:2012	Insulating glass units

5.3 Aluminium Windows

5.3.1 Alternatives

Alternatives Option 1

The materials and elements specified indicate the required standards for these works. Alternatives which are equal to or superior to these materials and elements may be tendered for approval.

Thermal performance (NZBC H1/AS1) must be as required to meet the Designer's Thermal Evaluation.

5.3.2 Installation Type

Timber Frame Installation - Direct Fix

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.

Check framing alignment, and that window openings are square and the correct size for fitting tolerances.

Prepare framing openings by neatly cutting the building wrap at 45° into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape,

stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the sill flashing, extending from an upstand lip behind the line of the aluminium frame out to lap a minimum of 35mm down over the top of the cladding, sloping at 15° unless the glazing weight requires the frame be blocked up for support. (If the flashing is level for blocking-up the sill, upstand its ends to create 'dams' as shown in E2/AS1).

Set shims or pack as necessary and install the frames exactly true and square. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15° down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm, before finishing with a 5mm 45° 'kick out'. Seal between head flashing and cladding at the ends as detailed. Install jamb flashings/sealant or scribes as detailed.

After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

Timber Frame Installation - Cavity Construction

All windows (and aluminium frame external doors) installation work shall be exactly in accordance with NZBC E2/AS1, the Windows Association's Windows Installation System (WANZ:WIS), and details on the drawings or supplied by the windows manufacturer.

Check framing alignment, and that window openings are square and the correct size for fitting tolerances.

Prepare framing openings by neatly cutting the building wrap at 45° into the corners, turning wrap through the frame depth and fixing to the inside face, flashing the bottom corners with moulded plastic and over-flashing the full sill and 200mm up the jambs with the specified flexible flashing tape, stapled to hold the stretched external corners. At head corners install flashing tape 200mm each way from the corners.

Install the WANZ extruded aluminium support bar with built in drainage and ventilation to NZBC E2, to provide continuous support to the window unit. Install the head cavity closer, positioned to provide a 15mm drip edge to the cladding.

Set shims or pack as necessary and install the frames exactly true and square, blocked-up off the support bar as required. Use appropriate separators between aluminium and other materials, and fix securely with due regard for any anticipated movements and for linings, trim etc.

Install the head flashing, extending 35mm up behind the cladding (and in turn over-flashed with an additional piece of wrap cover extended up under the wrap or flashing or eaves above), sloping at 15° down to the exterior, and turning down to cover the top of the aluminium frame by at least 10mm, before finishing with a 5mm 45° 'kick out'. Upstand the head flashing ends as detailed. Install jamb flashings/ sealant or scribes as detailed.

After frames installation install closed cell backing rods as required and expanding foam air-seal the gap between framing and liners.

5.3.3 Interior Finish

Architraved

Architraved.

5.3.4 Reveal

Timber Finger Jointed - 19mm

Timber reveals for paint finish with all sides primed.

5.3.5 Glass Platform

Double Glazed

Double Glazed.

5.3.6 Finish

Powder Coated Aluminium - Matt

Polyester powder coating in accordance with WANZ Powder Coating Quality Assurance System and AAMA 2603-98 performance is required.

5.3.7 Hardware

Colour Matched Hardware

Hardware colour matched to Aluminium Joinery: confirm with owner prior to manufacture of joinery

Hinges, stays, catches, fasteners, latches, locks and furniture as offered by the window and door manufacturer. Key alike all lockable window hardware able to be keyed alike.

Account for all keys and deliver separately to the site manager. Factory fit all required and scheduled hardware.

5.3.8 Workmanship

Workmanship

These windows will be manufactured in workshops containing all mechanical equipment appropriate for the work, and by experienced and competent tradesmen who are familiar with the techniques and materials specified.

The manufacturer will co-ordinate with other trades to establish the exact sizes for all frames before fabrication. Frames and sashes will be fabricated true, square, rigid, and 'out of wind', with all joints strongly mechanically fixed, and with mitres tight and fully sealed. Potential thermal, wind and seismic movements will be accommodated within the construction. All cavities will drain to the exterior, and all drilling swarf etc. will be removed during fabrication.

Stays, hinges, running gear and glazing will be installed as scheduled (the Designer will be notified if any scheduled hardware of fixing position appears to be inappropriate for this project).

Hardware will be fixed true to line and position, and adjusted and oiled as required for correct operation.

Glass will be cut true and square, sized to provide correct edge clearances, blocked into place as required, and all units will be delivered either pressure fit, pocket glaze, or beaded/wedged, unless site glazing is required. Glazing gaskets will be compatible with all adjacent materials, and cut 1% over-length to absolutely avoid stretching during installation. Frames will be braced etc. as necessary for transportation to the site.

Flashings as detailed will be supplied. Flashing materials will be compatible with the windows.

5.3.9 Delivery and Installation

Delivery and Installation

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and the construction principles that are embodied in the Acceptable Solutions.

Arrange for delivery of windows to the site only when a suitable storage situation is available for them, handle the windows in accordance with the manufacturers requirements, avoid any frame distortion, avoid rubbing damage, avoid contact with concrete, plaster, mud etc. and keep them dry. Retain protective coverings for as long as possible, and remove them at completion.

Experienced and competent tradesmen who are familiar with the techniques and materials specified shall carry out all installation work. Fix in accordance with the manufacturer's instructions. Take utmost care to avoid damage to anodized or powder coated surfaces - correction of any such disfigurement requires written authority - replace any badly damaged items.

Use fixings compatible with the materials involved, as recommended by the windows manufacturer and to comply with the DWP requirements, basically aluminium or Type 316 stainless steel where exposed externally; galvanized to AS/NZS 4680, 610g/m², may be used where not exposed.

Thoroughly check all preparatory work to openings prior to installation, including wrap, corner seal tapes, adjacent cladding, pre-installed flashings, etc. as appropriate. Use inert barriers or coatings to prevent contact between dissimilar metals or between aluminium and concrete.

Install flashings as detailed and supplied by the windows manufacturer, installed tightly and neatly with absolute minimum tolerances, with head weathering jamb, jamb weathering sill, and sill open (draining) to exterior. Except where the window is recessed all head flashings shall extend 30mm minimum beyond the frame.

Air-seal all frame perimeters to adjacent structure to a depth of 15 - 20mm with expanding foam or appropriate sealant including a PEF rod at head, sill and jambs to retard the spread of sealant.

Weather-seal frame jambs etc. to adjacent surfaces (or to each other) as detailed or as required by the windows manufacturer, to achieve a fully watertight installation. In preparation for sealant the joints shall be clean, dry, and primed if necessary. Insert closed cell polyethylene backer rods or a polyethylene tape slip layer if required. Mask adjacent surfaces if appropriate, install the sealant fully in accordance with the sealant manufacturers recommendations, and finish to even smooth surfaces.

Remove trade debris progressively, appropriately clean any affected adjacent surfaces, thoroughly clean the windows, check that all hardware is in full working order, and provide safety indication of the glass for the balance of adjacent works.

