

# 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

**Identifier** 198072  
**Land Registration District** Canterbury  
**Date Issued** 15 August 2005

**Prior References**  
CB32K/656

**Estate** Fee Simple  
**Area** 898 square metres more or less  
**Legal Description** Lot 8 Deposited Plan 348241

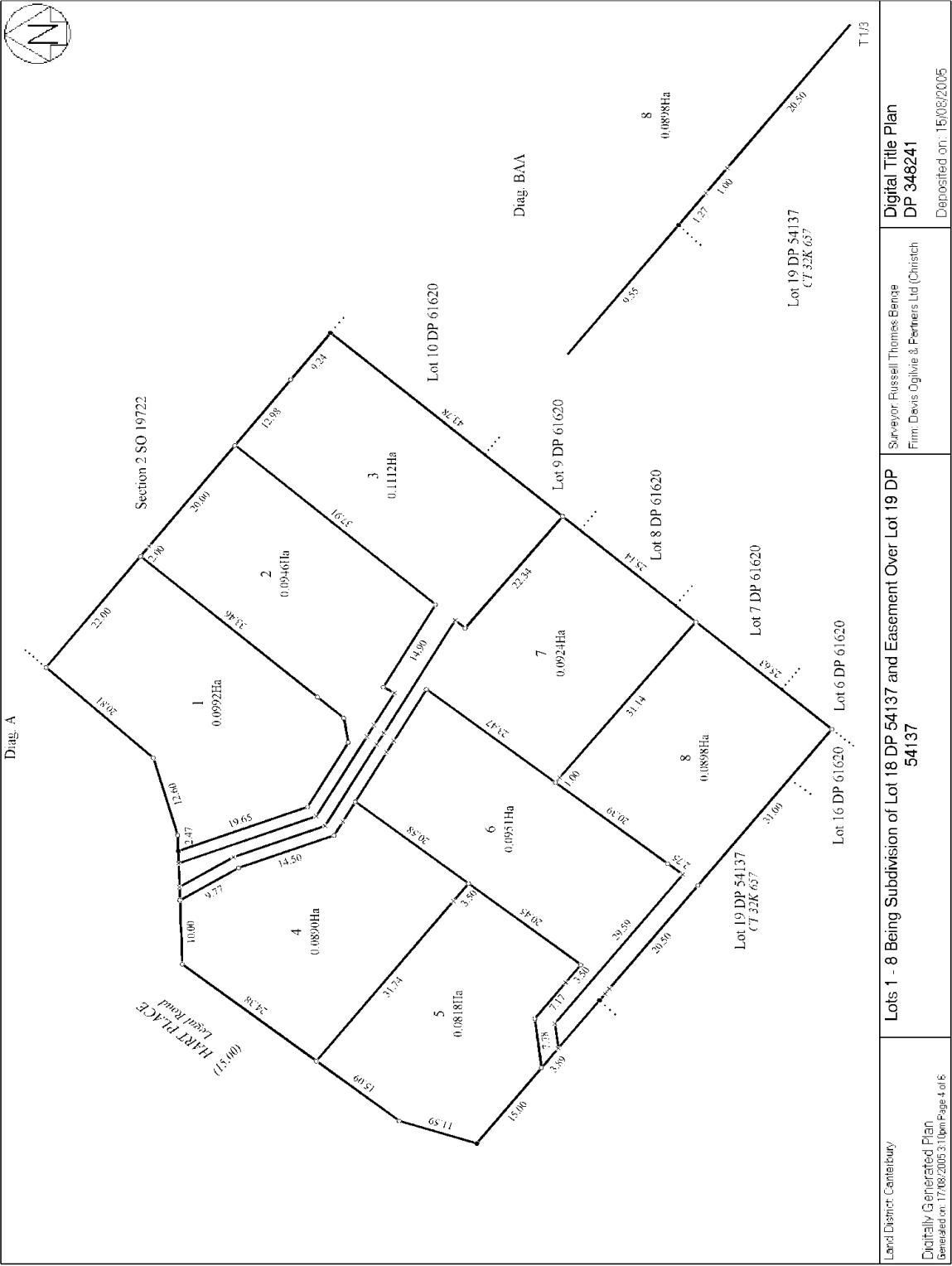
**Registered Owners**  
Lindsay Louis Munro and Hugh Garth Munro

**Interests**

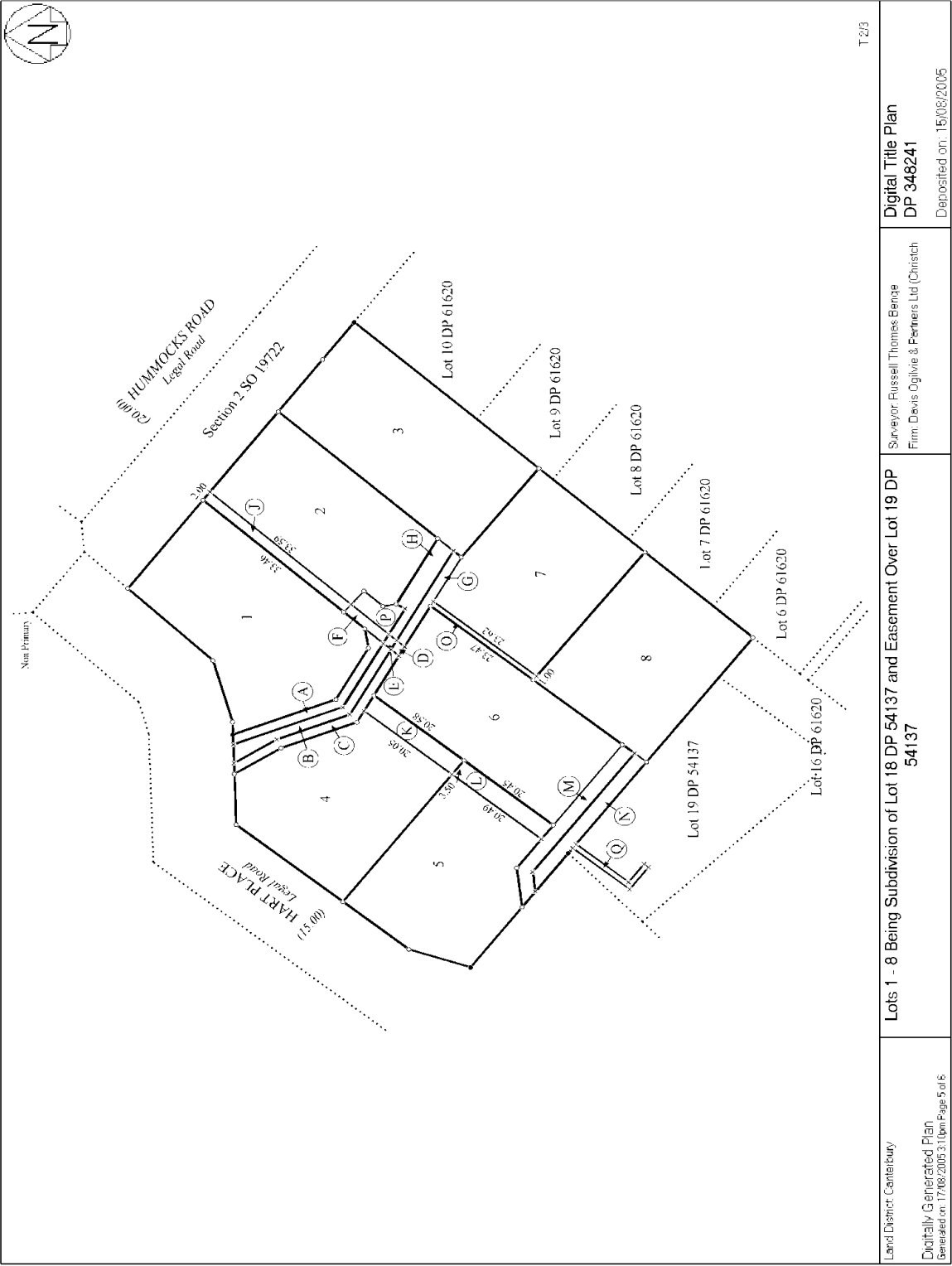
Subject to a right to convey electricity in gross over part marked N on DP 348241 in favour of Orion New Zealand Limited created by Transfer 6534113.6 - 15.8.2005 at 9:00 am  
The easements created by Transfer 6534113.6 are subject to Section 243 (a) Resource Management Act 1991  
Subject to a right of way, right to drain sewage and a right to convey water over part marked N on DP 348241 created by Easement Instrument 6534113.7 - 15.8.2005 at 9:00 am  
Appurtenant hereto is a right of way and a right to convey water, electricity and telecommunications created by Easement Instrument 6534113.7 - 15.8.2005 at 9:00 am  
The easements created by Easement Instrument 6534113.7 are subject to Section 243 (a) Resource Management Act 1991  
Land Covenant in Transfer 6534113.8 - 15.8.2005 at 9:00 am  
1491847.2 Mortgage to Bank of New Zealand - 15.7.2019 at 4:35 pm

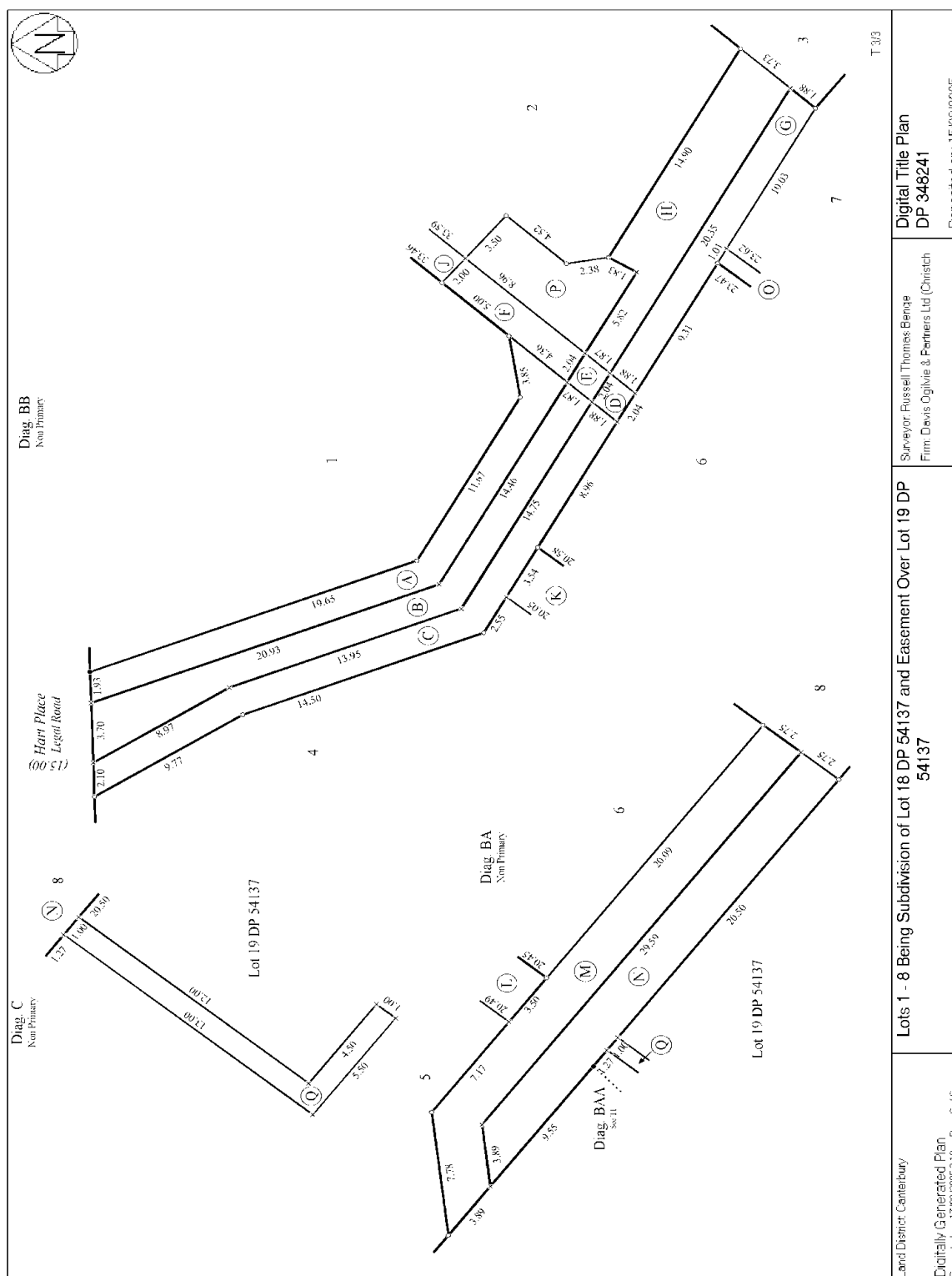
SDC - Approved Building Consent Document - BC192333 - Pg 2 of 378 - 26/01/2020 - dalles





Land District: Canterbury	Lots 1 - 8 Being Subdivision of Lot 18 DP 54137 and Easement Over Lot 19 DP 54137		Surveyor: Russell Thomas Benige Firm: Davis Ogilvie & Partners Ltd (Christch	Digital Title Plan DP 348241
Digitally Generated Plan Generated on: 17/08/2005 3:10pm Page 4 of 6		Deposited on: 15/08/2005		







7 October 2019

10747

Emma Stevens  
Mike Greer Homes

Email: [estevens@mikegreerhomes.co.nz](mailto:estevens@mikegreerhomes.co.nz)

Dear Emma,

**SOIL BEARING INVESTIGATION  
LOT 8, 13 HART PLACE, LAKE COLERIDGE**

**Testing & Results**

We confirm that a soil bearing investigation was completed on 4 October 2019 at the above property and now report as follows.

The section is located on the West side of Main Road. The section is a relatively flat, grass covered site in a rural setting.

The investigation consisted of four penetrometer tests and two Hand Augers to determine the underlying soil conditions and allowable bearing capacity. The locations and results of the scala penetrometer tests are recorded on the attached plan and 'soil investigation record' sheets.

The static water table was not encountered in the scala penetrometers at the time of this investigation.

Hand auger at test locations '1' and '3' revealed topsoil to approximately 200mm overlying silts. The scala penetrometer results were quite similar in all locations with low to medium bearing capacity at the surface, increasing with depth.

The penetrometer results showed that an ultimate bearing capacity of **200kPa** is generally available at approximately **500mm** below existing ground level, beneath the topsoil layer. One test location did not encounter bearing until 1200mm depth and excavation depths will need to be confirmed on site during excavation.

**Other Information Reviewed**

The site has been zoned 'Green, N/A - Rural & Unmapped' by CERA. The Geotech Consulting Ltd "2010 Canterbury Earthquake, liquefaction report" for the Selwyn District Council indicates the site is not within the potentially liquefiable ground zone.

Based on the above reports we infer that the site has a low probability of liquefaction so will be treated as equivalent to TC1, with reference to the MBIE guidance document "Repairing and rebuilding houses affected by the Canterbury earthquakes".

Cont...



Cont...

### Conclusion

Based on the testing results and other information reviewed, the site does not comply with the "good ground" criteria of NZS3604:2011. Therefore specific engineering design will be required for foundations onsite.

We recommend an allowable bearing pressure of 65kPa is used in designing the foundations at a minimum depth of 500mm or to solid bearing and below organic material. This is based on an ultimate bearing capacity of 200kPa and a strength reduction factor of 0.33.

We would infer that foundation details similar to NZS3604:2011 can be utilised for this site, however specific engineering design will be required due to the reduced bearing capacity.

All rubbish, noxious and organic matter as outlined in NZS3604:2011 Clause 3.5.1 should be removed from the building area and the ground brought back up to formation using compacted hardfill if required prior to pouring the foundation slab. An engineer should inspect the foundations at the time of excavation to ensure adequate bearing throughout.

Please note that my recommendations are based on a limited number of penetrometer tests and the nature and continuity of subsoil conditions is inferred. It should be appreciated that actual conditions could vary from the tests results.

Please contact me should any further information be required.

Yours faithfully

**Cory Bedford**

BEng (HONS) CEngNZ CPEng IntPE (NZ)

**Christchurch Office:**

6/75 Peterborough Street, Christchurch 8013  
PO Box 21381, Christchurch 8143  
Phone 03 365 3243 Email [cory@constructure.co.nz](mailto:cory@constructure.co.nz)

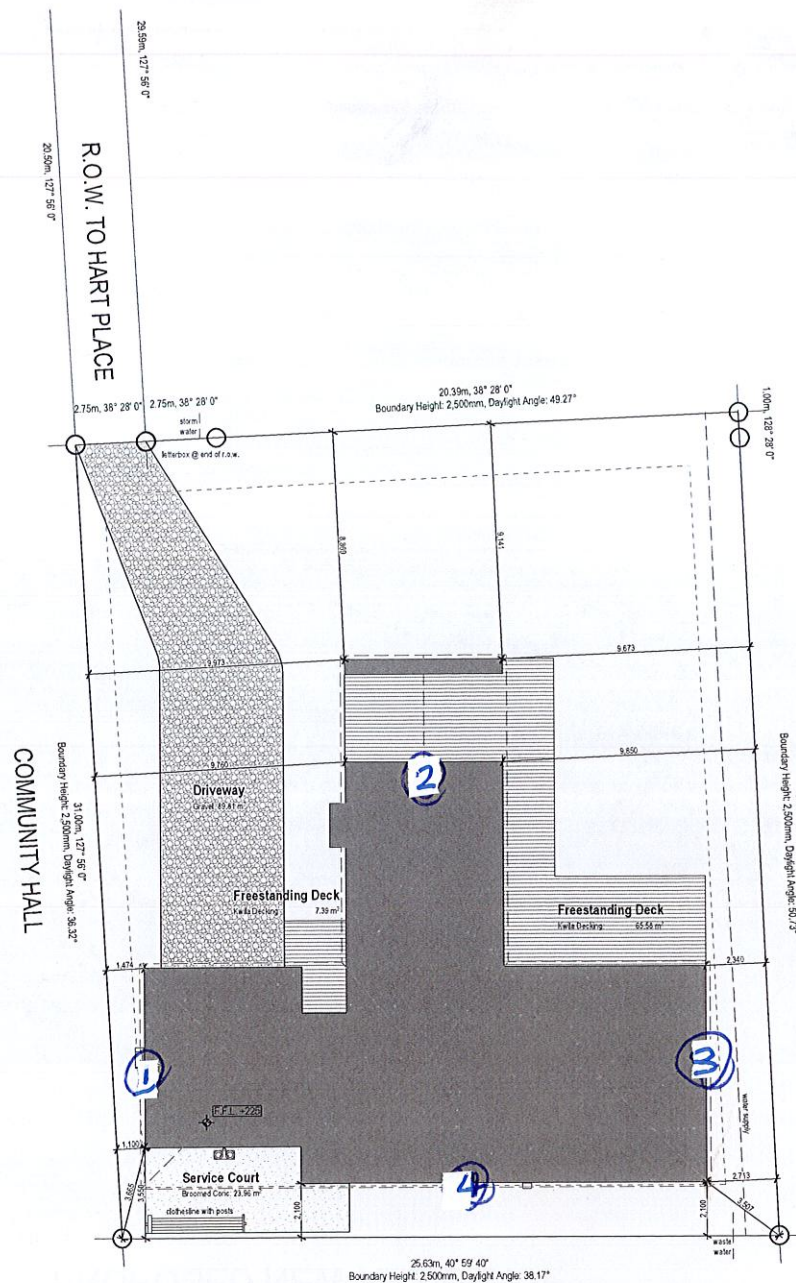
**Auckland Office:**

Suite 2.1, 63 Ponsonby Road, Auckland 1011  
PO Box 21381, Christchurch 8143  
Phone 09 320 5226 Email [james@constructure.co.nz](mailto:james@constructure.co.nz)



## GENERAL NOTES

Site Area	898m <sup>2</sup> including access 813m <sup>2</sup> excluding access
Floor Area over Framing	223.63 m <sup>2</sup>
Floor Area over Foundation	223.63 m <sup>2</sup>
Site Coverage Area (over Cladding incl. Covered Areas)	264.35 m <sup>2</sup>
Site Coverage	32.52% - excluding access (40% Allowable)
Impervious Surface Area	23.95 m <sup>2</sup> (2.67% Excluding Dwelling & Garage)
Exposure Zone	B
Wind Zone	Lea Zone (requires engineered bracing)
Earthquake Zone	3
Snow Zone	N4 - lbc with levels if 2kPa, or if higher specific engineered design required
Territorial Authority	Selwyn District Council
Planning Zone	Living 1
General:	Concept subject to TA rules and regulations. All dimensions to be confirmed on site Concept may be subject to subdivision developer's approval
Foundation Type:	NZS 3604:2011 (To be confirmed with Geotechnical Report)
Site Information:	Position of road crossing, services locations, street trees, lamp posts, parking bays, pedestrian islands etc is unknown - to be confirmed when information becomes available.
Landscaping:	This plan is indicative only. Landscaping to be confirmed by the client. All Fencing to comply with the relevant Covenants.
Boundary Information:	Confirmed with Certificate of Title
Site Levels:	Levels and other relevant site information for this site to be obtained and concept updated as required prior to a contract being signed
Site Services:	Stormwater: council connection at boundary Sewer Connection: council connection at boundary Gas: Bottled
Historical Interest:	N/A
Existing Use Rights:	N/A
Flood Management Area:	N/A
Non Compliances Requiring RC:	N/A
Covenant Non Compliances:	N/A
Extras:	Fencing lbc



10747  
# Test locations  
04.10.2019.  
JF

IMPORTANT NOTE: ALL LANDSCAPING, PLANTING, LIGHTING AND FENCING IS SHOWN FOR IMAGING PURPOSES ONLY. REFER TO BUILDING CONTRACT AND "FIXTURES AND FITTINGS" FOR LANDSCAPING INCLUSIONS

**mikegreerhomes**  
© Mike Greer Homes NZ Ltd  
PHONE: (03) 540106 I FAX: (03) 540107  
ADDRESS: Tower 2, 7 Deans Avenue, Addington, Christchurch 8011  
WEB: www.mikegreerhomes.co.nz

JOB TITLE:  
**MUNRO**

DRAWING TITLE:  
**Site Plan**

LEGAL DESCRIPTION:  
LOT: 8 DP: 348241  
13 Hart Place, Lake Coleridge

LEGAL NOTES:  
1. Subject to council approval  
2. All measurements to be confirmed on site by the contractor prior to the commencement of work.  
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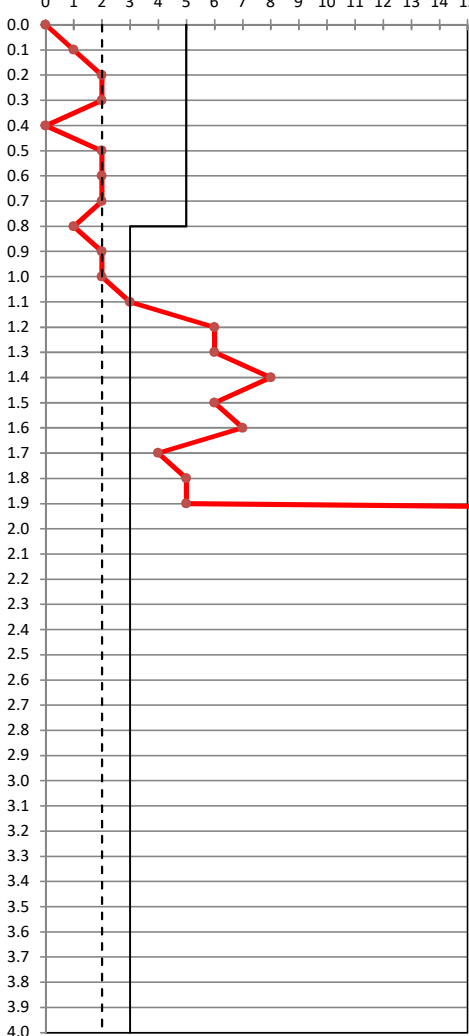

DATE OF ISSUE: 05/07/2019	DESIGNER: Chelsea	SCALE: 1:200	SHEET: <b>SK-02</b>
AMENDMENT DATE: 19/07/2019	TECHNICIAN: TBC	JOB # CT5958	
	VERSION: V1	CODE: 3	

IMPORTANT NOTE: THE SCHEDULE OF FIXTURES AND FITTINGS TAKES PRECEDENCE OVER THE SE DRAWINGS

## soil investigation record




Project:	13 HART PLACE, LAKE COLERIDGE	No.:	1 OF 5
Ref:	10747	Date:	7/10/2019
By:	JF	Checked:	CB

## Test Location 1

Depth (m)	Bore Log (Hand Auger)		Scala Penetrometer (Blows/100mm)
	Symbol	Description	
GL		Topsoil	
0.2		Dark Brown Silt	
0.4			
0.6		Light Brown Silt	
0.8			
1.0		End of Hand Auger	
1.2			
1.4			
1.6			
1.8			
2.0		End of test	
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			
4.0			

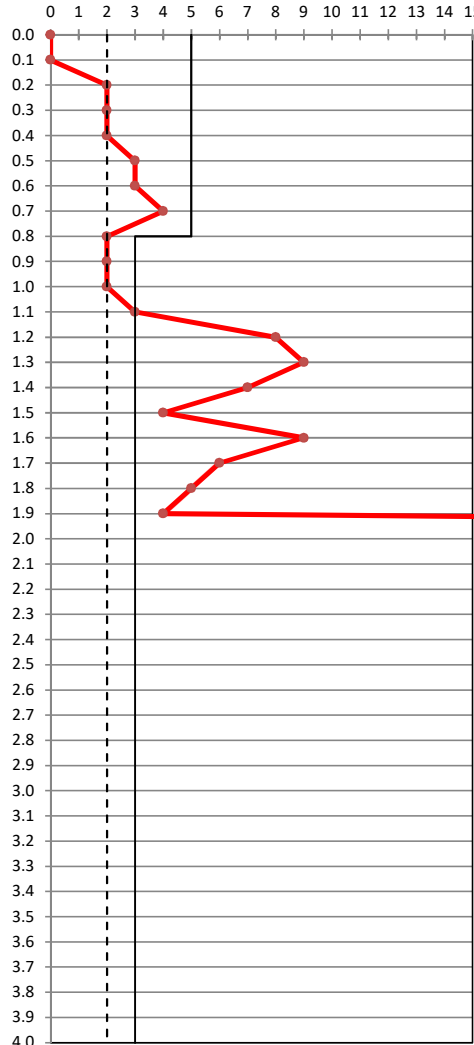
## Notes:

- Refer to attached site plan for location.
- Based on Stockwell, M.J., 1997: Determination of allowable bearing pressure under small structures, New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.
- The allowable bearing pressure has been calculated using a factor of safety = 3.
- 100 kPa allowable bearing pressure corresponds to the NZS 3604:2011 requirements for "Good ground".
- 65 kPa allowable bearing pressure corresponds to the MBIE Guidelines requirements for use of foundation options 1-4 (TC2).

 Blows/100mm  
 100 kPa Allowable Bearing Capacity  
 65 kPa Allowable Bearing Capacity



**soil investigation record**


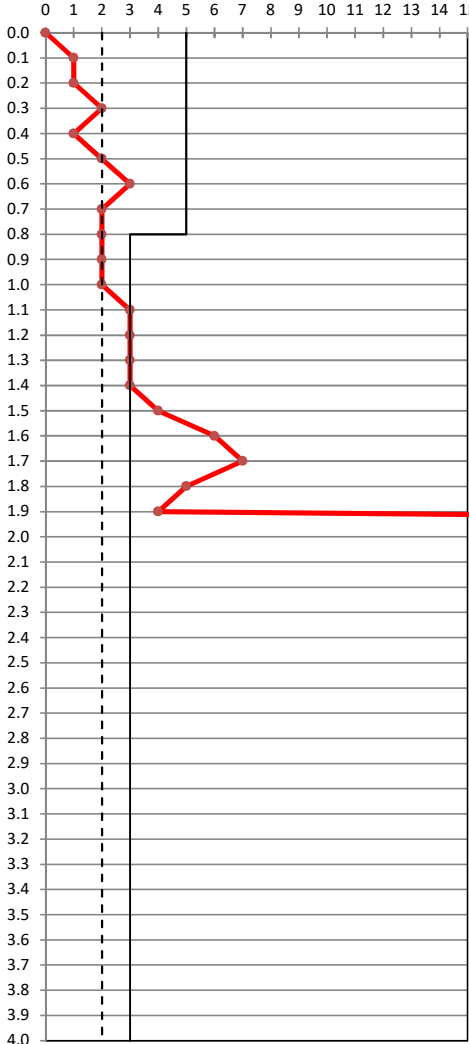

<b>Project:</b>	13 HART PLACE, LAKE COLERIDGE		<b>No.:</b>	2 OF 5
<b>Ref:</b>	10747		<b>Date:</b>	7/10/2019
<b>By:</b>	JF		<b>Checked:</b>	CB
<b>Test Location 2</b>				
Depth (m)	Bore Log (Hand Auger)		Scala Penetrometer (Blows/100mm)	
	Symbol	Description		
GL				
0.2				
0.4				
0.6				
0.8				
1.0				
1.2				
1.4				
1.6				
1.8				
2.0				
2.2				
2.4				
2.6				
2.8				
3.0				
3.2				
3.4				
3.6				
3.8				
4.0				
		End of test		
<b>Notes:</b> <ul style="list-style-type: none"> <li>• Refer to attached site plan for location.</li> <li>• Based on Stockwell, M.J. , 1997: Determination of allowable bearing pressure under small structures, New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.</li> <li>• The allowable bearing pressure has been calculated using a factor of safety = 3.</li> <li>• 100 kPa allowable bearing pressure corresponds to the NZS 3604:2011 requirements for "Good ground".</li> <li>• 65 kPa allowable bearing pressure corresponds to the MBIE Guidelines requirements for use of foundation options 1-4 (TC2).</li> </ul>				



# soil investigation record

<b>Project:</b>	<b>13 HART PLACE, LAKE COLERIDGE</b>	<b>No.:</b>	<b>3 OF 5</b>
<b>Ref:</b>	<b>10747</b>	<b>Date:</b>	<b>7/10/2019</b>
<b>By:</b>	<b>JF</b>	<b>Checked:</b>	<b>CB</b>

## Test Location 3

Depth (m)	Bore Log (Hand Auger)		Scala Penetrometer (Blows/100mm)
	Symbol	Description	
GL		Topsoil	
0.2		Dark Brown Silt	
0.4		Light Brown Silt	
0.6			
0.8			
1.0		End of Hand Auger	
1.2			
1.4			
1.6			
1.8			
2.0		End of test	
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			
4.0			

### Notes:

- Refer to attached site plan for location.
- Based on Stockwell, M.J. , 1997: Determination of allowable bearing pressure under small structures, New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.
- The allowable bearing pressure has been calculated using a factor of safety = 3.
- 100 kPa allowable bearing pressure corresponds to the NZS 3604:2011 requirements for "Good ground".
- 65 kPa allowable bearing pressure corresponds to the MBIE Guidelines requirements for use of foundation options 1-4 (TC2).

—●— Blows/100mm

— 100 kPa Allowable Bearing Capacity

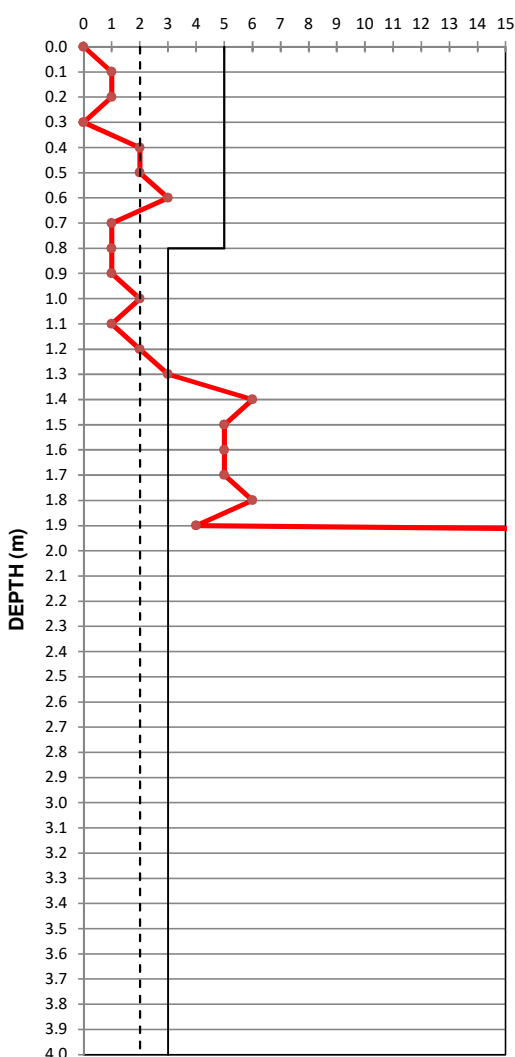
- - - 65 kPa Allowable Bearing Capacity

## soil investigation record

<b>Project:</b>	<b>13 HART PLACE, LAKE COLERIDGE</b>	<b>No.:</b>	<b>4 OF 5</b>
<b>Ref:</b>	<b>10747</b>	<b>Date:</b>	<b>7/10/2019</b>
<b>By:</b>	<b>JF</b>	<b>Checked:</b>	<b>CB</b>
<b>Test Location 4</b>			
Depth (m)	Bore Log (Hand Auger)		Scala Penetrometer
	Symbol	Description	(Blows/100mm)
GL			
0.2			
0.4			
0.6			
0.8			
1.0			
1.2			
1.4			
1.6			
1.8			
2.0		End of test	
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			
4.0			

Notes:

- Refer to attached site plan for location.
- Based on Stockwell, M.J. , 1997: Determination of allowable bearing pressure under small structures, New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.
- The allowable bearing pressure has been calculated using a factor of safety = 3.
- 100 kPa allowable bearing pressure corresponds to the NZS 3604:2011 requirements for "Good ground".
- 65 kPa allowable bearing pressure corresponds to the MBIE Guidelines requirements for use of foundation options 1-4 (TC2).



Legend:

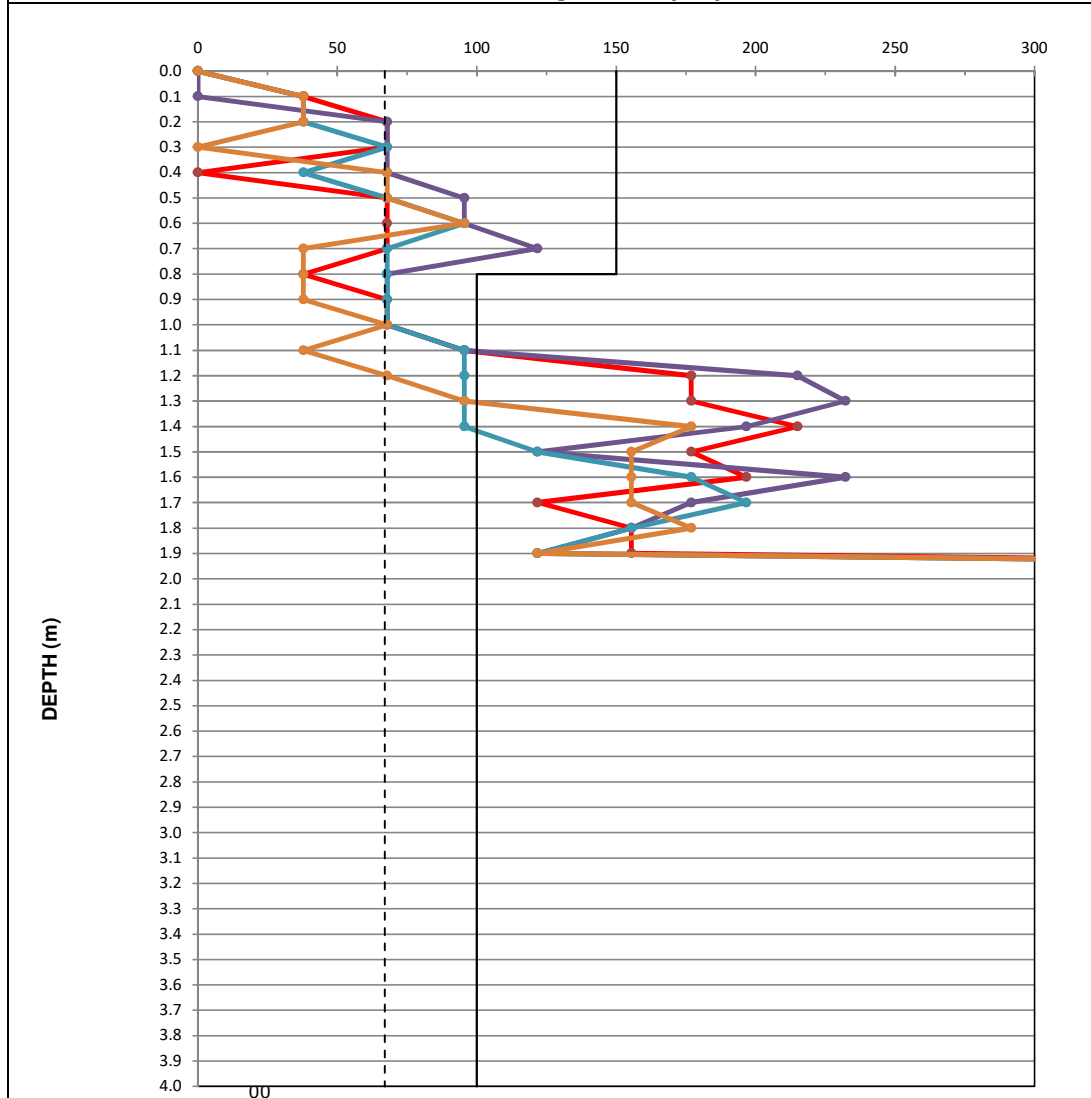
- Blows/100mm
- 100 kPa Allowable Bearing Capacity
- - - 65 kPa Allowable Bearing Capacity

# soil investigation record

Project:	13 HART PLACE, LAKE COLERIDGE	no.	5 OF 5
Ref:	10747	date	7/10/2019
By:	JF	checked	CB

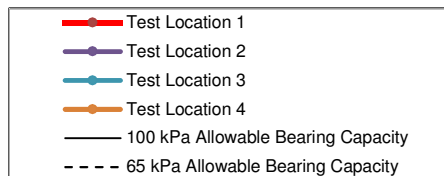
Scala Penetrometer

Allowable Bearing Pressure (kPa)



## Notes:

- Based on Stockwell, M.J. , 1997: Determination of allowable bearing pressure under small structures, New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.
- The allowable bearing pressure has been calculated using a factor of safety = 3.
- 100 kPa allowable bearing pressure corresponds to the NZS 3604:2011 requirements for "Good ground".
- 65 kPa allowable bearing pressure corresponds to the MBIE Guidelines requirements for use of foundation options 1-4 (TC2).



**Stormwater soakpit: design to NZBC E1/VM1:1992****Dynamic Drainage & Excavation Ltd**

**Client Name:** MIKE GREER HOMES CANTERBURY

**Site address:** 13 HART PLACE, LAKE COLERIDGE

**Site location (NZMG):**  mN  mE

**Local Authority:** SELWYN DISTRICT COUNCIL

**Servicing 5 Downpipes and Driveway****Date:** 14-Jan-20**Designer:** Grant Wooster**INPUT**

**Catchment area, Ac** (ha) **Ac (TOTAL) = 0.0311 ha**

roof (non-absorbent)  272.3 m<sup>2</sup>

paved surfaces (asphalt / concrete)  38.4 m<sup>2</sup>

other  m<sup>2</sup>

**Run-off co-efficient, C** (unitless) **C (TOTAL) = 0.89**

**Rainfall Intensity, I** (mm/hr) 10 yr / 10 minute  $I_{10-10}$   mm/hr

DESIGN: 10 yr / 60 minute  $I_{10-60}$   15.2 mm/hr

**OUTPUT**

**Run-off, Rc** (flow discharged from catchment in 1 hr)  4.2 m<sup>3</sup>

**Soakage volume, V<sub>soak</sub>** (disposed of by way of soakage in 1 hour)  1.5 m<sup>3</sup>

**Storage volume, V<sub>stor</sub>** (required storage to prevent overflow)  2.7 m<sup>3</sup>

**DESIGN**

**Depth of groundwater** (max. depth of soakpit)  m

**Design soakage rate, Sr** (mm/hr)

- from field test results (refer to separate worksheet)  500 mm/hr

**System selected:** (a) **Rock-filled soak pit**  Y (Y/N)

**Min. Volume required (total)** (assume 38% void space)  7.1 m<sup>3</sup>

**Overall dimensions (m)**  1 m wide by  3.1 m long

**Base area of soakpit, Asp**  3.1 (m<sup>2</sup>) by  2.3 m deep

**Total design volume (actual)**  7.1 m<sup>3</sup> (Check if > 7.1 => OK ?)

**or,** (b) **Chamber soak pit**  N (Y/N)

**No. of chambers**  0 **Diameter of chamber**  0 mm

**Base area of soakpit, Asp**  0.00 (m<sup>2</sup>) by  0.0 m deep

**Total design volume (actual)**  N/A m<sup>3</sup> (Check if > 2.7 => OK ?)

**DESIGN SUMMARY:**

Course soakage test in gravel medium 2.3m depths showed high percolation rates, to the extent that water wouldn't pond and a standard percolation test couldn't be carried out. Therefore a max of 500mm/hr has been used in calculations for soakage rate.

## HIRDS V4 Depth-Duration-Frequency Results

Site name: 13 HART PLACE, LAKE COLERIDGE

Coordinate system: WGS84

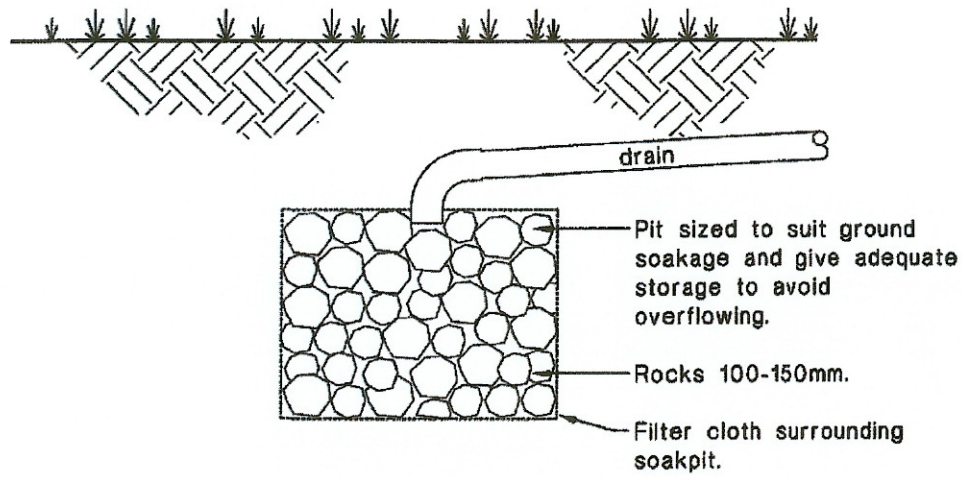
Longitude: 171.5323

Latitude: -43.3679

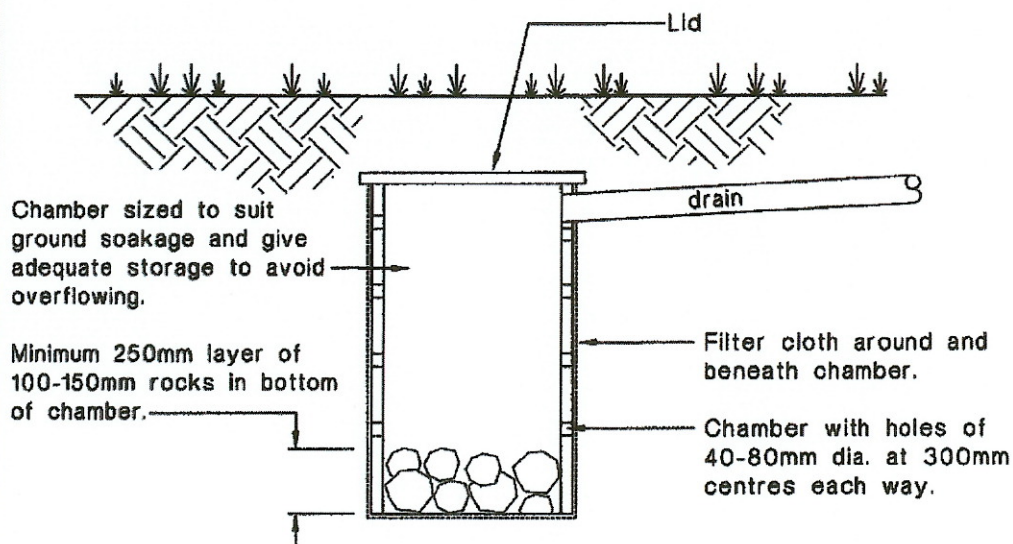
Rainfall depths (mm) :: Historical Data													
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	2.8	4.26	5.5	8.53	13.2	25.2	36.3	49.5	63.5	70.9	75.3	78.1
2	0.5	3.11	4.73	6.09	9.44	14.6	27.8	40	54.6	69.9	78	82.8	85.9
5	0.2	4.2	6.37	8.2	12.7	19.5	37.1	53.2	72.4	92.4	103	109	113
10	0.1	5.06	7.66	9.84	15.2	23.3	44.3	63.3	86	110	122	129	134
20	0.05	5.98	9.04	11.6	17.9	27.4	51.9	74	100	128	142	150	156
30	0.033	6.56	9.9	12.7	19.6	30	56.6	80.6	109	139	154	163	169
40	0.025	6.98	10.5	13.5	20.8	31.8	60	85.5	116	147	163	173	178
50	0.02	7.32	11	14.2	21.8	33.3	62.7	89.3	121	153	170	180	186
60	0.017	7.6	11.5	14.7	22.6	34.5	65	92.5	125	159	176	186	192
80	0.012	8.06	12.1	15.6	23.9	36.5	68.6	97.6	132	167	185	196	203
100	0.01	8.42	12.7	16.2	24.9	38.1	71.5	102	137	174	193	204	211
250	0.004	9.98	15	19.2	29.3	44.7	83.7	119	160	202	224	236	244
Depth standard error (mm) :: Historical Data													
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	0.21	0.53	0.36	0.6	0.91	0.94	2.3	2.7	1.5	2.8	1.6	2.3
2	0.5	0.24	0.58	0.39	0.64	0.97	0.96	2.5	2.9	1.5	3	1.6	2.5
5	0.2	0.4	0.85	0.66	0.96	1.5	1.7	3.6	4.3	3.2	5	3.4	4.6
10	0.1	0.59	1.2	1	1.4	2	2.8	5	6.1	5.4	7.3	5.8	7.2
20	0.05	0.87	1.6	1.5	1.9	2.9	4.2	6.9	8.4	8.3	10	9	11
30	0.033	1.1	1.9	1.9	2.4	3.6	5.2	8.3	10	10	13	11	13
40	0.025	1.3	2.2	2.3	2.7	4.1	5.9	9.4	12	12	15	13	15
50	0.02	1.4	2.4	2.5	3	4.6	6.6	10	13	13	16	15	17
60	0.017	1.5	2.6	2.8	3.3	5	7.2	11	14	15	18	16	19
80	0.012	1.8	3	3.2	3.8	5.7	8.1	12	16	17	20	19	21
100	0.01	2	3.3	3.6	4.2	6.3	8.9	14	17	19	22	21	24
250	0.004	3.1	5	5.7	6.3	9.6	13	19	25	28	32	31	35



Figure 13. Soak Pit for Surface Water Disposal  
Paragraph 9.0.4



(a) Rock soak pit



(b) Chamber soak pit



Building Code Clause(s) .....B1.....

## PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on page 2)

ISSUED BY: **CONSTRUCTURE LIMITED**

(Design Firm)

TO: **C/O MIKE GREER HOMES**

(Owner/Developer)

TO BE SUPPLIED TO: **SELWYN DISTRICT COUNCIL**

(Building Consent Authority)

IN RESPECT OF: **NEW DWELLING**

(Description of Building Work)

AT: **LOT 8, 13 HART PLACE, LAKE COLERIDGE**

(Address)

**LOT 8 DP 348241 SO**

We have been engaged by the owner/developer referred to above to provide **Structural Engineering Design and Construction Monitoring of NZS3604 perimeter foundation with slab on grade and associated pad to alfresco portal and post to the rear of garage, chimney lintel and veranda lintel at rear garage, bracing throughout, steel portal to alfresco and living slider, 18.3kN truss connection detail, chimney framing; wall studs (external and internal load bearing walls); purlins only** services in respect of the requirements of

(Extent of Engagement)

Clause(s) **B1 (STRUCTURE)**; .....of the Building Code for

All ☐ or Part only ☒ (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

☒ Compliance Documents issued by the Ministry of Business, Innovation & Employment **B1/VM1; B1/VM4; B1/AS1**; .....or  
(verification method / acceptable solution)

☒ Alternative solution as per the attached schedule... **Repairing & rebuilding houses affected by the Canterbury earthquake December 2012**

The proposed building work covered by this producer statement is described on the **Constructure Limited** drawings titled **Lot 8, 13 Hart Place, Lake Coleridge** and numbered **as per title sheet 10747 dated 15 January 2020** together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

(i) Site verification of the following design assumptions **Ground conditions as per Constructure soil bearing investigation dated 07 October 2019**

(ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

☐ CM1 ☐ CM2 ☒ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ as per agreement with owner/developer (Architectural)

I, **CORY JOHN BEDFORD**  
(Name of Design Professional)

am:

☒ CPEng # **238134**

☐ Reg Arch #.....

I am a Member of : ☒ Engineering NZ ☐ NZIA and hold the following qualifications: **BEng (HONS) CMEngNZ CPEng IntPE (NZ)**

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000\*.

The Design Firm is a member of ACENZ: ☒

SIGNED BY **CJ BEDFORD** ON BEHALF OF **CONSTRUCTURE LIMITED**  
(Design Firm)

Date: **16/01/2020-Rev1**

(signature) 

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000\*.

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

## GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

**PS1 Design** Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

**PS2 Design Review** Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

**PS3 Construction** Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011<sup>2</sup>

**PS4 Construction Review** Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

### Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

### \*Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

### Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers<sup>3</sup>). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

### Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

### Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

### Refer Also:

- <sup>1</sup> Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
- <sup>2</sup> NZIA Standard Conditions of Contract SCC 2011
- <sup>3</sup> Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)
- <sup>4</sup> PI Guidelines on Producer Statements

[www.acenz.org.nz](http://www.acenz.org.nz)  
[www.ipenz.org.nz](http://www.ipenz.org.nz)  
[www.nzia.co.nz](http://www.nzia.co.nz)



NEW ZEALAND INSTITUTE OF  
ARCHITECTS







16 January 2020

10747

C/o Mike Greer Homes

Dear Sirs,

**APPLICATION FOR BUILDING CONSENT  
LOT 8, 13 HART PLACE, LAKE COLERIDGE  
STRUCTURAL ENGINEERING INSPECTIONS**

We have been engaged to monitor the construction and wish to confirm the extent of our monitoring.

We will monitor the construction of the building structure. This will be an audit of a sample of work, rather than a detailed inspection of every component in accordance with IPENZ Construction Monitoring Services level CM3. We ask that the builder notify us at least 48 hours in advance of all major items of work before they are concealed. On this project, that would include:

- Foundation bearing at excavation.
- Foundations prior to casting.
- Steel/ timber beams and lintels after erection, prior to lining.
- Pre-line bracing during installation, prior to lining.
- Wall studs (external and internal load bearing walls).
- Purlins.

The number of inspections for each item above will depend on the builders method of construction, concrete pour sequencing and such like and shall be agreed with the builder as the works progress.

For any construction queries or inspection notifications, please contact our office.

A Producer Statement – PS4 – Construction Review could be issued once the above inspections have been completed.

Please forward this to the Local Authority as part of the Building Consent documentation.

Yours faithfully

**Cory Bedford**  
**BEng (HONS) CEngNZ CPEng IntPE(NZ)**

## Memorandum from licensed building practitioner: Certificate of design work

### Section 45 and Section 30C, 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: Lot 8, 13 Hart Place

Suburb:

Town/City: Lake Coleridge

Postcode:

#### THE OWNER

Name(s): C/o Mike Greer Homes

Mailing address:

Suburb:

PO Box/Private Bag:

Town/City:

Postcode:

Phone number:

Email address:

#### BASIS FOR PROVIDING THIS MEMORANDUM

I am providing this memorandum in my role as the: Please tick the option that applies (✓)	
( )	<b>sole</b> designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project
(✓)	<b>lead</b> 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
( )	<b>lead</b> designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design
( )	<b>specialist</b> 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 Cory Bedford carried out / supervised the following design work that is restricted building work

**PRIMARY STRUCTURE: B1**

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
<b>Primary structure</b>			
<b>All</b> RBW Design work relating to B1 (X)		( ) Carried out ( ) Supervised	
Foundations and subfloor framing (✓)	NZS3604 perimeter foundation with slab on grade and associated pad to alfresco portal and post to the rear of garage.	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747
Walls (✓)	Wall studs (external and internal load bearing wall).	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747
Roof (✓)	Purlins.	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747
Columns and beams (✓)	Chimney lintel and veranda lintel at rear garage.	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747
Bracing (✓)	Bracing throughout.	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747
Other (✓)	Steel portal to alfresco and living slider, 18.3 kN truss connection detail, chimney framing.	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747

**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.

**Note:** continue on another page if necessary.

**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]

**Note:** continue on another page if necessary.

**ISSUED BY**

Name: Cory Bedford		LBP or Registration number: 238134	
The practitioner is a:		( ) Design LBP ( ) Registered architect (✓) Chartered professional engineer	
Design Entity or Company (optional): Constructure Ltd			
Mailing address (if different from below):			
Street address / Registered office: Unit 6, 75 Peterborough Street			
Suburb:		Town/City: Christchurch	
PO Box/Private Bag: PO Box 21381		Postcode: 8143	
Phone number: 03 365 3243		Mobile:	
After Hours:		Fax:	
Email address: cory@constructure.co.nz		Website:	

**DECLARATION**

I Cory Bedford [name of practitioner], 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: 16/01/2020-Rev1



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## **OUTLINE STRUCTURAL SPECIFICATION**

**for**

**C/O MIKE GREER HOMES**

**LOT 8, 13 HART PLACE, LAKE COLERIDGE**

**by**

**CONSTRUCTURE LIMITED**

**NOVEMBER 2019**

**Project: 10747**

SDC - Approved Building Consent Document - BC192333 - Pg 23 of 378 - 26/01/2020 - dalles

**Christchurch Office:**

6/75 Peterborough Street, Christchurch 8013

PO Box 21381, Christchurch 8143

Phone 03 365 3243 Email [cory@constructure.co.nz](mailto:cory@constructure.co.nz)

**Auckland Office:**

Suite 2.1, 63 Ponsonby Road, Auckland 1011

PO Box 21381, Christchurch 8143

Phone 09 320 5226 Email [james@constructure.co.nz](mailto:james@constructure.co.nz)

## 1. GENERAL

Refer to the Preliminary and General Clauses of the Specification and to the General Conditions of Contract, which are equally binding on all Trades. This specification shall be read in conjunction with all other sections of the project specification.

No change or variation is permitted unless the Engineer provides appropriate written instructions.

Dimensions and details shall be read in conjunction with the Architect's drawings. The contractor shall check all dimensions before construction commences.

The contractor shall fully comply with all the provisions of the New Zealand Building Code, including all requirements for site and worker safety.

## 2. EXCAVATION AND HARDFILLING

Excavate the soils sufficient for the construction of the works, and to solid bearing. An ultimate bearing pressure of 200kPa has been assumed for the design. This assumption is to be verified at the time of excavation by the Engineer via site inspection and bearing check.

Provide at least 24 hours notice to the Engineer to allow the sub grade to be inspected before placement of hard fill, formwork, DPM or reinforcing.

Foundations shall not be cast until approval from the Engineer has been obtained.

Excavate all topsoil/organic matter from the building footprint and areas to be hard filled or to receive concrete foundations. Thoroughly compact all sub grade surfaces prior to backfilling with hard fill.

If excavation to a greater depth than that detailed is necessary, the contractor shall obtain the written approval of the Engineer before over-excavating. Over-excavation shall be back-filled in accordance with the instructions of the Engineer.

Supply, lay and compact hard fill under floor slabs and foundations where detailed. Hard fill material shall be well graded AP40, compacted backfill shall be consolidated to not less than 95% of the maximum dry density of the fill material as determined by NZS 4402, Test 4.1.3. The minimum depth shall be 150mm.

The contractor shall provide evidence of adequate compaction (by nuclear density gauge or alternative as approved by the Engineer) to hard fill greater than 600mm overall depth or as required.

Existing hard fill may be re-used, subject to compliance with this Specification.

### 3. CONCRETE CONSTRUCTION

All concrete work shall comply with the requirements of NZS 3109.

All reinforcing materials shall comply with the requirements of NZS3402 and AS/NZS 4671. All reinforcing shall be manufactured by the micro-alloy process.

On the drawings:

'D' indicates deformed grade 300E reinforcing to AS/NZS 4671:2001

'HD' indicates deformed grade 500E reinforcing to AS/NZS 4671:2001

'R' indicates round grade 300E reinforcing to AS/NZS 4671:2001

'HR' indicates round grade 500E reinforcing to AS/NZS 4671:2001

Mesh reinforcement in floor slabs shall be ductile mesh and comply with NZS3422.

All products shall be supplied and installed in accordance with the manufacturer's written recommendations.

Except where specified otherwise, finishes shall be as specified below and shall be in accordance with NZS 3114:

all concrete which is visible externally or internally in the completed building:	F5 finish
concrete concealed in the completed building:	F3 finish
concrete below ground	F1 finish
all floor slabs and toppings	U3 finish

Form all chases, rebates, etc as detailed.

Reinforcement shall be cut, bent, and fixed in accordance with NZS 3109, and as shown on the drawings. All reinforcement shall fully lap at all splices, corners of foundation beams, beams, blockwalls etc. Laps for reinforcement shall be in accordance with the schedule below, unless detailed otherwise on the drawings.

Bar	Lap length for concrete	Lap Length for blockwork
HD10	600mm	700mm
HD12	700mm	850mm
HD16	900mm	1150mm
HD20	1050mm	1400mm

All foundation reinforcement must lap in accordance with the above and as shown on the drawings.

Cast in all fixings, bolts, and other items detailed or required for the completion of the works. Fix securely in place before casting concrete, and check their positions immediately after casting. If post fix anchors are required these are to be installed as per the manufactures recommendations.

Place concrete in accordance with NZS 3109.

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Take care to protect and cure all concrete adequately, and in accordance with NZS 3109.

After casting floor slabs, supply and apply an anti-evaporation film such as FBS ER 921 or similar.

Apply a curing compound to all concrete floor slabs immediately on completion of the surface finishing, or alternatively, cure by ponding.

The following concrete shall be used:

Element	Concrete type	28 day strength	Slump	Max aggregate size
Foundations	Normal	20 MPa	100mm	19mm

It is the contractor's responsibility to prepare any additional shop drawings of the works or elements if required.

Supply and lay DPM beneath all ground slabs in accordance with the manufacturer's written recommendations and the Architectural Specification. The DPM shall be 0.25mm polythene or equivalent.

All ground slabs should have saw cuts and formed construction joints as detailed unless the Engineer approves a change in writing. Cut the concrete as soon as it has sufficient strength to avoid spalling of the cut edge. Saw cuts shall be 3mm wide and one-quarter the slab thickness.

Reinforcement shall not be bent on site except in accordance with this specification. Bending shall be in accordance with the requirements of NZS3109 and the manufacturer's written recommendations.

#### 4. STRUCTURAL STEELWORK

All structural steel fabrication and erection shall comply with AS/NZS 5131:2016, the Construction Category shall be CC2, unless noted otherwise on the drawings.

All structural steel shall be mild steel unless detailed otherwise, and shall comply with NZS 3404. All Universal Beam (UB), Universal Column (UC) & Hot Rolled (PFC) sections shall be Grade 300PLUS. All hollow sections shall be grade C350.

Welding shall be undertaken by qualified welding personnel, in accordance with the requirements of NZS 3404 and AS/NZS 1554. Welds shall be as detailed on the drawings. Additional butt welding of short lengths shall not be done without the specific written approval of the engineer.

The structural steelwork Sub-contractor shall provide a producer statement confirming that all welding and inspection has been carried out in accordance with the specification.

Unless detailed otherwise, all welding is category SP.

All steelwork dimensions shall be checked on site before commencing work. Notify the Engineer of any discrepancies and obtain prior written approval of any resultant



changes.

Unless shown otherwise all bolts shall be supplied with a standard nut and washer and shall be grade 8.8/S to AS1252

Bolts holes shall be no more than 2mm larger than the nominal bolt size, for bolts up to 24mm diameter, and 3mm for larger bolts and shall be formed in accordance with NZS 3404.

Macroclimate corrosion category C3

Concealed steelwork surfaces shall be coated with a coating system in accordance with SNZTS 3404:2018, system designation ALK1 or equivalent.

All external steelwork exposed to the weather or to the outside environment and not washed by rain shall be painted with a coating system in accordance with SNZTS 3404:2018, system designation PUR5 or equivalent. Note that this system gives a time to first maintenance of 25 years.

All external steelwork exposed to the weather or to the outside environment and subject to rain washing shall be painted with a coating system in accordance with SNZTS 3404:2018, system designation PUR5 or equivalent. Note that this system gives a time to first maintenance of 15 years.

Alternatively, exposed steelwork may be hot dip galvanised to HDG600-5D and shall be done in accordance with SNZTS 3404:2018. Do not galvanise weld plate surfaces, cast into concrete, contact surfaces of friction bolted joints and surfaces of steel members cast into concrete more than 100mm. Note that this system gives a time to first maintenance of 25 years.

Packing under steel baseplates shall be steel. Packing under baseplates that are hot dip galvanised shall be galvanised steel or proprietary non-ferrous packers. After erection of steelwork is complete, mortar pack under baseplates typically to a maximum height of 20mm. Mortar shall be 1:3 cement:sand mix, just moist and tightly packed into the space. Finish off neatly where exposed.

Preparation and painting shall be done strictly in accordance with the paint manufacturer's written recommendations, and in accordance with AS/NZS 2312. Galvanising shall be in accordance with AS/NZS 4680.

## 5. TIMBER WORK

Timber work and associated connections shall comply fully with NZS3604.

Care shall be exercised in assessing the durability requirements for all timber and fixings given their exposure and environment. If in doubt, the level of protection shall be discussed and agreed with the Architect and Local Authority.

All timber shall be SG8, graded dry to NZS3622.

Laminated Veneer Lumber (LVL) shall be grade 11 unless noted otherwise on the drawings.

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structural engineering

16 January 2020

10747

C/o Mike Greer Homes

Dear Sirs,

**APPLICATION FOR BUILDING CONSENT  
LOT 8, 13 HART PLACE, LAKE COLERIDGE  
STRUCTURAL ENGINEERING CALCULATIONS**

The design and calculation process for Constructure Limited projects includes a wide range of activities and documentation including:

- Project team meetings and discussion
- Design based on experience
- Engineering judgement
- Reference to Standards, codes and guidelines
- Drawings and Specification review and mark-up
- Electronic calculations, spreadsheets, etc.
- Written calculations

The attached calculations have been requested by the building consent authority for their review as part of the building consent process. They are provided on the basis that they are accompanying information to assist in the building consent authorities understanding of the design. However, it is the plans and specifications that wholly represent the design.

Please forward this to the Local Authority as part of the Building Consent documentation.

Yours faithfully

**Cory Bedford**  
**BEng (HONS) CEngNZ CPEng IntPE(NZ)**

SDC - Approved Building Consent Document - BC192333 - Pg 28 of 378 - 26/01/2020 - dalles



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**STRUCTURAL CALCULATIONS**  
**for**  
**BUILDING CONSENT**  
**at**  
**13 HART PLACE, LAKE COLERIDGE**  
**by**  
**CONSTRUCTURE LIMITED**  
**JANUARY 2020-REV1**

SDC - Approved Building Consent Document - BC192333 - Pg 29 of 378 - 26/01/2020 - dalles

**PROJECT:10747**

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**Order of calculations is as follows:**

- 1. Load Calculations**
- 2. Beam Design**
- 3. Bracing Design**
- 4. Plane Brace Design**
- 5. Portal Frame Design**
- 6. Masonry Block Retaining Wall Design**

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# 1. Load Calculations

SDC - Approved Building Consent Document - BC192333 - Pg 31 of 378 - 26/01/2020 - dalles

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## Snow Load

Region N4, sub-alpine

$$h_0 := 390 \text{ m}$$

Height ASL

$$C_e := 1$$

Sub - alpine

$$\alpha := 0$$

Roof slope in degrees

$$\mu_1 := \min \left( \left( 0.7 \cdot \frac{(60 - \alpha)}{50} \right), 0.7 \right) = 0.7$$

$$k_{puls} := 1.25$$

Probability factor for P=1/150

$$k_{psls} := 0.85$$

Probability factor for P=1/25

$$s_{guls} := \max \left( k_{puls} \cdot 1.2 \left( 3 \cdot \frac{h_0}{1000 \text{ m}} + 0.3 \right) \text{ kPa}, 0.9 \text{ kPa} \right) = 2.205 \text{ kPa}$$

$$s_{gsls} := k_{psls} \cdot 1.2 \left( 3 \cdot \frac{h_0}{1000 \text{ m}} + 0.3 \right) \text{ kPa} = 1.499 \text{ kPa}$$

## Wind Load

Region A7

$$V_{25} := 37 \frac{\text{m}}{\text{s}}$$

SLS regional wind speed

$$V_{500} := 45 \frac{\text{m}}{\text{s}}$$

ULS regional wind speed

$$M_d := 1$$

Wind direction multiplier

$$M_{z.cat} := 0.99$$

TC=1, z=7m

$$M_s := 1$$

Assume no sheilding

$$H := 40 \text{ m}$$

$$x := 300 \text{ m}$$

$$L_u := 10 \text{ m}$$

$$z := 7 \text{ m}$$

$$L_1 := \max (0.36 L_u, 0.4 H) = 16 \text{ m}$$

$$L_2 := \max (1.44 L_u, 1.6 H) = 64 \text{ m}$$

$$\frac{H}{2 \cdot L_u} = 2$$

$$M_h := 1$$

As  $x > L_2$

$$M_{lee} := 1$$

West of Lee zone

$$M_t := \max(M_h, M_{lee}) = 1$$

Topographic multiplier

$$V_{site.sls} := V_{25} \cdot M_d \cdot M_{z.cat} \cdot M_s \cdot M_t = 36.63 \frac{m}{s}$$

$$V_{site.uls} := V_{500} \cdot M_d \cdot M_{z.cat} \cdot M_s \cdot M_t = 44.55 \frac{m}{s}$$

Very High to NZS3604

**Constructure Limited**

6/75 Peterborough Street  
PO Box 21381, Christchurch 8143  
Ph: 03 365 3243

JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Load Calculation

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**EARTHQUAKE****Largest Translational Period**0.40 s  $T_1$ **Site Subsoil Class**

D

Deep or Soft Soil Sites

**Hazard Factor**

0.35

Z

AS/NZS 1170.5 Table 3.3

**Spectral Shape Factor**

3.00

 $C_h(T)$ 

AS/NZS 1170.5 Fig. 3.1

**Return Period Factor**

500

years

Average recurrence interval for ULS (Earthquake)

AS/NZS 1170.0 Table 3.3

25

years

Average recurrence interval for SLS1

AS/NZS 1170.0 Table 3.3

1.00

 $R_u$ 

AS/NZS 1170.5 Table 3.5

0.25

 $R_s$ 

AS/NZS 1170.5 Table 3.5

**Near-fault Factor**

50.00

D (km)

AS/NZS 1170.5 Cl. 3.1.6

1.00

 $N(T,D)$ Annual probability of exceedance  $\geq 1/250$ 

AS/NZS 1170.5 Cl. 3.1.6

**Elastic Site Spectra**

1.05

 $C(T_1) = Ch(T) Z R_u N(T,D)$ 

(Ultimate Limit State)

AS/NZS 1170.5 Cl. 3.1.1

0.26

 $C(T_1) = Ch(T) Z R_s N(T,D)$ 

(Service Limit State)

AS/NZS 1170.5 Cl. 3.1.1

**Ductility**

1.25

 $\mu_{ULS}$ 

Structural ductility factor

AS/NZS 1170.5 Cl. 4.4

0.925

 $S_p_{ULS}$ 

Structural performance factor

0.7 for  $1.0 < \mu < 2.0$ 1.3 -  $0.3\mu$  for  $1.0 < \mu < 2.0$ Use  $\mu=3.5$  for Timber with GIB BracingUse  $\mu=1-1.25$  for Steel or Reinforced Concrete

1.25

 $\mu_{SLS}$ For SLS1  $1.0 \leq \mu \leq 1.25$ For SLS2  $1.0 \leq \mu \leq 2.0$ 

AS/NZS 1170.5 Cl. 4.4

0.7

 $S_p_{SLS}$ 

Structural performance factor = 0.7 (SLS)

0.4

s

 $T_1$  for  $k_\mu$  calculation ( $T_1$  shall not be taken as less than 0.4s)

1.14

 $k_{\mu_{ULS}}$ 

1.14

 $k_{\mu_{SLS}}$ 

$$C_d(T_1) = \frac{C(T_1)S_p}{k_\mu}$$

0.850

 $C_d(T_1)_{ULS}$ 

$$\geq (Z/20 + 0.02)R_u \text{ but not less than } 0.03R_u$$

0.16

 $C_d(T_1)_{SLS}$ 

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**A is windward wall**

A/B	service	ultimate	
Windward	$p_z = 0.403$	0.595 kPa	(C <sub>pi</sub> =+ve)
	0.805	1.191 kPa	(C <sub>pi</sub> =-ve)
Leeward	$p_z = -0.564$	-0.834 kPa	(C <sub>pi</sub> =+ve)
	-0.161	-0.238 kPa	(C <sub>pi</sub> =-ve)

**Combined Pressures**

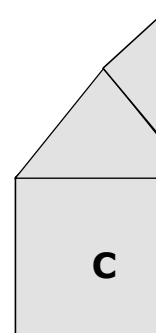
C/D	0 to 1h	to 2h	to 3h	>3h	
Side	5.3	10.6	15.9	m	
service	$p_z = -0.684$	-0.564	-0.403	-0.322 kPa	(C <sub>pi</sub> =+ve)
	-0.282	-0.161	0.000	0.081 kPa	(C <sub>pi</sub> =-ve)
ultimate	$p_z = -1.012$	-0.834	-0.595	-0.476 kPa	(C <sub>pi</sub> =+ve)
	-0.417	-0.238	0.000	0.119 kPa	(C <sub>pi</sub> =-ve)
Roof	service	ultimate			
Up-wind	$p_z = -0.242$	-0.357 kPa	(C <sub>pe</sub> -ve)	(C <sub>pi</sub> =+ve)	
	0.590	0.873 kPa	(C <sub>pe</sub> +ve)	(C <sub>pi</sub> =-ve)	
Down-wind	$p_z = -0.644$	-0.953 kPa	(C <sub>pi</sub> =+ve)		
	-0.242	-0.357 kPa	(C <sub>pi</sub> =-ve)		

0.00m trib length		0.00m trib length	
kPa	kN/m	kPa	kN/m
<b>Walls Serviceability:</b>		<b>Roof Serviceability:</b>	
A/B max 0.805	0.000	max 0.590	0.000
A/B min -0.564	0.000	min -0.644	0.000
<b>Ultimate:</b>		<b>Ultimate:</b>	
A/B max 1.191	0.000	max 0.873	0.000
A/B min -0.834	0.000	min -0.953	0.000
<b>Serviceability:</b>			
C/D max 0.081	0.000		
C/D min -0.684	0.000		
<b>Ultimate:</b>			
C/D max 0.119	0.000		
C/D min -1.012	0.000		

**C is windward wall**

C/D	service		ultimate			
Windward	p <sub>z</sub> =	0.403	0.595 kPa	(C <sub>pi</sub> =+ve)		
		0.805	1.191 kPa	(C <sub>pi</sub> =-ve)		
Leeward	p <sub>z</sub> =	-0.503	-0.744 kPa	(C <sub>pi</sub> =+ve)		
		-0.101	-0.149 kPa	(C <sub>pi</sub> =-ve)		
A/B	0 to 1h	to 2h	to 3h	>3h		
Side	5.3	10.6	15.9	m		
service	p <sub>z</sub> =	-0.684	-0.564	-0.403	-0.322 kPa	(C <sub>pi</sub> =+ve)
		-0.282	-0.161	0.000	0.081 kPa	(C <sub>pi</sub> =-ve)
ultimate	p <sub>z</sub> =	-1.012	-0.834	-0.595	-0.476 kPa	(C <sub>pi</sub> =+ve)
		-0.417	-0.238	0.000	0.119 kPa	(C <sub>pi</sub> =-ve)
Roof	0 to 0.5h	to 1h	to 2h	to 3h	>3h	
	2.65	5.3	10.6	15.9	m	
service	p <sub>z</sub> =	-0.886	-0.886	-0.564	-0.403	-0.322 kPa (C <sub>pe</sub> -ve) (C <sub>pi</sub> =+ve)
		-0.081	-0.081	0.242	0.322	0.403 kPa (C <sub>pe</sub> +ve) (C <sub>pi</sub> =-ve)
ultimate	p <sub>z</sub> =	-1.310	-1.310	-0.834	-0.595	-0.476 kPa (C <sub>pe</sub> -ve) (C <sub>pi</sub> =+ve)
		-0.119	-0.119	0.357	0.476	0.595 kPa (C <sub>pe</sub> +ve) (C <sub>pi</sub> =-ve)

0.00m trib length		0.00m trib length	
kPa	kN/m	kPa	kN/m
<b>Walls Serviceability:</b>		<b>Roof Serviceability:</b>	
A/B max 0.081	0.000	max 0.403	0.000
A/B min -0.684	0.000	min -0.886	0.000
<b>Ultimate:</b>		<b>Ultimate:</b>	
A/B max 0.119	0.000	max 0.595	0.000
A/B min -1.012	0.000	min -1.310	0.000
<b>Serviceability:</b>			
C/D max 0.805	0.000		
C/D min -0.503	0.000		
<b>Ultimate:</b>			
C/D max 1.191	0.000		
C/D min -0.744	0.000		





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## 2. Beam Design

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**Constructure Limited**

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Ph: 03 365 3243

JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Beam Design

JOB No. 10747

DESIGNED: KZ

DATE: 13/11/2019

CHECKED:

B1

Span = 6.0m RLW = 1.0m

 $M^* = 12.6 \text{ kNm}$   $R^* = 8.4 \text{ kN ULS}$  / -2.6 kN upliftProvide 2/300x45 LVL13  $\Phi M_n = 48 \text{ kNm}$   $\Delta = 2.6/(2 \times 101.3) = 12.8 \text{ mm} = \text{span}/468$ 

So OK!

B2

Span = 1.6m RLW = 3.1m Wall = 2.0m

 $M^* = 4.45 \text{ kNm}$   $R^* = 11.2 \text{ kN ULS}$  / -2.1 kN upliftProvide 2/140x45 LVL13  $\Phi M_n = 9.4 \text{ kNm}$   $\Delta = 0.069/(2 \times 10.3) = 3.4 \text{ mm} = \text{span}/470$ 

So OK!

**DOMESTIC LOADINGS CALCULATOR**

Use AS/NZS 1170

		Importance level	2				
		Annual Probability of exceedance	1/500	Wind & EQ			
			1/150	Snow			
			1/25	SLS1			
Loads							
G	roof	heavy domestic (conc tile, trusses, ceiling)	0.84	kPa			
		light domestic (steel sheet, trusses, ceiling)	0.46	kPa			
	Floor	20mm particle board	0.15	kPa			
		13mm Gib	0.1	kPa			
		200x45 at 450 crs	0.15	kPa			
	Walls	Partitions 9.5mm Gib, studs @ 600mm	0.25	kPa			
		Partitions 16mm Fyrelime, studs @ 600	0.38	kPa			
		Weatherboard, timber framing	0.35	kPa			
		Brick veneer, timber framing	2.17	kPa			
	Total G		Floor only	0.5	Roof only	0.5	
Q	Floor	General Areas	1.5	kPa	1.8 kN		
		Balconies 1m above ground	0	kPa			
		Stairs and landings	0	kPa	2.7 kN		
		Timber Deck	2	kPa			
	Roof	Structural elements	0.25	kPa	1.4 kN		
Su	Roof	kp	1.25	(Table 5.1 AS/NZS 1170.3:2003)			
		ho	10	m			
		Sg	if ho < 400m	0.50	if less than 0.75, Su = 0.4kPa	(Sg formula check 5.4.3)	
			if ho > 400m	1.08	if less than 0.75, Su = 0.4kPa		
		Ce	1	sub-alpine regions			
		ui	0.7	see Sections 6/7, AS/NZS1170.3			
		Su = Sgx Cexui	2.21	kPa	Refer to spread sheet for detail		
Wu	from separate spreadsheet	Ss	1.50	kPa			
		Wu up	-1.31				
		Wu down	0.873				
		Ws	0.59				
Combinations							
ULS	Deck	1.35G		Floor	0.68 kPa	Roof	0.68 kPa
		1.2G + 1.5Q	3.6 kPa	2.85 kPa	0.98 kPa		
		1.2 G + Su			2.81 kPa		
		1.2 G + Wu			1.47 kPa		
		0.9G + Wu			-0.86 kPa		
	SLS	G		0.50 kPa	0.50 kPa		
G + Qs		1.90 kPa	1.55 kPa	0.68 kPa			
G + Ss				2.00 kPa			
G + Ws				1.09 kPa			

<b>B1</b>					
span		6	m	span/400	0.015
tributary width	floor	0	m		
	roof	1	m		
	wall above	0	m (height)		
ULS load	floor	0.00	(Take maximum		
	roof	2.81	value of the		
	wall above	0.00	combination)		
<b>ULS TOTAL</b>		<b>2.81</b>	<b>kN/m</b>		
SLS Load	floor	0.00	(Take maximum		
	roof	2.00	value of the		
	wall above	0.00	combination)		
<b>SLS TOTAL</b>		<b>2.00</b>	<b>kN/m</b>		
<b>M*</b>	<b>wl2/8</b>	<b>12.62</b>	<b>kNm</b>	<b>Ru,up</b>	<b>-2.58 kN</b>
<b>R*</b>		<b>8.42</b>	<b>kN</b>	<b>Rs</b>	<b>6.00 kN</b>
<b>deflection</b>	steel	<b>0.169</b>	<b>1/lxx</b>	I req'd	11.24438
	LVL 13	<b>2.595</b>	<b>1/lxx</b>	I req'd	172.99 K2 =1.5
	MSG8	<b>6.247</b>	<b>1/lxx</b>	I req'd	416.4583 K2 =2.0
<b>M*</b>	<b>wl2/12</b>	<b>8.42</b>	<b>kNm</b>		
<b>R*</b>		<b>8.42</b>			
<b>deflection</b>		<b>0.034</b>	<b>1/lxx</b>	I req'd	2.25

<b>B2</b>					
tributary width	span		1.6	m	span/400
	floor		0	m	0.004
	roof		3.1	m	
	wall above		2	m (height)	
ULS load	floor		0.00	(Take maximum	
	roof		8.70	value of the	
	wall above		5.21	combination)	
		<b>ULS TOTAL</b>	<b>13.90</b>	<b>kN/m</b>	
SLS Load	floor		0.00	(Take maximum	
	roof		6.20	value of the	
	wall above		4.34	combination)	
		<b>SLS TOTAL</b>	<b>10.54</b>	<b>kN/m</b>	
<b>M*</b>	<b>wl2/8</b>		<b>4.45</b>	<b>kNm</b>	<b>Ru,up</b>
<b>R*</b>			<b>11.12</b>	<b>kN</b>	<b>Rs</b>
<b>deflection</b>			<b>0.004</b>	<b>1/lxx</b>	I req'd
		steel	<b>0.069</b>	<b>1/lxx</b>	1.123936
		LVL 13	<b>0.167</b>	<b>1/lxx</b>	17.29 K2 =1.5
		MSG8		<b>1/lxx</b>	41.62726 K2 =2.0
<b>M*</b>	<b>wl2/12</b>		<b>2.97</b>	<b>kNm</b>	
<b>R*</b>			<b>11.12</b>		
<b>deflection</b>			<b>0.001</b>	<b>1/lxx</b>	I req'd
					0.22



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## 3. Bracing Design

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## Demand Calculation Sheet

### Job Details

Name: MUNRO  
 Street and Number: 13 Hart Place, Lake Coleridge  
 Lot and DP Number: Lot 8 DP 348241  
 City/Town/District: Lake Coleridge  
 Designer: K.Z.  
 Company: Constructure  
 Date: Wednesday, 13 November 2019

### Building Specification

Number of Storeys: 1  
 Floor Loading: 2 kPa  
 Foundation Type: Slab  
 Cladding Weight: **Single** Light  
 Roof Weight: Light  
 Room in Roof Space: No  
 Roof Pitch (degrees): 35  
 Roof Height above Eaves (m): 2.8  
 Building Height to Apex (m): 5.3  
 Ground to Lower Floor (m): 0.4  
 Average Stud Height (m): 2.4  
 Building Length (m): 22  
 Building Width (m): 16  
 Building Plan Area (m²): 224

### Building Location

Wind Zone = Very High

Earthquake Zone 3

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	1173	1691

### Bracing Units required for Earthquake

	Along & Across
Single Level	1230

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## Single Level Along Resistance Sheet

Job Name: MUNRO

Wind	EQ
Demand	
1173	1230
Achieved	

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	2249 192%	2001 163%
a & b	a1	1.00		2.4	Frame	SED	86	95		
	b1	1.00		2.4	Frame	SED	86	95		
External Length = 6.0									172 OK	190 OK
c	1	0.40		2.4	BL1-H	GIB®	36	40		
	2	0.40		2.4	BL1-H	GIB®	36	40		
	3	1.10		2.4	BL1-H	GIB®	135	114		
	4	1.30		2.4	BL1-H	GIB®	166	135		
External Length = 16.0									373 OK	329 OK
d	1	4.50		2.4	GS1-N	GIB®	311	270		
	2	2.50		2.4	GS1-N	GIB®	173	150		
	3	3.90		2.4	GS1-N	GIB®	269	234		
	4	1.80		2.4	GS1-N	GIB®	124	108		
	5	1.80		2.4	GS1-N	GIB®	124	108		
									1001 OK	870 OK
e	1	5.00		2.4	GS1-N	GIB®	345	300		
	2	2.60		2.4	GS1-N	GIB®	179	156		
	3	2.60		2.4	GS1-N	GIB®	179	156		
External Length = 22									704 OK	612 OK

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Single Level Across Resistance Sheet

Job Name: MUNRO

Wind	EQ
Demand	
1691	1230
Achieved	
2025	1764
120%	143%

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Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	2025	1764
1	1	1.70		2.4	BL1-H	GIB®	218	177		
	External Length = 7.0								218 OK	177 OK
2	1	0.50		2.4	GS1-N	GIB®	28	29		
	2	0.50		2.4	GS1-N	GIB®	28	29		
	3	0.50		2.4	GS1-N	GIB®	28	29		
	4	2.50		2.4	GS1-N	GIB®	173	150		
	5	2.20		2.4	GS1-N	GIB®	152	132		
	External Length = 3.2								407 OK	369 OK
3	1	3.70		2.4	GS1-N	GIB®	255	222		
									255 OK	222 OK
4	1	4.20		2.4	GS1-N	GIB®	290	252		
	2	3.50		2.4	GS1-N	GIB®	242	210		
									531 OK	462 OK
5	1	2.00		2.4	GS1-N	GIB®	138	120		
	2	3.50		2.4	GS1-N	GIB®	242	210		
									380 OK	330 OK
6	1	1.60		2.4	GS1-N	GIB®	110	96		
	2	1.80		2.4	GS1-N	GIB®	124	108		
	External Length = 8.5								235 OK	204 OK

## Custom Wall Elements

Supplier	System	Min. Length m	Wind BUs/m	EQ BUs/m
James Hardie	RAB+GIB	0.4	90	98
James Hardie	RAB+GIB	0.6	127	136
James Hardie	RAB+GIB	1.2	164	138
JH	villa	1.2	99	86
existing GIB	existing	1.2	47	47
9 mm Strand	JNL/Laminex	.6	100	115
SED	steel portal	1	100	100
ecoply	EP1_0.4	0.4	80	95
ecoply	EP1_0.6	0.6	95	105
ecoply	EP1_1.2	1.2	120	135
SED	Frame	1	86	95



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## 4. Plane Brace Design

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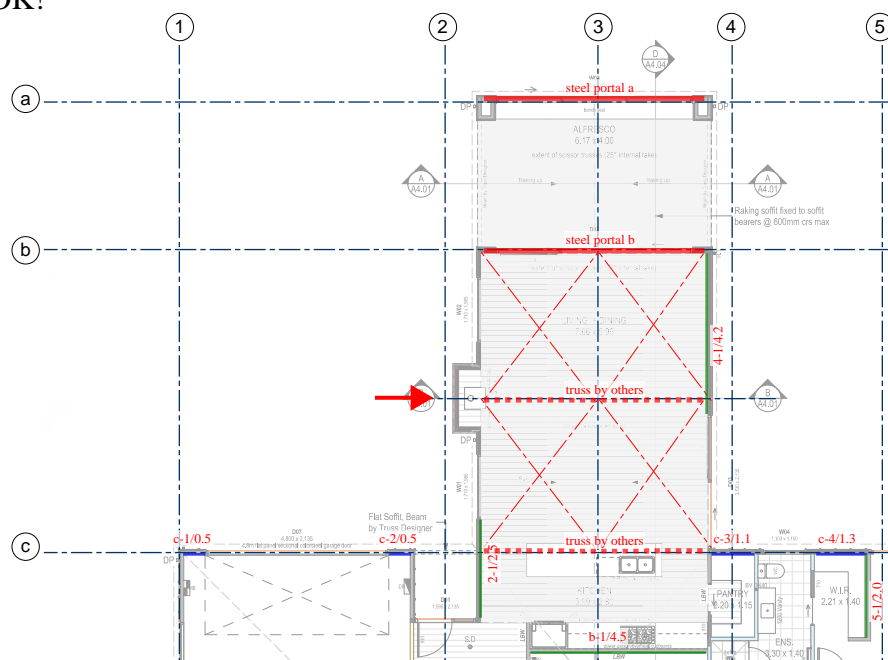
$$P^* = 2260 / (20 \times 4) = 28 \text{ kN} / 4 = 7 \text{ kN per strip}$$

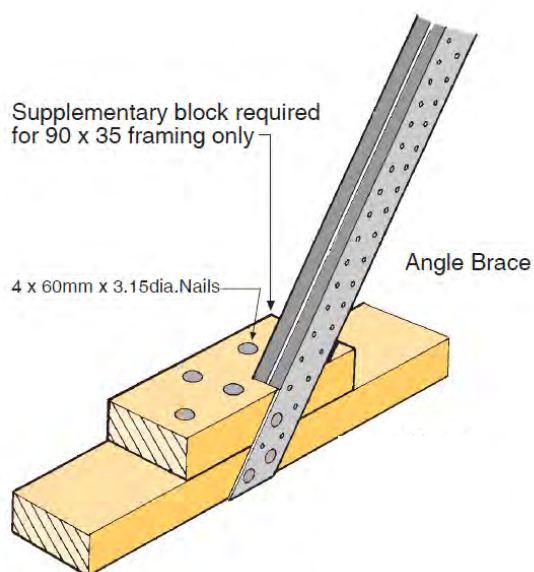
$$T^* = 7/\cos 45 = 9.9 \text{ kN}$$

Try LUMBERLOK multibrace

$$\Phi T_n = 14.8 \text{ kN}$$

So OK!





## ANGLE BRACE

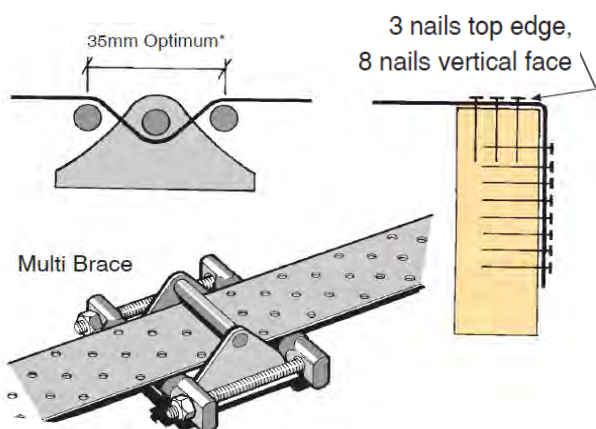
0.85mm G250 Z275 GALVANISED STEEL

Characteristic Load		Tested at 45°
End nail fixing 3 / 75mm x 3.15 dia. F.H. nails		3.9 kN
Tension		13.2 kN
Compression	600mm	4.2 kN
	800mm	3.0 kN

## MULTI BRACE

0.91mm G300 Z275 GALVANISED STEEL or  
0.9mm STAINLESS STEEL 304-2B

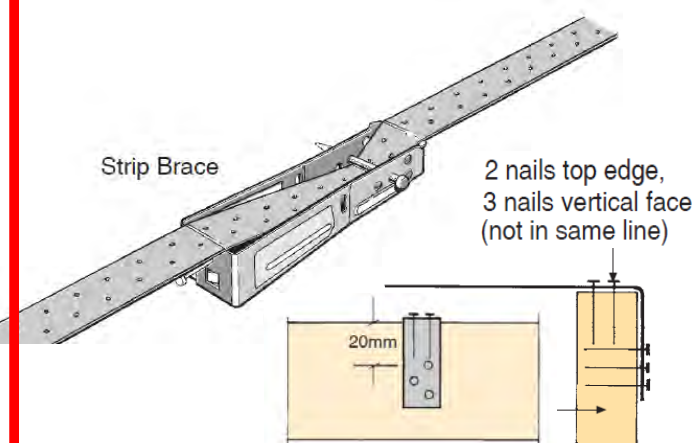
Characteristic Load	Multi-Brace / Multi-Brace with Tensioner <sup>#</sup>
Tension	14.8 kN
Elongation 0.2mm/m/kN including nail slip. End nail fixing 30mm x 3.15 dia. F.H. nails as shown. <sup>#</sup> Tensioner not available in Stainless Steel; provide tension during installation.	



## STRIP BRACE

0.55mm G550 Z275 GALVANISED STEEL or  
0.9mm STAINLESS STEEL 304-2B

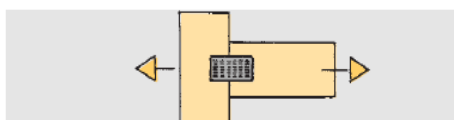
Characteristic Load	Strip Brace	Strip Brace with Tensioner <sup>#</sup>
Tension	8.4 kN	8.0 kN
End nail fixing 30mm x 3.15dia. F.H. nails as shown. <sup>#</sup> Tensioner not available in Stainless Steel; provide tension during installation.		



