SDC - Approved Building Consent Document - BC240494 - Pg 1 of 388 - 7/05/2024 - helen.fowler

Approved Building Consent Documents

Please Note: A copy of the stamped approved documents must be available on site for all inspections.

Inspection booking timeframes

Call received	before 3pm inspection will be done	after 3pm inspection will be done
Monday	Wednesday	Thursday
Tuesday	Thursday	Friday
Wednesday	Friday	Monday
Thursday	Monday	Tuesday
Friday	Tuesday	Wednesday

Building inspections and enquiries phone: 03 347 2839

Please ensure all work for inspection is ready the day before. Incomplete work requiring re-inspection will incur an additional inspection fee.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

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Identifier **1129667**

Land Registration District **Canterbury**

Date Issued 07 March 2024

Prior References
107005

Estate Fee Simple

Area 402 square metres more or less

Legal Description Lot 44 Deposited Plan 590653

Registered Owners
Hill Street Limited

Interests

12816946.2 Mortgage to TSB Bank Limited - 1.9.2023 at 3:17 pm

Land Covenant in Covenant Instrument 12955449.9 - 7.3.2024 at 8:54 am (Limited as to duration)

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DocuSign Envelope ID: 0397B732-0FCC-462B-BD81-2DBD5C942FF0

ADLS | REINZ

Eleventh Edition 2022 (2)

AGREEMENT FOR SALE AND PURCHASE OF REAL ESTATE

This form is approved by the Real Estate Institute of New Zealand Incorporated and by Auckland District Law Society Incorporated.

DATE: Monday 22nd May, 2023

VENDOR:
Hill Street Limited

PURCHASER: RW2020 Limited and/or nominee

The vendor is registered under the GST Act in respect of the transaction and/or will be so registered at settlement: Yes/~~No~~
If "Yes", Schedule 1 must be completed by the parties.

Purchase price allocation (PPA) is relevant to the parties for income tax and/or GST purposes: Vendor Yes/No
If both parties answer "Yes", use of the PPA addendum for this agreement is recommended. Purchaser/Purchaser's Nominee Yes/No

PROPERTY
Address:
Lot [44], 545 East Maddisons Rd, Rolleston, Selwyn District

Estate: FREEHOLD ~~LEASEHOLD~~ ~~STRATUM IN FREEHOLD~~
~~STRATUM IN LEASEHOLD~~ ~~CROSS LEASE (FREEHOLD)~~ ~~CROSS LEASE (LEASEHOLD)~~
If none of the above are deleted, the estate being sold is the first option of freehold.

Legal Description:
Area (more or less): 402 *Lot/Flat/Unit:* *DP:* *Record of Title (unique identifier):*

Lot [44] being a proposed subdivision of the underlaying title being Lot [44] DP 326339 (Record of Title 107005)

PAYMENT OF PURCHASE PRICE
Purchase price: $ $320,000

~~Plus GST (if any) OR~~ Inclusive of GST (if any)
If neither is deleted, the purchase price includes GST (if any).

GST date (refer clause 13.0):

Deposit (refer clause 2.0): $ 32,000

Balance of purchase price to be paid or satisfied as follows:
(1) By payment in cleared funds on the settlement date which is: Refer to the further terms of sale
OR
(2) In the manner described in the Further Terms of Sale.

Interest rate for late settlement: 14 % p.a.

CONDITIONS ~~(refer clause 9.0)~~

Finance required (clause 9.1):	Yes/No	OIA consent required (clause 9.6):	Yes/No
Finance date:		OIA date (clause 9.8):	
LIM required (clause 9.3):	~~Yes/No~~	Land Act consent required (clause 9.7):	Yes/No
Building report required (clause 9.4):	Yes/No	Land Act date (clause 9.8):	
Toxicology report required (clause 9.5):	Yes/No		

TENANCIES Yes/No
Particulars of any tenancies are set out in Schedule 3 or another schedule attached to this agreement by the parties.

It is agreed that the vendor sells and the purchaser purchases the property, and any chattels listed, on the terms and conditions of this agreement.

Release date: 19 July 2022

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DocuSign Envelope ID: 0397B732-0FCC-462B-BD81-2DBD5C942FF0

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Eleventh Edition 2022 (2)

WARNING AND DISCLAIMER

- This agreement is a standard form document. It is therefore likely that amendments and additions may need to be made in order to suit the circumstances of each of the vendor and the purchaser, and to suit the particular property involved. It is also important that you are certain that any amendments made correctly reflect your understanding of what has been agreed. **You should always get legal advice before you sign the agreement and throughout the buying and selling process.**
- ADLS and REINZ accept no liability whatsoever in respect of this document and any agreement which may arise from it.
- The vendor should check the correctness of all warranties made under clause 7, clause 8, and elsewhere in this agreement.
- In the case of a unit title, before the purchaser enters into the agreement, the vendor **must** provide to the purchaser a pre-contract disclosure statement under section 146 of the Unit Titles Act.
- The transaction may have tax implications for the parties and it is recommended that both parties seek their own professional advice regarding the tax implications of the transaction before signing, including:
  - the GST treatment of the transaction, which depends upon the GST information supplied by the parties and could change before settlement if that information changes; and
  - the income tax treatment of the transaction, including any income tax implications of purchase price allocation.

PROFESSIONAL ADVICE SHOULD BE SOUGHT REGARDING THE EFFECT AND CONSEQUENCES OF ANY AGREEMENT ENTERED INTO BETWEEN THE PARTIES.

Acknowledgements

Where this agreement relates to the sale of a residential property and this agreement was provided to the parties by a real estate agent, or by a licensee on behalf of the agent, the parties acknowledge that they have been given the guide about the sale of residential property approved by the Real Estate Authority and a copy of the agency's in-house complaints and dispute resolution process.

The person or persons signing this agreement acknowledge that either:

(a) they are signing in a personal capacity as the 'vendor' or 'purchaser' named on the front page, or

(b) they have authority to bind the party named as 'vendor' or 'purchaser' on the front page.

WARNING *(This warning does not form part of this agreement)*

Before signing, each party should read this entire contract and should obtain all relevant professional advice. This is a binding contract. Once signed, you will be bound by the terms of it and there may be no, or only limited, rights to terminate it.

Signature of Purchaser(s):

Name:
Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply

Name:
Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply

Signature of Vendor(s):

Name:
Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply

Name:
Director / Trustee / Authorised Signatory / Agent / Attorney*
Delete the options that do not apply

*If this agreement is signed under:

(i) a Power of Attorney – please attach a **Certificate of non-revocation** (available from ADLS: 4098WFP or REINZ); or

(ii) an Enduring Power of Attorney – please attach a **Certificate of non-revocation and non-suspension of the enduring power of attorney** (available from ADLS: 4997WFP or REINZ).

Also insert the following wording for the Attorney's Signature above:

Signed for [full name of the donor] by his or her Attorney [attorney's signature].

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Title Plan - LT 590653

Survey Number	LT 590653
Surveyor Reference	3572 545EMR Stg1
Surveyor	Reuben Vos
Survey Firm	Access Land Surveying
Surveyor Declaration	

Survey Details

Dataset Description	Lots 23-61 & 100-103 being Subdivision of Lot 1 DP 326339		
Status	Initiated		
Land District	Canterbury	**Survey Class**	Class A
Submitted Date		**Survey Approval Date**	
		Deposit Date	

Territorial Authorities

Selwyn District

Comprised In

RT 107005

Created Parcels

Parcels	Parcel Intent	Area	RT Reference
Lot 23 Deposited Plan 590653	Fee Simple Title	0.0434 Ha	1129645
Lot 24 Deposited Plan 590653	Fee Simple Title	0.0571 Ha	1129646
Lot 25 Deposited Plan 590653	Fee Simple Title	0.0571 Ha	1129647
Lot 26 Deposited Plan 590653	Fee Simple Title	0.0434 Ha	1129648
Lot 27 Deposited Plan 590653	Fee Simple Title	0.0406 Ha	1129649
Lot 28 Deposited Plan 590653	Fee Simple Title	0.0400 Ha	1129651
Lot 29 Deposited Plan 590653	Fee Simple Title	0.0503 Ha	1129652
Lot 30 Deposited Plan 590653	Fee Simple Title	0.0522 Ha	1129653
Lot 31 Deposited Plan 590653	Fee Simple Title	0.0499 Ha	1129654
Lot 32 Deposited Plan 590653	Fee Simple Title	0.0530 Ha	1129655
Lot 33 Deposited Plan 590653	Fee Simple Title	0.0603 Ha	1129656
Lot 34 Deposited Plan 590653	Fee Simple Title	0.0550 Ha	1129657
Lot 35 Deposited Plan 590653	Fee Simple Title	0.0519 Ha	1129658
Lot 36 Deposited Plan 590653	Fee Simple Title	0.0480 Ha	1129659
Lot 37 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129660
Lot 38 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129661
Lot 39 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129662
Lot 40 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129663
Lot 41 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129664
Lot 42 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129665
Lot 43 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129666
Lot 44 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129667
Lot 45 Deposited Plan 590653	Fee Simple Title	0.0402 Ha	1129668
Lot 46 Deposited Plan 590653	Fee Simple Title	0.0404 Ha	1129669

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Title Plan - LT 590653

Created Parcels

Parcels	Parcel Intent	Area	RT Reference
Lot 47 Deposited Plan 590653	Fee Simple Title	0.0434 Ha	1129670
Lot 48 Deposited Plan 590653	Fee Simple Title	0.0400 Ha	1129671
Lot 49 Deposited Plan 590653	Fee Simple Title	0.0400 Ha	1129672
Lot 50 Deposited Plan 590653	Fee Simple Title	0.0400 Ha	1129673
Lot 51 Deposited Plan 590653	Fee Simple Title	0.0400 Ha	1129674
Lot 52 Deposited Plan 590653	Fee Simple Title	0.0400 Ha	1129675
Lot 53 Deposited Plan 590653	Fee Simple Title	0.0400 Ha	1129676
Lot 54 Deposited Plan 590653	Fee Simple Title	0.0410 Ha	1129677
Lot 55 Deposited Plan 590653	Fee Simple Title	0.0479 Ha	1129678
Lot 56 Deposited Plan 590653	Fee Simple Title	0.0485 Ha	1129679
Lot 57 Deposited Plan 590653	Fee Simple Title	0.0561 Ha	1129680
Lot 58 Deposited Plan 590653	Fee Simple Title	0.0604 Ha	1129681
Lot 59 Deposited Plan 590653	Fee Simple Title	0.0468 Ha	1129682
Lot 60 Deposited Plan 590653	Fee Simple Title	0.0505 Ha	1129683
Lot 61 Deposited Plan 590653	Fee Simple Title	0.0290 Ha	Multiple
Area A Deposited Plan 590653	Easement		
Area B Deposited Plan 590653	Easement		
Area C Deposited Plan 590653	Easement		
Area D Deposited Plan 590653	Easement		
Area E Deposited Plan 590653	Easement		
Area F Deposited Plan 590653	Easement		
Lot 100 Deposited Plan 590653	Fee Simple Title	0.6479 Ha	
Lot 101 Deposited Plan 590653	Vesting on Deposit for Road	0.7996 Ha	
Lot 102 Deposited Plan 590653	Vesting on Deposit for Road	0.0428 Ha	
Lot 103 Deposited Plan 590653	Fee Simple Title	0.7411 Ha	
Total Area		3.9994 Ha	

Schedule / Memorandum

Land Registration District	Survey Number
Canterbury	**LT 590653**

Territorial Authority (the Council)

Selwyn District

Amalgamation Conditions

Last Edited: 26 Apr 2023 14:53:44

That Lot 61 hereon (legal access) be held as to four undivided one-fourth shares by the owners of Lots 28 - 31 hereon as tenants in common in the said shares and that individual Computer Freehold Registers be issued in accordance herewith.

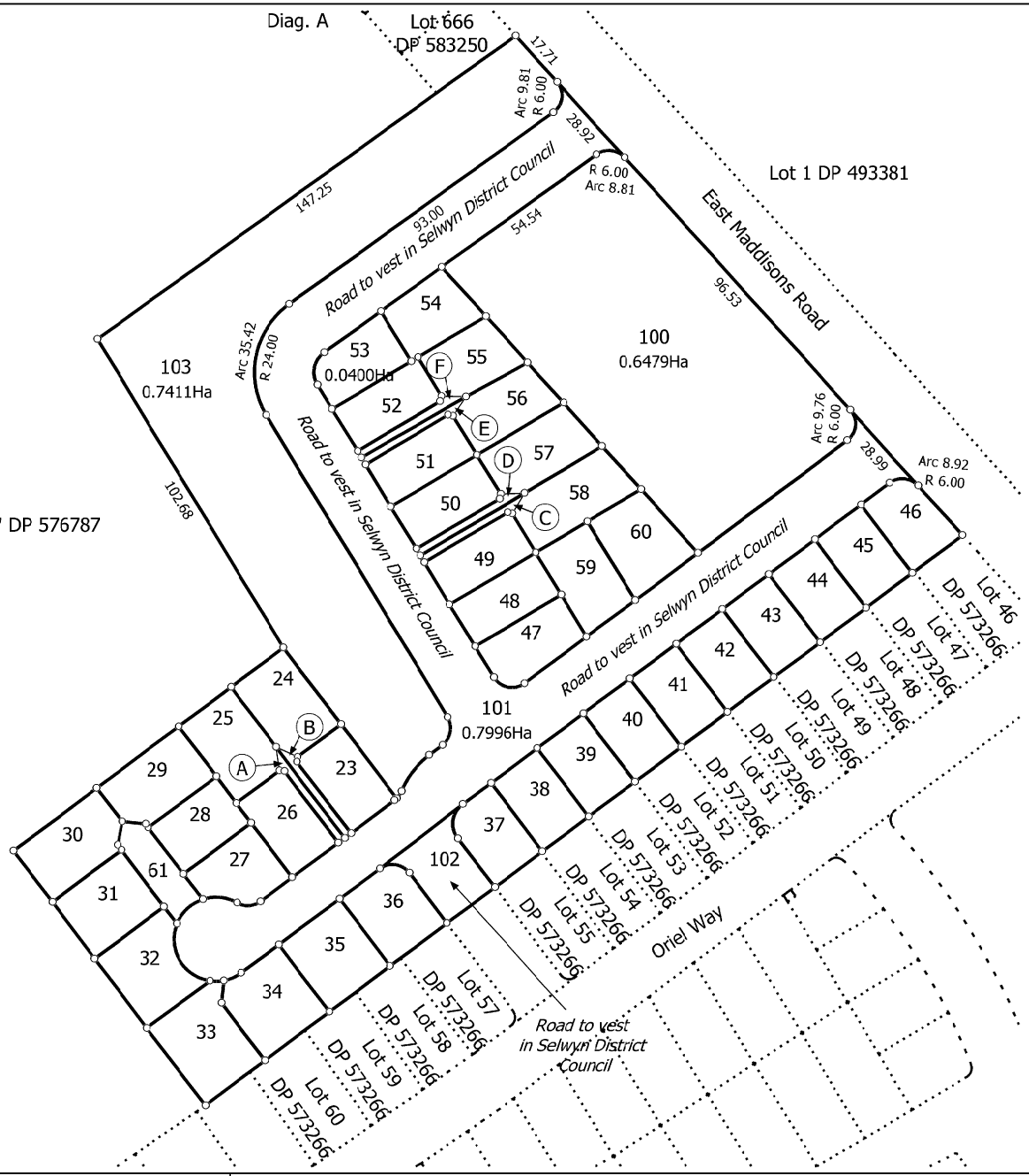
Memorandum of Easements

Last Edited: 26 Apr 2023 14:57:39

Purpose	Shown	Burdened Land (Servient Tenement)	Benefited Land (Dominant Tenement)
Right of Way	A	Lot 25	Lot 24
	B	Lot 24	Lot 25
	C	Lot 58	Lot 57
	D	Lot 57	Lot 58
	E	Lot 56	Lot 55
	F	Lot 55	Lot 56
Right to convey electricity, water, telecommunications	A	Lot 25	Lot 24
	B	Lot 24	Lot 25
	C	Lot 58	Lot 57
	D	Lot 57	Lot 58
	E	Lot 56	Lot 55
	F	Lot 55	Lot 56
Right to drain water, sewage	A	Lot 25	Lot 24
	B	Lot 24	Lot 25
	C	Lot 58	Lot 57
	D	Lot 57	Lot 58
	E	Lot 56	Lot 55
	F	Lot 55	Lot 56

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Land District: Canterbury Digitally Generated Plan Generated on: 27/04/2023 10:23am Page 4 of 6	Lots 23-61 & 100-103 being Subdivision of Lot 1 DP 326339	Surveyor: Reuben Vos Firm: Access Land Surveying	Title Plan LT 590653 DRAFT

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Land District: Canterbury

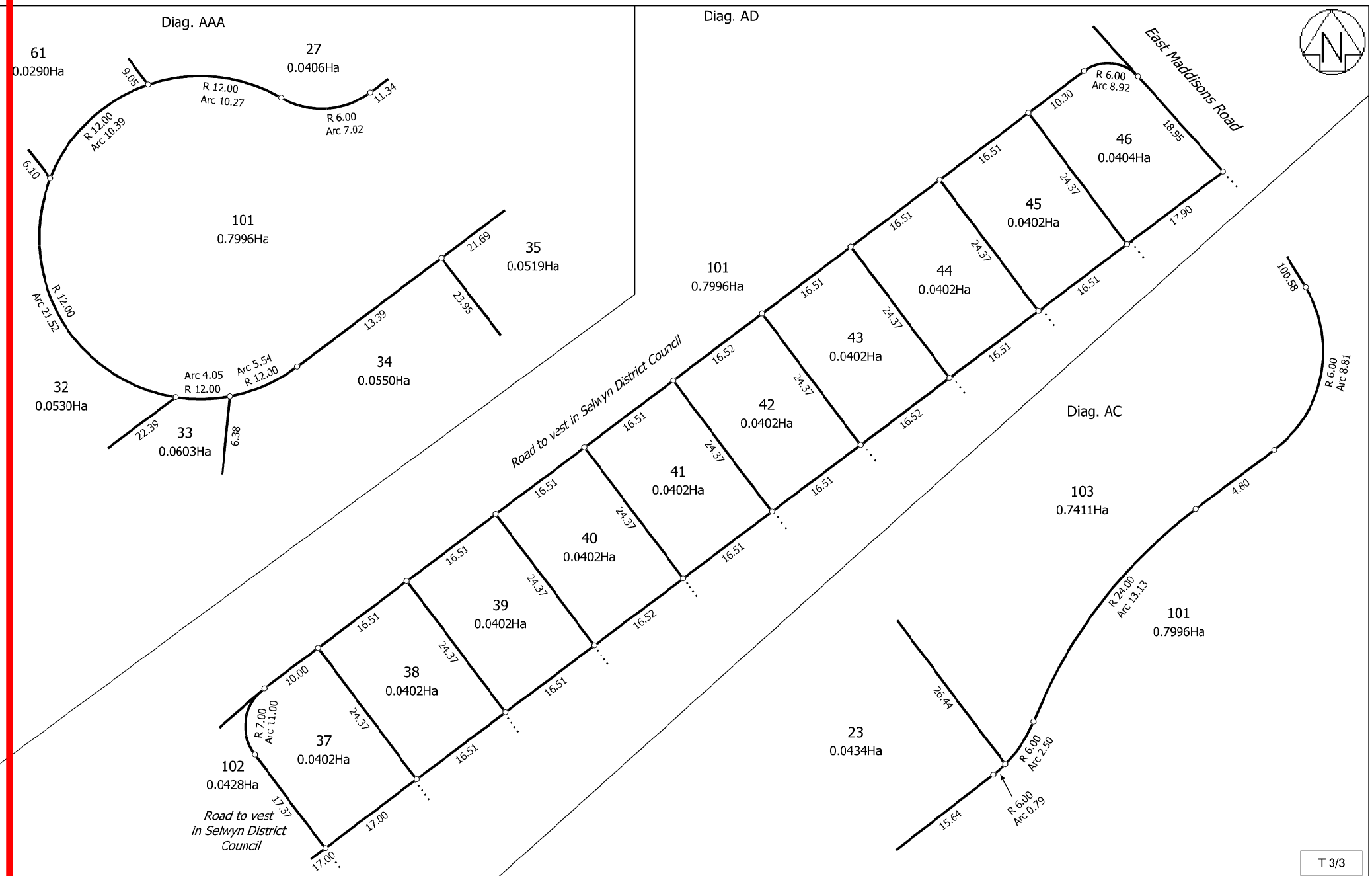
Digitally Generated Plan
Generated on: 27/04/2023 10:23am Page 5 of 6

Lots 23-61 & 100-103 being Subdivision of Lot 1 DP 326339

Surveyor: Reuben Vos
Firm: Access Land Surveying

Title Plan
LT 590653
DRAFT

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T 3/3

Land District: Canterbury

Digitally Generated Plan
Generated on: 27/04/2023 10:23am Page 6 of 6

Lots 23-61 & 100-103 being Subdivision of Lot 1 DP 326339

Surveyor: Reuben Vos
Firm: Access Land Surveying

Title Plan
LT 590653
DRAFT

Flood Assessment Certificate
FC230406

Issued pursuant to NH-SCHED1 of the Partially Operative Selwyn District Plan.

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Property Address:	545 East Maddisons Road, Rolleston (Lemonwood Estate)
Legal Description:	Lots 23-60 DP 590653
Date of Issue:	26 March 2024
This certificate is valid until:	26 March 2026

The sites are not located on land within a high hazard area.

The sites are likely to be subject to inundation in a 200-year Average Recurrence Interval (ARI) flood event.

Minimum finished floor level shall be for the following:

Lots 23 & 26 only:

+37.97m LVD37

Lots 24, 44 & 46 only:

+38.03m LVD37

Lot 25 only:

+38.07m LVD37

Lot 27 only:

+38.13m LVD37

Lot 28 only:

+38.26m LVD37

Lots 29, 30, 31 & 60 only:

+38.30m LVD37

Lot 32 only:

+38.15m LVD37

Lot 33 only:

+38.05m LVD37

Lots 34 & 35 only:

+37.95m LVD37

Lots 36, 37, 39 & 40 only:

+37.88m LVD37

Lot 38 only:

+37.83m LVD37

Lots 41 & 42 only:

+37.93m LVD37

Lot 43 only:

+37.98m LVD37

Lot 45 only:

+38.08m LVD37

Lot 47 only:

+38.22m LVD37

Lot 48 only:

+38.31m LVD37

Lot 49 only:

+38.32m LVD37

Lots 50 & 56 only:

+38.36m LVD37

Lot 51 only:

+38.47m LVD37

Lots 52 & 53 only:

+38.53m LVD37

Lot 54 only:

+38.63m LVD37

Lot 55 only:

+38.58m LVD37

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Lots 57 & 58 only:

+38.35m LVD37

Lot 59 only:

+38.25m LVD37

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Disclaimers:

1. Whether the site is likely to be subject to inundation in a 200-year ARI flood event, and the minimum finished floor level have been determined with reference to:

   (a) The most up to date models and maps held by Selwyn District Council or Canterbury Regional Council;
   (b) Any relevant field information; and
   (c) Any site specific flood assessment prepared by a suitably qualified and experienced person, including a site specific Flood Hazard Assessment prepared by Canterbury Regional Council.

2. This certificate is based on the best information available to Selwyn District Council at the time the certificate was issued. This information is subject to change and may be updated at any time, including during the valid period of this certificate. Selwyn District Council accepts no liability for changes in this information.

3. This certificate relies on flood modelling. Flood modelling is a tool that predicts what might happen in a flood event of a given magnitude. A flood model uses hypothetical scenarios and makes assumptions about how a flood event might unfold however there are many more variables that can influence how a site is affected in an actual flood event. The minimum finished floor level does not infer that no damage will occur to a structure built above the minimum finished floor level in a flood event.

4. The Building Act 2004 also manages flood risk. The minimum floor level certified under the Partially Operative District Plan may be different to the floor level required by the Building Act 2004, which must be met in order to obtain a building consent.

5. Any activity or construction carried out on a site where a Flood Assessment Certificate is issued is carried out at your own risk, and Council recommend that you carefully consider the impact of any flooding risk associated with this site.

Advice notes:

a) For a new residential unit or principal building or the alteration of, or addition to any residential unit or principal building to be a permitted activity under the Selwyn District Plan as a whole, all other relevant rules must be complied with.

b) If the certified level is for a particular location on the site, the certified level is the minimum floor level for the proposed building location shown on the attached plan. If you wish to build elsewhere on the site the minimum floor level may be different, and you will need to request another certificate for the new location.

c) For the purposes of this certificate, ground level means:

   a. The actual finished surface level of the ground after the most recent subdivision that created at least one additional allotment was completed (when the record of title is created);

   b. If the ground level cannot be identified under paragraph (a), the existing surface level of the ground;

   c. If, in any case under paragraph (a) or (b), a retaining wall or retaining structure is located on the boundary, the level of the exterior surface of the retaining wall or retaining structure where it intersects the boundary.

d) You must reference this certificate when applying for a building consent or the building consent will not be accepted.

Signed for and on behalf of the Selwyn District Council:



Emma Larsen

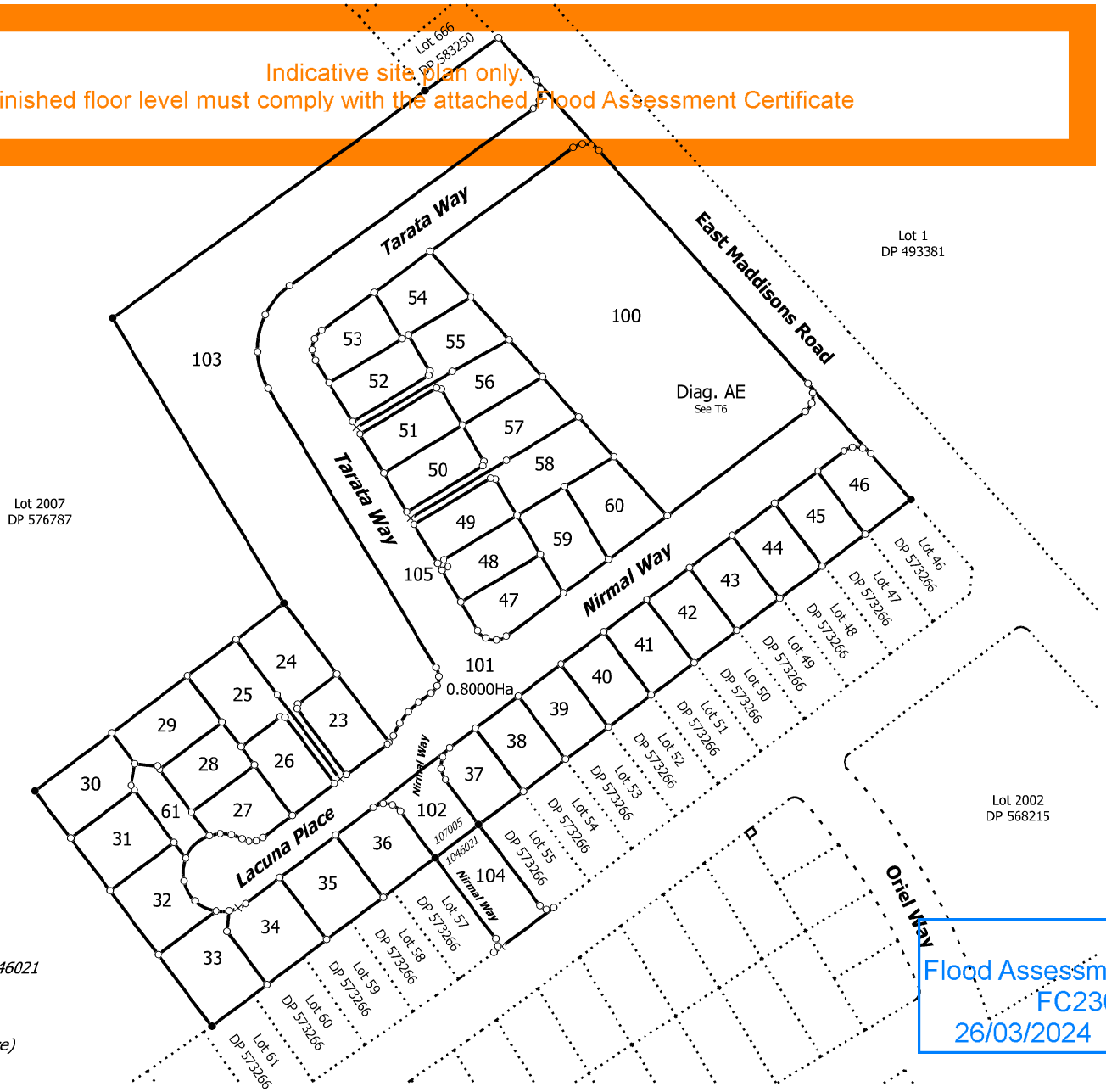
Head of Resource Consents

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Diag. A

Indicative site plan only.
The finished floor level must comply with the attached Flood Assessment Certificate



Notes

Lots 101, 102 & 104 are Road, to vest in Selwyn District Council

Lot 104 was previously Lot 56 DP 573266 and comprised in RT 1046021

Selwyn District Council references:
RC225470 (as varied by RC235308, RC235378 and RC235777)
Also see RC235063 (Land Use) and RC235379 (vary Consent Notice)

Flood Assessment Certificate
FC230406
26/03/2024 - bothan

T 1/7

Land District: Canterbury Digitally Generated Plan Generated on: 23/02/2024 12:59am Page 5 of 11	Lots 23-61 and 100-105 being subdivision of Lot 1 DP 326339 and Lot 56 DP 573266	Surveyor: Reuben Vos Firm: Access Land Surveying	Title Plan LT 590653 DRAFT

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Form 2A

Memorandum from licensed building practitioner: Certificate of design work

Section 30C or 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: 5 Nirmal Way (Lot 44)	
Suburb: Lemonwood Estate	
Town/City: Rolleston	Postcode:

THE OWNER(S)

Name(s): Wendelborn Property Ltd	
Mailing address:	
Suburb: Tower Junction	PO Box/Private Bag: PO Box 9315
Town/City: Christchurch	Postcode: 8149
Phone number: 0272550048	Email address: info@wendelbornproperty.co.nz

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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 work 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 memorandum 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 __Min (Tuan Main) Goh_ carried out / supervised the following design work that is restricted building work

PRIMARY STRUCTURE: B1

Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ⊗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
All RBW design work relating to B1 ☐		☐ Carried out ☐ Supervised	
Foundations and subfloor framing ☑	Firth Codemark Ribraft Foundation	☐ Carried out ☑ Supervised	Architectural Plan Specification Appendix - Firth Ribraft

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Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
Walls ☑	Timber framed wall NZS3604 & SED Lintel	☑ Carried out ☑ Supervised	Architectural Plan Specification Appendix - Truss Design
Roof ☑	Engineer trussed roof	☐ Carried out ☑ Supervised	Appendix - Truss Design
Columns and beams ☑	SED beam over timber framed column	☐ Carried out ☑ Supervised	Architectural Plan Specification Appendix - Truss Design
Bracing ☑	Bracing to NZS3604	☑ Carried out ☐ Supervised	Architectural Plan Specification Appendix - Bracing Calculation
Other ☐		☐ Carried out ☐ Supervised	

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Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2			
All RBW design work relating to E2 ☐		☐ Carried out ☐ Supervised	
Damp proofing ☑	DPM under foundation & slab DPM under bottom plates	☑ Carried out ☐ Supervised	Architectural Plan Specification
Roof cladding or roof cladding system ☑	Pressed metal tiles over self-supporting roof underlay on roof framing	☑ Carried out ☐ Supervised	Architectural Plan Specification Appendix
Ventilation system (for example, subfloor or cavity) ☑	Drained cavities to wall claddings	☑ Carried out ☐ Supervised	Architectural Plan Specification Appendix
Wall cladding or wall cladding system ☑	RCS Graphex on 20mm cavity battens & James Hardie Linea Weatherboard on 20mm cavity battens	☐ Carried out ☐ Supervised	Architectural Plan Specification Appendix
Waterproofing ☐		☐ Carried out ☐ Supervised	
Other ☐		☐ Carried out ☐ Supervised	

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Design work that is RBW	Description of RBW	Carried out or supervised	Reference to plans and specifications
Tick ✓ if included. Cross ✗ if excluded	If appropriate, provide details of the RBW	Tick ✓ whether you carried out this design work or supervised someone else carrying out this design work	If appropriate, specify references
FIRE SAFETY SYSTEMS: C1 - C6			
Emergency warning systems Evacuation and fire service operation systems ☐ Suppression or control systems 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

Waivers or modifications of the Building Code are required. ☐ Yes ☒ No

If Yes, provide details of the waivers or modifications below:

Clause	Waiver/modification required
List relevant clause numbers of building code	Specify nature of waiver or modification of building code required

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ISSUED BY

Name and contact details of the licensed building practitioner who is licensed to carry out or supervise design work that is restricted building work.

Name: Min (Tuan Main) Goh	LBP or Registration number: BP129011
The practitioner is a: ☑ Design LBP ○ Registered architect ○ Chartered professional engineer	
Design Entity or Company (optional): Archiplus Ltd	
Mailing address (if different from below):	
Street address/Registered office: 6 Browns Road	
Suburb:	Town/City: Christchurch
PO Box/Private Bag:	Postcode: 8014
Phone number:	Mobile: 02102381905
After hours:	Fax:
Email address: mg.archiplus@gmail.com	Website:

DECLARATION

I Min (Tuan Main) Goh 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: 07/03/2024

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Archiplus

SPECIFICATION APPENDIX

prepared for

WENDELBORN PROPERTY LTD
(owner's name)

LOT 44 DP 590653
5 NIRMAL WAY
LEMONWOOD ESTATE
ROLLESTON
(project address)

23099
(job number)

7 MARCH 2024

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APPENDIX 01 – GEOTECH REPORT

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22 September 2023

Project Ref: 2310319/Lot 44
Rev.: 01

Oakridge Homes Limited
James Parker
james.parker@oakridgehomes.co.nz

Shallow Soil Investigation Report for New Residential Dwelling – Lot 44 - 545 East Maddisons Road, Rolleston, Selwyn

Kirk Roberts Consulting has been engaged by the client to review available geotechnical investigation data, complete site investigations, and prepare a geotechnical report to advise foundation recommendations for a new residential dwelling at Lot 44 - 545 East Maddisons Road, Rolleston, Selwyn.

This letter report is suitable to accompany a Building Consent application.

1 Site Description

The subject property is physically located at proposed Lot 44, being a subdivision of Lot 1 DP 326339. The site is part of a new subdivision of 545 East Maddisons Road, Rolleston, Selwyn (Lemonwood Estate). Access to the property is available off East Maddisons Road. The approximate site location is shown in Attachment 1. The site is generally flat and similar to the surrounding topography.

2 Received Report Review

We reviewed the following document summarised below and referred to in our foundation assessment of the site.

- Kirk Roberts - *Natural Hazard Assessment Report for Proposed Subdivision: 545 East Maddisons Road, Rolleston, Selwyn*, ref. 2210219, rev. 01, dated 10 May 2022.

3 Site Proposed Development

Kirk Roberts has been provided with the concept design plans for the proposed residential development prepared by Archiplus *(Lot 4438 Lemonwood Estate, Rolleston,* Job No. 23099, rev 1*,* dated 11/09/2023). The plans indicate that the site will be developed with one single-storey dwelling with lightweight claddings and lightweight metal roofing. Refer to the proposed development plans in Attachment 2 for further details.

Geotechnical recommendations made herein assume that the proposed development will fall within the scope of MBIE guidelines[1] and NZS 3604:2011.

4 Sub-Surface Conditions

4.1 Geological Setting

We have reviewed the data published by GNS Science on the New Zealand Geology Web Map[2] for the published surface geology beneath the site. This is summarized in Table 1.

Table 1: Published Geology

Geological group	Geological sub-group	Geological age	Description
Late Pleistocene sediments	Late Pleistocene river deposits	0.012 – 0.024 million years	Unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (?loess) cap

[1] Ministry of Business Innovation and Employment (MBIE) Guidance**:** Repairing and rebuilding houses affected by the Canterbury earthquakes, Version 3, December 2012
[2] GNS Science – New Zealand Geology Web Map, date retrieved in September 2023 from http://data.gns.cri.nz/geology/

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A review of the GNS Active Faults Database[3] indicates that the closest GNS mapped active fault trace is the Greendale Fault located approximately 5.7 km northwest of the site. Therefore, the site is located outside the minimum 20 m Fault Avoidance Zone recommended by the Ministry for the Environment[4].

4.2 Geotechnical Investigation – Kirk Roberts September 2023

Site-specific geotechnical investigations were undertaken by Kirk Roberts on the 6th of September 2023. A summary of the geotechnical investigations is presented in Table 2 below. Refer to Attachment 3 for the test location plans 1 to 3.

Testing was completed to assess the near-surface soil profile, groundwater table and shallow foundation-bearing capacity within the proposed new dwellings.

Table 2: Summary of Investigations

Investigation	Test type/code	Depth of test (m bgl)	Comments
Kirk Roberts, September 2023	Hand-auger boreholes (HA-01 to HA-03)	0.1 – 0.3	Refusal
	Scala Penetrometers (SP-01 to SP-03)	0.3 – 0.5	Refusal

The hand-auger tests encountered topsoil to depths of 0.1 – 0.3m below ground level (bgl) where the test holes met practical refusal and the hand-auger could not penetrate further into the dense gravel.

The Scala penetrometer tests generally returned minimum blow counts of 3 blows per 100 mm of penetration from 0.1 – 0.3m bgl (below the topsoil), indicating an index geotechnical ultimate bearing capacity[5] (GUBC) of 300 kPa is available at these depths.

Groundwater was not encountered during our investigation. However, groundwater counters shown on the Canterbury Maps Viewer[6] and nearby wells indicate groundwater level is likely to be 8 - 10 m bgl.

Refer to the attached shallow soil test locations and test results (Attachment 3).

5 Flood Risk Assessment

The Selwyn District Council Flood Map[7] shows the 200-year and 500-year flood hazard models. The models indicate the site is at a low risk of inundation from the 200-year and 500-year Annual Recurrence Interval (ARI) models. This risk is < 0.2 m in depth.

However, we note that the site is part of a new subdivision, any risk of inundation is expected to be mitigated as part of the recent subdivision construction.

Further assessment of site-specific flood issues is beyond the scope of this report.

6 Seismic Assessment

6.1 Site Seismic Class

In accordance with NZS 1170.5:2004, site classification "*Class D*" applies to this particular site, defining it as a '*deep or soft soil site*'.

6.2 Liquefaction Risk

Kirk Roberts' report (as detailed in Section 2 of this report) concluded "*that the site will perform in accordance with the requirements for a Technical Category 1 (TC1)*".

[3] Geological and Nuclear Sciences (2004). Active Faults Database, date retrieved in September 2023 from https://data.gns.cri.nz/af/
[4] Planning for Development of Land on or Close to Active Faults: A Guideline to Assist Resource Management Planners in New Zealand (Published July 2003).
[5] The inferred bearing capacity is based on Scala penetrometer tests and have been estimated using the procedure presented by M.J. Stockwell in the paper '*Determination of allowable bearing pressure under small structures (June 1977)*'.
[6] Environment Canterbury – Canterbury Maps Viewer, data retrieved in September 2023 from https://mapviewer.canterburymaps.govt.nz/
[7] Selwyn District Council Flood Map – data retrieved in September 2023 from https://apps.canterburymaps.govt.nz/SelwynNaturalHazards/

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6.3 Lateral Spread

The site is generally flat and level with no abrupt changes in elevation and is not in close proximity to any major waterways. Considering the site topography, the underlying geology and a review of Kirk Roberts' report, it is our professional opinion that the site is not susceptible to lateral spreading in terms of both global lateral movement and lateral stretch.

7 Foundation Recommendations

7.1 Discussion

Given the results of Kirk Roberts geotechnical investigations, the assessed TC1 equivalent categorisation for the site and considering the preferred foundation system, foundation options specified for TC1 sites as outlined in Part A of the MBIE guidelines[1] are considered generally appropriate.

The following foundation options are considered suitable for the site:

- Tied concrete foundation slab-on-grade to NZS 3604:2011;
- TC1 waffle slab foundation.

7.2 In-Situ Soil Bearing Capacity

The site-specific geotechnical investigations indicate that an index geotechnical ultimate bearing capacity (GUBC) of 300 kPa is generally available from around 0.1 – 0.3m bgl (below topsoil).

The topsoil and any unsuitable/uncontrolled fill are not suitable to support shallow foundations due to the risk of consolidation settlement.

A capacity reduction factor as specified in Table 1, paragraph 3.5.1 of the NZBC B1/VM4 shall be used.

At the time of construction, and in accordance with the Council's requirements, all foundation excavations should be inspected by a suitably qualified geotechnical engineer to confirm that the soil profile is consistent with the findings of this geotechnical report. The requirement for additional excavation or testing will be determined by the inspecting Engineer at this time.

7.3 Concrete Slab Foundations

5.3.1 Overview

The concrete slab foundations are designed for *'Good Ground'* conditions as defined in NZS 3604:2011, and are therefore subject to a minimum geotechnical ultimate bearing capacity requirement (GUBC) of 300 kPa. As this bearing capacity is available at 0.1 – 0.3m bgl (below the topsoil), a basecourse of approved granular fill such as CAP20 (75 mm thick) or CAP40 (100 mm thick) should be placed, compacted, and built up to the underside of the floor slab. Where the excavation exceeds the above thicknesses, additional approved granular fill such as AP65 shall be placed, compacted, and built up to the underside of the basecourse.

Fill materials shall be placed and compacted in accordance with NZS 4431:2022.

5.3.2 Tied Concrete Foundation Slab on Grade to NZS 3604:2011

The NZS 3604 foundation slab shall be designed as a 100 mm (minimum) thick, reinforced concrete slab with a perimeter foundation and internal thickenings beneath load bearing walls. The layout of the slab system will require all internal load-bearing wall foundations to be tied-in to the perimeter foundations and thickened where necessary, to minimise tension crack failure of the concrete slab during strong ground shaking.

5.3.3 TC1 Waffle Slab Foundation

The TC1 waffle slab is a foundation system that provides a practical alternative to the option described in Section 5.3.2 and delivers a similar level of performance. The TC1 waffle slab is designed for '*Good Ground*' conditions as defined in NZS 3604:2011.

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5.3.4 Non-NZS 3604:2011 Compliant Dwelling Designs

Developments that are beyond the scope of NZS 3604:2011 will require specific engineering design by a Chartered Professional Engineer to ensure the foundation design is appropriate for the imposed structural loads and encountered ground conditions.

5.3.5 Foundations Adjacent to Soak Pits

Where soak pit will be required as part of the site development, then the recommendation of this section should be considered.

Foundations located within the zone of influence of the soak pit will require specific engineering design.

Foundation loads shall extend below a zone of influence defined by a 45-degree line projected from the base of the soak pit back up towards the foundations.

This may be achieved by locally deepening the footings below this plane of influence through, deeper trench excavation, bored concrete filled piles or concrete filled sub-foundation pads. The foundations could also be supported on deeper piles below the base level of the soak pit, depending on the proximity to the foundations.

Foundations could also be specifically designed to cantilever out over the zone of influence if deemed practical from a foundation design perspective.

Deepened foundations, bored piles and sub-foundation pads shall be designed for a soil ultimate bearing capacity of 300 kPa on the in-situ gravels and adopt a strength reduction factor Φ_{bc}=0.5.

Deeper piles found below 2 m depth can be designed for a soil ultimate bearing capacity of 1 MPa on the in-situ gravels and adopt a strength reduction factor Φ_{bc}=0.5.

8 Further Development Considerations

8.1 Static Settlement

The encountered soil profile within the shallow depth is unlikely to be susceptible to consolidation settlement. However, in accordance with New Zealand Building Code, foundations should be designed to limit the differential settlement to 25 mm deflection over a 6 m span.

The topsoil and uncontrolled fill materials are not considered suitable to support shallow foundations due to the risk of consolidation settlement. These unsuitable materials should be excavated and removed from the site.

Filling above existing ground level could result in an increase to, or acceleration of, static settlement. As such, earth filling above existing site levels (by more than 400 mm) should not be undertaken without further geotechnical input from a suitably qualified geotechnical engineer or engineering geologist.

8.2 Erosion & Sediment Control

During the development of the site, appropriate stormwater and erosion control measures should be implemented and monitored throughout construction. Erosion control is likely to require the introduction of silt fences, or other similar devices, to intercept soil run-off and improve the quality of the stormwater that will be discharged from the site.

8.3 Stormwater & Effluent Control

Stormwater concentrations and effluent should be channelled or piped to the existing Council infrastructure or subject to specific civil engineering design to avoid:

- Erosion of soils beneath foundation elements
- Discharge over slope batters and retaining walls (if applicable).

The respective systems should be maintained free from debris and other obstructions.

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8.4 Review of Developed Design

It is likely the Council will require that Kirk Roberts be provided with the developed design drawings as and when they are completed, in order to confirm that the recommendations presented in this report are still applicable.

At the time of construction, an appropriate level of construction monitoring shall be required to confirm that the encountered soil profile, and founding layers, remain consistent with those outlined in this document. Significant variations of the exposed soil (organic material, soft spots etc.), identified during construction should be brought to the attention of the geotechnical engineer and the ground remediated as necessary.

9 Limitations

This report has been prepared at the specific instructions of our client in connection with the above project.

Whilst every care was taken during our desktop review, site investigation and interpretation of subsurface conditions, there may well be subsoil strata and features that were not detected.

It must be appreciated that the actual characteristics of the subsurface materials may vary significantly between adjacent test locations and sample intervals other than where observations, explorations and investigations have been made.

It should be noted that because of the inherent uncertainties in subsurface evaluations, changed or unanticipated subsurface conditions may occur that could affect total project cost and/or execution. Kirk Roberts Consulting does not accept responsibility for the consequences of significant variances in the conditions and the requirements for execution of the works.

Only our client and the Council are entitled to rely upon this report, and then only for the purpose stated above. Kirk Roberts Consulting Engineers Ltd accepts no liability to anyone other than these parties in any way in relation to this report and the content of it and any direct or indirect effect this report may have. Kirk Roberts Consulting Engineers Ltd does not contemplate anyone else relying on this report or that it will be used for any other purpose.

Should anyone wish to discuss the content of this report with Kirk Roberts Consulting Engineers Ltd, they are welcome to contact us on 03 379 8600 and www.kirkroberts.co.nz.

Yours faithfully,

Prepared by	Reviewed by	Reviewed & Approved by
Dunya Salman *MSc, BSc* *Geotechnical Engineer*	**Charlie Walsh** *BE hons* *Geotechnical Engineer*	**Firas Salman** *PhD, CMEngNZ, CPEng* *Technical Director – Geotechnical*

Attachments:

Attachment 1: Site Location	(1 page)
Attachment 2: Proposed Residential Development	(5 pages)
Attachment 3: Site-Specific Investigation Plans and Bore-logs	(4 pages)

Attachment 1 : Site Location

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Notes:
These notes are an intergral part of this plan.
Areas and dimensions are subject to survey.
The Council datum has been transferred to the site using GNSS survey equipment.
Estimated accuracy of levels shown on the plan relative to the Council datum is ±30 mm
This plan has been carried out to topographical standards. all levels shown are correct at time of survey.
Critical dimensions and levels should be verified.
Access Land Surveying does not gurantee the accuracy of any underground services shown on this plan.
This plan is issued for a specific project and may not be altered or used for any other purpose without the prior written consent of Access Land Surveying Ltd.
Levels are in terms of Lyttleton Vertical Datum 1937, Origin of levels: UG32 (B882) RL55.9078
Contour interval 0.25m

Schedule of areas:
No of Residential Lots 38
Net Residential area: 16955m²
Average net area: 446m²
Balance lots for future development:
Lot 100: 6479m²
Lot 103: 7400m²
Road (Lots 101 & 102) to vest in SDC: 8426m²

Memorandum of Easements

Nature	Servient Tenament		Dominant Tenament
	Shown	Lot	
Right of Way, Right to drain water and sewage, Right to convey power, water and telecommunications	A	Lot 25	Lot 24
	B	Lot 24	Lot 25
	C	Lot 58	Lot 57
	D	Lot 57	Lot 58
	E	Lot 56	Lot 55
	F	Lot 55	Lot 56

Amalgamation Condition
That Lot 61 hereon (legal access) be held as to four undivided one-fourth shares by the owners of Lots 28 - 31 hereon as tenants in common in the said shares and that individual Computer Freehold Registers be issued in accordance herewith.

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ACCESS land surveying ltd
Registered Professional and Licensed Cadastral Surveyors
MNZIS Member of Consulting Surveyors NZ
access@landsurveying.co.nz
p: 03 335 0329
m: 0274 987 240

Notes:

Lots 23 - 61, 100 - 104 being Proposed Subdivision of Lot 1 DP 326339

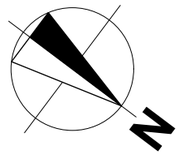
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Rev.	Description	Date
A	For information	14/11/2022

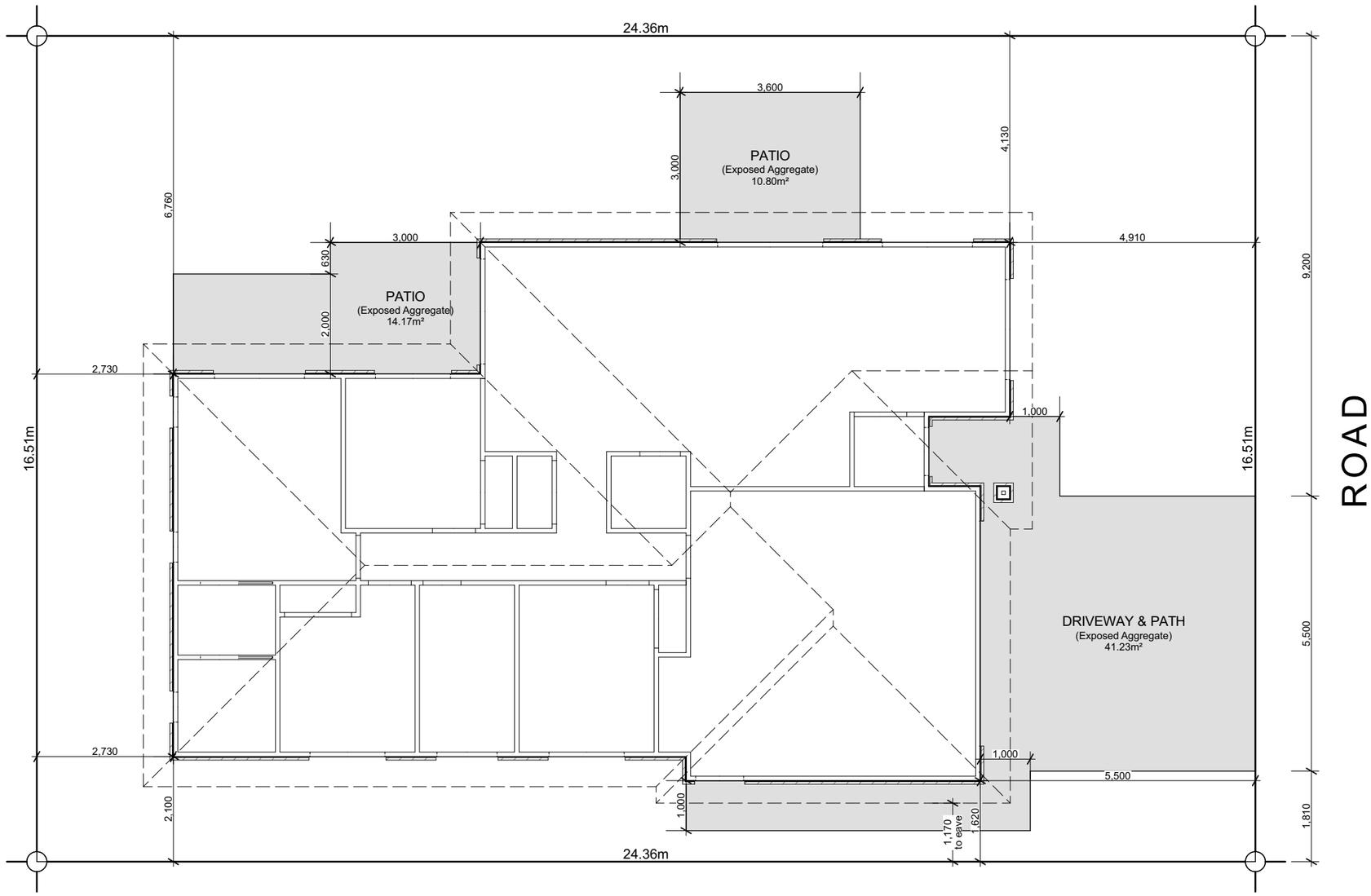
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Drawn: LS	Client: Hill Street Limited	
Checked: RV	Scale 1:1000	Sheet: 1 of 1
Local Authority: Selwyn District		Ref: 3572

KIRK ROBERTS CONSULTING

Attachment 2 : Proposed Residential Development

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Site Info

Site Address	Lemonwood Estate
Legal Description	Lot 44
Site Area	402m²
Building Area	196.63m²
Site Coverage	48.91%

Design Basis

Wind Zone	High
Earthquake Zone	2
Snow Zone	N4 < 100m
Exposure Zone	C

General Notes

All dimensions shown are to *face of foundation* unless noted otherwise.

Refer to Foundation Plan for foundation setout.

Refer to Drainage Plan for specific drainage info.

Refer to Sediment Control in Specification & implement where required.

All sealed driveway and patio areas to be min. 1:100 fall away from building.

Notes

Site boundaries, bearings and north point subject to final title plan.

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ey.archiplus@gmail.com
021 0238 1905
021 0221 8868
LICENSED BUILDING PRACTITIONER BUILDING CONFIDENCE

W E N D E L B O R N P R O P E R T Y L T D
LOT 44 LEMONWOOD ESTATE
ROLLESTON

Issue
Concept Plan

This plan is developed for the purchaser and is copy right to Archiplus Ltd.

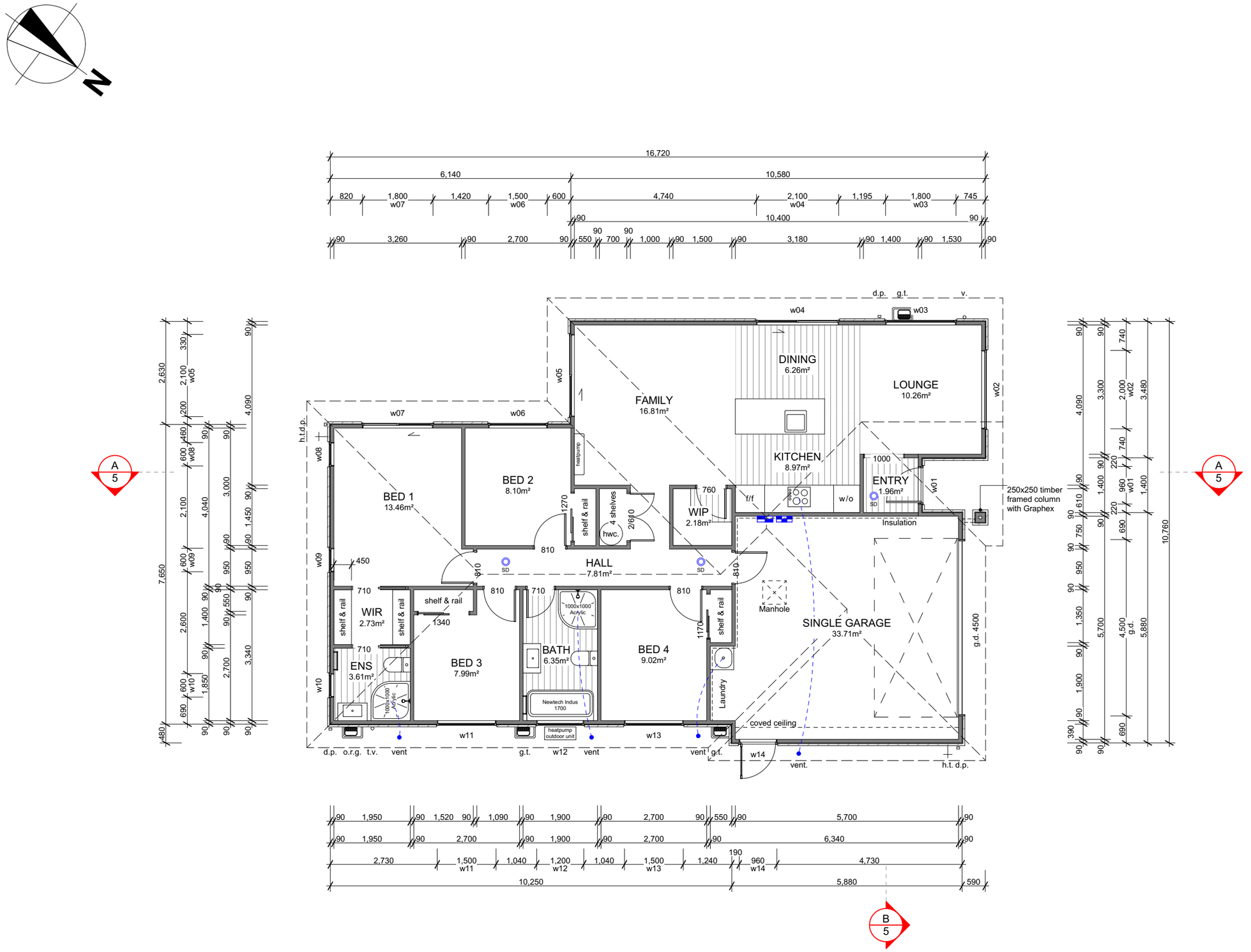
Site Plan

Scale 1:100 @ A3

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Date 11/09/2023
File No. **23099**

Sheet No.
1

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Building Area

Over Frame	153.10m²
Perimeter	57.02m
Over Cladding	157.11m²
Perimeter	57.58m
Roof Area*	196.63m²
Perimeter	60.18m

*Roof area includes fascia & gutter.

General

Main Cladding	RCS Graphex
Feature Cladding	JH Linea Weatherboard
Roof Pitch	25°
Roofing	Pressed Metal Tiles (Corona Shake)
Stud Height	2.42m
Interior Door	1.98m high
Wardrobe Door	2.20m high
Cooktop	Ceramic Cooktop

Note: Kitchen layout indicative only, refer to Kitchen Design for details.

Legend

- Distribution Board & Smart Meter Box
- Data Box
- SD — Smoke Detector with test and hush bottons to comply with NZBC F7/AS1

Floor Covering

- Carpet (excl. Garage)
- Vinyl Planks

WINDOW SCHEDULE		
ID	H	W
w01	2,130	960
w02	750	2,000
w03	1,400	1,800
w04	2,130	2,100
w05	2,130	2,100
w06	1,400	1,500
w07	2,130	1,800
w08	1,400	600
w09	1,400	600
w10	1,400	600
w11	1,400	1,500
w12	1,100	1,200
w13	1,400	1,500
w14	2,130	960

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Issue
Concept Plan

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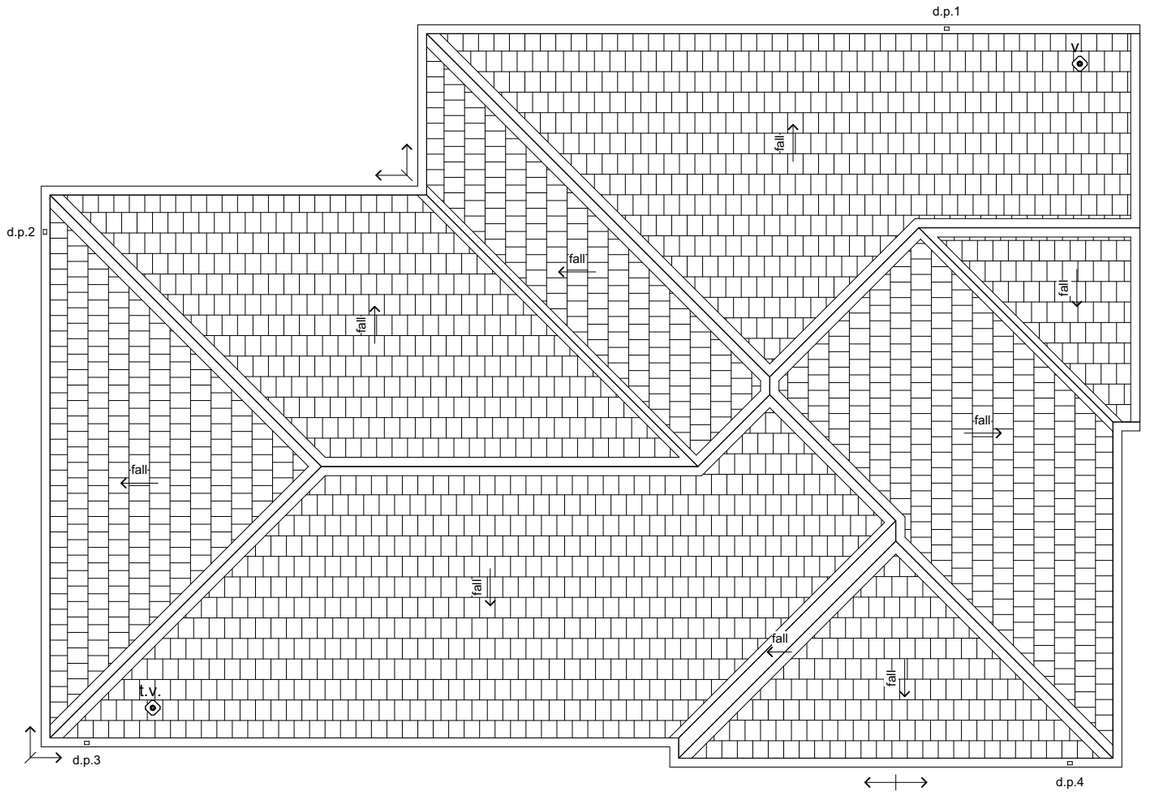
Floor Plan

Scale 1:100 @ A3

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2

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Roof Cladding

25º Pressed metal tiles roofing over Thermakraft 215 roof underlay.

Fascia & Gutter

Colorsteel Quad gutter supported on 185mm Colorsteel fascia.

Downpipes

75x55mm Colorsteel downpipes with wall brackets.

Roof Penetrations

Seal all pipe penetrations with Dektite flashing kit as per specification.

Downpipe Catchment (Plan Area)

d.p.1	52m²
d.p.2	47m²
d.p.3	53m²
d.p.4	37m²

Roof Bracings

Refer to Truss Design.

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ey.archiplus@gmail.com
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021 0221 8868

W E N D E L B O R N P R O P E R T Y L T D
LOT 44 LEMONWOOD ESTATE
ROLLESTON

Issue
Concept Plan

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Roof Plan

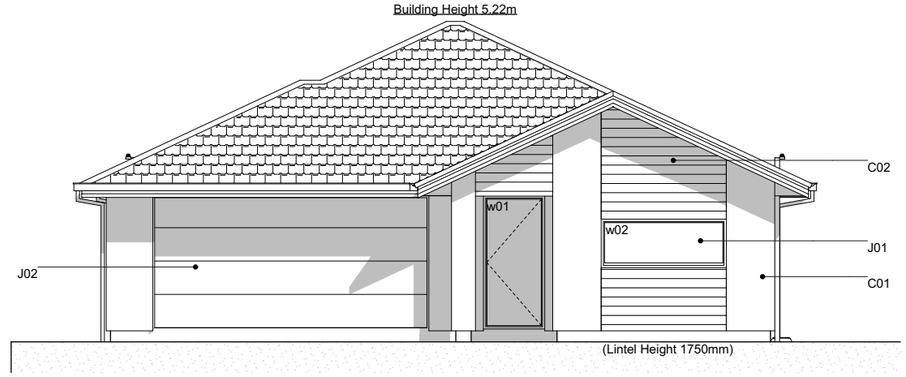
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Revision 01
Date 11/09/2023
File No. **23099**

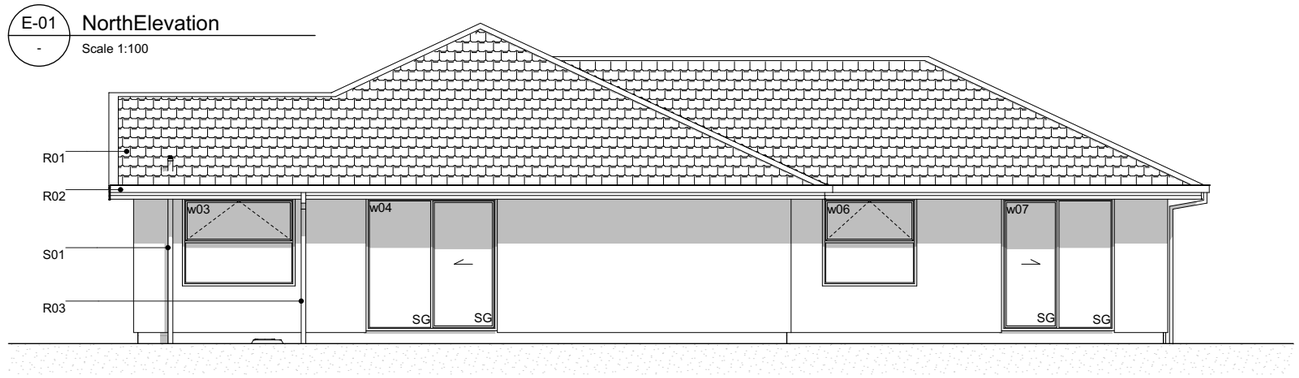
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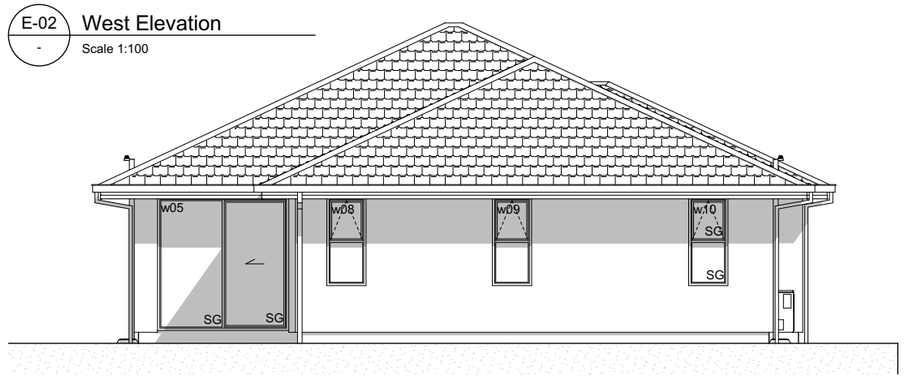
Building Height 5.22m



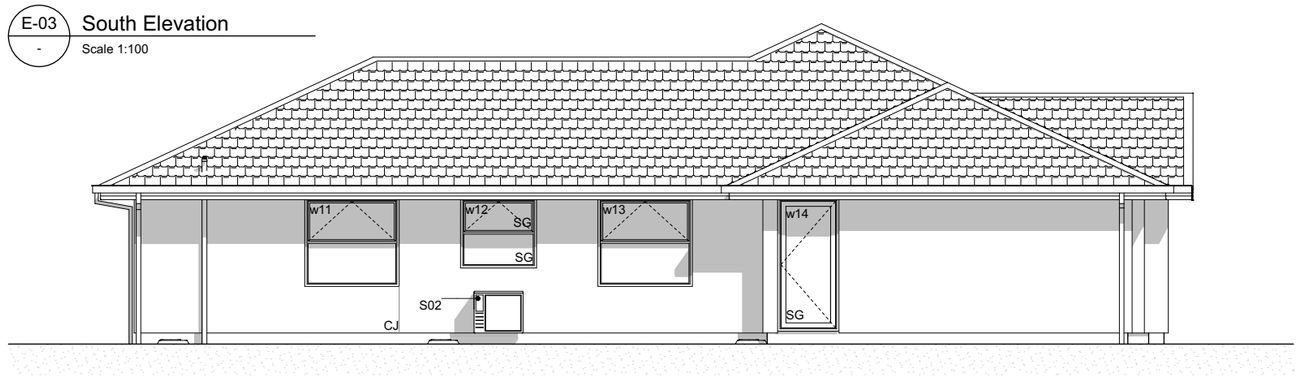
E-01 - NorthElevation
Scale 1:100



E-02 - West Elevation
Scale 1:100



E-03 - South Elevation
Scale 1:100



E-04 - East Elevation
Scale 1:100

Elevation Keys

C01	RCS Graphex 50mm panel with plastered finish on 20mm cavity battens.
C02	JH Linea weatherboard on 20mm cavity battens.
R01	Pressed metal tiles roofing.
R02	Colorsteel Quad gutter supported by Colorsteel 185mm fascia.
R03	Colorsteel 75x55mm downpipes.
J01	Low E Argon filled double glazed windows in thermally-broken powder coated aluminium frames.
J02	Sectional garage door.
J03	APL entry door in thermally-broken powder coated aluminium frames.
S01	Drainage vent pipe.
S02	Heatpump outdoor unit on wall bracket.

Legend

w01	Window ID
SS	Security Stay
SG	Safety Glass
CJ	Control Joint

General Notes

Driveway to fall from 20mm max. below garage rebate.

Archiplus
6 Browns Road, Christchurch
ey.archiplus@gmail.com
021 0238 1905
021 0221 8868
LICENSED BUILDING PRACTITIONER BUILDING CONFIDENCE

W E N D E L B O R N P R O P E R T Y L T D
LOT 44 LEMONWOOD ESTATE
ROLLESTON

Issue
Concept Plan

This plan is developed for the purchaser and is copy right to Archiplus Ltd.

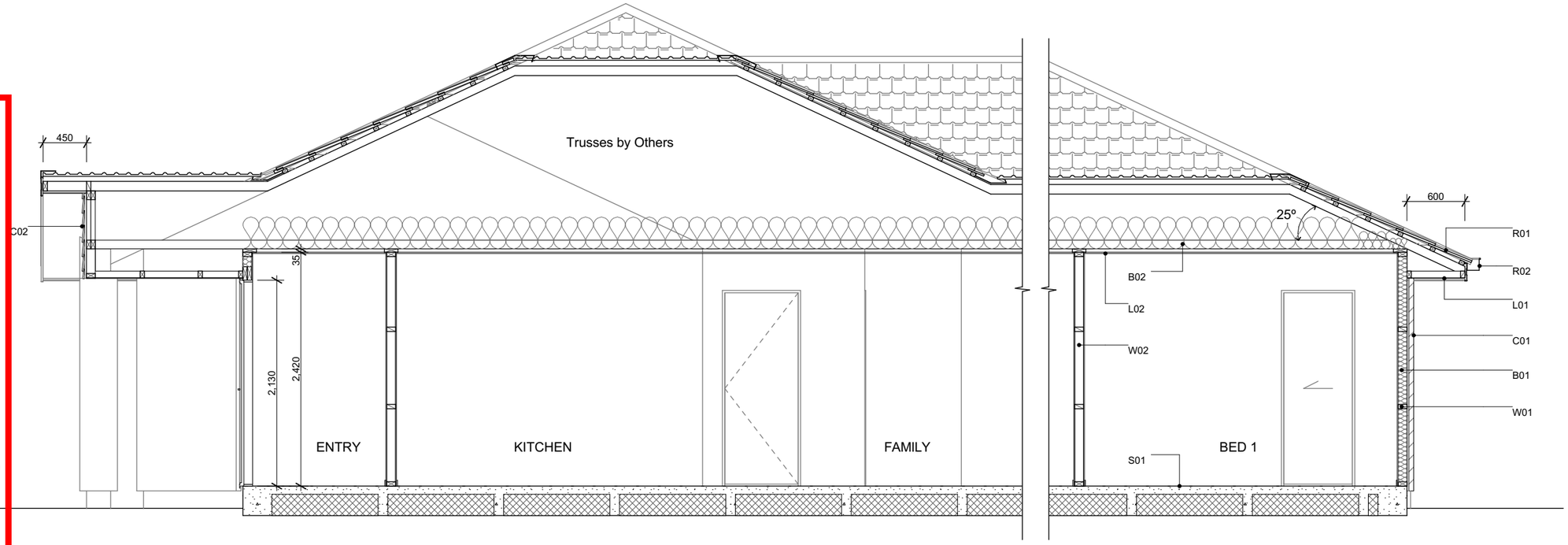
Elevations

Scale 1:100 @ A3

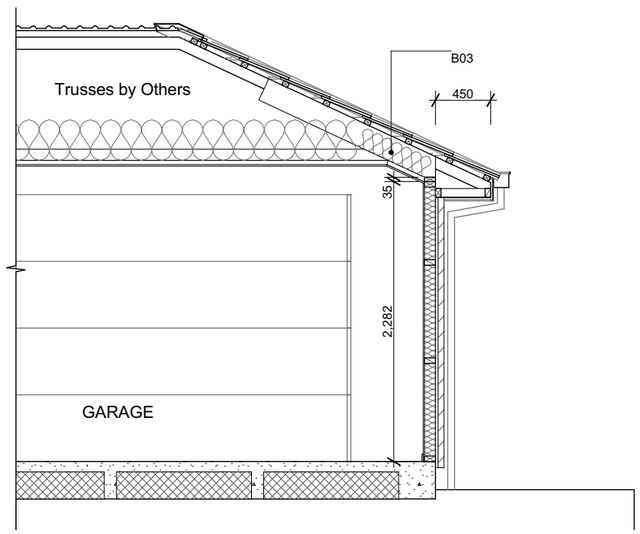
Revision 01
Date 11/09/2023
File No. **23099**

Sheet No.
4

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A
Section A-A
Scale 1:50



B
Section B
Scale 1:50

Section Keys

C01	RCS Graphex 50mm panel with plastered finish on 20mm cavity battens over building wrap on timber framing.
C02	James Hardie Linea weatherboard on 20mm cavity battens over building wrap on timber framing.
W01	External walls 90x45mm studs @ 600mm crs, dwangs @ 800mm crs. Top plates 90x45 + 140x35mm.
W02	Internal walls 90x45mm studs @ 600mm crs, dwangs @ 800mm crs.
S01	Ribraft floor slab and foundation.
T01	Roof trusses as per Truss Design.
R01	Pressed metal tiles roofing on 50x40mm timber battens over self-supported roof underlay on trusses.
R02	Colorsteel Quad gutter on 185mm Colorsteel fascia.
R03	75x55mm Colorsteel downpipes with wall brackets.
J01	Low E Argon filled double glazed windows in thermally-broken powder coated aluminium frames. H3.1 timber reveals for painted finish.
J02	Sectional garage door. H3.1 timber reveals for painted finish.
B01	R2.8 wall insulation batts.
B02	R7.0 ceiling insulation batts. Compressed insulation to fit at the first 500mm from the top plate as per manufacturer's instruction. Insulation baffle required to allow for the 25mm ventilation clearance.
B03	R4.1 skillion insulation batts at coved ceiling.
L01	4.5mm Hardie soffit linings for painted finish.
L02	13mm Gib ceiling linings supported by 35mm Rondo ceiling battens @ 600mm crs. Stopped smooth for painted finish. (Wet area ceiling 13mm Gib Aqualine)
L03	10mm Gib wall linings stopped smooth for painted finish. (Wet area wall 10mm Gib Aqualine)

Archiplus
6 Browns Road, Christchurch
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LICENSED BUILDING PRACTITIONER BUILDING CONFIDENCE

W E N D E L B O R N P R O P E R T Y L T D
LOT 44 LEMONWOOD ESTATE
ROLLESTON

Issue
Concept Plan

This plan is developed for the purchaser and is copy right to Archiplus Ltd.

Cross Sections

Scale 1:50 @ A3

Revision 01
Date 11/09/2023
File No. **23099**

Sheet No.
5

KIRK ROBERTS CONSULTING

Attachment 3 : Site-Specific Investigation Plans and Bore-logs

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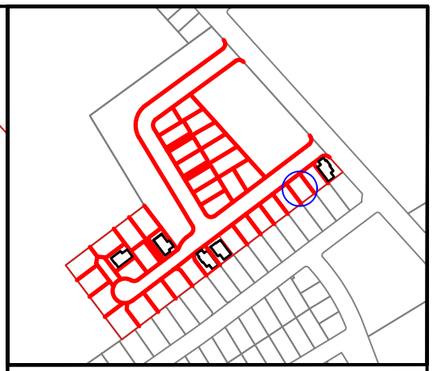
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Lot 44

HA/SP-1

HA/SP-2

HA/SP-3



LEGEND

HA/SP-1 — KIRK ROBERTS HAND AUGER BOREHOLE & SCALA PENETROMETER TEST LOCATIONS

NEIGHBOURING BOUNDARIES

PROPOSED LOT BOUNDARIES

NOTES

1. LOCATIONS OF FEATURES AND GROUND INVESTIGATION POINTS ARE APPROXIMATE ONLY.
2. AERIAL IMAGE & NEIBOURING BOUNDARIES SOURCED FROM LINZ https://data.linz.govt.nz/ (accessed 06-09-2023)
3. PROPOSED LOT BOUNDARIES SOURCED FROM ACCESS LAND SURVEYING LTD, REF. 107005, DATED 14-11-2022

PROJECT: 2310319	
CLIENT: OAKRIDGE HOMES LIMITED	
SCALE: 1:200	
CREATED BY: IV	
REVIEWED BY: FS	
REVISION: 01	DATE: 06/09/2023

LOT 44 LEMONWOOD ESTATE, ROLLESTON

GEOTECHNICAL INVESTIGATION LOCATION PLAN

KIRK ROBERTS CONSULTING

SCALA PENETROMETER & HAND AUGER RESULTS

KIRK ROBERTS CONSULTING

Client:	Oakridge Homes Limited	**Scala Penetrometer:**	SP-01
Site Address:	Lot 44 Lemonwood Estate, Rolleston	**Hand Auger No.**	HA-01
Town/City:	Christchurch	**Job No.:**	2310319
Logged By:	RM	**Checked By:**	FS
Logged Date:	06/09/23	**Checked Date:**	06/09/23
		Date:	06/09/23
		Weather:	Fine
		Operator:	RM + IV

Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D_r	Water Table	Undrained Shear Strength Su (kPa)	Blows per 100 mm of Penetration
Holocene Alluvial Deposits	0.5	Silty gravelly TOPSOIL (OL); dark brown. Firm, dry, non-plastic; gravel, fine to coarse, subround to round. EOH: 0.10m 0.1m: [REFUSAL ON DENSE GRAVELS]	TS	OL		Groundwater Not Encountered		3 17 20 0.5

Remarks:

Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

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SCALA PENETROMETER & HAND AUGER RESULTS

KIRK ROBERTS CONSULTING

Client:	Oakridge Homes Limited	**Scala Penetrometer:**	SP-02
Site Address:	Lot 44 Lemonwood Estate, Rolleston	**Hand Auger No.**	HA-02
Town/City:	Christchurch	**Job No.:**	2310319
Logged By:	RM	**Checked By:**	FS
Logged Date:	06/09/23	**Checked Date:**	06/09/23
		Date:	06/09/23
		Weather:	Fine
		Operator:	RM + IV

Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D_r	Water Table	Undrained Shear Strength Su (kPa)	Blows per 100 mm of Penetration
Holocene Alluvial Deposits	0.5	Silty gravelly TOPSOIL (OL); dark brown. Firm, dry, non-plastic; gravel, fine to coarse, subround to round. EOH: 0.30m 0.3m: [REFUSAL ON DENSE GRAVELS]	TS	OL		Groundwater Not Encountered		2, 2, 6, 15, 20

Remarks:

Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

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Generated with CORE-GS

SCALA PENETROMETER & HAND AUGER RESULTS

KIRK ROBERTS CONSULTING

Client:	Oakridge Homes Limited	**Scala Penetrometer:**	SP-03
Site Address:	Lot 44 Lemonwood Estate, Rolleston	**Hand Auger No.**	HA-03
Town/City:	Christchurch	**Job No.:**	2310319
Logged By:	RM	**Checked By:**	FS
Logged Date:	06/09/23	**Checked Date:**	06/09/23
		Date:	06/09/23
		Weather:	Fine
		Operator:	RM + IV

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Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D_r	Water Table	Undrained Shear Strength Su (kPa)	Blows per 100 mm of Penetration
Holocene Alluvial Deposits	0.5	Silty gravelly TOPSOIL (OL); dark brown. Firm, dry, non-plastic; gravel, fine to coarse, subround to round.	TS	OL		Groundwater Not Encountered		1, 2, 6, 20
		EOH: 0.30m						
		0.3m: [REFUSAL ON DENSE GRAVELS]						

Remarks:

Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

Generated with CORE-GS

APPENDIX 02 – SOAKPIT DESIGN

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Whiterock Consulting Ltd
638 Carrs Rd
RD2 Rangiora, 7472
T: 03 312 8830, M: 027 480 4883
Email: fiona@whiterockconsulting.co.nz

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15 September 2023

James Parker
Wendelborn Property Ltd
Emailed to: James.Parker@wendelbornproperty.co.nz

Dear James

SOAK PIT SIZING FOR LOT 44 LEMONWOOD ESTATE, ROLLESTON

1. Introduction

The Selwyn District Council (SDC) requires specific soak pit design for all new soak pits. Soak pits can either be designed using actual soakage test results from the site to show compliance in accordance with E1/VM1 or using an Alternative Solution. If an Alternative Solution is used, then evidence and supporting documentation is required to support the design soakage rate used to size the soak pits.

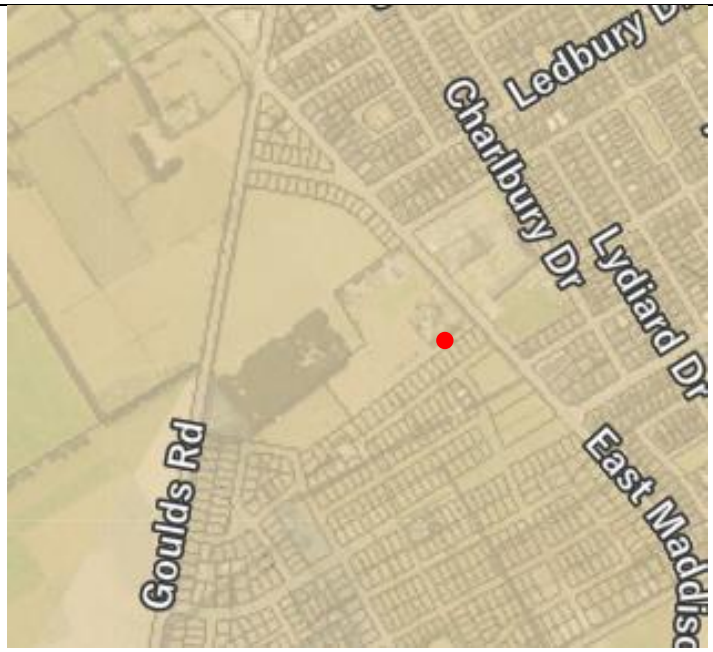
The discharge of roof water at this site needs to meet the conditions of the Environment Canterbury (ECan) permitted activity rule for the discharge of residential stormwater to land (Rule 5.96, Land and Water Regional Plan) and the Building Code (E1). The ECan permitted activity rule requires the soak pit to be sized to contain and dispose of stormwater from all events up to and including the 10% AEP, 24 hour duration storm. The base of the soak pit must also be at least 1 m above groundwater.

The site is shown on the Landcare Research soils mapping database SMaps to be well drained (see below; red dot marks the site location). E2 Environmental, who designed the roading network stormwater system, has provided an infiltration test result from the site. The test hole was 2.5 m deep and the two infiltration test rates were 3.53 m/hr and 3.51 m/hr. The test result is divided by a factor of 3 to account for partial blockage over the life of the soak pit and natural variation in soakage.

Therefore, the design infiltration rate is **1,000 mm/hr** for this site. The drainlayer will be responsible for confirming free draining gravels are present.

With respect to the separation depth to groundwater, the E2 Environmental stormwater consent application (E2 Environmental, 2022) reported that there was limited water level information within 1,000 m of the site and that groundwater levels could fluctuate from 5 to 12 m below ground. The soak pit is estimated to be around 2.5 m deep and therefore there will be more than 1 m separation to the highest expected groundwater.

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Source: Canterbury Maps

Poorly Drained

Soils that are within 15cm of the base of the A horizon or within 30cm of the mineral soil surface have 50% or more low-chroma colours on cut faces.

Imperfectly drained

Soils that have a horizon between 30 and 60 cm of the mineral soil surface with 50% or more low chroma mottles on cut faces OR soils that have in the top 30 cm of the profile or within 15 cm of the base of the A horizon, 2% or more redox segregations or 50% or less low chroma colours on cut faces.

Moderately well drained

Soils that have a horizon between 60 and 90 cm of the mineral soil surface with 50% or more low chroma mottles on cut faces OR soils that have a horizon between 30 and 90 cm of the mineral soil surface with 2% or more redox segregations.

Well drained

Soils that have no horizon within 90cm of the mineral soil surface with more than 2% or more redox segregations.

2. Soak Pit Sizing

The ECan stormwater permitted activity rule requires the soak pit to be sized to contain and dispose of stormwater from all events up to and including the 10% AEP, 24 hour duration event. For sites with rapid soakage, such as this site, the critical storm duration is 1 hour. This is the storm that results in the largest soak pit and is the same design requirement as the Building Code (E1).

The SDC Engineering Code of Practice, Part-5-Stormwater has been used to select the rainfall data. This is summarised below:

- Rolleston scaling factor: 1.03 * Christchurch Aero Rainfall
- Additional scaling: + 16% for climate change

Design rainfall depth for site (10% AEP, 1 hr): 1.03*19 mm/hr*1.16 = **22.7 mm/hr.**

The site details used to size the soak pit are presented in Table 1.

Table 1: Site details		
Total roof area	188.0	m^2
Total hardstand area	40.3	m^2
Runoff C	0.9	
Design infiltration rate (base only)	1,000	mm/hr
Design i (10 yr, 1 hr)	22.7	mm/hr

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Table 2 presents the minimum soak pit size for the proposed soak pit. It is recommended that the soak pit is located close to the drive.

Table 2: Soak Pit Details:	
Contributing Area [m^2]: roof + drive	228.3
Length (minimum - can be longer) [m]	3.4
Width (minimum - can be wider) [m]	0.8
Depth (**This is an assumed depth, drainlayer to check and excavate to free draining gravels**) [m]	2.5
Soak Pit base area [m^2]	2.7
Total Soak Pit volume [m^3]	5.4
Porosity	0.38
R_c: Volume of water to soak pit [m^3]	**4.7**
V_{soak}: Volume infiltrated [m^3]	2.7
V_{stor}: Storage volume in soak pit [m^3] [L*W* D-0.5 m*0.38] Note: it is assumed that the top 0.5 m of the soak pit is not available for storage	2.1
Total volume discharged and stored [m^3]	**4.8**
Soak pit large enough?	Y

3. Summary and Recommendations

A soakage test has not been undertaken at the site. A design infiltration rate of 1,000 mm/hr has been adopted for the design of the soak pit at this property. The soak pit size based on this assumption is presented in Table 2. The length and width of the soak pit can be altered to suit the site, but the base area and total volume presented in Table 2 must be maintained. The depth presented in the table is assumed and the **drainlayer is to ensure that the base of the soak pit is installed into free draining gravels.**

If you have any questions please do not hesitate to contact me.

Yours Sincerely

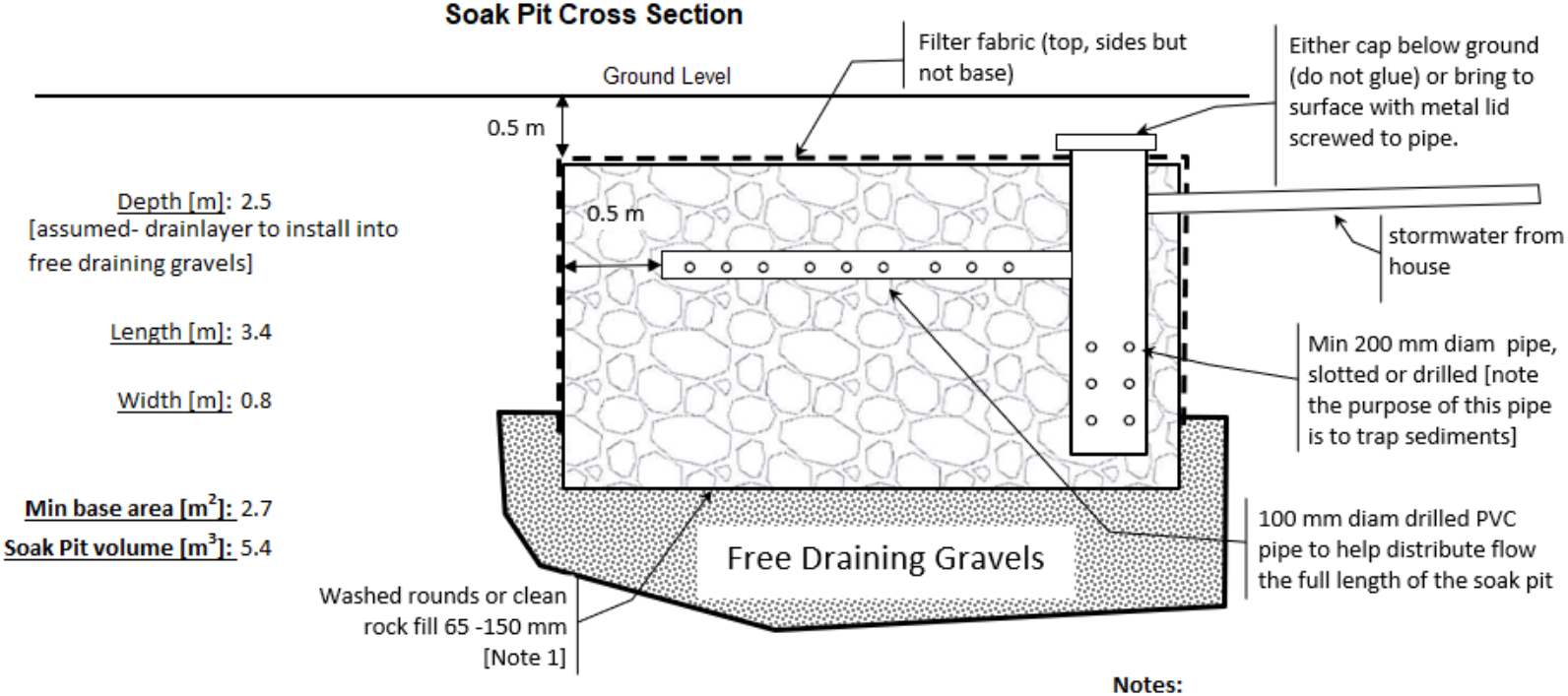
WHITEROCK CONSULTING LTD



Fiona Ambury
Natural Resources Engineer, Director
CPEng, CMEngNZ, IntPE(NZ)

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Soak Pit Cross Section



Depth [m]: 2.5
[assumed- drainlayer to install into free draining gravels]

Length [m]: 3.4

Width [m]: 0.8

Min base area [m^2]: 2.7

Soak Pit volume [m^3]: 5.4

Prepared by: Whiterock Consulting Ltd

Notes:

1): Washed rounds and rockfill (65 - 150 mm) have a similar void space ratio of 0.38. Either option can be used

2) Not to scale

APPENDIX 03 – FIRTH RIBRAFT FOUNDATION

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

CERTIFICATE NO: CM70056 Rev 3
Date of issue: 26 March 2021

KEY INFORMATION

1 CERTIFICATE HOLDER DETAILS

Fletcher Concrete and Infrastructure Ltd
T/A Firth Industries
810 Great South Road
Penrose, Auckland 1061

Info@firth.co.nz
Ph: 0800 800 576
www.firth.co.nz

2 PRODUCT CERTIFICATION BODY

Bureau Veritas Australia Pty Ltd
3/435 Williamstown Road
Port Melbourne VIC 3207
Australia

Ph: 1800 855 190
www.bureauveritas.com.au
Bureau Veritas Australia Pty Ltd
The complaints process for this certificate can be found here:
www.bureauveritas.com.au/your-feedback

3 SUMMARY OF DESCRIPTION OF BUILDING METHOD OR PRODUCT

The Firth RibRaft® Floor System comprises of polystyrene pods, steel reinforcing rods, plastic spacers and Firth RibRaft® concrete.

Continuation of description can be found in item 9. Supporting Information about Description of Building Product or Method.
Matters that should be taken into account in the use or application of the building method or product can be found in item 6. Conditions and Limitations of Use.

4 SUMMARY OF INTENDED USE OF BUILDING METHOD OR PRODUCT

The Firth RibRaft® Floor System is a method of concrete floor construction, suitable for all slab-on-ground concrete floors for domestic or residential buildings that fall within the scope of NZS 3604:2011 Timber framed buildings.

Continuation of intended use can be found in item 8. Supporting Information about Intended use of Building Product or Method.

5 BUILDING CODE PROVISIONS

The performance clauses of the New Zealand Building Code that are relevant to the intended use and with which the building method or product complies or contributes to (where used as part of a system).

B1 Structure: B1.3.1, B1.3.2, B1.3.3 (a, b, f, g, h, q, m), B1.3.4
B2 Durability: B2.3.1(a), B2.3.2(a)
E2 External Moisture: E2.3.3, E2.3.7
F2 Hazardous Building Materials: F2.3.1
H1 Energy Efficiency: H1.3.1 (contributes to), H1.3.2E (contributes to)

How the building method or product complies or contributes can be found in item 12. Basis for Certification. Any qualifications on the extent of that compliance can be found in item 6. Conditions and limitations of use.

This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.
The Ministry does not in any way warrant, guarantee, or represent that the building method or product that 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 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 is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website http://www.building.govt.nz.

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

6 CONDITIONS AND LIMITATIONS OF USE

1. The Firth RibRaft® Floor System shall only be used in buildings which fall within the scope of NZS 3604:2011 – Timber-framed buildings, located:
   a) Where the Seismic Hazard Factor Z (defined in NZ 1170.5:2004) is less than or equal to 0.45 (refer to Figure 6 of the Firth RibRaft® Technical Manual January 2020)
   b) in any wind zones up to and including Extra High
   c) in areas with snow loads up to 2.0 kPa
   d) in all exposure zones (except microclimates)
   e) and where the ground Ultimate Bearing Capacity exceeds the value specified in Table 2 for the types of construction in Table 1 of the Firth RibRaft® Technical Manual January 2020.
2. The Firth RibRaft® Floor System shall be designed and installed in accordance with the Firth RibRaft® Technical Manual January 2020.

NOTE: Together, items 3, 4, 5 and 6 define scope of use.

7 HEALTH AND SAFETY INFORMATION

The compliance with any manufacturer's installation instructions, maintenance, OH & S statements, MSDS's and other Health and Safety declarations will provide the necessary Health and Safety Information pertaining to the product.

8 SIGNATURES

Sam Guindi
Product Certification Manager

For and on behalf of
Bureau Veritas Australia Pty Ltd

Dene Cook
Divisional Technical Manager

For and on behalf of
Firth Industries

This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.
The Ministry does not in any way warrant, guarantee, or represent that the building method or product that 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 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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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

SCHEDULE: INFORMATION THAT SUPPORTS KEY INFORMATION

9 SUPPORTING INFORMATION ABOUT DESCRIPTION

The system consists of the following components:

- RibRaft® Polystyrene Pod 1100mm x 1100mm x 220mm. 300mm thick pods are also available for deeper edge beams and internal ribs.
- Firth Pod and Reinforcement spacer (300mm and 100mm)
- Firth Reinforcement chair
- Reinforcement Grade 500E
- Mesh reinforcement
- Firth RibRaft® Concrete 20MPa or 25 MPa
- Sand Blinding
- DPM (250 micron polyethylene sheet)

10 SUPPORTING INFORMATION ABOUT INTENDED USE

Further details regarding the use of the product can be found in Firth RibRaft® Technical Manual, January 2020.

11 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE

N/A

This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.
The Ministry does not in any way warrant, guarantee, or represent that the building method or product that 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 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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CERTIFICATE V1.3

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

12 BASIS FOR CERTIFICATION

B1 Structure - By analysis and comparison with Acceptable Solution B1/VM1
B2 Durability – By analysis and comparison with Acceptable Solution B2/AS1 and Verification Method B2/VM1
E2 External moisture – By analysis and comparison with Acceptable Solution E2/AS1
H1 Energy efficiency - By analysis and comparison with Acceptable Solution H1/AS1
F2 Hazardous building materials - By comparison with performance Clause F2.3.1

13 SUPPORTING DOCUMENTATION FOR CERTIFICATION

1. Acceptable Solutions and Verification Methods for New Zealand Building Code Clause B1 Structure 1st Edition (Amendment 19), 28 November 2019
2. Acceptable Solutions and Verification Methods For New Zealand Building Code Clause B2 Durability (Amendment 12), 28 November 2019
3. Acceptable Solutions and Verification Methods For New Zealand Building Code Clause E2 External moisture 3rd edition (Amendment 9), 27 June 2019
4. Structural assessment by Holmes Consulting Firth Ribraft Concrete Floor System, May 2012
5. OPUS Report "Compliance of Firth of Ribraft System with NZBC Clause B2 Durability", 24 May 2010
6. eCubed Building Workshop Report on R value of Ribraft Concrete Floor System, 17 September 2010
7. Firth RibRaft® Technical Manual, January 2020
8. NZS 3604:2011 Timber framed buildings
9. NZS 4214:2006 Methods of determining the total thermal resistance of parts of buildings

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The Ministry does not in any way warrant, guarantee, or represent that the building method or product that 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 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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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

14 CONDITIONS RELATING TO NOTIFICATION

(a) the certificate holder notifies the product certification body (Bureau Veritas) in writing of any intended change to any of the following particulars:
(i) the name, address, or contact details of the certificate holder:
(ii) any address of a location where a certified product is produced or manufactured:

(b) the certificate holder notifies the product certification body (Bureau Veritas) in writing of any intended change, modification, or alteration to any of the following:
(i) the certified building method or product:
(ii) the method of its production or manufacture:
(iii) the product quality plan prepared in respect of the certified building method or product:
(iv) the application or installation instructions for the certified building method or product:
(v) any documentation relating to the use and maintenance of the certified building method or product:

(c) if the certificate holder has any reason to suspect that the certified building method or product does not comply with the Building Code, the certificate holder notifies the product certification body (Bureau Veritas) in writing of the reason for that suspicion:

(d) if the certificate holder or the product certification body (Bureau Veritas) finds that a certified building method or product that has been released on the market does not comply with the Building Code, the certificate holder discloses that fact in disclosure statements published in a form that is acceptable to the product certification body and to the chief executive:

(e) if the certificate is suspended or revoked, the certificate holder—
(i) notifies all customers to whom the building method or product is regularly supplied; and
(ii) immediately ceases using the certificate, the mark of conformity, and any reference to the number of the certificate.

This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.
The Ministry does not in any way warrant, guarantee, or represent that the building method or product that 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.
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August 2023
Interim Version

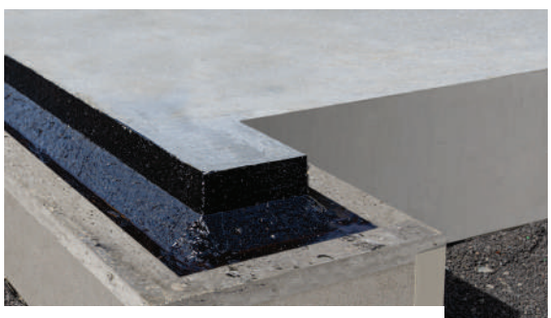
+RibRaft®

TECHNICAL MANUAL









This updated manual incorporates the latest guidance for H1. It supersedes previous versions of the manual. CodeMark has been applied for but is currently in progress. Foundations designed with edge insulation and or underslab insulation require a PS1 from a chartered professional engineer until the expected CodeMark version is available.

The current CodeMark can be used for foundations designed with no additional insulation.

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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 **not** covered by the MBIE Codemark® **although it is currently being reviewed, it is required that** 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.

To comply with the Manual does mean that Firth Certified Concrete® must be used.



THIS MANUAL CONSISTS OF 3 SECTIONS:

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Contains information principally useful for the **specifier** or **building designer**

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Describes the required verification checks

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1

1.0 THIS SECTION OF THIS MANUAL CONTAINS DESIGN INFORMATION FOR THE FIRTH RIBRAFT® FLOOR SYSTEM (THE SYSTEM). FULL INFORMATION ON THE INSTALLATION PROCEEDURES IS DESCRIBED IN *SECTION 2: INSTALLATION INFORMATION.* WHERE STANDARDS ARE REFERENCED IN THIS MANUAL, THESE SHALL INCLUDE THE LATEST AMENDMENTS.

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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 305-410mm depending on the thickness of the pods and topping. 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. 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, and when greater insulation is required. An alternative to the 220mm thick polystyrene pods is the Cleva Pods® which is a similarly dimension pod made from recycled plastic.

2.3 Steel

Reinforcing mesh in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2019 with a minimum weight of 2.27kg/m^2, 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 or N 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 4671:2019 “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 or Cleva Pods®. 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. For Cleva Pod® use Firth 20MPa (mix code: RC2019AW).
2) RaftMix® 25: 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 i.in 4.2.3.3 of NZS3604). For Cleva Pod® use Firth 25MPa (mix code: RC2519AW).

2.5 Insulation

For larger area to perimeter ratios (A/P) RibRaft® floors may meet H1 compliance without additional insulation. However, when required, the RibRaft® floor can be insulated with one or more of the following to meet H1 compliance,

- Firth HotEdge® - used for slab edge insulation below masonry veneers.
- Firth HotEdge Extra®, used as a slab edge insulation that sits below 140mm or greater framing.
- Firth HotEdge Base® - used to insulated the underside of the 300mm wide perimeter foundation beam.
- Or in place of HotEdge Base®, insulation below the entire footprint comprising of either 50mm H grade polystyrene or 75mm XPS. 90mm of Slab X 200 polystyrene can be used as an alternative to 75mm XPS.

Notes: 1. Additional admixtures to standard RibRaft® mixes to be approved by the Firth Plant Engineer. 2. Firth concrete mixes are generally formulated to have a **lower carbon footprint**, typically EC10* or greater. Options for additional carbon reduction (greater EC rating) are available on request.

Footnote: *For explanation of the EC rating system, refer to Firth’s EPD for concrete.

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3.0 SCOPE

This Clause sets out the limitations that apply to the use of the system. Engineering input will be required (PS1) while CodeMark is being updated. 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

This manual is applicable 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.
- 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).

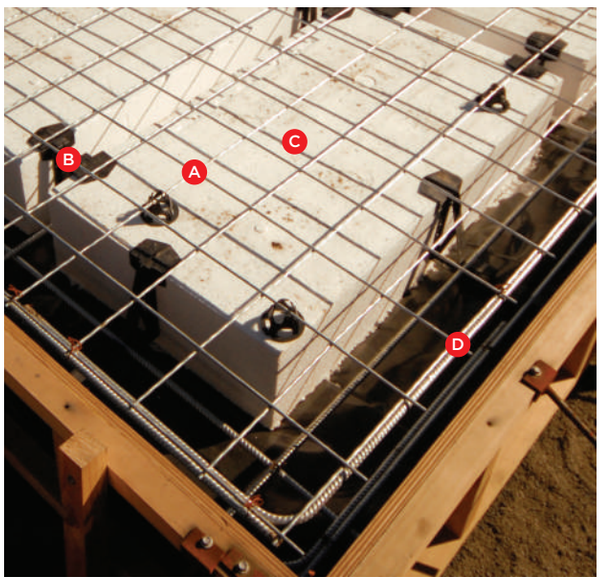
3.3 Snow Loading

Open ground snow loading as defined in NZS3604 of up to 2.5kPa.

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/m^2 – e.g. timber framing with weather boards and interior wall linings.
- Heavy external walls with total mass greater than 60kg/m^2 but not exceeding 220kg/m^2 – e.g. timber framing with masonry veneer.
- Internal walls with total mass not exceeding 45kg/m^2 – e.g. timber framing and linings.
- Light roofs with total mass not exceeding 45kg/m^2 – e.g. ceiling linings and metal roof, including framing.
- Heavy roofs with total mass greater than 45kg/m^2 but not exceeding 85kg/m^2 – e.g. ceiling lining and concrete tiles or slates, including framing.
- Mid-floors with total mass not exceeding 60kg/m^2 – 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 100mm spacer

C Firth RibRaft® polystyrene pods **D** Steel reinforcing

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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 3064.

Table 1. Foundation Type Identifier

NUMBER OF STORIES	ROOF	GROUND FLOOR EXTERNAL WALLS	SECOND STOREY EXTERNAL WALLS	1.5KPA LIVE LOAD & UP TO 1KPA SNOW LOAD	1.5KPA LIVE LOAD & UP TO 2.5KPA SNOW LOAD	3KPA LIVE LOAD & /OR 2KPA SNOW LOAD
SINGLE STOREY	Light	Light		A	A	A
	Heavy	Light		A	B	B
	Light	Heavy		B	C	B
	Heavy	Heavy		C	D	C
DOUBLE STOREY	Light	Light	Light	C	C	D
	Heavy	Light	Light	D	D	E
	Light	Heavy	Light	D	D	E
	Heavy	Heavy	Light	E	E	G
	Light	Heavy	Heavy	E	E	SED

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 (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.

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 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 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) will help in determining whether the 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 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 NZS3604.

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Figure 1. Building Check Flow Diagram

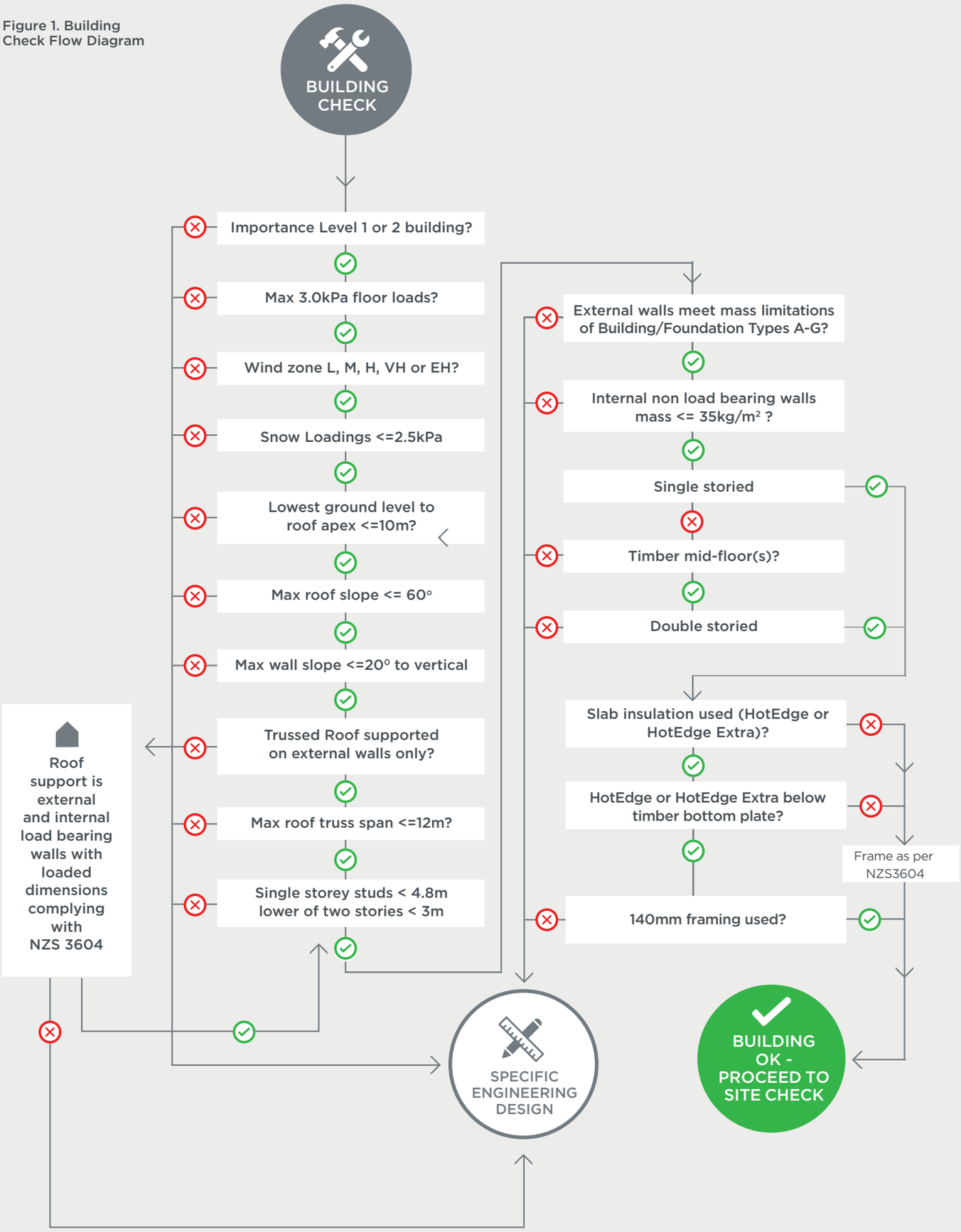
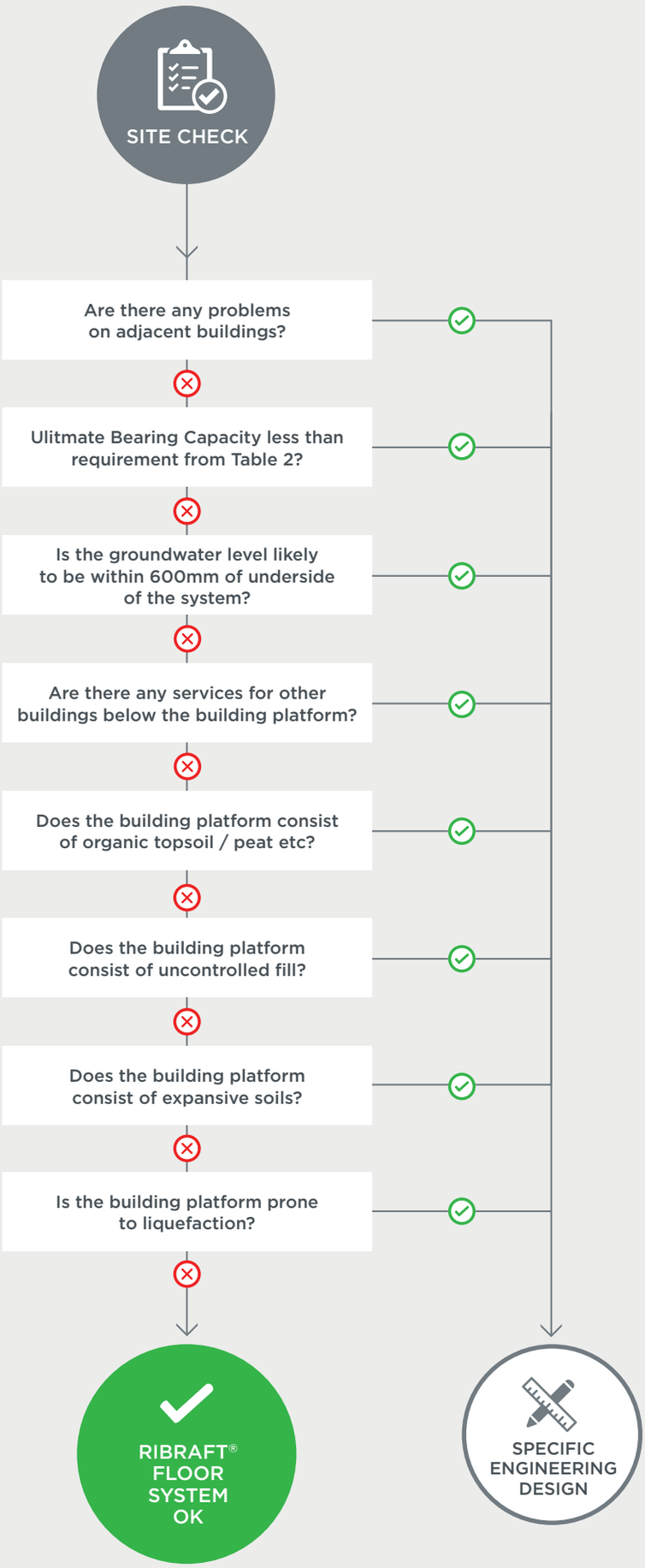


Figure 2. Building
Check Flow Diagram



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4.0 CONSTRUCTION DETAILS

Standard construction details for the system are provided here for buildings that fall within the scope.

4.1 Pod Layout

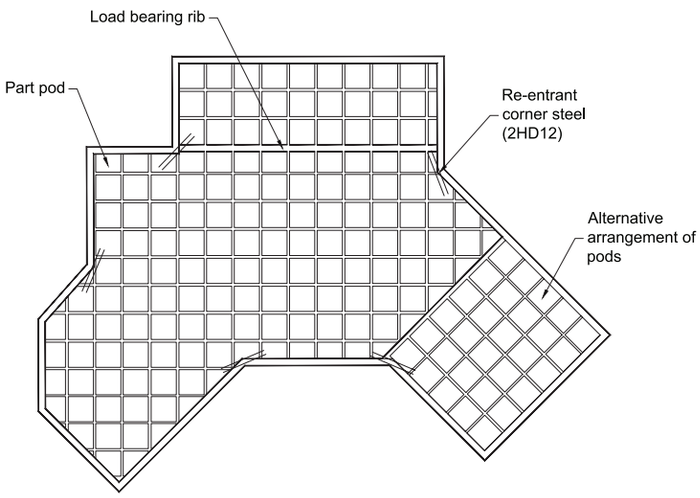
RibRaft® polystyrene pods supplied by Firth (1100 x 1100 x 220 or 300mm thick) shall be placed on levelled ground and arranged in a waffle pattern. The pods are used as void formers while the concrete is curing. Cleva Pods® which are plastic pods of 1100 x 1100 x 220mm dimension made of recycled material may be used in place of the polystyrene pods.

Pods shall be placed so that the maximum clear separation from any rib or beam shall not exceed 1.1m. Pods maybe cut down to size but shall not be added to.

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 concrete thickness to provide bearing capacity for external load bearing walls, and contain 2-HD12 bars (Grade 500E or 500N) as bottom steel and 1-HD12 bar (Grade 500E or N) in the top. This top bar shall be tied to the underside of the reinforcement mesh. Refer Figures 5, below for construction details. The edge beam shall be rebated for brick veneers where necessary as shown in Figures 5C / 5E / 5G.

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 or N) held in place at the bottom of the rib by a Firth spacer. Refer Figure 5A 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 or N) steel bars as bottom steel. Refer Figure 4B 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	BEAM OPTION, BEARING CAPACITY GREATER THAN 140KPA (1)
Up to 10kN	No thickening required
Up to 20 kN	300mm wide load under point load as detailed in Figure 4A
Up to 30kN	300mm wide load under point load as detailed in Figure 4A

Notes:
(1) 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.

Table 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

Figure 4A.

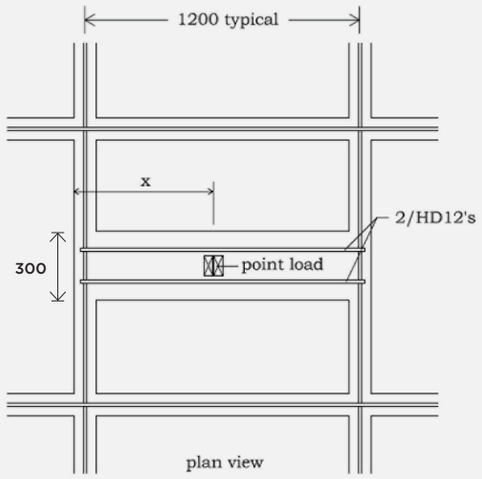
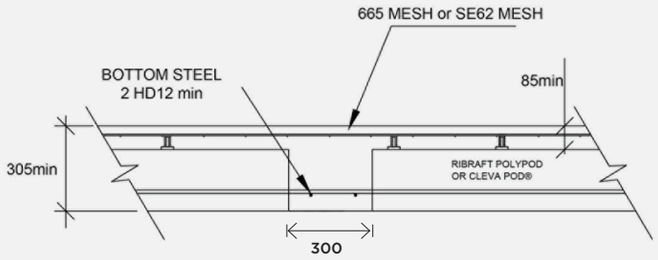


Figure 4B.



INTERNAL LOAD BEARING BEAM - SECTION

4.6 Mesh Reinforcement

The entire floor slab shall be reinforced with 665 or SE62 mesh supported on mesh chairs to achieve a minimum of 30mm cover to the top surface sitting on the polystyrene or Cleva Pods®.

4.7 Re-entrant Corners

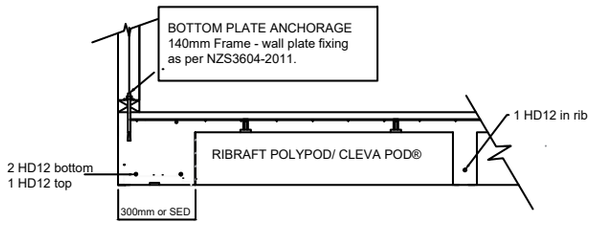
In order to limit the width of cracking at the re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E or N), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover from the internal corner – refer Figure 3.

4.8 Wingwalls

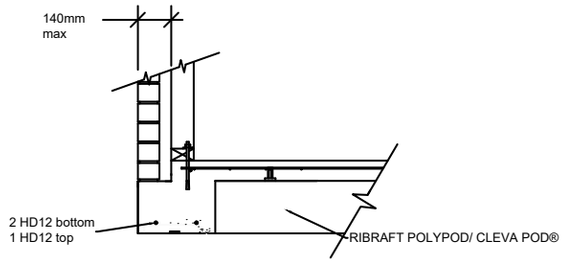
Non Load bearing wingwalls up to 600mm in length can be accommodated as detailed in this manual. The timber framing of the wingwall shall be latterly supported at floor levels and at the eaves. Load bearing wingwalls and wingwalls greater than 600mm or not supported laterally at eaves and floor level will require SED. See construction details refer Figure 12E.