6 GLAZING

6.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

6.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1170.0:2002SUPP1(AS/NZS) A1	Structural design actions - General principles - Commentary: Amendment 1
1170.5:2004(NZS)	Structural design actions - Earthquake actions - New Zealand
2208:1996(AS/NZS)	Safety glazing materials in buildings
3604:2011(NZS)	Timber-framed buildings
4211:2008(NZS)	Specification for performance of windows
4223.1:2008(NZS)	Code of practice for glazing in buildings - Glass selection and glazing
4223.3:2016(NZS)	Glazing in buildings - Part 3: Human impact safety requirements
4223.4:2008(NZS)	Glazing in buildings - Part 4: Wind, dead, snow, and live actions
4223.SUPP1:2008(NZS)	Code of practice for glazing in buildings - Supplement 1 to NZS 4223.1:2008 and NZS 4223.4:2008
4232.2:1988(NZS)	Performance criteria for fire resisting enclosures - Part 2: Fire resisting glazing systems
4667:2000(AS/NZS)	Quality requirements for cut-to-size and processed glass
4668:2000 (AS/NZS)	Glossary of terms used in the glass and glazing industry
AS/NZS 4666:2012	Insulating glass units

6.3 Non-Structural Glazing

6.3.1 Scope

Scope

Supply and install the selected glass products to the windows, doors, curtain wall systems, roofs and canopies, balustrades and barriers, partitions and screens, and other non-structural glazing elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the glass manufacturer's installation requirements and recommendations, other relevant product manufacturers' recommendations, and as shown on the drawings.

6.3.2 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Co-ordinate with other trades for all necessary holes and cut-outs etc. for glass mounted hardware, fittings and fixtures, and to install all glass and glazed elements as required.

6.3.3 Workmanship

Workmanship

All installation work shall be carried out by experienced and competent tradesmen familiar with the products specified and installation techniques, to the manufacturer's requirements and recommendations, and the requirements of the relevant Glazing Standards, and to the layout and details shown on the drawings.

Handle and store glass in accordance with the manufacturer's recommendations.

Provide temporary safety markings to all glass panes as the installation work progresses.

Finish all external glazing wind and watertight.

Do not use damaged, marked or faulty materials.

6.3.4 Glass Type

Clear Float Glass

Clear Float Glass: Clear annealed float glass, in accordance with NZS 4223, to the locations identified on the drawings.

Manufacturer, brand name & type: TBC

Obscure Patterned Glass

Obscure Patterned Glass: Surface patterned obscure glass, in accordance with NZS 4223, to the locations identified by the home owner.

Manufacturer, brand name & type: TBC

Toughened Safety Glass

Toughened Safety Glass: Toughened Grade 'A' Safety Glass, in accordance with AS/NZS 2208 and NZS 4223, to the locations identified on the drawings. All cutting and drilling and other processing requirements shall be done prior to toughening. Install safety glass in accordance with the manufacturer's recommendations and NZS 4223.

Manufacturer, brand name & type: TBC

6.3.5 Insulating Glass Units

Insulated Glass Units (IGU's)

Insulating Glass Units. Sealed, gas filled, insulating glass units manufactured and installed in accordance with AS/NZS 4666, and the Insulating Glass Manufacturers' Association recommendations, to the locations identified on the drawings.

Manufacturer, brand name & type: TBC

External Glass, type & thickness:

Space width and Gas:

Internal Glass, type & thickness:

6.3.6 Components & Accessories

Aluminium Framed Glazing

Provide all necessary glazing components and accessories including glazing tape, setting and distance blocks, sealants, gaskets, etc., to complete aluminium framed glazing as required.

6.3.7 Installation

Aluminium, Double Glazed (IGU's)

Install Insulated Glass Units into aluminium frames in accordance with the glazing manufacturer's recommendations and NZS 4223, and as detailed.

6.3.8 Completion

Completion

Check that all glass has been installed correctly to the required standard and as shown on the drawings. Check for damage and surface marking and replace as necessary. Clean off and remove all temporary safety markings, as programmed and when instructed, and leave glass trade clean.

Remove all rubbish and waste material from site.

Issue to the Owner a copy of the Glass Manufacturer's maintenance requirements and all necessary Manufacturer Warranties.

7 INSULATION

7.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

7.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3604:2011(NZS)	Timber-framed buildings
4220:1982(NZS)	Code of practice for energy conservation in non-residential buildings
4243.1:2007(NZS)	Energy efficiency - Large buildings - Building thermal envelope
4246:2016(NZS)	Energy efficiency - Installing bulk thermal insulation in residential buildings
4859.1:2002(AS/NZS)	Materials for the thermal insulation of buildings - General criteria and technical provisions

7.3 Thermal Insulation

7.3.1 Scope

Scope

Supply and install the selected products as thermal insulation to the specified R-values, complete with all accessories, to the floors, walls, ceilings, roofs, and other thermally insulated building elements, as noted and shown on the drawings. All aspects of this work shall be in accordance with the product manufacturer's technical literature and installation requirements, other relevant product manufacturers' recommendations, and as shown on the drawings.

7.3.2 Co-operation

Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Co-ordinate with other trades to install all thermal insulation as required.

7.3.3 Workmanship

Workmanship

All installation work shall be carried out by experienced and competent tradesmen, familiar with the specified products and installation techniques, in accordance with the manufacturer's installation requirements, and as noted and detailed on the drawings.

Store and handle products in accordance with the manufacturer's recommendations, keep dry and

protect from damage. Do not compress fibre insulation bales, do not use damaged or faulty insulation products and accessories.

The building must be completely enclosed and water tight before installation commences with the exception of roof insulation when installed with roofing. Ensure the moisture content of timber framing is no greater than 18% prior to installing insulation to timber framed elements. Always maintain the full insulation thickness to ensure the required thermal values are achieved. Do not install insulation pads or blankets into closed cavities that are less than the stated insulation nominal thickness.

7.3.4 Product

Glass Fibre Pads

Glass fibre thermal insulating pads.

Manufacturer, brand name & type: Pink Batts or similar approved

R-Value: refer to H1 calculations

Location: refer to H1 calculations

Glass Fibre Blanket

Glass fibre thermal insulating blanket.

Manufacturer, brand name & type: Pink Batts or similar approved

R-Value: refer to H1 calculations

Location: refer to H1 calculations

7.3.5 Installation

Wall Insulation - Glass Fibre Pads

Install glass fibre insulation pads, complete with accessories, friction fitted between wall studs and dwangs etc. and held in place in accordance with the manufacturer's installation recommendations. Completely fill the framing voids, leave no gaps at the edges or at penetrations etc, and maintain full insulation pad thickness. Support external wall insulation with vertical strapping tape at 400mm centres to the outside face, stainless steel stapled to the framing.

Ceiling Insulation - Glass Fibre Blanket

Install glass fibre insulation blanket, complete with accessories, friction fitted between the ceiling framing over the ceiling lining in accordance with the manufacturer's installation recommendations. Leave no gaps along the insulation blanket edges and joints, and at the ceiling perimeter/wall junction. Refer to the electrical fitting manufacturer's installation recommendations for insulation separation requirements around their recessed electrical fittings. Separate ceiling insulation 200mm from recessed light fittings and other recessed electrical fittings where no fittings manufacturers installation information is available and product does not have a CA, IC or ICF rating.

7.3.6 Completion

Completion

Check that all insulation has been installed correctly and is correctly supported and that all edges, joins and ends are fully closed without gaps. Check for damage and faults and repair or replace as necessary. Collect and remove from site all rubbish and waste material.

Issue to the Owner a copy of any product maintenance requirements and a copy of the Thermal Insulation Product and Installation Warranties for the completed works.

8 TILING

8.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

8.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3103:1991(NZS)	Specification for sands for mortars and plasters
3122:2009(NZS)	Specification for Portland and blended cements (General and special purpose)
4858:2004(AS/NZS)	Wet area membranes

8.3 Workmanship

8.3.1 Co-operation

Co-operation

Co-operate with the Contractor and other Subcontractors to ensure that substrates are completely appropriate for the tiling required, particularly with regard to concrete surface finish, the use of retarders, release agents or curing compounds, and with regard fixing and finishing of sheet substrates and their support.

8.3.2 Workmanship

Sequence

Delay tiling to allow maximum curing and settling and initial creep of the substrates, particularly to load bearing structural elements.