TYPE 1



TYPE 3



## STRAP NAIL

0.95mm G300 Z275 GALVANISED STEEL

Load	Type 1	Type 3
Tension	9.1 kN/pair	6.0 kN/pair





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## 5. Portal Frame Design

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Ph: 03 365 3243

JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Portal Frame b Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**LOAD**

Portal frame design to provide below required bracing units,

$$P = 160 \times 2.71 / 20 = 21.68 \text{ kN}$$

**CAPACITY DESIGN**

From SPACE GASS

$$M^* = 29.7 \text{ kNm} \quad V^* = 14 \text{ kN}$$

$$R^* = 14.7 \text{ kN} / -7 \text{ kN UPLIFT}$$

Provide 250PFC for portal beam 200PFC for portal leg

MemDes Calculations @ 10:31:22 14-11-2019 by KZ

Project : 13 Hart Place, Lake Coleridge

Description : 10747

Section : 250PFC Grade 300+

Major Axis Bending

$$\text{Design Action } M^*_x = 30.0 \text{ kNm}$$

User provided value for  $a_m = 1.00$

$$a_s = 0.42$$

$a_m \ a_s < 1.0, \Rightarrow$  Segment NOT Fully Restrained

$$M_{bx} = 1.00 * 0.42 * 126.3 = 53.2$$

$$\text{Major axis capacity Ratio} = M^*_x / f M_{bx} \\ = 0.63, \text{ --- OK ---}$$

Shear Calculations (Unstiffened Web)

$$\text{Design Action } V^*_x = 14.0 \text{ kN}$$

$$\text{Nominal Shear Yield capacity } V_w = 384.0 \text{ kN}$$

$$a_v = 6.09 \geq 1.0 \Rightarrow \text{full web shear capacity}$$

$$V_u = V_w = 384.0 \text{ kN}$$

$$\text{Shear capacity ratio} = V^*_x / f V_u \\ = 0.04, \text{ --- OK ---}$$

===== SUMMARY =====

\*\*\* U.L.S. Capacity Check Passed, Load Cap. Ratio = 0.63 --- OK ---

=====

SESOC MemDes v 3.7.1 : Calculations by KZ

Project : 13 Hart Place, Lake Coleridge at 10:31:22 AM on 14/11/2019

Description : 10747

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Ph: 03 365 3243

JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Portal Frame b Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**CAPACITY DESIGN**

MemDes Calculations @ 10:32:06 14-11-2019 by KZ

Project : 13 Hart Place, Lake Coleridge  
Description : 10747

Section : 200PFC Grade 300+

**Major Axis Bending**Design Action  $M^*x = 30.0$  kNmUser provided value for  $a_m = 1.00$  $a_s = 0.57$  $a_m \ a_s < 1.0, \Rightarrow$  Segment NOT Fully Restrained $M_{bx} = 1.00 * 0.57 * 66.3 = 37.7$ 

Major axis capacity Ratio =  $M^*x / f M_{bx}$   
= 0.88, ---- OK ----

**Shear Calculations (Unstiffened Web)**Design Action  $V^*x = 11.0$  kNNominal Shear Yield capacity  $V_w = 230.4$  kN $a_v = 5.35 \geq 1.0 \Rightarrow$  full web shear capacity $V_u = V_w = 230.4$  kN

Shear capacity ratio =  $V^*x / f V_u$   
= 0.05, ---- OK ----

**Axial Calculations**

Design Action  $N_d = 14.0$  kN [Comp],  $L_{eAx} = 2.70$  m,  $L_{eAy} = 2.70$  m  
= 898.4 kN

Major axis buckling : Minor axis buckling : Minimum Capac.  $N_{cmin} = 321.0$ 

Axial buckling capac. Ratio =  $N_d / f N_{cmin}$   
= 0.048, ---- OK ----

**Combined Actions Checks**Loading PASSES Cl 8.1.4,  $\Rightarrow$  Combined Actions Checks are not required

===== SUMMARY =====

\*\*\*\* U.L.S. Capacity Check Passed, Load Cap. Ratio = 0.88 ---- OK ----

SESOC MemDes v 3.7.1 : Calculations by KZ

Project : 13 Hart Place, Lake Coleridge at 10:32:06 AM on 14/11/2019

Description : 10747

**SLS DESIGN**

From SPACE GASS

 $\Delta_{EQ} = 23.7\text{mm} = \text{height}/100 \quad \Delta_{SLS} = 1.5\text{mm}$ 

Therefore OK!

SPACE GASS 12.80 - CONSTRUCTURE

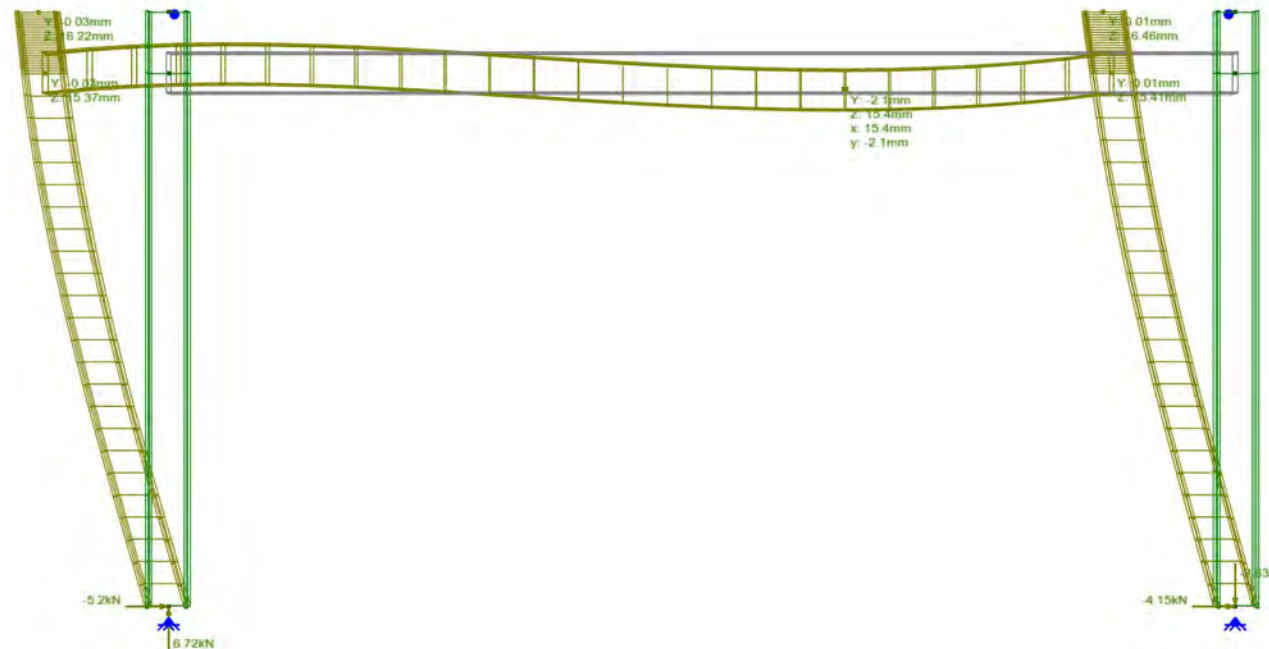
Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal a

Designer: Date: Tuesday, November 26, 2019 6:02 PM Page: 1

Load case 4

Min

Max



Viewpoint (90,0), Displacements, Reactions

Materials:

1 STEEL

Sections:

1 200\*100\*6 RHS

6 200 PFC

SPACE GASS 12.80 - CONSTRUCTURE

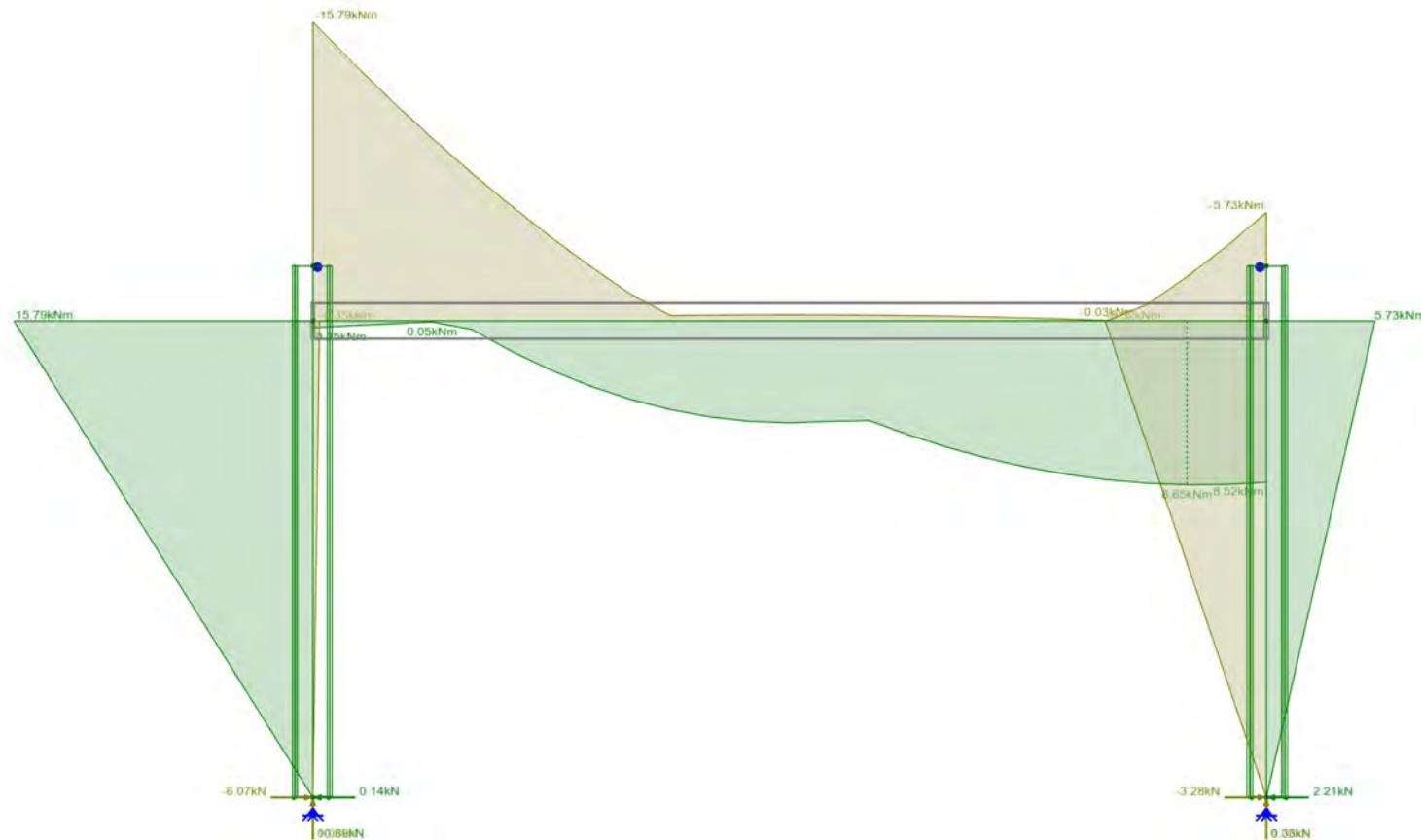
Path: Z:\projects\10747- 13 Hart Place, Lake Coler... \bracing\10747\_portal a

Designer: Date: Tuesday, November 26, 2019 6:01 PM Page: 1

Envelope of both for All combination load cases

Min

Max



Materials:  
1 STEEL

Sections:  
1 200\*100\*6 RHS  
6 200 PFC

Viewpoint (90,0), Moments, Reactions

SPACE GASS 12.80 - CONSTRUCTURE

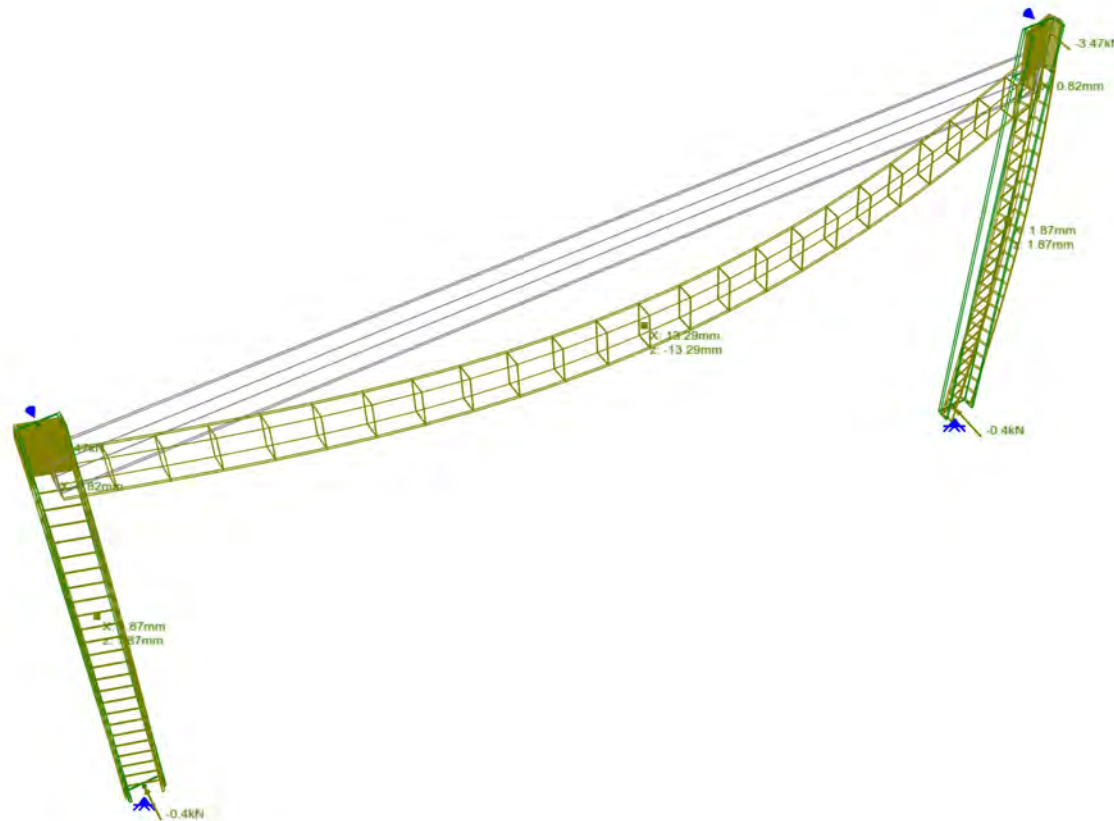
Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal a

Designer: Date: Tuesday, November 26, 2019 6:03 PM Page: 1

Load case 9

Min

Max



Viewpoint (60,-49), Displacements, Reactions

Materials:

1 STEEL

Sections:

1 200\*100\*6 RHS

6 200 PFC



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SECTION: Portal Frame a Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**LOAD**

Seismic load calculation,

As per spread sheet

$$C_{d(T1)ULS} = 0.85$$

Seismic weight

$$W_{t_{G+0.3Q}} = 2.0 \times (0.5 + 0.3 \times 0.25) \times 6.2 = 7.13 \text{ kN}$$

$$V^* = 0.85 \times 7.13 = 6.1 \text{ kN}$$

Wind load calculation

As per spread sheet

$$w_{uls} = 0.87 \text{ kPa} / -1.31 \text{ kPa}$$

$$V^* = (0.87 + 1.31) \times 2.8 \times 2.0 \times \cos 40^\circ = 9.35 \text{ kN (in control)}$$

**CAPACITY DESIGN**

From SPACE GASS

$$M^* = 15.6 \text{ kNm} \quad V^* = 10 \text{ kN}$$

$$R^* = 10.7 \text{ kN}$$

Provide 200PFC for portal beam and portal leg

MemDes Calculations @ 10:49:53 14-11-2019 by KZ

Project : 13 Hart Place, Lake Coleridge

Description : 10747

Section : 200PFC Grade 300+

Major Axis Bending

$$\text{Design Action } M^*x = 16.0 \text{ kNm}$$

User provided value for  $\alpha_m = 1.00$ 

$$\alpha_s = 0.36$$

 $\alpha_m \alpha_s < 1.0$ , => Segment NOT Fully Restrained

$$M_{bx} = 1.00 \times 0.36 \times 66.3 = 24.1$$

$$\text{Major axis capacity Ratio} = M^*x / f M_{bx} \\ = 0.74, \text{ ---- OK ----}$$

Shear Calculations (Unstiffened Web)

$$\text{Design Action } V^*x = 11.0 \text{ kN}$$

$$\text{Nominal Shear Yield capacity } V_w = 230.4 \text{ kN}$$

$$\alpha_v = 5.35 \geq 1.0 \Rightarrow \text{full web shear capacity}$$

$$V_u = V_w = 230.4 \text{ kN}$$

$$\text{Shear capacity ratio} = V^*x / f V_u \\ = 0.05, \text{ ---- OK ----}$$

Axial Calculations

$$\text{Design Action } N_d = 14.0 \text{ kN [Comp]}, \quad L_{eAx} = 5.20 \text{ m}, \quad L_{eAy} = 5.20 \text{ m} \\ = 898.4 \text{ kN}$$

Major axis buckling : Minor axis buckling : Minimum Capac.  $N_{cmin} = 107.3$ 

$$\text{Axial buckling capac. Ratio} = N_d / f N_{cmin} \\ = 0.145, \text{ ---- OK ----}$$

Combined Actions Checks



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DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**CAPACITY DESIGN**

Clause 8.3.3/4 :

$$M_{ry} = M_{sy} (1 - (N^* / f_{Ns})) \leq M_{sy} [\text{Alt. Prov. NOK}]$$

$$= 13.8$$

$$\text{Load / Capacity Ratio} = M_x^* / (0.9 M_{rx})$$
$$= 0.27, \text{ ---- OK ----}$$

Clause 8.4.2.2 : Major : Mix = 64.6

$$\text{Load / Capacity Ratio} = M_m^* / f_{Mi}$$
$$= 0.275 \text{ ---- OK ----}$$

Clause 8.4.4.1 :

$$M_{ox} = M_{bx} (1 - N^* / f_{Ncy}) \leq M_{rx}$$
$$= 20.6$$

$$\text{Load / Capacity Ratio} = M_x^* / f_{Mox}$$
$$= 0.862, \text{ ---- OK ----}$$

===== SUMMARY =====

\*\*\*\* U.L.S. Capacity Check Passed, Load Cap. Ratio = 0.86 ---- OK ----

=====

SESOC MemDes v 3.7.1 : Calculations by KZ

Project : 13 Hart Place, Lake Coleridge at 10:49:53 AM on 14/11/2019

Description : 10747

**SLS DESIGN**

From SPACE GASS

$$\Delta_{EQ} = 15.6\text{mm} = \text{height}/153 \quad \Delta_{SLS} = 3.0\text{mm}$$

Therefore OK!

SPACE GASS 12.80 - CONSTRUCTURE

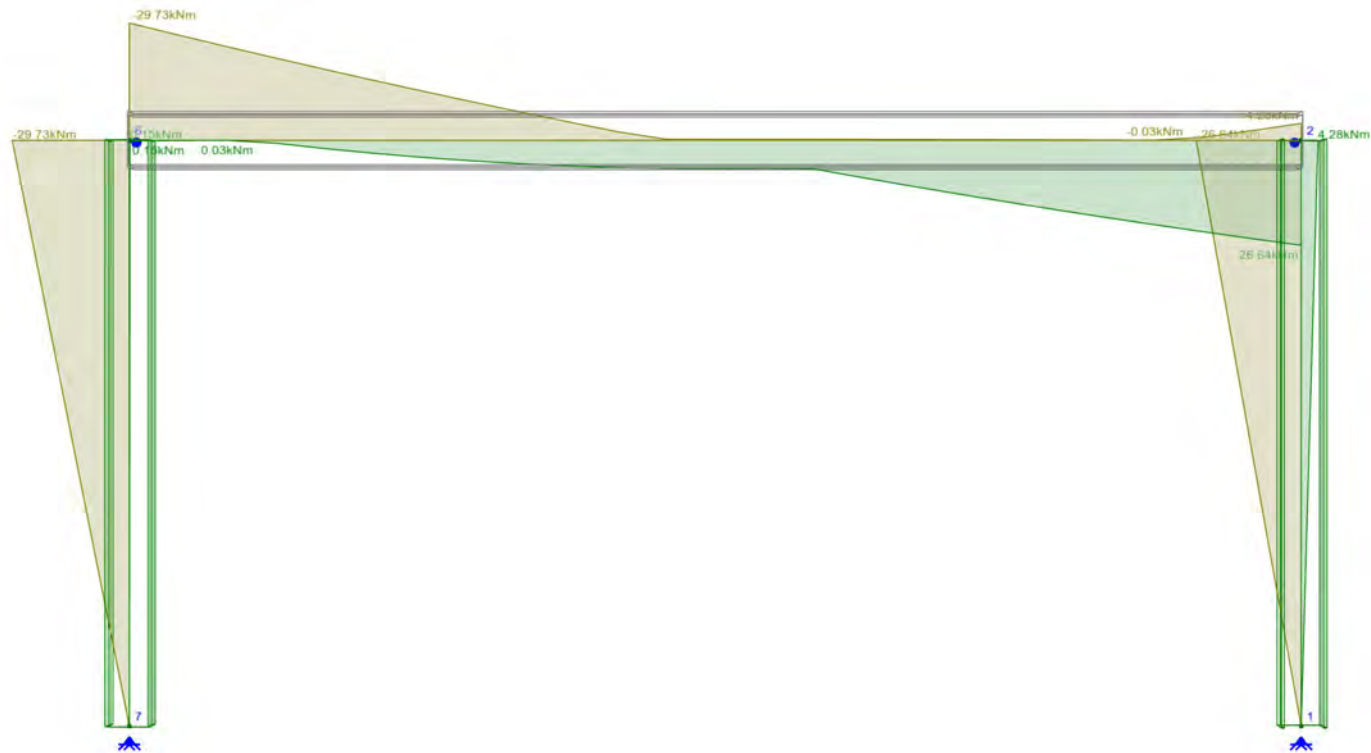
Path: Z:\projects\10747- 13 Hart Place, Lake Coler... \bracing\10747\_portal b

Designer: Date: Tuesday, November 26, 2019 6:04 PM Page: 1

Envelope of both for All combination load cases

Min

Max



Viewpoint (90,0), Moments

Materials: 1 STEEL 6 200 PFC  
Sections: 1 250 PFC 6 200 PFC

SPACE GASS 12.80 - CONSTRUCTURE

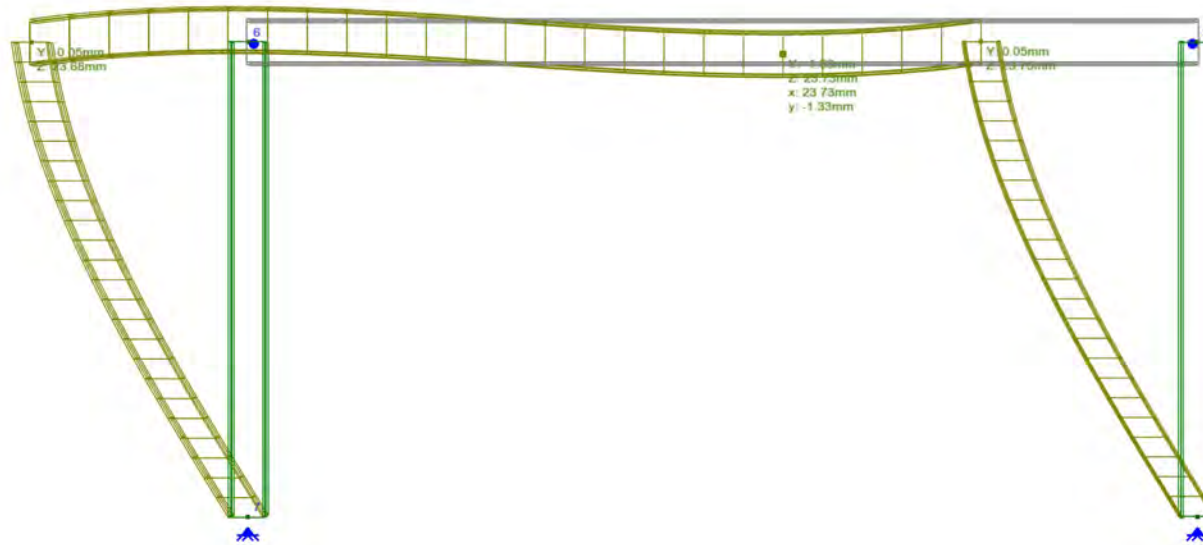
Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal b

Designer: Date: Tuesday, November 26, 2019 6:05 PM Page: 1

Load case 7

Min

Max



Viewpoint (90,0), Displacements

Materials:  
1 STEEL

Sections:  
1 250 PFC  
6 200 PFC

SPACE GASS 12.80 - CONSTRUCTURE

Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal b

Designer: Date: Tuesday, November 26, 2019 6:04 PM Page: 1

Envelope of both for All combination load cases

Min

Max



Viewpoint (90,0), Reactions

Materials:  
1 STEEL

Sections:  
1 250 PFC  
6 200 PFC



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structural engineering

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## 5. NZS3604 Foundation Design

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JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: NZS3604 Foundation Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**LOAD**

Groof	= 0.5kPa
Gwalls	= 0.50 kPa
Qroof	= 0.25 kPa
Su	= 0.40 kPa

**Perimeter/internal Beam****Dead**

Rroof	- 5m trib	= 0.5x5	= 2.5 kN/m
Walls	- 2.4m stud	= 0.50x2.4	= 1.2 kN/m
Foundation			= 2.8 kN/m
Total			= 6.5 kN/m

**Live**

Rroof	- 5m trib	= 0.5x0.25	= 1.25 kN/m
Floor			= 0.5 kN/m
Total			= 1.75 kN/m

**Snow**

Rroof	- 5m trib	= 0.4x5	= 2.0 kN/m
-------	-----------	---------	------------

**Combination**

1.35G	= 1.35x6.5	= 8.8 kN/m
1.2G+1.5Q	= 1.2x6.5+1.5x1.75	= 10.43 kN/m
1.2G+Su	= 1.2x6.5+2.0	= 9.8 kN/m

**Worstcase Bearing**

Bearing =  $10.43/0.2 = 52 \text{ kPa} < 200 \times 0.5 = 100 \text{ kPa}$   
Therefore OK!

**Reaction from girder truss**

$R^* = 33.4 \text{ kN compression} / 18.3 \text{ kN uplift}$

Design a 300x650mm (W x D) ground beam to resist the uplift/compression reaction.

For uplift, design with 2.5m long and 1m tribute concrete floor slab

$W_t = 24 \times 0.3 \times 0.75 \times 2.5 + 24 \times 0.1 \times 2.5 \times 1.0 = 19.5 \text{ kN} > 18.3 \text{ kN}$

Therefore ok!

For the 2.5m long ground beam

$M^* = 18.3 \times 2.5/4 = 11.43 \text{ kNm}$

Check 2-D16 with R10 stirrup @ 200crs

$\Phi M_n = 54 \text{ kNm} > M^* = 11.43 \text{ kNm}$

Therefore ok!



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## 6. WALL STUDS & PURLINS

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Ph: 09 320 5226

JOB NAME:

SECTION:

JOB No. 10747

DATE:

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CHECKED:

PAGE No.

SNOW  $\sigma \sim 390$ 

$$\begin{aligned} S_g &= 2.21 \text{ kPa} & \text{ULS} \\ S_g &= 1.5 \text{ kPa} & \text{SLS} \end{aligned}$$

$$\alpha = 35^\circ - 40^\circ$$

$$\begin{aligned} S_u &= 0.77 \text{ kPa} \\ S_s &= 0.52 \text{ kPa} \end{aligned}$$

FROM NZS 3604 Engineering Basics

$$S_g = 2 \text{ kPa} \quad \text{ULS}$$

assuming  $0 - 10^\circ$  roof pitch

$$S_u = 1.54 \text{ kPa}$$

← NOTE THAT THIS IS  
HIGHER THAN  
 $S_u = 0.77 \text{ kPa}$

FROM MGH GENERAL NOTES:

245mm Studs  
90x45 S68 @ 400 c/s max  
140x45 S68 @ 600 c/s max  
UNO - All dwangs @ 800 c/s

Wall studs Ext

$$1) \text{ Roof } (TW = \frac{8.8\text{m}}{2} = 4.4\text{m})$$

(rear of garage)

$$\begin{array}{ccc} G & Q & S_u \\ 0.45 \text{ kPa} & 0.25 & 0.77 \end{array}$$

Wall studs Internal

$$2) \text{ Roof } (TW = 4.4\text{m})$$

$$\begin{array}{ccc} G & Q & S_u \\ 0.45 & 0.25 & 0.77 \end{array}$$

LOADS

$$P^+ 1.26 + S_u = 5.8 \text{ kN/m}$$

$$\begin{aligned} \text{Assume } e &= \frac{90}{2} = 45\text{mm} \Rightarrow M^* = 0.26 \text{ kNm/m} \\ &\left\{ \begin{array}{l} \frac{140}{2} = 70\text{mm} \Rightarrow M^* = 0.41 \text{ kNm/m} \end{array} \right. \end{aligned}$$

→ 90x45 @ 400 w/ blocking @ 600 ok

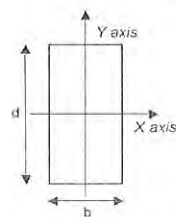
→ 140x45 @ 600 w/ blocking @ 800 ok

## Timber in Compression

## 90 Wall Studs

NZS 3603:1993

	MSG8 Dry	Type of timber	
D	90 mm	Section depth	
B	45 mm	Section width	
A	4050 mm <sup>2</sup>	Section Area	
$\phi$	0.8	strength reduction factor (CI 2.5)	
$k_1$	0.8	Load duration factor (CI 2.7)	
$L_{ax}$	2455 mm	$k_{10} L$ = length between points of restraint preventing column buckling in th	
$L_{ay}$	1200 mm	$k_{10} L$ = length between points of restraint preventing column buckling in th	
$S_2$	27.28	min of $L_{ax} / D$ or $k_{10} L / D$	
$S_3$	26.67	min of $L_{ay} / B$ or $k_{10} L / B$	
$k_{8x}$	0.39	modification factor for stability (CI 2.10)	
$k_{8y}$	0.41	modification factor for stability (CI 2.10)	
$f_c$	18 MPa	characteristic compressive strength parallel to grain	
$\phi N_{ncx}$	18.19 kN	$\phi k_1 k_{8x} f_c A$	ult member compressive strength about x-axis
$\phi N_{ncy}$	19.00 kN	$\phi k_1 k_{8y} f_c A$	ult member compressive strength about y-axis
$N^*c$	5.8 kN	compression load	
$\phi N_{nc}$	18.19 kN	ultimate member compressive strength	
		OK	



## Combined bending and compression

CI 3.5

$M_y^*$	0 kNm	moment about y-axis
$\phi M_{ny}$	0.27 kNm	moment capacity about y-axis
		OK

$$\left( \frac{M_y^*}{\phi M_{ny}} \right) + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

0.31      ≤      1.0  
OK

$M_x^*$	0.26 kNm	moment about x-axis
$\phi M_{nx}$	0.54 kNm	moment capacity about x-axis
		OK

$$\left( \frac{M_x^*}{\phi M_{nx}} \right) + \left( \frac{N_c^*}{\phi N_{ncx}} \right) \leq 1.0$$

0.80      ≤      1.0  
OK

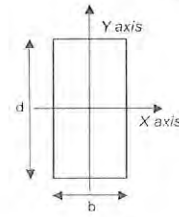
$$\left( \frac{M_x^*}{\phi M_{nx}} \right)^2 + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

0.54      ≤      1.0  
OK

## Timber in Compression

## 90 Wall Studs

NZS 3603:1993



	MSG8 Dry	Type of timber
D	140 mm	Section depth
B	45 mm	Section width
A	6300 mm <sup>2</sup>	Section Area
$\phi$	0.8	strength reduction factor (CI 2.5)
$k_1$	0.8	Load duration factor (CI 2.7)
$L_{ax}$	2455 mm	$k_{10} L$ = length between points of restraint preventing column buckling in th
$L_{ay}$	1200 mm	$k_{10} L$ = length between points of restraint preventing column buckling in th
$S_2$	17.54	min of $L_{ax} / D$ or $k_{10} L / D$
$S_3$	26.67	min of $L_{ay} / B$ or $k_{10} L / B$
$k_{8x}$	0.79	modification factor for stability (CI 2.10)
$k_{8y}$	0.41	modification factor for stability (CI 2.10)
$f_c$	18 MPa	characteristic compressive strength parallel to grain
$\phi N_{ncx}$	57.35 kN	$\phi k_1 k_{8x} f_c A$ ult member compressive strength about x-axis
$\phi N_{ncy}$	29.56 kN	$\phi k_1 k_{8y} f_c A$ ult member compressive strength about y-axis
$N^*c$	5.8 kN	compression load
$\phi N_{nc}$	29.56 kN	ultimate member compressive strength
		OK

## Combined bending and compression

CI 3.5

$M_y^*$	0 kNm	moment about y-axis
$\phi M_{ny}$	0.42 kNm	moment capacity about y-axis
		OK

$$\left( \frac{M_y^*}{\phi M_{ny}} \right) + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

0.20      ≤      1.0  
OK

$M_x^*$	0.41 kNm	moment about x-axis
$\phi M_{nx}$	1.3 kNm	moment capacity about x-axis
		OK

$$\left( \frac{M_x^*}{\phi M_{nx}} \right) + \left( \frac{N_c^*}{\phi N_{ncx}} \right) \leq 1.0$$

0.42      ≤      1.0  
OK

$$\left( \frac{M_x^*}{\phi M_{nx}} \right)^2 + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

0.30      ≤      1.0  
OK

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JOB NAME:

PAGE No.

SECTION:

JOB No. 10747

DESIGNED: PA

DATE:

CHECKED:

## PURLINS

70x45 S68 @ 900 c/s

fixed w/ 1/10g x 80mm screw on  
2/100 x 3.75mm skewed nails & 1 wire dog

OVERHANG = 150mm (Not CRITICAL!)  
(end, wall )  
gable "

Roof

G	Q	Su
0.45	0.25	0.77

→ 70x45 on flat @ 900 c/s ok!



<b>JOB NAME:</b> <b>JOB No.</b> 9479 <b>DATE</b> <b>SECTION:</b> Purlins <b>DESIGNED:</b> PA <b>CHECKED:</b>										
<b>NZS 3603:1993</b> <b>Basic input</b>										
Beam length/span	$L_b$	900 mm	Type of timber	MSG8 Dry						
Type		Roof	Section depth	D	45 mm					
Lateral stability		Free	Section width	B	90 mm					
		1200	Modulus of elasticity	E	8000 MPa					
	Lay	900 mm	Moment of inertia	I	683438 mm <sup>4</sup>					
			Section modulus	Z	30375 mm <sup>3</sup>					
			Shear area	$A_s$	2700 mm <sup>2</sup>					
			Bending strength	$f_b$	14 MPa					
			Shear strength	$f_s$	3.8 MPa					
Strength reduction factor	$\phi$	0.8 -	Slenderness	S	0.0 -					
Creep factor	$k_2$	2.0	Stability factor	$k_{st}$	1.00 -					
Parallel support factor	$k_4$	1 -	Size factor	$k_{24}$	1.00 -					
Load sharing		No	Load sharing factor	$k_5$	1.00 -					
Grid system (vibration)	$k_9$	1.00	Shaved & steamed	$k_{20} = k_{21}$	0.85 -					
<b>Loading</b>										
Tributary width	TW	0.9 m	Area load (kPa)	Line load (kN/m)	Total Line Load (kN/m)	Point Load (Midspan) (kN)				
Dead load	G	0.45	+	0	=	0.41	0			
Live load - Roof	$Q_{Roof}$	0.25	+	0	=	0.23	0			
Live load - Floor	$Q_{Floor}$	0	+	0	=	0.00	0			
Live load - Storage	$Q_{Storage}$	0	+	0	=	0.00	0			
Snow load (ULS)	$S_u$	0.77	+	0	=	0.69	0			
Snow load (SLS)	$S_s$	0.52	+	0.00	=	0.47	0.00			
Wind uplift (ULS)	$W_u$	0	+	0	=	0.00	0			
Wind downward (ULS)	$W_d$	0	+	0	=	0.00	0			
Wind uplift (SLS)	$W_{u,s}$	0.00	+	0.00	=	0.00	0.00			
Wind downward (SLS)	$W_{d,s}$	0.00	+	0.00	=	0.00	0.00			
<b>Loads</b>										
Short term factor	$\psi_s$	0.7	$Q_{Roof}$	$Q_{Floor}$	$Q_{Storage}$					
Long term factor	$\psi_l$	0	0.7	0.4	1					
Combination factor	$\psi_c$	0	0.4	0.6	0.6					
<b>Load combinations</b>										
			Area load (kPa)	Line load (kN/m)	Total Line load (kN/m)	Point Load (kN)	$M^*$ (kN/m)	$V^*$ (kN)		
ULS Permanent	1.35G		0.61	+	0.00	=	0.55	0.00	0.06	0.25
ULS Medium	1.2G + 1.5Q		0.92	+	0.00	=	0.82	0.00	0.08	0.37
	1.2G + $S_u$ + $\psi_c Q$		1.31	+	0.00	=	1.18	0.00	0.12	0.53
	Critical								0.12	0.53
ULS Brief	1.2G + $W_d$ + $\psi_c Q$		0.54	+	0.00	=	0.49	0.00	0.05	0.22
	0.9G + $W_u$		0.41	+	0.00	=	0.36	0.00	0.04	0.16
	Critical								0.05	0.22
<b>SLS Short-Term</b>										
G + $\psi_s Q$			0.63	+	0.00	=	0.56	0.00	0.88	
G + $S_s$ + $\psi_l Q$			0.97	+	0.00	=	0.88	0.00	1.37	
G + $W_{u,s}$			0.45	+	0.00	=	0.41	0.00	0.63	
G + $W_{d,s}$ + $\psi_l Q$			0.45	+	0.00	=	0.41	0.00	0.63	
	Critical								1.37	
<b>SLS Long-Term</b>										
$k_2 (G + \psi_l Q) + S_s$			1.42	+	0.00	=	1.28	0.00	2.00	
<b>ULS Design</b>										
Bending moment	$k_1$	$M^*$ (kNm)	$\phi M_n$							
Permanent	0.6	0.06	0.20	OK						
Medium	0.8	0.12	0.27	OK						
Brief	1.0	0.05	0.34	OK						
Shear		$V^*$ (kN)	$\phi V_n$							
Permanent	0.6	0.25	4.92	OK						
Medium	0.8	0.53	6.57	OK						
Brief	1.0	0.22	8.21	OK						
<b>SLS Design</b>										
Deflection		$\Delta$ (mm)	$\Delta$ limit							
Short-Term		1.37	2.25	OK						
Long-Term		2.00	2.25	OK						
Floor Vibration		2.78	1-2	(Ignore if member is not part of the floor)						



Building Code Clause(s) ..... B1.....

## PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on page 2)

ISSUED BY: **CONSTRUCTURE LIMITED**

(Design Firm)

TO: **C/O MIKE GREER HOMES**

(Owner/Developer)

TO BE SUPPLIED TO: **SELWYN DISTRICT COUNCIL**

(Building Consent Authority)

IN RESPECT OF: **NEW DWELLING**

(Description of Building Work)

AT: **LOT 8, 13 HART PLACE, LAKE COLERIDGE**

(Address)

**LOT 8 DP 348241 SO**

We have been engaged by the owner/developer referred to above to provide **Structural Engineering Design and Construction Monitoring of NZS3604 perimeter foundation with slab on grade and associated pad to alfresco portal and post to the rear of garage, chimney lintel and veranda lintel at rear garage, bracing throughout, steel portal to alfresco and living slider, 18.2kN truss connection detail, chimney framing wall studs (external and**

(Extent of Engagement)

Clause(s) **B1 (STRUCTURE)** of the Building Code for

all ☐ or Part only ☒ (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

☒ Compliance Documents issued by the Ministry of Business, Innovation & Employment **B1/VM1; B1/VM4; B1/** ;.....or  
(verification method / acceptable solution)

☒ Alternative solution as per the attached schedule **Repairing & rebuilding houses affected by the Canterbury**

The proposed building work covered by this producer statement is described on the **Constructure Limited** drawings titled **Lot 8, 13 Hart Place, Lake Coleridge** and numbered **as per title sheet 10747 dated 15 January 2020** together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

(i) Site verification of the following design assumptions **Ground conditions as per Constructure soil bearing investigation dated 07 October 2019**

(ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

☐ CM1 ☐ CM2 ☒ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ as per agreement with owner/developer (Architectural)

I, **CORY JOHN BEDFORD**  
(Name of Design Professional)

am:

☒ CPEng # **238134**

☐ Reg Arch #.....

I am a Member of : ☒ Engineering NZ ☐ NZIA and hold the following qualifications: **BEng (HONS) CMEngNZ CPEng IntPE (NZ)**

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000\*.

The Design Firm is a member of ACENZ: ☒

SIGNED BY **CJ BEDFORD** ON BEHALF OF **CONSTRUCTURE LIMITED**  
(Design Firm)

Date: **16/01/2020-Rev1**

(signature)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000\*.

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

## GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

**PS1 Design** Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

**PS2 Design** Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

**PS3 Construction** Forms common use as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules 1 & 2 of NZIA's SCC 2011<sup>2</sup>

**PS4 Construction Review** Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

The

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

### Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

### \*Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

### Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers<sup>3</sup>). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

### Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

### Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

### Refer Also:

- 1 Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
- 2 NZIA Standard Conditions of Contract SCC 2011
- 3 Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)
- 4 PI Guidelines on Producer Statements

[www.acenz.org.nz](http://www.acenz.org.nz)  
[www.ipenz.org.nz](http://www.ipenz.org.nz)  
[www.nzia.co.nz](http://www.nzia.co.nz)





16 January 2020

10747

C/o Mike Greer Homes

Dear Sirs,

**APPLICATION FOR BUILDING CONSENT  
LOT 8, 13 HART PLACE, LAKE COLERIDGE  
STRUCTURAL ENGINEERING INSPECTIONS**

We have been engaged to monitor the construction and wish to confirm the extent of our monitoring.

We will monitor the construction of the building structure. This will be an audit of a sample of work, rather than a detailed inspection of every component in accordance with IPENZ Construction Monitoring Services level CM3. We ask that the builder notify us at least 48 hours in advance of all major items of work before they are concealed. On this project, that would include:

- Foundations prior to casting.
- Steel/ timber beams and lintels after erection, prior to lining.
- Pre-line bracing during installation, prior to lining.
- Wall studs (external and internal load bearing walls).
- Purlins.

**SUPERSEDED**

The number of inspections for each item above will depend on the builders method of construction, concrete pour sequencing and such like and shall be agreed with the builder as the work progresses.

For any construction queries or inspection notifications, please contact our office.

A Producer Statement – PS4 – Construction Review could be issued once the above inspections have been completed.

Please forward this to the Local Authority as part of the Building Consent documentation.

Yours faithfully

**Cory Bedford**  
**BEng (HONS) CEngNZ CPEng IntPE(NZ)**



## Memorandum from licensed building practitioner: Certificate of design work

### Section 45 and Section 30C, 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: Lot 8, 13 Hart Place

Suburb:

Town/City: Lake Coleridge

Postcode:

#### THE OWNER

Name(s): C/o Mike Greer Homes

mailing address.

Suburb:

PO Box/Private Bag:

Town/City:

Post code:

Phone number

Email address:

#### BASIS FOR PROVIDING THIS MEMORANDUM

( )	<b>sole</b> designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project
(✓)	<b>lead</b> 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
( )	<b>lead</b> designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design
( )	<b>specialist</b> 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 Cory Bedford carried out / supervised the following design work that is restricted building work

**PRIMARY STRUCTURE: B1**

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
<b>Primary structure</b>			
All RBW Design work relating to B1 (X)		( ) Carried out ( ) Supervised	
Foundations and subfloor framing (✓)	NZS3604 perimeter foundation with slab on grade and associated pad to alfresco portal and post to the rear of garage.	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747
Walls (✓)	Wall studs (external and	( ) Carried out	Refer Constructure
	wall).		
Roof (✓)	Purlins.	( ) Carried out ( ) Supervised	Refer Constructur drawings #10747
Columns and beams (✓)	Chimney lintel and veranda lintel at rear garage.	( ) Carried out (✓) Supervised	Refer Constructur drawings #10747
		(✓) Supervised	drawings #10747
Other (✓)	Steel portal to alfresco and living slider, 18.3 kN truss connection detail, chimney framing.	( ) Carried out (✓) Supervised	Refer Constructure drawings #10747

**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.

**Note:** continue on another page if necessary.

**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]

**Note:** continue on another page if necessary.

**ISSUED BY**

Name: Cory Bedford	LBP or Registration number: 238134
The practitioner is a: ( ) Design LBP ( ) Registered architect (✓) Chartered professional engineer	
Design Entity or Company (optional): Constructure Ltd	
Mailing address (if different from below):	
Street address / Registered office: Unit 6, 75 Peterborough Street	
Suburb:	Town/City: Christchurch
PO Box/Private Bag: PO Box 21381	Postcode: 8143
Phone number: 03 365 3243	Mobile:
Address:	Website:
Email address: cory@constructure.co.nz	

**DECLARATION**I, **Cory Bedford**

(Name of practitioner, 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

- 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: 16/01/2020-Rev1



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## OUTLINE STRUCTURAL SPECIFICATION

**C/O MIKE GREER HOMES**  
**LOT 3, 13 HART PLACE, LAKE COLFRIDGE**  
**by**

**CONSTRUCTURE LIMITED**

**NOVEMBER 2019**

**Project: 10747**

**Christchurch Office:**

6/75 Peterborough Street, Christchurch 8013

PO Box 21381, Christchurch 8143

Phone 03 365 3243 Email [cory@constructure.co.nz](mailto:cory@constructure.co.nz)

**Auckland Office:**

Suite 2.1, 63 Ponsonby Road, Auckland 1011

PO Box 21381, Christchurch 8143

Phone 09 320 5226 Email [james@constructure.co.nz](mailto:james@constructure.co.nz)

## 1. GENERAL

Refer to the Preliminary and General Clauses of the Specification and to the General Conditions of Contract, which are equally binding on all Trades. This specification shall be read in conjunction with all other sections of the project specification.

No change or variation is permitted unless the Engineer provides appropriate written instructions.

Dimensions and details shall be read in conjunction with the Architect's drawings. The contractor shall check all dimensions before construction commences.

The contractor shall fully comply with all the provisions of the New Zealand Building

## 2. EXCAVATION AND HARD FILLING

Excavate the soils sufficient for the construction of the works, and to solid bearing. An ultimate bearing pressure of 200kPa has been assumed for the design. This assumption is to be verified at the time of excavation by the Engineer via site

Provide at least 24 hours notice to the Engineer to allow the sub grade to be inspected before placement of hard fill, formwork, DPM or reinforcing.

Foundations shall not be cast until approval from the Engineer has been obtained.

Excavate all topsoil/organic matter from the building footprint and areas to be hard filled or to receive concrete foundations. Thoroughly compact all sub grade surfaces prior to backfilling with hard fill.

If excavation to a greater depth than that detailed is necessary, the contractor shall obtain the written approval of the Engineer before over-excavating. Over-excavation shall be back-filled in accordance with the instructions of the Engineer.

Supply, lay and compact hard fill under floor slabs and foundations where detailed. Hard fill material shall be well graded AP40, compacted backfill shall be consolidated to not less than 95% of the maximum dry density of the fill material as determined by NZS 4402, Test 4.1.3. The minimum depth shall be 150mm.

The contractor shall provide evidence of adequate compaction (by nuclear density gauge or alternative as approved by the Engineer) to hard fill greater than 600mm overall depth or as required.

Existing hard fill may be re-used, subject to compliance with this Specification.

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### 3. CONCRETE CONSTRUCTION

All concrete work shall comply with the requirements of NZS 3109.

All reinforcing materials shall comply with the requirements of NZS3402 and AS/NZS 4671. All reinforcing shall be manufactured by the micro-alloy process.

On the drawings:

'D' indicates deformed grade 300E reinforcing to AS/NZS 4671:2001

'HD' indicates deformed grade 500E reinforcing to AS/NZS 4671:2001

'R' indicates round grade 300E reinforcing to AS/NZS 4671:2001

'HR' indicates round grade 500E reinforcing to AS/NZS 4671:2001

Mesh reinforcement in floor slabs shall be ductile mesh and comply with NZS3422.

All products shall be supplied and installed in accordance with the manufacturer's written recommendations.

Except where specified otherwise, finishes shall be as specified below and shall be in accordance with NZS 3114:

all concrete which is visible externally or internally in the completed building:	F5 finish
concrete concealed in the completed building:	F3 finish
concrete below ground	F1 finish
all floor slabs and toppings	U3 finish

Form all chases, rebates, etc as detailed.

Reinforcement shall be cut, bent, and fixed in accordance with NZS 3109, and as shown on the drawings. All reinforcement shall fully lap at all splices, corners of foundation beams, beams, blockwalls etc. Laps for reinforcement shall be in accordance with the schedule below, unless detailed otherwise on the drawings.

Bar	Lap length for concrete	Lap Length for blockwork
HD10	600mm	700mm
HD12	700mm	850mm
HD16	900mm	1150mm
HD20	1050mm	1400mm

All foundation reinforcement must lap in accordance with the above and as shown on the drawings.

Cast in all fixings, bolts, and other items detailed or required for the completion of the works. Fix securely in place before casting concrete, and check their positions immediately after casting. If post fix anchors are required these are to be installed as per the manufactures recommendations.

Place concrete in accordance with NZS 3109.

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Take care to protect and cure all concrete adequately, and in accordance with NZS 3109.

After casting floor slabs, supply and apply an anti-evaporation film such as FBS ER 921 or similar.

Apply a curing compound to all concrete floor slabs immediately on completion of the surface finishing, or alternatively, cure by ponding.

The following concrete shall be used:

Element	Concrete type	28 day strength	Slump	Max aggregate size
Foundations	Normal	20 MPa	100mm	19mm

It is the contractor's responsibility to prepare any additional shop drawings of the works or elements if required.

Supply and lay DPM beneath all ground slabs in accordance with the manufacturer's written recommendations and the Architectural Specification. The DPM shall be 0.25mm polythene or equivalent.

All ground slabs should have saw cuts and formed construction joints as detailed.

sufficient strength to avoid spalling of the cut edge. Saw cuts shall be 3mm wide and one-quarter the slab thickness.

Reinforcement shall not be bent on site except in accordance with this specification. Bending shall be in accordance with the requirements of NZS3109 and the manufacturer's written recommendations.

#### 4. STRUCTURAL STEELWORK

All structural steel fabrication and erection shall comply with AS/NZS 5131:2016, the Construction Category shall be CC2, unless noted otherwise on the drawings.

All structural steel shall be mild steel unless detailed otherwise, and shall comply with NZS 3404. All Universal Beam (UB), Universal Column (UC) & Hot Rolled (PFC) sections shall be Grade 300PLUS. All hollow sections shall be grade C350.

Welding shall be undertaken by qualified welding personnel, in accordance with the requirements of NZS 3404 and AS/NZS 1554. Welds shall be as detailed on the drawings. Additional butt welding of short lengths shall not be done without the specific written approval of the engineer.

The structural steelwork Sub-contractor shall provide a producer statement confirming that all welding and inspection has been carried out in accordance with the specification.

Unless detailed otherwise, all welding is category SP.

All steelwork dimensions shall be checked on site before commencing work. Notify the Engineer of any discrepancies and obtain prior written approval of any resultant

changes.

Unless shown otherwise all bolts shall be supplied with a standard nut and washer and shall be grade 8.8/S to AS1252

Bolts holes shall be no more than 2mm larger than the nominal bolt size, for bolts up to 24mm diameter, and 3mm for larger bolts and shall be formed in accordance with NZS 3404.

Macroclimate corrosion category C3

Concealed steelwork surfaces shall be coated with a coating system in accordance with SNZTS 3404:2018, system designation ALK1 or equivalent.

All external steelwork exposed to the weather or to the outside environment and not washed by rain shall be painted with a coating system in accordance with SNZTS 3404:2018, system designation PUR5 or equivalent. Note that this system gives a time to first maintenance of 25 years.

All external steelwork exposed to the weather or to the outside environment and subject to rain washing shall be painted with a coating system in accordance with SNZTS 3404:2018, system designation PUR5 or equivalent. Note that this system gives a time to first maintenance of 15 years.

Alternatively, exposed steelwork may be hot dip galvanised to HDG600-5D and shall be done in accordance with SNZTS 3404:2018. Do not galvanise weld plate surfaces, cast into concrete, contact surfaces of friction bolted joints and surfaces of steel members cast into concrete more than 100mm. Note that this system gives a time to first maintenance of 25 years.

Packing under steel baseplates shall be steel. Packing under baseplates that are hot dip galvanised shall be galvanised steel or proprietary non-ferrous packers. After erection of steelwork is complete, mortar pack under baseplates typically to a maximum height of 20mm. Mortar shall be 1:3 cement:sand mix, just moist and tightly packed into the space. Finish off neatly where exposed.

Preparation and painting shall be done strictly in accordance with the paint manufacturer's written recommendations, and in accordance with AS/NZS 2312. Galvanising shall be in accordance with AS/NZS 4680.

## 5. TIMBER WORK

Timber work and associated connections shall comply fully with NZS3604.

Care shall be exercised in assessing the durability requirements for all timber and fixings given their exposure and environment. If in doubt, the level of protection shall be discussed and agreed with the Architect and Local Authority.

All timber shall be SG8, graded dry to NZS3622.

Laminated Veneer Lumber (LVL) shall be grade 11 unless noted otherwise on the drawings.





16 January 2020

10747

C/o Mike Greer Homes

Dear Sirs,

**APPLICATION FOR BUILDING CONSENT  
LOT 8, 13 HART PLACE, LAKE COLERIDGE  
STRUCTURAL ENGINEERING CALCULATIONS**

The design and calculation process for Constructure Limited projects includes a wide range of activities and documentation including:

- Project team meetings and discussion
- Design based on experience

- Reference to Standards, codes and guidelines
- Drawings and Specification review and mark-up
- Electronic calculations, spreadsheets, etc.
- Written calculations

**SUPERSEDED**

The attached calculations have been requested by the building consent authority for their review as part of the building consent process. They are provided on the basis that they are accompanying information to assist in the building consent authorities understanding of the

Please forward this to the Local Authority as part of the Building Consent documentation.

Yours faithfully

**Cory Bedford**  
**BEng (HONS) CEngNZ CPEng IntPE(NZ)**



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structural engineering

**STRUCTURAL CALCULATIONS**  
**for**  
**BUILDING CONSENT**  
**at**  
**13 HART PLACE, LAKE COLERIDGE**  
**by**  
**CONSTRUCTURE LIMITED**  
**JANUARY 2020-REV1**

SDC - Approved Building Consent Document - BC192333 - Pg 80 of 378 - 26/01/2020 - dalles

**PROJECT:10747**

**Christchurch Office:**

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PO Box 21381, Christchurch 8143

**Phone** 03 365 3243 **Email** cory@constructure.co.nz

**Auckland Office:**

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SDC - Approved Building Consent Document - BC192333 - Pg 81 of 378 - 26/01/2020 - dalles

**Order of calculations is as follows:**

- 1. Load Calculations**
- 2. Beam Design**
- 3. Bracing Design**
- 4. Plane Brace Design**
- 5. Portal Frame Design**

**SUPERSEDED**

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## 1. Load Calculations

SUPERSEDED

SDC - Approved Building Consent Document - BC192333 - Pg 82 of 378 - 26/01/2020 - dalles

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## Snow Load

Region N4, sub-alpine

$$h_0 := 390 \text{ m}$$

Height ASL

$$C_e := 1$$

Sub - alpine

$$\alpha := 0$$

Roof slope in degrees

$$\mu_1 := \min \left( \left( 0.7 \cdot \frac{(60 - \alpha)}{50} \right), 0.7 \right) = 0.7$$

$$k_{puls} := 1.25$$

Probability factor for P=1/150

$$k_{psls} := 0.85$$

Probability factor for P=1/25

$$s_{guls} := \max \left( k_{puls} \cdot 1.2 \left( 3 \cdot \frac{h_0}{1000 \text{ m}} + 0.3 \right) \text{ kPa}, 0.9 \text{ kPa} \right) = 2.205 \text{ kPa}$$

$$s_{gsls} := k_{psls} \cdot 1.2 \left( 3 \cdot \frac{h_0}{1000 \text{ m}} + 0.3 \right) \text{ kPa} = 1.499 \text{ kPa}$$

**SUPERSEDED**

## Wind Load

Region A7

$$V_{25} := 37 \frac{\text{m}}{\text{s}}$$

SLS regional wind speed

$$V_{500} := 45 \frac{\text{m}}{\text{s}}$$

ULS regional wind speed

$$M_d := 1$$

Wind direction multiplier

$$M_{z.cat} := 0.99$$

TC=1, z=7m

$$M_s := 1$$

Assume no sheilding

$$H := 40 \text{ m}$$

$$x := 300 \text{ m}$$

$$L_u := 10 \text{ m}$$

$$z := 7 \text{ m}$$

$$L_1 := \max (0.36 L_u, 0.4 H) = 16 \text{ m}$$

$$L_2 := \max (1.44 L_u, 1.6 H) = 64 \text{ m}$$

$$\frac{H}{2 \cdot L_u} = 2$$

$$M_h := 1$$

As  $x > L_2$

$$M_{lee} := 1$$

West of Lee zone

$$M_t := \max(M_h, M_{lee}) = 1$$

Topographic multiplier

$$V_{site.sls} := V_{25} \cdot M_d \cdot M_{z.cat} \cdot M_s \cdot M_t = 36.63 \frac{m}{s}$$

**SUPERSEDED**

**Constructure Limited**

6/75 Peterborough Street  
PO Box 21381, Christchurch 8143  
Ph: 03 365 3243

JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Load Calculation

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**EARTHQUAKE****Largest Translational Period**0.40 s  $T_1$ **Site Subsoil Class**

D

Deep or Soft Soil Sites

**Hazard Factor**

0.35

Z

AS/NZS 1170.5 Table 3.3

**Spectral Shape Factor**

3.00

 $C_h(T)$ 

AS/NZS 1170.5 Fig. 3.1

**Return Period Factor**

500

years

Average recurrence interval for ULS (Earthquake)

AS/NZS 1170.0 Table 3.3

25

years

Average recurrence interval for SLS1

AS/NZS 1170.0 Table 3.3

1.00

 $R_u$ 

AS/NZS 1170.5 Table 3.5

0.25

 $R_s$ 

AS/NZS 1170.5 Table 3.5

**Seismic Fault Factor**

1.00

 $f_s$  (km)

AS/NZS 1170.5 Cl. 3.1.6

0.00

 $N(T,D)$ Annual probability of exceedance  $\leq 1/250$ 

AS/NZS 1170.5 Cl. 3.1.6

**Characteristic Site Spectra**

0.26

 $C(T_1)$  $= C_h(T) Z R_s N(T,D)$ 

(Service Limit State)

AS/NZS 1170.5 Cl. 3.1.1

**Ductility**

1.25

 $\mu_{ULS}$ 

Structural ductility factor

AS/NZS 1170.5 Cl. 4.4

0.925

 $S_p$ 

Structural performance factor

0.7 for  $1.0 < \mu < 2.0$ 1.3 -  $0.3\mu$  for  $1.0 < \mu < 2.0$ Use  $\mu=3.5$  for Timber with GIB BracingUse  $\mu=1-1.25$  for Steel or Reinforced Concrete

1.25

 $\mu_{SLS}$ For SLS1  $1.0 \leq \mu \leq 1.25$ For SLS2  $1.0 \leq \mu \leq 2.0$ 

AS/NZS 1170.5 Cl. 4.4

0.7

 $S_p$ 

Structural performance factor = 0.7 (SLS)

0.4

s

 $T_1$  for  $k_\mu$  calculation ( $T_1$  shall not be taken as less than 0.4s)

1.14

 $k_{\mu, ULS}$ 

1.14

 $k_{\mu, SLS}$ 

0.850

 $C_d(T_1)$  ULS

$$C_d(T_1) = \frac{C(T_1)S_p}{k_\mu}$$

$$\geq (Z/20 + 0.02)R_u \text{ but not less than } 0.03R_u$$

0.16

 $C_d(T_1)$  SLS

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**A is windward wall**

A/B	service	ultimate	
Windward	$p_z = 0.403$	0.595 kPa	(C <sub>pi</sub> =+ve)
	0.805	1.191 kPa	(C <sub>pi</sub> =-ve)
Leeward	$p_z = -0.564$	-0.834 kPa	(C <sub>pi</sub> =+ve)
	-0.161	-0.238 kPa	(C <sub>pi</sub> =-ve)

**Combined Pressures**

C/D	0 to 1h	to 2h	to 3h	>3h	
Side	5.3	10.6	15.9	m	
service	$p_z = -0.684$	-0.564	-0.403	-0.322 kPa	(C <sub>pi</sub> =+ve)
	-0.282	-0.161	0.000	0.081 kPa	(C <sub>pi</sub> =-ve)
ultimate	$p_z = -1.012$	-0.834	-0.595	-0.476 kPa	(C <sub>pi</sub> =+ve)
	-0.417	-0.238	0.000	0.119 kPa	(C <sub>pi</sub> =-ve)

Roof	service	ultimate	
Up-wind	$p_z = -0.242$	-0.357 kPa	(C <sub>pe</sub> -ve) (C <sub>pi</sub> =+ve)
	0.590	0.873 kPa	(C <sub>pe</sub> +ve) (C <sub>pi</sub> =-ve)
Down-wind	$p_z = -0.644$	-0.953 kPa	(C <sub>pi</sub> =+ve)
	-0.242	-0.357 kPa	(C <sub>pi</sub> =-ve)

0.00m trib length		0.00m trib length	
kPa	kN/m	kPa	kN/m
<b>Walls Serviceability:</b>		<b>Roof Serviceability:</b>	
A/B max 0.805	0.000	max 0.590	0.000
A/B min -0.564	0.000	min -0.644	0.000
A/B max 1.191	0.000	<b>Ultimate:</b>	
A/B min -0.834	0.000	max 0.873	0.000
		min -0.953	0.000
<b>Serviceability:</b>			
C/D max 0.081	0.000		
C/D min -0.58	0.000		
<b>Ultimate:</b>			
C/D max 0.119	0.000		
C/D min -1.012	0.000		

**C is windward wall**

C/D	service	ultimate	
Windward	$p_z = 0.403$	0.595 kPa	(C <sub>pi</sub> =+ve)
	0.805	1.191 kPa	(C <sub>pi</sub> =-ve)
Leeward	$p_z = -0.503$	-0.744 kPa	(C <sub>pi</sub> =+ve)
	-0.101	-0.149 kPa	(C <sub>pi</sub> =-ve)

A/B	0 to 1h	to 2h	to 3h	>3h	
Side	5.3	10.6	15.9	m	
service	$p_z = -0.684$	-0.564	-0.403	-0.322 kPa	(C <sub>pi</sub> =+ve)
	-0.282	-0.161	0.000	0.081 kPa	(C <sub>pi</sub> =-ve)
ultimate	$p_z = -1.012$	-0.834	-0.595	-0.476 kPa	(C <sub>pi</sub> =+ve)
	-0.417	-0.238	0.000	0.119 kPa	(C <sub>pi</sub> =-ve)

Roof	0 to 0.5h	to 1h	to 2h	to 3h	>3h	
	2.65	5.3	10.6	15.9	m	
service	$p_z = -0.886$	-0.886	-0.564	-0.403	-0.322 kPa	(C <sub>pe</sub> -ve) (C <sub>pi</sub> =+ve)
	-0.081	-0.081	0.242	0.322	0.403 kPa	(C <sub>pe</sub> +ve) (C <sub>pi</sub> =-ve)
ultimate	$p_z = -1.310$	-1.310	-0.834	-0.595	-0.476 kPa	(C <sub>pe</sub> -ve) (C <sub>pi</sub> =+ve)
	-0.119	-0.119	0.357	0.476	0.595 kPa	(C <sub>pe</sub> +ve) (C <sub>pi</sub> =-ve)

0.00m trib length		0.00m trib length	
kPa	kN/m	kPa	kN/m
<b>Walls Serviceability:</b>		<b>Roof Serviceability:</b>	
A/B max 0.081	0.000	max 0.403	0.000
A/B min -0.684	0.000	min -0.886	0.000
<b>Ultimate:</b>		<b>Ultimate:</b>	
A/B max 0.119	0.000	max 0.595	0.000
A/B min -1.012	0.000	min -1.310	0.000
<b>Serviceability:</b>			
C/D max 0.805	0.000		
C/D min -0.503	0.000		
<b>Ultimate:</b>			
C/D max 1.191	0.000		
C/D min -0.744	0.000		





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## 2. Beam Design

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JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Beam Design

JOB No. 10747

DESIGNED: KZ

DATE: 13/11/2019

CHECKED:

B1

Span = 6.0m RLW = 1.0m

 $M^* = 12.6 \text{ kNm}$   $R^* = 8.4 \text{ kN ULS}$  / -2.6 kN upliftProvide 2/300x45 LVL13  $\Phi M_n = 48 \text{ kNm}$   $\Delta = 2.6/(2 \times 101.3) = 12.8 \text{ mm} = \text{span}/468$ 

So OK!

B2

Span = 1.6m RLW = 3.1m Wall = 2.0m

 $M^* = 4.45 \text{ kNm}$   $R^* = 11.2 \text{ kN ULS}$  / -2.1 kN upliftProvide 2/140x45 LVL13  $\Phi M_n = 9.4 \text{ kNm}$   $\Delta = 0.069/(2 \times 10.3) = 3.4 \text{ mm} = \text{span}/470$ 

So OK!

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Loads		Importance level	2	Wind & EQ		
		Annual Probability of exceedance	1/500	Snow		
			1/150	SLS1		
G	roof	heavy domestic (conc tile, trusses, ceiling)	0.84	kPa		
		light domestic (steel sheet, trusses, ceiling)	0.46	kPa		
	Floor	20mm particle board	0.15	kPa		
		13mm Gib	0.1	kPa		
		200x45 at 450 crs	0.15	kPa		
Total G	Partitions 10mm plycrete, studs @ 600	0.35	kPa			
	Weatherboard, timber framing	0.35	kPa			
	Brick veneer, timber framing	2.17	kPa			
	Floor only	0.5	Roof only	0.5		
Q	General Areas	1.5	kPa	1.8 kN		
	Balconies 1m above ground	0	kPa			
Su	Roof	Structural elements	0.25	kPa	1.4 kN	
	Roof	kp	1.25	(Table 5.1 AS/NZS 1170.3:2003)		
		ho	10	m		
		Sg	0.50	if less than 0.75, Su = 0.4kPa (Sg formula check 5.4.3)		
			1.08	if less than 0.75, Su = 0.4kPa		
Wu	from separate spreadsheet	Ce	1	sub-alpine regions		
		ui	0.7	see Sections 6/7, AS/NZS1170.3		
		Su = SgxCexui	2.21	kPa Refer to spread sheet for detail		
		Ss	1.50	kPa		
		Wu up	-1.31			
	Wu down	0.873				
	Ws	0.59				
Combinations						
ULS	Deck		Floor		Roof	
	1.35G		0.68	kPa	0.68	kPa
	1.2G + 1.5Q	3.6 kPa	2.85	kPa	0.98	kPa
	1.2 G + Su				2.81	kPa
	1.2 G + Wu				1.47	kPa
	0.9G + Wu				-0.86	kPa
SLS	G		0.50	kPa	0.50	kPa
	G + Qs	1.90 kPa	1.55	kPa	0.68	kPa
	G + Ss				2.00	kPa
	G + Ws				1.09	kPa

<b>B1</b>					
tributary width	span	6	m	span/400	0.015
	floor	0	m		
	roof	1	m		
	wall above	0	m (height)		
ULS load	floor	0.00	(Take maximum		
	roof	2.81	value of the		
	wall above	0.00	combination)		
ULS TOTAL		2.81	kN/m		
SLS Load	floor	0.00	(Take maximum		
	roof	2.00	value of the		
	wall above	0.00	combination)		
SLS TOTAL		2.00	kN/m		
M*	w1/8	12.62	kNm	Ru up	3 kN
R*		8.42	kNm	Rs	0 kN
deflection	steel	0.169	1/lxx	I req'd	11.24 3
	LVL 13	2.595	1/lxx	I req'd	17.09 K2 =1.5
	MSG8	6.247	1/lxx	I req'd	416.3 K2 =2.0
M*		8.42	kNm		
R*		8.42			
deflection		0.034	1/lxx	I req'd	2.25

B2							
tributary width	span		1.6	m	span/400	0.004	
	floor		0	m			
	roof		3.1	m			
	wall above		2	m (height)			
ULS load	floor		0.00		(Take maximum		
	roof		8.70		value of the		
	wall above		5.21		combination)		
		ULS TOTAL	13.90	kN/m			
SLS Load	floor		0.00		(Take maximum		
	roof		6.20		value of the		
	wall above		4.34		combination)		
	SLS TOTAL		10.54	kN/m			
M*	wl2/8		4.45	kNm	Run up		kN
deflection		steel	0.004	1/lxx	I req'd	1.123936	
		LVL 13	0.069	1/lxx	I req'd	17.29	K2 =1.5
		MSG8	0.167	1/lxx	I req'd	41.62726	K2 =2.0
M*	wl2/12		2.97	kNm			
R*			11.12				
deflection			0.001	1/lxx	I req'd	0.22	



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### 3. Bracing Design

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## Demand Calculation Sheet

### Job Details

Name: MUNRO  
 Street and Number: 13 Hart Place, Lake Coleridge  
 Lot and DP Number: Lot 8 DP 348241  
 City/Town/District: Lake Coleridge  
 Designer: K.Z.  
 Company: Constructure  
 Date: Wednesday, 13 November 2019

### Building Specification

Number of Storeys: 1  
 Floor Loading: 1.5 kN/m²  
 Foundation Type: Slab  
 Cladding Weight: Single Light  
 Roof Weight: Light  
 Room in Roof: No  
 Roof Pitch (degrees): 35  
 Roof Height above Eaves (m): 2.8  
 Building Height to Apex (m): 5.3  
 Ground to Lower Floor (m): 0.4  
 Average Stud Height (m): 2.4  
 Building Length (m): 22  
 Building Width (m): 16  
 Building Plan Area (m²): 224

**SUPERSEDED**

### Building Location

Wind Zone = Very High

Earthquake Zone 3

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	1173	1691

### Bracing Units required for Earthquake

	Along & Across
Single Level	1230

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Single Level Along Resistance Sheet

Job Name: MUNRO

Wind	EQ
Demand	
1173	1230
Achieved	

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	2249 192%	2001 163%
a & b	a1	1.00		2.4	Frame	SED	86	95		
	b1	1.00		2.4	Frame	SED	86	95		
	External Length = 6.0								172 OK	190 OK
c	1	0.40		2.4	BL1-H	GIB®	36	40		
	4	1.30		2.4	BL1-H	GIB®	166	135		
	External Length = 16.0								373 OK	329 OK
d	1	1.80		2.4	GS1-N	GIB®	111	108		
	2	2.50		2.4	GS1-N	GIB®	173	150		
	3	3.90		2.4	GS1-N	GIB®	269	234		
	4	1.80		2.4	GS1-N	GIB®	124	108		
	5	1.80		2.4	GS1-N	GIB®	124	108		
e									1001 OK	870 OK
	3	2.60		2.4	GS1-N	GIB®	179	156		
	External Length = 22								704 OK	612 OK

SUPERSEDED

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Single Level Across Resistance Sheet

Job Name: MUNRO

Wind	EQ
Demand	
1691	1230
Achieved	
2025	1764
120%	143%

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	2025	1764
1										
External Length = 7.0									218 OK	177
2		0.50		2.4	GS1-N	GIB®	28	29		
		0.50		2.4	GS1-N	GIB®	28	29		
		0.50		2.4	GS1-N	GIB®	28	29		
		2.50		2.4	GS1-N	GIB®	173	30		
		2.20		2.4	GS1-N	GIB®	152	32		
External Length = 3.2									407 OK	369
3		3.70		2.4	GS1-N	GIB®	255	222	255 OK	222
4	2	3.50		2.4	GS1-N	GIB®	242	210	531 OK	462 OK
5	1	2.00		2.4	GS1-N	GIB®	138	120		
	2	3.50		2.4	GS1-N	GIB®	242	210		
									380 OK	330 OK
6	1	1.60		2.4	GS1-N	GIB®	110	96		
	2	1.80		2.4	GS1-N	GIB®	124	108		
External Length = 8.5									235 OK	204 OK

SUPERSEDED

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## Custom Wall Elements

Supplier	System	Min. Length m	Wind BUs/m	EQ BUs/m
James Hardie	RAB+GIB	0.4	90	98
James Hardie	RAB+GIB	0.6	127	136
James Hardie	RAB+GIB	1.2	164	138
JH	villa	1.2	99	86
existing GIB	existing	1.2	47	47
9 mm Strand	JNL/Laminex	.6	100	115
SED	steel portal	1	100	100
ecoply	EP1_0.4	0.4	80	95
ecoply	EP1_0.6	0.6	95	105
ecoply	EP1_1.2	1.2	120	135
SED	Frame	1	86	95



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## 4. Plane Brace Design

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JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Plane Bracing Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

Ceiling plan brace design to ensure the horizontal load can be reansfered to  
bracing grid line M and N

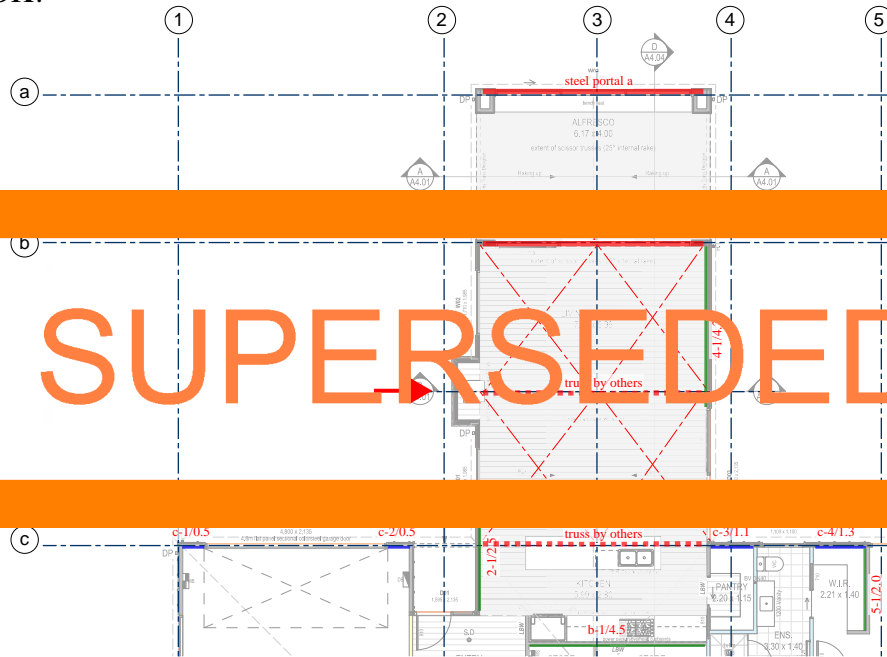
$$P^* = 2260 / (20 \times 4) = 28 \text{ kN} / 4 = 7 \text{ kN per strip}$$

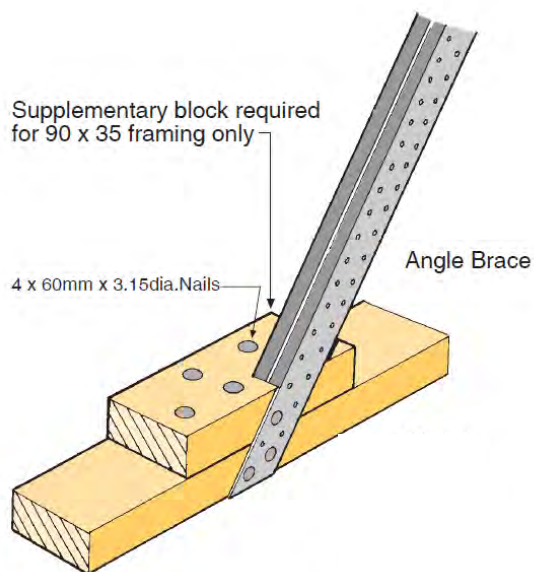
$$T^* = 7 / \cos 45 = 9.9 \text{ kN}$$

Try LUMBERLOK multibrace

$$\Phi T_n = 14.8 \text{ kN}$$

So OK!





## ANGLE BRACE

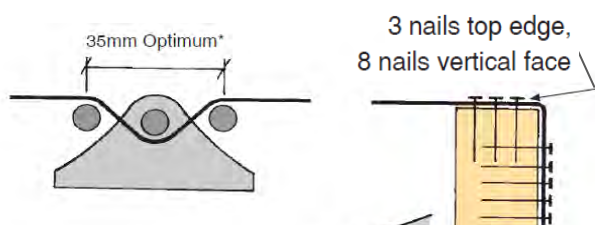
0.85mm G250 Z275 GALVANISED STEEL

Characteristic Load		Tested at 45°
End nail fixing 3 / 75mm x 3.15 dia. F.H. nails		3.9 kN
Tension		13.2 kN
Compression	600mm	4.2 kN
	800mm	3.0 kN

## MULTI BRACE

0.91mm G300 Z275 GALVANISED STEEL or  
0.9mm STAINLESS STEEL 304-2B

Characteristic Load	Multi-Brace / Multi-Brace with Tensioner <sup>#</sup>
Tension	14.8 kN
Elongation 0.2mm/m/kN including nail slip.	
<sup>#</sup> Tensioner not available in Stainless Steel; provide tension during installation.	

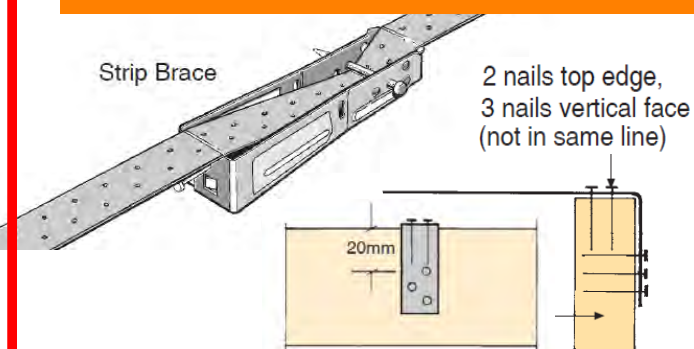


# SUPERSEDED

## STRIP BRACE

0.9mm STAINLESS STEEL 304-2B

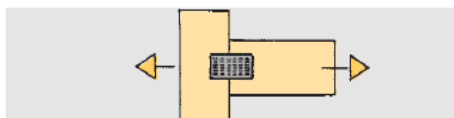
Characteristic Load	Strip Brace	Strip Brace with Tensioner <sup>#</sup>
Tension	8.4 kN	8.0 kN
End nail fixing 30mm x 3.15dia. F.H. nails as shown. <sup>#</sup> Tensioner not available in Stainless Steel; provide tension during installation.		



TYPE 1



TYPE 3



## STRAP NAIL

0.95mm G300 Z275 GALVANISED STEEL

Load	Type 1	Type 3
Tension	9.1 kN/pair	6.0 kN/pair



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## 5. Portal Frame Design

SUPERSEDED

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JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Portal Frame b Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**LOAD**

Portal frame design to provide below required bracing units,

$$P = 160 \times 2.71 / 20 = 21.68 \text{ kN}$$

**CAPACITY DESIGN**

From SPACE GASS

$$M^* = 29.7 \text{ kNm} \quad V^* = 14 \text{ kN}$$

Provide 250PFC for portal beam 200PFC for portal leg

MemDes Calculations @ 10:31:22 AM 14-11-2019 by KZ

Project : 13 Hart Place, Lake Coleridge

Description : 10747

Section : 250PFC Grade 300+

**Major Axis Bending**

Design Action  $M^*_x = 30.0 \text{ kNm}$

User provided value for  $\alpha_m = 1.00$

$$\alpha_s = 0.42$$

$\alpha_m \alpha_s < 1.0$ , => Segment NOT Fully Restrained

$$M_{bx} = 1.00 * 0.42 * 126.3 = 53.2$$

$$\text{Major axis capacity Ratio} = M^*_x / f M_{bx} \\ = 0.63, \text{ --- OK ---}$$

**Shear Calculations (Unstiffened Web)**

Design Action  $V^*_x = 14.0 \text{ kN}$

Nominal Shear Yield capacity  $V_w = 384.0 \text{ kN}$

$$a_v = 6.09 \geq 1.0 \Rightarrow \text{full web shear capacity}$$

$$V_u = V_w = 384.0 \text{ kN}$$

$$\text{Shear capacity ratio} = V^*_x / f V_u \\ = 0.04, \text{ --- OK ---}$$

**SUMMARY**

\*\*\* U.L.S. Capacity Check Passed, Load Cap. Ratio = 0.63 --- OK ---

SESOC MemDes v 3.7.1 : Calculations by KZ

Project : 13 Hart Place, Lake Coleridge at 10:31:22 AM on 14/11/2019

Description : 10747



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Ph: 03 365 3243

JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Portal Frame b Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**CAPACITY DESIGN**

MemDes Calculations @ 10:32:06 14-11-2019 by KZ

Project : 13 Hart Place, Lake Coleridge  
Description : 10747

Section : 200PFC Grade 300+

Major Axis Bending

Design Action  $M^*_x = 30.0 \text{ kNm}$  $a_s = 0.57$  $a_m \ a_s < 1.0, \Rightarrow$  Segment NOT Fully Restrained $M_{bx} = 1.00 * 0.57 * 66.3 = 37.7$ 

Major axis capacity Ratio =  $M^*_x / M_{bx}$   
= 0.88 ---- OK ----

Shear Calculations (Unstiffened Web)

Design Action  $V^*_x = 11.0 \text{ kN}$  $a_v = 0.33 < 1.0 \Rightarrow$  Full web shear capacity $V_u = V_w = 230.4 \text{ kN}$ Shear capacity ratio =  $V^*_x / f V_u$ 

= 0.05, ---- OK ----

Axial Calculations

Design Action  $N_d = 14.0 \text{ kN}$  [Comp],  $L_{eAx} = 2.70 \text{ m}$ ,  $L_{eAy} = 2.70 \text{ m}$   
= 898.4 kN

Major axis buckling : Minor axis buckling : Minimum Capac.  $N_{cmin} = 321.0$ 

Axial buckling capac. Ratio =  $N_d / f N_{cmin}$   
= 0.048, ---- OK ----

Combined Actions Checks

Loading PASSES Cl 8.1.4,  $\Rightarrow$  Combined Actions Checks are not required**SUMMARY**

\*\*\* U.L.S. Capacity Check Passed, Load Cap. Ratio = 0.88 ---- OK ----

SESOC MemDes v 3.7.1 : Calculations by KZ

Project : 13 Hart Place, Lake Coleridge at 10:32:06 AM on 14/11/2019

Description : 10747

**SLS DESIGN**

From SPACE GASS

 $\Delta_{EQ} = 23.7 \text{ mm} = \text{height}/100 \quad \Delta_{SLS} = 1.5 \text{ mm}$ 

Therefore OK!



SPACE GASS 12.80 - CONSTRUCTURE

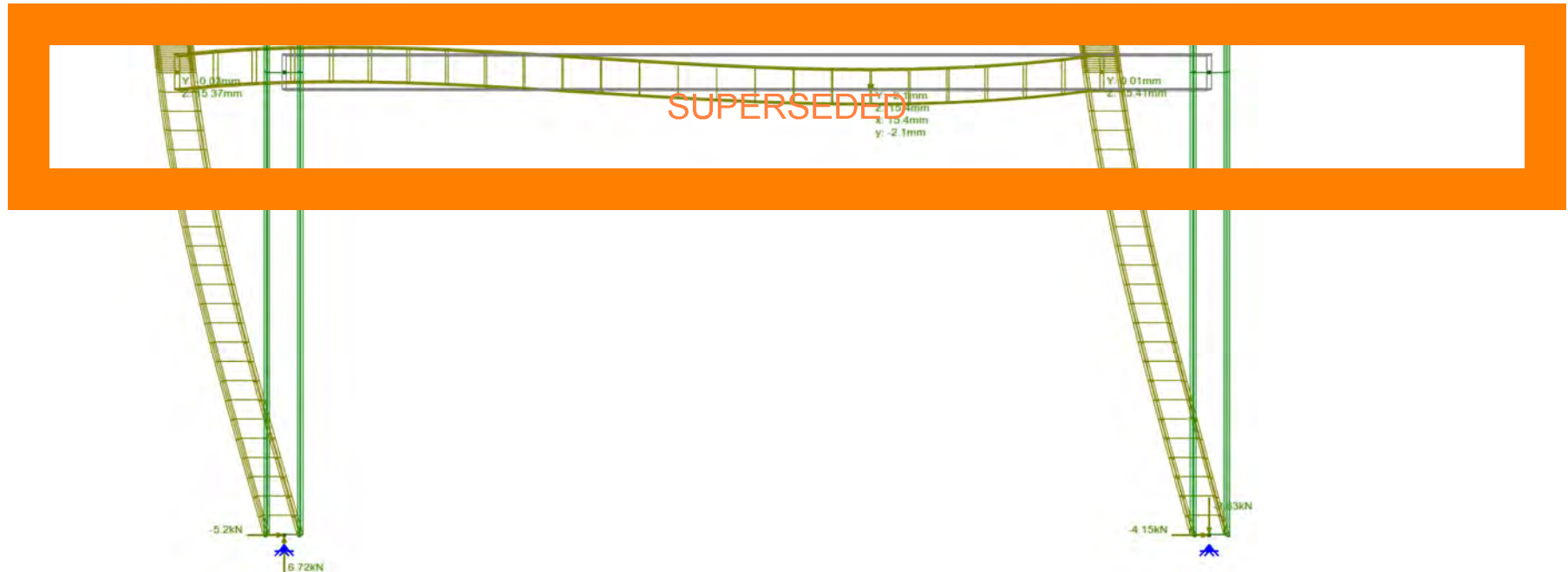
Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal a

Designer: Date: Tuesday, November 26, 2019 6:02 PM Page: 1

Load case 4

Min

Max



Viewpoint (90,0), Displacements, Reactions

Materials:

1 STEEL

Sections:

1 200\*100\*6 RHS

6 200 PFC

SPACE GASS 12.80 - CONSTRUCTURE

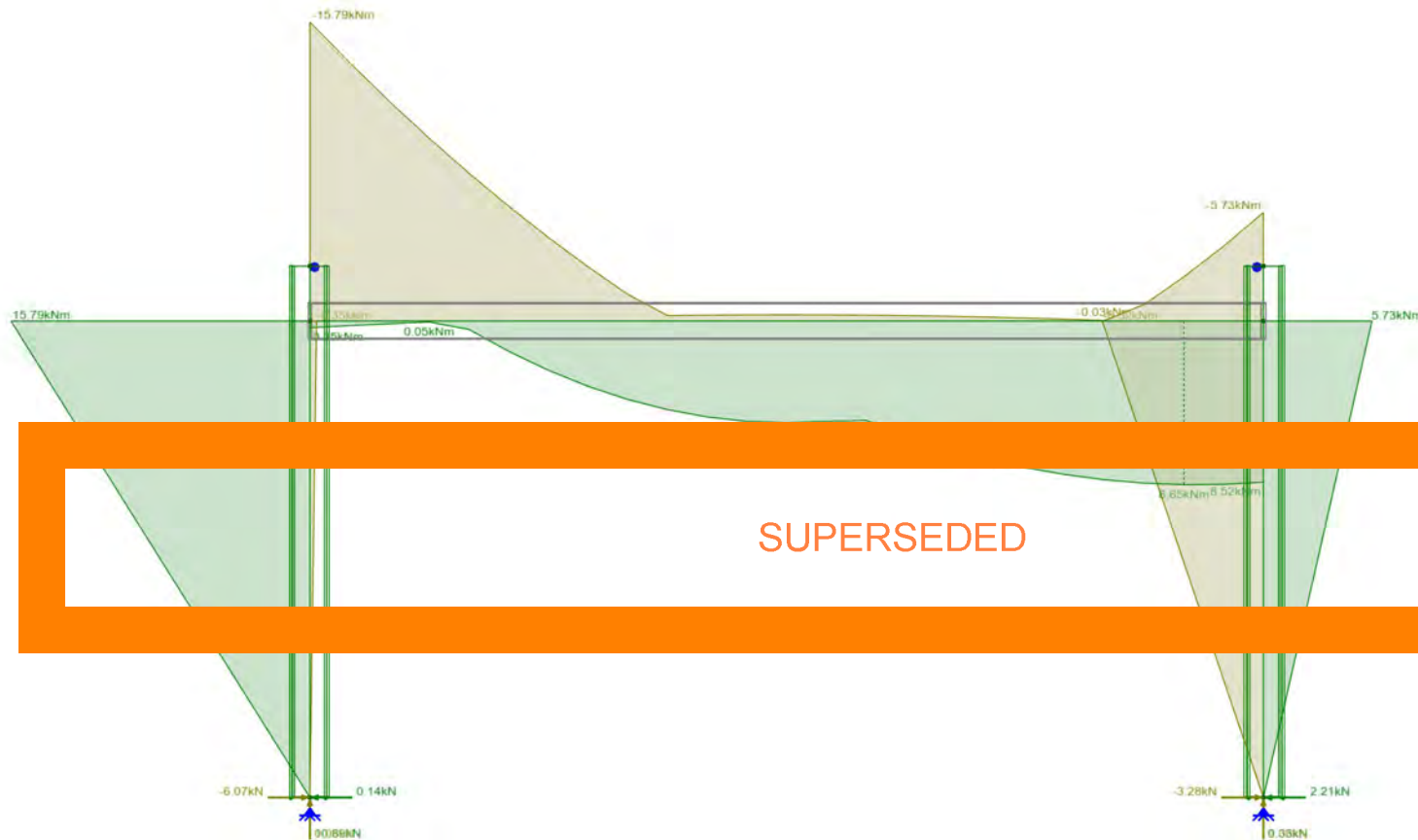
Path: Z:\projects\10747- 13 Hart Place, Lake Coler... \bracing\10747\_portal a

Designer: Date: Tuesday, November 26, 2019 6:01 PM Page: 1

Envelope of both for All combination load cases

Min

Max



SUPERSEDED

Viewpoint (90,0), Moments, Reactions

Materials:

1 STEEL

Sections:

1 200\*100\*6 RHS

6 200 PFC

SPACE GASS 12.80 - CONSTRUCTURE

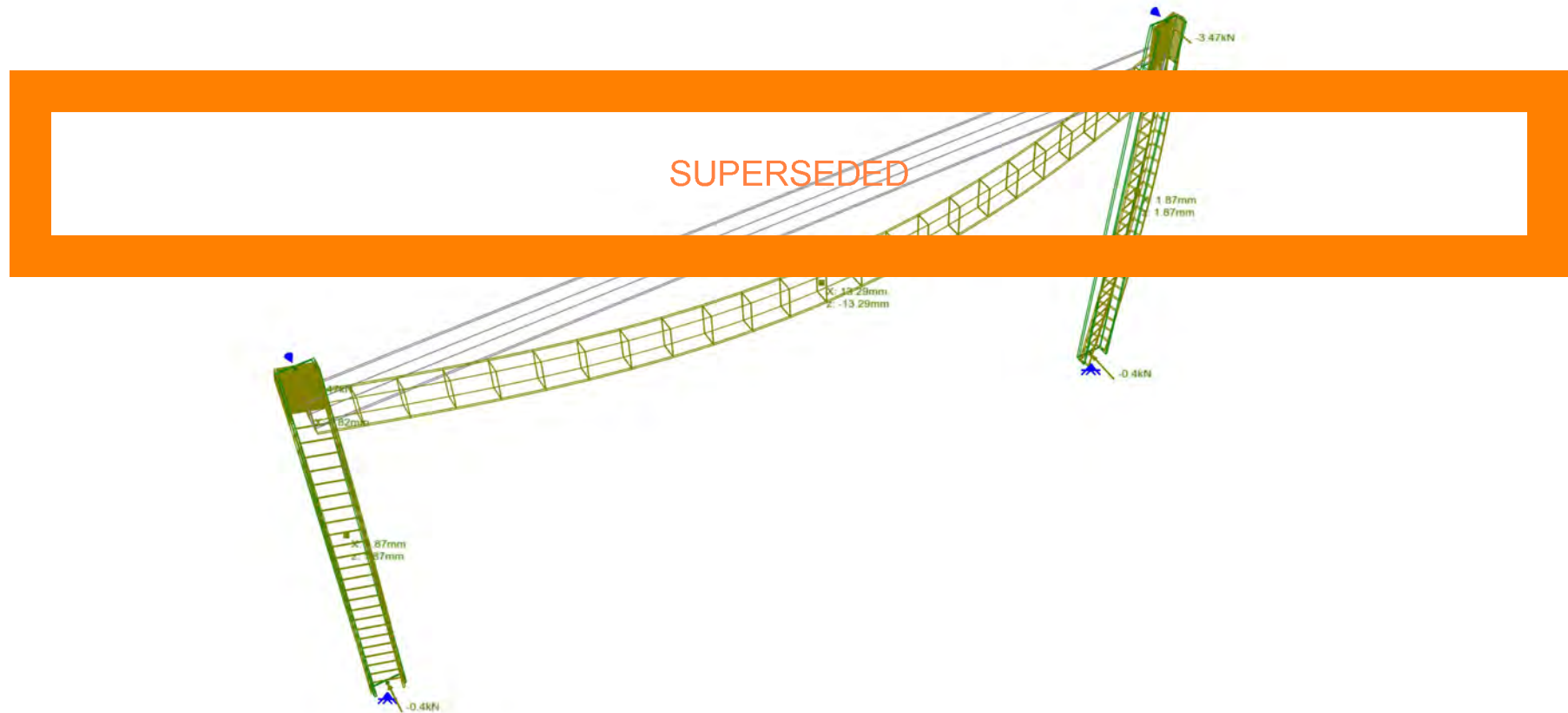
Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal a

Designer: Date: Tuesday, November 26, 2019 6:03 PM Page: 1

Load case 9

Min

Max



Viewpoint (60,-49), Displacements, Reactions

Materials:

1 STEEL

Sections:

1 200\*100\*6 RHS

6 200 PFC

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JOB NAME: 13 Hart Place, Lake Coleridge

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SECTION: Portal Frame a Design

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DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**LOAD**

Seismic load calculation,

As per spread sheet

$$C_{d(T1)ULS} = 0.85$$

Seismic weight

$$W_{t_{G+0.3Q}} = 2.0 \times (0.5 + 0.3 \times 0.25) \times 6.2 = 7.13 \text{ kN}$$

$$V^* = 0.85 \times 7.13 = 6.1 \text{ kN}$$

Wind load calculation

As per spread sheet

$$w_{uls} = 0.87 \text{ kPa} / -1.31 \text{ kPa}$$

$$V^* = (0.87 + 1.31) \times 2.8 \times 2.0 \times \cos 40^\circ = 9.35 \text{ kN (in control)}$$

**CAPACITY DESIGN**

from SPACE GASS

$$M^* = 15.6 \text{ kNm} \quad V^* = 10.1 \text{ kN}$$

$$M^* = 10.7 \text{ kNm}$$

Provide 200PFC for portal beam and portal leg

Project : 13 Hart Place, Lake Coleridge  
Description : 10747

Section : 200PFC Grade 300+

Major Axis Bending

$$\text{Design Action } M^*x = 16.0 \text{ kNm}$$

User provided value for  $\alpha_m = 1.00$ 

$$\alpha_s = 0.36$$

 $\alpha_m \alpha_s < 1.0$ , => Segment NOT Fully Restrained

$$M_{bx} = 1.00 \times 0.36 \times 66.3 = 24.1$$

$$\text{Major axis capacity Ratio} = M^*x / f M_{bx} = 0.74, \text{ ---- OK ----}$$

Shear Calculations (Unstiffened Web)

$$\text{Design Action } V^*x = 11.0 \text{ kN}$$

$$\text{Nominal Shear Yield capacity } V_w = 230.4 \text{ kN}$$

$$\alpha_v = 5.35 \geq 1.0 \Rightarrow \text{full web shear capacity}$$

$$V_u = V_w = 230.4 \text{ kN}$$

$$\text{Shear capacity ratio} = V^*x / f V_u = 0.05, \text{ ---- OK ----}$$

Axial Calculations

$$\text{Design Action } N_d = 14.0 \text{ kN [Comp]}, \quad L_{eAx} = 5.20 \text{ m}, \quad L_{eAy} = 5.20 \text{ m}$$

$$= 898.4 \text{ kN}$$

Major axis buckling : Minor axis buckling : Minimum Capac.  $N_{cmin} = 107.3$ 

$$\text{Axial buckling capac. Ratio} = N_d / f N_{cmin} = 0.145, \text{ ---- OK ----}$$

Combined Actions Checks

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JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: Portal Frame a Design

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DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**CAPACITY DESIGN**

Clause 8.3.3/4 :

$$M_{ry} = M_{sy} (1 - (N^* / f N_s)) \leq M_{sy} [\text{Alt. Prov. NOK}]$$

$$= 13.8$$

$$\text{Load / Capacity Ratio} = M^*_{rx} / (0.9 M_{rx})$$

$$= 0.27, \text{ ---- OK ----}$$

Clause 8.4.2.2 : Major : Mix = 64.6

$$\text{Load / Capacity Ratio} = M^*_{m} / f M_i$$

$$= 0.275 \text{ ---- OK ----}$$

$$M_{ox} = M_{ox} (1 - N^* / f N_s) \leq M_{ox}$$

$$= 20.6$$

$$\text{Load / Capacity Ratio} = M^*_{x} / f M_{ox}$$

$$= 0.862, \text{ ---- OK ----}$$

===== SUMMARY =====

\*\*\*\* ULS Capacity Check Passed Load Cap. Ratio = 0.86 ---- OK ----

=====

Description : 10747

**SLS DESIGN**

From SPACE GASS

$$\Delta_{EQ} = 15.6\text{mm} = \text{height}/153 \quad \Delta_{SLS} = 3.0\text{mm}$$

Therefore OK!