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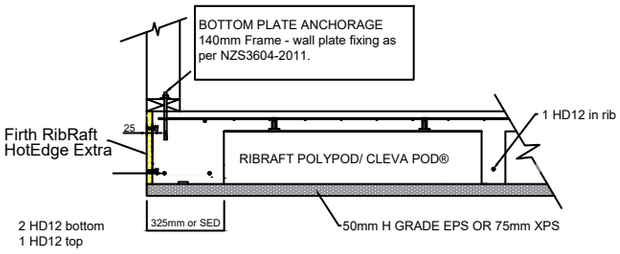
Figure 5. Standard RibRaft® Construction Details



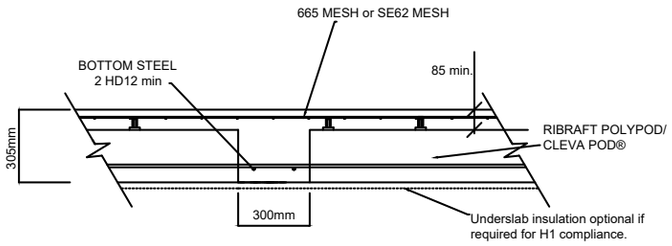
Ⓐ 220mm FIRTH RIBRAFT POLYPOD/ CLEVA POD®
90mm WALL FRAME- NO INSULATION
FIRTH RAFTMIX 20 OR 25MPa



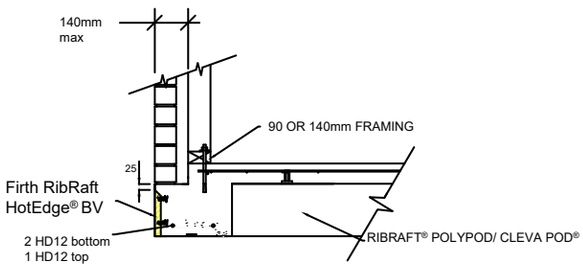
Ⓔ 220mm FIRTH RIBRAFT POLYPOD/ CLEVA POD®
BRICK VENEER - NO INSULATION
FIRTH RAFTMIX 20 OR 25MPa



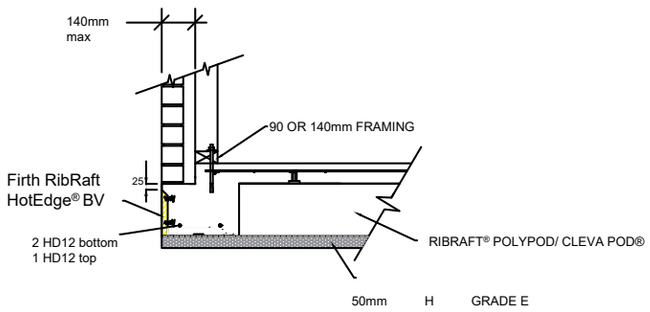
Ⓑ 220mm FIRTH RIBRAFT® POLYPOD/ CLEVA POD®
140mm WALL FRAME HOTEDGE EXTRA® & UNDERSLAB INSULATION
FIRTH RAFTMIX 20 OR 25MPa



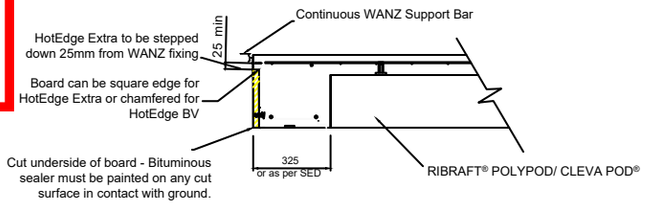
Ⓕ 220mm FIRTH RIBRAFT POLYPOD/ CLEVA POD®
140mm WALL FRAME HOTEDGE EXTRA & UNDERSLAB INSULATION
FIRTH RAFTMIX 20 OR 25MPa



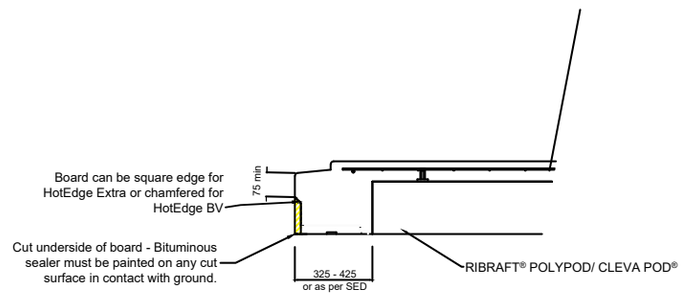
Ⓒ 220mm FIRTH RIBRAFT POLYPOD/ CLEVA POD®
BRICK VENEER HOTEDGE® (BV)
FIRTH RAFTMIX 20 OR 25MPa



Ⓖ 220mm FIRTH RIBRAFT® POLYPOD/ CLEVA POD®
BRICK VENEER HOTEDGE® & UNDERSLAB INSULATION FIRTH
RAFTMIX 20 OR 25MPa



Ⓓ FIRTH RIBRAFT HOTEDGE JOINERY DETAIL



Ⓗ GARAGE DOOR STEP CONSTRUCTION DETAIL

NOTES:

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3,. J?RCP?J PCQ&QR?LAC

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.

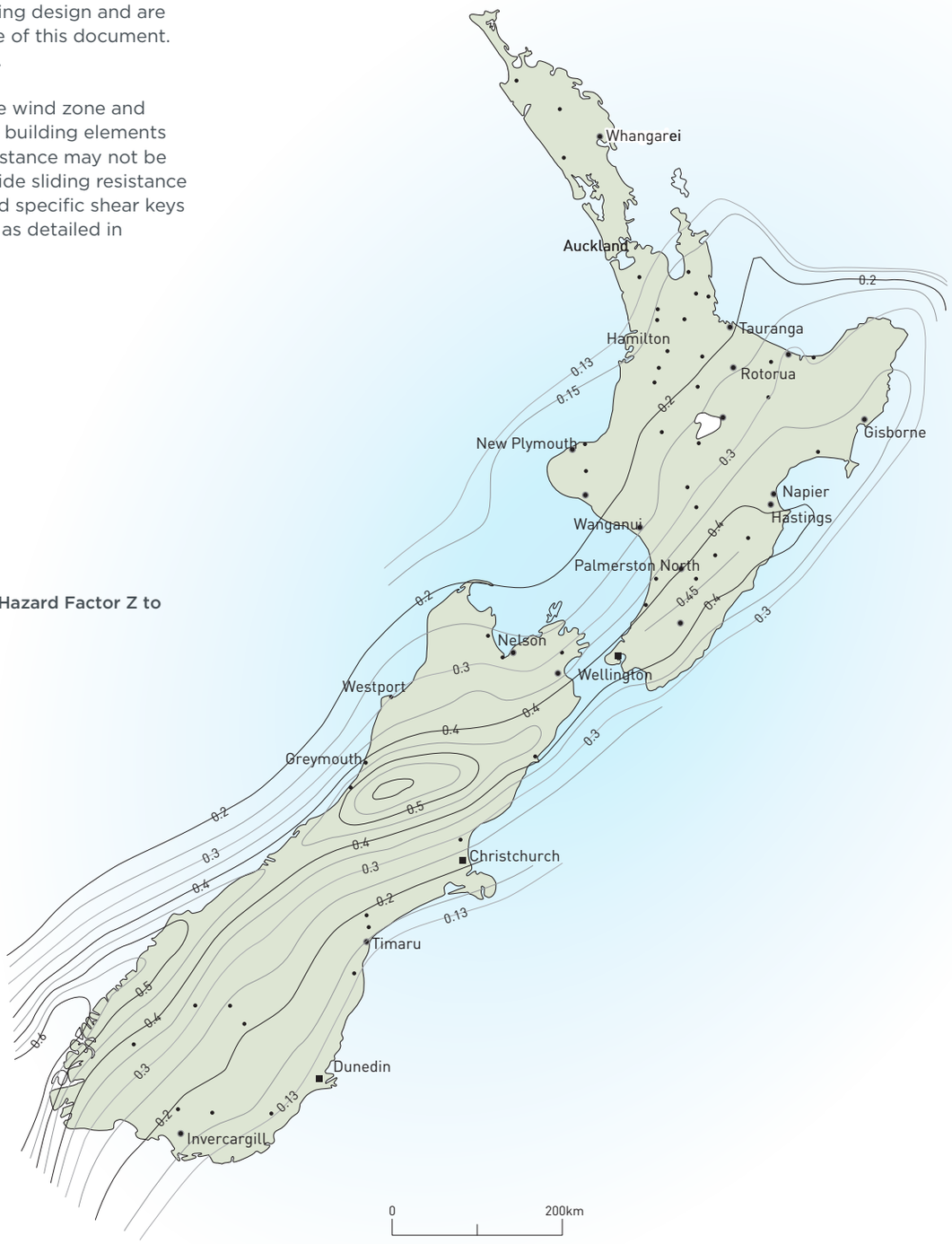


Figure 6. Seismic Hazard Factor Z to NZS 1170.5

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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 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.

Table 4. Bracing Capacity Provided By Frictional Resistance Per 100m² Of Ground Floor Area

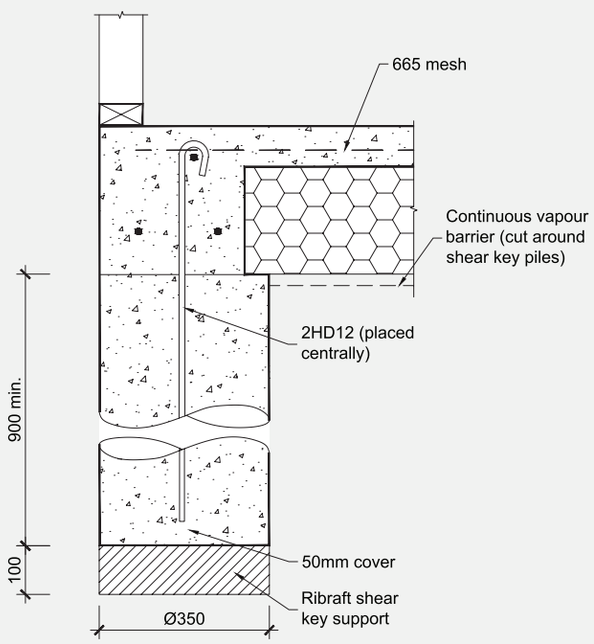
BUILDING TYPE	ROOF TYPE	GROUND FLOOR EXTERNAL WALLS	SECOND STOREY EXTERNAL WALLS	BU's PROVIDED PER 100M² 1.5KPA	FOR LIVE LOADING OF: 3.0KPA
Single Storey	Light	Light		1630	1746
Single Storey	Heavy	Light		1737	1857
Single Storey	Light	Heavy		1802	1922
Single Storey	Heavy	Heavy		1909	2029
Double Storey	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
Double Storey	Light	Heavy	Heavy	2524	2764

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



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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 180m^2 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 x 1.3 x 15 = 1853BU
The BU demand along the building = 90 x 1.3 x 12 = 1404BU

From Table 4 for a single storey light weight roof with 1.5kPa live load the capacity is 1630BU per 100m^2. Therefore for 180m^2 the capacity is 2934BU. As the capacity (2934) 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". Recent revisions to clause H1 of the Building Code has significantly changed the method used to calculate the insulation values of slabs supported on the ground. The most significant change being that the ground is now assumed to have a default thermal conductively of 2 W/(m.K) (more conductive than previously assumed) and modelling of the floor units are conducted in accordance with ISO 13370. The information provided in the R Value calcultor have been developed using method described in H1/VM1.

A further subtle change is that the way the area to perimeter ratio is calculated (A/P ratio). H1/AS1 defines this as:

$$slab\ area\ to\ perimeter\ ratio\ \left(\frac{A}{P}\right) = \frac{A_{slab,internal}}{P_{slab,internal}}$$

Where ***w*** equals the horizontal distance between the slab edge and the interior surface of the wall.

Alternatively, where external dimensions are known the following can be used.

$$slab\ area\ to\ perimeter\ ratio\ \left(\frac{A}{P}\right) = \frac{A_{slab,external}}{P_{slab,external}} - \frac{w}{2}$$

The acceptable solutions for H1, provides 3 methods of demonstrating compliance with the Building Code requirements. These being:

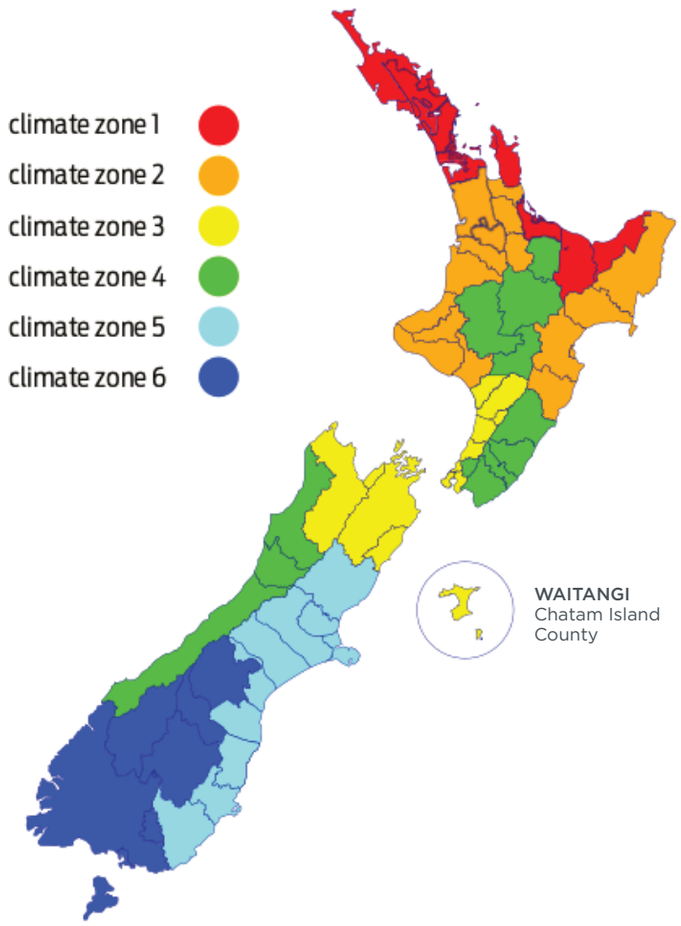
- The schedule method
- The calculation method
- Modelling using H1-VM1

H1 now splits New Zealand into 6 climate zones. Compliance by the schedule method involves providing a solution with a calculated R value in excess of the minimum scheduled value for the relevant climate zone. Tabled below are the minimum required R values for slabs on ground

BUILDING ELEMENT	CONSTRUCTION R VALUES (M2.K/W)					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Slab on ground	R1.5	R1.5	R1.5	R1.5	R1.6	R1.7
Slabs on ground with embedded heating coils	R2.5	R2.5	R2.5	R2.8	R3.0	R3.0

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New Zealand Climate Zones



The Firth HotEdge® range provides a suite of products to achieve compliance with the minimum R-values stipulated by the H1 schedule method. The construction R-values for the various Firth solutions can be found by using the R-value calculator at www.firth.co.nz/r-value-calc/

The calculation method described within H1 allows, optimised solutions to be developed by offsetting R-values within different elements of the building. Refer to H1 for details. There is a requirement that the R-values are not reduced by more than 50% of the Schedule Method. The exception being floors containing heating elements. For heated floors the R-values cannot be reduced below those specified in the schedule method. To conduct comparisons between the heat loss of the reference building and the proposed structure requires information on the actual R-value of the flooring system.

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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.

6.3 Saw Cut Joints

Saw cuts are located at positons 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 (ie Building Code compliance) being only an aesthetics issue. Therefore saw cuts are not mandatory for B1 compliance. 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 the 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 should 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.

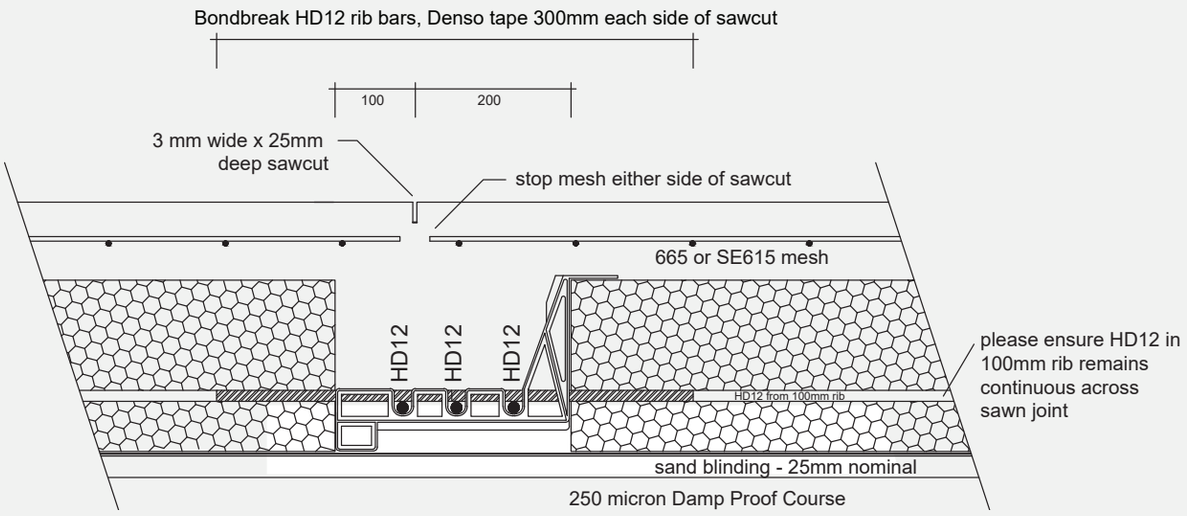
In order to limit the width of cracks at re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E or N), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 3.

6.4 Free Joints

Where the length of the floor exceeds 30m a free joint shall be provided as detailed in Figure 8. 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 8. Free Joint Details



RibRaft® control / free joint detail at 300mm wide thickening align sawcut with internal corner where possible

6.5 Services Detailing

Two options exist for running services, both of which are appropriate, however some regional Building Consent 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).

6.6 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

6.7 Under Slab Running Of Services

For this option, services ducts shall be conveyed underground to their plan location then brought up through the polystyrene or plastic pod and the concrete floor slab, within the limitation imposed by Table 6. 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/NZS3500.5:2015 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 9, 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 10 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:

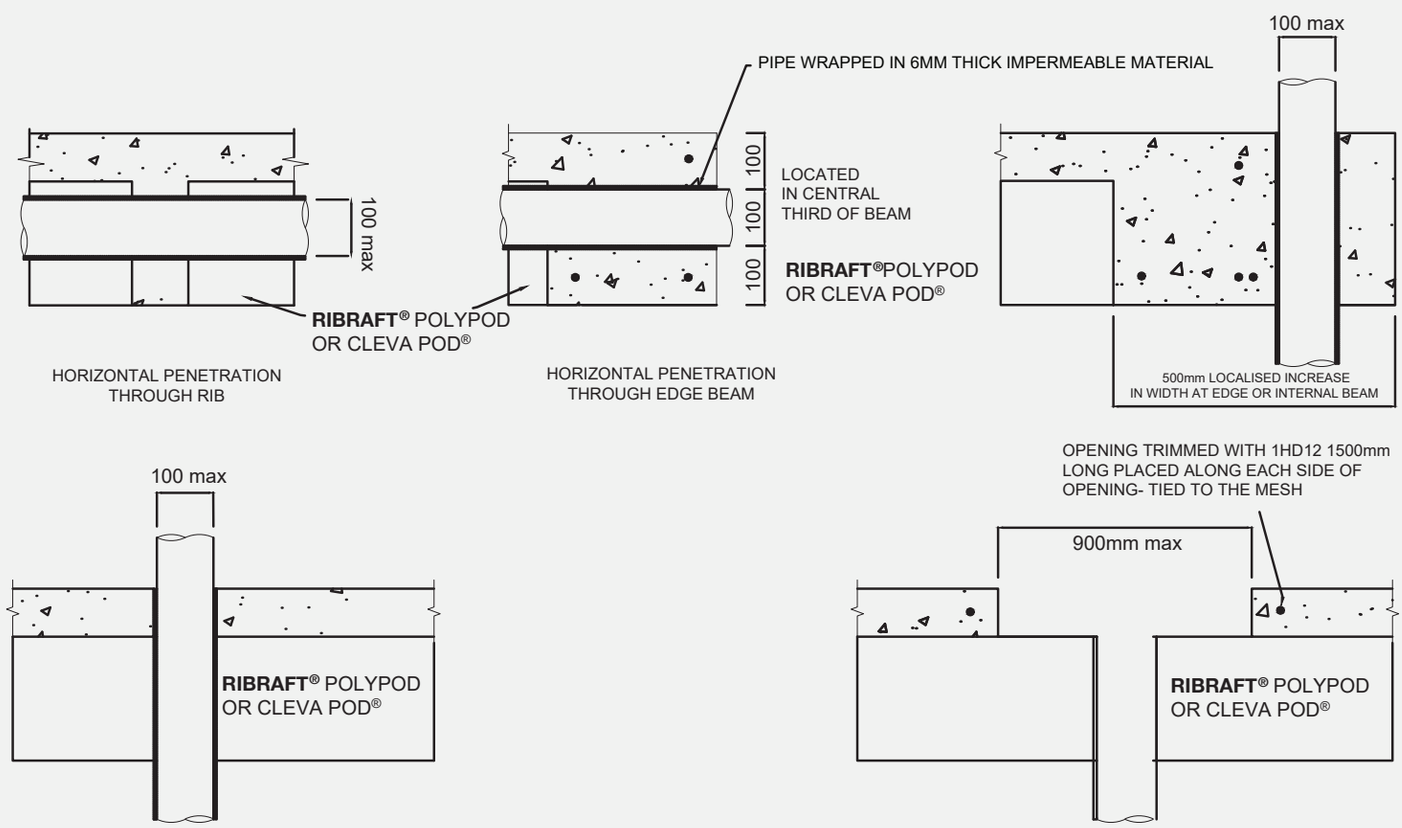
(1) For situations where a 100mm diameter pipe is required to pass vertically through the edge beam or internal load bearing beam, the beam shall be locally increased in width to a minimum of 500mm wide. This shall be achieved by keeping flush the outside face of the edge beam and removing 200mm from the pod. The width shall remain at 500mm for a distance of 600mm beyond the service pipe. Refer to figure 14 for details for pipes passing vertically through beams and internal ribs.

(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, be concrete encased and 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 or N) 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 120mm 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).

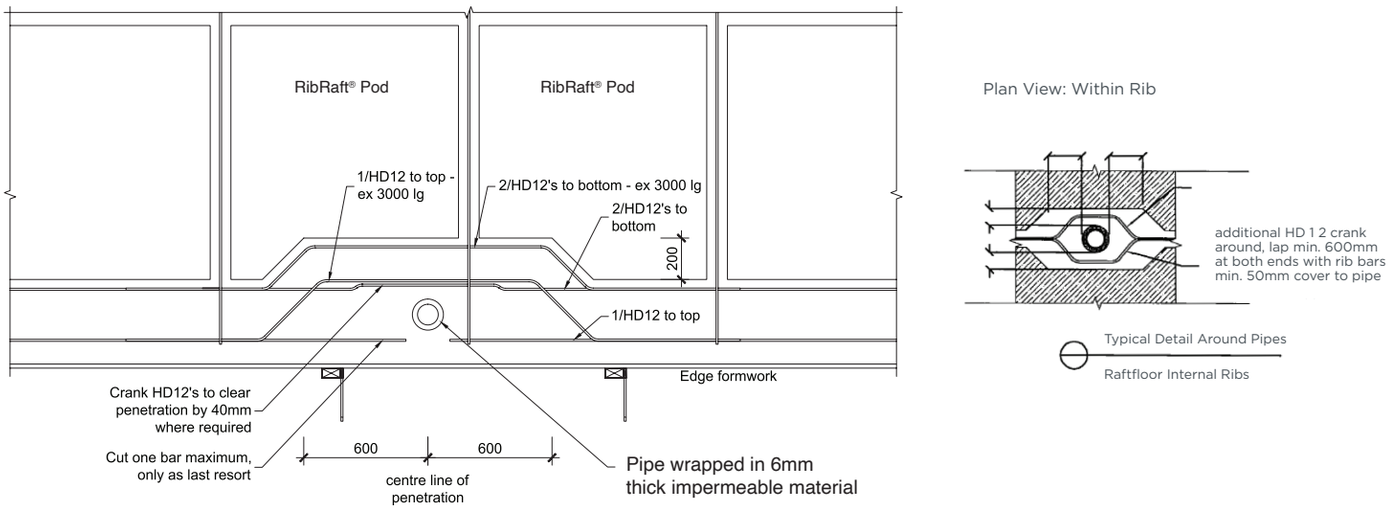
A pictorial of some of the above requirements is illustrated in Figure 9 and 10.

Figure 9. Example of Detailing Requirements For Services



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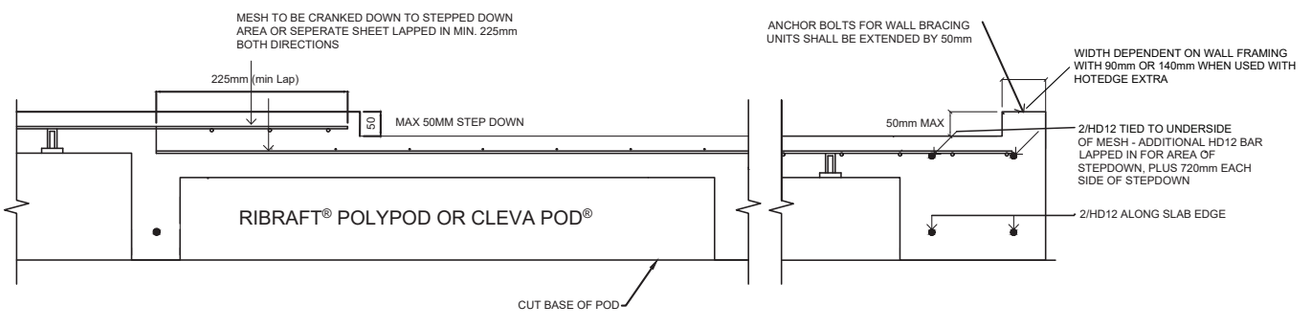
Figure 10. Localised Increase In Width At Edge Beam Where Vertical Service Up To 100mm Diameter Are Required



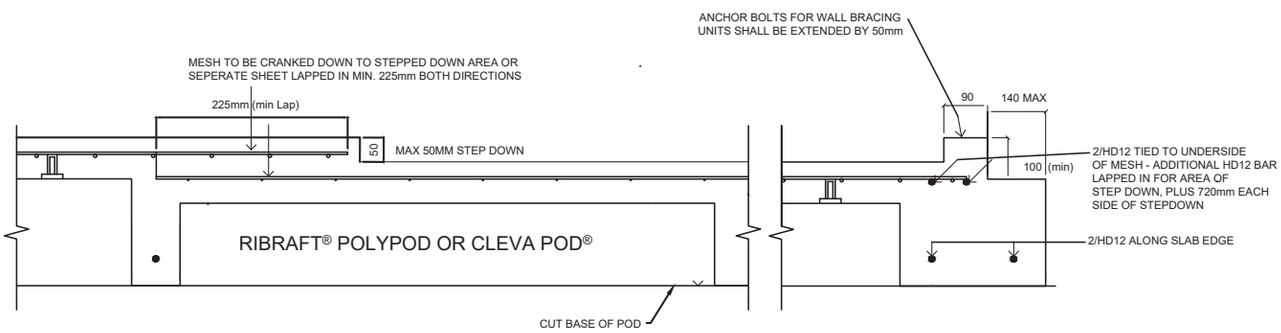
6.8 Recesses for Showers

Where showers are rebated up to 50mm into the RibRaft® concrete topping, the details specified shall be in accordance with Figure 11.

Figure 11. Details where recesses of up to 50mm are required for rebated showers



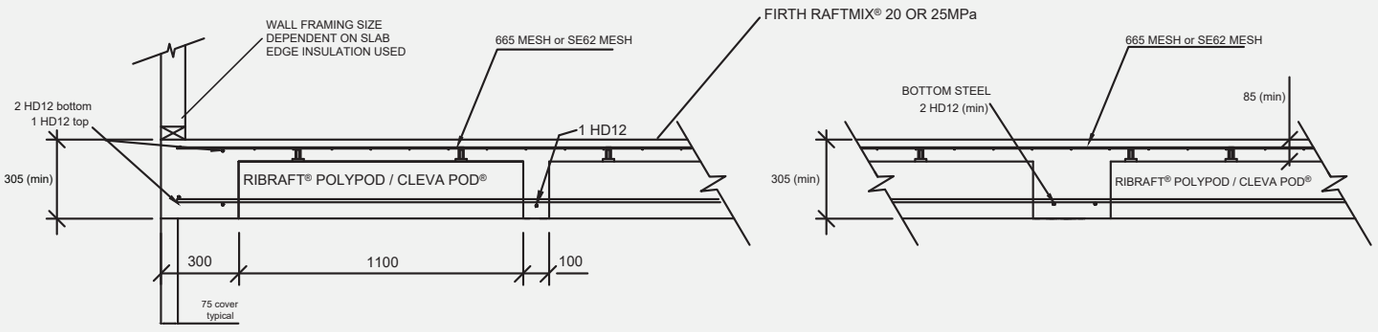
RIBRAFT® FLOOR - SET-DOWN DETAIL FOR MAX. 50mm **REBATED SHOWER**



RIBRAFT® FLOOR - SET-DOWN DETAIL FOR MAX. 50mm **REBATED SHOWER- BRICK REBATE**

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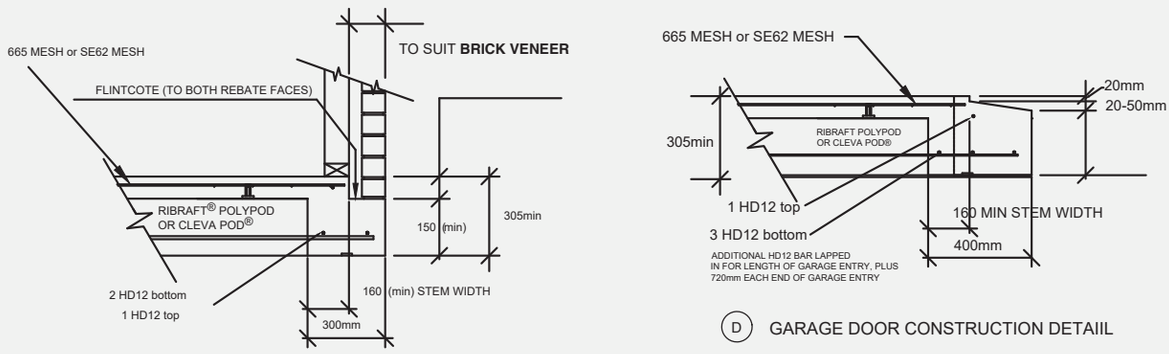
Figure 12. Construction Details



A PERIMETER BEAM & RIB CONSTRUCTION DETAIL

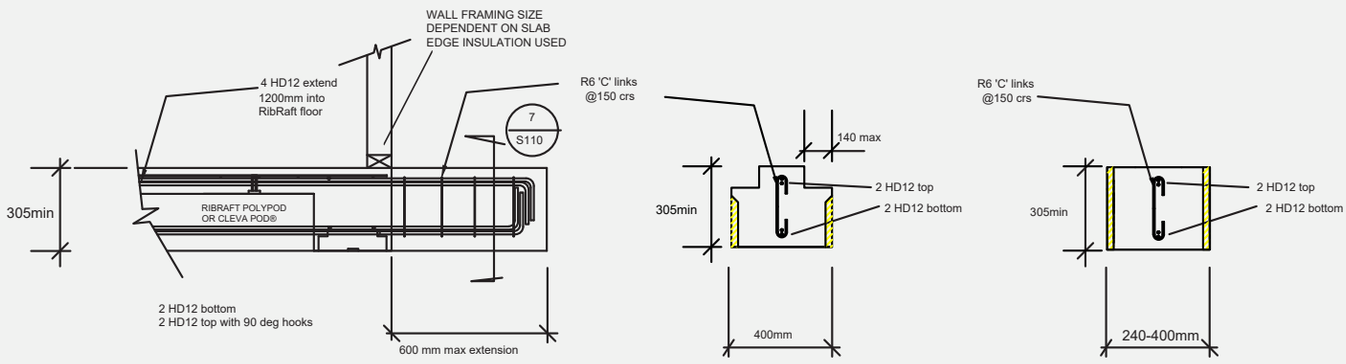
B SECTION UNDER INTERNAL LOAD-BEARING WALLS

Note: Slab edge and underfloor insulation not shown for clarity, refer figure 5 also when combining with insulation.



C BRICK VENEER CONSTRUCTION DETAIL

D GARAGE DOOR CONSTRUCTION DETAIIL



E NON LOAD BEARING WINGWALL DETAIL
Refer section 4.8 for Wingwall limitation

BRICK VENEER
WINGWALL SECTION

TIMBER FRAMING
WINGWALL SECTION

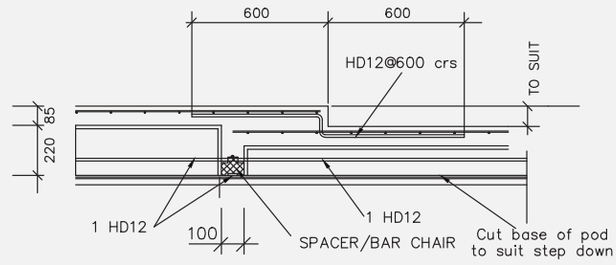
Note: 1. Refer section 4.8 for limitation

2. Slab edge insulation shown maybe ommitted when considered in H1 calculation.

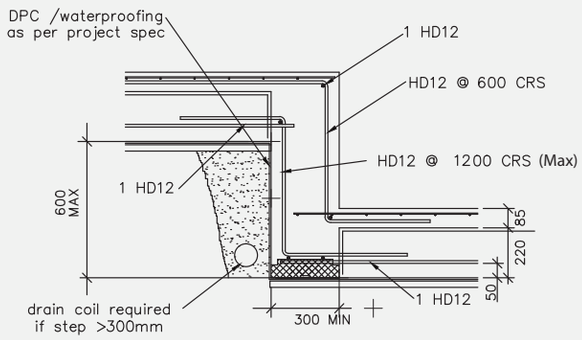
6.9 Step Down Of Up To 600mm In The RibRaft® Floor

Where the site topography requires a step down in the slab, steps of up to 600mm can be accommodated using one of the details provided in Figure 13. 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 6.4, a free joint shall be provided if the distance from the step down to the slab edge exceeds 15m.

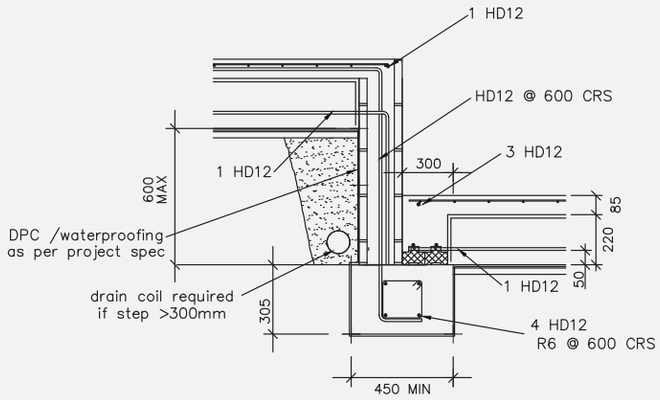
Figure 13. Details where step downs are required in the floor



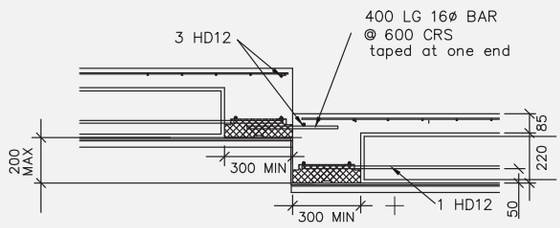
7/S2 SET–DOWN DETAIL FOR STEP UP TO 100mm
1:20



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

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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 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.



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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 14 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 14, 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 15. 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 16..

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Figure 14. Relationship of RibRaft® to Sloping Ground Surface

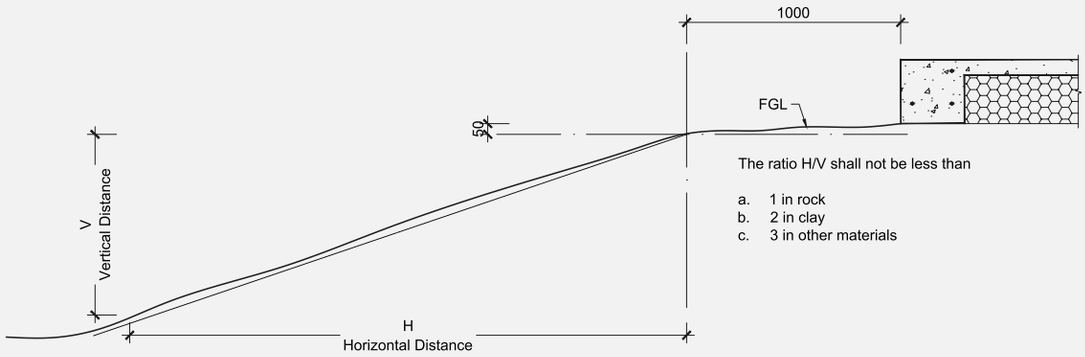


Figure 15. Temporary Excavation Limited

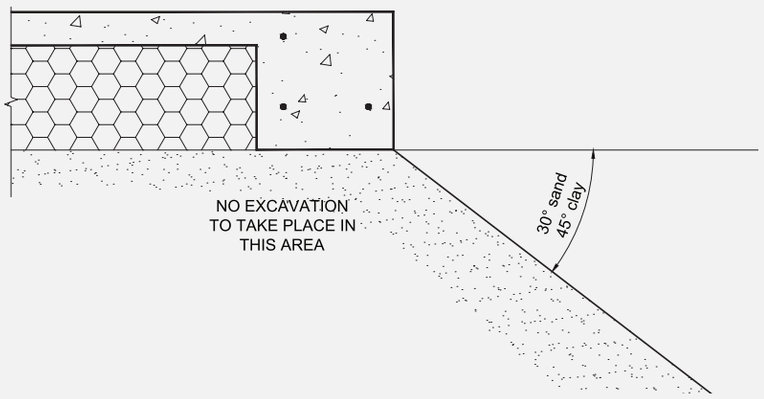
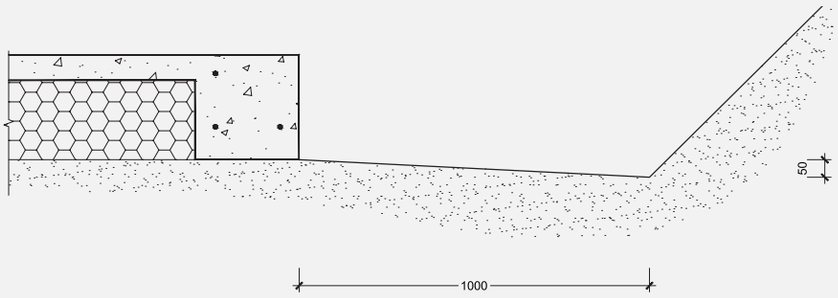


Figure 16. Site Grading



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3.0 INSTALLATION PROCEDURE

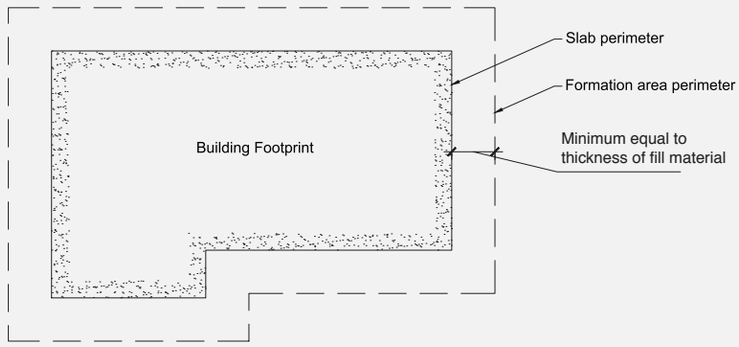
3.1 Site Preparation

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 equal to the floor thickness (including insulation layers) plus 25mm 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 "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 17. 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 6.7 of Section 1.

Where required, the services can be installed by removing unnecessary pods 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 10 (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 10 (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 500N or E) 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 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 ensure that the void is sealed/covered).

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 11 (Section 1).

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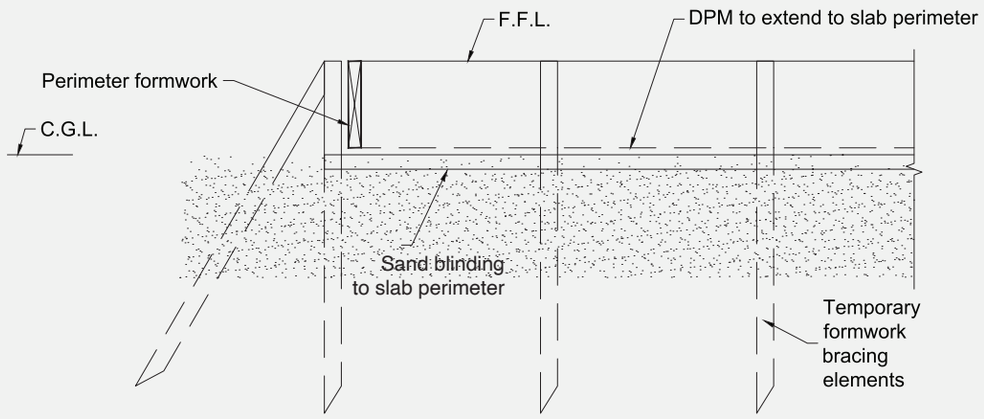
3.5 Sand Blinding

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 18. The maximum thickness of this blinding layer shall be 50mm. The surface shall be level and a minimum of the floor thickness 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 "Timber Framed Buildings". The sand is required to be level to ensure that pods or underfloor insulation 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 18 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 18. 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.

3.8 Laying insulation, Pods, HotEdge®, and spacers

Where below pod insulation has been specified on the drawings, lay polystyrene sheets over the entire foot print on the DPM. Butt joint sheets against each other and to the internal face of the formwork or insulation. Cut as necessary to fit.

The Firth RibRaft® polystyrene pods or Cleva pods shall be laid out over the DPM or underfloor polystyrene as appropriate. Where the drawings specify 300mm pods with XPS in ribs, lay 50mm XPS cut to fit in all ribs and beams. Where the drawings specify Firth HotEdge® or HotEdge Extra® and/or HotBase®, install as per Firths literature (refer Firth website). The edge beam shall be formed using the Firth approved 300mm spacers (refer Figure 22). 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.

For the insulation of Cleva Pods® refer to the Cleva Pod installation guide www.clevaco.co.nz

For poly pods, 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 19 shows a detailed layout of the pods and spacers.

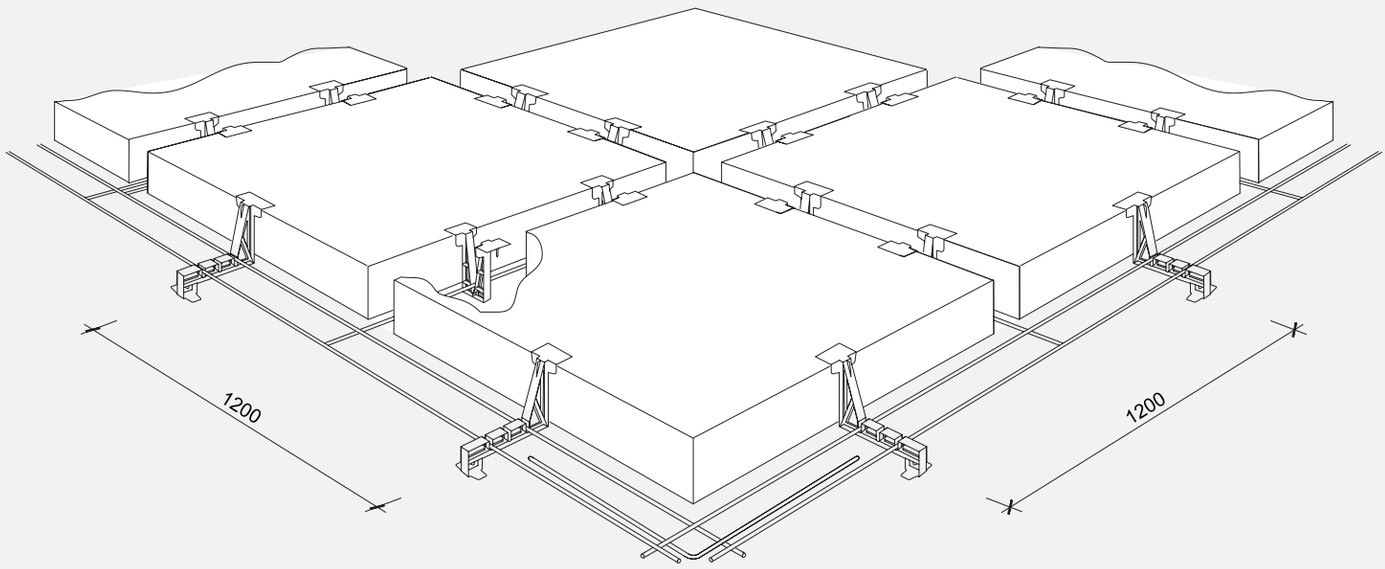
Where the shape of the house plan dictates, it may be more practical to consider the floor to be made up of different segments. The pods in each segment shall be in a regular waffle pattern – refer right hand side of Figure 20. Where these segments meet, the pods shall be cut to suit and the ribs made 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 20.

As can be seen from Figure 20, 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).

Firth 100mm spacers and Firth 300mm spacers can not be used with 300mm pods. WJ100 & WJ101 are suitable for both 220 & 300mm pods.

Figure 19. Detailed layout of Pods and spacers (mesh and top steel omitted for clarity)



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3.9 Reinforcing Steel

Reinforcing bars shall conform to NZS 4671:2019 “Steel Reinforcing Materials”. All bars shall be of deformed type (Grade 500N or E). 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 4671:2019 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 500N or 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 reinforcement will be 665 mesh (class L) or SE62 ductile mesh, each being equally applicable

Figure 19 shows the detailed layout of the spacers and the steel in the edge beam and the standard ribs.

Figure 20. Typical Pod And Rib Layout

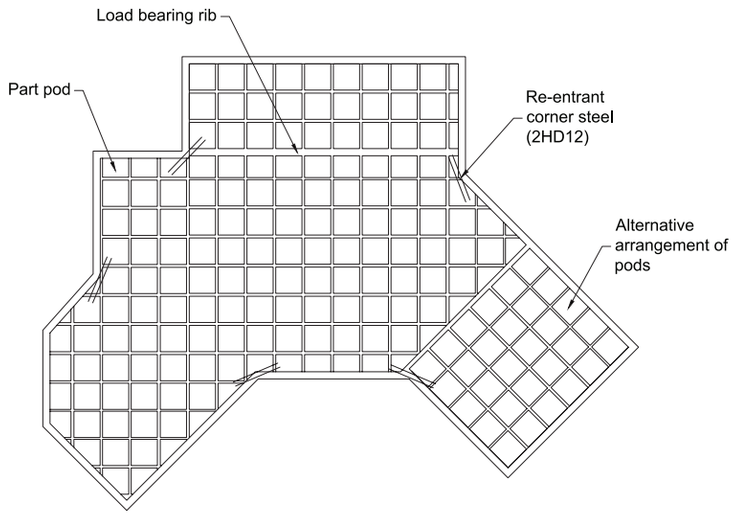
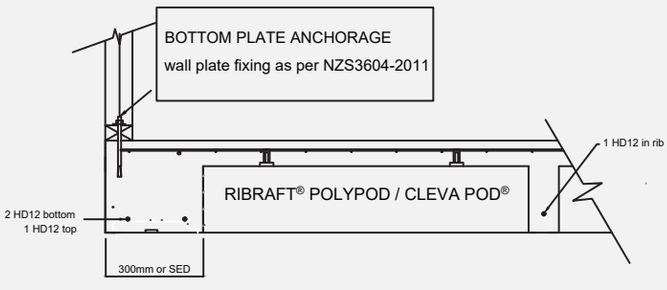
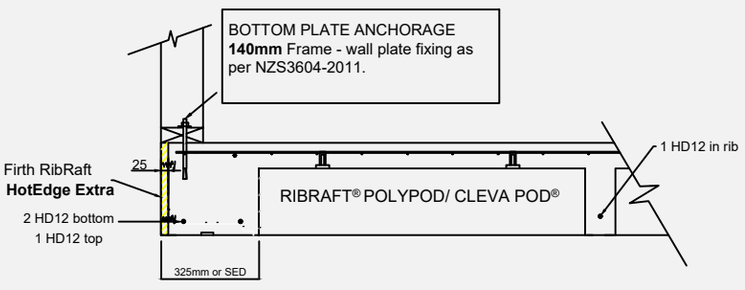


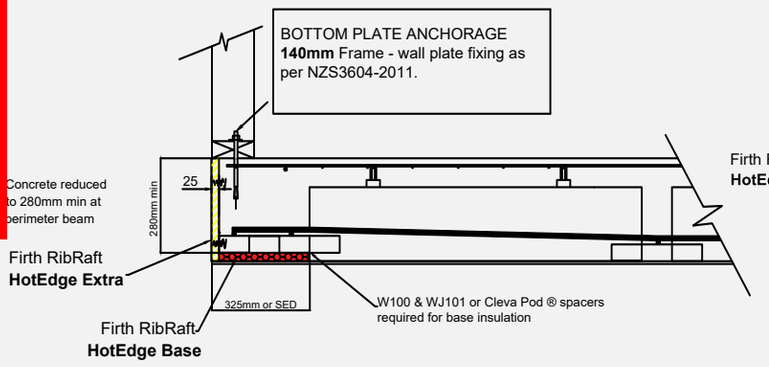
Figure 21.



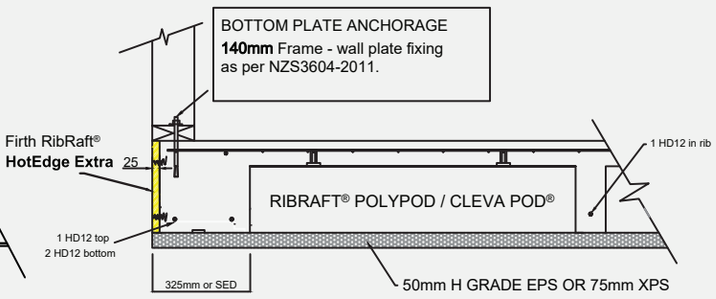
Ⓐ 220mm FIRTH RIBRAFT® POLYPOD / CLEVA POD®
90mm WALL FRAME- **NO INSULATION**
FIRTH RAFTMIX® 20 OR 25MPa



Ⓑ 220mm FIRTH RIBRAFT POLYPOD/ CLEVA POD®
140mm WALL FRAME **HOTEDGE EXTRA**
FIRTH RAFTMIX 20 OR 25MPa



Ⓒ 220mm FIRTH RIBRAFT POLYPOD/ CLEVA POD®
140mm WALL FRAME **HOTEDGE EXTRA** & **HOTEDGE BASE**
FIRTH RAFTMIX 20 OR 25MPa



Ⓓ 220mm FIRTH RIBRAFT® POLYPOD/ CLEVA POD®
140mm WALL FRAME **HOTEDGE EXTRA®** & UNDERSLAB INSULATION
FIRTH RAFTMIX® 20 OR 25MPa

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3.10 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 21. 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 21.

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 22 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.

3.11 Rib Steel

Rib reinforcing steel shall be placed in the bottom of the internal ribs and supported in the correct position by approved spacers. Figure 23 shows the spacers, and Figure 19 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 500N or E) 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.

3.12 Mesh Reinforcing

Mesh reinforcing shall be placed over the pods and supported on mesh chairs to achieve minimum concrete cover. At laps the overlap of the outermost cross wires of the sheets shall be the spacing of the wires plus 50mm.

3.13 Re-entrant Corner Steel

Two HD12 bars (Grade 500N or E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner as detailed in Figure 20 (this steel is to help reduce the width of cracks that may develop at this location)

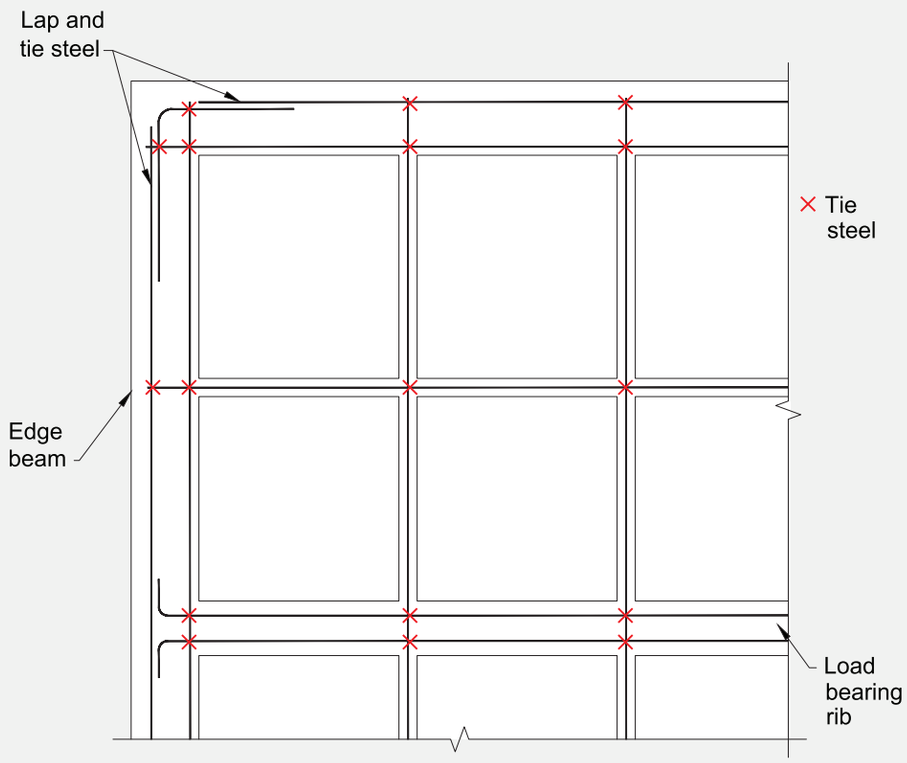


Figure 22. Corner steel layout

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3.14 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.

3.15 Placing

Only RaftMix® or RaftMix® 25 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. For Cleva Pod® use Firth 20MPa (mix code: RC2019AW).

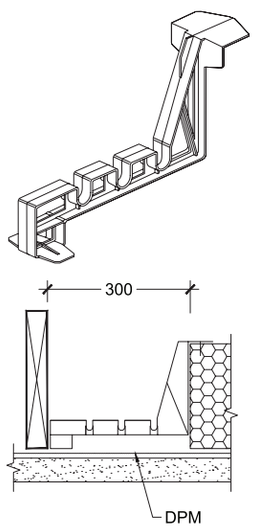
> RaftMix® 25 – a 25MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix. This mix shall be specified for buildings constructed in the 'sea spray zone' (i.e. within 500m of 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). For Cleva Pod® use Firth 25MPa (mix code: RC2519AW)..

> Check the drawings for the project. Where the specifier aims to achieve a **lower carbon footprint**, the concrete specification may request an EC rating. These mixes are designed to achieve the specified strength and a maximum specified carbon footprint. When ordering concrete ensure the EC rating is communicated when its specified.

Figure 23. Spacer Details

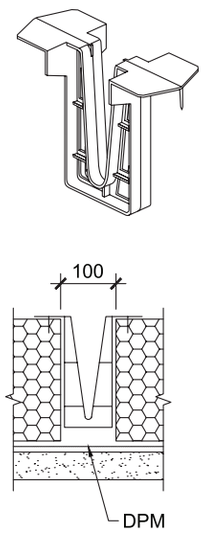
Firth 300mm Spacer

Use only with 220mm polystyrene pods where HotEdge Base® is not utilised.



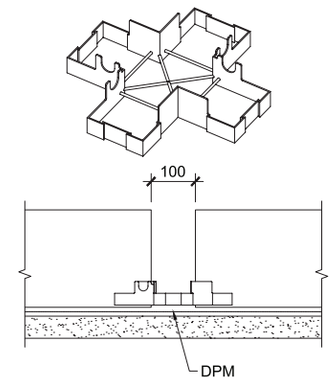
Firth & Cleva Pod® 100mm spacers

Use for 220mm pods



WJ100mm spacer & Cleva Pod® spacer

Use for 220 or 300mm pods or for options using HotEdge Base®. Use a WJ101 extension with WJ100 Spacer when creating a 300mm perimeter beam.extension.



Cleva Pod® spacer



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.

3.16 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	Early Age Crack Control
www.ccanz.org.nz/page/Hot-and-Cold-Weather-Concreting.aspx	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").

3.17 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.

3.18 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.

3.19 Saw Cut Joints

Saw cuts are located at positons 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.

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 500N or E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 20.

3.20 Free Joints

Where the length of the floor exceeds 30m a free joint shall be provided as detailed in Section 1, Figure 8. 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.

3.21 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.

3.22 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.

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3.23 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. 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.

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.

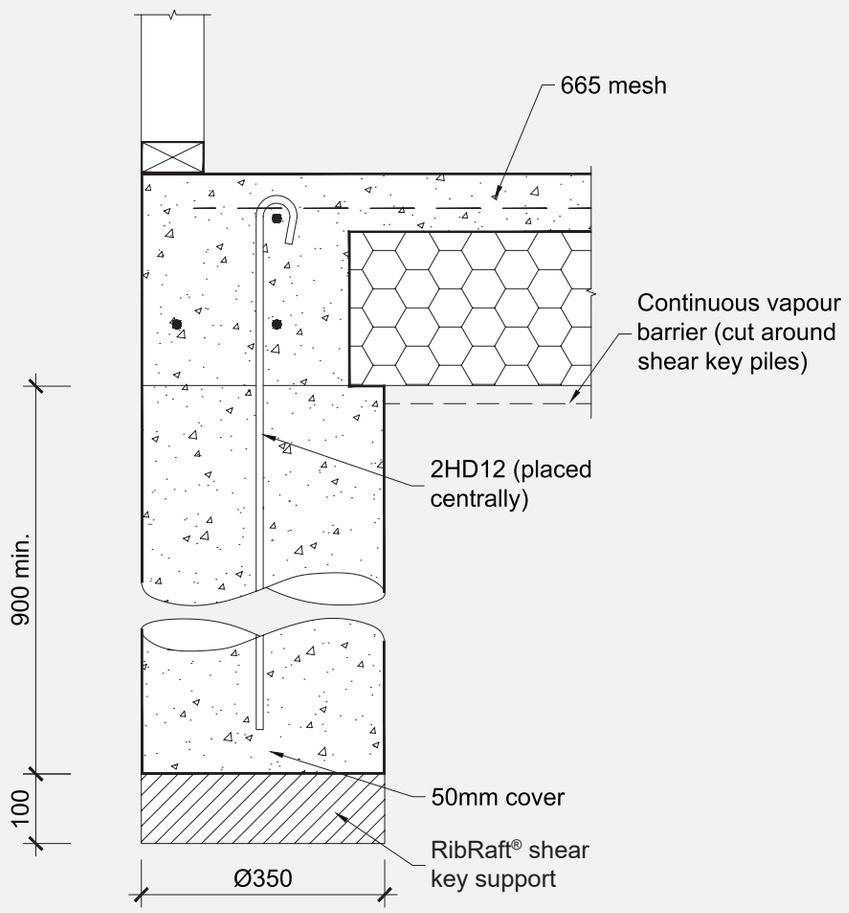
3.24 Ongoing Maintenance

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 500N or E) 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 24. 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 Consent Authority issuing the Building Consent. Solutions outside the limitations outlined in this Manual will require specific engineering design.

2.0 CONSTRUCTION

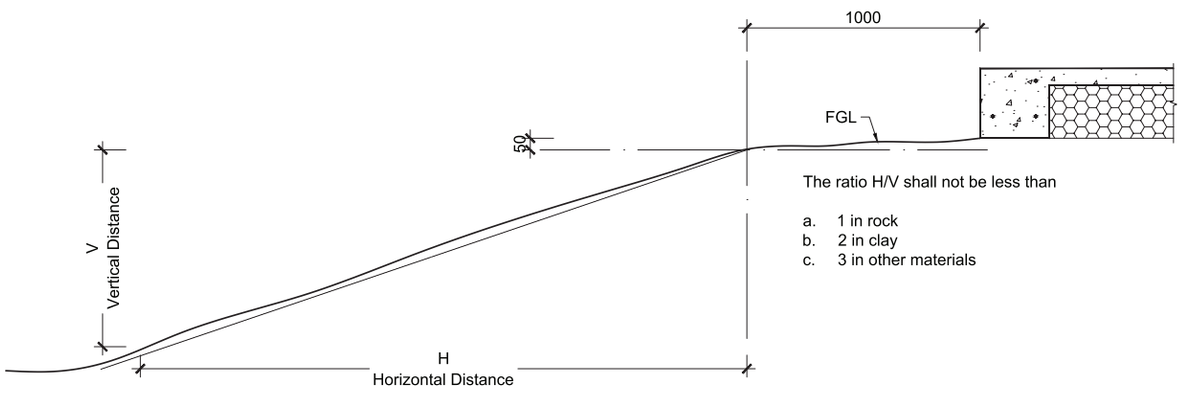
The RibRaft® foundation system has been designed to accommodate structures complying with the non specific design standards NZS3604 or NZS4229. With these types of structures the Building Consent Authority specifies the inspections required and often conducts these. A similar construction verification 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-LAYOUT 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 25. Relationship of RibRaft® To Sloping Ground Surface



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PRE POUR INSPECTION CHECK LIST

PERIMETER FOUNDATION	○ WIDTH 300MM(1) ○ REINFORCEMENT 2 X HD12 BOTTOM, 1 X HD12 TOP ○ FIRTH SUPPLIED SPACER USED AT 1.2M MAXIMUM CENTRES ○ HOTEDGE®, HOTEDGE EXTRA® OR HOTEDGE BASE® INSULATION INSTALLED AS SPECIFIED
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 OR CLEVA PODS®
MESH	○ MESH 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 PODS TO MINIMUM OF 85MM OR 110MM IF IN FLOOR 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.

NOTES:

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CONCRETE & MASONRY PRODUCTS: A SUSTAINABLE BUILDING OPTION & SOLUTION

- ✓ 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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0800 FIRTH 1 (347841)
FIRTH.CO.NZ

APPENDIX 04 – TRUSS DESIGN

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AKARANA TIMBERS CHRISTCHURCH

AGREEMENT LETTER

NOMINATED FABRICATOR = AKARANA TIMBERS (Ph: 03 347 8845)

DATE: **22 September 2023** CONSENT NO: **BC**

CLIENT: **Oakridge Homes**
JOB NAME: **New Home**
SITE ADDRESS: **Lot 44 Lemonwood Estate, Rolleston**
JOB REF: **23-04049**

Attn: Territorial Authority

We have been engaged to provide the trusses and / or frames for the above project.
To allow completion of the consent application we have supplied the following information:

(a) Truss Layout and Producer Statement
(b) Internal load bearing walls identified
(c) Slab thickening areas identified for single floor levels only
(d) The size of the lintels that provide the support to trusses
(e) Timber treatment defined within the scope of NZS3602 (relating to the frames & trusses)

On advice from the building project owner, the structure will be designed under the following parameters

Roofing material: **Metal Tiles**
Soffit: **600 & 450mm**
Spacing: **900mm**
Roof pitch: **25°**

Wind zone: **High**
Snow load: **0.441kPa (basic roof load)**
Snow load: **0.900kPa (O/G snow load)**

Treatment Definition:
Roof Trusses: **90x45mm SG KD (H1.2)**
All Walls: **By Architectural Designer**

It should be noted that the details provided have been designed to comply with the Building Code and relevant standards. Any increase above these standards is only at the preference and request of the building owner.

The following will be provided at the time of truss manufacture to both the building owner and your office:

(1) A full 'as-built' layout and Producer Statement
(2) Specific truss/truss fixings done as per NZS3604:2011, Clause 10.2.2.6.1
(3) Specific top plate to stud fixings that comply with NZS3604:2011, Table 8.18
(4) Specific lintel fixings outside NZS3604:2011

Acknowledgement of this letter, along with the Building Consent number, is required by our company as soon as available via email to: estimating.chch@akaranatimbers.co.nz

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.miteknz.co.nz

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

ISSUED BY: **MiTek New Zealand Limited**

TO: **Akarana Timbers Christchurch**

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 **23-04049** 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: Friday, 22 September 2023**



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

Job: 23-04049 Client: Oakridge Homes Site: New Home
Phone: Lot 44 Lemonwood Estate,
Description: Rolleston
Building Consent No.: Phone:
MiTek 20/20 Engineering 4.7.346.0 MiTek New Zealand Limited Printed: 18:15:34 22 Sep 2023

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **Akarana Timbers Christchurch**, 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.

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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:	SGx45 H1.2	Pitch:	25.000 deg	Nominal Overhang:	600 mm
Roof		**Ceiling**		**Wind**	
Material:	Metal Tiles	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:	400 mm centres	Restraints:	600 mm centres	**Snow**	
Live Load:	Qur = 0.250 kPa	Live Load:	Qc = 1.400 kN	Location:	Christchurch (N4) at 100 m
	Qc = 1.100 kN			Open Ground Load:	0.900 kPa
				Basic Roof Load:	0.441 kPa

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, ~~Txx~~ = 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)
ET01	1D	5139	25.000	900	T07	1	2918	25.000	900	T05A	2	4970	25.000	900
*H01	2	6226	18.249	900	TR01	1	7470	25.000	900	J02A	1	2002	25.000	900
*H02	2	4975	18.249	900	V01	1	803	25.000	900	J02B	2	2002	25.000	900
*H03	1	2082	18.249	900	V02	1	2580	25.000	900	J04A	4	2018	25.000	900
*H04	1	2843	18.249	900	V03	1	1680	25.000	900	J04B	1	2018	25.000	900
*H05	1	7881	18.249	900	V04	1	1095	25.000	900	J04C	1	2018	25.000	900
*H06	1	3468	18.249	900	V05	1	1778	25.000	900	J07A	1	2168	25.000	900
J0	2	2902	25.000	900	V06	1	878	25.000	900	J10	1	2580	25.000	900
J0	2	1102	25.000	900	V07	1	1570	25.000	900	J01A	1	2902	25.000	900
J0	1	1268	25.000	900	V08	1	870	25.000	900	J01B	1	2902	25.000	900
J0	1	1118	25.000	900	J01C	1	2902	25.000	900	J06	1	2918	25.000	900
J0	1	3480	25.000	900	J02	1	2002	25.000	900	J10A	1	2580	25.000	900
J1	1	1680	25.000	900	J04	1	2018	25.000	900	SG02	1	5880	25.000	900
R1	3	913	25.000	900	J07	1	2168	25.000	900	HTG01	1	4973	25.000	900
R2	1	913	25.000	900	J09A	2	3480	25.000	900	J06A	1	2918	25.000	900
R3	1	763	25.000	900	J09B	1	3480	25.000	900	J09C	1	3480	25.000	900
R4	1	1393	25.000	900	J09D	1	3480	25.000	900	TG01	1	7650	25.000	900
T0	3	7650	25.000	900	J11A	1	1680	25.000	900	T02	1	7028	25.000	900
T0	4	4973	25.000	900	*R01A	3	913	25.000	900	TG02	1	7470	25.000	900
T0	1	7028	25.000	900	*R02A	1	913	25.000	900	SG01	1	5880	25.000	900
T0	2	4970	25.000	900	*R03A	1	763	25.000	900					
T0	1	2918	25.000	900	T01A	1	7650	25.000	900					

Total quantity : 84

The computer design input has been carried out by:

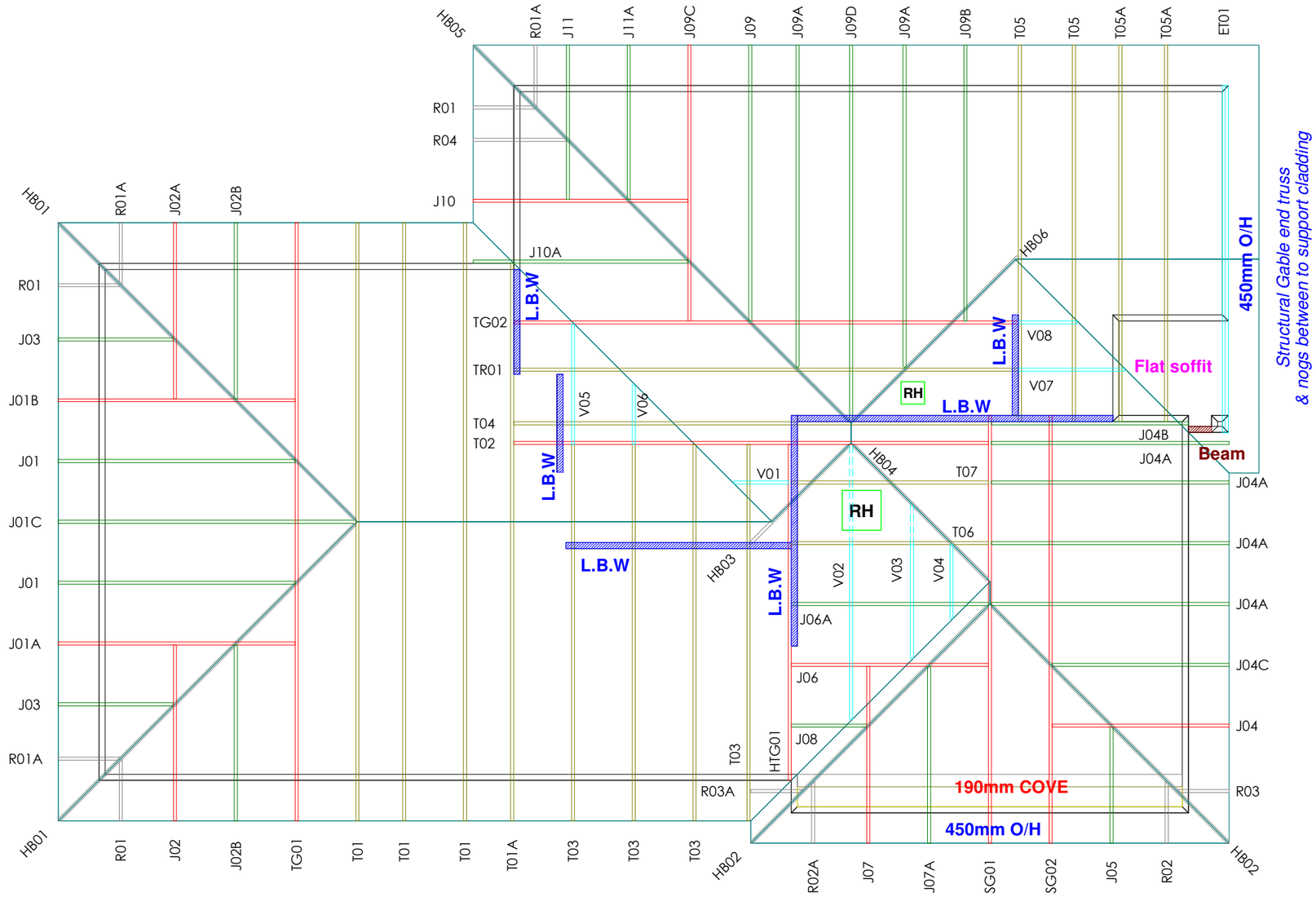
Signed: ..... Date: ...Friday, 22 September 2023....

Name of Detailer: Qualifications and Title: Detailer

On behalf of: Akarana Timbers Christchurch

18 Hynds Drive, I-Zone Industrial Park, Rolleston 7675, New Zealand
Phone: Ph 03 3478845

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Akarana timbers
Ph: 03 3477 818

Site Address :
New Home
Lot 44 Lemonwood Estate,
Rolleston

Sheet Title :
Buildable Design
Buildable Layouts

Date : Sep 22,2023 | Drawn : Lam Dang
Scale : 1: 100 | System : MiTek 20/20

Job Details:

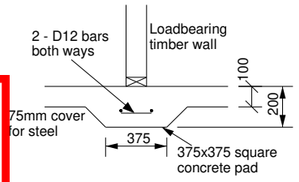
Roof Pitch	: 25.00deg	Truss Centres	: 900mm
Roof Material	: Metal Tiles	Roof Live Load	: 0.250kPa
Ceiling Material	: Gib Board 13mm	Floor Live Load	:
Wind Zone	: High	Wind Speed	: 44m/s
Roof Snow Load	: 0.441kPa	Overhang	: 600mm

PrimeCad v4.7.346

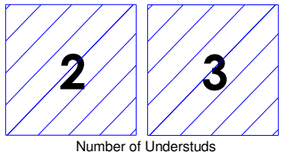
MiTek™

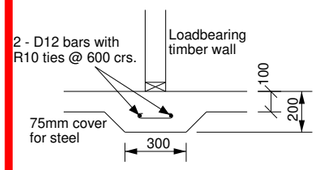
Job Title : 23-04049
Sheet : 1
Revision Number :

Slab Thickening Details

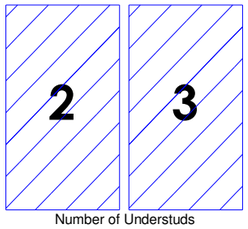


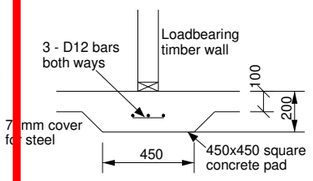
TYPE FP1 - 375x375mm Pad



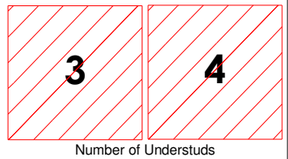


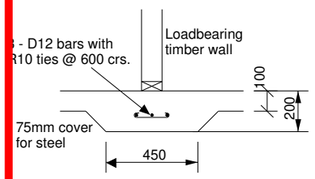
TYPE FS1 - 300mm Strip footing



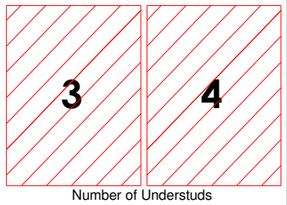


TYPE FP2 - 450x450mm Pad



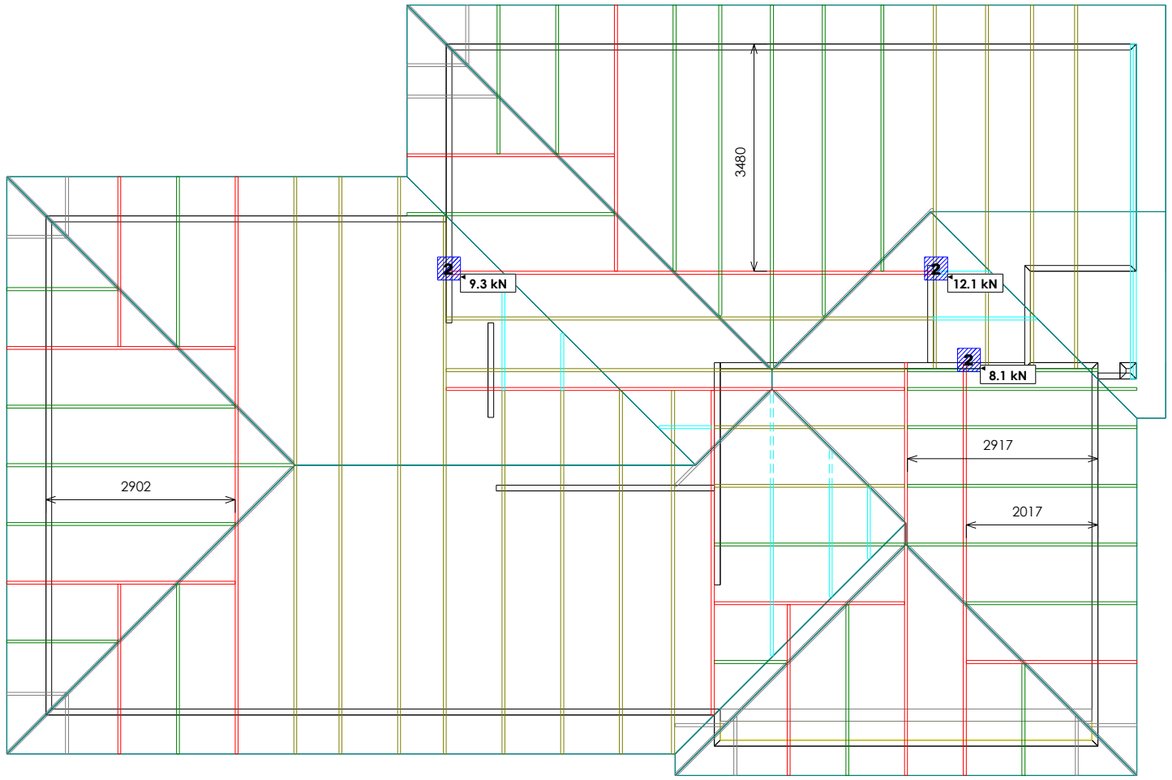


TYPE FS2 - 450mm Strip footing



NOTES:

The numbers found within the hatched area are the number of studs required below each truss.
Refer to:
- GANG-NAIL Internal Load Bearing on Concrete Floor Slabs brochure 10/2011



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PrimeCad v4.7.346

Akarana timbers
Ph: 03 3477 818

Site Address :
New Home
Lot 44 Lemonwood Estate,
Rolleston

Sheet Title :
Buildable Design
Slab Thickening/Dimensions

Date : Sep 22,2023 | Drawn : Lam Dang
Scale : 1: 100 | System : MiTek 20/20

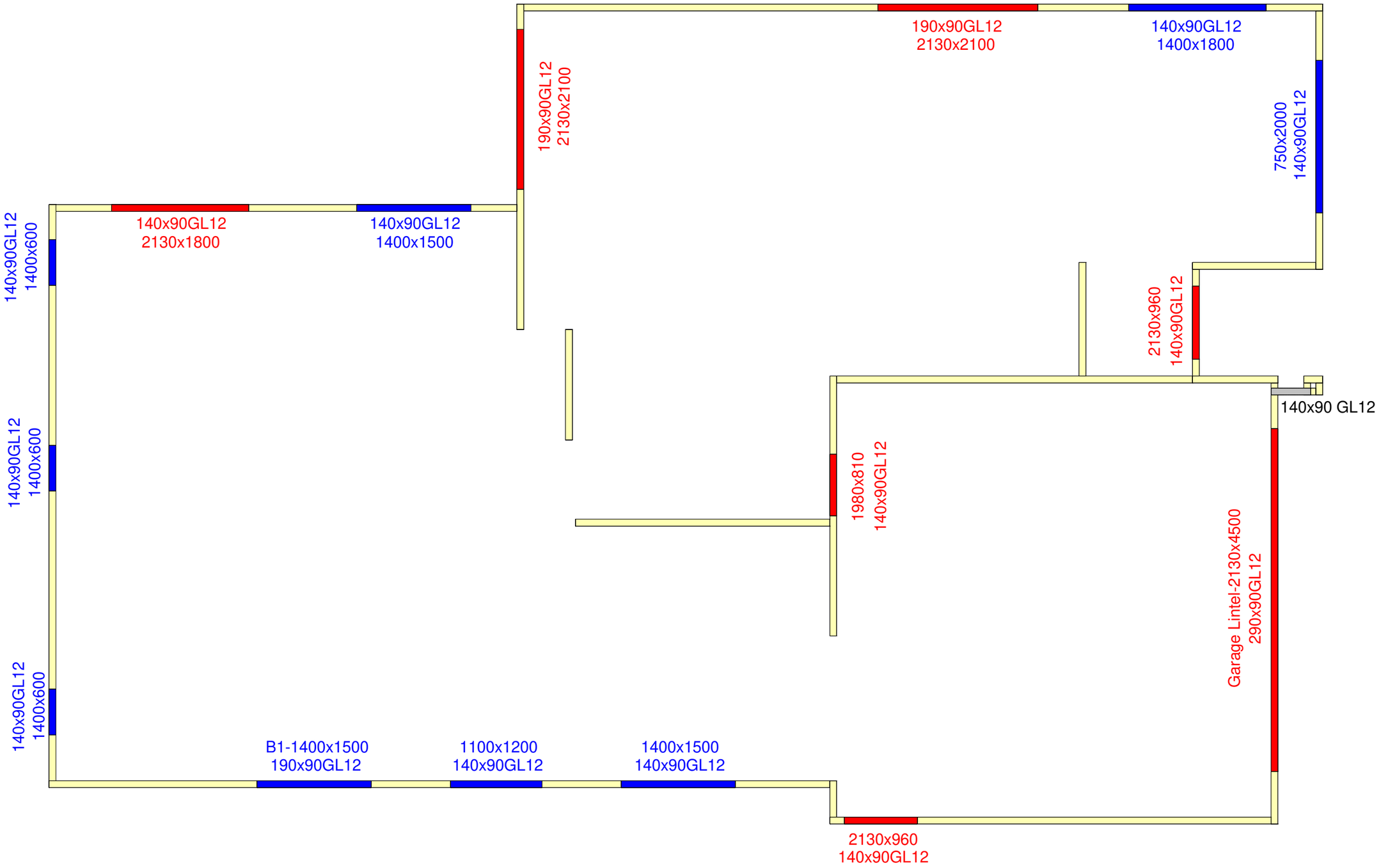
Job Details:

Roof Pitch	: 25.00deg	Truss Centres	: 900mm
Roof Material	: Metal Tiles	Roof Live Load	: 0.250kPa
Ceiling Material	: Gib Board 13mm	Floor Live Load	:
Wind Zone	: High	Wind Speed	: 44m/s
Roof Snow Load	: 0.441kPa	Overhang	: 600mm

MiTek™

Job Title : 23-04049
Sheet : 2
Revision Number :

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PrimeCad v4.7.346

Akarana timbers
Ph: 03 3477 818

Site Address :
New Home
Lot 44 Lemonwood Estate,
Rolleston

Sheet Title :
Buildable Design
Lintel Sizes

Date : Sep 22,2023 | Drawn : Lam Dang
Scale : 1: 100 | System : MiTek 20/20

Job Details:

Roof Pitch	: 25.00deg	Truss Centres	: 900mm
Roof Material	: Metal Tiles	Roof Live Load	: 0.250kPa
Ceiling Material	: Gib Board 13mm	Floor Live Load	:
Wind Zone	: High	Wind Speed	: 44m/s
Roof Snow Load	: 0.441kPa	Overhang	: 600mm

MiTek™

Job Title : 23-04049
Sheet : 3
Revision Number :

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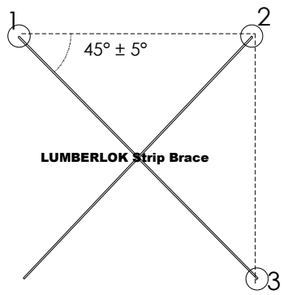
Truss Fixings

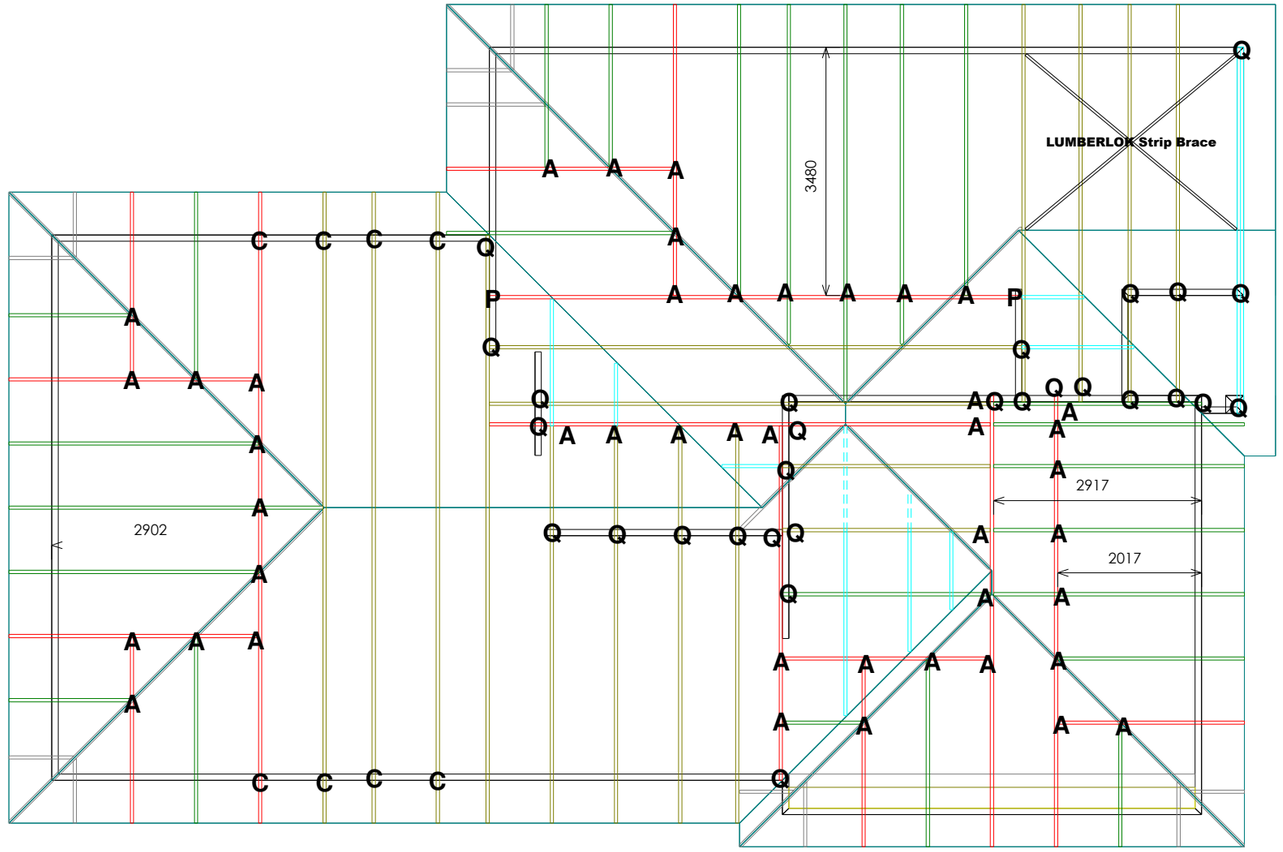
A - LUMBERLOK JH47x90 Joist Hanger
B - LUMBERLOK JH47x120 Joist Hanger
D - LUMBERLOK JH47x190 Joist Hanger
E - LUMBERLOK JH95x165 Joist Hanger
C - Pair of LUMBERLOK CT200 Ceiling Ties
M - Pair of LUMBERLOK Multi Grips
NP - LUMBERLOK Nailon Plate
N - LUMBERLOK N21 Diagonal Cleat
P - LUMBERLOK TTP 16kN Truss to Top Plate set
Q - LUMBERLOK TTP 9kN Truss to Top Plate set

Roof Bracing

Refer to:
LUMBERLOK Roof Bracing Specifications
Brochure 08/2006 for end fixing details.

The brace must be located such that it forms an angle of 45° ± 5° to the wall





NOTES:

All other areas must have at the minimum 2/ 90x3.15mm skew nails + 2 wire dogs for truss to top plate connections.

Refer to:
LUMBERLOK Timber Connectors Characteristic Loadings Data brochure 03/4

PrimeCad v4.7.346

Akarana timbers
Ph: 03 3477 818

Site Address :
New Home
Lot 44 Lemonwood Estate,
Rolleston

Sheet Title :
Buildable Design
Truss Fixings & Roof Bracing

Date : Sep 22,2023 | Drawn : Lam Dang
Scale : 1: 100 | System : MiTek 20/20

Job Details:

Roof Pitch	: 25.00deg	Truss Centres	: 900mm
Roof Material	: Metal Tiles	Roof Live Load	: 0.250kPa
Ceiling Material	: Gib Board 13mm	Floor Live Load	:
Wind Zone	: High	Wind Speed	: 44m/s
Roof Snow Load	: 0.441kPa	Overhang	: 600mm

MiTek™

Job Title :
23-04049
Sheet :
4
Revision Number :

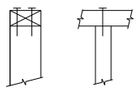
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Stud to top plate fixing details

Type A is minimum fixing required unless specified otherwise

FIXING TYPE A
0.7kN

2/90x3.33 plain steel wire nails driven vertically into stud.

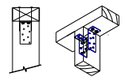


FIXING TYPE B
4.7kN

2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.

AND

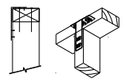
Plus 2x LUMBERLOK CPC40



Recommended for internal wall options to avoid lining issues.

OR

Plus LUMBERLOK Stud Strap (One face only)



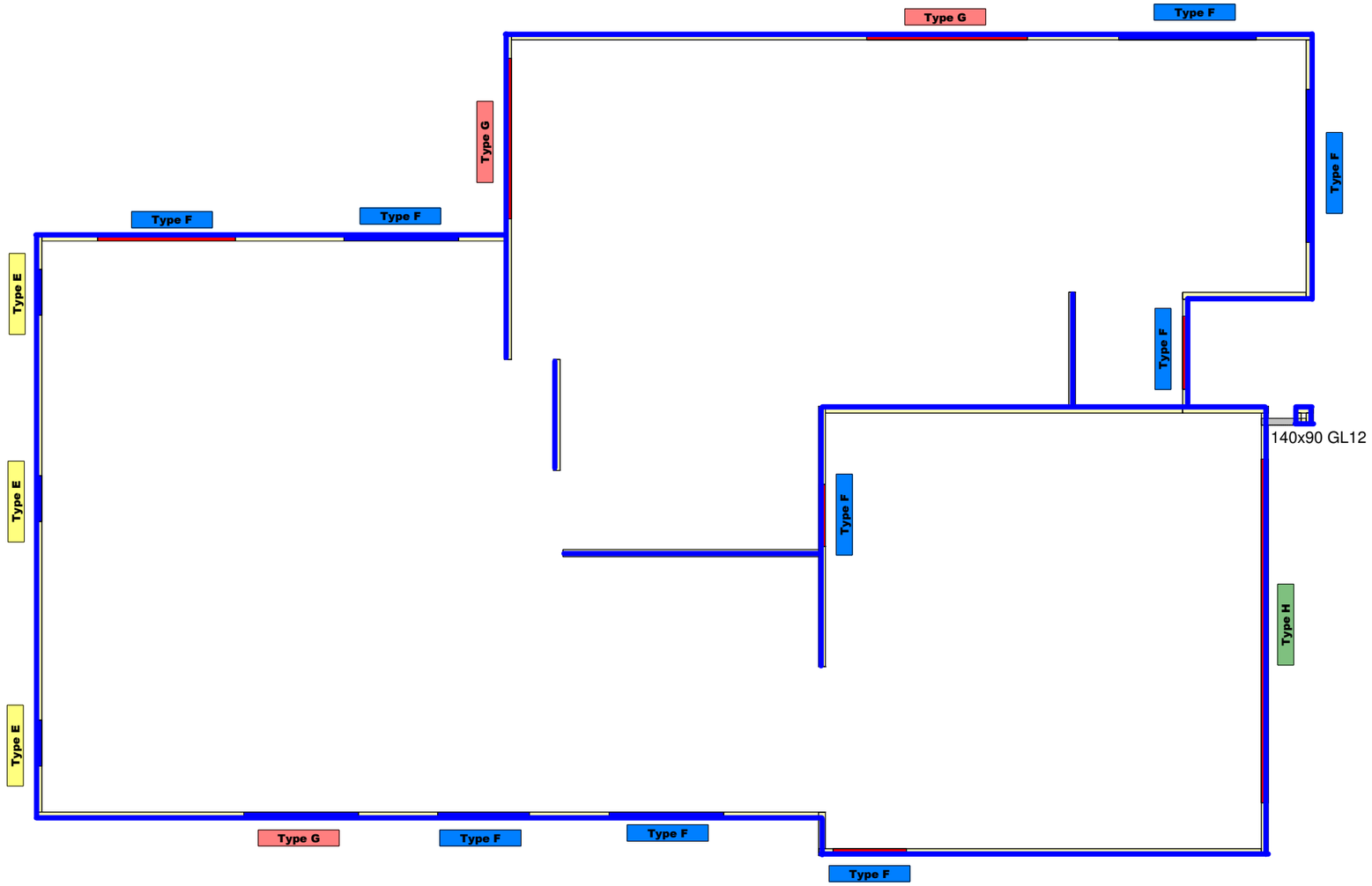
Lintel Fixing Details

TYPE E 1.4kN	TYPE F 4.0kN
TYPE G 7.5kN	TYPE H 13.5kN

NOTES:

Refer to:
LUMBERLOK Wall Fixing Chart - Stud to Top Plate Fixing Schedule 09/2011

(Alternative to NZS3604:2011 Table 8.18)



PrimeCad v4.7.346

Akarana timbers
Ph: 03 3477 818

Site Address :
New Home
Lot 44 Lemonwood Estate,
Rolleston

Sheet Title :
Buildable Design
Top Plate/Lintel Fixings

Date : Sep 22,2023 | Drawn : Lam Dang
Scale : 1: 100 | System : MiTek 20/20

Job Details:

Roof Pitch	: 25.00deg	Truss Centres	: 900mm
Roof Material	: Metal Tiles	Roof Live Load	: 0.250kPa
Ceiling Material	: Gib Board 13mm	Floor Live Load	:
Wind Zone	: High	Wind Speed	: 44m/s
Roof Snow Load	: 0.441kPa	Overhang	: 600mm

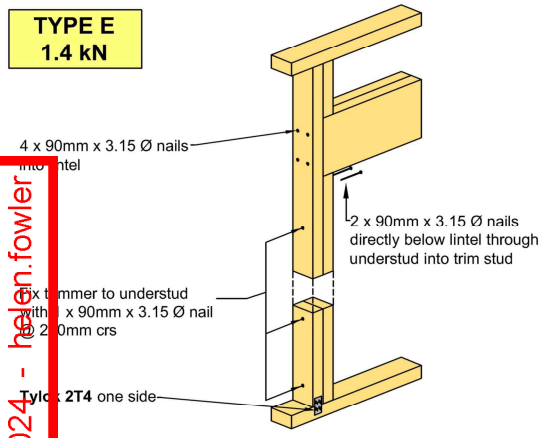
MiTek™

Job Title : 23-04049
Sheet : 5
Revision Number :

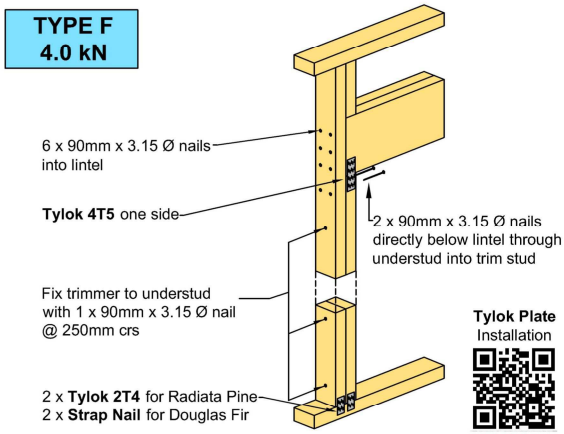
LUMBERLOK® LINTEL FIXING OPTIONS

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TYPE E
1.4 kN



TYPE F
4.0 kN



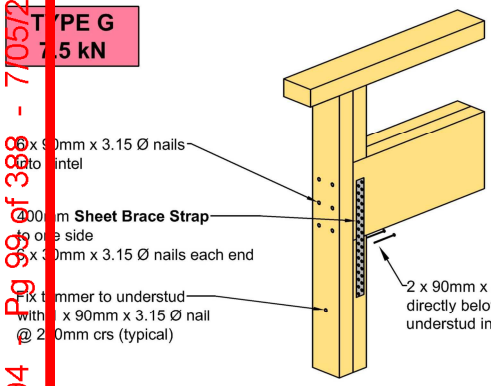
Tylok Plate Installation

NOTES:

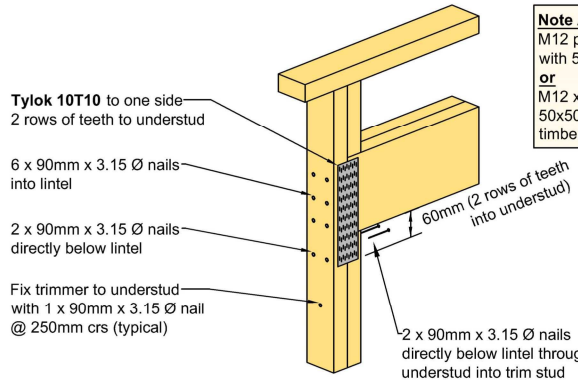
- For fixing of jack studs to lintel and top plate, refer to **Stud to Top Plate Fixing Schedule**
- **Stud numbers indicative only. Refer to Table 8.5 NZS 3604:2011**

Refer to:
LUMBERLOK Lintel Fixing Schedule 10/2011, MiTek Structural Fixings **On-Site Guide** for Building Code Compliance (Alternative to Table 8.14 & Figure 8.12 NZS 3604:2011)

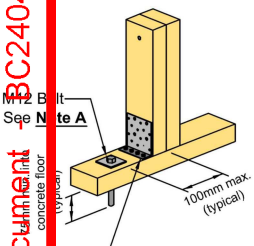
TYPE G
7.5 kN



OR

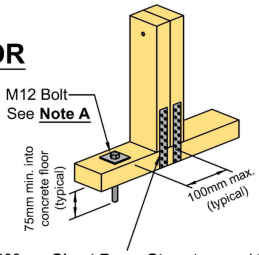


Note A:
M12 proprietary concrete fixing bolt with 50x50x3mm square washer
or
M12 x 150mm coach screw with 50x50x3mm square washer into timber joist/bearer



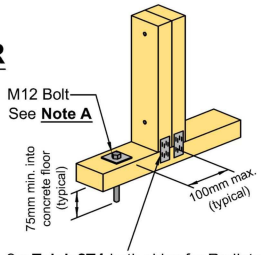
2 x 6kN Stud Anchor (**CPC80**)

OR



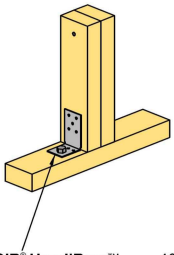
2 x 200mm **Sheet Brace Strap** to one side. Each Strap to have 3 x 30mm x 3.15 Ø nails into stud & 3 x 30mm x 3.15 Ø nails into bottom plate

OR



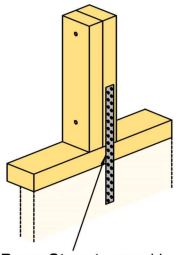
2 x **Tylok 2T4** both sides for Radiata Pine
2 x **Strap Nail** both sides for Douglas Fir

OR



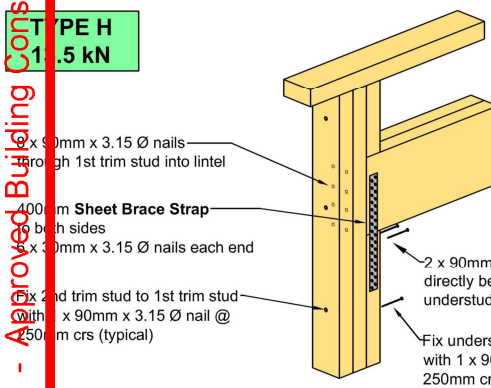
GIB® HandiBrac™

OR

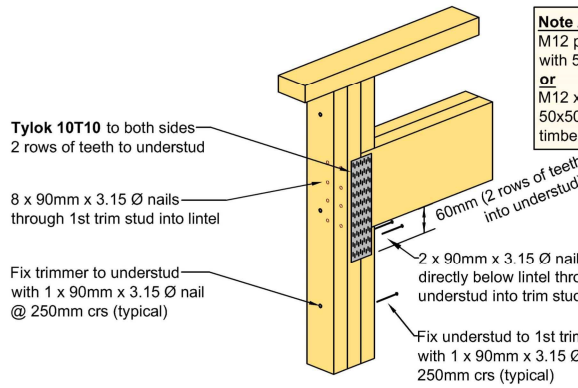


400mm **Sheet Brace Strap** to one side.
6 x 30mm x 3.15 Ø nails into stud.
3 x 30mm x 3.15 Ø nails into bottom plate.
6 x 30mm x 3.15 Ø nails into timber joist/bearer

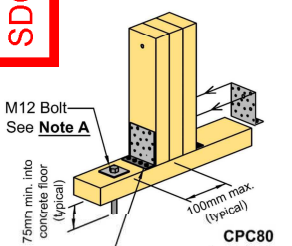
TYPE H
11.5 kN



OR



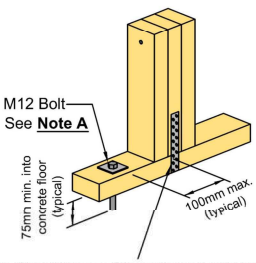
Note A:
M12 proprietary concrete fixing bolt with 50x50x3mm square washer
or
M12 x 150mm coach screw with 50x50x3mm square washer into timber joist/bearer



2 x 6kN Stud Anchor (**CPC80**)

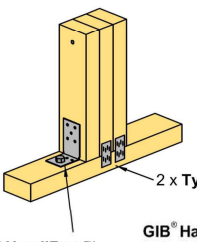
CPC80 Installation

OR



400mm **Sheet Brace Strap** wrap around bottom plate and up the other side.
6 x 30mm x 3.15 Ø nails into each side of stud.
3 x 30mm x 3.15 Ø nails into each side of bottom plate.

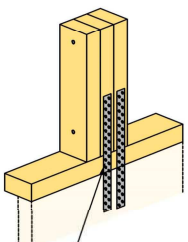
OR



GIB® HandiBrac™

GIB® HandiBrac™ Installation

OR



2 x 400mm **Sheet Brace Strap** to one side.
6 x 30mm x 3.15 Ø nails into stud.
3 x 30mm x 3.15 Ø nails into bottom plate.
6 x 30mm x 3.15 Ø nails into timber joist/bearer

Akarana Timbers Christchurch

Job: 23-04049 Client: Oakridge Homes Site: New Home
Phone: Lot 44 Lemonwood Estate,
Description: Rolleston
Building Consent No.: Phone:
MiTek 20/20 Engineering 4.7.346.0 MiTek New Zealand Limited Printed: 18:15:20 22 Sep 2023

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
SG02	1	5880	M	8.088	6.032
TG01	1	7650	B	8.679	6.444
			G	8.679	6.444
TG02	1	7470	A	9.229	7.096
			P	12.069	8.709

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

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AkaranaTimber

Job No: 23-04049
Job Name: New Home

Client: Oakridge Homes
Building Consent No:

Site: Lot 44 Lemonwood Estate, Rollestc

PRODUCER STATEMENT
MiTek Beam Program v1.07 April 2012

Certification of MiTek Beam Program v1.07 April 2012

The MiTek Beam Program v1.07 April 2012 has been developed by MiTek New Zealand Ltd for the design of these beams: Timber, Glulam, GANGLAM and GANG-NAIL FLITCH BEAMS. The beam designs calculated by this program 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 to satisfy the requirements of Clause B1 of the Building Code. We believe on reasonable grounds that these beams for the proposed building, if constructed in accordance with the drawings, specifications and other documents provided will comply with the relevant provisions of the NZ Building Code. This is subject to all proprietary products meeting their performance specification requirements; the provision of adequate bracing and fixings; and the correct input of design data carried out by suitably trained personnel.

Summary of MiTek Beam Program v1.07 February 2009 Data and Output

Roof		**Wind**		**Wall**	
Weight:	light + ceiling	Area/Speed:	high (44.0 m/s)	Type:	Low weight - 0.57kPa
Dead Load:	0.45 kPa				
Live Load:	0.25 kPa	**Snow**		**Floor**	
		Area:	0.441 kPa	Live Load:	1.5 kPa

Beam List

Opening Label	Beam Material	Beam Size	Beam Length	Design Status	Opening Label	Beam Material	Beam Size	Beam Length	Design Status
Garage Lintel	GL12 GLULAM	290x90	4500	OKAY					
B1	GL12 GLULAM	190x90	1500	OKAY					

GANGLAM plating details indicated with RD (regular duty plating), HD (heavy duty plating) and SHD (super heavy duty plating)

The design input has been carried out by:

Signed:

Date: 22/09/2023

Name of Computer Operator: Lam Dang

Qualifications and Title: Detailer

Company: AkaranaTimber

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MiTek Beam v1.07 February 2009

Date: Friday, 22 September 2023
Job Number 23-04049
Job Name New Home
Client Oakridge Homes
Calculated By Lam Dang

Roof Weight light + ceiling
Wind Zone high (44.0 m/s)
Snow Load 0.441 kPa

Beam Details

Beam Label	Garage Lintel	B1
Beam Span (mm)	4500	1500
Roof Span "S" (mm)	2017	7650
Overhang (mm)	600	600
Wall Type	NA	NA
Wall Height (mm)		
Floor Live load	NA	NA
Floor Span "F" (mm)		

MiTek Bearing Reactions

Not in use in this version

Point Load 1		
Girder Span (mm)		7650
Setback (mm)		2902
Location (mm)		172
Point Load 2		
Girder Span (mm)		
Setback (mm)		
Location (mm)		
Point Load 3		
Girder Span (mm)		
Setback (mm)		
Location (mm)		
Beam Status	OKAY	OKAY
Beam Material	GL12 GLULAM	GL12 GLULAM
Beam Size	290x90	190x90
Beam Deflection	3.67mm	0.65mm
Beam Length	4500	1500

APPENDIX 05 – BRACING CALCULATION

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GIB EzyBrace® Bracing Software

Demand Calculation Sheet

Job Details

Name:	Wendelborn Property Ltd
Street and Number:	5 Nirmal Way, Lemonwood Estate
Lot and DP Number:	Lot 44 DP 590652
City/Town/District:	Rolleston
Designer:	MG
Company:	Archiplus Ltd
Date:	Monday, 12 February 2024

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)	2.87
Building Height to Apex (m)	5.23
Ground to Lower Floor (m)	0.23
Average Stud Height (m)	2.42
Building Length (m)	16.86
Building Width (m)	10.90
Building Plan Area (m²)	157.11

Building Location

Wind Zone = High

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	**608**	**1021**

Bracing Units required for Earthquake

	Along & Across
Single Level	**605**

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GIB EzyBrace® Bracing Software

Single Level Along Resistance Sheet

Job Name: Wendelborn Property Ltd

									Wind	EQ
									Demand	
									608	605
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1083 178%	1000 165%
A	1	0.60		2.42	GS1-N	GIB®	34	35		
	2	1.10		2.42	GS1-N	GIB®	73	65		
	3	2.40		2.42	GS1-N	GIB®	164	143		
	External Length = 10.72								271 OK	243 OK
B	1	1.90		2.42	GS1-N	GIB®	130	113		
	2	0.60		2.42	GS1-N	GIB®	34	35		
	3	0.60		2.42	GS1-N	GIB®	34	35		
	4	0.70		2.42	GS1-N	GIB®	41	41		
	5	0.70		2.42	GS1-N	GIB®	41	41		
	External Length = 8.08								280 OK	264 OK
C	1	1.80		2.42	GS1-N	GIB®	123	107		
	2	1.20		2.42	GS1-N	GIB®	82	71		
	3	0.40		2.42	GS1-N	GIB®	21	23		
	External Length = 1.19								226 OK	202 OK
D	1	2.40		2.42	GS1-N	GIB®	164	143		
	2	0.50		2.42	BL1-H	GIB®	47	50		
	3	0.60		2.42	GS1-N	GIB®	34	35		
	4	0.60		2.42	GS1-N	GIB®	34	35		
	5	0.50		2.42	GS1-N	GIB®	27	29		
	External Length = 16.27								306 OK	291 OK

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Single Level Across Resistance Sheet

Job Name: Wendelborn Property Ltd

									Wind	EQ
									Demand	
									1021	605
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1288 126%	1162 192%
M	1	0.60		2.42	BL1-H	GIB®	59	60		
	2	0.60		2.42	BL1-H	GIB®	59	60		
	3	0.50		2.42	BL1-H	GIB®	47	50		
	4	0.50		2.42	BLP-H	GIB®	63	69		
	External Length = 10.90								227 OK	239 OK
N	1	1.20		2.42	GS2-N	GIB®	117	102		
									117 OK	102 OK
O	1	1.40		2.42	GS1-N	GIB®	96	83		
	2	1.80		2.42	GS1-N	GIB®	123	107		
	External Length = 0.64								219 OK	190 OK
P	1	1.70		2.42	GS1-N	GIB®	116	101		
	2	1.80		2.42	GS1-N	GIB®	123	107		
	External Length = 2.79								240 OK	208 OK
Q	1	1.80		2.42	GS1-N	GIB®	123	107		
	2	1.80		2.42	GS1-N	GIB®	123	107		
									246 OK	214 OK
R	1	2.10		2.42	GS1-N	GIB®	144	125		
	2	1.40		2.42	GS1-N	GIB®	96	83		
	External Length = 7.79								240 OK	208 OK

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APPENDIX 06 – GIB EZYBRACE

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GIB EzyBrace® Systems — August 2016

Winstone Wallboards Ltd accepts no liability if GIB EzyBrace® Systems are not designed and installed in strict accordance with instructions contained in this publication.

USE ONLY THE CURRENT SPECIFICATION

This publication may be superseded by a new publication at any time. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. Check for the current publication at gib.co.nz/library before using this publication. If you are unsure whether this is the current publication, call the GIB® Helpline on 0800 100 442.

GIB EzyBrace® 2011 software and specification literature remains valid until futher notice.

PATENTS

GIBFix® Framing System and GIB EzyBrace® Systems, including componentry and design method, have patents pending (NZ Patent Number 596691, NZ Patent 709159 pending) and design and other IP rights reserved.

Beware of substitution

The performance of GIB® Systems are very sensitive to design detailing and construction practices. All GIB® Systems have been developed specifically for New Zealand conditions and independently tested or assessed to ensure the required level of performance. It is important to use only GIB® branded components where specified and to closely follow the specified design details and construction practices, to be confident that the required level of performance and quality is achieved on site.

For further information call our GIB® Helpline on 0800 100 442.

GIB EzyBrace® Systems have been designed and tested using only the products specified. When additional GIB® plasterboard properties are required the table below provides acceptable alternative options.

	Acceptable alternative GIB® plasterboards								
Specified GIB® plasterboard	GIB® Standard	GIB Ultraline®	GIB Braceline/ Noiseline®	GIB Aqualine®	GIB Toughline®	GIB Fyreline®			
						10mm	13mm	16mm	19mm
GIB® Standard		OK	OK	OK	OK	Note 1 and 3			
GIB Braceline®	X	X		Note 2	OK	X	Notes 1, 2 and 3		

Note 1 *The fastener type and length must be as required for the relevant FRR system using the perimeter fixing pattern illustrated for the relevant bracing specification.*

Note 2 *The element must be 900mm or longer. Decrease perimeter fastener centres to 100mm. The bracing corner fastening pattern, as illustrated for the relevant specification applies to all four corners of the element. Panel hold-down fixings are required.*

Note 3 *Specify traditional wall framing layout (see figure 1) where a Fire Resistance Rating (FRR) is required.*

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Scope of use

This document is a guide to wall bracing of light timber frame (LTF) buildings constructed in accordance with NZS3604:2011 Timber Framed Buildings and presents a simple and efficient method for calculating and incorporating bracing resistance. This information draws on recent experiences from seismic activity in New Zealand and seeks to minimise earthquake damage to plasterboard linings in LTF buildings.

This document outlines the main principles of bracing design and construction using GIB® plasterboard products and systems. Further detailed information can be found in the GIB® Bracing Supplement by visiting gib.co.nz/library. This 'live' on-line document is updated continuously in response to market feedback and Winstone Wallboards' development initiatives.

Finish quality — framing and substrates

Home owners are increasingly demanding a high quality of interior finish. Finish quality is heavily influenced by the substrate to which linings are fixed. Detailed information on 'Levels of Finish' is given in AS/NZS 2589 and the latest version of the GIB® Site Guide.

New GIBFix® Framing System

With increased NZ Building Code requirements and growing customer demand for thermal efficiency and high quality interior finishes, traditional framing practices present problems such as multiple framing members at wall intersections creating thermal 'bridges' and cavities where insulation cannot be installed effectively.

Figure 1 shows a traditional wall framing layout. Figure 2 shows the alternative GIBFix® Framing System layout.

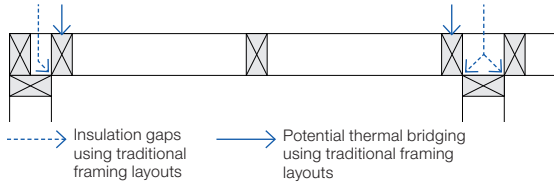
Multiple timber framing members also take longer to dry resulting in an increased risk of fastener pops and blemishes resulting from timber frame movement.

The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

The GIBFix® Framing System can be used in conjunction with GIB EzyBrace® Systems.

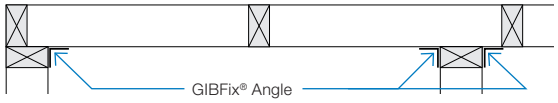
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

FIGURE 1: TRADITIONAL WALL FRAMING LAYOUT



GFS004

FIGURE 2: GIBFIX® FRAMING SYSTEM (ALTERNATIVE LAYOUT)



GFS005

NEW GS2-NOM Bracing Element

The new GS2-NOM bracing element allows most homes to be braced with a single lining type and less fixings so that a high quality finish is maintained throughout.

GS2-NOM permits the contribution of 'nominally fixed' internal walls. Higher performance elements are commonly specified on external walls and where limited wall area is available or adjacent to significant openings.

Winstone Wallboards recommends the use of the GIBFix® Framing System in conjunction with GS2-NOM elements. Key benefits of this approach include:

- Reduced potential for fastener pop and joint cracking of plasterboard linings.
- Enhanced thermal performance.
- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute bracing resistance.
- Potentially reduces the amount of fasteners[1].
- Encourages more even bracing distribution throughout the building.

1. Actual savings dependent on building and bracing design.

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Compliance with the NZ Building Code

NZBC CLAUSE B1 — STRUCTURE

The design and material specification for steel and timber framing used in conjunction with this literature must be in accordance with the performance requirements of NZBC Clause B1. GIB EzyBrace® Systems comply with the requirements of NZS 3604:2011, when designed and installed in accordance with this publication and relevant technical literature. NZS 3604:2011 is an acceptable solution to NZBC Clause B1.

NZBC CLAUSE B2 — DURABILITY

Under normal conditions of dry internal use GIB EzyBrace® Systems have a service life in excess of 50 years and satisfy the requirements of NZBC Clause B2. When in conditions of dry internal use, the components specified in this literature satisfy the requirements of NZBC Clause B2.

GIB® EzyBrace® Systems must not be specified in areas where 15 year durability applies and where linings are subject to direct water pressure, e.g. shower cubicle or shower over bath situations.

NZBC CLAUSE F2 — HAZARDOUS BUILDING MATERIALS

Under normal conditions of use, during handling, installation or serviceable life, the products detailed in GIB EzyBrace® Systems do not constitute a health hazard and meet the provisions of the NZBC Clause F2.

NZBC CLAUSE H1 — ENERGY EFFICIENCY

Buildings must be constructed to achieve an adequate degree of energy efficiency and the building envelope must provide adequate thermal resistance. The required thermal resistance (R-value) of timber framed external walls depends on climate zone but is commonly in the range from R 1.9 to R 2.0.

CAD design details

Where applicable drawings related to GIB EzyBrace® Systems have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box. CAD design details can be found at gib.co.nz/library.

Appraisal

GIB EzyBrace® Systems 2016 have been appraised by the Building Research Association of New Zealand (BRANZ), Appraisal No. 928 (2016) GIB EzyBrace® Systems, 2016.

It is of prime importance to comply with the details of design, construction and workmanship in this document.

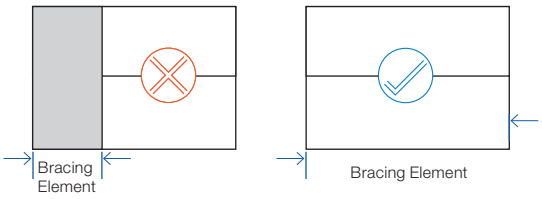
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Bracing resistance

WALL BRACING LAYOUT

When designing the bracing layout, carefully consider the final finished appearance and utilise full wall lengths where possible, avoiding unnecessary fastenings in the centre of a clear wall. Using the available wall length provides additional bracing and achieves improved aesthetics.

FIGURE 3: WALL BRACING LAYOUT



BRACING DISTRIBUTION

Distribute bracing by drawing a grid pattern of bracing lines along and across the building. Bracing lines must coincide as much as possible with the wall bracing elements. Pairs of elements may be counted on a single line provided they are no more than 2 metres apart and parallel. See figure 4.

Locate bracing evenly throughout the building and as close as practical to corners of external walls.

Space bracing lines no more than:

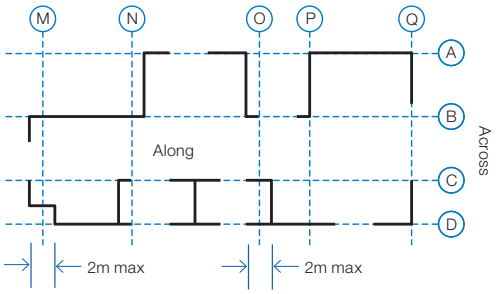
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

The construction of ceiling diaphragms is described in detail on p.18–20.

NZS3604:2011 requires that no bracing line shall have a capacity less than the greater of:

- 100 Bracing Units (BUs), or
- 15 x the external wall length (BUs) for bracing lines coinciding with external walls, or
- 50% of the total demand (D) divided by the number of lines (n) in the direction being considered (BUs).

FIGURE 4: BRACING GRID LAYOUT



The NZS3604 ‘rules’ are merely minimum guidelines and compliance with them does not in itself ensure even distribution. The designer is responsible for checking distribution. Poor distribution can cause torsional effects and localised or more significant damage in an earthquake event.

GIB EZYBRACE® SYSTEMS

The GIB EzyBrace® Specification Numbering System (and sub-components thereof) is protected by copyright and makes specification and identification of GIB EzyBrace® Systems transparent.

- 'GS' stands for GIB® Standard.
- 'BL' for GIB Braceline®.
- 'P' for plywood.
- '1' and '2' for linings one or both sides.
- ‘N’ stands for 'no specific panel hold-down fixings'.
- 'H' stands for 'specific panel hold-down fixing' required.
- 'NOM' stands for 'nominal plasterboard fixing'. This refers to the standard fixing method used to install plasterboard as shown in the current GIB® Site Guide.

Where specific hold-down fixings are specified, refer to p.15-16. GIB HandiBrac® is fully contained within the framing cavity and does not interfere with lining installation and quality of finish.

Where no specific hold-down fixings are required, the minimum NZS3604:2011 bottom plate fixings apply.

Full bracing element construction details are provided in this technical literature.

Further general design and construction information can also be found in our GIB® Bracing Supplement by visiting gib.co.nz/library.

Specifying GIB EzyBrace® elements (minimum wall length 400mm)	
Inside lining external walls.	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required. If the other side of the frame is lined with plywood consider GSP-H or BLP-H elements or use alternative proprietary bracing systems.
Internal walls (only one side available for bracing).	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required.
Internal walls (both sides available for bracing).	Nominate available length of wall as GS2-NOM elements. Change to GS1-N if higher ratings are required. Change to GS2-N if higher ratings are required. Change to BLG-H for even higher ratings. Consider GSP-H or BLP-H if the opposite side is lined with plywood.

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GIB® plasterboard linings

When fixing part sheets of GIB® plasterboard, a minimum sheet width of 300mm applies for bracing elements. Horizontal fixing is recommended. If fixing vertically, full height sheets shall be used where possible. Where sheet end butt joints are unavoidable they must be formed over nogs or over the studs and fastened at 200mm centres. Alternatively, and preferably, sheet end butt joints may be back-blocked.