Qualifications

All work by competent and experienced tilers. Co-ordinate with other trades and instruct them as necessary to ensure appropriate substrate conditions to assure first class tiling results.

Preparation

Protect all adjacent surfaces from damage or staining during tiling: arrange any making good or cleaning required as instructed by the Architect/Designer. Wash down and remove form work release agents, slab curing compounds, and surface retarders. Clean down with mould killer, etching agents, or wire brush as required. Grind off high spots if required. Ensure that the moisture content of substrates is appropriate.

Set-out

Set out tiles as detailed or for even margins with patterns to register in all directions. The finished surfaces shall be true and even and with lines accurate, level and plumb, or to even falls as noted, and finished flush with adjoining work as appropriate. Cut edges to the manufacturers instructions, and stone arris where the cut edges are not concealed under adjoining work.

Installation

No retempering of partially set or dried mortar, adhesive or grout. Prior to grouting rake out any excess bedding material. Grout shall be coloured as directed, placed full depth, and finish tooled to a dense, uniform surface. Clean excess grout off tiles and adjacent surfaces.

Control Joints

Form control joints at tiling edges abutting concrete or masonry, within the tiled surface to give a maximum panel dimension of 2m, and over any control joints in the substrate. Rake control joints full depth to the substrate as work proceeds, mask edges and clean out just prior to placing filler, and fill full depth and flush. Clean excess filler off the tiles or other surfaces.

Completion

On completion thoroughly clean the full tiled surfaces, and lightly buff where appropriate. Protect finished work from subsequent damage.

Exterior Tiling

No exterior tiling during inclement weather.

8.4 Materials

8.4.1 Materials

Adhesives & Grouts

All adhesives/beddings/grouts shall be selected for each specific tile/substrate situation, selected as the best readily available, and each is subject to approval by the Architect/Designer (who may require appropriate manufacturers information for consideration prior to approval).

Standards

Water, cement, sand and sand particle size grading, all exactly to the relevant NZS requirements.

Crack Control

Crack control joint filler as recommended by the tiles supplier, with the colours selected from the standard range.

Materials shall be from the same batch for even type and colour, and shall be delivered with their packaging and labeling intact.

Requirements

Store in dry areas, machine mix all materials to the manufacturers requirements, and do not mix proprietary materials.

8.4.2 Tiles/Scope

Delivery & Handling

All tiles true to shape, free of warp, and accurate in dimensions to facilitate laying with minimum joint width. All tiles true to samples and free of imperfections. Tiles from the same batch where possible, and delivered with the original packaging and labeling intact. Tiles handled and stored carefully to preserve edges.

Setout

The exact setout will be notified with the tile(s) selection.

9 PAINTING & DECORATING

9.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

9.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

2310:2002(AS/NZS)	Glossary of paint and painting terms
2311:2017(AS/NZS)	Guide to the painting of buildings
3750.0:2008(AS/NZS)	Paints for steel structures - Introduction and list of Standards
AS 1580	Methods of test for paints
BRANZ IB 257	Wood primers
NZBC E3	Internal Moisture
NZS 7702	Colours for specific purposes

9.3 General

9.3.1 Alternatives

Alternatives - Option 1

The materials specified in this section or on the drawings indicate the required standards for these works. Alternatives which are considered equal to or superior to these may be tendered for approval (in writing, and they must NOT be used unless they are approved in writing).

9.3.2 Co-operation

Co-operation

Co-operate with all trades and attend upon Concretor, Joiner, Carpenter, etc. to ensure that the surfaces provided by these trades are completely suitable for the Painter works that are required.

9.3.3 Preparation

Preparation

No painting or varnishing or other surface coating work shall be undertaken unless the surfaces to be coated are in a correct and proper condition to ensure first class results.

Inspect the works of other trades on which Painter work is scheduled and report to the Main Contractor and the Architect/Designer any defects or irregularities that would affect the permanency or finish of the painting work, and do not proceed until the defects or irregularities have been

completely rectified. Failure to examine and report will be construed as an acceptance that all preparatory works are completely satisfactory.

This clause does not relieve the Painter of any of the usual preparatory work to surfaces customarily performed by this trade.

Clean down all surfaces with sugar soap, strippers, mould killers, etching agents, etc. as required. Sand or rub all sharp edges off exterior timbers and other materials as appropriate before painting. Finish rub down ALL surfaces. Ensure that the moisture content of all substrates is appropriate. Remove locks, fastenings, and similar hardware before painting and refix on completion. Remove all electrical switch and power plates before painting and refix them on completion. Mask adjacent surfaces as required to a true line and remove the masking on completion. Dust and wipe down all surfaces for Painter work and completely remove all dust, rubbish, dirt etc. from areas involved immediately prior to commencement. To each area of the works complete all surface preparation before applying paint to any surface.

9.3.4 Protection

Protection

Take adequate precautions to prevent paint spots falling on prefinished or similar surfaces, and extreme care to keep absorbent materials (e.g. cedar, sawn framing, decking, paving) completely clean during all adjacent painting work. Correction of any such disfigurement shall be to the Architect/Designer's approval.

9.3.5 Qualifications

Qualifications - Option 2

All work by the Painting Subcontractor shall be of the highest reasonable standard, and executed by experienced and competent tradesmen to the Architect/Designer's approval.

9.3.6 Workmanship

Workmanship

Strictly adhere to all Manufacturers' instructions.

Strictly observe Manufacturers' requirements with regard to surface and air temperatures for painting. No work shall be carried out on surfaces that are not completely dry, and no external work shall be carried out during damp or wet conditions.

In all finishes any irregularities or brushmarks or dust etc. in each preceding coat shall be rubbed down to provide a smooth clean surface for the following coat. Each coat shall be finished over all surfaces before a further coat is applied, and each coat shall be completely dry before subsequent coats. Finish broad areas before painting trim, paint ceilings before walls and walls before joinery, trim and other items.

Each coat and the full completed system shall be of uniform finish, colour, texture and sheen, shall have proper covering of thin edges, corners, end grain etc. and shall be free of blemishes such as runs, sags, fat edges, entrained hairs, brush marks, starved patches etc.

9.3.7 General

General

The schedules indicate the general extent of the works to be carried out but are in no way exhaustive in their description of the actual items for painter work. Complete all work necessary for the proper and entire completion of the works. All items and portions of items reasonably inferable but not specifically mentioned are deemed included, i.e. cupboard interiors, the top and bottom of doors, unseen cabinetry tops, etc. All doors shall have equal painter work on ALL surfaces.

Where timber work is specified for priming before fixing the priming shall be thoroughly brushed in to all surfaces, and all exterior timber work for paint finishing shall be fully primed within one week of fixing. Should more than one month elapse between priming and undercoating the timber shall be fully reprimed.

Stopping up work shall be carried out immediately the priming or sealing coat is dry, and shall be solidly placed to finish clean and dry. Stopping tinted to match the timber for clear finished work.

9.3.8 Materials

Materials

All Painter materials shall be ready mixed and delivered in unopened containers. Materials shall be used only for the purpose and in the manner intended by the manufacturer; any apparent scheduled discrepancy in this respect shall be referred to the Architect/Designer immediately for clarification.

Where surfaces are specified to be finished in a particular manner or material, all preparatory work, priming, or undercoating, that is necessary to ensure a proper finish shall be provided, irrespective of any apparent omission herein.

In water splash or wet areas that require a paint finish the paint must be gloss or semi-gloss finish as per NZBC E3/AS1 3.1.2.