**SUPERSEDED**

SPACE GASS 12.80 - CONSTRUCTURE

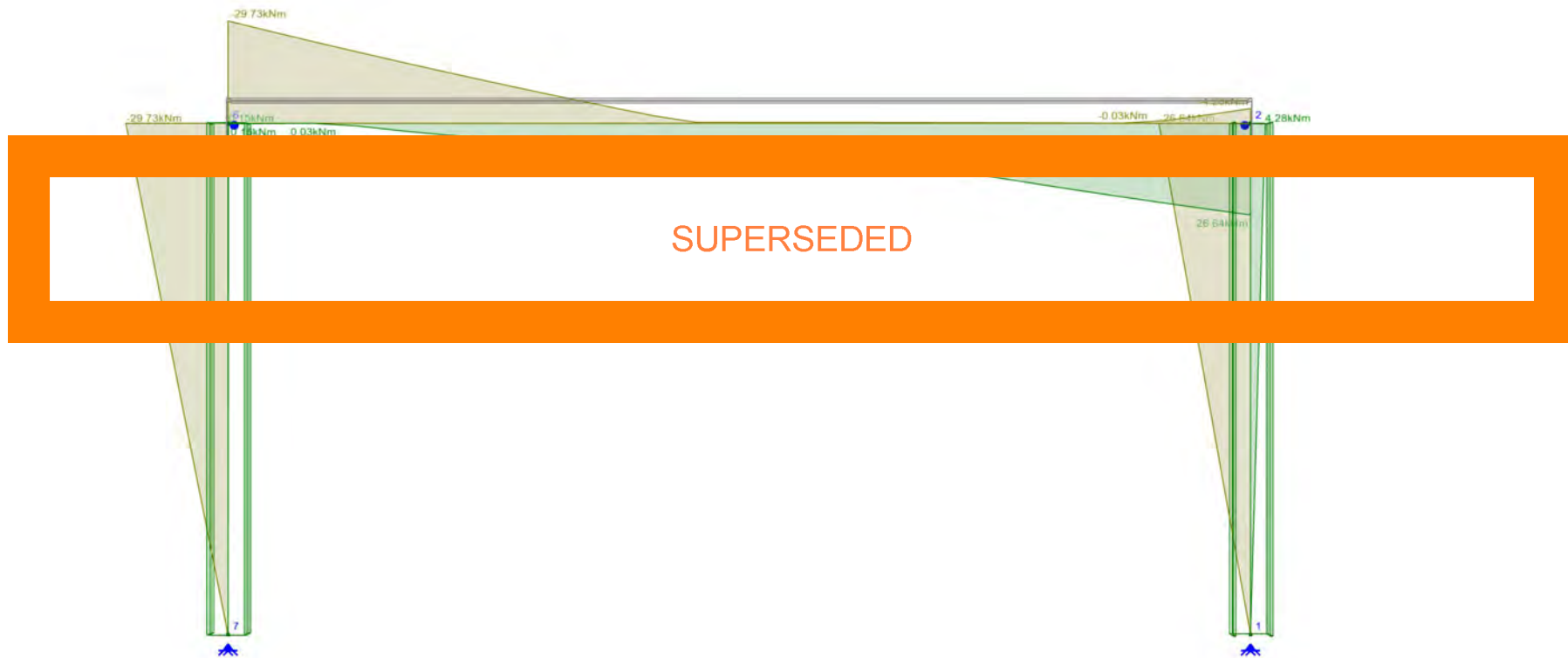
Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal b

Designer: Date: Tuesday, November 26, 2019 6:04 PM Page: 1

Envelope of both for All combination load cases

Min

Max



Viewpoint (90,0), Moments

Materials:  
1 STEEL

Sections:  
1 250 PFC  
6 200 PFC

SPACE GASS 12.80 - CONSTRUCTURE

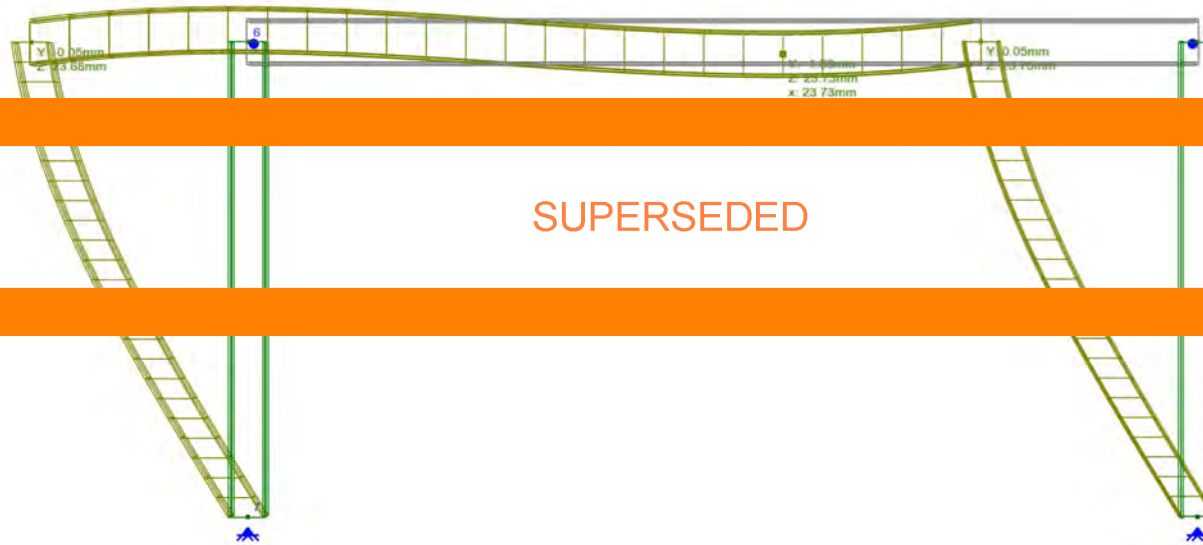
Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal b

Designer: Date: Tuesday, November 26, 2019 6:05 PM Page: 1

Load case 7

Min

Max



SUPERSEDED

Viewpoint (90,0), Displacements

Materials:  
1 STEEL

Sections:  
1 250 PFC  
6 200 PFC

SPACE GASS 12.80 - CONSTRUCTURE

Path: Z:\projects\10747- 13 Hart Place, Lake Coler...\bracing\10747\_portal b

Designer: Date: Tuesday, November 26, 2019 6:04 PM Page: 1

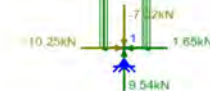
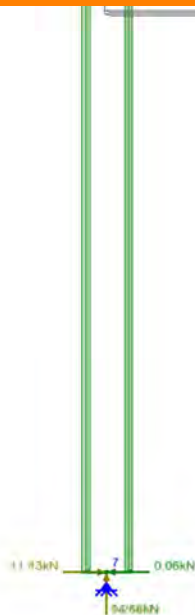
Envelope of both for All combination load cases

Min

Max



SUPERSEDED



Viewpoint (90,0), Reactions

Materials:  
1 STEEL

Sections:  
1 250 PFC  
6 200 PFC





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structural engineering

## 5. NZS3604 Foundation Design

SUPERSEDED

SDC - Approved Building Consent Document - BC192333 - Pg 111 of 378 - 26/01/2020 - dalles

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JOB NAME: 13 Hart Place, Lake Coleridge

PAGE No.

SECTION: NZS3604 Foundation Design

JOB No. 10747

DESIGNED: KZ

DATE: 26/11/2019

CHECKED:

**LOAD**

Groof	= 0.5kPa
Gwalls	= 0.50 kPa
Qroof	= 0.25 kPa
Su	= 0.40 kPa

**Perimeter/internal Beam****Dead**

Rroof	- 5m trib	= 0.5x5	= 2.5 kN/m
Walls	- 2.4m stud	= 0.50x2.4	= 1.2 kN/m

Total = 6.5 kN/m

**Live**

Rroof	- 5m trib	= 0.5x0.25	= 0.125 kN/m
Floor		= 0.5	= 0.5 kN/m
Total			= 1.75 kN/m

**SUPERSEDED**

Rroof - 5m trib = 0.4x5 = 2.0 kN/m

**Combination**

1.35G	= 1.35x6.5	= 8.8 kN/m
1.2G+1.5Q	= 1.2x6.5+1.5x1.75	= 10.43 kN/m
1.2G+Su	= 1.2x6.5+2.0	= 9.8 kN/m

**Worstcase Bearing**

Bearing =  $10.43/0.2 = 52 \text{ kPa} < 200 \times 0.5 = 100 \text{ kPa}$   
Therefore OK!

**Reaction from girder truss**

$R^* = 33.4 \text{ kN compression} / 18.3 \text{ kN uplift}$

Design a 300x650mm (W x D) ground beam to resist the uplift/compression reaction.

For uplift, design with 2.5m long and 1m tribute concrete floor slab

$W_t = 24 \times 0.3 \times 0.75 \times 2.5 + 24 \times 0.1 \times 2.5 \times 1.0 = 19.5 \text{ kN} > 18.3 \text{ kN}$

Therefore ok!

For the 2.5m long ground beam

$M^* = 18.3 \times 2.5/4 = 11.43 \text{ kNm}$

Check 2-D16 with R10 stirrup @ 200crs

$\Phi M_n = 54 \text{ kNm} > M^* = 11.43 \text{ kNm}$

Therefore ok!



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## 6. WALL STUDS & PURLINS

SUPERSEDED

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Ph: 09 320 5226

JOB NAME:

PAGE No.

SECTION:

JOB No. 10747

DESIGNED: PA

DATE:

CHECKED:

SNOW  $\sigma \sim 390$ 

$$\begin{aligned} S_g &= 2.21 \text{ kPa} & \text{ULS} \\ S_g &= 1.5 \text{ kPa} & \text{SLS} \end{aligned}$$

$$\alpha = 35^\circ - 40^\circ$$

$$\begin{aligned} S_u &= 0.77 \text{ kPa} \\ S_s &= 0.52 \text{ kPa} \end{aligned}$$

FROM NZS 3604 Engineering Basis

$$S_g = 2 \text{ kPa} \quad \text{ULS}$$

assuming  $0 - 10^\circ$  roof pitch

$$S_u = 1.54 \text{ kPa}$$

← NOTE THAT THIS IS  
HIGHER THAN  
 $S_u = 0.77 \text{ kPa}$

FROM MGH GENERAL NOTES:

140x45 JSB @ 600 c/s max

UNO - All dwangs @ 800 c/s

**SUPERSEDED**

Wall stud Ext

$$1) \text{ Roof } (TW = \frac{8.8\text{m}}{2} = 4.4\text{m})$$

$$\begin{array}{ccc} S_g & Q & S_u \\ 0.45 \text{ kPa} & 0.25 & 0.77 \end{array}$$

Wall stud Internal

$$2) \text{ Roof } (TW = 4.4\text{m})$$

$$\begin{array}{ccc} S_g & Q & S_u \\ 0.45 & 0.25 & 0.77 \end{array}$$

LOADS

$$P^+ 1.26 + S_u = 5.8 \text{ kN/m}$$

$$\begin{aligned} \text{Assume } e &= \frac{90}{2} = 45\text{mm} & \Rightarrow M^* = 0.26 \text{ kNm/m} \\ & \left\{ \begin{array}{l} \frac{140}{2} = 70\text{mm} \\ \frac{140}{2} = 70\text{mm} \end{array} \right. & \Rightarrow M^* = 0.41 \text{ kNm/m} \end{aligned}$$

→ 90x45 @ 400 w/ blocking @ 600 ok

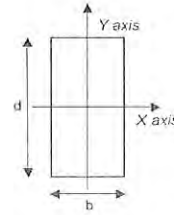
→ 140x45 @ 600 w/ blocking @ 800 ok

## Timber in Compression

## 90 Wall Studs

NZS 3603:1993

	MSG8 Dry	Type of timber
D	90 mm	Section depth
B	45 mm	Section width
A	4050 mm <sup>2</sup>	Section Area
$\phi$	0.8	strength reduction factor (CI 2.5)
$k_1$	0.8	Load duration factor (CI 2.7)
$L_{ax}$	2455 mm	$k_{10} L$ = length between points of restraint preventing column buckling in the
$L_{ay}$	1200 mm	$k_{10} L$ = length between points of restraint preventing column buckling in the
$S_2$	27.28	min of $L_{ax} / D$ or $k_{10} L / D$
$S_3$	26.67	min of $L_{ay} / B$ or $k_{10} L / B$
$k_{8x}$	0.39	modification factor for stability (CI 2.10)



$f_c$	18 MPa	characteristic compressive strength parallel to grain
$\phi N_{tx}$	18.1 kN	ultimate member compressive strength about x-axis
$\phi N_{ty}$	19.00 kN	ultimate member compressive strength about y-axis
$N^*c$	5.8 kN	compression load

OK

## Combined bending and compression

CI 3.5

$M_y^*$	0 kNm	moment about y-axis
$\phi M_{ny}$	0.27 kNm	moment capacity about y-axis

OK

$$\left( \frac{M_y^*}{\phi M_{ny}} \right) + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

$$0.31 \leq 1.0$$

OK

$M_x^*$	0.26 kNm	moment about x-axis
$\phi M_{nx}$	0.54 kNm	moment capacity about x-axis

OK

$$\left( \frac{M_x^*}{\phi M_{nx}} \right) + \left( \frac{N_c^*}{\phi N_{ncx}} \right) \leq 1.0$$

$$0.80 \leq 1.0$$

OK

$$\left( \frac{M_x^*}{\phi M_{nx}} \right)^2 + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

$$0.54 \leq 1.0$$

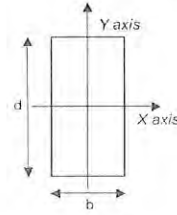
OK

## Timber in Compression

## 90 Wall Studs

NZS 3603:1993

	MSG8 Dry	Type of timber
D	140 mm	Section depth
B	45 mm	Section width
A	6300 mm <sup>2</sup>	Section Area
$\phi$	0.8	strength reduction factor (CI 2.5)
$k_1$	0.8	Load duration factor (CI 2.7)
$L_{ax}$	2455 mm	$k_{10} L$ = length between points of restraint preventing column buckling in th
$L_{ay}$	1200 mm	$k_{10} L$ = length between points of restraint preventing column buckling in th
$S_2$	17.54	min of $L_{ax} / D$ or $k_{10} L / D$
$S_3$	26.67	min of $L_{ay} / B$ or $k_{10} L / B$
$k_{8x}$	0.79	modification factor for stability (CI 2.10)
$k_{8y}$	0.41	modification factor for stability (CI 2.10)
$f_c$	18 MPa	characteristic compressive strength parallel to grain
$\phi N_{ncx}$	57.35 kN	$\phi k_1 k_{8x} f_c A$ ult member compressive strength about x-axis
$\phi N_{ncy}$	29.56 kN	$\phi k_1 k_{8y} f_c A$ ult member compressive strength about y-axis



$N^*c$  5.8 kN compression load  
 $\phi N_{nc}$

OK

## Combined bending and compression

C 3.5

$M_y^*$  0 kNm moment about y-axis  
 $\phi M_{ny}$  0.42 kNm moment capacity about y-axis  
 OK

$$\left( \frac{M_y^*}{\phi M_{ny}} \right) + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

0.20 ≤ 1.0  
OK

$M_x^*$  0.41 kNm moment about x-axis  
 $\phi M_{nx}$  1.3 kNm moment capacity about x-axis  
 OK

$$\left( \frac{M_x^*}{\phi M_{nx}} \right) + \left( \frac{N_c^*}{\phi N_{ncx}} \right) \leq 1.0$$

0.42 ≤ 1.0  
OK

$$\left( \frac{M_x^*}{\phi M_{nx}} \right)^2 + \left( \frac{N_c^*}{\phi N_{ncy}} \right) \leq 1.0$$

0.30 ≤ 1.0  
OK

SUPERSEDED



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JOB NAME:

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SECTION:

JOB No. 10747

DESIGNED: PA

DATE:

CHECKED:

PURLINS

70x45 S68 @ 900 c/s

fixed w/ 1/10g x 80mm screw or  
2/100 x 3.75mm skewed nails & 1 wire dog

OVERHANG = 150mm (NOT CRITICAL!)

# SUPERSEDED

→ 70x45 on flat @ 900 c/s ok!

JOB NAME:

JOB No. 9479

DATE

DESIGNED: PA

SECTION: Purlins

CHECKED:

NZS 3603:1993

Basic input

Beam length/span	$L_b$	900 mm	Type of timber		MSG8 Dry
Type		Roof	Section depth	D	45 mm
Lateral stability		Free	Section width	B	90 mm
		1200	Modulus of elasticity	E	8000 MPa
	Lay	900 mm	Moment of inertia	I	683438 mm <sup>4</sup>
			Section modulus	Z	30375 mm <sup>3</sup>
			Shear area	$A_s$	2700 mm <sup>2</sup>
			Bending strength	$f_b$	14 MPa
			Shear strength	$f_s$	3.8 MPa
Strength reduction factor	$\phi$	0.8 -	Slenderness	S	0.0 -
Creep factor	$k_2$	2.0	Stability factor	$k_{st}$	1.00 -
Parallel support factor	$k_4$	1 -	Size factor	$k_{24}$	1.00 -
Load sharing		No	Load sharing factor	$k_5$	1.00 -
Grid system (vibration)	$k_9$	1.00	Shaved & steamed	$k_{20} = k_{21}$	0.85 -

L

Dead load	G	0.45	+	0	=	0.41	0
Live load - Roof	$Q_{Roof}$	0.25	+	0	=	0.23	0
Live load - Floor	$Q_F$	0	+	0	=	0.00	0
Live load - Storage	$Q_{Storage}$	0	+	0	=	0.00	0
Snow load (ULS)	$S_u$	0.77	+	0	=	0.00	0
Snow load (SLS)	$S_s$	0.52	+	0.00	=	0.47	0.00
Wind uplift (ULS)	$W_u$	0	+	0	=	0.00	0
Wind downward (ULS)	$W_d$	0	+	0	=	0.00	0
Wind uplift (SLS)	$W_{u,s}$	0.00	+	0.00	=	0.00	0.00

Loads

Short term factor	$\psi_s$	0.7	0.7	1
Long term factor	$\psi_l$	0	0.4	0.6
Combination factor	$\psi_c$	0	0.4	0.6

	Load combinations	Area load (kPa)		Line load (kN/m)		Total Line load (kN/m)	Point Load (kN)	M* (kN/m)	V* (kN)
ULS Permanent	1.35G	0.61	+	0.00	=	0.55	0.00	0.06	0.25
ULS Medium	1.2G + 1.5Q	0.92	+	0.00	=	0.82	0.00	0.08	0.37
	1.2G + S <sub>u</sub> + ψ <sub>c</sub> Q	1.31	+	0.00	=	1.18	0.00	0.12	0.53
	Critical							0.12	0.53
ULS Brief	1.2G + W <sub>d</sub> + ψ <sub>c</sub> Q	0.54	+	0.00	=	0.49	0.00	0.05	0.22
	0.9G + W <sub>u</sub>	0.41	+	0.00	=	0.36	0.00	0.04	0.16
	Critical							0.05	0.22

								Δ (mm)
SLS Short-Term	G + ψ <sub>s</sub> Q	0.63	+	0.00	=	0.56	0.00	0.88
	G + S <sub>s</sub> + ψ <sub>l</sub> Q	0.97	+	0.00	=	0.88	0.00	1.37
	G + W <sub>u,s</sub>	0.45	+	0.00	=	0.41	0.00	0.63
	G + W <sub>d,s</sub> + ψ <sub>l</sub> Q	0.45	+	0.00	=	0.41	0.00	0.63
	Critical							1.37
SLS Long-Term	k <sub>2</sub> (G + ψ <sub>l</sub> Q) + S <sub>s</sub>	1.42	+	0.00	=	1.28	0.00	2.00

ULS Design	Bending moment	$k_1$	M* (kNm)	$\phi M_n$	
Permanent		0.6	0.06	0.20	OK
Medium		0.8	0.12	0.27	OK
Brief		1.0	0.05	0.34	OK
	Shear		V* (kN)	$\phi V_n$	
Permanent		0.6	0.25	4.92	OK
Medium		0.8	0.53	6.57	OK
Brief		1.0	0.22	8.21	OK

SLS Design	Deflection	$\Delta$ (mm)	$\Delta$ limit		Span /	Defl Fixed limit
Short-Term		1.37	2.25	OK	400	20
Long-Term		2.00	2.25	OK	400	20
Floor Vibration		2.78	1-2	(Ignore if member is not part of the floor)		



## PRODUCER STATEMENT for MiTek 20/20<sup>®</sup> TRUSS DESIGN - Version 4.7

ISSUED BY: **MiTek New Zealand Limited**

TO: **VIP Frames & Trusses**

IN RESPECT OF: **MiTek<sup>®</sup> Truss Designs**

This producer statement covers the MiTek 20/20<sup>®</sup> truss design and the structural performance of the GANG-NAIL<sup>®</sup> connector plate for the job reference **71627** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek 20/20<sup>®</sup> truss design program has been developed by MiTek New Zealand Limited for the design of MiTek<sup>®</sup> timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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, 1 November 2019**



Engineering, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)  
**TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited**

SDC - Approved Building Consent Document - BC19/333 - Ref 333-26/01/2020 - Sales



Job: 71627  
Description: New House  
Building Consent No.:  
MiTek 20/20 Engineering 4.7.301.0

Client: Mike Greer Homes  
Phone:

Site: New House  
Lot 8 , 13 Hart Place  
Lake Coleridge

Phone:

Printed: 06/16/04 01 Nov 2019

## TRUSS FIXING SELECTION REPORT - Characteristic Loads

Fixings are selected from the LUMBERLOK Brochure 08/2014 (Timber Connectors Characteristic Loadings Data)

### MiTek® Truss List

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

Truss	Qty	Span (mm)	Joint	Down (kN)	Uplift (kN)	Bearing	----- Fixing ----- Qty Selected	
*H1	4	6161						Refer NZS3604:2011 Tables 15.6
J1	2	2402	B	5.012	0.170	Cross	2	Pair of Wire Dog Staples
			F	1.142	0.646	Butt	2	JH 47x90
			D	6.383	3.549	Cross	2	CT400
			E	3.700	2.111	Cross	2	Pair of Wire Dog Staples
J2	2	2402	B	5.271	0.810	Cross	2	Pair of Wire Dog Staples
			F	3.152	1.738	Butt	2	JH 47x90
			D	1.475	0.829	Butt	2	JH 47x90
J3	2	2402	B	5.130	0.087	Cross	2	Pair of Wire Dog Staples
			E	1.145	0.658	Butt	2	JH 47x90
			D	6.691	3.725	Cross	2	CT400
J4	2	2402	B	5.271	0.810	Cross	2	Pair of Wire Dog Staples
			F	3.152	1.738	Butt	2	JH 47x90
			D	1.475	0.829	Butt	2	JH 47x90
J5	2	2402	B	5.130	0.087	Cross	2	Pair of Wire Dog Staples
			E	1.145	0.658	Butt	2	JH 47x90
			D	6.691	3.725	Cross	2	CT400
J6	1	2402	B	4.692	1.142	Cross	1	Pair of Wire Dog Staples
			F	2.073	1.118	Butt	1	JH 47x90
J7	1	1502	B	3.508	0.524	Cross	1	Pair of Wire Dog Staples
			E	1.251	0.688	Cross	1	Pair of Wire Dog Staples
			D	1.544	0.870	Butt	1	JH 47x90
J8	1	1502	B	2.728	0.846	Cross	1	Pair of Wire Dog Staples
			E	0.925	0.709	Cross	1	Pair of Wire Dog Staples
J10	2	1502	B	3.508	0.524	Cross	2	Pair of Wire Dog Staples
			E	1.251	0.688	Butt	2	JH 47x90
			D	1.544	0.870	Butt	2	JH 47x90
J11	2	1502	B	2.728	0.846	Cross	2	Pair of Wire Dog Staples
			E	0.925	0.709	Butt	2	JH 47x90
J12	1	1502	B	3.508	0.524	Cross	1	Pair of Wire Dog Staples
			E	1.251	0.688	Butt	1	JH 47x90
			D	1.544	0.870	Butt	1	JH 47x90
J13	1	1502	B	2.728	0.846	Cross	1	Pair of Wire Dog Staples
			E	0.925	0.709	Butt	1	JH 47x90
*R1	2	785						Refer NZS3604:2011 Tables 15.6
*R2	4	483						Refer NZS3604:2011 Tables 15.6
*R3	4	483						Refer NZS3604:2011 Tables 15.6
*R4	2	785						Refer NZS3604:2011 Tables 15.6
S1	3	8450	B	2.744	0.569	Cross	3	Pair of Wire Dog Staples
			J	12.592	6.781	Cross	3	CT400
			H	10.632	4.703	Cross	3	CT400
S2	4	8450	B	6.982	2.528	Cross	4	Pair of Wire Dog Staples
			H	7.750	2.977	Cross	4	Pair of Wire Dog Staples
			L	11.373	6.331	Cross	4	CT400
S4	1	8450	B	7.255	2.637	Cross	1	Pair of Wire Dog Staples
			H	4.896	1.433	Cross	1	Pair of Wire Dog Staples
			L	8.676	4.294	Cross	1	CT400
			P	5.302	1.559	Cross	1	Pair of Wire Dog Staples
S5	1	6505	B	8.669	3.416	Cross	1	CT400
			N	6.999	3.335	Butt	1	JH 47x90
			J	3.986	2.346	Cross	1	Pair of Wire Dog Staples
S6	4	6505	B	8.588	3.303	Cross	4	CT400
			O	5.612	2.274	Butt	4	JH 47x90
			J	3.731	1.884	Cross	4	Pair of Wire Dog Staples
			N	1.728	0.890	Cross	4	Pair of Wire Dog Staples
S7	1	6505	B	9.861	4.145	Cross	1	CT400
			N	6.698	3.076	Butt	1	JH 47x90
			M	2.999	1.876	Cross	1	Pair of Wire Dog Staples
S8	1	8450	B	6.981	2.522	Cross	1	Pair of Wire Dog Staples
			H	7.257	2.944	Cross	1	Pair of Wire Dog Staples
			K	11.383	6.343	Cross	1	CT400
S9	11	6170	B	9.622	4.205	Cross	11	CT400
			H	9.621	4.205	Cross	11	CT400
S10	2	6170	A	9.216	4.179	Cross	2	CT400
			G	9.626	4.205	Cross	2	CT400
S11	1	6170	A	9.221	4.180	Cross	1	CT400
			G	9.221	4.180	Cross	1	CT400
S12	1	6170	A	9.221	4.180	Cross	1	CT400
			G	9.221	4.180	Cross	1	CT400
S13	1	6170	B	8.600	3.345	Cross	1	CT400
			H	8.600	3.345	Cross	1	CT400
			J	0.930	0.360	Cross	1	Pair of Wire Dog Staples
			P	0.929	0.330	Cross	1	Pair of Wire Dog Staples
T2	1	8450	B	4.522	1.451	Cross	1	Pair of Wire Dog Staples
			I	10.879	4.958	Cross	1	CT400
			M	10.184	5.428	Cross	1	CT400
T4	1	8450	B	7.638	3.224	Cross	1	CT400
			I	5.407	1.985	Cross	1	Pair of Wire Dog Staples
			P	12.659	6.628	Cross	1	CT400

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VIP Frames & Trusses

Truss	Qty	Span (mm)	Joint	Down (kN)	Uplift (kN)	Bearing	----- Fixing -----	
							Qty	Selected
V1	1	811	A			Wide		No fixing selected
V2	1	912	A			Wide		No fixing selected
V3	1	1440	A			Wide		No fixing selected
J6A	1	2402	B	6.101	2.172	Cross	1	Pair of Wire Dog Staples
			F	3.897	2.233	Butt	1	JH 47x90
J9	1	2402	B	6.101	2.172	Cross	1	Pair of Wire Dog Staples
			F	3.897	2.233	Butt	1	JH 47x90
J9A	1	2402	B	6.101	2.172	Cross	1	Pair of Wire Dog Staples
			F	3.897	2.233	Butt	1	JH 47x90
T5	1	6170	A	1.791	0.537	Butt	1	JH 47x90
			F	16.006	6.750	Cross	1	CT400
S3	1	8450	J	28.585	13.011	Cross	1	16kN Truss to Top Plate
			B	7.255	2.637	Cross	1	Pair of Wire Dog Staples
			H	4.896	1.433	Cross	1	Pair of Wire Dog Staples
			L	8.676	4.294	Cross	1	CT400
T1	1	8450	P	5.852	1.771	Cross	1	Pair of Wire Dog Staples
			B	2.257	2.956	Cross	1	Pair of Wire Dog Staples
			O	33.367	18.323	Cross		No fixing selected. Specific engineering design required for uplift loads.
T3	1	8450	I	19.427	10.099	Cross	1	CT400
			B	13.044	6.534	Cross	1	CT400
			G	7.077	3.178	Cross	1	Pair of Wire Dog Staples
			P	32.461	17.946	Cross		No fixing selected. Specific engineering design required for uplift loads.

Fixing List

Qty	Selected Fixing
61	Pair of Wire Dog Staples
35	JH 47x90
64	CT400
1	16kN Truss to Top Plate
5	No fixing selected

**Note:**

1) Fixings have been selected based on loading only. Please check that selected fixings are practical for each situation and that appropriate nailing can be applied on site.

2) Fixings are selected from the LUMBERLOK Brochure 08/2014 (Timber Connectors Characteristic Loadings Data) with down and uplift characteristic loads of at least the values shown for each joint.

**Date:** 7 October 2019

**Fabricator:** VIP Frames & Trusses

**Job Name:** Mike Greer Homes  
New House  
Lot 8 , 13 Hart Place  
Lake Coleridge

**Building Consent No:** \_\_\_\_\_  
(Provided by relevant Consenting Authority at time of Consent application)

**Attn:** City/District Council

We have been engaged to provide the trusses and 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) Any slab thickening requirements detailed.
- (c) All truss loaded lintels that are either inside or outside the requirements of NZS3604:2011.
- (d) All roof bracing details as required by NZS3604:2011.

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

<b>Wind Zone</b>	<b><u>Very High</u></b>	<b>Altitude</b>	<b><u>367m</u></b>
		<b>Snow (Open Ground Load)</b>	<b><u>2.100 kPa</u></b>
<b>Roof Material</b>	<b><u>Longrun</u></b>	<b>Snow (Basic Roof Load)</b>	<b><u>0.735 kPa</u></b>

**Treatment Definition:**

<b>External Walls -</b>	H1.2 Treated
<b>Internals Walls -</b>	H1.2 Treated
<b>Trusses -</b>	H1.2 Treated

We can advise that 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.

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

Acknowledgement of this letter, along with the Building Consent number, is required by our company as soon as possible.

Council Contacts:

Consents Officer: \_\_\_\_\_

Fax #: \_\_\_\_\_

Phone: \_\_\_\_\_

Please forward to:

Keith Thompson  
Dyers Road ITM  
Ph (03) 373 6049  
Fax (03) 376 6049



SN-R10130357

# PROLAM SUMMARY

Customer/Project: Worksheet

Physical Address:

Designer: Barry O'Connor, Vip Frames and Trusses  
65 Wickham St, Bromley, Christchurch  
E: Barry@vft.co.nz P: 033898200

**Mike Greer Homes = Lot 8, 13 Hart Place - Garage**

**Prolam Lintels Supporting Girder/Setback Trusses**

Building Type	House	Roof Weight	Light with Ceiling
Timber	Pine, Machined	Roof Load	0.40 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	No		1.10 kN concentrated
Exposed	No	Wind Zone	Very High (50.0 m/s)
Roof Pitch	35 °	Snow Region	Region N4
Eaves	170 mm	Altitude	367 m
Position of Girder Truss on Lintel	2.39 m	Ground Snow Load	2.10 kPa
Setback	2.40 m	Roof Snow Load	1.47 kPa
Supported Truss Span	7.00 m		
Lintel Span	4.80 m		

**Use Prolam PL17H1-350100 315 x 90mm PL17**

Capacity Ratio	1.2
Long Term Deflection	5.8 mm
Max. Bearing Reaction	23.2 kN
Load Combination	1.2G + Su
Minimum Bearing Length	50 mm
Uplift Fixing Requirements	12.375 kN Characteristic Load

## PRODUCER STATEMENT



Tasman Consulting Engineers Limited has been engaged by Prowood to provide design services for the development of the Prolam Online calculator.

The design has been carried out using sound and widely accepted engineering principles to the requirements of AS/NZS1170:2002, NZS3603:1993 and NZS3604:2011 using the timber properties for GL8, GL12 and GL17 glulam and LVL15.

I believe on reasonable grounds that the above design will meet the requirements of clauses B1/VM1 of the Building Code Documents.

*David King*  
**David King**

ME (civil, MIPENZ CPEng (no 145511) IntPE

For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050

6 October 2019

**283 Waiwhero Rd P O Box 413 Motueka New Zealand Phone 03 526 7436 Fax 03 526 7437**

**Email: info@prowoodnz.com • www.prolamnz.com**

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SN-R10131861

# PROLAM SUMMARY

Customer/Project: Worksheet

Physical Address:

Designer: Barry O'connor, Vip Frames and Trusses  
65 Wickham St , Bromley, Christchurch  
E: Barry@vft.co.nz P: 033898200

## Mike Greer Homes - Lot 8 Hart Place - Alfresco

### Prolam Lintels Supporting Roof and Ceiling

Building Type	House	Roof Weight	Light with Ceiling
Timber	Pine, Machined	Roof Load	0.40 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	No		1.10 kN concentrated
Exposed	No	Wind Zone	Very High (50.0 m/s)
Roof Pitch	40 °	Snow Region	Region N4
Eaves	150 mm	Altitude	735 m
Roof Span	6.10 m	Ground Snow Load	3.26 kPa
Lintel Span	3.50 m	Roof Snow Load	2.28 kPa

## Use Prolam PL12H1-300100 290 x 90mm PL12

Capacity Ratio	1.3
Long Term Deflection	< 1.0 mm
Max. Bearing Reaction	17.1 kN
Load Combination	1.2G + Su
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	6 kN Characteristic Load

## PRODUCER STATEMENT



Tasman Consulting Engineers Limited has been engaged by Prowood to provide design services for the development of the Prolam Online calculator.

The design has been carried out using sound and widely accepted engineering principles to the requirements of AS/NZS1170:2002, NZS3603:1993 and NZS3604:2011 using the timber properties for GL8, GL12 and GL17 glulam and LVL15.

I believe on reasonable grounds that the above design will meet the requirements of clauses B1/VM1 of the Building Code Documents.

*David King*  
**David King**

ME (civil, MIPENZ CPEng (no 145511) IntPE

For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050

24 October 2019

**283 Waiwhero Rd P O Box 413 Motueka New Zealand Phone 03 526 7436 Fax 03 526 7437**

**Email: info@prowoodnz.com • www.prolamnz.com**

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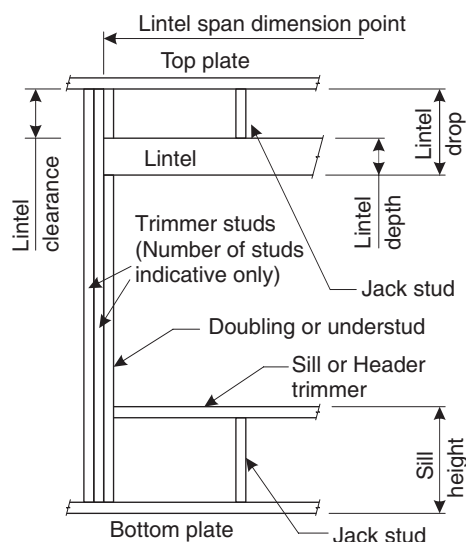


## LINTEL FIXING SCHEDULE ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

### NOTE:

- ★ All fixings are designed for vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20 kPa.
- ★ 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				Heavy Roof			
	Wind Zone				Wind Zone			
	L, M, H	VH	EH		L, M, H	VH	EH	
8.6 m <sup>2</sup>	G	G	H		G	G	H	
11.6 m <sup>2</sup>	G	H	H		G	G	H	
12.1 m <sup>2</sup>	G	H	H		G	H	H	
15.3 m <sup>2</sup>	H	H	-		G	H	H	
19.1 m <sup>2</sup>	H	-	-		G	H	-	
20.9 m <sup>2</sup>	H	-	-		H	H	-	
21.8 m <sup>2</sup>	H	-	-		H	-	-	
34.3 m <sup>2</sup>	-	-	-		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

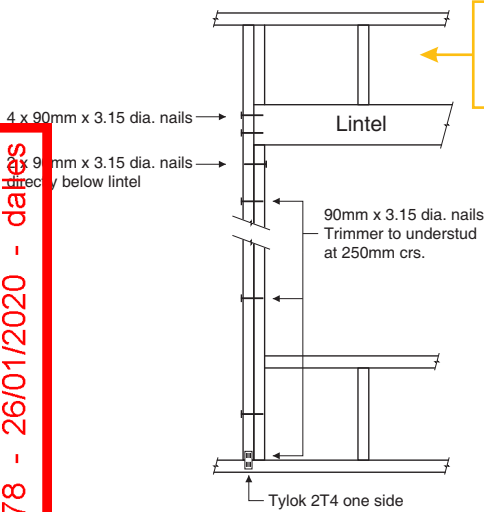
### SELECTION CHART FOR LINTEL FIXING

Lintel Span	Loaded Dimension (See Fig. 1.3 NZS 3604:2011)	Light Roof					Heavy Roof				
		Wind Zone					Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
0.7	2.0	E	E	E	E	F	E	E	E	E	E
	3.0	E	E	E	F	F	E	E	E	E	F
	4.0	E	E	F	F	F	E	E	E	F	F
	5.0	E	F	F	F	G	E	E	F	F	F
	6.0	E	F	F	G	G	E	E	F	F	G
0.9	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	E	F	F	F	E	E	F	F	F
	5.0	E	F	F	F	G	E	E	F	F	F
	6.0	E	F	F	G	G	E	E	F	F	G
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
	5.0	F	G	G	H	H	E	F	G	H	H
	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
	3.0	F	F	G	H	H	E	E	F	G	H
	4.0	F	G	G	H	H	E	F	G	H	H
	5.0	F	G	H	H	-	E	F	G	H	H
	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	-
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
4.8	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.2	F	G	H	H	-	F	F	G	H	-
	4.0	F	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-



## LINTEL FIXING OPTIONS

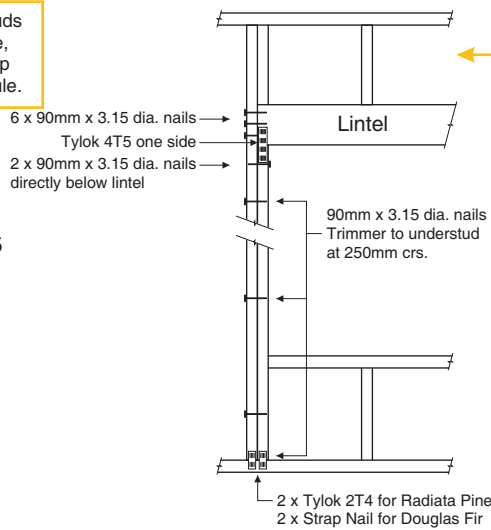
### TYPE E 1.4 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

Stud numbers indicative only. Refer Table 8.5 NZS 3604:2011

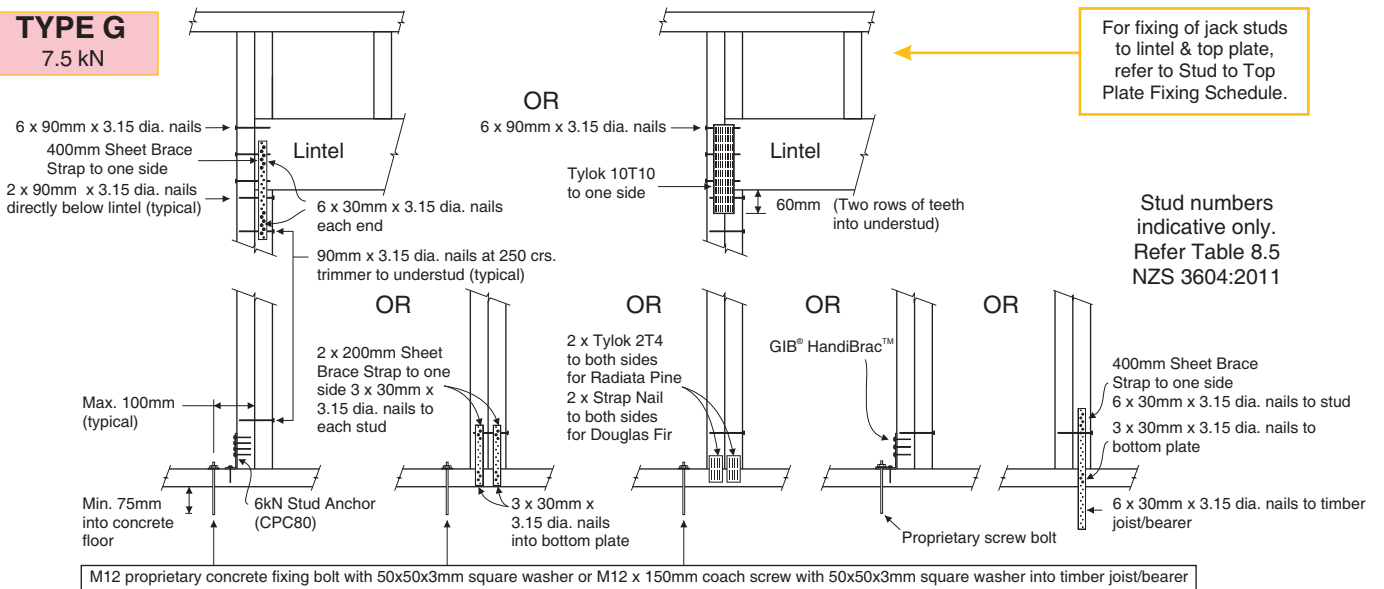
### TYPE F 4.0 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

Stud numbers indicative only. Refer Table 8.5 NZS 3604:2011

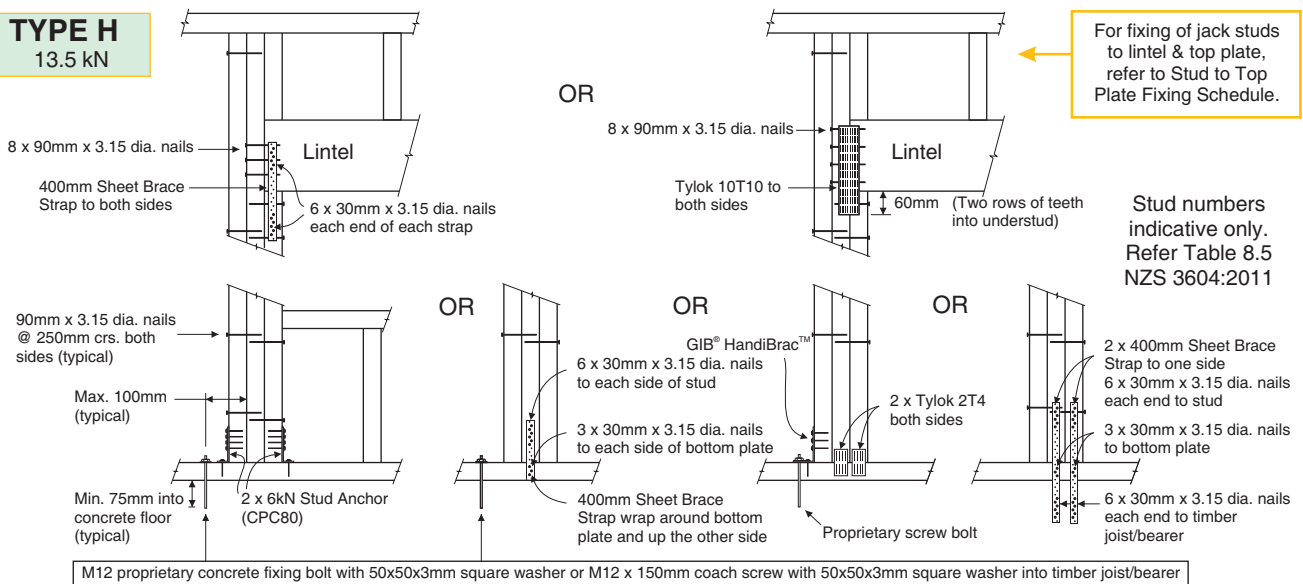
### TYPE G 7.5 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

Stud numbers indicative only. Refer Table 8.5 NZS 3604:2011

### TYPE H 13.5 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

Stud numbers indicative only. Refer Table 8.5 NZS 3604:2011



**PROLAM®** products are manufactured to the requirements of AS/NZS 1328.1:1998 Glue Laminated Structural Timber, and AS/NZS 1491:1996 Finger Jointed Structural Timber under an approved quality system based on the ISO 9000 series of standards. As such if the product is used in accordance with **PROLAM®** product literature, it will meet the durability clauses of the New Zealand Building Code B2.

#### Subfloor Applications:

- ☒ **PROLAM®** may be used where approved practices for clearance and ventilation are used.

#### External Use:

- ☒ **PROLAM®** is recommended for weather exposed applications if sealed and maintained in accordance with **PROLAM®** literature.

#### Preservative Treatment:

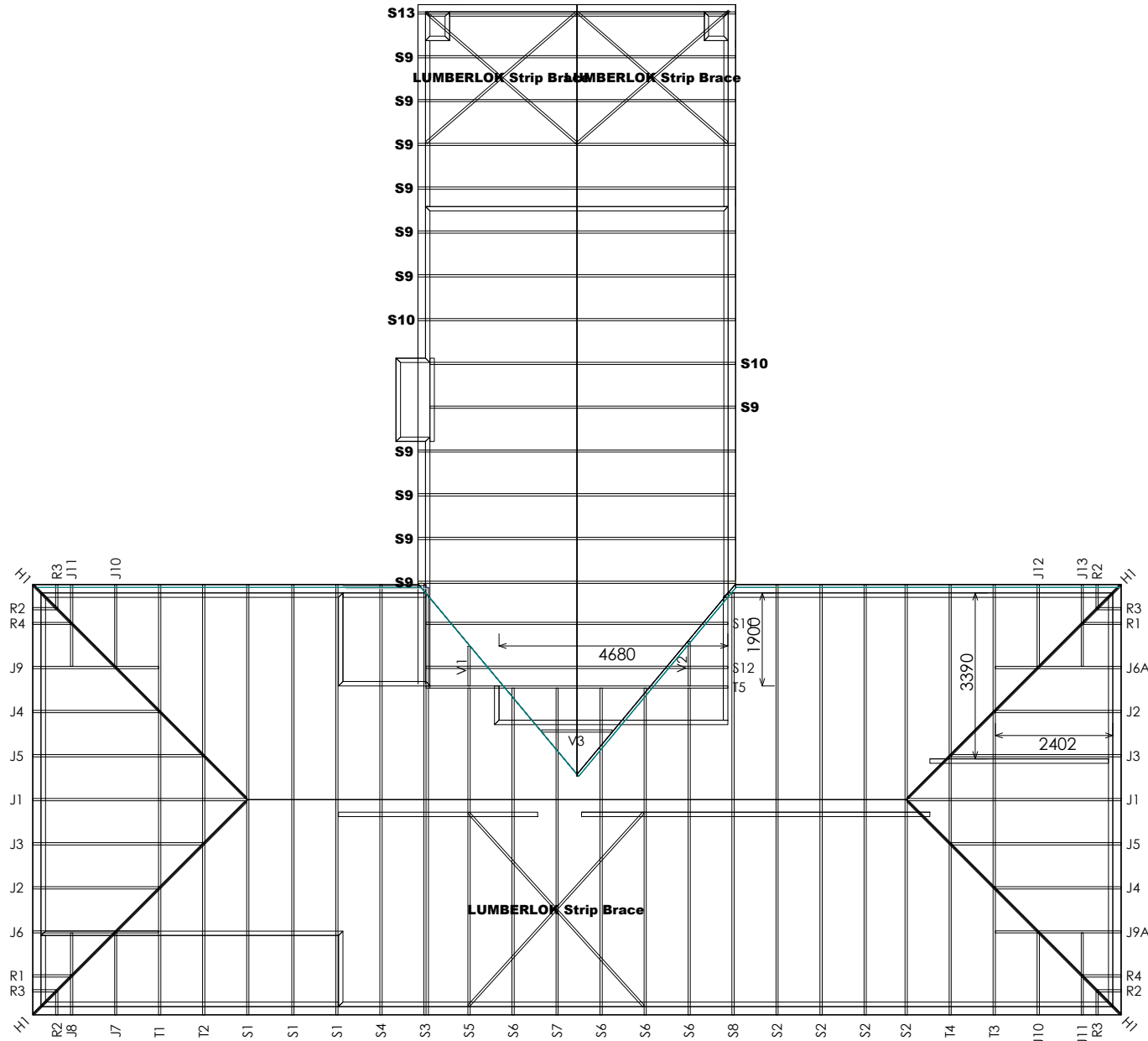
- ☒ **PROLAM®** Beams are CCA H3.2 treated as defined by NZS 3640:2003, for weather exposed applications, such as verandah beams, deck bearers, and subfloor applications.
- ☒ **PROLAM®** Posts are CCA H5 treated as defined by NZS 3640:2003 for in-ground and weather exposed applications, such as deck piles, verandah posts and similar applications.

#### Storage of **PROLAM®**:

- ☒ To ensure **PROLAM®** remains straight and true at the time of installation, follow the below recommendations:
  1. Store under cover so that it remains dry until installation.
  2. Stack clear of the ground for good ventilation.
  3. Stack on bearers to keep flat and straight.

#### Branded **PROLAM®**:

- ☒ **PROLAM®** is branded for your protection. Look-alike materials may not perform to the standard of **PROLAM®**. For your protection do not accept unauthorized substitution



**JOB No 71627**

Client: Mike Greer Homes  
Job Name: New House  
Address: Lot 8, 13 Hart Place  
Lake Coleridge

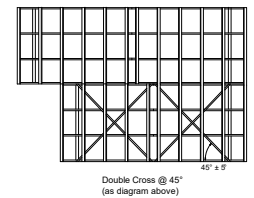
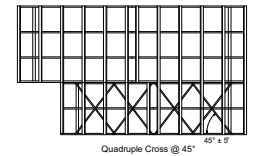
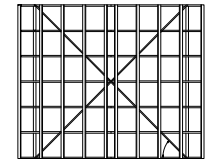
Pitch: 35.000  
Roof Material: Galv Iron .5mm  
Soffit Overhang: 150  
Wind Area: Very High  
Snow Load: 0.735

Trusses And Rafters At 900 Centres  
Unless Stated Otherwise

DRAWN BY Barry O'Connor

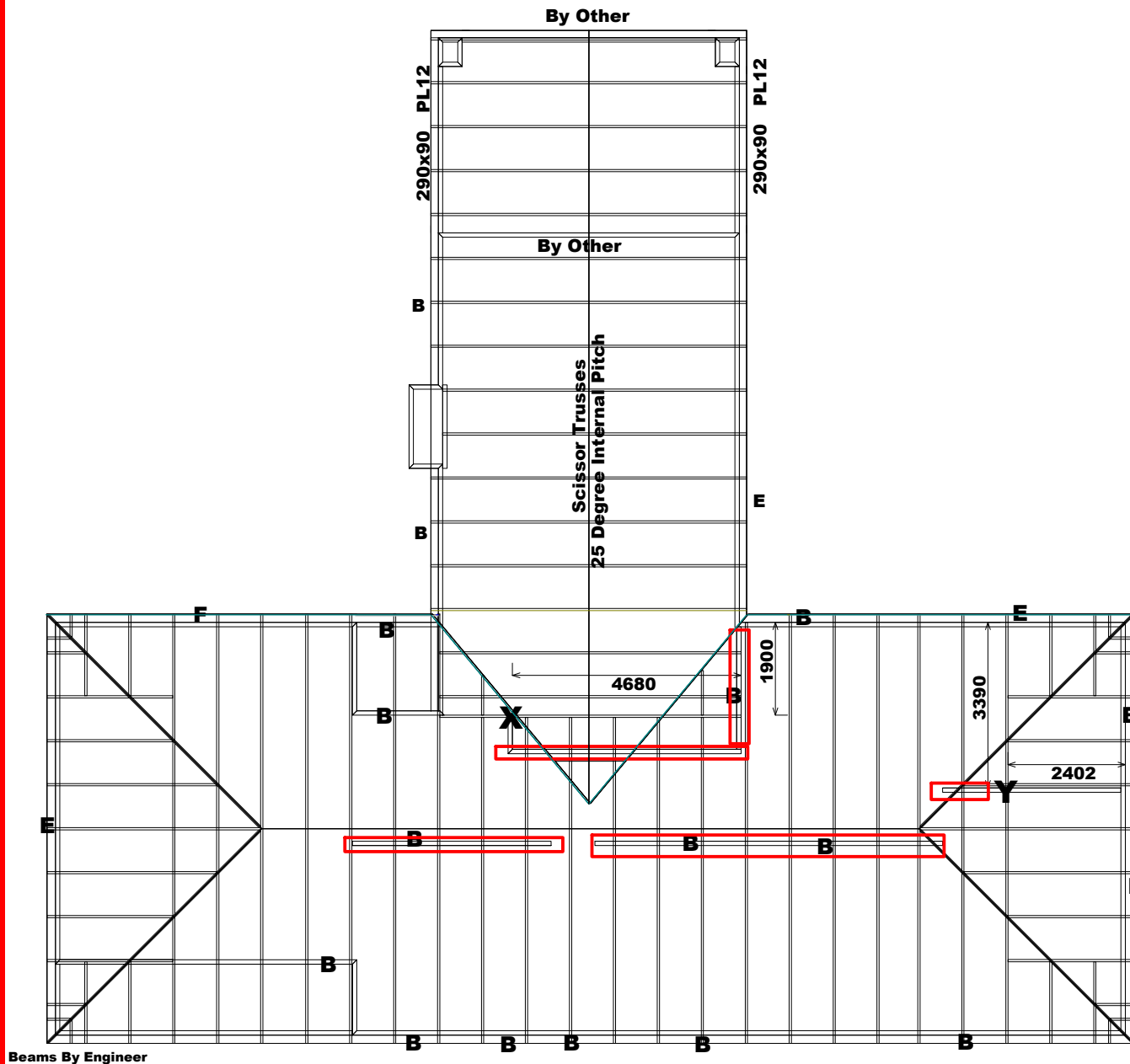
DATE 7 Oct,2019 PAGE 1 of

### Roof Bracing Details



#### NOTES:

Refer to:  
Lumberlok roof bracing brochure  
07/2006



X = Type FP1 375x375 Slab Pad

Y = Type FP2 450x450 Slab Pad

= Load Bearing Walls Not Requiring Slab Thickening (Under 10kN)

**JOB No 71627**

Client: Mike Greer Homes  
Job Name: New House  
Address: Lot 8, 13 Hart Place  
Lake Coleridge

Pitch: 35.000  
Roof Material: Galv Iron .5mm  
Soffit Overhang: 150  
Wind Area: Very High  
Snow Load: 0.735

Trusses And Rafters At 900 Centres  
Unless Stated Otherwise

DRAWN BY Barry O'Connor

DATE 7 Oct,2019 PAGE 1 of

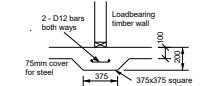
These lintels have been sized as per the GANGLAM and FLITCH BEAM selection manuals as provided by MiTek NZ Ltd.

HYSPAN lintels have been sized as per the HYSPAN selection charts.

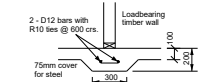
Unless otherwise stated all lintels are as per NZS3604 2011

LINTEL	SIZE	
A	2/90x45	MSG8
B	150x90	Hy90
C	200x90	Hy90
D	240x90	Hy90
E	300x90	Hy90
F	315x90	PL17

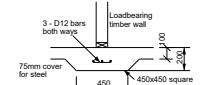
#### Slab Thickening Details



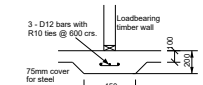
TYPE FP1 - 375x375mm Pad



TYPE FS1 - 300mm Strip footing



TYPE FP2 - 450x450mm Pad



TYPE FS2 - 450mm Strip footing

**Memorandum from licensed building practitioner: Certificate of design work****Section 45 and Section 30C, 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:

Suburb:

Town/City:

Postcode:

**THE OWNER**

Name(s):

Mailing address:

Suburb:

PO Box/Private Bag:

Town/City:

Phone number:

**BASIS FOR PROVIDING THIS MEMORANDUM**

I am providing this memorandum in my role as the: Please tick the option that applies (✓)	
<input type="radio"/>	<b>sole</b> designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project
<input checked="" type="radio"/>	<b>lead</b> 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
<input type="radio"/>	<b>lead</b> designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design
<input type="radio"/>	<b>specialist</b> 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 \_\_\_\_\_ the following design work that is restricted building work

**PRIMARY STRUCTURE: B1**

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
<i>Tick ✓ if included</i>	<i>[If appropriate, provide details of the restricted building work]</i>	<i>[Specify whether you carried out this design work or supervised someone else carrying out this design work]</i>	<i>[If appropriate, specify references]</i>

**Primary structure**

All RBW Design work relating to B1		Carried out	
		Supervised	
Foundations and subfloor framing		Carried out	
		Supervised	
Walls		Carried out	
		Supervised	

Roof ( )		( ) Carried out ( ) Supervised	
Columns and beams ( )		( ) Carried out ( ) Supervised	
Bracing ( )		( ) Carried out ( ) Supervised	
Other ( )		( ) Carried out ( ) Supervised	

**EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2**

All RBW design work relating to E2 ( )		( ) Carried out ( ) Supervised	
Damp proofing ( )		( ) Carried out ( ) Supervised	
Roof cladding or roof cladding system ( )		( ) Carried out ( ) Supervised	
Ventilation system (for example, subfloor or cavity) ( )		( ) Carried out ( ) Supervised	
Wall cladding or wall cladding system ( )		( ) Carried out ( ) Supervised	
Waterproofing ( )		( ) Carried out ( ) Supervised	
Other ( )		( ) Carried out ( ) Supervised	

**FIRE SAFETY SYSTEMS: C1 – C6**

Emergency warning systems, evacuation and fire service operation systems, suppression or control systems, or other ( )		( ) Carried out ( ) Supervised	
--	--	-----------------------------------	--

**Note:** The design of fire safety systems is only restricted building work when it involves small-to-medium apartment buildings as defined by the Building (Definition of Restricted Building Work) Order 2011.

**Note:** continue on another page if necessary.

**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]


**Note:** continue on another page if necessary.

#### ISSUED BY

Name:		LBP or Registration number:	
The practitioner is a:	<input checked="" type="checkbox"/> Design LBP <input type="checkbox"/>	Registered architect <input type="checkbox"/>	Chartered professional engineer
Design Entity or Company (optional):			
Mailing address (if different from below):			
Street address / Registered office:			
Suburb:		Town/City:	
PO Box/Private Bag:		Postcode:	
Phone number:		Mobile:	
After Hours:		Fax:	
Email address:		Website:	

#### DECLARATION

I \_\_\_\_\_ *[name of practitioner]*, 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: *Jdcooke*

Date:

## THERMATHENE BLACK

250 MICRON  
CONCRETE UNDERLAY

## APPLICATION AND INSTALLATION

Product Description	THERMATHENE BLACK 250 Micron Concrete Underlay is a tear resistant Polyethylene film.
Product Advantage	THERMATHENE BLACK is used as a concrete underlay and a moisture vapour barrier in areas where protection is required. Thermathene Black is 250 micron, and coloured black for ultra violet resistance.
Installation	<p>THERMATHENE BLACK must be installed to E2/AS1 10.3.3. Damp Proof Membranes, and must be laid on a properly prepared base as required by NZS3604: 2011.7.5.4.</p> <p>THERMATHENE BLACK may be used to cover ground areas under suspended timber floors to prevent the rise of dampness. Ensure that the site is clear of rubbish, sharp edges such as rocks or bricks. Slit and patch around jack studs or pipe work. All joints must be taped with Thermakraft 66mm White General Purpose Acrylic tape.</p> <p>THERMATHENE BLACK must be inspected for tears and penetrations. Repair with Thermakraft 66mm White General Purpose Acrylic tape to ensure integrity of THERMATHENE BLACK as a moisture barrier.</p> <p>Thermakraft recommends a lap of 150mm at all joints</p>
Roll Dimensions	<p>250micron x 4000mm x 25m = 100m<sup>2</sup> (gusseted rolls)</p> <p>Other sizes and thickness available (check for availability)</p>



## THERMATHENE BLACK

250 MICRON  
CONCRETE UNDERLAY

### TECHNICAL SPECIFICATIONS

SDC - Approved Building Consent Document - BC192333 - Pg 135 of 378 - 26/01/2020 - 13/01/2021

#### Durability

THERMATHENE BLACK 250 Micron Concrete Underlay to meet the performance requirements of NZBC Clauses B2, Durability B2.3.1[a] 50 years and B2.3.1(b) 15 years, E2 External Moisture,

#### THERMATHENE BLACK:

- Must be installed in accordance to the "APPLICATION and INSTALLATION GUIDELINES" as outlined in E2/AS1 10.3.3. Damp Proof Membranes, and must be laid on a properly prepared base as required by NZS3604:2011.7.5.4
- is not left exposed for more than 28 days,
- installed by a licensed building practitioner,
- Free of tears and penetrations.

#### Physical Properties

#### THERMATHENE BLACK

- Exceeds the minimum impact resistant film test AS1326:1972(IR3)
- Complies with (A) AS2870:1995, 5.3.3 vapour barrier for concrete underlays
- Resistance to Water Vapour Transmission Not less than 90MN.s/g



i. THERMATHENE BLACK is used as a concrete underlay and a moisture vapour barrier.

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards.



**Thermakraft**  
Industries (NZ) Ltd

11 Turin Place, East Tamaki, Auckland, New Zealand

PO Box 58-112, Botany, Manukau 2163, New Zealand

Phone: 09-273 3727 Fax: 09-273 3726 Free Phone: 0800 806 595

Email: sales@thermakraft.co.nz Website: www.thermakraft.co.nz



## BRANZ Appraised

Appraisal No. 878 [2014]

## THERMAKRAFT ALUBAND WINDOW FLASHING TAPE

Appraisal No. 878 [2014]

Amended 1 May 2019

### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.



### Thermakraft Limited

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Greenmount  
Auckland  
Tel: 09 273 3727  
Fax: 09 273 3726  
Free phone: 0800 806 595  
www.thermakraft.co.nz



### BRANZ

122 Moonshine Rd,  
Porirua 5381  
Private Bag 50 908  
Porirua 5240,  
New Zealand  
Tel: 04 237 1170  
branz.co.nz



## Product

- 1.1 Thermakraft Aluband Window Flashing Tape in conjunction with the Thermakraft Corner Moulded Piece is a flexible flashing tape system for use around framed joinery openings as a secondary weather resistant barrier.
- 1.2 The system is installed into and around the framed joinery opening over the wall underlay and exposed frame to cover both the face and edge of the opening framing. Thermakraft Aluband Window Flashing Tape is also used at joinery heads to seal flashing upstands to the wall underlay.

## Scope

- 2.1 Thermakraft Aluband Window Flashing Tape has been appraised as a flexible flashing system for use around window and door joinery openings for buildings within the following scope:
  - constructed with timber framing in accordance with the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; or,
  - constructed with steel framing subject to specific engineering design with building height and floor plan area scope limitations in accordance with NZBC Acceptable Solution E2/AS1; and,
  - with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
  - with wall cladding systems complying with NZBC Acceptable Solution E2/AS1 or a valid BRANZ Appraisal that specifies a flexible flashing system; and,
  - with flexible wall underlays compatible with the flashing tape and complying with the NZBC; and,
  - situated in NZS 3604 Wind Zones up to, and including, Extra High [refer to Paragraph 7.3].

## Building Regulations

### New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Thermakraft Aluband Window Flashing Tape, 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 B2 DURABILITY:** Performance B2.3.1 (b), 15 years and B2.3.2. Thermakraft Aluband Window Flashing Tape meets these requirements. See Paragraphs 8.1 and 8.2.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.2. Thermakraft Aluband Window Flashing Tape contributes to meeting this requirement. See Paragraphs 7.1 - 7.4 and 11.1.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Thermakraft Aluband Window Flashing Tape meets this requirement and will not present a health hazard to people.

- 3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance. See Paragraph 7.1.

## Technical Specification

- 4.1 System components and accessories supplied by Thermakraft Limited are:
- Thermakraft Aluband Window Flashing Tape is a polymeric faced, bituminous modified, self-adhesive tape with a release backing paper. The tape is supplied in rolls 200, 150 and 75 mm wide x 25 m long. The rolls are wrapped in clear polythene film.
  - The Thermakraft Corner Moulded Piece is made from inert polyethylene and is coloured orange. It is used in conjunction with the Thermakraft Aluband Window Flashing Tape and building underlays as part of the Thermakraft Aluband Window Flashing Tape system.
  - The Thermakraft Tool is used to ensure proper adhesion of the Thermakraft Aluband Window Flashing Tape and to achieve a tight fit into corners.
- 4.2 Accessories used with the system which are supplied by the installer are:
- Thermakraft Corner Moulded Piece fixings – staples, clouts or other temporary fixings to attach the corner mould to the framing prior to the installation of the Thermakraft Aluband Window Flashing Tape.
  - Scotch® Super 77™ Multipurpose Adhesive is a clear spray primer.

## Handling and Storage

- 5.1 Handling and storage of all materials supplied by Thermakraft Limited, whether on or off site, is under the control of the installer. Thermakraft Aluband Window Flashing Tape and accessories must be protected from damage and weather. Rolls must be stored under cover, in clean, dry conditions away from direct exposure to sunlight.

## Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Thermakraft Aluband Window Flashing Tape. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 Thermakraft Aluband Window Flashing Tape meets the requirements of AC148: 2001 which is an alternative solution to the version of AC148 referenced by NZBC Acceptable Solution E2/AS1 Paragraph 9.1.5 [b]. The installation method for Thermakraft Aluband Window Flashing Tape is an alternative solution to the installation method shown within NZBC Acceptable Solution E2/AS1, Figures 72A and 72B.
- 7.2 The use of flexible flashing systems around window and door joinery openings is critical to assist the overall weathertightness performance of window and door joinery installations.
- 7.3 Thermakraft Aluband Window Flashing Tape is suitable for use over flexible wall underlays compatible with the flashing tape in NZS 3604 Wind Zones up to and including Extra High. In the Extra High Wind Zone, the flexible underlay must be installed over a rigid underlay complying with NZBC Acceptable Solution E2/AS1, Table 23.
- 7.4 Thermakraft Aluband Window Flashing Tape is designed to prevent air leakage and water penetration around window and door openings at framing junctions [e.g. at the sill trimmer and opening stud junction], and to keep any water that gets past the cladding, or through the joinery, from direct contact with the framing timber.
- 7.5 Thermakraft Aluband Window Flashing Tape is not designed to overcome poor detailing and workmanship of the window or door joinery installation. The system must not be considered in isolation, but be considered as part of the wall cladding system. Thermakraft Aluband Window Flashing Tape is designed to be used in conjunction with air seals and joinery flashing systems, not as a substitute.

- 7.6 When Thermakraft Aluband Window Flashing Tape is used in conjunction with LOSP (light organic solvent preservative) treated timber, the solvent from the timber treatment must be allowed to evaporate (generally at least one week) prior to the installation of the system.

### Durability

- 8.1 Assessment of durability to meet the NZBC is based on difficulty of access and replacement, and the ability to detect failure of Thermakraft Aluband Window Flashing Tape both during normal use and maintenance of the building.

### Serviceable Life

- 8.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 42 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Thermakraft Aluband Window Flashing Tape is expected to have a serviceable life equal to that of the cladding.

### Maintenance

- 9.1 No maintenance is required for Thermakraft Aluband Window Flashing Tape. Regular checks, at least annually, must be made of the junctions between the joinery and wall cladding to ensure that they are maintained weathertight and that the primary means of weather resistance for the junction e.g. flashing, sealant, etc continues to perform its function, to ensure that water will not penetrate the cladding.

### Prevention of Fire Occurring

- 10.1 Thermakraft Aluband Window Flashing Tape must be separated from fireplaces, heating appliances, chimneys and flues in accordance with the requirements of NZBC Acceptable Solutions C/AS1 to C/AS6, Paragraph 7.5.9 for the protection of combustible materials.

### External Moisture

- 11.1 Where a cladding manufacturer specifies the use of generic flashing tapes around window and door joinery openings at framing junctions as part of their system, or they specify the use of flexible flashing tapes that comply with NZBC E2/AS1, Paragraph 9.1.5 (b), Thermakraft Aluband Window Flashing Tape may be used.

## Installation Information

### Installation Skill Level Requirements

- 12.1 Installation of Thermakraft Aluband Window Flashing Tape must be completed by trades-persons with an understanding of flexible flashing tape systems, in accordance with instructions given within Thermakraft Aluband Window Flashing Tape Technical Literature and this Appraisal.

### General

- 13.1 The selected wall underlay must be installed in accordance with the manufacturer's instructions, and must completely cover the joinery opening. The underlay is then cut on a 45° angle away from each corner of the opening so the flaps can be folded into the opening and secured to the interior face of the timber framing.
- 13.2 Fit a Thermakraft Corner Moulded Piece into each of the bottom corners to create a seal at the corner junction. The corner piece must be fixed to the framing with staples or clouts.
- 13.3 Before the Thermakraft Aluband Window Flashing Tape is applied, the substrate surfaces must be clean, dry and free from any surface contaminants such as dust and grease that may cause loss of adhesion. Application of Scotch® Super 77™ Spray Adhesive: When installing Aluband Flashing Tapes on difficult to bond substrates, Scotch® Super 77™ Spray Adhesive may be used. Ensure that the wall underlay/substrate is dry and free of dirt before applying the spray adhesive. Apply a light spray/coating of the spray adhesive onto the underlay/substrate. Wait for a minute to allow the spray adhesive to become tacky. When tacky to the touch apply the flashing tape in the normal manner.



- 13.4 A length of Thermakraft Aluband Window Flashing Tape must be cut to the length of the sill plus 400 mm. The tape is installed flush with the interior face of the opening and is applied along the entire length of the sill and 200 mm up each jamb. The overhanging tape is cut at the corner of the opening to allow the tape to be folded onto the face of the building underlay. The Thermakraft Tool must be used to ensure that adequate adhesion of the tape is achieved and that the tape is installed tight into the sill/jamb junction.
- 13.5 A 400 mm length of Thermakraft Aluband Window Flashing Tape must be installed 200 mm down the jamb and 200 mm along the lintel at each of the top corners of the window or door joinery opening. A 75 mm wide x 100 mm long sealing tape 'butterfly' must be installed at 45° across the corner of the head/jamb junction overlapping the corner by 3 mm to create a seal at the corner junction.
- 13.6 Thermakraft Aluband Window Flashing Tape must not be stretched. To avoid wastage, the tape can be lapped 100 mm minimum onto itself without reducing the performance of the Thermakraft Aluband Window Flashing Tape system.
- 13.7 If the Thermakraft Aluband Window Flashing Tape is exposed to the weather or UV light for more than 42 days, then it must be replaced with new material.

#### **Installation Temperature**

- 13.8 Thermakraft Aluband Window Flashing Tape must not be installed at temperatures of less than 5°C.

#### **Inspections**

- 13.9 The Technical Literature must be referred to during the inspection of Thermakraft Aluband Window Flashing Tape installations.

## **Basis of Appraisal**

The following is a summary of the technical investigations carried out:

#### **Tests**

- 14.1 Testing of Thermakraft Aluband Window Flashing Tape has been completed by BRANZ to the requirements of ICC Evaluation Service Acceptance Criteria for Flashing Materials AC148:2001. The adhesion of Thermakraft Aluband Window Flashing Tape to black bituminous Kraft building paper complying with the requirements of NZBC Acceptable Solution E2/AS1, Table 23 and selected other synthetic wall underlays has been tested and found to be satisfactory.

#### **Other Investigations**

- 15.1 An assessment was made of the durability of Thermakraft Aluband Window Flashing Tape by BRANZ technical experts.
- 15.2 Site inspections were carried out by BRANZ to examine the practicability of installation.
- 15.3 The Technical Literature has been reviewed by BRANZ and found to be satisfactory.

#### **Quality**

- 16.1 The manufacture of Thermakraft Aluband Window Flashing Tape has not been examined by BRANZ, but details of the quality and composition of the materials used were obtained and found to be satisfactory.
- 16.2 The quality of supply to the market is the responsibility of Thermakraft Limited.

- 16.3 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and wall underlays in accordance with the instructions of the designer.
- 16.4 The quality of installation, handling and storage on site is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

### Sources of Information

- ICC Evaluation Service, Inc, AC148 Acceptable Criteria for Flexible Flashing Materials, July 2001.
- NZS 3604: 2011 Timber-framed buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 [Amendment 7, 01 January 2017].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

### Amendments

#### Amendment No.1, dated 23 February 2017.

This Appraisal has been amended to update the Appraisal Holder.

#### Amendment No. 2, dated 1 May 2019.

This Appraisal has been amended to include the application of Scotch® Super 77™ Spray Adhesive.

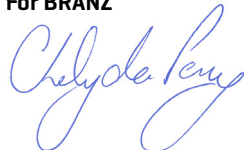
In the opinion of BRANZ, **Thermakraft Aluband Window Flashing Tape** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Thermakraft Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the Technical Literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. **Thermakraft Limited**:
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
  - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by **Thermakraft Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Thermakraft Limited** or any third party.

For BRANZ



**Chelydra Percy**

Chief Executive

Date of Issue:

02 December 2014

## ALUBAND WINDOW FLASHING SYSTEM

### APPLICATION AND INSTALLATION GUIDE

#### APPLICATION & INSTALLATION

1 Cut the wall underlay/air barrier at a 45° angle away from each corner. Fold flaps tightly into the window or door opening and fix with staples on the back faces of the framing.

2 Fix the Thermakraft Corner Moulded Piece to the bottom corners by way of staples or clouts to the two jambs. Always ensure that Aluband is applied to surfaces that are clean and free of dust, contaminants, solvents, oils or waxes. Note the following: 150mm wide tape is used for 100mm wide window or door framing, and the 200mm wide tape is used for 140mm to 150mm wide reveals. (With steel framed houses use Double Sided Tape to attach the Thermakraft Aluband Corner Moulded Piece to metal framing).

3 Measure 200mm up both jambs, add 400mm to the length of the window sill and cut to suit that measurement.

4 First remove the release film from the tape; align the back edge of the tape with the inside edge of the sill.

5 Using the Thermakraft Tool, firmly press the tape onto the wall underlay to ensure good adhesion and ensure the tape is fitted tightly into the jamb to sill corners.

6 At the sill/jamb corners cut the tape from the external edge of the frame outwards. Fold flaps back onto the wall underlay/air barrier and press tape firmly for good adhesion.

7 Proceed to fit the Window Flashing Tape to the top corners of the frame (200mm across lintel x 200mm down jamb).

8 For window or door lintel to jamb junction, apply a butterfly using the 75mm wide x 100mm long Aluband. Fix at a 45° angle to the jamb with an overlap at the corner of 3mm.

9 Door frames are to be treated similarly to window openings. The sill may be either a timber or a concrete floor.

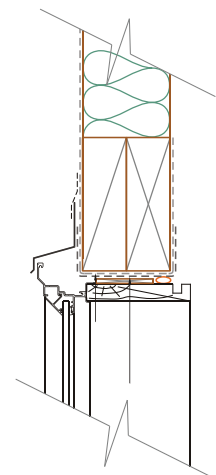
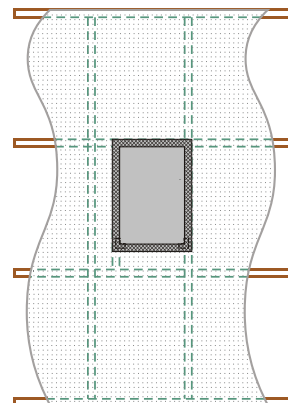
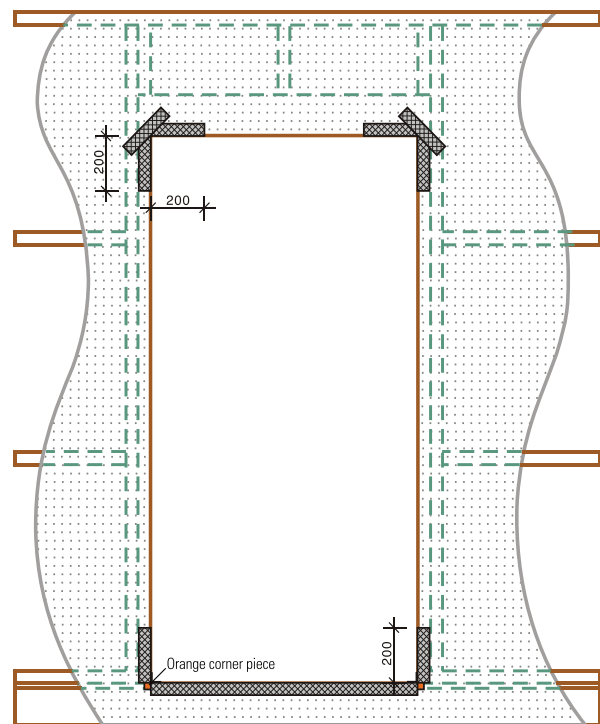
#### Window and door frames

A) Staple orange corner piece to the bottom corner sill. Place tape 200mm up the jambs and across the full width of the sill opening. Align tape with the back of the frame opening.

B) At the top corner place tape 200mm down the jamb and 200mm across the lintel. Place a strip of 75mm tape across the top corner.

10 Meter boxes with built-in flanges to be taped with Window Flashing Tape along each flange to the building underlay.

11 Window Flashing Tape is used to seal the up stand of the window head flashing to the building underlay. (Refer to the cladding manufacturer's details).

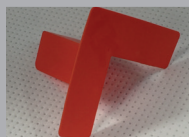






#### Thermakraft Window Flashing System

A polymeric faced, modified bituminous self-adhesive tape.



#### Thermakraft Aluband Corner Moulded Piece

Made from inert polyethylene (orange). Used in conjunction with Aluband and building underlay.



#### Thermakraft Tool

Used to ensure proper adhesion of the tape to the building underlay.

## IMPORTANT INFORMATION

To assist the adhesion of window flashing tapes Thermakraft suggests the following two options this is particularly relevant in the following conditions:

- In temperatures below 5°C
- When adhering to non-woven surfaces such as Covertex™
- When the tape has been lifted or moved after initial application

#### Application of Heat:

- Press the window sill tape into position in the usual manner
- Apply a gentle heat, using a heat gun on low heat to the top of the window sill tape
- Once the adhesive starts to soften use the Thermakraft tool or a roller to firmly press the tape into the wall underlay ensuring good adhesion
- Take care not to damage the foil face lining

#### Difficult to Bond Substrates Surface Preparation:

Always ensure that Aluband is applied to surfaces that are clean and free of dust, contaminants, solvents, oils or waxes.

Application of Scotch® Super 77™ Spray Adhesive: When installing Aluband Flashing Tapes on difficult to bond substrates, Scotch® Super 77™ Spray Adhesive may be used. Ensure that the wall underlay/substrate is dry and free of dirt before applying the spray adhesive. Apply a light spray/coating of the spray adhesive onto the underlay/substrate. Wait for a minute to allow the spray adhesive to become tacky. When tacky to the touch apply the flashing tape in the normal manner.

#### Adhesives and Solvents:

After the installation of Aluband, ensure that the edges do not come into contact with solvent based sealants or adhesives. Solvents in these products can adversely affect the adhesion or dissolve the bituminous adhesive and cause it to run. If the application of solvent based adhesives or sealants are necessary, cover the edges with Thermakraft F150 pure foil tape or equivalent foil tape to form a barrier.

#### LOSP Treated Timber:

Aluband should not be applied directly on to the timber, or indirectly on to a timber sheathed in underlay that has been freshly LOSP treated. Always allow the solvent to fully flash off prior to wrapping in underlay and applying Aluband.

#### Exposure Time:

Aluband must not be left exposed to the elements for more than 42 days.



For additional details and latest specifications [www.thermakraft.co.nz](http://www.thermakraft.co.nz)



Customer Service 0800 806 595

**Thermakraft™** THERE IS NO SUBSTITUTE

**Thermakraft Ltd** 11 Turin Place, East Tamaki, Auckland, New Zealand  
P.O.Box 58-112, Botany, Auckland 2163 **Phone** 0800 806 595 or +64 9 273 3727  
**Fax** +64 9 273 3726 **Email** [info@thermakraft.co.nz](mailto:info@thermakraft.co.nz) **www.thermakraft.co.nz**

The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found on the website.

# Thermakraft™

## ALUBAND WINDOW FLASHING SYSTEM

Thermakraft Aluband is a bituminous adhesive based Window Flashing Tape used around framed joinery openings as a secondary weather barrier. The system is installed into and around the framed joinery opening over the wall underlay and exposed frame to cover both the face and edge of the opening framing. Thermakraft Aluband Window Flashing Tape is also used at joinery heads to seal flashing upstands to the wall underlay.

✓ Adheres to most clean dust free building elements.

✓ No primer required (under normal situations).

✓ Suitable for use in all Wind Zones of NZS 3604 up to, and including "Extra High".

✓ Quick, simple and easy to use.



**Strong Adhesion**



**BRANZ Appraised**



ALUBAND WINDOW FLASHING SYSTEM



SDC - Approved Building Consent Document - B0192333 - Pg 144 of 378 - 26/01/2020 - dalles

## FLEXIBLE FLASHING TAPE



### Thermakraft Window Flashing System

A polymeric faced, modified bituminous self-adhesive tape.



### Thermakraft Aluband Corner Moulded Piece

Made from inert polyethylene (orange). Used in conjunction with Aluband and building underlay.



### Thermakraft Tool

Used to ensure proper adhesion of the tape to the building underlay.

## TECHNICAL SPECIFICATIONS

Thermakraft Aluband Window Flashing Tapes can be used as a flexible flashing system around window and door joinery openings on timber and steel framed buildings within the following scope:

- The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
  - Constructed with steel framing complying with the NZBC; and,
  - With a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
  - With wall cladding systems complying with NZBC Acceptable Solution E2/AS1; and,
  - With wall underlays compatible with the flashing tape and complying with the NZBC; and,
  - Situated in NZS3604 Wind Zones up to, and including 'Extra High'; and,
  - For steel framed buildings, constructed with steel framing complying with NZBC.
- Application of Scotch® Super 77™ Spray Adhesive: When installing Aluband Flashing Tapes on difficult to bond substrates, Scotch® Super 77™ Spray Adhesive may be used. Ensure that the wall underlay/ substrate is dry and free of dirt before applying the spray adhesive. Apply a light spray/coating of the spray adhesive onto the underlay/substrate. Wait for a minute to allow the spray adhesive to become tacky. When tacky to the touch apply the flashing tape in the normal manner.

#### Roll Dimensions:

ALU075025 / 75mm x 25m / 12  
ALU150010 / 150mm x 10m / 6  
ALU150025 / 150mm x 25m / 6  
ALU200025 / 200mm x 25m / 4

## DURABILITY

Thermakraft Aluband Window Flashing Tape will meet the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 [a] 50 years, B2.3.1 [b] 15 years and B2.3.2), E2 External Moisture Performance and F2 Hazardous Building Materials.

Thermakraft Aluband Window Flashing Tape are expected to have a serviceable life equal to that of the cladding, when installed in accordance with this application and installation sheet, provided they are not exposed to the weather or ultra-violet (UV) for a total number of no more than 42 days, or are damaged on installation.

Thermakraft Aluband Window Flashing Tape are designed to work on all building underlays that meet the requirements of NZBC E2/AS1 Table 23, and on all Thermakraft BRANZ appraised wall underlays.

Thermakraft Aluband Window Flashing Tape should be installed when temperatures are above 5°C.

For additional details and latest specifications [www.thermakraft.co.nz](http://www.thermakraft.co.nz)



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### Product Description

Barricade Plus & Barricade FR Building Wraps are synthetic breather-type flexible building wraps manufactured from (UV) resistant and fire resistant, spun-bonded Polypropylene and are coloured white.

### Brand Names:

- Barricade Plus Building Wrap (f)
- Barricade FR Building Wrap
- FR1 Building Wrap (f)

### Certificate Holder

**Masons Plastabrick Ltd**  
18A David McCathie Place  
Silverdale, Auckland 0932 New Zealand  
www.mpb.co.nz

### Certification Body

**CertMark International Pty Ltd**  
ABN: 80 111 217 568  
JAS-ANZ Accreditation No. Z4450210AK  
PO Box 321 Tuakau 2121  
+64 (09) 951 8246  
www.CertMark.org

# CERTIFICATE OF CONFORMITY

This is to certify that



**MASONS**  
Designed Smart, Built Tough.



## FR1, Barricade Plus & Barricade FR Building Wraps

### Complies with the New Zealand Building Code:

1. Performance B2.3.1 (a) - not less than 50 years, & B2.3.2.
2. E2.3.2
3. F2.3.1

### Product Purpose or Use

For use as an exterior wall underlay under direct and non-direct fixed wall cladding on timber and steel framed buildings.