When a GIB® Bracing element has been designated for a section of wall, BU ratings cannot be increased by incorporating additional proprietary bracing elements within that same section of wall.

LIMITATIONS

- GIB® plasterboard must be stacked flat and protected from the weather.
- GIB® plasterboard must be handled as a finishing material.
- GIB® plasterboard in use must not be exposed to liquid water or be installed in situations where extended exposure to humidities above 90% RH can reasonably be expected.
- GIB EzyBrace® Systems must not be used in showers or behind baths.
- It is highly recommended not to install GIB® plasterboard in any situation where external claddings are not in place or the property is not adequately protected from the elements.
- If GIB® plasterboard is installed under these conditions, the risk of surface defects such as joint peaking or cracking is greatly increased.

GIB EzyBrace® Systems in water-splash areas

When GIB® plasterboard is installed in locations likely to be frequently exposed to liquid water it must have an impervious finish. Examples are adhesive fixed acrylic shower linings or ceramic tiles over an approved waterproof membrane over GIB Aqualine®. The NZBC requires 15 years durability in these situations. Bracing elements are required to have a durability of 50 years. Bracing elements are not to be located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members. Otherwise GIB EzyBrace® Systems can be used in water-splash areas as defined by NZBC Clause E3, provided these are maintained impervious for the life of the building.

For futher design details refer to the current GIB Aqualine® Wet Area Systems literature.

Renovation

When relining walls during the process of renovation, ensure that bracing elements are reinstated (check the building plans).

Openings in bracing elements

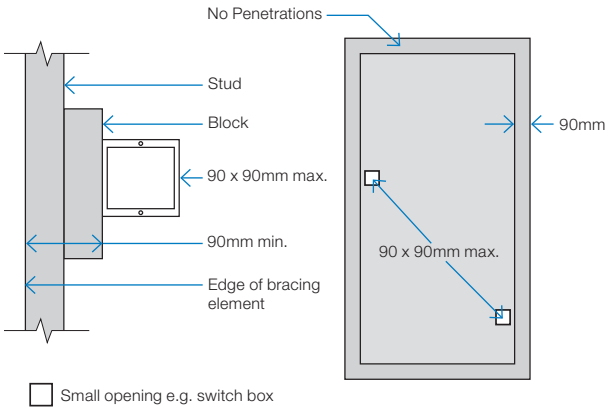
SMALL OPENINGS

Small openings (e.g. power outlets) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the braced element. A block may need to be provided alongside the perimeter stud as shown below.

LARGE OPENINGS

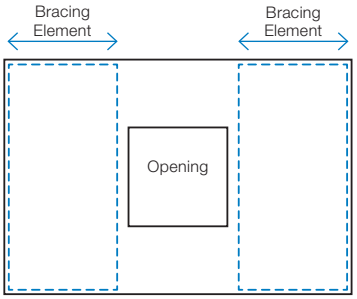
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GEB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS



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Timber framing

General framing requirements such as grade, spacings and installation shall comply with the provisions of NZS 3604:2011. To achieve the published bracing performance the minimum actual framing dimensions are 90 x 45mm for external walls and 70 x 45mm for internal walls.

As a minimum the use of Kiln Dried Stress Graded timber for all wall, roof and mid-floor framing members is recommended.

GIBFix® Framing System (alternative layout)

Practices recommended as part of the GIBFix® Framing System aim to increase timber framing efficiencies, reduce reliance on unnecessary framing at wall junctions and minimise surface imperfections that commonly arise from constructing plasterboard junctions over multiple timber members. GIBFix® Angles fixed to a single timber framing member are introduced to tie together plasterboard junctions, improving seismic resilience and decrease the risk of future defects due to timber movement. The GIBFix® Framing System can be used in conjunction with the GIB EzyBrace® System.

Note: GIBFix® Angles and 32mm x 7g GIB® Grabber® Dual Thread Screws may also be used in traditional wall framing layouts and in GIB EzyBrace® Systems.

When the GIBFix® Framing System is used a minimum of 2 equally spaced nogs for walls between 2.4m and 3m in height are required at corners and wall junctions.

When used in GIB EzyBrace® systems GIBFix® Angles must run from top to bottom on all applicable studs. If 2 GIBFix® Angles are required on a stud they must be overlapped by a minimum of 300mm with 2/32mm 7g GIB® Grabber® Dual Thread Screws penetrating through both GIBFix® Angles.

For full specification details refer to GIBFix® Framing System literature available at gib.co.nz/gibfix.

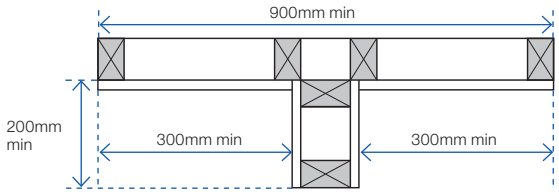
Guidelines for intersection walls

GIB® Bracing Elements may have intersecting walls with a minimum length of 200mm. Fasteners are required around the perimeter of the bracing element. Vertical joints at T-junctions shall be fixed and jointed as specified for intermediate sheet joints. The bracing element length must be no less than 900mm.

Where a Wall Bracing Element is interrupted by a T-junction the element is deemed to be continuous for the whole length (900mm minimum in the example illustrated).

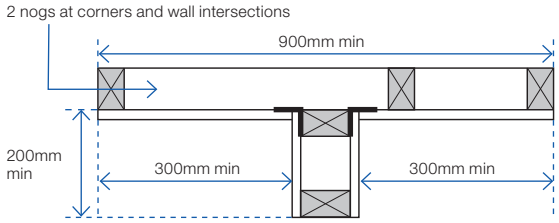
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



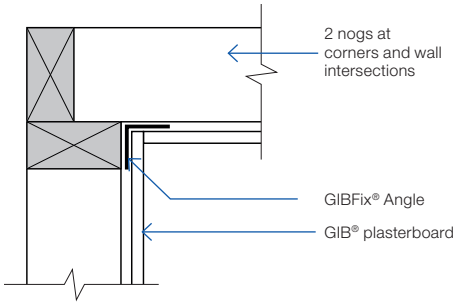
GEB002

FIGURE 13: WALL INTERSECTION (GIBFIX® FRAMING SYSTEM)



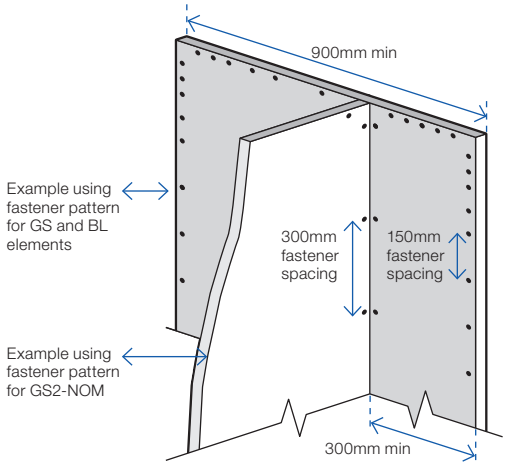
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFIX® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

Min 32mm x 6g GIB® Grabber® High Thread or 32mm x 7g GIB® Grabber® Dual Thread Screws @ 300mm ctrs each side.

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Top plate connections

For top plate connections refer to NZS3604:2011 section 8.7.3.

Parapets and gable end walls

Bracing elements must be fixed from top plate to bottom plate. Fixing to a row of nogs is not acceptable unless either:

A continuous member such as an ex 90 x 45mm ribbon plate is fixed across the studs just above a row of nogs at the ceiling line, as shown in figure 16.

or

GIBFix® Angle as shown in figure 17. The angle is fixed to a row of nogs with 30 x 2.5mm galv flat head nails or 32mm x 7g GIB® Grabber® Dual Thread Screws at 300mm centres.

Bottom plate fixing

TIMBER FLOOR

For elements with an 'N' specification use 2/100 x 3.75mm hand or 3/90 x 3.15mm power-driven nails at 600mm centres.

In addition, for elements with an 'H' specification, use GIB HandiBrac® panel hold-down fixings at each end of the bracing element, see p.16.

CONCRETE FLOOR — EXTERNAL WALL BRACING ELEMENTS

For bracing elements with an 'N' specification fix external wall plates in accordance with NZS 3604:2011.

Use GIB HandiBrac® panel hold-down fixings at each end of bracing elements with an 'H' specification and minimum intermediate fixings as required by NZS 3604:2011.

CONCRETE FLOOR — INTERNAL WALL BRACING ELEMENTS

For bracing elements with an 'N' specification fix plates in accordance with NZS 3604:2011 or use 75 x 3.8mm shot-fired fasteners with 16mm discs spaced at 150 and 300mm from end-studs and 600mm centres thereafter.

For bracing elements with an 'H' specification use GIB HandiBrac® panel hold-down fixings at each end of the element and minimum intermediate fixings as required by NZS 3604:2011.

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

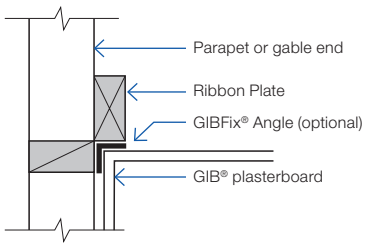
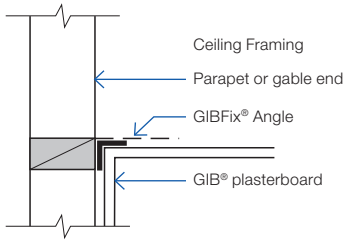


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

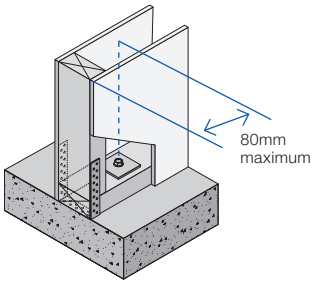
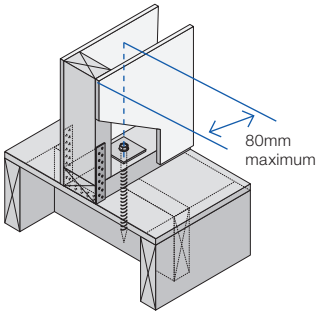
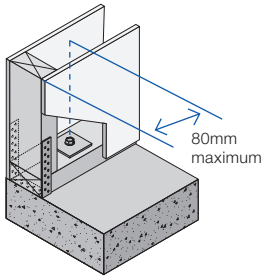
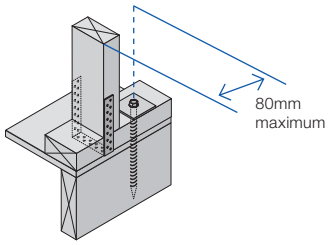
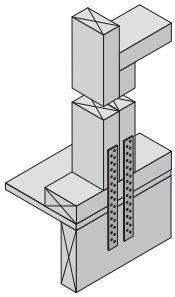
BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

Brace type	Concrete slabs		Timber floors
	External wall	Internal wall	External and Internal walls
GS1-N	As per NZS 3604:2011. No specific additional fastening required.	As per NZS 3604:2011. Alternatively use 75 x 3.8mm shot-fired fasteners with 16mm discs, 150mm and 300mm from each end of the bracing element and at 600mm thereafter.	Pairs of 100 x 3.75mm flat head hand driven nails or 3/90 x 3.15mm power driven nails at 600mm centres in accordance with NZS 3604:2011.
GS2-N	Not applicable.		
GS2-NOM			
GSP-H BL1-H BLP-H	Intermediate fastenings to comply with NZS 3604:2011 In addition: GIB HandiBrac® fixings or metal wrap-around strap fixings and bolt as illustrated on p.15 and 16.		Pairs of 100 x 3.75mm flat head hand driven nails or 3/90 x 3.15mm power driven nails at 600mm centres in accordance with NZS 3604:2011. In addition: GIB HandiBrac® fixings or metal wrap-around strap fixings and bolt as illustrated on p.15 and 16.
BLG-H	Not applicable	As for GSP-H, BL1-H, BLP-H on concrete slab as illustrated on p.15 and 16.	

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Bracing strap installation

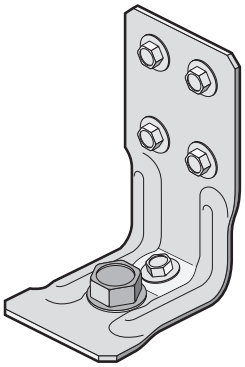
Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard and positioned in such a way that the corner fastenings of the bracing element are not affected by it. Keeping the strap to 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. 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

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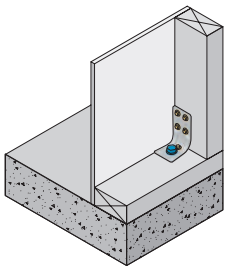
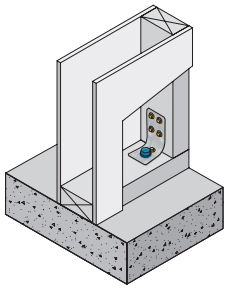
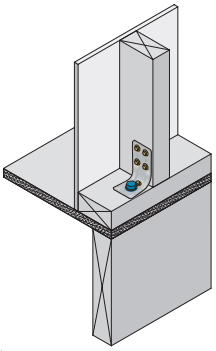
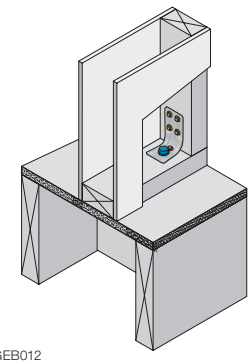
GIB HandiBrac® installation



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	 GEB010	 GEB011	 GEB012
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.	Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.	Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.	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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GIB HandiBrac® placement with GIBFix® Framing System for concrete floors

Figure 18 shows the preferred positioning of the GIB HandiBrac® panel hold-down brackets within the GIBFix® Framing System layout and where they are required by bracing systems with an 'H' in the specification code.

Note that, in corners and at wall junctions, a single GIB HandiBrac® can serve 'H' type bracing elements in both directions, but additional intermediate concrete anchors may need to be installed to meet the minimum requirements of NZS 3604:2011 for bottom plate fixing.

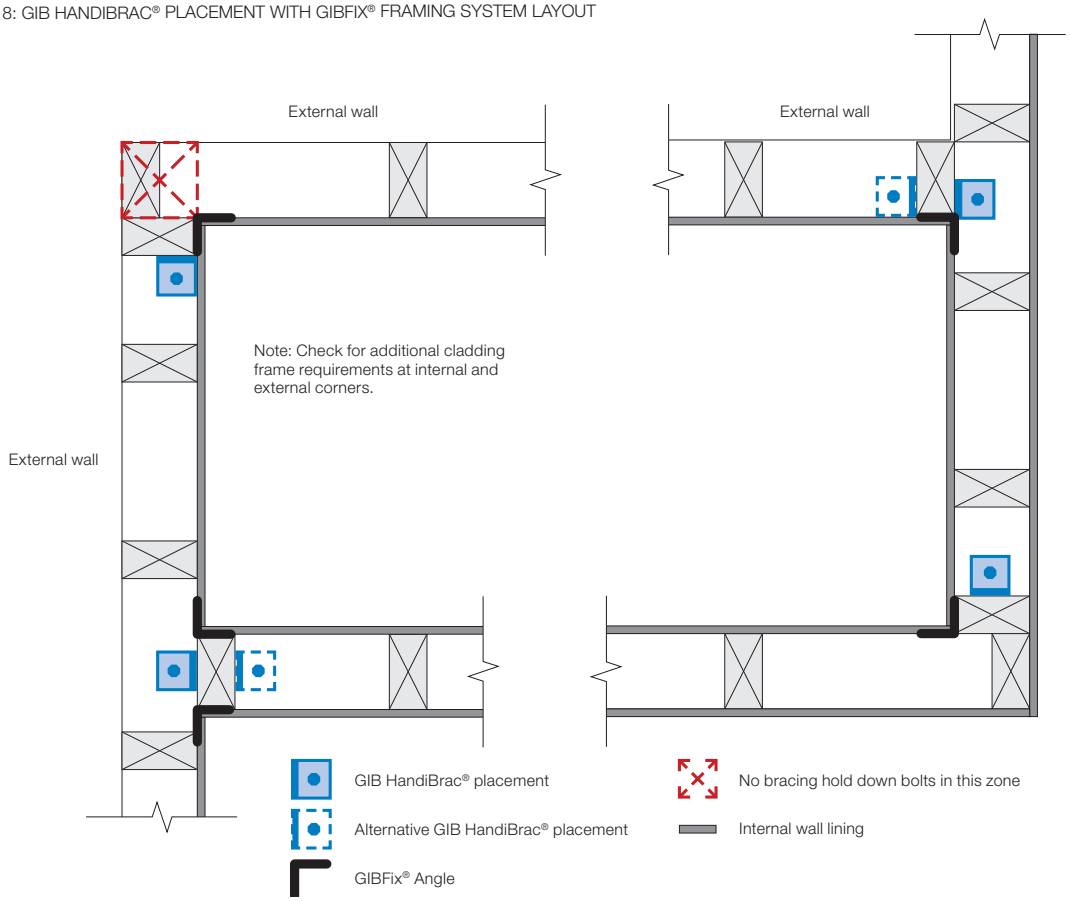
The GIB HandiBrac® is fixed to the stud which has the GIBFix® Angle.

For bracing elements with sheet material both sides of the wall connect corner studs using 8/90mm gun nails as shown in figure 19.

TIMBER FLOORS

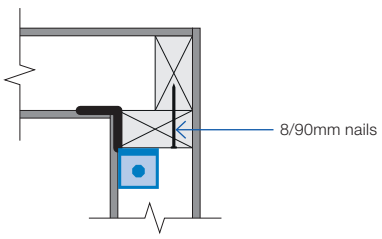
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

FIGURE 18: GIB HANDIBRAC® PLACEMENT WITH GIBFIX® FRAMING SYSTEM LAYOUT



GEB013

FIGURE 19: STUD CONNECTION FOR 'H' TYPE BRACING ELEMENTS WITH SHEET MATERIAL BOTH SIDES



GEB014

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Length of GIB EzyBrace® elements ('N' Type)

The length of GIB EzyBrace® elements with an 'N' extension (requiring standard NZS3604:2011 plate connections) can be taken as the full frame length measured from the outside of the end-stud to the opening face as illustrated in figures 29-32.

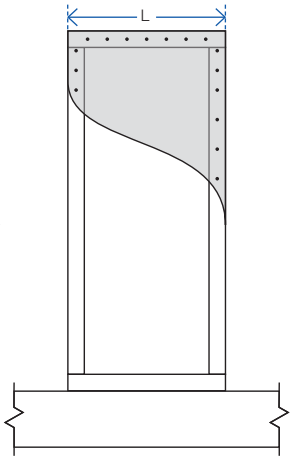
'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

The dimension 'L' shall not be less than 400mm.

Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening.

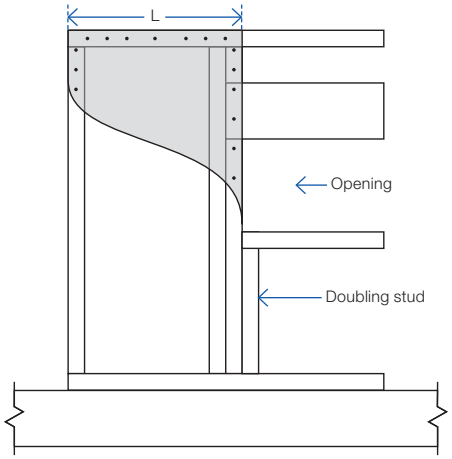
Fastener spacings and diagram scales shown in Figures 29–32 are indicative only. Refer to p.23–30 for construction details.

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



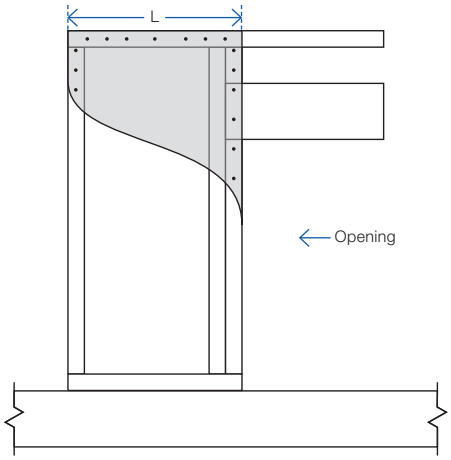
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



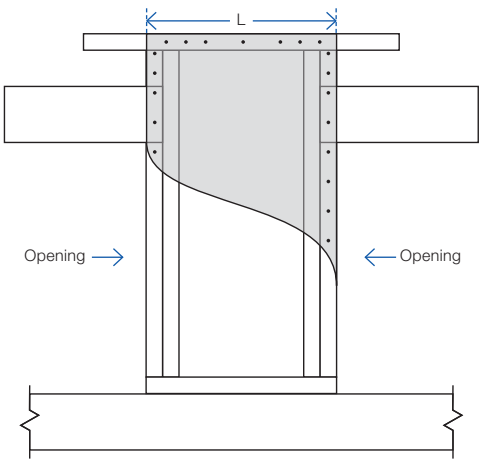
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

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Length of GIB EzyBrace® elements ('H' Type)

GIB EzyBrace® elements with an 'H' extension (requiring special panel hold-down fixings) can be used when the dimension 'L' as illustrated in figures 33–36 is 400mm or more.

'H' type GIB EzyBrace® elements are identified by GIB® specification numbers GSP-H, BL1-H, BLG-H and BLP-H.

The length of an 'H' type element is not only determined by the sheet material, but also by the placement of the hold-down fixings.

Hold-down fixings cannot be placed closer together than what is shown for the standard panel in figure 33.

Hold-down fixings can be placed under windows provided sill trimming studs beneath the opening are connected to the bracing element using 8/90mm gun nails, as illustrated in figure 34.

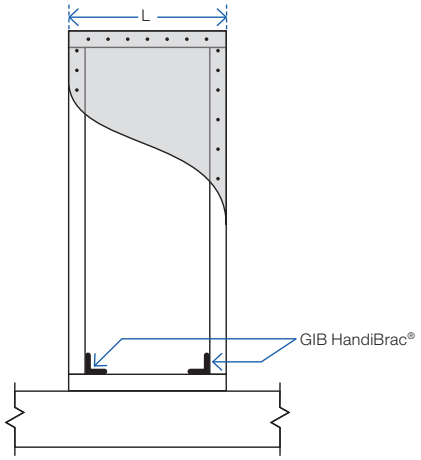
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening as indicated in figures 34-36.

When using bracing straps, installed in accordance with p.17, fix the strap to the same framing member as shown for the GIB Handibrac® below, and install the adjacent anchor bolt in the same position as the GIB HandiBrac® bolt.

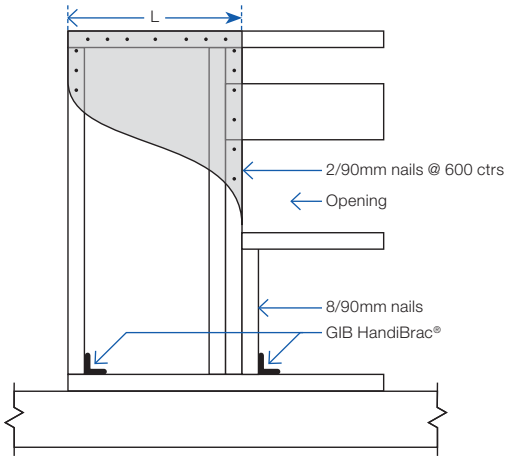
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



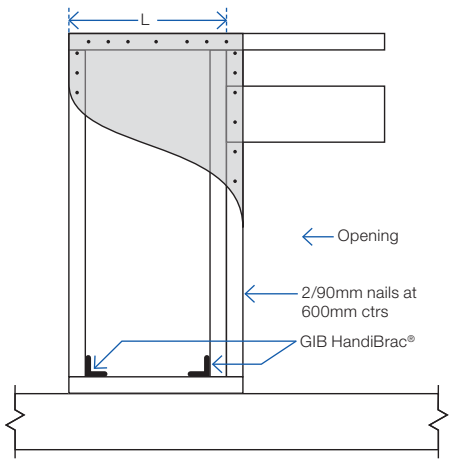
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



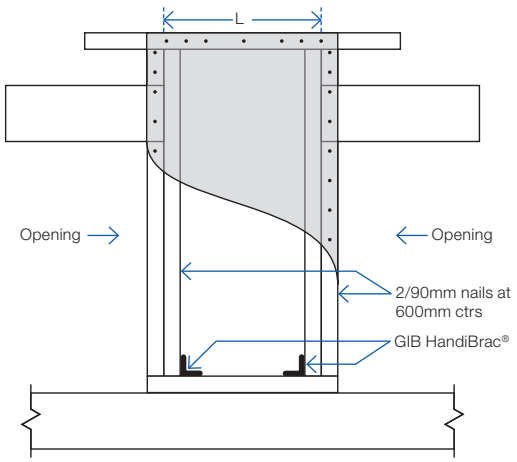
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

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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

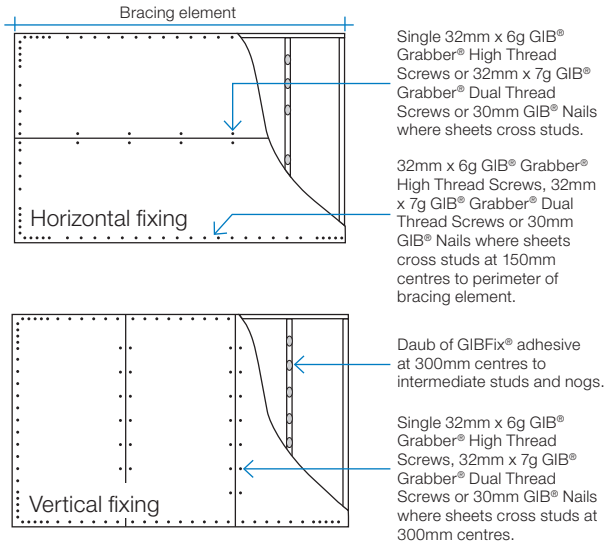
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

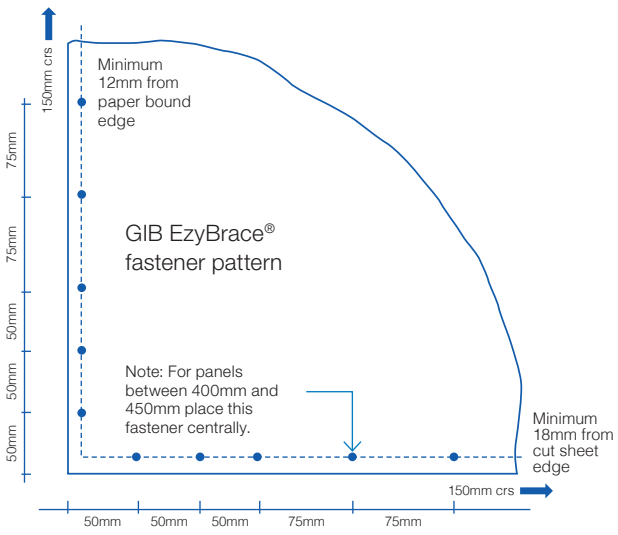
Fastener centres

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.





Unless stated all fastener spacings are maximums.

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

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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

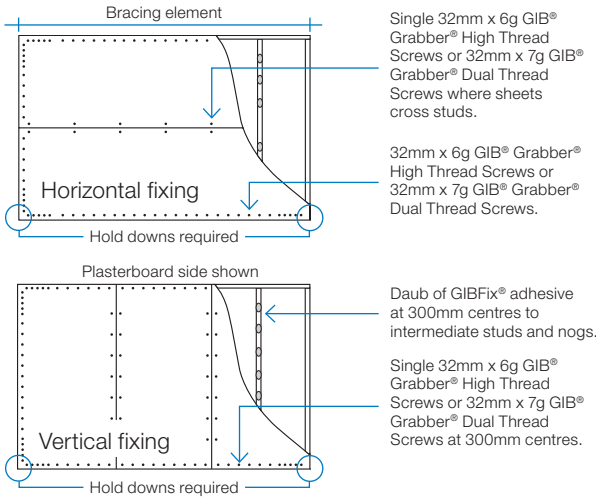
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

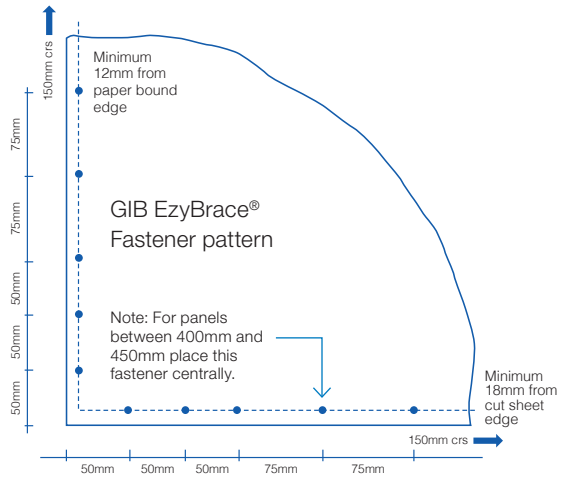
Fastener centres

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.





Unless stated all fastener spacings are maximums.

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

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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

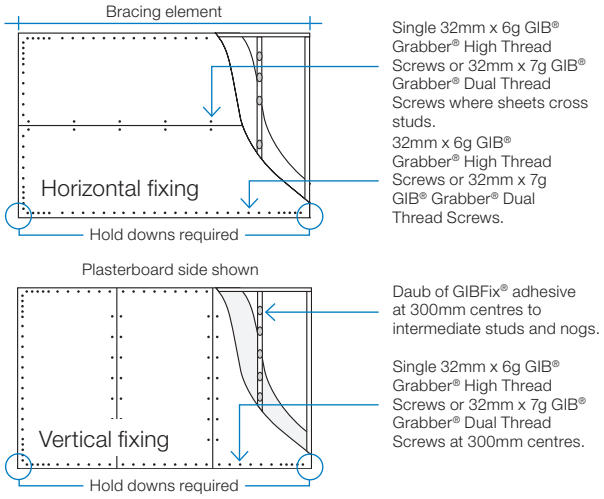
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread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

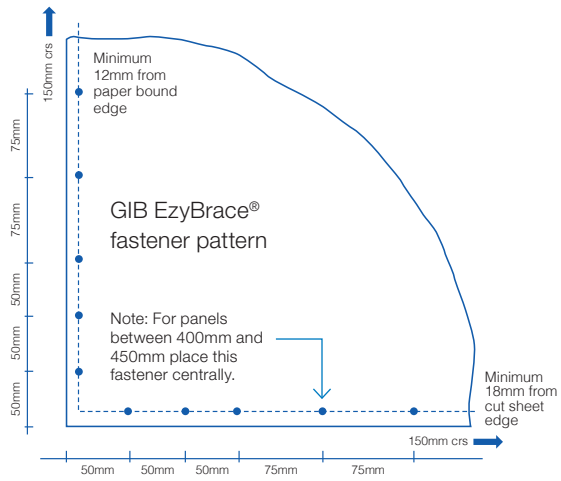
Fastener centres

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.





Unless stated all fastener spacings are maximums.

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

APPENDIX 07 – RCS GRAPHEX PLASTER SYSTEM

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BRANZ Appraised

Appraisal No. 633 [2018]

INSULATED FAÇADE SYSTEM

Appraisal No. 633 (2018)

Amended 16 March 2020

This Appraisal replaces BRANZ Appraisal No. 633 (2009) and Appraisal No. 476 (2013)



BRANZ Appraisals

Technical Assessments of products for building and construction.

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WFTAO
WORLD FEDERATION OF TECHNICAL ASSESSMENT ORGANISATIONS

Product

1.1 Insulated Façade System is a cavity-based Exterior Insulation and Finishing System (EIFS) wall cladding. It is an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 The system consists of Graphex (Neopor®), expanded polystyrene (EPS), extruded polystyrene (XPS) or polyisocyanurate (PIR) sheets fixed over battens to form the cavity. The plaster coating system consists of 5 mm thickness of fibreglass mesh reinforced, polymer-modified, cement-based plaster, which is finished with a cement-based finishing plaster that is then painted with a 100% acrylic-based paint system. The chosen finishing plaster is applied to give a range of different appearances, such as a sponge, patterned, adobe or spray textured finish.

1.3 The system incorporates Resene Construction Systems EdgeSeal joinery flashings. It also incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the cladding from the external wall framing with a nominal 20 mm drained cavity.

Scope

2.1 Insulated Façade System has been appraised as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Wind Zones up to, and including Extra High.

2.2 Insulated Façade System has also been appraised for weathertightness and structural wind loading when used as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- constructed with timber and steel framing subject to specific engineering design; and,
- situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.

2.3 Insulated Façade System must only be installed on vertical surfaces (except for tops of parapets, sills and balustrades, which must have a minimum 10° slope and be waterproofed in accordance with the Technical Literature).

2.4 The system is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(Note: The Appraisal of Insulated Façade System relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone or wind pressure.)*

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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2.2 Installation of components and accessories supplied by Resene Construction Systems and its approved applicators must be carried out only by Resene Construction Systems approved applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Insulated Façade System if designed, used, 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 B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Insulated Façade System meets the requirements for loads arising from self-weight, wind, impact and creep [i.e. B1.3.3 (a), (h), (j) and (q)]. See Paragraphs 10.1 - 10.4.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years, B2.3.1 (c), 5 years and B2.3.2. Insulated Façade System meets these requirements. See Paragraphs 11.1 and 11.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Insulated Façade System meets this requirement. See Paragraphs 16.1 - 16.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Insulated Façade System meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 System components and accessories supplied by Resene Construction Systems are as follows:

Cavity Battens

- **Graphex peel 'n' stick battens** –manufactured to meet the requirements of AS 1366 Part 3 with an approximate density of 18 kg/m^3. The battens are 45 mm wide by 21 mm thick, are supplied in 1200 mm lengths and are coated on the back face with an acrylic adhesive, which is protected prior to installation by a removable film.
- **Standard EPS cavity battens** – manufactured from high density (Class H) expanded polystyrene (EPS) with an approximate density of 24 kg/m^3. The battens are 40 mm wide by 22 mm thick and are supplied in 2400 mm lengths.
- **Timber cavity battens** – nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to minimum Hazard Class H3.1.

Graphex

- **Graphex sheets** are 50 - 100 mm thick with an approximate density of 18 kg/m^3. The sheets are supplied in lengths ranging from 2.4 to 3.6 m x 1.2 m wide and are manufactured to meet the requirements of AS 1366 Part 3.

EPS Sheets

- **EPS sheets** are 40-100 mm thick Class H with an approximate density of 24 kg/m^3, or 50 or 60 mm minimum thickness if using Class S with an approximate density of 16 kg/m^3. The sheets are supplied in lengths ranging from 2.4 to 3.6 m x 1.2 m wide and are manufactured to meet the requirements of AS 1366 Part 3.

XPS Sheets (XTherm Blue)

- **XPS sheets** are 50mm – 100 mm thick with an approximate density of 34kg/m3. The sheets are supplied in lengths ranging from 1.2,m and 2.2m x 0.6m wide and are manufactured to meet the requirements of AS 1366 Part 3.

PIR Sheets (XTherm PIR)

- **PIR sheets** are 50 mm thick with an approximate density of 35kg/m3. The sheets are supplied in lengths ranging from 1.2m and 2.2m x 0.6 m wide and are manufactured to meet the requirements of AS 1366 Part 3.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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Base, Levelling and Waterproofing Plasters

- A base [mesh] coat is applied using one of the following renders, followed by a subsequent coat of the same render to level the surface.
- **Coarse Mesh Render** is a polymer-modified, Portland cement-based plaster supplied in 20 kg bags and mixed on site with clean drinking water. It is applied as the base coat in a minimum 2 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface.
- **Rockcote PM100 Quick Render** is a dry mix, cement-based, polymer-modified plaster supplied in 20 kg bags and mixed on site with clean water. It is used as a base coat for bonding and bedding the fibreglass mesh and is trowel-applied to an approximate thickness of 4-5 mm.
- **Resene Construction Systems RMaxx** is a high-yielding, cement-free dispersion based basecoat plaster supplied in 20 kg pails. It is applied as the base coat in a minimum 1.5 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface. An additional 1.0-1.5 mm is applied to fully encase the mesh.
- **HydroPlast** is an acrylic dry powder with cement activator, that when mixed with water creates a flexible waterproofing render for use over plastered balustrade and fixing blocks. It is supplied in 10 kg bags and is applied over the levelling render with a trowel in a 1 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface.

Primer

- **Rockcote Render Prime** is a water-borne acrylic, polymer dispersion, tintable coating supplied in 15 litre pails. It is brush or roller-applied as a primer between the selected base coat and acrylic texture.
- **Resene Limelock** is a water-borne acrylic, polymer dispersion, tintable coating supplied in 10 litre pails. It is brush or roller applied as a primer between the mineral textures and the finishing system.

Mineral Texture Coating

- **Resene Construction Systems Mineral Textures** are dry mix, cement-based, polymer-modified plasters, supplied in 20 kg bags and mixed on site with clean water. They are trowel or spray applied to an approximate thickness of 1.0-3.0 mm.

Acrylic Texture Coating

- Resene Construction Systems acrylic texture coatings are ready mixed, tintable, mineral-filled, polymer-based, elastomeric high-build coating with in pail and dry film preservatives, supplied in 15 litre pails. They are spray or trowel applied to an approximate thickness of 0.5 – 2.0 mm. The selected Resene Construction Systems texture colour must have a minimum light reflectance value [LRV] of 25%.

uPVC Primer, Plaster Modifier, Waterproofing Plaster and Finishes

- **Multistop bedding compound** – used as a uPVC primer when mixed with diluted Acrylbond resin or water.
- **Acrylbond** is a water-based co-polymer resin supplied in 4 and 15 litre pails used as a plaster modifier.
- **Resene Lumbersider** is a water-borne 100% acrylic-based protective finish for use over mineral and acrylic textures. It is supplied in 4 and 10 litre pails and is brush or roller applied. The protective finish coat must have a minimum LRV of 25%.
- **Resene X200** is an acrylic waterproofing membrane for use as a protective finish over mineral and acrylic textures. It is supplied in 4 and 10 litre pails and is brush, roller or spray applied. The protective finish coat must have a minimum LRV of 25%.

Accessories

- **Reinforcing mesh** - alkali-resistant fibreglass mesh with a nominal mesh size of approximately 5 x 4 mm square and a weight of 160 g/m² for use in domestic and light commercial situations.
- **uPVC components** – starter strip flashing, standard corner flashing, vertical control joint, horizontal control joint, EdgeSeal sill, jamb and head flashings, and 40, 50, 60 mm and universal ventilated starter strips.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

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- **3M All Weather Flashing Tape 8067** – flexible flashing tape with a proprietary backing and an acrylic pressure sensitive adhesive to seal the EdgeSeal head flashing to the building underlay. The tape is available 76 mm wide in rolls 22.8 m long.
- **Graphex/EPS/XPS/PIR sheet nail fixings (timber frame)** – hot-dip galvanised steel flat head nails with 40 mm diameter washers. Refer to Table 1 for fixing length requirements. *(Note: Hot-dip galvanising must comply with AS/NZS 4680.)*
- **Sticky Mesh** - alkali-resistant fibreglass, 150 mm wide corner pieces

Table 1: Graphex/EPS/XPS/PIR sheet fixing lengths (timber frame)

Sheet Thickness	Nail Size (mm)
40	90 x 3.55
50	100 x 3.75
60	110 x 4.0
70	125 x 5.3
80	150 x 6.0
90	150 x 6.0
100	150 x 6.0

- **Graphex/EPS/XPS/PIR sheet screw fixings (timber frame)** – 8 gauge AS 3566 Corrosion Class 4 hot-dip galvanised wood screws with 40 mm diameter washers in NZS 3604 defined Exposure Zones B, C and D. Refer to Table 2 for fixing length requirements.

Table 2: Neopor® board and EPS sheet fixing lengths (timber frame)

Sheet Thickness	Minimum Screw Length (mm)
40	80
50	100
60	110
70	120
80	130
90	140
100	150

- **Graphex/EPS/XPS/PIR sheet screw fixings (steel frame)** – 8 gauge self-drilling AS 3566 Corrosion Class 4 hot-dip galvanised screws with 40 mm diameter washers in NZS 3604 defined Exposure Zones B, C and D. Refer to Table 3 for fixing length requirements.

Table 3: Graphex/EPS/XPS/PIR sheet fixing lengths (steel frame)

Sheet Thickness	Minimum Screw Length (mm)
40	80
50	95
60	95
70	105
80	115
90	125
100	135

- **Washers** - 40 mm diameter polypropylene washers.

4.2 Accessories used with the system which are supplied by the approved applicator are:

- **Waterproof membrane tapes** - tapes covered by a valid BRANZ Appraisal for use as waterproofing membranes over tops of plastered parapets, balustrades, fixing blocks and the like.
- **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.
- **Adhesive** - Compatible adhesive for gluing uPVC components to the Graphex EPS/XPS/PIR sheets as and where required.

4.3 Accessories used with the system which are supplied by the building contractor are:

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- **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.
- **Flexible wall underlay support** - polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. [Note: mesh and wire galvanising must comply with AS/NZS 4534.]
- **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 and jamb flashing tapes** - 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.
- **Window and door trim cavity airseal** - 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 for use around window, door and other wall penetration openings.

Handling and Storage

5.1 Handling and storage of all materials supplied by Resene Construction Systems or the approved installer, whether on or off site, are under the control of Resene Construction Systems approved installers. Dry storage must be provided on site for the fibreglass mesh and bags of plaster. Graphex /EPS/XPS/PIR sheets, battens, uPVC flashings and profiles must be protected from direct sunlight and physical damage, and should be stored flat and under cover. Liquid components must be stored in frost-free conditions.

5.2 Handling and storage of all materials supplied by the building contractor, whether on or off site, are under the control of the building contractor. Materials must be handled and stored in accordance with the relevant manufacturer's instructions.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Insulated Façade System. 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. Insulated Façade System listing on the BRANZ website excludes specific details. These details are outside the scope of this Appraisal.

Design Information

Framing

Timber Treatment

7.1 Timber wall framing behind Insulated Façade System must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

7.2 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. In all cases studs must be at maximum 600 mm centres for buildings designed to NZS 3604 in Wind Zones up to and including Very High and at maximum 400 mm centres for buildings situated in NZS 3604 Wind Zone Extra High and specifically designed buildings situated in Wind Zones above NZS 3604 defined Extra High. Dwangs must be fitted flush between the studs at maximum 800 mm centres.

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7.3 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. (Note: If sheets are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.)

Steel Framing

7.4 Steel framing must be to a specific design meeting the requirements of the NZBC.

7.5 The minimum framing specification is 'C' section studs and nogs of overall section size of 75 mm web and 32 mm flange. Steel thickness must be minimum 0.55 mm.

7.6 For steel framed buildings situated within NZS 3604 defined Wind Zones up to, and including, Very High, studs must be at maximum 600 mm centres. For all other buildings studs must be at maximum 400 mm centres. Dwangs must be fitted flush between the studs at maximum 800 mm centres.

Graphex/EPS/XPS/PIR Sheet Setout

7.7 All vertical Neopor® board or EPS sheet edges must be supported and fixed through the cavity battens to the framing. Horizontal board edges must be supported at fixing locations with cavity spacers in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2 (f). At the base of the wall, the Neopor® boards or EPS sheets must hang 50 mm below the supporting framing.

7.8 Additional framing will be required at soffits, internal and external corners and window and door openings for the support and fixing of sheet edges.

General

8.1 When Insulated Façade System is used for specifically designed buildings up to 2.5 kPa design differential ULS wind pressure, only the weathertightness aspects of the cladding and maximum framing centres and sheet fixing centres are within the scope of this Appraisal. All other aspects of the building need to be specifically designed and are outside the scope of this Appraisal.

8.2 Openings in the cavity vent strip provide a minimum ventilation opening area of 1000 mm^2 per lineal metre of wall in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3 (b).

8.3 The ground clearance to finished floor levels as set out in NZS 3604 must be adhered to at all times. At ground level, paved surfaces, such as footpaths, must be kept clear of the bottom edge of the cladding system by a minimum of 100 mm, and unpaved surfaces by 175 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Table 18.

8.4 At balcony, deck or roof/wall junctions, the bottom edge of Insulated Façade System must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 35 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.

8.5 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, and rigid underlays for buildings in the Extra High wind zone and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure. 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.

8.6 Where penetrations through the system are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities. A minimum 10 mm gap must be left between the bottom of the vertical cavity batten and the flashing to the opening.

8.7 Where the system abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. The Technical Literature provides some guidance. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

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Electrical Cables

8.2 PVC sheathed electrical cables must be prevented from direct contact with the sheets. When cables must penetrate the sheets for exterior electrical connections, the cable must be directly supported by passing through an electrical conduit.

Control Joints

9.1 Control joints must be constructed in accordance with the Technical Literature, and be provided as follows:

- Horizontal control joints - at maximum 6 m centres.
- Vertical control joints - at maximum 8 m centres; aligned with any control joint in the structural framing; where the system abuts different cladding types, or where the system covers different structural materials.

[Note: Horizontal and Vertical Control joints must be located over structural supports. The design of vertical control joints where the system abuts different cladding types is outside the scope of this Appraisal and is the responsibility of the designer - see Paragraph 8.7.]

Inter-storey Junctions

9.2 Inter-storey drained joints must be constructed in accordance with the Technical Literature. Inter-storey joints must be provided to limit continuous cavities to the lesser of 2-storeys or 7 metres in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4 (b). (Note: Refer to Paragraph 14.2 for the requirements for barriers to vertical fire spread at inter-storey junctions for buildings of three or more floors.)

Structure

Mass

10.1 The mass of Insulated Façade System is approximately 7 kg/m^2, therefore it is considered a light wall cladding in terms of NZS 3604.

Impact Resistance

10.2 The system has adequate resistance to hard body impacts likely to be encountered in normal residential use. Where a greater level of impact protection is required a heavier grade of reinforcing mesh may be used. The heavy-grade fibreglass reinforcing mesh (360 g/m^2) embedded in 5 mm thick plaster provides approximately 4 times the hard body impact strength of the standard grade mesh in 3 mm thick plaster. The likelihood of impact damage to the system when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers should be considered for vulnerable areas.

Wind Zones

10.3 Insulated Façade System is suitable for use in all Wind Zones of NZS 3604, up to, and including Extra High where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, or up to 2.5 kPa design differential ULS wind pressure where buildings are specifically designed.

Graphex/EPS/XPS/PIR Sheet Fixing

10.4 Sheets must be fixed through the cavity battens and cavity spacers to the wall framing at maximum centres specified in Table 4.

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Table 4: Sheet Fixing Centres for Edges and Body of the Sheet

NZS 3604 Wind Zone	Maximum Fixing Centres (mm)
Low[1]	300
Medium[1]	300
High[1]	300
Very High[2]	200

1. One fixing is also required into each dwang and top and bottom plates at mid length.
2. Fixings are also required to each dwang at 200 mm centres and top and bottom plates at mid-dwang length.

NZS 3604 Wind Zone Extra High and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure with studs at maximum 400 mm centres.		
Maximum vertical fixing centres (mm) along studs	Maximum horizontal fixing centres (mm) along top and bottom plates	Maximum horizontal fixing centres (mm) along dwangs
150	200	150

Durability

11.1 Insulated Façade System meets code compliance with NZBC Clause B2.3.1 (b), 15 years for the cavity system and plaster finish, and code compliance with NZBC Clause B2.3.1 (c), 5 years for the exterior paint system.

Serviceable Life

11.2 Insulated Façade System is expected to have a serviceable life of at least 30 years provided the system is maintained in accordance with this Appraisal, and the sheets, fixings and plaster are continuously protected by a weathertight coating and remain dry in service.

11.3 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 sheets 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

12.1 Regular maintenance is essential to ensure the performance requirements of the NZBC are continually met and to ensure the maximum serviceability of the system.

12.2 Regular cleaning (at least annually) of the paint coating is required to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Grime may be removed by brushing with a soft brush, warm water and detergent. Paint systems must be recoated at approximately 5-10 yearly intervals in accordance with the paint manufacturer's instructions.

12.3 Annual inspections must be made to ensure that all aspects of the cladding system, including the coating system, plaster, flashings and any sealed joints remain in a weatherproof condition. Any cracks, damaged areas or areas showing signs of deterioration which would allow water ingress, must be repaired immediately. Sealant, coatings and the like must be repaired in accordance with the instructions of Resene Construction Systems.

12.4 Minimum ground clearances as set out in this Appraisal and the Technical Literature must be maintained at all times during the life of the system. (Note: Failing to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of Insulated Façade System.)

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Control of Internal Fire and Smoke Spread

13.1 The Graphex/EPS/XPS/PIR sheets used with the system meets the flame propagation criteria of AS 1366 as specified in NZBC Acceptable Solution C/AS1, Paragraph 4.2.2 or NZBC Acceptable Solutions C/AS2, Paragraph 4.17.2. The completed wall system, including the surface lining product enclosing the Graphex/EPS/XPS/PIR sheet from the adjacent occupied space, must achieve the Group Number for internal surface finish requirements as specified in the relevant NZBC Acceptable Solutions C/AS1 and C/AS2.

Control of External Fire Spread

14.1 Insulated Façade System using Graphex or EPS sheet, Rockcote PM100 Quick Render base coat with mineral texture finish, Rockcote Render Prime and Resene Construction Systems Premium Armour protective finishing coat has a peak heat release rate of less than 100 kw/m2 and a total heat released of less than 25 MJ/m2. Testing was carried out as per Paragraph 5.4 of NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of NZBC Acceptable Solution C/AS2, achieving a Type A performance. The Insulated Facade System can therefore be used within 1m of the relevant boundary.

14.2 Insulated Façade System using any other substrate, Rockcote texture or surface finish has not been assessed for a peak heat release or total heat released rating.

14.3 For buildings in risk groups other than SH and VP Insulated Façade System is Appraised for use where the cladding extends over no more than 2 floors continuously.

14.4 Refer to NZBC Acceptable Solutions C/AS1 and C/AS2 and Verification Method C/VM2 for fire resistance rating and control of external fire spread requirements for external walls.

Prevention of Fire Occurring

15.1 Separation or protection must be provided to Insulated Façade System from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/ AS1, C/AS2 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

16.1 Insulated Façade System, when installed in accordance with this Appraisal and the Technical Literature, prevents the penetration of moisture that could cause undue dampness or damage to building elements.

16.2 The cavity must be sealed off from the roof and sub-floor space to meet code compliance with Clause E2.3.5.

16.3 Insulated Façade System 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.

16.4 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.

16.5 The use of Insulated Façade System where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations, etc to remain weather resistant.

Internal Moisture

17.1 Insulated Façade System alone does not meet NZBC Acceptable Solution E3/AS1, Paragraph 1.1.1 (a). 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.

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Water Vapour

17.2 Insulated Façade System is not a barrier to the passage of water vapour, and when correctly installed will not create or increase the risk of moisture damage resulting from condensation.

17.3 When Insulated Façade System is installed over a steel frame, the battens and insulated drainage cavity will act as a thermal break to the steel frame in accordance with NZBC Acceptable Solution E3/AS1.

Energy Efficiency

Building Thermal Envelope

18.1 NZBC Acceptable Solution H1/AS1 or NZBC Verification Method H1/VM1 can be used for housing, communal residential, communal non-residential and commercial buildings.

Determining Thermal Resistance

18.2 The thermal resistance (R-values) of building elements may be verified by using NZS 4214. The BRANZ 'House Insulation Guide' Fifth Edition provides thermal resistances of common building elements and is based on calculations from NZS 4214. Calculations in accordance with NZS 4214 require that the ventilated air gap and the thermal resistance of each layer between the ventilated air gap and outside air be de-rated by a factor of 0.45. Therefore, in Insulated Façade System, unless better information is available for a specific case, the R-value of the Graphex layer must be taken as R0.69 (40 mm thick), R0.86 (50 mm thick), R1.03 (60 mm thick), R1.20 (70 mm thick), R1.38 (80 mm thick), R1.55 (90 mm thick) and R1.72 (100 mm thick) based on a thermal conductivity (k value) of 0.032 W/m °C; the R-value of Class H EPS must be taken as R0.58 (40 mm thick), R0.72 (50 mm thick), R0.87 (60 mm thick), R1.01 (70 mm thick), R1.16 (80 mm thick), R1.30 (90 mm thick) and R1.44 (100 mm thick) based on a k value of 0.038 W/m°C. R-values for XPS and PIR sheets have not been assessed and are outside the scope of this Appraisal.

Installation Information

Installation Skill Level Requirements

19.1 Installation and finishing of components and accessories supplied by Resene Construction Systems and its approved installers must be completed by trained applicators, approved by Resene Construction Systems.

19.2 Installation of the accessories supplied by the building contractor must be carried out in accordance with Insulated Façade System Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

System Installation

Wall Underlay and Flexible Sill and Jamb Tape Installation

20.1 The selected wall 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 the cavity battens and the rest of Insulated Façade System. Flexible 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. Generic rigid wall underlay 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 wall 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.

20.2 Where studs are at greater than 450 mm centres and a flexible wall underlay is being used, a wall underlay support must be installed over the underlay at maximum 300 mm centres horizontally.

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Aluminium Joinery Installation

20.3 Aluminium joinery and associated head flashings must be installed by the building contractor in accordance with the Technical Literature. A 7.5-10 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.

Insulated Façade System

20.4 The system must be installed in accordance with the Technical Literature by Resene Construction Systems approved installers.

20.5 The plaster system must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Inspections

20.6 The Technical Literature must be referred to during the inspection of Insulated Façade System installations.

Finishing

20.7 The paint manufacturers' instructions must be followed at all times for application of the paint finish. The plaster must be cured for a minimum of 2-3 days and must be dry before commencing painting.

Health and Safety

21.1 Safe use and handling procedures for the components that make up Insulated Façade 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

22.1 The following testing has been completed by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for Insulated Façade System was based on evaluation of all details within the scope and as stated within this Appraisal and testing of the Resene Construction Systems Insulated Facade System to E2/VM1. The testing assessed the performance of the foundation detail, window head, jamb and sill details, meter box head, jamb and sill details, vertical and horizontal control joints, internal and external corners and balustrade to wall junction with a plastered cap. 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 Acceptable Solution E2/AS1 for drained cavity claddings.
- Wind face load and fastener pull through testing for EIFS cladding systems. BRANZ determined design wind suction pressures, and by comparing these pressures with AS/NZS 1170 pressure coefficients, the fixing requirements were determined for timber and steel framed walls.
- Cone Calorimeter testing of the Insulated Façade plaster system over 40 mm EPS. The testing was carried out in accordance with AS/NZS 3837.

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Other Investigations

23.1 Structural and durability opinions have been given by BRANZ technical experts.

23.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

23.2 The manufacturer's Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

24.1 The manufacture of the plasters and finishes has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

24.2 The quality of materials, components and accessories supplied by Resene Construction Systems is the responsibility of Resene Construction Systems.

24.3 Quality on site is the responsibility of the Resene Construction Systems approved installers.

24.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, wall underlays, flashing tapes, air seals and joinery head flashings in accordance with the instructions of Resene Construction Systems.

24.5 Building owners are responsible for the maintenance of Insulated Façade System in accordance with the instructions of Resene Construction Systems.

Sources of Information

- AS 1366.3: 1992 Rigid cellular plastic sheets for thermal insulation - Rigid cellular polystyrene - Moulded [RC/PS-M]
- AS 3566: 2002 Self-drilling screws for the building and construction industries.
- AS/NZS 1170: 2002 Structural design action – General principles.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- 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.
- NZS 4214: 2006 Methods of determining the total thermal resistance of parts of buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, 16 March 2020

This Appraisal has been amended to update the system name, include Polyisocyanurate [PIR] and Extruded Polystyrene [XPS] sheets within the technical specification and update references to C/AS2.

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In the opinion of BRANZ, Insulated Façade System 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 Rockcote Resene Ltd T/A Resene Construction Systems, 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. Rockcote Resene Ltd T/A Resene Construction Systems:
   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 Rockcote Resene Ltd T/A Resene Construction Systems.
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 Rockcote Resene Ltd T/A Resene Construction Systems or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
22 November 2018

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graphex.

Insulated Façade



Graphex Insulated Façade System Specification

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INSULATED FACADE SYSTEM

Our premium Insulated cavity based, rainscreen Façade System coated with our reinforced render system applied over our exclusive GRAPHEX Insulation panels.

The GRAPHEX Insulated Plaster Façade System offers a lightweight, complete thermal barrier to the weather extremes' which will keep your home cooler in summer and warmer in winter in a cost effective manner all the while protecting the structure.

Proven Technology

Our GRAPHEX Insulation panel is installed over the time tested cavity construction method along with our exclusive EdgeSeal flashing technology. Protected with our 6 layers of hand applied reinforced render, texture & paint. All finished with your choice of texture from our wide range incorporating 'genuine' Resene colours.

Attractive and Durable

This System carries our written Performance Guarantee, Workmanship Warranty from your qualified LBP Registered Plasterer. The System includes our premium OnSite Quality Assurance programme providing surety of performance from installation to finish.

Innovative design.
Integrated systems.
Enduring finish.

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Resene Construction Systems

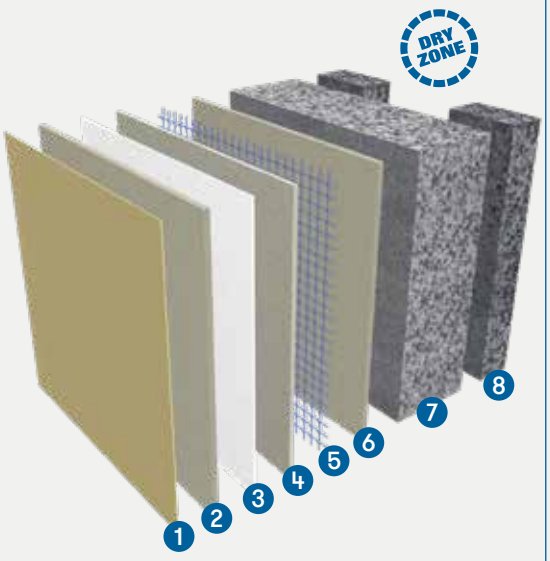
graphex.

SULATED FACADE SYSTEM

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SYSTEM FEATURES:

- Drained Rainscreen Façade System
- Hand Plastered
- Registered LBP plasterer application
- Performance Guarantee
- Patented EdgeSeal window flashing suite
- GRAPHEX Thermal envelope
- 'Genuine' Resene Colour Range
- Technical OnSite Assistance
- Seismic and Weathertight tested (BRANZ)
- BRANZ Appraisal # 681



1 Resene X 200
2 Pre-Coloured Texture
3 Resene Limelock
4 PM100 Quick Render
5 Fibreglass Reinforcing
6 PM100 Quick Render
7 GRAPHEX Insulation
8 Cavity Battens

ROCKCOTE | Plaster Systems

	INTEGRA Façade Light Weight Concrete	INTEGRA Flooring	INTEGRA Fencing	XTHERM Blue Insulated Façade	XTHERM Blue Masonry Overlay	GRAPHEX Insulated Plaster Façade	Masonry Block	Fibre Cement	INTEGRA Intertenancy systems	Brick	ICF(Insulated Concrete Formwork)	Pre Cast / In Situ Concrete	Artisan Interiors
Insulated	○	○		○	○	●					○		
Impact Resistance	○	○	○	○	○	●	○	○	○	○	○	○	
Acoustic	○	○	○		○				○		○	○	
Resene Colours	○		○	○	○	●	○	○	○	○	○	○	○
BRANZ	○			○	○	●	○	○	○	○			
Fire Tests	○			○	○	●	○	○	○	○	○	○	○
FPB	○	○	○	○	○	●	○	○	○	○	○	○	○
Full Render System	○		○	○	○	●	○	○	○	○	○		
Substrate supplied	○	○	○	○	○	●							
Acrylic Texture	○		○	○	○	●	○	○	○	○	○	○	
Mineral Texture	○		○	○	○	●	○		○	○	○	○	○
Cavity System	○			○		●		○	○				
GreenSite	○	○	○	○	○	●	○	○	○	○	○	○	
Masonry Construction	○	○	○		○		○			○	○	○	
Window Reveals	○		○	○	○	●	○			○	○	○	

BRANZ Appraised 530 476 477 500 681 633 706 553

FPB.CO.NZ FUTURE-PROOF BUILDING

P 0800 50 70 40
W reseneconstruction.co.nz

GRAPHEX Insulated Facade System - Graphex 50mm Panel on 20mm Cavity - Acrylic RenderSpec

General

Properties

Graphex Panels have the following material properties:

- R-Value 1.56, derated by 45% with a cavity to 0.858
- Weight: approx 7kg/m2 coatings and substrate, considered a light weight cladding in terms of NZS3604

Building Code Compliance

If the project has a building consent then the following clauses apply.

B1 - Structure

This specification complies with the requirements as set out in B1 - Structure which requires buildings, building elements and sitework to withstand the combination of loads and physical conditions they are likely to experience during construction, alteration and throughout their lives. Loads and physical conditions include self-weight, temperature, water, earthquakes, snow, wind, fire.

B2 - Durability

This specification complies with the requirements as set out in B2 - Durability which must always be considered when demonstrating compliance with each of the clauses of the Building Code. It ensures that a building throughout its life will continue to satisfy the performance of the Building Code. It confirms the use of materials that will remain functional throughout the specified intended life of the building, but not less than 50, 15 or 5 years

This cladding system meets the expected durability of the NZBC of at least 15 years

E2 - External Moisture

This specification complies with the requirements as set out in E2 - External Moisture which demonstrates External roof, wall claddings and external openings will prevent external moisture from causing undue dampness or damage.

F2 - Hazardous building materials

This specification complies with the requirements as set out in F2 - Hazardous building materials which safeguards people from illness and injury from quantities of gas, liquid, radiation and solid particles caused by exposure to building materials

On Going Maintenance Instructions

Provide ongoing maintenance instructions required to meet the performance requirements of the NZBC.

Building Consent Authority Requirements

All the appropriate inspections are to be carried out by a BCA representative and that it complies with the NZBC requirements.

Documents

Abbreviations

The following abbreviations are used throughout this work section:

- BCA - Building Consent Authority
- LBP - Licensed Building Practitioner
- PPCS - Proprietary Plaster Clading System
- MPNZA - Master Painters of New Zealand Association
- MSDS - Material Safety Data Sheet
- NZBC - New Zealand Building Code

Manufacturers Documents

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Copies of the above relevant company documents referred to in this specification are available at;

Resene Construction Systems
Web: reseneconstruction.co.nz
Telephone: 0800 50 70 40

No Substitutions

Substitutions are not permitted to any specified Resene Construction Systems system. Materials and execution to Resene Construction Systems specification except where varied by this specification and supported by architectural detailing.

Qualifications

Use only LBP registered plasterers licensed to apply the Resene Construction Systems exterior render systems.

Documentation

Finish Sample

Submit one 300 mm x 300 mm sample of the selected texture finish and colour for approval on request by the main contractor or specifier. Obtain signature of acceptance on sample and return to the Registered Plasterer.

Maintenance Instructions

Provide Resene Construction Systems Maintenance Guide on or before practical completion of the contract for issuing to the building owner. Resene Construction Systems Maintenance Guide to be provided on request.

Producer Statement

If the project has a building consent then a producer statement shall be supplied by the plasterer in the form as required by the BCA.

Health and Safety

Refer to the requirements of the Health and Safety in Employment Act 2015 and Worksafe NZ: Guidelines for the provision of facilities and general safety in the construction industry. If the elimination or isolation of potential hazards and risks is not possible then minimise hazards and risks in this work on site by using the proper equipment and techniques as required in the MPNZA Painters hazard handbook. Supply protective clothing and equipment. Inform employees and others on site of the hazards and put into place procedures for dealing with emergencies. Obtain from Resene Construction Systems the Material Safety Data Sheets for each product. Keep sheets on site and comply with the required safety procedures. Confirmation at the start of the project as to whether a Site Specific Safety Plan is to be produced by the Registered Plasterer prior to works starting.

Warranty

Warrant this system under normal environmental and use conditions against failure. Resene Construction Systems system warranty.
Materials: by Resene Construction Systems - 15 Years Materials only
Execution: by Registered Plasterer - 5 Years Workmanship only

On Site Assistance

Allow to inspect the whole of the work at each stage. Determine a programme for onsite assistance including notification when each part and stage of the work is ready for inspection prior to the work commencing. Permit representatives of Resene Construction Systems to inspect the work in progress and to take samples of their products from site if requested.

Components Used

Resene Construction Systems Battens - Graphex 20mm

- 40mm x 20mm H-Grade Graphex Peel and Stick Batten
- Supplied in Boxes
- 228 units in a box
- AS 1366 Part 3 Class H (with fire retardant).

Graphex 50mm (2450mm x 1200mm)

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- 2400 x 1200
- 50mm Thick
- Allow for 10% Wastage when Installing
- AS 1366 Part 3 Class H (with fire retardant).

Nails (Preloaded) 100mm

- Flat-head, hot-dipped galvanised and 40 mm diameter nylon washers.
- 100mm x 4.0mm

Resene Construction Systems Cavity Closer (20-30mm)

- Supplied in 2400mm Lengths
- Suitable for 20-30mm Cavities

Resene Construction Systems Channel - 50mm

- Supplied in 2400mm Lengths
- Suitable for 50mm Substrates

Resene Construction Systems EdgeSeal Window Flashing

- Used for sill and jamb installations
- Supplied in 2400mm lengths

Resene Construction Systems EdgeSeal Head Flashing

- Supplied in 2.4m Lengths
- Generally requires the Drip Edge Flashing

Resene Construction Systems Drip Edge - Small

- Supplied in 2400mm Lengths
- Used with both the EdgeSeal Head Flashing and also the Universal Starter Strip

Resene Construction Systems Pre-meshed Corners

- Supplied in 2400mm Lengths

Soudal Holdfast Nailpower Construction Adhesive

Holdfast Nailpower Construction Adhesive is a high performance, paste like construction adhesive formulated to bond a variety of common construction materials.

Supplied in 375mls cartidges

Rockcote PM100 Render

- Polymer-modified cement-based dry plaster mix. Supplied in 20 kg bags

Resene Construction Systems Mesh - Blue (1200mm wide)

- Alkali Resistant 6mm x 5mm Weave mesh supplied in 50m rolls

Resene Limelock

- Water based acrylic polymer dispersion. Supplied in 10 litre pails.

Rockcote Classico

- 100% acrylic, high-build texture coating. Supplied in 15 Litre pails

Resene X200

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- Acrylic reinforced waterproof membrane. Supplied in 4 and 10 litre pails. Tinted to the selected colour

Soudal Gorilla MS Sealant White

Gorilla MS is a high performance MS sealant, which is UV-resistant, waterproof, paintable*, solvent-free and with superior flexibility.

Ideal for the sealing of expansion and connection joints with a wide range of movement. Suitable for a wide range of substrates including blockwork, brickwork, granite, marble, timber, coated and uncoated aluminum.

Supplied in 420gm cartidges

Features and Benefits:

- Non slump
- The whitest of whites
- 900% elongation of break
- High performance MS
- BRANZ Appraised
- Works on damp surfaces
- Paintable 1 hour after application
- UV resistant
- AsureQuality tested
- Easily repairable
- Interior & exterior
- Solvent-free

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Installation/Application

Timber Frame

Check Fixings

It is the builder's or framing installer's responsibility to ensure it is set out true in the correct alignment, as required by the Designer. Before installing insulation boards, check framing is true and in the correct alignment with studs at a 600 mm maximum centres, dwangs/nogs are at no greater than 1200mm (800mm is a distance which is recommended), and blocking is provided for support of the substrate, e.g., around all openings, at soffits, at joints, and at internal corners.

All framing must comply with the requirements of NZS 3604 Light Timber Frame buildings not requiring specific design, or be to a specific structural design.

Ensure that any framing has a moisture content of no more that 18% mc prior to installing substrate. Refer to E2/AS1 section 11

Alignment of Walls

To be plumb, level and in true alignment.

A check should be made prior to render installation, using a straight edge to ensure the wall is flat. Any irregularities should be taken out by straightening the studs.

Builder to re-align framing when it is not in the correct alignment, and insert additional blocking if required.

Builder Supplied Flashings

Make sure all builder metal flashings, saddles flashings and back flashings are in place.

Battens - Graphex 20mm

General

Drained and ventilated cavities are seen as one way of dealing with moisture that may enter through the exterior envelope. Resene Construction Systems recommends the use of cavities.

When a drainage cavity is used, it should consist of an air space outboard of a building underlay fixed to the framing, with approved flashings to drain water to the outside face of the cladding.

Limitations

Vapour from freshly LOSP-treated timber may melt styrene based battens.

Fixing Battens

Adhesive fixing to the building underlay. This is probably the quickest method of fixing battens. The adhesive acts as a temporary fixing, and it will be permanently fixed upon nailing the substrate in place. Under no circumstances should any solvent-based adhesives be used, as these will melt the battens.

Remember the battens only need to be temporarily held in place, for when you fix the substrate at the appropriate centres this will secure all the battens in place.

Fix vertical battens on stud lines. Vertical battening must be the full height of the cavity, but battens may be joined (butted) to achieve this.

Take account of where cladding fixings will be needed for the exact location of the battens. For example, at corners or cladding junctions, provide additional or wider battens as required for fixing the cladding, back-flashings or facings.

Where an intermediate or horizontal fixing is required, for example to fix the top or bottom edge of sheet cladding, install a cavity spacer (short length of batten) on a minimum 5° slope. Leave a minimum 50 mm gap between the spacer and the vertical battens (the gap is to provide drainage and ventilation)

Closing off the top of the cavity

Ventilation is not required at the top of a cavity (note that masonry veneer uses a different cavity system that does require top venting)

Close off the top of the cavity to prevent damp air from the cavity getting into interior spaces, roof framing or eaves. This is particularly important where the cavity finishes beneath a soffit or other area that might be open to a roof space.

One way of closing off the top of the cavity is to use a continuous length of horizontal batten as shown in Figure 9. The horizontal batten also supports fixings at the top edge of sheet claddings where required.

Cavity walls over two storeys

Refer to E2/AS1 Paragraph 9.1.9.4

Cavities may be continuous up to two storeys or 7m maximum but not more, due to limits on drainage and drying. If the wall is greater than two storeys or 7m, divide the cavity using a horizontal flashing that bridges the cavity. Provide ventilation to the cavity above the junction, as described for the base of the wall.

It is the builder's responsibility for the supply and installation of the horizontal flashing according to E2/AS1.

Existing Substrates – over timber framing

Generally deals with existing weatherboard or rigid backing boards (fibre cement sheet)
Battens must be screw fixed to ensure positive fixing through to the structural framing.

Screw fixing of battens is recommended as existing internal linings may be damaged if nails are hammered into the structural framing.

Graphex Sheets 50mm

There must be no horizontal surfaces which will be subject to water ponding; a minimum slope of 5 degrees is required (for metal caps only, 10 degrees for liquid membranes).

Ground Clearances

It is important that ground clearances are maintained after completion and occupation of the building, with the exterior ground sloped to carry water away from the exterior walls.

Garage floors

Need to be low enough to drive onto and high enough to provide a minimum 50 mm step-down to exterior paving, while maintaining cladding clearances either side of the garage door. To achieve this it may be necessary to construct the garage floor lower than the floor level of the building.

In these situations, providing a 'nib' at garage doorways allows the cladding to continue in a straight line while maintaining minimum clearances at the bottom of wall cavities for ventilation.

E2/AS1 : reference section 9.1.3 and Figure 65 and Table 18

It is the landscaper or other external contractor's responsibility for ground level compliance in relation to cladding clearance and that ground clearances are maintained after completion and occupation of the building.

Decking Clearances / Level thresholds

150mm minimum clearance at the highest point of the deck to the cladding is required.

E2/AS1 : reference section 7.0

Control/Expansion Joint Set outs

- Where columns intersect beamwork control joints should be formed so that they are running vertically and horizontally of the intersection
- Large doors & windows ie Ranch Sliders, & Bi-Fold type where the window area is greater than 8.0m2
- Junctions between dissimilar materials, ie Masonry to Resene Construction Systems Graphex System
- Where there are small widths of plaster (ie. less than a trowel width)
- Where the wall length is greater than 8 metres in length a vertical control joint will need to be installed
- Where a two storey dwelling wall height exceeds 6 metres a horizontal control joint is required
- Control Joints are required at all interfloor levels on multi-level construction (eg. 3 or more floors)

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Substrate Installation

All Graphex insulation boards must be installed; vertically, be fully supported on all edges and butt-jointed hard against each other. Where a sheet join is fully supported on timber framing, one nail and washer may be used to fix both sheets. Any gaps between sheets must not be greater than 5mm. All gaps must be foam filled.

Nails (Preloaded) 100mm

- Fix insulation boards with fasteners and washers as given in the Table 1 – Fastener Sizes
- Fix fasteners into studs at the fixing centres shown in Table 2 – Fastening centres.
- Fixings must be flush with the recess in the washer, so that the washer is hard against the insulation board, and pulls the sheet hard back against the framing / batten.

Table 1 – Fastener Sizes

8g x 100 mm ** 8g x 100 mm **

Substrate Thickness (mm)	Timber Frame Nail size	Timber Frame Screw size	Timber Frame Screw size (countersinking)	Steel Frame Screw size
40mm +20mm Batten	90 x 3.55 mm *	8g x 80 mm **	8g x 70 mm **	8g x 80 mm **
50mm +20mm Batten	100x 4.0 mm *	8g x 100 mm **	8g x 80 mm **	8g x 100 mm **
60mm +20mm Batten	110x 4.0 mm *	8g x 100 mm **	8g x 80 mm **	8g x 100 mm **
75mm +20mm Batten		10g x 120 mm **	8g x 100 mm **	
80mm +20mm Batten		10g x 120 mm **	8g x 100 mm **	
100mm +20mm Batten		12g x 150 mm **	10g x 120 mm **	

* Nail type = Galvanised flat head
** Screw type = Class 4, countersunk

Table 2 – Fastening centres

NZS 3604 Building Wind Zones	Fastening centres (mm)
Low	300
Medium	300
High	300
Very High	200

NZS 3604 Wind Zone Extra High and Specifically designed buildings up to 2.5kPa design differential ULS wind pressure with studs at maximum 400mm centres.

Maximum vertical fixing centres (mm) along studs	Maximum horizontal fixing centres (mm) along top and bottom plates	Maximum horizontal fixing centres (mm) along dwangs
150	200	150

Note: One fixing is also required into each dwang and top and bottom plates at mid-nog length if you are installing EPS/Graphex. For XTherm products there is no need for this fastener based on the density and pull through testing.

50 mm Substrate and 20mm Cavity Flashing Solution

General Notes

- Comply with the Trade Specific penetration flashing guidelines. Carry out to the required standard of execution to ensure water does not penetrate.
- Refer to Resene Construction Systems technical drawings for the specified system being installed.

Priming Flashings

All Resene Construction Systems Flashings must be primed. It is a requirement of Resene Construction Systems to use a solution of 50% Acrylbond, 50% Water and Rockcote MultiStop Bedding compound or AAC Panel Compound. This is then brushed onto the flashings and left 24 hours so that it can adhere and cure.

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Fixing flashings

Use 40mm clouts to temporarily fix flashings in place.

Starter Strip/Channel Installation

Must be installed directly after sheet installation at ground level to prevent contamination of the bottom edge.

Vertical control joint installation

Where a vertical control joint intersects with starter strips, the starter strip must be cut to allow for substrate movement.

30mm space between adjacent substrates must be allowed for the positioning of the horizontal control joint.

Must be one continuous length. If the cladding section exceeds flashing length, the joint must be under-flashed with Butyl based flashing tape to the underside of the flashing prior to installation.

Horizontal control joint installation

30mm space between adjacent substrates must be allowed for the positioning of the horizontal control joint.

Must be one continuous length. If the cladding section exceeds flashing length, or at an external or internal corner the joint must be under-flashed with EIFS butyl tape to the underside of the flashing prior to installation.

Corner Beads

Fix to external corners or other exposed edges of the substrate ensuring a plumb, straight edge is formed.

Dissimilar cladding junctions

Refer to Resene Construction Systems and adjacent cladding manufacturers technical drawings.

Horizontal

Must have apron/z-flashing installed unless otherwise detailed.

Vertical junction

Must have back flashing installed prior to cladding installation.

10 - 15mm space must be provided from any adjacent cladding/substrate.

Oversize PEF Backing Rod must be inserted into the space 5mm-7mm below the outside line of the cladding.

Sealant must be applied to this junction.

EdgeSeal™ Flashing Suite Installation

Preparation – aluminium joinery

Clean the surface/substrate to which the Resene Construction Systems EdgeSeal™ Flashing Suite is being applied with Resene Construction Systems IPA wipes. Lightly rub the surface to which you are applying the Resene Construction Systems EdgeSeal™ Flashing Suite.
This process degreases and removes any pre and post-construction site residue.
DO NOT USE OTHER NON APPROVED CLEANER as the powder coat warranty may be voided.

Ensure the joinery has been set out of the framing at least 20mm or outside the line of the battens.

The EdgeSeal™ Flashing Suite acquires maximum hold after 72 hours. Cladding installation can continue during this curing period. Once cured the flashing cannot be removed without difficulty and risk of damage to the surface to which it adheres.

The EdgeSeal™ Flashing Suite can be made up of 2 lengths, please ensure that the flashing is tightly butted with the adjoining flashing.

Joinery Screws

If the Aluminium joinery has protruding screws along any edge, then you must trim the EdgeSeal™ Window Flashing adhesive and uPVC edge accurately around these and seal with MS sealant prior to priming.

Drainage holes

If the Aluminium joinery has drainage holes located along the underside of the aluminium 'sill' edge you must leave these areas clear of plaster and sealant. When you are installing the EdgeSeal Flashing make sure you remove out a section of the EdgeSeal Flashing so that the drainage holes on the joinery are left clear. The upstand on the EdgeSeal Flashing must remain upright and continuous behind the holes. This will prevent wind-driven rain from entering the back of the cavity, and maintain drainage to the outside face of the cladding system.

EdgeSeal™ Sill Installation

1. Measure the length of EdgeSeal™ Window Flashing 'oversize' by 10mm (5mm on each side of the opening).
2. This measurement is to the outside edge of the 'flexible elbow' of the jamb flashing.
3. To ensure accuracy 12mm past the outside edge of the opening.
4. Remove a corner of the backing tape from the adhesive edge of the prepared flashing.
5. Applying horizontally across the edge of the aluminium joinery so that the edge of the adhesive is flush, not proud of the front face of the aluminium joinery.
6. Slowly pull off the tape while holding the flashing in position

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7. Apply pressure to the front of the flashing to make sure an adequate bond has been achieved between flashing and joinery
8. Tack the flashing in place to maintain its shape

EdgeSeal™ Jamb Installation

1. Measure the length of the jamb from the top corner of the joinery unit to the exposed surface of the installed EdgeSeal™ sill flashing.
2. Cut the Rockcote EdgeSeal™ Window Flashing approximately 1mm proud of total length – cutting 1mm extra length will allow for a tight 'compressed' joint where the EdgeSeal™ Window Flashing junctions to the sill.
3. Remove 100mmof the backing tape from the adhesive edge of the prepared flashing.
4. Install the flashing by slipping and butting firmly under the EdgeSeal™ Window Head Flashing (or aluminium flashing depending on what is being used) first, then align the front edge of the flashing flush with the joinery unit..
5. Slowly pull off the tape while holding the flashing in position.
6. Apply pressure to the front of the flashing to make sure an adequate bond has been achieved between the flashing and joinery unit.
7. Tack the flashing in place to maintain its shape

EdgeSeal™ Head Installation

1. Measure the length of the Window Head and allow an extra 5mm on either side of the joinery unit (sill flashing should be measured and cut to the same dimension)
2. Cut the EdgeSeal™ Window Head Flashing to length.
3. Remove 100mm of the backing tape from the adhesive edge of the prepared flashing.
4. Place the EdgeSeal™ Window Head Flashing on top of the Window Head and slowly pull off the tape while holding the flashing in position
5. Apply firm pressure to the front of the flashing to make sure an adequate bond has been achieved between flashing and joinery
6. Using the same measurement as above, cut a length of Head Flashing tape that is compatible with the building wrap (eg. 3M All Weather Flashing Tape)
7. Adhere the Head Flashing Tape to the top part of the EdgeSeal™ Window Head Flashing and run this up onto the building wrap
8. At either end create a small stop end by turning up the tape against the cavity batten, you need to prevent moisture from tracking off the ends of the Flashing Tape.
9. Install the cladding substrate and decide whether you are plastering or painting the heads.
10. If you are painting the heads install the Universal Drip Edge Flashing between the cladding substrate and the EdgeSeal™ Window Head Flashing

Rockcote PM100 Quick Render Base Coat

Surface Preparation

Ensure surface is clean, sound, dry and free from dust, dirt, grease, mould and lichen.

Application

Mix a solution of Acrylbond and Rockcote MultiStop together and apply using a roller .

Curing:

Render should be protected from hot drying winds and direct sunlight for the first 6 hours..

Resene Construction Systems Mesh (Standard Weave)

General

Measured and cut slightly longer than the height/length of the area to be covered.

Application of Fibreglass Mesh

Apply the pre-measured mesh from the top of the wall.

Press the fibreglass mesh into the render mix with a steel trowel starting at the centre and working outwards towards the sides, so that it is completely embedded with the render mix forced right through the mesh holes.

Ensure there are no wrinkles or trapped bubbles in the mesh and that it is fully embedded just below the surface of the render.

Do not embed the leading edge of mesh as this locates your next mesh layer.

Mesh must not be exposed but retained as close to the surface as possible.

Overlap mesh 100 mm with the adjacent drop of mesh, and trowel to embed together.

Ensure the fibreglass mesh covers all exposed areas of the substrate, including any recesses around the exterior joinery and internal corners.

Fibreglass Mesh must be bought to the outside edge of all Flashings.

Apply 450 x 150 mm strips of fibreglass mesh `butterflies' diagonally at every corner of openings for window and door joinery, meter boxes etc.

After the render mix has cured, trim off excess length accurately against the flashing edge.

Rockcote PM100 Quick Render Levelling Coat

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Surface Preparation

Ensure surface is clean, sound, dry and free from dust, dirt, grease, mould and lichen.

Application

Plaster can be applied with a steel trowel, pump or broad-knife at approximately 2-3mm thick (6m2 per bag). Apply plaster only when the temperature is between 5°C and 30°C and will be in that range for the 24 hours period following application.

Curing:

Render should be protected from hot drying winds and direct sunlight for the first 16 hours. Protect newly applied plaster from rain and water run off for the first 24 hours.

Resene Limelock Sealer

Application

Apply to trowelled plasters immediately after final trowelling (Dependent on surface porosity, typically 5-8m2 per litre). Apply one coat of Resene Limelock over the fresh substrate by commercial grade knapsack sprayer, spray, long pile roller or brush and allow to dry. Evenly coat all fresh surfaces to ensure uniform curing and that free lime cannot be transferred through weak points.

Rockcote Classico Texture Finish

Limitations

Check colour before use
Ensure same batch numbers are used on a single wall where possible
Should not be applied in temperatures below 5ºC or above 35ºC
Not suitable for areas of continual damp or areas submerged in water

Surface Preparation:

Ensure surface is clean, sound, dry and free from dust, dirt, grease, mould and lichen.

Application

Texture is applied not less than 1mm with a steel trowel to a flat finish then float using a circular action to an even texture over the following five minutes with a plastic float. Apply plaster only when the temperature is between 5°C and 30°C and will be in that range for the 24 hours period following application.

Coverage approximately 12m2 per pail

Resene X200 Paint Finish (2 Coats)

Application

Use a 12-20mm synthetic fibre roller or texturing roller depending on surface. Apply two coats, First coat 2 sq. metres per litre, Second coat: 3.5 sq. metres per litre

Maintenance

Plan what maintenance you propose to undertake.

Take into consideration the type of work that is required, & the time of year you want to get it done. Most external maintenance is completed in the summer as this is generally the best weather for drying and for general outside work such as gardening. If you are planning on fixing brackets, security lights or any other fixture to the exterior make sure you have the skills & equipment to undertake the task.

If you are unsure call a specialist.

If it relates to a penetration through the exterior cladding call us direct on 0800 50 70 40 - a simple phone call could save you time & money later. Maintenance sounds difficult & costly - in fact, it can be quite the opposite.

It can become difficult & costly if it is never undertaken, by which time other issues may have arisen that could have been acted upon sooner through regular general maintenance.

There are virtually no “maintenance free” exterior claddings on the market, in fact, almost nothing is maintenance-free - many people tend to throw things away these days when they breakdown as it is cheaper than getting it fixed. This is not the case with your exterior cladding, you can't just throw it away, it is protecting your family & your belongings. It is quite interesting to note that most people maintain their garden, & vehicle so they look good. Yet when it comes to cleaning the exterior windows, & walls or clearing leaves from a blocked gutter it seems to get left alone as it is perceived to be “difficult” or there are better things to do, maybe the dirt & leaves will simply disappear one day. This generally isn’t the case & regular maintenance is required.

One of your major life investments is property so why not look after it? General Maintenance is a requirement of the Resene Construction Systems Performance Guarantee.

Extent of Maintenance

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The extent and nature of necessary maintenance is dependent on the

- Type of cladding or components used
- Position of cladding or components on the building
- Geographical Location of the building
- Specific site conditions.
- Areas that are considered non-maintainable
- Heavily textured areas

Wash Exterior Surfaces

You will need to clean down your Resene Construction Systems Plaster Finish every 12 -18 mths. Most airborne dirt particles accumulate on exterior surfaces during the summer months. So before the winter rain washes the dirt down over the walls, give these areas a clean, this will dramatically reduce the chances of your Resene Construction Systems Plaster Finish being stained.

Washing by rain removes most atmospheric contaminants, but sheltered areas, such as walls directly below eaves, are protected from the direct effects of rain and require regular manual washing. This work should be completed using a low-pressure water blaster (300 psi or less), keep the blaster at a 45-degree angle and 300mm away from the cladding when cleaning. For best results use “Resene Roof wash and paint cleaner”. Apply the diluted solution with a soft broom, & wash off with copious amounts of freshwater. Most detergents have a detrimental effect on fish life so avoid letting the washings runoff into the stormwater system. DO NOT use harsh solvent-based cleaners.

However, it is important that high-pressure water is not directed at sensitive junctions such as window surrounds and other flashings. Great care must be taken to avoid water being driven past anti-capillary gaps and flashings into the wall cavities.

Roof Junctions and Spouting

When cleaning, check your spouting to make sure there are no leaves that could block drains, or overflows when it rains. Trim back branches and clear gutters at the same time. Consider fitting gutter guards (however, dirt can still get through, so you do need to check under the gutter guards from time to time). Check apron flashing diverters (kick-outs) to make sure these are diverting water away from the cladding.

Deck and Ground Clearances

Exterior claddings require a minimum ground clearance to ensure no moisture gets to the timber of the wall due to capillary action. Ground clearances between the cladding and ground/deck must be maintained. For more information on required Ground Clearances refer to RCS TradeSpec 1.2 - Design Information.

If your lawn adjoins the house, a 150-225mm wide mowing strip along the edge will stop grass and weeds growing in these difficult-to-mow areas - and keep the area drier. A mowing strip will also prevent damage to the house from hitting the cladding with the mower. You can also use concrete, bricks, pavers or treated timber for a mowing strip, laid on a concrete base or on polythene but make sure there is at least 100mm gap between the pavers and the base of the cladding.

Check Sealants

Check for cracked, missing or loose sealant. You will find sealants have been used around windows, doors, electrical fittings, plumbing fittings and along the soffit line. All deteriorated sealants should be removed and resealed (refer to RCS TradeSpec 3.4 - Sealants)

Check hidden areas

Check behind foliage, under decks and areas that are heavily shaded for signs of algae and mould. If possible increase the circulation of air around these points by pruning foilage. The use of mulch, bark or stones in these areas will also lower the risk of algae appearing on the surface of the coatings.

Damaged Areas

Contact your Registered Plasterer they will provide the necessary expertise to remedy the damage. If you are unable to contact a registered Resene Construction Systems Plasterer call Resene Construction Systems - FreePhone 0800 50 70 40 -we will arrange for an inspection & provide an assessment for the repair the exterior cladding.

Non-Maintainable Areas

Parapets are considered non-maintainable areas. They are in such a location as the degree of difficulty to maintain these areas according to the general maintenance requirements of the building code without risk to your health and safety is considered high. If you have areas that are non-maintainable we would require that these are checked every 6 months. Any non-maintainable areas will also need to be repainted/coated every 2-3 years.

Repainting a Dwelling

Repainting the exterior should be undertaken by a professional painter every 7 - 10 years to ensure the integrity of the entire system is kept good. If you select a colour which has an LRV less than 25% you can expect to repaint every 7 years. It is recommended that when you repaint your dwelling that you consider the use of Resene X200 as your choice of paint.

Maintainable Parapet Areas utilising Liquid Membranes

If you have areas that have maintainable liquid membrane eg.large sloping sills, balustrades, chimney breasts we would require that these are checked every 12 months. Any maintainable areas will also need to be repainted/coated every 3-5 years.

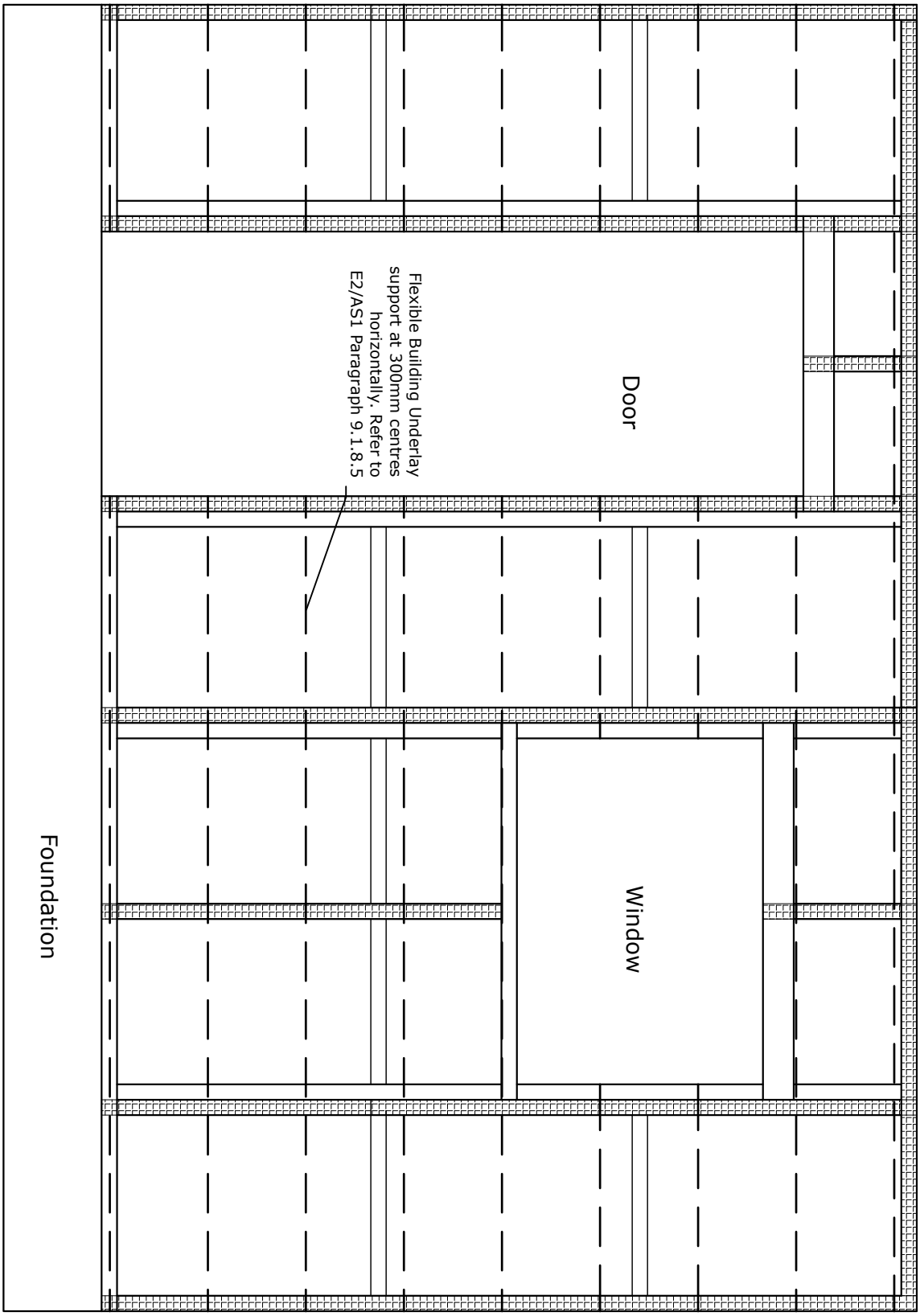
Important:

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This specification must be read in conjunction with the Resene Construction Systems technical drawings.
No alteration to the Resene Construction Systems RenderSpec® is permitted.
The following Resene Construction Systems TradeSpec® Documents can be found at http://tradespec.co.nz
All Technical Data Sheets are available at https://reseneconstruction.co.nz/technical-library/technical-data-sheets/
All Safety Data Sheets are available at https://reseneconstruction.co.nz/technical-library/safety-data-sheets/

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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

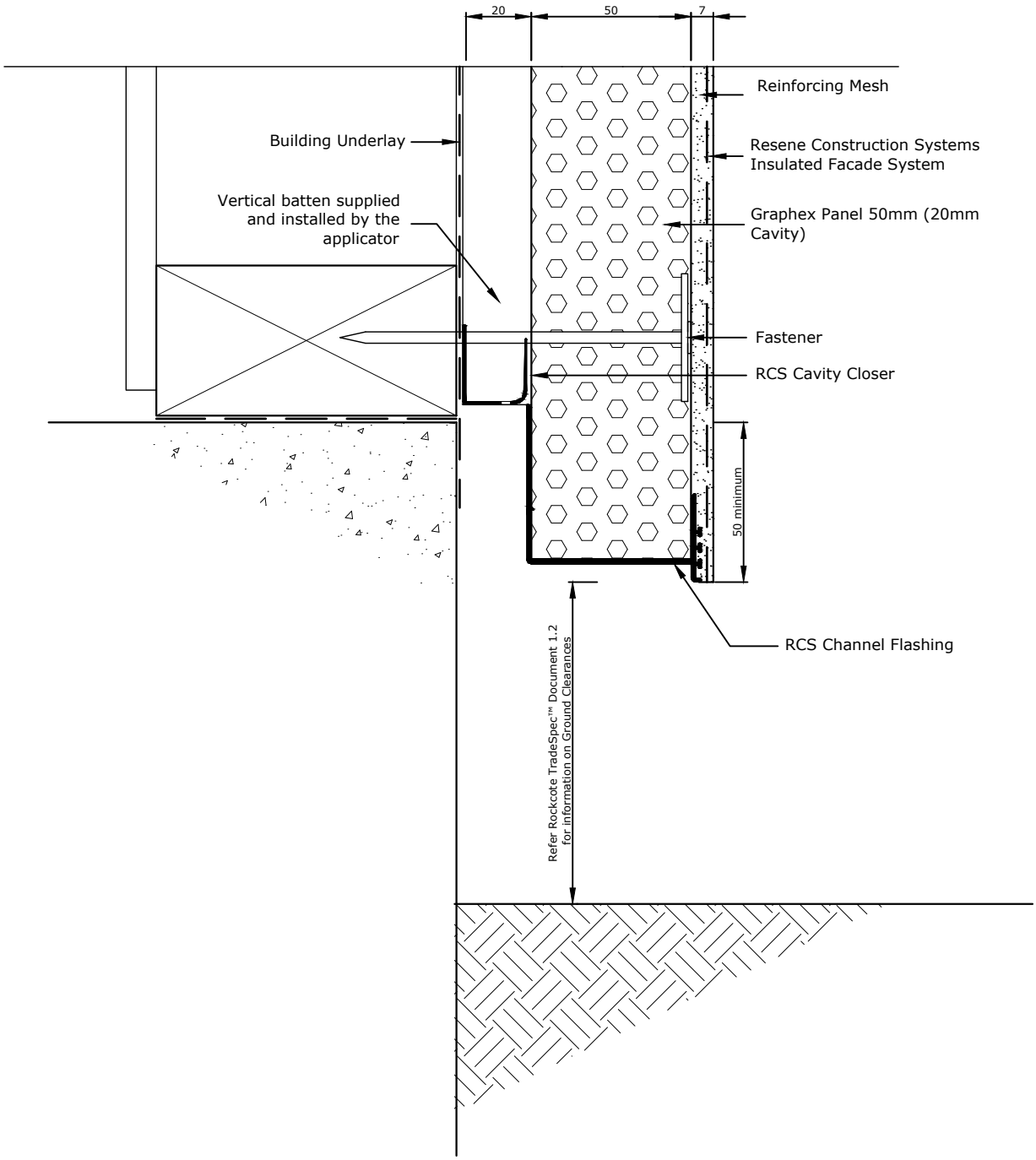
Drawing Name
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Scale
1 : 2 @ A4

Date
1 November 2017

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Refer TradeSpec™ Document 1.2 for information on Ground Clearances

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System
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Substrate
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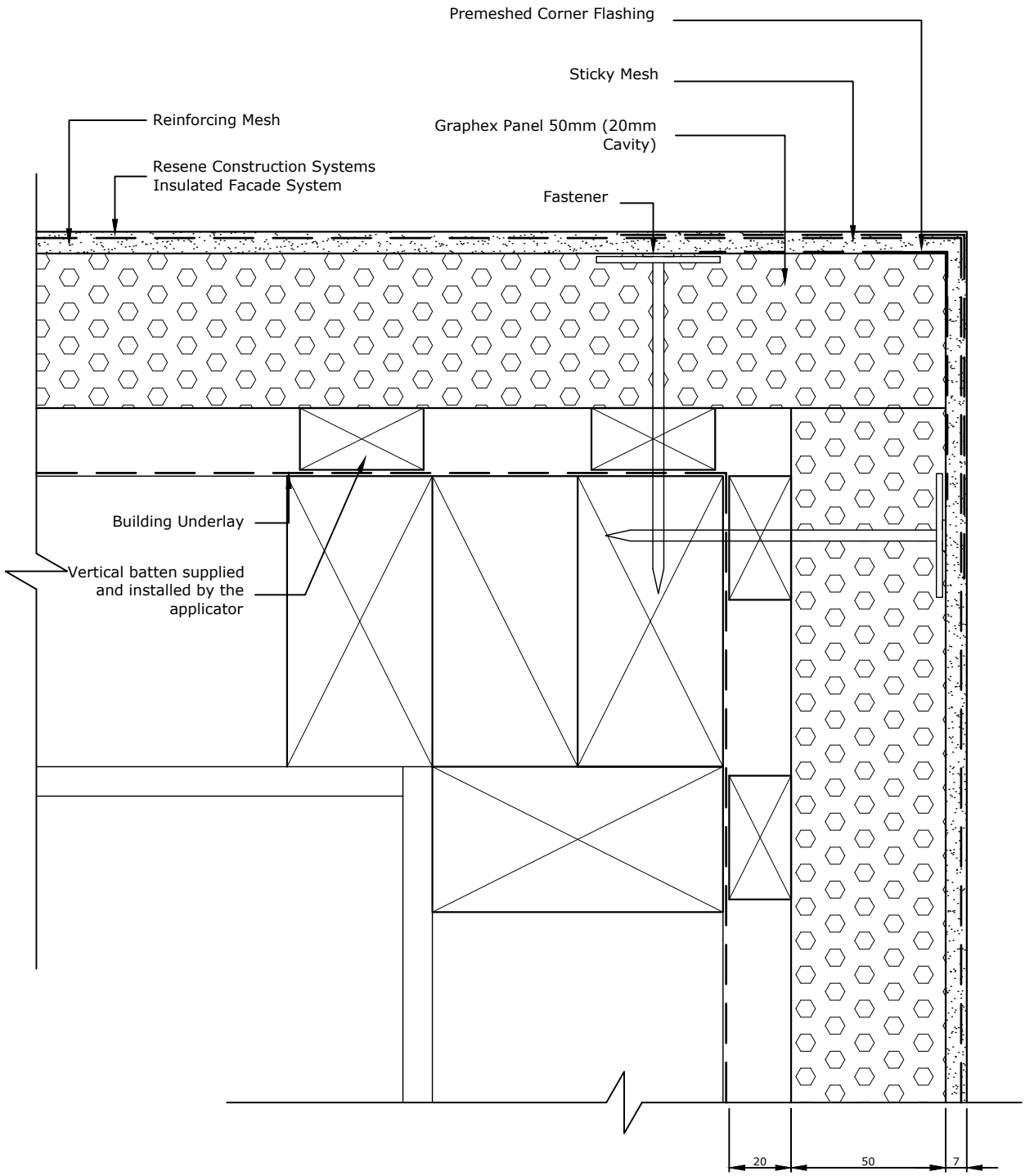
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Foundation

Scale
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Date
1 November 2017

Sheet
71.02.00

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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

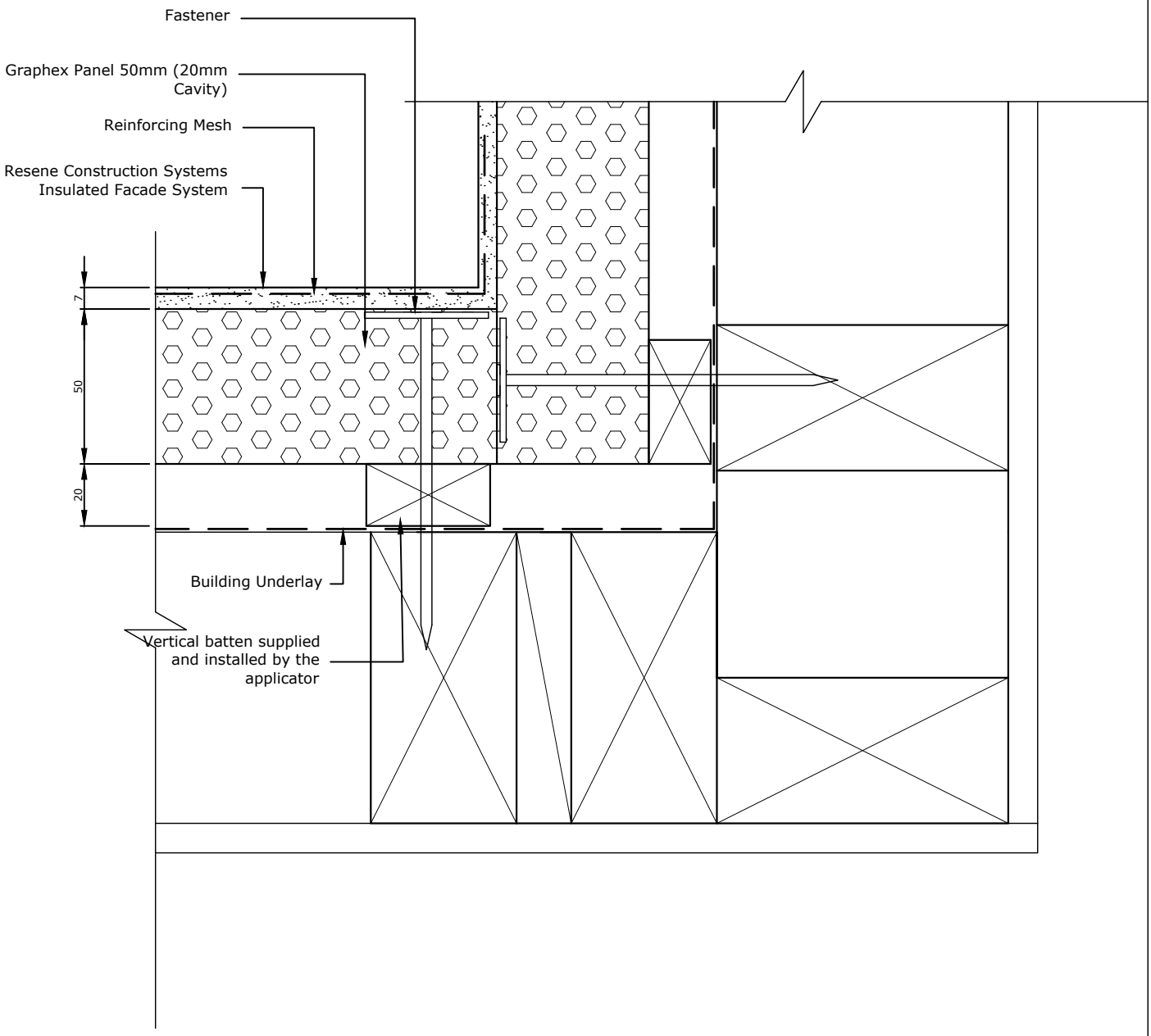
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Scale
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Date
1 November 2017

Sheet
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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

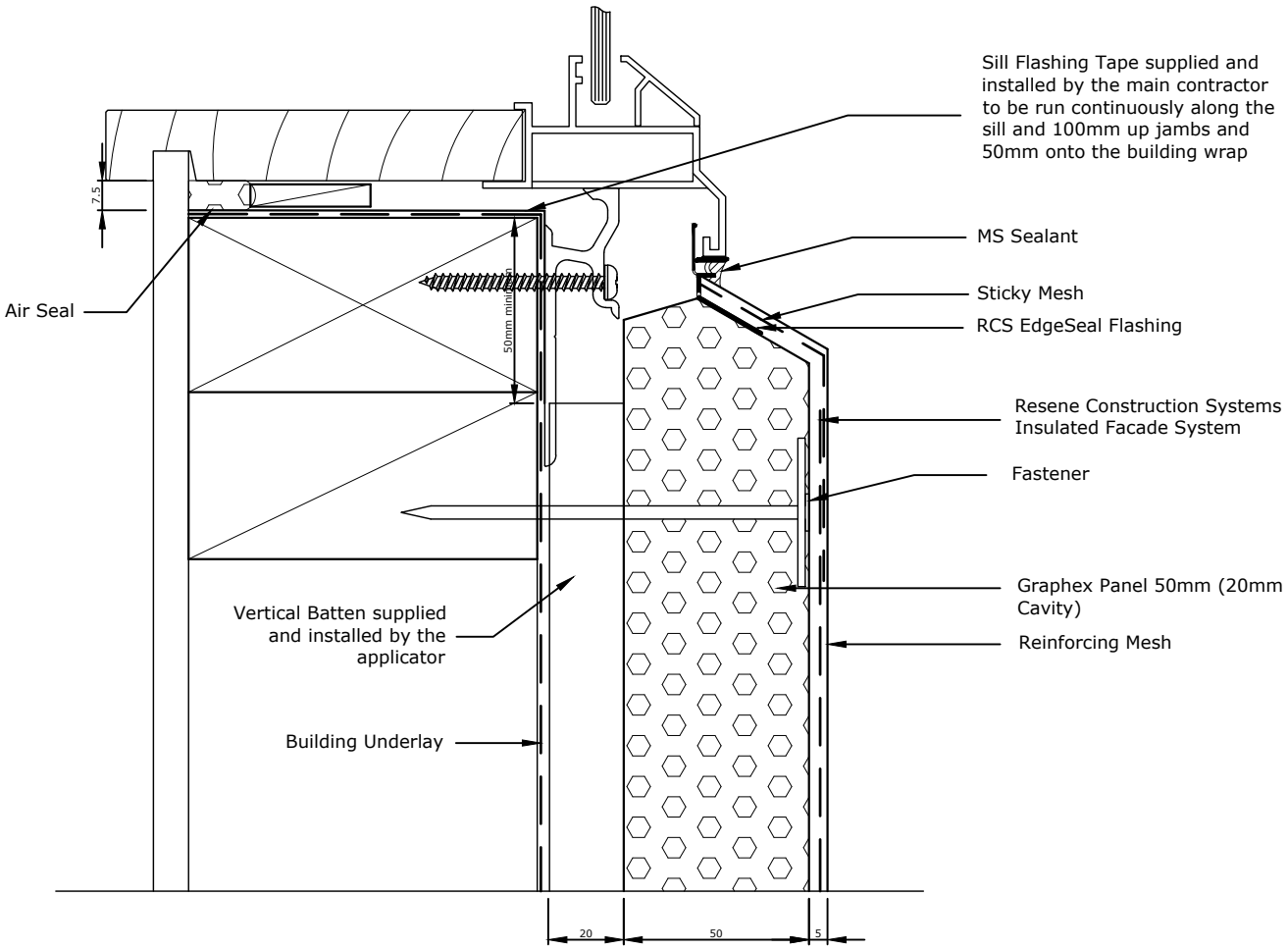
Drawing Name
Internal Corner

Scale
1 : 2 @ A4

Date
1 November 2017

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71.04.00

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Allow a 25mm Gap between the back of the joinery and external facing timber framing to allow the sill flashing to fit.