Thinning shall only be to manufacturer's specification. Thoroughly stir as required to lift any settled pigment and ensure the paint is homogeneous. Paints shall be factory or shop tinted to the colour required. Undercoats shall be fully tinted to match the final colour scheduled. All paints shall have the finished film thickness that is specified by the manufacturer (checked by monitoring the coverage per litre).

9.3.9 Completion

Completion

Allow to touch up to approval any Painter work which is damaged during the finishing works of other trades. Replace all hardware, remove all masking, covers, containers etc., thoroughly clean all

affected surfaces, and leave all spaces ready for immediate occupation. Avoid scratching or abrading glass or hardware during any cleaning.

10 PLUMBING

10.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

10.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1221:1997(AS/NZS)	Fire hose reels
1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1477:2017(AS NZS)	PVC pipes and fittings for pressure applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
2032:2006(AS/NZS)	Installation of PVC pipe systems
2033:2008(AS/NZS)	Installation of polyethylene pipe systems
2492:2007(AS/NZS)	Cross-linked polyethylene (PE-X) pipes for pressure applications
2537.1:2011(AS/NZS)	Mechanical jointing fittings for use with crosslinked polyethylene (PE-X) for pressure applications - Part 1: Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - General
2642.2:2008(AS/NZS)	Polybutylene pipe systems - Polybutylene (PB) pipe for hot and cold water applications
2712:2007(AS/NZS)	Solar and heat pump water heaters - Design and construction
3500.1:2015(AS/NZS)	Plumbing and drainage - Part 1: Water services
3500.2:2015(AS/NZS)	Plumbing and drainage - Part 2: Sanitary plumbing and drainage
3500.3:2015(AS/NZS)	Plumbing and drainage - Part 3: Stormwater drainage
3500.4:2015(AS/NZS)	Plumbing and drainage - Part 4: Heated water services
3500.5:2012(AS/NZS)	Plumbing and drainage - Part 5: Housing installations
3501:1976(NZS)	Specification for copper tubes for water, gas, and sanitation
4121:2001(NZS)	Design for access and mobility: Buildings and associated facilities
4305:1996(NZS)	Energy efficiency - Domestic type hot water systems
4517:2010(NZS)	Fire sprinkler systems for houses
4541:2007(NZS)	Automatic fire sprinkler systems
4602:1988(NZS)	Low pressure copper thermal storage electric water heaters
4603:1985(NZS)	Installation of low pressure thermal storage electric water heaters with copper cylinders (open-vented systems)

4606.1:1989(NZS)	Storage water heaters - General requirements
4607:1989(NZS)	Installation of thermal storage electric water heaters: valve-vented systems
4613:1986(NZS)	Domestic solar water heaters
4614:1986(NZS)	Installation of domestic solar water heating systems
4617:1989(NZS)	Tempering (3-port mixing) valves
4692.1:2005(AS/NZS)	Electric water heaters - Energy consumption, performance and general requirements
4766:2006(AS/NZS)	Polyethylene storage tanks for water and chemicals
5262:2003(NZS)	Gas appliance safety
5601.1:2013(AS NZS)	Gas installations - Part 1: General installations
7602:1977(NZS)	Specification for polyethylene pipe (Type 5) for cold water services
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
7646:1978(NZS)	Specification for polyethylene pipes and fittings for gas reticulation
AS/NZS 1596	LP gas handling and storage
AS/NZS 2053	Specification for unplasticized PVC conduit and fittings for electrical wiring
NZBC G12	Water Supplies
NZBC G13	Foul Water

10.3 General

Carry out all works necessary to leave the water, waste, vent and soil systems serving the sanitary fittings and the plumbing hardware shown on the drawings or specified below in correct working order complete with all ancillary systems (safetrays, floor drains, overflows, relief valves, etc.) required, and with all normal incidentals customarily installed by this trade.

Comply with the Building Code, Territorial Authority By-laws and statutory authority Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange for all tests and pay all fees and customary charges in connection with the required works.

10.4 Workmanship

10.4.1 Co-operation

Co-operation

Co-operate with all other trades. Attend upon Concretor, Drainlayer and Carpenter to set out the exact positions of pipe runs before adjacent work is put in hand, and to ensure that all pipes, sleeves, fixings, flashings etc. are correctly incorporated into the structure as construction proceeds.

10.4.2 Workmanship

Qualifications

All plumbing work shall be carried out by, or under the direct control of, properly qualified tradesmen, and shall be to recognised high standards.

Winter Conditions

Observe best local trade practice to avoid problems which arise from freezing winter conditions.

Cutting & Checking Timber

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials only to approval. Install seismic restraints to storage tanks and HWCs.

Weatherseal

Weatherseal wherever pipes, screws, bolts or other fastenings penetrate an external surface, and particularly roofing; seal with gaskets, flashings (and overflashings if necessary) or mastic as appropriate - any damage that results from failure of such seals will be made good at the Plumber's expense.

Protection

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Plumber's expense.

10.4.3 Pipework

Joints

Joints between pipes of different materials shall always be to the approval of the TA Plumbing Inspector.

Pipework Set-out

Pipework set-out neatly with a minimum number of bends, and more or less parallel to and at right angles to structural elements - avoid diagonal piping.

Concealed & Exposed Pipework

All internal pipework shall be concealed except where otherwise is either shown or approved. Exposed pipework shall be accurately and neatly run. Arrange all pipework (and particularly traps) in a manner which will allow maximum future accessibility for repairs or maintenance. Arrange for access panels to any primary maintenance positions, and install conveniently located isolating valves for each group of fittings. Wingbacks securely and squarely fixed. Crox unions usually acceptable only at the final connection to fittings. Install white plastic flanges where pipes penetrate linings in visible locations.

Marked Positions

Where pipes are covered with nail fixed linings and trim ensure that their positions are marked on the linings to minimise the risk of subsequent nailings penetrating the pipe. Any such damage shall be rectified immediately, with all consequential damage made good.

Fixing Pipework

Set pipework out in straight runs to even gradients. Fix all pipes to the structure sufficiently to fully support and to prevent sagging or vibration. Clips and saddles shall be the same material as the pipe.

Exterior pipes on stand-off brackets. Fixings to the exterior or damp locations shall all be hot dip galvanized unless otherwise noted. Sleeves for pipes or drains penetrating concrete or masonry shall be uPVC, 20mm minimum larger internal diameter than the external diameter of the pipe, finished flush with concrete or masonry, and packed and mastic sealed.

During Construction

Close open ends of the systems during construction to prevent the entry of foreign matter.

10.4.4 Temperature Movement

Thermal Issues

All work shall respect in full all probable thermal movements - layouts, fixings and jointings shall be arranged to allow thermal movement without risk of prejudice to watertight conditions, or risk of damage from straining of the pipes which will generate failures.

In particular, observe best local trade practice to avoid problems arising from freezing conditions.

10.4.5 Excavation

Excavation Requirements

Allow to carry out all excavation that is required to suit the services installed by this trade. Check for other services before excavation. Trenches true to line and level, base of trenches clear of loose material, and shore trenches as required to suit the ground conditions. Backfilling shall be carried out by this trade, and be to the requirements specified in Siteworks.

10.4.6 Testing

Services Testing

All plumbing services shall be completed in stages which will allow for proper testing under normal working pressures prior to the application of insulation, concealment or other enclosure. All leaks remedied and retested. On completion the whole of the plumbing services to be subjected to full operational tests in the presence of the plumbing inspector, with any defects revealed in these tests properly remedied.

10.4.7 Warranties

Warranties Submittal

Warranty cards and manufacturer's guarantees for all items supplied and installed by this trade shall be correctly filled in and handed over at Practical Completion.