### Subject to the following Conditions & Limitations:

- a. Must be installed in accordance with E2/AS1, Clauses 9.1.5 & 9.1.7.
- b. Building designers are responsible for the building design and for the incorporation of FR1, Barricade Plus & Barricade FR Building Wraps into their design in accordance with the declared properties and the instructions of the [FR1/Barricade Plus Technical Data Sheet \(February 2018\)](#) and [Barricade FR technical data sheet dated \(February 2018\)](#). FR1, Barricade Plus & Barricade FR Building Wrap has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:
  - i. The scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area;
  - ii. With absorbent and non-absorbent wall claddings direct fixed to framing and installed over an 18mm minimum drained cavity; and,
  - iii. With masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or specific design for steel framed buildings; and,
  - iv. Situated in NZS 3604:2011 – Timber-framed buildings, wind zones up to and including 'Extra High'.
- c. FR1, Barricade Plus & Barricade FR Building Wrap has an AS 1530.2-1993 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable solutions C/AS2 to C/AS6, paragraph 4.17.8 b).
- d. In cavity installations where stud spacing is greater than 450mm and flexible underlays only are used, an intermediate means of restraining the underlay and insulation from bulging into the drained cavity must be installed as required by E2/AS1 9.1.8.5.
- e. Only to be installed by a suitable licenced tradesperson in accordance with [FR1/Barricade Plus Technical Data Sheet \(February 2018\)](#) and [Barricade FR technical data sheet dated \(February 2018\)](#).
- f. FR1 and Barricade Plus cannot be used as an air barrier.
- g. This certification relates only the clauses of the NZBC as contained herein. Consequently any clause not included on this certificate are outside the scope of this Certificate. Excluded clauses are to be addressed at an individual project basis.
- h. This certification relates only to FR1, Barricade Plus & Barricade FR Building Wrap that is described above and has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective.
- i. The certificate holder must maintain compliance with the conditions set out in Section 15 of the Building (Product Certification) Regulations 2008.

**John Thorpe**  
CertMark International Pty Ltd

19/02/2015  
Date of Issue

CM40134-I02-R00  
Certificate Number

- This certificate is issued by an independent certification body accredited by the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation & Employment (MBIE) under the Building Act 2004. MBIE does not in any way warrant, guarantee, or represent that the building method or product the subject of this certificate conforms to the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product. MBIE disclaims, to the extent permitted by law, all liability (including negligence) for claims of losses, expenses, damages, and costs arising as a result of the use of the building method(s) or product(s) referred to in this certificate
- It is advised to check that this Certificate of Conformity is currently valid and not withdrawn, suspended or superseded by a later issue by referring to the MBIE website, www.mbie.govt.nz
- This certificate may only be reproduced in its entirety.







# Installation Instructions

## Barricade FR and Barricade Building Wrap

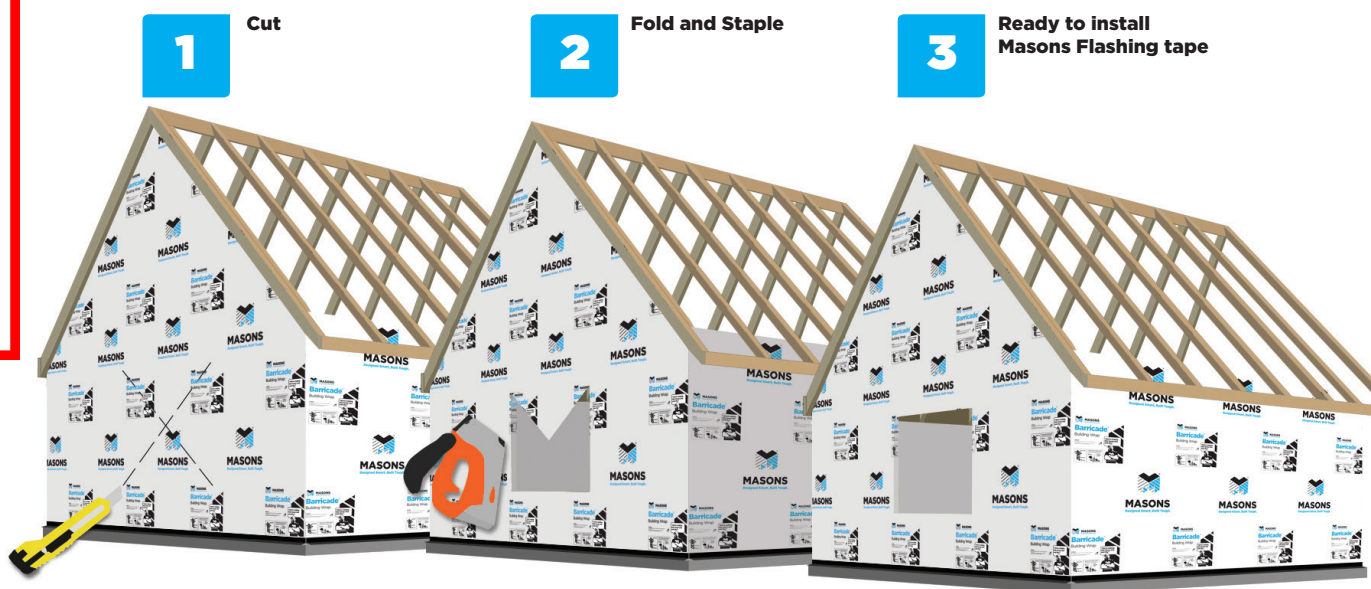
- 1** *Masons Building Wrap* must be fixed (with the printed side out) to all framing members at maximum 300 mm centres with large-head clouts 20 mm long, 6-8 mm staples, self drilling screws or proprietary underlay fixings. The membrane must be pulled taut over the framing before fixing.
- 2** *Masons Building Wrap* must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 75 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.
- 3** The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the membrane by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut membrane must be folded inside the opening and stapled to the penetration framing. Excess underlay may be cut off flush with the internal face of the wall frame. Masons **Hydro™ or 40 Below™ Flashing Tape** needs to be installed around the openings prior to fitting the doors and windows.
- 4** *Masons Building Wrap* must be restrained from bulging into the drained cavity in accordance with NZBC Acceptable Solution E2/ AS1, Paragraph 9.1.8.5. Installing Masons **WrapStrap** - horizontal at 300mm centres - prevents the wrap and insulation from bulging.
- 5** *Masons Building Wrap* can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.7(e).
- 6** When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.
- 7** Any damaged areas of *Masons Building Wrap*, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears with Masons **Hydro™ or 40 Below™ Flashing Tape**.

Provided Masons Wrap is not exposed to the weather or ultra-violet light for a total of more than 42 days, and provided the exterior cladding is maintained in accordance with the manufacturers instructions and the cladding remains weather resistant, the wrap is expected to have a serviceable life equal to that of the cladding.

### Handling & Storage

Masons Wrap whether on or off site should

- Be stored on end under a cover, in a clean and dry area
- Do not crush the rolls
- The rolls must be protected from damage



# Thermakraft™

## THERMAKRAFT 215

Thermakraft 215 self-supporting roof and wall underlay is an absorbent, breathable underlay specifically designed for use in Domestic and Commercial buildings. Suitable as a roof and wall underlay with all cladding types, where Fire Retardancy is NOT required.

- ✓ Versatile building Underlay, designed for use in residential and commercial roof and wall applications.
- ✓ Reduces wind entry into wall and roof cavities, improving thermal efficiency of bulk insulation. Can be used as a vapour control layer, and improve thermal performance if installed and taped on the warm side of bulk insulation.
- ✓ High water resistance provides for temporary weather protection prior to installation of cladding, and acts as a secondary layer of water protection during its serviceable life.
- ✓ Highly water vapour permeable, allowing excess water vapour that may otherwise condense in the wall structure to escape.
- ✓ Lap line printed.



Self-Supporting



High Water Barrier



Breathable



Absorbent



ROOF



WALL

## ROOF AND WALL UNDERLAY

## TECHNICAL SPECIFICATIONS

### NZBC E2/AS1 ROOF UNDERLAY REQUIREMENTS

NZBC E2/AS1 TABLE 23 ROOF UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥ 150gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 100mm	Pass
NZS2295:2206 CLASSIFICATION		
Flammability Index		Non Fire Retardant
Wind Zone	R2	Up to Very High
NZS2295:2006	R2	Self Support

#### NOTE:

For wall cavity systems, NZBC Acceptable Solution E2/AS1 Paragraph 9.1.5.5 requires where stud spacing's are greater than 450mm centres, an intermediate means of restraining the building underlay and insulation from bulging into the drained cavity shall be installed. An acceptable means of achieving this is by fixing with Thermakraft Stud Strap horizontally at 300mm centres.

Thermakraft 215 complies with the requirements of NZBC E2/AS1 Table 23. Is suitable for use in the following:

- With absorbent wall claddings directly fixed to timber and steel framing; and,
- With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity; and,
- With masonry veneer in accordance with NZS 3604; and,
- Situated in NZS3604 Building Wind Zones up to, and including 'Very High' (wall); and,
- As a ROOF underlay Self-supporting when run horizontally at pitches 3° and greater. When run vertically at pitches >3° and <10° degrees, 215 must be supported. Support recommended at very low pitches; and,
- As a roof underlay suitable for use with all Roofing materials; and
- Is suitable as an air barrier in unlined wall spaces.

Flammability Index  
Thermakraft 215  
is not fire retardant.



**Roll Dimensions:**  
1250mm x 20m (25m<sup>2</sup>)  
1250mm x 40m (50m<sup>2</sup>)  
M2 is the roll size for actual coverage, allow for laps and joins.

## DURABILITY

For Thermakraft 215 to meet the Performance Requirements of NZBC Clause B2, Durability B2.3.1 (a) 50 years and B2.3.1 (b) 15 years, E2 External Moisture providing:

- Installed in accordance to the Application and Installation Guidelines.
- Run length no greater than 10 meters.
- Is not left exposed for more than (7 days) roof.
- Is not left exposed for more than (28 days) wall.
- When used with LOSP treated timber, inspection must be carried out to ensure that the solvent in the LOSP treated timber has sufficient time to dry out (typically 7 days after the treatment process under the suitable environment conditions).
- Installed by or under guidance of Licensed Building Practitioners.
- Installed in accordance with the Roofing Code of Practice.

For additional details and latest specifications [www.thermakraft.co.nz](http://www.thermakraft.co.nz)



Customer Service 0800 806 595

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**Fax** +64 9 273 3726 **Email** [info@thermakraft.co.nz](mailto:info@thermakraft.co.nz) **www.thermakraft.co.nz**

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# CERTIFICATE OF CONFORMITY

This product Certificate is issued under Section 269 of the Building Act 2004 for:

## VertiClad Cladding system



Page 1 of 2



### Product Description

The VertiClad Cladding System (the System) is a cavity-based external wall cladding system installed on a structural timber frame. The system comprises: vertically fixed Western Red Cedar (*Thuja Plicata*) weatherboards installed over H3.2 treated timber castellated cavity battens to form the cavity; flashings and accessories. The system offers two cavity options: nominally 20mm and 45mm. The weatherboards are profiled to JSC's specifications and to NZS 3617:1979 and BRANZ BU 411 (April 2011) and are supplied with a minimum of a single coating of primer or stain to all four sides. Once installed top coats must be applied according to the coating manufacturers specifications.

### Product purpose and use

The scope of certification covers the use of the system as an external cladding within the following scope:

#### 1. Location

- In wind zones up to and including extra high, as defined in NZS3604:2011 or situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa, where the building has been specifically engineered
- In all corrosion zones, subject to use of fixing material as prescribed in NZS3604:2011

#### 2. Building

- Has the scope limitations of NZBC Acceptable System E2/AS1, Third Edition including amendment 7 (01/01/2017), Paragraph 1.1; and,
- New timber framed buildings with building wrap or rigid air barrier that comply with the NZ Building Code
- Existing timber framed buildings where the designer and installer have satisfied themselves that the existing building is suitable for the intended building work
- With a risk score of 0-20 when calculated in accordance with NZBC Acceptable Solution E2/AS1, Third Edition including amendment 7 (01/01/2017), Table 2
- The System must only be installed vertically on vertical, flat, surfaces
- The System is certified for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills
- Located more than 1m from the relevant boundaries.

### Certificate holder

JSC Timber Ltd, 22 Sawmill Rd, Riverhead, Auckland 0892, Tel: +64 9 412 2800, <http://www.jsctimber.co.nz>

CodeMark Certification Body		26/10/2017	17/12/2018	26/10/2020	GM-CM30084-RevC
Global-Mark Pty Ltd, Suite 4.07, 32 Delhi Road, North Ryde NSW 2113, Australia Tel: +61 (0)2 9886 0222 <a href="http://www.Global-Mark.com.au">www.Global-Mark.com.au</a>	Herve Michoux Managing Director	Date of issue	Last update	Date of next re-certification	Certificate Number

The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports.

This certificate is issued by Global-Mark Pty Limited, an independent certification body accredited by the product certification accreditation body (JAS-ANZ) appointed by the Chief Executive of the Ministry of Business Innovation and Employment under the Building Act 2004. The Ministry of Business Innovation and Employment does not in any way warrant, guarantee, or represent that the building method or product the subject of this certificate conforms with the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product. The Ministry of Business Innovation and Employment disclaims, to the extent permitted by law, all liability (including negligence) for claims of losses, expenses, damages, and costs arising as a result of the use of the building method(s) or product(s) referred to in this certificate. This Certificate may only be reproduced in its entirety.

It is advised to check that this Certificate of Conformity is currently valid and not withdrawn, suspended or superseded by a later issue by referring to the Ministry of Business Innovation and Employment website, <http://www.mbie.govt.nz/>

New Zealand Building Code (NZBC) references the Building Code in force at the time of issuing the product certificate.

Certificate holder will notify Global-Mark Pty Ltd in accordance with Regulation 15 of the Building (Product Certification) Regulations 2008

SDC - Approved Building Consent Document - BC192333 - Pg 150 of 378 - 26/01/2020 - dalles

# CERTIFICATE OF CONFORMITY

This product Certificate is issued under Section 269 of the Building Act 2004 for:

## VertiClad Cladding system



Page 2 of 2

JAS-ANZ



global-mark

[www.jas-anz.org/register](http://www.jas-anz.org/register)

### Compliance with the New Zealand Building Code (NZBC):

The System if designed, used, installed and maintained in accordance with this Certificate, the system will meet the following provisions of the NZBC:

**Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2, B1.3.4 (b), (c), (d) and (e) for the relevant physical conditions of B1.3.3 (a), (e), (f), (h), (j) and (q).

**Clause B2 DURABILITY:** Performance B2.3.1(b) and B2.3.2(b).

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.2, E2.3.5, E2.3.7(b) and (c).

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1.

### Subject to the following conditions and limitations:

1. Specification, installation, inspection and maintenance in accordance with the following sets of documents collectively referenced as the Applicable Technical Specification:
  - JSC VertiClad Specification and installation Guide v2 Sept17
  - JSC VertiClad Weatherboard System 20mm Cavity dated 1 October 2017,
  - JSC VertiClad Weatherboard System 45mm Cavity dated 1 October 2017
  - JSC VertiClad Installation Checklist Jul.18, V4.0
2. Design and installation of the System shall be carried out or supervised by a Licensed Building Practitioner with the appropriate license class and access to Applicable Technical Specification and supporting standards, and be able to meet all other regulatory obligations, where applicable
3. Where this Certificate is to form part of a building consent application, the designer in condition #2 above must submit a signed declaration that the building work falls within the scope of this certificate and that all conditions of the certificate have been met.
4. The system can only be used with the ancillary components and board profiles as described in the Applicable Technical Specification. Where these components are substituted with alternative products, these applications fall outside the scope of this certification. In particular, the System relies on the joinery meeting the requirements of NZS 4211:2008 including Amendment 1 for the relevant Wind Zone or wind pressure.)
5. In existing buildings, the designer signing the declaration referred in condition #3 must be satisfied that the existing building is adequate for the intended building work. This assessment is outside the scope of this certificate

End of the record

# **JSC VertiClad**

## **Vertical Shiplap Weatherboard System**

### **20mm Cavity**

- rigid air barrier
- flexible building wrap

## INDEX - JSC VERTICLAD ON FLEXIBLE CAVITY

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JV-PRF2-16	VertiClad Profiles 2	8/12/16
JV-FLSH-16	Flashings	8/12/16
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JV-FC-33	Meterbox Sill Detail	8/12/16

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Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland

Note: Details may be subject to change without notification



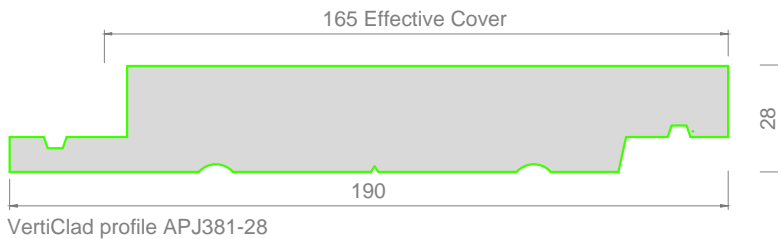
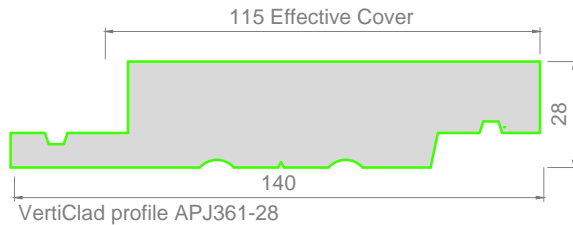
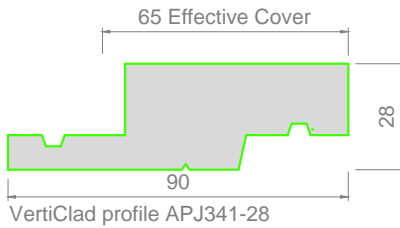
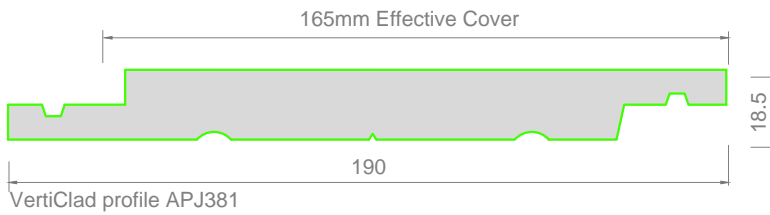
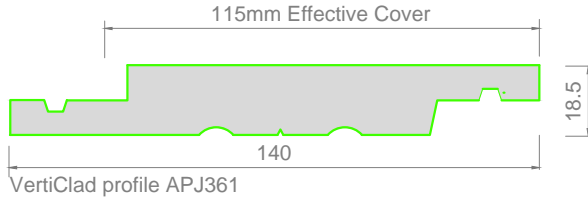
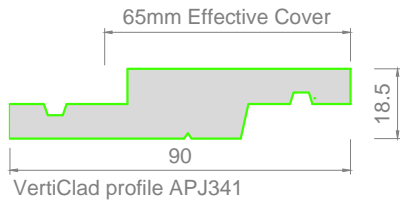
T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

**JR-INDEX**



**Note:** 28mm cover profiles for use with Random Width & Depth

## VertiClad Profiles (1)

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details maybe subject to change without notification

## JSC Timber

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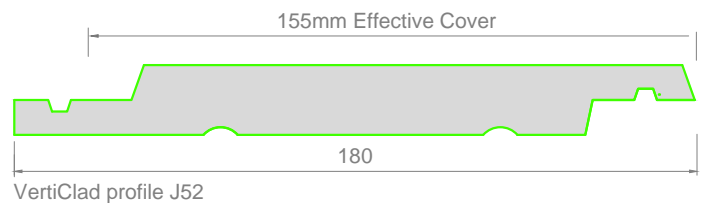
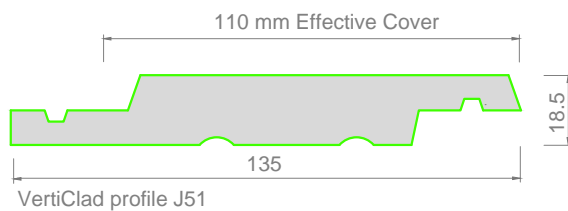
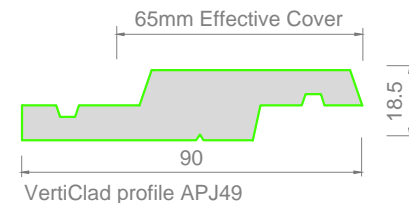
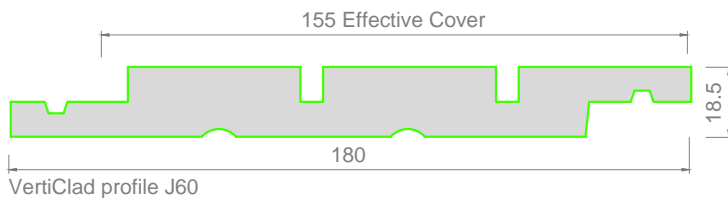
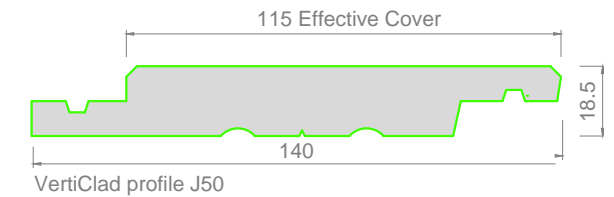
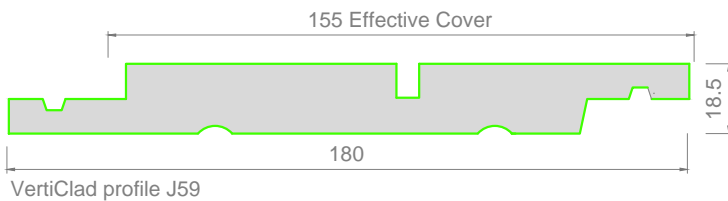
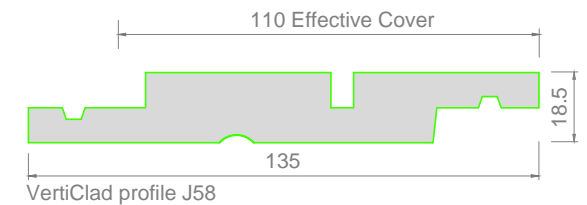
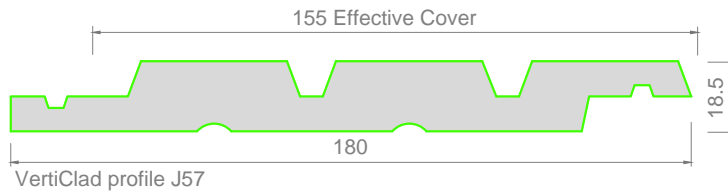
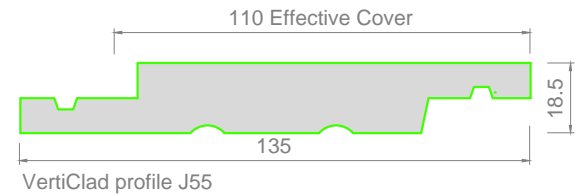
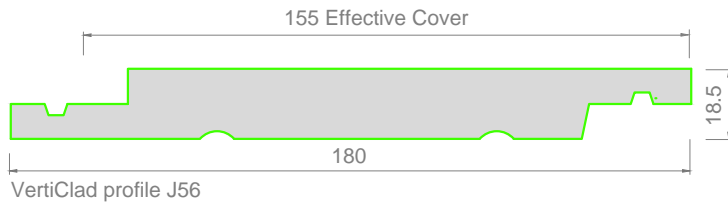
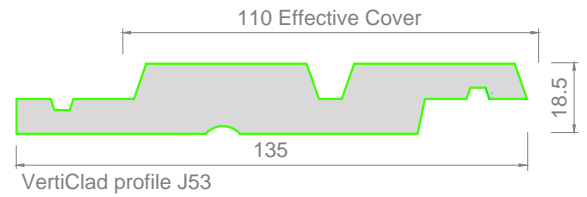
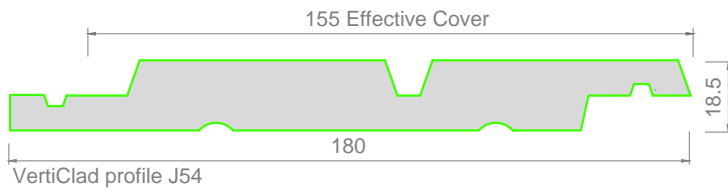
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JV-PRF1-16

## JSC Standard Vertical Shiplap Weatherboard Profiles - 6mm Channel Width



**Note:** JSC Custom Profiles available on application

## VertiClad Profiles (2)

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details maybe subject to change without notification

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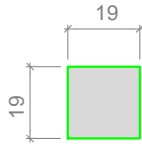
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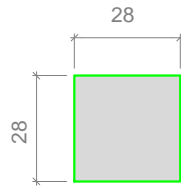
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## Internal Corner Moulds

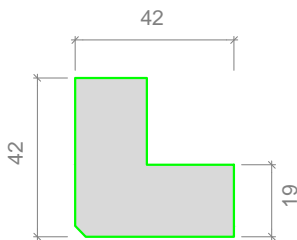


J41 Internal Corner Mould (or scribe)

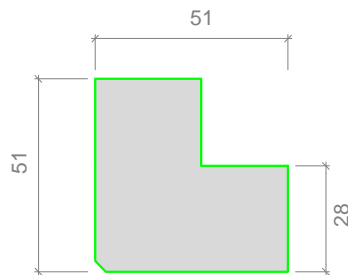


J44 Internal Corner Mould

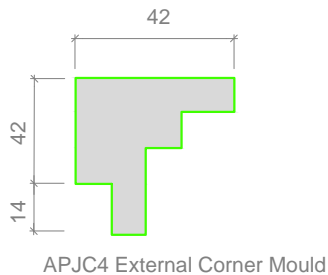
## External Corner Moulds



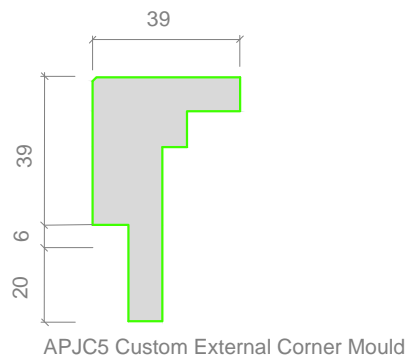
J42 External Corner Mould



J45 External Corner Mould

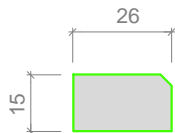


APJC4 External Corner Mould

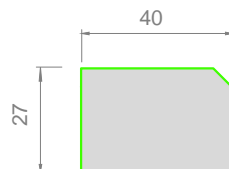


APJC5 Custom External Corner Mould

## Eaves Moulds



J33 Eaves Mould



J32 Eaves Mould

## Internal & External Mouldings

**JSC Timber**

22 Sawmill Road, Riverhead, Auckland  
Note: Details maybe subject to change without notification

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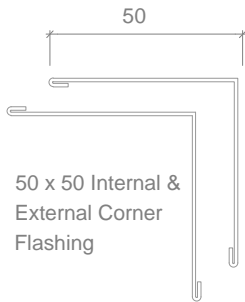
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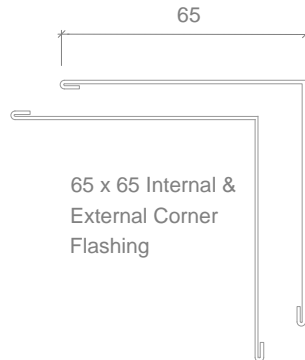
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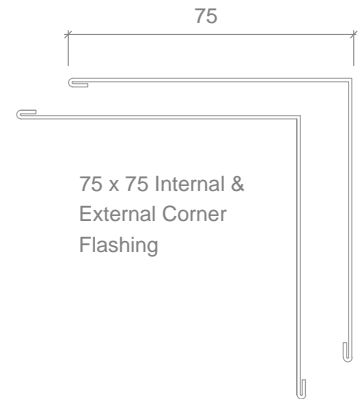




50 x 50 Internal & External Corner Flashing

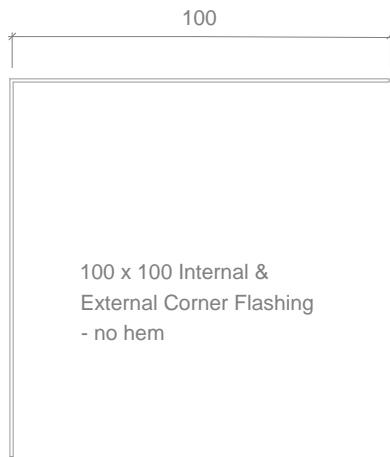


65 x 65 Internal & External Corner Flashing

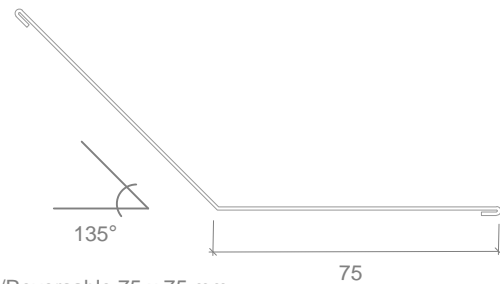


75 x 75 Internal & External Corner Flashing

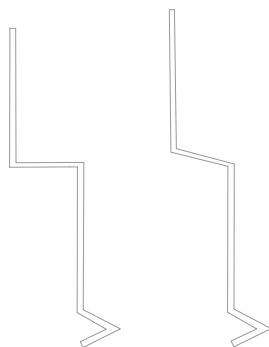
Selected corner flashing hem edge folds compatibility to comply with NZBC E2/AS1



100 x 100 Internal & External Corner Flashing - no hem



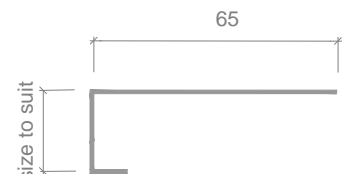
Flexible/Reversible 75 x 75 mm selected corner flashing hem edge folds compatibility to comply with NZBC E2/AS1



Z Flashings



Cavity Closure



J mould

PVC, Aluminum, Stainless Steel or other compatible material to comply with NZBC E2/AS1

## Flashing Profiles

# JSC Timber

22 Sawmill Road, Riverhead, Auckland

Note: Details to be read in conjunction with annotation list JV-C-A and may be subject to change without notification

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F.09 412-7723

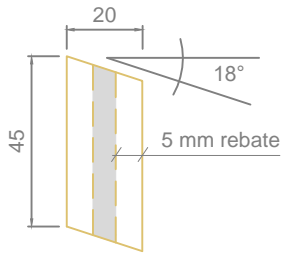
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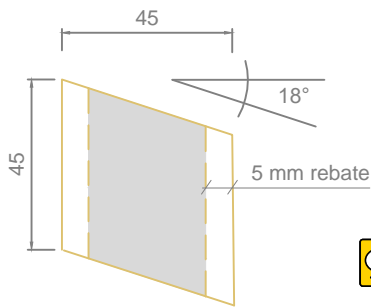
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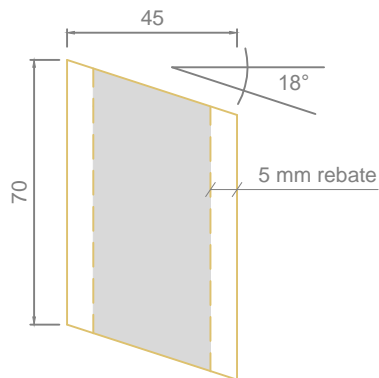
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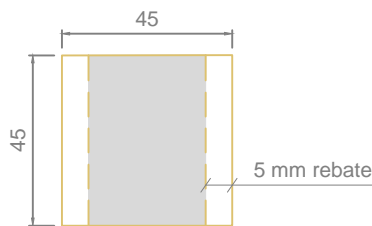
JSC-U-20x45



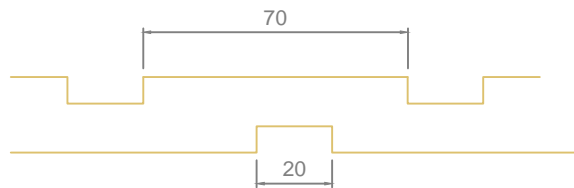
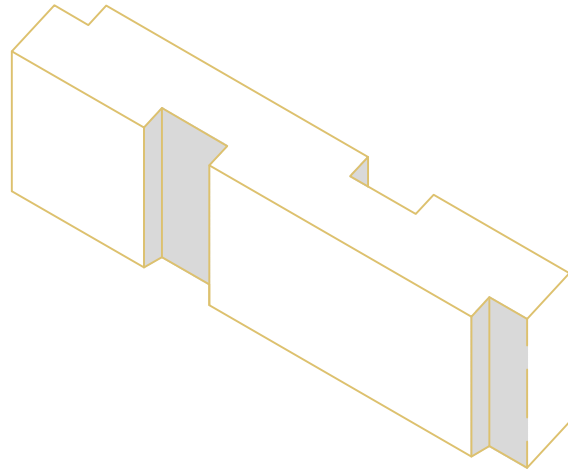
JSC-H-45x45



JSC-H-45x70



JSC-V-45x45



## 3.2 Treated Timber Castellated Batten

### Cavity Battens

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland

Note: Details to be read in conjunction with JSC installation details and may be subject to change without notification

## JSC Timber

T.09 412-7722

F.09 412-7723

[www.jsctimber.co.nz](http://www.jsctimber.co.nz)

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-CB-1-16

## NAIL FIXINGS FOR STANDARD TIMBER WEATHERBOARDS

Fixing selection for wall cladding

Suitability and Compatibility as per E2/AS1 tables 20, 21 and 24

Silicone bronze or 316 stainless steel annular grooved nails

### STAINED/OILED OR BARE FINISH

#### ON CAVITY



75mm annular grooved rose head

#### ON RIGID AIR BARRIER



75mm annular grooved rose head

### PAINT FINISH

#### Countersunk head nail



75mm counter sunk head nail



85mm counter sunk head nail

#### Jolt head nail



75mm jolt head nail



90mm jolt head nail

EXTRA 10mm length required for 28mm boards

## Nails

# JSC Timber

22 Sawmill Road, Riverhead, Auckland  
Note: Details maybe subject to change without notification

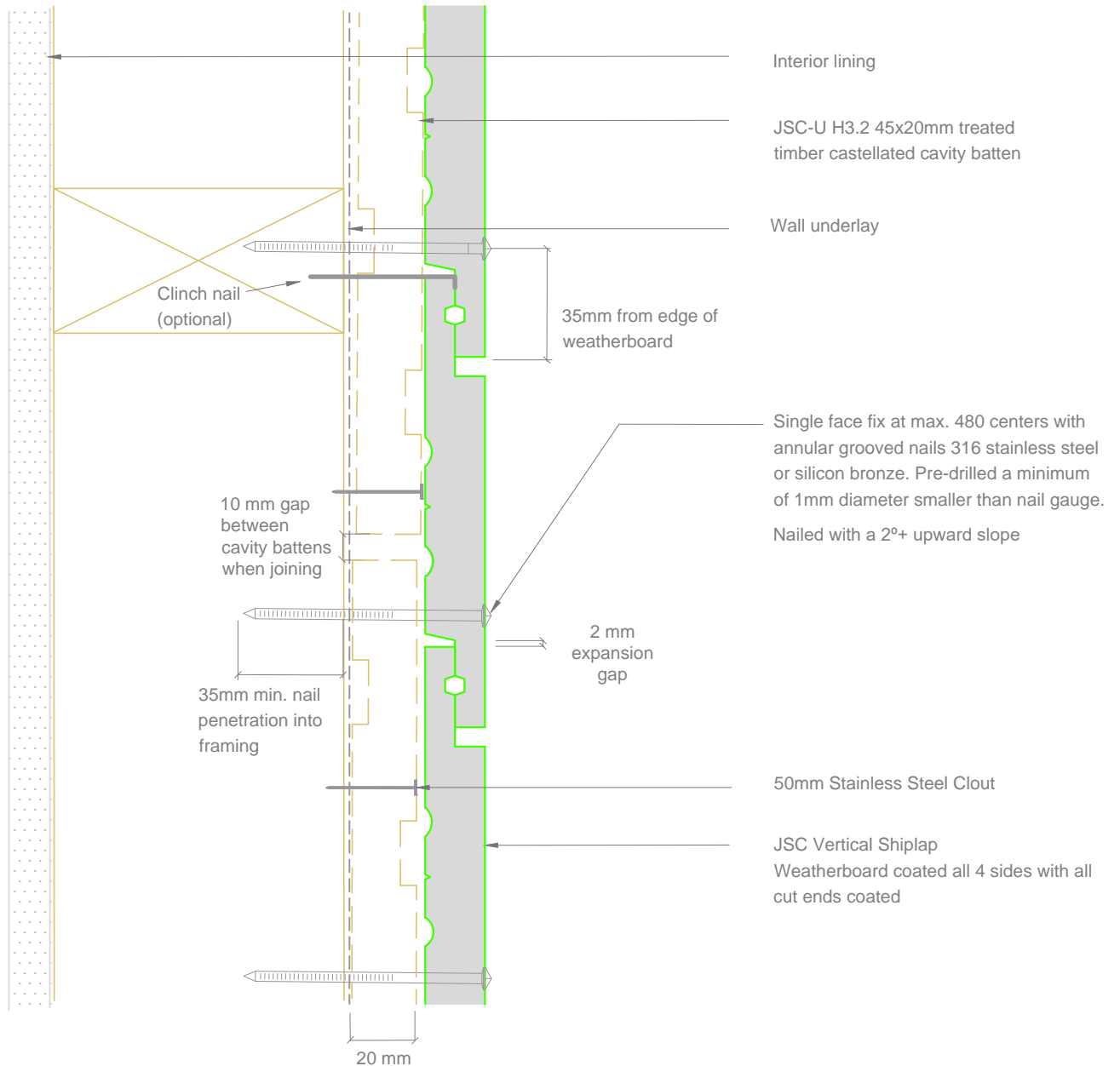
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tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-NAIL-16



To be read in conjunction with JSC Fixing installation notes

## VertiClad Sectional detail

Plan View

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

## JSC Timber

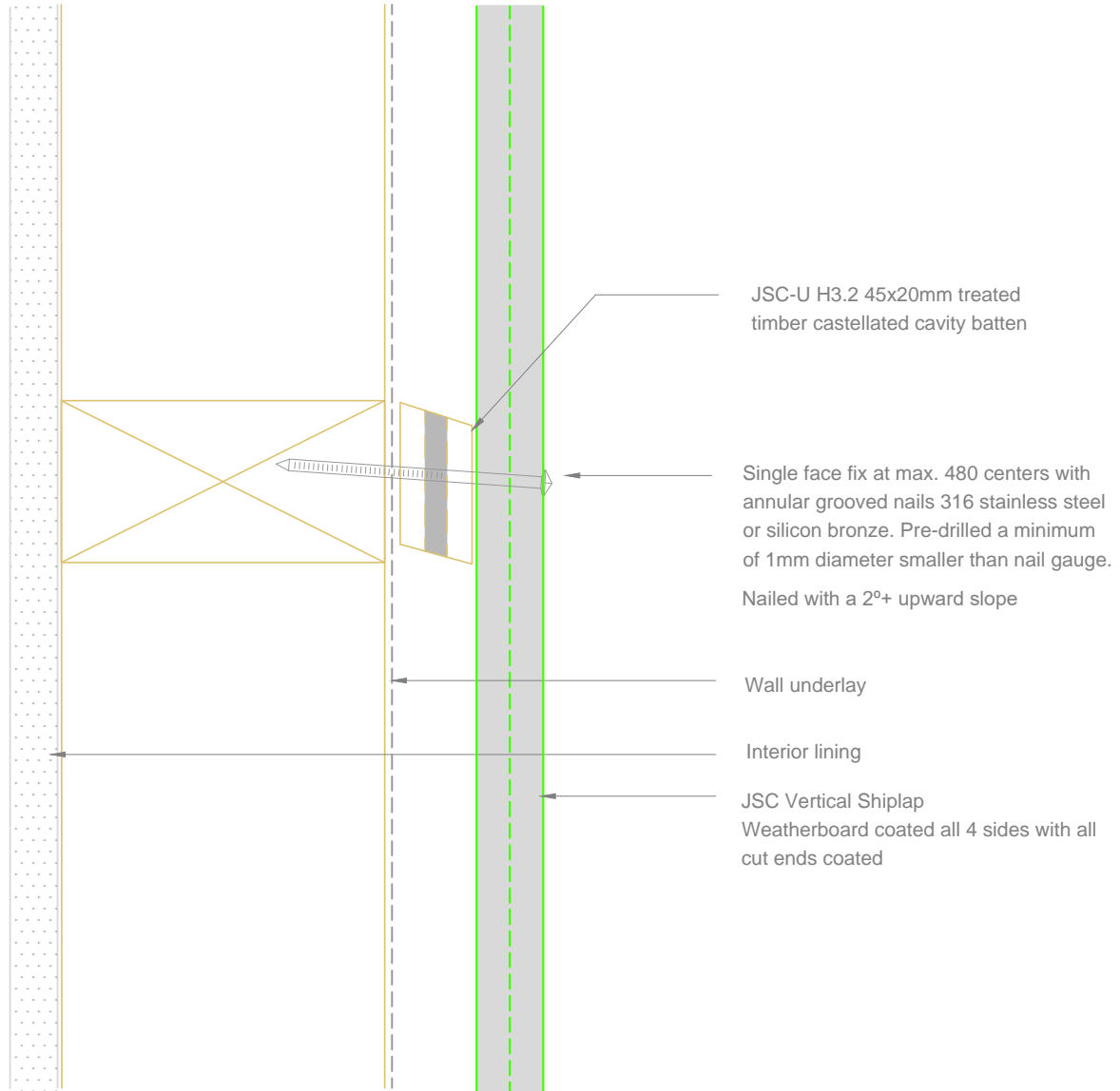
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tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-FC-SEC1



To be read in conjunction with JSC Fixing installation notes

## Sectional Detail 2

### Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details maybe subject to change without notification

## JSC Timber

T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:  
**JV-FC-SEC2**

Timber Framing

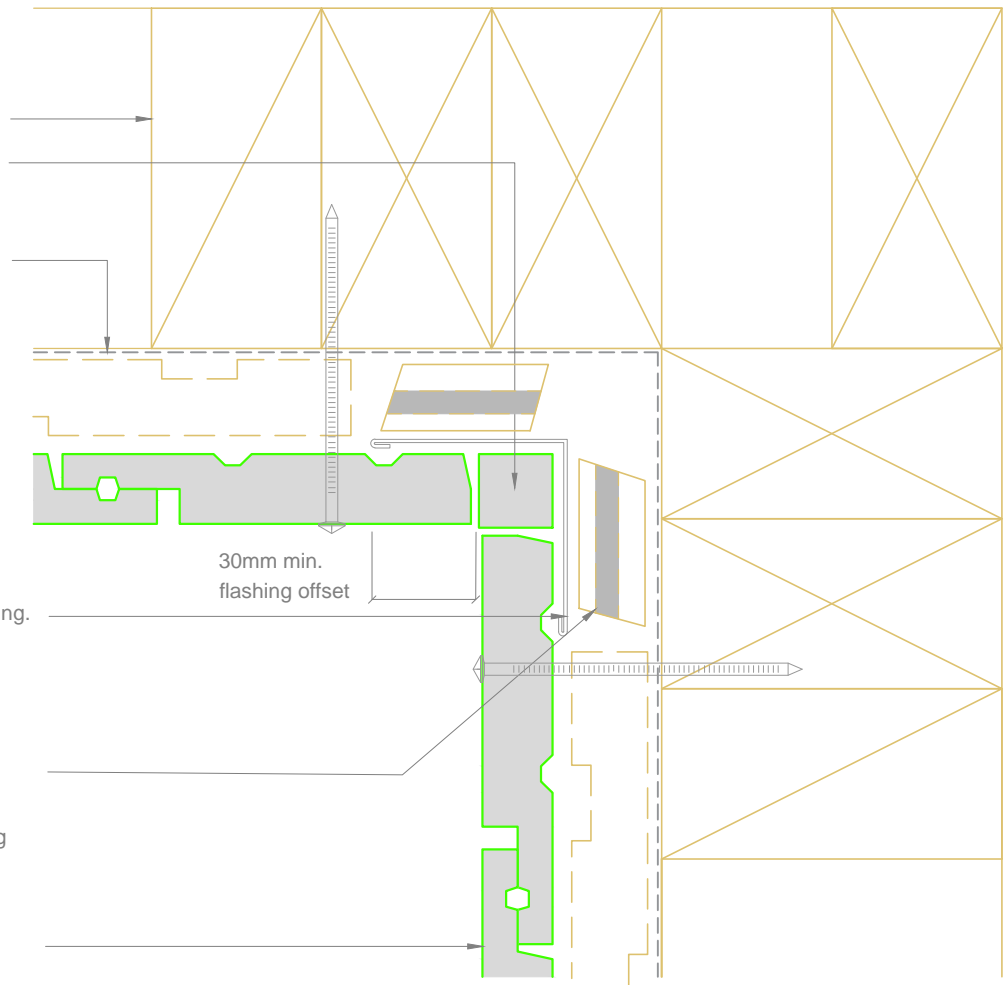
JSC 19 x 19mm J41 internal  
timber corner moulding

Wall underlay

Minimum 50x50mm Internal flashing.  
See notes on flashings

JSC-U H3.2 45x20mm treated  
timber castellated cavity batten  
Site machined to allow for flashing

JSC Vertical Shiplap  
Weatherboard



To be read in conjunction with JSC Fixing installation notes

## Internal Corner detail

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland

Note: Details maybe subject to change without notification

## JSC Timber

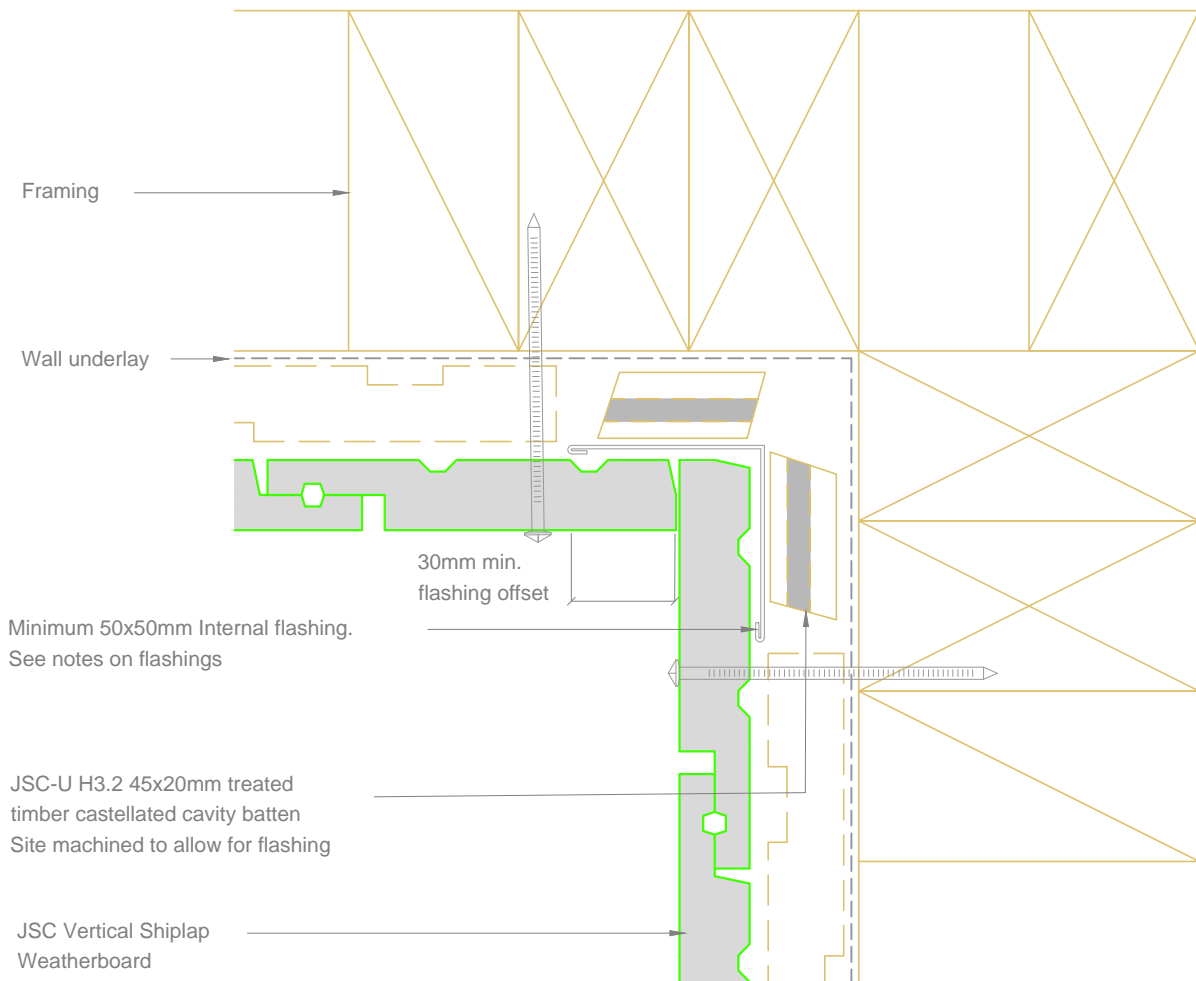
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tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-FC-10



To be read in conjunction with JSC Fixing installation notes

## Internal Corner detail

### Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

## JSC Timber

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tech@jsctimber.co.nz  
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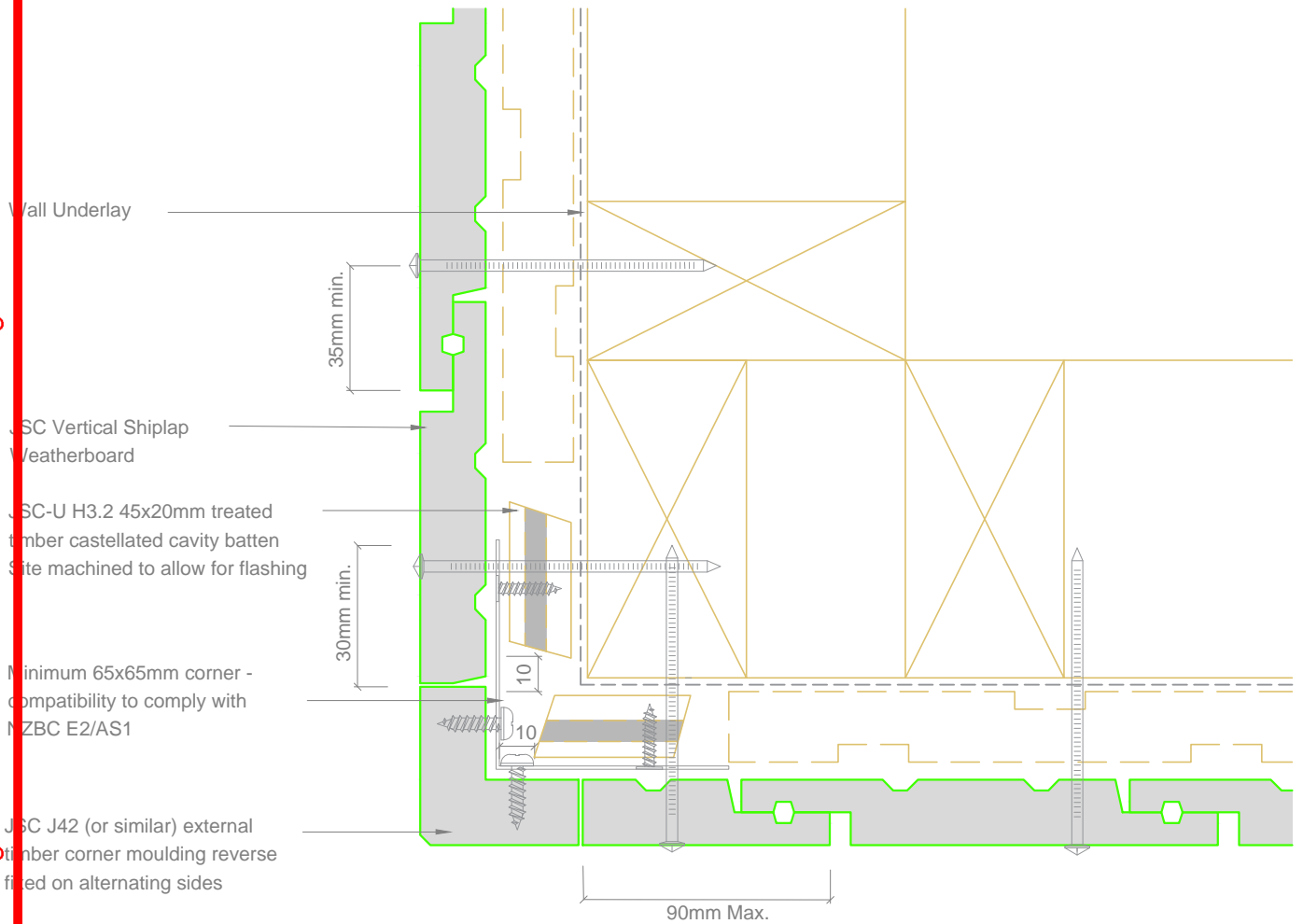
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Date: 8/12/2016

Dwg:

JV-FC-11





to be read in conjunction with JSC Fixing installation notes

## External Corner detail 1

### Vertical Shiplap Architectural Profile

(Reverse Fixed Version)

22 Sawmill Road, Riverhead, Auckland  
Note: Details maybe subject to change without notification

## JSC Timber

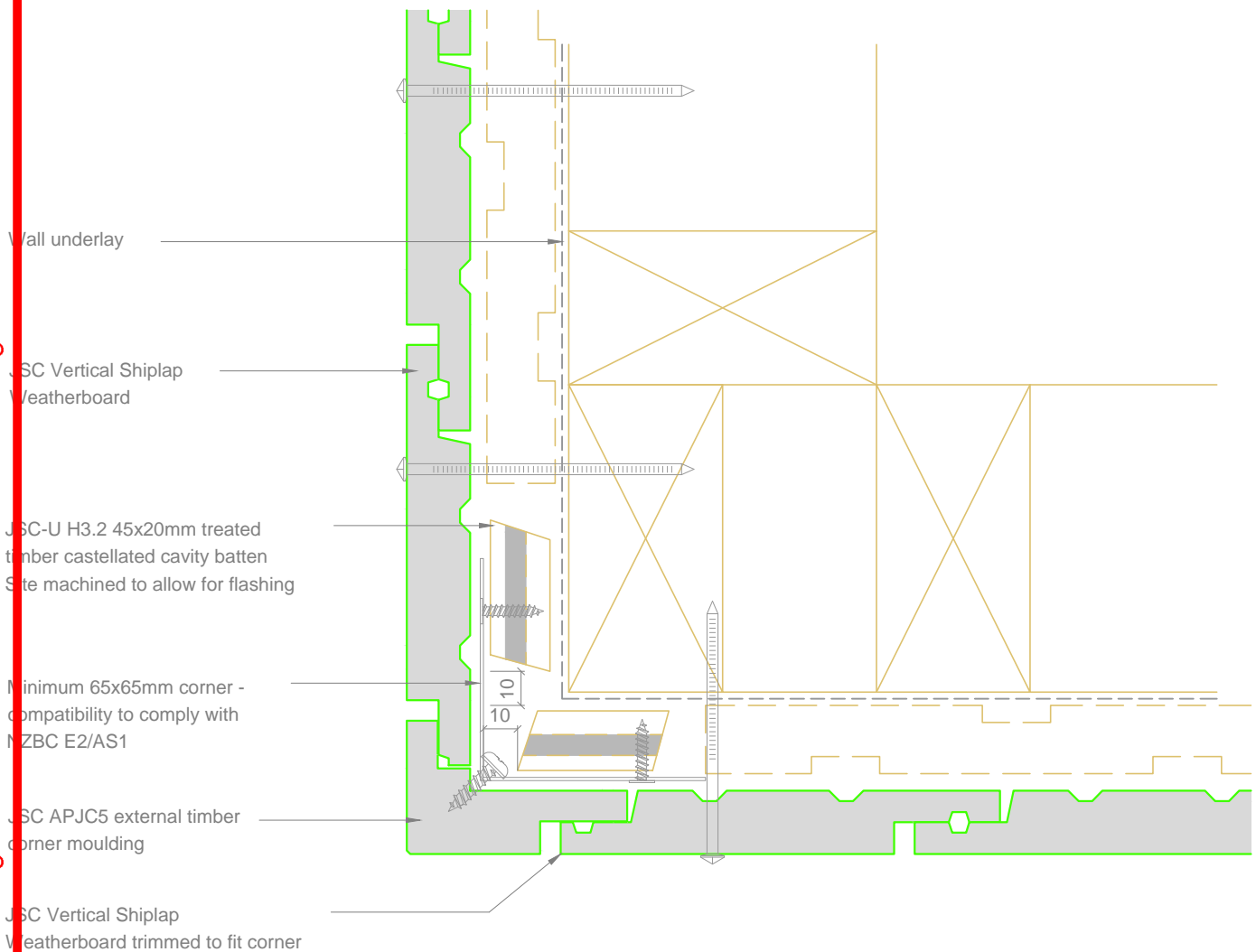
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www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-FC-12



To be read in conjunction with JSC Fixing installation notes

## External Corner detail Vertical Shiplap Architectural Profile

(Reverse Fixed Version)

22 Sawmill Road, Riverhead, Auckland

Note: Details maybe subject to change without notification

## JSC Timber

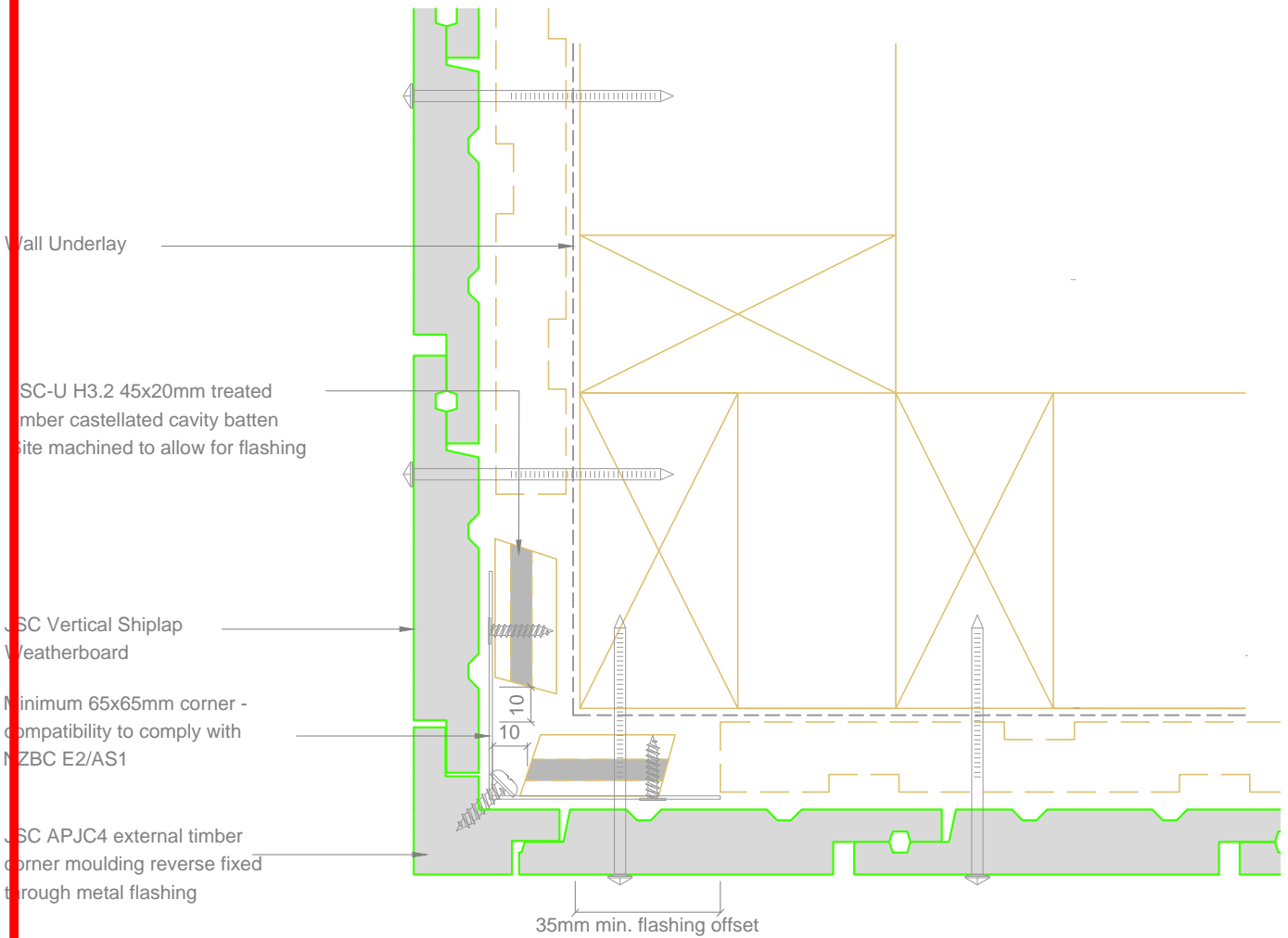
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tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-FC-13



To be read in conjunction with JSC Fixing installation notes

## External Corner detail 2

Vertical Shiplap Architectural Profile

(Reverse Fixed Version)

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

## JSC Timber

T.09 412-7722  
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www.jsctimber.co.nz

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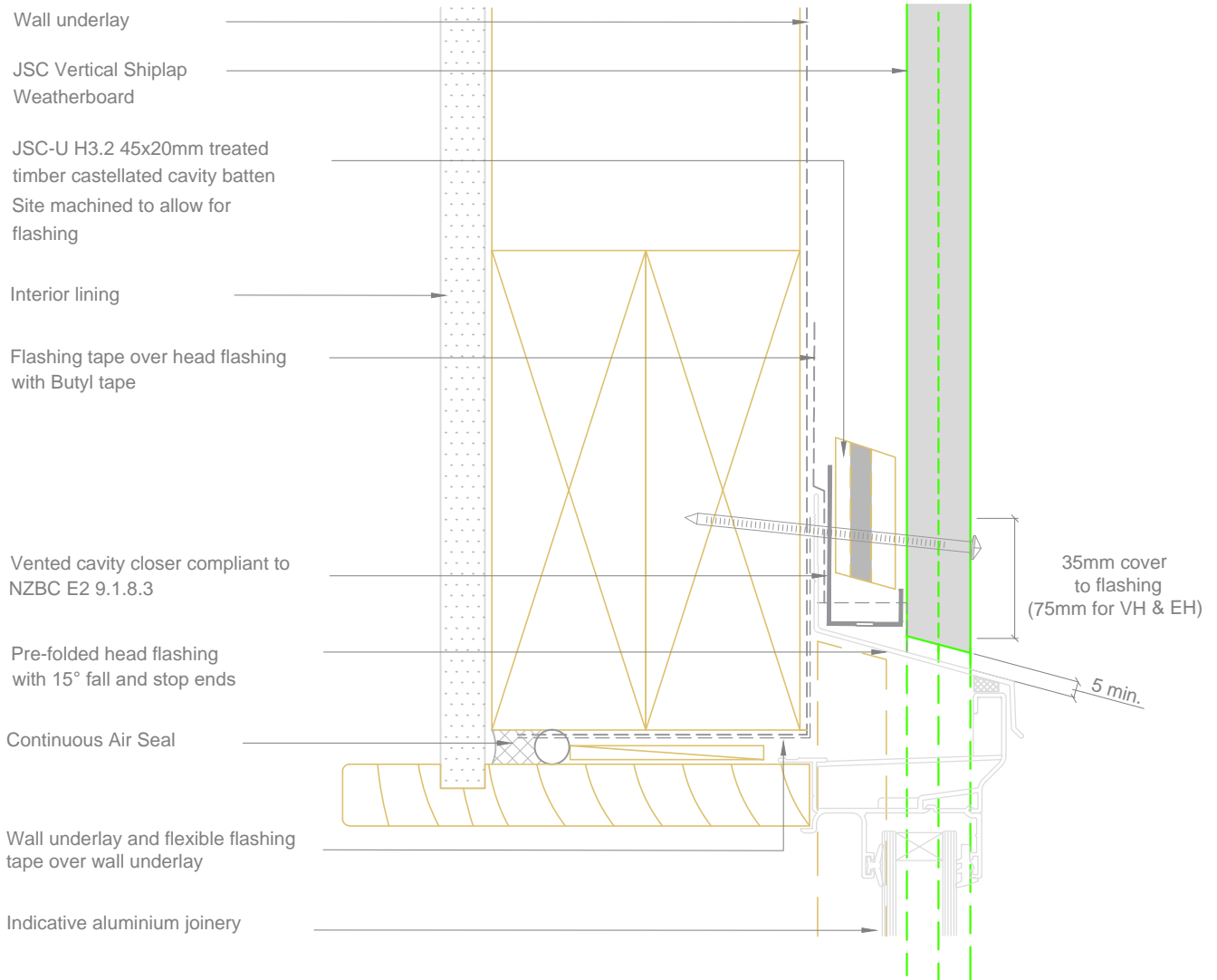
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Dwg:

JV-FC-13



T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz



To be read in conjunction with JSC Fixing installation notes  
VH: See VHWZ notes EH: See EHWZ notes

## Aluminium Window Head detail

### Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland

Note: Details may be subject to change without notification

## JSC Timber

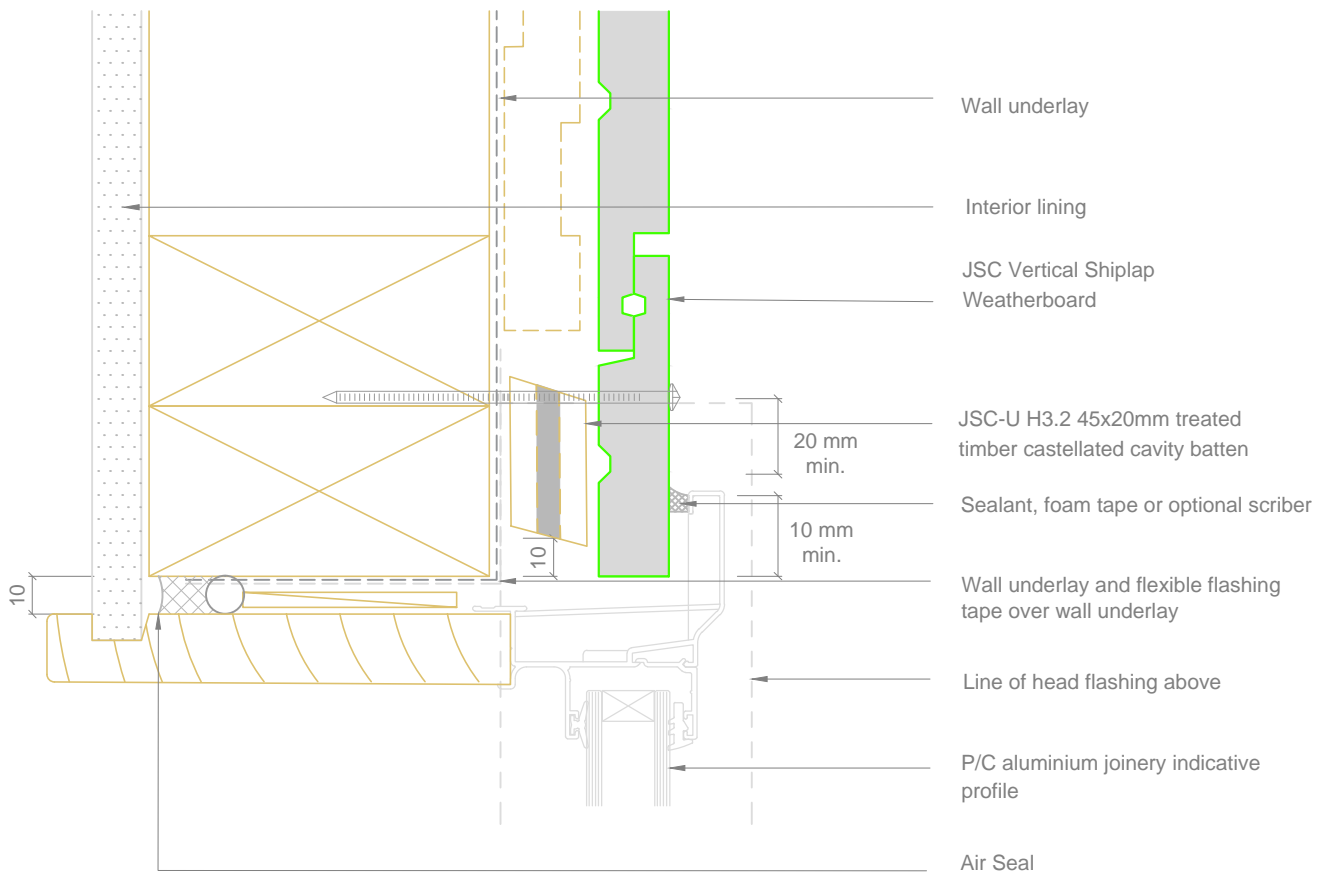
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www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-FC-20



to be read in conjunction with JSC Fixing installation notes

## Aluminium Window Jamb detail

### Vertical Shiplap Architectural Profile

# JSC Timber

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

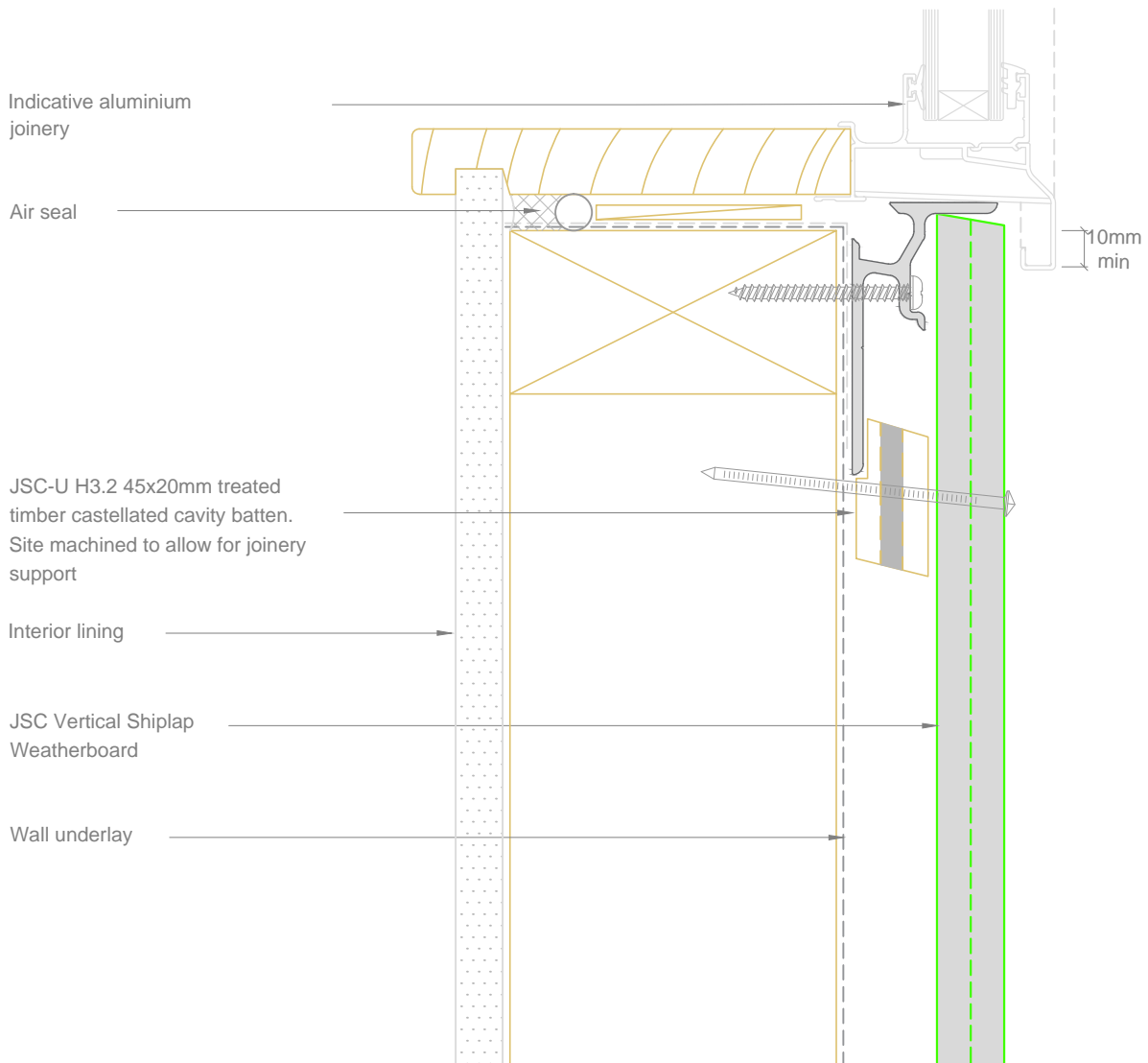
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tech@jsctimber.co.nz  
www.jsctimber.co.nz

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Date: 8/12/2016

Dwg:

JV-FC-21



Provide joinery support when appropriate, ensure cavity construction is not compromised

To be read in conjunction with JSC Fixing installation notes

## Aluminium Window Sill detail

### Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland

Note: Details maybe subject to change without notification

## JSC Timber

T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

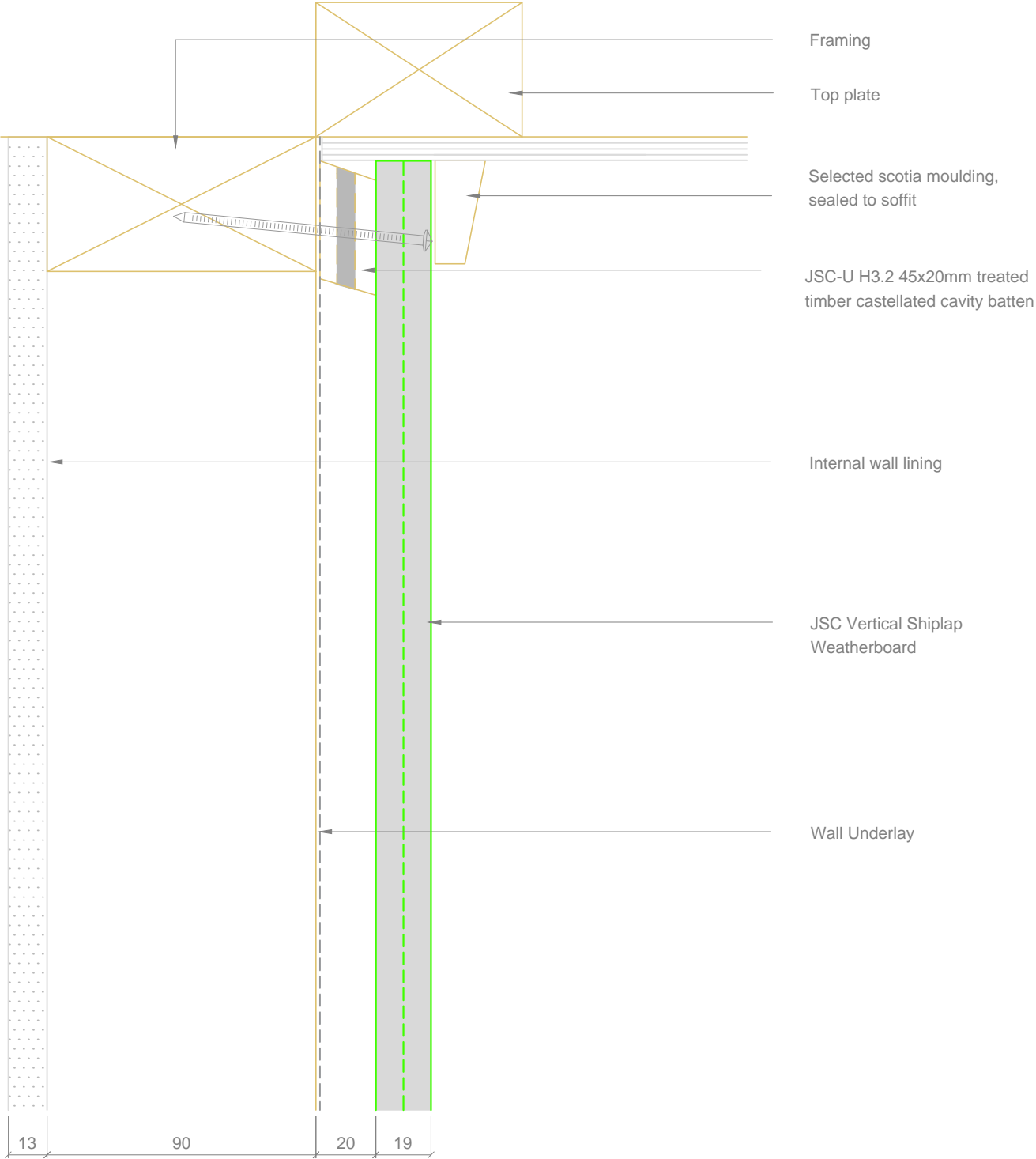
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Date: 8/12/2016

Dwg:  
**JV-FC-23**



SDC - Approved Building Consent Document - BC192333 - Pg 171 of 378 - 26/01/2020 - dalles



To be read in conjunction with JSC Fixing installation notes

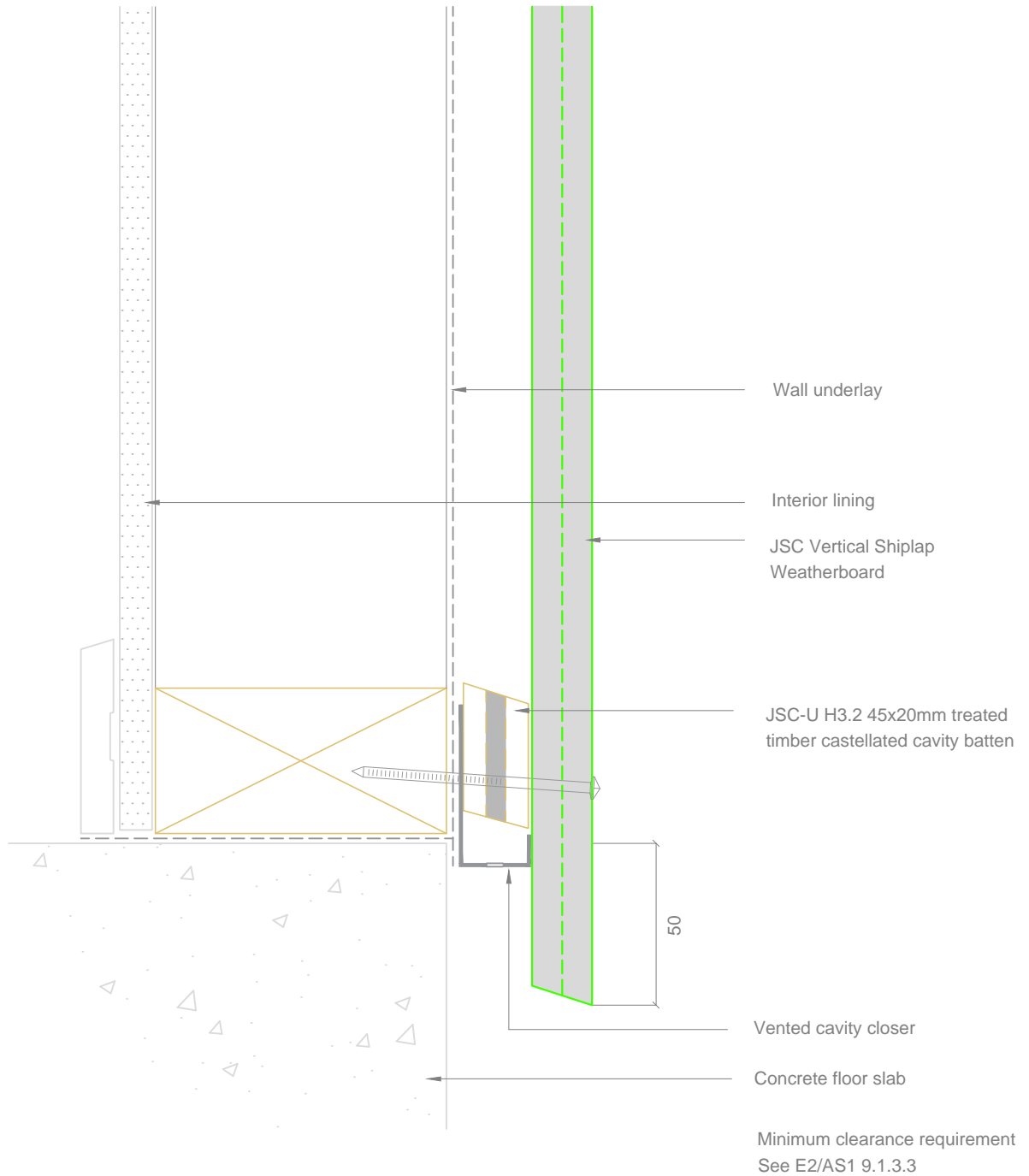
Top Plate to Soffit detail  
Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

**JSC Timber**

T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2  
Date: 8/12/2016  
Dwg:  
**JV-FC-02**



To be read in conjunction with JSC Fixing installation notes

## Bottom Plate detail

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details maybe subject to change without notification

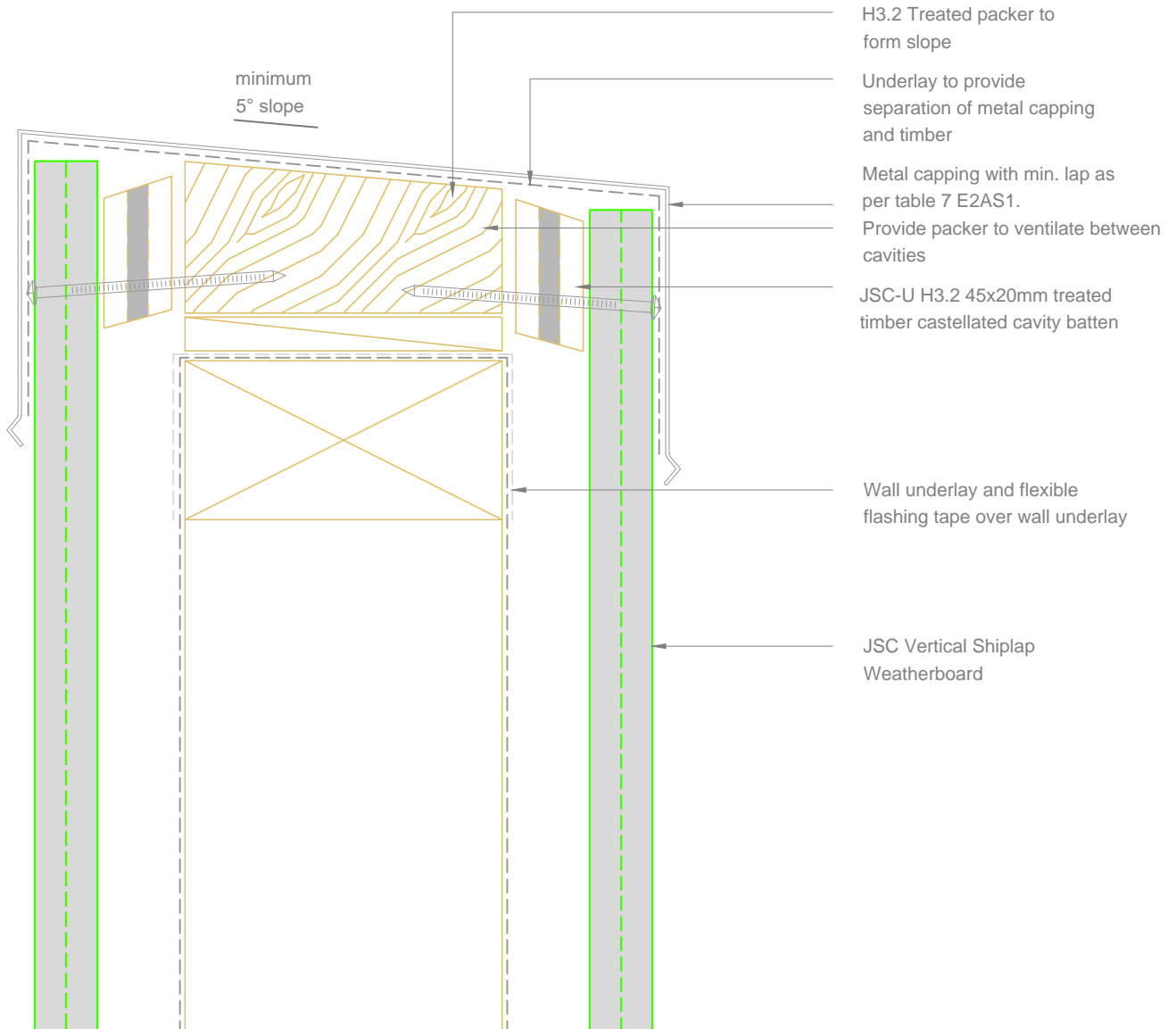
## JSC Timber

T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:  
**JV-FC-01**



To be read in conjunction with JSC Fixing installation notes

## Parapet detail

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

## JSC Timber

T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

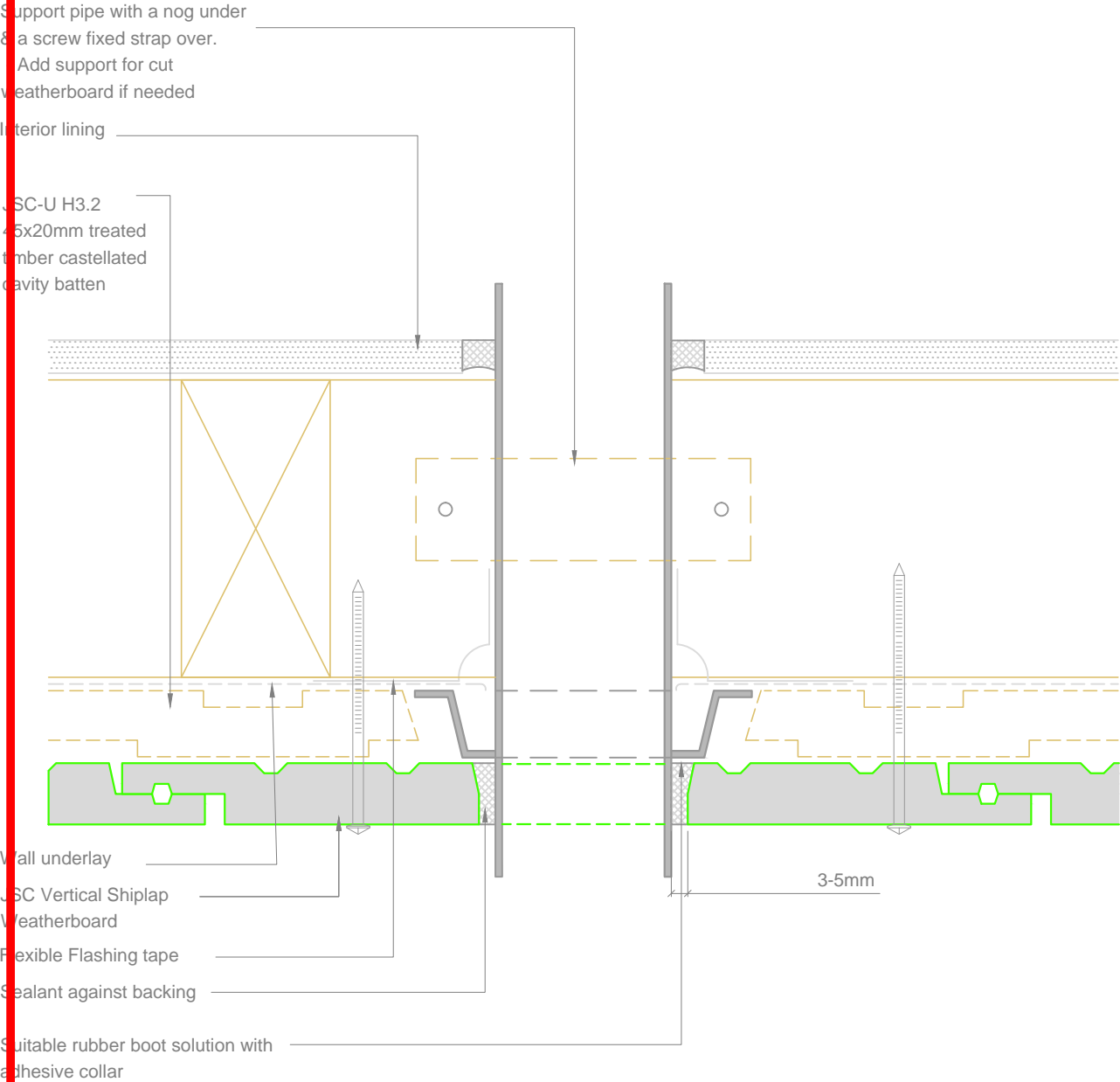
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Dwg:

JV-FC-05

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to be read in conjunction with JSC Fixing installation notes

Pipe Penetration detail  
Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland

Note: Details to be read in conjunction with JSC installation details and may be subject to change without notification

JSC Timber

T.09 412-7722

F.09 412-7723

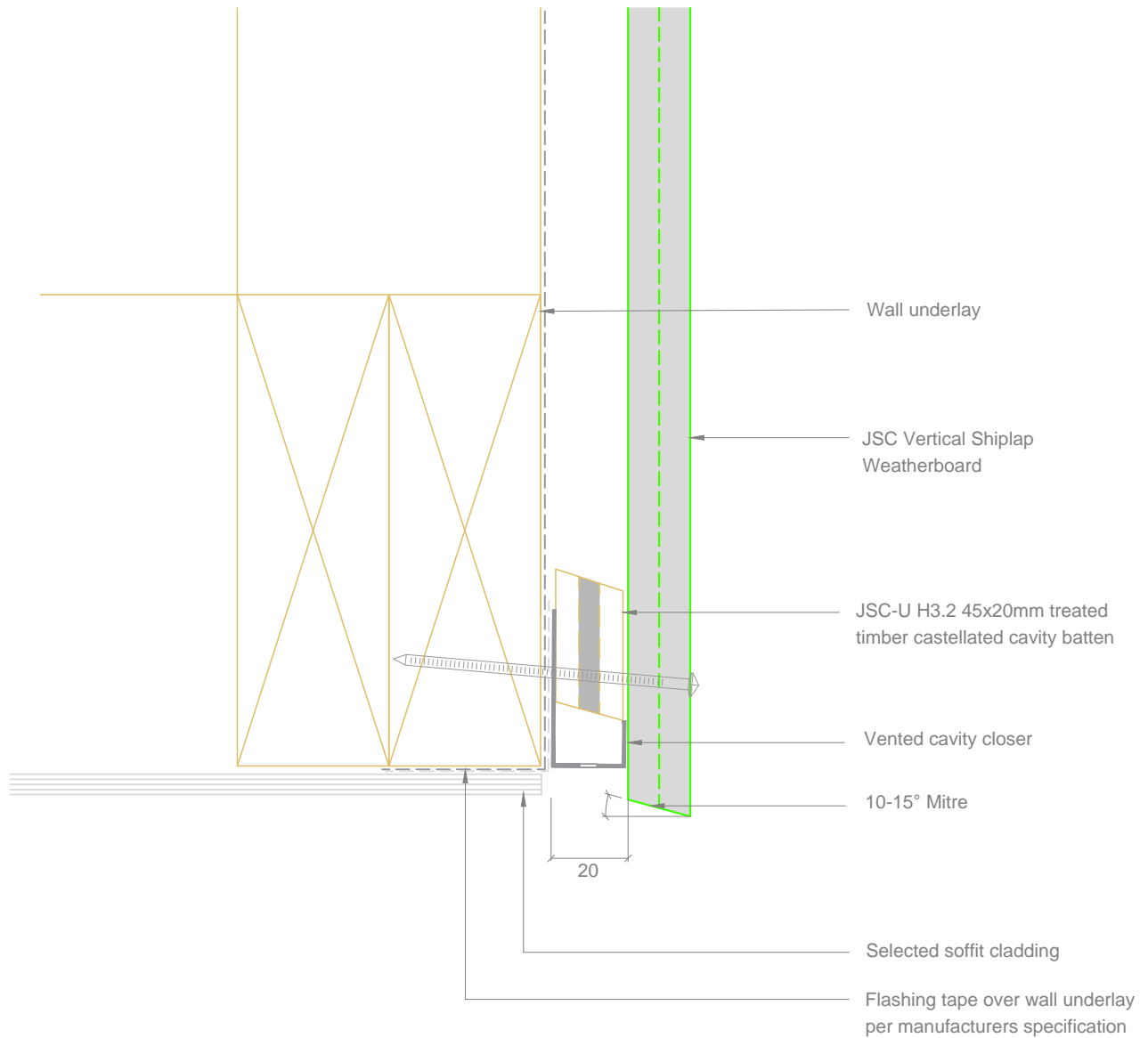
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-FC-30