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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

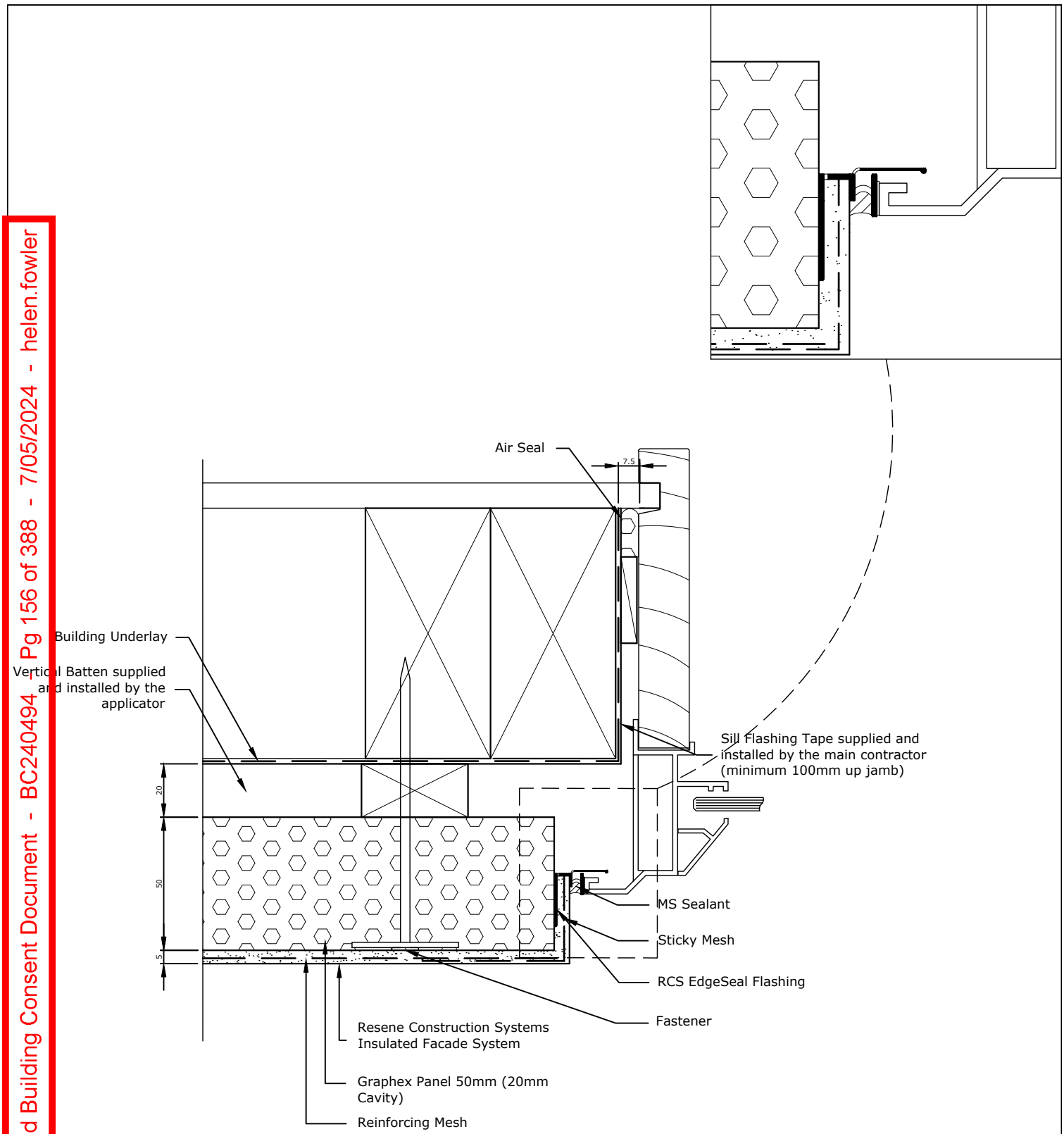
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Window Sill - 20mm Reveal

Scale
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Date
1 November 2017

Sheet
71.05.05

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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

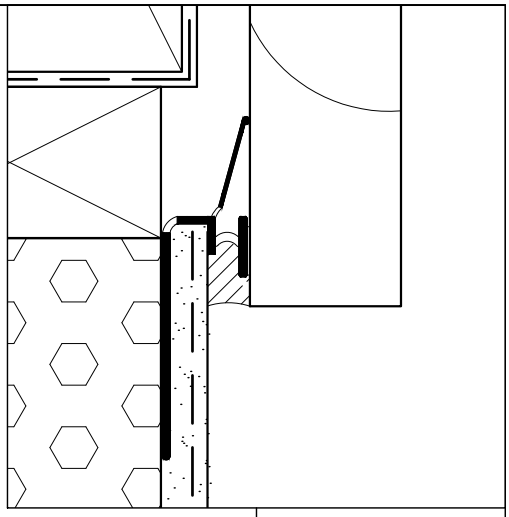
Drawing Name
Window Jamb - 20mm Reveal

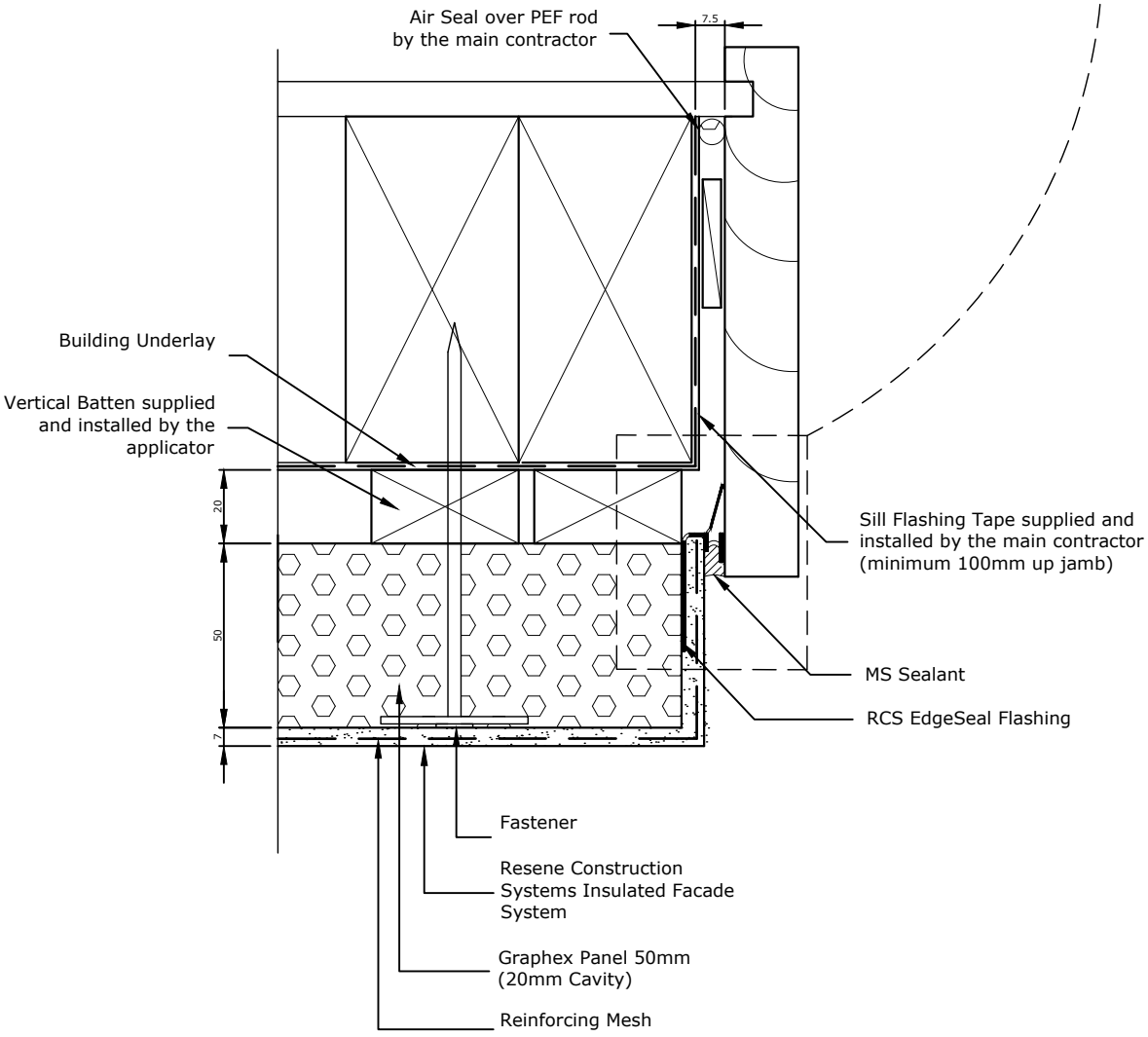
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Date
1 November 2017

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71.06.05

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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

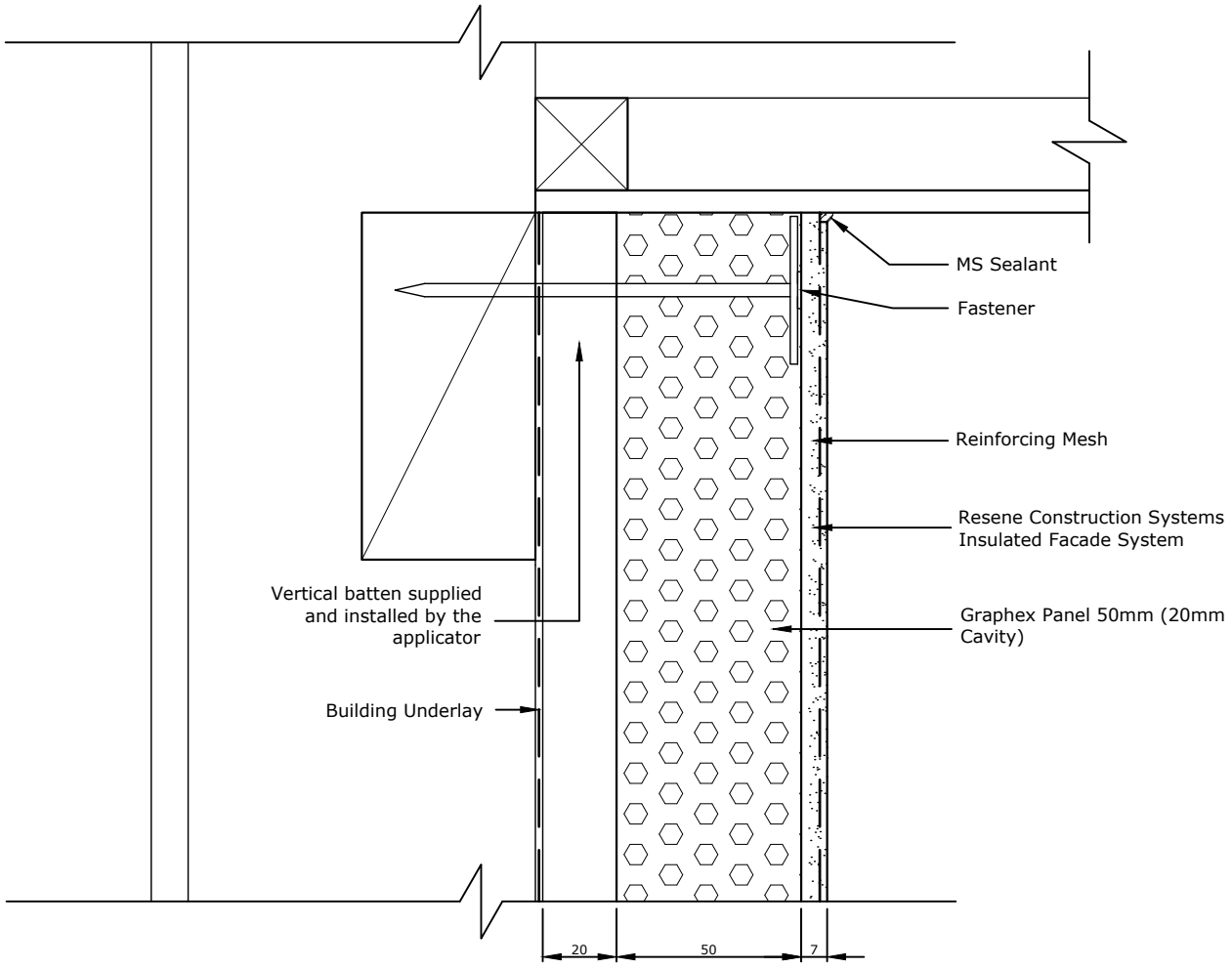
Drawing Name
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Scale
1 : 2 @ A4

Date
1 November 2017

Sheet
71.06.50

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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

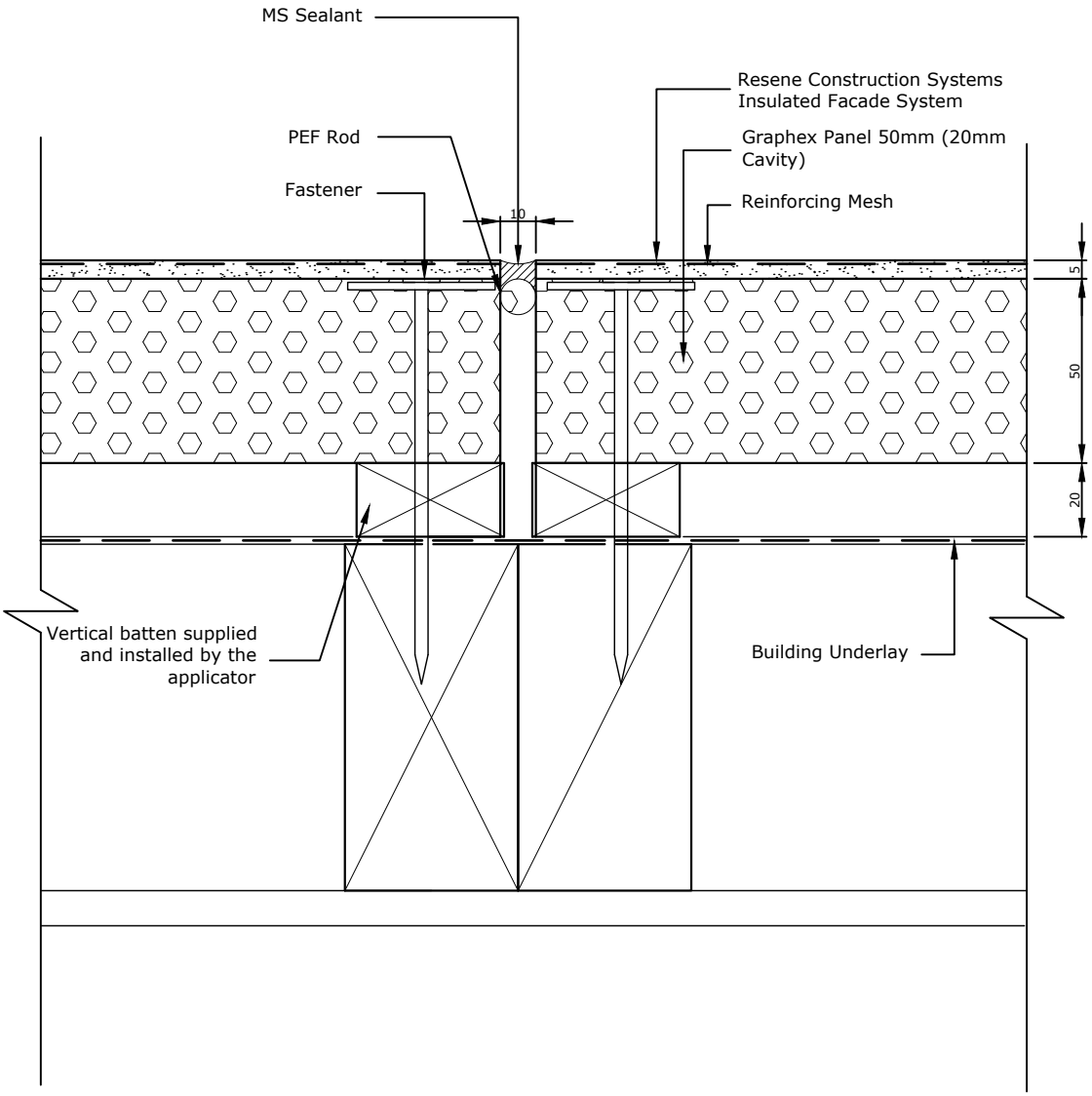
Drawing Name
Soffit

Scale
1 : 2 @ A4

Date
1 November 2017

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All Control Joint spacings and setouts are the responsibility of the Designer, for suggested locations refer to TradeSpec™ Document 1.4

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System
Insulated Facade System

Substrate
Graphex Panel 50mm (20mm Cavity)

Drawing Name
Vertical Control Joint - Option 1

Scale
1 : 2 @ A4

Date
1 November 2017

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71.10.00

APPENDIX 08 – JAMES HARDIE LINEA WEATHEBOARD

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JamesHardie™

jameshardie.co.nz

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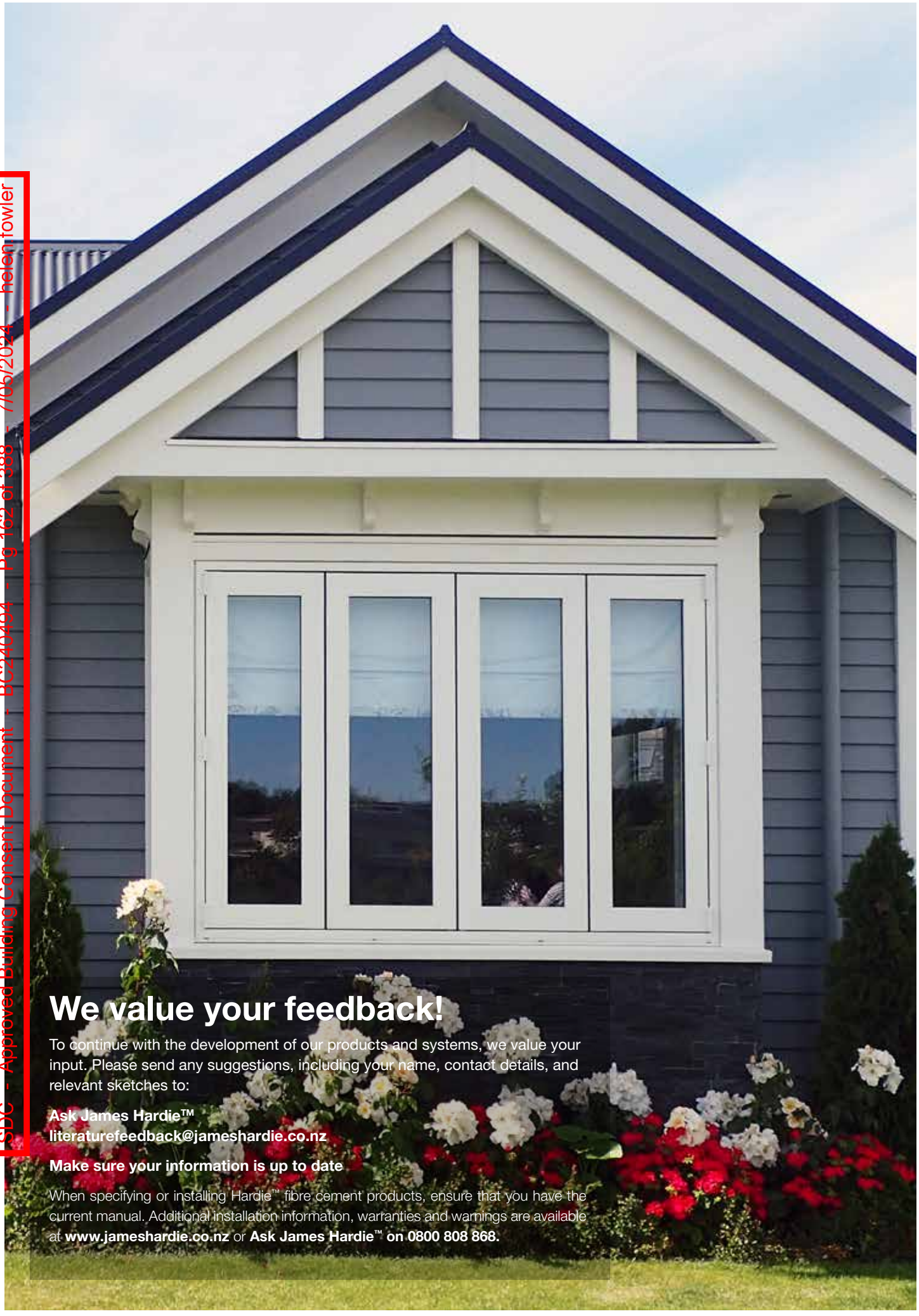


Linea™ Weatherboard Cavity Fix

Technical Specification

June 2023 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™
literaturefeedback@jameshardie.co.nz

Make sure your information is up to date

When specifying or installing Hardie™ fibre cement products, ensure that you have the current manual. Additional installation information, warranties and warnings are available at **www.jameshardie.co.nz** or **Ask James Hardie™ on 0800 808 868.**

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1 Product Overview

1.1 Product Information

Linea™ Weatherboard is an external cladding.

Linea™ Weatherboard is a 16mm thick, pre-primed bevel back fibre cement weatherboard. The bottom front edge of Linea™ Weatherboard is chamfered. It has tongue and groove ends for jointing and is classified as lightweight wall cladding for use in residential and light commercial buildings using timber or lightweight steel framed external walls. Linea™ Weatherboard is available in 150mm and 180mm widths.

James Hardie also has available:

- Hardie™ Axent™ Trim is a 19mm thick, pre-primed fibre cement product available in two widths. For use as decorative trims around openings and external corners.

For fixing to a steel frame. Ask James Hardie™ on 0800 808 868 for specific requirements. Or refer to the Cladding to Steel Framing Technical Supplement by James Hardie about the installation of Linea™ Weatherboard to steel frame.

Table 1

Linea™ Weatherboard and Hardie™ Axent™ Trim sizes

							Coverage Information		
Product	**Code**	**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/m² (approx. at EMC)**
Linea™ Weatherboard 150	402533	4200	150	16	T & G	120	8.3	3.1	24.93
Linea™ Weatherboard 180	401847	4200	180	16	T & G	150	6.7	3.57	23.92
Hardie™ Axent™ Trim	405260	3000	45	19	Square	N/A	N/A	1.1	N/A
Hardie™ Axent™ Trim	405257	3000	70	19	Square	N/A	N/A	1.6	N/A
Hardie™ Axent™ Trim	405258	3000	89	19	Square	N/A	N/A	2	N/A

The effective thickness of finished Linea™ Weatherboard on the wall at the lap is approximately 33 to 35mm

All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

Linea™ Weatherboard is categorised as a Light Weight Wall Cladding as described in the NZS 3604.

1.2 Manufacturing and Classification

The manufacturing process of Linea™ Weatherboard by James Hardie is ISO 9001 Certified.

Linea™ Weatherboard is an advanced lightweight cement composite cladding manufactured using a basic composition of Portland cement, ground sand, cellulose fibre, water and proprietary additives. The product is easily identified by the name 'Linea' printed on the back.

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Hardie™ Axent™ Trim is an advanced lightweight cement composite cladding manufactured using a basic composition of Portland cement, ground sand, cellulose fibre, water and proprietary additives. The trims come pre-sealed on all sides, ready for paint..

Linea™ Weatherboard is manufactured in Australia to the Australian/New Zealand Standard AS/NZS 2908.2 'Cellulose-Cement Products' (ISO 8336 'Fibre-Cement Flat Sheet').

Linea™ Weatherboard is classified Type A, Category 2 in accordance with AS/NZS 2908.2 "Cellulose-Cement Products".

For Safety Data Sheets (SDS) visit **www.jameshardie.co.nz** and view them in the technical literature section or Ask James Hardie™ on **0800 808 868**.

1.3 Components and Accessories

Table 2

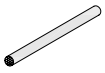
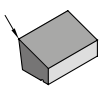
Accessories/tools supplied by James Hardie			
Accessories	**Description**	**Size (mm)**	**Code**
	**External corner soaker 90° for Linea™ Weatherboard 180mm** • Aluminium	200 long	**301186**
	**External corner soaker 135° for Linea™ Weatherboard 180mm** • Aluminium	200 long	**301178**
	**External corner soaker 90° for Linea™ Weatherboard 150mm** • Aluminium	170 long	**302820**
	**External Slimline Box Corner Mould** Etched primed aluminium extrusion used to create external corner	2700 long 4000 long	**301195** **305809**
	**Linea™ 35mm Cavity Closer**	3000 long	**306035**
	**Internal 'W' Mould 90°** Etched primed aluminium extrustion used to create 900 internal corner	2700 long 4000 long	**301184** **305807**
	**Internal 'W' Mould 135°** Etched primed aluminium extrustion used to create 135° internal corner	2700 long	**301183**
	**Hardie™ Corner Under Flashing 50 x 50mm** PVC moulding used as under fashing for internal and external corners	3000 long	**303745**
	**Hardie™ Flex Galvanised nail - 5kg**	60 x 3.15mm	**302784**
	**Hardie™ Flex Stainless steel nail - 5kg**	60 x 3.15mm	**302782**
	**Hardie™ Blade Saw Blade** Diamond tip fibre cement circular saw blade. Spacers not included	4 tooth - 184mm	**300660**
	**Hardie™ Blade Saw Blade** Diamond tip fibre cement circular saw blade. Spacers not included	6 tooth - 254mm	**303375**
	**Gecko Gauge™** This easy to use tool gauges and supports the weatherboard for a one person install.		**305941**

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Table 3

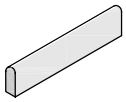
Accessories not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with its Linea™ Weatherboard. 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
	**Flexible Underlay** To comply with Table 23 of E2/AS1		
	D head or RounDrive Nail Gun nail for concealed fixing Linea™ Weatherboard.	60 x 2.87mm 75 x 3.06mm	Hot Dip Galvanised/ Stainless Steel
	Hardie™ Flex Hot Dip Galv. Nails For concealed fixing by hand nail	60 x 3.15mm 75 x 3.15mm	Hot Dip Galvanised/ Stainless Steel
	Jolt Head Nail for face fixing Linea™ Weatherboard	75 x 3.15mm 90 x 3.55mm	Hot Dip Galvanised/ Stainless Steel
	Titanium Coated High Speed Drill Bit. For pre-drilling prior to face fixing with jolt head.	3.0mm 3.5mm	
	Brad Nail To tie boards together	32mm	
	**Joint sealant** Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information.	Tube	Sika®, Bostik® or similar Holdfast®
	**CRC® ADOS® Builders Fill** Two part exterior grade fill to finish over jolt head nails.		
	**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.	Proprietary tape to adhere to flexible underlay	Tyvek®, Marshall Innovations or similar
	**Flashing Material** as per Table 20, 'E2/AS1'		Flashing Fabricator
Dimension to suit 	**Planted Sill**		H3.1 minimum Treated Timber Timber Merchant or cut on site

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Table 3 contd.

Accessories not supplied by James Hardie			
Accessories	**Description**	**Size (mm)**	**Material/ appearance**
	**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
	**Cavity Closer - aluminium** Used in walls taller than 10m for inter-tenancy fire separation.		
	Primers. Dulux® 1-Step Prep, Resene® Quick Dry etc.		

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2 Application and Scope

2.1 Application

This specification includes the installation of Linea™ Weatherboard cavity construction where risk matrix is 13 or more and must be read in conjunction with the current CodeMark Certificate and BRANZ Appraisal. This installation method can also be used for buildings where the risk matrix score is 0 - 12 if desired.

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.

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.

Refer to the Linea™ Weatherboard Direct Fixed Technical Specification when installing Linea™ Weatherboard without a cavity.

2.2 Scope

Linea™ Weatherboard cavity construction is suitable for use in timber framed buildings that fall within the scope limitations of the New Zealand Building Code (NZBC) Acceptable Solution E2/AS1, Paragraph 1.1.

Linea™ Weatherboard cavity construction is also suitable for use in specific engineering design projects (SED) subject to a wind pressure of 3.2kPa (ULS) maximum for building heights upto 25m.

2.3 Limitations

- Linea™ Weatherboard cladding must not be used on curved wall applications
- Linea™ Weatherboard cladding must not be installed vertically or angled
- The minimum ground clearances specified must be maintained
- Timber window joinery/recessed openings is subject to an alternative design by the designer
- Maximum SLS inter-story seismic deflections up to span/180 when used in specific design buildings (SED) buildings above 10m height. To accommodate higher inter-story drifts, a deflection should be used.

2.4 Details

Various typical Linea™ Weatherboard details are provided within this document. In addition to these, the construction details with HomeRAB™ Pre-Cladding/RAB™ Board have also been developed and are available on our website. These details are available in dwg, dxf, jpg and pdf file format and can be downloaded at **www.jameshardie.co.nz.**

All dimensions shown are in millimetres unless noted otherwise.

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3 Compliance

3.1 NZBC Compliance

When installed in accordance with the conditions of CodeMark number GM-CM30018 Linea™ Weatherboard complies with all relevant requirements of the NZBC. Please refer to www.building.govt.nz or jameshardie.co.nz for a copy of the certificate.

CODEMARK™
30018

Linea™ Weatherboard cavity fixed cladding also has a BRANZ Appraisal number 447 (2020) available at www.branz.co.nz or www.jameshardie.co.nz.

BRANZ Appraised
Appraisal No.447 [2020]

4 Design

4.1 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.

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

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 technical specification by James Hardie.. All the details provided in this document must be read in conjunction with the project specification.

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 their aesthetic expectations before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation. James Hardie will only offer a replacement product if the Linea™ Weatherboard supplied is found to be out of its manufacturing specification.

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4.2 Clearances

The clearance between the bottom edge of cladding and the paved/unpaved ground must comply with section 9.1.3 of E2/AS1. On the roofs and decks the minimum clearance must be 50mm. These clearances must be maintained throughout the life of the building.

Linea™ Weatherboard 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.

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

Do not install cladding such that it may remain in contact with water or ground, refer to figures in section 9 of this manual.

4.3 Structure

4.3.1 Timber Framing

Timber framing must be in accordance with NZS 3604 (Timber-framed buildings) or designed as for specific engineering design (SED) 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.

The stud spacing must not exceed 600mm centres maximum for buildings within the scope of NZS 3604 and 400mm centres maximum for wind pressures more than 1.5kPa (ULS).

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.

4.3.2 Durability

Timber framing must be treated to a minimum H1.2 treatment requirements and comply with Acceptable Solution B2/AS1 'Durability' of the NZBC. For further timber treatment information refer to the NZS 3602 (Timber and Wood-Based Products for use in Buildings) for minimum timber treatment selection and treatment requirements. Framing must be protected from moisture at sites in accordance with the recommendations of framing manufacturers. Refer to the NZS 3602 for information about the allowable moisture content in timber framing.

4.4 Structural Bracing

Bracing can be achieved by using HomeRAB™ Pre-Cladding or RAB™ Board installed direct to framing instead of a flexible underlay or by using the Villaboard™ Lining bracing system on the internal face.

4.5 Energy Efficiency

External walls constructed as per this technical specification, using Linea™ Weatherboard cladding must use suitable bulk insulation to meet the minimum thermal insulation requirements as per Clause H1/AS1 'Energy Efficiency' of the NZBC.

4.6 Fire Rated Walls

External walls with Linea™ Weatherboard cavity fix construction method can achieve fire resistance ratings up to 60/60/60 when constructed in accordance with the Fire and Acoustic Design Manual by James Hardie. Linea™ Weatherboard must be face fixed for fire rated applications.

Refer to the Fire and Acoustic Design Manual by James Hardie for further information about fire rated systems.

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4.7 Control of External Fire Spread

Linea™ Weatherboard material is classified as 'Type-A' when tested to the requirements of Appendix C7.1.1 of C/AS1 and C/AS2 of NZBC and is suitable for use where 'Non Combustible Material' or ' Limited Combustibility Material' is required for for use in buildings located anywhere in relation to the relevant boundary for building within the scope of C/AS1 or C/AS2.

- Where the upper floors contain sleeping uses or other property as per C/AS2, a horizontal flashed joint must be provided to block the top of lower cavity at each floor or intervals of no greater than 3.5m vertical height. Refer to Figure 38 & 39.
- On buildings greater than 10m in height a RAB™ Board must be used.

4.8 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.

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5 Safe Working Practices

WARNING - DO NOT BREATHE DUST AND CUT ONLY IN WELL VENTILATED AREA

Hardie™ fibre cement products contain sand, a source of respirable crystalline silica may cause cancer if dust from product is inhaled. Causes damage to lungs and respiratory system through prolonged or repeated inhalation of dust from product.

Intact fibre cement products are not expected to result in any adverse toxic effects. The hazard associated with fibre cement arises from the respirable crystalline silica present in dust generated by activities such as cutting, rebating, drilling, routing, sawing, crushing, or otherwise abrading fibre cement, and when cleaning up, disposing of or moving dust.

When doing any of these activities in a manner that generates dust, follow James Hardie instructions and best practices to reduce or limit the release of dust.

If using a dust mask or respirator, use an AS/NZS1716 P1 filter and refer to Australian/New Zealand Standard 1715:2009 Selection, Use and Maintenance of Respiratory Protective Equipment for more extensive guidance and more options for selecting respirators for workplaces. 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.

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 and when cleaning up
- Products containing silica are harmless if intact (e.g. an un-cut sheet of wall board)

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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 or higher vacuum or damp down dust before sweeping up
- ✕ NEVER use grinders
- ✓ ALWAYS use a dust reducing circular saw equipped with a sawblade specifically designed to minimise dust creation when cutting fibre cement – preferably a sawblade that carries the Hardie™ Blade name or one with at least equivalent performance – connected to an M Class or higher vacuum
- ✓ Before cutting warn others in the area to avoid dust
- ✓ 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 a properly-fitted, approved dust mask or respirator P1 or higher in accordance with applicable government regulations and manufacturer instructions
- ✓ Consider rotating personnel across cutting tasks to further limit respirable silica exposures.

When cutting

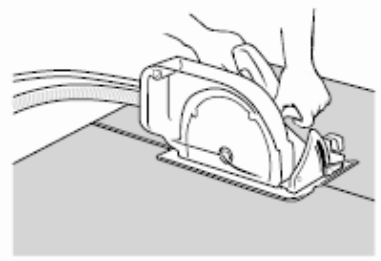
- ✓ Work outdoors only
- ✓ Make sure you work in a well ventilated area
- ✓ Position cutting station so wind will blow dust away from yourself and others in the working area
- ✓ Rotate employees across cutting task over duration of shift
- ✓ Cut products with a Hardie™ Blade Saw Blade (or equivalent) and a dust reducing circular saw connected to a M Class or higher vacuum
- ✓ When sawing, sanding, rebating, drilling or machining fibre cement products, always:
  - Wear your P1 or higher (correctly fitted in accordance with manufacturers' instructions), ask others to do the same.
  - Keep persons on site at least 2 metres and as far as practicable away from the cutting station while the saw is in operation
  - If you are not clean shaven, then use a powered air respirator with a loose fitting head top
  - Wear safety glasses
  - Wear hearing protection
- ✓ Make sure you clean up BUT never dry sweep. Always hose down with water/wet wipe or use an M Class or higher vacuum

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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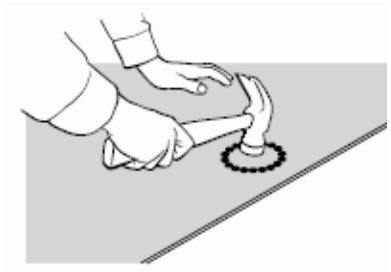
Working Instructions

Hardie™ Blade Saw Blade



The Hardie™ Blade Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of Hardie™ fibre cement products. A dust-reducing saw uses a dust collector connected to a M Class or higher vacuum. 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

5.1 Storage and Delivery

Keeping products and people safe

Off loading

✓ Hardie™ fibre cement products should be off-loaded carefully by hand or by forklift

✓ Hardie™ fibre cement products should not be rolled or dumped off a truck during the delivery to the jobsite

Storage

Hardie™ fibre cement 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

Hardie™ fibre cement 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.

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5.2 Tips for Safe and Easy Handling of Linea™ Weatherboard

✕ 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

6 Installation

The horizontal lap between the two Linea™ Weatherboard must be 30mm minimum. In certain scenarios you may require to creep up the lap, this must not exceed 33mm.

Linea™ Weatherboard must be kept dry whilst in storage prior to and during fixing. Site cut ends that are exposed such as slimline box corners, internal corners etc. and any sanded patches on the boards surface must be primed prior to installation. Dust and loose material must be removed before priming.

6.1 Fastener

6.1.1 Fastener – Size and Method

Linea™ Weatherboard must be fixed to timber with the types of nails specified in Tables 4 and 5, 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 figures in section 9 of this manual
- All concealed nails must be driven flush with the board surface
- When concealed fixing Linea™ Weatherboard, nails must be driven under the lap of boards, except at all corners and vertical edges of openings where Linea™ Weatherboard must be face fixed, refer to figures in section 9 of this manual
- Nails must be fixed 25mm from the end of the board when hand nailing. For gun nailing refer to Section 6.1.2
- 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 figures in section 9 of this manual
- When using concealed fixing method, Linea™ Weatherboard may be tied together by face fixing through the lap using a 32mm brad nail if desired.
- When face fixing Linea™ Weatherboard, the upper board must be pre-drilled before fixing with a jolt head nail

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Table 4

Wind pressure (kPa)	Underlay	Fixing method	Fixing type	Instructions
Up to 1.5 (up to and including VH Wind Zone)	Flexible underlay	Concealed nailing	60 x 3.15mm Hardie™ Flex nail or a 60 x 2.87mm D/round head gun nail	Finish flush with the board surface.
		Face nailing	75 x 3.15mm jolt head nails	Hot-dipped galvanised/stainless steel jolt head nail with pre-drilling through the top weatherboard. Use a 3mm drill bit.
	Rigid air barrier	Concealed nailing	75 x 3.15mm Hardie™ Flex nail or a 75 x 3.06mm D/round head gun nail	Finish flush with the board surface.
		Face nailing	90 x 3.55mm jolt head nails	Hot-dipped galvanised/stainless steel jolt head nail with pre-drilling through the top weatherboard. Use a 3.5mm drill bit.
1.5 to 2.5 (EH Wind Zone and SED projects)	RAB™ Board	Face nailing	90 x 3.55mm jolt head nail	Hot-dipped galvanised/stainless steel jolt head nail with pre-drilling through the top weatherboard. Use a 3.5mm drill bit.

Table 5

Nail requirements for Hardie™ Axent™ Trim	
Single thickness	60mm jolt head nails. If fixing over Linea™ Weatherboard use 75 x 3.15mm jolt head nails through a pre-drilled hole, using a 3mm drill bit.
Single thickness plus packer	If fixing over Linea™ Weatherboard use 75 x 3.15mm jolt head nails through a pre-drilled hole, using a 3mm drill bit. When fixing to timber support use 60mm jolt head nails.

For fire rated wall applications the Linea™ Weatherboard must be face fixed. For more information Ask James Hardie on 0800 808 868.

6.1.2 Gun Nailing

Linea™ Weatherboard can be gun nailed with a D-Head or RounDrive nail when concealed fixing method is used.

- 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 nearest gauge as per Table 4.
- Be finished flush with surface of board.

6.1.3 Fastener Durability

Fasteners must meet the minimum durability requirements of the NZBC. Refer to Table 6 for fixing materials requirements to be used in relation to the exposure conditions.

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Table 6

Exposure conditions and nail selection prescribed by NZS 3604		
Zone	**Application**	
D (sea spray) and geothermal hot spots	General	Stainless steel 304/316
	Fire	
*C and B	General	Hot dip galvanised**
	Fire	

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

**Hot dip galvanised must comply with AS/NZS 4680.

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.

6.2 Framing

Framing to be in accordance with the NZS 3604. The following must be provided for fixing Linea™ Weatherboard:

- Studs at 600mm centres maximum for all wind speed zones up to and including very high (VH)
- Studs at 400mm centres maximum for wind pressures more than 1.5 kPa (ULS)
- Double studs are required at internal corners
- Extra packers may be required at external corners
- Extra studs are required for aluminium internal corner sections

6.2.1 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
- Double studs are required at internal corners
- Extra packers may be required at external corners
- Extra studs are required for aluminium internal corner sections

6.2.2 Gable Ends

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.

6.2.3 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. The visual aspects of the finished cladding can differ between two different sites or the builders installing the product. It is recommended that you also refer to a building guidance document published by MBIE to understand an acceptable level of tolerances allowed in building materials and workmanship. www.building.govt.nz Guide to tolerances, materials and workmanship in new residential construction 2015

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6.3 Flexible Underlay or HomeRAB™ Pre-Cladding

Flexible underlay or HomeRAB™ Pre-Cladding must be provided to comply with the requirements of E2/AS1 up to and including very high wind zone.

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. HomeRAB™ Pre-Cladding is suitable for use as an air barrier and must be installed in accordance with the HomeRAB™ Pre-Cladding and RAB™ Board Installation Manual.

6.4 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.

6.5 Rigid Air Barrier

In EH wind zone or for specific design wind zone, a rigid air barrier i.e. RAB™ Board, must be used instead of flexible underlay.

For buildings more than 10m, RAB™ Board must be used. To achieve the temporary weathertightness using HomeRAB™ Pre-Cladding and RAB™ Board, windows/doors need to be installed with required flashing tapes and seals etc. Refer to HomeRAB™ Pre-Cladding and RAB™ Board Installation Manual for information regarding its installation and to achieve temporary weathertightness.

6.6 Vent Strip

Linea™ 35mm cavity closer vent strip must be installed at the bottom of all walls constructed using the drained and ventilated for cavity construction method. Linea™ 35mm cavity closer vent strip has an opening area of 1000mm^2/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. Alternate cavity closer can be used ensuring compliance of E2 and may need to be used with a cant strip.

6.7 Cavity Battens

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 to comply with the durability requirements of B2/AS1.

Cavity battens must comply with E2/AS1 and:

- Be minimum 18mm thick
- Be minimum 45mm wide
- 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)

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6.8 Joints

6.8.1 Jointing

The ends of Linea™ Weatherboard 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 to the front of tongue before pushing into the groove at the time of installation. From a visual perspective, the joint line will be visible and must not be hard filled.

6.8.2 Drainage Joint

After every two floors a horizontal drainage joint flashing is required, refer to Figure 29 in section 9 of this manual.

6.8.3 External Corner Joint

There are a number of options to select from when detailing external corners:

- 90º corner soaker in aluminium
- 135º corner soaker 180mm aluminium
- Aluminium boxed corners
- Box corners using Hardie™ Axent™ Trim
- Mitred corners to weatherboards

Refer to figures in section 9 of this manual.

6.8.4 Internal Corner Joint

There are a number of options to select from when detailing internal corners:

- 90º or 135º Aluminium W-mould
- Scribed corner

Refer to figures in section 9 of this manual.

6.9 Junctions and Penetrations

All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Linea™ Weatherboard which meet the performance requirements of E2 ‘External Moisture’, an approved document of the NZBC, refer to figures in section 9 of this manual.

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7 Finishes

Protective coating of Linea™ Weatherboard is required in order to meet the durability requirements of the NZBC.

7.1 Preparation and Priming

The Linea™ Weatherboard must be dry before painting. Punch and fill all exposed jolt head nails a maximum of 2mm below the surface. Fill the hole with an exterior grade 2 part builders fill, eg CRC® ADOS® Builders Fill, allow to cure and sand using 60 grit sand paper smooth ready for painting. Prime any sanded patch on board surface or the site cut edges that will be exposed.

It is not recommended to seal gap under the lap of weatherboards as it helps in circulation of air behind the weatherboard cladding. However if sealing of the gaps is undertaken, the product warranty still applies.

7.2 Sealants

All sealants must demonstrate the ability to meet the relevant requirements of the NZBC. 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. Dark coloured paints can be used, i.e. there is no restriction on the Light Reflectance Value (LRV) of paint to be applied. All exposed faces, including the top edges under the sills and bottom edges of Linea™ Weatherboard and accessories must be finished with an exterior paint system.

For best aesthetic results a low sheen paint is recommended.

The dark colours in certain environments may fade quicker. Special paints/coatings are required in certain harsh environments.

Paint selection and the preparation required is dependent on paint chosen. Refer to the paint manufacturer for information before starting painting.

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8 Care and 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 using low pressure water and a brush, and every 3-4 months in extreme coastal conditions or sea spray zones. Do not use a water blaster to wash down the cladding. Refer to your paint manufacturer for washing down requirements.
- Re-coating exterior protective finishes. Always refer to your paint manufacturer for re-coating requirements
- Maintaining the exterior envelope and connections including junctions, penetrations, flashings and sealants
- Cleaning out gutters, blocked pipes and overflow pipes as required
- Pruning back vegetation close to or touching the building as well as ensuring the NZBC ground clearance requirements are maintained especially where gardens are concerned
- 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

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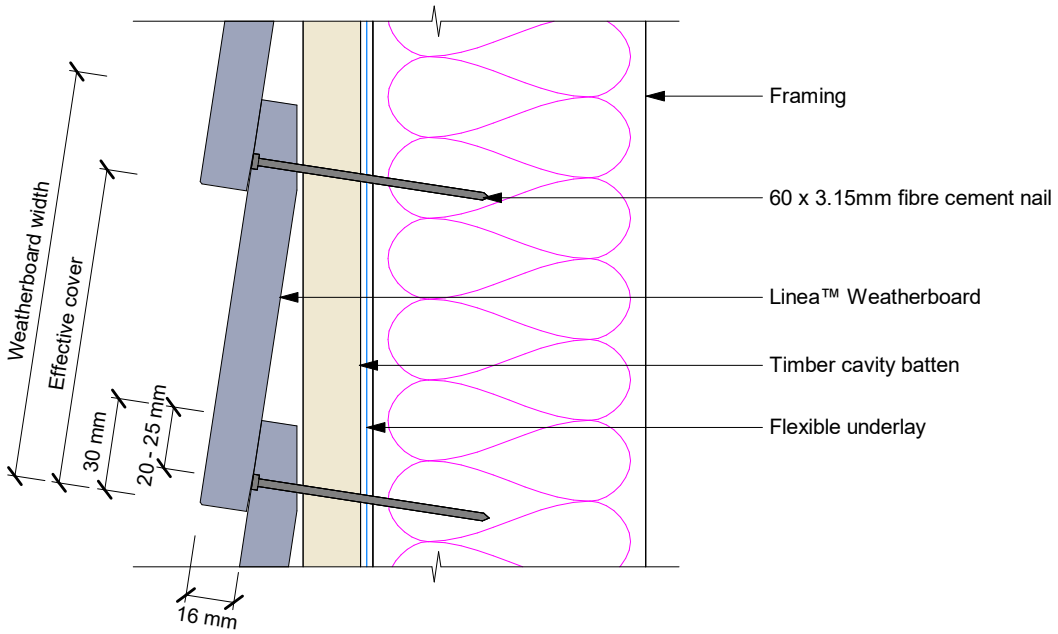
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For all meter box details please visit our website at **www.jameshardie.co.nz** or Ask James Hardie™ on **0800 808 868**.

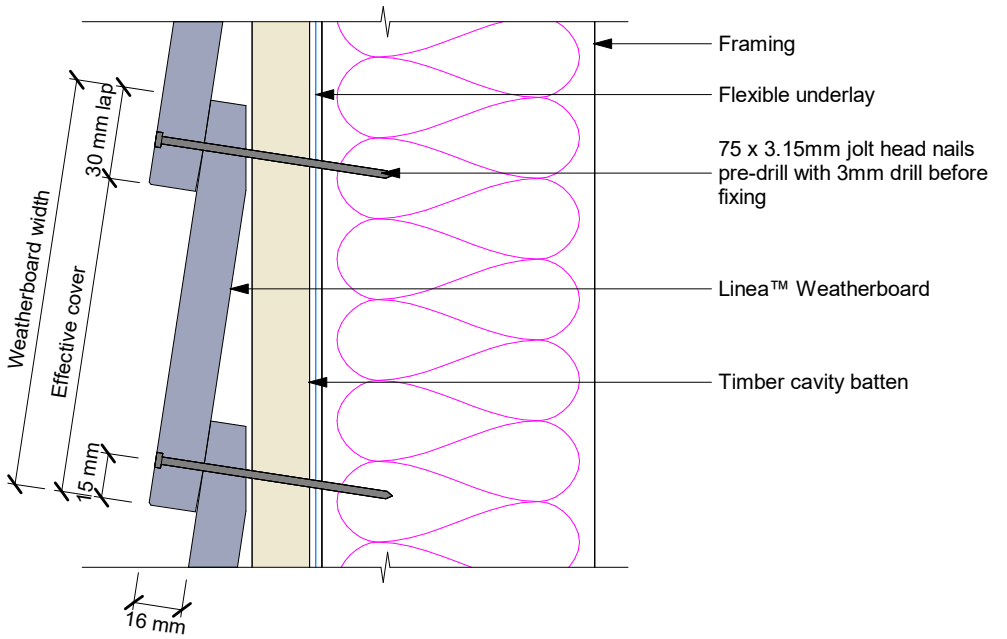
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Figure 1: Weatherboard fixing



Concealed Nailing

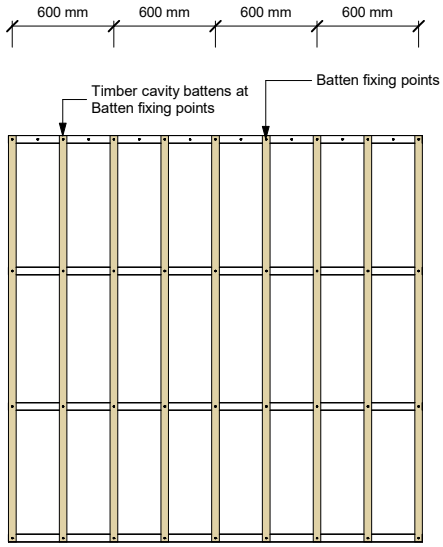
Linea™ Weatherboards to be face fixed at corners and down window and door openings using jolt head nails at 90° to face, punch 2mm below surface and fill. Refer to fixing table 4



Face/Exposed Nailing

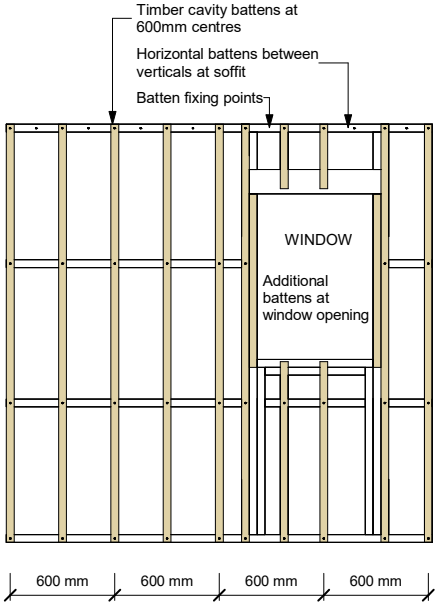
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Figure 2: Batten fixing



The intermediate support for insulation between the studs could be a timber cavity batten, polypropylene tape or 75 mm galvanised wire mesh. Refer to E2/AS1 Paragraph 9.1.8.5 Polypropylene tape must be fixed horizontally and drawn taut at 300 mm centres.

Figure 3: Batten layout at window opening



-The intermediate support for insulation between the studs could be a timber cavity batten, polypropylene tape or 75 mm galvanised wire mesh. Refer to E2/AS1 Paragraph 9.1.8.5 Polypropylene tape must be fixed horizontally and drawn taut at 300 mm centres.

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Figure 4: Foundation detail

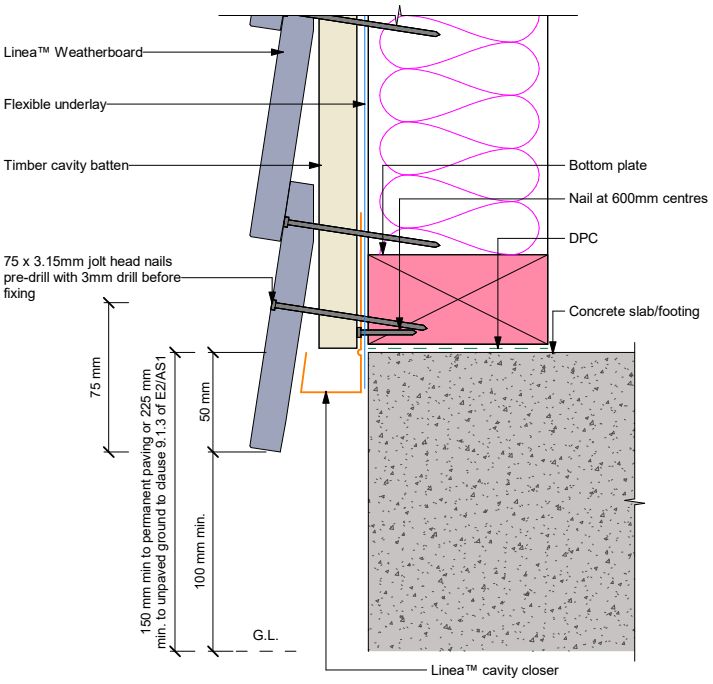
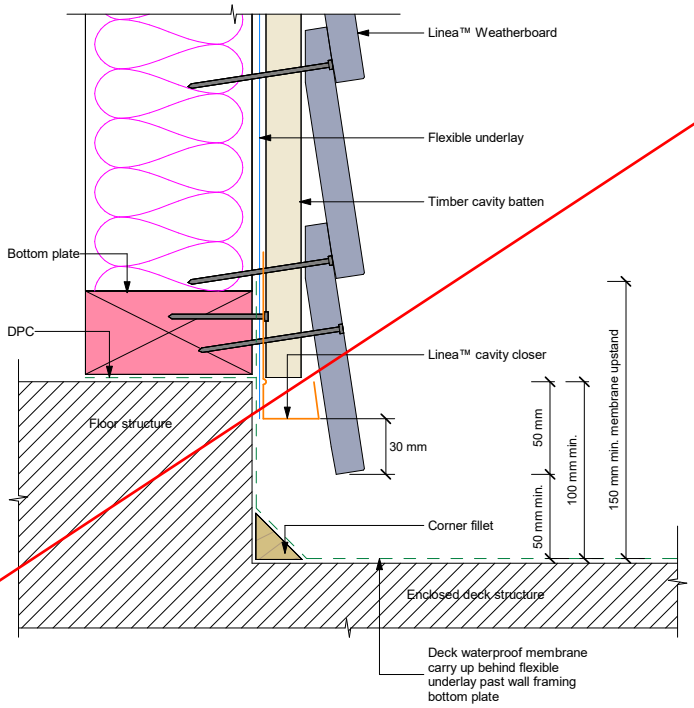


Figure 5: Enclosed Deck



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Figure 6: Jointing off stud

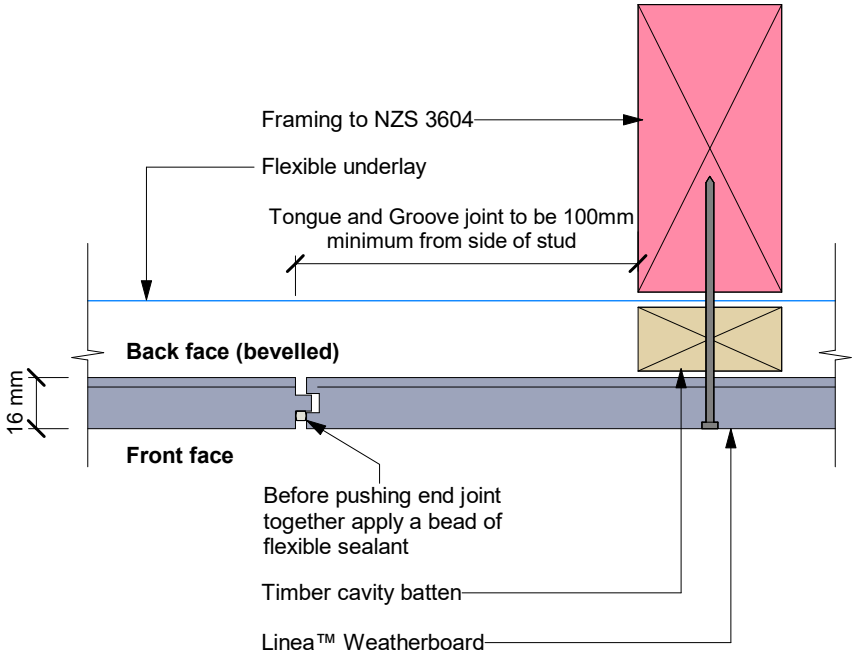
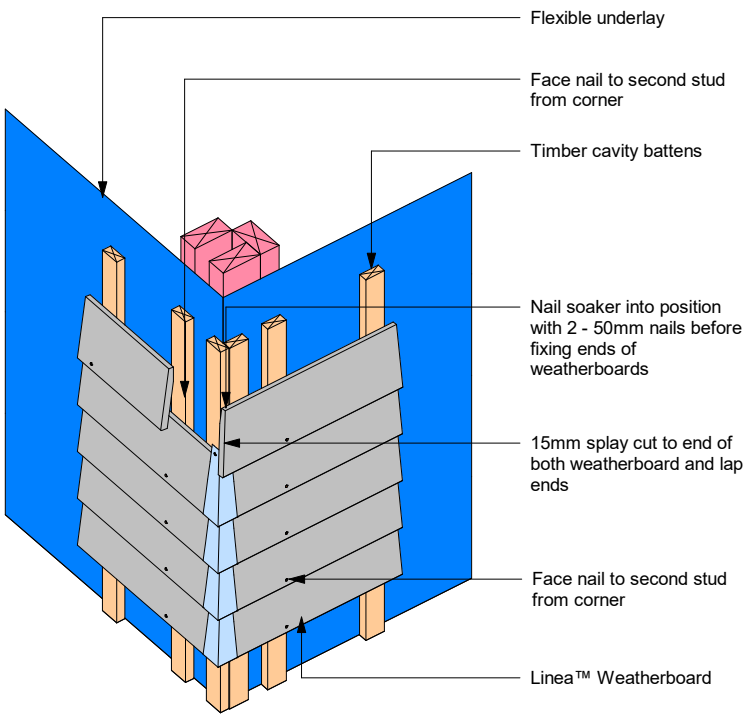


Figure 7: External corner soaker

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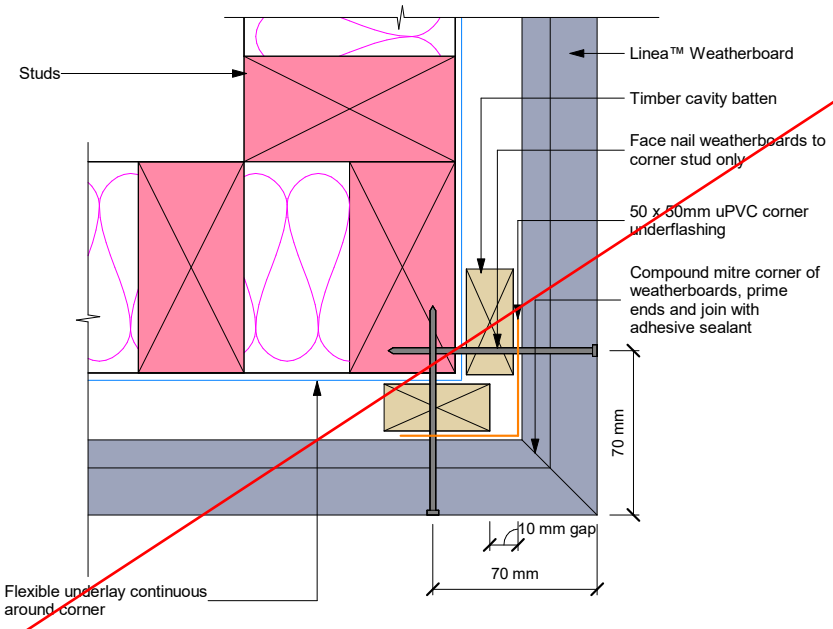
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Figure 10: Mitre corner



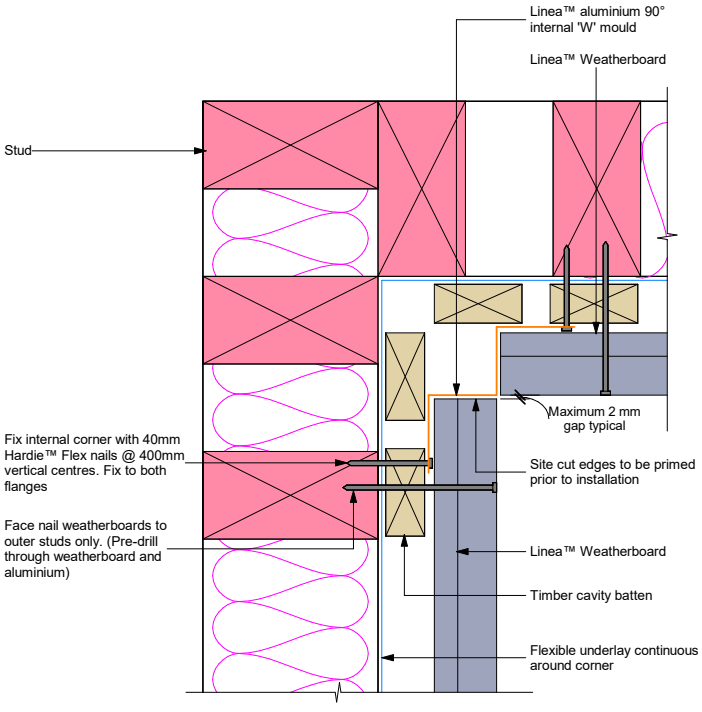
Note: Adhesive sealant must be used on the full end face of both weatherboards. Push lightly together

Figure 11: Internal 90 ° aluminium ‘W’ mould corner

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Figure 12: Internal 135 º aluminium 'W' mould corner

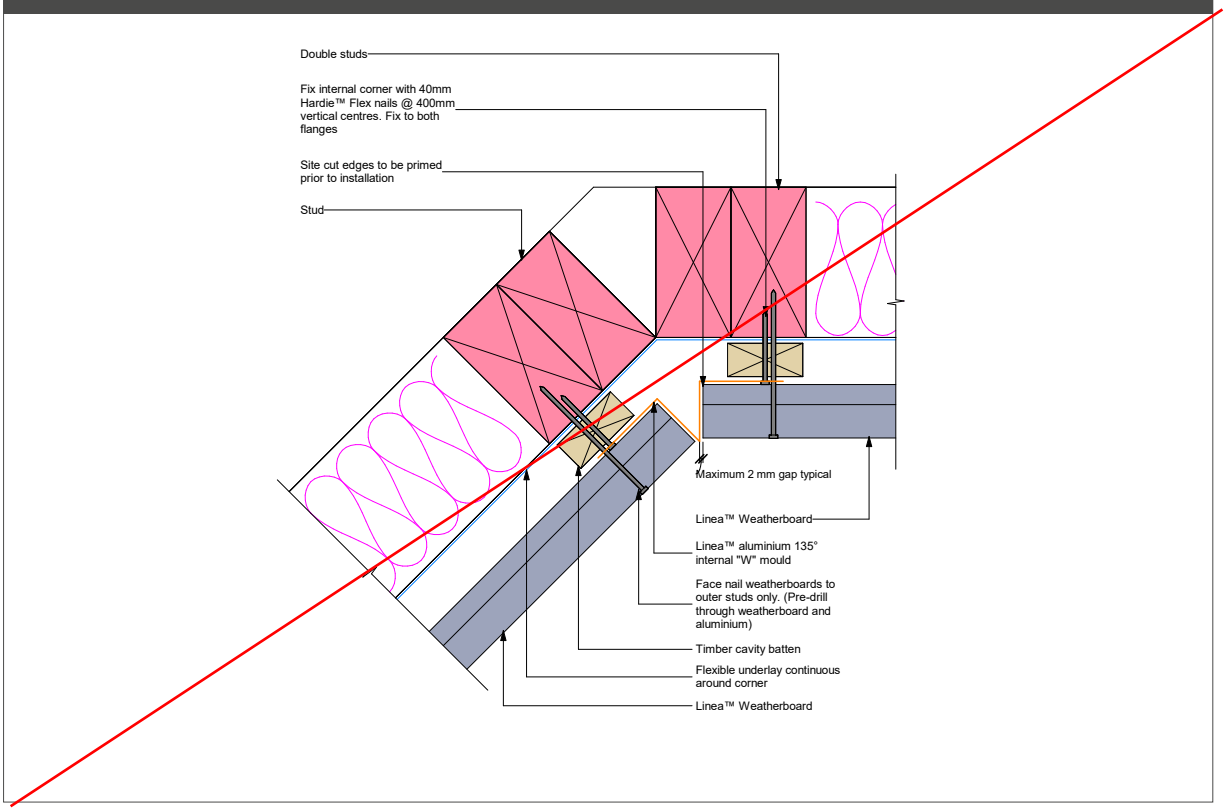
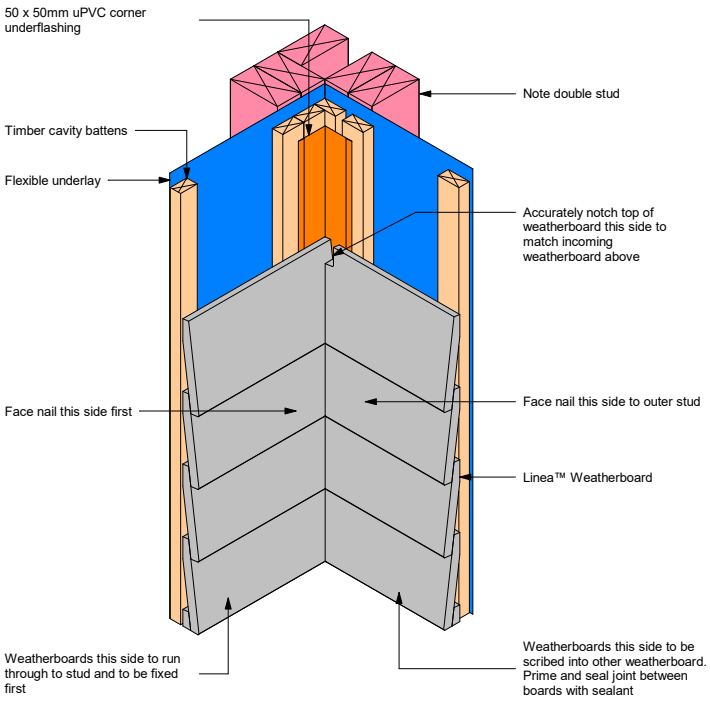
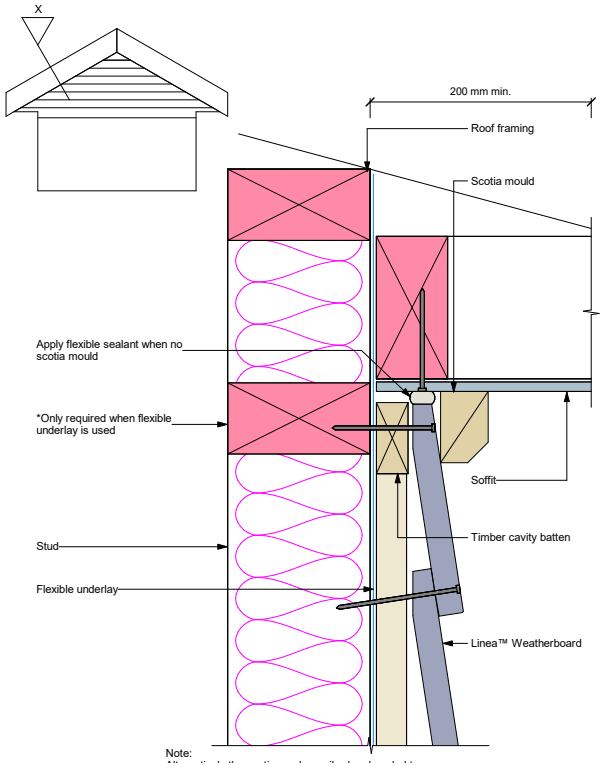


Figure 13: Internal corner joint flashing



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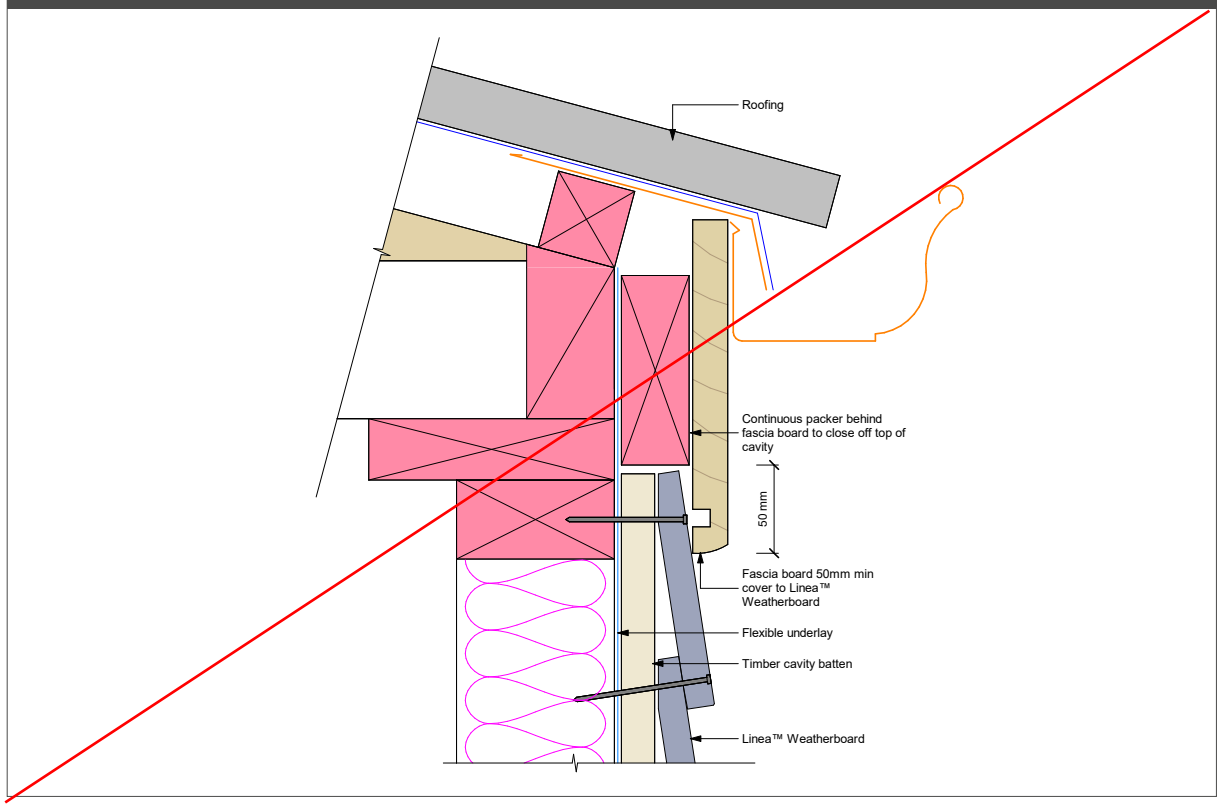
Figure 14: Wall to soffit junction 'X'



Note:
Alternatively the scotia can be scribed and sealed to Linea™ Weatherboard and the soffit lining

For soffits more than 200mm the Linea™ Weatherboard can be neat cut and silicone sealed to angle of soffit

Figure 15: Nil soffit detail



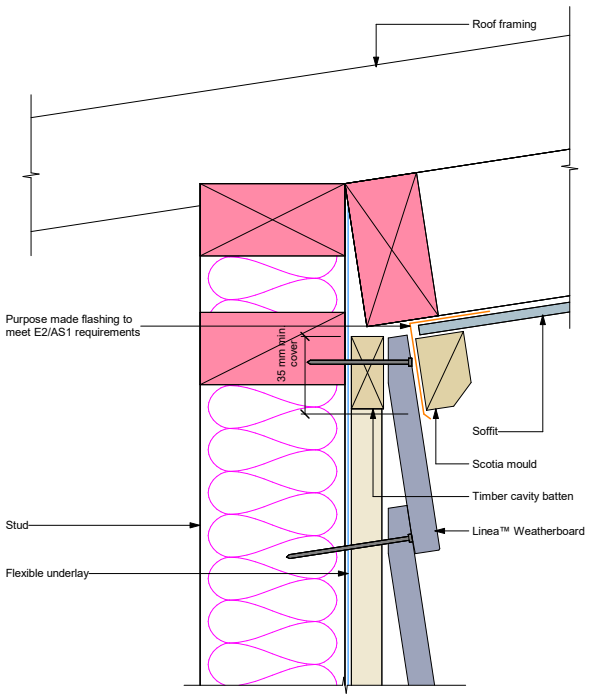
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Figure 16: Sloping soffit and wall junction

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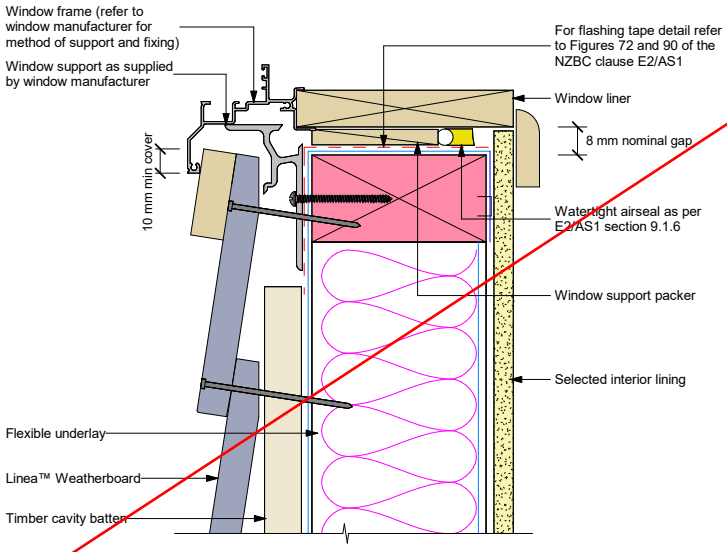
Note: Site cut edges to be primed

Figure 17: Window and door sill

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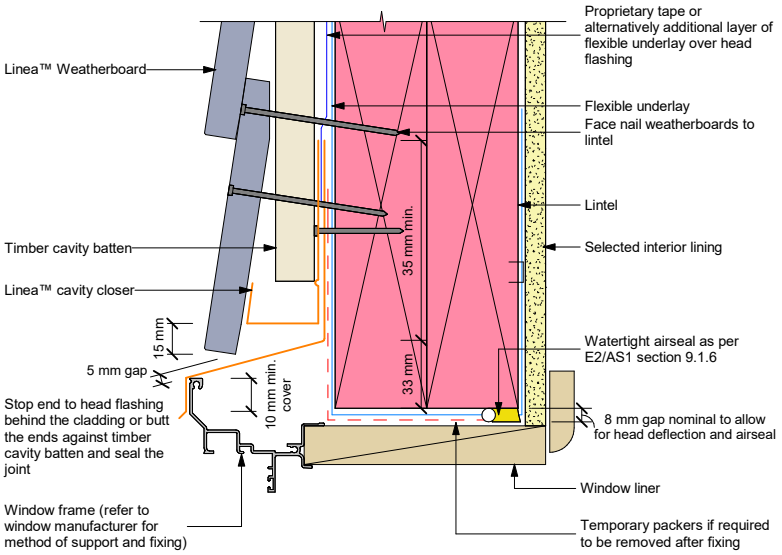
General notes for materials selection

1. Flexible underlay must comply with acceptable solution E2/AS1
2. 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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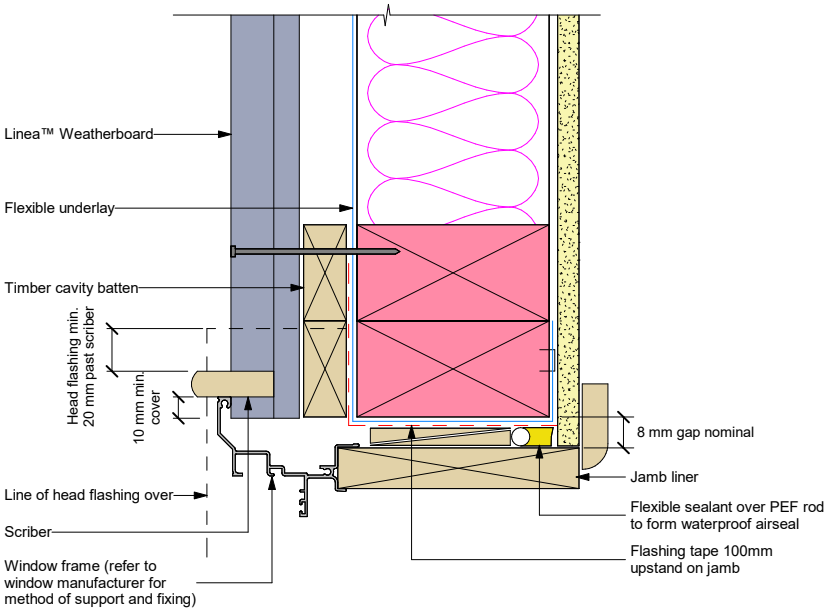
Figure 18: Window head



Note:
- Sealant must be installed between head flashing and window flange in VH and EH wind zones and SED pressures
- Alternatively, the head flashings can be formed with stop ends as per E2/AS1
- Refer to Figure 22 for sealing end battens to head flashing
- Site cut edges to be primed

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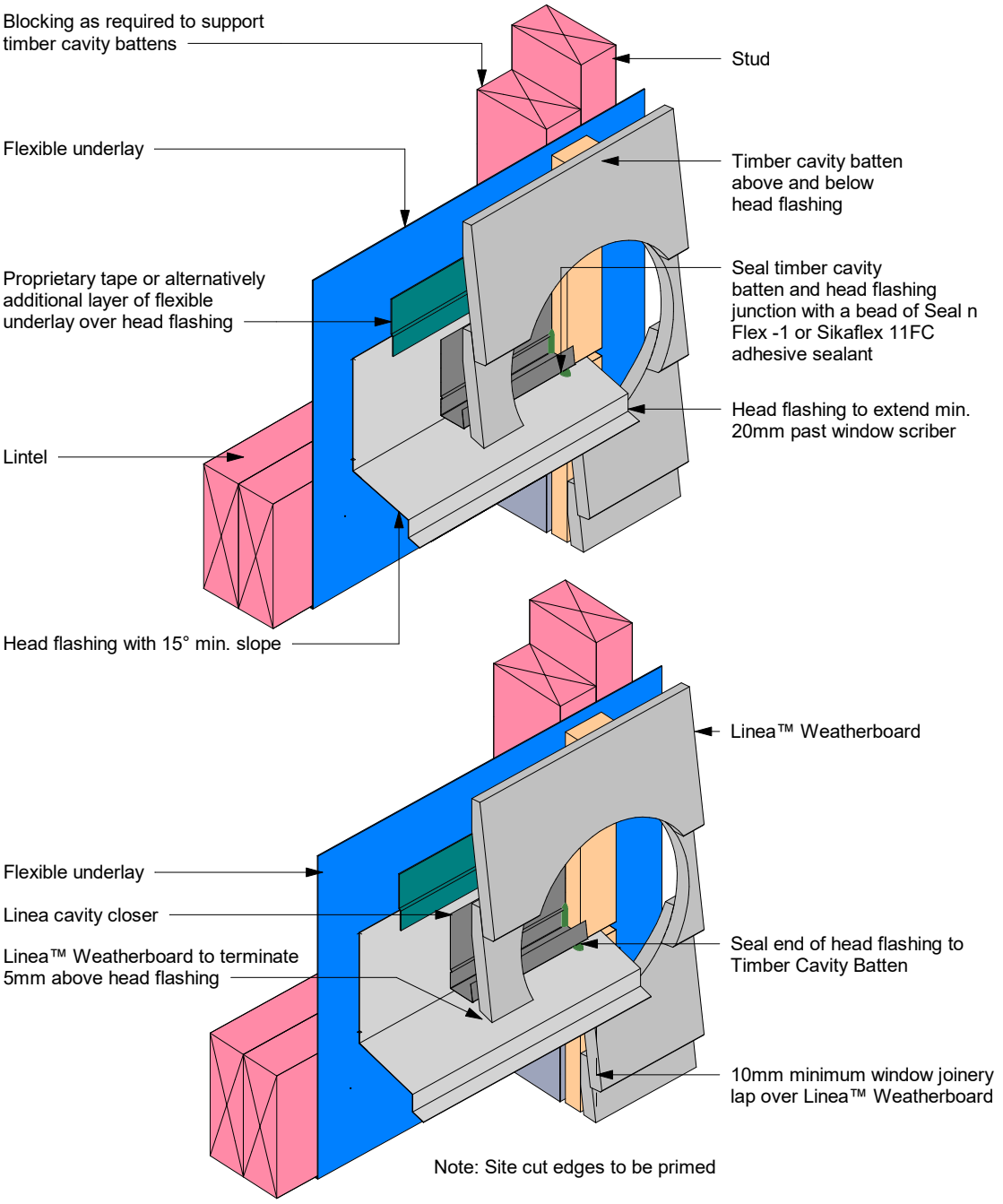
Figure 19: Window jamb



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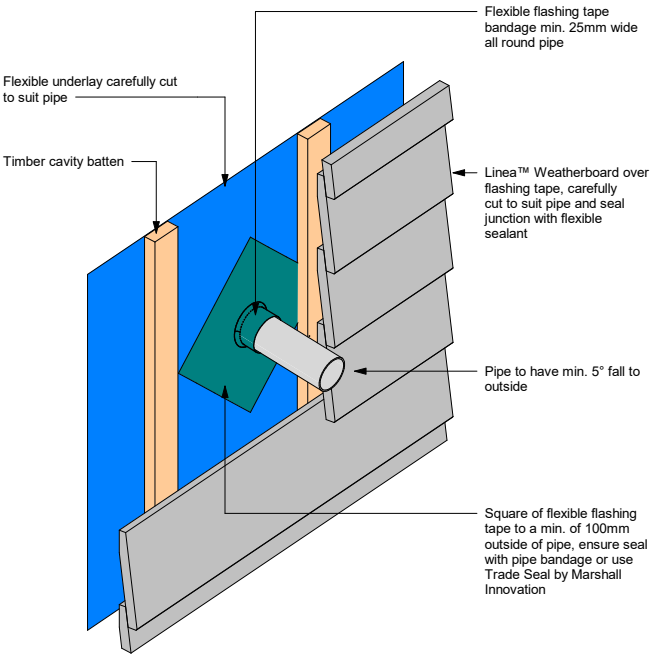
Figure 20: Window head stop end



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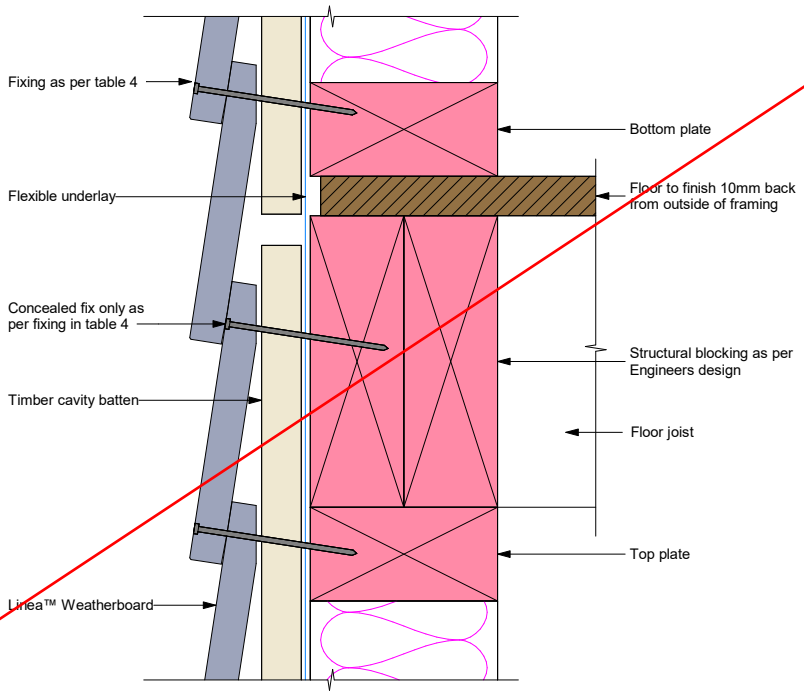
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Figure 25: Pipe penetration



Note: Site cut edges to be primed

Figure 26: Continous cladding over joist



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Product Warranty

James Hardie New Zealand Limited ("James Hardie") warrants for a period of 25 years from the date of purchase that the Linea™ Weatherboard (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 ("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™ Weatherboard when installed in accordance with the appropriate Linea™ Weatherboard (cavity or direct fixed) technical specifications, 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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Linea™ Weatherboard
Care and Maintenance

The extent and nature of maintenance required will depend on the geographical location and exposure of the building. It is the responsibility of the Specifier to determine any site specific maintenance requirements to comply with the New Zealand Building Code.

As a guide, it is recommended that the basic normal maintenance tasks shall include, but not be limited to:

- Washing down exterior surfaces every 6 - 12 months using low pressure water and a brush, and every 3-4 months in extreme coastal conditions or sea spray zones. Do not use a water blaster to wash down the cladding. Refer to your paint manufacturer for washing down requirements
- Re-coating exterior protective finishes. Always refer to your paint manufacturer for re-coating requirements
- Regular inspection and repair if necessary of the cladding joints, sealants, nail head fillers
- Cleaning out gutters, down pipes and overflow pipes as required
- Pruning back vegetation which is close to or touching the Linea™ Weatherboard as well as ensuring the NZBC ground clearance requirements are maintained, especially where gardens are concerned
- The clearance between the bottom edge of the Linea™ Weatherboard and the finished/unfinished ground must always be maintained.

Date: _____

Project: _____

Address: _____

_____

_____

Customer Name: _____

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

CERTIFICATE: **CMNZ 30018**
Version No: **RevN**

3 DESCRIPTION OF BUILDING METHOD OR PRODUCT

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.
Linea™ Weatherboard Direct Fixed Cladding system consists of Linea™ Weatherboards applied direct to the external wall framing over a flexible underlay.
Linea™ Weatherboard Cavity Cladding system consists of Linea™ Weatherboards fixed over timber battens to form the cavity.
Both cladding methods (referenced as the system) 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.

4 INTENDED USE OF BUILDING METHOD OR PRODUCT

The system is designed to be used as part of an external cladding system on timber framed building.

5 NEW ZEALAND BUILDING CODE PROVISIONS

The systems if designed, used, installed and maintained in accordance with this certificate will meet the following provisions of the NZBC:

Clause B1 STRUCTURE:	Performance B1.3.1, B1.3.2, B1.3.4 for the relevant physical conditions of B1.3.3 (a), (f), (h), (j) and (q).
Clause B2 DURABILITY:	Performance B2.3.1(b) 15 years and B2.3.2.
Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE:	Performance C3.5, C3.7
Clause E2 EXTERNAL MOISTURE:	Performance E2.3.2, E2.3.5, E2.3.6 and E2.3.7
Clause F2 HAZARDOUS BUILDING MATERIALS:	Performance F2.3.1.

1 CERTIFICATE HOLDER DETAILS

James Hardie New Zealand Limited
Trading as James Hardie
1 O'Rorke Road, Penrose , Auckland 1061, New Zealand,
TechnicalTeam@jameshardie.co.nz
Tel: 0800 808 868,
www.jameshardie.co.nz

ORIGINAL ISSUE DATE	VERSION DATE	RECERTIFICATION
26/05/2020	06/10/2022	03/07/2025

8 SIGNATURE

Herve Michoux, Global Mark Managing Director

2 PRODUCT CERTIFICATION BODY

Global-Mark Pty Ltd
57 Willis Street, Wellington, 6011
customer.service@global-mark.co.nz
+64 9 889 0622
www.global-mark.co.nz

The complaints process for this certificate can be found here:
https://www.global-mark.com.au/?s=complaint

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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 expert and/or laboratory advise or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.
CERTIFICATE V2

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

6 CONDITIONS AND LIMITATIONS OF USE

1. The systems (respectively) are certified:
   a. as a direct fixed external wall cladding for buildings:
      i. within the scope limitations of the New Zealand Building Code (NZBC) Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 1.1, and
      ii. with a risk score of 0-12, calculated in accordance with the NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 2, and
      iii. situated in NZS 3604:2011 Wind Zones up to, and including Very High, and
   b. as a cavity fixed external wall cladding for buildings:
      i. within the scope limitations of the NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 1.1,
      ii. with a risk score of up to 20, calculated in accordance with the NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 2,
      iii. situated in in NZS 3604:2011 Wind Zones up to, and including Extra High, and
   c. as a cavity fixed external wall cladding for buildings specifically engineering designed (SED):
      i. up to 25m in height, and
      ii. with an inter-storey drift of span/180 maximum, and
      iii. the design ultimate limit state (ULS)differential wind pressure does not exceed 3.2 kPa, and
      iv. with the stud spacing no more than 600mm centres
   d. located:
      i. in all exposure zones (except microclimates) as defined in NZS 3604:2011 section 4.2, and
      ii. located anywhere in relation to the relevant boundary for building within the scope of:
         - C/AS1, amendment 5, 5 November 2020 or
         - C/AS2, amendment 2, 5 November 2020
2. The system shall be specified, installed, inspected and maintained in accordance with the following sets of documents collectively referenced as the Applicable Technical Specification to the extent that their scope covers that for this Certificate:
   a. For direct fixed external wall cladding application
      i. James Hardie Linea™ Weatherboard Direct Fix Technical Specification (May 2020)
      ii. Fire & Acoustic Design Manual (November 2020) by James Hardie section 4:16 Control of External Fire Spread, figures No's. 1 to 8 and 12 to 20, specifically details JHETGL30 and JHETGL60. These details have only been assessed and certified with respect to external fire spread via Linea™ Weatherboard. For walls located within 1.0m of a relevant boundary, Linea™ Weatherboard may be used as an external façade/cladding attached to the exterior of fire rated wall systems as depicted within the Fire and Acoustic Design Manual (November 2020). Fire Resistance rating performance of the wall assembly falls outside the scope of this certificate
      iii. BRANZ Appraisal No 446 (2020) Linea™ Weatherboard Direct Fixed Cladding
   b. For cavity fixed external wall cladding applications:
      i. James Hardie Linea™ Weatherboard Cavity Fix Technical Specification (May 2020)
      ii. Fire & Acoustic Design Manual (November 2020) by James Hardie section 4:16 Control of External Fire Spread, figures No's. 1 to 8 and 12 to 20, specifically details

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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 expert and/or laboratory advise or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

JHETGL30 and JHETGL60. These details have only been assessed and certified with respect to external fire spread via Linea™ Weatherboard. For walls located within 1.0m of a relevant boundary, Linea™ Weatherboard may be used as an external façade/cladding attached to the exterior of fire rated wall systems as depicted within the Fire and Acoustic Design Manual (November 2020). Fire Resistance rating performance of the wall assembly falls outside the scope of this certificate

iii. BRANZ Appraisal No 447 (2020) Linea™ Weatherboard Cavity Cladding

(Note: Provisions within the documents above related to the use of the systems with steel-frame construction are outside the scope of this certification).

3. In wind zones greater than Very High a rigid air barrier which complies with Table 23 of E2/AS1 shall be used. In Buildings exceeding 10 m in height RAB™ Board must be used including horizontal control joints in accordance with the requirements of the CodeMark certificate for RAB™ Board. (Refer to GM-CM30130)
4. The system is certified for use:
   a. with the ancillary components as described in this certificate,
   b. with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. Only joinery compliant with the requirements of NZS 4211:2008 including amendment 1 for the relevant Wind Zone or wind pressure shall be used or have a current CodeMark
5. The weatherboards must only be installed horizontally on vertical surfaces. .
6. All exposed faces, including top edges at sills and all bottom edges of Linea™ Weatherboard and fibre cement ancillary components must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730
7. E2.3.5 and E2.3.6 compliance is limited to cavities created between the internal surface of the panels and the underlay or RAB™ Board's.

7 HEALTH AND SAFETY INFORMATION

Standard industry safety practices and manufacturer safety requirement as detailed in the technical literature including the applicable SDS must be observed at all time. Please refer to James Hardie SDS Fibre Cement Products June 2022

9 BASIS FOR CERTIFICATION

The certification decision is based on independent technical review(s) of test report(s), engineering opinion(s) and other documented evidence(s), factory audit(s) and site review(s)

Code Clause	Compliance pathway	Evidence
B1 STRUCTURE	Alternative solution -Expert judgement	001, 002, 003, 021 and 022
B2 DURABILITY	Alternative solution -Expert judgement	001, 002, 003, 021 and 022
C3 FIRE AFFECTING AREAS BEYOND THE SOURCE	Alternative solution -Expert judgement	001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 021, 022 and 023
E2 EXTERNAL MOISTURE	Alternative solution -Expert judgement	001, 002, 003, 013, 014, 015, 016, 017, 018, 019, 020, 021 and 022
F2 HAZARDOUS BUILDING MATERIALS	Alternative solution -Expert judgement	001, 002, 003, 021, 022 and 024

10 SUPPORTING DOCUMENTATION FOR CERTIFICATION

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

Ref	Author	Title	Date and/or revision
001	BRANZ	LINEA™ - WEATHERBOARD CAVITY CLADDING - Appraisal No. 447 [2020]	02 September 2020
002	BRANZ	LINEA™ - WEATHERBOARD DIRECT FIXED CLADDING - Appraisal No. 446 [2020]	02 September 2020
003*	BRANZ	BRANZ Appraisals Means of Compliance - Basis of Appraisal - LINEA™ WEATHERBOARD DIRECT FIXED AND CAVITY CLADDING - Appraisal No 446 and 447 (2020)	TV10686-001 21/08/2020
004*	BRANZ	Fire Assessment Report based Cone calorimeter test.	FH3182 21 November 2002
005*	BRANZ	Fire Assessment Report based Cone calorimeter test.	FH 2976 15 May 2001
006*	BRANZ	Fire Assessment Report based Cone calorimeter test (BRANZ Project No. FC10254-001).	FSR 4206 Issue2 7 November 2018
007*	BRANZ	Fire technical Opinion: Technical opinion based on NFPA 285 Compliance with NZBC C/AS2, clause 5.8.2 (b) and C/VM2 Part A (a).	FC12172-001 1 November 2019
008*	BRANZ	Fire Assessment Report Review of James Hardie Fire and Acoustic Manual	FAR 4620 – 04 November 2016
009*	BRANZ	Fire technical Opinion: Fire resistance of James Hardie Wall Systems with Service Penetrations	FC12040-004 -03 december2019
010*	BRANZ	Technical Assessment “Fire Resistance of External Wall and Soffit” _Various JH Products	FAR 2597- 5th October 2005
011*	Intertek B&C	JH cavity fix wall assembly fire test as per NFPA 285	J6706.01-121-24 - 20th August 2019
012*	Intertek B&C	JH cavity fix wall assembly fire test as per NFPA 285	J6707.01-121-24 - 21st August 2019
013*	Clarkson Consulting Services	JH NZ_RAB_Weathertightness Assessment_200626_R1.5	26 June 2020
014*	James Hardie Building Product	Weathertightness Testing of Residential Façade Fibre Cement Cladding System On Cavity Battens to the requirement of Verification Method E2/VM1	TS061-05, dated 15 February 2006
015*	James Hardie Building Product	TESTING OF A TITAN RESIDENTIAL FIBRE CEMENT CLAD FAÇADE FOR COMPLIANCE WITH THE REQUIREMENTS OF AS/NZS 4284:1985 “TESTING OF BUILDING FACADES”	TS010-06, dated 14 November 2006
016*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS003-13, dated 4 December 2013
017*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS022-13, dated 12 November 2013
018*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS033-13, dated 8 January 2014
019*	James Hardie Technical Support group	Weathertightness & Façade System (E2/VM1)	TS009-15, dated 14 October 2015
020*	James Hardie Technical Support group	Testing of James Hardie NZ ExoTec Façade panel top hat rainscreen façade system in accordance with AS/NZS 4284:2008	FT-R1005, dated May 2017
021	James Hardie New Zealand Limited	James Hardie Linea™ Weatherboard Direct Fix Technical Specification (May 2020)	May 2020
022	James Hardie New Zealand Limited	James Hardie Linea™ Weatherboard Cavity Fix Technical Specification (May 2020)	May 2020

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CERTIFICATE V2

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

023	James Hardie New Zealand Limited	James Hardie Fire & Acoustic Design Manual. Section 4:16 Control of External Fire Spread, figures No's. 1 to 8 and 12 to 20, specifically details JHETGL30 and JHETGL60	November 2020
024	James Hardie New Zealand Limited	LQA8N - SAFETY DATA SHEET- JAMES HARDIE FIBRE CEMENT SHEETS PRODUCTS	Version No.: 2.0 ISSUED Date : 22/06/2022
* These documents were provided commercial in confidence and are not publicly available			

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CERTIFICATE V2

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

11 SUPPORTING INFORMATION ABOUT DESCRIPTION (OPTIONAL)

Linea™ Weatherboard cladding is finished with a latex paint system

Linea™ Weatherboards are bevel-back profile weatherboards with tongue and grove at each end for jointing. The weatherboards are pre-primed with an acrylic primer on the front face and edges.

Linea™ Weatherboards are 16 mm thick and are available 150mm and 180 mm wide. The boards are supplied 4200 mm long.

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 revel profile is machined on the back face of the weatherboard, the bottom of the board is chamfered and the tongue and grove are machined on the ends. Linea™ Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

James Hardie supplies the following ancillary components:

- Hardie™ Axent™ Trim - a 19mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Hardie™ Axent™ Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 70 mm and 89mm wide by 3000 mm long.
- 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 2,700 mm and 4,000 mm lengths.
- Corner soakers - 90° soakers are available for 150 mm and 180 mm Linea™ Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.
- Cavity vent strip - uPVC, available in 3,000 mm lengths.
- Rigid wall underlay – HomeRAB™ Pre-Cladding, RAB™ Board or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.

Other components not supplied by James Hardie must meet the following requirements

- Flexible wall underlay – building paper complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 23, or breather-type membranes covered by a valid CodeMark certificate for use as wall underlays.
- Flexible building underlay support – polypropylene strap at 300 mm centres fixed horizontally and drawn taut, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. (Note: Mesh and wire galvanising must comply with AS/NZS 4534. Additional vertical battens may also be installed to provide support.)
- Flexible sill, head and jamb flashing tape - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- Cavity battens - nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- Cavity batten fixings - 40 x 2.8 mm flathead hot-dip galvanised nails.
- 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, 3rd Edition, amendment 10, 5 November 2020, Table 20 for durability requirements.
- Planted sill and scribers - timber treated to Hazard Class H3.1, pre-primed before installation.

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

- Window and door trim cavity air seal - air seals complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, 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, 3rd Edition, amendment 10, 5 November 2020, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- Linea™ Weatherboard fixings
  - Direct fix cladding method:- 40 x 2.8 mm flathead hot-dip galvanised Hardie™ Flex nails or stainless steel ring shank Hardie™ Flex nails (for concealed nailing), and 60 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing).
  - Cavity cladding method - 60 x 3.15 mm flathead hot-dip galvanised Hardie™ Flex nails or stainless steel ring shank Hardie™ Flex nails (for concealed nailing in NZS 3604 Wind Zones up to, and including, Very High), 75 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in NZS 3604 Wind Zones up to, and including, Very High), and 90 x 3.55 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 3.2 kPa).
- Hardie™ Axent™ Trim fixings - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolthead nails and stainless steel ring shank jolthead nails.

(Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).

- Flashings - balustrade and parapet cap flashings and inter-storey joint flashings. Refer to NZS 3604 Section 4, and NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 20 for durability requirements.

Aluminium joinery head flashing - as supplied by the joinery manufacturer or the contractor

12 SUPPORTING INFORMATION ABOUT INTENDED USE (OPTIONAL)

Nil

13 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE (OPTIONAL)

Linea™ Weatherboard Cavity Cladding can be used to provide fire resistance rated construction, but this aspect has not been assessed and is outside the scope of this certificate

End of document

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APPENDIX 09 – H1 CALCULATION

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BRANZ H1/AS1 5th Edition Calculation Method Spreadsheet - Results

Version: 4 May 2023

Client	Wendelborn Property Ltd
Project name	Lot 44 Lemonwood Estate
Address	5 Nirmal Way Rolleston
Designer	MG
Date	07/03/2024
Territorial Authority	Selwyn District
Climate Zone	5
When submitted	After 2 November 2023
Application	Housing

Proposed Building

Element		Area (m²)	Proposed Building Heat Loss (W/K)
Slab Floors		113.3	81.0
Other Floors		0.0	0.0
Roof		113.3	18.4
Skylights		0.0	0.0
Walls		98.3	37.4
Glazing (walls & doors)	(20.9% of total wall area)	26.9	53.9
Doors (opaque)		3.6	12.0
		355.6	**Total** **202.6**

Reference Building

Element	Area (m²)		Reference Building Heat Loss (W/K)
Slab Floors	113.3	1.6	**70.8**
Other Floors	0.0	3.0	**0.0**
Total Roof (includes skylight area)	113.3	6.6	**17.2**
Walls (70% of total wall area)	90.2	2.0	**45.1**
Glazing allowance (30% of total wall area)	38.7	0.50	**77.3**
	355.6	**Total**	**210.5**

Comparison of proposed building against the reference building **PASS**

	Element type	Description	Embed heating?	Area (m²)	Construction R-value (m².K/W)	Heat Loss (W/K)	Errors
1	Slab Floors	Ribraft	No	113.3	1.4	81.0	
2	Roof	Trussed roof with R7.0 batts	No	95.8	7.2	13.2	
3	Roof	Perimeter edge with R7.0	No	17.6	3.4	5.2	
4	Walls	Graphex with R2.8 batts	No	70.7	2.8	25.4	
5	Walls	Linea with R2.8 batts	No	3.3	2.3	1.4	
6	Walls	Internal wall with R2.8 batts	No	24.3	2.3	10.5	
7	Glazing (walls & doors)			1.5	0.50	3.0	
8	Glazing (walls & doors)			2.5	0.50	5.0	
9	Glazing (walls & doors)			4.5	0.50	8.9	
10	Glazing (walls & doors)			4.5	0.50	8.9	
11	Glazing (walls & doors)			2.1	0.50	4.2	
12	Glazing (walls & doors)			3.8	0.50	7.7	
13	Glazing (walls & doors)			0.8	0.50	1.7	
14	Glazing (walls & doors)			0.8	0.50	1.7	
15	Glazing (walls & doors)			0.8	0.50	1.7	
16	Glazing (walls & doors)			2.1	0.50	4.2	
17	Glazing (walls & doors)			1.3	0.50	2.6	
18	Glazing (walls & doors)			2.1	0.50	4.2	
19	Doors (opaque)	Aluminium Front Door		2.0	0.29	7.3	
20	Doors (opaque)	Garage Internal Door		1.6	0.34	4.7	
21							
22							
23							
24							
25							
26							

BRANZ H1/AS1 5th Edition Calculation Method Spreadsheet - Results

Version: 4 May 2023

Client	Wendelborn Property Ltd
Project name	Lot 44 Lemonwood Estate
Address	5 Nirmal Way Rolleston
Designer	MG
Date	07/03/2024

Territorial Authority	Selwyn District	**Climate Zone**	5
When submitted	After 2 November 2023	**Application**	Housing

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BRANZ H1/AS1 5th Edition Calculation Method Spreadsheet - Results

Version: 4 May 2023

Client	Wendelborn Property Ltd
Project name	Lot 44 Lemonwood Estate
Address	5 Nirmal Way Rolleston
Designer	MG
Date	07/03/2024

Territorial Authority	Selwyn District	**Climate Zone**	5
When submitted	After 2 November 2023	**Application**	Housing

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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 "isothermal 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.

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 ( )

Date: 07/03/2024

Ribraft — 1.40 m²°C/W

Type: Floor: Raft Slab Floor - H1/AS1 Edition 5 and H1/AS2 Edition 1

Raft Slab Floor - H1/AS1 Edition 5 and H1/AS2 Edition 1

Table F Slab Insulation (H1 Edition 5) - H1 Acceptable Solutions and Verification Methods

Slab floor area [m²]: 153.1

Area Perimeter Ratio: 2.69

Perimeter:

	*Length**	*Masonry Veneer Wall*	*External Wall Thickness**	*Edge Insulation*
-	57.02 m	☐	100 mm	☐
+				

* required data. If empty the perimeter type will be ignored.

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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 ◉

Date: 02/08/2023

Trussed roof — 7.23 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal Tiles 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*	Earthwool glasswool Ceiling Section 460mm 7 notched to cover bottom chord ☑

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: Number of downlights: Clearance from lamp holder side [m]:

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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 "isothermal 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.

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 ◉

Date: 01/03/2024

Trussed Roof (Coved) — 4.29 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal Tiles 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*	Earthwool glasswool Skillion Ceiling 430mm 5 notched to cover bottom chord ☐

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: Number of downlights: Clearance from lamp holder side [m]:

[Print Page]

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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 "isothermal 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.

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 ◉

Date: 23/02/2024

Trussed Roof (Perimeter) — 3.39 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling, compressed Perimeter Insulation

Timber framed truss Roof, direct fixed or battened flat Ceiling, compressed Perimeter Insulation

external surface 0.03

Roofing : generic - Metal Tiles with building paper
R-value: 0.01

Timber Frame & Cavity : 90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Framing : *R-value: 0.75*	Earthwool glasswool Ceiling Section 460mm 7

Compressed Insulation Details

Roof Slope	25 °	Perimeter Width	500 mm
Wall Stud Width	90 mm	Offset	0 mm
Heel Height	0 mm	Top Chord Depth	90 mm
Compression Constant	1		
Is a ventilation panel used? ☑		Is insulation inside chord base? ☑	

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

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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 "isothermal 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.

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 ○

Date: 17/10/2023

Graphex — **2.78** m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : generic - Polystyrene H-grade EPS 40mm and plaster
R-value: 1.00

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

Wall Frame Area: 14.4%	*Cavity Area: 85.6%*
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 : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

[Print Page]

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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 "isothermal 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.

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 ○

Date: 28/08/2023

Internal Wall — 2.31 m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : generic - None (facing inside air, i.e. internal bulkhead into roof space)
R-value: 0.09

Air Barrier : generic - none
R-value: 0.00

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

Wall Frame Area: 14.4%	*Cavity Area: 85.6%*
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 : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

[Print Page]

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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 "isothermal 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.

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 ○

Date: 23/02/2024

Linea WB — **2.32** m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : James Hardie Linea weatherboard
R-value: 0.08

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

Wall Frame Area: 14.4%	*Cavity Area: 85.6%*
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*	Earthwool glasswool Wall 430mm 2.8
	still Airgap: none *R-value: 0.00*

Wall Lining : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

[Print Page]

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19-Jul-22

Glass Configuration

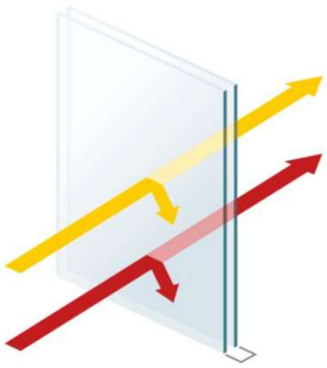
4mm Energy Light AS pos.2 - 14mm Argon 90% - 4mm Indoflot Clear

LIGHT

Transmission	76
Selectivity	1.41

ENERGY

Solar Factor	(g)	54
Shading Coefficient	(SC)	0.62



Standard: EN 410:2011/673:2011

LIGHT PROPERTIES

Light Transmission	[%]	76
Light Reflection	[%]	15
Internal Light Reflection	[%]	15

ENERGY PROPERTIES

Solar Factor (g)	[%]	54
Energy Reflection	[%]	28
Direct Energy Transmission	[%]	50
Total Energy Absorption	[%]	22
UV Transmission	[%]	27

Solar Factor (g)	0.54
Shading Coefficient (SC)	0.62
Selectivity	1.41

THERMAL PROPERTIES

U Value	W/(m2·K)	1.1
U Value(Summer)	W/(m2·K)	---

[conformity]

The data are calculated using spectral measurements that are conform to the above-mentioned standard.
This document is no evaluation of the risk of glass breakage due to thermal stress.
For tempered glass: the risk of spontaneous breakage due to Nickel-Sulfide is not covered by AGC Group. The heat soak test is available on request.
Specifications, technical and other data are based on information available at the time of preparation of this document and are subject to change without notice.
AGC Group can not be held responsible for any deviation between the data introduced and the condition on site.
This document is only informative, in no way it implies an acceptance of the order by AGC Group.

Address
Contact Person
E-mail address
TEL

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Type of glazing	U_g [1]	Spacer type [2]	Example IGU [3], [4] (informative)	R_{window} (m^2·K/W) for different frames			
				Aluminium frame	Thermally broken aluminium frame	uPVC frame	Timber frame
Double pane	2.63	Aluminium	Glass: Clear/Clear Gas: Air	R0.26	R0.32	R0.40	R0.44
	1.90	Aluminium	Glass: Low E_1/Clear Gas: Argon	R0.30	R0.39	R0.50	R0.56
	1.60	Thermally improved	Glass: Low E_2/Clear Gas: Argon	R0.33	R0.42	R0.56	R0.63
	1.30	Thermally improved	Glass: Low E_3/Clear Gas: Argon	R0.35	R0.46	R0.63	R0.71
	1.10	Thermally improved	Glass: Low E_4/Clear Gas: Argon	R0.37	R0.50	R0.69	R0.77
	0.90	Thermally improved	Glass: Low E_4/Clear Gas: Krypton	R0.40	R0.54	R0.76	R0.85
Triple pane	1.89	Thermally improved	Glass: Clear/Clear/Clear Gas: Air		R0.38	R0.50	R0.56
	1.20	Thermally improved	Glass: Low E_2/Clear/Clear Gas: Argon		R0.48	R0.66	R0.74
	1.00	Thermally improved	Glass: Low E_3/Clear/Clear Gas: Argon		R0.52	R0.73	R0.81
	0.70	Thermally improved	Glass: Low E_3/Low E_3/ Clear Gas: Argon		R0.59	R0.86	R0.95
	0.60	Thermally improved	Glass: Low E_4/Low E_4/ Clear Gas: Argon		R0.62	R0.91	R1.01

Entrance Door R-values

LATITUDE WIDE STILE

Height \ Width	710	760	810	860	910	960
1950	0.262	0.270	0.278	0.286	0.292	0.299
2000	0.262	0.271	0.279	0.286	0.293	0.300
2050	0.263	0.272	0.280	0.287	0.294	0.301
2100	0.263	0.272	0.280	0.288	0.295	0.302
2150	0.264	0.273	0.281	0.289	0.296	0.303
2200	0.264	0.273	0.282	0.289	0.297	0.304
2250	0.265	0.274	0.282	0.290	0.297	0.304

LATITUDE NARROW STILE

Height \ Width	710	760	810	860	910	960
1950	0.288	0.296	0.304	0.311	0.317	0.323
2000	0.289	0.297	0.305	0.312	0.318	0.324
2050	0.29	0.298	0.306	0.313	0.320	0.326
2100	0.291	0.299	0.307	0.314	0.321	0.327
2150	0.292	0.300	0.308	0.315	0.322	0.328
2200	0.293	0.301	0.309	0.316	0.323	0.329
2250	0.294	0.302	0.310	0.317	0.324	0.331

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InsulPro

NOVAhush

creating better environments

Panel Absorber Insulation Product Data Sheet

Application

NOVAhush Panel Absorber is made in New Zealand by InsulPro. It is polyester acoustic insulation that is made using fibres from recycled plastic bottles. It is available as a semi-rigid board in white or black polyester, with a white, black or grey polyester inner. It can be applied in factories, workshops, cafes, restaurants, gyms, halls, offices, sports centres, cultural centres and, in fact, anywhere where the focus is to reduce noise!

From April 2013, all interior surface lining products have to comply with new fire performance requirements.

NOVAhush Panel Absorber complies with new Building Code fire performance requirements in New Zealand and Australia after being tested to ISO 9705.

InsulPro's NOVAhush Panel Absorber has achieved the supreme 1S group number – making it one of the easiest interior lining solutions to use in a building!

Group Number 1S means that InsulPro's NOVAhush Panel Absorber can be used in any interior surface lining application in commercial and residential construction – you don't need to be concerned about using multiple products to meet the different interior surface fire requirements. NOVAhush Panel Absorber can also be used with HVAC ducting - so it really is your one stop solution!

Application

	Where can you use NOVAhush Panel Absorber
Exitways All occupied space in importance level 4 building	✓
Wall materials in sleeping spaces (not in household units)	✓
Ceiling materials in sleeping spaces (not in household units)	✓
All other occupied spaces including household units: walls and ceilings	✓
Ducts for HVAC systems: internal surfaces	✓
Ducts for HVAC systems: external surfaces. Acoustic treatment and pipe insulation with air handling plenum	✓

NEW ZEALAND MADE

50 Year Warranty

Product Range

			Bale Pack Sizes			
NOVAhush Product Range	**Product R-Value**	**NRC**	Nominal Thickness (mm)	Dimensions (mm)	Pieces (per pack)	Total Coverage (m^2)
35-25mm	0.70	0.70	25	2400 x 1200	12	34.56
35-50mm	1.40	0.90	50	2400 x 1200	6	17.28
35-75mm	2.11	1.05	75	2400 x 1200	4	11.52
20-100mm	2.27	0.95	100	2400 x 1200	3	8.64
40-100mm	2.96	1.05	100	2400 x 1200	3	8.64

NOVAhush can be manufactured in other dimensions subject to minimum order quantities

*Terms and conditions apply

Technical details

Technical Attributes	Standard	Test Result
New Zealand Building Code		
√ Durability	Clause B2.3.1 b) 50 years	
√ Internal Moisture	Clause E3.3.1	
√ Hazardous Building Materials	Clause F2.3.1	
Product Safety		
√ Non Toxic	OSH Health and Safety Guidelines[1]	Polyester products 'non-toxic' and 'non-irritant'
√ Non Irritant		
√ Respiratory Safe	n/a	Polyester fibres are non-respirable
√ Fire Tests	AS 1530 Part 3:	
	Ignitability	0 (Scale 0:20)
	Spread of Flame	0 (Scale 0:10)
	Heat Evolved	0 (Scale 0:10)
	Smoke Developed	2 (Scale 0:10)
	ISO 9075	1S
√ VOC Emission Safe[3]	Total VOC ≤ 0.5mg/m^3 Formaldehyde ≤ 0.06mg/m^3	Level below detection[2] Level below detection
√ Glue Free		Free from all glues
Other		
√ Non Corrosive	NZS 4222	Alkalinity of PH 7.8
√ Vermin Resistant	n/a	Not a food source for vermin (and not treated)

1 Occupational Health and Safety Service. Health and Safety Guidelines for the Selection and Safe Handling of Synthetic Mineral Fibres. Department of Labour, 1994, p18.
2 NOVAhush has been tested under ASTM D5116 to the limits set for insulation by CETEC PTY Ltd
3 All individual VOCs were less than their threshold limit values. Carcinogens and reproductive toxins were not identified as part of the VOCs.

Emissions test data

Product	Total Volatile Organic Compound Specific Emission Rate (mg/m^2/hr)
Black Panel Absorber Liner	<0.003

This product can be classed as low VOC emitting. The material emissions are less than the recognised threshold of 0.5 mg/m2/hr – eg: 'Green Star'

NOVAhush Panel Absorber is compliant with the Building Code of Australia C1.1 (AS ISO 9705) and the New Zealand Building Code C/VM2 (ISO 9705) as a surface lining material for walls and ceilings and also as a HVAC duct liner.

Specification and installation

For NOVAhush specification advice contact an InsulPro representative.

NOVAhush must be installed according to the manufacturer's guidelines, which are printed on the back of each bale label. These guidelines are also available at **www.insulpro.co.nz** or call InsulPro on 0800 100 007.

InsulPro

InsulPro Manufacturing Ltd

27 Birmingham Road,
East Tamaki, Auckland 2013
PO Box 204 289 Highbrook,
Auckland 2061, New Zealand

P +64 9 273 2308 F +64 9 273 2309
insulation help-line 0800 100 007
www.insulpro.co.nz

Authorised Distributor

Creating better environments with NOVAhush

- NOVAhush helps to create a more energy efficient comfortable and healthy environment.
- A more energy efficient space will protect the environment by consuming less fossil fuels for heating and cooling.
- NOVAhush Panels are made in a near zero waste production process and are fully recyclable.







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Source from Design Navigator

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Window and Skylight Types

Name: Window — Opaque Door ☐ — 0.50 m²°C/W

Type: Thermally Broken Aluminium Frame

Glass Type : Double Pane: Low E4/Clear - Argon - Thermally improved Spacer (Ug 1.10)

R-value: 0.50

Solar Heat Gain Coefficient (SHGC):

Name: Entry Door — Opaque Door ☑ — 0.29 m²°C/W

Type: Glazing: Custom - enter R-value manually below (i.e. the house-lot R-value from a WEERS assessment)

Insulation : 0.287

Name: Garage Door — Opaque Door ☑ — 0.69 m²°C/W

Type: Doors

Door Type : Insulated Garage Door (panel R-1.3)

R-value: 0.69

Solar Heat Gain Coefficient (SHGC): 0.00

Name: Garage Internal Door — Opaque Door ☑ — 0.34 m²°C/W

Type: Doors

Door Type : Internal Hollow Core (i.e. to the garage)

R-value: 0.34

Solar Heat Gain Coefficient (SHGC): 0.00

APPENDIX 10 – RISK MATRIX

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External Moisture Risk Matrix

Project Name / Facade ID: North Elevation

Wall type:
- ○ Parapet or enclosed balustrade
- ◉ Other

Risk Scores	Low	Medium	High	Very High
A. Wind Zone:	○ Low = 0	○ Medium = 0	◉ High = 1	○ Very High = 2 ○ Extra High = 2
B. Number of Storeys:	◉ Low = 0	○ Medium = 1	○ High = 2	○ Very High = 4
C. Roof/Wall Intersection Design:	◉ Low = 0	○ Medium = 1	○ High = 3	○ Very High = 5
D. Eaves Width:	○ Low = 0	○ Medium = 1	◉ High = 2	○ Very High = 5
E. Envelope Complexity:	○ Low = 0	◉ Medium = 1	○ High = 3	○ Very High = 6
F. Deck Design:	◉ Low = 0	○ Medium = 2	○ High = 4	○ Very High = 6

Total Risk Score: **4**

low risk 0 up to 6	medium risk 7 up to 12	high risk 13 up to 20	very high risk over 20

this wall

Display Results Table | Download Results Table (HTML)

This wall can use any of the wall cladding types which have a green tick ☑. Claddings with red crosses ☒ are not permitted under the Acceptable Solution E2/AS1.

Direct fixed to framing	Over nominal 20 mm drained cavity
☑ Timber weatherboard - all types	☑ Masonry veneer
☑ Timber weatherboard - bevel backed	☑ Stucco
☑ Fibre cement weatherboards	☑ Horizontal profiled metal - corrugated and trapezoidal only
☑ Vertical profiled metal - corrugated and symmetrical trapezoidal	☑ Rusticated weatherboards
☑ Vertical profiled metal - corrugated only	☑ Fibre cement weatherboards
☑ Vertical timber board and batten	☑ Fibre cement sheet - flush finish
☑ Fibre cement sheet jointed finish (except stucco over fibre cement backing)	☑ Fibre cement sheet - jointed finish
☑ Plywood sheet	☑ Plywood sheet
☒ EIFS	☑ EIFS
	☑ Bevel backed weatherboards

This table is based on Table 3 of E2/AS1. The claddings which have not received a green tick should not be used in this situation.

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APPENDIX 11 – STRUCTURAL FIXINGS

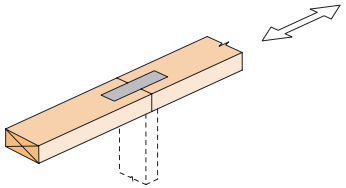
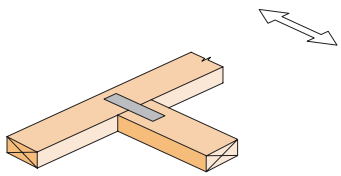
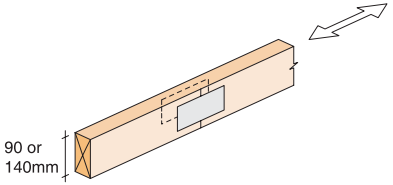
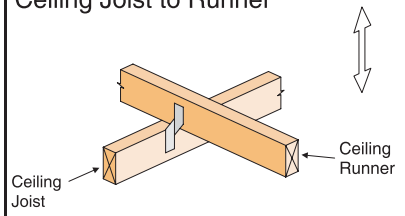
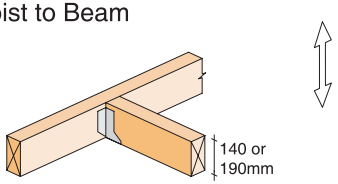
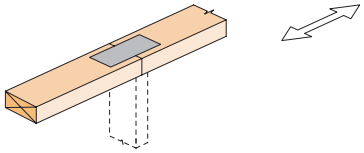
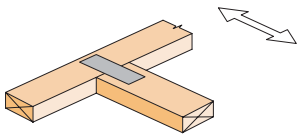
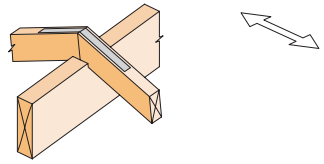
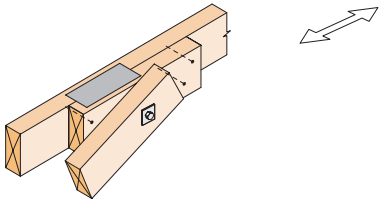
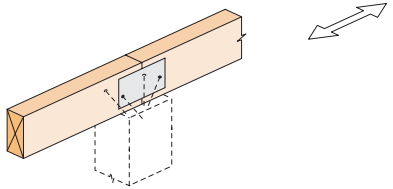
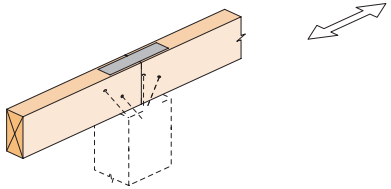
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LUMBERLOK® EASY-FIX

01/2017

A SIMPLE ON-SITE GUIDE FOR 3kN, 6kN & 12kN LOADS AS SPECIFIED IN NZS 3604:2011

FIXING LOAD	CONNECTION TYPE			
3kN	Top Plate Joint over Stud  Single Tylok 6T5 or Single Strap Nail Ref. Fig. 8.15 NZS 3604:2011	Top Plate Joint  Single Tylok 6T5 Ref. Fig. 8.16 NZS 3604:2011	Hip Rafter & Ridge Board Joint  Pair of Tylok 6T10 Ref. Fig. 10.2 NZS 3604:2011	Ceiling Joist to Runner  Single CT160 Ceiling Tie fully nailed with 30mm x 3.15 dia. nails Ref. Fig. 10.10 NZS 3604:2011
6kN	Joist to Beam  JH47 x 120 Joist Hanger with 12 x 30mm x 3.15 dia. nails (3 per flange) Ref. Fig. 7.7 NZS 3604:2011	Top Plate Joint over Stud  Single Tylok 6T10 or Single PLATE-LOK Ref. Fig. 8.15 NZS 3604:2011	Top Plate Joint  Single Tylok 6T10 or Single PLATE-LOK Ref. Fig. 8.16 NZS 3604:2011	Rafter  LUMBERLOK Sheet Brace Strap with 6 x 30mm x 3.15 dia. nails each end Ref. Fig. 10.5 NZS 3604:2011
12kN	Brace to Bearer  Single Nailon Plate 1mm x 110 x 160mm with 12 x 30mm x 3.15 dia. nails each side of joint Ref. Fig. 6.7 NZS 3604:2011	Bearer Joint over Pile  Single Nailon Plate 1mm x 110 x 160mm with 12 x 30mm x 3.15 dia. nails each end & 4 x 100mm skew nails Ref. Fig. 6.19 NZS 3604:2011	Bearer Joint over Pile  Single Nailon Plate 1mm x 110 x 160mm with 12 x 30mm x 3.15 dia. nails each end & 4 x 100mm skew nails Ref. Fig. 6.19 NZS 3604:2011	

SCAN FOR SPECIFICATION VIDEO

https://vimeo.com/117350347

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TIMBER CHARACTERISTIC STRENGTH

NZS 3603:1993 AMENDMENT 4

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Structural Grades (as defined in NZS 3604:2011 Clause 1.3)

Timber properties are for dry in-service conditions m/c = 16%

Timber Grade	Bending Strength f_b (MPa)	Compress. Strength f_c (MPa)	Tensile Strength f_t (MPa)	Shear Strength f_s (MPa)	Modulus of Elasticity E (GPa)	Lower Bound Modulus of Elasticity E_{lb} (GPa)
SG6	10.0	15.0	4.0	3.8*	6.0	4.0
SG8	14.0	18.0	6.0	3.8*	8.0	5.4
SG10	20.0	20.0	8.0	3.8*	10.0	6.7

*f_s = 3.0MPa for Douglas Fir

Timber Sizes

Call Size	Gauged Kiln Dried Size (in mm) (Actual Size)	Rough Sawn (in mm) (Actual Size)
100 x 50	90 x 45	100 x 50
150 x 50	140 x 45	150 x 50
200 x 50	190 x 45	200 x 50
250 x 50	240 x 45	250 x 50
300 x 50	290 x 45	300 x 50
100 x 100	90 x 90	100 x 100
150 x 100	140 x 90	150 x 100
200 x 100	190 x 90	200 x 100
250 x 100	240 x 90	250 x 100
300 x 100	290 x 90	300 x 100

Note: It is common now to refer to the timber size as the Kiln Dried Size. Where the Call Size refers to the use of Rough Sawn timber the Actual Size then becomes the Call Size. The Actual Size is the size used in the design calculations.

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MiTek®

DURABILITY PRODUCT SELECTION

ALTERNATIVE SOLUTION TO TABLE 4.1 NZS 3604:2011

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Zones	Fixings	Environment	Product Option
All Zones	Nail plates and timber connectors All other structural fixings	Closed	GANG-NAIL and LUMBERLOK Standard Zinc Coated Product(1) BOWMAC Hot Dip Galvanised(3)
Zone D	Structural fixings	Sheltered and Exposed	LUMBERLOK Stainless Steel 304(2) BOWMAC Stainless Steel 304(2)
Zones B and C	Timber pile fixings MORE than 600mm from ground	Sheltered Subfloors vented 7000mm²/m² or less	LUMBERLOK Hot Dip Galvanised(4) BOWMAC Hot Dip Galvanised(3)
		Exposed Subfloors vented 7000mm²/m² or more	LUMBERLOK Stainless Steel 304(2) BOWMAC Hot Dip Galvanised(3)
	Timber pile fixings LESS than 600mm from ground	Sheltered and Exposed	LUMBERLOK Stainless Steel 304(2)
	All other structural fixings	Sheltered	LUMBERLOK Hot Dip Galvanised(4) BOWMAC Hot Dip Galvanised(3)
		Exposed	LUMBERLOK Stainless Steel 304(2) BOWMAC Hot Dip Galvanised(3)

1. All GANG-NAIL, LUMBERLOK and BOWMAC product complies with Table 4.2 NZS 3604:2011.
2. LUMBERLOK and BOWMAC Stainless Steel product is 304 grade. Regular washing and maintenance will positively affect long term appearance of these items.
3. BOWMAC Hot Dip Galvanised product is to AS/NZS 4680 to 600g/m²
4. LUMBERLOK Hot Dip Galvanised product is to AS/NZS 4680 to 390g/m²

NOTES

Items above refer to GANG-NAIL®, LUMBERLOK® and BOWMAC® product marketed for specific applications with a requirement to last 50 years as an alternative solution to Table 4.1 NZS 3604:2011.

The MiTek New Zealand Limited Durability Flow Chart for product selection is derived from this alternative solution to Table 4.1 NZS 3604:2011. Definitions of zones and environments are derived from NZS 3604:2011.

Supporting documents available for this alternative solution:-
Les Boulton and Associates. Materials and Corrosion Consultants Report 00330: Evaluation of Bracket Durability; NZS 3604:1999 and Report 01372: Corrosion of BOWMAC Fixings in Treated Timber.
Optimech Services Metallurgical Consultancy Test Certificate Reports No: 00-134 BOWMAC and No: 01-023 LUMBERLOK Determination of Galvanising Coating thickness.
Product Statements for LUMBERLOK and BOWMAC products.

Content from NZS 3604:2011 Table 4.1 adapted by MiTek New Zealand Limited with permission from Standards New Zealand under Copyright Licence 000907. Please see Standard for full details, available from www.standards.co.nz.