10.5 Materials

10.5.1 Materials

Materials Quality

Materials shall be delivered with packaging and labeling intact. Incidentals (jointing compounds, PTFE tape, seals, washers, silfos, solvent cements, etc.) shall be completely appropriate for the application involved. The use of imperfect items or items damaged in any way is always subject to approval.

10.5.2 Materials Separation

Materials Separation

Separate dissimilar metals in any circumstances which could produce contact or electrolytic action by a water film, with thick plastic tape, bituminous felt or other inert material. Pipes in contact with or built into concrete or masonry shall be fully spiral wrapped in Denso tape or equal.

10.6 Systems

10.6.1 Wastes & Vents

Sizes & Falls

All traps sized to AS 3500.2. Wastes and vents all uPVC. Wastes shall be to AS 3500.2 falls as a minimum. Vents shall be generally as indicated, but avoid where permissible in compliance with AS 3500.2, or shall be combined above the flood level of the fittings.

Bird-proof Domes

Fit bird proof domes to all vents.

10.6.2 Cold Water System

Supply From Existing Toby

All cold water supply pipework shall be polybutylene, arranged and fixed so that all joints are in a fully 'relaxed' condition, without any stress or tension.

Lay on a 20mm main from the existing toby along the route designated by the plumber to the connection position designated by the plumber (pipe depth, protection, backfilling, signal strip etc. to comply with all Supply Authority requirements). At the connection position take a branch feed off for the hosecocks (and reticulate to the positions shown and install angle hosecocks) and toilet cisterns and then take the main feed through an accessibly positioned cleanable in-line sediment and dirt filter.

Primary distribution from the water filter shall be in 20mm piping, with water pipe sizes to individual fixtures sized to suit clause 5.3.1 of NZBC G12/AS1. Install conveniently located isolating valves to turn off each group of fittings, and install a small isolating valve alongside each toilet cistern not integrally fitted with one. (Note that these isolating valves and the hosecocks are not covered by the Plumbing Hardware Prime Cost Sum).

10.6.3 Hot Water System

Gas Instant Hot Water Device

Supply the gas instant hot water device complete with a wall recess box as noted on the drawings and install it where shown on the plan and elevation.

Install pressure relief valves, cold water expansion valves, flow control valves, pressure limit valves, and non-return/isolating valves as required to leave the hot water systems in full design operational order.

Install a tempering valve to control the hot water temperature at any sanitary fixture used for personal hygiene at not more than 55°C.

Flush all pipework before making the final connections. Lag the main distribution pipes full length

with wall pipe insulation.

Showers shall have priority feeds, without 'tees', and the pipework layout shall ensure that the showers temperature and pressure remain as even as possible.

10.6.4 Gas Fitting

Scope

Is included in the Plumbing trade, although all work must be carried out by Registered Gasfitters, and be in complete accordance with all relevant Regulations and standards and be in full accordance with best trade practice.

Obtain all necessary permits and pay all fees. If necessary obtain a Dangerous Goods Licence for the storage installation in the name of the Owner; and if the Owner's signature is required forward all relevant papers to the Architect/Designer.

Testing & Compliance

Test the full systems to all relevant requirements; if any faults are discovered rectify them and then re-test the full system.

Check that all necessary flues comply in all respects with the regulations and the item manufacturer's requirements.

10.7 Elements

10.7.1 Sanitary Fittings

Sanitary Fittings - Option 1

Supply and fix all of the sanitary fittings as scheduled on the drawings. All fittings checked on delivery for 'perfect' condition, and all fittings plain white. Supply and fix all normal accessories that are not usually supplied with the fitting.

The Plumber is responsible for fittings from delivery until Practical Completion of the contract.

10.7.2 Flashings

Responsibility

Ridges, hips, barges, valleys, aprons etc. flashings all supplied and installed by the Roofer. Metal windows flashings (those installed during windows installation ONLY) will be supplied by the windows subcontractor and installed by the Carpenter. All other flashings including wall penetration flashings, soakers, etc. that are required to leave the building completely water and weathertight are the Plumber's responsibility.

Flashings Fabrication

All flashings shall be machine folded to profiles as shown or required, incorporating capillary breaks where appropriate, shall be formed in one piece where possible, and lead or other soft edged where required. Stop ends, external angles, junctions etc. soldered or sealed and blind riveted as appropriate.

Materials - Option 1

All flashings 1mm powder coated aluminium unless otherwise noted. Supply the flashings to appropriate trades for building in as work proceeds, with all flashings neatly dressed to substrates.

11 DRAINLAYING

11.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

11.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS/NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
2032:2006(AS/NZS)	Installation of PVC pipe systems
3500.2:2015(AS/NZS)	Plumbing and drainage - Part 2: Sanitary plumbing and drainage
3500.3:2015(AS/NZS)	Plumbing and drainage - Part 3: Stormwater drainage
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems
AS/NZS 1547:2012	On-site domestic wastewater management
BS 5572	Code of practice for sanitary pipework
NZBC G13	Foul Water

11.3 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals.

Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

11.4 Workmanship

11.4.1 General

General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals. Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

11.4.2 Co-operation

Co-operation

Cooperate with all trades and attend upon the Concretor and Plumber to set out exact pipe runs before any adjacent work is put in hand and ensure that all sleeves etc. are correctly incorporated as work proceeds.

11.4.3 Materials

Materials

All pipes and other materials shall comply with the appropriate Standards, and shall be protected from damage of any kind until installation is complete. All incidentals appropriate for the applications involved. Concrete shall be 17.5MPa and as specified under Concretor, Mortar shall be as specified in Blocklayer.

11.4.4 Workmanship

Workmanship

All drainlaying shall be carried out by, or under direct control of, properly qualified tradesmen, and shall be to recognised high standards. Ensure cast-in items are installed when required so that no delay is caused by this trade. Adequately protect all adjacent surfaces - clean down to remove dirt etc., and any damage shall be made good by the appropriate trade at the Drainlayer's expense.

On completion of drainlaying clean up full area affected by this trade to the condition it was in before drainlaying commenced.

Site is to be returned as close as possible to its present condition on completion of the contract.

11.4.5 Excavation

Excavation

As required for sewer and stormwater. Check for other service lines before excavation - the Drainlayer is responsible for making good any damage. Trenches true to line and with even gradients between gullies, soil stack terminations or downpipes, etc.

Keep the bottom of trenches clear of loose material. All pipes shall be laid in appropriate bedding material, compacted as required. Shore trenches if required to suit ground conditions. Backfilling shall be by this trade, to the standards required in Siteworks.

11.5 Elements

11.5.1 Drainlaying

Drainlaying

Commence drainlaying at the low end of even fall sections of drains and proceed in a continuous sequence to the fittings connections.

Sumps, gullies, etc. solidly bedded. Lay 110 (ODmm) uPVC drains to connect gullies, sumps, stacks, and downpipes through to the street edge connections.

Junctions and bends shall have an inspection point as shown on the drawings and as required by NZS3500.2. Temporarily seal the open ends of incomplete drains to prevent entry of foreign matter. Make appropriate provision for any anticipated differential settlement. Place signal strip above all drains.

Ensure that stormwater drains are very accurately positioned so that downpipes can drop directly into them, without offsets.

11.5.2 Soakage Pits

Soakage Pits

Where shown on the site plan, Soakage Pits shall be dimensioned and filled in accordance with best local trade practice, and to the complete satisfaction of the Territorial Authority Inspector.

11.5.3 Testing

Testing

The sewer and stormwater systems shall both be fully tested to the approval of the Territorial Authority Inspector before being covered in. If any defects show rectify and then fully retest.

11.5.4 As Built Drawings

As Built Drawings

During drainlaying plot the location of all bends and changes in direction and all cleaning access positions. Locate each item by two diagonal measures from structure corners, etc. and record on a blank plan copy (supplied by Architect/Designer when requested).