To be read in conjunction with JSC Fixing installation notes

## Soffit detail

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

## JSC Timber

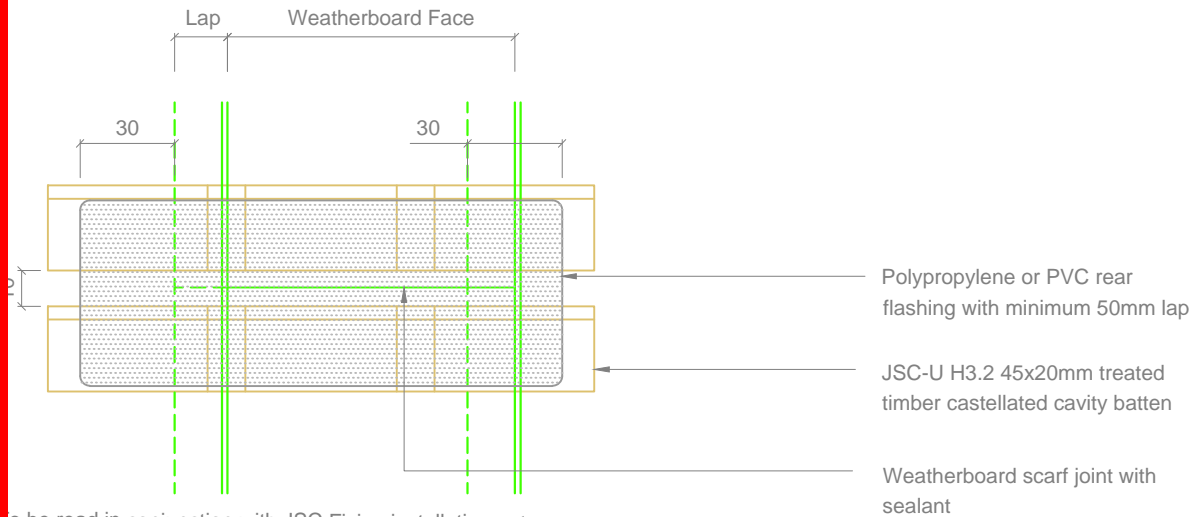
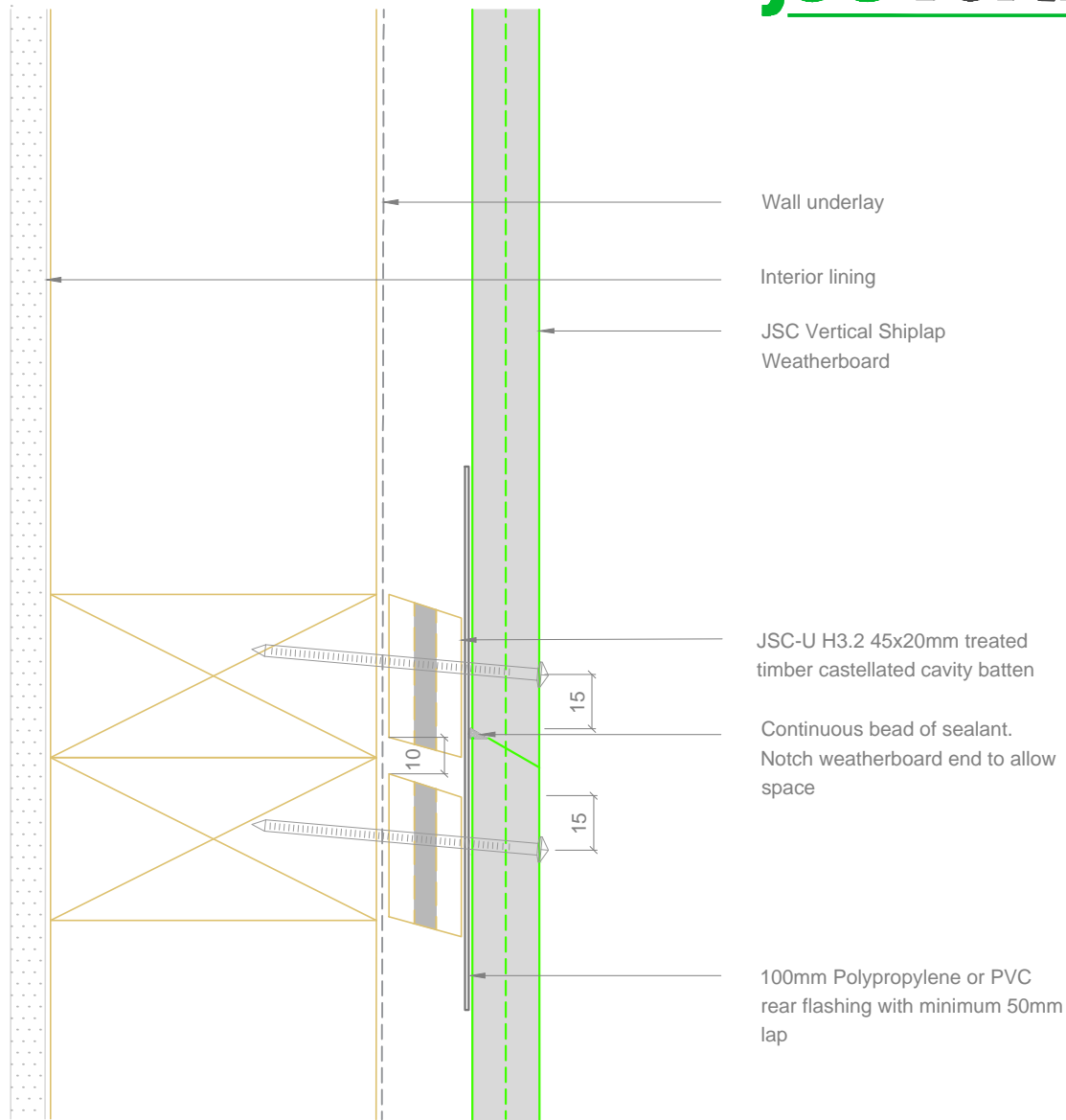
T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

JV-FC-04



to be read in conjunction with JSC Fixing installation notes

## Scarf Jointing detail

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland

Note: Details may be subject to change without notification

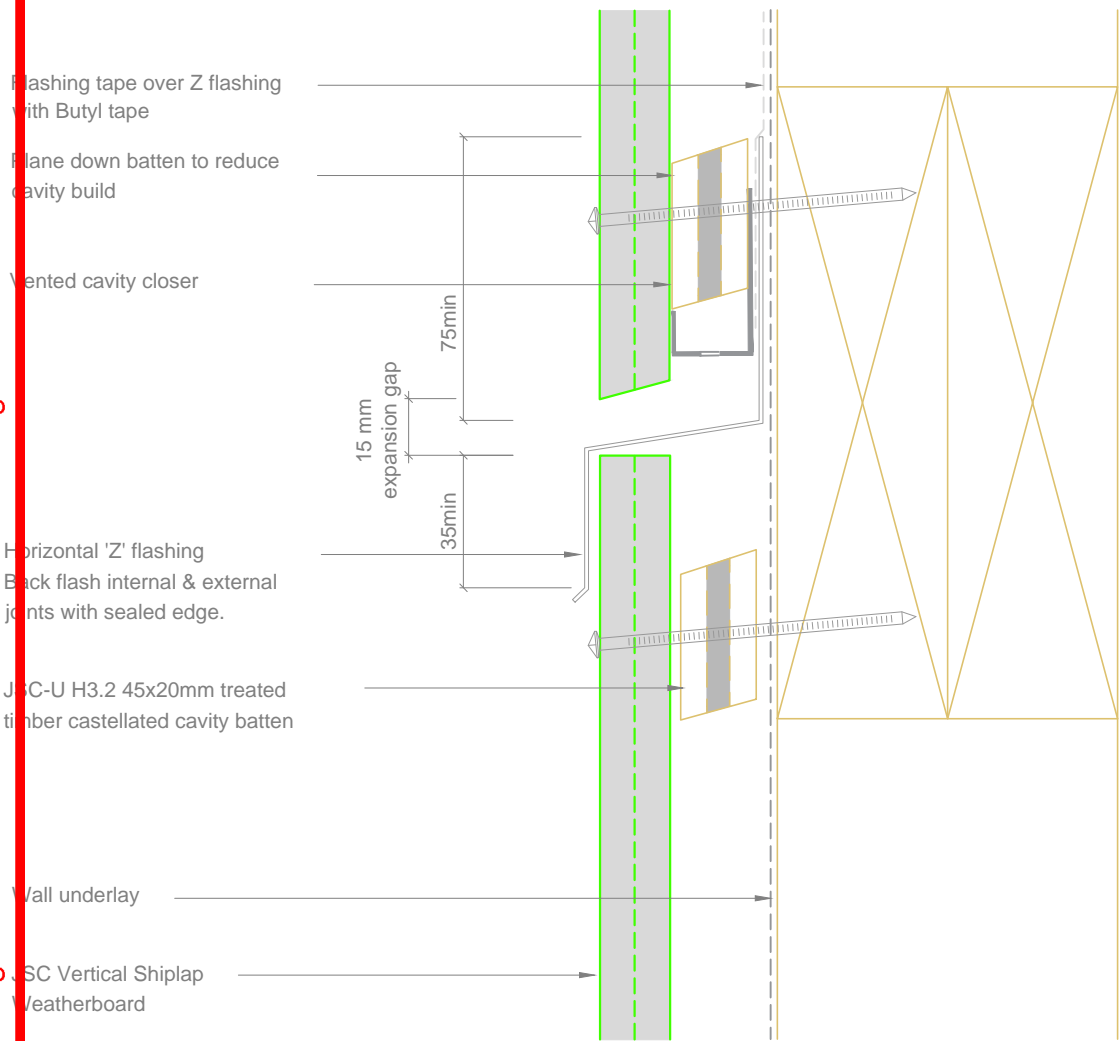
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T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:  
**JV-FC-09**



To be read in conjunction with JSC Fixing installation notes

## Horizontal Joint detail

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Notes: Details may be subject to change without notification

**JSC Timber**

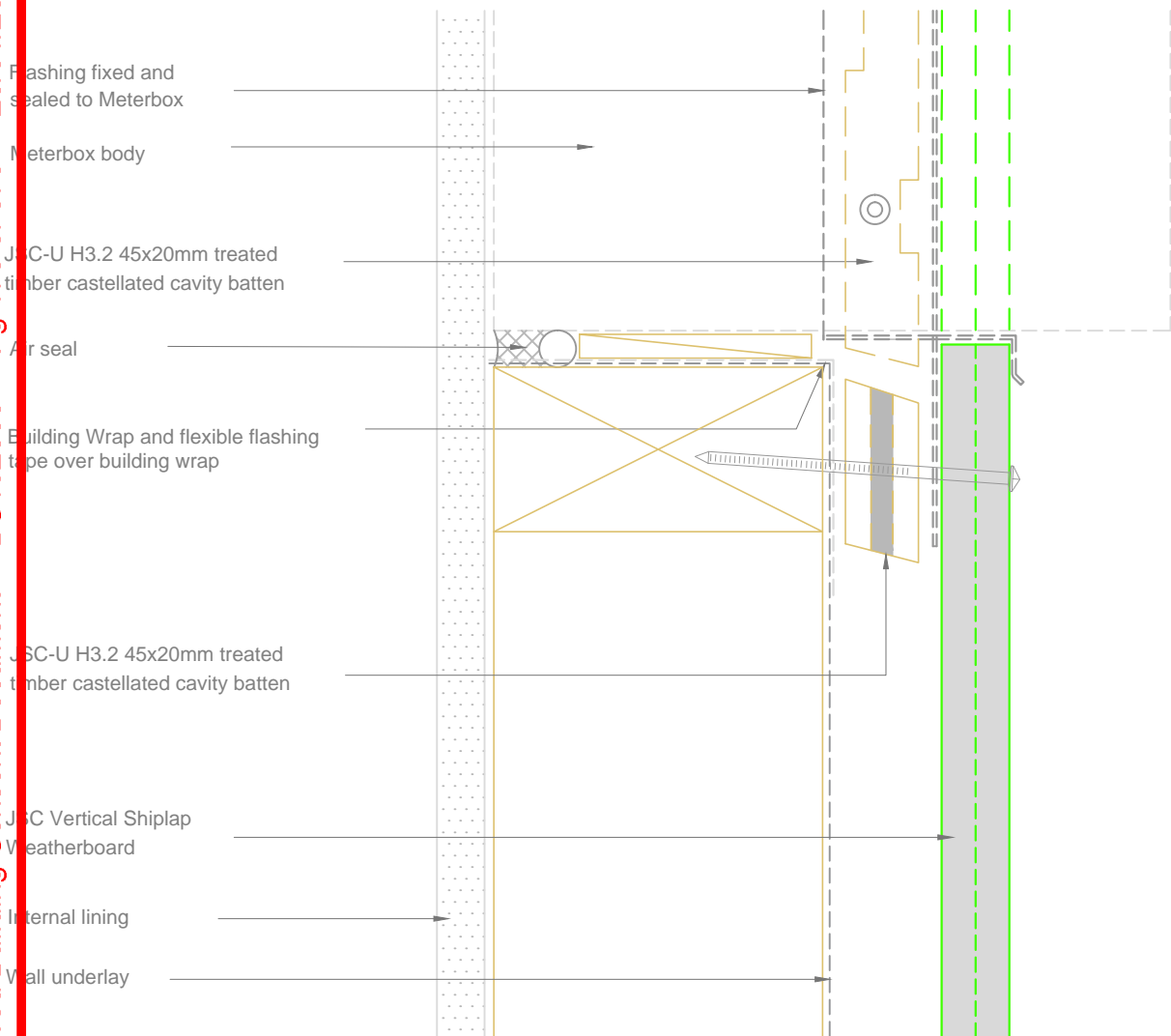
T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:

**Jv-FC-03**



To be read in conjunction with JSC Fixing installation notes

## Meterbox Sill detail

Vertical Shiplap Architectural Profile

22 Sawmill Road, Riverhead, Auckland  
Note: Details may be subject to change without notification

**JSC Timber**

T.09 412-7722  
tech@jsctimber.co.nz  
www.jsctimber.co.nz

Scale: 1:2

Date: 8/12/2016

Dwg:  
**JV-FC-33**





EXPIRES: 1 JUNE 2020

## BEAL Appraisal Certificate



## The Classic Stone's Manufactured Stone Veneer Cladding System



## Product

1.1 Classic Stone's Manufactured Stone Veneer Cladding System comprises weather resistant light-weight manufactured stone pieces adhered by way of a durable acrylic modified cement based adhesive to one of three types of substrate over either timber or lightweight steel framing. The substrates include fibre-cement sheet, concrete block, and concrete tilt-up slab. The fibre cement sheets are fixed to cavity battens according to the manufacturer's instructions and subject to the limitations described in this appraisal.

1.2 Framing must comply with the requirements of NZS 3604 for timber framing or NASH Standard for Residential and Low-rise Steel Framing, Parts 1 and 2, for lightweight steel framing.

## Building Regulations

2.1 In the opinion of BEAL, the Classic Stone Veneer Cladding system, if designed, installed and maintained in accordance with the statements and conditions of this Appraisal Certificate, will meet the following provisions of the New Zealand Building Code:

## 2.2 B1 STRUCTURE

Performances B1.3.1 and B1.3.3. See paragraph 7.1

## 2.3 B2 DURABILITY

Performance B2.3.1(b). See paragraph 8.1

## 2.4 E2 EXTERNAL MOISTURE

Performance E2.3.2. See paragraphs 9.1

## 2.5 F2 HAZARDOUS BUILDING MATERIALS

Performance F2.3.1. The Classic Stone's Manufactured Stone Veneer Cladding System meets this requirement and will not present a health hazard to people. See paragraph 10.1

The Classic Stone Veneer Cladding system has been appraised as an Alternative Solution in terms of New Zealand Building Code Compliance.

Applicant:



Classic Stone

**Classic Stone Ltd.**

49 Elginshire St  
Timaru 7910  
Tel: 03 688 7036  
Fax: 03 688 7037  
E-Mail: [info@classicstone.co.nz](mailto:info@classicstone.co.nz)  
[www.classicstone.co.nz](http://www.classicstone.co.nz)

Appraiser:

**BEAL**

2A Plimmerton Drive  
Plimmerton, Porirua, NZ  
Tel: +64 233 6661  
E-Mail: [sales@beal.co.nz](mailto:sales@beal.co.nz)  
[www.beal.co.nz](http://www.beal.co.nz)



The most up to date version of this BEAL Appraisal Certificate can be viewed at [www.beal.co.nz](http://www.beal.co.nz)

## Scope and Limitations

3.1 The Classic Stone's Manufactured Stone Veneer Cladding System has been appraised for use as an external cladding system over timber framing or light gauge steel framing complying with the requirements of the New Zealand Building Code (NZBC) within the following scope:

- 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,
- Can be situated in up to and including 'Very High' wind zones as described in NZS 3604:2011 Building Wind Zones.
- Incorporating the use of cavity battens, and wall underlay that complies with the NZBC.

3.2 The wall system is appraised for use with aluminium window and door joinery for use in a rebated opening as shown in the Technical and Installation Manual. In each situation the specified rebates to the head, jambs and sill details must be complied with. The air seals are to be installed as shown in the relevant drawings. The performance of the Classic Stone's Manufactured Stone Veneer Cladding System relies on the window and door joinery meeting the performance requirements of NZS 4211 for the relevant Wind Zone or being specifically designed for use.

3.3 The cladding system shall be installed only by Classic stone's Ltd. trained and approved applicators.

## Technical Literature

4.1 The Classic Stone Technical and Installation Manual, and Detail Drawings describes the correct method of installation and must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained within the Technical Literature and scope of this Appraisal Certificate must be followed.

4.2 For a copy of this Technical Literature and any subsequent updates please refer to [www.beal.co.nz](http://www.beal.co.nz)

## Technical Specification

5.1 Classic Stone's Manufactured Stone Veneer Cladding System is deemed a Medium Weight wall cladding based on NZS 3604, being 40 to 50 kg /m<sup>2</sup>, comprising of approximately 20 - 45mm thick pieces of light-weight manufactured stone of varying sizes (a proprietary masonry product) glued on their back to the nominated substrate using a proprietary acrylic-modified sand and cement based adhesive. The adhesive is also used as the splash coat and grout between the pieces of manufactured stone to produce a weather resistant aesthetically attractive finish. In order to prevent moisture ingress past the face of the cladding system, two coats of **CS Water Repellent** is applied over the finished wall or column once the installation of the manufactured stones is complete.

5.2 This cladding system is described throughout this appraisal as 'the Classic Stone Cladding System'.

## Handling and Storage

5.3 The Classic Stone manufactured stones are supplied loose in cardboard boxes, of varying sizes and can be stored indefinitely when kept dry and out of the weather.

5.4 The **CS Acrylic Stone** admixture is supplied in 5 and 20 litre plastic containers. The **CS graded sand** is supplied in 20 kg paper sacks. The cement complying with NZS 3122 is obtained from trade suppliers in 25 kg paper sacks.

All products shall be stored in a dry space out of the weather and in a manner to prevent accidental damage.

## Design Information

### General

6.1 The Classic Stone Technical and Installation Manual, and Detailed Drawings are designed to enable designers to understand the construction and installation details of the Classic Stone Cladding System.

### Structure - Clause B1

7.1 The Classic Stone Cladding System when used in accordance with this Appraisal will meet Performance Requirements of B1.3.1, and B1.3.3 (a), (b), (f) and (h) of the NZBC.

### Durability - Clause B2

8.1 The Classic Stone Cladding System when used in accordance with this Appraisal will meet Performance Requirement B2.3.1(b) of the NZBC.

In other words, the product as appraised will be durable for at least 15 years.

### External Moisture - Clause E2

9.1 The Classic Stone Cladding System complies with performance clause E2.3.2 of the Building Code when installed in accordance with this Appraisal. In other words, the product as appraised will "prevent the penetration of water that could cause undue dampness, or damage to building elements".

### Hazardous Building Materials - Clause F2

10.1 The product contains no hazardous materials and complies with clause F2.3.1 of the Building Code.

### Maintenance

11.1 The maintenance of the completed application of the Classic Stone Cladding System consists of annual inspection and, where necessary, cleaning and removal of contamination that could reduce the performance and/or life of the exterior finish.

11.2 In the event of damage to the exterior finish, the location and details along with photos shall be recorded with a copy supplied to the applicator company or Classic Stone Ltd. for action. No applicator may carry out repairs without the prior approval of Classic Stone Ltd.

## Installation Information

### Installation Skill Requirement

12.1 Installation of the Classic Stone Cladding System must be completed by Classic Stone Ltd. approved and trained applicators who have experience in the application of stone veneer products.



C716

## Health and Safety

13.1 Guidance for the safe use and handling of the components and related materials of the Classic Stone Cladding System is provided in the Technical Literature. The products must be used in conjunction with the relevant materials safety data sheet for each product.

## Basis of Appraisal

BEAL uses the compliance verification procedure to evaluate compliance with the relevant clauses of the NZBC including a risk analysis procedure. The following is a summary of the technical investigations carried out.

### Assessments

14.1 The following assessments of the Classic Stone Cladding System have been undertaken by BEAL: Review of structural data test and Technical Literature supplied by Classic Stone Ltd.

### Tests

15.1 The following testing of the Classic Stone Cladding System has been undertaken by BEAL to verify compliance:

- Weathertightness by way of testing using a method adapted for thermal mass walls based on E2/VM1.

### Other Investigations

16.1 The ability of the Classic Stone Cladding System to support self weight and wind loadings, was assessed by an independent engineer.

16.2 An opinion has been given by BEAL of the durability of The Classic Stone Cladding System based on other Technical Literature and in-service history.

16.3 The Classic Stone Cladding System was also evaluated (including site visits) in practical building situations assessing the following:

- Ease of installation;
- Potential risks of non-performance when being installed;
- Any external factors that could affect the quality of the installed product;
- Ease of repair or maintenance.

16.4 The Technical Literature has been examined by BEAL and found to be satisfactory.

### Quality

17.1 The manufacture of the Classic Stone Cladding System has not been assessed by BEAL, but details regarding the quality and composition of the materials used were obtained by BEAL and found to be satisfactory.

17.2 The quality of materials, components and accessories supplied by Classic Stone Ltd. is managed through the use of a Building Product Quality Plan.

17.3 The Classic Stone Ltd. Building Product Quality Plan ensures continuous conformance with the quality requirements from purchase to supply of components.

17.4 Classic Stone Ltd's Building Product Quality Plan is reviewed and audited at least annually by BEAL or appointed agent.

17.5 Designers are responsible for the substructure design, and building contractors are responsible for the quality of construction of the substructure or new substrate in accordance with the instructions of the substrate

manufacturer and this Appraisal Certificate.

17.6 Building owners are responsible for the maintenance of the Classic Stone Cladding System in accordance with the instructions of Classic Stone Ltd. and this Appraisal Certificate.

## Sources of Information

- New Zealand Building Code
- Acceptable Solutions E2/AS1
- AS/NZS 1170:2002 Structural Design Actions
- AS/NZS 4284:2008 Testing of Building Facades
- NZS 3122:2009 Specification for Portland and Blended Cements
- NZS 4211:2008 Specification for Performance of Windows
- NZS 3604:2011 Timber-framed buildings
- NASH Standard Residential and Low-rise Steel Framing, Parts 1 and 2
- BEAL test Reports

## Concluding statement

18.1 In the opinion of BEAL, the Classic Stone Cladding System is fit for purpose and will comply with the NZBC to the extent specified provided that it is used, designed, installed and maintained as set out in this Appraisal Certificate.

18.2 The Appraisal Certificate is issued only to Classic Stone Ltd. and is valid until the expiry date on the front of this appraisal certificate.

# Conditions of Appraisal

1. This appraisal Certificate :
  - a) Relates only to the Classic Stone Cladding System as described herein;
  - b) Must be read, considered and used in full, together with the current version of the Technical Literature;
  - c) Does not address any legislation, regulations, codes or standards, not specifically named herein;
  - d) Is copyright of BEAL.
2. The Appraisal Certificate holder continues to meet the quality requirements of the Classic Stone Ltd. Building Product Quality Plan and has the plan audited and Appraisal certificate revalidated by BEAL on an annual basis.
3. Classic Stone Ltd. shall notify BEAL and obtain approval of any changes of the product specification or quality assurance prior to product being marketed, including any trade literature, web site info or the like.
4. BEAL makes no representation 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 the Appraisal Certificate holder.
5. BEAL's verification of the building product or system complying with one or more of the above-mentioned criteria is given on the basis that the criteria used were those that were appropriate to demonstrate compliance with the NZBC at the date of this Appraisal Certificate. In the event that the criteria is withdrawn or amended at a later date, this Appraisal may no longer remain valid.
6. Any reference in this Appraisal Certificate to any other publication shall be read as a reference to the version of publication specified in this Appraisal Certificate.

Authorised Signatory



C R Prouse - Manager  
BEAL Testing Services  
[Updated August 2017]







# STONESHEET™

## STONE TILE SUBSTRATE

## Technical Specification | Apr 2015

**Update:** This document replaces the technical details in BGC External Cladding brochure Jul 2007 and BGC Stonesheet™ Technical Updates Jun 2008, Sep 2010 and Aug 2012.

This document is to be read in conjunction with BEAL Appraisal C807 BGC Stonesheet™ and Render Tape for use with manufactured or natural stone slip veneers.

### Product Description

BGC Stonesheet™ is a purpose designed Fibre Cement sheet for external application. It is recommended as a backing board for stone slip substrates on timber framed buildings.

BGC Render tape is a single-faced self-adhesive tape comprising a non-woven polyester fabric adhered to a film of butyl-rubber.

BGC Render Tape comes in a 60mm x 20m roll.

### Sheet Sizes & Mass

Stonesheet™ is available in the following tabulated sizes. The approximate weight of Stonesheet™ at equilibrium moisture content (7% moisture) is also as tabulated:

Thickness (mm)	Length (mm)	Width (mm)	Approx. Weight (kg/m <sup>2</sup> )
7.5	3000	1200	11.8
9.0	3000	1200	14.27

### Framing

Please refer to page 6, Timber Framing Section of the BGC Durasheet™ brochure - February 2010. Please also refer to your stone supplier for any specific framing requirements.

### Fixing Guide

Slip Weight (kg/m <sup>2</sup> )	Wall Height	Stonesheet™ Type (mm)
20 – 50	Up to and above 4m	7.5
50 – 60	Up to 4m	7.5
	Above 4m	9.0

#### Fasteners:

- Cavity - 10g x 65mm Surefast Screws
- Direct Fixed - 10g x 50mm Surefast Screws
- Washer - Direct and Cavity - M6 x 19mm x 1.6mm
- Interior Application - Zinc Chromate
- Exterior Application - Stainless Steel 304 or 316
- Or fasteners as per your stone suppliers installation details.

Screws and washers can be sourced from BGC, MSL Fortress Fasteners or your local Building Merchant, providing they are compliant with AS 3566 part 2.

For stone weights above 60 kg/m<sup>2</sup> please refer to your stone supplier for fasteners, mechanical fixings and adhesives.

### Installation

BGC Stonesheet™ can either be installed on a cavity or direct fixed. This is determined upon the calculated Risk Score as per the NZBC, Section 3 of E2/AS1.

#### General Fixing:

- Sheets are to be fixed vertically with a 2-3mm gap between sheets.
- Sheets are to be fixed with screws and washers, as per the fixing guide, at 200mm centres (edges and centre). Sheets must be fixed with the smooth side on the external face (i.e. rough surface on the framing side).
- Screws must be 12mm from the edge and 50mm from the corner of the sheets.
- Or fixed as per your stone suppliers installation details.

#### Joints:

- Joints must be dry and free from dust and contaminants before applying the BGC Render Tape. BGC Render Tape is to be installed over the joint in the centre of the tape. The tape must be well adhered to the Stonesheet™ by pressing down on both sides of the adhesive tape.
- Where the BGC Render Tape has been applied to both the vertical and horizontal joint, the tape is to be installed so it overlaps the tape already applied. To join the tape – overlap the joint by at least 100mm. BGC Render tape can be used for both vertical and horizontal sheet joints except for Horizontal Control Joints (5400mm maximum centres or all floor joist locations).
- Horizontal Control Joints must be formed as per E2/AS1 fig 107 and/or fig 108 for up to 2 stories – BGC Render tape can be applied over the Horizontal joint to ensure the joint is kept free from Adhesives or Fig. 70 for over 2 stories in height.
- Vertical Non Flush finished joints are deemed to be control joints so no special vertical control joint is required.

#### Corners:

- Sheets are to be butt jointed (leave 2-3mm gap) with tape applied over the joint.

#### General:

- BGC Stonesheet™ should not be left exposed in external applications for longer than 90 days before the installation of the stone work.
- All cut sheet edges must be sealed with BGC Edge Sealer which can be ordered with BGC Stonesheet™ from your local Building Merchant.
- For information on BGC Render Tape contact BGC Fibre Cement (NZ).
- Please also refer to E2/AS1 section 9.7 Fibre Cement.

## Note

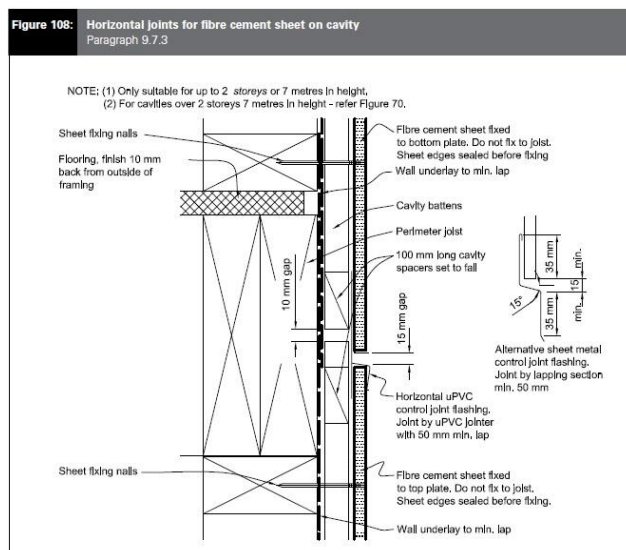
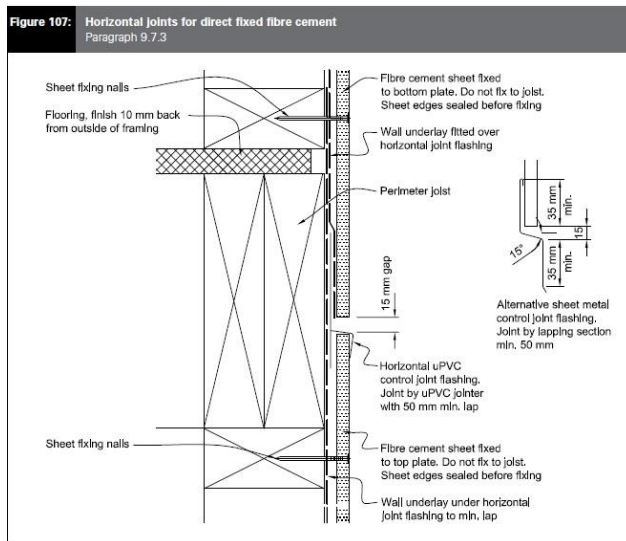
Stonesheet™ is a non-structural substrate. BGC does not accept any responsibility for the selection and design of mechanical fixing and adhesives used. Installation instructions and recommended kg/m<sup>2</sup> are supplied as a guide only.

BGC Stonesheet™ and BGC Render tape are not the primary waterproofing in a Stone Slip veneer system.

BGC recommend using a Stone system that has been suitably evaluated to comply with all relevant Building Codes and standards.

## Pictorial Figures

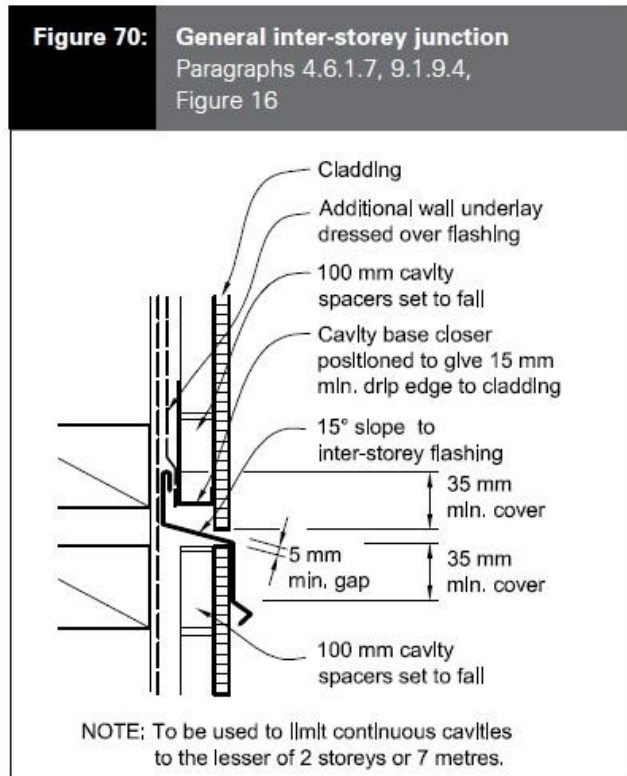
Following are pictorials taken from section 9.5 of the NZBC Acceptable Solutions E2/AS1 (Amendment 6 - 14 February 2014).



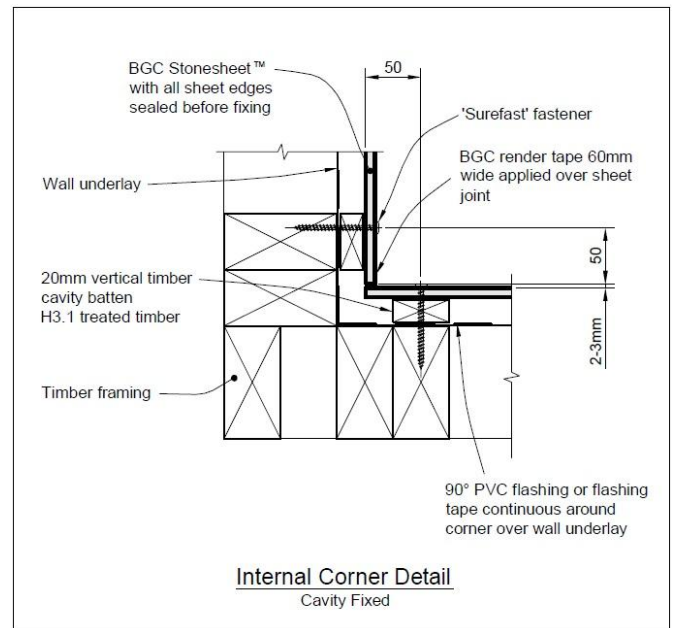
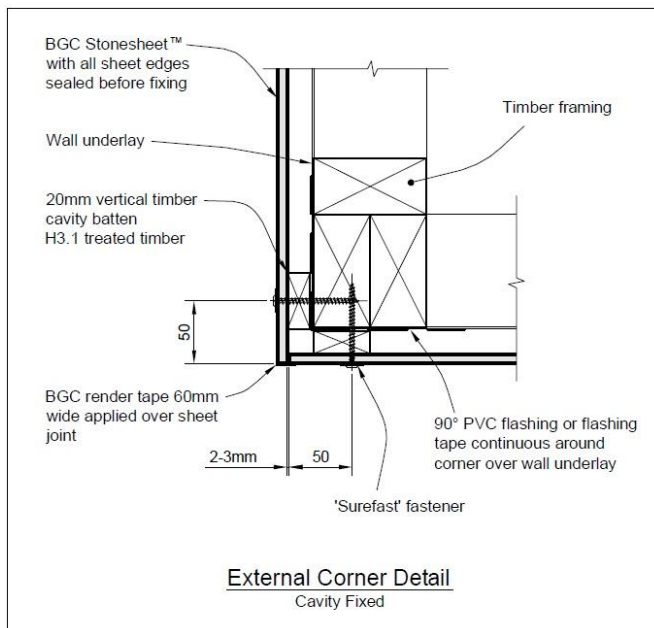
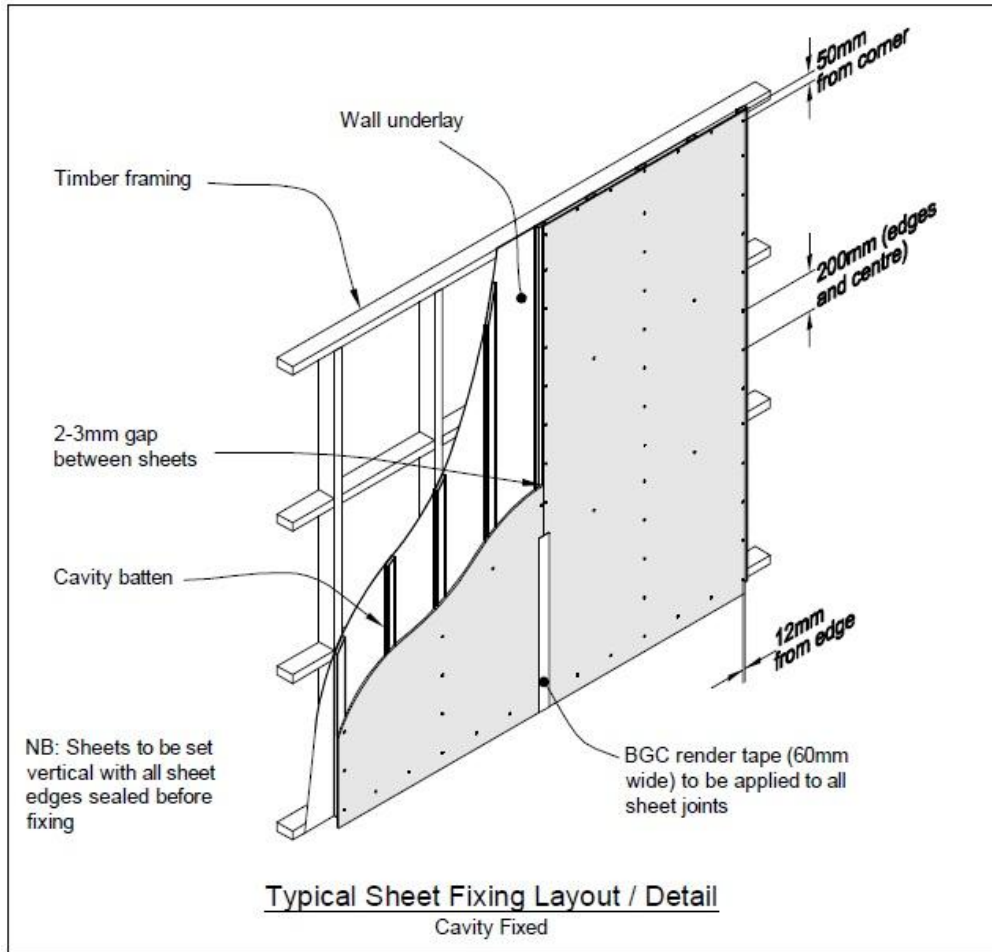
## Warranty

BGC warrants Stonesheet™ to be free from defects caused by defective manufacture or materials for a period of 15 years from the date of purchase. Furthermore, BGC warrants its products to be resistant from rotting, fire and cracking so long as the installation is carried out in accordance with BGC literature available at the time of purchase.

This warranty is subject to conditions as set out in a separate document. For a copy of this information and/or a copy of the quality control measures, please contact BGC Fibre Cement (NZ).



## Architectural Details



## Notes:

BGC Fibre Cement provides builders, developers and architects with a range of design alternatives and innovative products, such as:

### EXTERIOR PRODUCTS AND APPLICATIONS

#### Innova™ Range of Products:

<b>Duragrid™ Residential &amp; Duragrid™ Light Commercial</b>	A lightweight façade giving a modern and durable finish.
<b>Duracom™</b>	A compressed fibre cement façade system.
<b>Duragroove™</b>	A vertically grooved exterior façade panel.
<b>Durascape™</b>	A lightweight exterior façade base sheet with a subtle vertical shadow line.
<b>Nuline™ Plus</b>	A traditional weatherboard style cladding system.

<b>Stonesheet™</b>	A purpose designed substrate for stone tile facades.
--------------------	--

<b>Stratum™</b>	The Stratum™ series is a trio of vibrant, contemporary style, shiplap weatherboard cladding systems.
<b>Stratum™ Duo</b>	
<b>Stratum™ Contour</b>	

### EXTERIOR PRODUCTS AND APPLICATIONS

#### BGC Fibre Cement Range of Products:

<b>Durasheet™</b>	Ideal for the cladding of gables and lining of eaves.
<b>Duraplank™</b>	A weatherboard style cladding system, available in Smooth and Woodgrain finishes.

### EXTERIOR PRODUCTS AND APPLICATIONS

#### BGC Fibre Cement Range of Products (Continued):

<b>Compressed</b>	Domestic or commercial sheet for wet areas, flooring, partitions, exterior decking, fascia and facade cladding.
<b>Duralux™ Plus</b>	Suitable for exterior applications where it will be sheltered from direct weather.
<b>Duraliner™ Plus</b>	Suitable for eaves and soffits where it will be sheltered from direct weather.
<b>Durafloor™</b>	Superb solution for interior wet areas such as bathrooms and laundries.

### INTERIOR PRODUCTS AND APPLICATIONS

#### BGC Fibre Cement Range of Products:

<b>Duralux™ Plus</b>	A square edge interior lining board. This is a perfect substrate for tiles and is ideal for wet areas.
<b>Duraliner™ Plus</b>	A rebated interior lining board. This is a perfect substrate for tiles and is ideal for wet areas.
<b>Ceramic Tile Floor Underlay</b>	A substrate for ceramic and slate floor tiles.
<b>Durafloor™</b>	An ideal solution for exterior balconies and verandas.





## BRANZ Appraised

Appraisal No. 238 [2018]

### PINK® BATTS® INSULATION

Appraisal No. 238 [2018]

This Appraisal replaces BRANZ

Appraisal No. 238 [2012].

Amended 26 November 2018.

#### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.



Tasman Insulation New

Zealand Ltd

P.O. Box 12 069

Porirua

Auckland

Tel: 09 579 2139

Fax: 09 571 3482

Freephone: 0800 746 522

Web: [www.pinkbatts.co.nz](http://www.pinkbatts.co.nz)



BRANZ

122 Moonshine Rd,

Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

[branz.co.nz](http://branz.co.nz)



## Product

- 1.1 Pink® Batts® Insulation is a range of resin bonded fibrous glasswool thermal insulating material for use in walls, ceilings and roofs of buildings. Pink® Batts® Insulation is pre-cut to suit a range of framing spacings.

## Scope

- 2.1 Pink® Batts® Insulation has been appraised as a thermal insulation material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings.

## Building Regulations

### New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Pink® Batts® Insulation, 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 B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years and B2.3.1 (b) 15 years. Pink® Batts® Insulation meets these requirements. See Paragraph 8.1.

**Clause E3 INTERNAL MOISTURE:** Performance E3.3.1. Pink® Batts® Insulation will contribute to meeting this requirement. See Paragraphs 13.1 and 13.2.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Pink® Batts® Insulation meets this requirement and will not present a health hazard to people.

**Clause H1 ENERGY EFFICIENCY:** Performance H1.3.1 (a) and H1.3.2 E. Pink® Batts® Insulation will contribute to meeting these requirements. See Paragraphs 14.1 and 14.2.



## Technical Specification

- 4.1 Pink® Batts® Insulation is a resin bonded fibrous glasswool insulation manufactured from recycled and/or virgin glass and cured urea extended phenolic resin.
- 4.2 Pink® Batts® Insulation is manufactured in a range of sizes to suit framing centres and cavity depths. Building Insulation Blanket (BIB) is supplied in rolls for commercial applications. Pink® Batts® Insulation is available as set out in Table 1.

**Table 1: Pink® Batts® Insulation product table.**

R-value	Length [mm]	Width [mm]	Nominal Thickness [mm]	Nominal Total Area [m²]	Density [kg/m³]
<b>Roof - Thermal Insulation</b>					
1.8 <sup>1</sup>	1220	432	95	13.7	8.3
2.2 <sup>1</sup>	1220	432	115	12.6	8.2
2.6 <sup>1</sup>	1220	432	140	10.5	7.7
3.2 <sup>1</sup>	1220	432	170	8.4	8.4
3.2 <sup>1</sup>	1220	432	170	8.4	6.9
3.6 <sup>1</sup>	1220	432	180	7.4	7.4
3.6	1220	432	180	7.4	8.8
4.0 <sup>1</sup>	1220	432	195	6.3	8.1
5.0 <sup>1</sup>	1220	432	220	4.2	10.0
6.0 <sup>1</sup>	1220	432	235	3.7	13.0
6.3 <sup>1</sup>	1220	432	250	3.2	12.3
7.0 <sup>1</sup>	1220	432	260	2.6	15.8
<b>Roof - Building Insulation Blanket</b>					
1.2	12,000	1200	50	28.8	12.0
1.8	8000	1200	75	19.2	12.0
2.2	8000	1200	100	19.2	9.1
2.4	8000	1200	100	19.2	11.5
2.6	6000	1200	110	14.4	11.0
3.2	8000	1200	135	9.6	10.9
<b>Roof - Pink® Batts® Retrofit Insulation</b>					
2.9 <sup>1</sup>	1220	432	150	9.5	7.7
3.3 <sup>1</sup>	1220	432	175	8.4	7.1
<b>Wall - Masonry Insulation</b>					
1.0 <sup>1</sup>	1220	580	40	21.2	14.0
1.2	1220	580	50	17.0	12.8
<b>70 mm Wall Range - Thermal Insulation</b>					
2.2	1140	560	70	6.4	30.0
<b>90 mm Wall Range - Thermal Insulation</b>					
1.8 <sup>1</sup>	1140	560	90	16.6	9.0
2.2 <sup>1</sup>	1140	560	90	13.4	11.6
2.4 <sup>1</sup>	1140	560	90	10.2	14.7
2.4 <sup>1</sup>	1140	560	90	10.2	17.4
2.6 <sup>1</sup>	1140	560	90	9.6	19.4
2.8 <sup>1</sup>	1140	560	90	6.4	27.1

**Table 1: Pink® Batts® Insulation product table cont.**

R-value	Length [mm]	Width [mm]	Nominal Thickness [mm]	Nett Area [m <sup>2</sup> ]	Density [kg/m <sup>3</sup> ]
<b>90 mm Narrow Wall Range - Thermal Insulation</b>					
2.2 <sup>1</sup>	1140	360	90	9.0	11.8
2.6 <sup>1</sup>	1140	360	90	7.4	19.4
2.8 <sup>1</sup>	1140	360	90	4.5	27.1
<b>90 mm Steel Wall Range - Thermal Insulation</b>					
2.2 <sup>1</sup>	1220	610	90	15.6	11.8
2.6 <sup>1</sup>	1220	610	90	9.7	19.4
<b>140 mm Wall Range - Thermal Insulation</b>					
3.2 <sup>1</sup>	1140	560	140	9.6	9.6
3.6 <sup>1</sup>	1140	560	140	7.0	14.0
4.0 <sup>1</sup>	1140	560	140	5.1	19.5
<b>140 mm Narrow Wall Range - Thermal Insulation</b>					
3.2 <sup>1</sup>	1140	360	140	7.0	9.6
4.0 <sup>1</sup>	1140	360	140	4.1	19.5

<sup>1</sup> Pink® Batts® Insulation products that have the Environmental Choice license.

- 4.3 Pink® Batts® Insulation is pink in colour and is baled in polythene bags with labelling in compliance with AS/NZS 4859.1.
- 4.4 Pink® Batts® Retrofit Ceiling Insulation is pink in colour and is baled in teal polythene bags with labelling in compliance with AS/NZS 4859.1.
- 4.5 Accessories used with Pink® Batts® Insulation, which are supplied by the insulation installer, are wire netting, plastic strapping and fixings.

## Handling and Storage

- 5.1 Pink® Batts® Insulation must be stored under cover and in dry conditions. Heavy objects must not be stacked on the bales. The bales must be stored in an orientation that avoids excessive compression of the product.
- 5.2 In general, insulation products are sensitive to the length of time they are stored under compression packaging. Product that does not recover to its nominal thickness may not achieve the stated R-value.

## Technical Literature

- 6.1 Refer to the Appraisal listing on the BRANZ website for details of the current Technical Literature for Pink® Batts® Insulation. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 Pink® Batts® Insulation is intended for use as thermal insulation to meet the requirements of the NZBC. Pink® Batts® Insulation can be used to meet the minimum schedule method R-values of NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Greater construction R-values can be achieved where specific design is used. For construction R-values refer to the BRANZ House Insulation Guide. Product R-values and dimensions are given in Table 1.

- 7.2 Pink® Batts® Insulation thermal resistance [R-value] has been determined by testing to AS/NZS 4859.1, which is an acceptable method in NZBC Acceptable Solution H1/AS1.
- 7.3 Pink® Batts® Insulation is designed to be friction-fitted between wall, ceiling or roof framing. They can also be laid directly on a ceiling lining, over ceiling battens or joists/truss chords. In other horizontal situations, the insulation must be adequately supported by galvanised wire netting or some other suitable durable material.
- 7.4 Where the insulation is installed in exterior walls, the insulation material nominal thickness must be selected to provide a snug close fit which touches all sides of the insulation cavity between the wall underlay and the interior wall lining.
- 7.5 Where the insulation is retrofitted in external walls without a wall underlay, and with direct-fixed claddings, the insulation must be at least 20 mm thinner than the framing to allow a gap of at least 20 mm between the insulation and the wall cladding. Horizontal straps must be stapled into the sides of the wall studs at 300 mm centres maximum as support before the insulation is installed. Refer also to NZS 4246, Section 5.4.2.
- 7.6 When the insulation is installed in a wall with a drained cavity, it is recommended that specific wall products with a controlled nominal thickness be used. Where the stud spacings are greater than 450 mm, an intermediate means of restraining the insulation from bulging into the cavity must be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.
- 7.7 Building Insulation Blanket is designed specifically for commercial roof and commercial wall applications. In residential applications, installation must be completed in line with NZS 4246.
- 7.8 To prevent moisture transfer and to provide roof ventilation, a separation of 25 mm minimum is required between the insulation and any rigid substrate or flexible roof underlay. Selecting specifically designed skillion roof insulation products with a controlled nominal thickness can assist with this requirement.
- 7.9 The building envelope must be constructed to ensure the insulation remains dry during installation and throughout the life of the building.
- 7.10 The clearance requirements for heating appliances and downlights must be met and reference made to the manufacturer's instructions and NZS 4246. See Paragraphs 10.1 - 10.3.

## **Durability**

### **Serviceable Life**

- 8.1 Where the building is maintained so that provisions of NZBC Clauses E2 and E3 are met, and where the insulation is not crushed or exposed to conditions that will diminish its thermal performance [e.g. moisture], Pink® Batts® Insulation can be expected to have a serviceable life of at least 50 years.

## **Maintenance**

- 9.1 Insulation that has become damp must be removed and the cause of dampness repaired. Cavities must be clean and dry before fitting new insulation of an equivalent thermal rating. NZS 4246 gives guidance on thermal insulation maintenance due to water damage.

## **Prevention of Fire Occurring**

- 10.1 Pink® Batts® Insulation is considered a non-combustible material and need not to be separated from heat sources such as fire places, heating appliances, flues and chimneys. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from fireplaces, heating appliances, flues and chimneys in accordance with the requirements of Part 7 of NZBC Acceptable Solutions C/AS1 to C/AS6 and NZBC Verification Method C/VM1.

### Downlights

- 10.2 Recessed luminaires shall be of type and be installed in accordance with NZBC Acceptable Solution C/AS1 to C/AS6, Section 7.4.
- 10.3 Insulation materials must maintain a clearance of 100 mm to undefined recessed luminaires in existing buildings.

### Control of Internal Fire and Smoke Spread

- 11.1 Pink® Batts® Insulation has been classified non-combustible when tested to AS 1530.1 and can therefore be assigned a Group Number of 1-S. Unless foamed plastics building materials are also used as part of the wall or ceiling construction, there are no internal surface finish requirements in Risk Group SH in accordance with NZBC Acceptable Solution C/AS1, Paragraph 4.2. When used in an occupied space, Pink® Batts® Insulation does not need to be enclosed in any Risk Group. Refer to NZBC Acceptable Solutions C/AS2 to C/AS6 for the specific internal surface requirements for walls or ceilings in other Risk Groups.

### External Moisture

- 12.1 The total building envelope must be weathertight and comply with the requirements of NZBC Clause E2 to ensure that the insulation remains dry in use.
- 12.2 The moisture content of the construction materials at the time of installing and enclosing the insulation must meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 10.2 (a), or a lower moisture content if required by the lining manufacturer.

### Internal Moisture

- 13.1 Buildings must provide an adequate combination of thermal resistance, ventilation and space temperature to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate. This does not apply to Communal Non-residential, Commercial, Industrial, Outbuildings or Ancillary buildings.
- 13.2 Roofs and walls of housing complying with the Schedule Method for Compliance with Clause H1.3.2 E will have adequate thermal resistance. Other buildings may require more thermal insulation to satisfy the requirements of NZBC Acceptable Solution E3/AS1 than that to satisfy the energy efficiency provisions alone.

### Energy Efficiency

- 14.1 Pink® Batts® Insulation will contribute to meeting the requirements of NZBC Clause H1, Performance H1.3.1 (a) and H1.3.2 E by compliance with NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Refer to Paragraphs 7.1 - 7.8.
- 14.2 Pink® Batts® Insulation R-values have been determined by BRANZ testing to AS/NZS 4859.1 and are given in Table 1.

## Installation Information

### Installation Skill Level Requirements

- 15.1 Installation of Pink® Batts® Insulation must be completed by an installer with an understanding of insulation installation.

### General

- 16.1 Installation of Pink® Batts® Insulation must be in accordance with the Technical Literature, Installation Instructions and this Appraisal. NZS 4246 should be used as a guide for installing insulation in residential buildings.
- 16.2 The product must be installed only when the building is enclosed and when the construction materials have achieved the required maximum moisture content or less.
- 16.3 Pink® Batts® Insulation must be released from the packaging and allowed to re-loft prior to installation. The time to loft will depend upon the length of time the product has been packaged and stored.

- 16.4 Pink® Batts® Insulation is supplied in segment and blanket form [see Table 1] to suit framing layouts. The product is able to be cut to suit wall cavities and when fitted between roof or ceiling framing. The insulation must be neatly friction-fitted between framing members so that the potential for gaps and convective heat loss is reduced. In wall cavities the insulation must be neatly friction-fitted between framing members to prevent sagging. In ceiling or roofs, the insulation may be fitted between framing members or fitted over framing members and butted tightly. The insulation must extend to the external wall top plate. The insulation must not be folded or compressed. A close even fit provides the most efficient thermal performance. Whenever possible, the insulation should be fitted beneath wiring or plumbing.
- 16.5 The clearance requirements for heating appliances and downlights must be followed. Refer also to NZS 4246.

#### **Inspections**

- 16.6 The Technical Literature, this Appraisal and NZS 4246 must be referred to during the inspection of Pink® Batts® Insulation installations.

#### **Health and Safety**

- 17.1 Refer to the Technical Literature and NZS 4246 for guidance on health and safety requirements such as personal protective clothing and installation hazard assessment.

### **Basis of Appraisal**

The following is a summary of the technical investigations carried out:

#### **Tests**

- 18.1 BRANZ has carried out thermal resistance testing of Pink® Batts® Insulation in accordance with AS/NZS 4859.1.
- 18.2 Tests have been carried out in accordance with AS 1530.1. Pink® Batts® Insulation is not deemed combustible according to the test criteria. The results have been reviewed by BRANZ technical experts.

#### **Other Investigations**

- 19.1 An assessment of the durability of Pink® Batts® Insulation has been made by BRANZ technical experts.
- 19.2 The manufacturer's Technical Literature including installation instructions have been reviewed by BRANZ and found to be satisfactory.

#### **Quality**

- 20.1 The manufacture of Pink® Batts® Insulation has been examined by BRANZ, including methods adopted for quality control. Details of the manufacturing processes, and quality and composition of the raw materials used were obtained and found to be satisfactory.
- 20.2 The range of Pink® Batts® Insulation products have been assessed for their environmental impact by the New Zealand Ecolabelling Trust and comply with the requirements of the Environmental Choice Specification, Licence No. 2504017 - Thermal [resistive type] Building Insulants. The products that have the Environmental Choice license are noted in Table 1.
- 20.3 Tasman Insulation New Zealand Ltd is responsible for the quality of the product supplied.
- 20.4 Quality of installation of the product on site is the responsibility of the installer.
- 20.5 Quality of maintenance of the building to ensure the insulation material remains dry is the responsibility of the building owner.

## Sources of Information

- AS 1530.1: 1994 Combustibility test for materials.
- AS/NZS 4859.1: 2002 Materials for the thermal insulation of buildings.
- NZS 4246: 2016 Energy efficiency - Installing bulk thermal insulation in residential buildings.
- BRANZ Bulletin Number 525 Preventing moisture problems in timber-framed skillion roofs.
- BRANZ House Insulation Guide, Fifth Edition 2014.
- Acceptable Solution and Verification Methods for New Zealand Building Code Energy Efficiency Clause H1, Ministry of Business, Innovation and Employment, Fourth Edition, [including Amendment 3, 1 January 2017].
- Ministry of Business, Innovation and Employment record of Amendments - Acceptable Solutions, Verification Methods and Handbooks.
- The Building Regulations 1992.

## Amendments

### Amendment No. 1, dated 05 September 2018.

This Appraisal has been amended to include the use of Pink® Batt's® Insulation when retrofitting external walls without wall underlay with direct-fixed claddings.

### Amendment No. 2, dated 26 November 2018.

This Appraisal has been amended to update Table 1 to include the Roof - Building Insulation Blanket product range.



In the opinion of BRANZ, **Pink® Batts® Insulation** 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 **Tasman Insulation New Zealand Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the Technical Literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. **Tasman Insulation New Zealand Ltd:**
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions;
  - d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by **Tasman Insulation New Zealand Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Tasman Insulation New Zealand Ltd** or any third party.

For BRANZ



**Chelydra Percy**

Chief Executive

Date of Issue:

03 August 2018



## INSTALLATION INSTRUCTIONS

# Wall

## PINK® BATTS® WALL INSULATION

### Installation Instructions

Correct installation with no compression, gaps or folds is critical to ensure Pink® Batts® wall insulation performance is not compromised.

#### Safety:

Each installation is unique, so prior to installation check for all hazards that may cause injury:

- Carry out any required repair work before starting installation
- Ensure there's adequate lighting to identify any hazards
- Treat all electrical cables as live, being careful not to cut or expose cables and wires
- Beware of other sharp objects (protruding nails, splinters etc.), pests (bees and wasps), loose boards and pipe work

**Note:** Seek professional advice if you are unsure how best to isolate the hazard or have a professional installer carry out the work on your behalf.

We recommend PinkFit® professional installers. PinkFit® are a nationwide network of professional installers who guarantee that their completed installation will meet the requirements of NZS 4246:2016.

For your local PinkFit® installer call **0800 746 534** or visit [pinkbatts.co.nz/installing-pink-batts/](http://pinkbatts.co.nz/installing-pink-batts/)

#### Installation:

Any slight irritation to exposed skin caused by the fibres in glass wool, or through their inhalation, is harmless and temporary.

However for your comfort while installing, it's recommended you wear:

- Loose fitting work clothes which cover the arms and legs
- Covered shoes
- Dust mask
- Safety glasses

For safety while installing, it's recommended you use:

- Cut resistant gloves (if knife is used)

For an efficient installation, the following tools are recommended:

- Stable working platform
- Knife
- Tape measure

To ensure Pink® Batts® wall insulation performance isn't compromised, use only wall products for installing in wall applications.

- Ensure the product and all cavities are dry
- If cutting is required, cut oversize by 5 mm to ensure a good friction fit
- Ensure there are no gaps, folds or compression of the product to achieve optimal performance
- Fill gaps around windows and doors with off-cuts
- Follow the manufacturer's instructions for minimum clearances from hot inbuilt appliances. If they are unknown, refer to NZS 4246:2016
- Do not cover vents. Insulate around vents to allow unhindered ventilation
- Fit Pink® Batts® insulation tight and close around electrical cables and pipes. It's important to minimise compression, gaps and folds in the insulation. For electrical cables and small diameter pipes, partially cut insulation and place around the cables and pipes
- In new construction, it is recommended that Pink® Batts® insulation is installed once the cladding system is completely installed.

Retrofitting insulation in external walls without wall underlay/or in poor condition

##### a) Direct Fixed Cladding

- Use insulation that is at least 20mm thinner than the framing width - if the frame is 90mm we recommend to use **Pink® Batts® Classic R2.2 70mm** OR
- Fit inserts of Bitumac® 720 wall underlay.

##### b) Drained Cavity

- The insulation can be the same thickness as the frame. The use of horizontal strapping is recommended , OR
- Fit inserts of Bitumac® 720 wall underlay.

Unlined Walls in Roof Cavities

- **Pink® Batts® Wall** or **Pink® Batts® HandyPack insulation** should be secured in place by using horizontal strapping (max spacing of 300mm)

Pink® Batts® Masonry Wall Insulation

- It is recommended that an absorbent building paper or a waterproof membrane is placed between the insulation and the concrete. This is not intended to replace the DPC which must still be fixed between strapping and masonry.

**CAUTION:** Electrical cables and equipment installed prior 1989 may overheat and fail when partially or completely covered with bulk thermal insulation



**Tip:** To verify Building Code Compliance, staple a product label and installer information at an easy to find location away from any hot items such as downlights or water cylinders. An alternative is to supply the information to the building owner or authorised person.

Refer to NZS 4246:2016 for further information related to the correct installation of insulation and clearances.

## Product Specifications

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WALL - Thermal Insulation		PRODUCT CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)	NOMINAL TOTAL AREA PER BALE (m²)	APPROX. COVERAGE PER BALE* (m²)	ENVIRONMENTAL CHOICE
<b>Masonry</b>							
R1.0	Pink® Batts® Masonry R1.0	7160110	1220 x 580	40	21.2	-	✓
R1.2	Pink® Batts® Masonry R1.2	7160134	1220 x 580	50	17.0	-	
<b>70mm Wall Range</b>							
R2.2	Pink® Batts® Classic R2.2 70mm Wall	7160248	1140 x 560	70	6.4	7.5	
<b>90mm Wall Range</b>							
R1.8	Pink® Batts® Classic R1.8 Wall	7127118	1140 x 560	90	16.6	19.6	✓
R2.2	Pink® Batts® Classic R2.2 Wall	7127122	1140 x 560	90	13.4	15.8	✓
R2.2	Pink® Batts® Steel R2.2 Wall	7160214	1220 x 610	90	15.6	15.6	✓
R2.2	Pink® Batts® R2.2 Narrow Wall	7160243	1140 x 360	90	9.0	11.2	✓
R2.4	Pink® Batts® Classic R2.4 Wall	7127124	1140 x 560	90	10.2	12.1	✓
R2.6	Pink® Batts® Ultra® R2.6 Wall	7127126	1140 x 560	90	9.6	11.3	✓
R2.6	Pink® Batts® Ultra® Steel R2.6 Wall	7160215	1220 x 610	90	9.7	9.7	✓
R2.6	Pink® Batts® Ultra® R2.6 Narrow Wall	7160244	1140 x 360	90	7.4	9.2	✓
R2.8	Pink® Batts® Ultra® R2.8 Wall	7127128	1140 x 560	90	6.4	7.5	✓
R2.8	Pink® Batts® Ultra® R2.8 Narrow Wall	7160247	1140 x 360	90	4.5	5.6	✓
<b>140mm Wall Range</b>							
R3.2	Pink® Batts® Ultra® R3.2 140mm Wall	7127132	1140 x 560	140	9.6	11.3	✓
R3.2	Pink® Batts® Ultra® R3.2 140mm Narrow Wall	7160245	1140 x 360	140	7.0	8.6	✓
R3.6	Pink® Batts® Ultra® R3.6 140mm Wall	7127136	1140 x 560	140	7.0	8.3	✓
R4.0	Pink® Batts® Ultra® R4.0 140mm Wall	7127140	1140 x 560	140	5.1	6.0	✓
R4.0	Pink® Batts® Ultra® R4.0 140mm Narrow Wall	7160246	1140 x 360	140	4.1	5.0	✓
<b>ROOF and WALL - Thermal Insulation</b>							
R2.4	Pink® Batts® HandyPack R2.4 <sup>^</sup>	7200158	7000 x 580	90	4.06	-	

\*Coverage relates to standard structures (ie with framing allowance) therefore actual coverage may vary.  
 For full details of the Pink® Batts® Lifetime Warranty visit [pinkbatts.co.nz/lifetime-warranty](http://pinkbatts.co.nz/lifetime-warranty).  
 Product does not have the Pink® Batts® Lifetime Warranty or BRANZ Appraised Accreditation.

## Storage and Maintenance

Pink® Batts® insulation should be protected from damage and weather. Store under cover in clean, dry conditions. The installed product should remain dry at all times. If the product becomes wet or damp, the source of dampness (e.g. leak in building) should be repaired and any wet or damp insulation should be removed and replaced with new insulation of an equivalent R-value.

## Disposal of bags

Recyclable LLDPE bags are used for packaging of Pink® Batts® insulation.  
For further details download the relevant product data sheet from [pinkbatts.co.nz](http://pinkbatts.co.nz)

## Accreditations/Appraisals/Certifications



### DISTRIBUTED BY

Tasman Insulation New Zealand Ltd  
9-15 Holloway Place, Penrose, Auckland,  
New Zealand

This document supersedes all previous versions and may have been superseded; is a guide only and the purchaser should ascertain the suitability of this product for the end-use situation intended and when used in conjunction with other products; and is provided without prejudice to Tasman Insulation New Zealand Ltd (Tasman) standard terms of sale. Tasman retains the right to change specifications without prior notice. Refer to [www.pinkbatts.co.nz](http://www.pinkbatts.co.nz) or consult Tasman for further information. Do not use this product for any application not detailed in this document. All claims about this product are subject to any variation caused by normal manufacturing process and tolerances. The liability of Tasman and its employees and agents for any errors or omissions in this document or otherwise in relation to the product is limited to the fullest extent permitted by law. Except where the consumer acquires the goods for the purposes of a business, any rights a consumer may have under the Consumer Guarantees Act are not affected. The colour PINK and Pink® are registered trademarks of Owens Corning used under license by Tasman Insulation. Batts® is the registered trade mark of Tasman Insulation.



Always.





## INSTALLATION INSTRUCTIONS

# Roof

## PINK® BATTS® CEILING INSULATION

### Installation Instructions

Correct installation with no compression, gaps or folds is critical to ensure Pink® Batts® ceiling insulation performance is not compromised.

#### Safety:

Each installation is unique so prior to installation check for all hazards that may cause injury:

- Carry out any required repair work before starting installation
- Ensure there's adequate lighting to identify any hazards
- Treat all electrical cables as live, being careful not to cut or expose cables and wires
- Beware of other sharp objects (protruding nails, splinters etc.), pests (bees and wasps), loose boards and pipe work

- Avoid installing during the warmest part of the day. The roof cavity temperature can increase to uncomfortable levels

- Do not stand on ceiling or ceiling battens

**Note:** Seek professional advice if you are unsure how best to isolate the hazard or have a professional installer carry out the work on your behalf.

We recommend PinkFit® professional installers. PinkFit® are a nationwide network of professional installers who guarantee that their completed installation will meet the requirements of NZS 4246:2016.

Call **0800 746 534** for your local PinkFit® installer

**Installation:**

Any slight irritation to exposed skin caused by the fibres in glass wool, or through their inhalation, is harmless and temporary.

However for your comfort while installing, it's recommended you wear:

- Loose fitting work clothes which cover the arms and legs
- Covered shoes
- Dust mask
- Safety glasses

For safety while installing, it's recommended you use:

- Cut resistant gloves (if knife is used)
- Kneepads (for retrofitting)

For an efficient installation, the following tools are recommended:

- Stable working platform (for new build)
- Kneeling board or planks (for retrofitting)
- Knife
- Tape measure
- Install rod for tight spaces
- Head torch (for retrofitting)

For retrofitting, take into consideration:

- Using planks laid across joists to walk and work on
- Leveling and refitting any existing insulation if required with correct clearances
- Removing any damp insulation
- Starting installation at the point furthest away from the ceiling access hole

To ensure Pink® Batts® ceiling insulation performance isn't compromised, confirm the correct product and R-value is used in ceiling applications.

- Ensure the product is installed dry
- Friction fit product between framing, ensuring there are NO gaps, folds or compression of the product to achieve optimal performance
- If cutting is required, cut oversize by 5-10mm to ensure a good friction fit
- Ensure that Pink® Batts® ceiling segments are firmly butted against each other
- For retrofitting, install over timber where insulation already exists or where appropriate. Any open air pockets beside joist/truss cord ends at the roof perimeter to be blocked off with insulation off-cuts
- Fit Pink® Batts® insulation beneath electrical wiring and plumbing work. Minimise tucks
- Install to the outer edge of the top plate covering at least 50% of it while ensuring minimal overflow to the eaves
- Maintain a 25mm gap clearance between the Pink® Batts® insulation and any roofing material. If required, to maintain 25mm clearance, trim insulation or use a thinner product around the perimeter
- Insulate access hole cover and secure in place with strapping or glue
- Remove excess material

**Unlined Walls in Roof Cavities**

- **Pink® Batts® Wall** or **Pink® Batts® HandyPack insulation** should be secured in place by using horizontal strapping (max spacing of 300mm)



**Tip:** To verify Building Code Compliance, staple a product label at an easy to find location away from any hot items such as downlights or water cylinders e.g. on truss/rafter above ceiling access hole and hot water cupboard.



**Note:** Pink® Batts® ceiling insulation shall not be installed in a roof space where foil has been installed as a roof underlay.

Refer to NZS 4246:2016 for full details.



## Clearances

Follow the clearances specified by the manufacturer; if they are not known then:

### Recessed Luminaire

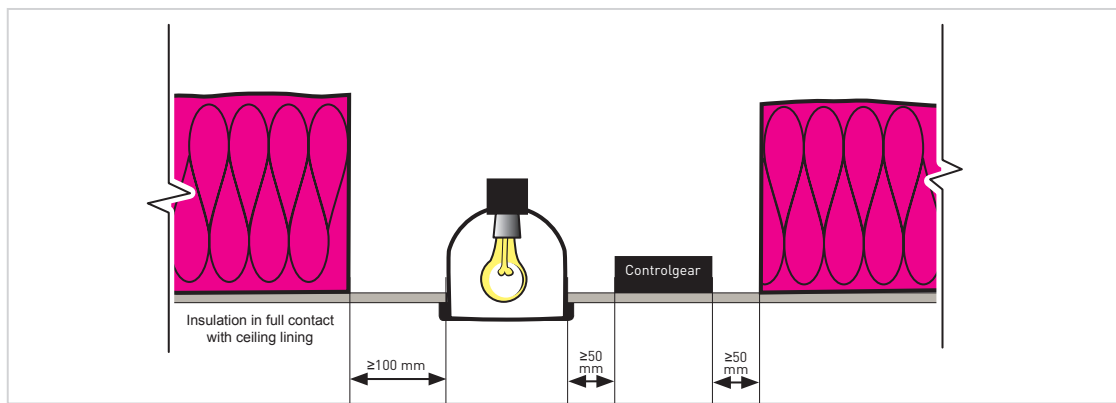
- CA rated recessed luminaires - Nil, however do not install insulation on top of the recessed luminaire
- IC rated recessed luminaires - Nil, insulation can be installed over the top of the recessed luminaire
- Unmarked - Minimum 100mm

**Surface Mounted Luminaire** - Minimum clearance 200mm; however it does not apply if the insulation is permanently shielded.

### Controlgear

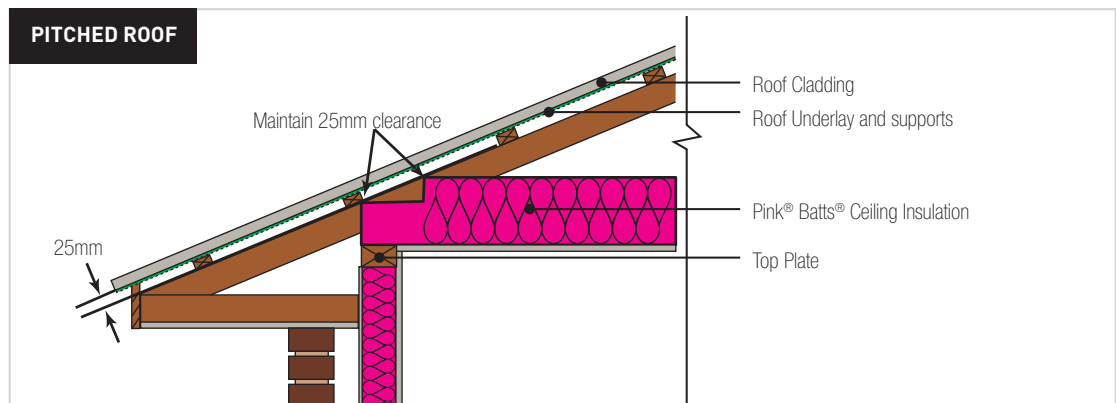
- If possible place it on top of the insulation and leave a minimum clearance of 50mm between controlgear and luminaire
- If not possible to place it on top of the insulation and leave 50mm from the insulation to the controlgear

Controlgear **shall not** sink into the insulation.



Unmarked luminaire and controlgear not placed on top of Pink® Batts® ceiling products.

- Built in appliances - Minimum 50mm
- Enclosures containing electrical equipment - Minimum 50mm
- Fan/heat/light unit - Minimum 100mm
- Ventilation systems - Minimum 50mm
- Unducted mechanical fan units - Minimum 200mm
- Unducted passive vents that remain functional - Minimum 200mm
- Metal chimney and flues - Minimum 75mm
- Brick chimney - Minimum 50mm
- Roof underlay - Minimum 25mm



**Note:** Pink® Batts® ceiling insulation can be installed from below when the ceiling is to be lined or replaced

**\*Caution:** Electrical cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989.

**pink batts®**

**Always.**

## Product Specifications

## ROOF - Thermal Insulation

		PRODUCT CODE	SIZE (mm)	NOMINAL STABILISED THICKNESS (mm)	NOMINAL TOTAL AREA PER BALE (m <sup>2</sup> )	APPROX. COVERAGE PER BALE* (m <sup>2</sup> )	ENVIRONMENTAL CHOICE
R1.8	Pink® Batts® Classic R1.8 Ceiling	7110118	1220 x 432	95	13.7	14.4	✓
R2.2	Pink® Batts® Classic R2.2 Ceiling	7110122	1220 x 432	115	12.6	13.3	✓
R2.6	Pink® Batts® Classic R2.6 Ceiling	7110126	1220 x 432	140	10.5	11.1	✓
R3.2	Pink® Batts® Classic R3.2 Ceiling <sup>‡</sup>	7110132	1220 x 432	170	8.4	8.8	✓ <sup>‡</sup>
R3.2	Pink® Batts® Skillion Roof R3.2	7110232	1220 x 432	115 max	3.7	3.9	✓
R3.6	Pink® Batts® Classic R3.6 Ceiling <sup>‡</sup>	7110136	1220 x 432	180	7.4	7.7	✓ <sup>‡</sup>
R3.6	Pink® Batts® Skillion Roof R3.6	7110236	1220 x 432	165 max	6.3	6.6	✓
R4.0	Pink® Batts® Ultra® R4.0 Ceiling	7110140	1220 x 432	195	6.3	6.6	✓
R5.0	Pink® Batts® Ultra® R5.0 Ceiling	7110150	1220 x 432	220	4.2	4.4	✓
R6.0	Pink® Batts® Ultra® R6.0 Ceiling	7110160	1220 x 432	235	3.7	3.9	✓
R6.3	Pink® Batts® Ultra® R6.3 Ceiling	7110163	1220 x 432	250	3.2	3.3	✓
R7.0	Pink® Batts® Ultra® R7.0 Ceiling	7110170	1220 x 432	260	2.6	2.8	✓

## ROOF - Thermal Retrofit Insulation

R2.9	Pink® Batts® R2.9 Retrofit Ceiling	7110129	1220 x 432	150	9.5	10.0	✓
R3.3	Pink® Batts® R3.3 Retrofit Ceiling	7110133	1220 x 432	175	8.4	8.8	✓

## ROOF and WALL - Thermal Insulation

R2.4	Pink® Batts® HandyPack R2.4 <sup>^</sup>	7200158	7000 x 580	90	4.06	-	
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\* Coverage relates to standard structures (ie with framing allowance) therefore actual coverage may vary.

† This product is manufactured in both New Zealand and Australia. Environmental Choice New Zealand applies to New Zealand made product only.

‡ For full details of the Pink® Batts® Lifetime Warranty visit [pinkbatts.co.nz/lifetime-warranty](http://pinkbatts.co.nz/lifetime-warranty).

^ Product does not have the Pink® Batts® Lifetime Warranty or BRANZ Appraised Accreditation.

## Storage and Maintenance

Pink® Batts® insulation should be protected from damage and weather. Store under cover in clean dry conditions. The installed product should remain dry at all times. If the product has become wet or damp, the source of the dampness (e.g. leak in roof) should be repaired immediately and any wet or damp insulation should be removed and replaced with new product of an equivalent R-value.

## Disposal of bags

Recyclable LLDPE bags are used for packaging of Pink® Batts® insulation. For further details download the relevant product data sheet from [pinkbatts.co.nz](http://pinkbatts.co.nz)



## Accreditations/Appraisals/Certifications



‡ R3.6 ceiling product is manufactured in both New Zealand and Australia. Environmental Choice New Zealand applies to New Zealand made products only.  
# For full details of the Pink® Batts® Lifetime Warranty visit [pinkbatts.co.nz](http://pinkbatts.co.nz)

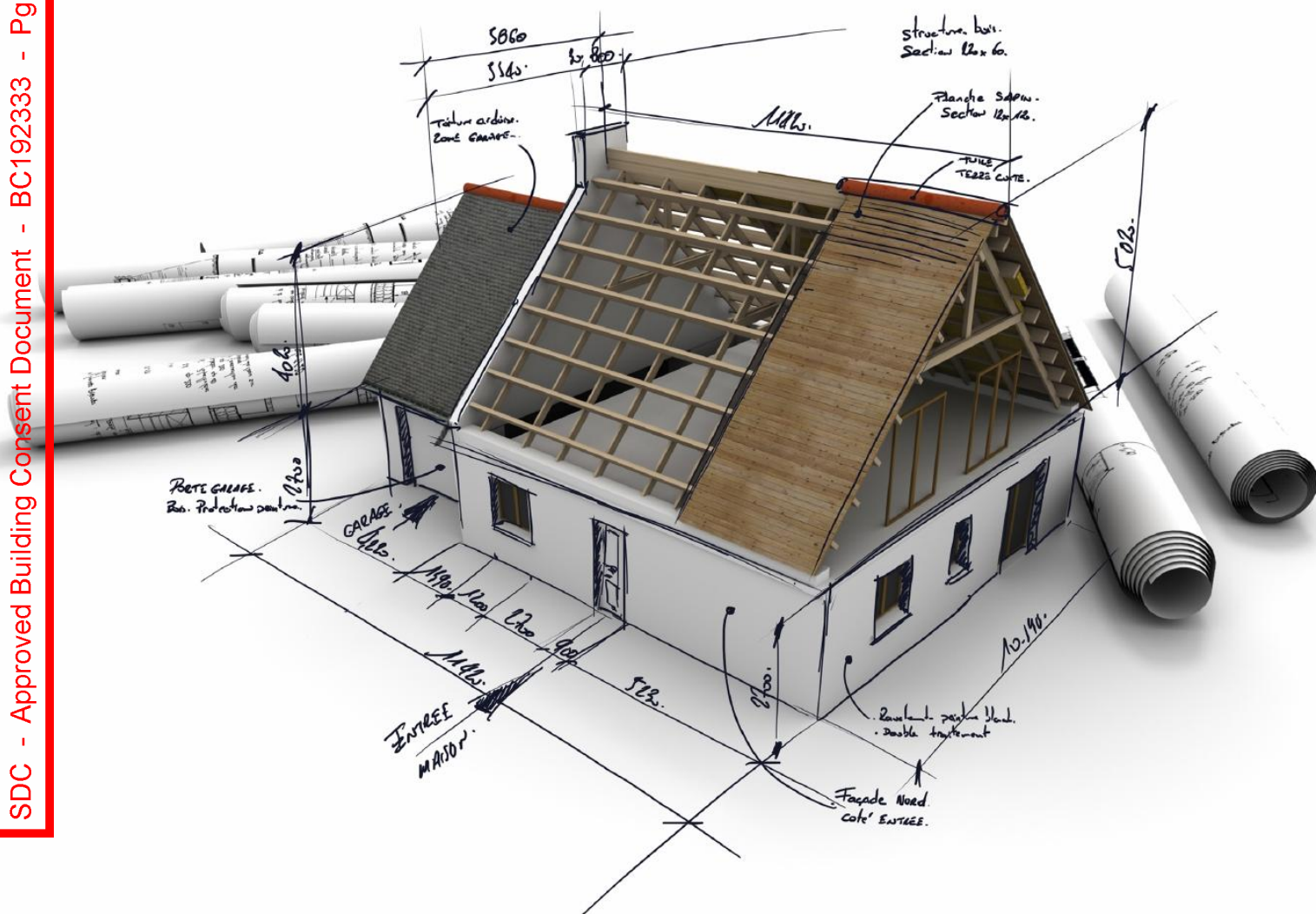


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New Zealand

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**Always.**



## Contents

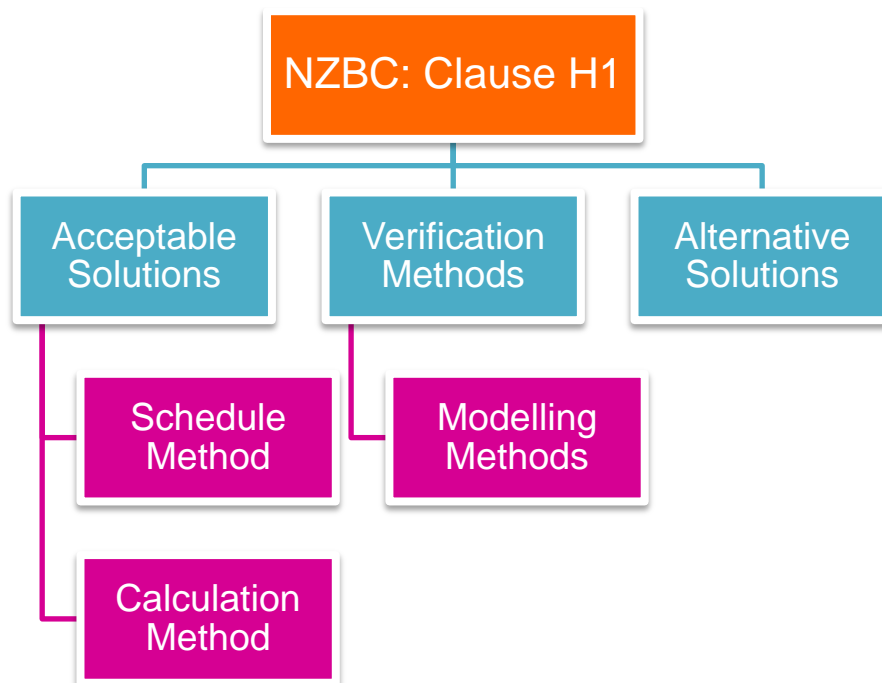
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## 1.0 Introduction

The main objective of clause H1 in the New Zealand building code is to facilitate efficient use of energy. It applies to all residential dwellings and all other buildings less than 300m<sup>2</sup>. The change in the code now sees us building more sustainable homes with higher levels of insulation than we have ever had. This higher level of insulation reduces heat lost when heating, and heat gain when cooling buildings.

## 2.0 Compliance

There are several methods with which compliance can be met as show below:



Using an **Acceptable Solution** will automatically comply with the building code.

The **Verification method** will provide a means of verifying a building complies with the Building Code.

An **Alternative solution** allows designers to offer an alternative means of showing compliance. For example use of an international standard that is proven to be equivalent to the NZBC requirements.

### 3.0 NZBC Clause H1 and Climate Zones

The NZBC: Clause H1 divides New Zealand into 3 different climate zones as shown below-

**Climate zone 1** - specified Northland, Auckland, and the Thames-Coromandel districts in the North Island, the Kermadec Group of Islands, and other land territories, islands, and islets north of the 42nd parallel.

**Climate zone 2** - land territories, islands, and islets within the internal waters of New Zealand but not in climate zone 3 or climate zone 1.

**Climate zone 3** - the South Island, the Taupo and Ruapehu Districts, the Rangitikei District from just north of the 40<sup>th</sup> parallel, the Chatham Islands, Stewart Island, and other land territories, islands, and islets south of the 42nd parallel.





The NZBC Clause H1 Table1 details the construction R-value for each climate zone to meet the requirement of the NZBC. Construction R-values, take into account thermal bridging, cladding materials and other factors, and as shown below **the R-value of the insulation itself is *not* the same as the final construction R-value.**

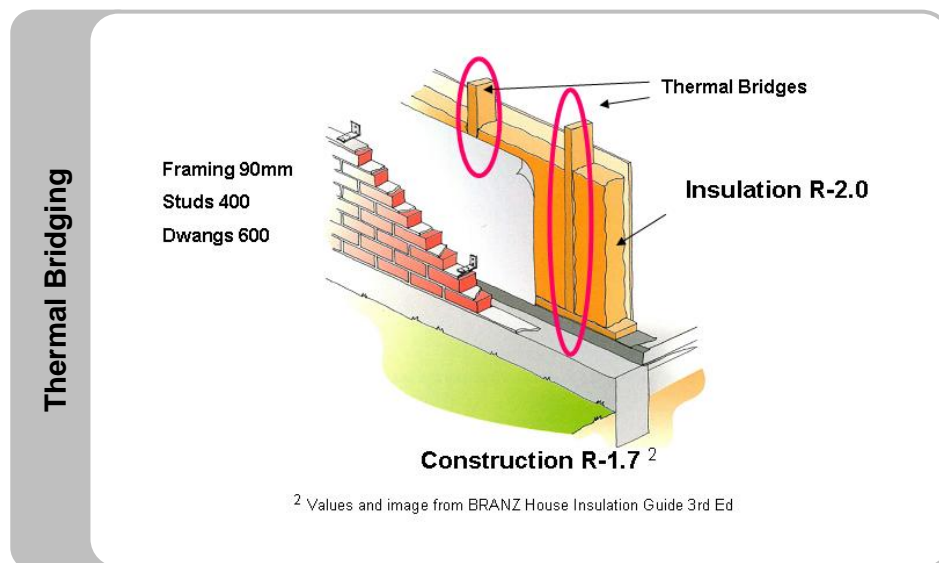
Replacement Table 1:	Non-solid construction – minimum R-values for schedule method (only where area of glazing is 30% or less of total wall area)		
Building thermal envelope component	Minimum R-values (m <sup>2</sup> °C/W)		
	Climate zone 1	Climate zone 2	Climate zone 3
Roof	R 2.9	R 2.9	R 3.3
Wall	R 1.9	R 1.9	R 2.0
Floor	R 1.3	R 1.3	R 1.3
Glazing (vertical)	R 0.26	R 0.26	R 0.26
Glazing (skylights)	R 0.26	R 0.26	R 0.31

Table 1

To download the clause including all the tables and associated notes visit [www.dbh.govt.nz](http://www.dbh.govt.nz).

#### Thermal bridging and Construction R-values

Thermal bridging occurs where building elements with a low thermal resistance reduce the effect of the overall R-value of the building construction insulation the diagram below shows how timber framing provides a thermal bridge. Construction R-values takes thermal bridging into account to provide an accurate R-value of the entire system



## 4.0 Compliance Methods

The following sections explain each of the Acceptable solutions (Schedule and Calculation) and the Verification method (Modelling) in greater detail.

### A. Acceptable solution: Schedule Method

This section explains in greater detail how compliance may be met using the Schedule method.

The Schedule method can be used to meet minimum construction R-values and take into account:

- Climate zone
- Construction method
- Insulation material R-value
- Thermal bridging

The tables of the following pages have been developed to assist in determining insulation R-values based on the schedule method and should be read in conjunction with NZBC Clause H1 and NZS 4218:2009.

The R-value listed in each of the following tables are the insulation R-values required to achieve compliance for each common construction type. It has been determined by taking into account all the typical variations of that particular construction type. The R-value stated will assist in meeting compliance with the NZBC Clause H1 for any of the typical variants. Please note this is a guide only. Exact R-values can be calculated according to NZS 4214:2006.

## ROOF – Insulation R-values required for various claddings and climate zones

Roof Cladding Details		Zone 1 & 2 (non solid wall) (Minimum Construction R-value = R 2.9)	Zone 3 (non solid wall) (Minimum Construction R-value = R 3.3)	Zone 3 (solid wall) (Minimum Construction R-value = R 3.5)
Profiled Steel	Pitched	R 3.2	R 3.8*	R 4.2
	Skillion	R 3.2	R 3.6	R 3.8
	Low Slope Timber Frame	R 3.2	R 3.6	R 3.8
Concrete / Clay Tiles	Pitched	R 3.2	R 3.8*	R 4.2
	Skillion	R 3.0	R 3.4	R 3.6
	Low Slope Timber Frame	-	-	-
Membrane	Pitched	-	-	-
	Skillion	-	-	-
	Low Slope Timber Frame	R 3.0	R 3.4	R 3.8

NOTES- (The following is based on 2007 information. Refer to NZS 4218:2009 for the latest information to be taken into consideration)

These insulation guidelines take into consideration Timber Framed Building designs (NZS 3604) and their respective framing spacing and cladding types to assist in meeting the minimum NZBC H1 Energy Efficiency (2007) requirements. To achieve higher performance, reference can be made to the better/best classification of PAS 4244.

This information is applicable if:

- the total glazing area is 30% or less than the total wall area,
- the sum of the glazing area is 30% or less than the external west, east and south facing wall area,
- total skylight area is less than 1.2m<sup>2</sup>,
- all residential buildings and building up to 300m<sup>2</sup>,
- non CA rated downlights used are less than 1 per 5m<sup>2</sup> of ceiling,
- insulation installed to NZS 4246.