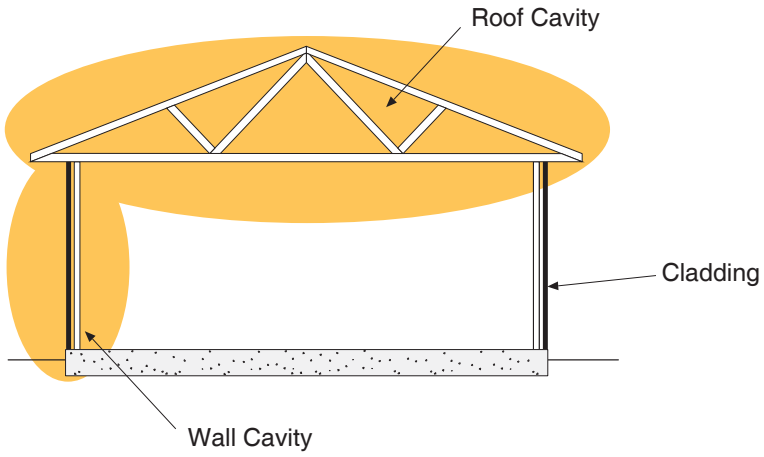
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DURABILITY FLOW CHART

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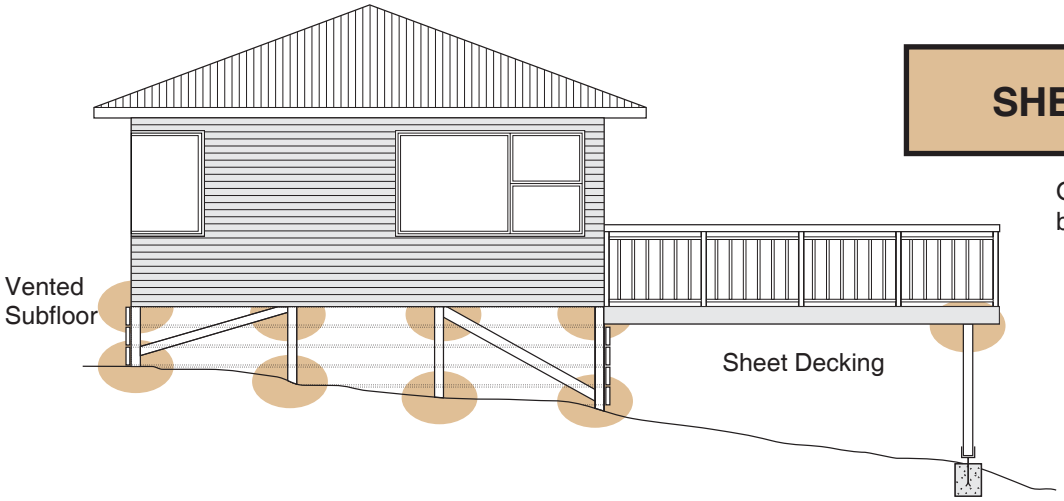
CLOSED

Dry, internal location, not subject to airborne salts or rain wetting.



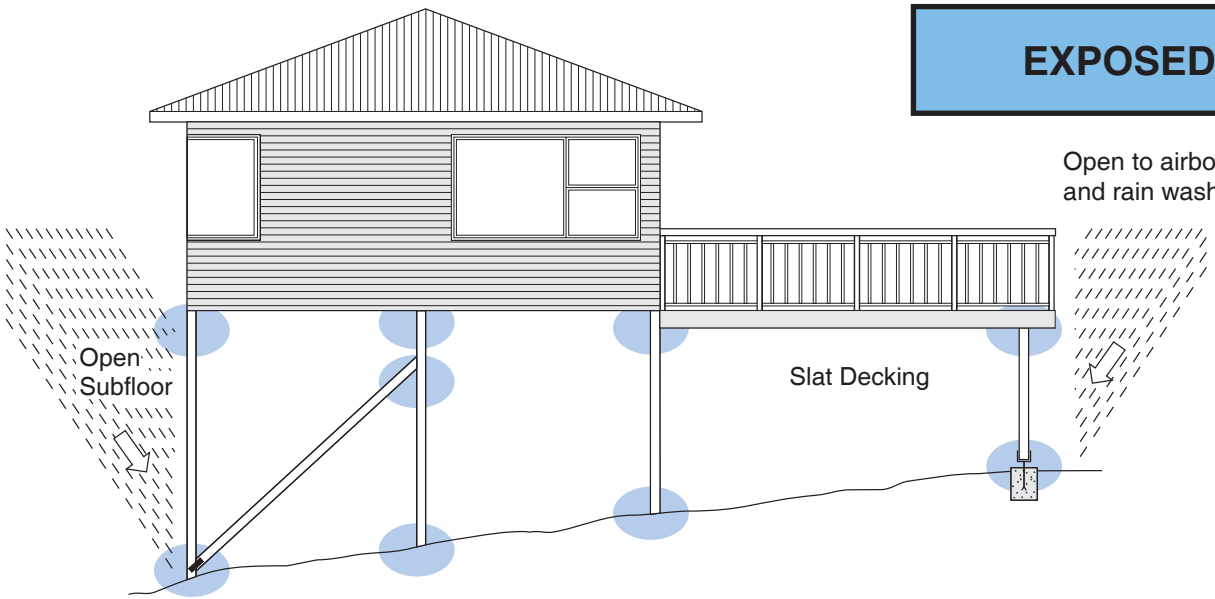
SHELTERED

Open to airborne salts, but not rain washed.



EXPOSED

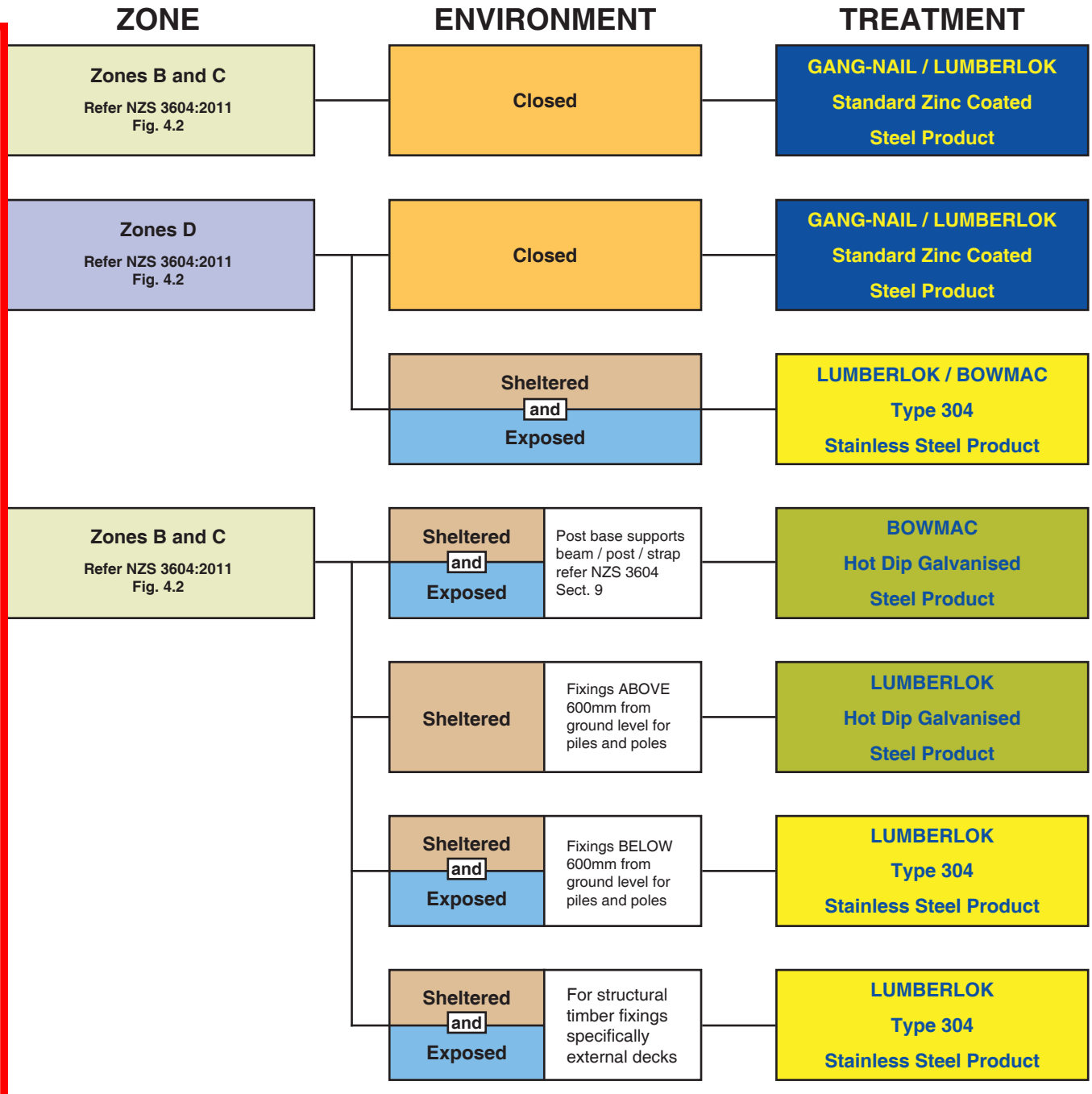
Open to airborne salts and rain washed.



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DURABILITY FLOW CHART

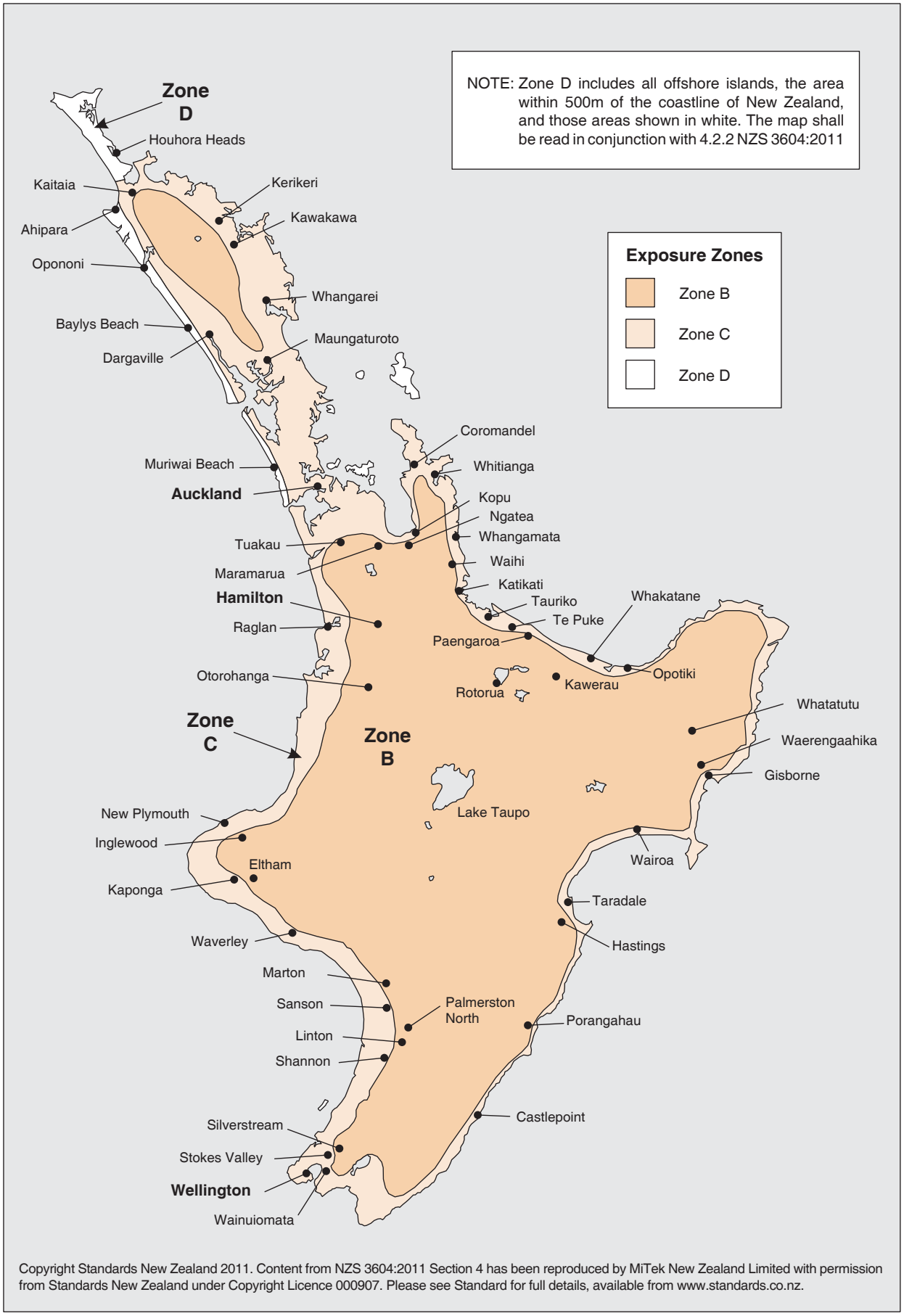


Product Key

- Standard Zinc Coated Steel Product
- Hot Dip Galvanised Steel Product
- Type 304 Stainless Steel Product

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Exposure zone map

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4. DURABILITY

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Exposure zone map

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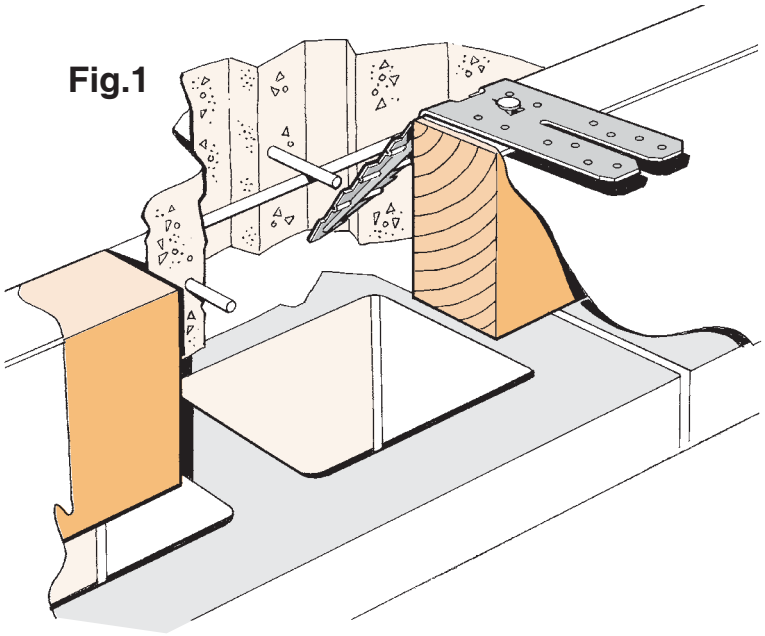
LUMBERLOK®

BOTTOM PLATE FIXING ANCHOR

- ★ Eliminates the drilling of bottom plates
- ★ Makes the fixing of timber framework easier and quicker
- ★ Saves hand trowelling around cast-in anchor bolts or rods
- ★ Use at 900mm centres max.
- ★ Complies with Clause 7.5.12.2 NZS 3604:2011

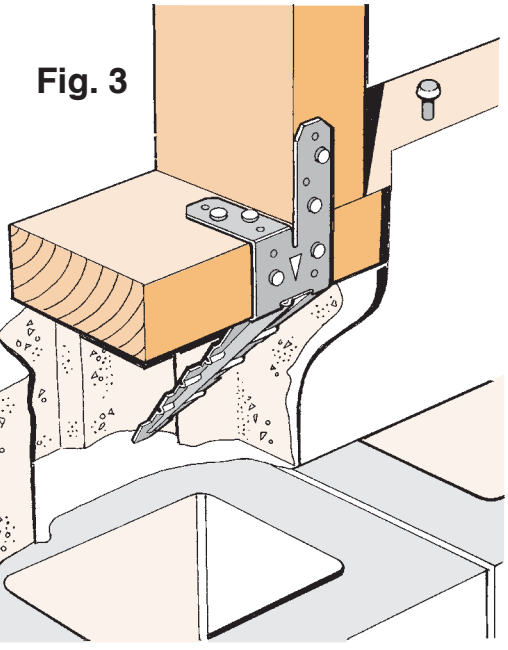
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Fig.1



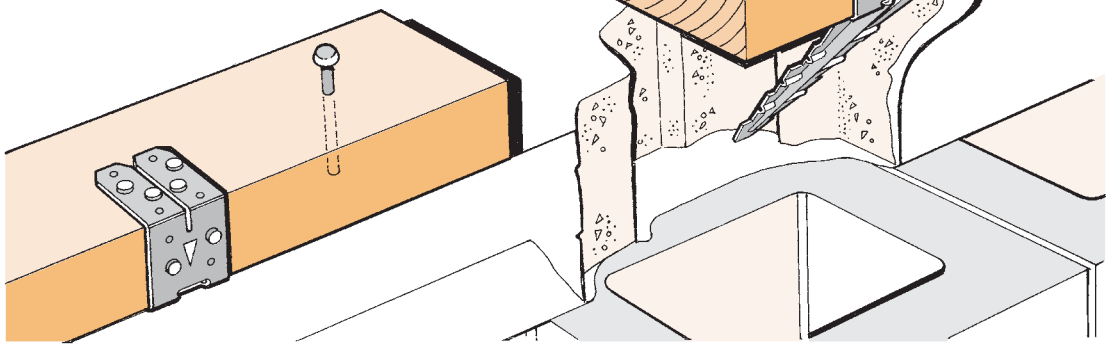
1. Bottom Plate Fixing Anchors shall be fixed at 900mm centres max. to the boxing for concrete floor slabs, over a continuous vapour barrier. Each Fixing Anchor is nailed prior to concrete pour, and shall be left undisturbed until concrete has hardened ready for timber frames to be installed. (Fig.1).
2. When timber framing is in place, the Fixing Anchors are folded up and over the bottom plate. (Fig. 2).
3. Two LUMBERLOK Product Nails 30mm x 3.15 dia. shall then be driven into the side of the bottom plate and two additional nails applied through each of the lugs. Should a stud coincide with the position of a Fixing Anchor, nail as shown in Fig. 3.

Fig. 3



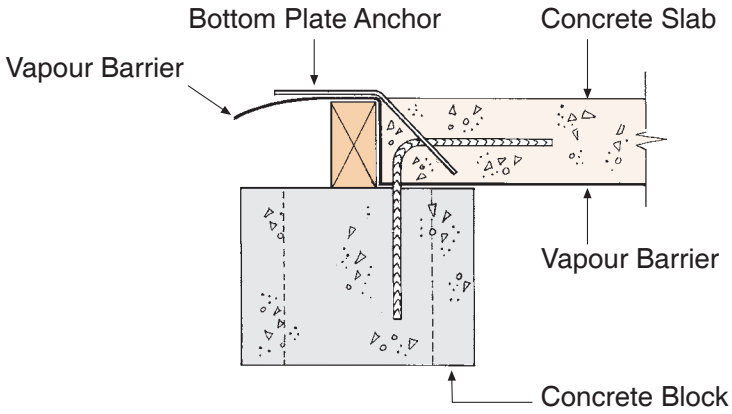
4. A 75mm x 4 dia. concrete nail must be fixed adjacent to each Fixing Anchor, through the bottom plate into the concrete, at no less than 70mm from the concrete edge. When used as a Bracing Wall hold-down, a Fixing Anchor must be positioned within 150mm from the end of that wall. Bracing wall must not exceed 70 BU/m.

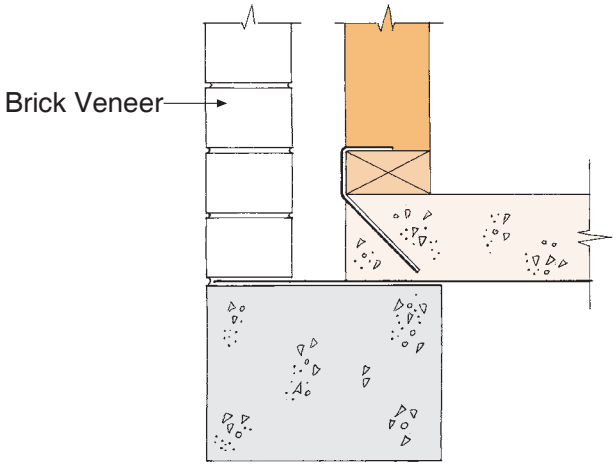
Fig. 2



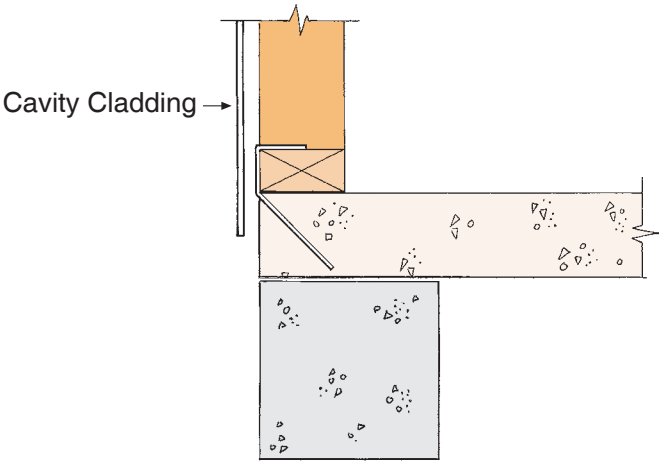
Available from leading Builders Supply Merchants throughout New Zealand

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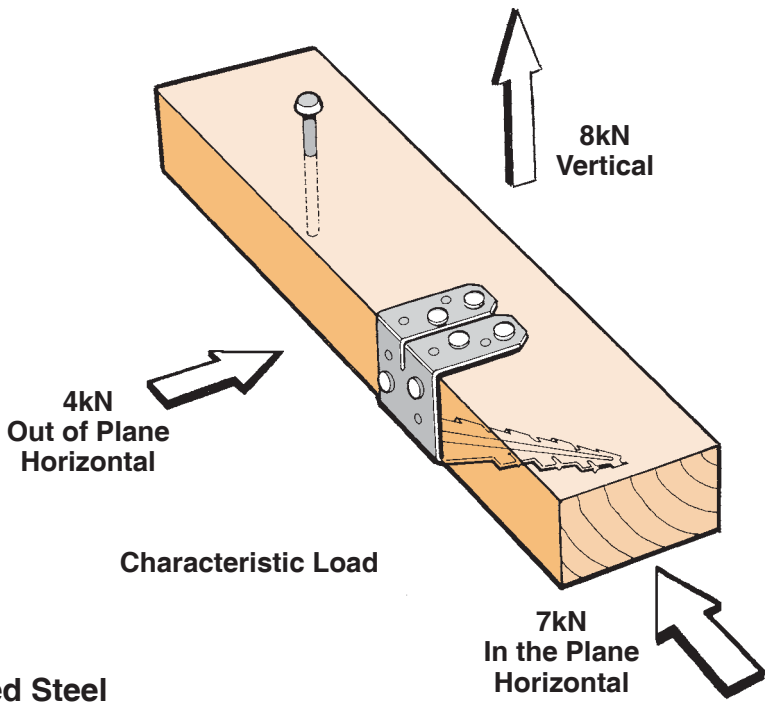
BRICK VENEER



CAVITY CLADDING

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Design Loads
Concrete compressive strength 20MPa min.



Code: BPA
Material: 0.95mm G300 Z450 Galvanised Steel
Code: SSBPA
Material: 0.9mm Stainless Steel 304-2B
Packed: 50 per Carton

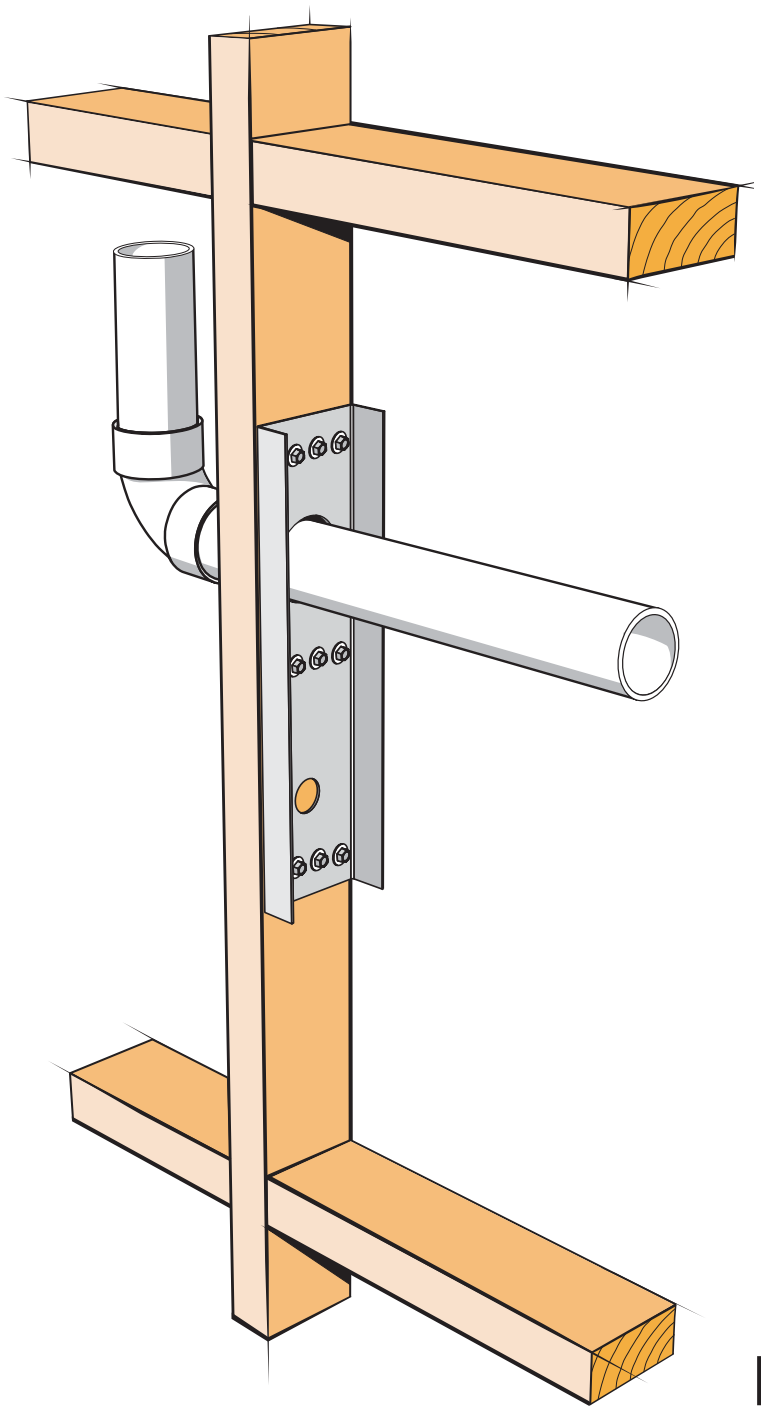
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LUMBERLOK®

FRAMING STUD STIFFENER

- ★ For plumbing or vacuum system ducting through timber studs
- ★ Reinforces 90 x 45mm timber studs back to FULL STRENGTH!
- ★ Solution to include holes up to 60mm diameter
- ★ Refer Clause 8.5.1.6 NZS 3604:2011

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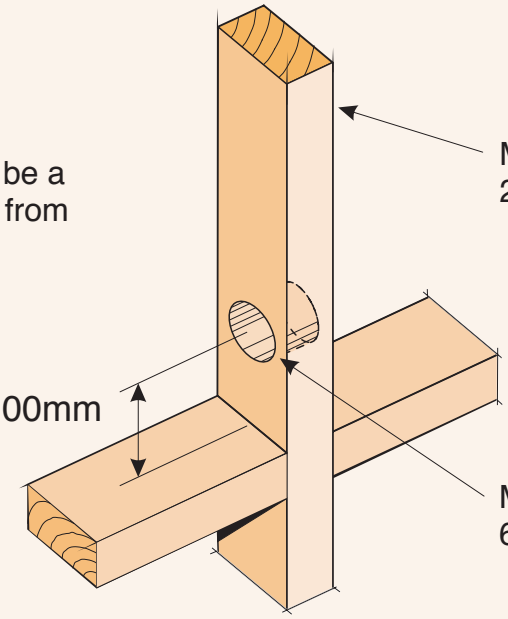


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SCAN FOR INSTALLATION VIDEO

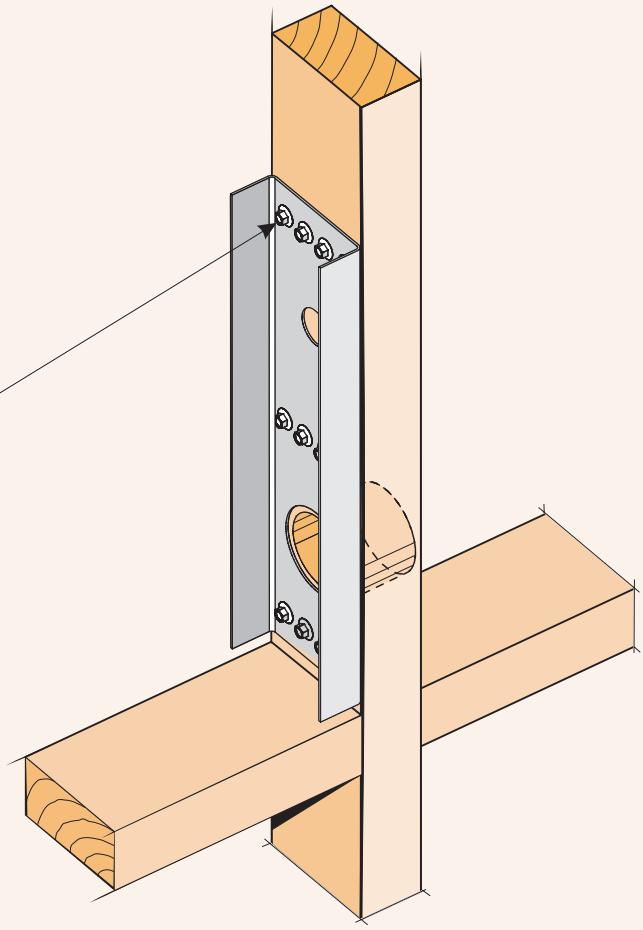
https://vimeo.com/117353342

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Note: Use Stud Stiffener as template for drilling 60mm hole

Fix to side of stud with 3 rows of 4 x Type 17-14g x 35mm Hex Head Screws (supplied)



Code: **FSS**
Material: **1.55mm G300 Z275 Galvanised Steel**
Packed: **8 x Framing Stud Stiffeners per Carton**
100 x Type 17-14g x 35mm Hex Head Galvanised Screws

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LUMBERLOK®

LINTEL FIXING SCHEDULE

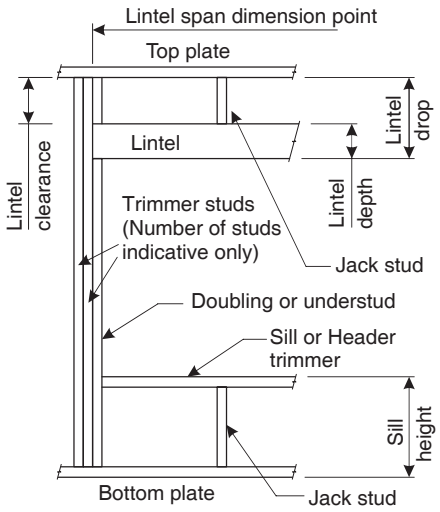
ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

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NOTE:

- ★ All fixings are designed for vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20kPa.
- ★ Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist horizontal loads.
- ★ These fixings assume the correct choice of rafter/truss to top plate connections have been made.
- ★ All fixings assume bottom plate thickness of 45mm maximum. Note: TYLOK options on timber species.
- ★ Wall framing arrangements under girder trusses are not covered in this schedule.
- ★ All timber selections are as per NZS 3604:2011.

DEFINITIONS



Lintel Supporting Girder Trusses

Roof Tributary Area	Light Roof Wind Zone			Heavy Roof Wind Zone		
	L, M, H	VH	EH	L, M, H	VH	EH
8.6m²	G	G	H	G	G	H
11.6m²	G	H	H	G	G	H
12.1m²	G	H	H	G	H	H
15.3m²	H	H	-	G	H	H
19.1m²	H	-	-	G	H	-
20.9m²	H	-	-	H	H	-
21.8m²	H	-	-	H	-	-
34.3m²	-	-	-	H	-	-

NOTES:

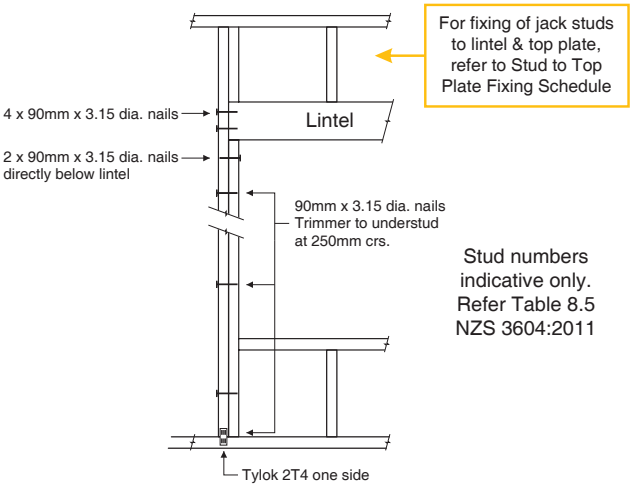
1. Roof Tributary Area = approx. 1/2 x (Total roof area on girder and rafter trusses supported by lintel)
2. Assumed girder truss is at mid-span or middle third span of lintel
3. Use similar fixings for both ends of lintel
4. All other cases require specific engineering design

Lintel Span (m)	Loaded Dimension (m) (See Fig. 1.3 NZS 3604:2011)	Light Roof Wind Zone					Heavy Roof Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
1.0	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	F	F	E	E	E	F	F
	4.0	E	F	F	F	G	E	E	F	F	F
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	E	F	F	G	G	E	E	F	F	G
1.2	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	E	F	F	F	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	F	F	G	G	H	E	E	F	G	G
1.5	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	F	F	F	G	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	F	F	G	G	H	E	E	F	G	G
	6.0	F	F	G	H	H	E	E	F	G	H
2.0	2.0	E	F	F	F	G	E	E	F	F	F
	3.0	E	F	F	G	G	E	E	F	F	G
	4.0	F	F	G	G	H	E	E	F	G	G
	5.0	F	F	G	H	H	E	E	F	G	H
	6.0	F	G	G	H	H	E	F	G	H	H
2.4	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	G	H	E	E	F	G	G
	4.0	F	F	G	H	H	E	E	F	G	H
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	6.0	F	G	H	H	-	E	F	G	H	H
3.0	2.0	E	F	F	G	G	E	E	F	F	G
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	6.0	F	G	H	-	-	E	F	G	H	-
3.6	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	F	G	H	H	E	F	G	G	H
	4.0	F	G	H	H	-	E	F	G	H	H
	5.0	F	G	H	-	-	E	F	G	H	-
	6.0	G	H	H	-	-	E	F	H	-	-
4.2	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	H	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
4.5	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.4	F	G	H	H	-	E	F	G	H	H
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	6.0	G	H	-	-	-	E	F	H	-	-
4.8	2.0	F	F	G	H	H	E	E	F	G	H
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	3.2	F	G	H	H	-	E	F	G	H	H
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	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
5.1	2.0	F	F	G	H	H	E	F	G	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.5	F	G	H	-	-	E	F	G	H	-
	4.0	G	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	G	H	-	-
5.4	2.0	F	F	G	H	H	E	F	G	G	H
	2.8	F	G	H	H	-	E	F	G	H	H
	3.0	F	G	H	-	-	E	F	G	H	-
	4.0	G	H	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	G	H	-	-

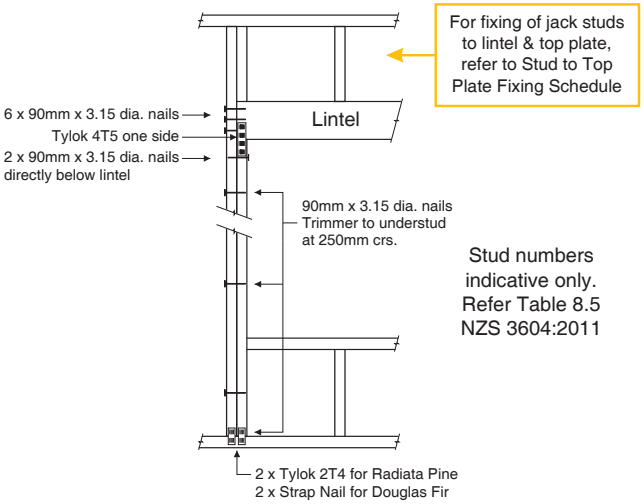
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LINTEL FIXING OPTIONS

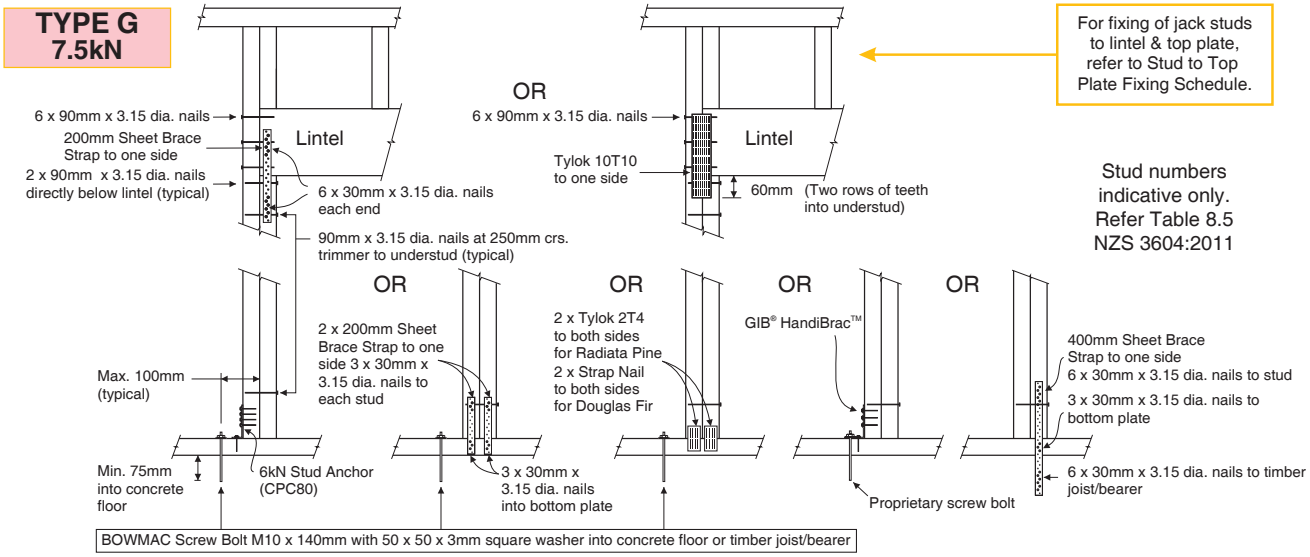
TYPE E 1.4kN



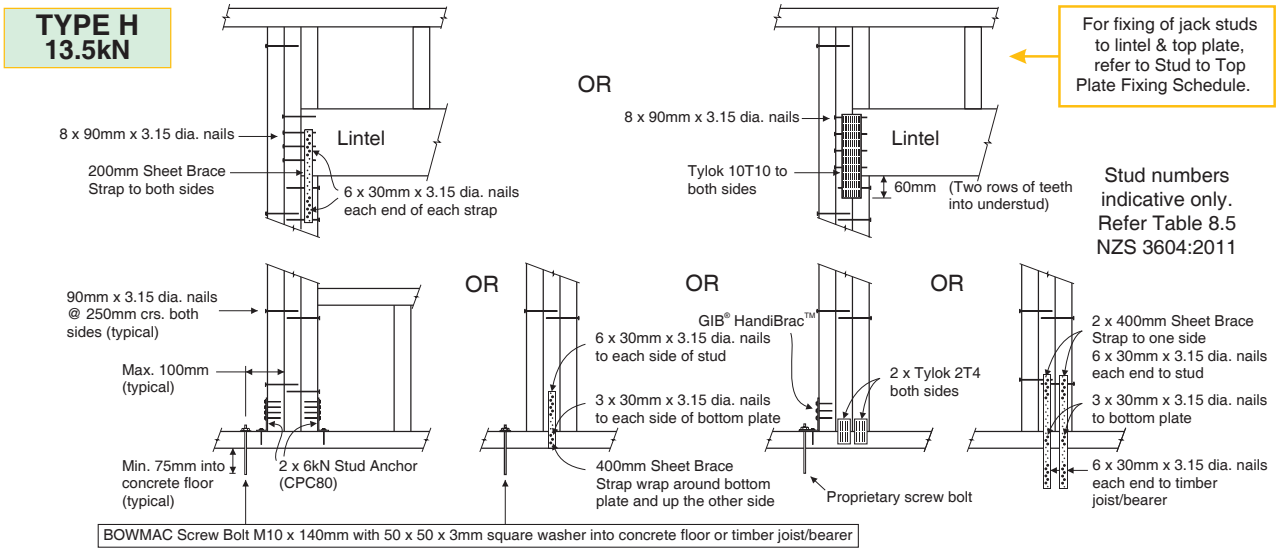
TYPE F 4.0kN



TYPE G 7.5kN



TYPE H 13.5kN



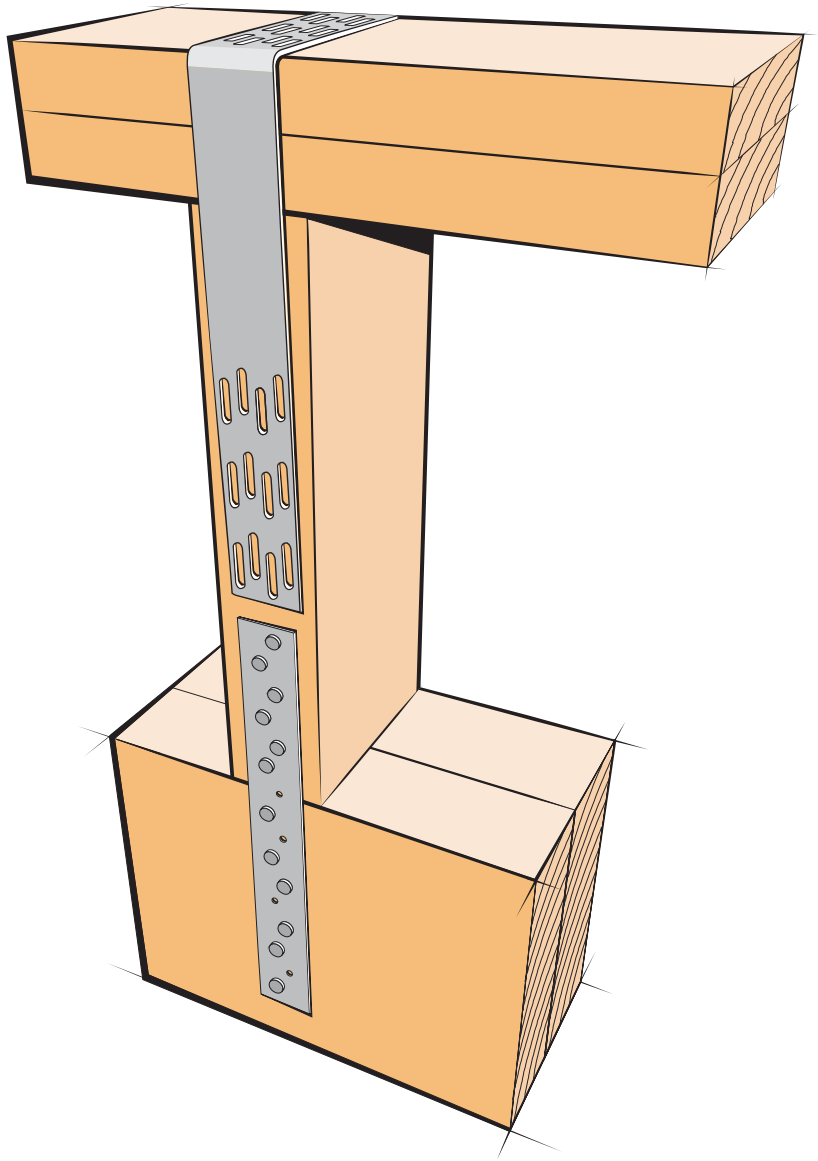
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LUMBERLOK®

JACK STUD TO TOP PLATE & LINTEL FIXING

Provides a solution for all jack stud length fixing options



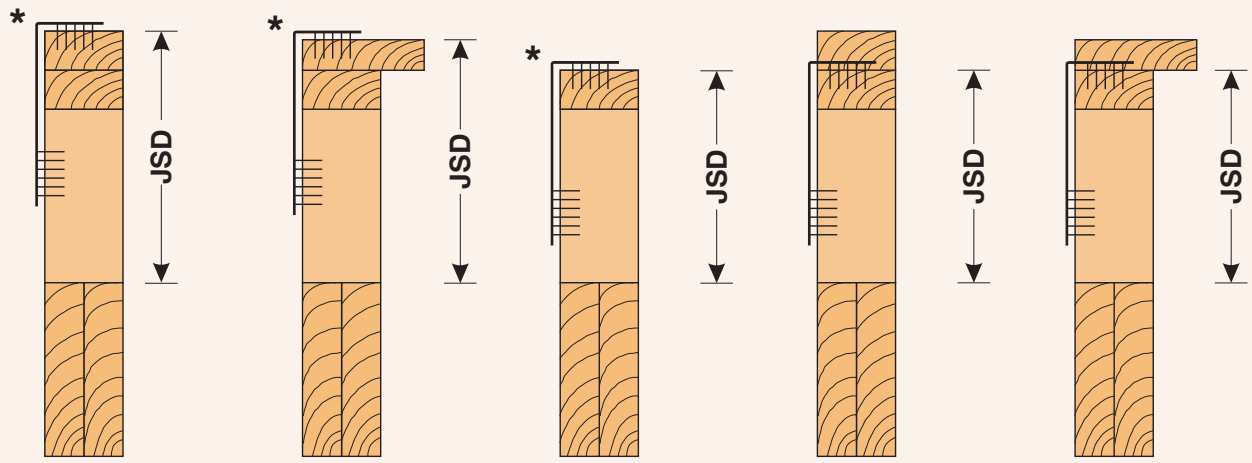
- ★ Covers the requirements for LUMBERLOK® Stud to Top Plate Fixing "Type B - 4.7kN" as required by LUMBERLOK® Lintel Fixing Schedule
- ★ Wall framing and connection details under girder trusses are not covered by this fixing solution and are subject to specific engineering design
- ★ All timber selections are as per NZS 3604:2011

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FRAMING ARRANGEMENTS

Jack Stud Dimension Definition **(JSD)**

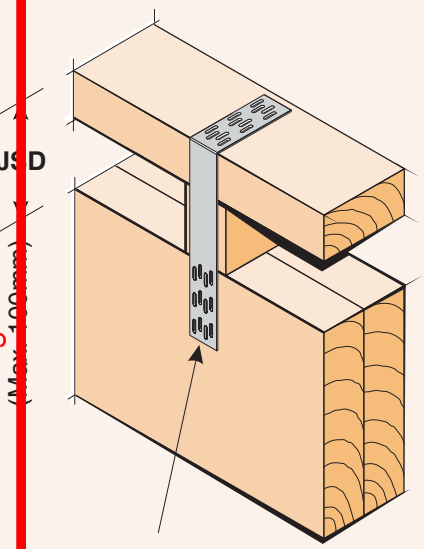


* Note: It is preferable for the top fixing to be located on the uppermost top plate or top plate packer to provide better fixing options for the truss connections

FIXING OPTIONS

FIXING 1

Jack Stud Dimension **(JSD)** up to a maximum of 100mm. Includes top plate fixed directly onto lintel i.e. no jack stud used.

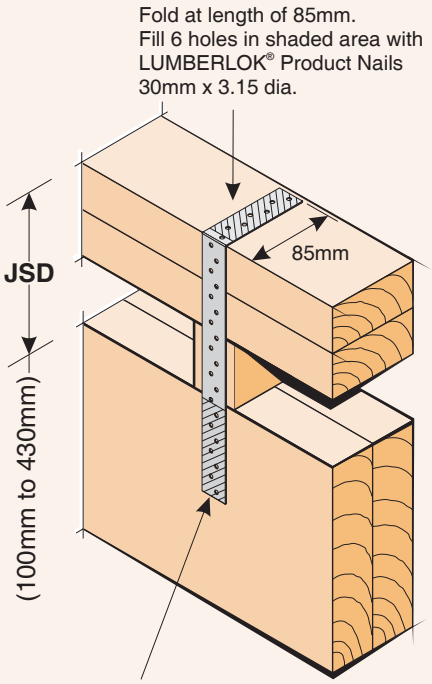


LUMBERLOK® Stud Strap on one face.

Note:
Fix jack stud with 2/ 90mm x 3.15 dia. nails from top plate and 2/ 90mm x 3.15 dia. skew nails to lintel (typical)

FIXING 2

Jack Stud Dimension **(JSD)** from a minimum of 100mm to a maximum of 430mm.

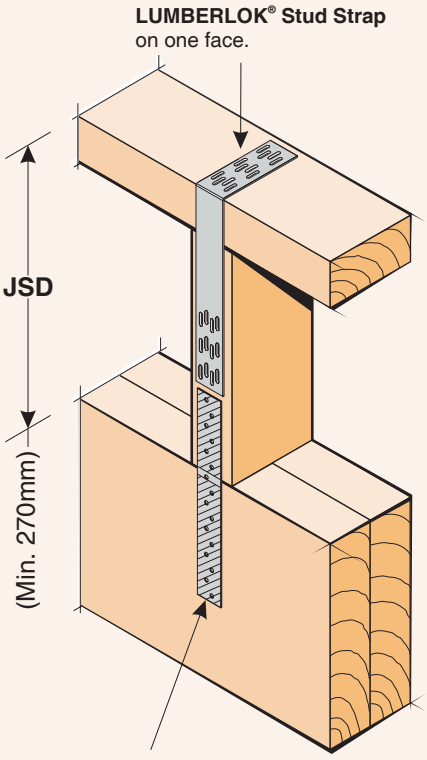


LUMBERLOK® Sheet Brace Strap on one face.
Fill 6 holes in shaded area with LUMBERLOK® Product Nails 30mm x 3.15 dia.

Note:
- JSD up to 230mm use Sheet Brace Strap 400mm.
- JSD from 230mm to 430mm use Sheet Brace Strap 600mm.

FIXING 3

Jack Stud Dimension **(JSD)** from a minimum of 270mm. No maximum dimension.



LUMBERLOK® Sheet Brace Strap 200mm on one face.
Fill 6 holes in both shaded areas of jack stud and lintel with LUMBERLOK® Product Nails 30mm x 3.15 dia.

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GIB HandiBrac®

Panel Hold-Down Bracket

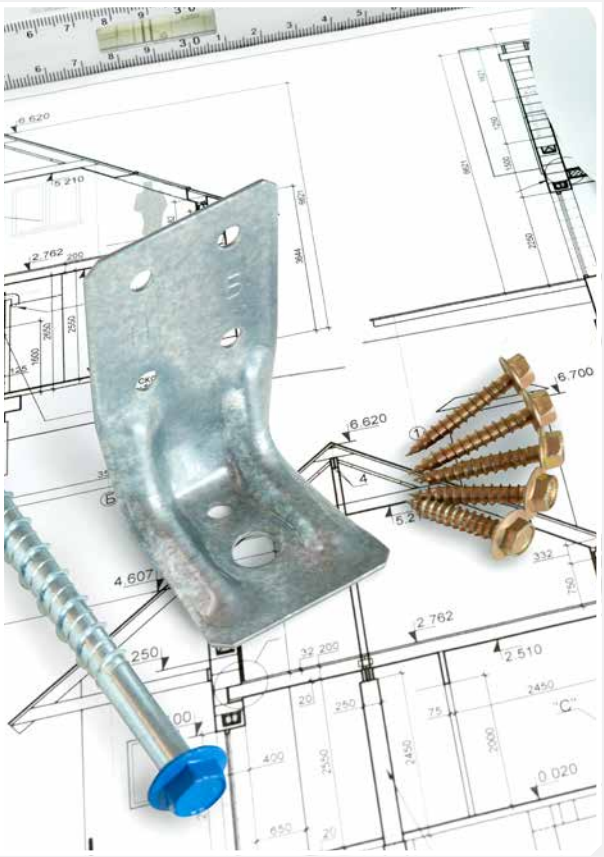
Developed in conjunction with MiTek™, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs. The GIB HandiBrac® is a substitute for bottom plate hold-down straps.

- 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

The GIB HandiBrac® provides quick and easy installation. The registered design provides a flush surface for the wall linings because it is fitted inside the framing.

There is therefore no need to check in the framing as is recommended with conventional straps. Because the GIB HandiBrac® conveniently allows for installation and inspection at any stage prior to fitting internal linings, it is suitable for both new and retrofit construction.



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GIB HANDIBRAC® OVERVIEW

COMPONENTS

GIB HandiBrac® is available in boxes of 10, each containing 5 pairs.

Components per paired pack include:

- 2 x GIB HandiBrac® Brackets
- 10 x Tek Screws
- 2 x BOWMAC® screw bolts included within specific GIB HandiBrac® pack

GIB® BRACING ELEMENTS

The GIB HandiBrac® is a proprietary product that has been tested and is suitable for use with specified GIB Ezy Brace® systems.

FIXING TO TIMBER FRAMED FLOORS

BOWMAC® screw bolt to achieve a characteristic uplift strength of 12kN.

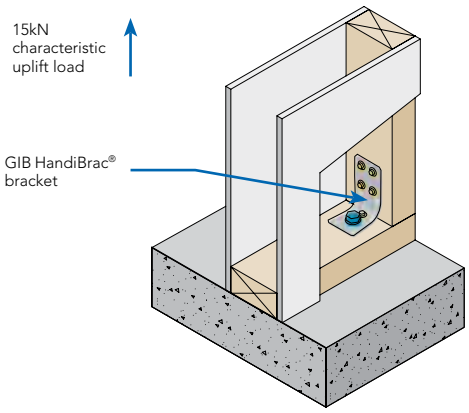
FIXING TO CONCRETE SLABS

BOWMAC® screw bolt to achieve a characteristic uplift strength of 15kN

PANEL HOLD-DOWN DETAILS

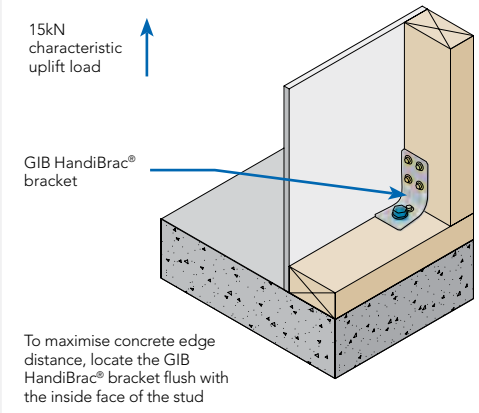
CONCRETE FLOOR – INTERNAL WALL

The bottom plate at both ends of the bracing element is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page



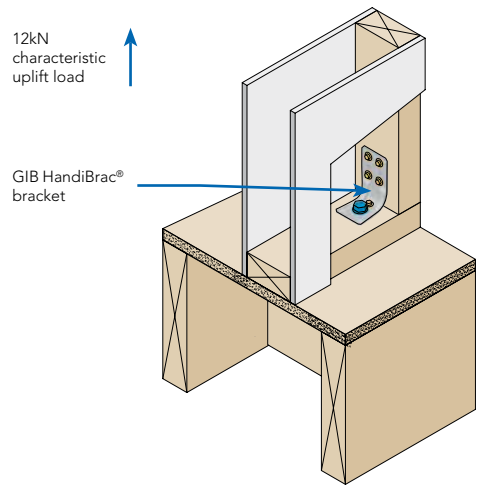
CONCRETE FLOOR – EXTERNAL WALL

The bottom plate at both ends of the bracing element is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



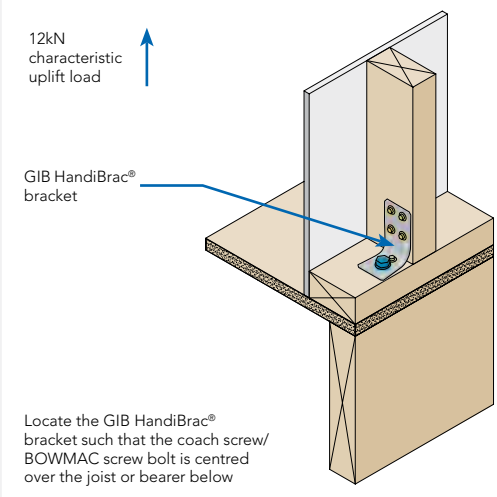
TIMBER FLOOR – INTERNAL WALL

Bottom Plate is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



TIMBER FLOOR – EXTERNAL WALL

Bottom Plate is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



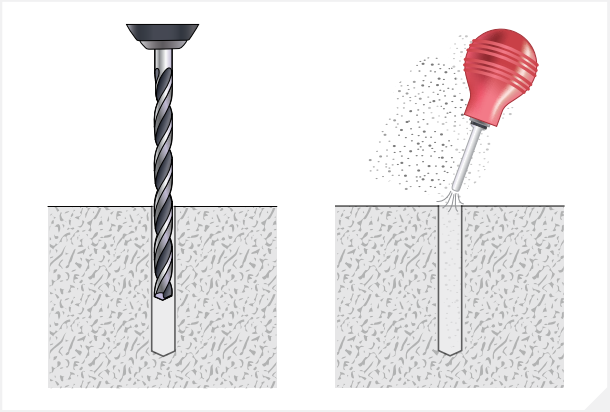
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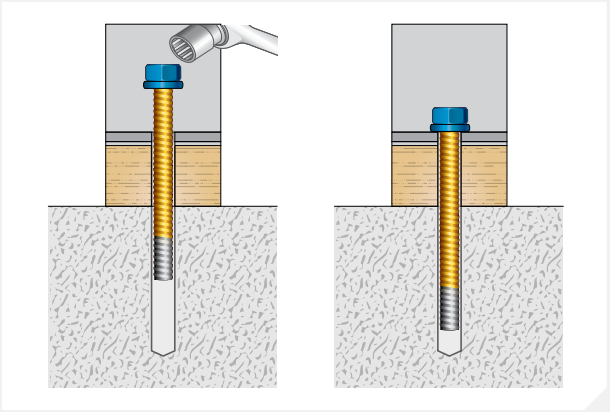
INSTALLATION OF GIB HANDIBRAC® BRACKET

1. Install the screw located in the bracket base
2. Install the BOWMAC® screw bolt as per instructions below
3. Install remaining four screws into the face of the timber stud

Installation Tips

- Use quality hexagonal socket with a ratchet spanner
- During installation debris or dust created by the thread cutting action may cause some resistance to be experienced. This is easily overcome by unscrewing the BOWMAC® screw bolt for one turn or more and then continuing to fix to the full embedment.





PREPARATION

- Use a 10mm diameter masonry bit for a solid concrete substrate and an 8mm diameter bit for fixing to a timber sub-floor.
- Drill a hole into the base material to depth 8 mm deeper than the required embedment and clean out the hole of dust and debris prior to installation of BOWMAC® screw bolt.

FIXING THE BRACKET

- Insert the bolt through the GIB HandiBrac® plate and bracket and into the hole.
- Begin tightening the bolt by applying forward pressure when engaging the first thread.
- Additional forward pressure may be required for installation in high strength, dense base materials.
- Continue tightening the anchor until the head is firmly seated against the GIB HandiBrac® base.
- In extremely dense material, use of an impact wrench is recommended.
- Be sure the bolt is at the required embedment depth.
- The installation is now complete.

GIB HANDIBRAC®

TRADEMARKS

The name GIB®, GIB HandiBrac® and the shield device are registered trademarks of Fletcher Building Holdings Limited.

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NZ Registered Design Application #420161

MANUFACTURER

GIB HandiBrac® is manufactured and distributed by MiTek New Zealand Ltd.

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P O Box 58-014, Botany, Auckland 2163, New Zealand
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Christchurch Office
14 Pilkington Way, Riccarton 8440, Christchurch, New Zealand
P O Box 8387, Riccarton, New Zealand
Ph: 64-3-348 8691, Fax: 64-3-348 0314

www.miteknz.co.nz

LUMBERLOK®

TOP PLATE JOINTING

AS PER CLAUSE 8.7.3 NZS 3604:2011

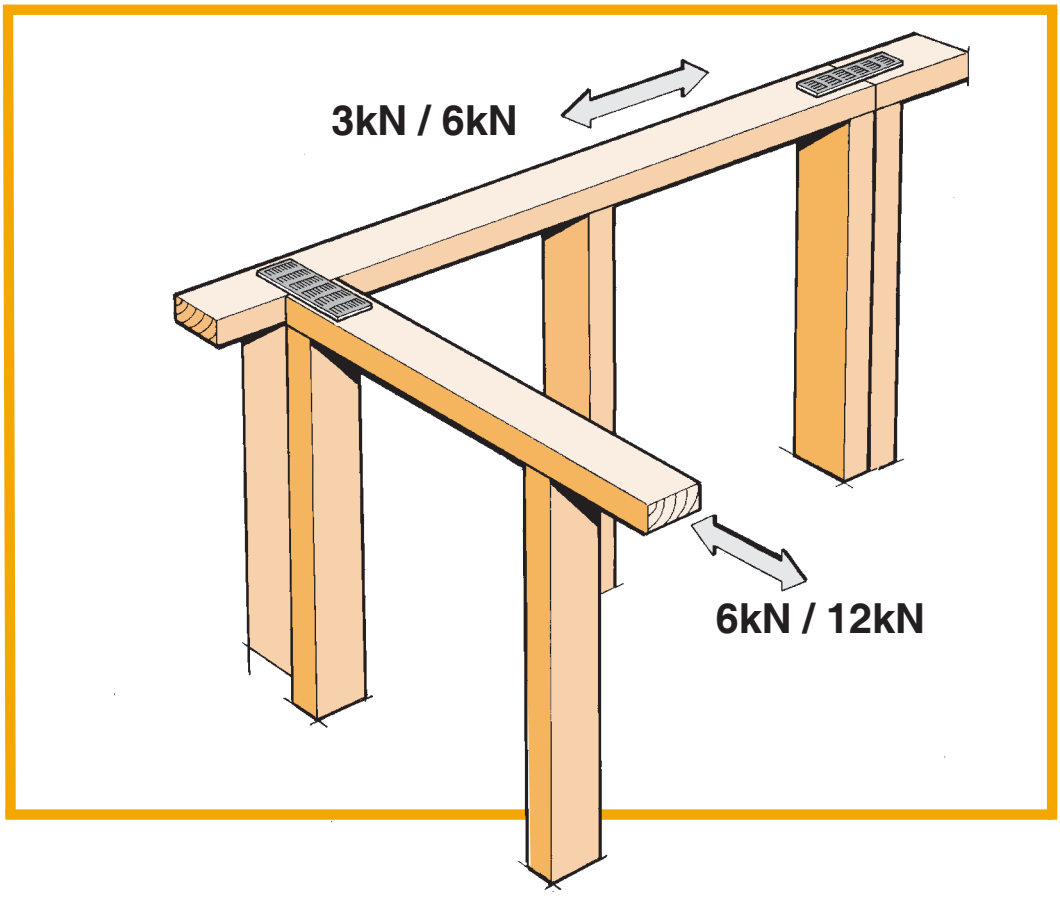
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Top Plates at Right Angles

Connection capacity	LUMBERLOK Connector
6kN	Tylok 6T10 **OR** PLATE-LOK
12kN	2 x Sheet Brace Straps fixed with 6 x LUMBERLOK Product Nails 30mm x 3.15 dia. per end per strap (24 nails total)

Top Plates in Line

Connection capacity	LUMBERLOK Connector
3kN	Tylok 6T5 **OR** Strap Nail
6kN	Tylok 6T10 **OR** PLATE-LOK



Available from leading Builders Supply Merchants throughout New Zealand

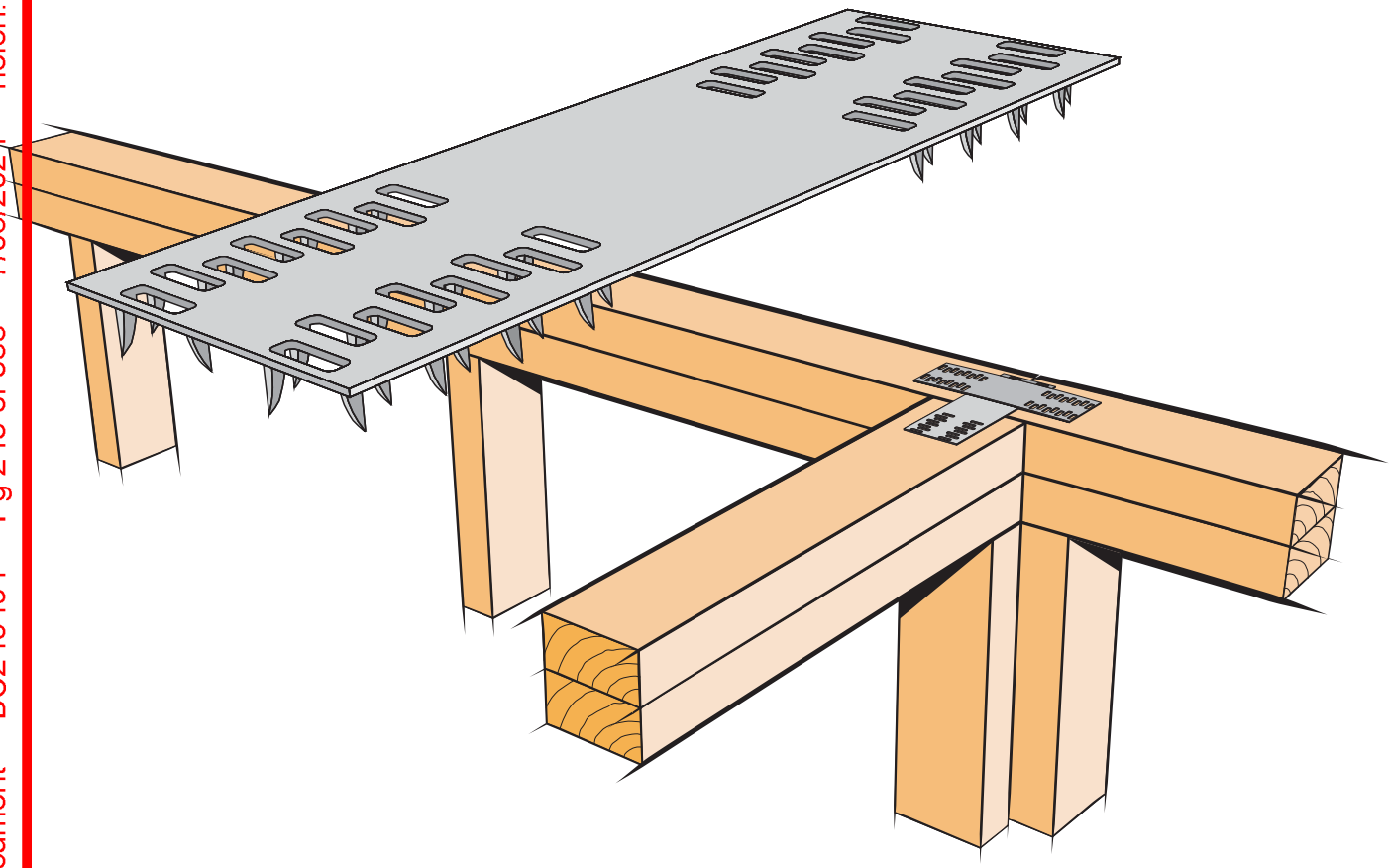
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LUMBERLOK®

PLATE-LOK

6kN CAPACITY CONNECTOR

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- The LUMBERLOK PLATE-LOK is ideally suited for right angle wall connections with a unique clear centre section to allow easy overlapping
- Suitable for use in SG8 Radiata pine/Douglas fir & LVL8 top plates
- This brochure also provides simple guidelines for the interpretation of Clause 8.7.3 NZS 3604:2011 for top plate connections
- The LUMBERLOK PLATE-LOK also provides a simple solution for a 6kN capacity connection where required by NZS 3604:2011

Code: **PLATELOK**
Material: **0.95mm G300 Z275 Galvanised Steel 150x50mm**
Packed: **100 per Carton**

MiTek®

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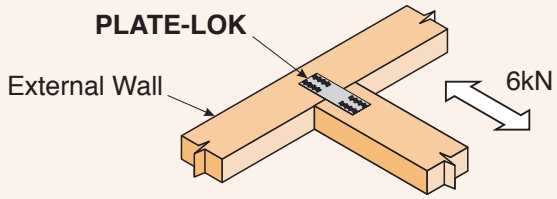
TOP PLATE CONNECTIONS AS REQUIRED BY CLAUSE 8.7.3 NZS 3604:2011

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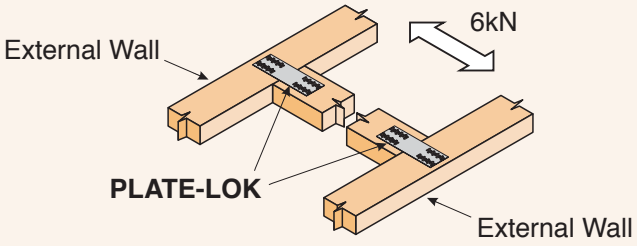
① Top plate joints for walls at right angles to external walls:

(a) Walls with bracing elements not exceeding 125 bracing units (BU) require a 6kN capacity connection to one external wall.

(b) Walls with bracing elements not exceeding 250 BU require a 6kN capacity connection to two external walls.

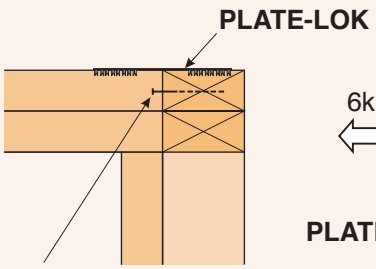


Wall bracing up to 125 BU

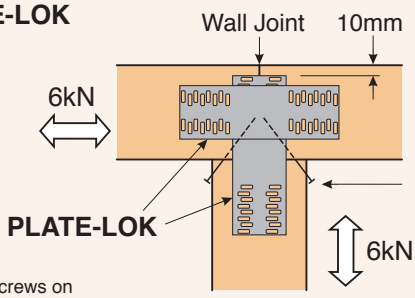


Wall bracing between 125 BU & 250 BU

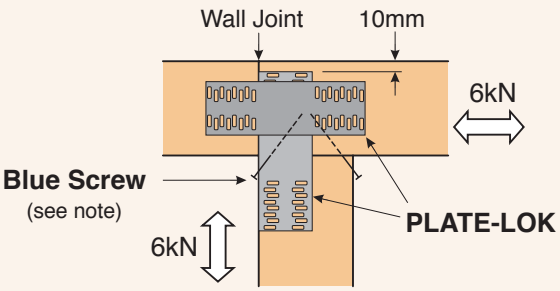
② Details of top plate joints using LUMBERLOK PLATE-LOK at "T" junction walls are shown below:



Note: Fix with a pair of LUMBERLOK Blue Screws on sides of top plate for Douglas fir and LVL8 only

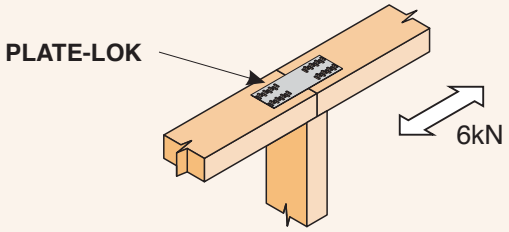


Centre Wall Joint

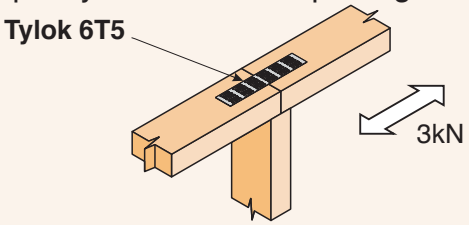


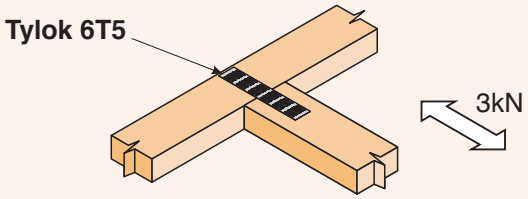
Side Wall Joint

③ Top plate joints for all walls in line that have wall bracing elements exceeding 100 BU or have a ceiling diaphragm attached require a 6kN capacity connection as per Figure 8.15 NZS 3604:2011.



④ Top plate joints for walls at right angles and in line that have either no bracing elements or are on a single storey building only with wall bracing demands not exceeding 100 BU require a 3kN capacity connection as per Figure 8.15 & 8.16 NZS 3604:2011.





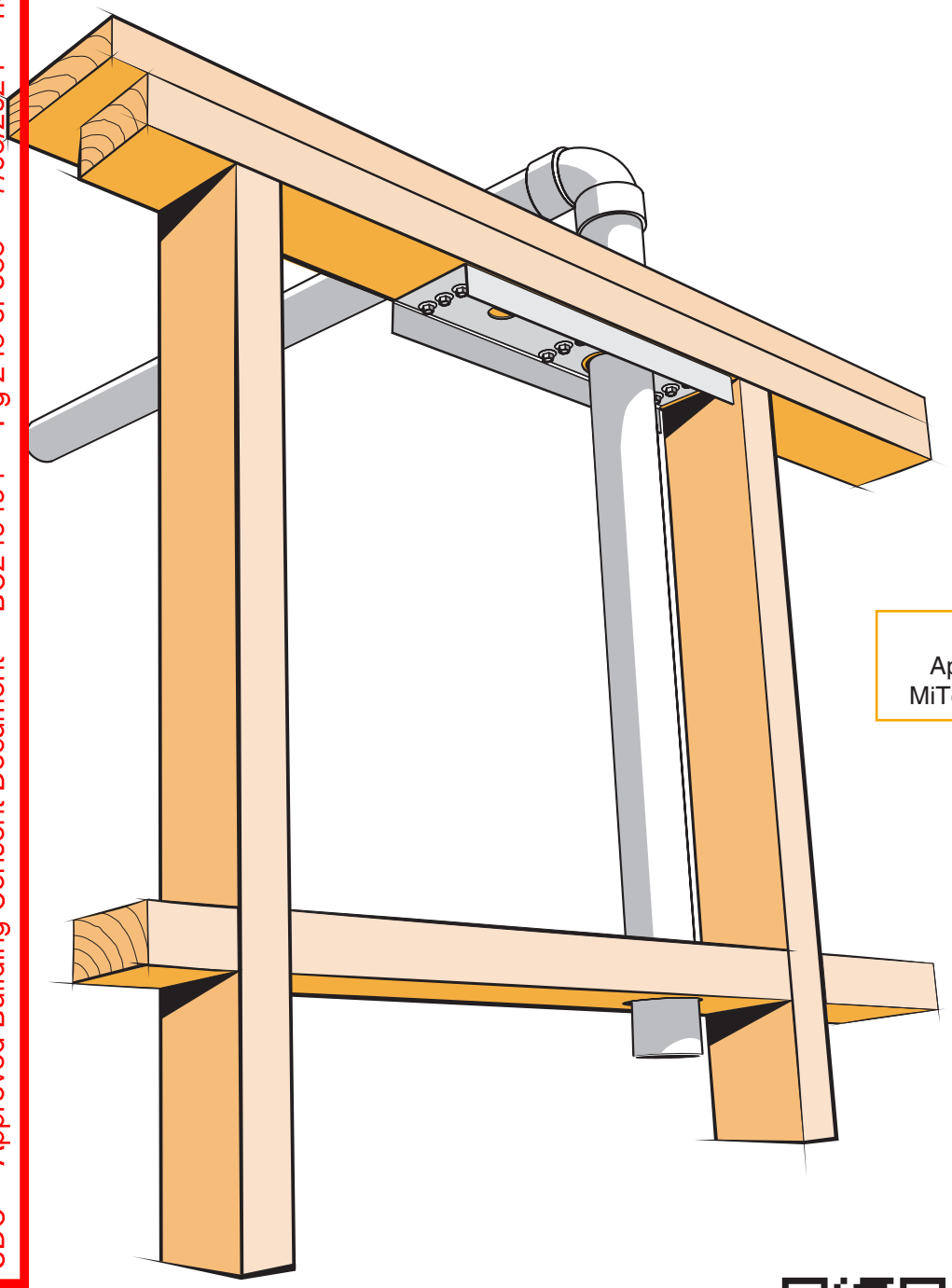
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LUMBERLOK®

TOP PLATE STIFFENER

- ★ For plumbing or vacuum system ducting through top plates
- ★ Reinforces the top plate back to FULL STRENGTH!
- ★ Alternative solution to Figure 8.20 NZS 3604:2011

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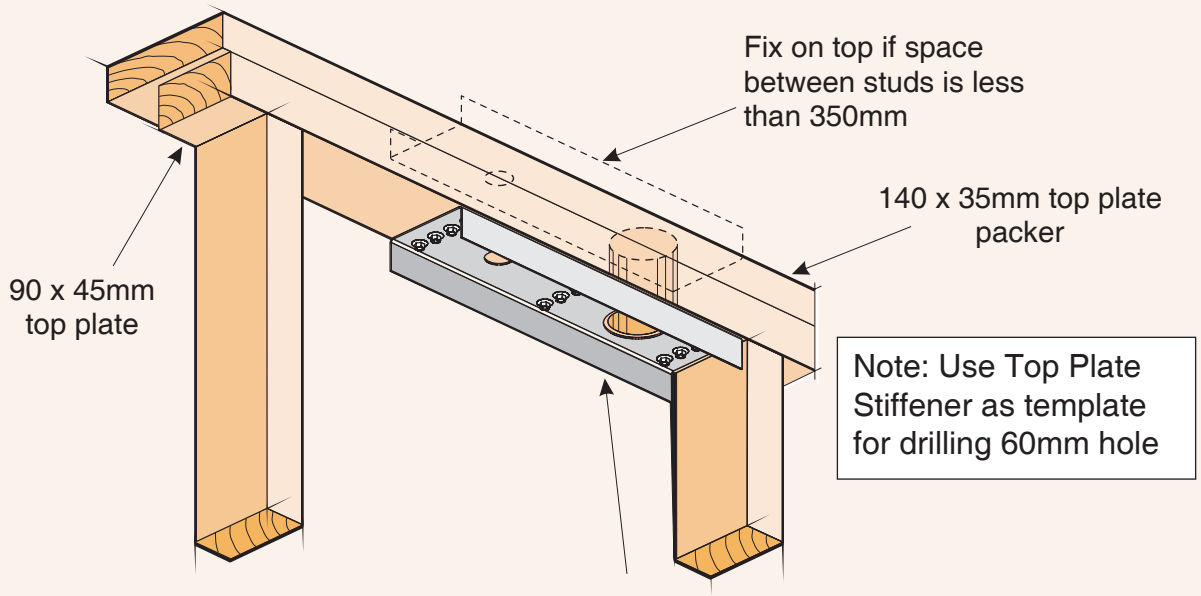
NZ Reg. Design
App. 408133 © 2006
MiTek New Zealand Ltd.

SCAN FOR INSTALLATION VIDEO

https://vimeo.com/117353342

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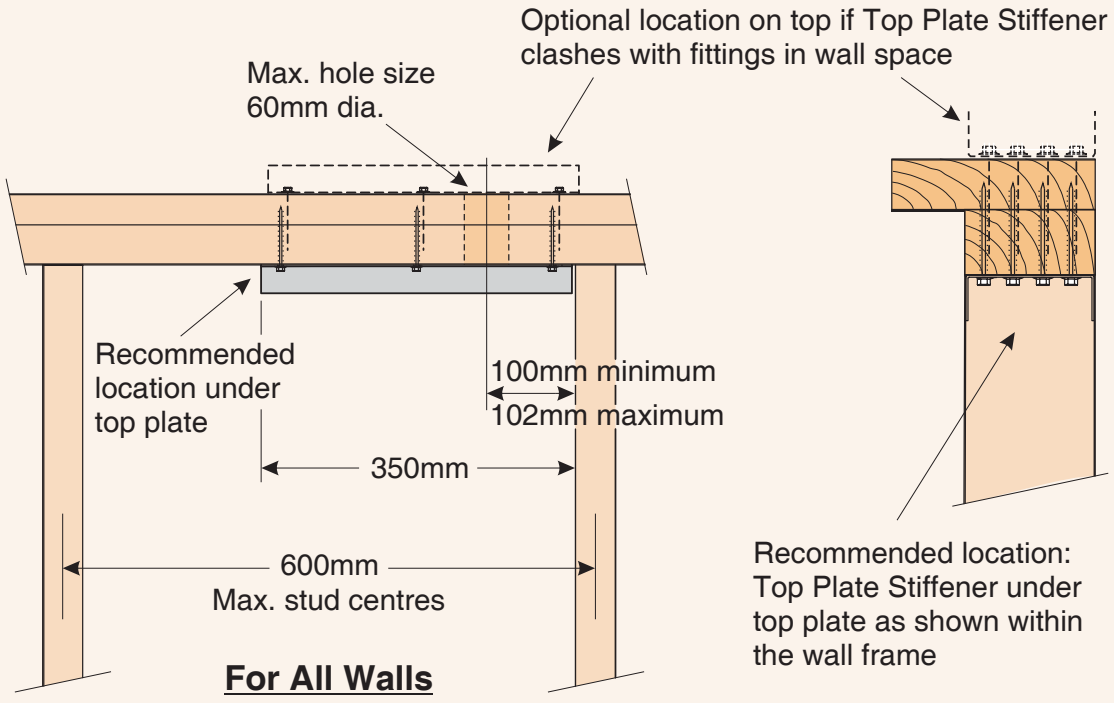
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Note: Use Top Plate Stiffener as template for drilling 60mm hole

Note: For single top plate fix with Type 17-14g x 35mm Hex Head Screws (not supplied)

Fix up into top plate and into packer with 3 rows of 4 x Type 17-14g x 75mm Hex Head Screws (supplied). It may be advisable to drill pilot hole for each screw to assist installation



For All Walls

Recommended location: Top Plate Stiffener under top plate as shown within the wall frame

Code: **TPS**

Material: **1.55mm G300 Z275 Galvanised Steel**

Packed: **8 x Top Plate Stiffeners per Carton**
100 x Type 17-14g x 75mm Hex Head Galvanised Screws

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LUMBERLOK®

STUD TO TOP PLATE FIXING SCHEDULE

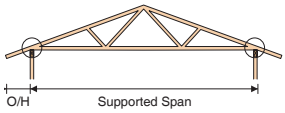
ALTERNATIVE TO TABLE 8.18 NZS 3604:2011

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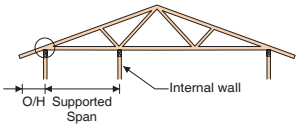
NOTE:

- ★ All fixings are designed to resist vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20kPa.
- ★ Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist lateral loads.
- ★ These fixings assume the correct choice of rafter/truss to top plate connections have been made.
- ★ For gable end walls where the adjacent rafter/truss is located within 1200mm and with a maximum verge overhang of 750mm, select stud to top plate fixing using a loaded dimension of 1.5m.
- ★ All fixings assume top plate thickness of 45mm maximum.
- ★ Wall framing arrangements under girder trusses are not covered in this schedule.
- ★ All timber selections are as per NZS 3604:2011.

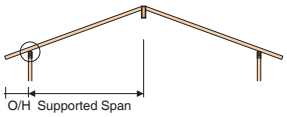
LOADED DIMENSION DEFINITION



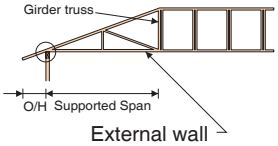
External wall
Standard truss



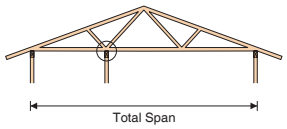
External wall
Internally supported truss



External wall
Rafter roof



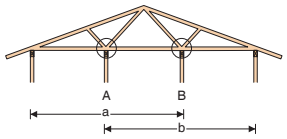
External wall
Jack truss



Internal wall
Internally supported truss
(overhang dimension does not apply)

EXTERNAL WALL
LOADED DIMENSION =
$\frac{\text{SUPPORTED SPAN}}{2}$ + O/H

INTERNAL WALL
LOADED DIMENSION =
$\frac{\text{TOTAL SPAN}}{2}$



Multiple internal walls
(overhang dimension does not apply)

MULTIPLE INTERNAL WALL
LOADED DIMENSION FOR
WALL A = $\frac{a}{2}$
WALL B = $\frac{b}{2}$

FIXING SELECTION CHART

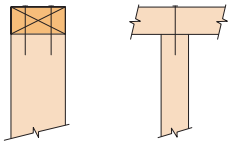
(Suitable for walls supporting roof members at 600, 900 or 1200mm crs.)
Wind Zones L, M, H, VH, EH, as per NZS 3604:2011

Loaded Dimension (m) Stud Centres			Light Roof Wind Zone					Heavy Roof Wind Zone				
300mm	400mm	600mm	L	M	H	VH	EH	L	M	H	VH	EH
2.0	2.3	1.5	A	A	B	B	B	A	A	B	B	B
3.0	3.0	2.0	A	A	B	B	B	A	A	B	B	B
4.0	3.8	2.5	A	B	B	B	B	A	A	B	B	B
6.0	4.5	3.0	A	B	B	B	B	A	A	B	B	B
7.0	5.3	3.5	A	B	B	B	B	A	A	B	B	B
8.0	6.0	4.0	A	B	B	B	B	A	A	B	B	B
9.0	6.8	4.5	B	B	B	B	B	A	A	B	B	B
10.0	7.5	5.0	B	B	B	B	B	A	A	B	B	B
11.0	8.3	5.5	B	B	B	B	B	A	A	B	B	B
12.0	9.0	6.0	B	B	B	B	B	A	A	B	B	B

FIXING OPTIONS

FIXING TYPE A 0.7kN

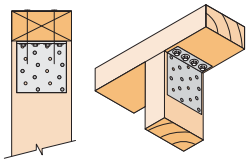
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



FIXING TYPE B 4.7kN

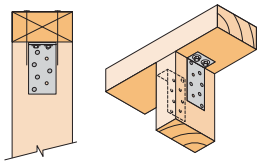
CHOOSE ANY OF THE 3 OPTIONS BELOW

2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
LUMBERLOK
6kN Stud Anchor
(CPC80)

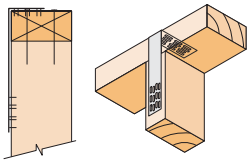
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
2 x LUMBERLOK
CPC40

Recommended for internal wall options to avoid lining issues

2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
LUMBERLOK
Stud Strap
(one face only)

NOTE:
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.

SCAN FOR SPECIFICATION VIDEO

https://vimeo.com/117353604

MiTek®

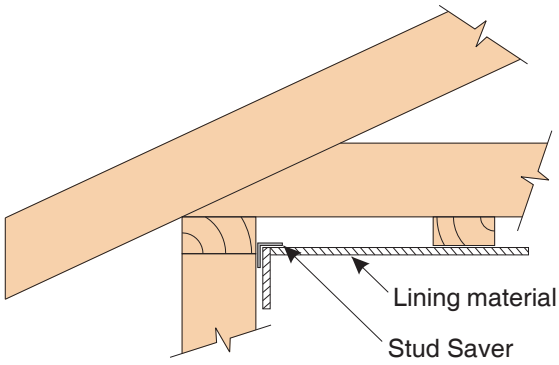
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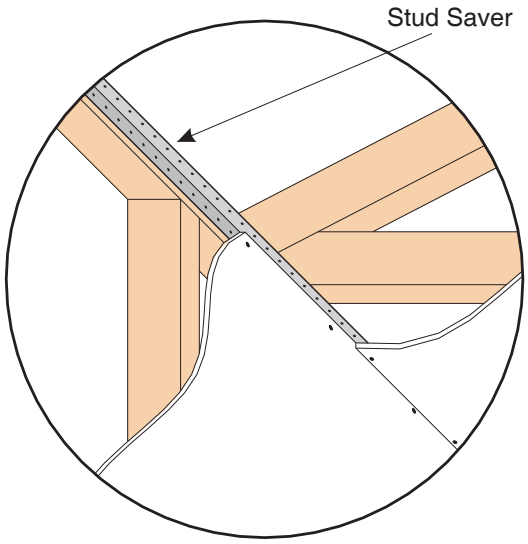
STUD SAVER

FOR CEILINGS

Patent No. 314494

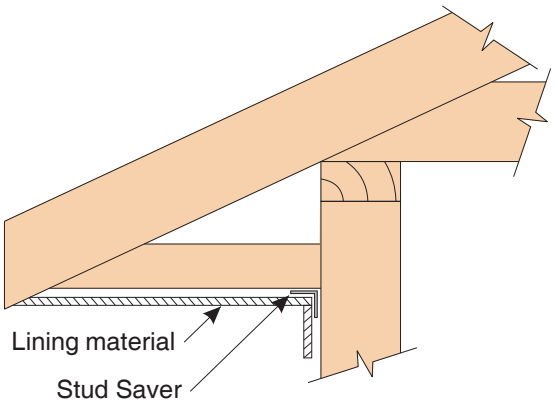
- ★ Alternative to top plate packers.
- ★ Can be adjusted in location to suit any size ceiling batten.
- ★ Can be located over internal walls at the required level to suit the ceiling line.
- ★ Easily fixed to wall plates and studs.
- ★ Reduces cracking along the ceiling wall corners.
- ★ Ceiling material simply attached by use of standard self tapping screws.
- ★ Supplied in 2400mm length.
- ★ Not for ceiling diaphragms.

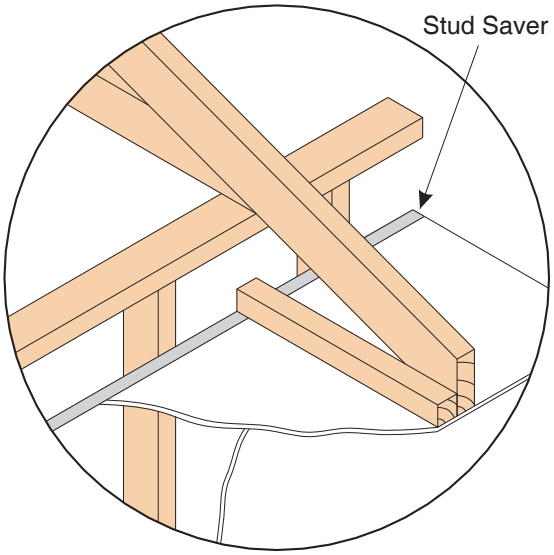




FOR SOFFIT & EXTERIOR CLADDING SUPPORT

- ★ Eliminates dwang/nog for wall lining support.
- ★ Eliminates ribbon plate for soffit sprockets and lining support.





Material: **0.75mm x 67mm G250 Z275 Galvanised Steel**

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LUMBERLOK®

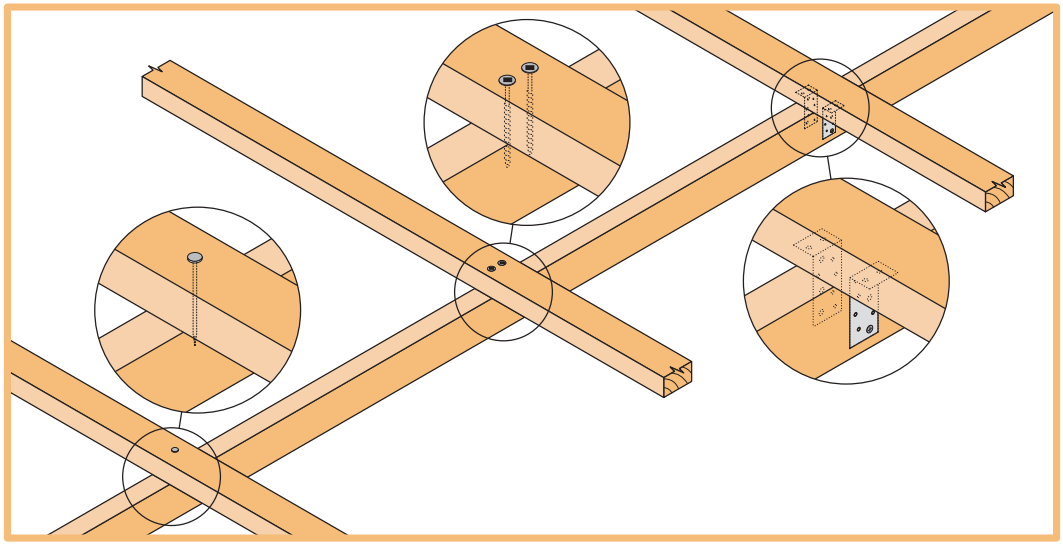
PURLIN & BATTEN FIXING CHART

ALTERNATIVE SOLUTION TO NZS 3604:2011 TABLES 10.10 & 10.12

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NOTE:

- ★ All purlin and batten sizes are as per NZS 3604:2011.
- ★ All fixings assume that the purlin and battens are installed on their flat over the top of the rafter or truss.
- ★ The minimum fixing requirements apply to all purlin locations within the roof area.
- ★ The LUMBERLOK BLUE SCREW where specified requires a minimum of 30mm penetration into rafter or truss i.e. it is suitable for rough sawn timber up to 50mm thick at 18% moisture content.



SELECTION CHART FIXING OPTIONS

(minimum fixing requirements)

ROOF WEIGHT	MAX. PURLIN SPAN (mm)	MAX. PURLIN CRS. (mm)	WIND ZONE				
			L	M	H	VH	EH
HEAVY ROOF Tile Battens	900	370	A	A	A	A	A
LIGHT ROOF Tile Battens	900	370	A	A	B	C	C
	1200	370	A	B	C	C	C
LIGHT ROOF Purlins	900	900	C	C	C	C	D
	1200	900	C	C	C	D	D
	1200	1200	C	C	D	E	E

Wind Zone:
As per NZS 3604:2011

L = Low Wind
M = Medium Wind
H = High Wind
VH = Very High Wind
EH = Extra High Wind

SCAN FOR INSTALLATION VIDEO

https://vimeo.com/117353340

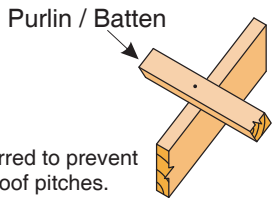
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STANDARD FIXING OPTIONS

FIXING TYPE A 0.55kN

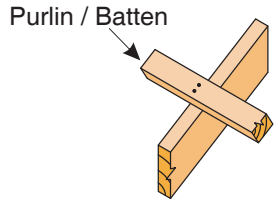
1 NAIL

Note: Two nails maybe preferred to prevent batten rolling over with high roof pitches.



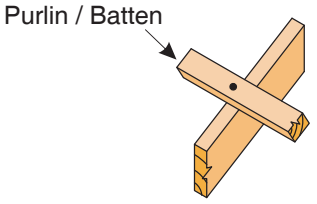
FIXING TYPE B 0.8kN

2 NAILS



FIXING TYPE C 2.4kN

1 BLUE SCREW



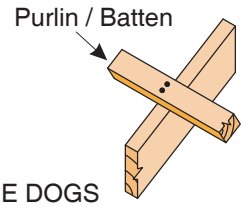
FIXING TYPE D 3.45kN

2 BLUE SCREWS

OR

2 SKEW NAILS plus 2 WIRE DOGS

(for purlin on edge)

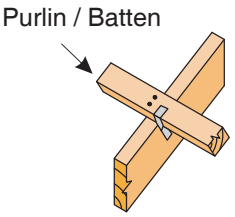


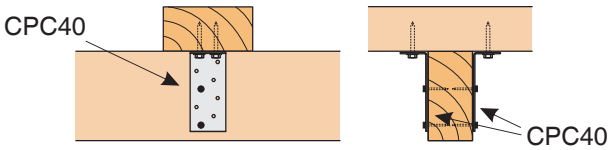
FIXING TYPE E 5.5kN

2 NAILS plus 1 CT200

OR

1 PAIR of CPC40





FIXING DEFINITIONS

NAIL = Either 90mm x 3.15 dia. power-driven nail or 100mm x 3.75 dia. hand-driven nail

BLUE SCREW = 80mm x 10 gauge LUMBERLOK BLUE SCREW

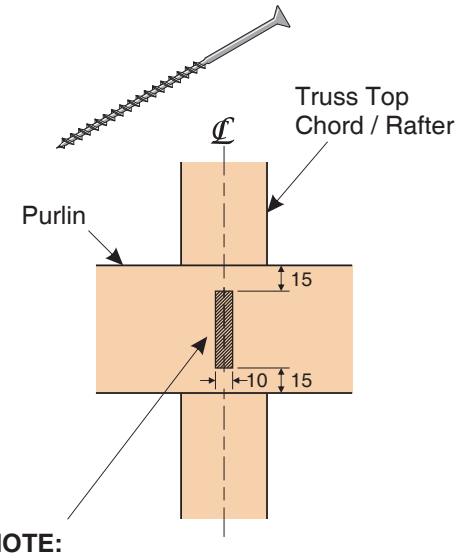
WIRE DOG = LUMBERLOK WIRE DOG either LH or RH

CT200 = LUMBERLOK Ceiling Tie CT200 bend over purlin, 4 x LUMBERLOK Product Nails 30mm x 3.15 dia. each end

CPC40 = LUMBERLOK CPC40 with 2 x Type 17 - 14g x 35mm Hex Head Screws per flange

FIXING TOLERANCES

LUMBERLOK BLUE SCREW

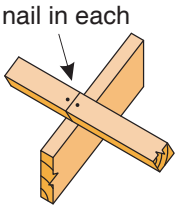


NOTE:

Locate fixings within the shaded area. Care to be taken to avoid over tightening of screws.

PURLIN / BATTEN SPLICE FIXING OPTIONS

FIXING TYPE A & B OVER PURLIN SPLICE

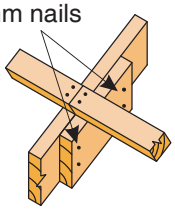


NOTE:

Skew nail when fixing to 35mm rafter or truss

FIXING TYPE C, D or E OVER PURLIN SPLICE

90 x 35mm block fixed to chord or rafter with 4 x 75mm nails



- TYPE C
  1 SCREW
  to each purlin
- TYPE D & E
  1 NAIL plus 1 SCREW to each purlin

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LUMBERLOK®

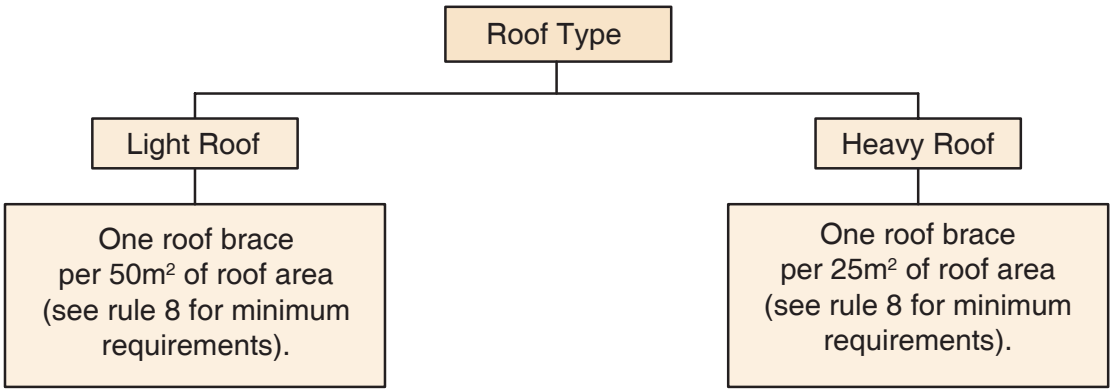
ROOF BRACING SPECIFICATION

AS PER NZS 3604:2011

- ★ Covers roof bracing requirements to resist horizontal loads as set out in Section 10 NZS 3604:2011.
- ★ A definitive guide to the description and installation of Roof Plane Braces and Roof Space Braces.

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Roof Bracing Requirements



Roof Bracing - Rules & Definitions

1. The bracing described in this brochure covers both framed roofs and fully trussed roofs.
2. Roof planes less than 6m² (e.g. dormers & porches) do not require bracing.
3. Roof braces can consist of either
   i) Roof Plane Brace or
   ii) Roof Space Brace or combination of the two.
4. Roof braces are not required on roofs where sarking is installed as per Clause 10.4.4 NZS 3604:2011 or where a ceiling diaphragm is installed and is attached to the rafters.
5. Roof area is the actual plan area of the roof and includes overhangs.
6. A hip or valley rafter running continuously from ridge to top plate can be classed as one roof plane brace.
7. A pair of crossed LUMBERLOK Strip Brace (preferred for ease of installation) can be classed as one roof plane brace and shall be installed as detailed in this brochure.
8. There must be at least one roof plane brace in each roof plane. Each ridge line shall have a minimum of two roof braces.
9. Every design effort should be made to distribute the roof braces as evenly as possible over the entire roof area and run alternately in opposite directions.

SCAN FOR SPECIFICATION VIDEO

https://vimeo.com/117353345

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Roof Bracing Options

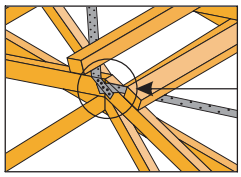
i) ROOF PLANE BRACE

Each roof plane brace can be:

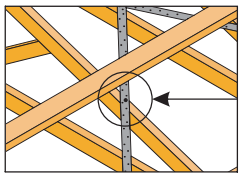
- A hip or valley rafter running continuously from ridge to the top plate in accordance with Clauses 10.2.1.3.2 or 10.2.1.3.3 NZS 3604:2011.

OR

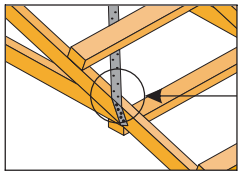
- A pair of tensioned and crossed LUMBERLOK Strip Brace running continuously from ridge to top plate installed as detailed below.



5 x 30mm x 3.15 dia. nails each end

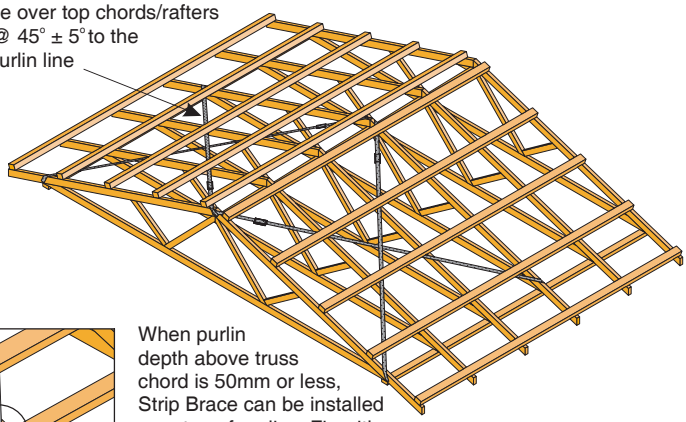


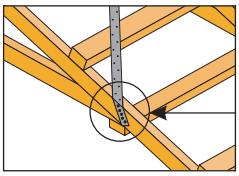
1 x 30mm x 3.15 dia. nail at crossing (after tensioning)



5 x 30mm x 3.15 dia. nails each end

A pair of tensioned and crossed LUMBERLOK Strip Brace over top chords/rafters installed @ 45° ± 5° to the rafter or purlin line

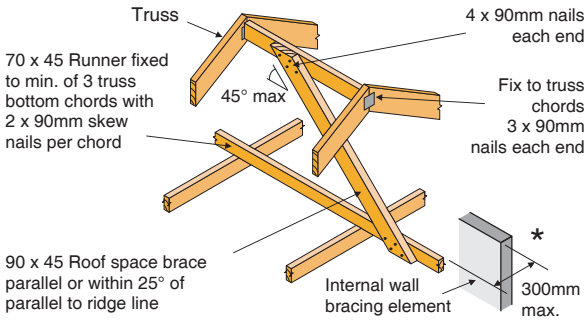




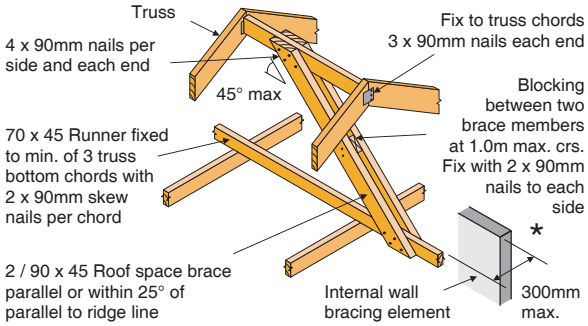
When purlin depth above truss chord is 50mm or less, Strip Brace can be installed over top of purlins. Fix with 1 x 30mm x 3.15 dia. nail at the purlin closest to the rafter/truss crossing

ii) ROOF SPACE BRACE

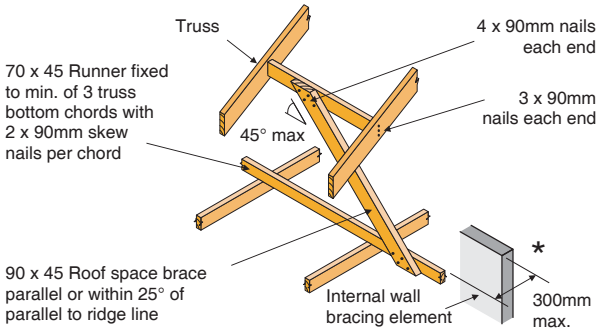
(A) Less than 2m long



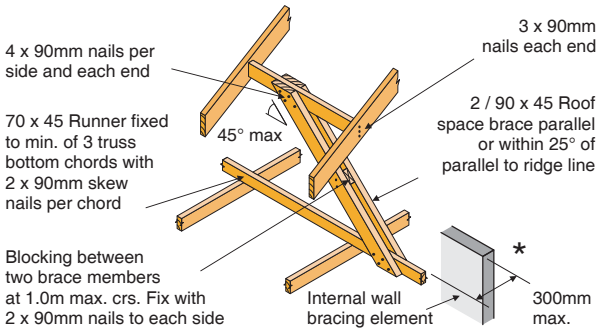
(B) More than 2m long (Max. 4.8m)



(C) Not directly under the ridge - less than 2m long



(D) Not directly under the ridge - more than 2m long



*Not required when a ceiling diaphragm complying with Clause 13.5 NZS 3604:2011 is used.

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GABLE END RAKING VERGE
OVERHANG OPTIONS

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★ Covers raking verge using standard purlin overhang options.
★ Covers up to 750mm overhang using standard verge outriggers.
★ Covers up to 1200mm overhang using verge outrigger/purlin combination.

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OVERHANG OPTIONS

- **All gable end loading parameters are based on the design considerations used in NZS 3604:2011 and cover heavy roof weight, extra high wind load and snow load Sg of up to 1.0kPa.**
- **All live load considerations as per AS/NZS 1170.**
- **All timber to be minimum grade SG8 as defined in NZS 3604:2011.**

CANTILEVER PURLIN OPTION

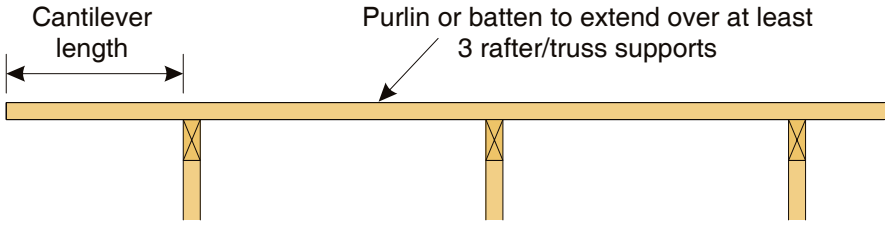


TABLE 1

PURLIN SIZE & ORIENTATION	MAX. CANTILEVER LENGTH (mm)	PURLIN CENTRES (mm)
45x45	200	400
70x45	300	900
90x45	450	900

CANTILEVER OUTRIGGER OPTION

(Note: Maximum sidewall overhang of 750mm)
(See details on next pages)

TABLE 2

	OUTRIGGER SIZE & ORIENTATION	MAX. CANTILEVER LENGTH (mm)	OUTRIGGER CENTRES (mm)
MAX. CANTILEVER LENGTH 750mm	70x45	750	600
		600	900
	90x45	750	900
		600	1200
	90x45	750	400
		600	600

CANTILEVER OUTRIGGER/PURLIN COMBINATION OPTION

(Note: Maximum sidewall overhang of 1200mm)
(See details on next pages)

TABLE 3

	OUTRIGGER SIZE & ORIENTATION	MAX. CANTILEVER LENGTH (mm)	OUTRIGGER CENTRES (mm)
MAX. CANTILEVER LENGTH 1200mm	45x45 Purlin 90x45 Outrigger	1200	450
	70x45 Purlin 90x45 Outrigger	1200	700
	90x45 Purlin 90x45 Outrigger	1200	900

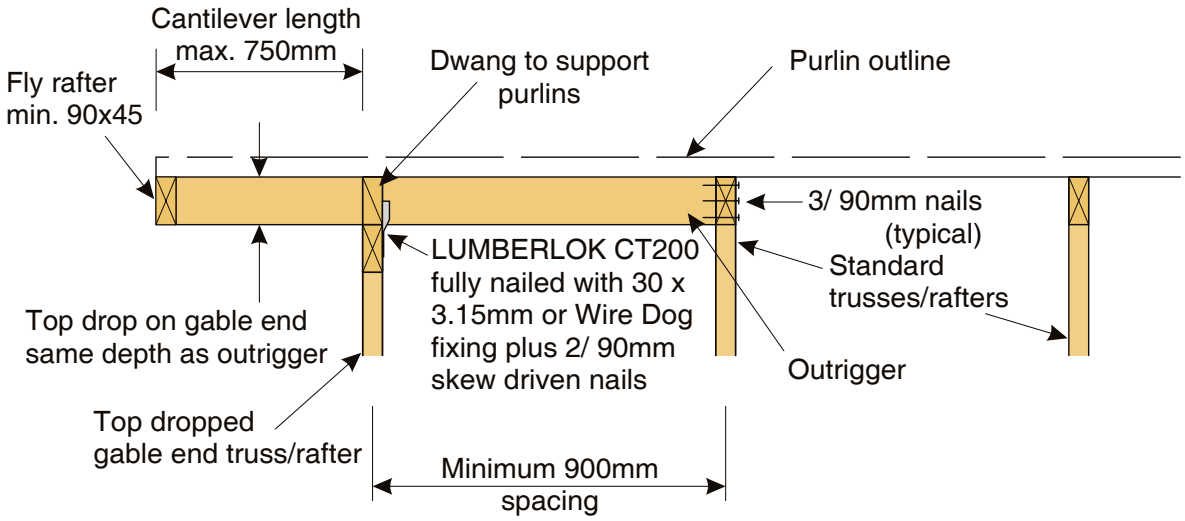
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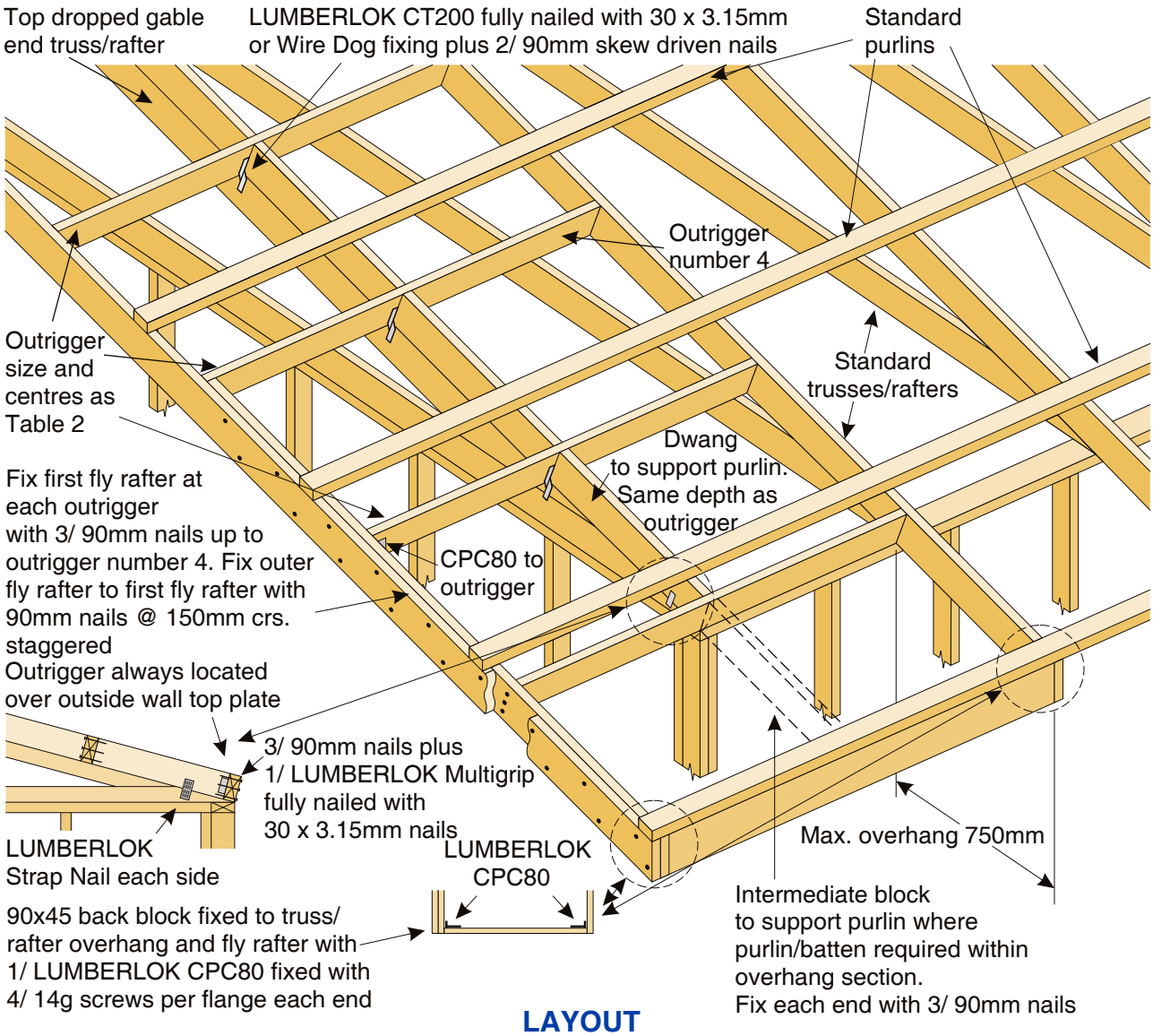
CONSTRUCTION DETAILS FOR CANTILEVER OUTRIGGER OPTION

(SPANS & CENTRES AS PER TABLE 2)

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CROSS SECTION

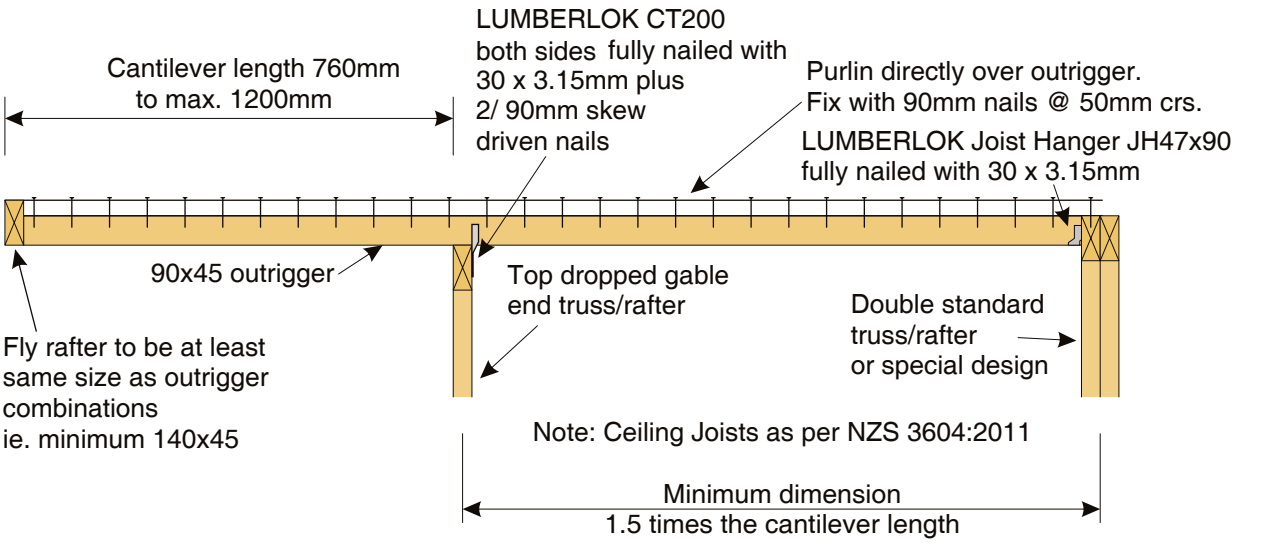


LAYOUT

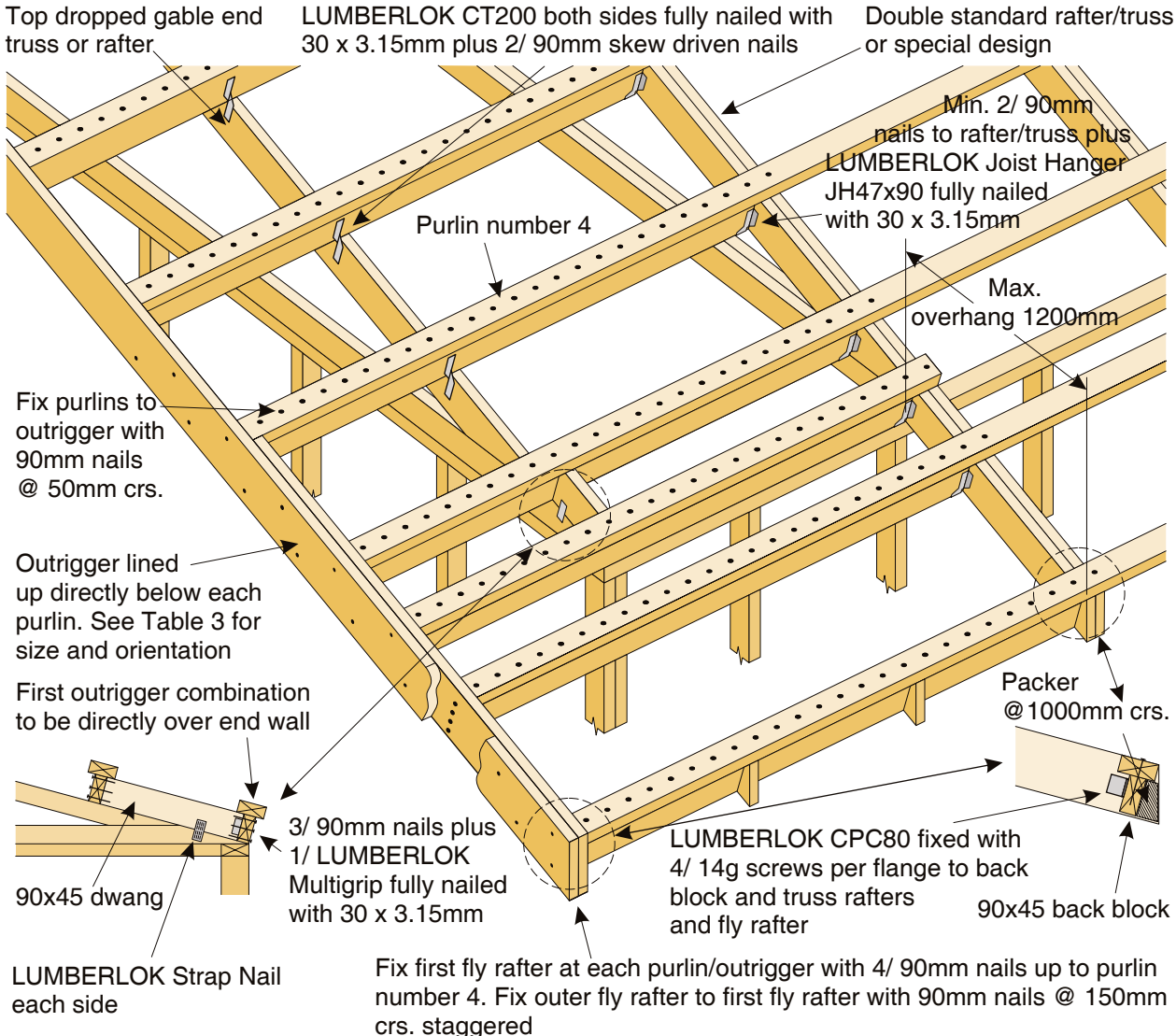
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CONSTRUCTION DETAILS FOR OUTRIGGER/PURLIN COMBINATION

(SPANS & CENTRES AS PER TABLE 3)



CROSS SECTION



LAYOUT

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APPENDIX 12 – MASONS UNI FLEXIBLE AIR BARRIER

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PRODUCT CERTIFICATE

Masons UNI® and UNI® PLUS Flexible Air Barriers

CERTIFICATE NO: CM70116 Rev1
Date of issue: 6 April 2022

KEY INFORMATION

1 CERTIFICATE HOLDER DETAILS

MASONS Plastabrick Ltd
18A David McCathie Place
Silverdale, Auckland 0932, New Zealand

info@mpb.co.nz
Ph: +64 9 414 7551
www.mpb.co.nz

2 PRODUCT CERTIFICATION BODY

Bureau Veritas Australia Pty Ltd
3/435 Williamstown Road
Port Melbourne VIC 3207
Australia

Ph: 1800 855 190
www.bureauveritas.com.au

Bureau Veritas Australia Pty Ltd

The complaints process for this certificate can be found here:
www.bureauveritas.com.au/your-feedback

3 SUMMARY OF DESCRIPTION OF BUILDING METHOD OR PRODUCT

Masons UNI® and UNI® PLUS Flexible Air Barriers are tri-laminate synthetic sheets 2.74 metres wide consisting of two outer non-woven layers and a middle synthetic membrane which is dark grey.