Note that Practical Completion of the contract will not be certified until this as-built drawing has been produced (made available to the Contractor in time for the Code Compliance Certificate application).

12 ELECTRICAL

12.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

12.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1125:2001(AS/NZS)	Conductors in insulated electric cables and flexible cords
2201.1:2007(AS/NZS)	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
2293.2:1995(AS/NZS)	Emergency evacuation lighting for buildings - Inspection and maintenance
3000:2007(AS/NZS)	Electrical installations (known as the Australia/New Zealand Wiring Rules)
3085.1:2004(AS/NZS)	Telecommunications installations - Basic requirements
3191:2008(AS/NZS)	Electrical flexible cords
5000.1:2005(AS/NZS)	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV
60227.5:2003(AS/NZS)	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Flexible cables (cords)
60335.2.30:2009(AS/NZS)	Household and similar electrical appliances - Safety - Particular requirements for room heaters
60335.2.35:2004(AS/NZS)	Household and similar electrical appliances - Safety - Particular requirements for instantaneous water heaters
60898.1:2004(AS/NZS)	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Circuit-breakers for a.c. operation
61009.1:2015(AS/NZS)	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules
6104:1981(NZS)	Specification for emergency electricity supply in buildings
AS/NZS 2053	Specification for unplasticized PVC conduit and fittings for electrical wiring
AS/NZS 3012	Electrical installations - Construction and demolition sites
AS/NZS 3018	Domestic electrical installations
AS/NZS 3100	Requirements for electrical apparatus
AS/NZS 3439	Electrical switchgear and controlgear
AS/NZS 3947	Low-voltage switchgear
AS/NZS 60598	Luminaires - Particular requirements - Recessed luminaires

NZECP 54	Recessed luminaires
NZS 1989	Plugs and socket outlets
NZS 6206	Electric meter boxes

12.3 Workmanship

12.3.1 General

Scope

Supply and install all materials, including all necessary minor and incidental items, for proper completion of all of the electrical services specified or shown on the drawings. The contract will not be deemed to be complete until the Electrician has provided an Electrical Certificate of Compliance in accordance with NZECP 11 (made available to the Contractor in time for the Code Compliance Certificate application).

Required Tasks

Obtain all necessary permits and consents, serve all notices and pay all fees in and customary charges connection with the works.

Position of Items (Edit)

The position of switches, light and power outlets and other fittings, although shown specifically in some instances, are in general only shown diagrammatically. The exact location of each of these items will be as directed on site by the Architect/Designer and home owner; the Electrician shall give reasonable notice of when this information is required. Items positioned in contravention of this shall be repositioned if directed, including rewiring if necessary, all at the Electrician's expense.

Unless drawn (on 1:20 wall elevations) or specified otherwise the mounting height to the centreline of the following items above the floor shall be:

- 1000mm for lighting switches;
- 2000mm for wall mounted lights;
- 2100mm for the bayonet of pendant lights;
- 300mm for power points, except at benches.

(Notify the Architect/Designer if either the actual fitting or mounting position seem to make the mounting height noted above inappropriate).

Warranties Submittal

Warranty cards and manufacturers guarantees for items supplied and installed by this trade shall be filled in correctly and handed over at Practical Completion. Arrange all circuits to obtain an optimum balance of the system, and check and reconnect where necessary to achieve this on completion. Leave the works clean and tidy and in full operational order.

12.3.2 Co-operation

Co-operation

Co-operate with all other trades and attend upon the Concretor and Carpenter to set out all required penetrations and to ensure that all wiring and fittings are correctly incorporated as work proceeds. The Carpenter will provide and fix all necessary dwangs and timber supports in locations determined by the Electrician.

12.3.3 Workmanship

Qualifications

All electrical work shall be carried out by, or under the direct control of, registered tradesmen, and shall be to recognized high standards. All work shall be such as to leave a neat, efficient and robust installation. Neatly label switchboards to identify each circuit.

Cutting & Checking Timber

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604: 2011 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials shall be only to approval.

Protection

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Electrician's expense.

12.3.4 Wiring

Wiring Quality

Joints within cable runs will not normally be accepted. TPS cable shall be adequately supported, and clipped at regular intervals. At terminations all strands of conductors shall be fully secured in a terminal block or clamped under a screw head washer; do not cut away any strands. Wiring which terminates in enclosed fittings and/or where subject to heat liable to cause deterioration, shall be high temperature type, with the tails made off with heat resisting sleeves, to protect the permanent wiring.

Wiring Cable

Wire lights in 1.5mm 3 core - 7.5 amps loading max per circuit (allow for 100w to all light fittings unless identified otherwise).

Wire power outlets in 2.5mm 3 core - 7 maximum GPO singles or doubles per circuit. Assess power outlets for specific equipment and allow accordingly.

Conceal Wiring

Conceal all wiring except as noted on drawings or below. All wiring cast into concrete shall be run in conduit pipes. All cables shall be stranded (single core is unacceptable).

Wiring Layout

Wire more or less parallel to and at right angles to the structural elements - avoid any diagonal wiring. Layout of the principal distribution wiring shall be to approval. Position all wires to minimise the risk of damage from subsequent nailing of linings etc.

Wiring in Timber Framing

Generally, do not run TPS horizontally within timber walls except in the area up to 300mm above floor. Wire in the ceiling framing and drop vertically to outlets and switches.

Exterior Lighting Wiring

Wire exterior lighting in screened cable.

12.4 Systems

12.4.1 Earth

Earth

Provide a driven main earth suitable for the full installation, close to the meterboard, complying fully with all appropriate regulations and to the complete approval of a certified inspector. Bond all exposed metals, including light fittings and piped services and provide earth conductors for the entire system. Sheathing to any neutral screened cables may be used for earthing.

12.4.2 Mains

Mains, Single Phase, Underground

Install a neutral screened 16mm main cable underground (depth, cover/protection, backfilling, signal strip etc. to comply with all relevant regulations) from the grid connection position to the meterboard, positioned where shown on the drawings, and make appropriate arrangements for the grid connection. Install pilot as required. The meterboard shall be metalclad with a meter reading window, recessed maximum depth into the wall and at 2m to the top of the board, with the meters and water heater controllers by the supply company nominated by the Principal. Install all switches and fuses that are necessary. From the meterboard run (route to approval) a neutral screened 16mm main plus controllers etc. to the switchboard.

12.5 Materials & Control

12.5.1 Materials

Material Quality

All materials delivered with packaging and labeling intact. All required incidentals (insulating tape, seals, fixings, etc.) shall be completely appropriate for the application involved. The use of items damaged in any way is subject to approval in each instance.

12.5.2 Switchboard

Single Switchboard

The switchboard shall be an appropriate size standard PDL DBF series board installed fully recessed where shown and at 2m to the top of the board. Install appropriate sized MCB's for all circuits, including a minimum of two power and one lighting RCDs as required to cover all outlets.

12.6 Elements

12.6.1 Appliances

Appliances - Option 2

All appliances are exactly identified on the drawings notes. Main Contractor will establish, in consultation with the Plumber and Electrician, which of them will be supplied by each of these trades.

The Electrician shall supply appliances that are his responsibility, install them exactly in accordance with their manufacturer's instructions, and protect them until completion.

12.6.2 Light Fittings

Light Fittings - Option 1

Generally light fittings are identified as to type on the drawing, and will be supplied by the Principal. Take delivery, install in accordance with any directions supplied and protect until Practical Completion.

All light fittings and fixtures are to be confirmed by the home owner

12.6.3 Tele Communications

Workmanship

Workmanship shall be recognised best trade practice, and in accordance with the manufacturers' recommendations. All work shall be by competent and experienced operatives.