UNI® Flexible Air Barrier has a blue front face marked "UNI® Flexible Air Barrier" and a black rear face.

UNI® PLUS Flexible Air Barrier has a blue front face marked "UNI® PLUS Flexible Air Barrier" and a white rear face.

UNI® Flexible Air Barrier is also available as 600 mm wide sheet with a self-adhesive strip, marketed as UNI® Soffit.

Continuation of description can be found in item 9. Supporting Information about Description of Building Product or Method.
Matters that should be taken into account in the use or application of the building method or product can be found in item 6. Conditions and Limitations of Use.

4 SUMMARY OF INTENDED USE OF BUILDING METHOD OR PRODUCT

Masons UNI® and UNI® PLUS Flexible Air Barriers are wall underlays and flexible air barriers and are suitable for use as temporary weather protection to allow interior works to continue inside the building without the exterior wall cladding fully in place.

UNI® PLUS Flexible Air Barrier is fire retardant and suitable for use where exposed to view in an occupied space.

Continuation of intended use can be found in item 8. Supporting Information about Intended use of Building Product or Method.

5 BUILDING CODE PROVISIONS

The performance clauses of the New Zealand Building Code that are relevant to the intended use and with which the building method or product complies or contributes to (where used as part of a system).

B2 Durability: B2.3.1(a), B2.3.2
C3 Fire affecting areas beyond the fire source: C3.4(c) (UNI® PLUS)
E2 External moisture: E2.3.2 (contributes to), E2.3.5 (contributes to), E2.3.6 (contributes to), E2.3.7
F2 Hazardous building materials: F2.3.1
H1 Energy efficiency: H1.3.1(b) (contributes to)

How the building method or product complies or contributes can be found in item 12. Basis for Certification. Any qualifications on the extent of that compliance can be found in item 6. Conditions and limitations of use.

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PRODUCT CERTIFICATE

Masons UNI® and UNI® PLUS Flexible Air Barriers

6 CONDITIONS AND LIMITATIONS OF USE

1. Masons UNI® and UNI® PLUS Flexible Air Barriers are certified for use as a wall underlay and air barrier on buildings:
   a. within the scope limitations of:
      i. NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area for timber-framed construction; or
      ii. NZBC Acceptable Solution E2/AS4 with regards to building height and floor plan area for light-steel framed construction, and
   b. situated in wind zones (as defined in NZS 3604:2011) up to and including 'Extra High', provided stud and fixing centres are no greater than specified in the Masons UNI® Flexible Air Barrier Design and Installation Manual V1.0, October 2021 - CM, or the Masons UNI® PLUS Flexible Air Barrier Design and Installation Manual V2.0, March 2022 - CM respectively, and
   c. with absorbent or non-absorbent wall claddings directly fixed to the frame; or 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 NZBC Acceptable Solution E2/AS4 for steel framed buildings, and
   d. Masons UNI® Flexible Air Barrier must not be used where the underlay is exposed to view in an occupied space.
   e. Masons UNI® PLUS Flexible Air Barrier may be used when exposed to view in an occupied space.
2. Masons UNI® and UNI® PLUS Flexible Air Barriers shall be:
   a. installed in accordance with the Masons UNI® Flexible Air Barrier Design and Installation Manual V1.0, October 2021 - CM, or the Masons UNI® PLUS Flexible Air Barrier Design and Installation Manual V2.0, March 2022 - CM respectively, and
   b. separated from fireplaces, heating appliances, flues and chimneys in accordance with the requirements of NZBC Acceptable Solutions C/AS1 and C/AS2, Paragraph 7.5.9 for the protection of combustible materials, and
   c. protected from sunlight within 90 days
3. Contribution to compliance with Building Code clause H1.3.1(b) is conditional on:
   a. the element incorporating Masons UNI® and UNI® PLUS Flexible Air Barrier being part of the thermal envelope of the building, and
   b. horizontal and vertical laps being securely taped.

NOTE: Together, items 3, 4, 5 and 6 define scope of use.

7 HEALTH AND SAFETY INFORMATION

The compliance with any manufacturer's installation instructions, maintenance, OH & S statements, MSDS's and other Health and Safety declarations will provide the necessary Health and Safety Information pertaining to the product.

8 SIGNATURES

Sam Guindi
Product Certification Manager

For and on behalf of
Bureau Veritas Australia Pty Ltd

Trent Mason
Director

For and on behalf of
MASONS Plastabrick Ltd

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PRODUCT CERTIFICATE

Masons UNI® and UNI® PLUS Flexible Air Barriers

SCHEDULE: INFORMATION THAT SUPPORTS KEY INFORMATION

9 SUPPORTING INFORMATION ABOUT DESCRIPTION

The following accessories are used with Masons UNI® Flexible Air Barrier :

- UNI Seam Tape
- UNI Fasteners
- Masons 40 Below, 40 Below Platinum and 40 Below Flex flashing tapes
- Masons Corner Guards
- Penetration seals

10 SUPPORTING INFORMATION ABOUT INTENDED USE

N/A

11 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE

N/A

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CERTIFICATE V1.3

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PRODUCT CERTIFICATE

Masons UNI® and UNI® PLUS Flexible Air Barriers

12 BASIS FOR CERTIFICATION

B2 Durability - By testing and comparison with Acceptable Solution E2/AS1 and referenced standard NZS2295
C3 Fire affecting areas beyond the fire source - By testing and comparison with Acceptable Solutions C/AS1 and C/AS2
E2 External moisture - By testing and comparison with Acceptable Solution E2/AS1 and referenced standard NZS2295
F2 Hazardous building materials - By comparison with requirements of performance requirements of Building Code clause F2.3.1
H1 Energy efficiency - By testing and comparison with Acceptable Solution E2/AS1 and referenced standard NZS 2295

13 SUPPORTING DOCUMENTATION FOR CERTIFICATION

1. C/AS2 Acceptable Solution for Buildings other than Risk Group SH for New Zealand Building Code Clauses C1-C6 Protection from Fire First edition (Amendment 2), 5 November 2020
2. C/VM1 Verification Method for Solid Fuel Appliances C/AS1 Acceptable Solution for Buildings with Sleeping (residential) and Outbuildings (Risk Group SH) For New Zealand Building Code Clauses C1-C6 Protection from Fire (Amendment 5), 5 November 2020
3. Verification Methods E2/VM1 and Acceptable Solutions E2/AS1, E2/AS2 and E2/AS3 for New Zealand Building Code Clause E2 External Moisture Third edition (Amendment 10), 5 November 2020
4. Acceptable Solution E2 External Moisture E2/AS4 First edition, 28 November 2019
5. NZS 2295 2295:2006 Pliable, permeable building underlays
6. AS1530.2:1993 Methods for fire tests on building materials, components and structures
7. Masons Plastabrick Material Safety Datasheet V2, January 2022
8. Scion Report No 2704886 [J31991 / QT8222VHPU] Evaluation of Roof VHP Ultra to NZS2295, July 2020
9. ProConsult Report Reference 13038 HP Ultra wall underlay system compliance with NZBC B1 Structure (including fixing recommendations), 22 March 20
10. L H Bolton Report 201265 Assessment of Masons Roofing Underlays for Buildings, 21 October 2020
11. NZWTA Test Report No.1374734.0 "SP180 Test for Flammability to AS1530 .2-1993", July 2021
12. Scion Report No 45558911 [J32028 / QT9596] Assessment of SP180 TO NZS 2295, January 2022
13. Masons UNI® Flexible Air Barrier Design and Installation Manual V1.0, October 2021 - CM
14. Masons UNI® PLUS Flexible Air Barrier Design and Installation Manual V2.0, March 2022 - CM

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PRODUCT CERTIFICATE

Masons UNI® and UNI® PLUS Flexible Air Barriers

14 CONDITIONS RELATING TO NOTIFICATION

(a) the certificate holder notifies the product certification body (Bureau Veritas) in writing of any intended change to any of the following particulars:
(i) the name, address, or contact details of the certificate holder:
(ii) any address of a location where a certified product is produced or manufactured:

(b) the certificate holder notifies the product certification body (Bureau Veritas) in writing of any intended change, modification, or alteration to any of the following:
(i) the certified building method or product:
(ii) the method of its production or manufacture:
(iii) the product quality plan prepared in respect of the certified building method or product:
(iv) the application or installation instructions for the certified building method or product:
(v) any documentation relating to the use and maintenance of the certified building method or product:

(c) if the certificate holder has any reason to suspect that the certified building method or product does not comply with the Building Code, the certificate holder notifies the product certification body (Bureau Veritas) in writing of the reason for that suspicion:

(d) if the certificate holder or the product certification body (Bureau Veritas) finds that a certified building method or product that has been released on the market does not comply with the Building Code, the certificate holder discloses that fact in disclosure statements published in a form that is acceptable to the product certification body and to the chief executive:

(e) if the certificate is suspended or revoked, the certificate holder—
(i) notifies all customers to whom the building method or product is regularly supplied; and
(ii) immediately ceases using the certificate, the mark of conformity, and any reference to the number of the certificate.

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MASONS UNI® FLEXIBLE AIR BARRIER

DESIGN AND INSTALLATION GUIDE

MASONS
Designed Smart, Built Tough.

V1.0 October 2021 - CM

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General and product information

PURPOSE

This design and installation guide relates to Masons UNI® Flexible Air Barrier (UNI® FAB).

IMPORTANT DOCUMENTS

This guide should be read in conjunction with the relevant:

- Masons UNI® FAB Codemark Certificate
- Masons UNI® FAB pass™
- Masons UNI® FAB Warranty
- Masons UNI® FAB Installation Video. SEE VIDEO

SKILLS REQUIRED

This guide is suitable for use by a competent designer and person with basic carpentry skills. Where applicable the person specifying, supervising or installing the Masons UNI® FAB must be able to meet all RBW provisions.

FOR MORE HELP

Technical assistance is available at www.mpb.co.nz.

While all reasonable efforts have been made to ensure the accuracy of information provided, this guide is a guide only. It may be subject to change.

FOR OUR WARRANTY

Refer to www.mpb.co.nz.

PRODUCT DESCRIPTION

UNI® FAB is a nonwoven, absorbent, water-resistant, 180 GSM, synthetic wall underlay. It comprises three polypropylene layers: two outer layers of nonwoven polypropylene with a middle layer of a functional-technical film. It is manufactured to meet the European standard EN 13859-2:2014 as well as the absorbency performance requirement as per NZS 2295:2006. It is supplied coloured blue with a black underside unless an alternative colour is requested.

SCOPE AND LIMITATIONS

For scope of use, limitations, conditions and statement of building code compliance, refer to the Masons UNI® FAB pass™ or Codemark Certificate.

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Design

STEP 1:

CONFIRM SCOPE

Confirm the proposed use is within the scope and limitations of the pass™ and Codemark Certificate.

STEP 2:

CONFIRM RELATED BUILDING WORK

Masons UNI® FAB is suitable for use with a timber or steel framed structure. For new and existing buildings confirm that the primary structure:

- complies with the NZ Building Code and is designed in accordance with NZS 3604:2011 or NASH Design Standard 2019 Parts 1 and 2; or
- is specifically designed to NZS 3603:1993 or AS/NZS 1170:2002; or
- where existing, is suitable for the intended building work.

Masons UNI® FAB can be used with a cladding fixed over a cavity or direct fixed. Confirm whether the design includes a cavity system or not and determine the type and orientation of the battens. Ensure cavity battens specified are timber battens. Ensure that the framining meets, as a minimum the requirements in Table 1.

SEE TABLE

STEP 3:

FIXING TABLE

SPECIFY FIXINGS

Specify Masons UNI® fastener fixings in accordance with Table 1. Masons UNI® Fasteners are 25 mm galvanised or stainless steel nails with a plastic washer.

SEE TABLE

STEP 4:

SPECIFY ANCILLARY PRODUCTS

Ensure all required ancillary products are specified in the completed Masons UNI® FAB specification.

STEP 5:

QUALITY CHECK

Confirm all relevant design requirements are met.

Collate the following documents and include in the building consent application:

- Masons UNI® FAB Codemark Certificate
- Masons UNI® FAB pass™,
- Masons UNI® FAB Specification,
- Masons UNI® FAB Warranty and
- this document.

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Pre-installation

HEALTH AND SAFETY

Take all necessary steps to ensure your safety and the safety of others:

- ensure adequate ventilation or mechanical dust extraction when cutting or drilling
- take care when fixing the wrap in windy conditions
- wear appropriate safety equipment, clothing and footwear
- use all tools in accordance with relevant instruction manuals
- plan and monitor a safe approach for working at height; select and use the right equipment
- clear the work area of any obstruction before work starts.

For further information refer to:

- WorkSafe. [July 2018] Small Construction Sites, the Absolutely Essential Health and Safety Toolkit.
- WorkSafe. [December 2016] Health and Safety at Work, Quick Reference Guide.

These documents are available at www.worksafe.govt.nz.

HANDLING AND STORAGE

Handling

Care must be taken during loading, unloading, and transporting the materials to prevent pre-installation damage.

Unload the rolls carefully by hand. Do not crush the rolls and ensure they are protected from damage.

Storage

Store the rolls on end under a cover, in a clean and dry area and out of direct sunlight.

TOOLS AND EQUIPMENT REQUIRED

Install Masons UNI® FAB using standard carpentry tools and equipment. Use tools in accordance with good trade practice and supplier's instructions.

CN100 UNI Cap Nailer Gun



UNI Fasteners



UNI FAB Seam Tape



40 Below Flashing Tape



BrickTies



Penetration Seals



Corner Guards



PEF Rod



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Installation

STEP 1:

BUILDING CONSENT DOCUMENTATION

Where applicable, access and view building consent documentation.

STEP 2:

CHECK RELATED BUILDING WORK

For new and existing buildings ensure the primary structure is straight and true and within framing tolerances as described in Table 2.1, section 2 of NZS 3604:2011.

Masons UNI® FAB can be used where cladding is installed over a cavity system or direct fixed cladding.

STEP 3:

INSTALL WRAP

For assistance in installing UNI® FAB refer to video.

SEE VIDEO

DIAGRAM 0.1

Fit Wrap

SEE VIDEO

Ensure all necessary equipment and ancillary components are available.

Masons UNI® FAB must be installed with the printed side out, typically run horizontally on vertical framing. However, it is non directional and may be run in line with raking soffit lines or gables.

Fixing

SEE VIDEO

DIAGRAM 0.9

Masons supply Masons UNI® Fasteners for both timber and lightweight steel framing.

Ensure battens are fixed to Table 1 (as a minimum) or to the building consent.

Where cavity battens are to be installed, fix Masons UNI® FAB to frames at the plates and nogs/dwangs using the applicable Masons UNI® Fasteners. Do not fix to the studs.

When fixing vertical or horizontal cavity battens ensure batten nails are a minimum of 100 mm away from the UNI® Fastener.

Fasten battens promptly to prevent wind blow out whilst 'UNI® FAB is tacked up' with reduced numbers of cap nails.

Where bulging has or is likely to occur secure with Masons Wrap Strap.

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DIAGRAM 0.1

Fit UNI® FAB Soffit

SEE VIDEO

The use of UNI® FAB Soffit is optional.

Run UNI® FAB soffit (self-adhesive strip at the bottom) along the top face and level with the top plate. Ensure that it is taut. Secure in accordance with Table 1.

SEE TABLE

Do not fasten the bottom of the soffit strip as this needs to overlap the next layer of UNI® FAB.

DIAGRAM 0.1

Fit UNI® FAB

SEE VIDEO

Where UNI® Soffit has been installed:

- Hold the soffit strip up to allow the horizontal installation of the UNI® FAB. Ensure that the soffit layer overlaps the lower layer by 150 mm.
- Fold the soffit layer down, peel the self-adhesive backing strip down and ensure adhesion by applying pressure with the plastic tape scraper.

Where UNI® Soffit has not been installed:

- Run UNI® FAB along the top face, level with the top plate. Ensure that it is taut. Ensure the wrap extends a minimum of 50 mm below the bottom plate or bearer.

Ensure the wrap is taut and does not belly into the cavity or openings. Fix in accordance with the building consent or Table 1.

SEE TABLE

Run the wrap over all openings and leave openings covered until windows and doors are ready to be installed.

DIAGRAM 0.1

Where UNI® Soffit has not been installed:

Run UNI® FAB along the top face, level with the top plate. Ensure that it is taut. Ensure the wrap extends a minimum of 50 mm below the bottom plate or bearer. Secure in accordance with Table 1.

- Ensure the wrap is level and is pulled taut so that the wrap does not belly into the cavity.
- Run the wrap over all openings and leave openings covered until windows and doors are ready to be installed

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DIAGRAM 0.1

Laps

SEE VIDEO

Masons UNI® FAB must lap a minimum of 150 mm at horizontal joints and over framing wherever possible. Vertical joints must always be over framing and a minimum of 150 mm lap.

Upper wrap sheets must lap over lower wrap sheets to ensure water is shed outside the wrap.

All laps must be taped off with 60 mm Masons UNI® FAB Seam and Repair Tape or Masons 40 Below Flashing Tape (Flex or Platinum). Ensure adhesion by applying pressure using a plastic scraper.

If UNI® FAB is to be used as temporary weather protection, ensure all joins have been sealed using Masons UNI® FAB Seam and Repair Tape, the self-adhesive strip on the reverse of the UNI® Soffit roll, or Masons 40 Below (Flex or Platinum) Flashing Tape. The roof cladding and soffit linings must also have been installed.

DIAGRAM 0.8

Penetrations

SEE VIDEO

Pipe penetrations must be sealed using Masons Penetration seals or similar, ensuring good adhesion by applying pressure with a plastic scraper.

DIAGRAM 0.7

Intersections – Apron Flashings, Interstorey Flashings, Change of pitch

Drape UNI® FAB over the upstand of apron, change of pitch or inter storey flashings. The UNI® FAB length should extend beyond the flashing by 100 – 150 mm at each end. Secure with UNI® Fastenings. Tape all laps with UNI® 40 Below (Flex or Platinum) Flashing Tape.

Tears

SEE VIDEO

Regularly check Masons UNI® FAB for damage, tears, holes and gaps. Any damaged areas must be repaired immediately.

Repair by covering with new wrap lapping the damaged area by at least 150 mm and tape the wrap using Masons UNI® Seam and Repair Tape.

Small tears can be repaired by taping with Masons UNI® Seam and Repair Tape.

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STEP 5

PREPARE OPENINGS

Openings

DIAGRAM 0.2

SEE VIDEO

Remove the wrap by cutting the wrap diagonally from each corner of the opening. Fold the flaps of the cut membrane inside the opening. Staples may be used to fix the wrap to the inside of the window frame. Cut excess wrap flush with the internal face of the framing.

Flashing tape must be installed to all openings. Masons 40 Below (Flex or Platinum) Flashing Tape must be used.

All exposed wall framing in the openings must be protected by the Masons UNI® FAB, and Masons 40 Below Flashing Tape.

To ensure the best possible adhesion make sure the substrate is clean, dry, free from dust or any other contaminants.

Window & Door sills

DIAGRAM 0.3

SEE VIDEO

Place Masons Corner Guard over the Masons UNI® FAB and into the bottom corners of the window or door sill and staple to the jamb for timber framing or attach with double sided tape for steel framing.

Install Masons 40 Below (Flex or Platinum) Flashing Tape flush with the interior face of the opening along the entire length of the sill and up each jamb to a minimum of 200 mm. Press tape firmly into the corner over the guard first then slit at each corner and fold around onto the frame face. Fold remainder of the tape against the outer face of the frame and press firmly using the plastic scraper.

Window and door heads

DIAGRAM 0.3

SEE VIDEO

Install lintel pieces at top corners of opening, 200 mm along the lintel and 200 mm down the jamb. Slit Masons UNI® FAB at each corner and fold at least 50 mm onto outer face of building wrap. To create a seal at corner junctions, install butterflies at 45° across the corner of the head/jamb.

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STEP 6:

DIAGRAM 0.2

INSTALL JOINERY

SEE VIDEO

Install window and door joinery with head flashings and air seals.

Masons recommends Running Masons Dry Fix Plastic DPC up the side of the window jambs and under the head flashing. Where plastic DPC is installed around joinery as secondary water proofing such as for brick veneer work, fasten the DPC to the frame over the wrap using Masons UNI® Fasteners.

To seal above the head flashing, Masons recommends installing UNI® FAB so that it drapes over the head flashing extending the length of the flashing by 100 – 150 mm at each end. Secure with UNI® Fastenings. Tape all laps with UNI® 40 Below (Flex or Platinum) Flashing Tape. This method of sealing is mandatory at wind zones very high and above.

For wind zones less than very high, the head flashing may be sealed to the UNI® FAB using UNI® Seam and Repair Tape or UNI® 40 Below (Flex or Platinum) Flashing Tape.

STEP 7:

QUALITY CHECK

Ensure that all joins are taped, and all tears have been repaired. Ensure full adhesion around penetrations and openings.

Ensure Mason's warranty is inserted into the client document package.

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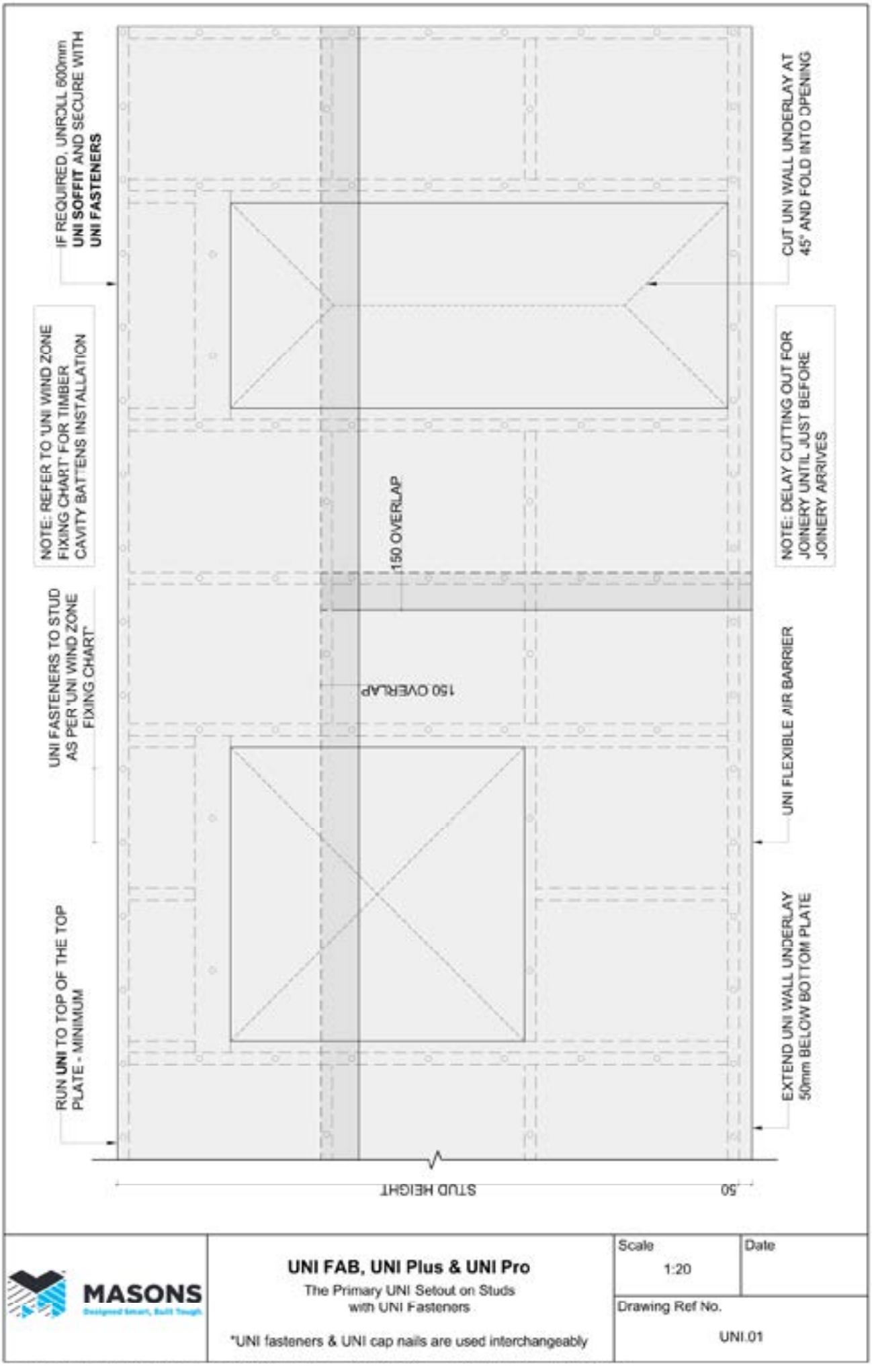
Appendix 1

TABLE 1: FIXING TABLE

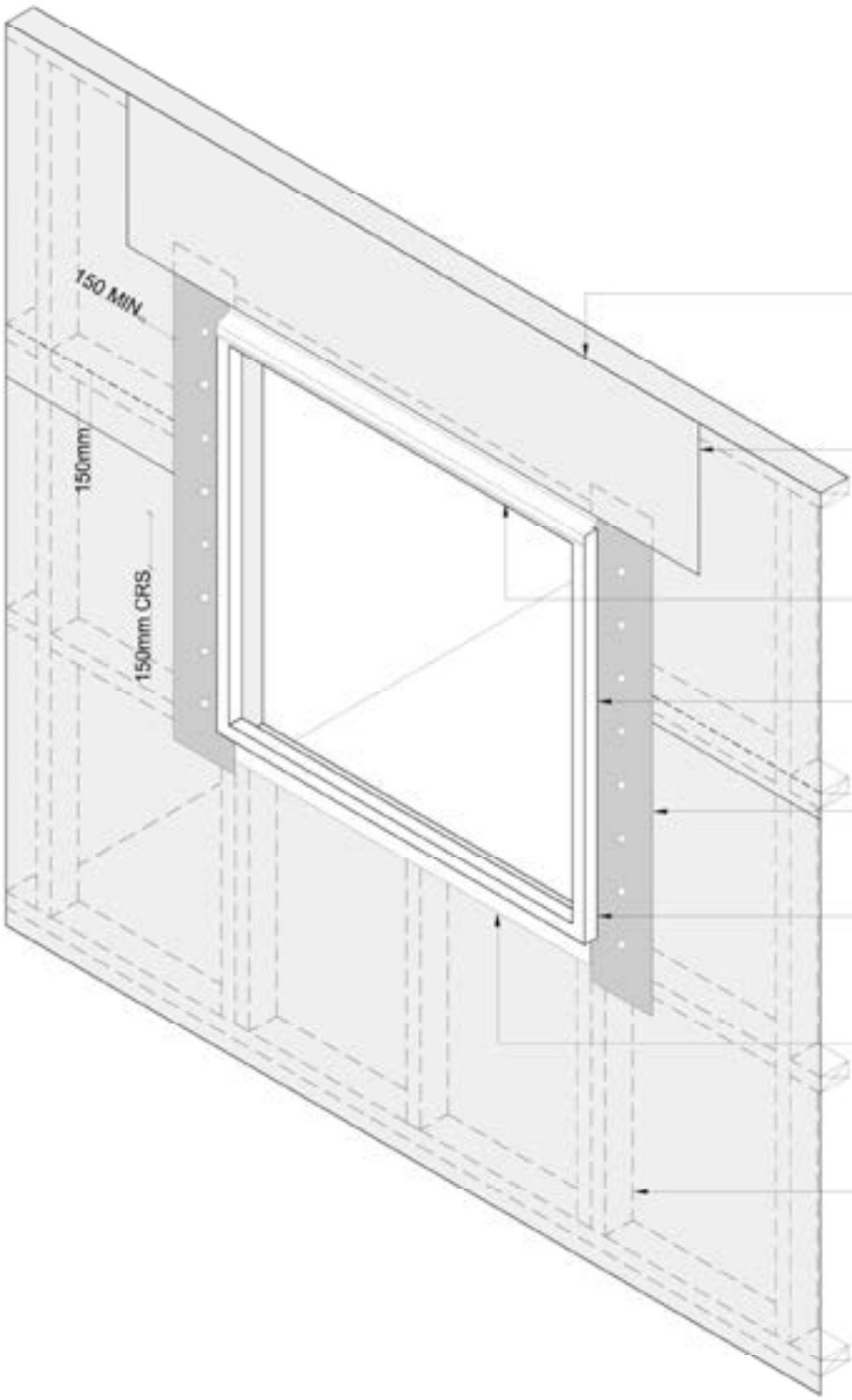
Stud centres (mm)	Fixings on studs (mm)	Minimum nogs centre (mm)	Perimeter fixing all around	Wind Zone	Fixing on nogs	Fixings
600	Nail at 450 mm centres	800	Nail at 300 mm centres	Low/ Medium	Nail at centre	25 mm nails with plastic washer
450	Nail at 500 mm centres	800	Nail at 300 mm centres	Low/ Medium	Nail at centre	25 mm nails with plastic washer
400	Nail at 450 mm centres	800	Nail at 300 mm centres	Low/ Medium	Nail at centre	25 mm nails with plastic washer
600	Nail at 300 mm centres	800	Nail at 300 mm centres	High	Nail at centre	25 mm nails with plastic washer
450	Nail at 350 mm centres	800	Nail at 300 mm centres	High	Nail at centre	25 mm nails with plastic washer
400	Nail at 300 mm centres	800	Nail at 300 mm centres	High	Nail at centre	25 mm nails with plastic washer
400	Nail at 250 mm centres	800	Nail at 300 mm centres	Low/ Medium/ High/ Very High	Nail at centre	25 mm nails with plastic washer
300	Nail at 300 mm centres	800	Nail at 300 mm centres	Low/ Medium/ High/ Very High/ Extra High	Nail at centre	25 mm nails with plastic washer
300	Nail at 250 mm centres	800	Nail at 300 mm centres	Low/ Medium/ High/ Very High/ Extra High	Nail at centre	25 mm nails with plastic washer
300, 400, 450, 600	Battens with nails at 400 mm centres	800	Batten with nails at 300 mm centres	Low/ Medium/ High/ Very High/ Extra High	Battens with nails at 400 mm centres (2 nails min)	Batten – 20 x 45 SG8 Nails – 60 2.8 ring shank galvanised

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2nd LAYER OF **UNI** UP TO LOGICAL BREAK IN THE CLADDING. FIX TO FRAMING WITH **UNI CAP NAILS**

HORIZONTAL AND VERTICAL LAPS MUST BE TAPED OFF WITH **MASONS UNI SEAM TAPE** OR **40 BELOW PLATINUM OR FLEX**

HEAD FLASHING FITTED OVER THE PRIMARY **UNI** LAYER

200mm DRY FIX DPC CURVED AND FIT BEHIND JOINERY FLANGE

FIX **200mm DRY FIX DPC** TO STUDS WITH **UNI CAP NAILS** @ 150mm CRS

200mm DRY FIX DPC CURVED AND FIT BEHIND JOINERY FLANGE

AIR SEALS TO JOINERY WITH PREMIUM EXPANDING URETHANE FOAM SEALANT, OVER COMPRESSED PEF ROD

FRAME

MASONS

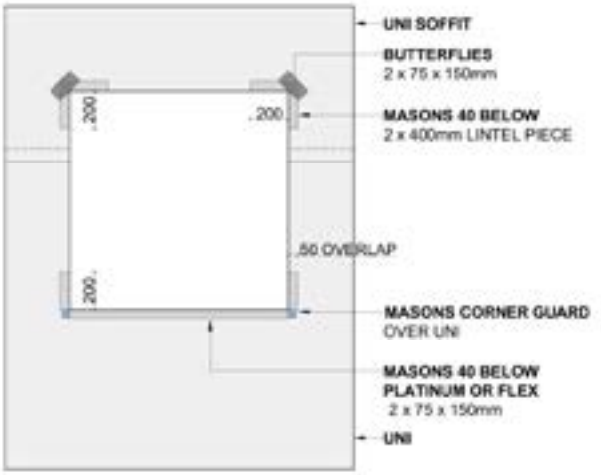
UNI FAB, UNI Plus & UNI Pro
Setout on Timber Frame

Additional Layer of UNI over Head Flashing

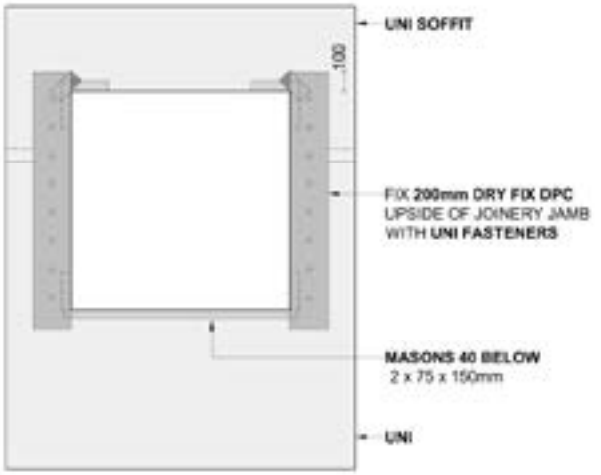
Scale	Date
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Drawing Ref No.
UNI.02

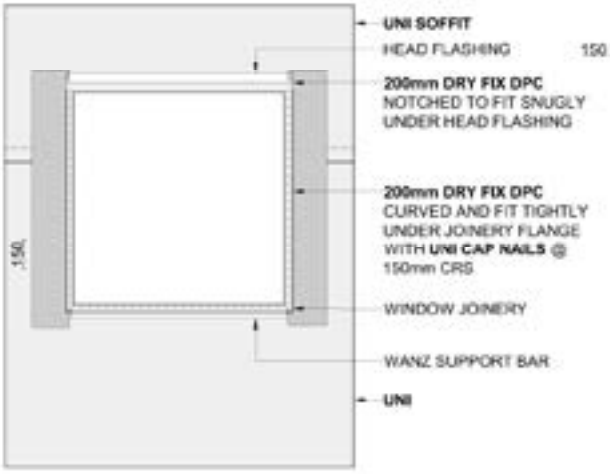
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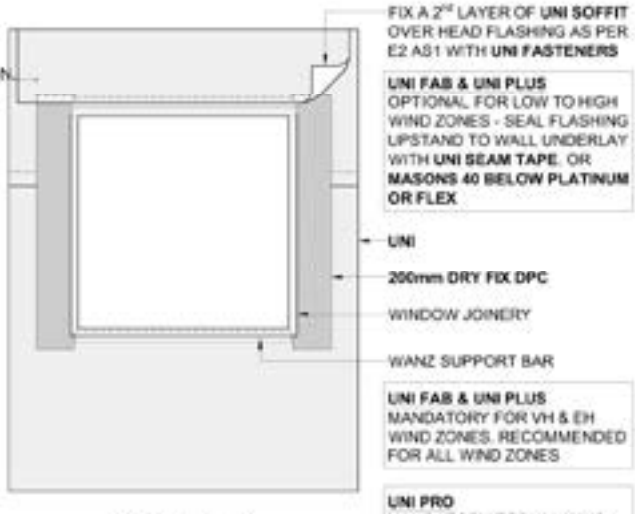
STEP ONE



STEP TWO



STEP THREE



STEP FOUR

MASONS

Window Installation

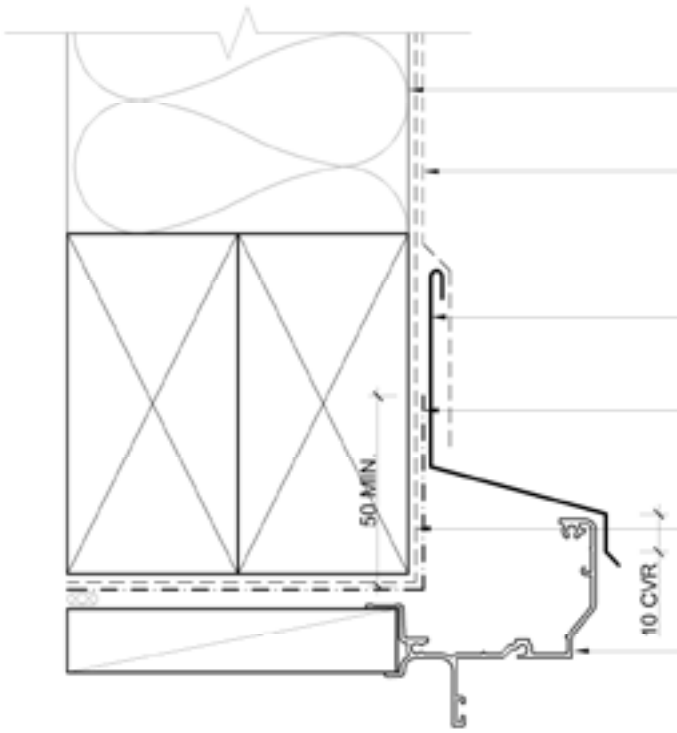
UNI FAB, UNI Plus & UNI Pro

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1:40	

Drawing Ref No.

UNI.03

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TIMBER FRAMING

SECOND LAYER OF **UNI** FIXED OVER HEAD FLASHING UPSTAND WITH **UNI CAP NAILS**

HEAD FLASHING OVER **UNI** OR **UNI FR**

MASONS 40 BELOW PLATINUM OR FLEX FLASHING TAPE INSTALLED AS PER MANUFACTURERS INSTRUCTIONS

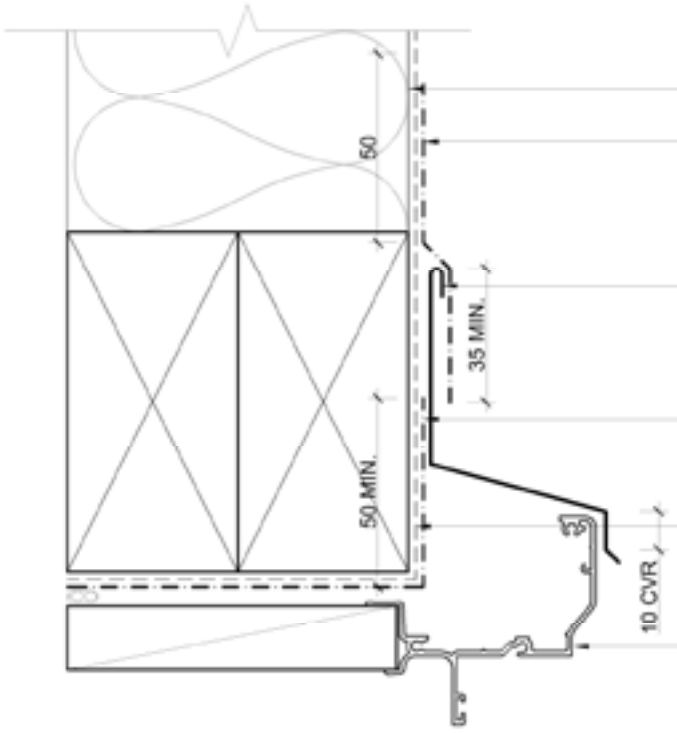
PRIMARY LAYER OF **UNI** DRESSED INTO OPENING

WINDOW JOINERY

ADDITIONAL UNI OVER HEAD FLASHING

UNI FAB & UNI PLUS
MANDATORY FOR VERY HIGH AND EXTRA HIGH WIND ZONE. RECOMMENDED FOR ALL WIND ZONES

UNI PRO
MANDATORY FOR ALL WIND ZONES



TIMBER FRAMING

UNI SEAM TAPE, OR **MASONS 40 BELOW PLATINUM OR FLEX** TO SEAL HEAD FLASHING AS PER E2/AS1 IN UP TO HIGH WIND ZONES

HEAD FLASHING OVER **UNI**

MASONS 40 BELOW FLASHING TAPE INSTALLED AS PER MANUFACTURERS INSTRUCTIONS

PRIMARY LAYER OF **UNI** DRESSED INTO OPENING

WINDOW JOINERY

FLASHING TAPE OVER HEAD FLASHING

NOTE: DO NOT TAPE HEAD FLASHING ON UNI PRO. USE ADDITIONAL LAYER OF UNI TO ALL WIND ZONES

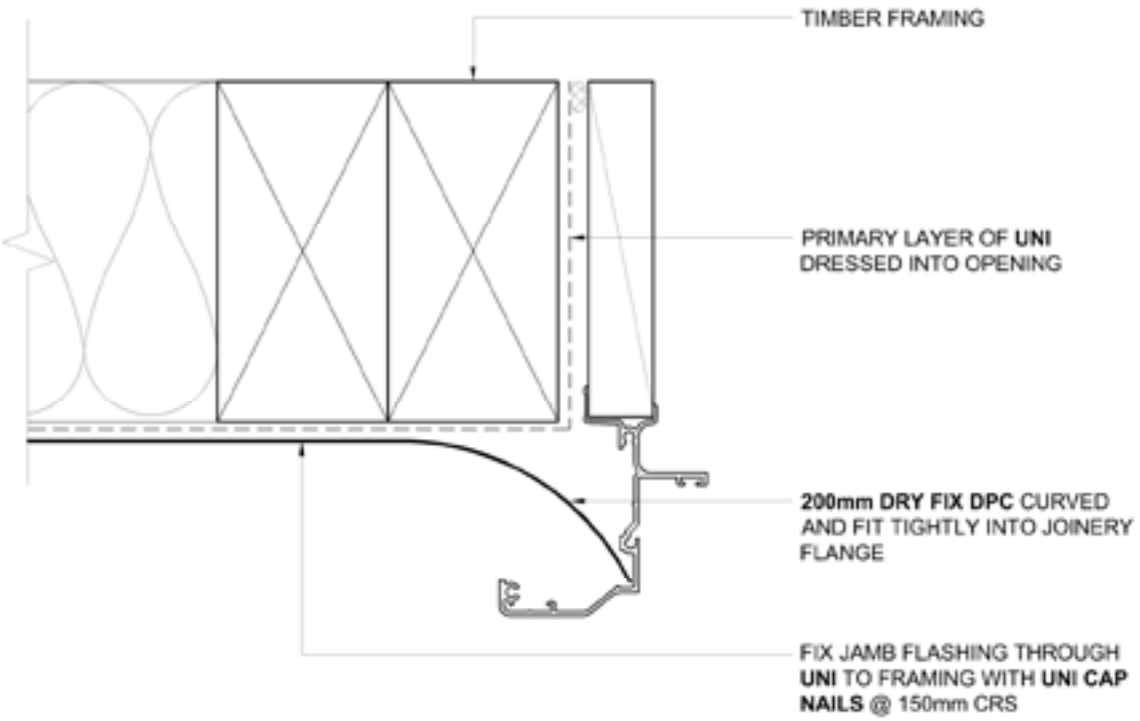
MASONS
Designed Smart, Built Tough

Window Head
Head Flashing to UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

Drawing Ref No.
UNI.04

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MASONS

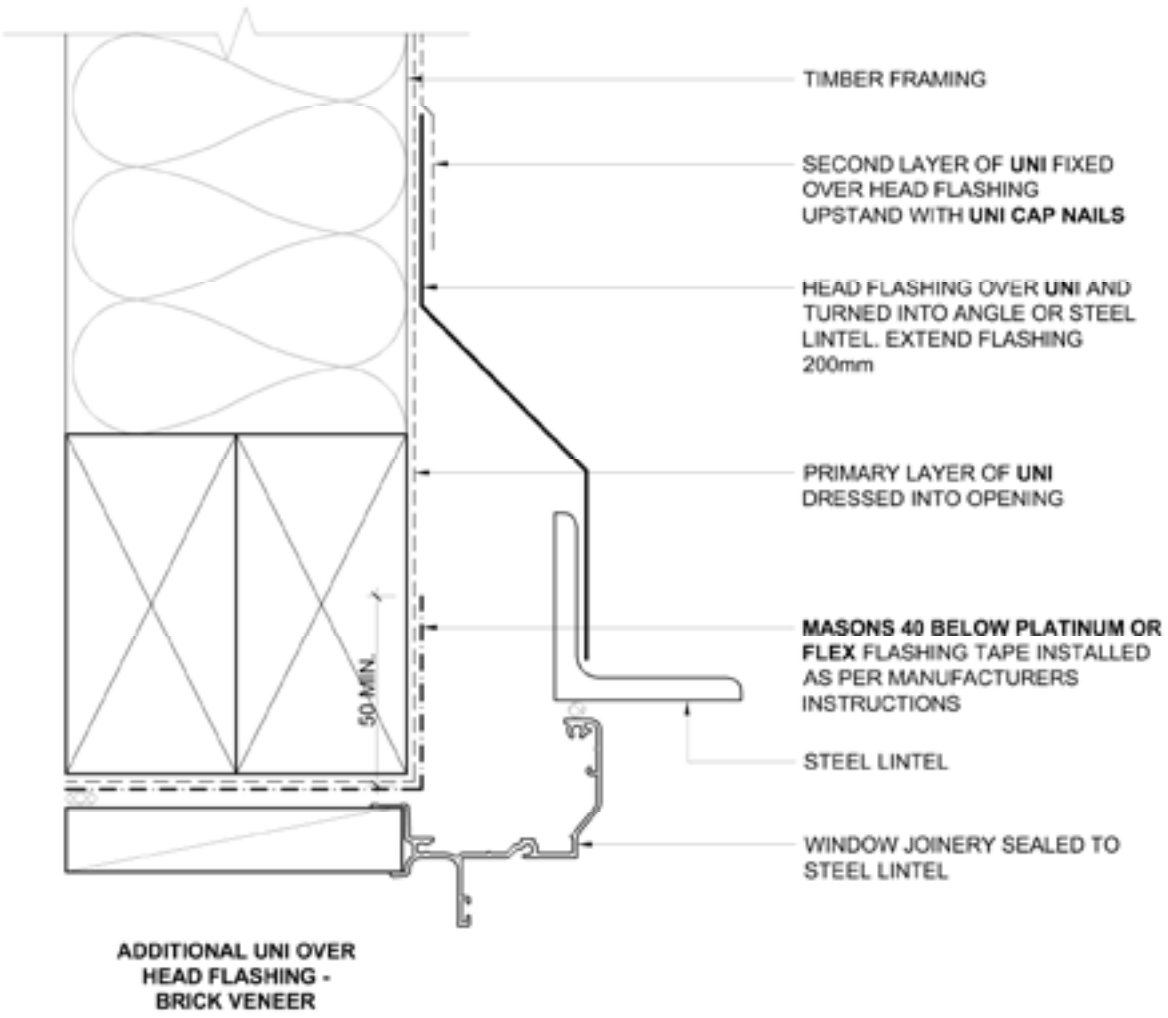
Typical Jamb with 200mm Plastic DPC

UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

Drawing Ref No. UNI.05

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MASONS

Brick Lintel Veneer Window Head

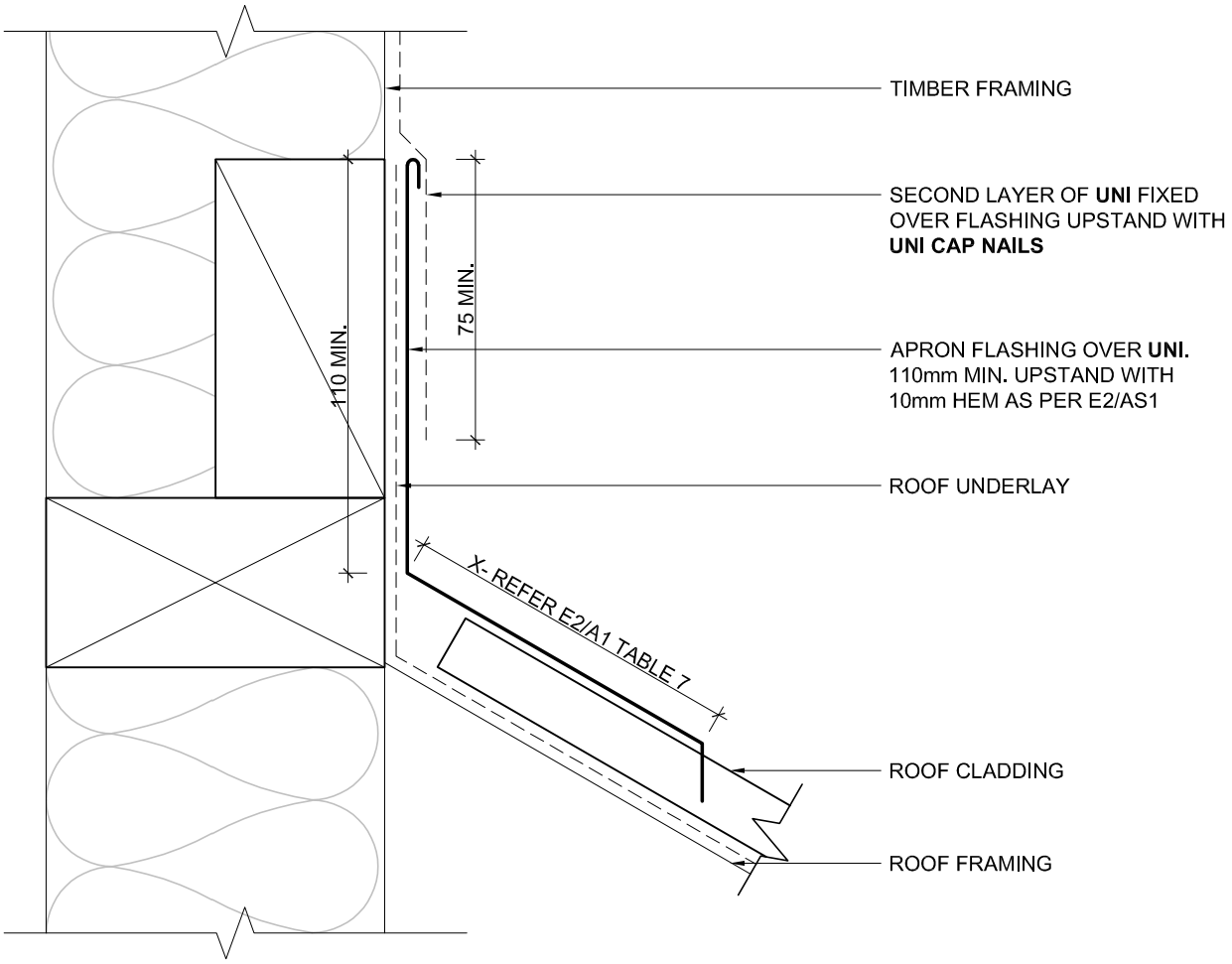
UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

Drawing Ref No.

UNI.06

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MASONS

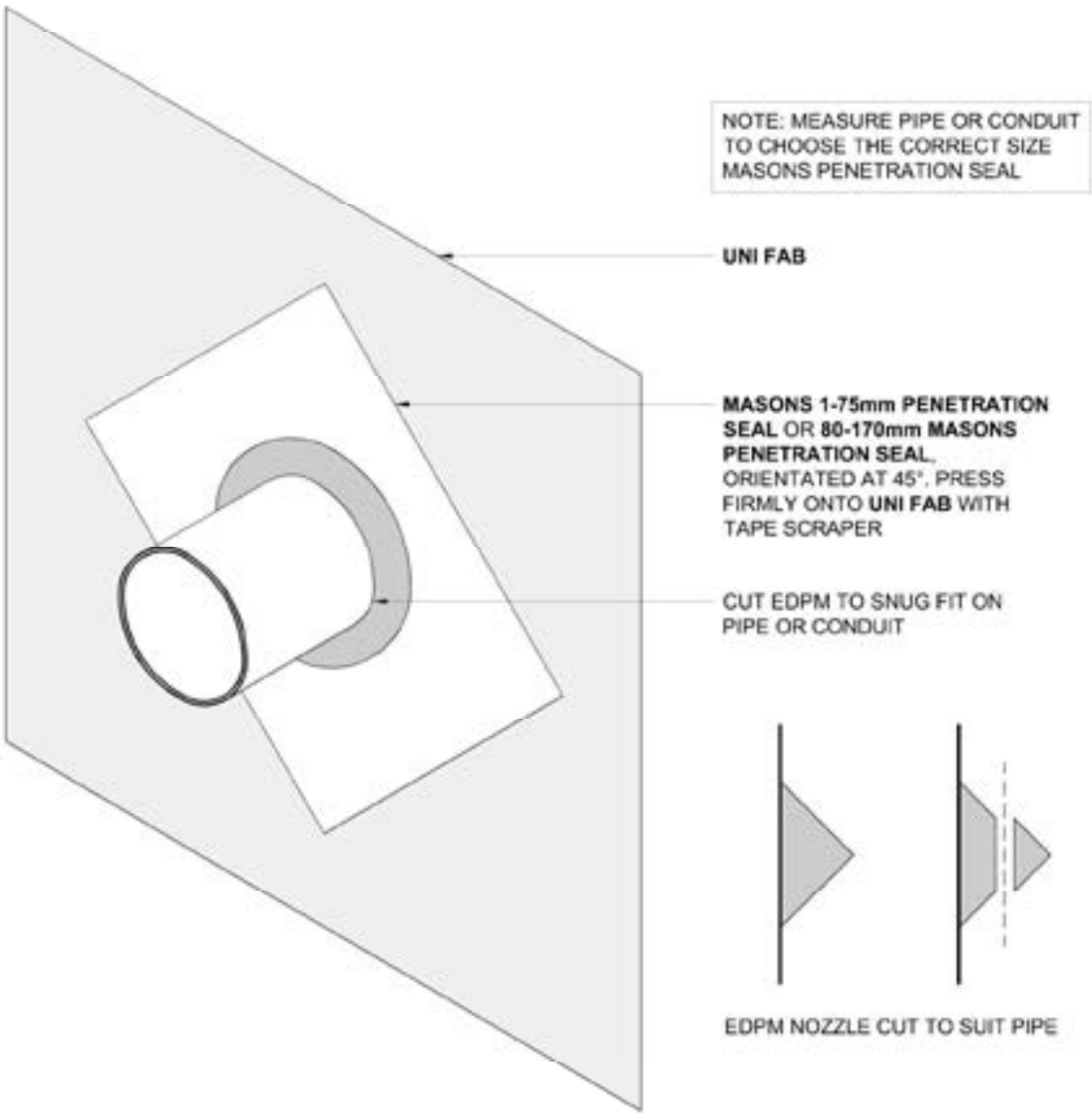
Apron Flashing Installation

UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

Drawing Ref No. UNI.07

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MASONS

Penetration Seals

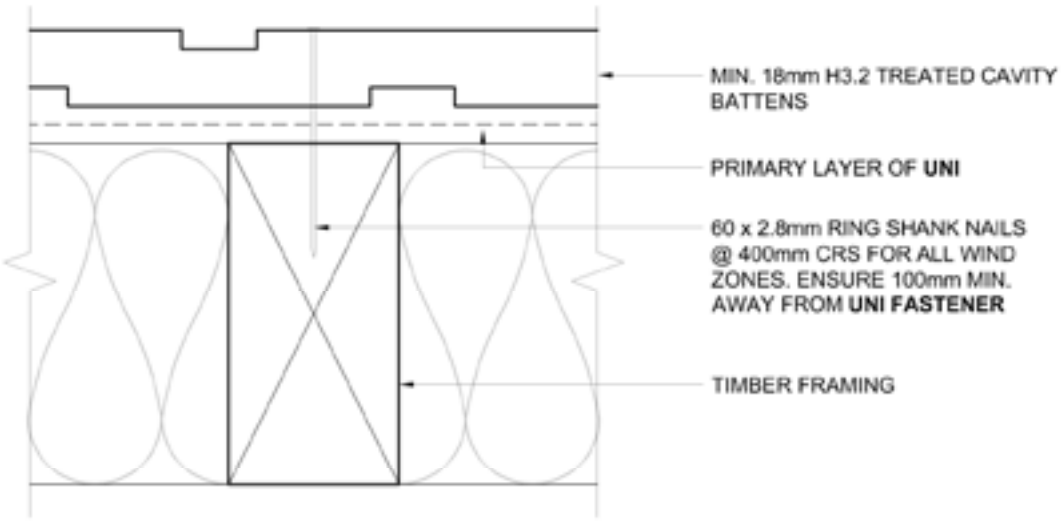
UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

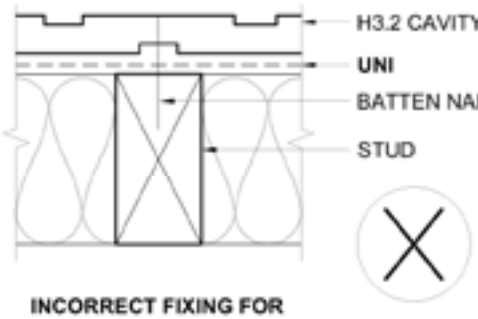
Drawing Ref No.

UNI.08

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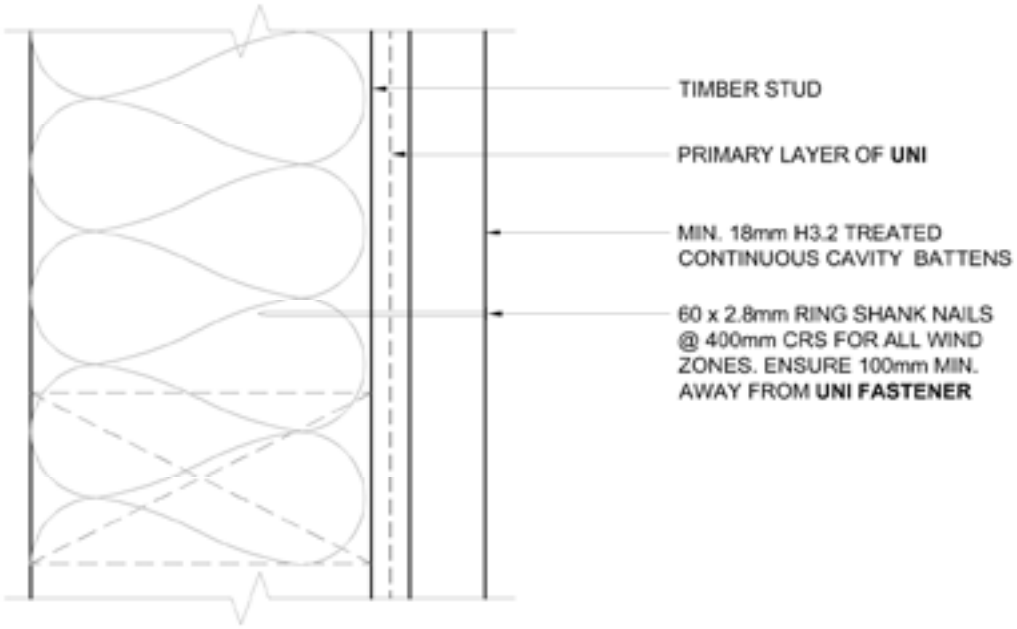


HORIZONTAL CAVITY BATTEN



INCORRECT FIXING FOR VENTILATED BATTENS

NOTE:
- BATTEN FIXINGS REFER TO 'UNI WIND ZONE FIXING CHART"
- USE APPROPRIATE FIXING FOR CORROSION ZONE
- DO NOT FIX AT BATTEN NOTCHES
- MASONS WRAP STRAP IS RECOMMENDED BEFORE INSTALLING BATTENS TO PREVENT BUILDING WRAP FROM BULGING



VERTICAL CAVITY BATTEN

MASONS

CAVITY BATTEN FIXING
UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

Drawing Ref No. UNI.09

21256

APPENDIX 13 – 40 BELOW WINDOW FLASHING TAPE

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CodeMark

Certificate no: CMNZ70075
Version: 2
Original issue date: 08 April 2021
Version date: 31 August 2023

Product Certificate

MASONS Flashing Tapes

1 Certificate Holder Details

MASONS
Designed Smart, Built Tough.

MASONS Plastabrick Ltd
13A David McCathie Place, Silverdale Auckland 0932
New Zealand
info@mpb.co.nz
Ph: +64 9 414 7551
www.mpb.co.nz

2 Product Certification Body

Bureau Veritas Australia Pty Ltd
11/500 Collins Street
Melbourne VIC 3000 Australia
product.certification@bureauveritas.com
Ph: 1800 855 190
www.bureauveritas.com.au

Complaints: The complaints process for this certificate can be found here:
www.bureauveritas.com.au/your-feedback

Sam Guindi – Bureau Veritas Product Certification Manager

3. Description of Building Method or Product

Name of the product or method in Aotearoa New Zealand, including any brand names used. Description of what it is and the components that make up any system and its physical attributes including the materials and make-up of the product, where applicable. Matters that should be taken into account in the use or application of the building method or product can be found in item 6. Conditions and Limitations of Use. Continuation of description can be found in item 10 – Supporting Information about Description. [Delete if not applicable]. The building method's or building product's catalogue or model identification number or numbers or other unique identifiers that might be used to identify the building product or building method

Masons Flashing Tapes are made of three components (film or fabric carrier, adhesive, and a release liner).
This certificate covers the following products:

- 40 Below Window Flashing Tape
- 40 Below Platinum Flashing Tape
- 40 Below Flex Flashing Tape
- Hydro Flashing Tape
- Bayonet BayoWrap Window Sealing Tape

and the following optional accessories for sill flashing:

- CornerGuard
- BayoWrap Corner Guard

4. Intended use of Building Method or Product

Intended use of the building method or product as described in the product manual and other instructional materials. A statement of the function or purpose of the building method or product. Continuation of intended use can be found in item 11 – Supporting Information about Intended use. [Delete if not applicable]

Masons Flashing Tapes are used to flash around windows and doors as a secondary water-resistant barrier. Bayonet BayoWrap, 40 Below, 40 Below Platinum, 40 Below Flex tapes may be used to seal joints in rigid air barriers. Bayonet BayoWrap, 40 Below Platinum, 40 Below Flex and Hydro may also be used at joinery heads to seal flashing upstands to the wall underlay.

5. New Zealand Building Code Provisions

The performance clauses of the New Zealand Building Code that are relevant to the intended use and with which the building method or product complies or contributes to (where used as part of a system).

How the building method or product complies or contributes can be found in item 8. Basis for Certification. Any qualifications on the extent of that compliance can be found in item 6. Conditions and limitations of use.

Clause B2 Durability: Performance Clauses B2.3.1(a), B2.3.2
Clause E2 External moisture: Performance Clauses E2.3.2 (contributes to), E2.3.5 (contributes to), E2.3.6 (contributes to), E2.3.7
Clause F2 Hazardous building materials: Performance Clauses F2.3.1

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CodeMark

Certificate no: CMNZ70075
Version: 2
Original issue date: 08 April 2021
Version date: 31 August 2023

Product Certificate

MASONS Flashing Tapes

BUREAU VERITAS

6. Conditions and Limitations of Use

The building method or product's use is to be in accordance with the installation instructions and requirements against which the building method or product was assessed.

Conditions or limitations of conformity for the performance requirements the building method or product is compliant with, including any requirements for people with the qualifications and skills to install or use the building method or product, any known or demonstrated situations where the building method or product should not be used. A statement as to whether there are any matters that should be taken into account in the use or application of the building product or building method and, if so, what those matters are.

1. Masons Flashing Tapes are certified for use in buildings:
   a. within the scope of E2/AS1, and
   b. located in any wind zone up to and including Extra High, and
   c. located in any exposure zone (both as defined in NZS3604:2011 Timber framed buildings)

2. 40 Below, 40 Below Platinum, 40 Below Flex Flashing Tapes shall be used in accordance with the 40 Below & Hydro Flashing Tape Installation Instructions, March 2021, and the requirements of Acceptable Solution E2/AS1.

3. Bayonet BayoWrap Window Sealing Tape shall be used in accordance with the Bayonet BayoWrap Window Sealing Tape. Installation Guide, Version 1 July 2023, and the requirements of Acceptable Solution E2/AS1.

4. Masons Flashing Tapes shall not be installed in areas where the tape has the potential to be exposed to heat, such as chimney flues.

7. Health and Safety Information

Health, safety, and well-being declarations associated with installation, maintenance, and use of the building method or product, and their specific editions and dates necessary to ensure the performance requirements of clauses F1 to F9 of the Building Code can be met.

The compliance with any manufacturer's installation instructions, maintenance, OH & S statements, MSDS's and other Health and Safety declarations will provide the necessary Health and Safety Information pertaining to the product.

8. Basis for Certification

How the performance requirements in the Building Code were met for each of the provisions. Where used as part of a system, the specific contribution to compliance.

B2 Durability - By testing and comparison with Acceptable Solution E2/AS1
E2 External moisture - By testing and comparison with Acceptable Solution E2/AS1
F2 Hazardous building materials - By comparison with the performance requirements of Building Code Clause F2.3.1

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CodeMark

Certificate no: CMNZ70075
Version: 2
Original issue date: 08 April 2021
Version date: 31 August 2023

Product Certificate

MASONS Flashing Tapes

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9. Supporting Documentation for Certification

Reference to any acceptable solutions, verification methods, New Zealand Standards, or other compliance pathways referenced against each individual performance requirement the building method or product is compliant with, and their specific version and date. Reference to documents describing tests and evaluations and any other documents relied on for certification or used to prove compliance, including their full title, specific version and date.

1. Acceptable Solutions and Verification Methods for New Zealand Building Code Clause B2 Durability Second edition (Amendment 12), 28 November 2019
2. Acceptable Solutions and Verification Methods for New Zealand Building Code Clause F2 Hazardous building materials First edition (Amendment 3), 1 January 2017
3. Verification Methods E2/VM1 and Acceptable Solutions E2/AS1, E2/AS2 and E2/AS3 for New Zealand Building Code Clause E2 External Moisture Third edition (Amendment 10), 5 November 2020
4. PRI Test Report 2309T0001-01 Tests on 40 Below Flashing Tape to AAMA 711 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 19 January 2021
5. PRI Test Report 2309T0001-02 Tests on 40 Below Platinum Flashing Tape to AAMA 711 "Voluntary Specification for Self- Adhering Flashing Used for Installation", 19 January 2021
6. PRI Test Report 2309T0001-03 Tests on Gerband 587 Flashing Tape to AAMA 711 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 19 January 2021
7. LABORATORIO SUDAMERICANO DE ENSAYOS E INVESTIGACIONES TERMODINAMICAS Test Report No 17-13632 Tests on Hydra Flashing Tape to AAMA 711, 3 August 2018
8. Les Boulton & Associates Report 191235-02 Assessment of Masons Self-adhesive Window Flashing Tapes, 20 March 2019
9. PRI Test Report 2309T0003 Tests on LS-E 4934 ST PO80 40 Below to AAMA 711-20 "Voluntary Specification for Self-Adhering Flashing Used for Installation," 12 October 2021
10. PRI Test Report 2309T0004 Tests on LS-E 4930 ST PO80 Platinum to AAMA 711-20 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 12 October 2021
11. PRI Test Report 2309T0005 Tests on LS-E 4832 PT/D 120w Below Flex to AAMA 711-20 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 12 October 2021
12. 40 Below & Hydro Flashing Tape Installation Instructions, March 2021
13. Bayonet BayoWrap Window Sealing Tape. Installation Guide, Version 1 July 2023

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Product Certificate

MASONS Flashing Tapes

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10. Supporting Information About Description (Optional)

Any supporting information for section 3.

- 40 Below Window Flashing Tape has a white woven facing and is supplied in 20 m rolls 75 mm, 100 mm, 150 mm or 230 mm wide.
- 40 Below Platinum Flashing Tape has a silver foil facing and is supplied in 20 m rolls 75 mm, 100 mm, 150 mm or 230 mm wide.
- 40 Below Flex Flashing Tape has white flexible facing and is supplied in 20 m rolls 75 mm, 100 mm, 150 mm or 230 mm wide.
- Hydro Flashing Tape has an aluminium facing and is supplied in rolls 75mm x 25m, 100mm x 25m, 150mm x 10m, 150mm x 25m, or 200mm x 25m.
- Bayonet BayoWrap Window Sealing Tape has a white woven facing and is supplied in 20 m rolls 75 mm, 150 mm or 230 mm wide.

11. Supporting Information About Intended Use (Optional)

Any supporting information for section 4.

N/A

12. Supporting Information About Conditions and Limitations of Use (Optional)

Any supporting information for section 6.

N/A

All CodeMark certificates that are current must be registered with MBIE. MBIE maintains a register of valid product certificates. Please find the register here.

If the certificate is not listed on this register or it appears as (SUSPENDED), it is not a valid CodeMark certificate and does not have to be accepted by a building consent authority as establishing compliance with the New Zealand Building Code.

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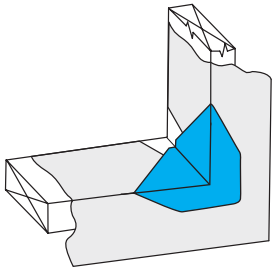
MASONS
Designed Smart, Built Tough.

40 Below & Hydro Flashing Tape

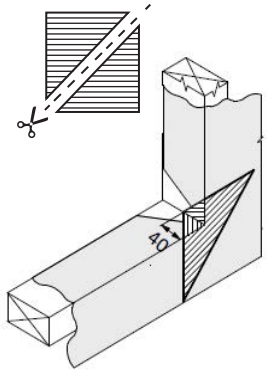
Installation Instructions for 40 Below (Ultra Sticky)
40 Below Platinum, 40 Below Flex and Hydro

40 Below Ultra Sticky and 40 Below Platinum ONLY:
Two layers are required on the sill for nail and screw sealability

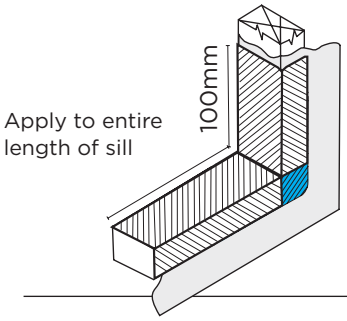
Window Sill Installation Instructions



1. Corner Guard *option 1*
Place the *Masons Corner Guard* over the building wrap and into the **bottom** corners of the window or door sill and staple to the jamb. With steel frames use double sided tape to attach the *Corner Guard* to the metal.



1. Corner Guard *option 2*
Cut a 150mm square of *Flashing Tape* into two equal triangular pieces. Install these at the **bottom** corners of the frame opening. The triangle needs to reach 40mm in from the extreme end of the window sill, with the remainder overlapping the building paper.



2. Sill Guard

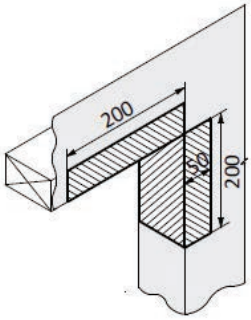
A. Install sill tape flush with the interior face of the opening. Apply along entire length of sill, continue up each jamb with a minimum of 100mm

B. IMPORTANT: Press tape firmly into the corner over the Corner Guard first, then fold around onto the frame face.

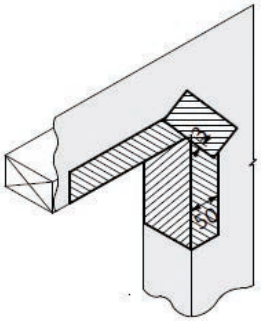
C. Fold remainder *Flashing Tape* against outer face of frame/ building. Smooth out all creases & press firmly for good adhesion.

CODEMARK™
CM70075

Window Head Installation



1. Lintel Piece
Install lintel pieces on top corners of opening, 200mm along the lintel and 200mm down the jamb. Slit at each corner and fold onto outer face of building wrap (at least 50mm).



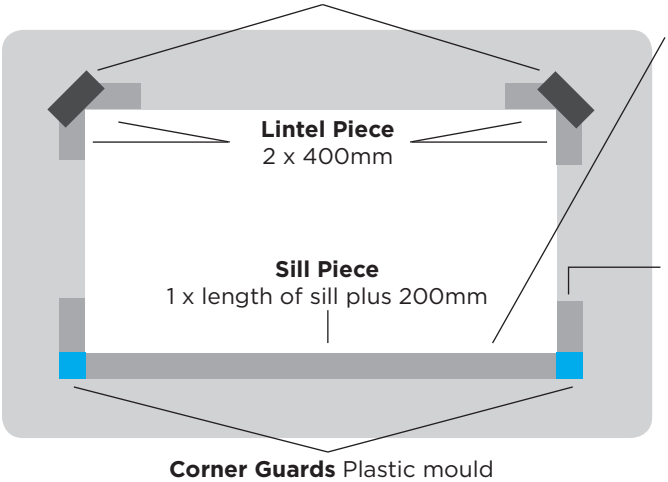
2. Butterflies
To create a seal at corner junction, install butterflies at 45° across the corner of head/jamb.

Window Head Flashing Installation

Apply *Masons Flashing Tape* to top of window head flashing, up-stand and building wrap.
Refer to window & cladding details for specific application.

To ensure maximum adhesion of the tape, make sure the substrate surface is clean, dry and free from any dust or other contaminants.

Always use a Masons or similar plastic scraper to firmly press tape into the surface.



Install two layers of 40 Below and 40 Below Platinum to the sill to achieve nail and screw sealability. Only one layer of 40 Below Flex or Hydro is required to the sill.

100mm minimum tape up Jamb. 200mm up either side of Jamb is recommended.

June 2022

APPENDIX 14 – GERARD ROOFING INSTALLATION MANUAL

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GERARD
Roofing Designed to Endure



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New Zealand specification manual

Roofing Designed to Endure

Gerard Roofs specification manual

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New Zealand's steel roofing system

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New Zealand's ingenious pressed steel roofing system

A Gerard roof is made up of individual lightweight pressed steel panels secured using a unique fixing system that effectively locks them together to form a single structural unit. The result is a roof that's stylish, copes with severe weather and lasts a very long time.

Invented in New Zealand ...

In 1957 New Zealand innovator Lou Fisher saw an opportunity to create a new kind of roof.

Disappointed with the limitations of solid tile and the utilitarian look of long-run corrugated iron roofs, he invented the steel tile roof and established a trusted brand that would grow to become Gerard Roofs.

... proven all over the world

The company continues to lead through ongoing product development and relentless attention to quality standards. Over the years Gerard Roofs' products have been fine-tuned to endure in all living situations and are now used in over 120 countries.

The Gerard roof you put over your head has not only been proven throughout New Zealand, but in some of the most extreme climates and environments on the planet

1.1 Products

1.1.1. Gerard Roof profiles

The roof has profound effect on the look of most homes

An attractive roof is a significant architectural feature. The roof usually accounts for around a third of the overall visual appearance of a home and will have a noticeable influence on its style and street appeal.

Gerard Roofs' profiles complement a range of styles

For many people, choosing a roof is primarily about looks. Homes are a reflection of individuality and their roofs a prominent feature. Unlike most other roofing types Gerard offers a system of choices that enables you to determine the right 'look' rather than having to accept a pre-defined one.

Applicable to traditional or contemporary architecture

Whether you're imagining traditional style or something following the latest trends, Gerard Roofs have profiles to meet the brief. Milano, for example, is reminiscent of the enduring ridged roofs of the Mediterranean; by contrast, a profile like Rockport offers a slimmer, squarer more contemporary pattern.


Gerard Rockport


Gerard Classic


Gerard Stratos


Gerard Milano


Gerard Senator


Gerard Oberon

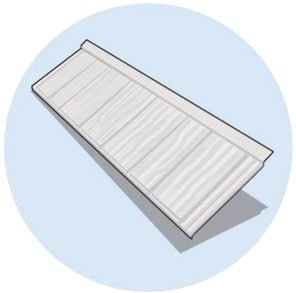

Gerard Alpine


Gerard Heritage

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Gerard Stratos

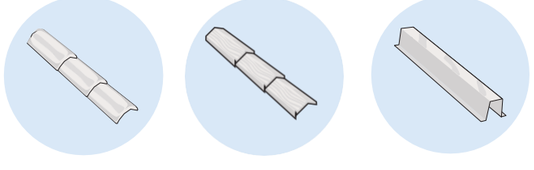
Combining a flat plane with continuous but irregular grooves gives Gerard Stratos a recurring but slightly organic pattern that works with many styles of home.





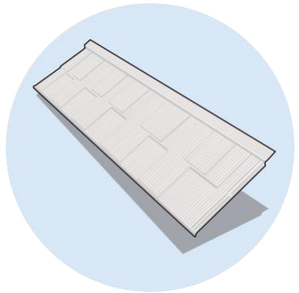
Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	370 mm
Upstand	27 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	3.0 kg
Weight/panel Smooth	2.1 kg
Weight/m^2 Textured	6.6 kg
Weight/m^2 Smooth	4.7 kg

Gerard Stratos is compatible with all three Gerard trims – **Barrel**, **Angle** and **Box**.



Gerard Senator

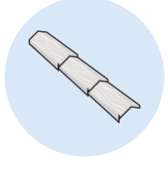
A profile with a modern look and subtle raised detailing. Senator is known for the simplicity and uniformity it brings to contemporary and traditional homes.





Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	368 mm
Upstand	16 mm
Roof cover/panel	0.46 m2
Panels/m^2	2.2
Weight/panel Textured	3.0 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.6 kg
Weight/m^2 Smooth	NA

Gerard Senator is compatible with **Angle** trim.

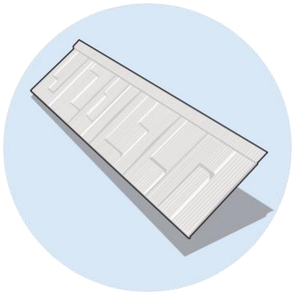


Dimensions and weights given are nominal.

Products and specifications

Gerard Rockport

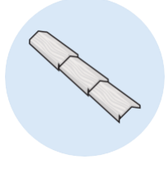
Among Gerard's flattest profiles, Rockport lends your roof a sleek, linear look and is often used on clean, simple architecture with a modern bias.





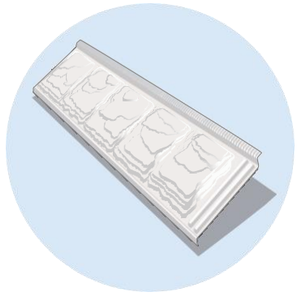
Pitch – min./max.	15-90°
Overall length	1330 mm
Length of cover	1250 mm
Width of cover	368 mm
Upstand	20 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	3.0 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.6 kg
Weight/m^2 Smooth	NA

Gerard Rockport is compatible with **Angle** trim.



Gerard Alpine

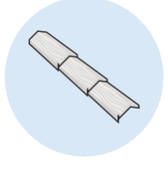
Inspired by the look of Welsh slate the Gerard Alpine profile lends a smooth, sleek linear look while surface detailing adds a slightly rustic overtone.





Pitch – min./max.	15-90°
Overall length	1335 mm
Length of cover	1260 mm
Width of cover	368 mm
Upstand	17 mm
Roof cover/panel	0.46 m^2
Panels/m^2	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	NA
Weight/m^2 Textured	6.4 kg
Weight/m^2 Smooth	NA

Gerard Alpine is compatible with **Angle** trim.

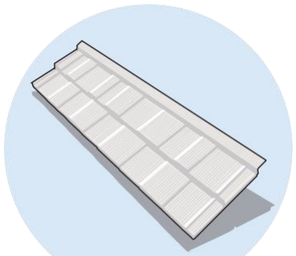


Dimensions and weights given are nominal.

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Gerard Oberon

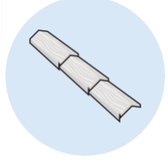
The depth and dimension of Oberon make it most responsive to changes in light. It is often seen on substantial homes alongside dressed stone and natural timbers.





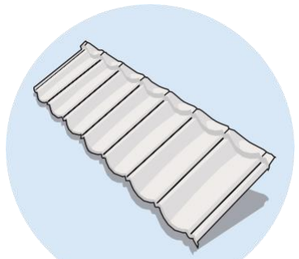
Pitch – min./max.	20-90°
Overall length	1310 mm
Length of cover	1230 mm
Width of cover	320 mm
Upstand	20 mm
Roof cover/panel	0.39 m²
Panels/m²	2.54
Weight/panel Textured	2.8 kg
Weight/panel Smooth	NA
Weight/m² Textured	7.1 kg
Weight/m² Smooth	NA

Gerard Oberon is compatible with **Angle** trim.



Gerard Heritage

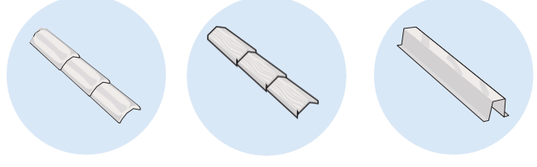
The scalloped shapes of this profile bring a look that's similar to heavyweight tiles. The advantages of pressed steel mean this profile is often chosen as a substitute.





Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1257 mm
Width of cover	369 mm
Upstand	28 mm
Roof cover/panel	0.46 m²
Panels/m²	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	2.1 kg
Weight/m² Textured	6.4 kg
Weight/m² Smooth	4.7 kg

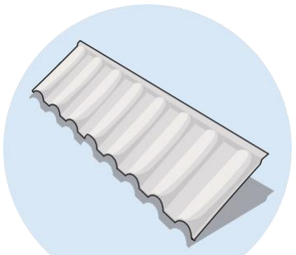
Gerard Heritage is compatible with all three Gerard trims – **Barrel, Angle** and **Box**.



Dimensions and weights given are nominal.

Gerard Milano

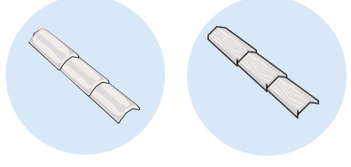
With balanced arches and flats found in traditional design, Gerard Milano is a timeless profile that creates clean, elegant and classical looking roofs.





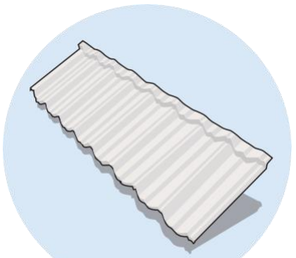
Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1215 mm
Width of cover	368 mm
Upstand	24 mm
Roof cover/panel	0.45 m²
Panels/m²	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	NA
Weight/m² Textured	6.4 kg
Weight/m² Smooth	NA

Gerard Milano is compatible with **Barrel** and **Angle** trims.



Gerard Classic

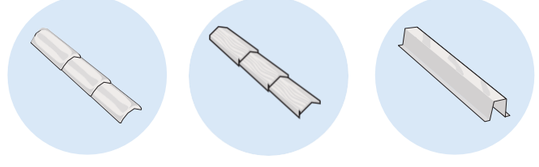
Gerard Classic is a geometric profile with shapes and angles that accentuate light and shadow to emphasise its corrugations and create a look of strength and definition.





Pitch – min /max.	12-90°
Overall length	1320 mm
Length of cover	1257 mm
Width of cover	369 mm
Upstand	28 mm
Roof cover/panel	0.46 m²
Panels/m²	2.2
Weight/panel Textured	2.9 kg
Weight/panel Smooth	2.1 kg
Weight/m² Textured	6.4 kg
Weight/m² Smooth	4.7 kg

Gerard Classic is compatible with all three Gerard trims – **Barrel, Angle** and **Box**.



Dimensions and weights given are nominal.

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1.1.2. Trims

Gerard Roof trims

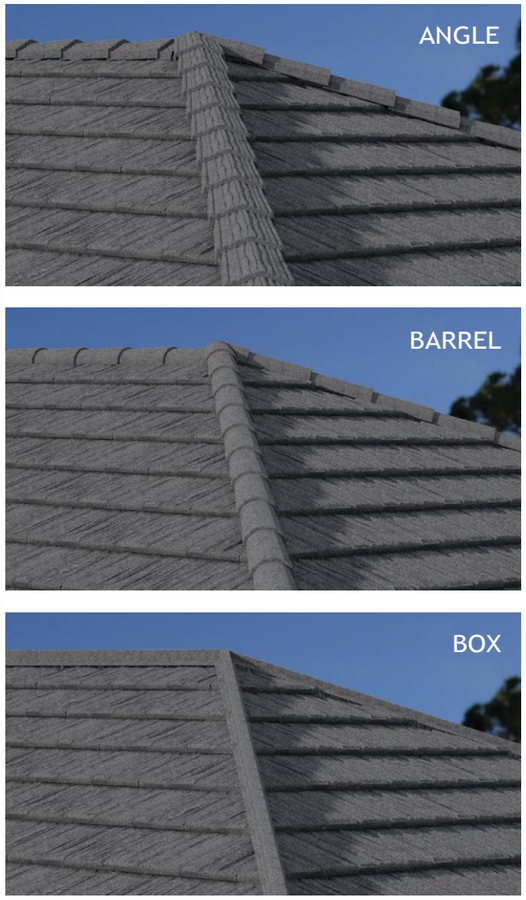
Trim is an essential roofing element, for performance as well as appearance; roof trims create a weatherproof seal at roof junctions and are an important part of the integrity of the roofing system.

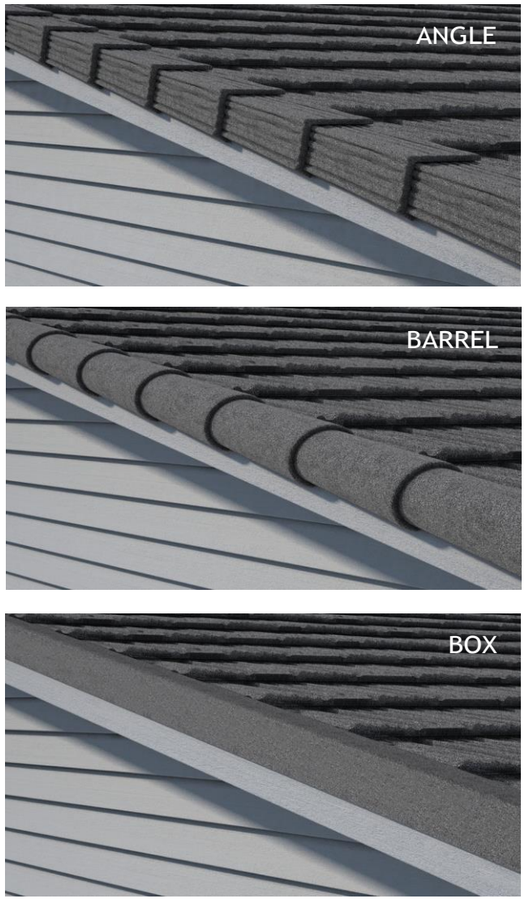
There are three types of roof trim – Angle, Barrel and Box. Each roof profile is compatible with one or more of these as shown in the chart on the right.

Gerard's roof trim component system is designed to be fully integrated. The finish of Gerard trims can be chosen to exactly match the finish of a Gerard roof or chosen in a contrasting colour to create a specific effect.

	Angle trim	Barrel trim	Box trim
Stratos	✓	✓	✓
Senator	✓		
Rockport	✓		
Alpine	✓		
Oberon	✓		
Heritage	✓	✓	✓
Milano	✓	✓	
Classic	✓	✓	✓

Gerard Roof Profiles With Corresponding Trims





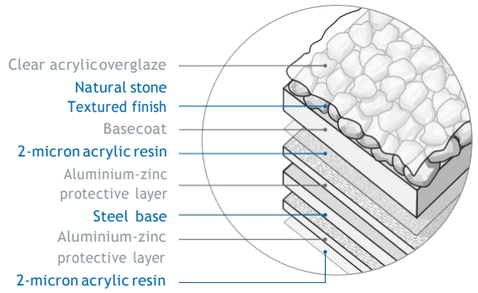
1.2 Finishes

Choice of surface finishes

Some Gerard roof profiles allow you to choose either a textured or Smooth finish on the surface of your roof.
Both have their merits and both come in a range of contemporary colours. The decision is usually influenced most by the architectural style of the home and the intended colour scheme.

1.2.1 Textured finishes

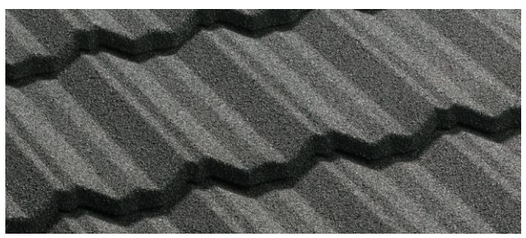
Naturally coloured mineral fragments, or ceramic coated stone fragments, fused to aluminium-zinc steel in layers of acrylic resin and over-glaze.



Textured finish advantages:

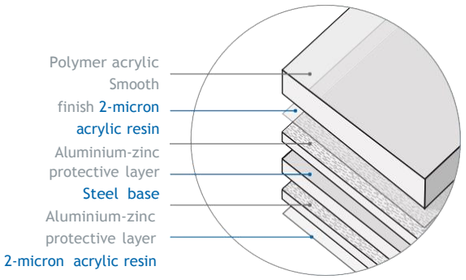
- Additional protection from the elements
- Natural stone colours are almost entirely fade-free
- Gerard textured finishes have longer warranty

A textured stone finish is inclined to look a little more substantial yet visually softer than a Smooth finish.



1.2.2 Smooth finishes

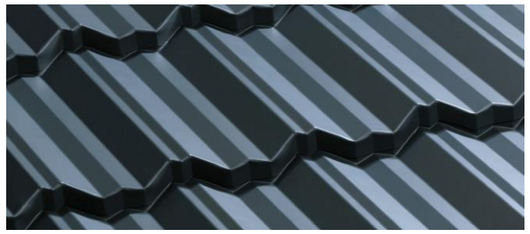
45-micron thick topcoat of ultra-tough polymer acrylic applied after the shape has been pressed into the aluminium-zinc steel (preventing surface micro-cracks).



Smooth finish advantages:

- Less expensive than a textured finish
- Smooth surface with clearer detail
- Just like ordinary coloured steel but much more durable

Smooth finishes tend to produce a smoother, crisper look accentuating patterns and details more.



1.2.3 Custom finishes to order

Custom finishes can be created for special projects by request.

A Gerard Smooth finish can be made to match any colour sample. We also have the ability to develop a custom textured finish – for example, we could work with stone that's native to your location.

To find out more contact Gerard Roofs on 0800 100 244.

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1.3 Colours & finishes

1.3.1 Textured finish colours



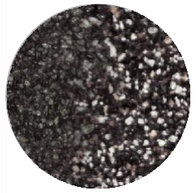
Midnight

Black / Ebony



Charcoal

Black / Ebony



Eclipse

Black / Ebony



Onyx

Greyfriars / Greyfriars



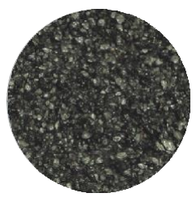
Ashwood

Sandstone Grey / Sandstone Grey



Rainforest

Karaka / Karaka



Greenstone

Karaka or River Gum / Karaka



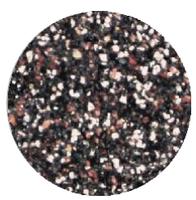
Ravine

Karaka / Karaka



Teak

Lignite / Lignite



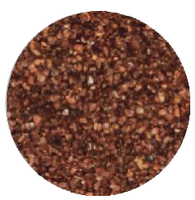
Pepper

Ironsand / Ironsand



Terracotta

Scoria / Scoria



Cedar

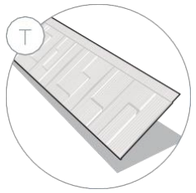
Lignite or Scoria / Lignite

1.3.2 Types of finish by roof profile

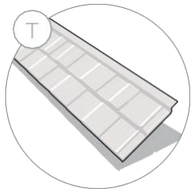
Textured finishes and colours are available for all Gerard roof profiles.



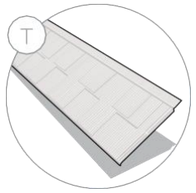
Gerard Alpine



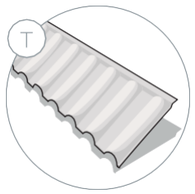
Gerard Rockport



Gerard Oberon

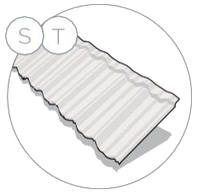


Gerard Senator



Gerard Milano

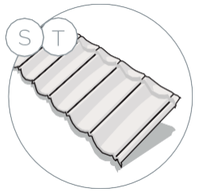
Smooth finishes and colours are available for the three Gerard profiles shown below.



Gerard Classic

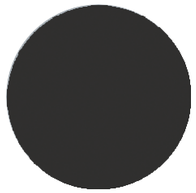


Gerard Stratos



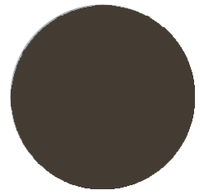
Gerard Heritage

1.3.3 Smooth finish colours



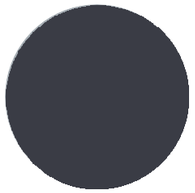
Obsidian

Black / Ebony



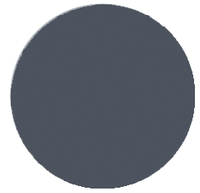
Graphite

Ironsand / Ironsand



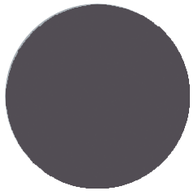
Castle Grey

Windsor Grey / Windsor Grey



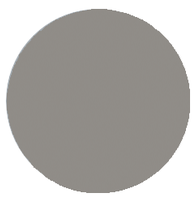
Ocean Blue

New Denim Blue / New Denim Blue



Smoke Grey

Greyfriars / Greyfriars



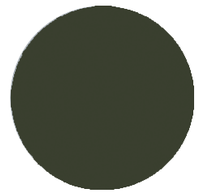
Pearl Grey

Sandstone Grey / Sandstone Grey



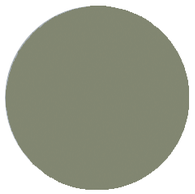
Chalk

Cloud / Pacific Cloud



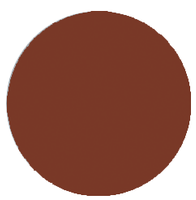
Dark Green

Karaka / Karaka



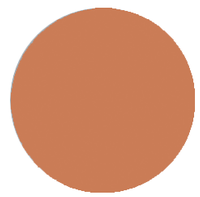
Mint Green

Mist Green / Mist Green



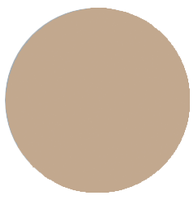
Russet

Scoria / Scoria



Marseille Clay

Terracotta / Terracotta



Morocco

Beige / *No equivalent*

The name below each colour swatch title is the Colorcote® / Colorsteel® equivalent. These are useful for matching accessories like fascia or aluminium joinery as the names are often referred to as a colour standard.

The name below each colour swatch title is the Colorcote® / Colorsteel®equivalent. These are useful for matching accessories like fascia or aluminium joinery as the names are often referred to as a colour standard.

1.4 Product warranty

Gerard's warranty addresses homeowners' two main concerns:

1. That the roof remains weatherproof
2. That the coating remains sound

Complicated rules simplified

Warranties are complex but we've narrowed the variables affecting Gerard Roofs' warranty cover down to two questions:

Is the building sited in a corrosive environment?

Does the roof have a Smooth or a textured finish?

On the right is a chart showing the terms of the warranty according to the circumstances of the individual building.

In each situation the warranty is pro-rata with cover diminishing over time.

There are two warranty environment zones: Standard and Corrosive. Warranty cover is longer in the standard environment zone.

A Corrosive Environment is defined as anywhere within 750m of breaking surf.

Gerard Roofs' warranty applies to all Gerard manufactured products, even if installed in extreme corrosive conditions.

Installation is assured

Be reassured that Gerard roofs are only installed by Gerard Certified Roofers.

Each GCR is responsible under law to make good any problems in the unlikely event they arise.

Visit www.gerardroofs.co.nz to download a sample of the full warranty document.

The chart shows the duration of both aspects of roof cover, according to the type of texture and the corrosiveness of the environment.

		
Weatherproofing		
Weatherproofing cover with textured finish roof	50 years pro-rata	25 years pro-rata
Weatherproofing cover with Smooth finish roof	50 years pro-rata	15 years pro-rata
Surface coating		
Textured Coating cover	20 years pro-rata	10 years pro-rata
Smooth Coating cover	15 years pro-rata	5 years pro-rata

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Products and specifications

1.5 Environmental responsibility

A Gerard pressed steel roof is an environmentally responsible choice.

Pressed steel roofing generates minimal manufacturing, construction site and demolition waste.

A pressed steel roof is lighter than its concrete or clay equivalent, which means transportation is more energy-efficient. It requires less framing support, which also saves resources. Steel is endlessly recyclable too.

Gerard Roofs is conscious of its environmental footprint and was New Zealand's first roofing manufacturer to be awarded ISO 14001 environmental accreditation.

TELARC REGISTERED
Environment ISO 14001

1.6 CAD details available

CAD details for commonly encountered roof details in a number of common formats can be found at www.gerardroofs.co.nz/designtech

At the time of publication these details cover:

- Eaves
- Gables
- Ridges
- Roof-to-wall (transverse)
- Hips
- Roof-to-wall (parallel)
- Valleys

Gerard Roofs' CAD library is an expanding online resource that will be added to periodically as new details become available.
Check www.gerardroofs.co.nz/designtech to see the latest available versions.

Specific details for unusual or challenging areas can be requested by contacting Gerard Roofs on 0800 100 244.

1.7 Handling and storage

Gerard panels and accessories must be transported and handled with care to avoid damaging the pre-finished surfaces.

Long term storage of panels and accessories must be under dry, ventilated cover. For short term storage on site, panels and accessories must be stored flat off the ground, no more than two pallets high.

Handling and storage of all materials supplied by Gerard Roofs, whether on or off site, is under the control of the Gerard Certified Roofer.

Other materials must be handled and stored in accordance with the relevant manufacturer's instructions.

1.8 Product identification

Gerard Roofs print a run number, date and time of production on the reverse side of each panel. Pallets have pallet cards that show the run number, date of production and colour code markings; this allows identification of batch colours.

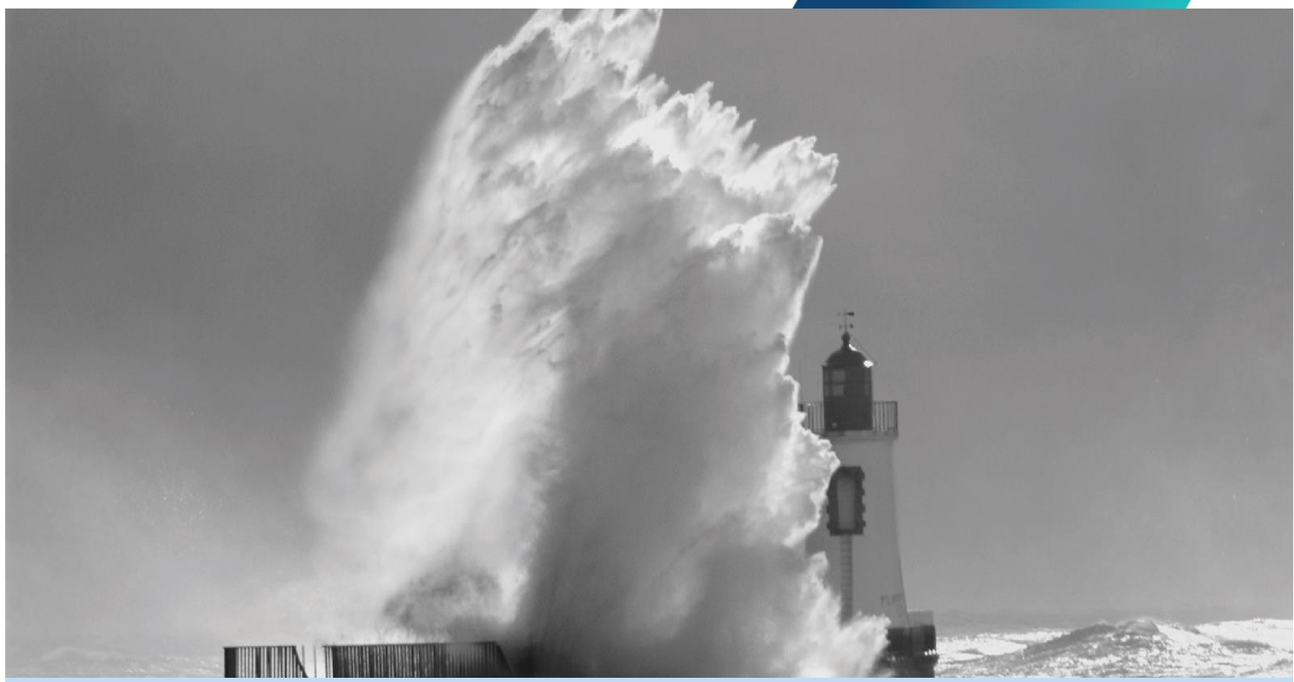
The steel supplier also prints a code which allows identification of the parent coil.



Reverse side of the panel.

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2.0 Design considerations

This section contains general information you need to keep in mind when designing buildings with Gerard Roofs. The numbered sections (2.1; 2.2; etc.) correspond to the equivalent parts of the Gerard Roofs website specification area (www.gerardroofs.co.nz/designtech). Any details and diagrams can be downloaded from there.

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2.1 Scope

This specification covers the supply and fixing of:

- Materials
- General information
- Limitations of use
- Service of life
- Workmanship - pre-roofing requirements
- Timber battens.
- Roofing underlay
- Valleys
- Gerard Roofs - pressed metal tiles/panels
- Trim, standard, barrel and angle
- Wall flashings
- Fixings/fasteners
- Incompatible materials
- Extra high wind zone variations
- Solar panels

2.2 Building code

The following standard specifications should be adhered to in both materials and workmanship.

NZS 2295	Roofing underlays
NZS 4217	Standard for pressed metal tile roofs
NZS 3604:2011	Code of practice for light timber framed buildings, not requiring specific design
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles - galvanising of nails
E2/AS1	New Zealand Building Code clause E2 External moisture
AS1397:2011	AS 1397-2011 continuous hot-dip metallic coated steel sheet and strip - coatings of zinc and zinc alloyed with aluminium and magnesium.
AS/NZS 1530	pt. 3:1999. Fire standard

NZ Building Code sections B1,B2,E2, G12

2.3 Serviceable life

Durability (B2)

Without recoating, the Gerard Roofs products will meet the provisions of NZBC B2.3(C) for 15 years, when used and maintained.

Structure (B1)

When installed according to the manufacturers recommendations the Gerard Roofs products will allow provisions of NZBC B1.3.1, B1.3.2 and B1.3.4 to be met for the relevant provisions of B1.3.3.

External moisture (E2)

When correctly used and installed, the Gerard products meet the requirements of the NZ Building Code E2/AS1

Live loads

During installation and subsequent construction process or maintenance, walking load must be positioned to the front of the panel where the panel is supported by a batten.

Wind zones

On new roofs when fixed to battens sized and installed according to NZS 3604:2011 Gerard Roofs systems are suitable for use in all NZS 3604:2011 building wind zones up to and including extra high.

Spread of fire (C3)

The coating of the roof is <1mm thickness and applied directly to a non-combustible substrate. There was no spread of flames when tested to AS/NZ 1530.pt3.

Water supplies (G12)

Rainwater collected from the Gerard Roofs systems will meet the provisions of NZBC G12.3.1, providing the surface coating is maintained as directed.

It is recommended that a potable water collection system is not installed until 3 good rainfalls have washed the new roof surface free of building debris and surface coating surfactants.

Snow

The Gerard Roofs products are suitable for use where buildings are designed for a 1kPa snow loading.

2.4 Other information sources

NZ MRM Code of Practice.

2.5 Alternatives

No alternatives or substitutions permitted.

2.6 Materials

2.6.1 Panels and accessory materials

The roofing panels and accessories are made by Gerard Roofs.

The base material is aluminium-zinc coated steel - 0.39 mm, AZ150 of AS1397:2011.

Panels are finished in either a granulated textured or Smooth paint finish.

Submissions

An actual product sample should be sighted to confirm colour choice before material orders are placed/accepted.

2.6.2 Installation materials

1. Roofing underlay shall be either a bitumen impregnated Kraft or synthetic underlay. Kraft underlays are covered by NZS2295 while synthetic roofing underlays are approved by Acceptable Solution documentation from the suppliers.
2. Battens of rough sawn radiata pine type timber meeting suitable dimensions (table 02, page 22) with H1.2 protection.
3. Ridge, hip, gable and wall flashings shall be supplied as standard products from Gerard Roofs.
4. Valleys may be used as supplied pre-finished in 2.4 metre lengths by Gerard Roofs or made to order out of pre-painted 0.55 mm G300 AZ150 aluminium-zinc coated steel in a matching colour from a sheet metal fabricator. If made to order, valleys should have similar dimensions to those supplied by Gerard Roofs.
5. Valleys must be painted to the same colour as the roof panel if not pre-finished.
6. Hip end caps to be installed where necessary to stop ingress of moisture or bird-life.
7. All nails in panels should be 50 mm galvanised and coated to meet AS/NZS 4680 specification (Zn 390 g/m^2). Galvanised nails are used for ridge hip caps 30 mm, all other trim or flashings 50 mm.

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2.7 General information

Profile	Minimum pitch
Stratos	15°
Senator	15°
Rockport	15°
Alpine	15°
Oberon	20°
Heritage	12°
Milano	12°
Classic	12°

Minimum Roof Pitches For Gerard Roof Profiles

For full specifications - refer to individual panel profile data (pages 6-9) dimensions, coverage, weights etc.

2.7.1. Dissimilar metals/materials

When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. A similar effect often occurs with water flowing over different metals.

This form of corrosion is commonly found:

- Where water is discharged from copper or brass systems over a galvanised or aluminium-zinc coated steel roof.
- Where unpainted lead flashings are applied directly to aluminium-zinc coated steel products.
- Where fasteners are incompatible with the roofing material.
- Any electrical contact between dissimilar metals should be avoided, e.g. wet leaves making contact between copper gutters and aluminium-zinc coated steel roof panels.

Note: Special consideration should be given when replacing existing roofs as some roof claddings use unsuitable materials for flashing such as lead.

2.8 Limitations on use

2.8.1. Corrosive environments

The Gerard system must not be used in high alkaline environments (such as intensive animal shelters or other buildings with high ammonia concentrations); contact with fresh concrete or plaster must be avoided. The roofing must not be used in contact with permanently damp materials, nor on or near industrial buildings in which corrosive processes occur, nor over swimming pools.

Directing water-flow to minimise potential corrosion

More active metals → **More noble metals**

Zinc > Aluminium-Zinc Coated Steel > Aluminium > Steel > Lead > Copper > Stainless Steel

This chart lists commonly used metals in a 'Galvanic Series'. If any two of these metals are in damp contact or a run-off situation, the metal further to the left will sacrifice itself to protect the metal further to the right. Therefore the simple rule to remember is that you can run water from left to right, but not from right to left. For example zinc to copper is alright, but copper to zinc is not. Specific advice should be sought from Gerard Roofs regarding use of dissimilar metals.

GERARD
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3.0 Substrate & installation overview

Information for the design and specification of the sub-structure of a Gerard roof; rafters, battens, underlays and fixings are covered in detail. The numbered points (3.1; 3.2; etc.) correspond to the equivalent parts of the Gerard Roofs website specification area (www.gerardroofs.co.nz/designtech). Any details and diagrams can be downloaded from there.

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3.1 Preparation of structure

3.1.1 Rafters and valley boards

Rafters and valley boards are to be correctly installed by the builder before roofing can start.

Refer to Gerard Roofs Technical Note - Builder Check List, on the Gerard Roofs website.

Where an exact number of complete panel courses is not possible, the top row of panels should be trimmed to fit and then bent up beneath the ridge flashing.

3.2 Battens

Select batten size to suit rafter or truss spacing. Battens are to be treated to H1.2 and graded on site.

Truss spacing (mm)	Batten size (mm)	Situation
900	40 x 50	Standard
1200	50 x 50	Occasional
1500	50 x 65 on edge	Unusual
1800	50 x 75 on edge	Unusual

Table 02 Batten/Spacing

3.2.1 Batten setout

Stratos, Heritage, Classic, Milano, Rockport and Alpine profiles

A row of battens fixed directly behind the fascia with the second batten 330mm up the truss. Subsequent battens are spaced at 370mm (or as specified for profile and coating finish). The final, top row of panels is 365mm or less, depending on whether the top row needs cutting due to rafter length.

Senator

A row of battens fixed directly behind the fascia with the second batten 330mm up the truss. Subsequent battens are spaced at 368mm. A centre support batten (40x50 mm) positioned 185 mm behind the front face of the panel batten is installed and held in place with a single batten nail. Panels are not fastened to this support batten. The final top row of panels should be 365mm or less, depending on whether the top row needs cutting due to rafter length.

NB. The second batten up from the facia is left out to allow the roofing underlay to maintain an angle above horizontal.

Oberon

A row of battens fixed directly behind the facia with the second batten 280 mm up the truss. Subsequent battens are spaced at 160mm. The final top row of panels is 155mm or less, depending on whether the top row needs cutting due to rafter length. Panels are not fastened to intermediate support battens.

NB. The second batten up from the facia is left out to allow the roofing underlay to maintain an angle above horizontal.

Eaves panels at gutter fascia

Panels should extend into the gutter by 40mm. This may vary slightly depending on the rafter length and roof pitch.

Roof profile	Batten spacing	
	Textured	*Smooth*
Stratos	370mm	371mm
Senator*	368mm	
Rockport	368mm	
Alpine	368mm	
Oberon^	320mm	
Heritage	369mm	370mm
Milano	368mm	
Classic	369mm	370mm

Table 03 Batten Set-Out

**Centre batten 185 mm, second batten from eave not installed*
^Centre batten 160 mm, second batten from eave not installed

3.0 Substrate & installation overview

3.2.2 Batten/rafter fastening

Gerard Roofs require that all 40 x 50 mm battens fastened to rafters at 900 mm centres are to be fastened with 2 x 90 mm gun nails in all wind zones up to and including the very high wind zone.

In extra high wind zones a screw fastener must be used for all batten rafter junctions.

This meets or exceeds the requirements of NZS3604:2011

Wind zone	900 rafter 50x40 mm	1200 rafter 50x50 mm
Low 32m/s	S	S
Medium 37m/s	S	S
High 44m/s	S	T
Very high 50m/s	S	T
Extra high 55m/s	T	T
SED +55m/s*	Contact GR	Contact GR

Table 04 Fasteners for Panel Battens -Wind Zones – NZS3604.

S = 2 x 90 mm x 3.15 mm nails (0.8kN)
T = 80 mm x 10g screw (2.4kN)

**In SED Specific design situations refer to Gerard Roofs Technical Notes on installation in SED wind areas.*

3.3 Roofing underlay

Must comply with standard NZS 2295 - Pliable and Permeable Building Underlays. Roofing underlay is installed under the battens but over the bottom batten.

Roofing underlay should be installed horizontally with a minimum overlap of 75 mm.

All vertical laps to be taken past rafters and lap by a minimum of 150 mm.

The Roofing underlay is self-supporting up to 1200 mm and does not need mesh.

3.4 Valleys

Valley trays should be made from 0.55 mm AZ150 coated steel. Typically the steel will be pre-painted. Install valleys in a weatherproof workmanlike manner. Do not fix through valleys. Where more than one valley length is used in one run, have an overlap of at least 150mm. Tag valleys at the top edge of the valley join to eliminate valley creep.

3.5 Solar brackets

Gerard Roofs have proprietary solar brackets which can be installed at the time of roofing or later. These brackets do not require holes to be cut into the surface of the panels offering complete weather security.

Refer to Gerard Roofs for more information.

3.6 Panel installation

Care must be taken when handling, cutting, bending and installing to avoid damage to the surface. In particular, the paint finish must be kept clean.

Use rubber soled work shoes during installation and protective/synthetic padding on bending equipment.

Where work is still to be carried out on upper storey dormer windows or walls, panels can be left off to avoid damage or fallout from paint or plaster coatings. Alternatively, a plank embedded into 3 sand bags along its length can be used on top of the panel, with the sand bags placed over the support batten near the nose of the panel.

Where work is progressing above installed panels, dust sheets must be used held down with sand bags.

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3.6 Panel installation continued

Heritage, Classic and Milano

Heritage, Classic and Milano can be installed to a minimum of 12° and may be laid left to right or right to left. All laps to be the same way on each plane.

Stratos

Stratos can be installed to a minimum of 15° and may be laid left to right or right to left. The laps must be laid facing away from prevailing winds or line of vision. All laps should be the same way on each plane. Courses must be staggered in a random pattern to avoid patterning as you progress up a hip, or gable.

Senator, Alpine and Rockport

Senator, Alpine and Rockport can be installed to a minimum of 15°. These profiles may only be laid in a single direction, as follows:

- Senator and Alpine – left to right only
- Rockport – right to left only

Courses of all three should be laid in a random pattern, with staggered start points.

Senator should be installed with an intermediate batten at 185mm to support roof traffic.

Oberon

Oberon can be installed at a minimum of 20° and should be laid right to left. Reference can be made to the individual profile fixing pattern pages at the back of this specification manual. Courses must be staggered in a random pattern for Oberon, to avoid patterning as you progress up a hip or gable.

Eaves

At eaves, the front rows of panels are fixed to the battens alongside the fascia by driving nails through the top face into the eave batten. These nails are positioned at points of low water run off. Eaves nails for Smooth finish have a synthetic washer installed under the nail head, eaves nails on textured finishes are sealed with the touch up kit basecoat and chip.

Nailing panels

Successive rows of panels are fixed by driving 50mm nails through the centre of the panel nose into the face of the battens. These nails are spaced as shown/ described in the individual profile fixing pattern pages at the back of this specification manual.

Only Gerard Roofs approved nails should be used in the installation of panels and accessories.

Valleys

Panels are cut at the same angle as the valley, at appropriate points, and bent down into the valley; they must not touch the valley tray. At the ridge, panels are cut and bent up under ridge accessories.

Ridge, Hip, Gable and Wall flashings

Only factory produced flashings and trim as supplied by Gerard Roofs may be installed. Panels are turned up by a minimum of 40 mm and covered by Gerard Roofs accessories to the prescribed coverage. Special flashings can be formed and coated to order.

Wall roof lower junctions

Gerard roofs have proprietary PVC stop end flashings that direct roof/wall run off water into the rain water gutter system.

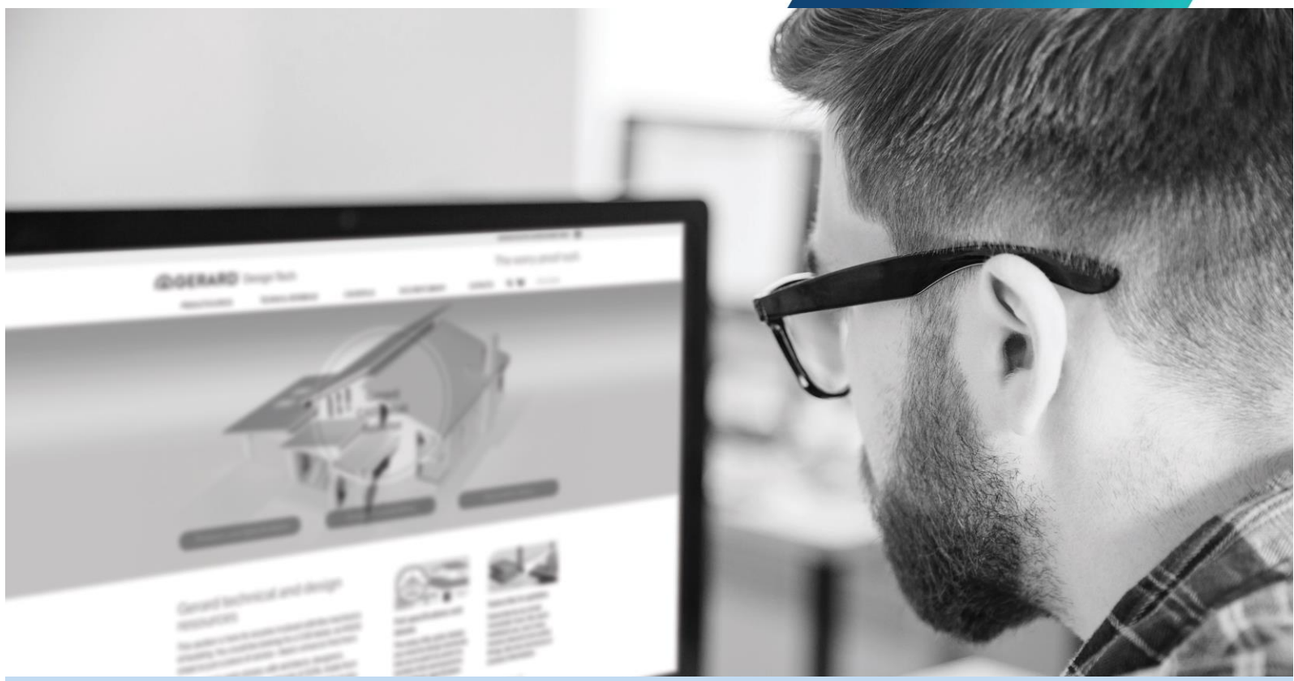
Membrane areas

If flat membrane areas such as Butynol overlap onto product surfaces, these can be painted with the touch up kit or base coated and granite textured.

Weather sealing

Proprietary or custom made rubber or metal flashings require neutral-cure silicone or MS sealants acceptable to Gerard Roofs to be used for weather-sealing services penetrating the roof. Sealant shall be applied between the flashing and panel surface and mechanical fasteners (rivets, Tek screws) installed to permanently fix the flashing in place.

GERARD
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4.0 Standard roof details

This section contains the common junction details and information you need to design and specify buildings with Gerard Roofs. The numbered sections (4.1; 4.2; etc.) correspond to the equivalent parts of the Gerard Roofs website specification area (www.gerardroofs.co.nz/designtech). Any details and diagrams can be downloaded from there.

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4.1 Batten spacing – Eave

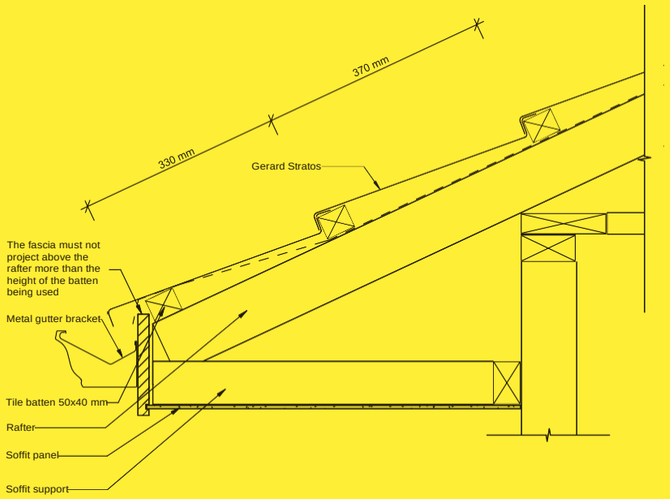


Fig 001 - Gerard Eave

4.2 Ridge installation

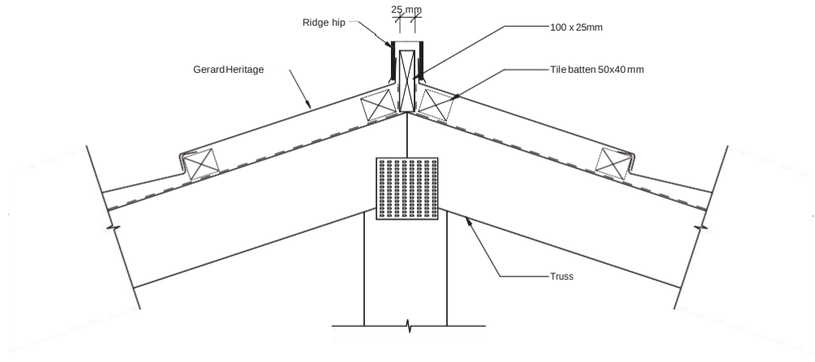


Fig 002 - Gerard Box Trim Ridge Board/Batten - Truss

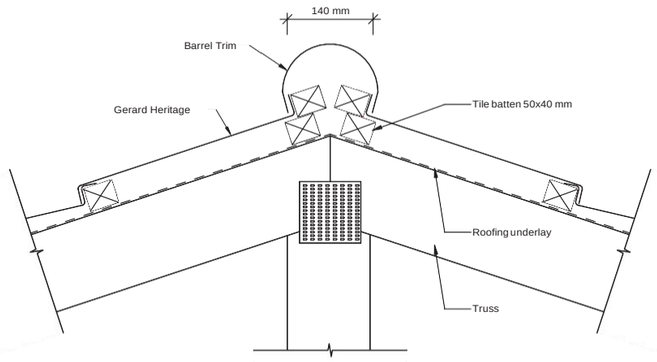


Fig 003 - Gerard Barrel Trim Ridge Board/Batten - Truss

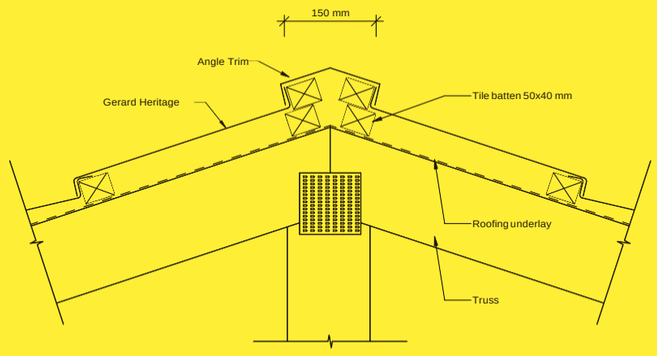


Fig 004 - Gerard Angle Trim Ridge Board/Batten - Truss

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4.3 Valleys

Gerard Roofs provide valley trays in two widths, a 160mm Combination Valley and a 250mm E2 Wide Valley for use where required by specification.

Valleys must be supported by valley boards; these should be installed with nogging where necessary.

The nogging should have at least 25 mm clearance beyond where the valley sits so battens have sufficient support and nailing width.

Panels above valleys should be turned down to within 5 mm of the valley tray but must not touch the tray.

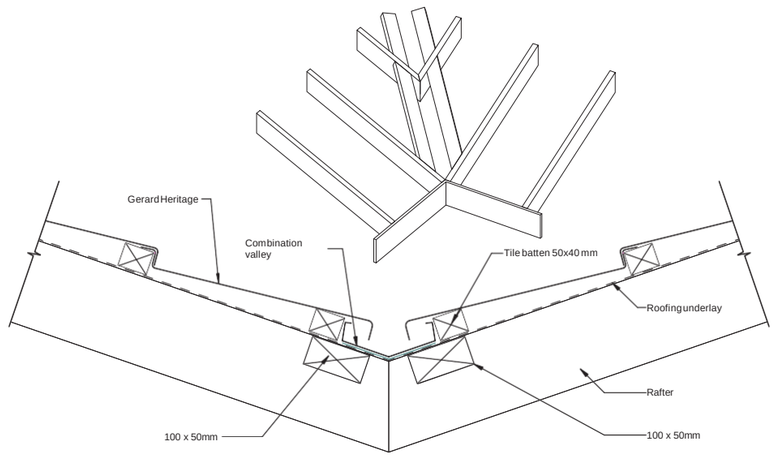


Fig 005 - Gerard Combination Valley

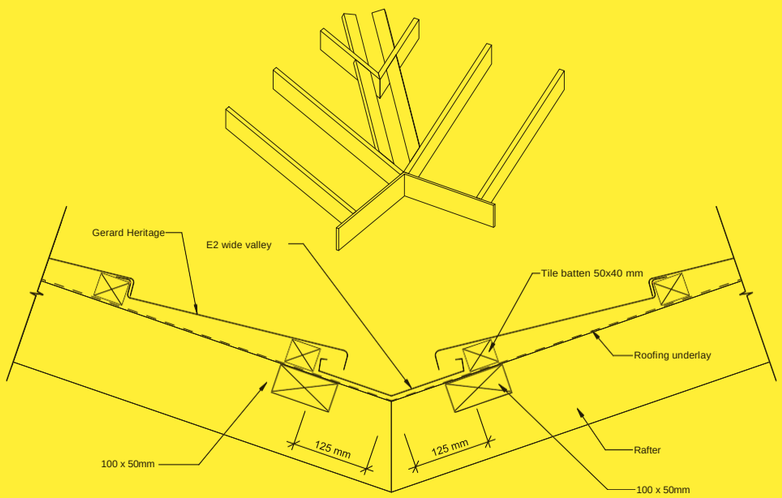


Fig 006 - Gerard E2 Wide Valley

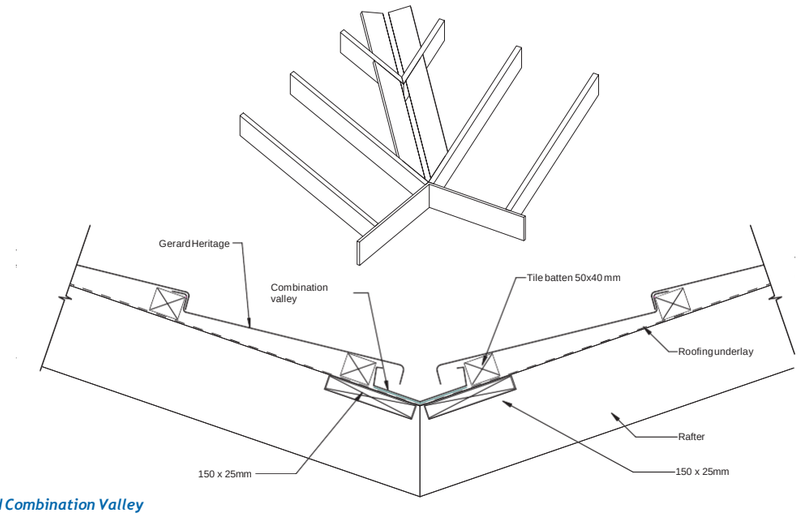


Fig 007 - Gerard Combination Valley

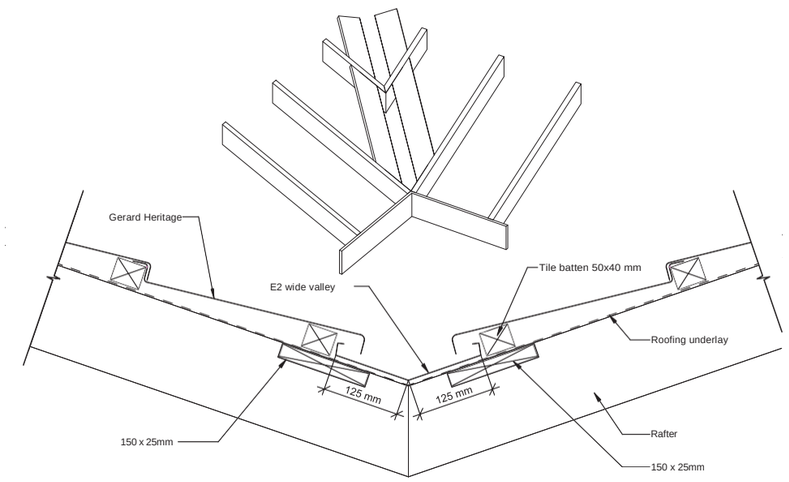


Fig 008 - Gerard Valley - E2 Wide Valley

4.4 Hips

4.4.1 Installation of roof trim on hip junction with wooden battens

Roof panels that butt up to hip battens should be turned up by 40 mm; roof trims must cover battens and overlap panels below by a minimum of 35 mm.

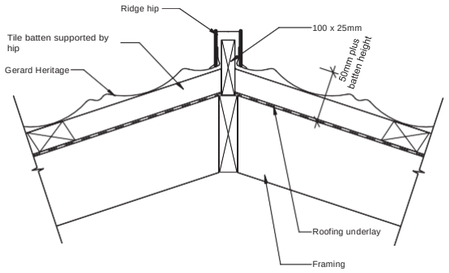


Fig 009 - Gerard Heritage Hip - Box Trim

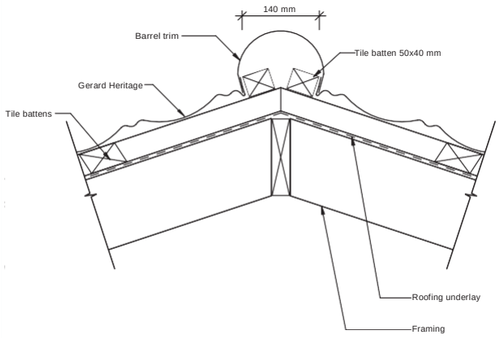


Fig 010 - Gerard Heritage Hip - Barrel Trim

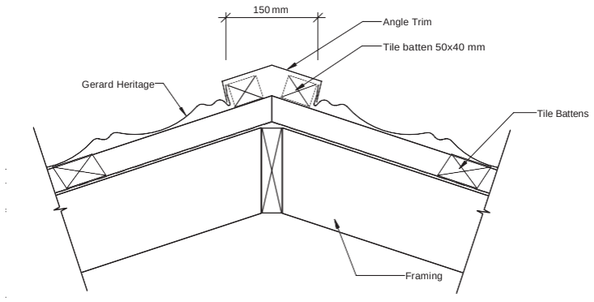


Fig 011 - Gerard Heritage Hip - Angle Trim

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4.5 Barge/Gable ends

4.5.1 Installation of roof trim over a wooden fascia with batten

Roof panels that butt up to edge battens should be turned up by 40 mm; roof trims must cover battens and overlap panels below by a minimum of 25 mm.

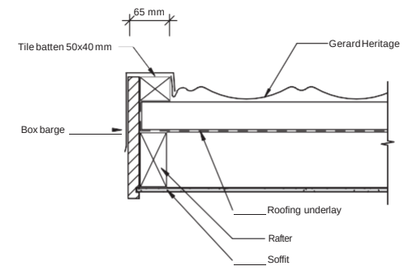


Fig 012 - Gerard Heritage Gable End - Box Barge

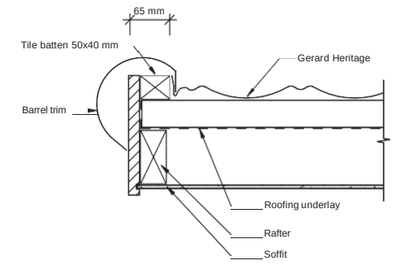


Fig 013 - Gerard Heritage Gable End - Barrel Trim

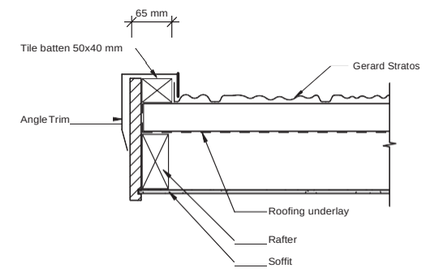


Fig 014 - Gerard Stratos Gable End - Angle Trim

4.5.2 Installation of roof trim over a metal fascia with and without batten

Roof panels that butt up to edge battens should be turned up by 40 mm; roof trims must cover battens and overlap panels below by a minimum of 25 mm.

Roof trims should be riveted to the metal facia.

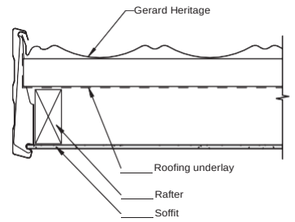


Fig 015 - Gerard Heritage Fascia - Box Trim

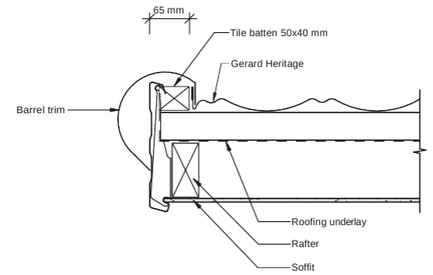


Fig 016 - Gerard Heritage Fascia - Barrel Trim

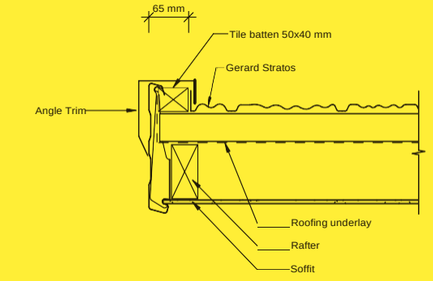


Fig 017 - Gerard Stratos Fascia - Angle Trim

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4.6 Wall flashings

There are several types of wall flashings that may be used with various thicknesses of wall claddings.

Gerard Roofs manufacture most of these without hooks or hems which then requires 100 mm coverage of the section hidden behind the wall cladding.

4.6.1 Side flashings

Side flashings are general purpose flashings suitable for use with most wall claddings.

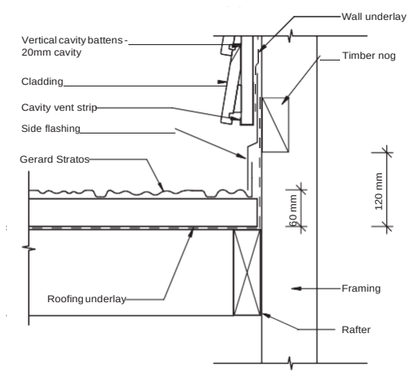


Fig 018 - Gerard Stratos Wall Parallel - Side Flashing

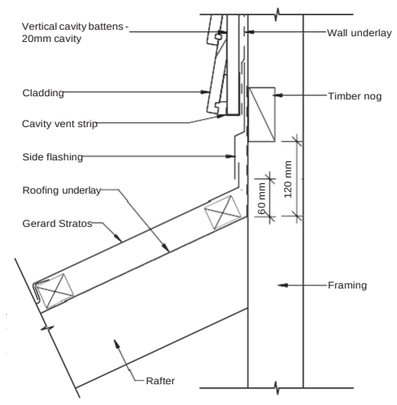


Fig 019 - Gerard Wall Transverse - Side Flashing

4.6.2 Step - Pitch flashings

Pitch flashings are a special system for thicker wall claddings like brick veneer. The transverse wall flashing is folded to closely match the roof pitch allowing the corner junctions to mitre neatly.

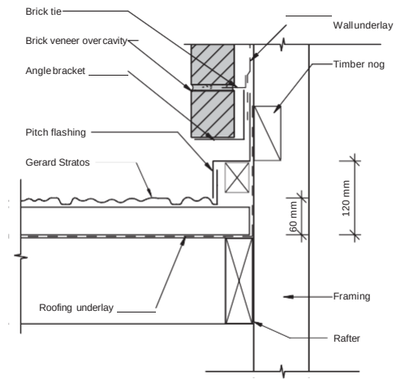


Fig 020 - Gerard Stratos Wall Parallel - Pitch Flashing

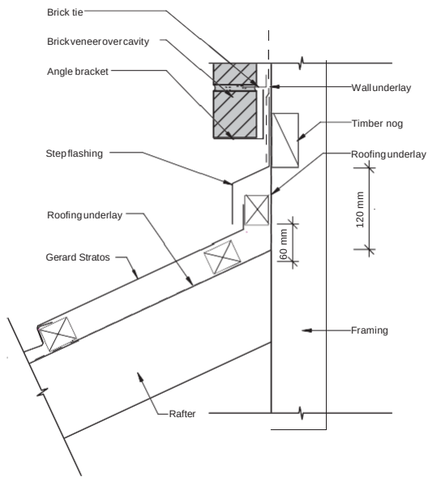


Fig 021 - Gerard Wall Transverse - Step Flashing

4.6.3 Soft edge apron flashings

Soft edge apron flashings are general purpose flashings suitable for most wall claddings. The soft edged aluminium is moulded down to meet the surface of the panel.

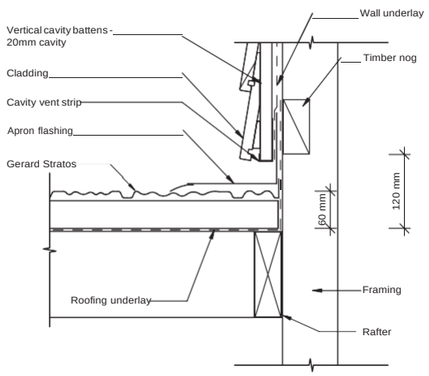


Fig 022 - Gerard Stratos Wall Parallel - Apron Flashing

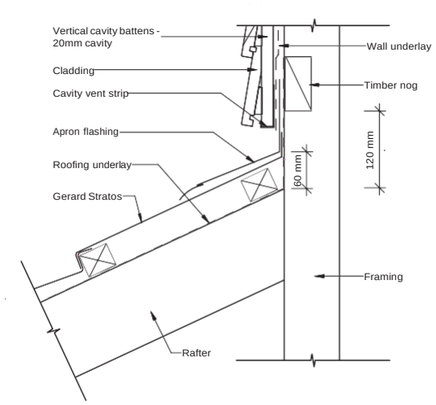
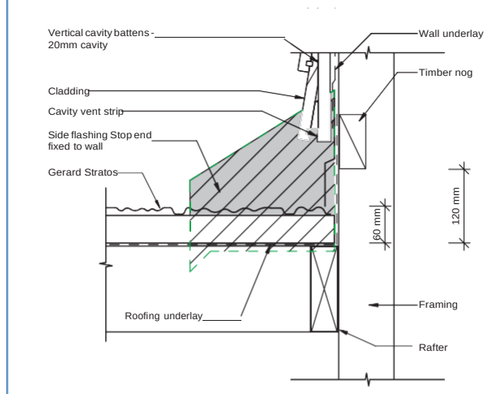


Fig 023 - Gerard Transverse - Apron Flashing

4.7 Wall Stop Ends

Gerard Roofs proprietary PVC Stop Ends direct water away from the roof and wall and into the rain water collection gutters. There are left and right versions.



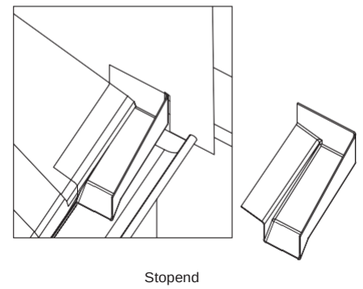


Fig 024 - Gerard Wall Parallel - Stop End Wall

4.8 Change in pitch

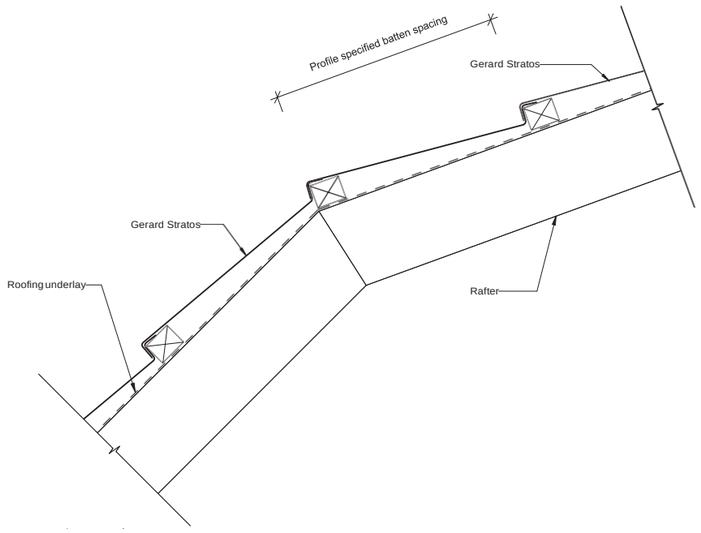


Fig 025 - Gerard Change in Pitch - Low Pitch to High Pitch
A batten is located at the point where the roof line changes pitch. If an exact number of courses of full panels is not practical a panel may be bent to suit.

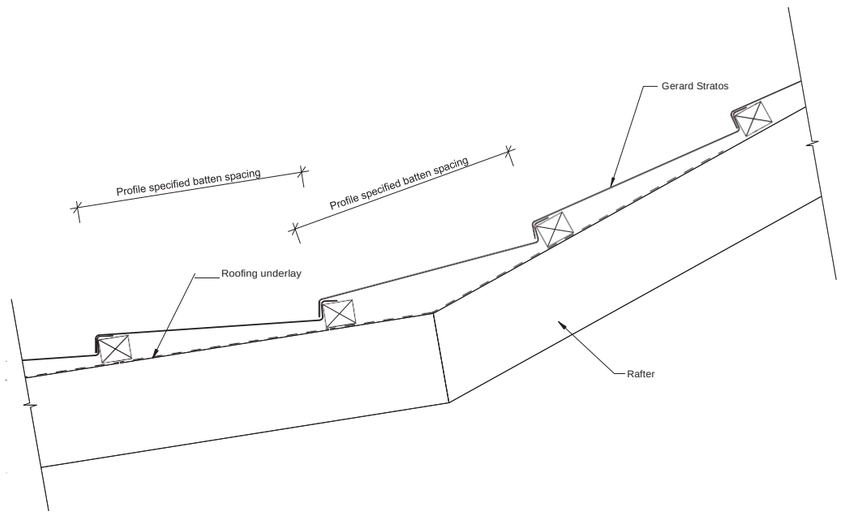


Fig 026 - Gerard Change in Pitch
A batten is located at the point where the roof line changes pitch. If an exact number of courses of full panels is not practical a panel may be bent to suit.

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4.9 Penetrations

4.9.1 Pipes

Pipe penetrations should be flashed using an EPDM flexible sleeve/boot or similar, such as Aquaseal. The edge of the EPDM flexible sleeve/boot should be fixed at 45° to horizontal.

4.9.2 Chimneys

Chimneys require specific flashings depending on the type and width of the chimney.

Cylindrical chimneys may be flashed with a large EPDM rubber sleeve similar to pipe flashings.

Rectangular chimneys require a back flashing. For chimneys up to 600 mm wide this may be made of flat sheet supplied by Gerard Roofs, AZ150 pre-painted steel, aluminium, or a supported butyl membrane.

Chimneys exceeding 600mm in width

For chimneys and other penetrations wider than 600mm an internal gutter should be used to create a fall to the edges of the penetration.

This requires a cricket flashing or slope to direct water to the edges using a supported butyl membrane.

Where the chimney is situated at the eave an internal gutter should be installed around the side to allow water to exit into the eave's rainwater system.

Angled internal gutters should be formed using butyl rubber or other inert material such as aluminium. These should be installed by suitably qualified Licensed Building Practitioners (LBPs).

4.9.3 Roof windows

Refer to specific roof window supplier's installation instructions. Typically this will involve cutting and bending panels up to the perimeter of the roof window in a manner that supports installation of the proprietary flashings supplied by the roof window manufacturer.

4.9.4 Solar panels

Refer to specific solar panel supplier's installation instructions. Note that these should allow for fastening directly to the rafters and not to the roof panel battens. Penetrations of the support must be appropriately flashed to ensure weather security, e.g. an EPDM flexible sleeve/boot.

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4.10 Extra high wind zone installation

Refer to *Table 04 Fasteners for Panel Battens - Wind Zones - NZS3604.* (Page 23)

Gerard Roofs fixing patterns do not change for extra high wind zones.

Gerard Roofs can provide a wall flashing that retains the panel turn up and offers greater wind-blown rain protection. This is an extended side flashing that has a soft edge to contour the panel surface and a hem at the top section that is mandatory for roofs in extra high wind zones.

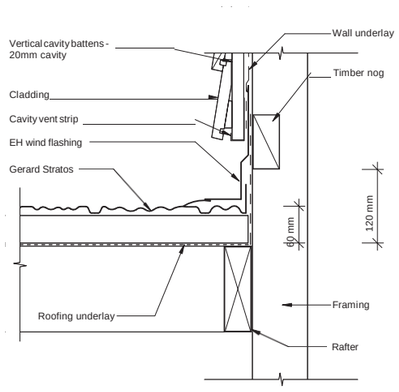


Fig 027 - Gerard Stratos Parallel - EH Wind Wall Flashing

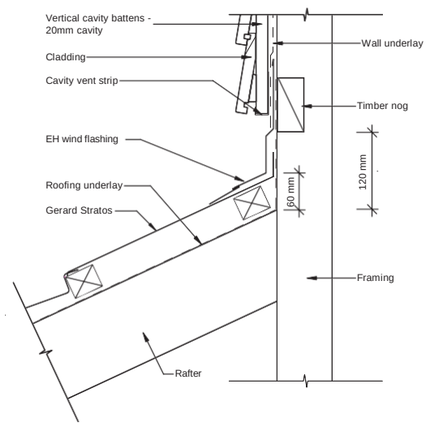


Fig 028 - Gerard Wall Transverse - EH Wind Wall Flashing



5.0 Components & fixing patterns

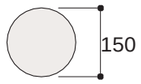
This section contains useful installation information for very detailed specification. You'll find a complete list of Gerard Roofs componentry and specific layout and fixing instructions for each of the eight Gerard Roof profiles. The information contained in this section is also contained in individual product profile sheets available for download at www.gerardroofs.co.nz/designtech

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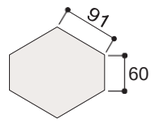
5.1 Gerard Roofs components

To accompany their eight roof profile panels – Stratos, Senator, Rockport, Alpine, Oberon, Milano, Heritage and Classic – Gerard Roofs produces a full range of accessories.

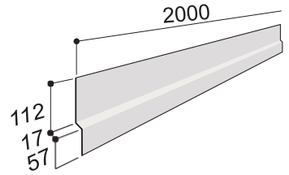
All components are produced in the same way, from the same steel and, where appropriate, coated to match the roof profile panels themselves using the same materials and techniques to ensure complete synergy for performance and aesthetics.



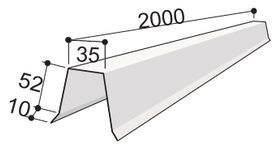
Barrel Trim End



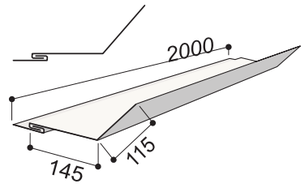
Angle Trim End



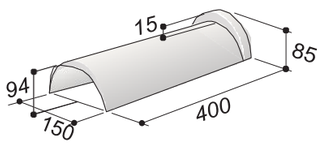
Side Flashing



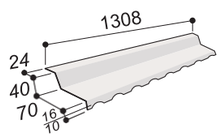
Box Trim



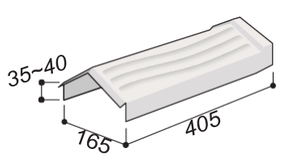
Apron Flashing



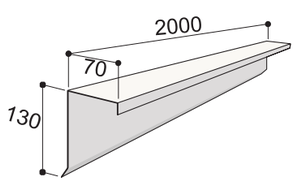
Barrel Trim



Milano Ridge Flashing

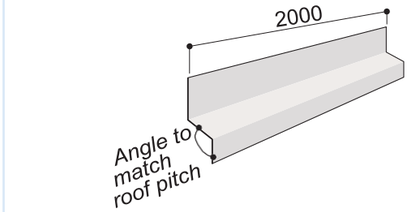


Angle Trim

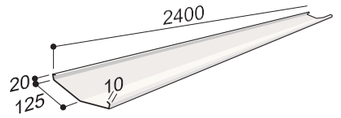


Box Barge

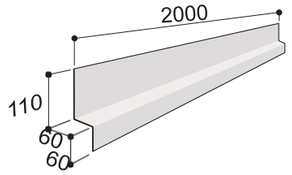
5.0 Components & fixing patterns



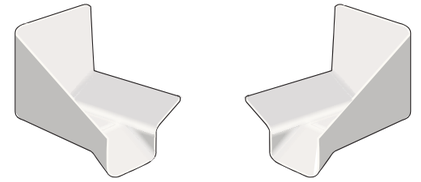
Step Flashing



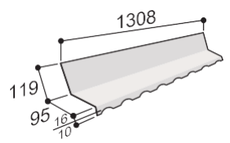
E2 Wide Valley



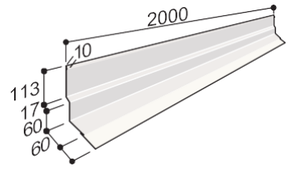
Pitch Flashing



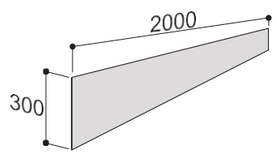
Left Stop End *Right Stop End*



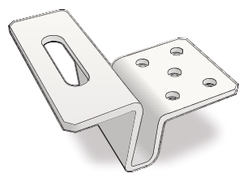
Milano Wall Flashing



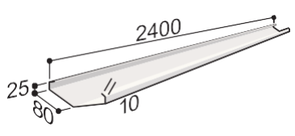
EH Wind Wall Flashing



Flat Sheet 300 (Also 400 and 490)



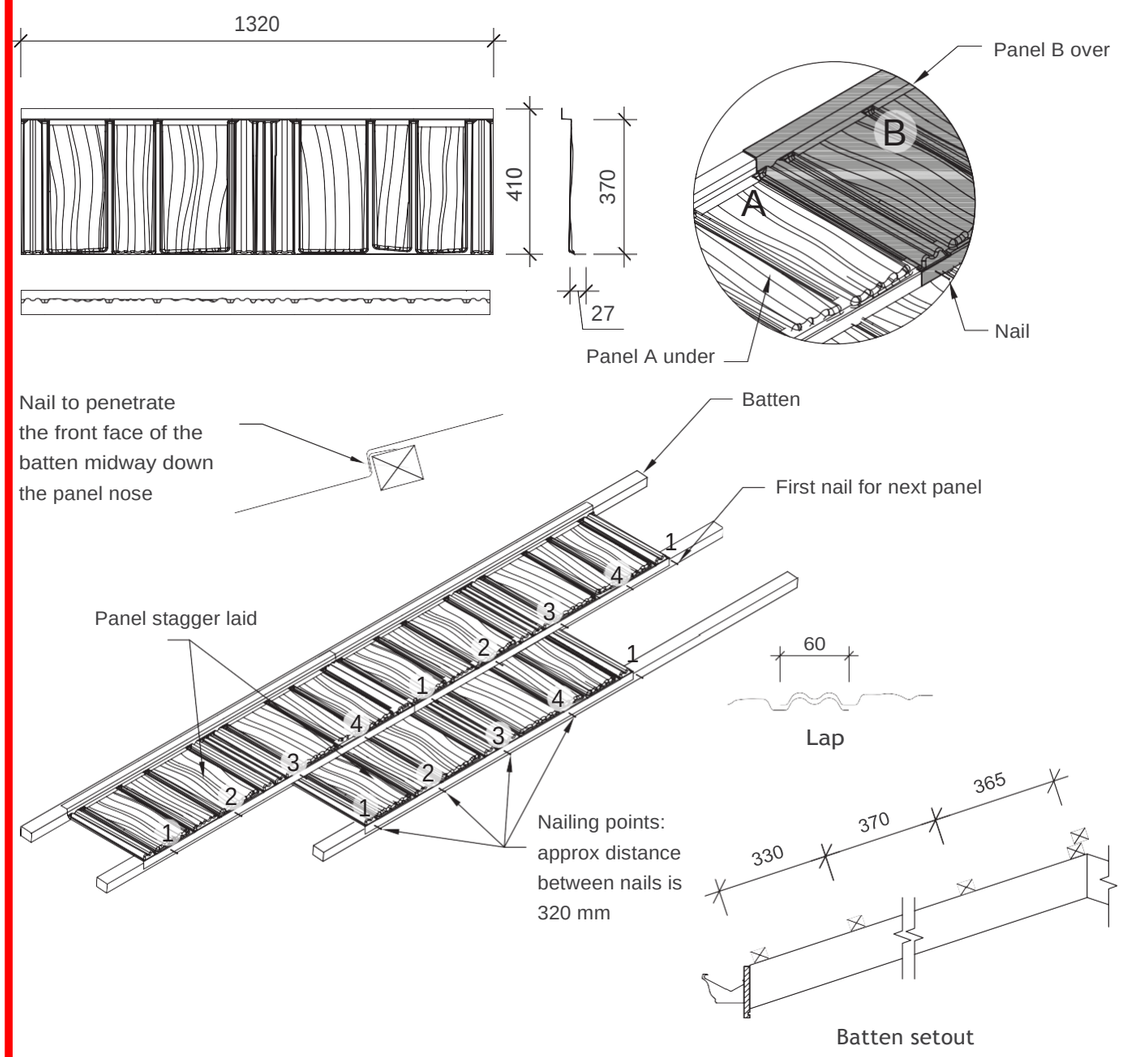
Solar Brackets



Combination Valley

5.2 Gerard Stratos installation

Panel installation instructions & nailing positions



Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

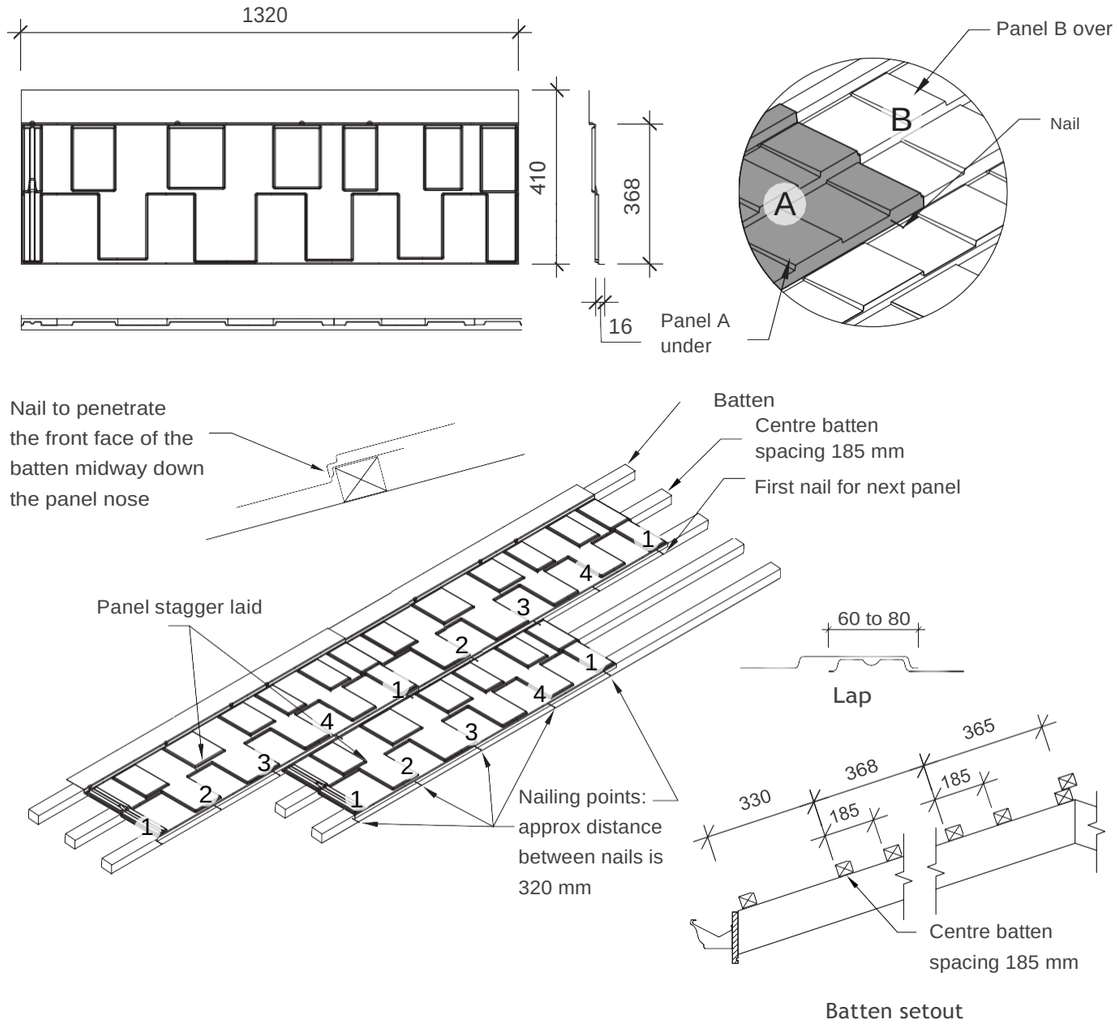
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

Dimensions and weights given are nominal.

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5.3 Gerard Senator installation

Panel installation instructions & nailing positions



Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

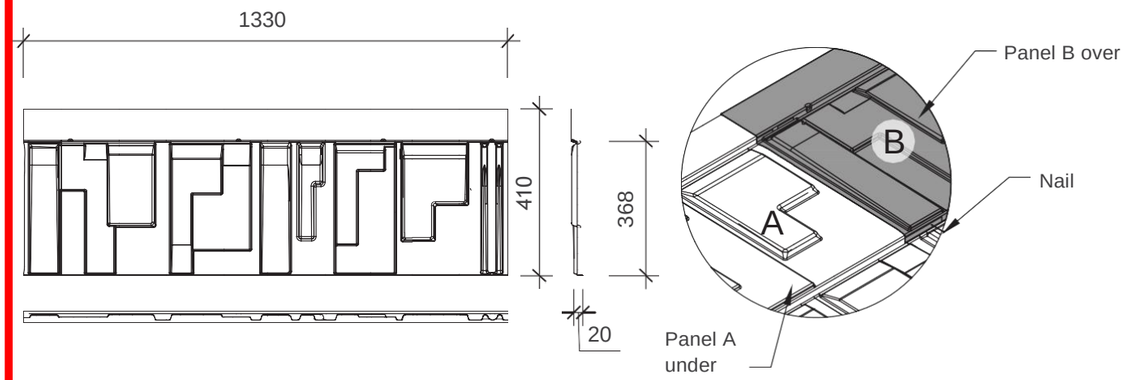
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

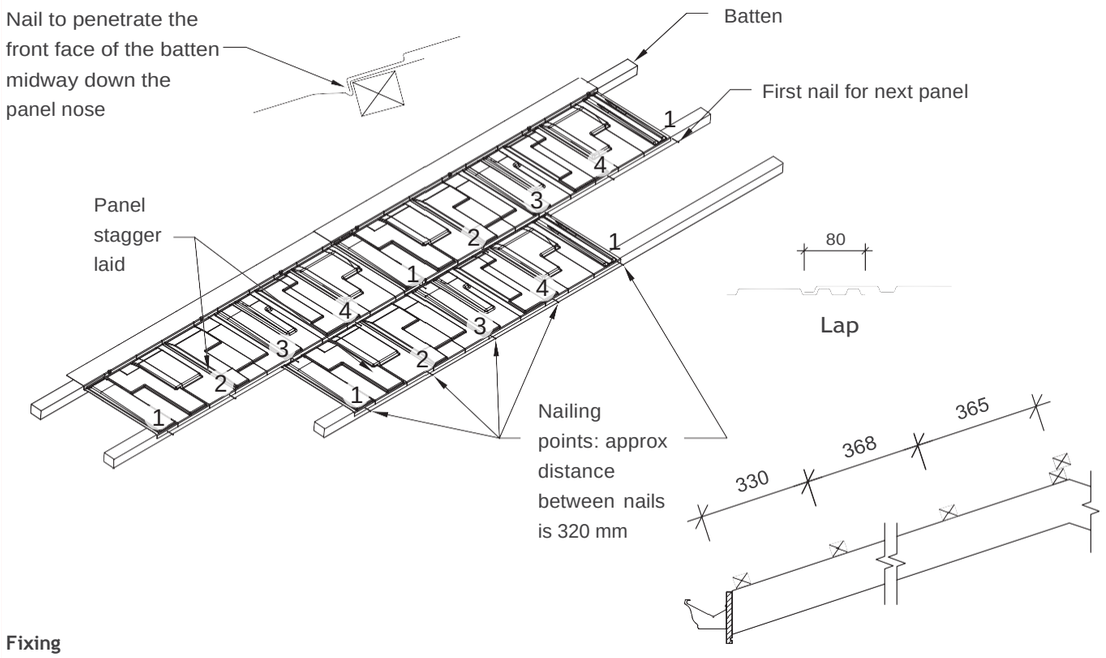
Dimensions and weights given are nominal.

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5.4 Gerard Rockport installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

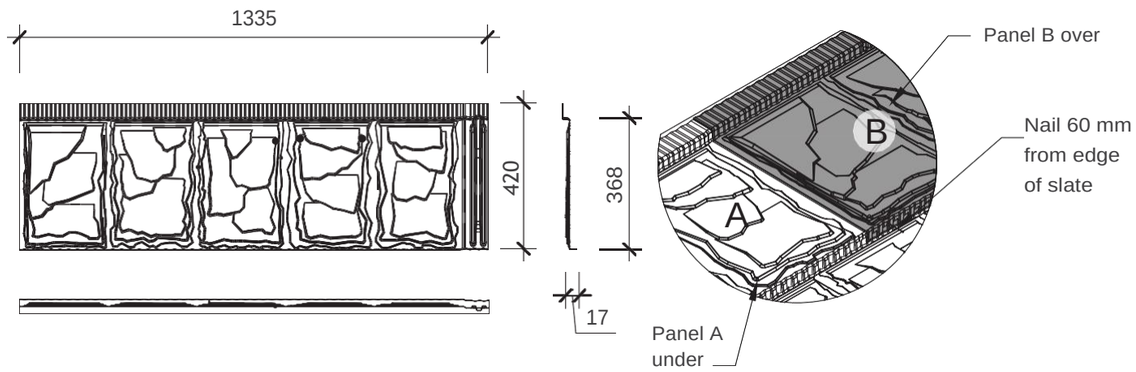
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

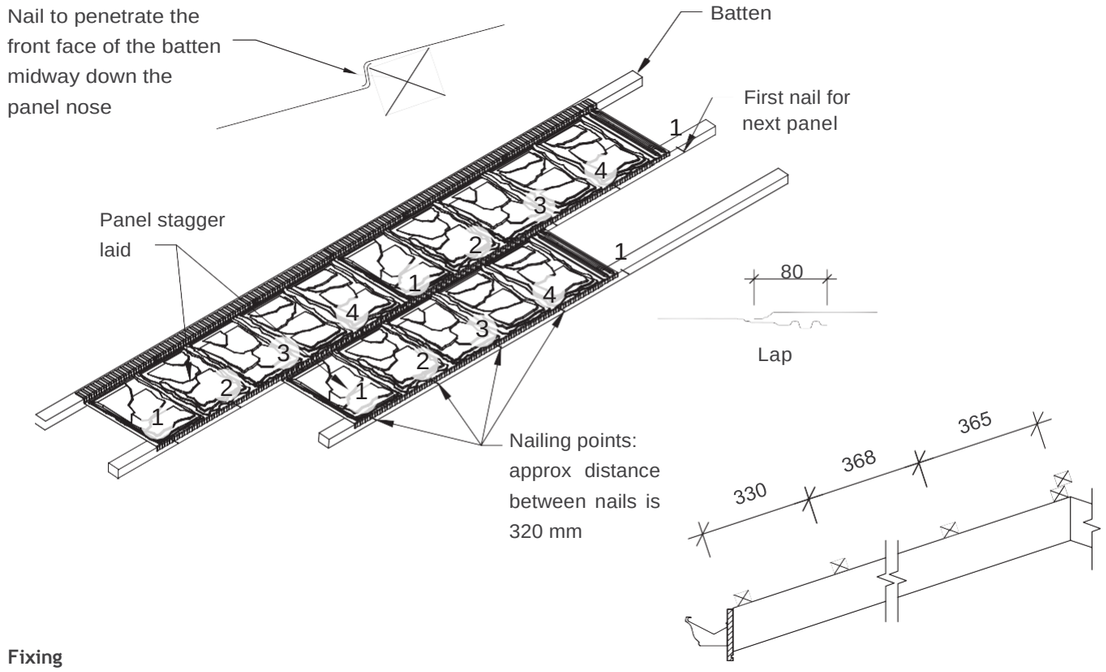
Dimensions and weights given are nominal.

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5.5 Gerard Alpine installation

Panel installation instructions & nailing positions





Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

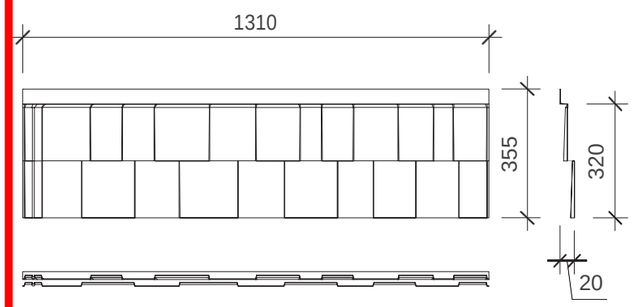
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

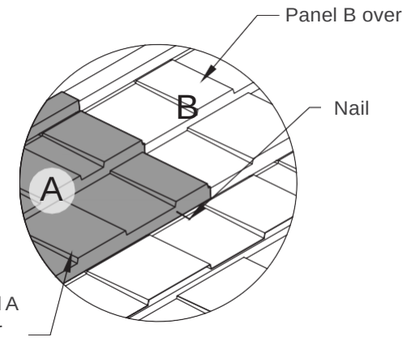
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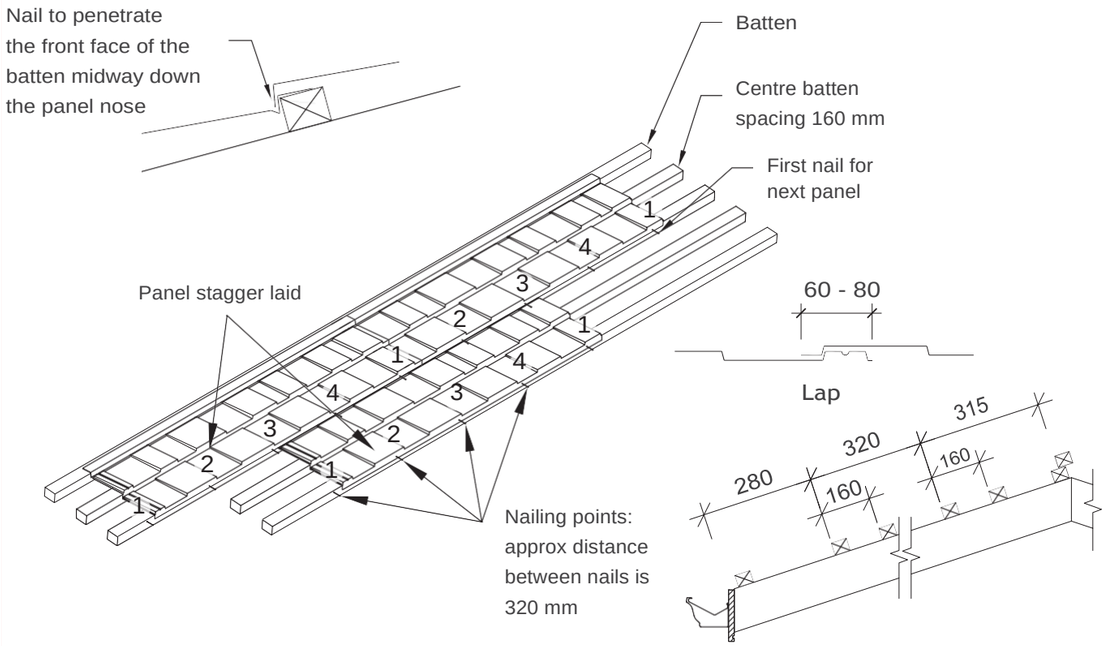
5.6 Gerard Oberon installation

Panel installation instructions & nailing positions

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Batten setout

Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

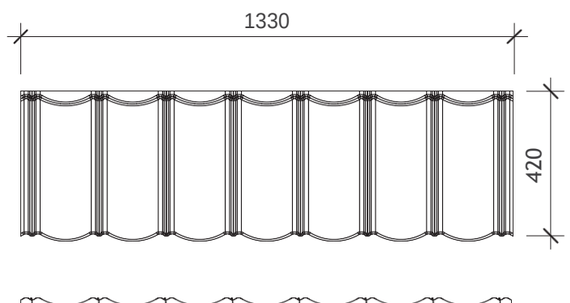
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

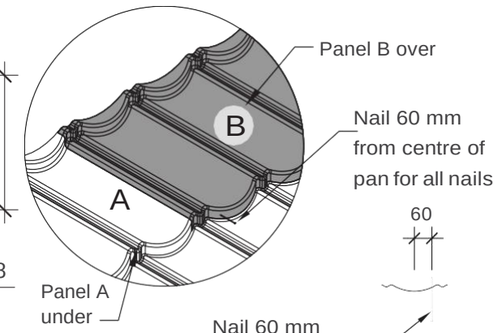
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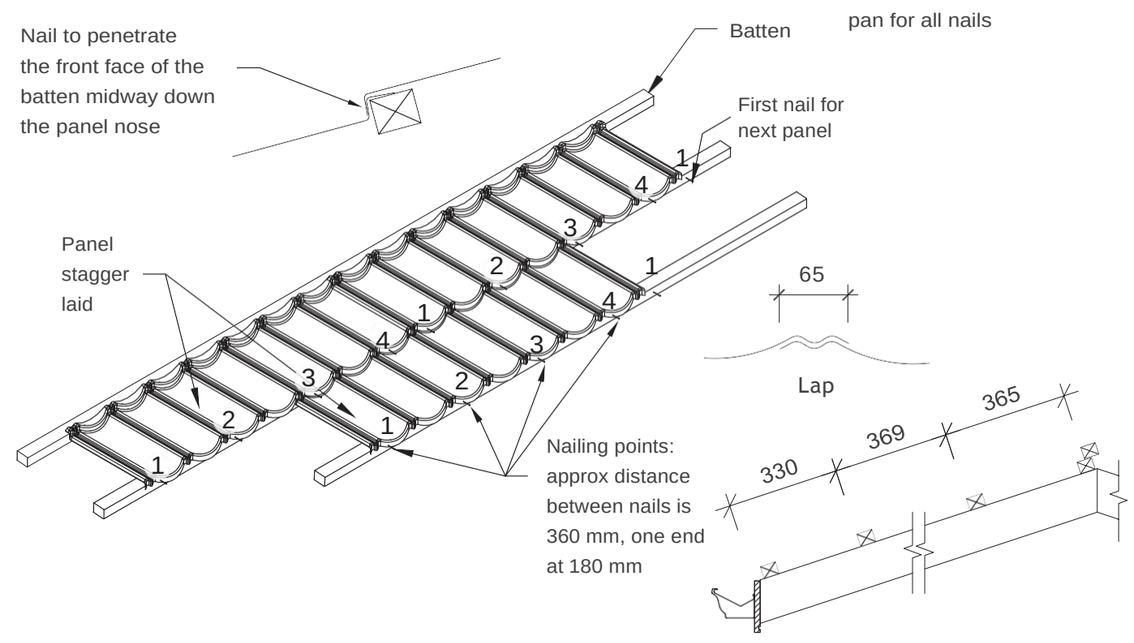
5.0 Components & fixing patterns

5.7 Gerard Heritage installation

Panel installation instructions & nailing positions







Batten setout

Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

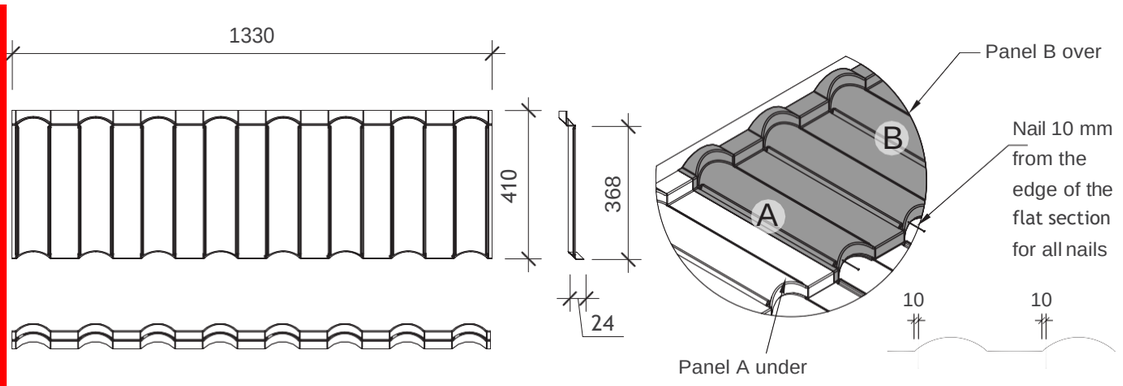
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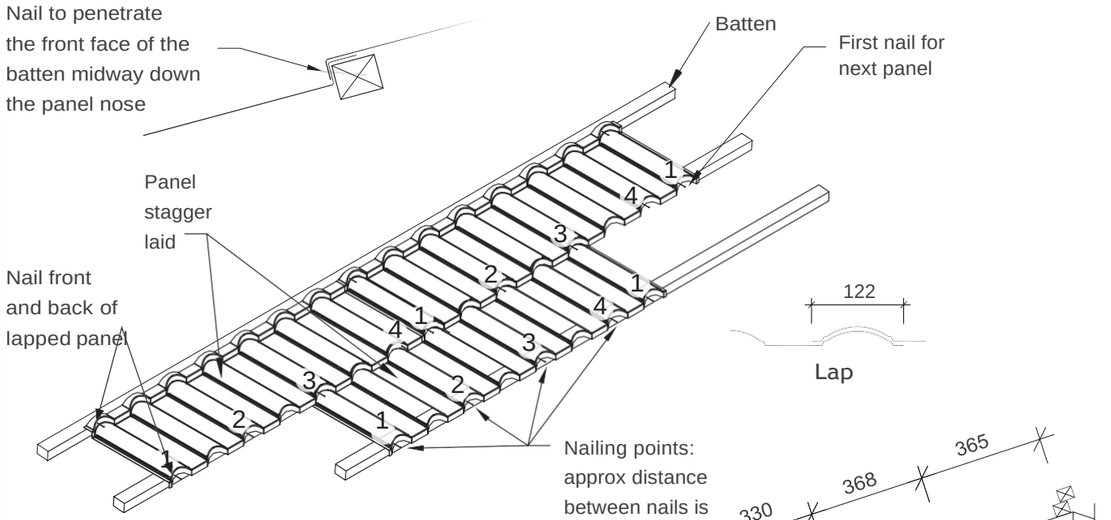
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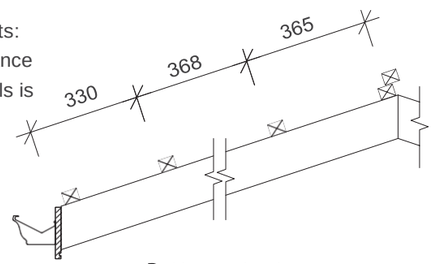
5.8 Gerard Milano installation

Panel installation instructions & nailing positions

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Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.
- Nail front and back of lapped panel.

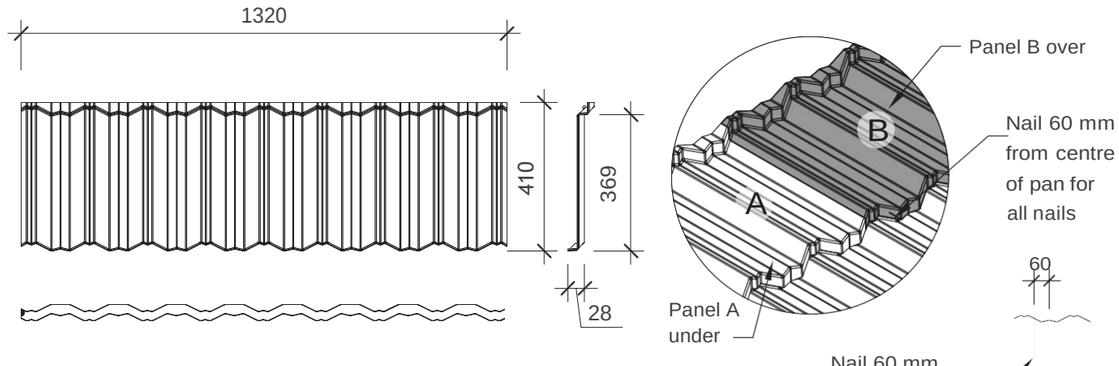
Fastening Panels in Cyclone Areas

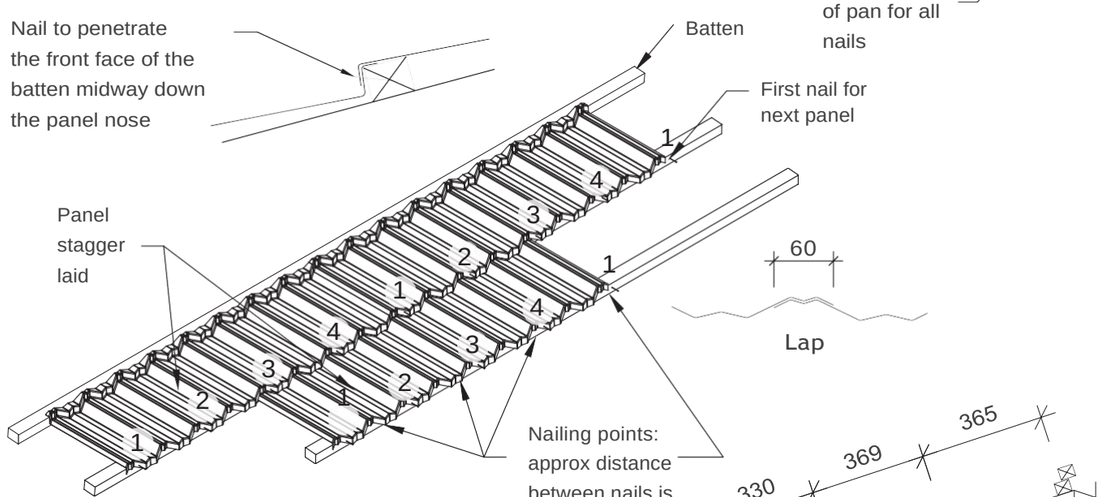
- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

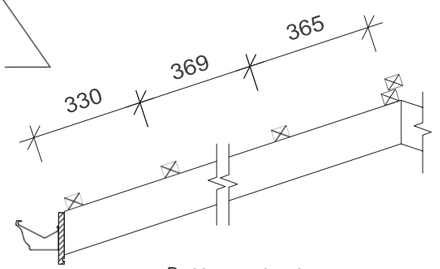
Dimensions and weights given are nominal.

5.9 Gerard Classic installation

Panel installation instructions & nailing positions







Fixing

- The nose of each panel is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlapping panel.

Fastening Panels in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Gerard panels (tiles) on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

Dimensions and weights given are nominal.

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Important information about this material

The Gerard Roofing System

RoofTG Pacific Ltd accepts no liability if the Gerard roofing system is not used in accordance with instructions contained in this publication.

Use only the current specification

This publication may be superseded by a newer publication. RoofTG Pacific Ltd accepts no liability for reliance upon publications that have been superseded. Before using this manual check whether this is the current version; simply call the Gerard Roofs Helpline on 0800 100 244 or visit www.gerardroofs.co.nz

Substitution

RoofTG Pacific Ltd accepts no liability if the systems are not installed in accordance with instructions contained in this and other Gerard Roofs technical literature. Substitution of specified or recommended components with alternative brands can compromise performance dramatically. The Gerard roofing system is not generic and must be installed as specified including the use of Gerard branded components.

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www.gerardroofs.co.nz

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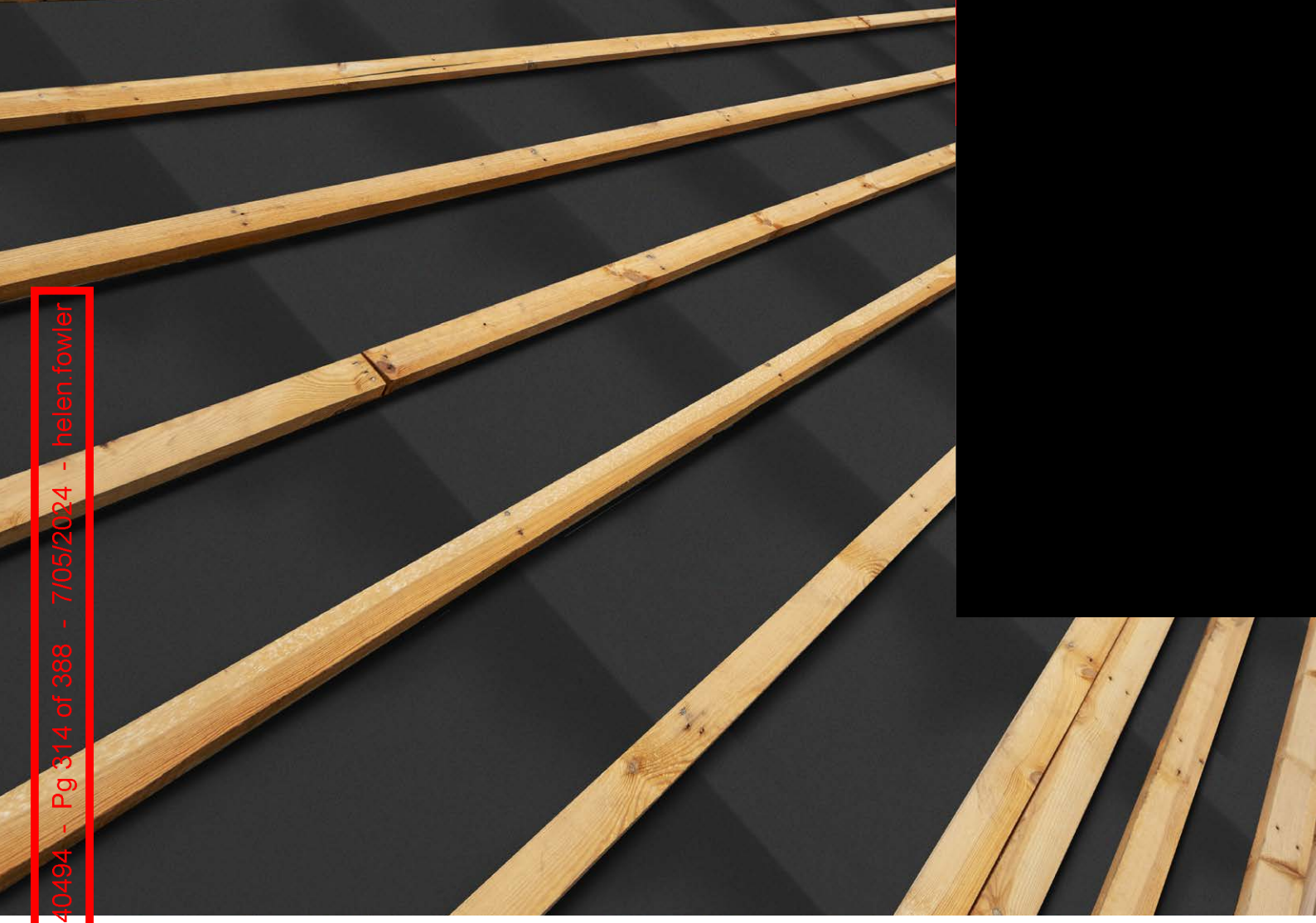
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GER2006-25
This edition published July 2020

GERARD
Roofing Designed to Endure

APPENDIX 15 – THERMAKRAFT ROOF UNDERLAY

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Thermakraft™

THERMAKRAFT 215

Self-supporting bituminous wall and roof underlay

Commonly referred to as “Building Paper” Kingspan Thermakraft 215 is a self-supporting, kraft paper based, bituminous building underlay that is suitable for use on roofs and walls in residential buildings. It is vapour permeable, meaning that liquid water from the outside is prevented from penetrating but water vapour from the inside can pass through and escape the building envelope. Thermakraft 215 is easy to install.

Thermakraft 215 comes in two roll sizes:

1250mm wide	20m long	25m^2 coverage*
1250mm wide	40m long	50m^2 coverage*

* **Note:** m^2 is the roll size for actual coverage, allow for laps and joins.

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Thermakraft 215

Self-supporting bituminous wall and roof underlay

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Scope of Use (Roof Application)

- Suitable with masonry tile, metal tile and profiled metal roof cladding.
- Direct fix or cavity fix.
- Can be used on roofs up to and including NZS 3604 'Extra High' wind zones.
- Refer to installation guide regarding underlay support requirements.
- Will provide temporary weather protection during construction (maximum 7 days), same day coverage recommended.

Scope of Use (Wall Application)

- Suitable for use with both timber and steel framing, either direct fix or in conjunction with an 18mm minimum drained cavity.
- Can be used with absorbent wall claddings (e.g. timber, brick or fibre cement) or non-absorbent wall claddings (e.g. metal or plastic).
- Can be used with masonry veneer in accordance with NZS 3604.
- Suitable for buildings situated in NZS3604 Building Wind Zones up to and including 'Very High'.
- Thermakraft 215 can be used as an air barrier to reduce wind entry and is highly water resistant.
- Will provide temporary weather protection during construction (maximum 7 day exposure), same day coverage recommended.

General

Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.

Limitations

- In roof and wall applications must NOT be exposed to the weather or UV for more than 7 days.
- Must NOT be used under translucent sheeting.
- Is not fire retardant.
- Not suitable for School Property, please refer to Ministry of Education; Weather-Tightness & Durability requirements for School Property.

Compliance

Thermakraft 215 meets the requirements of NZBC Acceptable Solutions E2/AS1, Table 23 and NZS 2295:2006 for both wall & roof underlay.

Durability

Meets 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:

- It is installed in accordance to Installation Guide.
- Run length is no greater than 10 meters.
- Is not exposed to weather or UV for more than 7 days.
- Is installed by or under guidance of Licensed Building Practitioners.
- Is installed in accordance with the MRM Code of Practice.
- Is compatible with the cladding system used.*

* **Note:** roof cladding system compatibility testing must be done first before installation.

Property Performance

The following data represents the minimum pass rates required by the NZBC. This product tests well beyond the minimum standards. If you require actual performance results, please contact your local Kingspan Insulation representative.

NZBC E2/AS1 Wall Underlay Requirements					
NZBC E2/AS1 Table 23 (NZS2295) Roof Underlay Properties	**Absorbency**	**Vapour Resistance**	**pH of Extract**	**Shrinkage**	**Water Resistance**
Property Performance Requirement	≥ 150gsm	≤ 7 MN.s/g	≥ 5.5 and ≤ 8	≤ 0.5%	100mm for 24 hrs
Property Performance	Pass	Pass	Pass	Pass	Pass

Thermakraft 215

Self-supporting bituminous wall and roof underlay

NZS2295:2006 Classification			
NZBC E2/AS1 Table 23 (NZS2295) Roof Underlay Properties	**Flammability Index**	**Wind Zone**	**NZS2295:2006 Index**
Property Performance Requirement		R2	R2
Property Performance	Non-Fire Retardant	Up to Extra High	Self - Support

Control of Condensation

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 method to prevent moisture build-up in the roof cavities.

Factors which adversely affect the condensation risk in roofing systems include:

- Humid, and/or cold climatic regions.
- Warm/Skillion roof construction.
- Low roof cavity air volume and restricted air movement.
- Omitting Vapour Control Layers.
- Occupancy activities which have high moisture loading on conditioned spaces.
- Ceiling penetrations and entry of warm air into roof cavities.
- 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 to MRM Code of Practice for details.

For passive ventilation of the roof space, it is recommended that all roof underlays are terminated at the ridge, and if not it should be slit or slotted to allow for passive ventilation. (For further information refer to the NZ MRM Roofing Code of Practice).

Product Warranty

Standard Kingspan Insulation Warranty applies. Refer to Kingspan Insulation Warranty statement for further details. This is available online at **thermakraft.co.nz** or call **0800 806 595.**

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Issue 7.0, September 2022



INSTALLATION GUIDE

Thermakraft™
THERMAKRAFT
215

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Thermakraft™

THERMAKRAFT 215

Self-supporting bituminous wall and roof underlay

Commonly referred to as 'Building Paper' Thermakraft 215 is a self-supporting, kraft paper based, bituminous building underlay that is suitable for use on roofs and walls in residential buildings. It is vapour permeable, meaning that liquid water from the outside is prevented from penetrating but water vapour from the inside can pass through and escape the building envelope. Thermakraft 215 is easy to install.

Kingspan®

Thermakraft 215

Self-supporting bituminous wall and roof underlay

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Application Method (Roofing)

Thermakraft 215 is a bituminous building underlay used on roofs in residential buildings.

- Thermakraft 215 can be used for roof construction.
- Run NO longer than 10m.

Long-run metal roofing/vertical or horizontal installation method

- Fix using stainless steel 8-12mm staples or 20mm flat head clouts, or appropriate proprietary fastenings on timber framed structure. Fixing at 300mm centres. Fixing types and requirements for steel framed structure can be found in the NZ Metal Roof and Wall Cladding Code of Practice.
- Refer to table below to determine underlay support requirements.

Roof Pitch	Span	Underlay Support Required	
		Horizontally Installed	Vertically Installed
≥ 10°	> 1200mm	Yes	Yes
	≤ 1200mm	No	No
< 10° (Min 3°)	> 1200mm	Yes	Yes
	≤ 1200mm	No	Yes

- Thermakraft 215 upper sheet lapped over lower sheets (shiplap) to ensure water is shed to the outer face.
  Note: Thermakraft 215 can move downwards. To prevent this, it must be 'Captured' by the fastenings at each purlin. Horizontal fix must not be used on purlin distance greater than 1100mm to allow for 150mm laps.
- Must be laid firmly (tight/taut) without creases. All laps either vertical or horizontal must be a minimum of 150mm lap.
- When underlay support is required, Kingspan recommend using Ausmesh Roof Safety Mesh, Ausnet hexagonal netting or Thermastrap 201.
- Thermakraft 215 can be installed above the battens or purlins for profiled metal roof claddings and otherwise in accordance with NZBC E2/AS1.
- If required to achieve a lap seal (refer to NZ Metal Roofing Code of Practice), use Thermakraft Aluband window sealing tape or Thermakraft White General Purpose Tape.
- Thermakraft 215 will provide temporary weather protection during construction, same day coverage recommended. DO NOT over expose the product to the weather or UV for more than 7 days in any roof applications.
- Thermakraft 215 may be unwound to the full length from the gutter to the ridge. However, when ridge ventilation is required Thermakraft 215 may be terminated or slit at the ridge purlin to allow a free passage of air.
- Thermakraft 215 must NOT overhang the gutter line by more than 20 mm, or if eaves flashings are used, terminate on the upper side of the flashing. More details can be found in the NZ Metal Roof and Wall Cladding Code of Practice.
- Flue penetrations must have a minimum distance of 50mm from Thermakraft 215 (refer to NZ Metal Roof and Wall Cladding Code of Practice 10.11.5).
- Thermakraft 215 must be free of tears and punctures, fit tightly and be lap taped around all penetrations (except flue penetrations), to provide drainage for any condensation, or surface water from leaks.

Note: Do not use Aluband on penetrations where Polybutene water pipes have been installed. Refer Pipe Manufacturers for instructions on sealing penetrations.

Concrete/Metal tile roofing

- Thermakraft 215 must be laid over rafters prior to fixing the tile battens. The maximum span between rafters for Thermakraft 215 is 1200mm. Masonry tile roofs must have antiponding boards in accordance with NZBC E2/AS1 Paragraph 8.2.5.
- Installed Thermakraft 215 may be laid over the top of the antiponding boards and draped into the gutter by no more than 20mm. Antiponding boards must be treated in accordance with E2/AS1 8.2.5.
- Do NOT Run Thermakraft 215 longer than 10m in length.

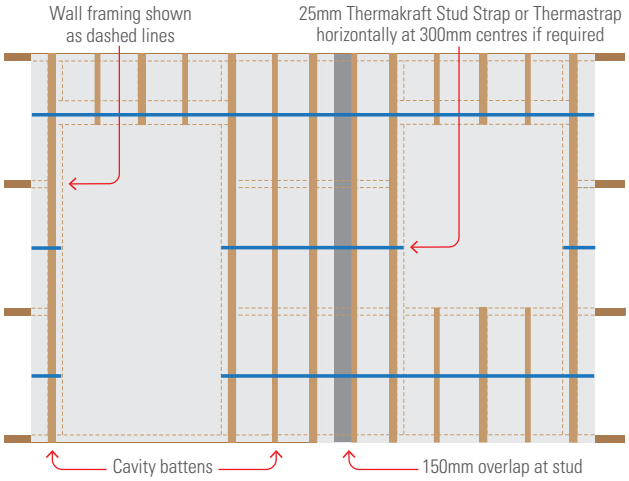
Application Method (Wall)

- Fix Thermakraft 215 underlay with the lap line printed side facing the exterior.
- Fix to all exterior walls from below bearers to the top plate. Pull the Thermakraft 215 underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically. Additional fasteners should be used around each opening to be cut out. Fixing types and requirements for steel framed structure can be found in the NZ Metal Roof and Wall Cladding Code of Practice.

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- When fixing Thermakraft 215 underlay to Steel framing the same procedures applies, use adhesive spray or tape or flat head screws to fasten to the framing or thermal break, the exterior cladding fastenings will act as the permanent fixings.
- Cover all windows and door openings with Thermakraft 215 underlay.
- It is recommended that the Thermakraft 215 underlay is not cut and prepared for window installation until the arrival of the windows. Minimum of 150mm lap is required at joins, all vertical laps must be made over studs. Horizontal laps to be laid ship lap style allowing water to be shed to the outer face of the membrane.
- When windows and doors are ready for installation, the Thermakraft 215 underlay covering the openings should cut at 45° and folded into the opening and securely fastened. Thermakraft window flashing tapes are recommended as the window flashing system.

  Note: In accordance with NZBC Acceptable Solution E2/AS1, wall underlay must be prevented from bulging into the drained cavity. Where stud spacing is greater than 450mm Thermakraft Stud Strap run horizontal at 300 centres is an acceptable means of prevention.
- Once installed, Thermakraft 215 must not be left exposed to the weather or UV for a maximum of 7 days. Thermakraft 215 underlays will provide temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZS 3604.
- Make good any forced tears with Thermakraft window flashing tapes. Any large areas which require repair may be covered with a second layer of underlay, a lap of 150mm is required.
- Thermakraft 215 underlay must be installed by a licensed building practitioner.



Application Tips

- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.

Handling and Storage

Thermakraft 215 underlay must be handled with care to prevent damage such as tearing and roll deformation. Due to the width of the product, care should be taken when installing in windy conditions.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

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Product Warranty Statement
Thermakraft™ Product Range

Warranty

1. Subject to the terms of this warranty statement, **Kingspan Insulation NZ Ltd ("Kingspan")** warrants to the original purchaser of a **Thermakraft™ product ("the Product")** that the Product will, subject to compliance with the conditions below, be free from defects due to defective factory workmanship or materials. For the avoidance of doubt, the Product will not be defective for the purposes of this warranty to the extent that the Product is performing or operating within any applicable tolerance or rating (or similar) levels as set out in Kingspan's relevant published literature current at the time of purchase. Kingspan warrants to the original purchaser of any accessories in respect of the Product supplied by Kingspan that such accessories will be free from defects due to defective factory workmanship or materials.
2. Nothing in this warranty shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act 1993 **("Consumer Guarantees Act")** or otherwise (except where the same may be excluded or modified to the maximum extent permitted by law). For the avoidance of doubt, the Consumer Guarantees Act does not apply to any purchaser of the Product who acquires the Product for:
   (a) resupplying the Product in trade;
   (b) consuming the Product in the course of a process of production or manufacture; or
   (c) repairing or treating in trade other goods or fixtures on land, and does not apply if the Product is not of a kind ordinarily acquired for personal, domestic or household use or consumption.
3. The term of the warranty in respect of the Product is 15 years from the date of purchase. Kingspan is not liable for any claim that is not lodged by the original purchaser within the term of the warranty.
4. The entity giving this warranty is Kingspan Insulation NZ Ltd (company number 6220850), a duly incorporated company having its registered address at 11 Turin Place, Ōtara, Auckland 2013. Its contact details are as follows:
   (a) Telephone: 0800 806 595 / 09 273 3727
   (b) Email: info@kingspaninsulation.co.nz

Conditions of Warranty

This warranty is strictly subject to the following conditions:

5. Kingspan will not be liable for breach of warranty unless the claimant has a valid claim and submits a claim in writing to Kingspan. The written claim must be made 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.
6. The claim to Kingspan must include the following:
   (a) proof of purchase;
   (b) the name, physical address, phone number and email address of the original purchaser (as the claimant);
   (c) the name and address of the licensed building practitioner (as defined in section 7 of the Building Act 2004) **("Licensed Building Practitioner")** who completed the installation (if any); and
   (d) the date on which the defect became apparent.

   For the avoidance of doubt, Kingspan will not process any claim under this warranty unless the claim includes all of the relevant documents and/or information set out in this clause 6.
7. The warranty is personal to the original purchaser of the Product and is not transferable.
8. The Product must be installed by or under the direct supervision of a Licensed Building Practitioner strictly in accordance with the relevant Kingspan literature in respect of the Product current at the time of installation. The Product must be installed in conjunction with the components or products specified in the relevant literature.
9. The Product must be installed in accordance with all applicable legal requirements.
10. All other products, including coating and joining systems, applied to, or used in conjunction with the Product must first have been verified by a Licensed Building Practitioner and/or an accredited laboratory as being compatible with the Product, must be applied or installed by a Licensed Building Practitioner, and must be maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.

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11. The project in which the Product is used must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand building code (as defined in section 7 of the Building Act 2004) **("Building Code")**, regulations and standards and in accordance with the terms specified in any building consent issued by the local or territorial authority in which the project is being undertaken. If requested by Kingspan, the claimant must provide a copy of the building consent.
12. The claimant agrees to provide information in relation to the installation and/or maintenance of the Product reasonably requested by Kingspan in assessing any claim. Kingspan is not liable for under this warranty if the requirements set out in clauses 8 to 11 have not been satisfied.
13. Notwithstanding any other provision contained in this warranty, the claimant's sole remedy for breach of this warranty is that Kingspan will, at its sole discretion, elect to:
    (a) supply a replacement for the defective Product;
    (b) rectify the defective Product; or
    (c) pay the cost of the replacement or rectification of the defective Product.

    If a defective Product is repaired or rectified, the original warranty period will continue to apply based on the original date of purchase of the relevant Product.

    To the maximum extent permitted by law, Kingspan's liability for failing to comply with any statutory guarantee (or liability under any other warranty, condition or indemnity that cannot be excluded) is limited in the same manner as set out in this clause 13.
14. The claimant is responsible for its expenses in making any claim against Kingspan under this warranty.
15. If Kingspan determines that a claim is not valid, Kingspan may charge the claimant for any labour, materials or transport costs incurred by it in assessing the claim
16. To the maximum extent permitted by law, except as expressly set out in this warranty, Kingspan 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, Kingspan 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 or failure 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, normal wear and tear, growth of mould, mildew, fungi, bacteria or any organism on any Product surface or Product. It is a condition of this warranty that the claimant indemnifies Kingspan against any and all of these excluded losses, damages and claims.
17. To the maximum extent permitted by law, all warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded.
18. Any references to statutes or statutory provisions in this warranty include those statutes or statutory provisions as amended, extended, consolidated, re-enacted or replaced from time to time and any orders, regulations, instruments or other subordinated legislation made under them.

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Thermakraft and Ausmesh products are brought to you by Kingspan Insulation NZ Limited.

The recommendations contained in Kingspan'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 Kingspan (for example quality of workmanship and design), Kingspan 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 online. E&OE.

Issue 3.1, September 2022

APPENDIX 16 – COLORSTEEL GUTTER

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RAINWATER DISPOSAL SYSTEM PERFORMANCE STATEMENT

(a) Description

Dimond rainwater disposal systems are available in a variety of materials together with the appropriate brackets and downpipes. Table 3.1A below summarises the gutter material options available.

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Table 3.1A

Material	Grade	Thickness mm	Metal Coating	Prepaint Finish Available	Relevant Standard
Steel	G 250/300	0.55 BMT	Zinc/Aluminium/ Magnesium	Yes	AS 1397
Aluminium (plain)	5052 5251	0.9 BMT	N/A	Yes	AS 1734
Stainless Steel	445M2/304	0.55	N/A	No	AS1449
Copper	122A	0.55	N/A	No	AS2738

(b) Scope of Use

Dimond Rainwater Disposal Systems are intended to collect and channel water that runs off a roof. It is intended that the metal gutters be placed at the perimeter of the building, and not in an internal situation. Use of the products is subject to the limitations listed below.

(c) Requirements

Attention to the following details is required to ensure the expected system performance is achieved.

- The selection of the type and grade of gutter and bracket material and fasteners must be based on the life expectancy required and the severity of the external and internal environments. Refer Sections 2.1.1.2, 2.1.1.3, 2.1.1.4, 2.2.3.
- Site storage that keeps the product dry and protected from damage.
- Product handling that prevents surface damage.
- Correct installation of the brackets and gutter and snow straps.
- Allowance for thermal expansion and contraction.
- Sufficient fall to permit complete surface water drainage, allowing the gutter to completely dry out and not hold water.
- Control of allowable contact with dissimilar materials. Refer Section 2.1.3.3.
- Awareness and implementation of maintenance requirements, particularly for surfaces not washed by natural rainfall. Refer Section 2.1.1.3.

(d) NZBC Compliance

Test information available from Pacific Coilcoaters and BHP NZ Steel, and past history of rainwater products, indicate that provided the product use and maintenance is in line with the guidelines contained in the current literature referenced, Dimond Rainwater Disposal Systems can be expected to meet the performance criteria in Clause E2 of the New Zealand Building Code, for a period of not less than 5 years.

(e) Use Outside the Stated Guidelines

If the need arises to use Dimond Rainwater Disposal Systems outside the limitations and procedures given in this or other referenced literature, or, if any doubt exists on product handling or use, written approval for use must be obtained from Dimond, before the project commences.

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DURABILITY, WARRANTY, MAINTENANCE

DURABILITY

Reference should be made to Section 2.1.1.2 Environments, to ensure the correct material for the environment is chosen. Coated brackets should be considered for use in severe and very severe marine environments. In snowfall areas refere to section 3.1.4.7.

WARRANTY

Warranties for commercial applications are issued on a job by job basis. It is imperative that care is taken during the planning process to choose the Dimond rainwater disposal system that will provide the life expectancy in the environment in which it will be installed, as incorrect selection could result in no warranty being available.

To assist you in determining the system that will best meet your warranty expectations Dimond have in place a Warranty Inquiry Service. Your design decisions on product type, paint coating type and colour, along with site details including address, distance from sea and degree of exposure will be required to enable us to provide a meaningful warranty. To access the service, please contact your Dimond Key Account person or phone 0800 DIMOND.

All warranties will carry a required maintenance clause, which must be complied with to ensure the warranty remains valid. Often aspects of design such as roof shape and roof pitch can influence the maintenance requirements. Due consideration of these factors during the design process is wise.

As a general guide, provided the materials are correctly selected from Section 2.1.1.2, Table 2.1B, and provided the building design does not impact on durability, it is reasonable to expect the following warranty terms will be available to your rainwater disposal system.

Steel and aluminium based materials

10 years to perforation of substrate.

5 years resistance to flaking, peeling and excessive fade.

MAINTENANCE

Dimond rainwater disposal systems require at least the following maintenance as a minimum to ensure the guaranteed performance is achieved. Additional regular maintenance can extend the useful life of the products. We define “regular” as often as is needed to avoid dirt build up on the gutter surface.

1. Keep surfaces clean and free from continuous contact with moisture and debris. The use of a proprietary leaf build-up protection system does not remove the need for regular gutter cleaning to remove any accumulated dirt and debris build-up on the roof or gutter.
2. Ensure that areas that are not washed by rainfall are cleaned regularly with water spray and/or if necessary by scrubbing with a soft nylon brush. This includes the foot of the internal brackets.
3. At the first sign of corrosion, the affected areas should be cleaned down, spot primed and then repainted to an appropriate paint manufacturer’s recommendations.
4. Some fading of the surface coating will occur over time, making repainting necessary to retain aesthetic value.

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INSTALLER PROGRAMME

Dimond rainwater disposal systems must be correctly selected, specified and installed if they are to meet their designed performance.

Correct system selection and specification will be achieved by following the design guidelines in this manual.

Correct system installation (including components used and workmanship) will be achieved by specifying the use of a Dimond recommended installer.

Correct system performance will be endorsed by requesting a Dimond inspection and written report on completed work that has been carried out by a Dimond recommended installer.

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AREAS TO CHECK ON SITE

Gutters

- Materials compatible with environment and roofing material used
- Laps sealed and correctly fastened
- Sufficient fall provided to avoid ponding
- Thermal expansion accommodated where necessary
- Secondary means of water discharge to eliminate water overflow from gutter entering the building

Brackets

- Correct type and size to suit the gutter chosen
- Snow straps installed if in Snowfall Region

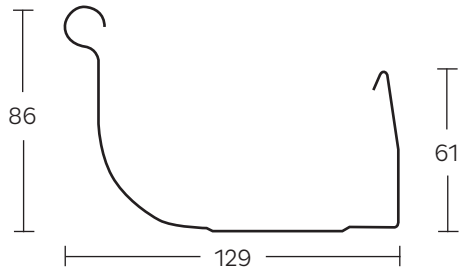
Fasteners

- Correct type and size to suit bracket and environment
- Fixings to resist wind uplift of gutter

Droppers and Downpipes

- Droppers to be positioned at lowest point of gutter run
- Correct downpipe size and placement to handle flow load of roof and gutter chosen

QUAD SI



All dimensions given are nominal.

Effective cross sectional area (with 10mm free board)	5485mm^2	
Flow capacity	75 litres/min	
Minimum recommended fall	1:500	= 2mm in 1m
Minimum downpipe	Circular Rectangular	60mm min. cross sectional area of 2742mm^2, smallest dimension at least 50mm.

Catchment area per downpipe based on the above flow capacity is given in Table 3.1L. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1L

Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A_c (m^2)	112	90	75	64	56	50	45	37	32	28	25	22

Material options including thickness and grade	Steel	0.55mm G300	
Roll-forming facility	Christchurch		
Gutter bracket material and thickness	Internal	Galvanised	1.15mm
Recommended maximum spacings	900mm spacing (refer section 3.1.4.7 for recommended spacings where snow fall is possible).		
Recommended fixings	Screw fastenings to be compatible with substrate and bracket material.		
Stop ends	Zinc cast stop ends are available powder coated to match fascia colour.		

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MATERIAL FINISH

For indepth information on the materials and finishes that rainwater disposal goods are available in, please refer to Section 3.1.1 of this manual.

BRACKETS AND FASTENERS

Eave gutters are secured to the edge of the structure by internal or external brackets that are shaped to fit the gutter.

Internal brackets are available for Quad SI, Deep Quad, 125 Quad, Box 125 and Box 175 gutter, but the Box 175 brackets should only be used in areas that are not subjected to snow fall and/or wind above medium velocity (as described by NZS 3604). Refer Sections 3.1.4.1 to 3.1.4.5 and 3.1.4.9.

External brackets are available for 150 Half Round, 200 Half Round, Box 125, Box 175 and Box 300 gutter. The brackets for the Box 125, Box 175 and Box 300 gutters can be custom run to accommodate the depth of the profile where metal cladding is fixed vertically. Refer Sections 3.1.4.1, 3.1.4.2, 3.1.4.3, 3.1.4.6 and 3.1.4.8.

300mm wide extruded external aluminium brackets are used on 150 Half Round gutters.

Please refer to the individual section for each profile (Section 3.1.4.1-3.1.4.9) for guidance on bracket spacings and the recommended fasteners. For bracket spacings in snowfall areas refere Section 3.1.4.7.

It is recommended that snow clips are attached to the gutter in areas where snow fall is expected and it is considered prudent to do so in the areas where snow fall may occur. Typically the bracket is 0.55mm thick and 40mm wide, fixed using the last roof fixing, through the bracket, and is nominally at 600mm centres. The gutter is fixed with 2 x 4.8mm diameter aluminium rivets. Refer Section 3.1.4.7 or snow straps welded to gutter if stainless steel is used.

Brackets for custom run gutters are made to suit the gutter shape chosen. Recommended bracket material dimensions for custom folded brackets are:

Cross Sectional Area A_e (mm^2)	Steel & Stainless Steel (mm)	Aluminium (mm)	Maximum Bracket Spacing* (mm)
4,00-6,000	20 x 2	20 x 4	900
6,100-10,000	32 x 3	30 x 5	900
10,100-20,000	30 x 5	30 x 6	900
20,100-40,000	40 x 5	40 x 6	600
40,100 - 65,000	50 x 5	fabricated with stiffening rib	600

*In areas not subject to snowfall.

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DOWNPIPES

Downpipe options are many and varied.

Steel As a standard round in 80mm diameter or custom made in a rectangular shape such as 100mm x 50mm, in prepainted coil steel of ColorCote® MagnaFlow™ (formerly ZM8) and Zincalume.® Standard lengths are 3.2m long. Other lengths are subject to confirmation. Call 0800 DIMOND.

Spiral welded pipe can be used on large commercial jobs especially where the downpipe passes through the building, resulting in a “pressurised” downpipe system.

Dimond do not recommend using a fabricated lock-seamed downpipe such as is used on the rectangular shape in enclosed ceiling spaces and wall cavities.

115º round zinc elbow bends are available in standard colours for connecting the standard 80mm diameter downpipes together. The joint with the downpipe must be sealed and held with a minimum two 3mm aluminium rivets to each joint. Rectangular shapes are available in lengths up to 6m long. These require fabricating, riveting and sealing together with a neutral curing silicone sealant.

Copper A similar range of sizes are available. Call 0800 DIMOND to confirm availability. The material is suitable for use where bends are required as the product can be mitre cut and joint soldered. Zinc elbow bends must not be used due to dissimilar metal contact.

Other materials subject to confirmation. Call 0800 DIMOND.

FLASHINGS

As required to saddle abutting gutter terminations at high point between downpipes.

Flashings overlapping the back upstand of the gutter and extending under the roof sheeting may be used for extra security against leakage into the building, e.g. if gutter flow is blocked by hail or ice.

STOP ENDS

Zinc cast stop ends, powder coated to match, are available for use on Deep Quad and Quad SI. These stop ends have locating lugs which allow the stop ends to be located on the cut end of the gutter and provide secure positioning before sealing with a neutral silicon sealing and riveting onto the gutter with 2 x 4.3mm diameter aluminium rivets.

DROPPERS

Droppers are available as a standard in 65mm, 75mm and 100mm diameter in either 0.55mm ColorCote® MagnaFlow™ (formerly ZM8) material, Titania colour or in PVC material. A rectangular PVC 100x50mm is also available. Other sizes can be custom made in the following materials: 0.6mm copper, 0.9mm unpainted aluminium and 0.9mm ColorCote® AlumiGard™ (formerly AR8/ARX) depending on coil availability.

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APPENDIX 17 – DEKTITE ROOF FLASHING

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Dektite Aluminium

The best solution for stone chip and pressed metal tiles

- The base is 99.9% pure grade aluminium making it strong, malleable and easy to install.
- Environmentally friendly, ideal where potable water is collected.
- The best solution for stone chip and pressed metal tiles.
- EPDM withstands temperatures from -50°C to 115°C and up to 150°C intermittently.

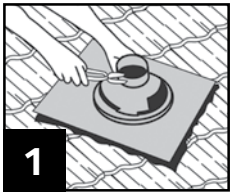
CODE	BASE (MM)	PIPE (MM)	ROOF PITCH
TFA 12-70	500 x 600	12-70	Up to 45°
TFA 50-170	600 x 600	50-170	Up to 45°
TFA 110-200	764 x 764	110-200	Up to 45°
TFA 160-300	600 X 900	160-300	Up to 45°
TFA 300-450	965 x 965	300-450	Up to 45°



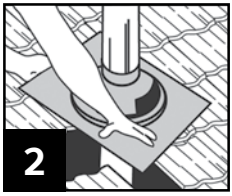
20 YEAR WARRANTY



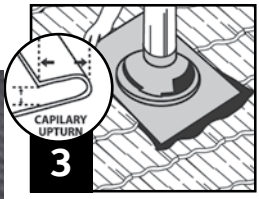
Installation Instructions:



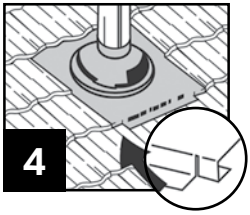
Trim Dektite cone to suit pipe size using sharp tin snips.



After lubricating the flue with water, slide Dektite down to the tile level.



Form an anti-capillary fold then place upper edge of base under up-stream tiles.



Dress base to profile, cut tabs on the bottom corners and fold under to stop wind lift .

APPENDIX 18 – EARTHWOOL INSULATION

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www.knaufinsulation.co.nz

EARTHWOOL® GLASSWOOL INSULATION: WALL

January 2024



TWINTECH

with ECOSE TECHNOLOGY

Enhanced moisture resistance with DriTherm® technology. Earthwool® glasswool insulation is silicone treated, which provides moisture resistance for up to 50 years.

APPLICATION

DESCRIPTION

The Earthwool® glasswool insulation: wall batt range includes a selection of R-values and densities to provide builders, designers, installers and DIYers the opportunity to choose the best thermal and acoustic performance for their project. Earthwool® glasswool insulation: wall batt will absorb the transfer of unwanted sound from outside to inside the building. In addition to sound absorption, Earthwool® glasswool insulation: wall batt will improve the thermal comfort and energy efficiency of the building in which it has been installed thus keeping it cool in summer and warm in winter.

The super-soft and easy to handle benefits of Earthwool® glasswool have been further enhanced with TwinTech®. TwinTech® heralds another advancement in insulation manufacture - the dual forming technique ensures there is a smooth finish on both sides of the insulation, which improves product handling and appearance. Earthwool® glasswool is made using up to 80% recycled glass and with ECOSE® Technology, a sustainable, bio-based binder that contains no added formaldehyde.

PERFORMANCE

Thermal	AS/NZS 4859.1 (2018).
Fire Hazard Properties (AS/NZ 1530.3)	Ignitability: 0, Spread of Flame: 0, Heat Evolved: 0, Smoke Developed: 2-3.
Water Vapour Absorption	Less than 5% by weight.
Microbial Growth	Does not support microbial growth.
Corrosion Resistance	No greater than sterile cotton.
Combustibility (AS 1530.1)	Non-combustible.

BENEFITS

- DriTherm® technology - silicone treated glasswool for increased durability
- TwinTech® - smooth finish on both sides
- High thermal performance - year round comfort
- Sound absorbing
- Non-combustible
- Saves energy - lower energy bills
- No added formaldehyde
- Soft to handle and install
- 50 year warranty
- Compression packed - more product per pack
- Odourless.

CERTIFICATION

Please scan the QR Code to view the complete list of certifications on our website.

EARTHWOOL® GLASSWOOL INSULATION: WALL

January 2024

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SPECIFICATIONS

45mm Frame

Product Code	R-Value (m^2K/W)	Thermal Conductivity (W/mK)	Thickness (mm)	Width (mm)	Length (mm)	Area per pack (m^2)	Pieces per pack
781975	1.3	0.035	45	450	1160	12.5	24

All dimensions are nominal.

90mm Frame

Product Code	R-Value (m^2K/W)	Thermal Conductivity (W/mK)	Thickness (mm)	Width (mm)	Length (mm)	Area per pack (m^2)	Pieces per pack
783644	2.2	0.041	90	580	1160	19.5	29
783645	2.4	0.037	90	580	1160	13.5	20
783655	2.6^{HD} Soundshield	0.035	90	430	1160	7.0	14
783656	2.6^{HD} Soundshield	0.035	90	580	1160	9.4	14
783646	2.8^{SHD} Soundshield Plus	0.032	90	430	1160	5.0	10
783647	2.8^{SHD} Soundshield Plus	0.032	90	580	1160	6.7	10

All dimensions are nominal. | HD = High Density, SHD = Superr High Density

140mm Frame

Product Code	R-Value (m^2K/W)	Thermal Conductivity (W/mK)	Thickness (mm)	Width (mm)	Length (mm)	Area per pack (m^2)	Pieces per pack
783648	3.2	0.044	140	580	1160	14.8	22
791267	4.1^{SHD} Soundshield Plus	0.034	140	580	1160	6.1	9
779911	4.4^{SHD} Soundshield Plus	0.032	140	580	1160	4.0	6

All dimensions are nominal. | HD = High Density, SHD = Superr High Density

EARTHWOOL® GLASSWOOL INSULATION: WALL

January 2024

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ADDITIONAL INFORMATION

Specification Guide

The wall insulation shall be Earthwool® glasswool insulation: wall batt R*, *mm thick, BRANZ appraised to meet the provisions of the NZBC. The product will be non-combustible, Red List Free as labelled by Declare, Global GreenTag Level A certified, glasswool insulation with high post-consumer recycled glass content and with ECOSE® Technology. It will be manufactured under Quality Assurance Standards ISO 9001:2015 by Knauf Insulation and shall be installed in accordance with the instructions issued by them.

*architect to insert details of products used.

Specification Compliance

AS/NZS 4859.1: 2018 Materials used in the Thermal Insulation of Buildings and comply with the New Zealand Building Code requirements: B2 – Durability, E3 – External Moisture, F2 – Hazardous Building Materials, and H1 – Energy Efficiency, as appraised by BRANZ. The Earthwool® glasswool insulation: wall batt range is an acceptable solution in terms of the New Zealand Building Code. This product is designed for use in timber and metal frame applications in new and existing domestic and commercial buildings.

Bio-solubility

The formulation used for Earthwool® glasswool insulation has been independently assessed to meet the requirements of the stringent Note Q standard (and is therefore consistent with the highest Australian and New Zealand industry standards), and also assessed by Knauf Insulation against NZ Work-Safe requirements. Earthwool® glasswool is classified as a non-hazardous substance in line with the NOHSC: 1008 3rd Edition.

Environmental

Earthwool® glasswool insulation: wall batt represents no known threat to the environment and comes with GreenTag Level A certification, Declare label and a certified Environmental Product Declaration. Earthwool® glasswool has low VOC and benefits from ECOSE® Technology.

Proven Performance

- Earthwool® glasswool insulation is preferred by professional installers concerned with quality, appearance and productivity.
- Earthwool® glasswool insulation has excellent acoustical properties reduce sound transmission in the home when properly installed in walls, ceiling and floor systems.

Durability

- Earthwool® glasswool insulation is odourless, rot proof, non-hygroscopic, does not sustain vermin and will not encourage the growth of fungi, mould or bacteria.
- DriTherm® technology - silicone treated glasswool for increased durability.

Superior Handling

- Highly resilient insulation recovers quickly to full thickness for a snug fit and superior finished aesthetics.
- Consistent quality materials feel good, cut easily and install fast.
- Low dust for easier handling and increased productivity.

Convenient Packaging, Easier Handling

- Earthwool® glasswool insulation is packaged in a strong, white poly bag that offers excellent protection from abuse, dust and moisture.
- Earthwool® glasswool insulation packages feature easy to follow installation instructions.
- MasterBag insulation units (containing multiple packs) ensure reduced handling costs with improved compression – more square metres per bag, more square metres per truck load, fewer trips to the job site and less warehouse space for storage.

Superior Service and Support

- Knauf Insulation is focused on providing first class customer service, producing high quality products and 'in full on time' deliveries.
- Knauf Insulation recognises the need to establish, develop and support a professional network of distributors and re-sellers in order to service a growing insulation market.
- Knauf Insulation is committed to providing a comprehensive range of relevant sales and marketing literature and web-based technical information to support specifiers and customers.

with ECOSE® TECHNOLOGY

Earthwool® glasswool products made with ECOSE® Technology benefit from a no added formaldehyde binder, which is less energy intensive than traditional binders and is based on rapidly renewable, bio-based materials instead of petro-based chemicals. The technology has been developed for Knauf Insulation's glass and rock mineral wool products, enhancing their environmental credentials without affecting the thermal, acoustic or fire performance. Earthwool® glasswool products made with ECOSE® Technology contain no added dyes or artificial colours.

Knauf Insulation Ltd

PO Box 217063, Botany Junction, Auckland, 2164, New Zealand

Customer Service: Tel: 0800 562 834

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INSTALLATION INSTRUCTIONS

EARTHWOOL® GLASSWOOL INSULATION: WALL

These instructions should be read in conjunction with local standards AS 3999 or NZS 4246 and all applicable local, state and federal building regulations. Before you start installing, please make sure you are familiar with our Health and Safety Information contained in this document. Ensure that you use tools and equipment that are suitable for the intended application. This will include suitable safety equipment.

Do not start work until the site is safe!

Assess the wall condition and structure together with the method of installation you are to use based on the appropriate requirements established in the building code, site assessment and or plans provided. Installation must be completed to the requirements of relevant standard: AS 3999 or NZS 4246.

Tools required:

- Sharp knife for trimming insulation
- Ladder
- Suitable clothing (see our Health and Safety Information)
- Tape measure

STEP 1

- Determine the most suitable product for your project. Walls can be insulated using rolls or segments.
- Insulation is available in varying widths and thicknesses to suit most framing spaces. Please check Knauf Insulation's product guide for the most suitable product for your application.
- To calculate the number of packs needed, determine the area (m^2) to be insulated by multiplying the length by the width or wall height. The number of m^2 of insulation material is clearly marked on each pack. Divide the total area to be insulated by the m^2 in a pack to determine the number of packs required (don't forget to round up to the nearest whole pack). Allowances should be made for areas that are unable to be insulated.

STEP 2

- Don't take the insulation out of the packaging until you're in position and ready to install.
- Before installation check that the product selected matches the specification.
- Ensure that the insulation has lofted to the nominal thickness, if required, gently agitate the insulation by gently shaking or bouncing it on its side until it recovers to thickness stated on the label.
- Where installing around wall lights or heat sources consult the appliance manufacturer's instructions for appropriate clearances. Additional guidance is provided in AS 3999 and NZS 4246.

STEP 3

- When installing insulation between framing members, ensure that you achieve a snug fit avoiding any gaps, tucks and folds.
- It is recommended that you select products that have the same thickness as the cavity. In circumstances where the cavity is deeper than the product selected, adequate support must be provided.
- Make sure insulation fits snugly against top and bottom wall plates. The front face of the batt should be flush with the inside face of the framing.
- For metal frame walls, install insulation according to the relevant building code. Friction fit one side of the batt into the metal C-channel and butt the other edge against the metal stud. Install insulation to cover the full height of the wall.
- Use off cuts to insulate small and hard to fit areas.

STEP 4

- Attention to detail is very important. Make sure all areas are insulated, behind electrical outlets, plumbing and services.
- Seal all penetrations in exterior walls with insulation or foam sealants.

STEP 5

- Complete a final check of the installation ensuring all areas have been insulated and that you have an even and consistent layer of insulation.
- Finish your project by removing all packaging and disposing of all rubbish and excess insulation responsibly.

We recommend that once completed another person checks the work to ensure it has been installed according to required standards.

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HEALTH AND SAFETY INFORMATION

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SAFETY WARNINGS AND HAZARDS

- You must turn the mains power "Off" before entering the work space, and, if in any doubt about how to turn the power "Off", you must consult a licensed electrician.
- Working in areas that contain live electrical wiring is extremely hazardous. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.
- Defective electrical cables, exposed terminals and conductors of electrical equipment such as light fittings and fans can cause burns and electric shocks please exercise caution when working near such hazards – check with an electrician if you are unsure if the cabling is safe.
- Working in hot and poorly ventilated areas when installing insulation can be dangerous.
- Working at heights, when installing insulation can be dangerous.

BEFORE INSTALLATION

- You must turn the mains power "Off" and, if in any doubt about how to turn the power "Off", consult a licensed electrician.
- Do not enter the workspace for the purposes of the pre-work inspection or the installation until you are satisfied that the power has been isolated. Even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live.
- Complete a pre-work assessment before installation to identify safety hazards which may include but are not limited to the following:
    - o access to the roof area,
    - o working at heights,
    - o electrical safety hazards,
    - o adequate ventilation of the work area and
    - o nails and sharp objects on the ground
- Before commencing work you must have systems in place to reduce risks identified in the pre-work assessment such as but which are not limited to:
    - o systems to prevent falling when working at heights.
    - o ventilate the working area if possible.
    - o cover exposed skin. When working in an unventilated area, wear a disposable face mask.
    - o rinse hands in cold water before washing.
    - o wear goggles when working overhead.
    - o clean using vacuum equipment.

DURING INSTALLATION

- Work with another person and maintain contact throughout both the assessment and installation process.
- Only open bags as required.
- Wear appropriate clothing for the job such as long sleeved top, flat rubber sole shoes, gloves conforming to Australian Standard AS2161 and ventilated non-fogging dust resistant goggles conforming to AS/NZ 1336, and a P2 dust mask.
- Avoid eye contact with dust or fibres to minimise eye or skin contact and inhalation during handling.
- Avoid installing insulation in hot weather and at the hottest part of the day.
- Under no circumstances must fixing devices in ceiling spaces or under floors, or in proximity to electrical wiring, be of metal or other conductive material.

Proven Performance

- Preferred by professional installers concerned with quality, appearance and productivity.
- Excellent acoustical properties reduce sound transmission in the home when properly installed.

HEALTH AND SAFETY INFORMATION

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ELECTRICAL SAFETY CONSIDERATIONS BEFORE ISOLATING POWER

- Locate and review the incoming power supply, main switchboard and meter box.
- Ensure you understand if there is a main isolator and how power can be safely isolated.
- Ensure you understand the direction of the "On" and "Off" position of the main switch (NOTE: the "Off" position is not always as it seems - check with an electrician if you are unsure).
- Before installation, switch "Off" the electricity supply at the main switchboard (check with an electrician if you are unsure if power can be turned "Off" at the switchboard).
- Be aware that even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.

PROCEDURE FOR ISOLATION - CERAMIC FUSES (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Ceramic fuses are typically found in older style homes.
- Identify if any fuse is deactivated.
- Check if there are any fuses currently in the "Off" position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned "Off".
- Apply additional strips of electrical tape over the deactivated fuse and any individual isolator in the "Off" position as a reminder to leaving it in the "Off" position once the re-activation procedure has been completed.
- If you find a fuse plug out of its socket, whilst the main isolator is in the "Off" position, place electrical tape over its respective switch and one over the fuse socket opening.
- DO NOT touch the internal metal fittings.
- Place a written note on the main isolator switch or meter box enclosure to advise the power is "Off" and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances, within the home, previously left on are no longer operating to confirm the mains power is now isolated.
- The original person who placed the isolation tag is the only one who can re-activate the power. Advise occupants of this requirement.

PROCEDURE FOR ISOLATION CIRCUIT BOARD (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Circuit boards are typically found in modern homes.
- Check if there are any switches currently in the "Off" position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned "Off".
- Apply additional strips of electrical tape over any deactivated fuses or individual switches in the "Off" position after isolating the mains power as a reminder to leave it in the "Off" position once the re-activation procedure has been completed.
- Turn "Off" all individual switches on the circuit board.
- Place a written note on the switches or meter box enclosure to advise the power is "Off" and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances within the home previously left on are no longer operating to confirm the mains power is now isolated.
- The originator that placed the isolation tag is the only one who can re-activate the power. Advise occupants of the requirement.

REACTIVATING THE POWER

- After the completion of the installation, switch the mains power to the "On" position (for ceramic fuse board), but for a circuit board, switch the main power "On" and then each individual power isolator on one at a time. The taped switches in the "Off" position should stay switched "Off".
- WARNING: If you cannot reconnect power please ensure you seek assistance from a qualified electrician.

SUITABLE CLOTHING

- When handling any insulation material, especially in enclosed poorly ventilated areas and/or overhead, the use of suitable eye protection conforming to AS1336 will greatly reduce contact with dust or fibres.
- Wear suitable loose fitting clothes, including long sleeved shirts, long pants, cap and gloves.
- A suitable dust mask is recommended when working in confined, poorly ventilated and dusty areas.
- Wash work clothes separately and rinse the washing machine after use.

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EARTHWOOL® GLASSWOOL INSULATION: CEILING / SKILLION ROOF

January 2024

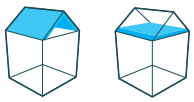


TWINTECH

with ECOSE TECHNOLOGY

Enhanced moisture resistance with DriTherm® technology. Earthwool® glasswool insulation is silicone treated, which provides moisture resistance for up to 50 years.

APPLICATIONS



DESCRIPTION

The Earthwool® glasswool insulation: ceiling and skillion batt range includes a selection of R-values to provide builders, designers, installers and DIYers the opportunity to choose the best thermal performance for their project. Earthwool® glasswool insulation: ceiling and skillion batt will improve the thermal comfort and energy efficiency of the building in which it has been installed thus keeping it cool in summer and warm in winter.

The super-soft and easy to handle benefits of Earthwool® glasswool have been further enhanced with TwinTech®. TwinTech® heralds another advancement in insulation manufacture - the dual forming technique ensures there is a smooth finish on both sides of the insulation, which improves product handling and appearance. Earthwool® glasswool insulation: ceiling and skillion batt is made using up to 80% recycled glass and with ECOSE® Technology, a sustainable, bio-based binder that contains no added formaldehyde.

PERFORMANCE

Thermal	AS/NZS 4859.1 (2018).
Fire Hazard Properties (AS/NZ 1530.3)	Ignitability: 0, Spread of Flame: 0, Heat Evolved: 0, Smoke Developed: 2-3.
Water Vapour Absorption	Less than 5% by weight.
Microbial Growth	Does not support microbial growth.
Corrosion Resistance	No greater than sterile cotton.
Combustibility (AS 1530.1)	Non-combustible.

BENEFITS

- DriTherm® technology - silicone treated glasswool for increased durability
- TwinTech® - smooth finish on both sides
- High thermal performance - year round comfort
- Sound absorbing
- Non-combustible
- Saves energy - lower energy bills
- No added formaldehyde
- Soft to handle and install
- 50 year warranty
- Compression packed - more product per pack
- Odourless.

CERTIFICATION

Please scan the QR Code to view the complete list of certifications on our website.

EARTHWOOL® GLASSWOOL INSULATION: CEILING / SKILLION ROOF

January 2024

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SPECIFICATIONS

CEILING SEGMENTS

Product Code	R-Value (m^2K/W)	Thermal Conductivity (W/mK)	Thickness (mm)	Width (mm)	Length (mm)	Area per pack (m^2)	Pieces per pack
683674	3.3	0.047	155	430	1160	10.5	21
712468	3.4	0.032	110	580	1160	4.7	7
731850	3.6	0.049	175	430	1160	8.5	17
731846	4.1	0.048	195	430	1160	7.5	15
683653	5.2	0.040	210	430	1160	5.5	11
779551	7.0	0.047	330	460	1200	4.4	8
779554	8.0	0.041	330	460	1200	3.3	6

All dimensions are nominal.

SKILLION ROOF / PERIMETER BATT

Product Code	R-Value (m^2K/W)	Thermal Conductivity (W/mK)	Thickness (mm)	Width (mm)	Length (mm)	Area per pack (m^2)	Pieces per pack
712468	3.4	0.032	110	580	1160	4.7	7
683642	3.2 SKILLION	0.033	105	430	1160	5.5	11
779683	5.0 SKILLION	0.033	165	430	1160	3.0	6
781973	6.0 SKILLION	0.036	215	430	1160	3.5	7
781979	7.4 SKILLION	0.036	265	430	1160	3.0	6

All dimensions are nominal.

CEILING ROLL

Product Code	R-Value (m^2K/W)	Thermal Conductivity (W/mK)	Thickness (mm)	Width (mm)	Length (mm)	Area per pack (m^2)	Rolls per pack
790936	3.6	0.042	150	1200	7000	8.4	1

All dimensions are nominal.

PERIMETER BATT

Product Code	R-Value (m^2K/W)	Thermal Conductivity (W/mK)	Thickness (mm)	Width (mm)	Length (mm)	Area per pack (m^2)	Pieces per pack
712468	3.4	0.032	110	580	1160	4.7	7

All dimensions are nominal.

EARTHWOOL® GLASSWOOL INSULATION: CEILING / SKILLION ROOF

January 2024

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ADDITIONAL INFORMATION

Specification Guide

The ceiling insulation shall be Earthwool® glasswool insulation: ceiling and skillion batt* R*, *mm thick, BRANZ appraised to meet the provisions of the NZBC. The product will be non-combustible, Red List Free as labelled by Declare, Global GreenTag Level A certified, glasswool insulation with high post-consumer recycled glass content and with ECOSE® Technology. It will be manufactured under Quality Assurance Standards ISO 9001:2015 by Knauf Insulation and shall be installed in accordance with the instructions issued by them.

*architect to insert details of products used.

Specification Compliance

AS/NZS 4859.1: 2018 Materials used in the Thermal Insulation of Buildings and comply with the New Zealand Building Code requirements: B1 – Durability, E3 – External Moisture, F2 – Hazardous Building Materials, and H1 – Energy Efficiency, as appraised by BRANZ. The Earthwool® glasswool insulation: ceiling batt range is an acceptable solution in terms of the New Zealand Building Code. This product is designed for use in timber and metal frame applications in new and existing domestic and commercial buildings.

Bio-solubility

The formulation used for Earthwool® glasswool insulation has been independently assessed to meet the requirements of the stringent Note Q standard (and is therefore consistent with the highest Australian and New Zealand industry standards), and also assessed by Knauf Insulation against NZ Work-Safe requirements. Earthwool® glasswool is classified as a non-hazardous substance in line with the NOHSC: 1008 3rd Edition.

Environmental

Earthwool® glasswool insulation: ceiling and skillion batt represents no known threat to the environment and comes with GreenTag Level A certification, Declare label and a certified Environmental Product Declaration. Earthwool® glasswool has low VOC and benefits from ECOSE® Technology.

Proven Performance

- Earthwool® glasswool insulation is preferred by professional installers concerned with quality, appearance and productivity.
- Earthwool® glasswool insulation has excellent acoustical properties reduce sound transmission in the home when properly installed in walls, ceiling and floor systems.

Durability

- Earthwool® glasswool insulation is odourless, rot proof, non-hygroscopic, does not sustain vermin and will not encourage the growth of fungi, mould or bacteria.
- DriTherm® technology - silicone treated for increased durability.

Superior Handling

- Highly resilient insulation recovers quickly to full thickness for a snug fit and superior finished aesthetics.
- Consistent quality materials feel good, cut easily and install fast.
- Low dust for easier handling and increased productivity.

Convenient Packaging, Easier Handling

- Earthwool® glasswool insulation is packaged in a strong, white poly bags (batts) and film (rolls) that offers excellent protection from abuse, dust and moisture.
- Earthwool® glasswool insulation packages feature easy to follow installation instructions.
- MasterBag insulation units (containing multiple packs) ensure reduced handling costs with improved compression – more square metres per bag, more square metres per truck load, fewer trips to the job site and less warehouse space for storage.

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INSTALLATION INSTRUCTIONS

EARTHWOOL® GLASSWOOL INSULATION: CEILING R7.0 and R8.0

Introduction

The following provides guidance on how to achieve H1 compliance at the perimeter of a pitched roof. The following installation instructions support the use of the R7.0 and R8.0 ceiling insulation. It provides examples at 20° and 25° roof pitches using a 90 and 105mm heel hights. These calculations can be used as conservative values in situations where the roof pitch and heel depth are greater.

The schedule method. H1/AS1 requires the roof building element to have a construction R-value of R6.6. It also allows for the construction value to be reduced to R3.3 for up to 500mm from the outer edge of the ceiling perimeter. Using Knauf Insulation's R7.0 and R8.0 in a typical truss or pitched roof will achieve the R6.6 requirements over the main area of the roof. Using these products with a baffle / insulation barrier at the eaves will also meet the R3.3 requirements at the perimeter, without the need for a heel truss. Calculation method allows for building elements to be under the H1/AS1 schedule method's requirements. This is possible when they are offset with higher values elsewhere in the thermal envelope. Using Knauf Insulation's R7.0 and R8.0 significantly lifts the thermal performance of the ceiling and the thermal values at the perimeter, making them a great choice when using the calculation method.

Do not start work until the site is safe!

Assess the ceiling condition and structure together with the method of installation you are to use based on the appropriate requirements established in the building code, site assessment and or plans provided. Installation must be completed to the requirements of relevant standard: AS 3999 or NZS 4246.