12.6.4 Other Wired Services

Other Wired Services

Co-operate with all other trades to ensure that the following services are installed complete and in accordance with their manufacturer's recommendations with all normal or necessary incidentals and with all wiring concealed.

The installation of the following are to be confirmed with the home owner:

- SKY TV.
- Garage door operating mechanisms.
- Gas hot water supply unit installed complete by the Plumber - supply electrical feed and connect.
- Wall mounted fan heaters.
- Front door bell - supply and install.
- Kitchen, laundry and wet areas air exhaust fans and ducting as noted - supply and install.

- Under-tile electric heating to the bathroom and shower room complete with thermostat control installed where shown. Supply and install (immediately prior to tiles installation) exactly to the suppliers recommendations.
- Heated towel rails to bathroom and shower room.
- Heat pump
- Supply a Heavy Duty TV Aerial (suitable for TV1, 2, and 3, Sky, and all local and community TV stations) and install on the roof ridges where directed, stayed against wind, and with all connections compatible with the roofing and waterproof. Feed to the outlets shown with the complete system exactly to aerial suppliers recommendations.
- Heating.

Application accepted 23/11/2018 - A2359789

To: david@pennyhomes.co.nz[david@pennyhomes.co.nz]; Tech Support[businesssupport@taupo.govt.nz]; buildingconsents[buildingconsents@taupo.govt.nz]
From: buildingconsents
Sent: Thur 22/11/2018 10:30:04 p.m
Importance: Normal
Subject: Accepted Building Consent application for 18 Penny Grove, Taupo
MAIL_RECEIVED: Thur 22/11/2018 10:30:11 p.m
[REF181127014.pdf](#)

;

Your online building consent application has been accepted.

Attached is a copy of the vetting checksheet completed by the vetting officer, for the proposed works at 18 Penny Grove, Taupo (REF181127014).

We will advise you of the outcome within 20 working days of the **consent being submitted.**

Please note that further information may be requested during the processing of your application.

Kind regards,
Taupō District Council Building Consent Team

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Checklist

Reference Number:	REF181127014
Submitted On:	22/11/2018 11:30
Submitted By:	David Park
Status:	Accepted

Office Use Only

PIM Required?	PIM
Compliance Schedule?	N/A
Restricted Building Work?	Yes
Fast track amendment?	N/A
Building Category	Residential 1

General Documentation Required

Owner authorisation provided	N/A
Form 2A Certificate of Design Work	Pass
All drawings must meet the minimum requirements of the technical drawings standard AS/NZS1100 with a minimum font size of Microsoft Word text size 8. Index provided for plans and specifications.	Pass
All documents including photocopies must be legible	Pass
All plans are to be titled and dated (or version number)	Pass

Legal Documentation Required

Evidence of ownership provided.	Fail
Vetting Officer Comments	Council to provide

Site/Location Plan

North point	Pass
Road frontage indicated and street named	Pass
Location of all existing and proposed buildings	Pass
Distance of buildings to boundaries and distance between existing and proposed buildings including eaves and gutters.	Pass

Existing contours (proposed cut or fill also needs to be shown).	Pass
Building line restrictions and easements, if applicable	Pass
Site boundaries/exclusive area boundaries for cross lease properties and common areas clearly shown	Pass
Show calculations and percentage of net site coverage	Pass
Labelled points on boundaries where overshadowing is taken from.	Pass
Dimensions and location of parking spaces shown onsite	Pass
Sediment control plan	N/A
If building under or near transmission lines, please show transmission plan area or location of power lines.	N/A
Vetting Officer Comments	existing retaining walls

Foundation Plan

Foundation details	Pass
For timber floors and decks, show the location of piles, pile type, sub-floor bracing calculations, foundation perimeter walls and internal piling system where applicable.	N/A
Concrete floor details provided	Pass
Bearer layout for floors and decks	N/A
Access/ventilation to subfloor space.	N/A
Foundation details and concrete strength, post foundations (must provided resistance to uplift).	Pass
Construction joints to control concrete shrinkage.	N/A

Floor Plan

Plan of all floors describing the function of each room	Pass
Show all doors, windows and ventilation including enclosed space ventilation	Pass
Stairs, handrails and decking shown showing dimensions and details	N/A
Smoke alarm positions shown	Pass
For additions and alterations, the existing shall be shown separately to the proposed and to the same scale for comparison	Pass
Chimneys and solid fuel heaters	Pass
Disabled access to building showing dimensions and details.	N/A
Disabled access toilet showing dimensions and details	N/A
Lintel sizes/beam sizes and proprietary systems.	Pass
Dimensions of proposed building work.	Pass
Finished floor levels/datum, daylight angles.	Pass

Framing Plan/Bracing Plan

Bracing calculations/details - type and fixings	Pass
Framing plan, including size, centres, grade and treatment of members.	Pass
Bottom plate, top plate, stud, lintel fixing details.	Pass
Upper storey floor design, if applicable.	N/A

Roof Plan

Roof plans and roof bracing.	Pass
Truss types/roof framing layout, design statement and manufacturers PS1.	Pass
Truss/Rafter and purlin fixings.	Pass

Elevations

North, South, East and West elevations.	Pass
Overshadowing labelled to correspond with points on site plan shown on all elevations	Pass
Height from ground level to apex of building	Pass
Show existing finished ground levels/floor levels and proposed finished ground levels/floor levels (sub-floor ventilation and access).	Pass
Stairs, handrails and decking shown	N/A
Cladding systems, roofing type and any other relevant details	Pass
Window schedule	Pass
Roof pitch and chimneys (show height of chimney in relation to ridge)	Pass
Alterations to land contour, retaining, cut and fill and batters	Pass

Specifications &Other Documentation

Technical specifications for proprietary systems/products e.g. tile showers, membranes, claddings systems and foundation systems etc.)	Pass
H1 calculations	Pass
E2 Risk Matrix	Pass
Compliance Schedule systems design and relevant maintenance and inspection procedures (copy of existing compliance schedule and/or proposed compliance schedule).	N/A
A4/A3 plan showing location of all specified systems for Compliance Schedule.	N/A
Has a seismic assessment been undertaken, if applicable	N/A
Natural hazard assessment report, where applicable (erosion, falling debris, subsidence, inundation, slippage).	N/A
Technical specifications for proprietary systems/products e.g. foundations/structural design.	Pass
If the building was built before 1 April 2000, provide an asbestos assessment in accordance with the Health and Safety at Work (Asbestos) Regulations 2016, and if necessary an asbestos management plan.	N/A

Plumbing &Drainage

All existing SEWERS, sewer connections and sewer drains shown including Territorial Authority services	Pass
All existing STORMWATER drains and connections shown including Territorial Authority services	Pass
Proposed sewer and stormwater drains/soak holes, terminal vents shown.	Pass

Existing and proposed potable water supply.	N/A
All existing and proposed sanitary fittings including pipe sizes and gradients (isometric)	Pass
Sanitary facilities - Assessment of existing sanitary facilities within the building comparative to current code and levels of amenity provided by the acceptable solutions.	N/A
Wastewater design and on-site soil evaluation to show compliance with Waikato Regional Council rules.	N/A
Specifications for hot water heating system including seismic restraints.	Pass
Water Supply Schematic (multi-storey buildings).	N/A
Backflow preventer shown – type and location	N/A
Stormwater disposal design and calculations.	Pass
Stormwater - soakholes (sizes and depths), Council drains disposal (if applicable).	Pass
Design for any proposed drainage, including those installed behind retaining walls.	Pass
Wet Area Shower	N/A
Cross sections	Yes
Drawings showing constructional details of foundations, floor systems, wall, ceiling, stud heights and stud sizes, roof construction, balustrades and barriers.	Pass
Surface finishes to wet areas (walls and floor to laundry, kitchen and bathroom).	Pass
Location and type of insulation.	Pass
Details for all penetration in walls, roof (i.e. windows, doors, meter boards, skylights etc.)	Pass
Cavity construction details, where applicable.	Pass
Relocatable buildings	N/A
Structure	Yes
Flashing details for openings, change of cladding, internal/external corners.	Pass
Roof barge, ridge, apron, valley flashing details.	Pass
Framing, connections, bracing layout, details and calculations.	Pass
Fixing details including wind fixings and structure to floor/foundation.	Pass
Details provided for fire walls.	N/A
Marquee/Temporary structures	N/A