Tools required:

- Sharp knife for trimming insulation
- Ladder
- Suitable clothing (see our Health and Safety Information)
- Tape measure
- Non-conductive insulation stick for positioning insulation in hard to reach areas
- Kneeling board to span ceiling framing

BEFORE YOU START

- Determine the most suitable product for your project. Ceilings can be insulated using ceiling batts, blankets and rolls.
- Where you have existing insulation that is level with the ceiling joists, you can install additional insulation over the top. It is recommended that this is installed at right angles to the existing insulation.
- Insulation is available in varying widths and thicknesses to suit most framing spaces. Please check www.knaufinsulation.co.nz for the most suitable product for your application.
- To calculate the number of packs needed, determine the area (m^2) to be insulated by multiplying the length by the width or wall height. The number of m^2 of insulation material is clearly marked on each pack. Divide the total area to be insulated by the m^2 in a pack to determine the number of packs required (don't forget to round up to the nearest whole pack). Allowances should be made for areas that are unable to be insulated.
- Don't take the insulation out of the packaging until you're in a position and ready to install.
- Before installation, gently agitate the insulation by gently shaking or bouncing it on its side until it recovers to the thickness stated on the label.
- Do not block ceiling vents and take care around downlights and other sources of heat. Consult the manufacturer's instructions for appropriate clearances. Additional guidance is provided in NZS 4246.

TRUSS ROOF / INSTALLATION FROM BELOW

- Release the insulation from the packs.
- Lightly bounce the slabs on their side to invigorate the insulation and help it recover to its 330mm nominal thickness.
- Feed the product up through the ceiling battens and position the insulation on top of the ceiling battens and against the truss cord.
- Gently push the ceiling batts against the truss to encourage them to fit around the timbers while creating room for the next ceiling batt to be installed beside it.
- Repeat the process, installing the other ceiling batts in a similar way, paying attention to all the joins between the slabs and timbers to ensure a tight and neat fit.
- Once a truss bay is completed it is recommended that you inspect from above to see that the top surface is smooth and consistent, lifting the ends and sides of the batts to ensure a tight and neat connection before moving to the next truss bay.
- Repeat this process until all truss bays are completed.
- When installing insulation in the eave (i.e. the junction between the roof, wall and ceiling), make sure the insulation covers the top plate but is not in contact with the roof. It is important to maintain a 25mm gap between the roofing substrates and the insulation.
- H1 allows for the insulation R-value to be reduced to R3.3 for 500mm from the top plate. This could assist with the 25mm requirement being met.
- Do not block ceiling vents and take care around downlights and other sources of heat. Consult the appliance manufacturer's instructions for appropriate clearances. Additional guidance is provided in NZS 4246.
- Try to fit insulation behind pipes or other obstructions unless this would compress the insulation. If so, cut the insulation to fit around objects, beams or other barriers.

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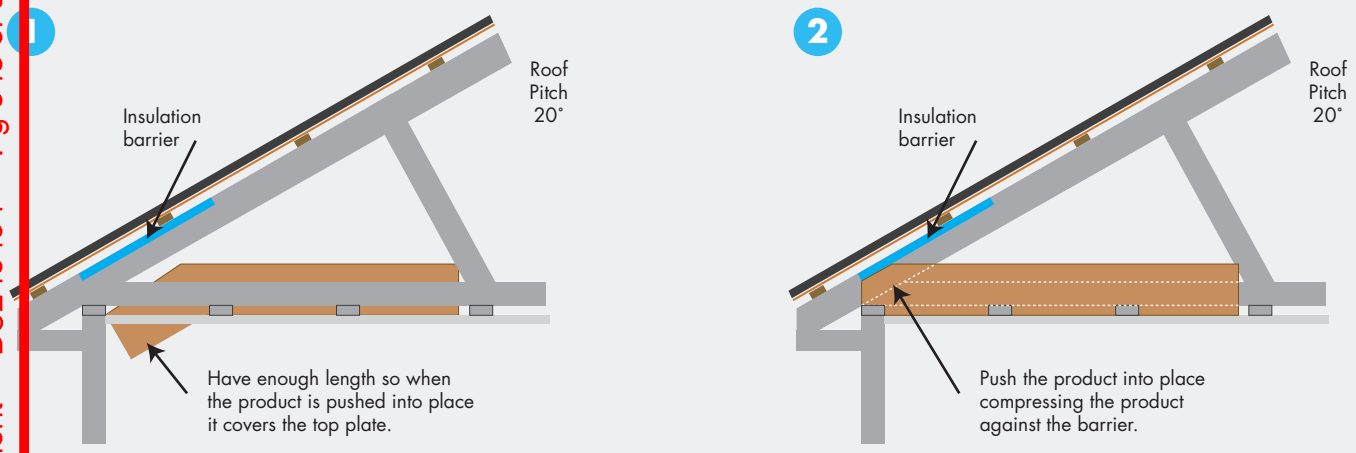
INSTALLATION INSTRUCTIONS

H1 PERIMETER INSULATION REQUIREMENTS

The H1 schedule method requires ceilings to achieve an R6.6 construction value with the ability to reduce the construction R-value to R3.3 for the first 500mm from the inside of the top plate. The following details the R7.0 and R8.0 ceiling batts compressed into the eaves with the use of a barrier to achieve the R3.3 compliance. Knauf Insulation's R7.0 and R8.0 product has been designed with a nominal density which allows the product to be easily compressed into the eaves. The following provides guidance and a calculation of the thermal performance in roofs with a roof pitch of ≥ 20°.

Install instructions

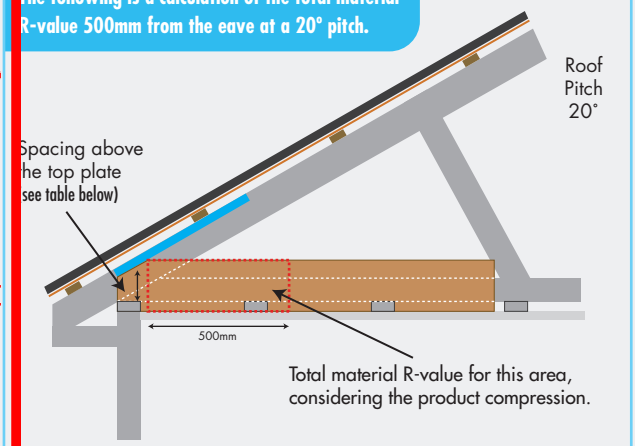
- If the eave barrier has not already been installed, cut the barrier between the truss timbers and staple into place.
- Running the ceiling batts length parallel with the truss, slide the ceiling batt into the eaves. The following two step procedure can help with this process.
- The ceiling batts can also be installed with the length of the product parallel to the eave if required.



THERMAL CALCULATION

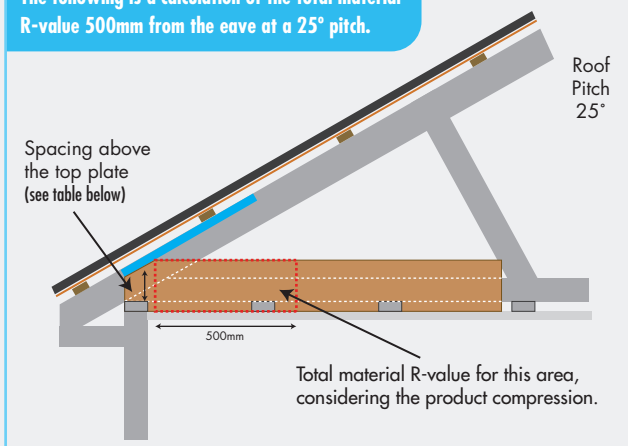
H1 requires that the construction R-value is minimum of R3.3 the below values are material values and should be used to determine the construction R-values.

The following is a calculation of the total material R-value 500mm from the eave at a 20° pitch.



Heel Height (mm)	R-Value	Roof pitch (°)	Material Performance
90	R7.0	20	R4.1
90	R8.0	20	R4.7
105	R7.0	20	R4.5
105	R8.0	20	R5.0

The following is a calculation of the total material R-value 500mm from the eave at a 25° pitch.



Heel Height (mm)	R-Value	Roof pitch (°)	Material Performance
90	R7.0	25	R4.5
90	R8.0	25	R5.1
105	R7.0	25	R4.8
105	R8.0	25	R5.4

Notes: (1) The above values have been calculated using the BRANZ home insulation guide 6th edition. **(2)** The heel depth has been calculated based on the table above. Greater heel depth will increase the thermal calculation. If this value is critical to your project design, contact Knauf Insulation for a specific design.

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care.

INSTALLATION INSTRUCTIONS

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RETRO FIT / INSTALLATION FROM ABOVE

- When retrofitting ceilings you must turn the power 'Off'. A torch or adequate lighting will be required. Step / kneeling boards can be used to help with access, especially in truss roof designs. A wooden, non-conductive positioning rod (1-2 metres long) can assist in insulating eaves or hard to reach areas.
- Ensure you have the right product for the application. Check the thermal resistance rating (R-value) required on the drawings / plans and that this matches the product selected. Check the condition of the roof ensuring that it is watertight repairing any damage to the roof sarking.
- Start installing the insulation at the far corners of the roof and work your way back towards the ceiling access.
- When installing insulation between ceiling joists, ensure that you achieve a snug fit avoiding any gaps (we recommend installing between the ceiling timbers and in contact with the ceiling linings. For installs over timbers refer to NZS 4246 for guidance).
- When installing insulation in truss roofs, ensure that insulation is firmly butted together to achieve a consistent layer of insulation without any gaps.
- Where required, use a sharp knife to cut the insulation to fit, be careful avoid gaps and maintain a continuous layer. It is important that when you cut the insulation that you avoid coming into contact with any electrical services.
- When installing insulation in a roof eave (i.e. the junction between the roof, wall and ceiling), make sure the insulation covers the top plate but is not in contact with the roof. It is important to maintain a 25mm gap between the roofing substrates and the insulation.
- Once you have worked your way back to the ceiling access, make sure you insulate the ceiling access panel before exiting the roof space.
- Always take extra care while moving around in a ceiling space. Ensure sound footing at all times. Only use roof trusses or ceiling joists for support and never stand on ceiling plasterboard.
- Watch out for nails — especially in ceilings where roofing nails may protrude through the sheathing.
- To make access across the roof space easier, use kneeling boards. Place boards over roof trusses or ceiling joists to make a path.
- Do not take the insulation out of the packaging until you're in position and ready to install. Before installation, gently invigorate the insulation by 'bouncing' it on its side until it recovers to thickness stated on the label.
- Do not block ceiling vents and take care around downlights and other sources of heat. Consult the appliance manufacturer's instructions for appropriate clearances. Additional guidance is provided in NZS 4246.
- Try to fit insulation behind pipes or other obstructions unless this would compress the insulation. If so, cut the insulation to fit around objects, beams or other barriers.

WHERE YOU HAVE EXISTING CEILING INSULATION

- When you are topping up existing insulation you may want to establish the thermal value of the existing insulation. A contribution of R0.2 for every 10mm of exiting insulation is a conservative approach.
- Once you have determined your existing insulation levels, install Earthwool® glasswool with a suitable R-value to achieve the desired thermal performance. (allowance should be made for a slight compression of the lower layer)
- Place the insulation over the existing insulation at right angles to the ceiling joists ensuring a consistent layer with no gaps or voids.
- For further guidance of retrofit solutions refer to NZS 4246.

CATHEDRAL/SKILLION ROOFS

- Where cavity depths allow the R7.0 and R8.0 products can be used in skillion roofs, take care to ensure that the 25mm gap between the insulation and the roof is maintained.
- For smaller cavities refer to the range Skillion roof products designed for this application.

HEALTH AND SAFETY INFORMATION

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SAFETY WARNINGS AND HAZARDS

- You must turn the mains power "Off" before entering the work space, and, if in any doubt about how to turn the power "Off", you must consult a licensed electrician.
- Working in areas that contain live electrical wiring is extremely hazardous. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.
- Defective electrical cables, exposed terminals and conductors of electrical equipment such as light fittings and fans can cause burns and electric shocks please exercise caution when working near such hazards – check with an electrician if you are unsure if the cabling is safe.
- Working in hot and poorly ventilated areas when installing insulation can be dangerous.
- Working at heights, when installing insulation can be dangerous.

BEFORE INSTALLATION

- You must turn the mains power "Off" and, if in any doubt about how to turn the power "Off", consult a licensed electrician.
- Do not enter the workspace for the purposes of the pre-work inspection or the installation until you are satisfied that the power has been isolated. Even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live.
- Complete a pre-work assessment before installation to identify safety hazards which may include but are not limited to the following:
    - o access to the roof area,
    - o working at heights,
    - o electrical safety hazards,
    - o adequate ventilation of the work area and
    - o nails and sharp objects on the ground
- Before commencing work you must have systems in place to reduce risks identified in the pre-work assessment such as but which are not limited to:
    - o systems to prevent falling when working at heights.
    - o ventilate the working area if possible.
    - o cover exposed skin. When working in an unventilated area, wear a disposable face mask.
    - o rinse hands in cold water before washing.
    - o wear goggles when working overhead.
    - o clean using vacuum equipment.

DURING INSTALLATION

- Work with another person and maintain contact throughout both the assessment and installation process.
- Only open bags as required.
- Wear appropriate clothing for the job such as long sleeved top, flat rubber sole shoes, gloves conforming to Australian Standard AS2161 and ventilated non-fogging dust resistant goggles conforming to AS/NZ 1336, and a P2 dust mask.
- Avoid eye contact with dust or fibres to minimise eye or skin contact and inhalation during handling.
- Avoid installing insulation in hot weather and at the hottest part of the day.
- Under no circumstances must fixing devices in ceiling spaces or under floors, or in proximity to electrical wiring, be of metal or other conductive material.

Proven Performance

- Preferred by professional installers concerned with quality, appearance and productivity.
- Excellent acoustical properties reduce sound transmission in the home when properly installed.

HEALTH AND SAFETY INFORMATION

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ELECTRICAL SAFETY CONSIDERATIONS BEFORE ISOLATING POWER

- Locate and review the incoming power supply, main switchboard and meter box.
- Ensure you understand if there is a main isolator and how power can be safely isolated.
- Ensure you understand the direction of the "On" and "Off" position of the main switch (NOTE: the "Off" position is not always as it seems - check with an electrician if you are unsure).
- Before installation, switch "Off" the electricity supply at the main switchboard (check with an electrician if you are unsure if power can be turned "Off" at the switchboard).
- Be aware that even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.

PROCEDURE FOR ISOLATION - CERAMIC FUSES (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Ceramic fuses are typically found in older style homes.
- Identify if any fuse is deactivated.
- Check if there are any fuses currently in the "Off" position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned "Off".
- Apply additional strips of electrical tape over the deactivated fuse and any individual isolator in the "Off" position as a reminder to leaving it in the "Off" position once the re-activation procedure has been completed.
- If you find a fuse plug out of its socket, whilst the main isolator is in the "Off" position, place electrical tape over its respective switch and one over the fuse socket opening.
- DO NOT touch the internal metal fittings.
- Place a written note on the main isolator switch or meter box enclosure to advise the power is "Off" and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances, within the home, previously left on are no longer operating to confirm the mains power is now isolated.
- The original person who placed the isolation tag is the only one who can re-activate the power. Advise occupants of this requirement.

PROCEDURE FOR ISOLATION CIRCUIT BOARD (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Circuit boards are typically found in modern homes.
- Check if there are any switches currently in the "Off" position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned "Off".
- Apply additional strips of electrical tape over any deactivated fuses or individual switches in the "Off" position after isolating the mains power as a reminder to leave it in the "Off" position once the re-activation procedure has been completed.
- Turn "Off" all individual switches on the circuit board.
- Place a written note on the switches or meter box enclosure to advise the power is "Off" and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances within the home previously left on are no longer operating to confirm the mains power is now isolated.
- The originator that placed the isolation tag is the only one who can re-activate the power. Advise occupants of the requirement.

REACTIVATING THE POWER

- After the completion of the installation, switch the mains power to the "On" position (for ceramic fuse board), but for a circuit board, switch the main power "On" and then each individual power isolator on one at a time. The taped switches in the "Off" position should stay switched "Off".
- WARNING: If you cannot reconnect power please ensure you seek assistance from a qualified electrician.

SUITABLE CLOTHING

- When handling any insulation material, especially in enclosed poorly ventilated areas and/or overhead, the use of suitable eye protection conforming to AS1336 will greatly reduce contact with dust or fibres.
- Wear suitable loose fitting clothes, including long sleeved shirts, long pants, cap and gloves.
- A suitable dust mask is recommended when working in confined, poorly ventilated and dusty areas.
- Wash work clothes separately and rinse the washing machine after use.

KNAUF INSULATION

EARTHWOOL® GLASSWOOL WARRANTY

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1. WARRANTY APPLICATION: Knauf Insulation Pty Ltd (ACN 129 827 336) and Knauf Insulation Ltd (Registered NZ Company No. 35 271 92) - (Knauf) - warrant that Earthwool® glasswool insulation products (Product) are manufactured in accordance with AS/NZS-4859.1 and are fit for the purpose of insulating ceilings, external timber frame walls, underfloors and internal acoustic partitions, if tested in accordance with the methodology referred to in AS/NZS 4859.1, if properly installed in accordance with the installation instructions and if maintained according to relevant Standards including AS-3999/NZS-4246.

2. WARRANTY COVERAGE: Knauf warrants to the person purchasing the Product (Covered Person) that:

a) The Product is free from manufacturing defects for a period of 50 years from the date of purchase.

b) When used for its intended purpose, properly installed in accordance with Knauf installation instructions, tested in accordance with the methodology referred to in AS/NZS 4859.1 and maintained in dry conditions and otherwise in accordance with AS-3999/NZS-4246, the NZBC Clauses E2 and E3 (or equivalent), the Product can be expected to maintain its thermal insulation properties for a period of 50 years from the date of purchase (Product Serviceable Life).

3. CONDITIONS OF WARRANTY: Knauf's liability to the Covered Person under this Warranty shall be subject to the following terms and conditions:

A. The claimant must provide proof that he/she is a Covered Person including a receipt showing the date of purchase of the Product and details of the seller and the installer.

B. The Product must be transported and stored in dry conditions at all times between purchase and installation and without bearing the weight of other materials. Knauf will have no liability under this Warranty in respect of wet or water damaged product.

C. The Product must be installed in accordance with Knauf installation instructions and maintained according to AS3-999/NZ2-4246, the NZBC Clauses E2 & E3 (or equivalent) and all other applicable building codes adopted by federal, state or local government or government agencies and applicable to the installation or maintenance of the Product. Failure to properly install or maintain the Product in accordance with this Clause will void this Warranty.

D. The Covered Person may not claim for manufacturing defects under this warranty that appear outside the Product Serviceable Life 50 years after the date of purchase.

E. The Covered Person must provide written notice to Knauf within 30 days after discovery of any claimed defect or failure covered by this Warranty and before beginning any permanent replacement, recitification or repair. The notice must describe the location and details of the defect or failure and such information as is necessary for Knauf to investigate the claim. Photographs of the Product, showing the defect or failure, must accompany the notice. Product samples must be provided.

F. Before commencing any replacement, repair or rectification work, the Covered Person must allow Knauf or Knauf's agent to enter the property where the Product is installed and examine, photograph and take samples of, the Product.

G. Instead of repairing, replacing or rectifying the Product, Knauf may elect to make a full refund of the purchase price of the Product.

H. Knauf will pay the reasonable, direct expenses of the Covered Person claiming under this Warranty. The Covered Person may submit details of their expense claim to Knauf for consideration.

I. For the avoidance of doubt, this Warranty applies only to the Covered Person and does not transfer to any subsequent purchaser of any structure in which the Product has been installed.

4. EXCLUSIONS: Knauf will have no liability under this Warranty in respect of damage or defects resulting from, or in any way attributable to:

(a) the storage, shipping, handling or installation of the Product in an improper manner or in a manner other than as described n the installation instructions;

(b) neglect;

(c) abuse;

(d) misuse;

(e) damage from incorrect design or construction of the structure in connection with which the Product is used;

(f) acts of God including, but not limited to, cyclones, tornados, floods, earthquakes, severe weather, fire or other natural phenomena, (including, but not limited to, unusual climate conditions);

(g) growth of mold, mildew, fungi, bacteria, or any organism; and

(h) lack of proper maintenance.

5. CLAIMS: For any claim by the Covered Person under the terms of this Warranty:

(a) if the Product is found to be non-compliant with this Warranty, Knauf will (at Knauf's sole option) either (i) refund the purchase price; or (ii) repair, replace or rectify the Product.

(b) such claims must be made by written notice:

i. sent to the following address:
Knauf Insulation Warranty Claims Section
PO Box 244
Cannon Hill Queensland 4170
Australia.
Phone +61 7 3393 7300

ii. received within 30 days after discovery of any circumstance giving rise to liability under this Warranty;

iii. containing the details specified in section 3 E above and attaching documentary evidence of the matters specified in section 3 A above.

6. EXCLUSION OF INCIDENTAL AND CONSEQUENTIAL DAMAGES: Under this warranty Knauf shall not be liable for any incidental, special, indirect or consequential damages. Any monetary compensation is limited to a refund of the purchase price of the Product except as required by law.

7. MODIFICATIONS AND ALTERATIONS OF PRODUCT: Knauf shall have no liability under this Warranty for any Product subjected to further processing or alteration by any person other than Knauf or its related companies.

8. SETTLEMENT OF CLAIM: Any refund or material replacement by Knauf pursuant to section 5 above of this Warranty shall constitute a full settlement and release of Knauf by the Covered Person of all claims, potential claims or actions of any Covered Person for damages or other relief under this Warranty.

9. OTHER RIGHTS: The benefits given by this Warranty are additional to other rights and remedies that the Covered Person may have under law.

Australian customers: Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the Product repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

New Zealand Consumer Guarantees Act: It is acknowledged that where a claimant has acquired the goods and/or services for the purpose of a business, the claimant and Knauf agree that the provisions of the Consumer Guarantees Act 1993 shall not apply to the supply of goods and/or services by Knauf to such business applicants.

10. LIMITATION OF WARRANTY: This Warranty constitutes the only warranty extended by Knauf for the Product. Knauf disclaims all other warranties, express or implied, but does not exclude any statutory warranties or consumer guarantees that may apply and which cannot be excluded at law. For the avoidance of doubt, any and all other warranties or conditions which are not guaranteed by the Australian Consumer Law, the New Zealand Consumer Law or the Competition and Consumer Regulation 2010 (Australia) and which are not expressly included in this Warranty as additional warranties or conditions, are expressly excluded where permitted, including liability for incidental or consequential damages caused by the breach of any express or implied warranty or condition.

11. LIMITATION OF LIABILITY: You may be entitled to statutory consumer guarantees and Knauf does not exclude, restrict of modify those consumer guarantees. In all other respects, in so far as and to the maximum extent that it may lawfully do so, Knauf excludes any liability, whether in tort (including negligence), contract, equity or otherwise, connected with, or arising in relation to, the use or installation of the Product.

This Warranty is given by Knauf Insulation Pty Ltd ACN 129 827 336 and Knauf Insulation Ltd (Registered NZ Company No. 35 271 92).

EARTHWOOL® GLASSWOOL

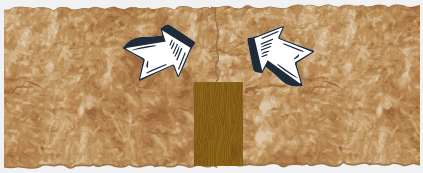
the feel good glasswool insulation

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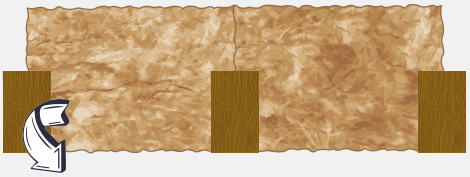
A NEW QUICK AND EASY SINGLE LAYER CEILING SOLUTION



Extra thick insulation using advanced TwinTech® technology for super high R-values.



Specially engineered insulation designed to expand and knit together over joists.



Unbridged insulation in a single layer to meet the high R-values required for H1 compliance.

H1 R6.6 compliant

$ Lower cost than double layer

Faster and easier to install

R7.0 CEILING INSULATION

H1 compliance doesn't need to be difficult. Installing a double layer ceiling system can be time consuming, costly and complex.

That's why we have developed an advanced single layer solution to meet H1 compliance standards for new houses.



BRANZ Appraised
Appraisal No. 648 [2022]



For more information please visit **www.knaufinsulation.co.nz/h1**

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Ceiling options for target construction R-value of R6.6

Single layer option using thicker insulation batts

✓ Existing installation methodology

× Thermal bridging through timber & air space above joists



Double layer option using 2 x insulation batts

× Increased install time, complexity & cost

✓ No thermal loss above joists





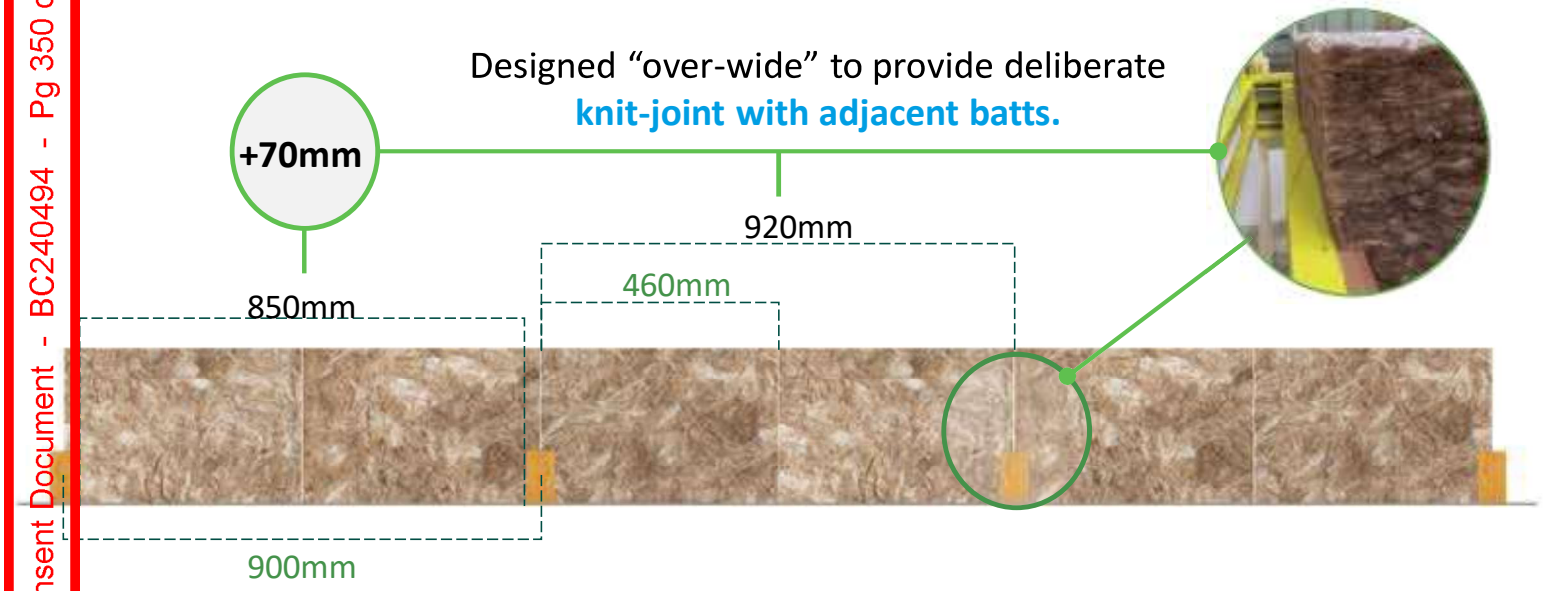
BUNNINGS warehouse

EARTHWOOL GLASSWOOL by KNAUF INSULATION
the feel good glasswool insulation

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Introducing the new SINGLE LAYER R7.0 ceiling bat





EARTHWOOL GLASSWOOL by KNAUF INSULATION
the feel good glasswool insulation

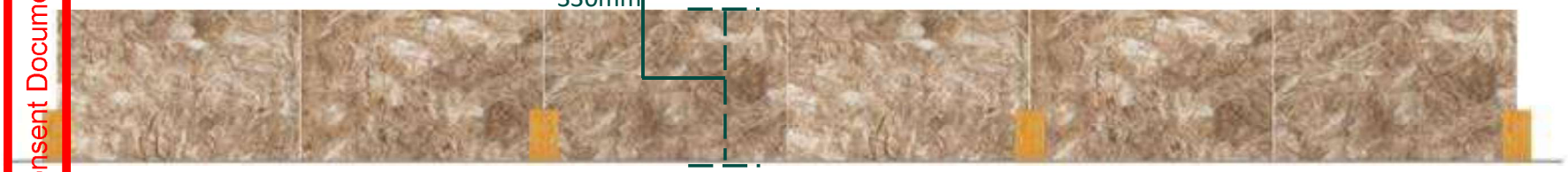
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Introducing the new SINGLE LAYER R7.0 ceiling bat



Extra thick insulation using advanced TwinTech® technology for **super high R-values.**

TWINTECH®



BUNNINGS warehouse

EARTHWOOL GLASSWOOL by KNAUF INSULATION
the feel good glasswool insulation

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Introducing the new SINGLE LAYER R7.0 ceiling bat



Provides a **complete layer of unbridged insulation** to meet new H1 R-value requirements **in a single layer.**

DESIGNED FOR H1 COMPLIANCE



Bunnings warehouse

EARTHWOOL GLASSWOOL by KNAUF INSULATION
the feel good glasswool insulation

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Lower complexity and install time than double layer







Lower complexity

Lower install time



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the feel good glasswool insulation

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Optimised design minimizes environmental impac



TWINTECH

R-value	R7.0	
Option	A	B
Thickness	265mm	330mm
Thermal conductivity	0.037W/mK	0.047W/mK

Less material to deliver **better performance**



✓ **Lower embodied carbon**

✓ **Higher construction R-value**

BUNNINGS warehouse

EARTHWOOL GLASSWOOL by KNAUF INSULATION
the feel good glasswool insulation

VENT ROLL PANEL VENT
G502

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PRODUCT INFORMATION SHEET

DESCRIPTION

The VENT Roll Panel Vent G502 commonly referred to as an Eaves Baffle or Insulation Guard is designed to maintain a continuous 25mm air gap between the underside of the roofing underlay or sarking board and the loft insulation at the eaves, in accordance with NZS4246:2016.6.2.10. The G502 assures calculated air flowing in and out of the roof cavity is unimpeded by loft insulation.

FEATURES

- Facilitates compliance with NZS4246:2016.6.2.10
- Facilitates insulation installations in accordance with H1 guidelines.
- Ideal for trussed roofs of any degree pitch
- Suitable for new builds or renovations/re-roofs
- Works with glass wool or blown insulation
- Prevents heat loss from badly installed insulation
- Protects insulation from internal moisture

SCOPE OF USE

- To be used as part of proprietary ventilation system.
- For trussed roof installations only
- Not for use on skillion roofs

WARRANTY

- 15 years

MAINTENANCE

- No maintenance requirements.

INSTALLATION

1. Lay the castellated profile across the top of the roof trusses/rafters.
2. Castellations are designed for timber trusses but can be applied to metal framing
3. Nail or staple the G502 to hold in position.
4. The G502 can be positioned in between or directly under the purlins.
5. The G502 should be rolled out across the roof trusses parallel to the fascia and directly above the wall plate.
6. The G502 should be rolled out the full length of the eaves and adjusted to align with the required roof truss centres.
7. The G502 should not be pulled excessively, i.e. the shape of the castellations should be maintained.
8. Installation of black vs clear:

   - The G502 - Black should be covered immediately after installation and installed in temperatures under 20°C.

   - The G502 - Clear can be installed in temperatures up to and including 35°C and can be exposed to the elements for periods of up to 21 days.
9. When installing 2x G502s please ensure that castellations are aligned so that airflow can flow freely over both G502s

SPECIFICATIONS

Dimensions	6000mm L x 650mm W
Colour	Black/Clear
Box Quantity	2 (12m)
Material	PET Plastic
Manufacturing process	Injection moulding

STORAGE

Handling and storage of the VENT Ventilation Products, whether on-site or off-site, is under the control of the building contractor. Roof Ventilation Products must be protected from direct sunlight and physical damage, and should be stored flat and under cover.

VENT ROLL PANEL VENT
G502

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PRODUCT INFORMATION SHEET

Fig A: Roll Panel Vent

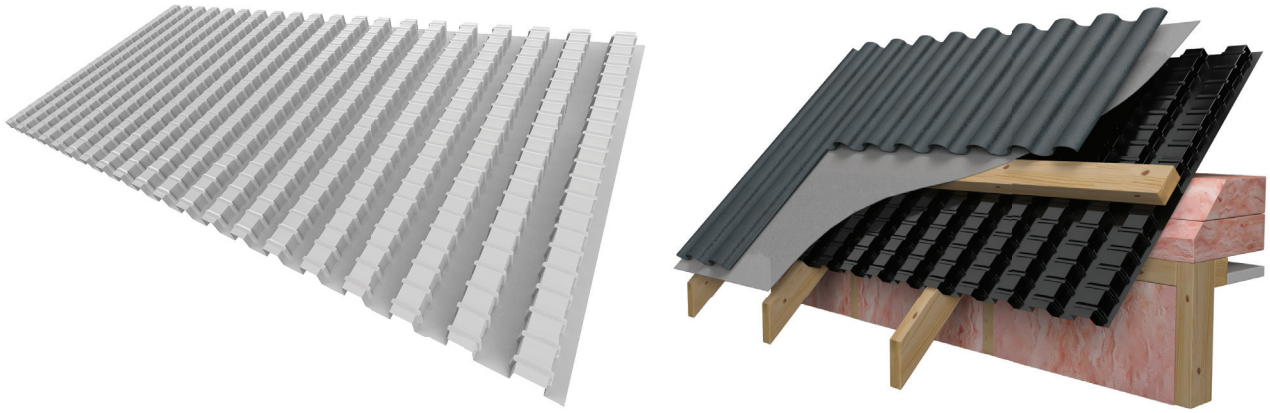
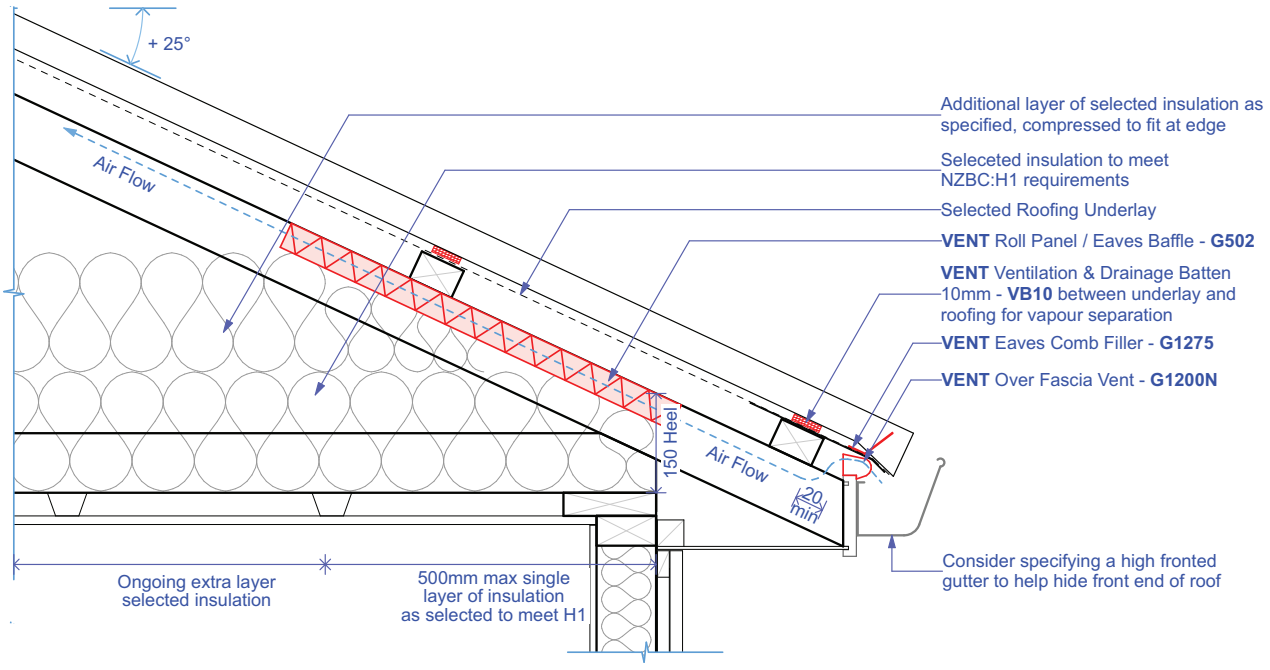


Fig B: G502 Application with G2500N Over Fascia Vent, roof pitch >15°



APPENDIX 19 – GIB AQUALINE

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This publication

This publication is a best practice guide to the design and construction of wall and ceiling linings in wet areas with intermittent water exposure within residential and non-residential buildings, as covered by NZ Building Code Clause E3 Internal Moisture.

The information is designed to be helpful to designers, contractors and home-owners wishing to achieve a result that is easy to incorporate into modern design, simple and clear to construct, and that will satisfy the needs, requirements and expectations of both the NZ Building Code and the end user.

Wet areas in the home often require relatively frequent and expensive renovation or repair, often because of the ingress of water to the structure of the building.

To form a complete wet area system it is important to specify compatible materials and systems, designed to cope with conditions that are common in wet areas, and to ensure correct installation using best practice.

WET AREAS

Generally, wet areas are described as spaces to where fresh water is reticulated, such as bathrooms, toilets, laundries and kitchens. Within wet areas the following requirements apply;

1. NZBC Clause E3.3.4 states that wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.
2. NZBC Clause E3.3.6 states that surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

NZ Building Code Clause E3 also refers to other requirements not covered in this publication, such as ventilation, condensation control and overflow management. Ongoing maintenance of wet areas is also important to maximise service life.

GIB AQUALINE®, GIB TOUGHLINE® AQUA AND GIB WEATHERLINE®

Although able to cope with infrequent short-term exposure, standard gypsum plasterboard will have a shortened life expectancy when frequently exposed to water or a high moisture environment.

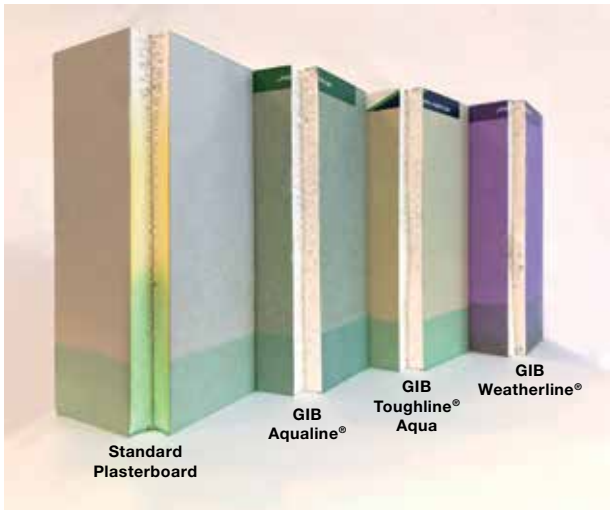
The NZ Building Code does not call for water resistant linings in wet areas but it is desirable to specify lining materials which will maintain their integrity longer when exposed more frequently to moisture, and to one-off events such as leaks or flooding.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® feature a water-resistant polymer impregnated core, designed for wet area applications. These core formulations not only resist penetration of moisture through the lining into the framing behind, but also resist water “wicking” up the core, a common cause of long-term damage where a water-resistant lining has not been used.

WATER ABSORPTION TEST

The illustrations below show how GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® compare with standard plasterboard after soaking for two-hours in green dye.





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WHERE TO USE GIB® WET AREA LININGS

In order to prolong the life expectancy of the space it is highly desirable to include wet area linings in situations where there is an increased risk of water or moisture damage. Applications include walls and ceilings in bath and shower rooms, and walls in laundries, toilets and kitchens.

BENEFITS

- Water resistant and durable linings help protect against water damage
- Proven substrate for paint, wallpaper, waterproofing membranes, tiles, sheet vinyl and rigid sheet shower linings
- Suitable for both residential and non-residential applications
- Dimensionally stable and an excellent substrate for ceramic tiles
- Conventional jointing methods
- Easy to cut and form openings
- Contains glass fibres and other additives to increase strength and fire resistance
- May be used in GIB® Bracing, GIB® Fire Rated and GIB Noise Control® Systems (see Compliance with the NZ Building Code, Clauses B1, C3 and G6). Consult the appropriate GIB® literature for installation details

HANDLING AND STORAGE

- GIB® plasterboard must be stored under cover, stacked flat and clear of the floor with sufficient support to avoid sagging
- GIB® plasterboard must be handled as a finishing material

LIMITATIONS

- GIB® wet area linings must not be used for bracing purposes in shower cubicles or above baths. For more information refer to page 9 of this manual
- Do not use GIB® wet area linings where exposed for extended periods to humidity levels above 90% RH, such as in group shower or steam rooms, or where exposed to moisture and chlorine rich environments such as in indoor swimming pools
- GIB® wet area linings used in a bathroom or other high humidity environment must not be directly applied to solid plaster (gypsum or cement), wood-based sheet linings or similar materials, masonry or concrete, without strapping or steel furring channels
- GIB® wet area linings must not be installed over a vapour barrier or a wall acting as a vapour barrier
- Cracked or damaged sheets must never be used
- GIB Aqualine® or GIB Toughline® Aqua must not be used in external applications
- GIB® plasterboard must not be exposed to temperatures in excess of 52°C for prolonged periods. Heat-generating devices may include halogen lighting, cooking elements, radiant heating, solid fuel exhausts and fire surrounds. Consult the appliance manufacturer for installation details

Table 1: GIB® Wet Area linings sheet dimensions and weights

Product	Sheet face colour	Thickness (mm)	Sheet width (mm)	Edge Type	Sheet length (mm)						Max. Weight (kg/m²)
					2400	2450	2700	3000	3600	4800	
GIB Aqualine®	Green	10	1200	TE/TE	■		■	■	■		8.0
			1200	TE/SE	■					■	
			1350	TE/SE	■				■		
		13	1200	TE/TE	■		■	■	■		11.0
GIB Toughline® Aqua	Mauve	13	1200	TE/TE	■		■	■			11.4
GIB Weatherline®	Purple	10	1200	SE/SE		■	■	■			9.0
		13	1200	SE/SE			■	■			11.5

BOARD SUBSTITUTION OPTIONS

Acceptable GIB Aqualine® alternatives	
10mm GIB Aqualine® can be replaced with:	10mm GIB Weatherline® 13mm GIB Toughline® Aqua
13mm GIB Aqualine® can be replaced with:	13mm GIB Weatherline® 13mm GIB Toughline® Aqua

GIB® Wet Area System construction details in this manual refer to the use of GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® sheets may also be used in place of GIB Aqualine®.

FLEXIBLE SHEET VINYL – SHOWERS AND OTHER WET AREAS

- GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® are suitable substrates for flexible vinyl wall finishes in wet areas of residential, commercial or institutional buildings
- Framing requirements and installation procedures are presented in this literature, except that the lining gap at the floor is no more than 5mm when a pencil cove detail is used
- The installation of galvanised steel reinforcing angles behind internal lining corners is recommended for sheet vinyl applications in showers or shower over bath situations
- The lining must be jointed and stopped to a paint quality finish (Level 4) – trowel marks can telegraph even through a commercial grade 2mm vinyl
- A commercial grade vinyl is recommended in commercial or institutional bathrooms and showers
- In areas directly exposed to liquid water, all joints in flexible sheet vinyl must be heat welded
- Installation of flexible vinyl must be carried out strictly in accordance with the specifications provided by the suppliers/ manufacturers of the vinyl

RIGID SHEET SHOWER LININGS

- The wall surface must be free of dust before installation of the lining
- Avoid lining joints as much as possible and where necessary flush with plaster to achieve a level surface
- Do not preseal or paint areas which are to be covered by the rigid shower linings
- The suppliers of thin (usually 2-3mm) and rigid acrylic shower linings commonly recommend direct adhesive fixing to wall linings using solvent-based adhesives
- Care must be taken to ensure that rooms are adequately ventilated
- Water temperature changes will cause movement of the thin acrylic sheet, which in turn will stress the adhesive and wall lining substrate
- Consult the supplier of the shower lining for full installation details
- Suppliers of rigid sheet acrylic shower linings recommend a minimum of 24 hours for the adhesive to cure fully prior to the shower being put into service

WATERPROOF MEMBRANE SYSTEMS AND TILING

- A waterproof membrane system must be applied to lining materials used as a substrate for ceramic tiles in a shower or shower over bath situation
- The wall surface in a shower or shower over bath situation is not complete and ready for tiling until coated with a waterproof membrane system over the lining and once penetrations for shower mixers, taps and associated fittings are sealed
- The installation of galvanised steel reinforcing angles behind internal lining corners is required for tiled wall applications in showers or shower over bath situations
- In-situ waterproofing membrane materials manufactured to AS/NZS 4858:2004 “Wet Area Membranes” are recommended and must be applied to manufacturer’s recommendations. Typically, these types of membrane systems are not suitable for paint and wallpaper finishes
- Waterproof membrane systems must be fully cured and dry prior to application of tiling adhesives
- Preformed sheet membranes are also available and may be more suitable where curing times or specialist skills are an issue
- The details shown in this manual are generic in nature. For accurate detailing, follow the specifications provided by the supplier of the proprietary waterproof membrane system

For further information on tiling consult the BRANZ Good Practice Guide – Tiling.

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PENETRATIONS AND SEALANTS

As leaks and water ingress typically occur at junctions between building elements and at penetrations, it is essential that particular attention is given to these details at the time of installation. Lack of attention to detail can result in water damage that could remain undetected for a long time.

- Ensure that all cut-outs for pipe penetrations are made neatly, and slightly oversize, with a hole saw. These penetrations should be of a diameter no more than 12mm greater than that of the pipe
- Ensure shower mixer and tap penetrations are sealed with a proprietary flange system to prevent the passage of moisture into the wall cavity
- Sealants should be of a mould inhibiting type and be paintable. Neutral cure silicones will generally meet these requirements
- Surfaces should be dry and free from dust before application, a minimum of a 4mm joint width provided and the depth should not exceed the width
- Apply a bead of sealant to the full depth of the lining in the following locations:
  - Around all tap/pipe bodies
  - The gap between the bath rim and the bottom edge of the wet area lining
  - Between the upstand of preformed shower bases and the bottom edge of the lining
  - Where an impervious junction is required at the floor/wall line, carefully seal the gap between the bottom edge of the board and the finished floor. Leave a 5-10mm gap at the bottom of the wall lining for this purpose, ensuring the gap is free from dirt and dust
- Do not locate shower heads or taps on fire rated or intertenancy walls. Should this be unavoidable always use tested and approved proprietary penetration seals

RENOVATIONS

Bathrooms, kitchens and laundries are the most renovated rooms in the house, partly due to fashion considerations and partly because of damage sustained by ingress of water and moisture.

When renovating these rooms it is often easier and more cost-effective to remove the existing linings and replace them. This allows for a new start in the room and offers sound substrates for new surfaces such as tiling and painting, where otherwise flaking paint or damaged plasterboard may compromise good and sound finish or practice. At the very least re-lining will:

- Allow for inspection of framing where damage may have occurred and provide the opportunity to repair such damage
- Allow plumbing and electrics to be checked and altered or replaced where required
- Provide the opportunity to install thermal and acoustic insulation, water-resistant linings, and propriety plumbing penetration flange systems where appropriate
- Make the job easier

MAINTENANCE

Lack of maintenance is frequently the cause of premature and often expensive failure of components and building elements within wet areas.

It is important to regularly inspect and repair any potential problem before it becomes expensive to reinstate. Good maintenance should include:

- Ongoing ventilation. At the very least, good passive ventilation (e.g. window vents); but good active ventilation (e.g. extraction fans) of an appropriate size for the room is recommended
- Impervious coatings and surfaces should be checked for wear and damage and maintained and re-coated before ingress of water to the substrate occurs
- Regular cleaning with appropriate cleaners so that build-up of matter, such as mould, is well controlled
- Sealants at junctions and penetrations should be checked for adhesion on a regular basis and replaced where adhesion failure to substrates occurs
- Where pipe leaks have become evident, however small, they should be repaired promptly and any area around such leaks dried out completely before any other repairs are carried out

Compliance with the NZ Building Code

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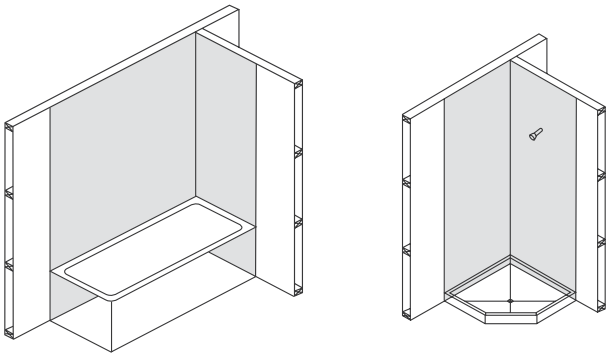
STRUCTURE – CLAUSE B1

The design and material specification for steel and timber framing used in GIB® Wet Area systems must be in accordance with the performance requirements of NZ Building Code Clause B1 (Structure).

Bracing elements are required to have a durability of 50 years. GIB® bracing elements are not to be located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members, such as at bath and shower tray locations.

Otherwise, GIB® Bracing Systems can be used in water-splash areas, provided these are maintained impervious for the life of the building.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. They can also be used in place of GIB Braceline® in GIB® bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB® Grabber 32mm x 6g screws at 100mm centres, using the GIB Braceline® corner fixing pattern. Refer to the GIB® Bracing System literature.



No bracing in the shaded areas.

DURABILITY – CLAUSE B2

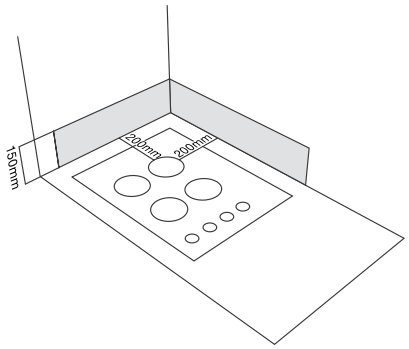
When installed and maintained in accordance with this literature, GIB® Wet Area systems tiled or vinyl covered have a serviceable life of at least 15 years. They comply with the requirements of NZ Building Code Clause B2 (Durability) for use in wet areas directly exposed to liquid water, e.g. showers, showers over baths and splash-backs.

When used as a general wet area lining and maintained under normal dry internal conditions, GIB® Wet Area Systems have a serviceable life of at least 50 years and comply with NZ Building Code Clause B2 (Durability) for use within toilets, kitchens, bathrooms and laundries not directly exposed to liquid water.

FIRE AFFECTING AREAS BEYOND THE SOURCE – CLAUSE C3

GIB® Fire Rated Systems provide passive fire protection in accordance with the requirements of NZ Building Code Clause C3. When GIB Aqualine® or GIB Toughline® Aqua is substituted into fire rated systems in place of the equivalent thickness GIB Fyreline®, the Fire Resistance Rating (FRR) of that system will be maintained.

The protection of combustible surfaces surrounding gas cooking appliances is covered by the latest version of AS/NZS 5601.1.



As a guide the following options are acceptable for wall surfaces within 200mm of the periphery of a gas element to a height of 150mm above the element for the full dimension (width and depth) of the cooktop surface area:

- 5mm tiles on GIB® plasterboard
- 5mm toughened glass on GIB® plasterboard
- or any system that can be demonstrated to meet the specific requirements of AS/NZS 5601.1

GIB® plasterboard products must not be exposed to temperatures in excess of 52°C for sustained periods. Check with the appliance manufacturer that this requirement will be met. It would be unusual for surfaces outside 200mm to exceed 52°C for sustained periods.

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INTERNAL MOISTURE – CLAUSE E3

The New Zealand Building Code Clauses that relate to wall surfaces are;

E3.3.4 - Wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.

E3.3.5 - Surfaces of the building elements likely to be splashed or become contaminated in the course of the intended use of the building, must be impervious and easily cleaned.

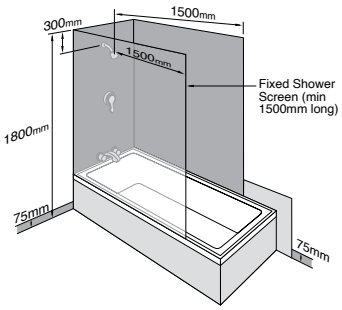
E3.3.6 - Surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

New Zealand Building Code Acceptable Solution E3/AS2 substantially refers to the Waterproof Membrane Association Incorporated (WMAI) Code of Practice for Internal Wet Area Membrane Systems (IWAM), August 2020.

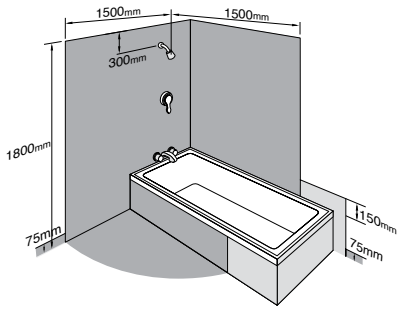
The IWAM Code of Practice refers to wet area membranes and over-surfaces that are easy to clean and suggests an extent as outlined below for a typical bathroom application. For further details refer to the IWAM Code of Practice which also lists suitable rigid sheet materials and tiling membranes.

Shaded areas in the diagrams below represent the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.

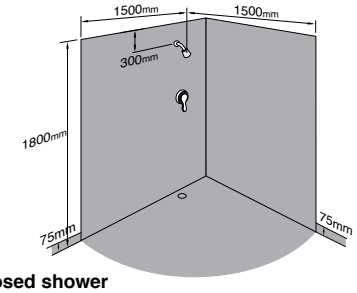
Enclosed shower over bath



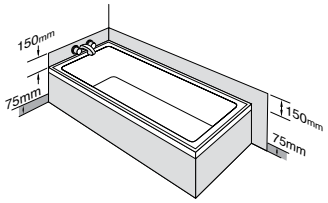
Unenclosed shower over bath



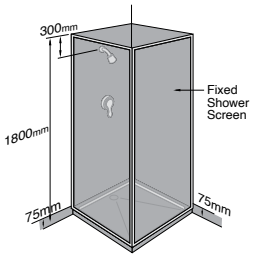
Unenclosed shower



Bath



Enclosed shower



HAZARDOUS BUILDING MATERIALS – CLAUSE F2

At no stage during its serviceable life does GIB Aqualine® constitute a health hazard. It therefore meets the provisions of NZ Building Code Clause F2 (Hazardous Building Materials). Dust resulting from the sanding of stopping compounds may be a respiratory irritant and the use of a suitable facemask is recommended.

VENTILATION – CLAUSE G4

NZ Building Code Clause G4 (Ventilation) requires buildings to have a means of collecting or otherwise removing steam generated from laundering, utensil washing, bathing or showering. To prolong the life of interior linings and surface finishes and to minimise the risk of moisture related problems such as condensation and mould growth, adequate heating, thermal insulation and mechanical ventilation must be provided in kitchens, bathrooms and laundries.

AIRBORNE AND IMPACT SOUND – CLAUSE G6

GIB® Noise Control Systems can be used to provide ratings for Sound Transmission Class (STC) and Impact Insulation Class (IIC) in accordance with the requirements of NZ Building Code Clause G6 (Airborne and Impact Sound). When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®, the STC and IIC rating of that system will be maintained. When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information refer to the GIB Noise Control® Systems literature or contact the GIB® Helpline 0800 100 442.

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TIMBER WALL FRAMING

Framing dimensions must comply with the requirements of NZS 3604:2011.

- The moisture content of timber framing shall be 18% or less at the time of lining
- Studs shall be spaced at 600mm centres maximum for both 10mm and 13mm GIB® plasterboard
- Nogs to be evenly spaced with a maximum spacing of 1350mm. Alternatively, nogs may be staggered 150mm maximum either side of a horizontal joint line
- Nogs are not required behind horizontal joints except in shower situations or specific fire or noise control systems

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread screws.

FASTENER CENTRES

- 300mm centres to top and bottom plates and to perimeter studs
- Single fasteners to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Daubs of GIBFix® adhesive at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners. Sheet edges at door or window openings can be adhesive fixed unless forming part of the perimeter of a bracing element

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

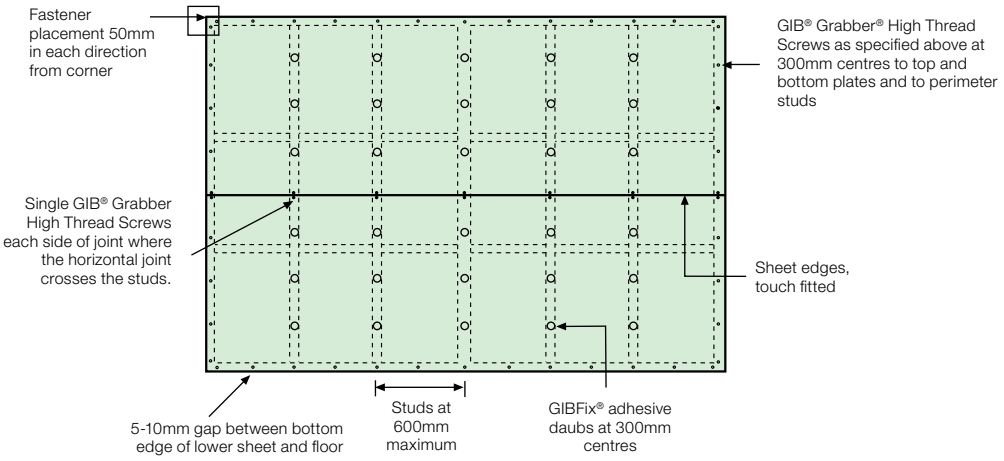
LINING

- Use minimum 10mm GIB® plasterboard
- Install the sheets leaving a 5-10mm gap at the floor line to allow for movement of the framing members and to allow for cleaning dirt and rubbish before sealing
- Sheets to be touch fitted.

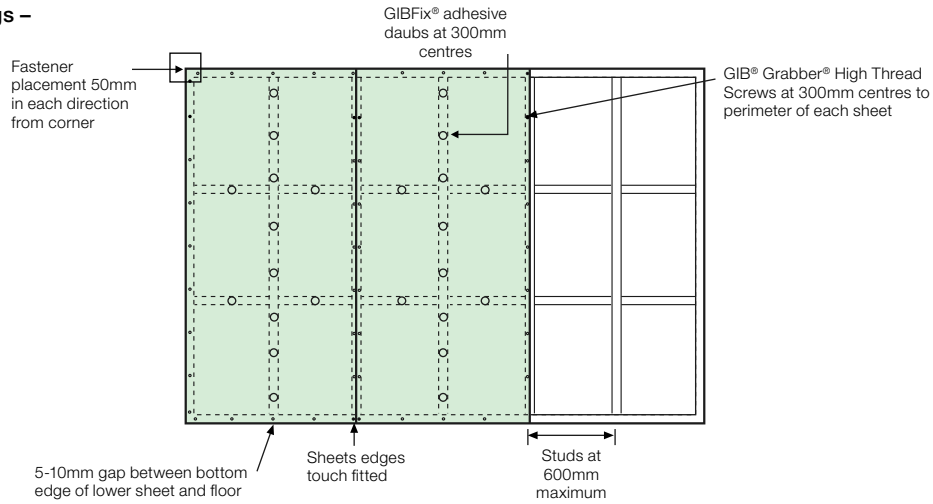
JOINTING

- Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide.

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



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STEEL WALL FRAMING

The minimum sheet thickness for fixing on light gauge 0.55mm base metal thickness (BMT) steel framing is 13mm GIB® plasterboard. For bracing, noise control or fire rating applications consult the relevant GIB® technical publication.

Steel frame for residential construction is in accordance with NZBC B1/AS1 9.1 NASH Standard Part 2 Light Steel Framed Buildings, or by specific design. 10mm GIB plasterboard is commonly used on minimum 0.75mm BMT residential steel framing.

FASTENERS

— Minimum 25mm x 6g GIB® Grabber® Self Tapping Screws.

FASTENER CENTRES

— 300mm centres to top and bottom channels and to end studs

— Single screws to each stud where the horizontal joint crosses the studs

— Place fasteners 12mm from sheet edges and 18mm from sheet ends

— Daubs of GIBFix® All-Bond adhesive or screws at 300mm centres to intermediate studs

— Do not place adhesive at sheet edges or under fasteners.

— Sheet edges at door or window openings can be adhesive fixed.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

LINING

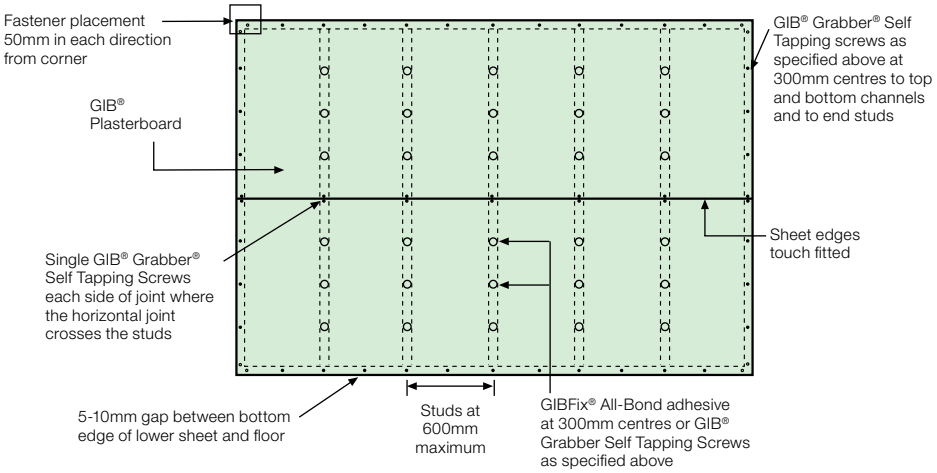
— Lay the sheets, leaving a 5-10mm gap at the floor line. Note: If friction fitted steel studs have been used, sheets must be fitted hard to the floor. Ensure floor is cured and dry

— Sheets to be touch fitted.

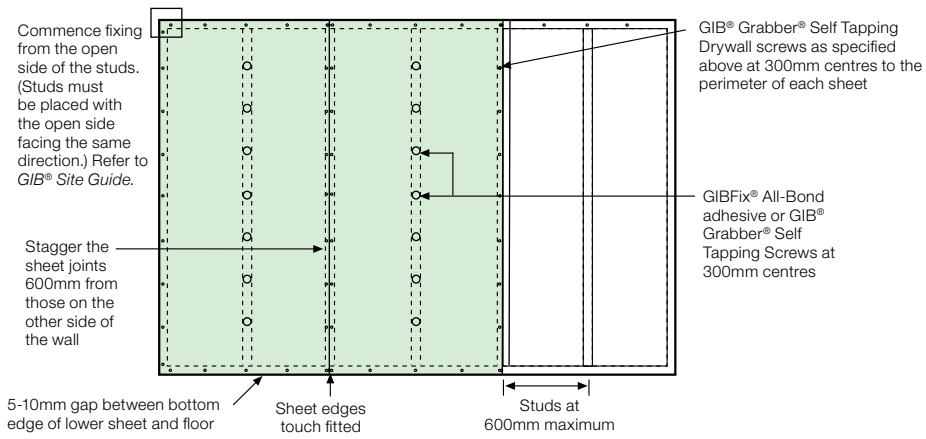
JOINTING

— Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



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TIMBER WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NZS 3604:2011 Timber Framed Buildings, or relevant specific design Standard.

NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Angles need to be temporarily held in place until secured by the lining fixings.

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread Screws

FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Single fasteners to each stud where the horizontal joint crosses the studs
- Where relevant, fastener lengths must comply with the requirements of GIB® Fire Rated Systems or GIB® Noise Control Systems

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

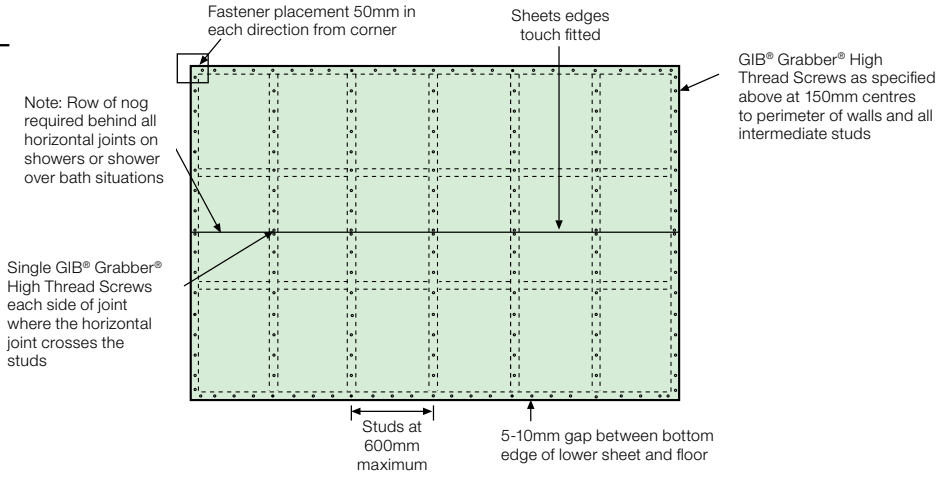
LINING AND TILE WEIGHTS

- Use minimum 10mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

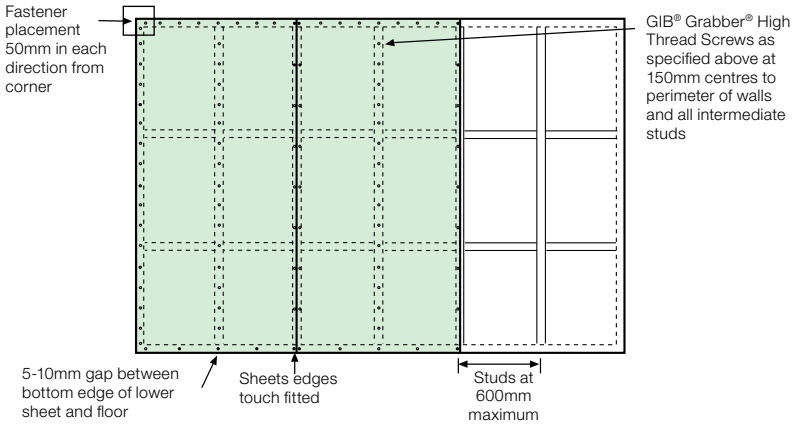
JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



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STEEL WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NASH Standard Part 2:2019 Light Steel Framed Buildings, or relevant specific design Standard.

- Linings are placed hard to floor, bedded into a sealant bead
- Steel framing for tiling to have a minimum base metal thickness (BMT) of 0.75mm

NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Angles need to be temporarily held in place until secured by the lining fixings

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® Self Tapper screws

FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Single screws to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

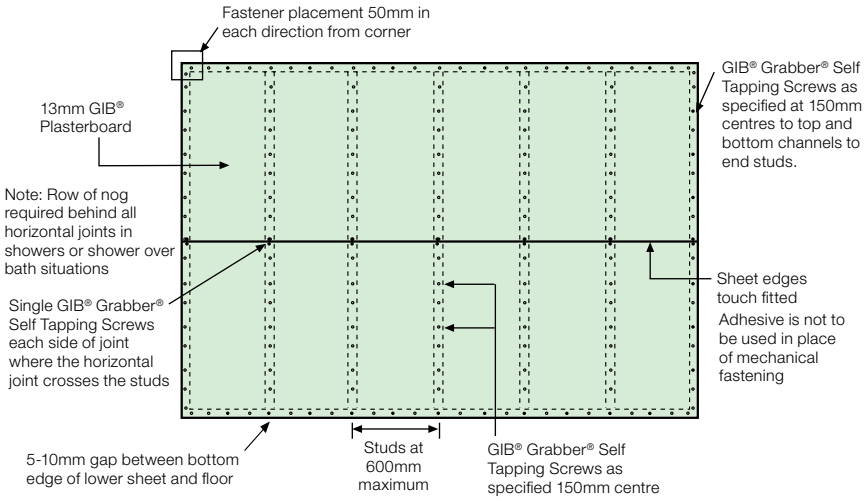
LINING AND TILE WEIGHTS

- Use minimum 13mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

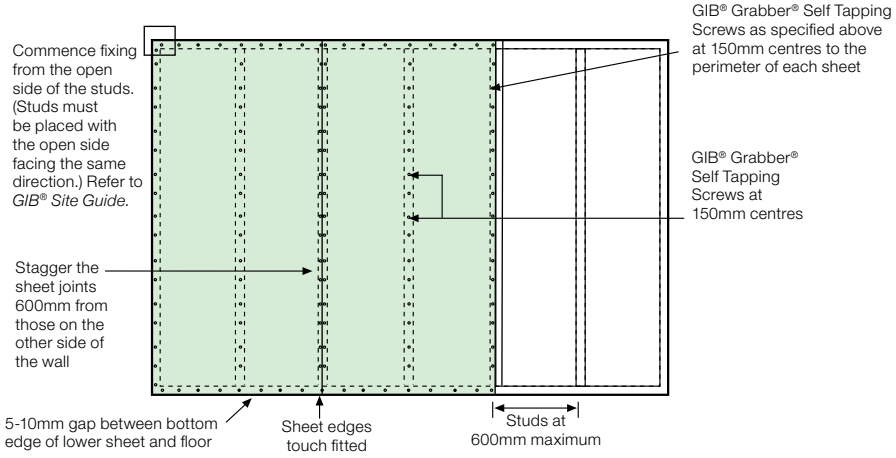
JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



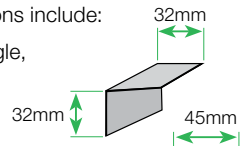
Fastening the Linings – Vertical Fixing Only



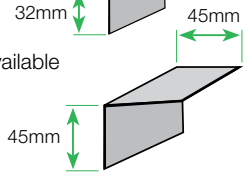
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METAL ANGLES FOR TILED INTERNAL CORNERS

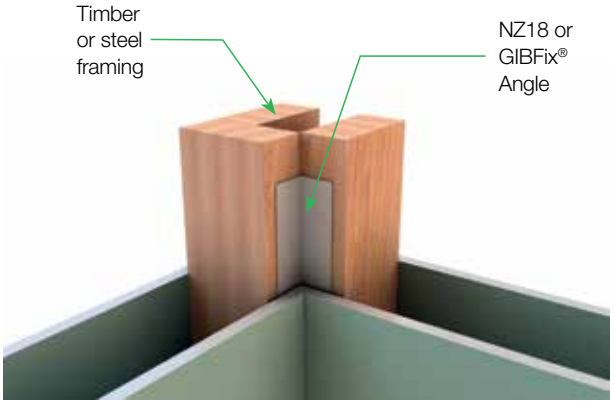
- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum 32 x 32 x 0.55mm galvanised metal angle.
- Suitable GIB® metal angle options include:
  - GIB® Rondo® NZ18 metal angle, available length: 3.0m



  - GIBFix® Angle metal angle, available lengths: 2.4m and 2.7m



- Angles need to be temporarily held in place until secured by the lining fixings
- Minimum height of the metal angle is 1800mm



WATERPROOF MEMBRANE SYSTEMS

A waterproof membrane system must be applied to all lining materials used as a substrate for ceramic tiles in a shower or shower over a bath application, or any other tiled application exposed to frequent water splash.

For further information see p10.

TILES AND TILE WEIGHTS

In areas likely to be directly exposed to water, tiles may be ceramic, porcelain or stone must comply with the over-surface finish requirements of the IWAM Code of Practice and be bedded with a suitable tile adhesive on the waterproof membrane system. See page 10 for the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.

Smaller mosaic tiles are often lighter, but the integrity of grout joints might be more prone to impact, whilst heavier tiles are larger and have less and deeper grout and sealant joints. For more information also see AS 3958:2007 Ceramic tiles – Guide to the installation of ceramic tiles.

Table 2: Recommended maximum tile weights

Maximum Tile Weights for GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline®			
Stud Centre (maximum)	**Fasteners Centre (maximum)**	**Lining Thickness**	**Tile Weight**
600mm maximum	150mm maximum	10mm	26kg/m^2
		13mm	40kg/m^2

ADHESIVE AND GROUT WEIGHTS

The weight of adhesive and grout can vary depending on the type of tile and the installation process used. The maximum tile weights stated in table 2 are conservative and refer to the tile weight excluding grout and adhesive used. An additional 3kg/m^2 has been factored into tile adhesion testing on top of the above stated tile weights to account for adhesive and grout weight used during the installation of the tile.

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CEILING FRAMING

Framing dimensions and spacing must comply with the requirements of NZS 3604:2011, NASH for steel or relevant NZ Standard.

For noise control or fire rating applications consult the relevant GIB® technical publication.

FASTENERS

- Steel battens – 25mm x 6g GIB® Grabber® Self Tapping screws
- Timber battens or Joists – 32mm x 6g GIB® Grabber® High Thread screws

ADHESIVES

- Steel battens - GIBFix® All-Bond
- Timber battens - GIBFix® All-Bond or GIBFix® One

FASTENERS CENTRES

- Single screws to the edges and centre of the sheets across each batten
- Single screw at 600mm maximum to the perimeter of the ceiling
- Screws to be 12mm from sheet edges
- Daubs of adhesive at 200mm centres between the screws
- Do not place adhesive at sheet edges or under fasteners, this may lead to screw pops

LINING

- The lining shall be fixed at right angles to the battens or joists
- Commence fixing from the centre of the sheets outwards.
- Sheets to be touch fitted
- Use long length sheets to minimise sheet end butt joints.
- Back-block sheet end butt joints
- See GIB® Site Guide for sheet edge backblocking requirements

BATTEN SPACINGS

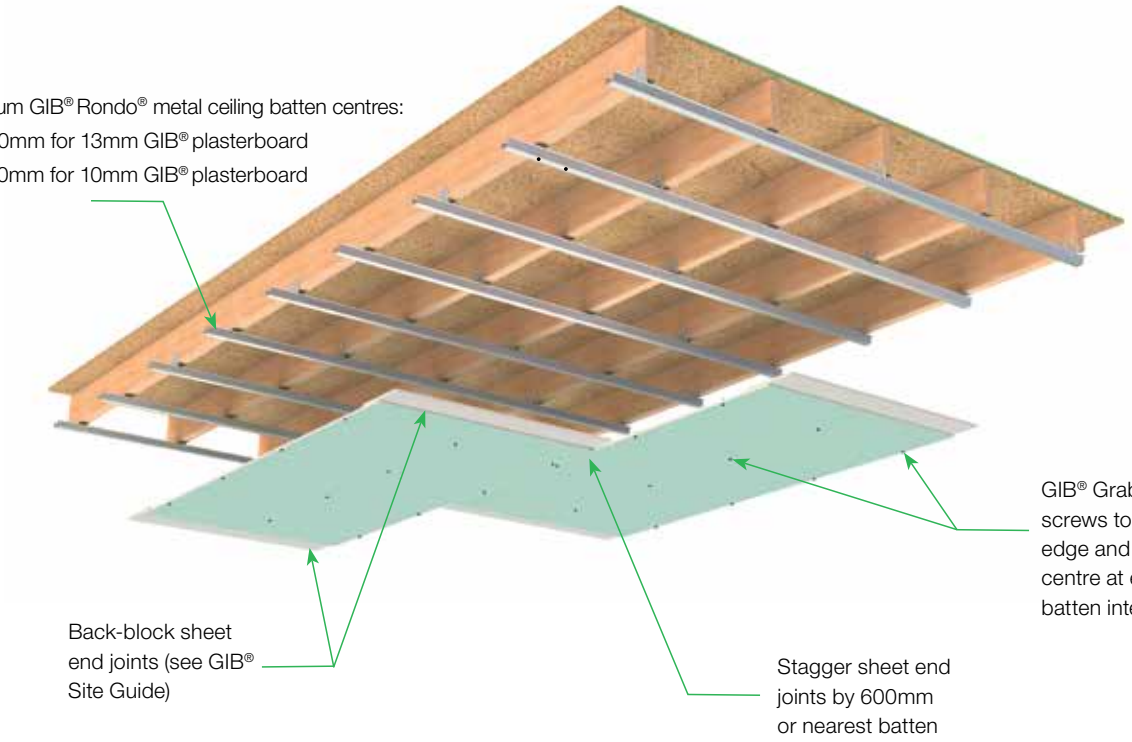
- 13mm GIB® plasterboard – 600mm centres maximum
- 10mm GIB® plasterboard – 450mm centres maximum

JOINTING

- All sheet joints must be paper tape reinforced and stopped in accordance with instructions in the GIB® Site Guide
- Do not fix tiles to GIB® plasterboard ceilings

Maximum GIB® Rondo® metal ceiling batten centres:

- 600mm for 13mm GIB® plasterboard
- 450mm for 10mm GIB® plasterboard



APPENDIX 20 – BATH INSTALLATION GUIDE

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Installation Instructions

Freestanding and Back-to-Wall Baths

IMPORTANT:
Please ready the following instructions carefully before commencing installation.
Qualified tradesmen must carry out all plumbing works and all aspects of the installation process should be in accordance with the building code.

newtech
BATHROOMWARE DESIGN ■ INNOVATION

0800 728 662
www.newtech.co.nz

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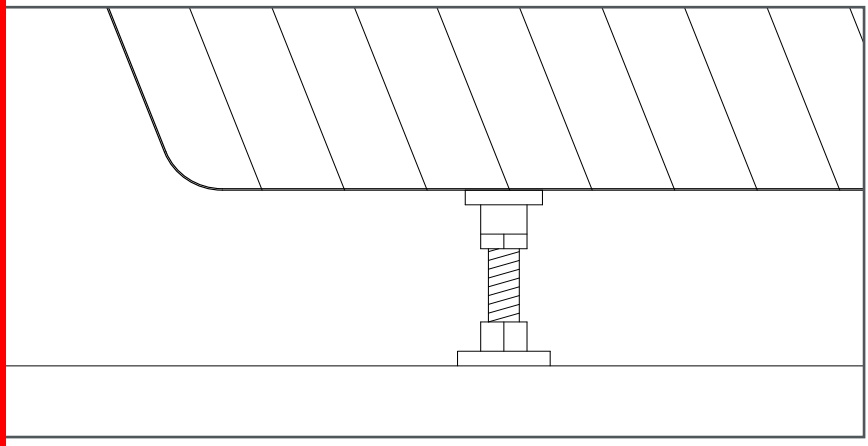
FREESTANDING AND BACK-TO-WALL BATH
Installation Instructions

For optimum results the bathroom floor should be level. To aid the installation the use of a low profile 2-piece bath waste is recommended.
Refer to Newtech Evoke 2-Piece 40mm Bath Waste - Product Code: 2280.

1. Newtech baths are supplied on an integrated support with adjustable feet. Place the bath in the desired position. Note: Waste placement and plumbing requirements should have been determined and prepared by this stage. Once in the desired position adjust the bath feet so that the baths surround is touching the floor.

2. Using the spirit level check to ensure the top edge of the bath is level. If necessary, use the levelling feet to adjust. Adjusting the feet will cause the acrylic surround to lift off the floor.

BATH INSTALL DETAIL LEG



3. Carefully tilt the bath backward and apply an appropriate adhesive to each of the bath feet.

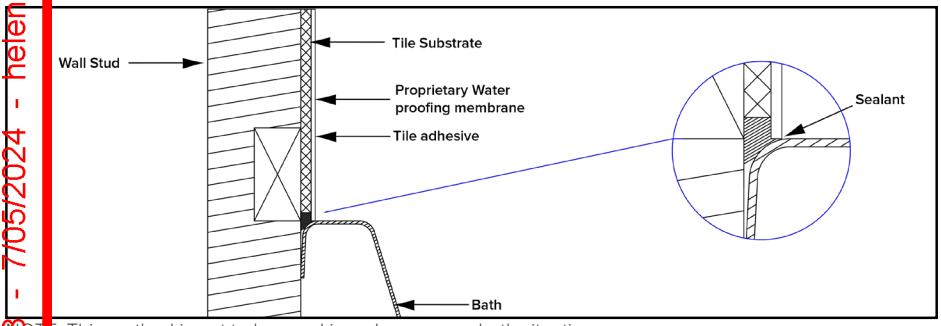
4. Connect the waste and lower the bath into position.

5. As an option, once the bath is in its final position the acrylic surround may be sealed to the floor using a sanitary grade silicone. Leave to cure for a minimum of 24 hours with no water

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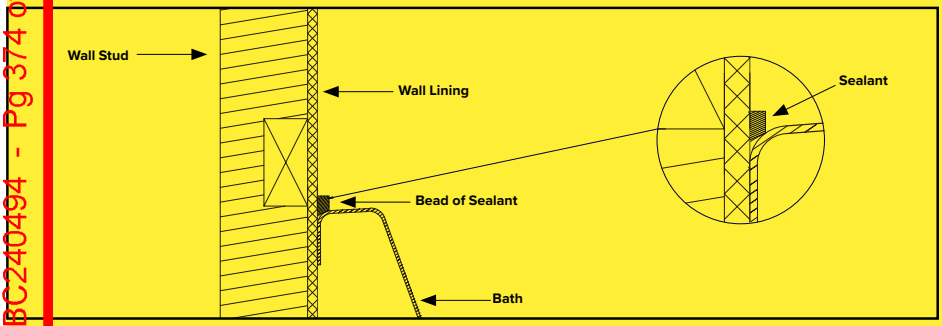
Additional installation instructions for a Newark/Indus Back-to-Wall Baths or Park Avenue Bath

INSTALLING WITHOUT AN UPSTAND - TILES



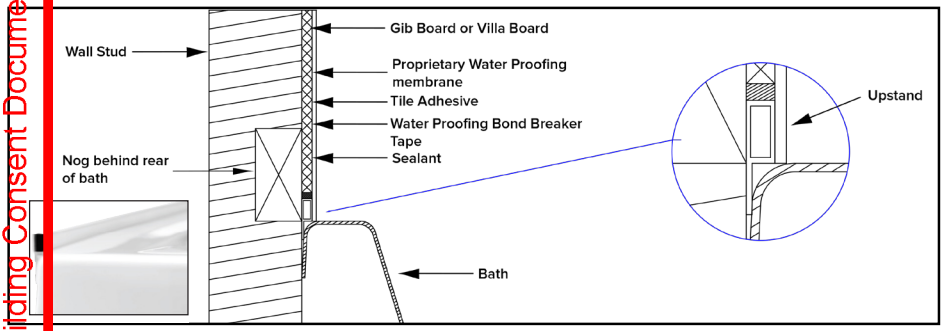
NOTE: This method is not to be used in a shower over bath situation

INSTALLING WITHOUT AN UPSTAND - WALL LINING



NOTE: This method is not to be used in a shower over bath situation

INSTALLING WITH AN OPTIONAL UPSTAND



NOTE: When installing a shower over a bath, an upstand must be installed in accordance with the NZ Building Code.

DO NOT RUN WATER UPON INSTALLATION FOR 24 HOURS

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Newtech warrant that products or product components manufactured and distributed by Newtech:

1. meet or exceed the standard requirements of the New Zealand Building Code; and

2. will be free from inherent defects in materials and workmanship for the extended warranty period applicable to the product.

Newtech will provide a replacement product or replacement part (or the nearest equivalent) free of charge where a product is covered by our warranty. Any remedial works will not be covered by Newtech.

The Newtech warranty will not apply where the product has been improperly installed, has been misused, proof of purchase cannot be provided or where the warranty claim has not been notified to Newtech within three months of the problem first appearing.

For further information, please read the Newtech Warranty document at newtech.co.nz.



Our 5 year warranty offers our customers peace of mind knowing Newtech products are free of defects, both in materials and workmanship.

newtech
BATHROOMWARE DESIGN ■ INNOVATION

Head Office
281 Heads Road, Wanganui
PO Box 2050, Wanganui
sales@newtech.co.nz

Auckland Showroom
525 Great South Road, Penrose, Auckland
aucklandshowroom@newtech.co.nz

0800 728 662
www.newtech.co.nz

APPENDIX 21 – VINYL PLANK ALTERNATIVE SOLUTION

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Belgotex
INTERNATIONAL CARPET & FLOORING

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RE: E3/AS1 LUXURY VINYL TILES – ALTERNATIVE SOLUTION COMPLIANCE

To whom it may concern,

Please find below Belgotex NZ recommended "alternative solution" information to cover ES/AS1 where a building consent for new or refurbished work is required and complies with E3/AS1 building code requirement Belgotex NZ have been distributing the following LVT ranges between 5-20 years in the New Zealand market, the products are manufactured in Europe and China to strict standards and have been operating for 5-50 years. The product can be installed into residential and commercial applications in the following areas- Kitchens, Dining, Laundries, toilets, and bathrooms.

For the use of Belgotex Luxury Vinyl Tile (LVT) ranges:
Primero II, Ultimo II, Matrix Acoustic - Distributor/ 10 years NZ Market/ Manufacturing 15 years
Province - Manufacturer/ 5 years NZ Market/ Manufacturing 5 years
Amtico First product ranges - Distributor/ 20+ Years NZ Market/ Manufacturing 50+ years

E3.3.1
An adequate combination of thermal resistance, ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries, and other spaces where moisture may be generated or may accumulate.

Please refer to our Installation guidelines available to download from our website:
Primero II and Ultimo II Installation Recommendations
Matrix Acoustic Installation Recommendations
Amtico First Installation Recommendations
Province Installation Recommendations

E3.3.2
Free water from accidental overflow from sanitary fixtures or sanitary appliances must be disposed of in a way that avoid loss of amenity or damage to household units or other property.
The following can be used and is as per the document on page 3.
This is a Building/plumbing design not flooring. Discuss with designers. Amendment allows as part of containment for integrated overflows instead of floor wastes.

Supplement Section
Belgotex recommends Gilt Edge Industries specifications for installation of all Belgotex Luxury Vinyl Tile (LVT) ranges which can be downloaded from www.giltedge.co.nz/systems/specifications

Watersplash Kitchens, Toilets & Laundries along with **bathrooms**

- Concrete substrates - LVT Overlay on Concrete floors E3 Kitchen, Toilet & Laundry Watersplash
- Concrete substrates - LVT Overlay on Concrete floors E3 Bathroom Watersplash
- Timber substrates - LVT Overlay on Timber Floors E3 Kitchen, Toilet & Laundry Watersplash
- Timber substrates - LVT Overlay on Timber Floors E3 BATHROOMS Watersplash

Containment- Bathrooms

- Concrete substrate- LVT OVERLAY E3 AS1 Containment 12112021
- Timber Substrate- LVT ON TIMBER E3 AS1 Containment 07122021

Flooring Design Centres
25 Leslie Hills Drive, Riccarton, Christchurch
159 Great North Road, Grey Lynn, Auckland

P. +64 3 349 2140 | **F.** +64 3 349 4816 | belgotex.co.nz | info@belgotex.co.nz
Postal Address PO Box 9238, Tower Junction, Christchurch 8149
Distribution Centre 12 Ha Cres, Wiri, Auckland

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E3.3.3

Floor surfaces of any space containing sanitary fixtures or sanitary appliances must be impervious and easily cleaned.

Our LVT collections all feature a high-density Urethane Wear layer making them impervious to moisture penetration. This wear layer is extremely easy to clean, has high clarity and comes with excellent impact resistance.

Primero II Technical Specifications
Ultimo II Technical-Specifications
Matrix Acoustic Technical Specifications
Province Technical Specifications
Amtico First Technical Specifications

E3.3.4

Wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily clean- *Please refer to the Wall provider/Builder/ Construction Company for specific information.*

E3.3.5

Surfaces of building elements likely to be splashed or become contaminated during the intended use of the building, must be impervious and easily cleaned.

Please refer to our Care and Maintenance guidelines available to download from our website:
Primero II Care and Maintenance Guide
Ultimo II Care and Maintenance Guide
Matrix Acoustic Care and Maintenance Guide
Province Care and Maintenance Guide
Amtico First Care and Maintenance Guide

E3.3.6

Surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

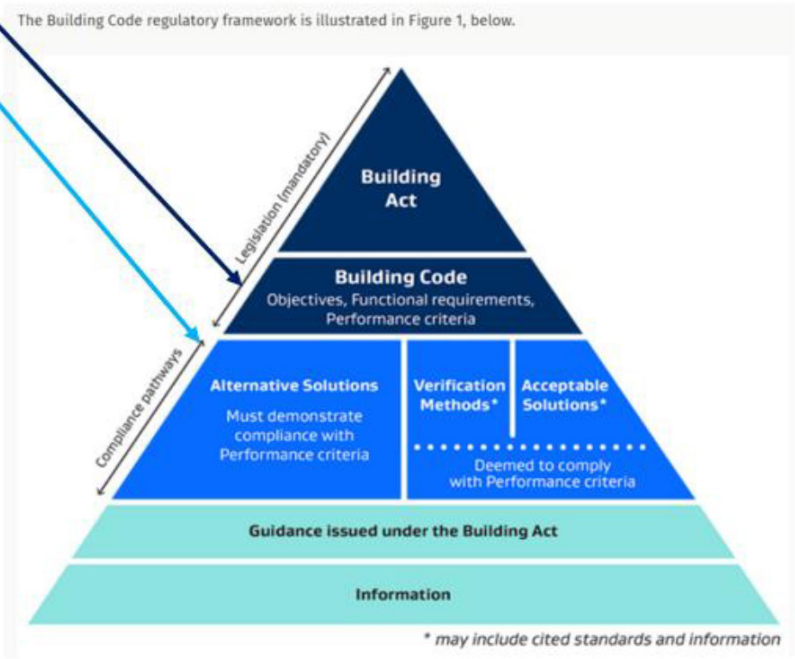
All Belgotex Luxury Vinyl Tile (LVT) ranges require that gaps or cracks are eliminated around any parts of the perimeter that are exposed to water splash.

In keeping with clause 3.1 and 3.6 all perimeters that are within 1.5m of all or any sanitary fixtures and appliances are to be sealed with a silicone or flexible sealant recommended by Gilt Edge Industries or similar.

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Wording and clauses of the E3

a. Objective
b. Functional requirement
c. Performance clauses



KEY PROVISIONS FROM THE NEW ZEALAND BUILDING CODE - BUILDING REGULATIONS 1992 (VERSION AS AT 15 NOVEMBER 2021) **SHEDULE 1 CLAUSE E3 INTERNAL MOISTURE**

OBJECTIVE

E 3.1

(a) Safeguard people against illness, injury, or loss of *amenity* that could result from the accumulation of internal moisture; and

(b) **P**rotect household units and other property from damage caused by free water from another household unit in the same building

FUNCTIONAL REQUIREMENT

E3.2 *Buildings* must be constructed to avoid the likely hood of-

(a) **F**ungal growth or the accumulation of contaminants on linings and other building elements; and
(b) **F**ree water overflow penetrating to an adjoining household unit; and
(c) **D**amage to building elements being caused by the presence of moisture.

PERFORMANCE

E3.3.2 Freewater from accidental overflow from *sanitary fixtures* or *sanitary appliances* must be disposed of in a way that avoids loss of *amenity* or damage to *household units* or *other property*. This is Building/plumbing design **not** flooring. Discuss with designers. Amendment allows as part of containment for integrated over flows instead of floor wastes.

E3.3.3 Floor surfaces of any space containing *sanitary fixtures* or *sanitary appliances* must be *impervious* and easily cleaned.

E3.3.5 Surfaces of *building elements* likely to be splashed or become contaminated in the course of the *intended use* of the *building*, must be *impervious* and easily cleaned

E3.3.6 Surfaces of *building elements* likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into *concealed spaces*.

APPENDIX 22 – HOT WATER SYSTEM

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July 2016

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INSTALLATION INSTRUCTIONS
&
OWNERS GUIDE

RHEEM MAINS PRESSURE ELECTRIC HOT WATER HEATERS

Congratulations for choosing a Rheem Water Heater

It is important that you take a few minutes
to read this booklet as it may save you
time and trouble later.
If you require any further information or your
water heater needs to be serviced, please contact the
Rheem Service Department on 0800 657 335,
or the nearest service centre
(look in the Yellow Pages under “Plumbers”)
Or visit www.rheem.co.nz

Important to the Installer

Do not leave this booklet inside the element cover
after installation
Please leave the booklet with the water heater’s owner

IMPORTANT INFORMATION

GENERAL

- The information contained in this manual, and all other information or advice given at any time by Rheem New Zealand Limited in connection with the purchase, installation or use of a Rheem water heater, is given in good faith. Subject to any rights the owner may have under the “Consumer Guarantees Act 1993”, Rheem New Zealand Limited will not be liable to any person for any inaccuracy or omission in the information or advice arising through the fault or negligence of Rheem New Zealand Limited or any other person or through any other cause whatsoever.
- This water heater is not intended to be operated, adjusted or tampered with by young children or infirm persons. Young children should be supervised to ensure they do not play with the water heater.

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ABOUT YOUR WATER HEATER

Q. DOES THE WATER QUALITY AFFECT THE WATER HEATER?

A. Your water heater is suitable for most public water supplies, however, some water qualities may have a detrimental effect on it. **If you are in a known harsh water area please refer to page 6**.

Q. HOW HOT SHOULD THE WATER BE?

A. All models (temperature range 60 - 70°C) require an authorised person to make any temperature adjustments. For reasons of safety and economy, we advise the thermostat is adjusted to the lowest setting that meets your needs.

The New Zealand Building Code requires a stored temperature setting of not less than 60°C. A tempering valve set at a maximum of 55°C must be used on domestic wet areas.

Q. HOW DO I KNOW IF THE WATER HEATER IS INSTALLED CORRECTLY?

A. Refer to the installation requirements on page 4.

Q. HOW LONG WILL THE WATER HEATER LAST?

A. There are a number of factors that affect the life of the water heater. These include; the water quality, water pressure, water temperature and the usage pattern, however, your Rheem water heater is supported by a comprehensive warranty (refer to page 7).

The life of the water heater may be extended by arranging for an authorised person to inspect the anode and replace it, if required.

The suggested time after installation when the anode should be inspected is:

Vitreous Enamel 8 years
Optima 10 years

For softened water supplies or in areas of poor water quality, it is recommended the anode be inspected 3 years earlier than shown (refer to "Water Quality" on page 6).

HOW THE WATER HEATER WORKS

SINGLE AND TWIN ELEMENT MODELS

Water stored within the water heater is heated by the electric heating element. The thermostat controls the electricity supply to the heating element so that a constant water temperature is maintained. As the cold water is heated it expands approximately 1/50 of its volume and, as a result, a small amount of water is discharged from the cold water expansion valve.

NON-SIMULTANEOUS ELEMENT MODELS

The two heating elements are wired for non-simultaneous operation, so that only one heating unit can operate at a time. The bottom heating unit is usually connected to an off-peak (overnight) supply and the top heating unit to a continuous supply. **The red link wire must be removed from the terminal block during installation if two separate power supplies are to be used**. Leaving the link in place ensures both elements operate correctly with a single power supply.

The basic operation is as follows: when the water temperature at the top of the water heater has reached the set temperature, the thermostat switches the top element off. This creates a circuit to the bottom heating element by switching the neutral.

SAFETY

On all models, a Temperature and Pressure Relief valve is supplied with each water heater. It can be found inside the front cover and must be mounted on top of the water heater.

Also fitted to the water heater is a thermostat, which incorporates an over-temperature thermal cut-out device.

⚠ ***Warning:*** *The operation of the thermal cut-out indicates a possible dangerous situation. The thermostat and thermal cut-out is to only be adjusted or reset by an authorised service person.*

These safety devices must not be tampered with, or removed, and under no circumstances operate the water heater unless both devices are fitted.

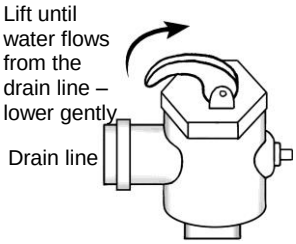
REGULAR CARE

MANUALLY OPERATING THE TEMPERATURE AND PRESSURE RELIEF (TPR) VALVE:

The easing lever (see diagram. 1) on the TPR valve should be operated regularly to remove lime deposits and verify that it is not blocked. **It is very important that you raise and lower the lever gently.**

⚠ ***Warning:*** *To ensure the relief valve is working correctly, operate the relief valve easing lever at least every six months. Failure to do this may result in the water heater over-pressurising.*

DIAGRAM 1



Water Heater

If water does not flow freely from the drain line or the valve fails to completely close and water continues to be discharged, contact the Rheem Service Department, phone **0800 657 335,** or the nearest Rheem Service Centre (look in the Yellow Pages under "Plumbers).

GOING ON HOLIDAYS:

If you plan to be away from home for one or two nights, we suggest that you leave the water heater switched on. However, if you plan to stay away more than a few nights, conserve energy by switching the water heater off at the isolating switch, or at the main switchboard. In locations where freezing could occur, you should leave the water heater turned on.

SAVE A SERVICE CALL

CHECK THE ITEMS BELOW BEFORE MAKING A SERVICE CALL. YOU MAY BE CHARGED FOR SERVICE IF THE FAULT IS NOT RELATED TO THE WATER HEATER MANUFACTURE OR PARTS SUPPLIED WITH THE WATER HEATER BY RHEEM.

WATER DISCHARGING FROM EXPANSION CONTROL VALVES

It is normal for the cold water expansion valve and the temperature and pressure relief valve to discharge a small quantity of water during the heating cycle. If either of these valves discharge more than a bucket full of water in 24 hours, one of the following may be the cause.

- **Continuous dribble**
  Try gently raising the easing lever on the relief valve for a few seconds. This may dislodge small particles of foreign matter and clear the fault.
- **Heavy flow of hot water until the water is cold – then stops while the water reheats**
  Immediately turn off the electricity supply to the water heater. Call the Rheem Service Department or look in the Yellow Pages under "Plumbers" for your nearest Rheem Service Centre or www.rheem.co.nz to arrange an inspection.
- **A steady flow of water (often at night)**
  This may indicate that your cold water pressure sometimes rises above the design pressure of the water heater. A Pressure Limiting valve should be installed, or if one is installed, it may need replacing.

NOT ENOUGH HOT WATER (or no hot water)

- **Is the electricity turned on?**
  Check the switch marked 'water heater' at the switchboard and the water heater isolating switch.
  Check the fuse or circuit breaker marked 'water heater'.

WHERE THE WATER HEATER IS CONNECTED TO AN OFF PEAK (NIGHT RATE) ELECTRICAL TARIFF, THE SUPPLY MAY NOT BE AVAILABLE AT CERTAIN TIMES OF THE DAY.

- **Do you have the correct size heater for your requirements?**
  Refer to the sizing guide in the Rheem sales literature or the Rheem website.
- **Is one outlet (especially the shower) using more hot water than you think?**
  Carefully review the family's hot water usage and if necessary, check the shower flow rate.
  For maximum efficiency we recommend the flow rate through the shower is between 8 to 10 litres per minute (mixed hot and cold). This can be achieved by installing a flow control valve if provision is not made to fit a flow restrictor in the shower rose.
- **Ensure the thermostat setting is appropriate. Note, some models require an authorised person to make electrical thermostat adjustments.**

HIGH ELECTRICITY BILLS

- **Consider recent changes to your hot water usage pattern and check if there has been an increase in tariffs since your previous account.**
- **Is either of the expansion valves discharging too much water?**

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- **Is one outlet (especially the shower) using more hot water than you think?**
- **Is there a leaking hot water pipe, dripping hot water tap, etc?**
  Even a small leak will waste a surprisingly large quantity of hot water and energy. Replace faulty tap washers, and have your plumber rectify any leaking pipe-work.

INSTALLATION

Please take careful notice of the advice given as Rheem New Zealand Limited will not be liable for any loss or damage suffered as a result of the incorrect installation of the water heater, or any failure to check the capability of the electrical supply wiring to the water heater.

The water heater must be installed by a certified person or registered plumber and the installation must comply with the New Zealand Building Code, Rheem Installation Instructions, AS/NZS 3000 electrical installations and all local codes and regulatory authority requirements. Note that no warranty costs will be payable where the water heater is located in a position that does not comply with the Rheem water heater installation instructions or relevant statutory requirements, where the unit is installed in a position that does not allow safe or ready access, the cost of that access shall not be payable (refer to "Rheem Warranty" on page 7).

- **WATER HEATER LOCATION**
  Water heaters with a galvanised outer casing are only suitable for indoor installations, whereas water heaters with a painted casing are suitable for both indoor and outdoor installations.
  Clearance must be allowed for servicing and removal of the water heater and it must be accessible without the use of a ladder or scaffold. (Typical clearances are: TPR valve removal 135 mm, Element Cover and Element Removal 400 mm). Also, you must be able to read the information on the rating plate and if possible, leave headroom of one water heater length so the anode can be inspected or replaced.
- **CONNECTION SIZES**
  - Hot and Cold water connections: RP *¾ / 20.*
  - Relief valve connection: RP ½ / 15.
- **INLET/OUTLET CONNECTIONS**
  A union must always be provided at the cold water inlet and hot water outlet for disconnection reasons. All connection sockets on the water heater are parallel threaded and therefore tapered brass nipples must be used to ensure watertight connections. Both connections are fitted with plastic liners and it is important that they remain in situ for the water heater to function properly. These liners will be pushed into the correct position as the fitting is being screwed in.
- **NON RETURN VALVE**
  A non return valve must be installed on the cold water line to the water heater.
- **PIPE SIZES**
  The cold water line to the water heater should be the same size or bigger than the hot water line from the water heater. For best results, choose the most suitable pipe size for each individual application.
- **COLD WATER EXPANSION VALVE**
  A cold water expansion valve must be fitted to the cold water line to the water heater.
- **TEMPERATURE AND PRESSURE RELIEF VALVE**
  When fitting the temperature and pressure relief valve, ensure the probe has not been bent. Seal the thread with PTFE tape, or similar, as recommended by the valve manufacturer and screw the valve into the off-centre socket. Do not use a wrench on the valve body – use the spanner flats provided. Drain the TPR valve with a pipe the same size as the valve outlet. The drain must run downwards to a visible point outside the house, preferably over a gully trap.
  In some setups or circumstances, such as if freezing could occur, an air break must be provided in the drain within 300 mm of the TPR valve, refer to the New Zealand Building Code - Clause G12 for requirements and acceptable solutions for the running of hot water drain line(s).
  Warning: The drain line from the TPR valve must be in copper. *A Rheem mains pressure water heater must* ***not*** *be installed and operated without a suitable (valve that complies with AS 1357.1) temperature and pressure relief valve. Under no circumstances block the outlet of this valve or its drain pipe.*
- **WATER SUPPLY PRESSURE**
  Maximum permitted mains water pressure - refer product label and Table 5.2 AS/NZS 3500.4. Note inlet pressure control valve is required where maximum permitted mains pressure is likely to be exceeded.
  Minimum inlet pressure: 60 kPa
- **PRESSURE LIMITING/REDUCING VALVE**
  If the water supply pressure exceeds the requirements of Table 5.2 AS/NZS 3500.4, a pressure limiting valve with a maximum setting of 500 kPa is to be fitted in the installation.
- **SAFE TRAY AND SEISMIC RESTRAINTS**
  The water heater must be installed with a properly drained safe tray where there is the possibility of water damage to furniture, carpets or building. All water heaters must be restrained to protect against seismic forces. (Refer to the Zealand Building Code for acceptable solutions.)

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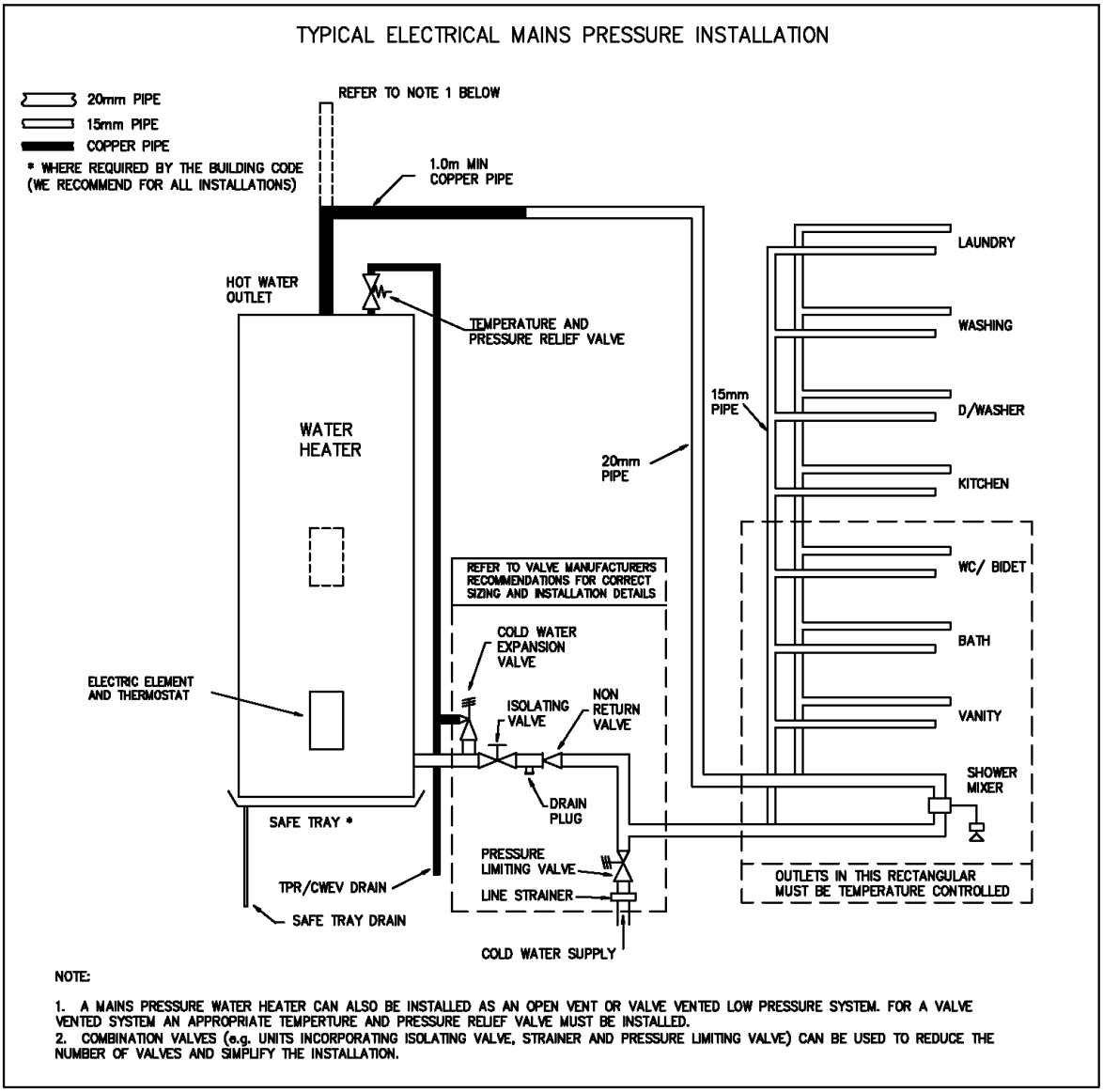


DIAGRAM 2:

CONNECTIONS - ELECTRICAL

The electrical installation must be completed in accordance with AS/NZS 3000. All water heaters are designed for 230 VAC, 50 Hz mains operation and a means of disconnection from the power supply must be incorporated in the fixed wiring during installation.

A flexible 20 mm conduit is required for the electrical cable to the water heater. The conduit is to be connected to the unit with a 20 mm plain to screw adaptor. Connect the power supply wires directly to the terminal block and earth tab connection, ensuring there are no excess wire loops inside the front cover. For details, refer to the wiring diagram on the inside of the element cover. **A separate heating element earth wire is not required because the element earths by the thread of the element boss or the flange being in contact with the element socket.**

COMMISSIONING

TO FILL AND TURN ON THE WATER HEATER

⚠ ***Warning:*** *The power supply to the water heater must not be switched on until the water heater is filled with water and an "earth continuity test", as outlined in Annex A of AS/NZS 60335.1 has been carried out. Failure to do so will damage the element and shorten its life and may create a dangerous situation.*

- Open all of the hot water taps in the house (don't forget the shower). Open the cold water isolation valve fully to the water heater to force the air out of the taps. As water flows freely from each tap, close it. Check the pipe-work for leaks.
- Switch on the electrical supply at the isolating switch to the water heater.

TO TURN OFF THE WATER HEATER

If it is necessary to turn off the water heater on completion of the installation, such as on a building site or where the premises is vacant, then;

- Switch off the electrical supply at the isolating switch to the water heater.
- Close the cold water isolation valve at the inlet to the water heater.

DRAINING THE WATER HEATER

- Switch off the electrical supply at the isolation switch to the water heater.
- Close the cold water isolation valve.
- Operate the relief valve easing lever to release the pressure in the water heater.
- Drain the water heater through the drain valve or plug.
- Undo the top outlet union or operate the relief valve easing lever again to let air into the water heater and allow the water to drain

WHAT YOU SHOULD KNOW ABOUT WATER QUALITY

WATER SUPPLY CHEMISTRY

Water quality can have a detrimental effect on water heater operation, components and life expectancy and may affect the warranty.

⚠ ***Warning****: This water heater must be installed in accordance with advice given to be covered by the Rheem warranty.*

Your Rheem water heater is manufactured to suit the water condition of most local authority water supplies. However, some water supplies can have a detrimental effect on the water heater and its operation and/or life expectancy. This water heater must only be connected to a water supply which complies with these specifications for the Rheem warranty to apply. If you are unsure of your water chemistry you may be able to obtain information from your local water supply authority or you can contact Rheem and we will provide you with contact details of a suitable agency capable of testing your water for compliance with Rheem standards. Water quality tests must be carried out at the owner's cost.

HARSH WATER AREAS

Rheem water heaters are designed for use in areas where the Total Dissolved Solids (TDS) content of the water supply is less than 2500 mg/L.

In areas where the TDS exceeds 600 mg/L it is possible the standard magnesium anode fitted to the water heater, may be excessively active. To alleviate this, the magnesium anode should be replaced with an aluminium anode. Where the TDS of the water is less than 40 mg/L, such as when the water has been deionised or is from an alpine supply, a high potential anode should be used. The changing of anodes must be carried out by a plumber or qualified service person.

CAUTION

If your water supply has a TDS greater than 600 mg/L and the anode has not been changed, there is a possibility of hydrogen gas accumulating in the top of the water heater during long periods of no use.

If, under these conditions, the water heater has not been used for two or more weeks the following procedure should be carried out before using any electrical appliances (e.g. automatic washing machines and dishwashers) which are connected to the hot water supply.

The hydrogen, which is highly flammable, should be vented safely by opening a hot tap and allowing the water to flow. There should be no smoking or naked flames near the tap whilst it is turned on. Any hydrogen gas will be dissipated as indicated by an unusual spurting of the water from the tap. Once the water runs freely again any hydrogen in the system will have been released.

SATURATION INDEX

The saturation index is used as a measure of the water's corrosive or scaling properties. In a scaling water supply calcium carbonate is deposited out of the water onto any hot metallic surface. When scaling water has a saturation index greater than +0.40 an expansion control valve must be fitted on the cold water line after the non-return valve.

Where the saturation index exceeds +0.80, low watts density elements should be used. Where the saturation index is less than -1.0, a corrosive resistant heating unit should be used (contact your local Rheem Service Department or an authorised service person).

Scaling water is water that containing levels of calcium carbonate (total hardness in excess of 200 mg/litre at any time when the water heater is operating) Scaling water can block and prevent the pressure & temperature relief valve from operating, resulting in damage to the water heater storage cylinder and water components. A cold water expansion control valve must be fitted where in all areas with scaling water to assist in preventing blockage of the pressure and temperature relief valve.

⚠ ***Warning:*** *Failure to install an expansion control valve where scaling water conditions occur may result in the water storage cylinder failing or under certain circumstances over pressurising.*

To avoid damage to the storage cylinder and components Rheem strongly recommends scaling water be treated before entering the water heater by fitting appropriate water filters, conditioners, etc – refer to your local water authority for information on water in your area. A build up of white sediment on the hot taps or shower rose can be indicative of scaling water. Contact Rheem if this condition is observed.

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⚠ ***Warning:*** *Damage caused by scaling water can affect the Rheem warranty.*

The Rheem warranty of this water heater will not cover resultant faults on components, including storage tank, due to the effects of sludge and/or sediment as a result of connection to a water supply from silted or untreated sources, i.e. springs, dams, bores, rivers or town supplied from a bore.

WATER HEATERS NOT INSTALLED IN ACCORDANCE WITH THE ABOVE ADVICE WILL NOT BE COVERED BY THE RHEEM WARRANTY.

RHEEM WARRANTY

Mains Pressure Electric Water Heater Product Warranty New Zealand Only

In addition to your legal right, in New Zealand Rheem New Zealand Limited makes the following promise to the owner. We will repair or, if necessary, replace a defective unit or part of it, which has failed due to faulty manufacture on the following terms and conditions:

1. THE RHEEM WARRANTY – GENERAL

1.1 This warranty is given in respect of sales in New Zealand by Rheem New Zealand Limited of 475 Rosebank Road.

1.2 Rheem offer a trained and qualified national service network who will repair or replace components at the address of the unit subject to the terms of the Rheem warranty in New Zealand – contact your Rheem Service Centre on 0800 657 335.

1.3 For details about this warranty, you can contact your Rheem Service Centre in New Zealand on 0800 657 335.

1.4 The terms of this warranty are set out in section 2 and apply to units manufactured after 1st July 2016.

1.5 If a subsequent version of this warranty is published, the terms of that warranty will apply to units manufactured after the date specified in the subsequent version.

2. TERMS OF THE RHEEM WARRANTY AND EXCLUSIONS TO IT

2.1 The decision of whether to repair or replace a faulty component is at Rheem New Zealand Limited's sole discretion.

2.2 Where a failed component or unit is replaced under this warranty, the balance of the original warranty period will remain effective. The replacement does not carry a new Rheem warranty.

2.3 Where the unit is installed outside the boundaries of a metropolitan area, defined by Rheem as further than 25 km from a Rheem service centre, the cost of transport, insurance and travelling between the Rheem service centre and the installed site shall be the owner's responsibility.

2.4 Where the unit is installed in a position that does not allow safe or ready access, the cost of that access, including the cost of additional materials handling and/or safety equipment, shall be the owner's responsibility. In other words, the cost of dismantling or removing cupboards, doors, walls, roofs or trap doors and the cost of any special equipment to bring the unit to floor or ground level or to a serviceable position is not covered by this warranty.

2.5 This warranty only applies to the original and genuine Rheem unit in its original installed location and any genuine Rheem replacement parts. It does not cover any plumbing, gas fitting or electrical parts supplied by the installer, that are not an integral part of the unit, e.g. pipe-work, pressure limiting valve, stop valves, non-return valves, electrical switches, pumps and fuses.

2.6 The Rheem warranty does not cover faults that are a result of:

a) Accidental damage to the unit or any component, for example Acts of God such as floods, storms, fires, lightning strikes and the like and Third party acts or omissions.

b) Misuse or abnormal use of the unit.

c) Installation or use not in accordance with the Owner's Guide and Installation Instructions, New Zealand Building Code requirements or with relevant statutory and local requirements including failure to install a properly drained safe tray where required by the owners guide and installations.

d) Connection at any time to a water supply that does not comply with the water supply guidelines as outlined in the Owner's Guide and Installation Instructions, or poor water quality outside the limits specified in the owners guide and installation instructions.

e) Repairs, attempts to repair or modifications to the unit by a person other than Rheem Service or a Rheem Accredited Service Technician.

f) Faulty plumbing or faulty power supply.

g) Failure to maintain the unit in accordance with the Owner's Guide and Installation Instructions.

h) Transport damage.

i) Fair wear and tear from adverse conditions (for example, corrosion).

j) Cosmetic defects.

2.7 If you require a call out and we find that the fault is not covered by the Rheem warranty, you are responsible for Rheem Service Centre call out costs. If you wish to have the relevant component repaired or replaced by Rheem that service will be at your cost.

2.8 Subject to any statutory provisions to the contrary, this warranty excludes any and all claims however arising including under contract or tort for damage to furniture, carpet, walls, foundations or any other consequential loss or incidental expenses either directly or indirectly due to leakage from Rheem unit, or due to leakage from fittings and/ or pipe work of metal, plastic or other materials caused by water temperature, workmanship or other modes of failure.

2.9 This warranty excludes to the extent permissible all implied warranties set out in the sale of goods act 1908 (New Zealand) and all guarantees set out in the consumers guarantees act 1933 (New Zealand) to the extent that the goods are acquired for the purpose of resupply in trade consumption in the course of a process of production or manufacture or repairing or treating in trade other goods or fixtures on land.

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3. WHAT IS COVERED BY THE RHEEM WARRANTY FOR THE UNITS DETAILED IN THIS DOCUMENT

3.1 Rheem will repair or replace a faulty component of your unit if it fails to operate in accordance with its specifications as follows:

Warranty Cover	**The period from date of installation, in which the fault must appear, in order to be covered**		*Domestic use is defined as; when the appliance is installed in a single family domestic dwelling.
What components are covered	**Domestic use***	**Non-domestic use***	**What coverage you receive**
Mains Pressure**	**Years**		**(Excludes Optima)
All components	1	1	Repair or replacement of failed component, or if necessary, replacement of the complete water heater, free of charge, including labour.
Cylinder only	3	1	Repair or replacement of the complete water heater, free of charge, including labour.
Vitreous Enamel - Cylinder only	7	3	Repair or replacement of the complete water heater, free of charge. Installation and labour cost are the responsibility of the owner.
Stainless Steel - Cylinder only	10	3	
Optima	**Years**		
All components	3	1	Repair or replacement of failed component, or if necessary, replacement of the complete water heater, free of charge, including labour.
Cylinder only	5	1	Repair or replacement of the complete water heater, free of charge, including labour.
Cylinder only	10	5	Repair or replacement of the complete water heater, free of charge. Installation and labour cost are the responsibility of the owner.

4. ENTITLEMENT TO MAKE A CLAIM UNDER THIS WARRANTY

4.1 To be entitled to make a claim under this warranty you need to:

a) Be the owner of the unit or have consent of the owner to act on their behalf.

b) Contact Rheem New Zealand Limited Service Department without undue delay after detection of the defect and, in any event, within the applicable warranty period.

c) Return the faulty component or unit as directed by the Rheem New Zealand Limited Service Department.

4.2 You are **not** entitled to make a claim under this warranty if your unit:

a) Does not have its original serial numbers or rating labels.

b) Is not installed in New Zealand.

5. HOW TO MAKE A CLAIM UNDER THIS WARRANTY

5.1 If you wish to make a claim under this warranty, you need to:

a) Contact Rheem New Zealand on 0800 657 335 and provide owner's details, address of the unit, a contact number and date of installation of the unit or if that's unavailable, the date of manufacture and serial number (from the rating label on the unit).

b) A Rheem service centre will arrange for the unit to be tested and assessed on-site.

c) If Rheem determines that you have a valid warranty claim, Rheem will repair or replace the unit in accordance with this warranty.

5.2 Any expenses incurred in the making of a claim under this warranty will be borne by you.

RHEEM SERVICE DEPARTMENT
475 Rosebank Road, Avondale, Auckland

www.rheem.co.nz

FOR SERVICE TELEPHONE
Phone: 0800 657 335
Fax: 09 829 0222
or refer to your local Yellow Pages under "Plumbers"
for your nearest Rheem Service Centre

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