Application for Building Consent/PIM (including Amendment & Temporary Structures)

Checklist

Reference Number:	REF181127014
Submitted On:	22/11/2018 11:30
Submitted By:	David Park
Status:	Accepted

Office Use Only

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Window schedule	Pass
Roof pitch and chimneys (show height of chimney in relation to ridge)	Pass
Alterations to land contour, retaining, cut and fill and batters	Pass

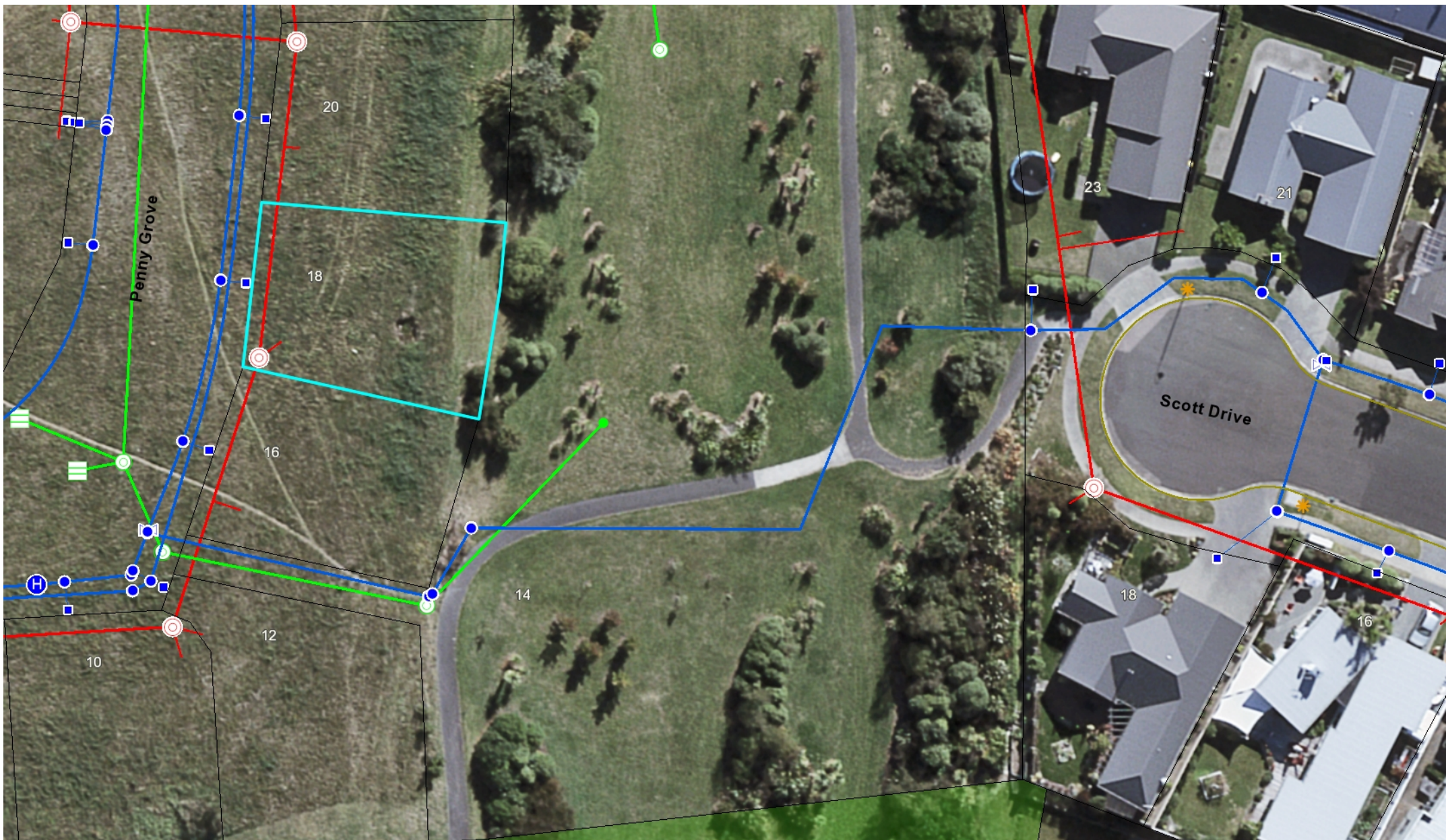
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Details provided for fire walls.	N/A
Marquee/Temporary structures	N/A



Services Plan - 18 Penny Grove

LEGEND:

- Property Boundaries
- Proposed Subdivisions
- Lease Boundaries
- Taupō District Boundary
- TDC Reserves
- DOC Reserves
- Council Owned Land
- Council Easements

SERVICES

Sewer (wastewater)

- Manhole
- Node
- Pump Station
- Sewer pipe

Water

- Water point (valve, fire hydrant)
- Water pipe

Stormwater

- Manhole
- Inlet / cesspit
- Node
- Stormwater pipe

- Fibre Optic Cable (Council)
- Street Lights

MAP PRODUCED FROM GEOCORTX

26.194 Meters

Scale = 1: 500 (A4)

Date Created: 27 November 2018 4:23 p.m.

Author:



Services Plan - 18 Penny Grove

Agents request to CANCEL application - A2361972

To: buildingconsents[buildingconsents@taupo.govt.nz]
From: David Park
Sent: Tue 27/11/2018 8:44:09 p.m
Importance: Normal
Subject: RE: Building consent application submitted for 18 Penny Grove, Taupo
MAIL_RECEIVED: Tue 27/11/2018 8:44:16 p.m

.....
>>>>>>
Hi Team

Sorry I have sent this application in by mistake it has already been submitted can you please disregard.

Thanks

David Park SALES CONSULTANT

 0274 909 129	 07 377 0154	
 david@pennyhomes.co.nz		
 1 Jarden Mile, Brentwood, Taupo		
pennyhomes.co.nz		

The contents of this email message and any attachments are intended solely for the addressee(s) and may contain confidential and/or privileged information and may be legally protected from disclosure. If you are not the intended recipient of this message or their agent, or if this message has been addressed to you in error, please immediately alert the sender by reply email and then delete this message and any attachments. If you are not the intended recipient, you are hereby notified that any use, dissemination, copying, or storage of this message or its attachments is strictly prohibited.

From: buildingconsents@taupodc.govt.nz [mailto:buildingconsents@taupodc.govt.nz]
Sent: Thursday, 22 November 2018 12:03 PM
To: David Park; techsupport@taupo.govt.nz
Subject: Building consent application submitted for 18 Penny Grove, Taupo

Please be advised that Taupō District Council is in receipt of your Building Consent application for 18 Penny Grove, Taupo.

We have included a copy of your application for your reference.

Application reference number: **REF181127014**

Owner: Penny Homes Ltd
Address: 1 Jarden Mile, Nukkuhau, Taupo 3330
You will be updated on the status of your application within 2 business days.

Kind regards,
Taupō District Council Building Consent Team