If these criteria are not met, please consult with your building designer for Calculation and Modelling method (NZS 4218) to ensure compliance to the NZ Building Code. The R-value guidelines determined from the Schedule Method (NZS 4218) are **minimum** insulation levels recommended by Tasman Insulation New Zealand to cover a **range of similar framing systems**.

Lower levels of insulation R-value than those indicated may apply for some framing systems. **We strongly recommend a detailed analysis specific to your construction is carried out by a building designer, or alternatively use the table above to select insulation R-values to ensure compliance to the NZ Building Code.**

\* While Pink® Batts® insulation is manufactured in an extensive range of R-values it is not possible to cover all specific designs. In some instances a higher R-value than indicated may need to be specified.

## WALL- Insulation R-values required for various claddings and climate zones

Wall Cladding Details		Zone 1 & 2 (Minimum Construction R-value = R 1.9)	Zone 3 (Minimum Construction R-value = R 2.0)
Brick	Masonry Veneer	R 2.6	R 2.8
Weatherboard	Bevel Back Rusticated Fibre Cement (direct fixed only)	R 2.6	R 2.8
Monolithic	Stucco with Rigid Backing (cavity only)	R 2.8	R 2.8
	EIFS Direct fixed and Cavity	R 1.8*	R 1.8*
Metal	Vertical Profile (direct fixed only) Horizontal Profile (cavity only)	R 2.6	R 2.8
Sheet Cladding	Non Metal (direct fixed only)	R 2.8	R 2.8

**NOTES - (The following is based on 2007 information. Refer to NZS 4218:2009 for the latest information to be taken into consideration)**

These insulation guidelines take into consideration Timber Framed Building designs (NZS 3604) and their respective framing spacing and cladding types to assist in meeting the minimum NZBC H1 Energy Efficiency (2007) requirements. To achieve higher performance, reference can be made to the better/best classification of PAS 4244.

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- all residential buildings and building up to 300m<sup>2</sup>,
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Lower levels of insulation R-value than those indicated may apply for some framing systems. **We strongly recommend a detailed analysis specific to your construction is carried out by a building designer, or alternatively use the table above to select insulation R-values to ensure compliance to the NZ Building Code.**

\*EIFS used with R 1.8 Insulation will generally result in construction R-values above the minimum; EIFS typically have a R-value higher than most common cladding types.

## BRANZ House Insulation Guide

Alternatively the *BRANZ House Insulation Guide* provides in greater detail the *Insulation R-values* required to achieve *Construction R-values*. Visit [http://www.branz.co.nz/H1\\_support](http://www.branz.co.nz/H1_support) for further information.

## B. Acceptable solution: Calculation Method

The Calculation method:

- Allows for buildings with mixed construction types.
- Uses reference building to calculate minimum construction R-values.

$$HL = \frac{A_{ROOF}}{R_{ROOF}} + \frac{A_{WALL}}{R_{WALL}} + \frac{A_{FLOOR}}{R_{FLOOR}} + \frac{A_{GLAZING}}{A_{GLAZING}}$$

An easy to use spreadsheet can be downloaded from BRANZ

[http://www.branz.co.nz/H1\\_support#calculation](http://www.branz.co.nz/H1_support#calculation)

The Heat Loss (*HL*) of the proposed building must be less than the *HL* of the reference building.

Where *A* is the area of the building element and *R* is the **Construction R-value**.

Refer to **NZS4218:2009 Thermal Insulation- Housing and Small Buildings** for further details and worked examples.

## C. Verification Method: Modelling Method

The modelling method can be used to verify your design complies with the requirement of NZBC Clause H1. The software used must meet the requirements set out in NZS 4218

- The software programmes take into account many factors including the building design, location, environment, orientation, heating loads etc.
- Modelling is required for complicated designs and where glazing is > 50% of total wall area.
- Examples of modelling programmes are:
  - SUNREL
  - BRANZ ALF Method ( Annual Loss Factor) software programme

### ***Still not sure about these changes***

Email [pinkbatts@pinkbatts.co.nz](mailto:pinkbatts@pinkbatts.co.nz) with H1 in the subject heading

or

Phone **0800 PINKBATTS** and ask for the H1 helpdesk

For further product information please visit [www.pinkbatts.co.nz](http://www.pinkbatts.co.nz)

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MAY 2010 RevA 3010



**BRANZ Appraised**  
Appraisal No. 648 [2016]

**EARTHWOOL  
GLASSWOOL  
INSULATION**

Appraisal No. 648 [2016]

This Appraisal replaces BRANZ  
Appraisal No. 648 [2009]

### BRANZ Appraisals

Technical Assessments of products  
for building and construction.



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[branz.co.nz](http://branz.co.nz)



## Product

- 1.1 Earthwool glasswool insulation is a range of thermal insulating material manufactured from ECOSE Technology resin bonded glass wool fibres. The insulation is pre-cut to suit a wide range of thermal insulation requirements and framing set-outs in walls, roofs and ceilings of buildings.

## Scope

- 2.1 Earthwool glasswool insulation has been appraised as a thermal insulation material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings.

## Building Regulations

### New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Earthwool glasswool Insulation 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 B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years and B2.3.1 (b) 15 years. Earthwool glasswool insulation will meet these requirements. See Paragraph 8.1.

**Clause E3 INTERNAL MOISTURE:** Performance E3.3.1. Earthwool glasswool insulation will contribute to meeting this requirement. See Paragraphs 13.1 and 13.2.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Earthwool glasswool insulation meets this requirement and will not present a health hazard to people.

**Clause H1 ENERGY EFFICIENCY:** Performance H1.3.1 (a) and H1.3.2 E. Earthwool glasswool insulation will contribute to meeting this requirement. See Paragraphs 14.1 and 14.2.



## Technical Specification

4.1 Earthwool glasswool insulation is an ECOSE Technology resin bonded fibrous glass wool insulation. It is manufactured from recycled and/or virgin glass and ECOSE Technology resin and is formed into segments, blankets and rolls. Earthwool glasswool insulation is available as set out in Table 1.

**Table 1: Earthwool glasswool insulation product range**

R-value	Nominal Thickness [mm]	Length [mm]	Width [mm]	Nett Area [m <sup>2</sup> ]	Density [kg/m <sup>3</sup> ]
<b>Acoustic</b>					
1.3	50	2700	600	32.4	11.0
1.4	50	1160	430	18.9	14.0
1.4	50	1160	450	19.8	14.0
1.4	50	1160	580	25.6	14.0
1.4	50	1160	600	26.4	14.0
1.9	75	2700	600	22.7	11.0
2.0	75	1160	430	11.9	14.0
2.0	75	1160	450	12.5	14.0
2.0	75	1160	580	16.1	14.0
2.0	75	1160	600	16.7	14.0
<b>Wall Segments</b>					
2.2	90	1160	580	19.5	10.8
2.4	90	1160	580	13.4	14.5
2.6	90	1160	430	6.9	20.3
2.6	90	1160	580	9.4	20.3
2.8	90	1160	430	4.9	29.1
2.8	90	1160	580	6.7	29.1
3.2	140	1160	580	14.8	9.3
3.6	140	1160	580	10.0	13.4
4.1	140	1160	580	6.1	21.0
<b>Ceiling Segments</b>					
2.7	125	1160	430	12.0	8.8
3.2	150	1160	430	10.0	8.7
3.2^	105	1160	430	5.5	23.3
3.6	175	1160	430	10.5	7.3
3.6	175	1200	600	15.1	7.3
4.1	195	1160	430	8.9	7.7
5.2	210	1160	430	5.5	11.2
6.3	275	1160	430	5.5	9.0
<b>Ceiling Rolls</b>					
1.8	70	13,500	1200	16.2	12.1
2.9	115	8500	1200	10.2	12.2
3.2	135	8000	1200	9.6	11.0
3.6	150	7000	1200	8.4	11.0



**Table 1: Earthwool glasswool insulation product range cont...**

R-value	Nominal Thickness [mm]	Length [mm]	Width [mm]	Nett Area [m <sup>2</sup> ]	Density [kg/m <sup>3</sup> ]
<b>Handy Rolls</b>					
2.2	90	18,000	430	7.7	10.7
2.2	90	18,000	580	10.4	10.7
<b>DriTherm Masonry Wall Insulation</b>					
1.5	50	1100	600	5.3	29.5
<b>Commercial Rolls</b>					
1.4	55	37,000	1200	44.4	11.1
1.6	60	28,000	1200	33.6	13.4
1.9	75	26,000	1200	31.2	11.6
2.4	100	22,000	1200	26.4	10.2
2.6	105	18,500	1200	22.2	11.5
3.1	120	14,500	1200	17.4	13.1
3.3	130	13,500	1200	16.2	12.7

Note: ^ Skillion Roof

- 4.2 Earthwool glasswool insulation is brown in colour and is packaged in pre-printed plastic compression bags with labelling in compliance with AS/NZS 4859.1.
- 4.3 Accessories used with Earthwool glasswool insulation, which are supplied by the insulation installer, are plastic strapping and fixings.

## Handling and Storage

- 5.1 Earthwool glasswool insulation must be stored under cover and in dry conditions. Heavy objects must not be stacked on the packs. The packs must be stored in an orientation that avoids excessive compression of the product.
- 5.2 In general, insulation products are sensitive to the length of time they are stored under compression packaging. Product that does not recover to its nominal thickness may not achieve the stated R-value.

## Technical Literature

- 6.1 Refer to the Appraisal listing on the BRANZ website for details of the current Technical Literature for Earthwool glasswool insulation. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 Earthwool glasswool insulation is intended for use as thermal insulation to meet the requirements of the NZBC. Earthwool glasswool insulation can be used to meet the minimum schedule method R-values of NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Greater construction R-values can be achieved where specific design is used. For construction R-values, refer to the BRANZ House Insulation Guide. Product R-values and dimensions are given in Table 1.
- 7.2 Earthwool glasswool insulation thermal resistance [R-value] has been determined by testing to AS/NZS 4859.1, which is an acceptable method in NZBC Acceptable Solution H1/AS1.

- 7.3 Earthwool glasswool insulation segment, blanket and roll products are designed to be friction-fitted between wall, ceiling or roof framing. They can also be laid directly on a ceiling lining, or over ceiling battens or joist/truss chords. In other horizontal situations, the insulation must be adequately supported by a suitable durable material. Earthwool glasswool skillion roof insulation is designed to be friction-fitted between rafters.
- 7.4 Where the insulation is installed in exterior walls, the insulation material nominal thickness must be selected to provide a snug close fit which touches all sides of the insulation cavity between the wall underlay and the interior wall lining.
- 7.5 When the insulation is installed in a wall with a drained cavity, it is recommended that specific wall products with a controlled nominal thickness be used. Where the stud spacings are greater than 450 mm, an intermediate means of restraining the insulation from bulging into the cavity must be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.
- 7.6 To prevent moisture transfer and to provide roof ventilation, a separation of 25 mm minimum is required between the insulation and any rigid substrate or flexible roof underlay. Selecting the specifically designed skillion roof insulation product with a controlled thickness can assist with this requirement.
- 7.7 The building envelope must be constructed to ensure the insulation remains dry during installation and throughout the life of the building.
- 7.8 The clearance requirements for heating appliances and downlights must be met and reference made to the manufacturers instructions and NZS 4246. See Paragraphs 10.1 - 10.3.

### **Durability**

#### **Serviceable Life**

- 8.1 Where the building is maintained so that the provisions of the NZBC E2 and E3 Clauses are met, and where the insulation is not crushed or exposed to conditions that will diminish its thermal performance, Earthwool glasswool insulation can expect to have a serviceable life of at least 50 years.

### **Maintenance**

- 9.1 Insulation that has become damp must be removed and the cause of dampness repaired. Cavities must be clean and dry before fitting new insulation of an equivalent thermal rating. NZS 4246 gives guidance on thermal insulation maintenance due to water damage.

### **Prevention of Fire Occurring**

- 10.1 Earthwool glasswool insulation is considered a non-combustible material and need not be separated from heat sources such as fire places, flues and chimneys. However, when used in conjunction with or attached to heat sensitive materials, the heat sensitive material must be separated from fire places, heating appliances, flues and chimneys in accordance with the requirements of Part 7 of NZBC Acceptable Solutions C/AS1 to C/AS6 and NZBC Verification Method C/VM1.

#### **Downlights**

- 10.2 Recessed luminaires shall be of a type and be installed in accordance with NZBC Acceptable Solutions C/AS1 to C/AS6, Section 7.4.
- 10.3 Insulation materials must maintain a clearance of 100 mm to undefined recessed luminaires in existing buildings.

### **Control of Internal Fire and Smoke Spread**

- 11.1 Earthwool glasswool insulation has been classified non-combustible when tested to AS 1530.1 and can therefore be assigned a material Group Number of 1-S. Unless foamed plastic building materials are also used as part of the wall or ceiling construction, there are no internal surface finish requirements in Risk Group SH in accordance with NZBC Acceptable Solution C/AS1, Paragraph 4.2. When used in an occupied space, Earthwool glasswool insulation does not need to be enclosed in any Risk Group. Refer to NZBC Acceptable Solutions C/AS2 to C/AS6 for the specific internal surface requirements for walls or ceilings in other Risk Groups.

### External Moisture

- 12.1 The total building envelope must be weathertight and comply with the requirements of NZBC Clause E2 to ensure that the insulation remains dry in use.
- 12.2 The moisture content of the construction materials at the time of installing and enclosing the insulation must meet the requirements of NZBC Acceptable Solution E2/AS1 Paragraph 10.2 (a) or lower moisture content if required by the lining manufacturer.

### Internal Moisture

- 13.1 Buildings must provide an adequate combination of thermal resistance, ventilation and space temperature to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate. This does not apply to Communal Non-residential, Commercial, Industrial, Outbuildings or Ancillary buildings.
- 13.2 Roofs and walls of housing complying with the Schedule Method for Compliance with Clause H1.3.2 E will have adequate thermal resistance. Other buildings may require more thermal insulation to satisfy the requirements of NZBC Acceptable Solution E3/AS1 than that to satisfy the energy efficiency provisions alone.

### Energy Efficiency

- 14.1 Earthwool glasswool insulation will contribute to meeting the requirements of NZBC Clause H1 Performance H1.3.1 (a) and H1.3.2 E by compliance with NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Refer to Paragraphs 7.1 - 7.7.
- 14.2 Earthwool glasswool insulation R-values have been determined by BRANZ testing to AS/NZS 4859.1 and are given in Table 1.

## Installation Information

### Installation Skill Level Requirements

- 15.1 Installation of Earthwool glasswool insulation must be completed by an installer with an understanding of insulation installation.

### General

- 16.1 Installation of Earthwool glasswool insulation must be in accordance with the Technical Literature, Installation Instructions and this Appraisal. NZS 4246 should be used as a guide for installing insulation in residential buildings.
- 16.2 The product must be installed only when the building is enclosed and when the construction materials have achieved the required maximum moisture content or less.
- 16.3 Earthwool glasswool insulation must be released from the packaging and allowed to re-loft prior to installation. The time to loft will depend upon the length of time the product has been packaged and stored.
- 16.4 Earthwool glasswool insulation is supplied in segments, blanket and roll form (Table 1) to suit framing layouts. The segment products are sized to fit between standard framing centres. The product is able to be cut to suit wall cavities and when fitted between roof or ceiling framing. The insulation must be neatly friction-fitted between framing members so that the potential for gaps and convective heat loss is reduced. In wall cavities the insulation must be neatly friction-fitted between framing members to prevent sagging. In ceilings or roofs, the insulation may be fitted between framing members or fitted over framing members and butted tightly. The insulation must extend to the external wall plate. The insulation must not be folded, tucked or compressed. A close, even fit provides the most efficient thermal performance. Whenever possible, the insulation should be fitted beneath wiring or plumbing.
- 16.5 The clearance requirements for heating appliances, and downlights must be followed. Refer also to NZS 4246.

### Inspections

- 16.6 The Technical Literature, this Appraisal and NZS 4246 must be referred to during the inspection of Earthwool glasswool insulation installations.

### Health and Safety

- 17.1 Refer to the Technical Literature and NZS 4246 for guidance on health and safety requirements such as personal protective clothing and installation hazard assessment.

## Basis of Appraisal

The following is a summary of the technical investigation carried out:

### Tests

- 18.1 BRANZ has carried out thermal resistance testing of Earthwool glasswool insulation in accordance with AS/NZS 4859.1.
- 18.2 Tests have been carried out in accordance with AS 1530.1. Earthwool glasswool insulation is not deemed combustible according to the test criteria. The results have been reviewed by BRANZ technical experts.

### Other Investigations

- 19.1 An assessment of the durability of Earthwool glasswool insulation has been made by BRANZ technical experts.
- 19.2 The manufacturer's Technical Literature and Installation Instructions have been reviewed by BRANZ and found to be satisfactory.
- 19.3 The fibre used to manufacture Earthwool glasswool insulation is certified to the European Certification Board for Mineral Wool Products [EUCB].

### Quality

- 20.1 The manufacture of Earthwool glasswool insulation has been examined by BRANZ, including methods adopted for quality control. Details of the manufacturing processes, and quality and composition of the raw materials used were obtained and found to be satisfactory.
- 20.2 Knauf Insulation Pty Limited is responsible for the quality of the product supplied.
- 20.3 Quality of installation of the product on site is the responsibility of the installer.
- 20.4 Quality of maintenance of the building to ensure the insulation remains dry is the responsibility of the building owner.

### Sources of Information

- AS 1530.1: 1994 Combustibility test for materials.
- AS/NZS 4859.1: 2002 Materials for the thermal insulation of buildings.
- NZS 4214: 2006 Method of determining the total thermal resistance of parts of buildings.
- NZS 4246: 2016 Energy efficiency – Installing bulk thermal insulation in residential buildings.
- BRANZ House Insulation Guide, Fifth Edition 2014.
- BRANZ Bulletin Number 525 Preventing moisture problems in timber-framed skillion roofs.
- Compliance Documents for New Zealand Building Code Energy Efficiency Clause H1, Department of Building and Housing, Third Edition, August 2007.
- Ministry of Business, Innovation and Employment Records of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

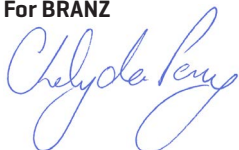
In the opinion of BRANZ, **Earthwool glasswool insulation** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Knauf Insulation Pty Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the Technical Literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. **Knauf Insulation Pty Limited:**
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
  - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by **Knauf Insulation Pty Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Knauf Insulation Pty Limited** or any third party.

For BRANZ



**Chelydra Percy**

Chief Executive

Date of Issue:

01 December 2016

## EARTHWOOL® GLASSWOOL INSULATION: EXTERNAL WALL

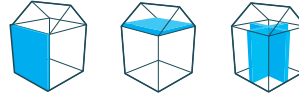
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with **ECOSE** TECHNOLOGY

### APPLICATIONS



### DESCRIPTION

The Earthwool® glasswool insulation: external 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: external wall batt will absorb the transfer of unwanted sound from outside to inside the building. In addition to sound absorption, Earthwool® glasswool insulation: external 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. Super-soft to handle and install, 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

Thermal conductivity:  
Thermal resistance:

ASTM C 518 and AS/NZS 4859.1: 2002.  
ASTM C 653 and AS/NZS 4859.1: 2002.

#### Fire Hazard Properties (AS/NZ 1530.3)

Ignitability: 0, Spread of Flame: 0, Heat Evolved: 0, Smoke Developed: 0-1.

#### 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

- ✓ 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



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## EARTHWOOL® GLASSWOOL INSULATION: EXTERNAL WALL

May 2019

### ADDITIONAL INFORMATION

#### Specification Guide

The wall insulation shall be Earthwool® glasswool insulation: external wall batt R\*, \*mm thick, BRANZ appraised to meet the provisions of the NZBC. The product will be non-combustible, CFC/HCFC free, zero ODP and GWP, Global GreenTag Cert™ 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 9001:2008 and ISO 14001:2004 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 per NZS 4859.1: 2002 Materials used in the Thermal Insulation of Buildings and comply with the New Zealand Building Code requirements: B2 – Durability, E – External Moisture, F2 – Hazardous Building Materials, and H1 – Energy Efficiency, as appraised by BRANZ. The Earthwool® glasswool insulation: external 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.

#### Bi-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 the criteria of the Australian Safety and Compensation Council ASCC Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008 3rd Edition]. As a result of this assessment, Earthwool® glasswool insulation is not classified as hazardous according to the NOHSC criteria.

#### Environmental

Earthwool® glasswool insulation: external wall batt represents no known threat to the environment and have zero Ozone Depletion Potential and zero Global Warming Potential.

#### Proven Performance

- Preferred by professional installers concerned with quality, appearance and productivity.
- 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.

#### 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.



## EARTHWOOL® GLASSWOOL INSULATION: EXTERNAL WALL

May 2019

### SPECIFICATIONS

Product Code	R-Value (m <sup>2</sup> K/W)	Thickness (mm)	Width (mm)	Length (mm)	Pieces per pack	Area per pack (m <sup>2</sup> )	Packs per MasterBag	MasterBags per Supakube
71045	1.4	50	580	1160	38	25.57	4	4
71049	2.0	75	580	1160	24	16.15	4	4
71039	2.4	90	580	1160	20	13.46	4	4
71070	2.6	90	430	1160	14	6.98	5	5
71071	2.6	90	580	1160	14	9.42	4	4
71040	2.8	90	430	1160	10	4.99	5	5
71041	2.8	90	580	1160	10	6.73	4	4
71042	3.2	140	580	1160	22	14.80	4	4
70319	3.6	140	580	1160	15	10.10	4	4
05604	4.1	140	580	1160	9	6.10	4	4

Wood frame

Product Code	R-Value (m <sup>2</sup> K/W)	Thickness (mm)	Width (mm)	Length (mm)	Pieces per pack	Area per pack (m <sup>2</sup> )	Packs per MasterBag	MasterBags per Supakube
29446	1.3	50	600	2700	20	32.40	4	4
29447	1.9	75	600	2700	14	22.68	4	4

Metal frame



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

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KINZ0914114DS

Updated June 2019

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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<sup>2</sup>) to be insulated by multiplying the length by the width or wall height. The number of m<sup>2</sup> of insulation material is clearly marked on each pack. Divide the total area to be insulated by the m<sup>2</sup> 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.

## 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:
  - access to the roof area,
  - working at heights,
  - electrical safety hazards,
  - adequate ventilation of the work area and
  - 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:
  - systems to prevent falling when working at heights.
  - ventilate the working area if possible.
  - cover exposed skin. When working in an unventilated area, wear a disposable face mask.
  - rinse hands in cold water before washing.
  - wear goggles when working overhead.
  - 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.

## INSTALLATION INSTRUCTIONS

### EARTHWOOL® GLASSWOOL INSULATION: CEILING

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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 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

#### STEP 1

- Determine the most suitable product for your project. Ceilings can be insulated using blanket, rolls or segments.
- 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 Knauf Insulation's product guide for the most suitable product for your application.
- To calculate the number of packs needed, determine the area (m<sup>2</sup>) to be insulated by multiplying the length by the width or wall height. The number of m<sup>2</sup> of insulation material is clearly marked on each pack. Divide the total area to be insulated by the m<sup>2</sup> 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 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 AS 3999 and NZS 4246.

#### STEP 3

- Start installing the insulation at the far corners of the ceiling and work your way back towards the ceiling access.
- When installing insulation between ceiling joists, ensure you achieve a snug fit, avoiding any gaps.
- 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. 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. where the roof joins the ceiling), make sure the insulation covers the top plate but is not in contact with the roof. It is important to maintain a 20mm gap between the roofing substrate and the insulation.

#### STEP 4

- Complete the final check of the insulation ensuring all areas have been insulated and that you have an even and consistent layer of insulation.
- Finish your project by removing all packaging from the ceiling and disposing of all rubbish and excess insulation responsibly.

#### STEP 5

- Once you have worked your way back to the ceiling access, make sure you insulate the ceiling access panel before exiting the roof space.

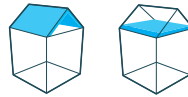
We recommend that once completed another person checks the work to ensure it has been installed according to required standards.

## EARTHWOOL® GLASSWOOL INSULATION: CEILING

May 2019



### APPLICATIONS



### DESCRIPTION

The Earthwool® glasswool insulation: ceiling 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 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. Super-soft to handle and install, Earthwool® glasswool insulation: ceiling 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

Thermal conductivity:  
Thermal resistance:

ASTM C 518 and AS/NZS 4859.1: 2002.  
ASTM C 653 and AS/NZS 4859.1: 2002.

#### Fire Hazard Properties (AS/NZ 1530.3)

Ignitability: 0, Spread of Flame: 0, Heat Evolved: 0, Smoke Developed: 0-1.

#### 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

- ✓ 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



## EARTHWOOL® GLASSWOOL INSULATION: CEILING

May 2019

### ADDITIONAL INFORMATION

#### Specification Guide

The ceiling insulation shall be Earthwool® glasswool insulation: ceiling batt R\*, \*mm thick, BRANZ appraised to meet the provisions of the NZBC. The product will be non-combustible, CFC/HCFC free, zero ODP and GWP, Global GreenTag Cert™ 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 9001:2008 and ISO 14001:2004 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: 2002 Materials used in the Thermal Insulation of Buildings and comply with the New Zealand Building Code requirements: B2 – Durability, E – 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.

#### Bi-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 the criteria of the Australian Safety and Compensation Council ASCC Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008 3rd Edition]. As a result of this assessment, Earthwool® glasswool insulation is not classified as hazardous according to the NOHSC criteria.

#### Environmental

Earthwool® glasswool insulation: ceiling batt represents no known threat to the environment and have zero Ozone Depletion Potential and zero Global Warming Potential.

#### Proven Performance

- Preferred by professional installers concerned with quality, appearance and productivity.
- 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.

#### 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.



## EARTHWOOL® GLASSWOOL INSULATION: CEILING

May 2019

### SPECIFICATIONS

Product Code	R-Value (m <sup>2</sup> K/W)	Thickness (mm)	Width (mm)	Length (mm)	Pieces per pack	Area per pack (m <sup>2</sup> )	Packs per MasterBag	MasterBag per Supakube
83498	2.9	130	430	1160	24	11.97	5	5
70320	3.2 SKILLION	105	430	1160	11	5.49	5	5
83500	3.3	155	430	1160	21	10.47	5	5
71072	3.6	175	430	1160	21	10.47	5	5
71073	4.1	195	430	1160	18	8.98	5	5
71054	5.2	210	430	1160	11	5.49	5	5
71055	6.3	275	430	1160	11	5.49	5	5



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 217 063, Botany Junction,  
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Fax: +61 7 3902 0613

Technical Advisory Centre: tech.nz@knaufinsulation.com

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KINZ1213029DS  
Updated June 2019

challenge.  
create.  
care.

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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:
  - access to the roof area,
  - working at heights,
  - electrical safety hazards,
  - adequate ventilation of the work area and
  - 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:
  - systems to prevent falling when working at heights.
  - ventilate the working area if possible.
  - cover exposed skin. When working in an unventilated area, wear a disposable face mask.
  - rinse hands in cold water before washing.
  - wear goggles when working overhead.
  - 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.



**BRANZ Appraised**

Appraisal No. 928 [2016]

**GIB EZYBRACE®  
SYSTEMS 2016**

Appraisal No. 928 [2016]

**BRANZ Appraisals**

Technical Assessments of  
products for building and  
construction.



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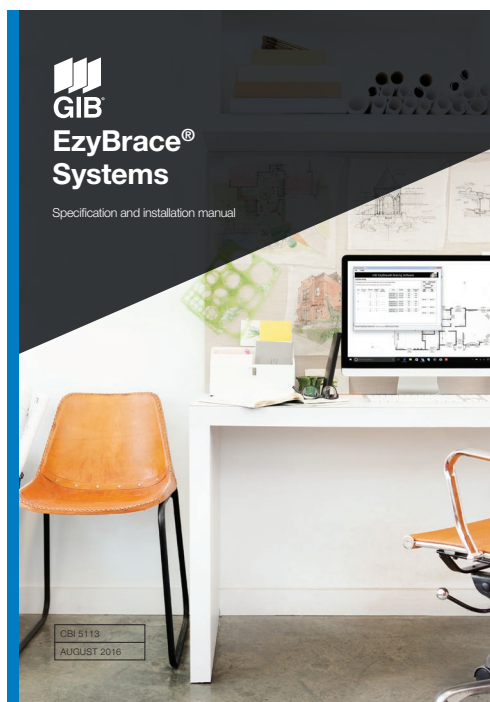
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## Product

- 1.1 GIB EzyBrace® Systems 2016 are a range of wall and ceiling bracing systems based on the use of GIB® Standard, GIB Braceline® and other GIB® plasterboards. GIB EzyBrace® Systems 2016 are used to resist earthquake and wind loads on timber frame buildings designed and constructed in accordance with NZS 3604 and the GIBFix® Framing System. The GIB EzyBrace® Bracing Software provides an electronic means of calculating bracing demand and resistance.

## Scope

- 2.1 GIB EzyBrace® Systems 2016 and the GIB EzyBrace® Bracing Software have been appraised for the design and use of interior wall and ceiling bracing systems in buildings within the scope limitations of NZS 3604.

## Building Regulations

### New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, the GIB EzyBrace® Systems 2016, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

**Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4. GIB EzyBrace® Systems 2016 meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 [a], [f], [h] and [j]]. See Paragraphs 8.1 - 8.10.

**Clause B2 DURABILITY:** Performance B2.3.1 [a] not less than 50 years. GIB EzyBrace® Systems 2016 meet this requirement. See Paragraphs 9.1 - 9.4.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. GIB EzyBrace® Systems 2016 meet this requirement and will not present a health hazard to people.

- 3.2 The bracing demand calculation and bracing distribution rules contained in the GIB EzyBrace® Bracing Software are in accordance with Section 5 of NZS 3604. Bracing resistance is provided by bracing element ratings determined in accordance with NZS 3604, Paragraph 8.3.1.2.
- 3.3 NZS 3604 is an **Acceptable Solution** for compliance with New Zealand Building Code Clause B1 Structure.

## Technical Specification

4.1 The GIB® plasterboards and accessories used with the GIB EzyBrace® Systems 2016, and supplied or specified by Winstone Wallboards Ltd are as follows:

### GIB® plasterboards

- **GIB® Standard** - GIB® Standard plasterboard is a paper-bound fibreglass reinforced gypsum-plaster core sheet lining material. GIB® Standard plasterboard is available in 10 mm and 13 mm thicknesses and a sheet width of 1200 mm and 1350 mm [GIB® Wideline]. The sheets have a taper on the two long sheet edges. The 10 mm thick sheets are also available with a square edge. Sheets are available in various lengths from 2400 mm to 6000 mm. The nominal sheet weight is 6.5 kg/m<sup>2</sup> for 10 mm thick sheets and 8.5 kg/m<sup>2</sup> for 13 mm thick sheets. GIB® Standard plasterboard face paper is a light buff colour.
- **GIB Braceline®** - GIB Braceline® is a high-density fibreglass reinforced paper-bound gypsum-plaster core sheet lining material. GIB Braceline® is available in 10 mm and 13 mm thicknesses. The sheets have a taper on the two long sheet edges. GIB Braceline® has a sheet width of 1200 mm and 1350 mm, and is available in lengths of 2400 mm, 2700 mm, 3000 mm, 3600 mm and 4800 mm. The nominal sheet weight is 9 kg/m<sup>2</sup> for 10 mm thick sheets and 12.5 kg/m<sup>2</sup> for 13 mm thick sheets. GIB Braceline® face paper is a light blue in colour.
- **Alternative GIB® plasterboards** - In certain situations, as specified in the Technical Literature, substitution is permitted with GIB Aqualine®, GIB Fyrelene®, GIB Toughline® and GIB Ultraline®.

### Components and Accessories

- **GIB® Accessories and GIB® Jointing Compounds** - As specified in the GIB® Site Guide Technical Literature.
- **Fasteners**
  - GIB Grabber® High Thread Screws for fixing directly to timber - 32 mm x 6g.
  - GIB Nail - 30 x 2.8 mm.
  - GIB Grabber® screws for fixing to light gauge steel battens - 32 mm x 6g.
- **Adhesive and Sealants**
  - GIBFix® One - an off-white acrylic adhesive supplied in 375 ml cartridges and 600 ml sausages.
  - GIBFix® All-Bond - a green solvent-based adhesive supplied in 375 ml cartridges and 600 ml sausages.
- **GIBFix® Framing Components**
  - GIBFix® Angle - 45 x 45 x 0.55 mm galvanised steel angle with a knurled surface. Supplied in lengths of 2.4 and 2.7 m.
  - GIB Grabber® Dual Thread Screws for fixing to timber through GIBFix® Angle - 32 mm x 7g needle-point screw with coarse thread lower section and fine thread upper section.
- **Fasteners, Anchors and Connections**
  - GIB® HandiBrac® - a one-piece, 2 mm thick, galvanised-steel angle bracket approximately 95 mm high, 65 mm long and 54 mm wide. The bracket is supplied with 5 Type 17 screws 14 g x 35 mm.
  - BOWMAC® screw bolt - M10 x 140 mm screw anchor, with a blue painted hex-head.
  - Coach screws - 12 mm x 150 mm and 50 x 50 x 3 mm washer hot-dipped galvanised for fixing to timber floors.
  - Cast-in bolts - M12 x 150 mm minimum and 50 x 50 x 3 mm washers for fixing to concrete floors.
  - Shot fired fasteners - minimum 75 mm x 3.8 mm with 16 mm discs for fixing GS1-N, GS2-N and GS2-NOM internal line bracing elements to concrete slabs.
  - Galvanised or stainless steel strap - 25 x 0.9 mm top and bottom plate connections.
  - Strap fixings - 30 x 2.5 mm hot-dipped galvanised or stainless-steel flat-head nails.

*Note: For corrosion protection requirements refer to NZS 3604: 2011 Section 4.*

- **Ceiling Diaphragms** - Ceiling diaphragms are constructed using timber ceiling battens, or GIB® Rondo® or similar metal ceiling batten systems.
- **Plywood**
  - **Plywood** – minimum of 7 mm thick complying with AS/NZS 2269 D-D Structural Grade.
  - **Plywood fixings** – 50 x 2.5 mm hot-dipped galvanised or stainless-steel annular-grooved, flat-head nails.

## Handling and Storage

- 5.1 The best results are achieved when GIB® plasterboards are treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the GIB® Site Guide. Sheets must be carried on edge and not dragged.
- 5.2 All accessories must be kept dry.

## Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for GIB EzyBrace® Systems 2016. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 NZS 3604 provides methods to distribute the bracing elements in walls to resist forces. The use of ceiling diaphragms is defined in the Technical Literature.
- 7.2 GIB EzyBrace® Systems 2016 are for use in dry, internal situations only.
- 7.3 GIB EzyBrace® Systems 2016 must not be exposed to temperatures of 52°C or greater for prolonged periods. Refer to appliance and fitting manufacturers for installation details.

### GIB EzyBrace® Bracing Software

- 7.4 The GIB EzyBrace® Bracing Software contains design procedures and an electronic calculation method for bracing demand calculated in accordance with NZS 3604: 2011, Section 5. Floor loadings can be selected in accordance with either NZS 3604, Bracing Demand Tables 5.5 – 5.10 for 2 kPa floor loads or less, or Tables 14.1 – 14.3 for 3 kPa floor loads.
- 7.5 The bracing demand calculations contained in the GIB EzyBrace® Bracing Software are based on first principles engineering and calculate wind and earthquake demand based on the building parameters entered. Resulting bracing demand calculations are project specific and can differ from values derived using NZS 3604 wind and earthquake demand tables. The GIB EzyBrace® Bracing Software has been assessed as part of this Appraisal.
- 7.6 The bracing ratings for GIB EzyBrace® Systems 2016 are embedded in the GIB EzyBrace® Bracing Software.

### GIBFix® Framing System

- 7.7 The GIBFix® Framing System utilises GIBFix® Angles fixed at internal corners and at wall/ceiling junctions to reduce the potential for fastener 'popping' and joint cracking due to timber framing movement. The GIBFix® Framing System also offers an alternative arrangement of studs at corners and at intersecting walls to improve insulation and to reduce thermal bridging compared to traditional wall framing layouts. Refer to the Technical Literature for full details.
- 7.8 Where walls intersect, noggings are required at maximum 900 mm centres to enable fixing of the end stud of the intersecting wall to the main wall framing.
- 7.9 The GIBFix® Framing System permits the use of a single panel hold-down [e.g. GIB® HandiBrac®] at wall corners and T-intersections for both the across and along bracing directions.

### Framing

- 7.10 GIB EzyBrace® Systems 2016 can be installed using conventional timber framing layouts or by using the layouts provided in the GIBFix® Framing System. The bracing ratings embedded in the GIB EzyBrace® Bracing Software are equally applicable to both framing options.
- 7.11 Timber framing grade, spacing and construction must comply with NZS 3604. Timber treatment must comply with NZBC Acceptable Solution B2/AS1.
- 7.12 Winstone Wallboards Ltd recommends the use of kiln-dried stress-graded framing timber. The minimum actual framing dimensions are 90 x 45 mm for external walls and 75 x 45 mm for internal walls.
- 7.13 Joints in the top plates of bracing panels must be tied together with 3 kN and 6 kN top plate connectors using 25 x 0.9 mm hot-dip galvanised mild steel strap, 3 nails each side of joint for 3 kN and 6 nails each side of joint for 6 kN.

### Bracing System GS2-NOM

- 7.14 Most GIB EzyBrace® Systems require additional fasteners at the corners to achieve the published bracing ratings. The GS2-NOM system only requires fixings at 300 mm centres around the sheet perimeter.
- 7.15 Where internal doors penetrate a GS2-NOM bracing element and recessed door jambs are used, the sheets may be adhesive fixed around the door opening with GIBFix® All-Bond, instead of screw fixing. This is designed to reduce fastener 'popping' around internal doors when using grooved door frames. Screw fixing should be used where door frames are to be finished with architraves and the architrave will cover the screws. The adhesive fix option around door openings must not be used with any other GIB EzyBrace® Systems 2016.

### Alternative GIB® plasterboards

- 7.16 On occasions, properties additional to bracing may be required of the plasterboard lining. Refer to Table 1.

### BOWMAC Screw Bolts

- 7.17 When BOWMAC Screw Bolts are used as fixings for external walls with concrete masonry header block foundations, the minimum grout/concrete strength must be as specified in NZS 3604. BOWMAC Screw Bolts may be used in Corrosion Zones B and C as defined in NZS 3604. BOWMAC Screw Bolts may only be used in NZS 3604 Corrosion Zone D where the minimum concrete cover to the bolt is 60 mm. This cannot be achieved with standard 90 mm wide timber framing. An alternative option in this scenario is to use 140 mm wide framing.

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**Table 1: Permitted Alternatives in GIB EzyBrace® Systems**

PERMITTED GIB® plasterboard ALTERNATIVES IN GIB EZYBRACE® SYSTEMS 2016									
GIB Ezybrace® Systems 2016 have been designed and tested using only the products specified. Occasionally additional properties may be required to be provided by a different GIB® plasterboard product. The following table provides acceptable alternative options.									
Specified	Permitted alternative GIB® plasterboard products								
GIB® Plasterboard	GIB® Standard	GIB Ultraline®	GIB Braceline/ Noiseline®	GIB Aqualine®	GIB Toughline®	GIB Fyrelime®			
						10mm	13mm	16mm	19mm
GIB® Standard	N/A	✓	✓	✓	✓	✓ NOTE 1	✓NOTE 1 and 3		
GIB Braceline®	X	X	N/A	✓ NOTE 2	✓	X	✓NOTES 1, 2 and 3		

- NOTE 1:** The fastener type and length must be as required for the relevant FRR, system but the fixing pattern must be as required for bracing elements.
- NOTE 2:** The bracing element must be 900 mm or longer. Fasteners must be at maximum 100 mm centres to the perimeter of the bracing element. The bracing corner fastening pattern applies to all four corners of the element.
- NOTE 3:** Specify traditional wall framing layout where a Fire Resistance Rating (FRR) is required. See Paragraph 11.4.



## Structure

### Bracing

- 8.1 The bracing unit [BU] ratings embedded in the GIB EzyBrace® Bracing Software and vary with the wall length.
- 8.2 The Technical Literature provides comprehensive construction and panel hold-down details. These include bottom plate fixings using anchor screws and cast-in bolts (concrete), coach screws (timber), GIB® HandiBrac® or nailed stud-to-plate straps.
- 8.3 The bracing units are derived from BRANZ P21 test method based on a wall height of 2.4 m. For greater wall heights the bracing rating is calculated by multiplying the appropriate bracing rating shown in Table 1 by a factor  $f=2.4$  and divided by the wall height in metres. Walls lower than 2.4 m shall be rated as if they were 2.4 m high.
- 8.4 NZS 3604 limits wall bracing elements to a maximum of 120 BU/m for timber-framed floors and 150 BU/m for concrete floors.

### Ceiling Diaphragms

- 8.5 GIB® ceiling diaphragms are used to space bracing lines further apart than 6 m. The basic shape of a ceiling diaphragm must be square or rectangular and the length must not exceed twice the width.
- 8.6 For ceiling diaphragms not steeper than 15° and not exceeding 7.5 m in length, any GIB® plasterboard may be used provided the perimeter fixing are at 150 mm centres.
- 8.7 For ceiling diaphragms not steeper than 45° and not exceeding 7.5 m in length, and for diaphragms not steeper than 25° and not exceeding 12 m in length, any GIB® plasterboard may be used provided the perimeter fixings are at 100 mm centres.

### Openings in Bracing Elements

- 8.8 Small openings of 90 x 90 mm or less may be placed anywhere except within 90 mm of the edge of the bracing element.

### Shower Areas

- 8.9 GIB EzyBrace® Systems 2016 must not be located in shower cubicles or behind baths and the like. GIB EzyBrace® Systems 2016 may be used in water-splash areas provided they are protected as required by NZBC Clause E3 Internal Moisture. Refer GIB Aqualine® Wet Area Systems.

### Impact Resistance

- 8.10 GIB® plasterboards provide adequate resistance to soft body impact, based upon history of use in domestic and light commercial applications.

## Durability

- 9.1 GIB EzyBrace® Systems 2016, including linings and their fixings have a serviceable life of at least 50 years. The ability of the systems to remain durable is dependent on them remaining dry in service, and being maintained in accordance with this Appraisal.

### Maintenance

- 9.2 The building must be maintained weatherproof and GIB® plasterboards must be protected from external and internal moisture in accordance with NZBC Clauses E2 and E3.
- 9.3 Holes resulting from damage to the lining, up to 100 x 100 mm square, will have no significant effect on the performance of the bracing panel. Such holes may be repaired by patching, stopping and finishing as appropriate. Independent expert advice must be sought to assess the effect and repair of larger areas of damage.
- 9.4 Bracing elements require no ongoing maintenance, apart from decoration and the repair of any damage.

### Prevention of Fire Occurring

- 10.1 Separation or protection must be provided to GIB® plasterboard from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

### Fire Affecting Areas Beyond the Fire Source

- 11.1 For Internal Surface Finish properties and Fire Resistance Ratings, refer to BRANZ Appraisal No. 289 [2012] GIB® Fire Rated Systems.

### Internal Moisture

- 12.1 GIB® plasterboard must be used in dry internal situations, and must not be used where likely to be exposed to liquid water, or where extended exposure to humidity above 90% RH is expected, e.g., such as may be expected in sauna rooms, commercial kitchens and the like.

## Installation Information

### Installation Skill Level Requirement

- 13.1 Installation of GIB EzyBrace® Systems 2016 must be completed by, or under the supervision of a Licensed Building Practitioner with the relevant Licence Class, in accordance with the Technical Literature and this Appraisal.

### General

- 14.1 GIB EzyBrace® Systems 2016 must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

### Framing

- 14.2 To achieve an acceptable decorative finish, the GIB® Site Guide specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. Winstone Wallboards Ltd recommends a moisture content of 12% or less where buildings are to be air conditioned, centrally heated or have heat pumps installed.
- 14.3 Where the GIBFix® Framing System is used, GIBFix® Angles are tacked to the framing with flat-head clouts prior to installation of the GIB® plasterboard.

### Cutting

- 14.4 GIB® plasterboard is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.

### Hold-downs

- 14.5 GIB EzyBrace® Systems 2016 which require hold-downs must either have a GIB® Handibrac® fitted to each end of the bracing element or alternatively a metal stud-to-plate strap and hold-down anchor may be used. Refer to the Technical Literature for full installation details. Where a metal stud-to-plate strap is used, the hold-down anchor must be placed no more than 80 mm from the end of the bracing element.
- 14.6 Where the GIBFix® Framing System is used, a single hold-down located at a wall intersection may be used to provide the hold-down in both the across and along bracing directions.

### Plasterboard Sheet Fixing

- 14.7 Corner fixings must be 50 mm away from the sheet corner. Fixings must be no closer than 12 mm from the paper-bound sheet edge, and no closer than 18 mm from a cut edge, and driven at right angles to the sheet until the head is seated in a slight dimple just below the surface of the paper liner. Fixings must not be over-driven.
- 14.8 Wall bracing plasterboards (except for those used with the GS2-NOM system) are fixed at 150 mm centres around the perimeter framing of the bracing element *[Note variation for GIB Aqualine® and GIB Fyrelime® - see Table 1]*. At the corners of the wall bracing elements, a special fastening pattern is required with fasteners spaced at 50 mm, 100 mm, 150 mm, 225 mm and 300 mm from the corner and there-after at 150 mm centres. Fixing to other framing is either mechanical or by using GIBFix® adhesives.
- 14.9 When installing GS2-NOM bracing elements, the GIB® plasterboard is fixed to framing around the bracing element perimeter and at sheet joints with fasteners at maximum 300 mm centres. Where recessed door jambs are used on internal door frames, the GIB® plasterboard may be fixed to the framing around the door opening with GIBFix® All-Bond. See Paragraph 7.15.
- 14.10 Where GIB Aqualine® or GIB Fyrelime® substitutes for GIB Braceline®, bracing elements must be longer than 900 mm and the bracing element perimeter fasteners must be spaced at 100 mm centres and the corner pattern described in Paragraph 14.8 used.
- 14.11 Full sheets must be used wherever possible.

### Fire Resistance Rated Bracing Elements

- 14.12 Where a bracing element is also used as a fire-rated element, the method of fixing (including the length of the fixing specified) for the fire-rated element must be used, but the perimeter fixings of the bracing element must be at 150 mm centres and fixings at corners of the bracing element must be fixed as described in Paragraph 14.8. In two-layer systems the inner layer must be used for bracing.

### Plywood Fixing

- 14.13 Plywood is nail fixed at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing.

### Ceiling Diaphragms

- 14.14 All GIB EzyBrace® System 2016 ceiling diaphragms require fixings around the perimeter at 100 or 150 mm centres, depending on the ceiling pitch and length. See Paragraphs 8.4 to 8.6 and refer to the Technical Literature.
- 14.15 The perimeter of the ceiling diaphragm is fixed to GIBFix® Angles, GIB® Rondo® perimeter channels, or alternatively, to an additional ex 150 x 40 mm timber plate fixed to the top plate.

### Jointing and Finishing

- 14.16 All bracing element joints must be reinforced with GIB® tape and finished in accordance with the GIB® Site Guide.

### Health and Safety

- 15.1 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.

## Basis of Appraisal

The following is a summary of the technical investigations carried out:

### Tests

- 16.1 Bracing tests were carried out by Winstone Wallboards Ltd in accordance with BRANZ Technical Paper P21 to determine the performance of GIB EzyBrace® Systems 2016 when the building is subjected to lateral wind or earthquake loading. Nail and screw slip tests were carried out by BRANZ and Winstone Wallboards Ltd. The Winstone Wallboard's test facilities, procedures and results have been reviewed by BRANZ and found to be satisfactory.

### Other Investigations

- 17.1 The GIB EzyBrace® Bracing Software has been assessed by BRANZ and found to be satisfactory.
- 17.2 The GIB EzyBrace® Systems 2016 and GIB® Site Guide Technical Literature have been examined by BRANZ and found to be satisfactory.
- 17.3 Site visits were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.
- 17.4 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.
- 17.5 The properties of Winstone Wallboards Ltd GIB® plasterboards have been assessed for the following properties: MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, inspection for fungal spores, hard and soft body impact tests.

### Quality

- 18.1 Winstone Wallboards Ltd's manufacturing process and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory.
- 18.2 The quality management systems of Winstone Wallboards Ltd have been assessed and registered by TELARC as meeting the requirements of ISO 9001, Registration No. 581.
- 18.3 Winstone Wallboards Ltd is responsible for the quality of the product supplied.
- 18.4 The quality of the application and finish on site is the responsibility of the installation and stopping contractors.
- 18.5 Designers are responsible for the design of buildings.
- 18.6 Building owners are responsible for the maintenance in accordance with the instructions of Winstone Wallboards Ltd.

### Sources of Information

- AS/NZS 2269.0:2012 Plywood - Structural - Specifications
- AS/NZS 2588: 1998 Gypsum plasterboard.
- BRANZ Technical Paper P21: 2010 A wall bracing test and evaluation procedure.
- NZS 3604: 2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.


In the opinion of BRANZ, **GIB Ezybrace® Systems 2016** 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 **Winstone Wallboards Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the Technical Literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. **Winstone Wallboards Ltd**:
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
  - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by **Winstone Wallboards Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Winstone Wallboards Ltd** or any third party.

For BRANZ



**Chelydra Percy**

Chief Executive

Date of Issue:

05 September 2016



# EzyBrace<sup>®</sup> Systems

Specification and installation manual

SDC - Approved Building Consent Document - BC192333 - Pg 241 of 378 - 26/01/2020 - dalles

CBI 5113

AUGUST 2016



## **NATIONAL SUPPORT**

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## **GIB® HELPLINE**

0800 100 442



Based on learnings derived from the 2011 Canterbury earthquakes GIB EzyBrace® Systems have been updated to offer improved design flexibility and further simplification of the bracing design and build process.

#### **NEW GIB EZYBRACE® 2016 DESIGN SOFTWARE**

- Improved user interface with simplified bracing design process.
- Increased functionality including exterior line check function, easy insert/deletion of bracing elements and built in software help function.
- Includes the new GIB® Bracing element GS2- NOM
- Allows the GIBFix® Framing System to be used in GIB EzyBrace® designs.

#### **NEW GIB® BRACING ELEMENT GS2-NOM**

- 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 to bracing resistance.
- Potentially reduces the amount of fasteners<sup>1</sup>
- Encourages more even bracing distribution throughout the building.

<sup>1</sup> Actual savings dependent on building and bracing design

#### **UPDATE TO OPENINGS IN BRACING ELEMENTS AND CEILING DIAPHRAGMS**

- Large hole specification updated to use a more conservative methodology.
- Guidance included for fireplace flues and range hoods.

#### **NEW — GIBFIX® FRAMING SYSTEM**

- Reduced potential for fastener pop and joint cracking as a result of timber frame movement.
- Reduced potential for on-site call backs.
- Improved thermal performance.
- Reinforced plasterboard junctions.

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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](http://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 further 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 Ultralite®	GIB Braceline/ Noiseline®	GIB Aqualine®	GIB Toughline®	GIB Fyrelite®			
						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.

## 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](http://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.

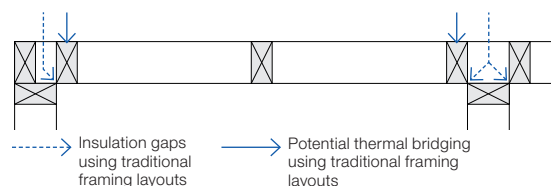
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

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

Bracing resistance is not affected by the GIBFix® Framing System if the use of this alternative timber framing layout is preferred. Refer to the GIBFix® Framing System literature for more information.

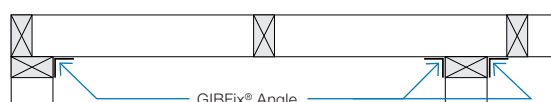
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

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!
- Encourages more even bracing distribution throughout the building.

1. Actual savings dependent on building and bracing design.

## 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](http://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.

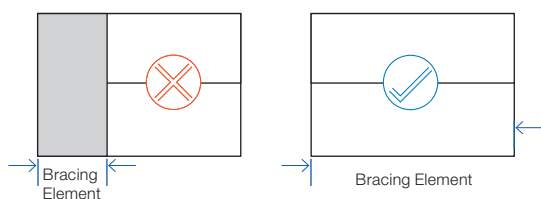


## Bracing resistance

### 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:

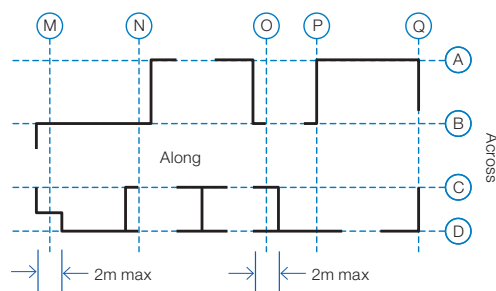
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

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](http://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.

## Bracing demand

## GIB EZYBRACE® CALCULATOR

The GIB EzyBrace® calculator is a software tool to determine the wind and earthquake bracing demand and to design the bracing resistance for light timber-framed buildings constructed in accordance with NZS 3604:2011.

The updated GIB EzyBrace® calculator combines an up-to-date user-friendly interface with the latest knowledge relating to the performance of GIB® plasterboard in light timber-framed structures when subjected to high winds or earthquakes. The calculator can be down-loaded free of charge by visiting [gib.co.nz/ezybrace](http://gib.co.nz/ezybrace) and can be installed on either Microsoft® or Apple® Mac environments.

## DEMAND

Wind and Earthquake ‘Demand’ calculates the forces a structure must be able to resist during its ‘design life’. The GIB EzyBrace® calculator’s Demand sheet determines the number of Bracing Units required depending on building location, building dimensions and materials used. The Demand sheet closely follows the familiar format of our Excel based GIB EzyBrace® calculator, and includes additional features such as a pop-up help facility explaining required input.

Bracing resistance sheets ('tabs') are added depending on the building specification entered. For example, subfloor bracing resistance tabs only show when a 'subfloor' foundation type has been selected.

The Demand sheet gives the designer the option to select a longer earthquake return period which represents a higher earthquake design force. The default for buildings constructed in accordance with NZS3604:2011 is an earthquake that has a 10% chance of being exceeded within the assumed 50 year 'design life' of a light timber framed residential structure, a 'return period' of 500 years.

Many commercial and public buildings are designed for the more stringent requirement of a 10% probability of exceedance in a 100 or 250 year life expectancy.

A screen shot of the GIB EzyBrace® 2016 Demand Sheet and Help Facility is shown in figure 5.

FIGURE 5: GIB EZYBRACE® 2016 – DEMAND CALCULATION SHEET AND ‘POP UP’ HELP FACILITY

GIB EzyBrace® PLUS
File
Home
GIB

# GIB EzyBrace® Bracing Software

## Job Details

Name: A Job  
Street and Number: 100 Job Street  
Lot and DP Number: Lot 321, DP 456  
City/Town/District: Jobtown  
Designer: AR Chitack  
Company: Jobs Limited  
Date: 1/08/15

## Building Specification

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

Single

Cladding Weight: Light  
Roof Weight: Light  
Roofs in Roof Space: No  
Roof Pitch: 25  
Roof Height above Eaves (m): 1.5  
Building Height to Apex (m): 4.5  
Ground to Lower Floor (m): 0.2

Stud Height (m): 2.4  
Building Length (m): 10  
Building Width (m): 10  
Building Area (m2): 100

## Bracing Location

Wind Zone - Low

Wind Zone or Consent Authority: Not Avail.  
Wind Region: A  
Lee Zone: No  
Ground Roughness: Urban  
Site Exposure: Sheltered  
Topography Class: 1

Earthquake Zone: 1  
Soil Type: D & E (Deep to Very Soft)  
Annual Prob. of Exceedance: 1 in 500 (NZS3104:2011 Default)

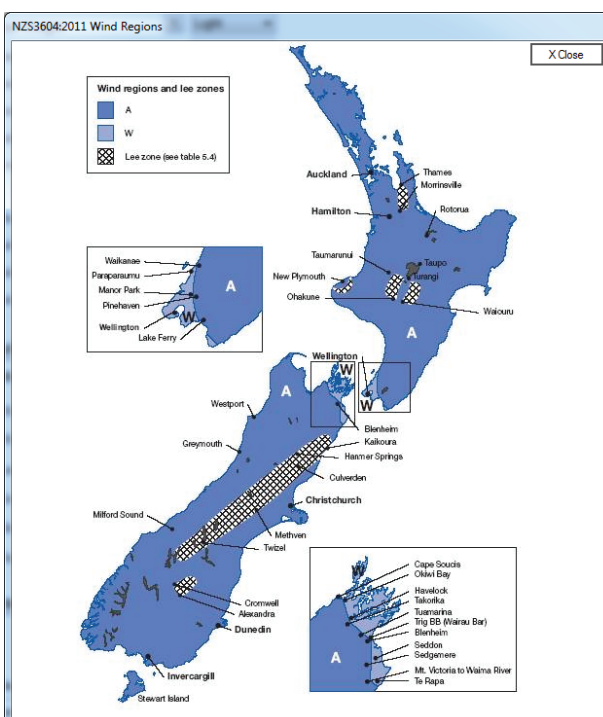
### Bracing Units required for Wind


	Along	Across
Single Level	258	222

### Bracing Units required for Earthquake

	Along and Across
Single	264

Demand
Single Along
Single Across
Custom



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from [gib.co.nz/ezybrace](http://gib.co.nz/ezybrace)



## Software functionality

Innovations adopted in the GIB EzyBrace® 2016 bracing 'resistance' calculation sheets include the ability to easily add and delete lines and elements during calculations.

The software compares bracing resistance achieved with demand and for wall bracing lines incorporating external walls, the external wall length can now be entered to check minimum

bracing units required on that line. The NZS 3604:2011 rules and associated software output are not the only check. Designers must additionally check the building layout to ensure adequate bracing distribution.

Figures 6 and 7 show screen shots of the Wall and Subfloor Resistance Sheets respectively.

FIGURE 6: GIB EZYBRACE® 2016 — WALL BRACING RESISTANCE CALCULATION SHEET

Line	Ext. Len. (m)	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BU)	Earthquake (BU)
a	11.25	1	0.5		2.44	GSP-H	GIB®	53	58
		2	1.1		2.44	GS1-N	GIB®	72	65
		3	0.6		2.44	GSP-H	GIB®	67	73
b	6.41	1	1.2		2.44	GS1-N	GIB®	81	71
		2	0.6		2.44	GS1-N	GIB®	34	35
		3	4		2.44	GS2-NOM	GIB®	197	197
c		1	3.2		2.44	GS2-NOM	GIB®	157	157
d		1	7.9		2.44	GS2-NOM	GIB®	389	389
e	17.9	1	0.6		2.44	BL1-H	GIB®	58	60
		2	0.6		2.44	BL1-H	GIB®	58	60
		3	0.8		2.44	GS1-N	GIB®	48	46
		4	2.1		2.44	GS1-N	GIB®	143	124
		5	1.2		2.44	EP1-1.2	CHH	142	159

Demand		Resistance	
Wind	Earthquake	Wind	Earthquake
682	880	1499	1492
220%	170%		
		193 OK	196 OK
		312 OK	302 OK
		157 OK	157 OK
		389 OK	389 OK
		449 OK	449 OK

FIGURE 7: GIB EZYBRACE® 2016 — SUBFLOOR BRACING RESISTANCE CALCULATION SHEET

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Line	Ext. Len. (m)	Element	Length (m) or No.	Angle (degrees)	Type	Supplier	Wind (BU)	Earthquake (BU)
A		1	1		Braced Piles	NZS3604	160	120
		2	1		Anchor Pile	NZS3604	160	120
		3	1		Braced Piles	NZS3604	160	120
B		1	1		Braced Piles	NZS3604	160	120
		2	1		Cantilever Pile	NZS3604	70	30
		3	1		Cantilever Pile	NZS3604	70	30
C		1	1		Anchor Pile	NZS3604	160	120
		2	1		Anchor Pile	NZS3604	160	120

Demand		Resistance	
Wind	Earthquake	Wind	Earthquake
426	687	1100	780
258%	114%		
		480 OK	360 OK
		300 OK	180 OK
		320 OK	240 OK

## Software functionality

Custom elements can be entered by accessing the 'custom' tab as shown in figure 8.

FIGURE 8: GIB EZYBRACE® 2016 — CUSTOM ELEMENTS SHEET

Supplier	System	Min. Length m	Wind BU/s/m	EQ BU/s/m	Element Height Dependant	Element Foundation Dependant
Custom1	CU1.0.4	0.4	80	95	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom1	CU1.0.6	0.6	95	105	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom1	CU1.1.2	1.2	120	135	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom2	CU2.0.4	0.4	90	98	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom2	CU2.0.6	0.6	127	136	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom2	CU2.1.2	1.2	164	135	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Engineer	Portal	1	300	300	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Note: Values and systems shown in Custom Elements Sheets are for illustrative purposes only.

Help can be accessed by pressing the ? symbol which displays a window with further information.

The GIB EzyBrace® 2016 software has a number of options that can be accessed via the File tab at the top left hand corner of the window. The options include: New, Save, Save As, Open, Recent and Print.

- The New option closes any opened job ready for the input of a new job.
- The Save option saves the currently opened job to the same filename and the Save As option saves the job to a new filename.

- The Open option prompts for the name of an existing job.
- The Recent option displays a list of the ten latest jobs and allows for the selection of one of these jobs to be opened.
- The Print option displays the print screen. In this screen, a print preview is displayed. The print preview can be copied to the clipboard by clicking the right-hand mouse button. Also on the print screen is the option to choose which pages are to be printed and the option to print the output to a portable data format, PDF, file.
- The Print Screen View is shown in figure 9.

FIGURE 9: GIB EZYBRACE® 2016 — PRINT SCREEN VIEW

Download GIB EzyBrace® 2016 design software from [gib.co.nz/ezybrace](http://gib.co.nz/ezybrace)

## 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 further 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

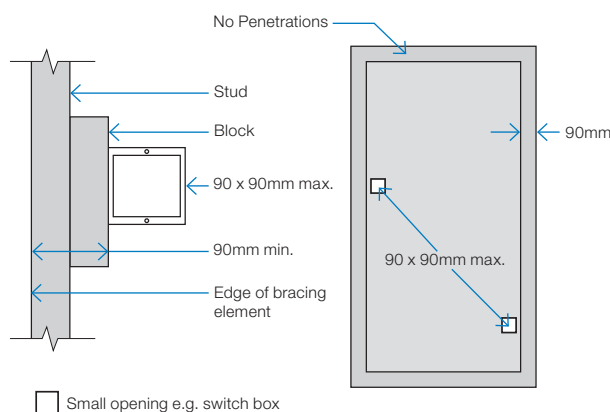
### SMALL OPENINGS

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

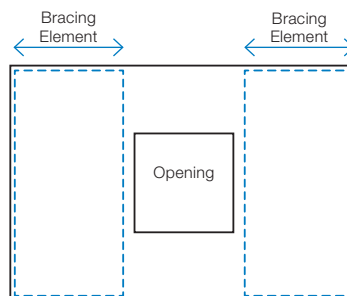
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GEB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS



## 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](http://gib.co.nz/gibfix).

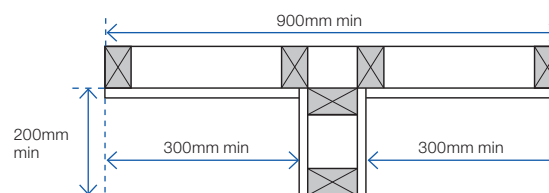
## Guidelines for intersection walls

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).

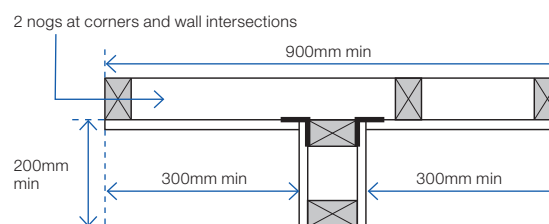
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



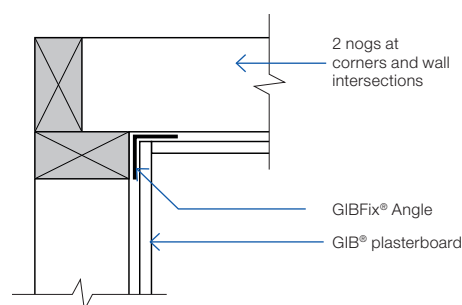
GEB002

FIGURE 13: WALL INTERSECTION (GIBFix® FRAMING SYSTEM)



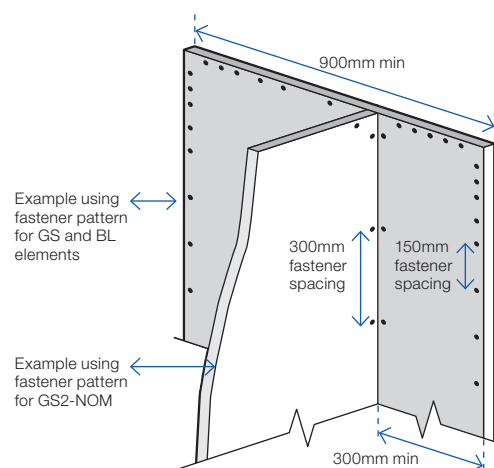
GEB003

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.

## 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

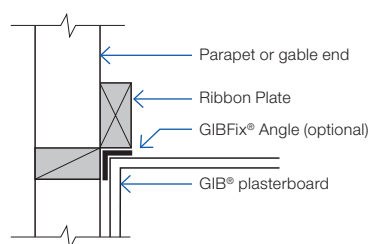
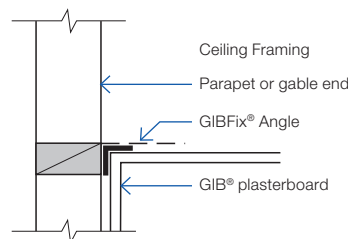


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

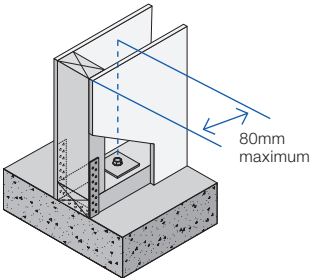
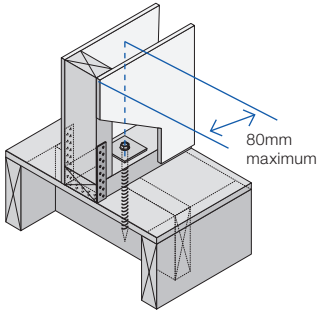
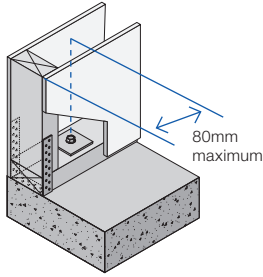
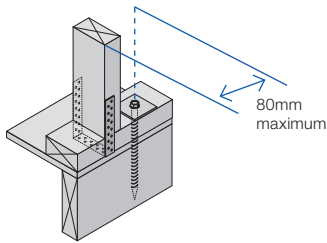
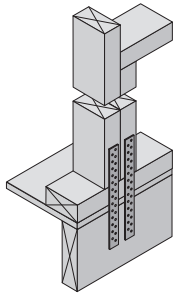
### BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

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.	

## 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.

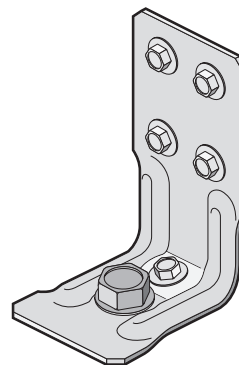
Concrete floor	Timber floor
<p>400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.</p>	
Internal wall	
 <p>GEB004</p>	 <p>GEB005</p>
External wall	
 <p>GEB006</p>	 <p>GEB007</p>
<p>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 <a href="http://gib.co.nz/library">gib.co.nz/library</a>.</p>	
<p>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.</p>	
 <p>GEB008</p>	
Hold-down fastener requirements	
Concrete floor	Timber floor
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.	12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element

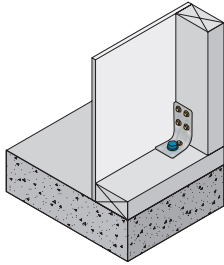
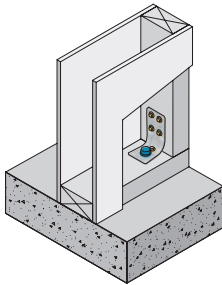
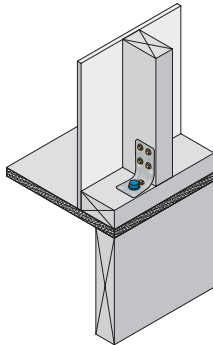
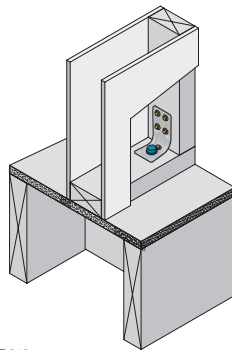
## GIB HandiBrac® installation

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

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

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



Concrete floor		Timber floor	
External walls	Internal walls	External walls	Internal walls
 <p>GEB009</p> <p>Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.</p>	 <p>GEB010</p> <p>Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.</p>	 <p>GEB011</p> <p>Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.</p>	 <p>GEB012</p> <p>Position GIB HandiBrac® in the centre of floor joist or full depth solid block.</p>
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.	



## 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.

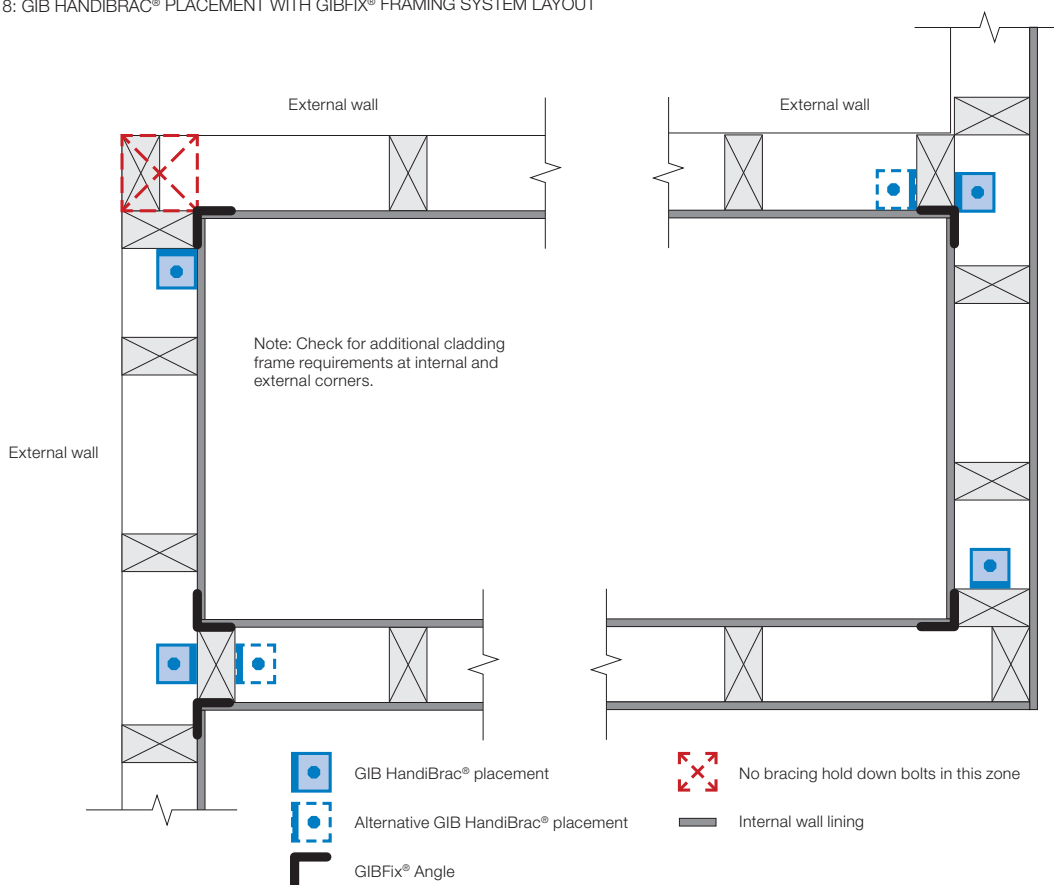
The GIB HandiBrac® is fixed to the stud which has the GIBFix® Angle.

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

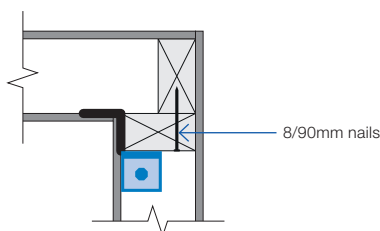
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

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

## Ceiling diaphragms

GIB® plasterboard ceiling diaphragms are stiff and strong horizontal elements which effectively transfer loads to bracing walls. They themselves do not have a bracing unit rating but are used when bracing lines exceed 6m separation. The basic shape of a ceiling diaphragm is square or rectangular. Protrusions are permitted but cut-outs are not. The length of a ceiling diaphragm shall not exceed twice its width. Dimensions are measured between supporting bracing lines. Supporting bracing lines shall have a bracing capacity no less than the greater of 100 bracing units or 15 bracing units per metre of diaphragm dimension, measured at right angles to the line being considered, see figure 21.

## Limitations for GIB® plasterboard ceiling diaphragms

Ceiling diaphragms may be constructed using any GIB® plasterboard provided perimeter fixing is at;

150mm centres for: Diaphragms up to 7.5m in length, no steeper than 15°.

100mm centres for: Diaphragms up to 7.5m in length, no steeper than 45°. Diaphragms up to 12m in length, no steeper than 25°.

Diaphragms outside these parameters must be specifically designed.

### General fixing requirements for GIB® Ceiling Diaphragms:

- Linings must be installed over the entire area of the diaphragm.
- Fastening must be no less than 12mm from sheet edges and not less than 18mm from sheet ends.
- Sheets must be supported by framing members (e.g., ceiling battens) spaced at no more than 500mm centres for 10mm GIB® plasterboard and at no more than 600mm centres for 13mm GIB® plasterboard.
- Sheets within the diaphragm area may be fastened and finished conventionally in accordance with the publication entitled, "GIB® Site Guide". All joints shall be GIB® Joint Tape reinforced and stopped. It is recommended that sheet butt joints are formed off framing and back-blocked (see "GIB® Site Guide").
- Use full width sheets where possible. At least 900mm wide sheets with a length not less than 1800mm shall be used. Sheets less than 900mm wide but no less than 600mm may be used provided all joints with adjacent sheets are back-blocked (see "GIB® Site Guide" and figure 22).
- Fasteners are placed at the specified centres around the ceiling diaphragm with the corners fastened using the GIB EzyBrace® fastener pattern.

FIGURE 20: PROTRUSIONS AND CUTOUTS

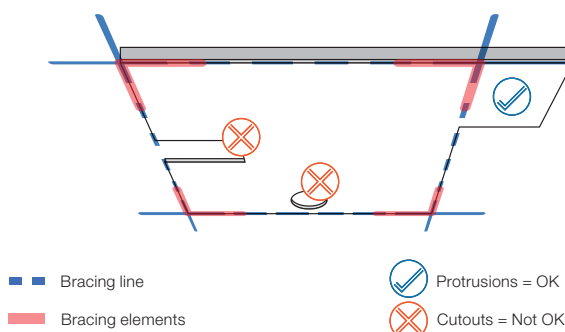


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

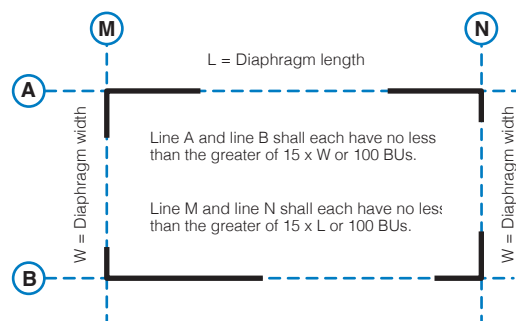


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS

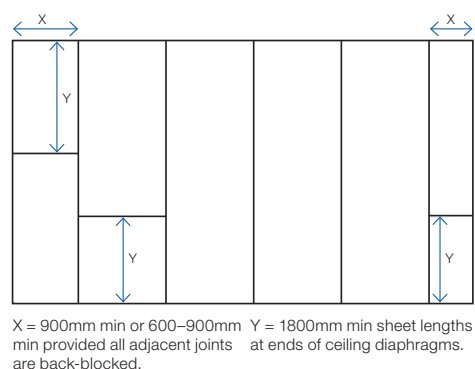
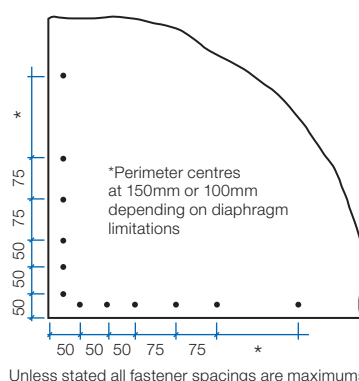


FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



GEB015

## Ceiling battens in ceiling diaphragms

Ceiling diaphragms may be constructed using steel or timber ceiling battens.

Battens shall be spaced at a maximum of:

- 500mm for 10mm GIB® plasterboard.
- 600mm for 13mm GIB® plasterboard.

Timber battens shall be fixed in accordance with the requirements of NZS 3604:2011.

Metal battens shall be GIB® Rondo® battens with two external flanges of 8mm to allow direct screw fixing to roof framing.

GIB® Rondo® metal battens shall be fixed with 2/32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws to supporting framing.

GIB® Rondo® metal battens must be fixed directly to the roof framing. If a clip system has been used, a timber block (min 300mm) or a continuous timber member can be fixed alongside the bottom chord to permit a direct connection to the batten, see figure 26.

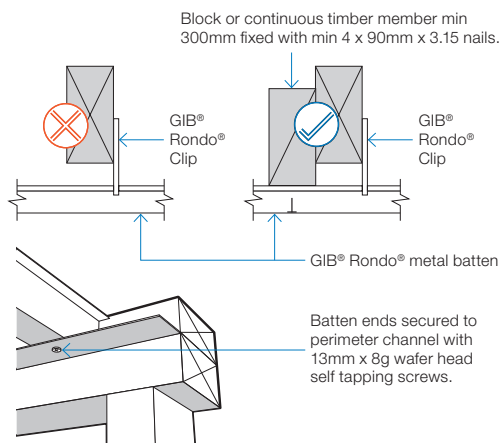
For GIB® Rondo® metal battens, a GIB® Rondo® metal channel or metal angle is required at the perimeter of the diaphragm. The perimeter channel shall be fastened to the top plate with 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screw at 300mm centres maximum.

Linings are fastened to metal using 25mm x 6g GIB® Grabber® Self Tapping screws and to timber framing using 32mm x 6g GIB® Grabber® High Thread screws. Alternatively 32mm x 7g GIB® Grabber® Dual Thread screws can be used in both cases. Fastener centres are specified on p.18.

Coved ceiling diaphragms can be achieved by using nominally 32 x 32 x 0.55mm proprietary galvanised metal angles ("back-flashing") at the changes in direction. These angles shall be:

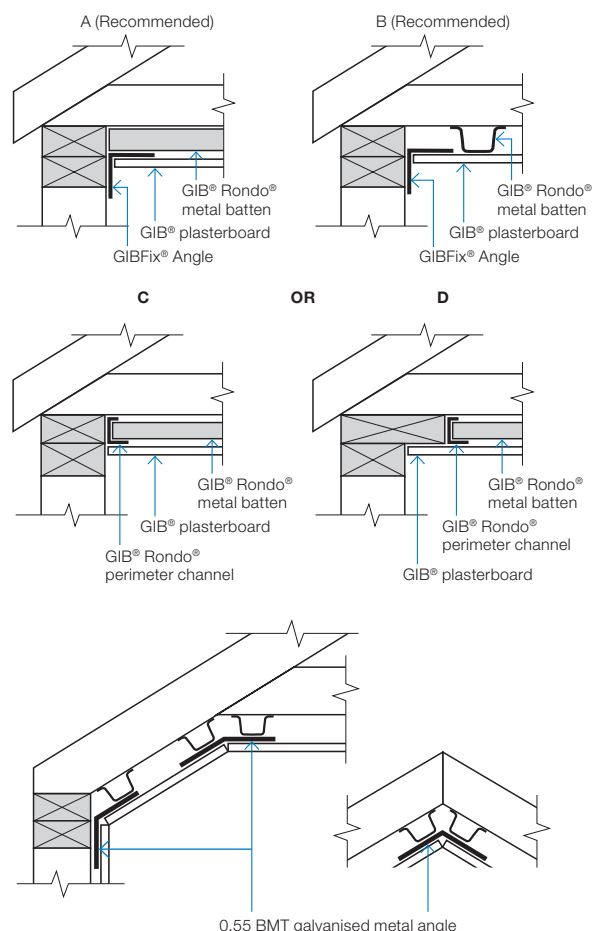
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screws.
- Fastened to timber framing using 32mm x 7g GIB® Grabber® Dual Thread screws when linings are installed.

FIGURE 26: GIB® RONDO® METAL CEILING BATTEN INSTALLATION



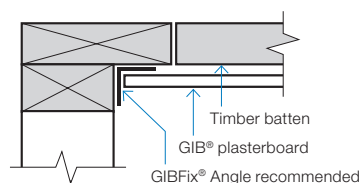
GEB016

FIGURE 27: GIB® RONDO® METAL CEILING BATTENS WITH CORNER ANGLES



GEB017

FIGURE 28: TIMBER CEILING BATTENS\*



GEB018

## Openings in ceiling diaphragms

### SMALL OPENINGS

Small opening (e.g. down lights) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the ceiling diaphragm.

### LARGE OPENINGS

Openings are allowed within the middle third of the diaphragms length and width. Fixing of sheet material to opening trimmers shall be at 150mm centres. Neither opening dimension shall exceed a third of the diaphragm width. Larger openings or openings in other locations require specific engineering design.

Where fireplace flue or range hood openings are required in a ceiling diaphragm use a galvanised metal backing plate as shown in figure 25, with a maximum hole diameter of 350mm.

Figure 25 can also be used for range hood openings in walls.

For information on openings in ceiling diaphragms contact the GIB® Helpline on 0800 100 442.

FIGURE 24: LARGE OPENINGS IN CEILING DIAPHRAGMS

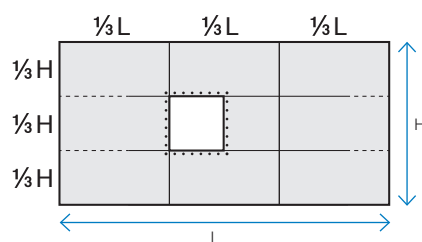
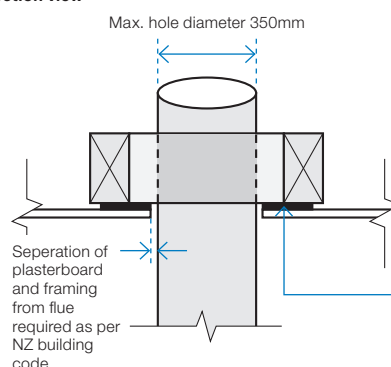
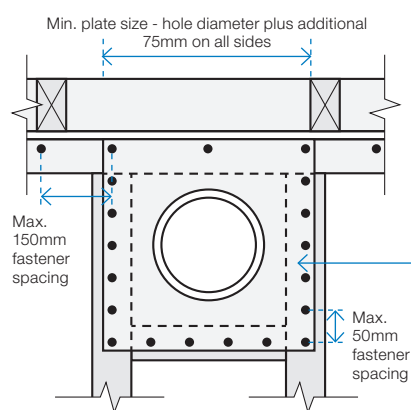


FIGURE 25: FIREPLACE FLUES AND RANGE HOOD OPENINGS

#### Section view



#### Plan view



Plasterboard ceiling not shown in plan view

**Steel plate**  
0.55 BMT  
Galvanised sheet  
Max. opening  
350mm diameter.  
Installed prior to  
GIB® plasterboard.

**Framing**  
90 x 45mm framing  
trimmed to provide  
extra fixing.

**GIB® plasterboard ceiling**  
Installed over the  
steel plate and into  
framing using a  
minimum of 32mm  
x 6g GIB® Grabber  
High Thread or  
32mm x 7g GIB®  
Grabber Dual Thread  
screws at 50mm  
max centre spacing.

## 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.

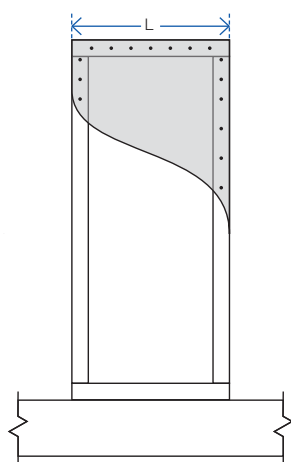
'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

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.

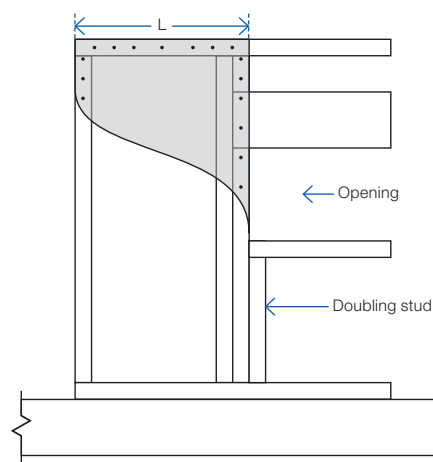
Fastener spacings and diagram scales shown in Figures 29-32 are indicative only. Refer to p.23-30 for construction details.

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



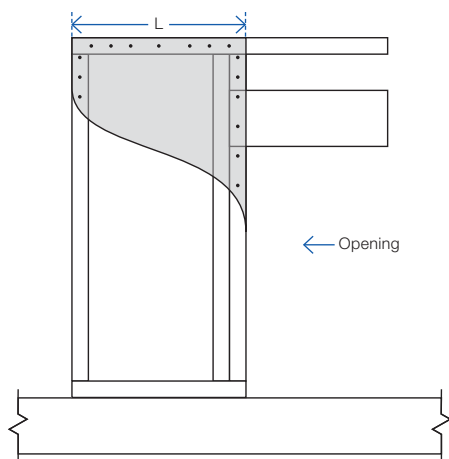
GS1-N, GS2-N elements  
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



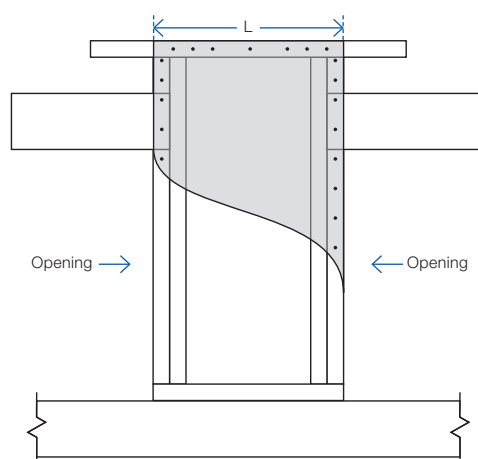
GS1-N, GS2-N elements  
'L' indicates the length of the bracing element

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

## 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.

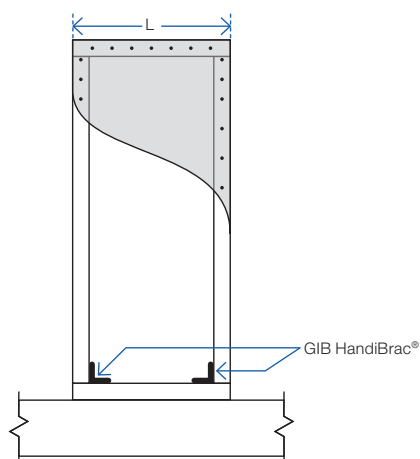
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

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.

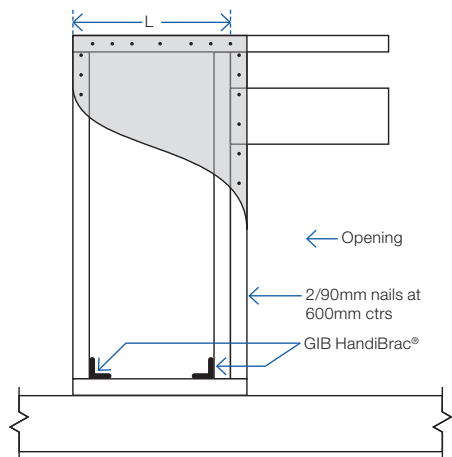
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



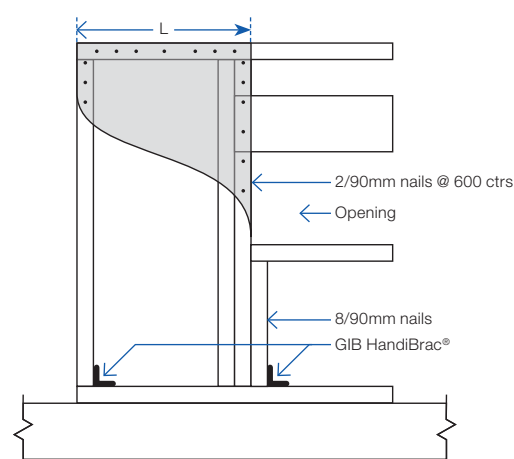
'H' type elements with specific hold downs  
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



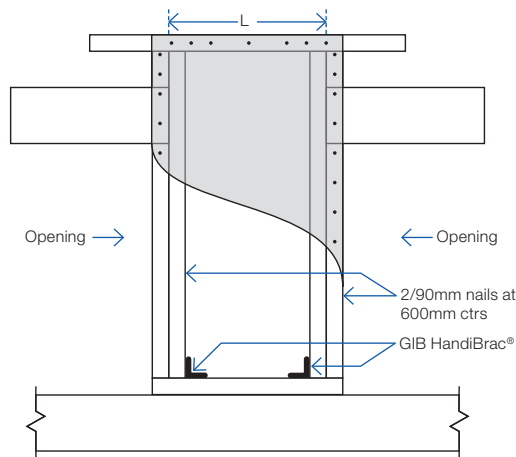
'H' type elements with specific hold downs  
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



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

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



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

## GIB EzyBrace® Systems specification GS1-N

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

#### Concrete floor

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

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

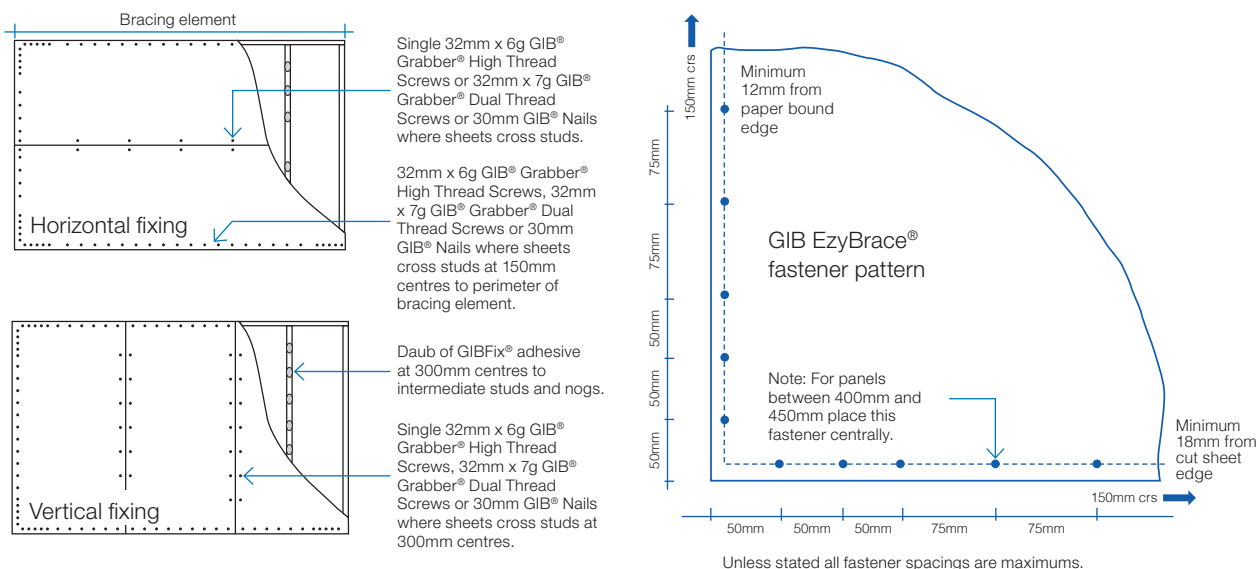
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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



# GIB EzyBrace® Systems specification GS2-NOM

Specification code	Minimum length (m)	Lining requirement
GS2-NOM	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

## 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 100mm x 3.75mm nails at 600mm centres; or three power driven 90mm 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 75mm x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and then 600mm centres thereafter.

## WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to each side of the wall.
- 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

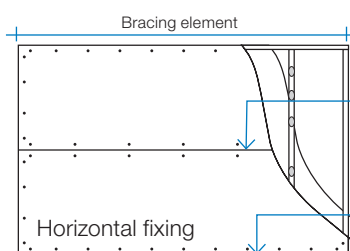
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

### Fastener centres

50, 300mm from each corner and 300mm maximum thereafter around the perimeter of the bracing element. 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.

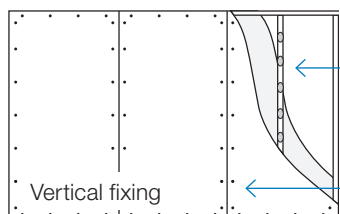
## JOINTING

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.



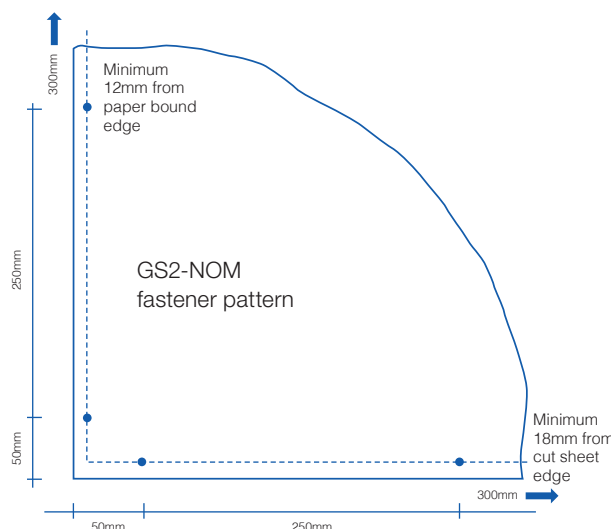
Single 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws where sheets cross studs.

Single 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws to perimeter of bracing element (note corner fastening pattern).



Daub of GIBFix® adhesive at 300mm centres to intermediate studs and nog.s

32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws at 300mm centres to perimeter of bracing element (note corner fastener pattern).



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

### GS2-NOM ADHESIVE FIXING OPTION AT DOOR JAMBS

As an alternative to using screw fixings, a continuous 6-10mm bead of solvent based GIBFix® All-Bond can be applied along the full height studs immediately adjacent to an internal door opening and at the door lintel or head trimmer. The lining is then bedded into the adhesive and installed into the rebated jamb, as shown in figure 38.

This solvent based adhesive option may only be used with GS2-NOM specification and is designed to reduce popping of fasteners around door openings on internal walls.

FIGURE 37: SCREW FIX FOR OPENINGS

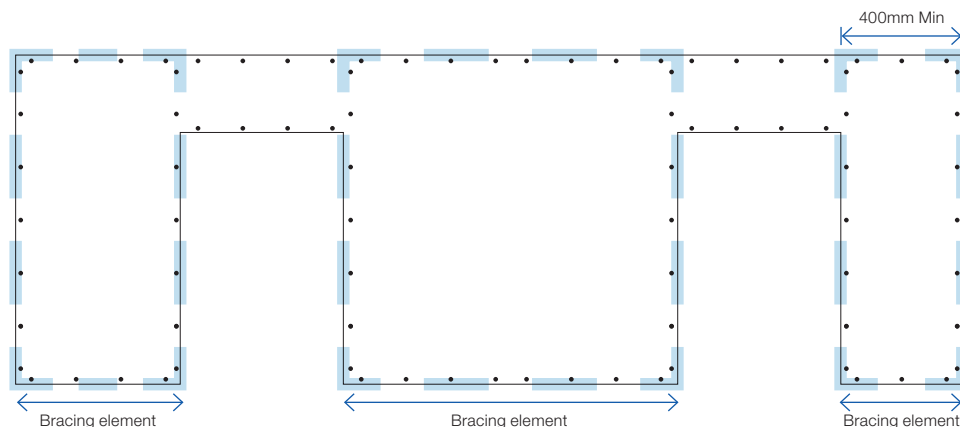
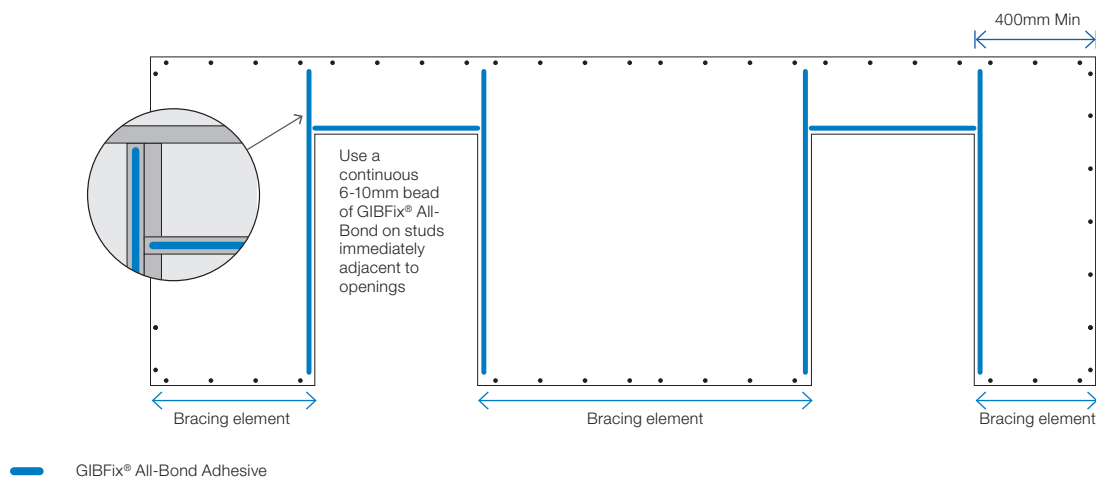
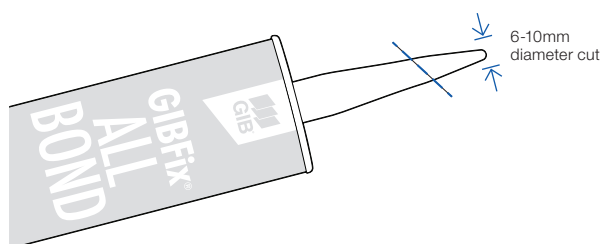


FIGURE 38: SCREW AND ADHESIVE FIX FOR OPENINGS



#### ADHESIVE NOZZLE APERTURE



## GIB EzyBrace® Systems specification GS2-N

Specification code	Minimum length (m)	Lining requirement
GS2-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

### 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 then 600mm centres thereafter.

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

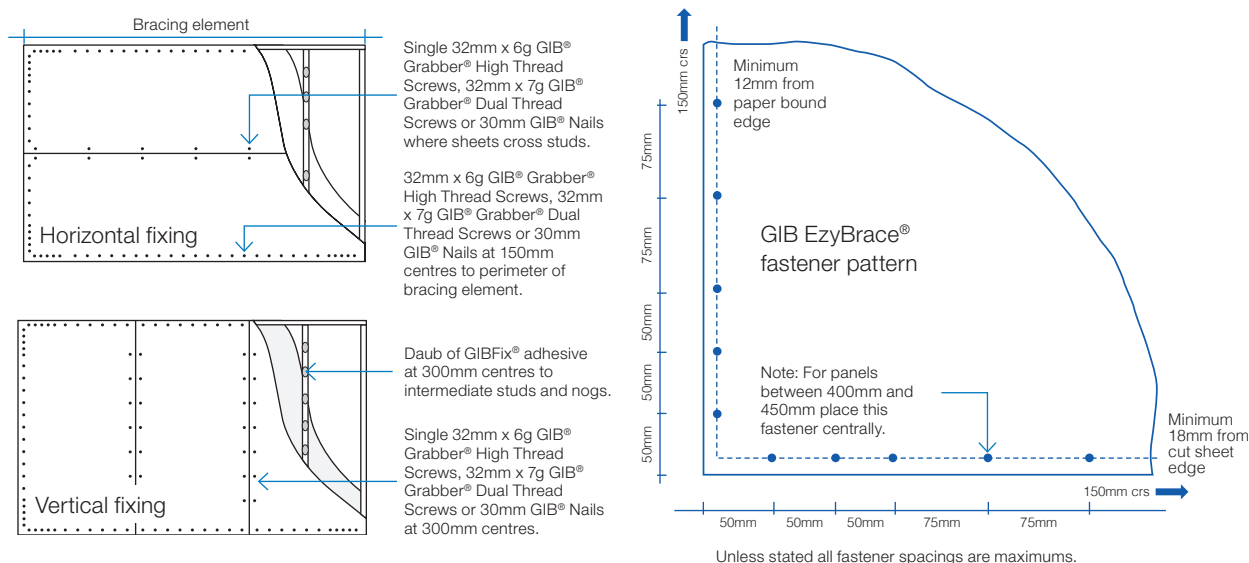
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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

# GIB EzyBrace® Systems specification GSP-H

Specification Code	Minimum length (m)	Lining requirement	Other requirements
GSP-H	0.4	Any 10mm or 13mm GIB® plasterboard lining to one side of framing and 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 NZS 3604:2011.

## WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally, 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

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails.

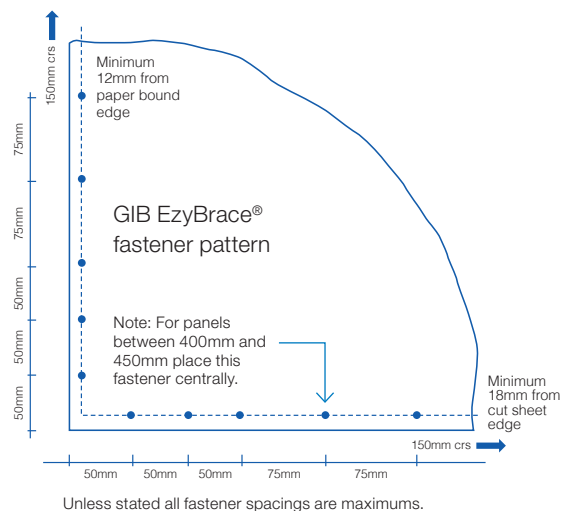
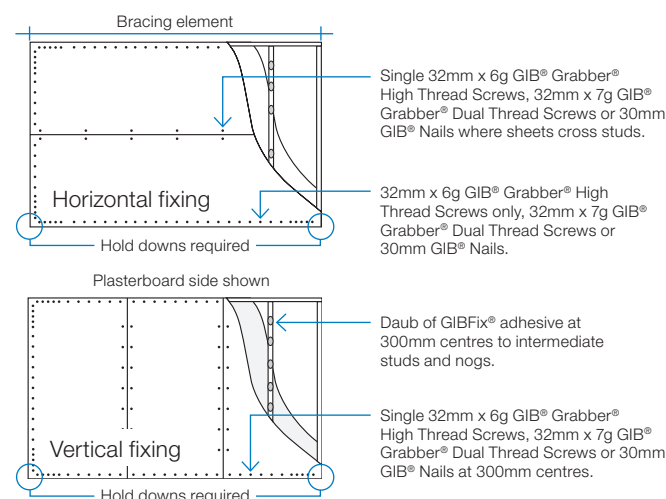
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

### Fastener centres

GIB® plasterboard side: 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 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 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. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

## JOINTING

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



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

## GIB EzyBrace® Systems specification BL1-H

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

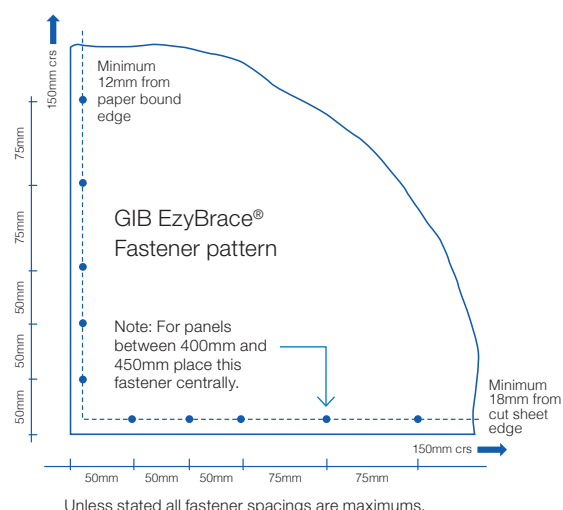
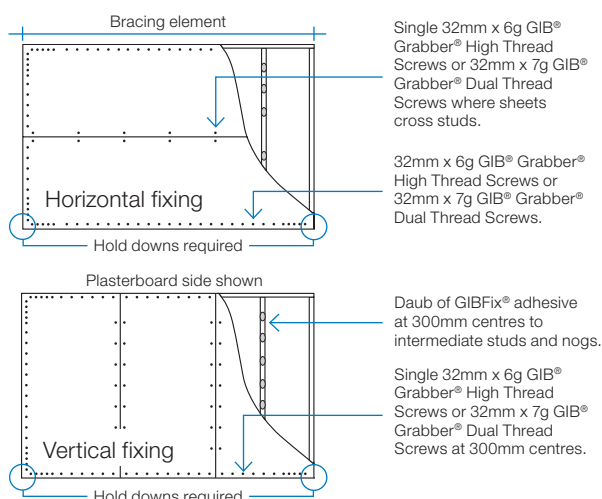
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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

## GIB EzyBrace® Systems specification BLG-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLG-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus any 10mm or 13mm GIB® plasterboard 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 2011 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® to one side of the wall plus any 10mm or 13mm GIB® plasterboard lining to the other side.
- 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

GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Other side: 32mm x 6g GIB® Grabber® High Thread Screws, 30mm GIB Nails or 32mm x 7g GIB® Grabber® Dual Thread Screws.

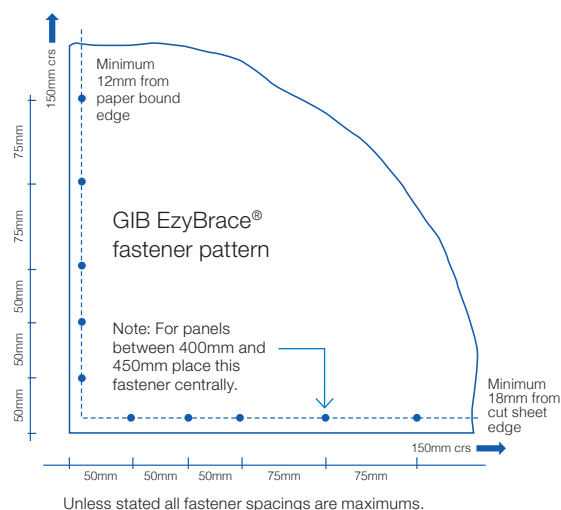
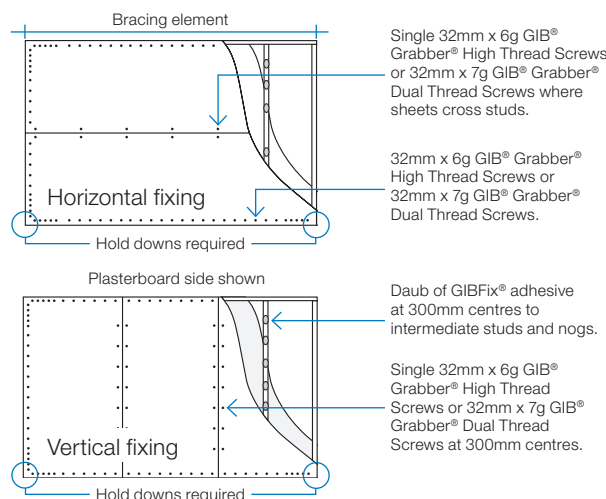
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

50,100,150, 225, 300mm maximum from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum 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 maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

### JOINTING

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



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



## GIB EzyBrace® Systems specification BLP-H

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

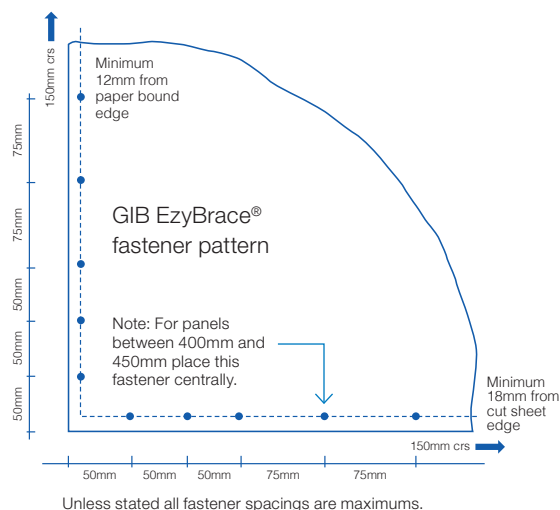
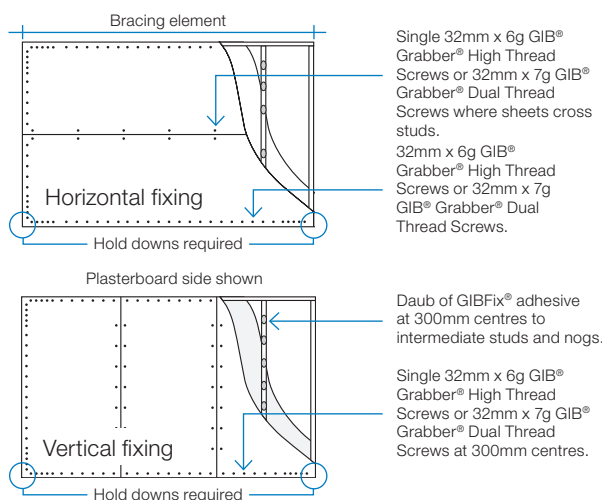
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread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

#### Fastener centres

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

### JOINTING

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



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





Winstone Wallboards is committed to protecting the environment. Environmental matters are integrated into all business activities:

- Our operations strive to exceed all environmental regulatory requirements at all times.
- Protection of the environment is a day to day responsibility that we all must accept.
- We allocate appropriate management time and resources to address relevant environmental issues and continuously improve our activities in that area.
- We will achieve our standards of performance through positive action, employee involvement and constant communication with our neighbours, local authorities and customers.

Minimise on-site waste when designing and/or installing GIB® Systems. For larger projects give consideration to our cut-to-length service to reduce waste. GIB® plasterboard off-cuts, if separated from other waste building materials, can be readily recycled.

For larger projects waste can be diverted to compost manufacturers who grind up the GIB® plasterboard and use it in compost. For smaller projects, the GIB® plasterboard can be ground up and spread around the building site.

### GLOBAL GREENTAG<sup>CERT</sup>™

The Global GreenTag<sup>Cert</sup>™ certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag<sup>Cert</sup>™

GIB® plasterboard has a Level B green rating.

### DECLARE CERTIFICATION

Declare is a database of non-toxic, sustainably sourced building products.

Many GIB® plasterboard products including GIB® Standard, GIB Braceline®, GIB Noiseline® and GIB Aqualine® have achieved Red List Free status in Declare certification.

For more information on Winstone Wallboards sustainability commitments visit [gib.co.nz](http://gib.co.nz).

### COPYRIGHT

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Winstone Wallboards asserts its moral rights and reserves all other intellectual property rights in the materials contained in this brochure and related to GIBFix® Framing System and GIB EzyBrace® Systems.

### TRADEMARKS

The names GIB®, GIB Fyrelite®, GIB Ultralite®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, GIB HandiBrac®, GIB EzyBrace®, the colour blue for GIB Braceline®, the colour pink for GIB Fyrelite®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

### 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.



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**FOR MORE INFORMATION VISIT**

[gib.co.nz](http://gib.co.nz)

**OR CALL THE GIB® HELPLINE**

0800 100 442



## BRANZ Appraised

Appraisal No.427 [2007]

### BRANZ Appraisals

Technical Assessments of products  
for building and construction

## BRANZ APPRAISAL No. 427 (2007)

Amended 31 January 2012

## GIB AQUALINE® WET AREA SYSTEMS

### Winstone Wallboards Limited

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**BRANZ**

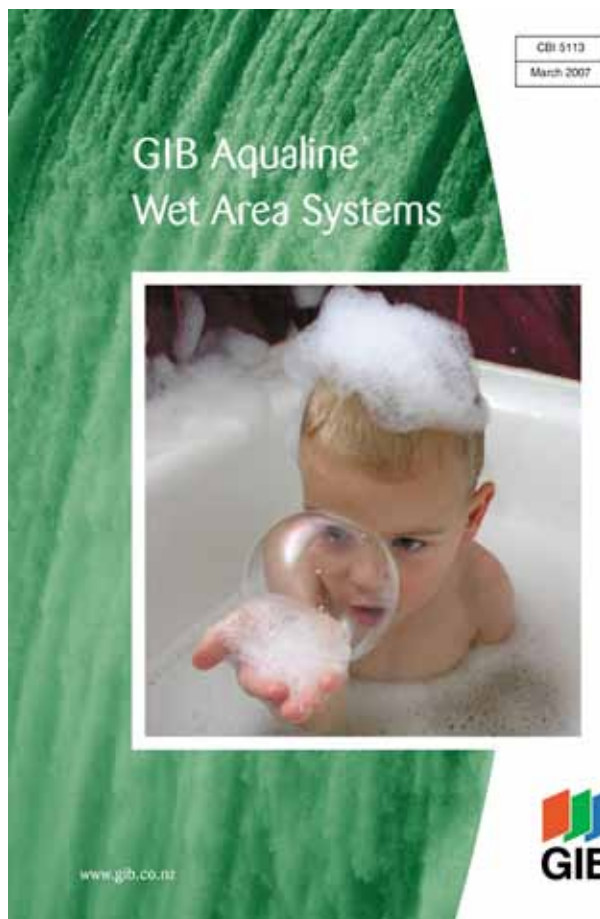
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## Product

1.1 GIB Aqualine® Wet Area Systems are for the interior lining of timber and steel frame walls and ceilings in wet areas such as bathrooms, laundries, kitchens and toilets where a water resistant lining material is desirable.

1.2 GIB Aqualine® Wet Area Systems are based on 10 mm and 13 mm thick GIB Aqualine® water resistant plasterboard.



## Scope

2.1 GIB Aqualine® Wet Area Systems have been appraised for use as a wet area wall and ceiling lining in buildings within the following scope:

- on framed walls and ceilings within the scope limitations on NZS 3604; and,
- on timber and light gauge steel framed walls and ceiling subject to specific design; and,

2.2 GIB Aqualine® may also be used to substitute for some other GIB® Plasterboards in fire-rated, sound-rated and bracing-rated wall and floor/ceiling constructions.

## Building Regulations

### New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the GIB Aqualine® Wet Area Systems, 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. GIB Aqualine® Wet Area Systems meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 (a), (f), (h) and (j)]. See Paragraphs 8.1 - 8.3.

**Clause B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.1 (c) 5 years. GIB Aqualine® Wet Area Systems meet these requirements. See Paragraphs 9.1 - 9.5.

**Clause C3 SPREAD OF FIRE:** Performance C3.3.1, C3.3.2, and C3.3.5. GIB Aqualine® Wet Area Systems meet these requirements by providing passive fire and smoke protection.

**Clause E3 INTERNAL MOISTURE:** Performance E3.3.4, E3.3.5 and E3.3.6. GIB Aqualine® Wet Area Systems meet these requirements. See Paragraphs 13.1 - 13.3.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. GIB Aqualine® Wet Area Systems meet this requirement and will not present a health hazard to people.

**Clause G6 AIRBORNE AND IMPACT SOUND:** Performance G6.3.1 and G6.3.2. GIB Aqualine® Wet Area Systems meet the requirements. See Paragraph 14.1.

This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

## Technical Specification

The GIB® plasterboards and accessories used in the GIB Aqualine® Wet Area System and supplied or specified by Winstone Wallboards Limited are as follows:

### GIB Aqualine®

GIB Aqualine® is a paper-bound, modified water-resistant gypsum-plaster core sheet lining material. The sheets have a taper on the two long sheet edges. GIB Aqualine® is available in 10 mm and 13 mm sheet thicknesses, a sheet width of 200 mm and in lengths of 2400 mm, 2700 mm, 3000 mm and 3600 mm. The maximum weights are 7.8 kg/m<sup>2</sup> and 10.2 kg/m<sup>2</sup> for 10 mm and 13 mm thick sheets respectively. GIB Aqualine® face paper is green in colour.

### Fastenings

- GIB® Grabber® High Thread Drywall screws for fixing to timber:
  - 6g x 25 mm and 32 mm.
- GIB® Grabber® Self Tapping Drywall screws for fixing to light gauge steel:
  - 6g x 25 mm and 32 mm.
- GIB® Nails
  - 30 mm and 40 mm x 2.8 mm

### Adhesive and Sealants

- GIBFix® One (Acrylic)
- GIBFix® All-Bond (Solvent)

### GIB® Accessories and GIB® Jointing Compounds

As specified in the GIB Aqualine® Wet Area Systems and GIB® Site Guide Technical Literature.

### Finishes

Finishes such as tiling, flexible sheet vinyl, paints and wallpapers have not been assessed and are outside the scope of this Appraisal.

## Handling and Storage

The best results are achieved when GIB Aqualine® is treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the GIB® Site Guide. Sheets must be carried on edge and not dragged.

All accessories must be kept dry.

## Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the GIB Aqualine® Wet Area 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.

## Design Information

### General

7.1 GIB Aqualine® provides a water-resistant lining as a base for finishing systems in wet areas such as bathrooms, toilets, laundries and kitchens. The typical finishes are ceramic tiles and flexible sheet vinyl to walls and paint, and wallpaper to walls and ceilings.

7.2 GIB Aqualine® must not be used in the following situations:

- For bracing applications in shower areas or adjacent baths (See Paragraphs 7.4 and 8.2).
- In areas of high humidity (above 90% RH) or continually wet such as group showers, steam rooms, or swimming pools.
- Installed over a vapour barrier.
- Applied directly to masonry, concrete or solid plaster.
- Applied over other sheet lining materials.
- Used externally of the building envelope.
- Exposed to temperatures of 52°C or greater for prolonged periods. (Refer to appliance and fitting manufacturer's for installation details.)

7.3 GIB Aqualine® may be substituted for some other GIB® Plasterboard products in specific GIB® Bracing Systems, GIB® Fire Rated Systems, GIB® Noise Control Systems and GIB Ultraline® PLUS Lining System.

### Wet Areas

7.4 Wet areas are spaces where sanitary fixture and sanitary appliances are located such as bathrooms, toilets, laundries and kitchens. There are two general categories of wet areas as follows:

- Water Splash – These are areas subject to intermittent splashing of water such as around baths, vanities, tubs and sinks.
- Shower Areas – These are areas subject to frequent and heavy water splash such as enclosed showers, unenclosed shower zones and showers over baths.

7.5 Both the above wet area categories must be finished with surfaces and joints that are impervious and easily cleaned. Shower areas must additionally be waterproof. This can be achieved using proprietary rigid shower lining systems, flexible vinyl shower wall finish, or tiling. Tiled shower areas must include a wet area waterproofing membrane system under the tiles.

### Intertenancy Walls – Wet Areas

7.6 Intertenancy drywall constructions that incorporate fire resistance and noise control must be protected from water splash. In shower areas GIB Aqualine® must not be substituted for other GIB® Plasterboards but must be an extra lining layer. Refer to the GIB Aqualine® Wet Area Systems Technical Literature.

### Tiling

7.7 GIB Aqualine® is suitable as a substrate for tiling up to the following weights:

- 10 mm GIB Aqualine® up to 20kg/m<sup>2</sup>
- 13 mm GIB Aqualine® up to 32kg/m<sup>2</sup>.



Note: Most ceramic and porcelain wall tiles weigh less than 20kg/m<sup>2</sup>. For further information on tiling consult the BRANZ Good Practice Guide – Tiling.

## Framing

7.8 Supporting framing must comprise one of the following subject to the minimum sizes, dwang centres and all other frame requirements of GIB Aqualine® Wet Area Systems Technical Literature:

- Timber framing must be designed and constructed in accordance with NZS 3604, or to a specific design using NZS 3603 and AS/NZS 1170.
- Steel framing must be designed to withstand loads in accordance with AS/NZS 1170.

## Structure

### Bracing

8.1 GIB Aqualine® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. GIB Aqualine® can be used in place of GIB Braceline® in GIB® bracing elements 900 mm or longer, provided the perimeter of the element is fixed with GIB Braceline® Nails or GIB Braceline® screws at 100 mm centres, using the GIB Braceline® corner fixing pattern.

8.2 GIB Aqualine® must not be used for bracing in shower areas or behind baths.

### Impact Resistance

8.3 GIB® plasterboards provide adequate resistance to soft body impact, based upon experience of use in domestic and light commercial applications.

## Durability

### Serviceable Life

9.1 GIB Aqualine® has a serviceable life of at least 15 years as a fully protected shower or water splash lining. As a general wall and ceiling lining GIB Aqualine® will have a serviceable life in excess of 50 years. The ability of GIB Aqualine® to remain durable is dependent on being protected and remaining dry in service, and being maintained in accordance with this Appraisal.

### Maintenance

9.2 The building must be maintained weathertight and all lining systems protected from internal and external moisture.

9.3 Finishes to water splash and shower areas, including tiles, grout, waterproof membranes, sealants and flexible sheet vinyl must be checked to ensure the integrity of the system is maintained. They must be repaired or replaced if necessary. When repairing or replacing finishes, the GIB Aqualine® substrate must be checked for defects and repaired or replaced, as required.

9.4 For flexible sheet vinyl, particular attention must be paid to joints especially at corners. Checks should be made to ensure the vinyl has not been punctured. Where damage has occurred, repairs must be made immediately.

9.5 Impact damage to GIB Aqualine® plasterboard, resulting in small holes and cracks, may be patched, stopped and finished. For larger areas of damage, expert advice on repair must be sought from Winstone Wallboards Ltd.

## Outbreak of Fire

10.1 Separation or protection must be provided to GIB Aqualine® Wet Area Systems from heat sources such as stoves, heaters, flues and chimneys.

10.2 NZBC Acceptable Solution C/AS1, Part 9 and Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

## Spread of Fire

11.1 When 10 mm GIB Aqualine® is substituted into fire rated systems in place of 10 mm GIB Fyrelite®, the FRR of that system will be maintained. Similarly, the FRR is maintained when 13 mm GIB Aqualine® is substituted for 13 mm GIB Fyrelite®.

## Flame Barrier

12.1 Where flame barriers are required by Acceptable Solution C/AS1 Table 6.3, GIB Aqualine® is a suitable material to provide a 10 minute flame barrier, provided all sheet joints are formed over framing, or backblocked with GIB® plasterboard.

## Internal Moisture

13.1 When installed in accordance with this Appraisal, GIB Aqualine® Wet Area Systems will provide wall surfaces adjacent to sanitary fixtures and sanitary appliances that are impervious and easily cleaned.

13.2 The construction methods meet with the internal moisture requirements of the NZBC Acceptable Solution E3/AS1.

13.3 To minimise internal condensation, adequate levels of ventilation and thermal resistance must be provided to all spaces where moisture may be generated.

## Airborne and Impact Sound

14.1 When GIB Aqualine® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyrelite®, the STC and IIC rating of that system will be maintained. When GIB Aqualine® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur.

## Installation Information

### Installation Skill Level Requirement

15.1 Installation of GIB Aqualine® Wet Area Systems can be carried out by any competent building contractor.

## General

16.1 GIB Aqualine® Wet Area Systems must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

### Cutting

16.2 GIB Aqualine® is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.

### Health and Safety

16.3 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.

### Framing

16.4 To achieve an acceptable decorative finish, GIB Aqualine® Wet Area Systems and the GIB® Site Guide specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. Winstone Wallboards Limited recommend a moisture content of 8–12% where buildings are to be air conditioned or centrally heated.

## Fixing Sheets

### Non-Tiled Areas

17.1 GIB Aqualine® sheets may be installed vertically or horizontally. Sheets are fixed with GIB® Grabber® screws or GIB® Nails at 300 mm centres around the perimeter of the sheet, and with GIBFix® adhesive on all intermediate studs and dwangs. Adhesive must not be used under fasteners. A 5-10 mm gap must be left between the floor and the bottom of the sheet.

### Tiled Areas

17.2 Control joints must be provided at maximum 4 m centres.

Internal corners in shower areas must be reinforced with a minimum 32 x 32 x 0.55 mm galvanised metal angle prior to tiling the walls.

17.3 GIB Aqualine® sheets may be installed vertically or horizontally. Sheets are fixed with GIB® Grabber® screws at 100 mm centres to perimeter of wall and to all intermediate studs. Adhesive must not be used in place of screws.

### Ceilings

17.4 Supports of timber or steel battens or ceiling joists must be at 450 centres for 10 mm GIB Aqualine®, or 600 mm centres for 13 mm GIB Aqualine®.

17.5 GIB Aqualine® sheets must be fixed with GIB® Grabber® screws at 600 mm centres around perimeter and at 200 mm centre along supports. Alternatively, sheets are screw fixed at 600 mm centres along the supports and GIBFix® adhesive fixed at 200 mm centre between.

## Penetrations and Sealants

18.1 All cut-outs for pipe penetrations must be made neatly using a hole saw. Cut-outs should be made approximately 12 mm diameter greater than the pipe.

18.2 A bead of silicone sealant must be placed to the full thickness of the GIB Aqualine® sheet around all pipe penetrations, at bath rims and preformed shower bases and where an impervious junction is required at the floor/wall line.

18.3 In tiled areas, a bead of silicone sealant 6 mm wide must also be placed to the full thickness of the tiles where the above situation occurs. The sealant manufacturer's technical literature must be followed for installation.

## Jointing and Finishing

19.1 Jointing must be carried out in accordance with GIB® Site Guide Technical Literature.

19.2 Tiled shower areas must incorporate a waterproofing membrane over GIB Aqualine®. Waterproofing membranes are outside the scope of this Appraisal and must otherwise be specified and approved.

## Investigations

20.1 The GIB Aqualine® Wet Area Systems and GIB® Site Guide Technical Literature have been examined by BRANZ and found to be satisfactory.

20.2 Site visits were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.

20.3 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.

20.4 Winstone Wallboards Limited GIB® plasterboards have been assessed for the following properties: MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, inspection for fungal spores, hard and soft body impact tests.

## Quality

21.1 Winstone Wallboards Limited's manufacturing process and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory. The quality management systems of Winstone Wallboards Limited have been assessed and registered by TELARC as meeting the requirements of ISO 9001, Registration No. 581. Winstone Wallboards Limited is responsible for the quality of the product supplied.

21.2 The quality of the application and finish on site is the responsibility of the installation, stopping and finishing contractors.

21.3 Designers are responsible for the design of buildings.

21.4 Building owners are responsible for the maintenance in accordance with the instructions of Winstone Wallboards Limited.

## Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2588: 1998 Gypsum Plasterboard.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber structures standard.
- NZS 3604: 2011 Timber-framed buildings.
- BRANZ Good Practice Guide - Tiling, March 2004.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.

**Amendment No. 1, dated 29 April 2010.**

This Appraisal has been amended to include a new adhesive, GIBFix® One, and to update reference to AS/NZS 1170.

**Amendment No. 2, dated 31 January 2012.**

This Appraisal has been amended to update reference to NZS 3604: 2011.



**BRANZ**

In the opinion of BRANZ, GIB Aqualine® Wet Area Systems are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to the Client, Winstone Wallboards Limited, and is valid until further notice, subject to the Conditions of Appraisal.

**Conditions of Appraisal**

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the technical literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. The Client:
  - 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.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation 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 the Client.
5. 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.

For BRANZ

P Robertson  
Chief Executive

Date of issue: 4 April 2007



# GIB Aqualine<sup>®</sup> Wet Area Systems



# GIB Aqualine® Wet Area Systems Specification and Construction Guide

 Residential and non-residential applications.

 Bathrooms, laundries, toilets and kitchens.

## **GIB Aqualine® Wet Area Systems, March 2007**

Winstone Wallboards Ltd accepts no liability if the GIB Aqualine® Wet Area System is 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. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. Before proceeding, you should check that this is the current version of the publication. Simply call the GIB® Helpline on 0800 100 442 or visit [www.gib.co.nz](http://www.gib.co.nz)

### **Beware of Substitution**

The performance of GIB® Systems is very sensitive to design detailing, product specifications 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. Therefore for GIB® Systems

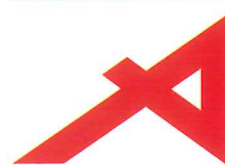
it is important to use only GIB® branded components where specified and closely follow the specified design details and construction practices, so you can be confident that the required level of performance and quality is achieved on site.

### **Customised Design Solutions**

The systems detailed in this book should cover most common wet area situations. However, for projects where specific performance is necessary, GIB® Technical Services can assist you to develop customised solutions. Simply contact us through the GIB® Helpline on 0800 100 442.

**This publication supersedes the following publication:**

GIB Aqualine® Wet Area Systems, October 2002 (v2).



**BRANZ Appraised**  
Appraisal No.427 [2007]

GIB Aqualine® Wet Area Systems, March 2007.





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## GIB AQUALINE® WET AREA SYSTEMS



## Introduction

MARCH 2007

## THIS PUBLICATION

This publication is not intended as the definitive guide on wet area construction and wet area systems, but rather as a helpful guide to best practice around areas where there is intermittent water exposure and splash zones within residential and non-residential buildings – in particular, areas covered by the New Zealand Building Code (NZBC), Clause E3 Internal Moisture.

The information herein 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 NZBC 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.

It is important to introduce materials and systems which have been specially designed to cope with the conditions that are common in wet areas, and to ensure they are installed correctly, using best practice, and are compatible to form a complete wet area system.

The code numbers shown with each “typical detail”, e.g. GAW-D030, match the code numbers for drawings available as downloads on the GIB® website at [www.gib.co.nz](http://www.gib.co.nz)

The reference numbers (e.g. GAW-D030) stand for:



## WHAT IS A WET AREA?

Generally, wet areas are described as spaces to where fresh water is reticulated, such as bathrooms, toilets, laundries and kitchens. Wet areas fall into two categories; these are well explained and documented in the NZBC, Clause E3.

1. Water splash areas – These are areas subject to intermittent splash of liquid water around sanitary fittings and appliances such as baths, vanities, laundry tubs, sinks, etc. These areas are required to have an impervious, easily cleaned surface.
2. Shower enclosures – These are areas subject to more frequent, larger quantities of water, and include shower enclosures and shower over bath areas. The NZBC E3/AS1 requires these areas to be impervious, and specifically excludes any paint and wallpaper finishes. Where ceramic tile or stone finishes are applied, E3/AS1 requires that they “shall be laid on a continuous impervious substrate or membrane”.

The requirements of these wet areas are described on page 6 of this publication and in full in Clause E3 of the NZBC. Clause E3 also refers to other requirements not covered in this publication, such as ventilation, condensation control and overflow management, which will require separate consideration. Ongoing maintenance of wet areas is also important to maximise the life of the wet area.

## GIB AQUALINE®

Although able to cope with infrequent short-term exposure, standard gypsum plasterboard will have a shortened life expectancy when frequently exposed to water or moisture.

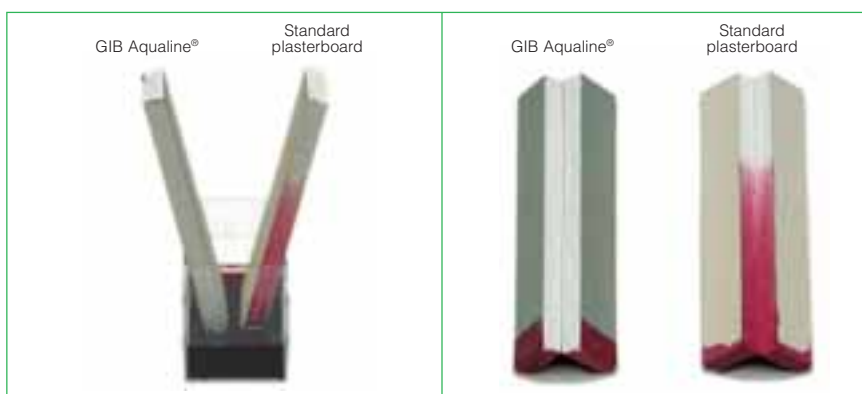
The NZBC does not call for water resistant linings in wet areas but it is highly desirable to incorporate lining materials which will maintain their integrity longer when exposed more frequently to water or steam and particularly to one-off events such as leakages or flooding of a room.

GIB Aqualine® is ideal in such situations because it features a water resistant wax polymer impregnated core.

Unlike other commonly used substrates, the GIB Aqualine® core not only resists penetration of water through the lining into the framing behind, but also resists water “wicking” up the core, a common cause of long-term damage where a water resistant lining has not been used.

GIB Aqualine® will maintain its integrity for extended periods, particularly where wicking over large areas can destroy the integrity of the interface between the lining and paint or wallpaper surfaces or between the lining and the tile adhesive.

The illustrations below graphically show the difference between GIB Aqualine® and standard plasterboard after a two-hour soak test in red dye.



**Where to Use GIB Aqualine®**

Though not required by NZBC, it is highly desirable to include GIB Aqualine® in all areas at risk of water or moisture damage, in order to prolong the life expectancy of that space.

They include:

	WALLS	CEILINGS
BATHROOMS	✓	✓
SHOWERS	✓	✓
LAUNDRY	✓	✓
KITCHEN	✓	
TOILET	✓	

**Benefits**

- Water resistant and durable to help protect against water damage
- Proven substrate for paint, wallpaper, tiles, sheet vinyl and rigid sheet shower linings with installations in over 300,000 bathrooms in New Zealand
- Suitable for both residential and non-residential applications
- Dimensionally stable, will not buckle or warp, hence an excellent substrate for ceramic tiles
- Conventional jointing methods
- Easy to cut and form openings
- Contains fibreglass and other additives for strength and fire resistance
- May be used in GIB® Bracing, GIB® Fire Rated and GIB® Noise Control Systems (see Compliance with the NZBC, Clauses B1, C3 and G6). Consult the appropriate GIB® literature for installation details
- Green face paper for ease of recognition.

**Sheet Dimensions and Weights**

SHEET DIMENSIONS (ALL SHEETS 1200mm WIDE AND TE/TE)		MAXIMUM WEIGHT/m <sup>2</sup>
Thickness (mm)	Length (mm)	
10	2400, 2700, 3000, 3600	7.8kg
13	2400, 2700, 3000, 3600	10.2kg

**Handling and Storage**

- GIB Aqualine® must be stored under cover, stacked flat and clear of the floor with sufficient support to avoid sagging
- GIB Aqualine® must be handled as a finishing material.

**APPRAISAL**

The document entitled *GIB Aqualine® Wet Area Systems* 2007 has been appraised by BRANZ, Appraisal Certificate, No. 427 (2007).

**COMPLIANCE WITH THE NEW ZEALAND BUILDING CODE (NZBC)****Structure – Clause B1**

The design and material specification for steel and timber framing used in GIB Aqualine® systems must be in accordance with the performance requirements of NZBC Clause B1 (Structure). See Bracing in Wet Areas on page 5.

**Durability – Clause B2**

When installed and maintained in accordance with this literature, GIB Aqualine® tiled or vinyl covered systems have a serviceable life of at least 15 years. They comply with the requirements of NZBC 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 Aqualine® systems have a serviceable life of at least 50 years and comply with NZBC Clause B2 (Durability) for use within toilets, kitchens, bathrooms and laundries not directly exposed to liquid water.

**Spread of Fire – Clause C3**

GIB® Fire Rated Systems provide passive fire protection in accordance with the requirements of NZBC Clause C3 (Spread of Fire). When GIB Aqualine® is substituted into fire rated systems in place of the equivalent thickness GIB Fyrelite®, the Fire Resistance Rating (FRR) of that system will be maintained.

COMPLIANCE WITH THE NEW ZEALAND BUILDING CODE (NZBC) *continued***Internal Moisture – Clause E3**

When installed in accordance with this literature, tiled or vinyl covered GIB Aqualine® systems may be used in areas directly exposed to liquid water, such as showers, to provide an impervious and easily cleaned wall surface. These systems comply with the requirements of NZBC Clause E3 (Internal Moisture).

**Hazardous Building Materials – Clause F2**

At no stage during handling, installation, or serviceable life does GIB Aqualine® constitute a health hazard. It therefore meets the provisions of NZBC 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**

NZBC 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 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 NZBC Clause G6 (Airborne and Impact Sound). When GIB Aqualine® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyrelene®, the STC and IIC rating of that system will be maintained. When GIB Aqualine® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information contact the GIB® Helpline 0800 100 442.

## LIMITATIONS

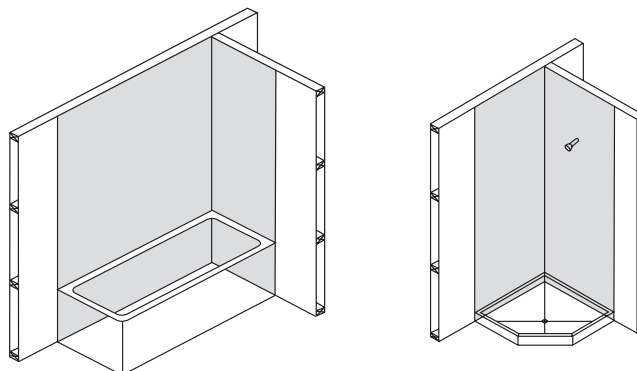
- GIB Aqualine® must not be used for bracing purposes in shower cubicles or above baths (see Bracing in Wet Areas below)
- Do not use GIB Aqualine® where it may be exposed for extended periods to humidities of 90% RH and above. Such areas include group shower or steam rooms as well as moisture and chlorine rich environments such as indoor swimming pools
- GIB Aqualine® must not be directly applied to solid plaster (gypsum or cement), wood based sheet linings or similar materials, masonry or concrete. GIB Aqualine® may only be applied to these materials where timber strapping or steel furring channels are installed
- GIB Aqualine® 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® 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.

## BRACING IN WET AREAS

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.

Otherwise, GIB® Bracing Systems can be used in water-splash areas as defined by NZBC Clause E3/AS1, provided these are maintained impervious for the life of the building.

GIB Aqualine® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. GIB Aqualine® can be used in place of GIB Braceline® in GIB® bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB Braceline® Nails or GIB Braceline® screws at 100mm centres, using the GIB Braceline® corner fixing pattern.



No bracing in the shaded areas.



### NEW ZEALAND BUILDING CODE

E3.3.4 requires impervious and easily cleaned surfaces to all surfaces adjacent to sanitary fixtures or laundering facilities.

E3.3.5 requires that surfaces of building elements likely to be splashed or contaminated in the course of the intended use of the building must also be impervious and easily cleaned.

E3.3.6 requires that surfaces of building elements likely to be splashed must be constructed in a way that prevents water from penetrating behind linings or into concealed spaces (e.g. wall cavities).

Walls in wet areas therefore need to be addressed according to whether they fall within the scope of one of the following descriptions:

1. Wall surface likely to be splashed
2. Shower walls. Although not a requirement of NZBC it is highly recommended that the wall surfaces within 150mm of the top edge of a bath, and the vertical faces immediately under the edge of a bath, are treated in the same way as for a shower wall.

### WALL SURFACES IN AREAS LIKELY TO BE SPLASHED

Suitable linings include:

- a. Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints
- b. Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use
- c. Cement based solid plaster or concrete having a steel trowel or polished finish (semi-gloss or gloss paint must be used if a paint finish is required)
- d. Cork tile or sheet sealed with waterproof applied coatings
- e. Monolithic applied coatings having a polished, non-absorbent finish (e.g. terrazzo)
- f. Sheet linings finished with vinyl coated wallpaper, or semi-gloss or gloss coating
- g. Water resistant sheet linings finished with decorative high pressure laminate or factory applied polyurethane or resin
- h. Modular or multiple lining units which are themselves *impervious* and easily cleaned, and are installed with *impervious* joints
- i. Timber or timber-based products such as particleboard sealed with waterproof applied coatings.

**NB: Floor surfaces and floor/wall junctions are required by E3 to be impervious.**

### SURFACES IN SHOWERS AND AROUND BATHS

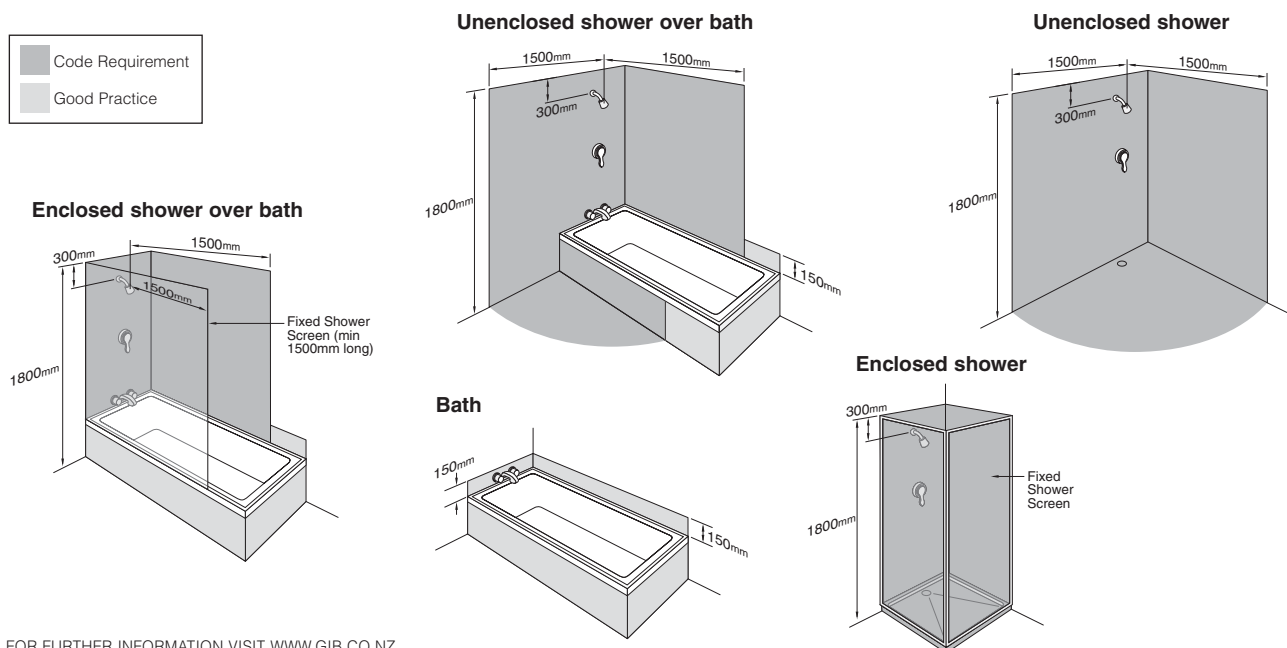
Suitable linings include all of the above, but **NOT including items (d) and (f) from the above list.**

Note that a waterproof membrane complying with AS/NZS 4858: 2004 **MUST** be applied to all lining materials used under ceramic tiles in these areas.

The waterproof membrane must extend to a 1500mm horizontal radius from a shower rose unless the shower is contained within a fixed enclosure. A shower curtain does not constitute a fixed enclosure.

Particleboard manufacturers recommend that in wet areas, panels should be protected with a suitable wet area membrane or an integrally waterproof sheet material. Some local authorities call for this treatment on all timber based floors. Local requirements should be checked before proceeding.

**Dark grey shaded areas in the diagrams below represent the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membranes prior to tiling. Light grey shaded areas represent good practice.**







### WALL SURFACES SURROUNDING COOKTOPS

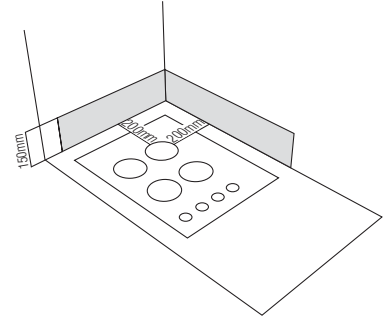
The protection of combustible surfaces surrounding gas cooking appliances is covered by NZS 5261. Consult the current version of this standard to ensure compliance.

However, 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 ceramic tiles on GIB® plasterboard
- 5mm toughened glass on GIB® plasterboard
- or any system that can be demonstrated to meet the requirements of Clause 2.6.2.6 of NZS5261.

Because of the moisture generated by cooking, it is highly recommended that GIB Aqualine® is used in kitchen areas.

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. However, it would be unusual for surfaces outside 200mm to exceed 52°C for sustained periods.



### 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
- Sealants should be of a mould inhibiting type and be neutral cure. 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
- Gun a bead of silicone sealant to the full depth of the GIB Aqualine® in the following locations:
  - Around all tap/pipe bodies
  - The gap between the bath rim and the bottom edge of the GIB Aqualine®
  - 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 GIB Aqualine® 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 then refer to the publication *Penetrations in GIB® Fire Rated Systems*. Always use tested and approved proprietary solutions.

### WATERPROOF MEMBRANES

- A waterproof membrane must be applied to **all** 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 over the lining and the jointed areas shown shaded on page 6
- Only in-situ waterproofing materials which are manufactured to AS/NZS 4858:2004 "Wet Area Membranes" are recommended and applied to manufacturer's recommendations. Typically, these types of membranes are not suitable for paint and wallpaper finishes
- Waterproof membranes must be fully cured and dry prior to application of tiling adhesives
- Embed reinforcing mats in the membrane at all internal corners of the shower (including floor/wall junctions)
- 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 technical literature are generic in nature. For accurate detailing, follow the specifications provided by the supplier of the proprietary waterproof membrane.

### TILING

GIB Aqualine® is suitable as a substrate for tiling up to the following weights:

- 10mm GIB Aqualine® up to 20kg/m<sup>2</sup>
- 13mm GIB Aqualine® up to 32kg/m<sup>2</sup>.

**Note:** Most ceramic and porcelain tiles weigh less than 20kg/m<sup>2</sup>.

For further information on tiling consult the BRANZ *Good Practice Guide – Tiling*.



### FLEXIBLE SHEET VINYL – SHOWERS AND OTHER WET AREAS

- GIB Aqualine® is a suitable substrate for flexible vinyl wall finishes in wet areas of residential, commercial or institutional buildings
- Framing requirements and installation procedures for the GIB Aqualine® substrate shall be as per page 10 or 11, except that the lining gap at the floor should be reduced to 5mm when a pencil cove detail is used
- The installation of galvanised steel reinforcing angles (32 x 32 x 0.55mm) behind internal GIB Aqualine® corners is recommended for sheet vinyl applications in showers or shower over bath situations (see illustration page 14)
- The GIB Aqualine® lining must be jointed and stopped to a paint quality finish (Level 4) – trowel marks can telegraph through even a commercial grade 2mm vinyl
- A commercial grade vinyl is recommended for the wall finish 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 the 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 manufacturers/suppliers of thin (usually 2-3mm) and rigid acrylic shower linings commonly recommend direct adhesive fixing to wall linings using solvent-based adhesives
- Water temperature changes will cause movement of the thin acrylic sheet, which in turn will stress the adhesive and wall lining substrate
- **Do not preseal or paint** areas which are to be covered by the rigid shower linings
- The wall surface must be free of dust before installation of the lining
- 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
- Care must be taken to ensure that rooms are adequately ventilated and the adhesive is fully cured before the shower is used
- Consult the manufacturer/supplier of the shower lining for full installation details.

### 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 within those spaces.

In most cases when renovating these rooms it is often easier and more cost-effective to remove the existing linings and replace them with GIB Aqualine®. This allows for a completely 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 and water resistant linings where appropriate
- Make the job easier.

### MAINTENANCE

Lack of maintenance is frequently the cause of premature and often very expensive failure of components and building elements within wet areas.

It is important to regularly inspect and repair any potential problem before it becomes a major problem and 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 recoated 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.



High-rise and commercial wet areas can generally be divided into four separate categories:

### HIGH-RISE APARTMENTS AND INTERTENANCY

Wet areas in apartment complexes are generally covered by Clause E3 of the NZBC and will have the same requirements as shown for residential applications. However, apartment buildings will also involve intertenancy walls requiring noise control and fire resistance.

Generally, noise control and fire resistance are the first consideration and then the water resistance is added to those systems.

For noise control, GIB Aqualine® can substitute for the equivalent thickness GIB® Standard plasterboard or GIB Fyrelite®.

For fire resistance, GIB Aqualine® can substitute for GIB Fyrelite® of equivalent thickness.

In all cases the prescribed noise control or fire resistance system specifications must be followed completely as presented in the GIB® publications *GIB® Noise Control Systems* and *GIB® Fire Rated Systems*.

Refer to typical details on page 25.

The NZBC for intertenancy calls for special consideration to be given to preventing water from travelling from one tenancy to another. This calls for a waterproof membrane to all wet area floors with upstands to walls and the inclusion of floor wastes.

It is important to avoid penetrations such as taps, shower roses, etc. in intertenancy walls as this will compromise fire and noise ratings.

### OFFICE, WORKPLACE AND SCHOOLS

These wet areas are generally no different in requirements to those shown in this publication or those of high-rise apartments, and are treated in the same manner.

As there is often a higher impact requirement in commercial applications, 13mm GIB Aqualine® is the minimum thickness recommended.

These areas are often finished in sheet vinyl or ceramic tiles and GIB Aqualine® is an ideal substrate, particularly in the case of sheet vinyl where a high quality finish is required to minimise telegraphing of imperfections in the substrate.

### HEALTHCARE AND HOSPITALS

This industry will generally have special requirements for wet areas. GIB Aqualine® will generally satisfy specific design needs in healthcare facilities and in particular is an ideal substrate for the preferred finish of sheet vinyl.

### PUBLIC AMENITIES AND SPORTS CLUBS

Public amenities and sports clubs often have a high demand for impact resistance, therefore 13mm GIB Aqualine® should be used, and suitable impact resistant wall coverings considered, such as heavy duty sheet vinyl or ceramic tiles over waterproof membrane to 1200mm high.

Also full consideration should be given to the usage of the amenity and whether high pressure or chemical cleaners will be used or if the amenity may be subject to vandalism.

Because of extreme humidity and presence of chemicals, GIB Aqualine® is not suitable for enclosed swimming pool areas.

Contact the GIB® Helpline on 0800 100 442 for further assistance.

## GIB AQUALINE® WET AREA SYSTEMS – FRAMING AND LINING INSTALLATION



### Non-tiled Walls – Timber Framing

MARCH 2007

If bracing, noise control or fire rating considerations exist, consult the relevant GIB® technical publication, e.g. *GIB® Fire Rated Systems*, *GIB® Noise Control Systems*, *GIB® Bracing Systems*, for the appropriate information.

#### Wall Framing

Framing dimensions must comply with the requirements of NZS 3604:1999.

- 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

- 10mm GIB Aqualine® – minimum 25mm x 6g GIB® Grabber® High Thread Drywall Screws or 30mm x 2.8mm GIB® Nails
- 13mm GIB Aqualine® – minimum 32mm x 6g GIB® Grabber® High Thread Drywall Screws or 30mm x 2.8mm GIB® Nails.

#### 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
- 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.

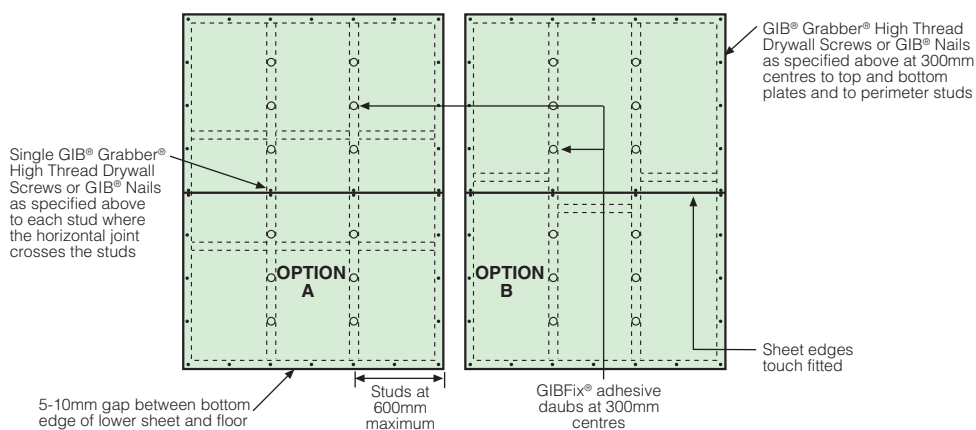
#### Lining

- 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.

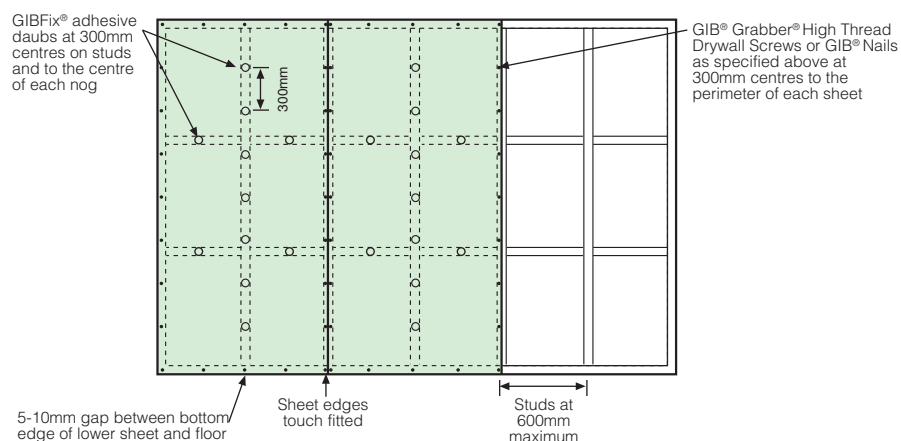
#### Jointing

- Jointing shall be carried out in accordance with the instructions in the *GIB® Site Guide*; GIB® AquaMix is recommended for the first two coats.

#### Fastening the Linings – Horizontal Fixing Only



#### Fastening the Linings – Vertical Fixing Only



## GIB AQUALINE® WET AREA SYSTEMS – FRAMING AND LINING INSTALLATION



## Non-tiled Walls – Steel Framing

MARCH 2007

The minimum sheet thickness for fixing on light gauge steel framing is 13mm GIB® plasterboard.

Steel framing for residential construction is by specific design.

If noise control or fire rating considerations exist, consult the relevant GIB® technical publication (e.g. *GIB® Fire Rated Systems* or *GIB® Noise Control Systems*) for the appropriate information.

**Wall Framing**

- Steel stud dimensions to be minimum 63 x 34 x 0.55mm nominal with a 6mm return
- Steel channel dimensions to be minimum 63 x 30 x 0.55mm nominal
- Studs shall be spaced at 600mm centres maximum
- Ensure that the studs are placed with the open side facing in the same direction (see *GIB® Site Guide*).

**Fasteners**

- 25mm x 6g GIB® Grabber® Self Tapping Drywall 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
- 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.

**Lining**

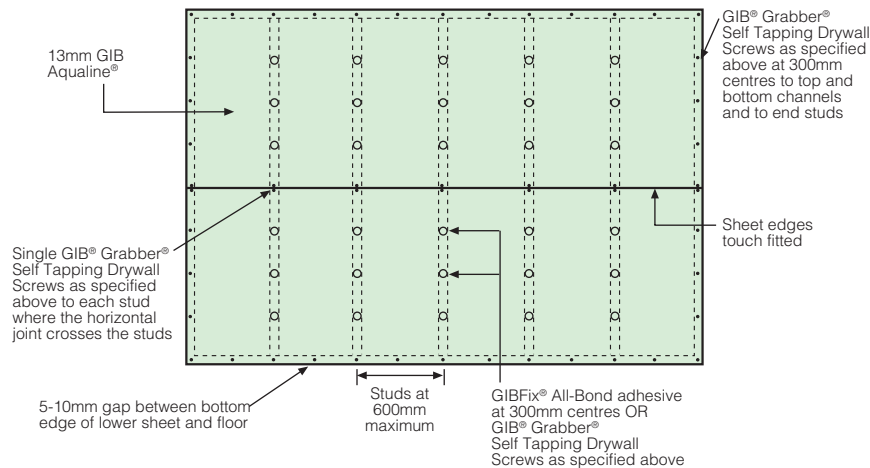
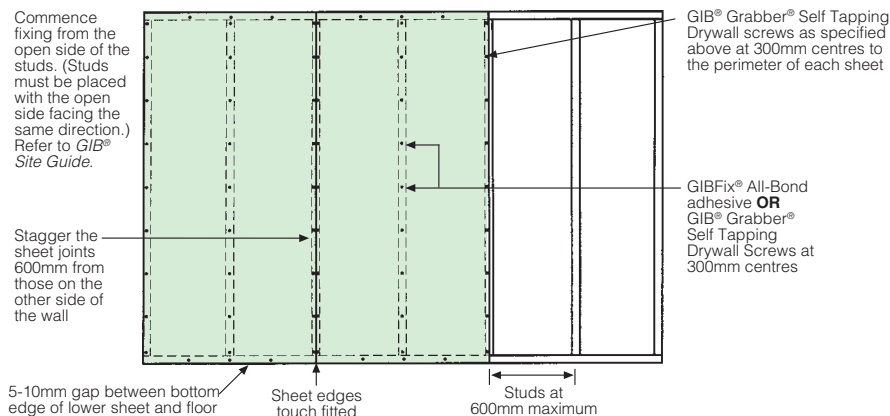
- Lay the sheets, leaving a 5-10mm gap at the floor line.

**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*. GIB® AquaMix is recommended for the first two coats.

**Fastening and Jointing the Linings – Horizontal Fixing****Fastening and Jointing the Linings – Vertical Fixing**

## GIB AQUALINE® WET AREA SYSTEMS – FRAMING AND LINING INSTALLATION



### Tiled Walls

MARCH 2007

**Important:** See page 6 and 7 for waterproof membrane requirements.

#### Wall Framing

Framing dimensions and spacing must comply with the requirements of NZS 3604:1999 or relevant NZ Standard.

- 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. Each side of the angle shall be fastened to the framing with 30mm galvanised clouts at 300mm centres
- Steel stud systems do not generally require nogs except as below:
  - Adjacent to each pipe penetration and behind sink and tub flashings
  - Between all studs above bath flanges and preformed shower bases
- 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 either vertical fixing of the GIB Aqualine® or the installation of some additional nogs.

#### Fasteners

- For 10mm GIB Aqualine® use minimum 25mm x 6g GIB® Grabber® Drywall Screws
- For 13mm GIB Aqualine® use minimum 32mm x 6g GIB® Grabber® Drywall Screws.

#### Fastener Centres

- GIB® Grabber® Drywall Screws at 100mm centres to perimeter of wall and to all intermediate studs
- Adhesive is not to be used in place of mechanical fastenings.

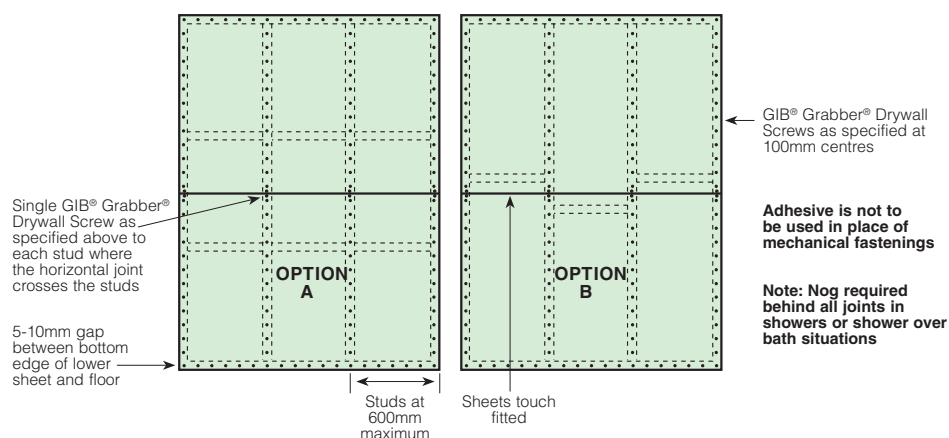
#### Lining

- 10mm or 13mm GIB Aqualine® is suitable for use on timber framing and for tile weights up to 20kg/m<sup>2</sup>
- 13mm GIB Aqualine® must be used for tile weights between 20 and 32kg/m<sup>2</sup> and when light steel framing has been used
- GIB Aqualine® may be fixed vertically or horizontally
- Provide a 5-10mm gap at the wall/floor junction
- Provide a 5-10mm gap between the bottom edge of the GIB Aqualine® and any bath rim or preformed shower base to allow for placement of sealant
- GIB Aqualine® sheets shall be touch fitted
- Where the framing or fastener centres required for tiled areas are closer than those specified for GIB® Fire Rated and GIB® Noise Control Systems, the tiling specification shall prevail. Where relevant, check that fastener lengths comply with the requirements of GIB® Fire Rated Systems or GIB® Noise Control Systems.

#### Jointing

- Jointing shall be carried out in accordance with instructions in the *GIB® Site Guide*
- Water resistant GIB® AquaMix is recommended for the first two coats
- No top coat is required.

#### Fastening the Linings – Horizontal Fixing in Tiled Areas



#### Note:

GIB Aqualine® is suitable for tiling to full height of walls, but if a wall is to be partially tiled (i.e. half high), only the area of wall under the tiles needs to be fixed as above. The remainder of the wall may be fixed as for non-tiled area (see page 10 & 11).

## GIB AQUALINE® WET AREA SYSTEMS – FRAMING AND LINING INSTALLATION



## Ceilings

MARCH 2007

**Ceiling Framing**

Framing dimensions and spacing must comply with the requirements of NZS 3604:1999 or relevant NZ Standard. If bracing, noise control, fire rating considerations exist consult the relevant GIB® publication for appropriate information.

**Fasteners**

- Steel battens – 25mm x 6g GIB® Grabber® Self Tapping Drywall screws
- Timber battens or Joists – 32mm x 6g GIB® Grabber High Thread Drywall screws.

**Adhesives**

- Steel battens – GIBFix® All-Bond
- Timber battens – GIBFix® Wood Bond (not suitable for LOSP treated timber).

**Fasteners Centres**

- Single screws to the edges and centre of the sheets across each batten
- 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 or nail pops.

**Lining**

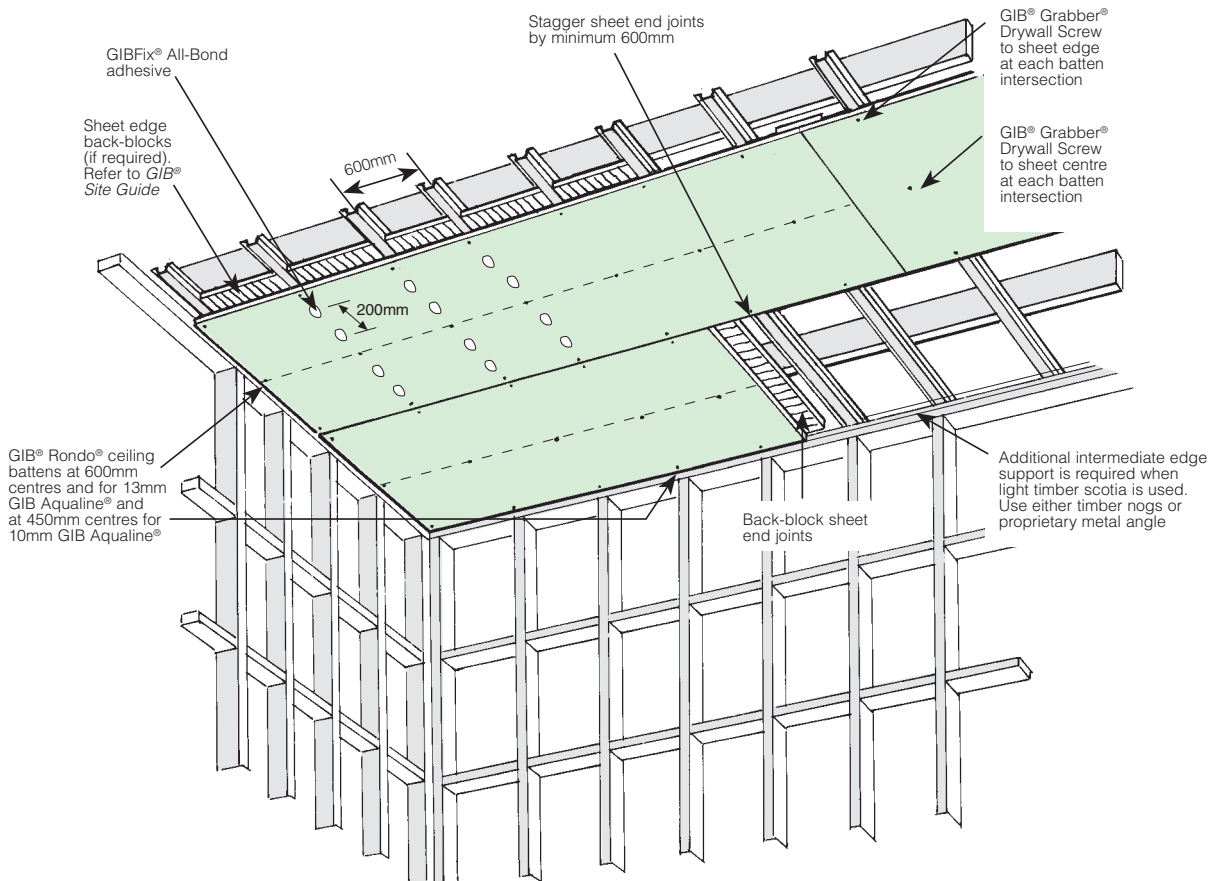
- The lining shall be fixed at right angles to the battens or joists
- Commence fixing from the centre of the sheets outwards
- Sheets to be touch fitted
- Use long length sheets to minimise sheet end butt joints
- Back-block sheet end butt joints
- See GIB® Site Guide for sheet edge backblocking requirements.

**Batten Spacings**

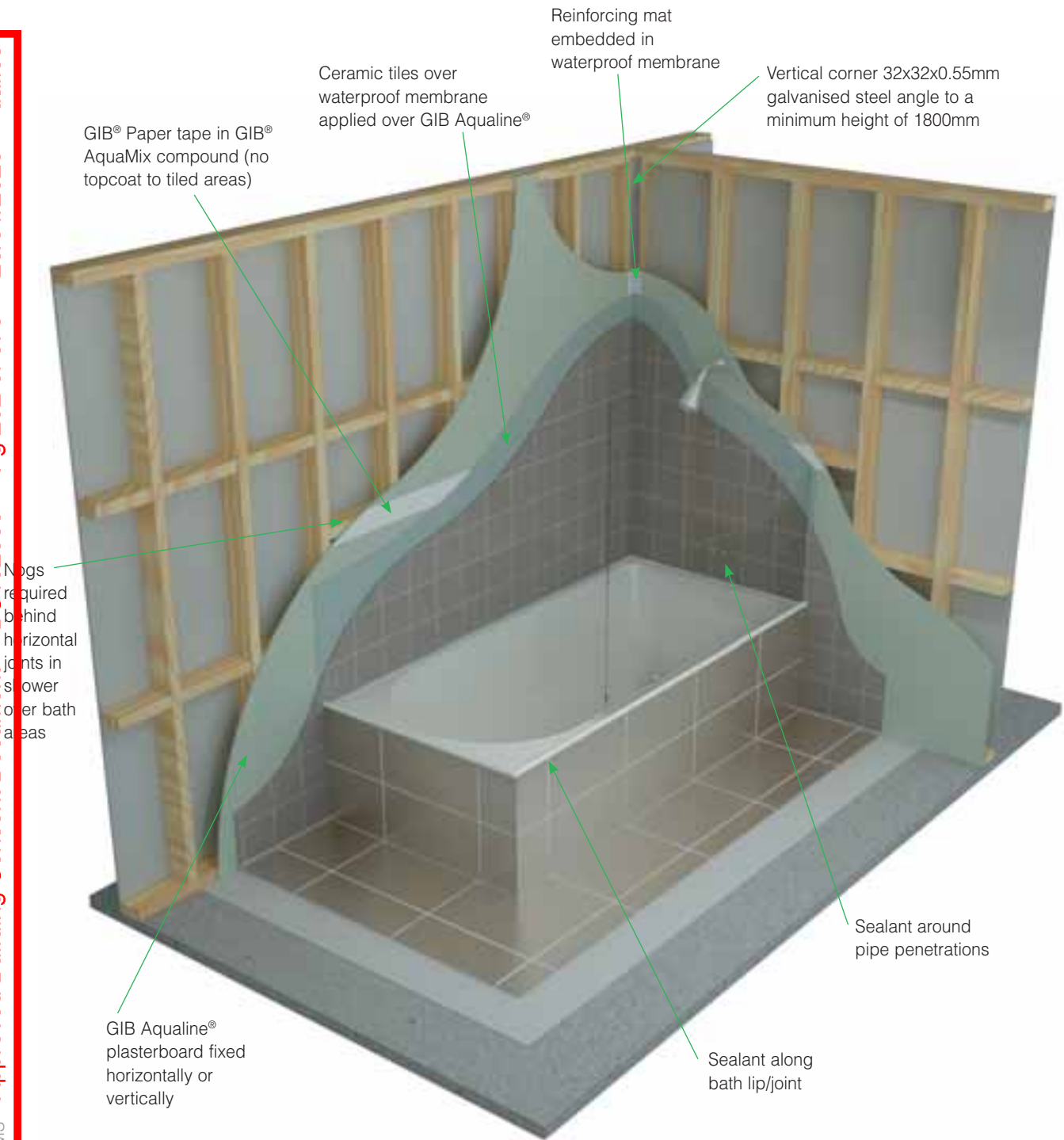
- 13mm GIB Aqualine® plasterboard – 600mm centres max
- 10mm GIB Aqualine® plasterboard – 450mm centres max.

**Jointing**

- All sheet joints must be paper tape reinforced and stopped in accordance with instructions in the *GIB® Site Guide*. Water resistant GIB® AquaMix is recommended for the first two coats.
- Do not fix tiles to GIB® plasterboard ceilings.







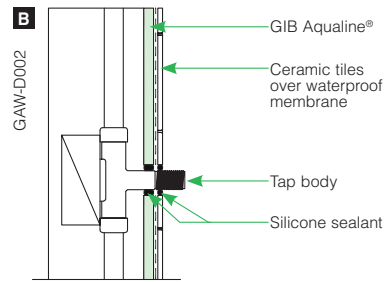
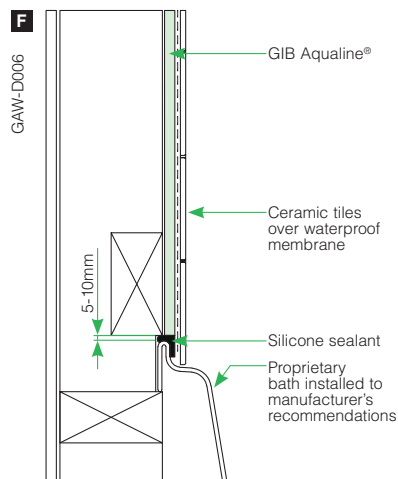
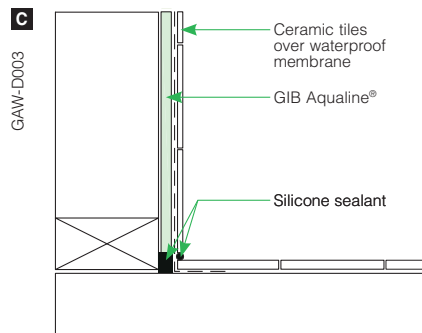
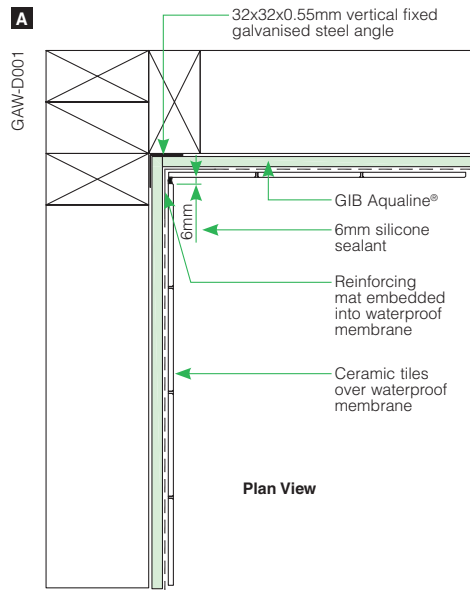
Run a bead of silicone sealant around the mixer unit on the tiles extending below the bottom of the pipe aperture.

For typical details, see the following pages.

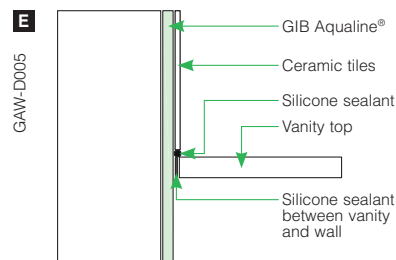
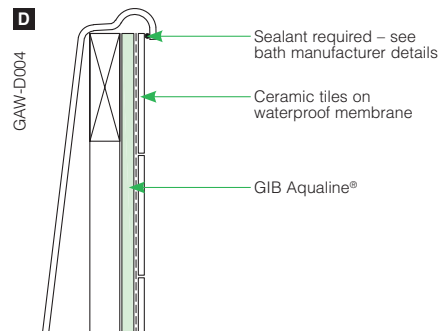


## Shower Over Bath – Tiled Walls

MARCH 2007



**Note:**  
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.

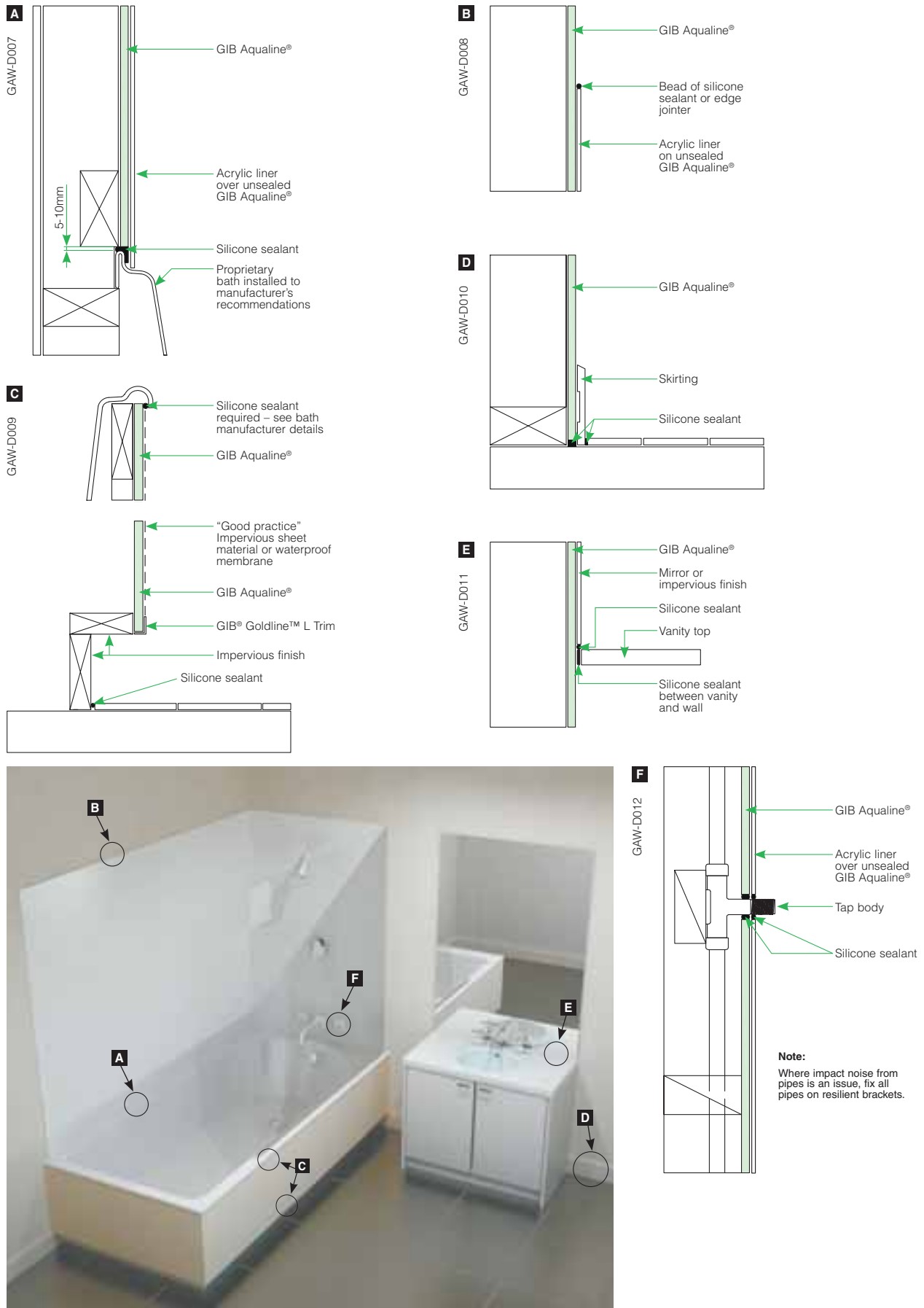


## GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS



### Shower Over Bath – Acrylic Liner

MARCH 2007

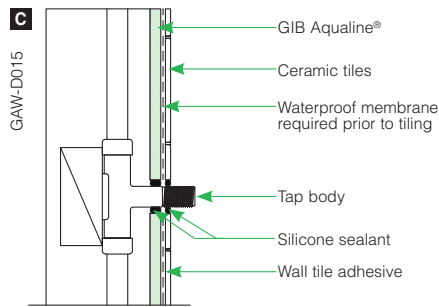
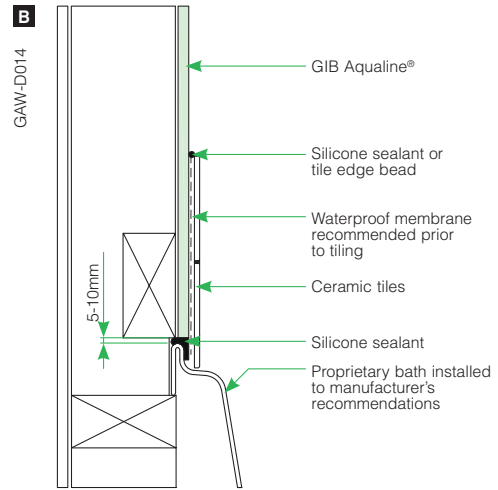
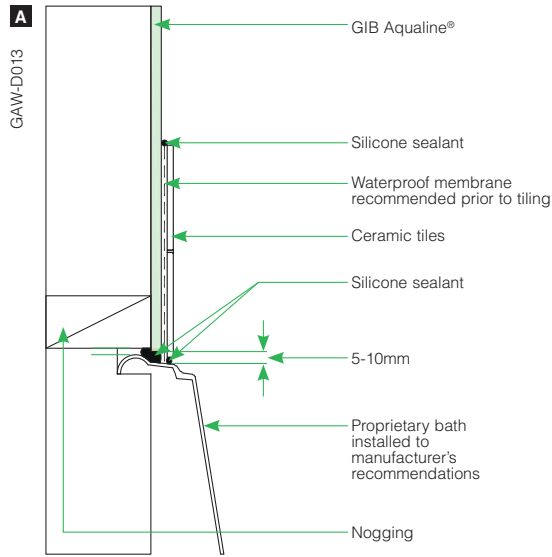


## GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS

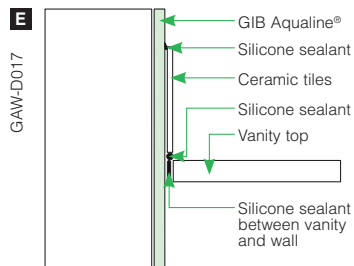
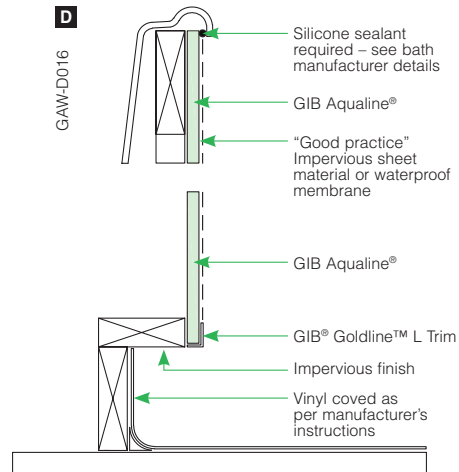


### Bath – Tiled Upstand

MARCH 2007



**Note:**  
Where impact noise from pipes is an issue, fix all pipes on resilient brackets.





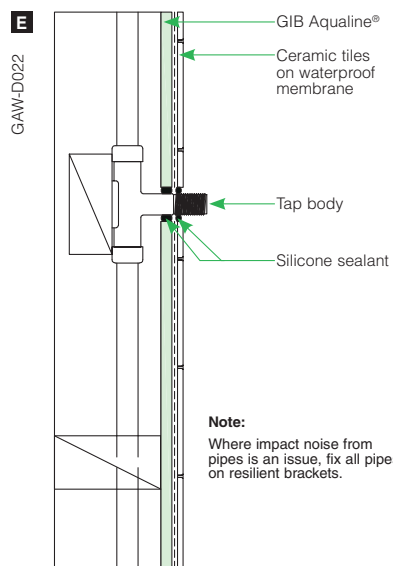
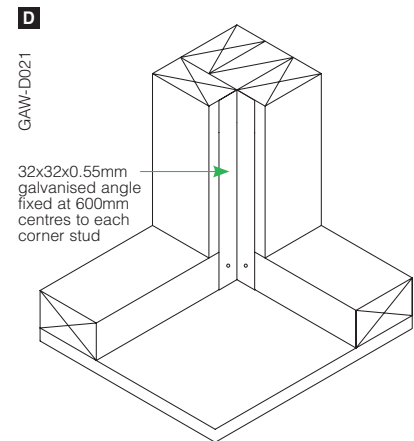
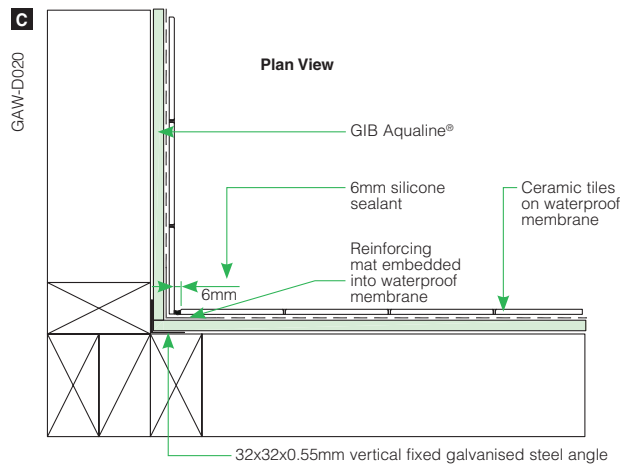
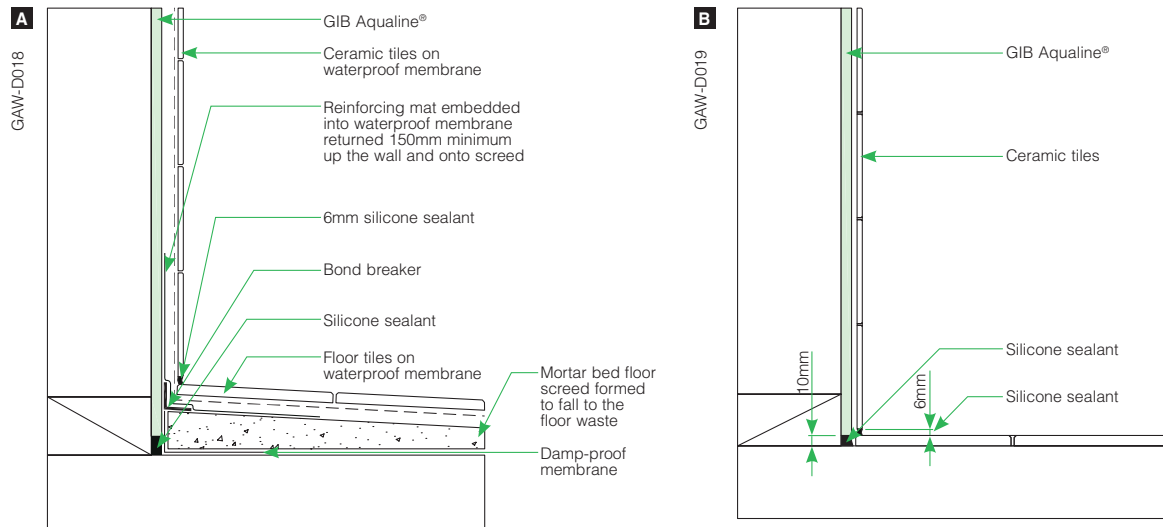
For typical details, see the following pages.

## GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS



### Shower – Tiled Walls and Base

MARCH 2007



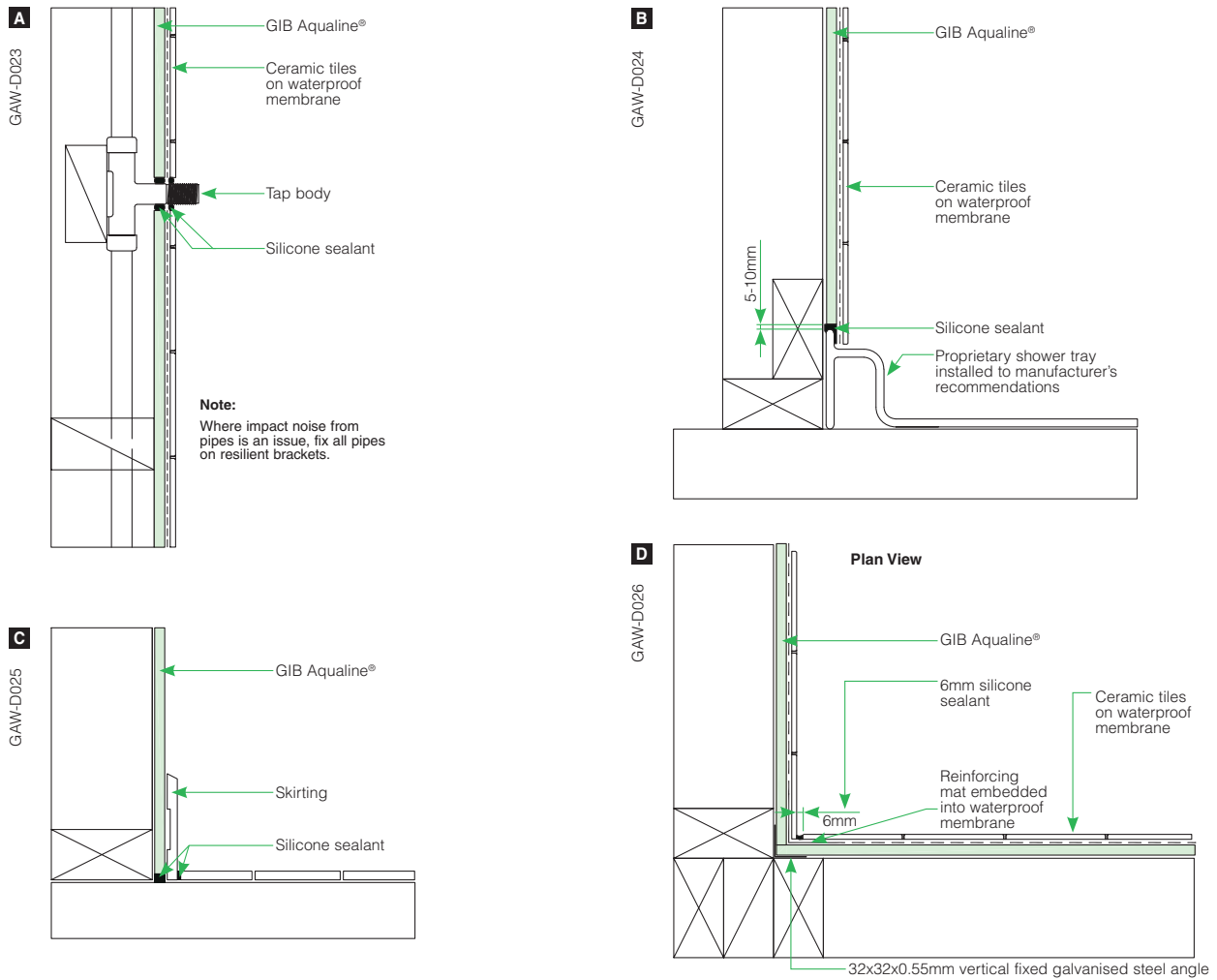


## GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS



### Shower – Tiled Walls and Acrylic Base

MARCH 2007





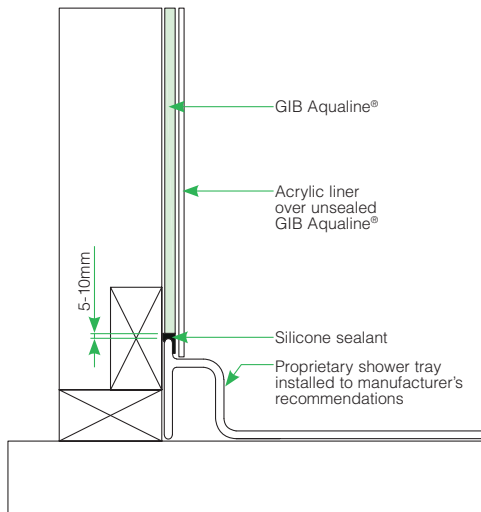
# GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS



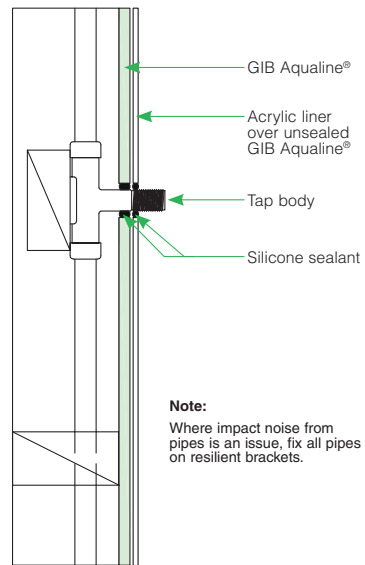
## Shower – Acrylic Liner and Base

MARCH 2007

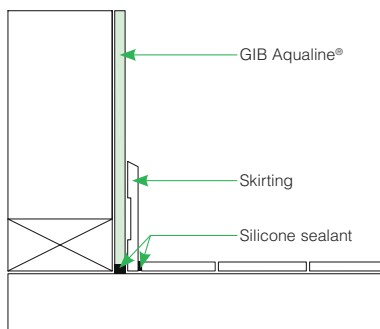
**A**  
GAW-D027



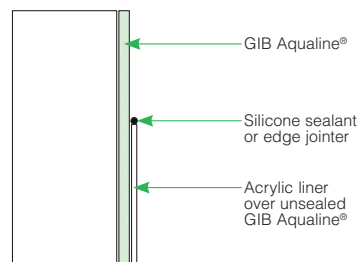
**B**  
GAW-D028



**C**  
GAW-D029



**D**  
GAW-D030

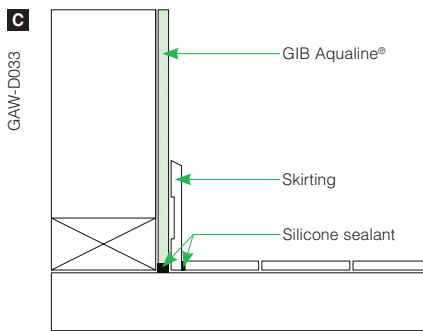
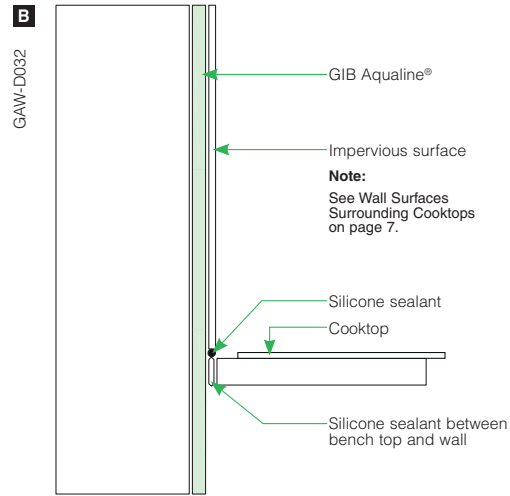
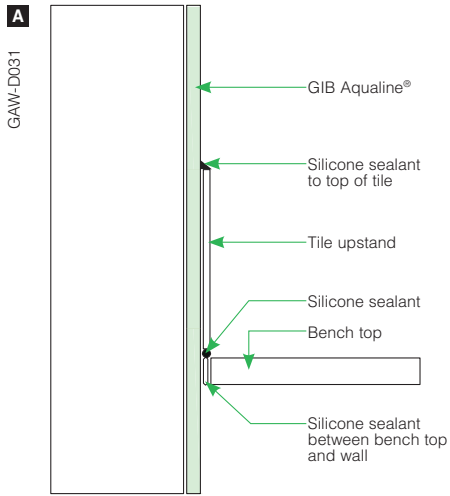


GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS



Kitchen and Laundry

MARCH 2007



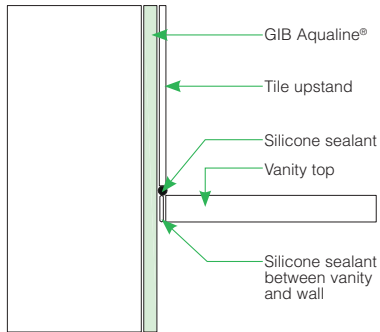
# GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS



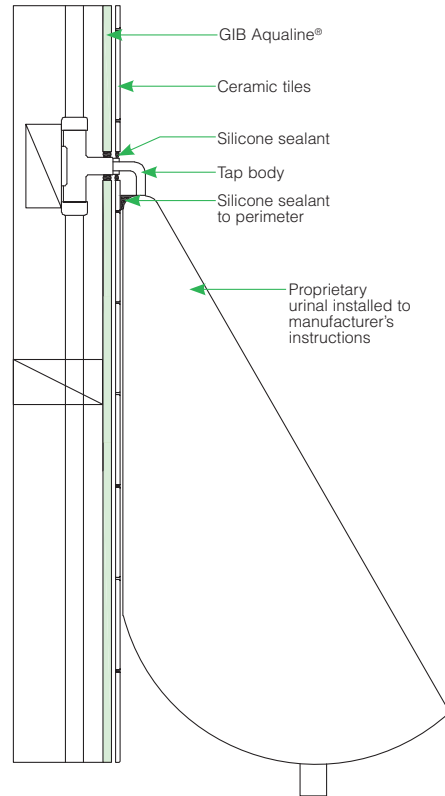
## Office, Workplace or School Bathroom

MARCH 2007

**A**  
GAW-D034



**B**  
GAW-D035

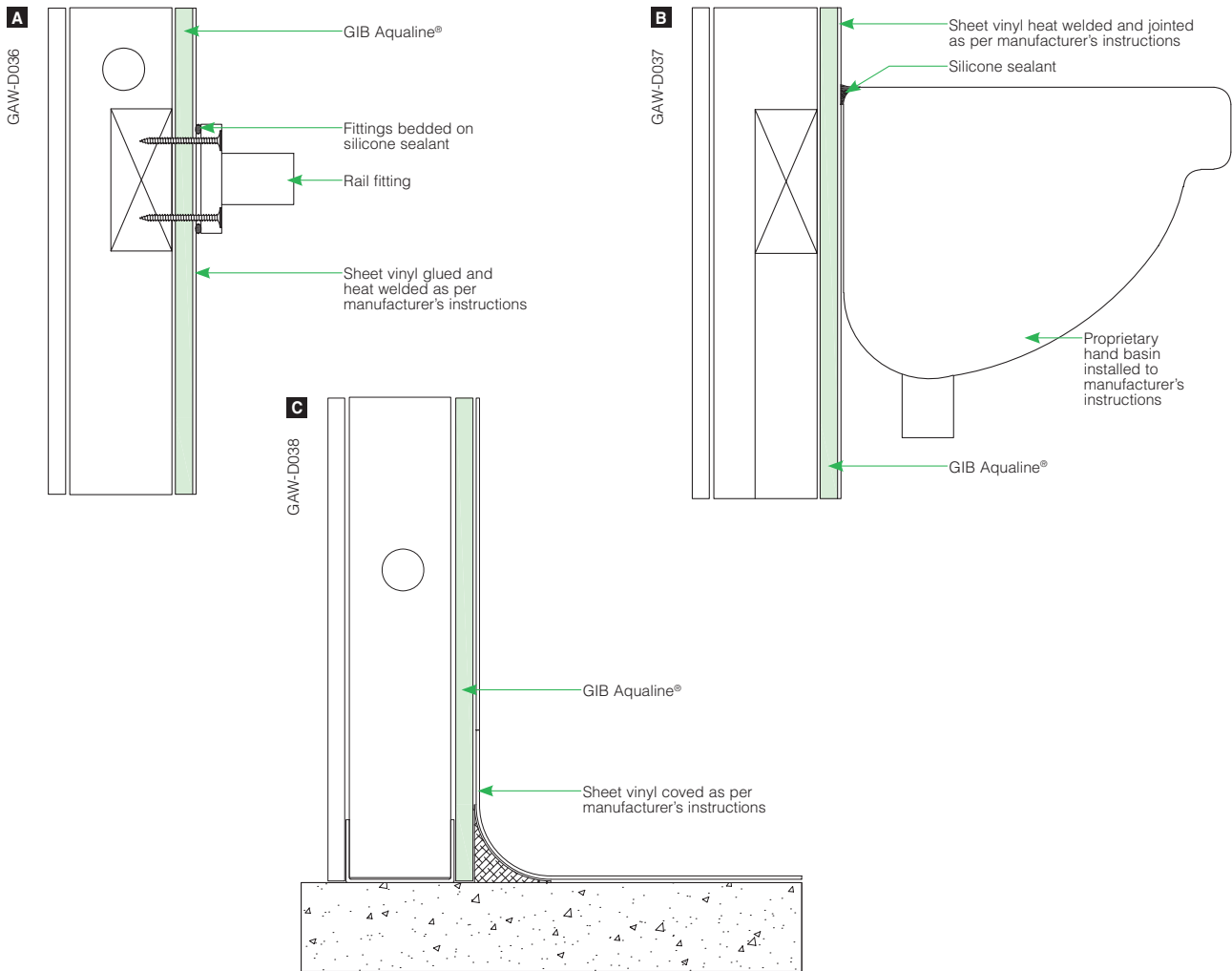


# GIB AQUALINE® WET AREA SYSTEMS – TYPICAL DETAILS



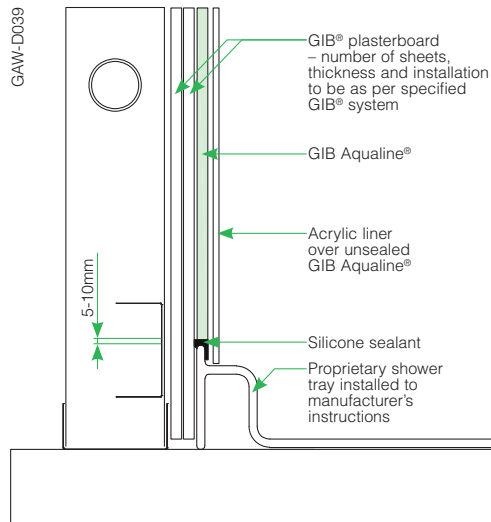
## Healthcare and Hospital Bathroom

MARCH 2007

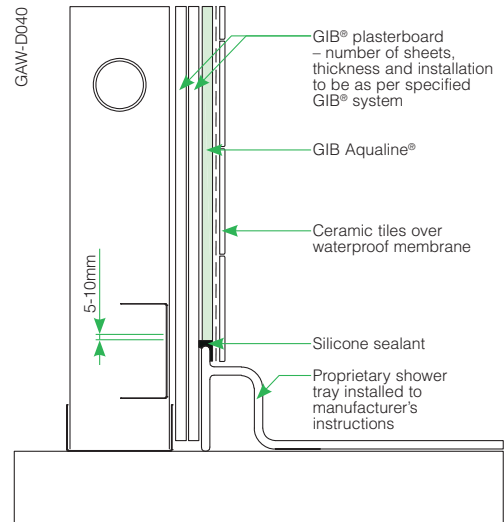




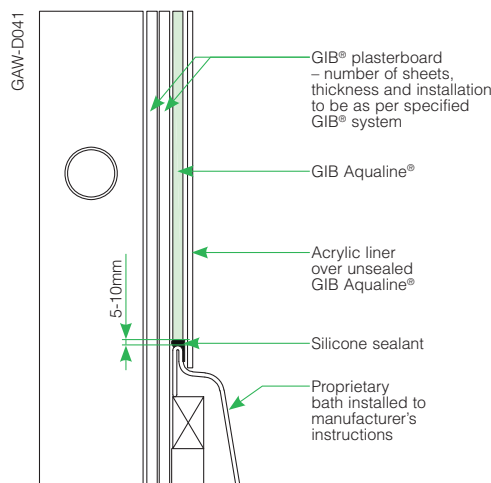
**Shower – Acrylic Liner**



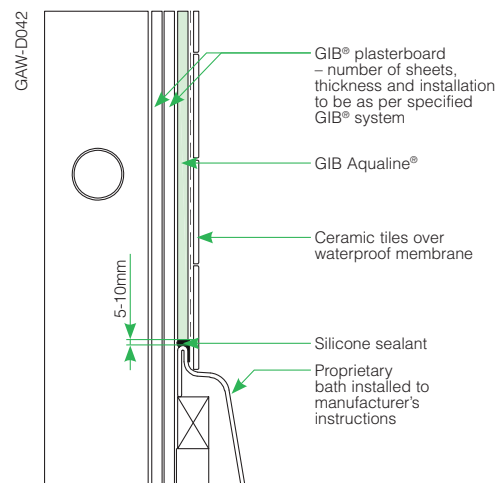
**Shower – Tiled Walls**



**Shower Over Bath – Acrylic Liner**



**Shower Over Bath – Tiled Walls**



### GIB Aqualine® Fire Resistance and Noise Control Performance

When GIB Aqualine® is substituted into GIB® Fire Rated systems in place of the equivalent thickness GIB Fyrelite®, the Fire Resistance Rating (FRR) of that system will be maintained.

When GIB Aqualine® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyrelite®, the STC and IIC rating of that system will be maintained. When GIB Aqualine® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information contact the GIB® Helpline on 0800 100 442.

# GIB AQUALINE® WET AREA SYSTEMS



## Specification and Installation Checklist

MARCH 2007

Contract ID	
Site Address	
Client Name	
Designer	
Builder	
Plasterboard Installer	
Plasterboard Supplier	
Tiler	
Shower Installer	

DESIGNER	YES	NO	CHECKED BY	DATE
GIB Aqualine® specified for wet areas and appropriate details included on plans?				
Are tiled areas clearly shown on plans?				
Is area requiring waterproof membrane clearly shown on plan?				
Is the waterproof membrane required to be installed by a licensed applicator? If so, is this noted on the documentation?				
No bracing behind shower or bath?				
BUILDER	YES	NO	CHECKED BY	DATE
Galvanised steel angle installed to the internal corners of tiled shower?				
All sheet joints in showers to be made on solid timber. This may require some additional dwangs for horizontal board installation.				
PLASTERBOARD INSTALLER	YES	NO	CHECKED BY	DATE
10mm GIB Aqualine® for tiles up to 20kg per m²?				
13mm GIB Aqualine® for tiles up to 32kg per m²?				
GIB Aqualine® mechanically fastened at 100mm centres when tiles are to be installed?				
All junctions between GIB Aqualine® and walls, floors, baths, showers and other elements are correctly sealed with appropriate sealant?				
Pipe penetrations sealed?				
PLASTERBOARD STOPPER	YES	NO	CHECKED BY	DATE
Air drying compound (e.g. GIB ProMix® or GIB Plus 4®) not to be used on areas to be tiled.				
Recommended that GIB® AquaMix is used in wet areas.				
TILER	YES	NO	CHECKED BY	DATE
Waterproof membrane applied to shower areas prior to tiling?				
SHOWER INSTALLER	YES	NO	CHECKED BY	DATE
GIB Aqualine® walls must not be sealed or painted under where acrylic linings are to be installed.				
Ensure GIB Aqualine® is free from dust before installation of acrylic liners.				
Sealant applied to top edge of acrylic shower linings?				
BUILDER/PLUMBER	YES	NO	CHECKED BY	DATE
Sealant applied under penetration face covers?				



## BRANZ Appraised

Appraisal No. 609 [2017]

## DAVCO K10 PLUS AND K10 RAPID WET AREA MEMBRANES

Appraisal No. 609 [2017]

This Appraisal replaces BRANZ

Appraisal No. 609 [2008]

Amended 24 May 2018.

### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.



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### BRANZ

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Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

[branz.co.nz](http://branz.co.nz)



## Product

- 1.1 Davco K10 Plus and K10 Rapid are liquid-applied waterproofing membranes for use under ceramic or stone tile finishes in internal wet areas.

## Scope

- 2.1 Davco K10 Plus and K10 Rapid have been appraised for use as waterproofing membranes for internal wet areas of buildings, within the following scope:
- on floor substrates of concrete, flooring grade particleboard, plywood, compressed fibre cement sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
  - when protected from physical damage by ceramic or stone tile finishes; and,
  - where floors are designed and constructed such that deflections do not exceed 1/360<sup>th</sup> of the span.
- 2.2 The use of Davco K10 Plus and K10 Rapid on concrete slabs and walls where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Movement and control joints in the substrate must be carried through to the tile finish. The design and construction of the substrate and movement and control joints is specific to each building, and therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.4 Ceramic or stone tile finishes are outside the scope of this Appraisal.
- 2.5 The membranes must be installed by ParexGroup Pty Limited Approved and Trained Applicators.

## Building Regulations

### New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Davco K10 Plus and K10 Rapid if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

**Clause B2 DURABILITY:** Performance B2.3.1 (b) 15 years. Davco K10 Plus and K10 Rapid meet this requirement. See Paragraph 9.1.

**Clause E3 INTERNAL MOISTURE:** Performance E3.3.6. Interior wet area floors and walls incorporating Davco K10 Plus and K10 Rapid will meet this requirement. See Paragraphs 11.1 – 11.7.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Davco K10 Plus and K10 Rapid meet this requirement and will not present a health hazard to people.





## Technical Specification

4.1 Materials supplied by ParexGroup Pty Limited are as follows:

- **Davco K10 Plus** - A flexible [Class III as defined in AS/NZS 4858], single pack, water based polyurethane waterproofing membrane. It is supplied as a grey paste in 20 litre pails or green paste in 4 and 20 litre pails.
- **Davco K10 Rapid** - A flexible [Class III as defined in AS/NZS 4858], single pack, water based polyurethane waterproofing membrane. It is supplied as a yellow paste in 5 and 15 litre pails.
- **Ultraprime** - An acrylic based multipurpose primer for all porous substrates. It is supplied as a clear liquid in 1 and 5 litre containers.
- **Ultrabond** - Is a grey, flexible, two - part primer/bond enhancer for use over difficult or non-porous substrates. It is supplied as a kit made up of a 20 kg bag and a 5 litre pail.

## Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and out of freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used.

## Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Davco K10 Plus and K10 Rapid. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 Davco K10 Plus and K10 Rapid are for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 The membranes must be protected from physical damage by the application of ceramic or stone tile finishes.
- 7.3 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ Good Practice Guide to Tiling.
- 7.4 Timber floor framing systems must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of NZS 4203. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed  $1/360^{\text{th}}$  of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

### Substrates

#### Plywood

8.1 Plywood must be a minimum of 17mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used. The plywood must be supported with dwangs or framing with a maximum span of 400 mm in each direction, fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres on the edges and 200 mm through the body of the sheets.

### **Fibre Cement Compressed Sheet/ Fibre Cement Sheet Tile Underlay**

- 8.2 Fibre cement compressed sheet must be manufactured to comply with the requirements of AS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Installation must be in accordance with the instructions of the manufacturer.

### **Concrete and Concrete Masonry**

- 8.3 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101 and NZS 3604, Concrete Slab-On-Ground Floors and Concrete masonry to NZS 4229 and NZS 4230.

### **Wet Area Wall Linings**

- 8.4 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be covered by a valid BRANZ Appraisal for use in internal wet areas.
- 8.5 Fibre cement sheet must be manufactured to comply with the requirements of AS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area lining. Installation must be in accordance with the instructions of the manufacturer.

## **Durability**

### **Serviceable Life**

- 9.1 Davco K10 Plus and K10 Rapid, when subjected to normal conditions of environment and use, are expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design service life of 15-25 years.

## **Maintenance**

- 10.1 No maintenance of the membranes will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grouts and sealants.
- 10.2 In the event of damage to the membrane, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.
- 10.3 Drainage outlets must be maintained to operate effectively, and ceramic or stone tile finishes must be kept clean.

## **Internal Moisture**

- 11.1 Davco K10 Plus and K10 Rapid are impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Davco K10 Plus and K10 Rapid are suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of Code Compliance for overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.
- 11.3 Surfaces must be finished with ceramic or stone tile finishes. A means of Code Compliance to NZBC Clause E3.3.3 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 [b] and 3.1.2 [b].
- 11.4 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes must be provided and the floor must fall to the outlet.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, the BRANZ Good Practice Guide to Tiling, and flooring and wallboard manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must flash over the membrane a minimum of 30 mm.
- 11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms where wood-based floors are used.

## Installation Information

### Installation Skill Level Requirement

- 12.1 Installation must always be carried out in accordance with the Davco K10 Plus and K10 Rapid Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class and an understanding of internal wet area construction.
- 12.2 Installation and finishing of components and accessories supplied by ParexGroup Pty Limited and its approved applicators must be completed by trained applicators, approved by ParexGroup Pty Limited.

### Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 Concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585. The relative humidity of the concrete must be 75% or less before membrane application.
- 13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have a bond breaker joint system installed as set out in the Technical Literature.
- 13.4 If required, substrates must be primed with the appropriate primer and allowed to cure before the membrane is installed.

### Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 5°C or above 35°C.
- 14.2 The membrane must be applied in two coats at the rates set out in the Technical Literature. The total finished system thickness of the Davco K10 Plus and K10 Rapid must be a minimum of 1.2 mm.
- 14.3 Application can be made by roller [medium/long nap] or brush [long bristle].
- 14.4 Clean up may be undertaken with water while the membrane is still wet.

### Tiling

- 15.1 The membrane must be fully cured before tiling. The cured membrane must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide - Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer or ParexGroup Pty Limited.

### Inspections

- 16.1 Critical areas of inspection are:
  - Construction of substrates, including crack control and installation of bond breakers and movement control joints.
  - Moisture content of the substrate prior to the application of the membrane.
  - Acceptance of the substrate by the membrane installer prior to application of the membrane.
  - Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness and use of reinforcement.
  - Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

## Basis of Appraisal

The following is a summary of the technical investigations carried out:

### Tests

- 17.1 The testing on Davco K10 Plus and K10 Rapid has been undertaken by various organisations:
- Testing to AS/NZS 4858: 2004 Appendix A including effect of heat aging, bleach, detergent and water on tensile and elongation, Water Vapour Transmission to ASTM E96-92 and cyclic movement.
  - Adhesion to various substrates and low temperature flexibility.

Test methods and results were reviewed by BRANZ and found to be satisfactory.

### Other Investigations

- 18.1 An assessment was made of the durability of Davco K10 Plus and K10 Rapid by BRANZ technical experts.
- 18.2 Site visits have been carried out by BRANZ to assess the practicability of installation and to examine completed installations.
- 18.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

### Quality

- 19.1 The manufacture of the membrane has been examined by BRANZ, details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 19.2 The quality management system of the membrane manufacturer has been assessed and found to be satisfactory.
- 19.3 The quality of supply of the membrane system materials to the market is the responsibility of ParexGroup Pty Limited.
- 19.4 Quality on site is the responsibility of the ParexGroup Pty Limited Approved and Trained Applicators.
- 19.5 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, ParexGroup Pty Limited and this Appraisal.
- 19.6 Building owners are responsible for the maintenance of the tiling or stone finishing systems in accordance with the instructions of ParexGroup Pty Limited.

### Sources of Information

- AS 2908.2: 2000 Cellulose-cement products – Flat sheet.
- AS 3740: 2010 Waterproofing of wet areas within residential buildings
- AS 3958.1 Guide to the installation of ceramic tiles.
- AS/NZS 2269: 2012 Plywood-Structural
- AS/NZS 2588:1998 Gypsum Plasterboard
- AS/NZS 4858: 2004 Wet area membranes.
- NZS 3101: 2006 Concrete Structures Standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design
- NZS 4230: 2004 Design of reinforced concrete masonry structures
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.
- Good Practice Guide – Tiling, BRANZ, 2015.



**BRANZ Appraised**  
Appraisal No. 609 [2017]

**BRANZ Appraisal**  
Appraisal No. 609 [2017]  
17 January 2017

DAVCO K10 PLUS AND K10  
RAPID WET AREA MEMBRANES



## Amendments

### Amendment No. 1, dated 24 May 2018.

This Appraisal has been amended to include the Davco K10 Rapid Membrane.

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In the opinion of BRANZ, **Davco K10 Plus and K10 Rapid Wet Area Membranes** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **ParexGroup Pty Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the Technical Literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. **ParexGroup Pty Limited**:
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions;
  - d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by **ParexGroup Pty Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **ParexGroup Pty Limited** or any third party.

For BRANZ



**Chelydra Percy**

Chief Executive

Date of Issue:

17 January 2017



# K10 Plus



A flexible, 1 part, ready to use, water based polyurethane Class III waterproofing membrane



## WHERE TO USE

### Surfaces

Most common substrates; concrete, cement renders, screed, lightweight blocks, prepared metal surfaces, building boards approved for wet areas, such as compressed fibre cement sheeting.

### Areas

Suitable for interior and exterior applications. Commercial and domestic walls and floors including wet areas such as showers, bathrooms, terraces, balconies, roofs walkways and other exposed situations which can be tiled over if required, using Davco cement-based adhesives. Also suitable for confined areas, as Davco K10 Plus is water based and solvent free.

## PRODUCT INFORMATION

### AS 4858 Classification

AS/NZS 4858: Class III membrane

### VOC Content

Low VOC - 40g/L (SCAQMD method 304-91)

### Coverage

**Wet areas** 2 coats required

Each coat should achieve 0.6mm dry film thickness. Apply at the rate of 1L/m<sup>2</sup> (two normal coats). A 20L pail will cover 20m<sup>2</sup> per coat

**Balconies / patios – covered external areas** 2 heavy coats required

Each coat should achieve 0.8mm dry film thickness. Apply at a rate of 1.25L/m<sup>2</sup> (two heavy coats). A 20L pail will cover 16m<sup>2</sup> per coat

**Rooftops / exposed external areas** 3 heavy coats required

Each coat should achieve 1.0mm dry film thickness. Apply at the rate of 1.5L/m<sup>2</sup> (three heavy coats required for this application). A 20L pail will cover 13m<sup>2</sup> per coat

### Curing Time

Single coat 6-8 hours at 22°C



MADE IN AUSTRALIA

## FEATURES & BENEFITS

Ready to use straight from the pail

Suitable as an anti-fracture membrane

Excellent curing time

Water based polyurethane

Non-toxic

UV stable

Available in green or grey

## PACKAGING

Available in a 4L or 20L pail (green)

and a 20L pail (grey)





## DIRECTIONS FOR USE

A test area should be undertaken to ensure suitability

## SURFACE PREPARATION

All surfaces must be installed according to manufacturer's instructions and relevant Australian Standard(s) and be structurally sound, dry, clean and free from movement, oil, grease, wax, curing compounds, release agents and any other loose or contaminating material

Prior to application, remove all sharp protrusions, which may pierce the membrane

Any voids, potholes in the substrate must be appropriately filled up with a high strength mortar (Lanko 136 Rapid patching mortar)

## Concrete

All new concrete slabs must have a wood float finish and be allowed to cure for at least 6 weeks

Old concrete must be cleaned with a strong commercial grade detergent or degreaser. Residue must then be thoroughly washed off with clean water. Allow the surface to dry for at least 24 hours

If the concrete (new or old) has a steel trowel or power float finish, it must be mechanically abraded to expose the aggregate. Signs of laitance must be removed

Prime the concrete surface using Davco Ultraprime or Davco PrimeX

## Render

New rendered surfaces must have a wood float finish and be allowed to cure for at least 7 days

## Lightweight Blocks

- Prime the surface with 2 coats of Davco Ultraprime or Davco PrimeX

## Metal Surfaces

- All metal surfaces must be totally free of rust
- Prime metal surfaces with a suitable etching primer

## Cracks / Joints - NOT subject to movement

- Small hairline cracks, up to 1mm wide, may be filled by the first application of K10 Plus
- For cracks / joints wider than 1mm, a joint filler should be applied along the length of the crack prior to the application of K10 Plus or Davco K5 Bond Breaker

## Cracks / Joints - subject to movement

- All cracks / joints, irrespective of their width, must be filled firstly with K5 Bond Breaker. Then 50mm wide polyethylene / polypropylene tape should be placed over the crack, ensuring it adheres to the surface.

## Building Boards

- Standard wall / floor building boards must be primed with PrimeX and firmly fixed in accordance with manufacturer's instructions and appropriate Australian Standards. Such boards include plasterboard, fibre cement sheeting, marine grade ply and wet area composition board. Check with manufacturer of other building boards for their suitability
- Screw or nail heads must be sealed with either epoxy or K5 Bond Breaker
- All sheeting joints need to be covered with 50mm wide polyethylene / polypropylene tape

## Falls to Drain

- In all wet areas, it is important that falls be provided to the drain outlet. The slope of this fall should be 1:80 – which equates to a 12.5mm fall over 1m. For wet areas, balconies and rooftops, if the existing substrate does not provide the necessary falls, a sand / cement screed needs to be created. Once the screed is in place and has cured adequately apply the membrane as per instructions below. Contact ParexGroup for more information on an appropriate screed mix should this be required
- For balconies and rooftops, the slope of this fall should be 1:100 – which equates to a 10mm fall over 1m. If the existing substrate does not provide the necessary fall, a sand / cement screed needs to be created. Once the screed is in place and has cured adequately, apply the membrane as per instructions below. Contact ParexGroup for more information on an appropriate screed mix should this be required

## APPLICATION

### Concrete Surfaces

- This can be primed with Ultraprime or PrimeX. Allow the primer to dry before application of the membrane

### Timber Surfaces

- This applies to solid timber floors, ply and particle board flooring. Prime the surface with Ultraprime. Allow the primer to dry before application of the membrane

### Compressed Fibre Cement

- This should be primed using PrimeX. Allow the primer to dry before application of the membrane. Refer to the PrimeX Data Sheet for instructions

### Bond Breaker - Abelrod

- When using Abelrod gap filler as a bond breaker, prime the surface first as per instructions. Allow to dry
- Place Abelrod gap filler along all wall / floor and rapid junctions and secure into place with polyethylene / polypropylene tape
- When using either K5 Bond Breaker, apply the bead into the corner and smooth out to form a 12mm cove in the corner
- Allow to cure for 24 hours before subsequent application of membrane

### General Application

- K10 Plus requires no mixing. Apply directly from the pail. Use a thick brush or a short nap roller to apply the first coat of K10 Plus on the area to be waterproofed
- Allow the first coat to dry for approximately 1-2 hours before applying the 2nd coat at 90° to the first coat. Ensure there are no pinholes or air bubbles on the membrane surface
- Apply a third coat only if necessary or required to do so
- Allow the final coat to dry for at least 6 hours before tiling (according to temperature conditions). This gives an overall drying time of 6-8 hours for the full application
- Note: The lower the temperature, the slower the drying time of the membrane

### Drain Application

- The drainage flange should ideally be recessed into the substrate and a bead of K5 Bond Breaker sealant placed around the circumference. The drainage flange should be lightly sanded before priming with plumbers primer
- Apply the first coat of K10 Plus in and around the drain and allow to dry for approximately 1-2 hours at 20°C
- Apply a second coat in and around the drain ensuring no pinholes or air bubbles are present on the membrane surface. If necessary apply a third coat

## Ponding

- If pond testing is required, ensure the membrane is allowed to cure for a minimum of 5 days before pond testing

## Clean-up & Return to Service

- Tools and excess K10 Plus can be cleaned up with water while it is still wet

## PRECAUTIONS

### Safety

- MSDS is available from [parexdavco.com.au](http://parexdavco.com.au)
- It is recommended that applicators wear PVC or similar gloves and safety goggles while handling this product.
- Keep out of reach of children. If eye contact occurs, rinse with cool water
- If ingested, seek immediate medical assistance

### General

- Do not apply in temperatures above 35°C or below 5°C
- Do not allow the product to freeze
- Delay external applications when inclement weather is imminent
- Do not thin the liquid, it is supplied ready for use
- Do not use K10 Plus in areas of permanent water immersion like swimming pools, spas etc.
- Do not use where negative hydrostatic pressure is evident (i.e. rising damp), as it affects the bond of K10 Plus. Contact ParexGroup for product recommendation in areas where negative hydrostatic pressure exists

### Specific

- For other uses not mentioned in these instructions, please contact ParexGroup

## TECHNICAL DATA

TECHNICAL DATA	K10 PLUS
Appearance	Green or grey liquid
Coverage 20L pail	
– <b>Wet areas</b> 2 normal coats required applied at a rate of 1L/m <sup>2</sup> per coat	20m <sup>2</sup>
– <b>Balconies / patios</b> 2 heavy coats required applied at a rate of 1.25L/m <sup>2</sup> per coat	16m <sup>2</sup>
– <b>Rooftops / exposed external areas</b> 3 heavy coats required applied at a rate of 1.5L/m <sup>2</sup> per coat	13m <sup>2</sup>
Drying time	6-8 hours
Elongation	545%
– Water vapor transmission rate	1.552g /m <sup>2</sup> /24 hours
Water absorption	1.8%
Tensile strength	2.1MPa
Adhesion to concrete	1.1MPa
Shore a hardness	75
Shelf life when stored unopened in elevated, cool, dry location	12 months

All measurements are taken at 22°C and 50% relative humidity. Specifications vary according to site conditions and should be taken as a guide only.

ParexGroup products manufactured in Australia are produced in accordance with quality management systems certified as complying with AS/NZS ISO 9001:2008.



Quality  
ISO 9001  
GLOBAL

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ParexGroup reserves the right to inspect any alleged failure at our cost. No responsibility will be accepted unless a representative of ParexGroup is afforded the opportunity to inspect any alleged failure.



**PAREXGROUP**  
Building expertise, together

# Installation Manual

# Content

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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

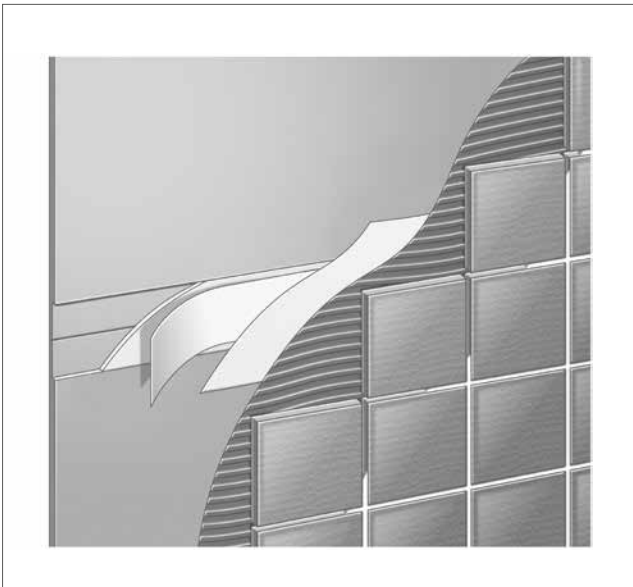
# 1 Introduction

Villaboard™ Lining is a premium sanded fibre cement sheet with recessed edges for flush jointing, or square edge sheet for butt jointing. Villaboard Lining is an ideal lining for bathrooms, laundries, kitchens and other high traffic areas.

The main features of Villaboard Lining are:

- Durable internal lining suitable for wet areas.
- Creates suitable surface for tiles, paint or wallpaper.
- Long edges recessed for easy flush-jointing.
- Reliable impact resistant lining. Ideal for wall lining in commercial applications where walls are prone to damage.
- Suitable for use in fire and acoustically rated systems.

This manual covers the use of Villaboard Lining in internal wall and ceiling applications. Further information relating to Villaboard Lining is also available in the following James Hardie manuals:



- Eaves and Soffit Linings Installation Manual.
- Fire and Acoustic Design Manual.
- Bracing Design Manual.

The specifier or other responsible party for the project must ensure the information and details in this guide are appropriate for the intended application and specific design and detailing is undertaken for areas which fall outside the scope of this documentation.

Note: James Hardie Villaboard Lining is not suitable for exterior wall applications.

## Make sure your information is up to date

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

## 1.1 BRACING

Villaboard Lining can be used to achieve structural bracing. For further information refer to Bracing Design Manual.

For dry area internal applications the standard hot dipped galvanised nails can be used.

For wet area internal application stainless steel nails must be used.

## 1.2 STRUCTURAL CEILING DIAPHRAGM

Villaboard Lining can be used as structural ceiling diaphragms in accordance with NZS 3604. For further information refer to Bracing Design Manual.

## 1.3 HEAT SHIELD

9mm Villaboard Lining can be used as a heat shield. For further information refer to Heat Shield - Villaboard Lining 9mm Accel™ Technical Supplement.









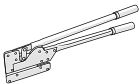
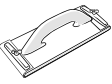



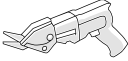



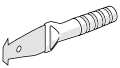





Table 3

## Components not supplied by James Hardie

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

Accessories	Description	Accessories	Description
	<b>Galvanised/Stainless Steel HardieFlex™ nails</b> 40 x 2.8mm fibre cement nails		<b>Second Coat Trowel 200mm</b> For installing second coats on set joints.
	<b>Backing Rod</b> Backing to sealant in movement joints.		<b>Finishing Coat Trowel</b> For installing top coats on set joints.
	<b>Perforated Paper Tape</b> Joint reinforcing tape. e.g. GIB® paper tape, Strataflex tape or similar.		<b>Corner Tool</b> For setting of internal corners.
	<b>Level/Straight Edge</b> For checking straightness of frame.		<b>Hawk</b> To assist in the application of compounds especially with the use of trowels.
	<b>Hand Guillotine</b> Guillotine for cutting fibre cement.		<b>Hand Sander</b> For sanding set joints.
	<b>Broadknife 150mm</b> For setting of joints on Villaboard Lining.		<b>Notched Trowel</b> For applying tile adhesive to face of Villaboard Lining.
	<b>Collated Screw Gun</b> For speedy installation of Villaboard Lining.		<b>Electric Shear/Fibreshear</b> For cutting of James Hardie fibre Cement.
	<b>Hole Saw</b> For clean cut circular holes.		<b>Paper Faced Corner Mould</b> 'Goldline' mouldings
	<b>Bondbreaker Tape</b> Selltape 5850 Super Mask 18mm		<b>Waterproofing Admixture</b> Multiplast Resin by Plaster Systems. Used in diluted form over sheet edges to control moisture suction.
	<b>Score and Snap Knife</b> Scoring tool for easy cutting.		<b>Lumberlock</b> Studsaver
	<b>Wet Wall Cavity</b> Wet Wall Caddy  Wall penetrating sealing device eg Aquatite Wetwall cavity protectors		<b>Support Angle</b> To support tiles Is fixed over the lining to main frame

## 2 Safe working practices

### **WARNING — DO NOT BREATHE DUST AND CUT ONLY IN WELL VENTILATED AREA**

James Hardie products contain sand, a source of respirable crystalline silica which is considered by some international authorities to be a cause of cancer from some occupational sources. Breathing excessive amounts of respirable silica dust can also cause a disabling and potentially fatal lung disease called silicosis, and has been linked with other diseases. Some studies suggest smoking may increase these risks. During installation or handling: (1) work in outdoor areas with ample ventilation; (2) minimise dust when cutting by using either 'score and snap' knife, fibre cement shears or, where not feasible, use a HardieBlade™ Saw Blade and dust-reducing circular saw attached to a HEPA vacuum; (3) warn others in the immediate area to avoid breathing dust; (4) wear a properly-fitted, approved dust mask or respirator (e.g. P1 or P2) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposures. During clean-up, use HEPA vacuums or wet cleanup methods — never dry sweep. For further information, refer to our installation instructions and Safety Data Sheets available at [www.jameshardie.co.nz](http://www.jameshardie.co.nz).

**FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.**

#### James Hardie recommended safe working practices

##### **CUTTING OUTDOORS**

1. Position cutting station so wind will blow dust away from the user or others in working area.
2. Use one of the following methods based on the required cutting rate:

##### **BEST**

- Score and snap
- Hand guillotine
- Fibreshear

##### **BETTER**

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and HEPA vacuum extraction.

##### **GOOD**

- Dust reducing circular saw with HardieBlade™ Saw Blade.

##### **CUTTING INDOORS**

- Cut only using score and snap, hand guillotine or fibreshears (manual, electric or pneumatic).
- Position cutting station in a well-ventilated area.

##### **SANDING/REBATING/DRILLING/OTHER MACHINING**

When sanding, rebating, drilling or machining you should always wear a P1 or P2 dust mask and warn others in the immediate area.

##### **IMPORTANT NOTES**

1. For maximum protection (lowest respirable dust production), James Hardie recommends always using "Best" — level cutting methods where feasible.
2. NEVER use a power saw indoors.
3. NEVER use a circular saw blade that does not carry the HardieBlade™ logo.
4. NEVER dry sweep — Use wet suppression or HEPA vacuum.
5. NEVER use grinders.
6. ALWAYS follow tool manufacturers' safety recommendations.

P1 or P2 respirators should be used in conjunction with above cutting practices to further reduce dust exposures. Additional exposure information is available at [www.jameshardie.co.nz](http://www.jameshardie.co.nz) to help you determine the most appropriate cutting method for your job requirements. If concern still exists about exposure levels or you do not comply with the above practices, you should always consult a qualified industrial hygienist or contact James Hardie for further information.

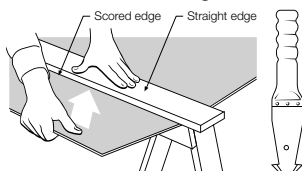
## Working instructions

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

### Score and snap

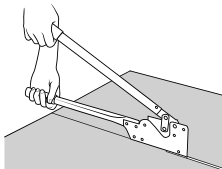
Score and snap is a fast and efficient method of cutting James Hardie building products using special tungsten tipped score and snap knife.

Preferably score on the face side of the product. Score against a straight edge and repeat the action to obtain adequate depth for clean break — normally one third of sheet thickness. Snap upwards to achieve break. Smooth any rough edges with a rasp.



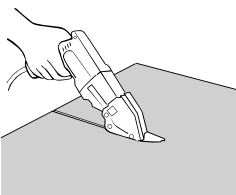
### Hand guillotine

Make guillotine cut on the off-cut side of line to allow for the thickness of the blade.



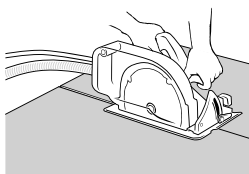
### Fibreshear heavy duty

An electrically powered, fast, clean and effortless way of cutting James Hardie building products, especially around curves such as archways. Make fibreshear cut on the 'off-cut' side of the line to allow for the thickness of the shear.



### HardieBlade™ Saw Blade

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

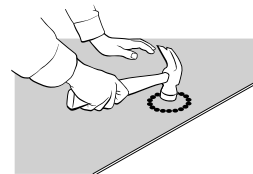


### Hole-forming

#### For smooth clean cut circular holes:

- Mark the centre of the hole on the sheet.
- Pre-drill a pilot hole.

- Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.



#### For irregular holes:

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

### Storage and handling

To avoid damage, all James Hardie building products should be stored with edges and corners of the sheets protected from chipping.

James Hardie building products must be installed in a dry state and protected from rain during transport and storage. The product must be laid flat under cover on a smooth level surface clear of the ground to avoid exposure to water, moisture, etc.

### Quality

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

# 3 Framing / substrate

## 3.1 GENERAL

Villaboard Lining can be fixed to either timber framing, light gauge domestic type steel framing and battens fixed over masonry. The framing and substrate used must comply with the relevant building regulations and standards and the requirements of this manual.

For untiled walls the studs spacing must not exceed 600mm centres and noggings 1200 centres maximum.

For tiled wall applications studs spacing must be closed to 400mm for a 6mm Villaboard Lining, and between 400mm to 600mm centres for a 9mm Villaboard Lining. Refer Table 10 for further information.

At sheet joint the studs must be minimum 45mm wide.

### Notes

1. Stud spacings restrict the thickness of tiles used to finish Villaboard Lining. For more information refer to the Finishes and Maintenance section on page 25.
2. In internal and external corners use a PVC perforated corner mould or paper faced rigid moulding.
3. Ensure a 6mm building tolerance gap is provided at the floor and ceiling junctions with the Villaboard Lining.

## 3.2 TIMBER

Timber framing must at a minimum comply with the requirements of NZS 3604 'Timber Framed Buildings'.

The timber framing treatment and moisture contents must comply with the requirements of NZS 3602.

## 3.3 STEEL

The minimum size for steel stud framing should be 64mm deep x 35mm wide and 0.55mm base metal thickness (BMT) minimum.

Steel framing shall comply with the minimum stiffness requirements of NZS 3604. Refer to NASH 3405 document for further guidance on steel framing or contact steel framing supplier for information.

Steel sections shall be suitably galvanised zinc coated to comply with the durability requirements of NZBC. Refer to framing manufacturer for further information. Studs must not be less than 35mm wide at joints.

For tiled applications it is recommended to use a 0.75mm thick steel framing to achieve the required rigidity/stiffness.

## 3.4 MASONRY SUBSTRATE

Always ensure the substrate is given adequate time to dry out before the installation of Villaboard Lining. The wall surface must be clean, dry and free of any material that will affect the straightness of the battens. Refer to page 13 for further information.

## 3.5 SKILLION ROOF DESIGN

When installing Villaboard Linings direct to skillion roof framing, refer to Eaves and Soffit Linings Installation Manual.

## 3.6 FRAME TOLERANCES

Ensure the frame is square and work from a central datum line. Frames must be straight and true to provide a flush face to receive the sheeting.

Figure 1: Frame straightness



A suggested maximum tolerance of between 3mm and 4mm in any 3000mm length of frame will give best results. Villaboard Lining will not straighten excessively warped or distorted frames and any warping may still be visible after the internal lining is installed.

## 3.7 MASONRY WALL

Cut Villaboard Lining approximately 12mm less than floor to ceiling height to allow for building tolerances. Ensure a 6mm building tolerance gap is provided at the floor and ceiling junctions with the Villaboard Lining. Refer to page 14 for specific substrate requirements.

## 4 Sheet layout

### 3.8 CURVED WALLS

Villaboard Lining may be bent to accommodate curved walls. The minimum bending radii are shown below.

Table 4

Curved wall minimum bending radii		
	Along Length (mm)	Across Width (mm)
Villaboard Lining 6mm	1800 (1200)	2400
Villaboard Lining 9mm	3000 (1800)	4000

Notes

1. The bending radii given above require no special pre-wetting of the sheet and may be used on internal or external curves.
2. With extra care, the sheet can be bent to the radius shown in the brackets.

To maintain the smoothness of the curve, studs must be closed to spacings as shown below.

Table 5

Curved lining — stud spacing	
Range of Radii (mm)	Stud Spacing (mm)
1200 to 3000	300
Above 3000	*400

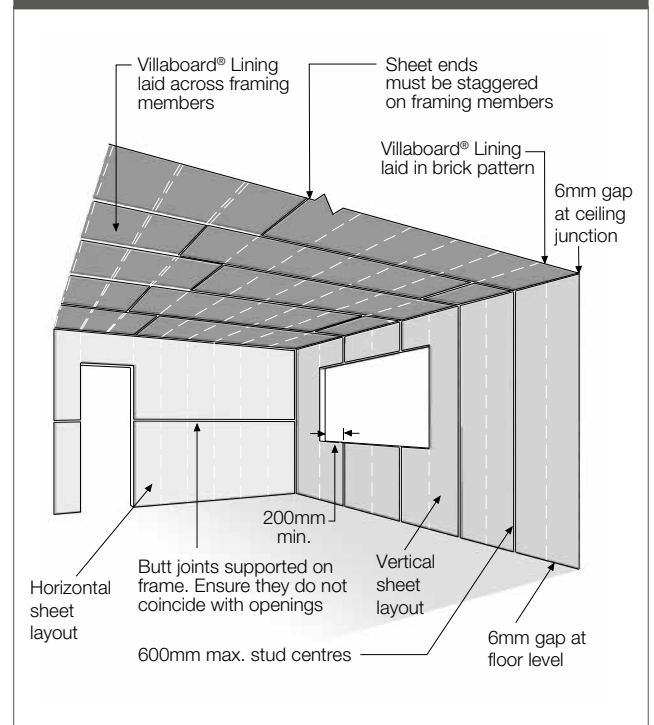
\*or at one third of the sheet width, whichever is the lesser.

Install Villaboard Lining across the framing either vertically or horizontally.

Sheet joints must coincide with the centre line of the framing member.

At door and window openings fix sheets around the opening in a way that the sheet joints do not coincide with the edges of openings. The sheet joint must be 200mm minimum away from the opening edge. See Figure 2.

Figure 2: Sheet layout



Notes

1. The sheets should be installed vertically on the inner face of external walls where the exterior cladding is installed on cavity battens. For cavity construction method the nogs are generally fixed at 800mm centres max.
2. Sheets with two long edges recessed are most suitable for vertical installation.
3. When the space above the window/door is less than 250mm then a control joint must be provided on either side of opening. Refer to Figure 18.
4. 3-4mm packers can be fixed on the framing where required to suit the window reveals or in wet areas.
5. All sheet edges must be supported by the framing.
6. Joints can be staggered.

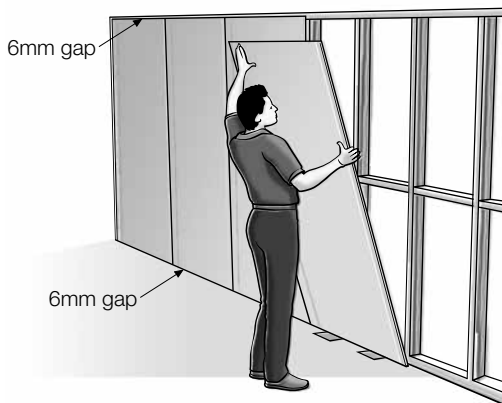
# 5 Installation

## 5.1 GENERAL

Place 6mm packers along the floor as temporary support for sheets. This will allow for any frame movement/shrinkage. Put sheets in place as shown.

Ensuring the sheet is level, fix starting from the centre of sheet and working outwards to avoid any drumminess.

Figure 3: First sheet



Provide 1-2mm gap between Villaboard Lining sheets at vertical, horizontal, internal or external corner joints.

Fix the remaining sheets in a similar sequence.

### Notes

1. For fastener selection and spacings see pages 10 -13.
2. Do not fix sheets to the bottom chord of roof trusses. Instead, fix to ceiling battens or furring channels.

Figure 4: Fixing remaining sheets



## 5.2 FASTENERS

Fasteners must have the appropriate level of durability required for the intended project.

Fasteners must be fully compatible with all other material that they are in contact with to ensure the durability and integrity of the assembly.

On timber frame use Villadrive collated screws for quick installation of Villaboard Linings. Alternatively the Villaboard Lining can also be fixed with HardieDrive stainless steel screws or 40 x 2.8mm HardieFlex nails.

For fixing Villaboard Lining to 0.55 – 1.0mm BMT steel framing, use 30mm Buildex FibreZip Class 3 collated screws. These screws must not be used in sea spray zones.

Nails must be finished flush (Figure 5). Screws can be driven 0.5mm below the sheet surface to achieve the required finish level (Figure 5). In steel framing the fasteners should be driven as close as possible to the stud corners to avoid deflection of the stud flange, see Figure 6.

Refer to Section 6 – Step 7, for finishing of fasteners.

Figure 5: Fastener depth

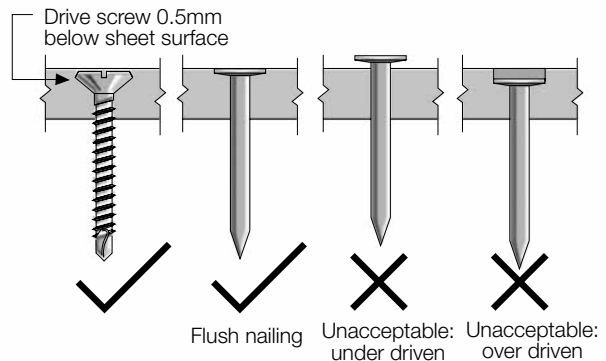
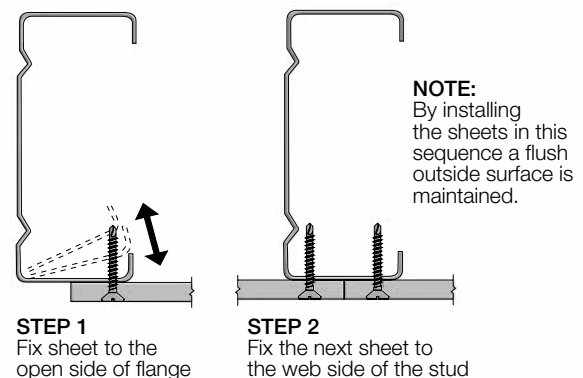


Figure 6: Screw fastening



### 5.3 FIXING TO FRAMED WALLS

#### Untiled walls

Where Villaboard Lining is to be left untiled, the sheets can be fixed with fasteners or a combination of fasteners and adhesive, see Figures 7 and 8 respectively.

Figure 7: Fastening to wall frames

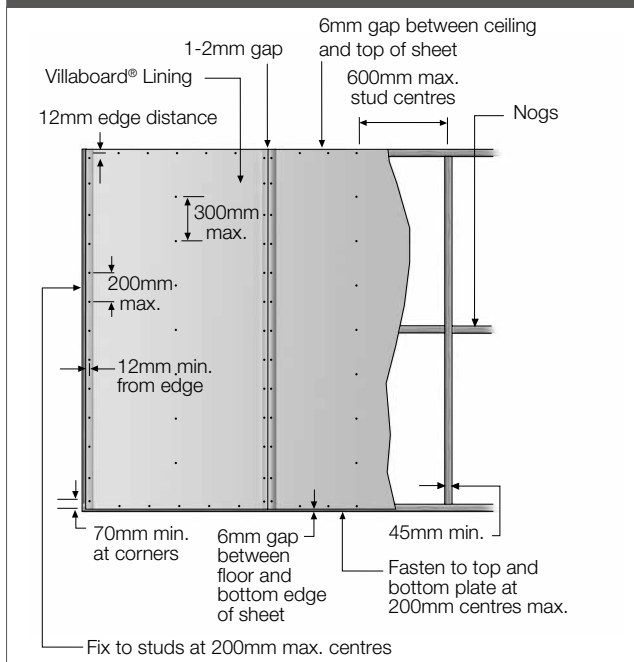
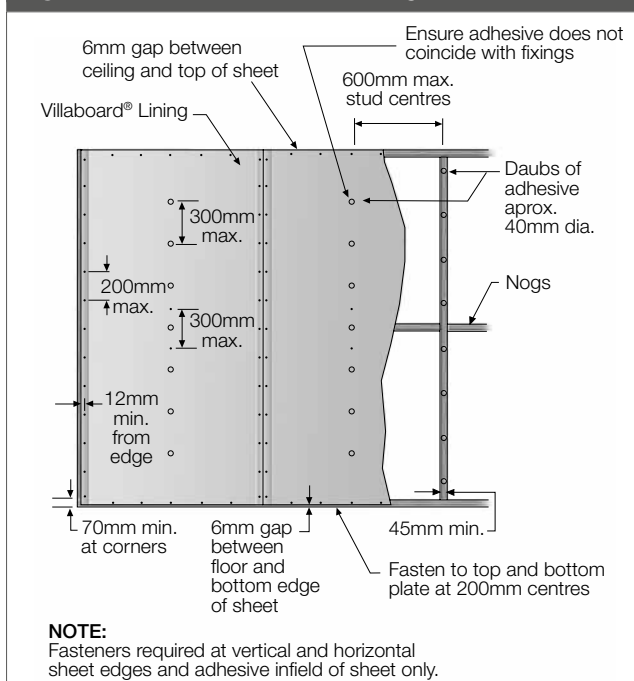


Figure 8: Fastener / adhesive fixing to wall frames



#### Notes

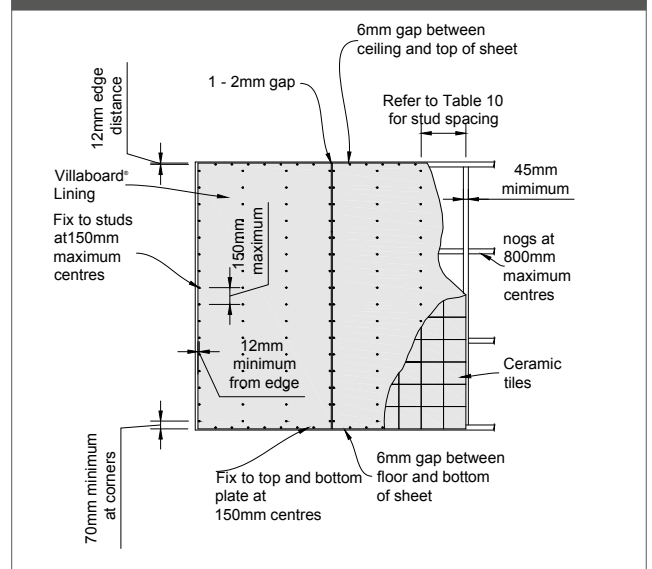
1. All surfaces to receive adhesive must be clean, free of dust, oil, etc.
2. Ensure daubs of adhesive never coincide with permanent fastener points, as adhesive shrinkage may cause fastener head protrusion.

#### Tiled walls

Where Villaboard Lining is to be finished with tiles, the sheets must be fixed with fasteners only as shown in Figure 9.

For tiled wall applications studs spacing must be closed to 400mm for a 6mm Villaboard Lining, and between 400mm to 600mm centres for a 9mm Villaboard Lining. Refer Table 10 for further information.

Figure 9: Fastening to wall frames for tiling



#### Notes

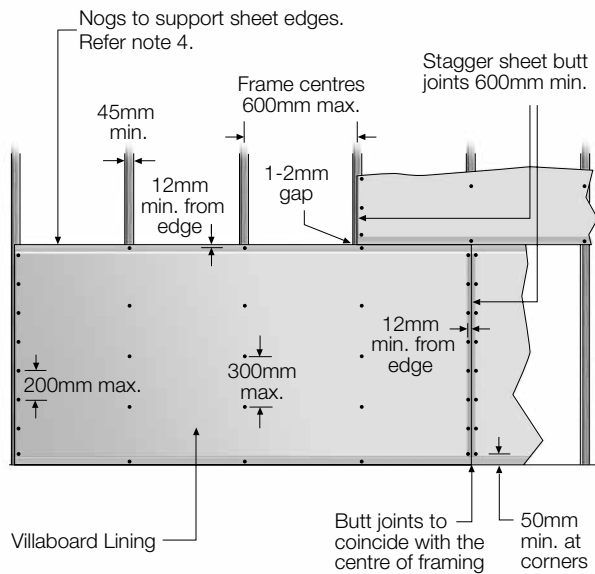
1. It is good practice to install Villaboard Lining horizontally for tiled applications.
2. When tiling in wet areas, apply water proofing membranes before tiling on walls. Ensure water proofing membranes manufacturers recommendations are followed.
3. The recessed edges are required to be stopped with James Hardie Base Coat as per Section 6. The top coat is not required behind the tiles. The square sheet joint can be sealed with a flexible sealant before the installation of tiles. Refer Figure 16.
4. When installed horizontally full perimeter sheet support and fixing is required. The vertical sheet joints can be staggered.
5. Fixings not to be staggered at the joint. Refer Figure 9.



## 5.4 FIXING TO FRAMED CEILINGS

For ceiling applications either the fastener or fastener/adhesive method can be used. Refer to Figures 10 and 11 respectively.

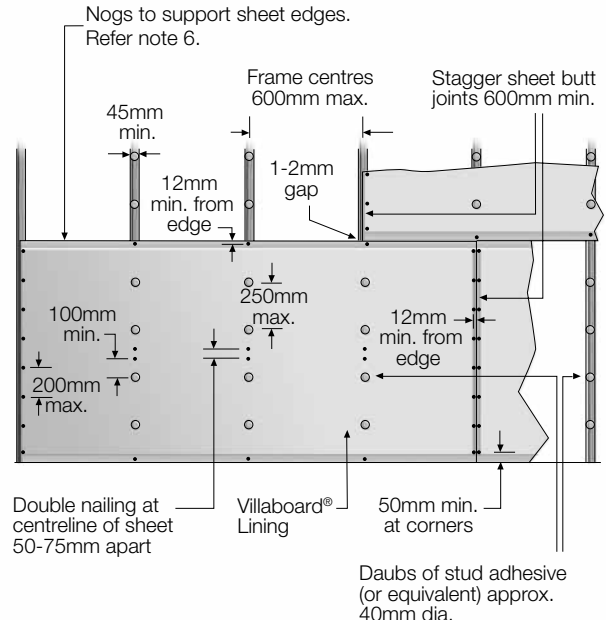
Figure 10: Fastening to ceiling frames



### Notes

1. Do not install tiles in ceiling applications.
2. Do not fix sheets to the bottom chord of trusses. Batten these out first with timber battens or steel ceiling battens.
3. It is recommended that flush stopping of joints is suitable when using recessed edge Villaboard Lining.
4. When nogs not installed for perimeter support, unsupported sheet edges across the framing must be supported by back blocking using a 300-400mm wide Villaboard Lining strip adhered to rear face and centered between the framing.
5. For external soffit applications refer to James Hardie Eaves and Soffit Linings Installation Manual.

Figure 11: Fastener / adhesive fixing to ceiling frames



### Notes

1. Do not install tiles in ceiling applications.
2. Do not use adhesive only. Ensure sheet perimeter is fastened as shown.
3. All surfaces to receive adhesive must be clean, free of dust, oil, etc.
4. Ensure daubs of adhesive never coincide with permanent fastener points, as adhesive shrinkage may cause fastener head protrusion.
5. It is recommended that flush stopping of joints is suitable when using recessed edge Villaboard Lining.
6. When nogs not installed for perimeter support, unsupported sheet edges across the framing must be supported by back blocking using a 300-400mm wide Villaboard Lining strip adhered to rear face and centered between the framing.
7. For external soffit applications refer to James Hardie Eaves and Soffit Linings Installation Manual.

## 5.5 FIXING TO MASONRY/CONCRETE WALL

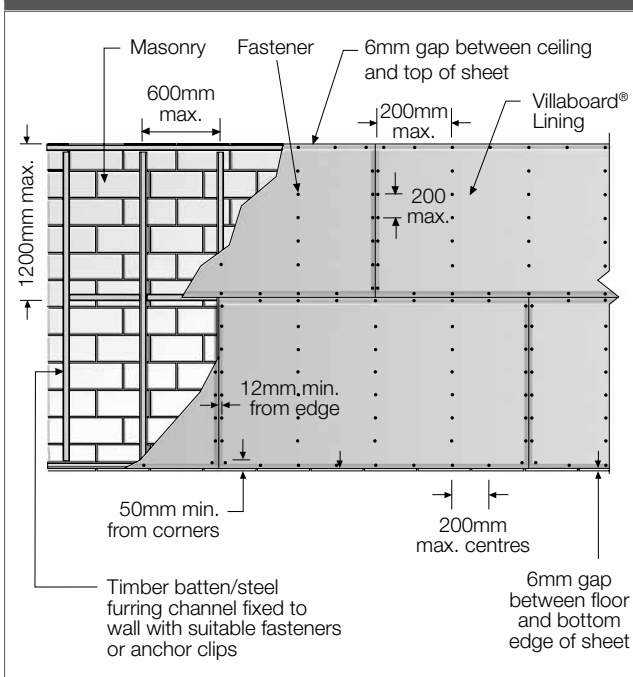
Villaboard Lining can be installed over masonry, concrete and Aerated Autoclaved Cement (AAC) substrates by following the requirements as explained below.

## 5.6 BATTEN/FURRING CHANNEL METHOD

Note: This method is suitable for tiled or untiled applications.

1. Where substrate may be uneven and misaligned – this method allows correction of irregular surfaces; allows packing out to accommodate large surface variations.
2. Timber battens are either fixed directly to the walls, or alternatively, metal furring channel anchor clips can be used. These are attached to the wall prior to fitting the metal furring channels.
3. Where services are run over walls, deeper furring channels may be used.
4. Use suitable masonry fasteners to structurally fix timber/steel battens or recessed furring channels as shown in Figure 12.
5. Pack behind battens as required to achieve a flat surface.
6. Villaboard Lining edges must be supported on the wall.

Figure 12: Batten/furring channel — horizontal layout



### Notes

1. Timber battens or proprietary steel battens or furring channel sections may be used. Where space is a major consideration, use recessed furring channels which have the least section depth.
2. The spacing and fixing of anchor clips must be in accordance with the manufacturer's recommendations.
3. The sheets can also be fixed vertically using this method.
4. The depth of timber battens must be suitable for the length of fasteners used.

# 6 Joints

## 6.1 GENERAL

Villaboard Lining joints are set with proprietary jointing compounds reinforced with perforated paper tape. Both recessed edge, square edge and butt joints are finished by using the jointing products outlined in this manual.

The performance of joints is the responsibility of the installer, as this is governed by the installation practices and the standard of workmanship applied. However, James Hardie considers that the recommendations provided in Table 6 describe best practice to reduce the risk of joint cracking or other problems.

There are various factors that can affect the performance of jointing compounds on edge recessed fibre cement substrates. These factors include the framing, movement, installation quality,

vibrations, moisture, humidity, temperature, etc. To achieve satisfactory joint performance these factors need to be carefully considered and understood by the installer and designer when positioning joints.

James Hardie Base Coat has been specifically developed for use with Villaboard Lining and offers superior joint strength when compared with the gypsum jointing compound alternatives.

All site cut and site recessed sheet edges must be sealed with Dulux Acraprime 501/1 or Dulux Primacryl or similar.

In addition, provision for movement needs to be made by the installation of control joints. See Figure 18.

Table 6

Jointing recommendations				
		Application	Base Compound	Topping Compound
Dry area walls	Recessed Edge	Untiled	James Hardie Base Coat with perforated paper tape	James Hardie Top Coat, Plaster Systems compound or Gypsum topping compound
		Tiled	James Hardie Base Coat with perforated paper tape	N/A
	Butt Edge	Untiled	Silicone Joint	N/A
		Tiled	Silicone Joint	N/A
Wet area walls	Recessed Edge	Untiled	James Hardie Base Coat with perforated paper tape	James Hardie Top Coat
		Tiled or Shower Lining	James Hardie Base Coat with perforated paper tape	N/A
	Butt Edge	Tiled or Shower Lining	James Hardie Base Coat with perforated paper tape	N/A
			Silicone Joint	N/A

Figure 13: Vertical flush joint setout

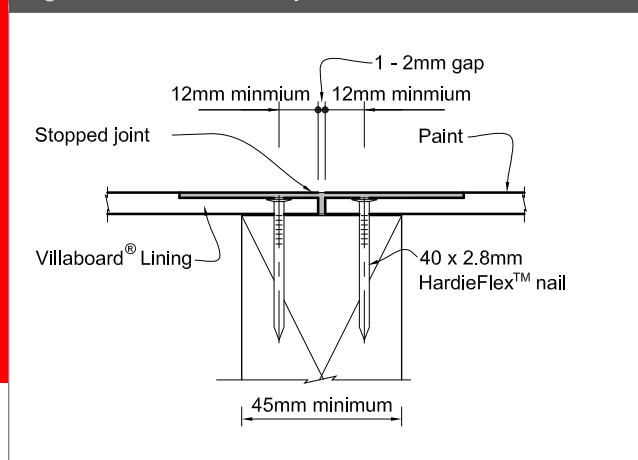
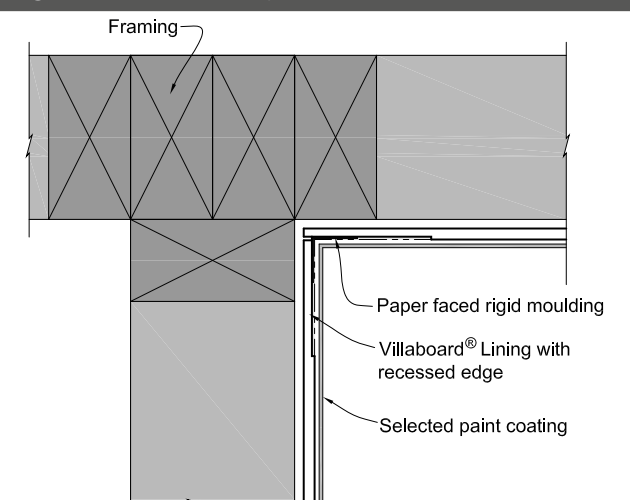
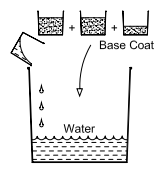


Figure 14: Wall to wall junction



Note: When Villaboard™ Lining is to be tiled the corners behind the Villaboard Lining must be tied together with a Lumberlok® Stud Saver steel corner angle. Refer to Figure 21 for this angle's location.

## 6.2 JAMES HARDIE BASE COAT MIXING INSTRUCTIONS

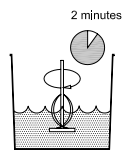


**Step 1**

First, add 1 part of clean water into bucket.

Then add 2½ parts James Hardie Base Coat powder

Allow to soak for 1 minute.

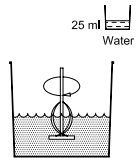


**Step 2**

Mix for 1½ – 2 minutes using paint mixer or equivalent (approximately 2500-3000rpm).

James Hardie Base Coat is NOT like the plaster based compounds. Initial mixing will indicate a dry mix and further mixing **WITHOUT** further addition of water will deliver the ideal workable paste.

Warning: Inadequate or over mixing can lead to poor workability and can cause performance issues. **Do Not Hand Mix.**



**Step 3**

The mix at this stage should be consistently smooth.

Based on the environmental conditions i.e. temperature, humidity and wind etc you may add maximum of 25ml of water per 1Kg of base coat powder in the mix at this stage to adjust workability. Mix it well.

(Note: Adding excess water than the recommendation may delay the drying of base coat and may cause joint cracking due to excessive shrinkage.)

The mix should be glossy and smooth. There should be no lumps in the mix.

### Important Notes:

1. Do not apply James Hardie Base Coat in temperatures above 40° C or below 5° C.
2. Allow the compounds to dry before applying the next coat. The drying time will vary between 12 to 24 hours depending upon the weather conditions.
3. Site cut and site recessed sheet edges must be sealed with an acrylic sealer e.g. Dulux Acraprime 501/1, Dulux Primercyl or similar product.
4. In corners, use James Hardie uPVC internal/external corner mould primed with Dulux Primerlock or similar. A 'GIB® Goldline™ Platinum' corner mould can also be used.
5. Use only perforated paper tapes in straight joints.
6. It is recommended that one (1) base coat bag is mixed in three (3) portions.
7. Before stopping the sheet edges, Multiplast Resin or a similar product in diluted form must be applied to the sheet edges. Mix the resin as per the manufacturer's recommendations.

### Product Life:

James Hardie Base Coat has a shelf life of 12 months in unopened bags when stored in a cool dry place.

James Hardie Base Coat has a bag life of 1 month if opened bags are resealed and stored in a cool dry place.

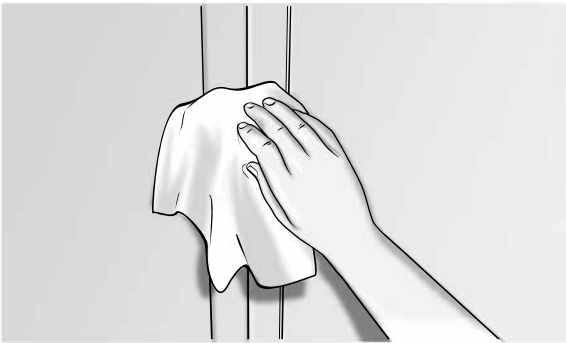
### 6.2.1 Compound coverage

1kg of Base Coat will provide approximately 5 lm of standard joints. 1kg of Top Coat will provide approximately 5.6 lm of standard joints.

## 6.3 SET RECESSED EDGE JOINTS

### Step 1 — Preparation

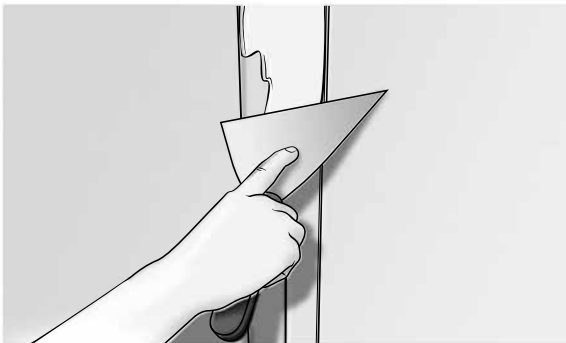
Ensure that the recesses are clean and free of dust and contaminants. Sheet edges must be sealed prior to stopping with Multiplast Resin water proofing admixture or other similar products. If working conditions are hot and dry, dampen the area around the joint prior to working.



Note: The jointing method shown on page 16 and 17 provides a level 4 finish. For more information about this and other finishes refer to Table 9.

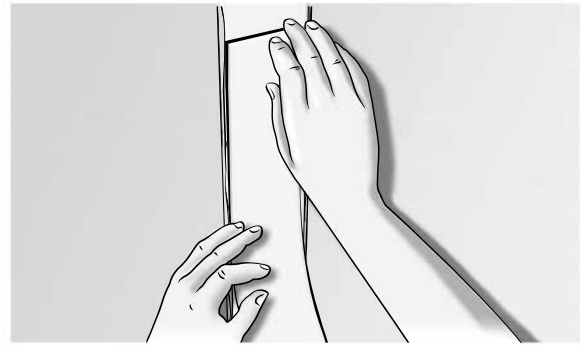
### Step 2 — First coat

Apply James Hardie Base Coat to fill the recess with a 150mm broad knife.



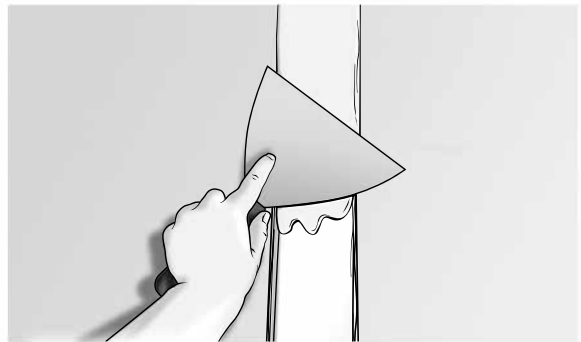
### Step 3 — Embed tape

Firmly embed the perforated paper tape centrally into the joint using a 50mm broad knife. Ensure that there are no voids under the tape and remove excess compound.



### Step 4 — Thin layer

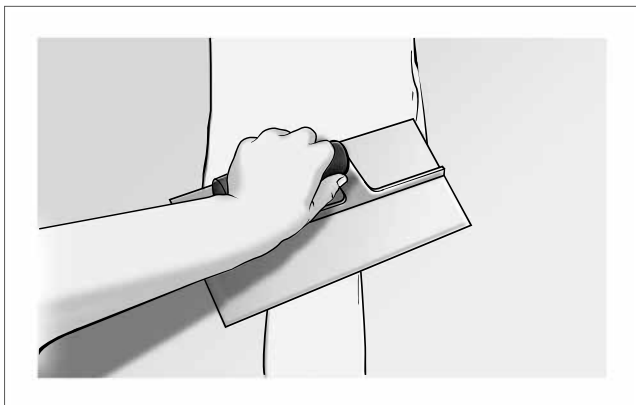
Immediately fill joint covering tape with a layer of James Hardie Base Coat applied with a 150mm broadknife.



Note: Steps 5, 6 and 7 are only required for paint and wall paper finishes up to a level 4 finish. Refer Table 9 for level 5 finish.

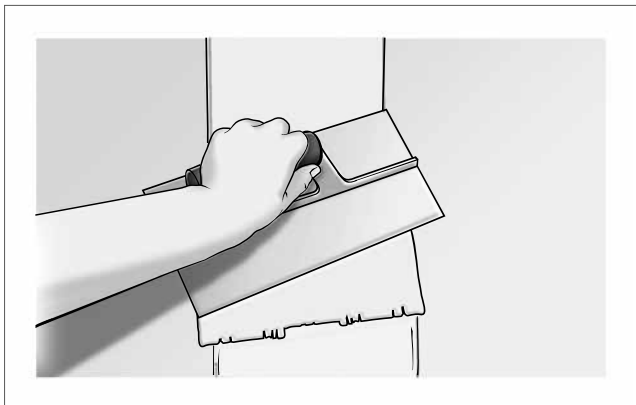
#### Step 5 — Second coat (untiled walls only)

When the first coat is fully dry, use a 200mm wide second coat trowel to apply the James Hardie Base Coat. Apply this coat approximately 180mm wide, laid down over the recess and feather the edges.



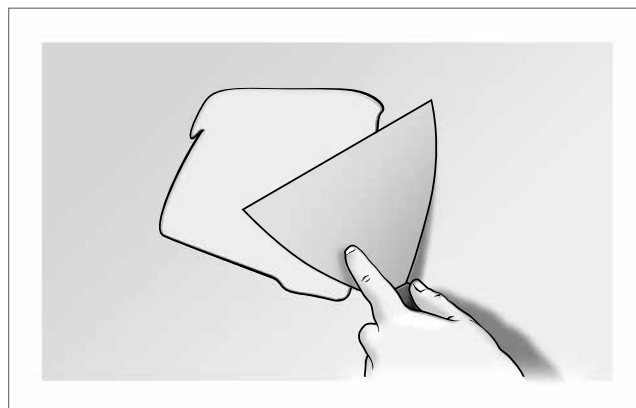
#### Step 6 — Finishing coat (untiled walls only)

Ensure the second coat is fully dry. Using a finishing trowel, apply a coat of James Hardie Top Coat 280mm wide centrally over the joint and feather out the edges. Allow to dry fully before sanding.



#### Step 7 — Fastener heads (untiled walls only)

Apply a finishing coat of James Hardie Base Coat to fastener heads, feathering out the edges. Allow to fully dry before sanding.

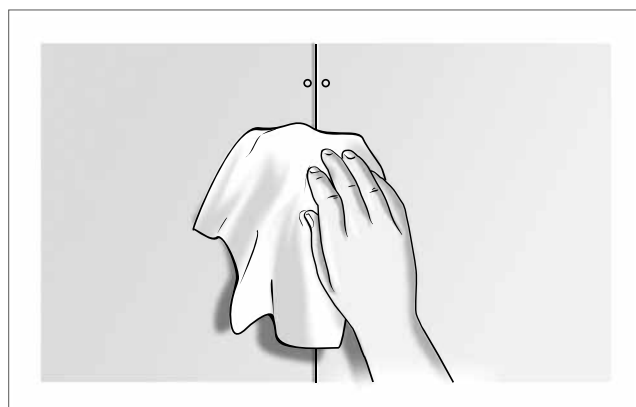


### 6.4 SET SQUARE EDGE JOINTS

As an alternative to setting the recessed edge joints, square edge Villaboard Lining can also be jointed and stopped on stud as shown below. This detail will achieve a level 3 finish.

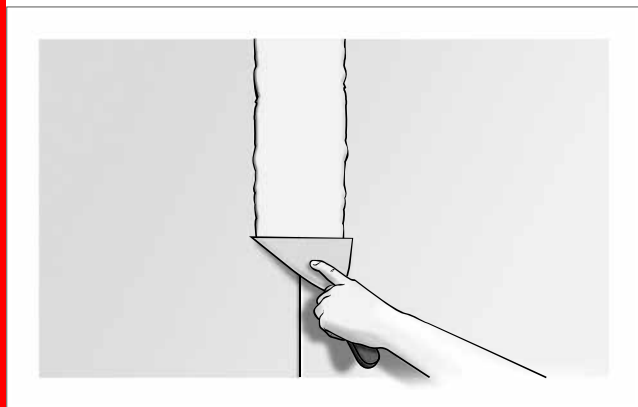
#### Step 1 — Preparation

When jointing un-recessed sheet joint, ensure that sheet edges are clean and free of dust and contaminants. Sheet edges must be sealed prior to stopping with Multiplast Resin water proofing admixture or other similar products. If working conditions are hot and dry, dampen the area around the joint prior to working.



### Step 2 — First coat

Apply James Hardie Base Coat centrally over butt joint to 200mm wide with a 150mm broadknife.



### Step 3 — Embed tape

Firmly embed the perforated paper tape centrally using a 50mm broadknife. Ensure that there are no voids under the tape and remove excess compound.



### Step 4 — Thin layer

Immediately cover tape with a thin layer of James Hardie Base Coat applied with a 150mm broadknife.



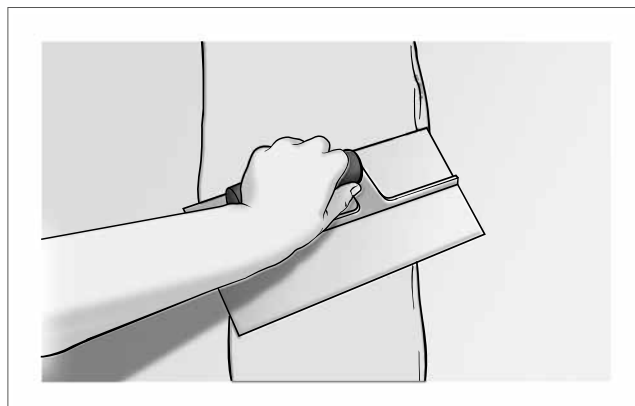
### Step 5 — Second coat (untiled walls only)

When the first coat is fully dry, use a 200mm wide second coat trowel to apply the James Hardie Base Coat. Apply this coat approximately 300mm wide.



### Step 6 — Finishing coat (untiled walls only)

Ensure the second coat is fully dry. Using a finishing trowel, apply a coat of James Hardie Top Coat 500mm wide centrally over the joint and feather out the edges. Allow to fully dry before sanding.





## 6.5 BUTT JOINT

Figure 15: Butt joint detail (dry area)

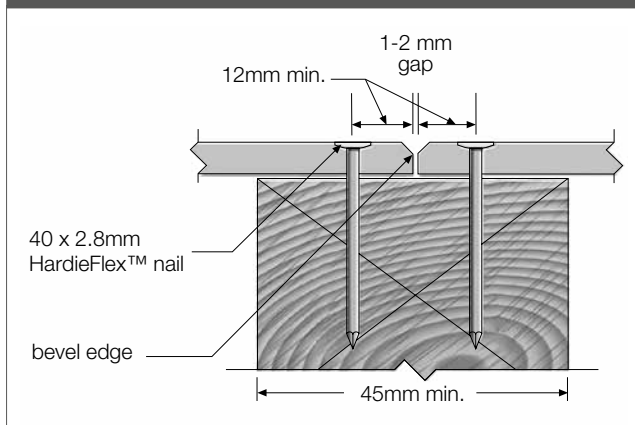
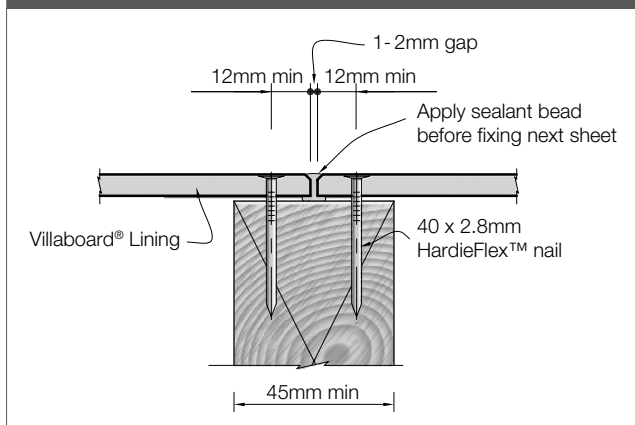
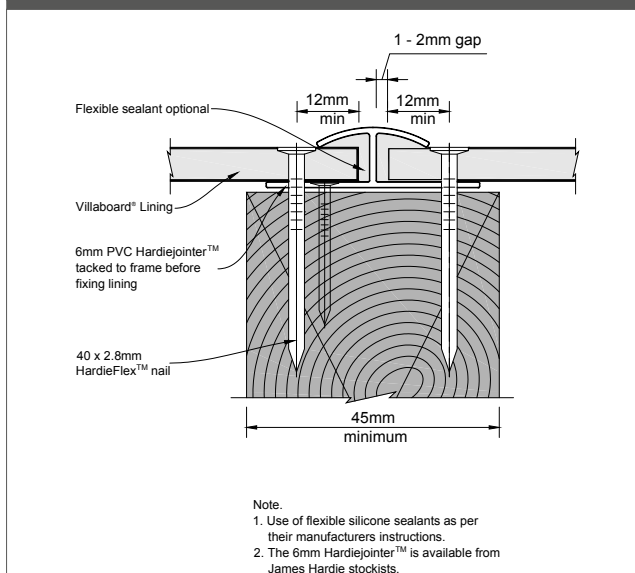


Figure 16: Butt joint detail  
(tiled over in dry and wet areas)



## 6.6 PVC JOINT

Figure 17: Butt joint detail



## 6.7 INTERNAL CORNERS

The internal corners can be formed as per one of the following two methods;

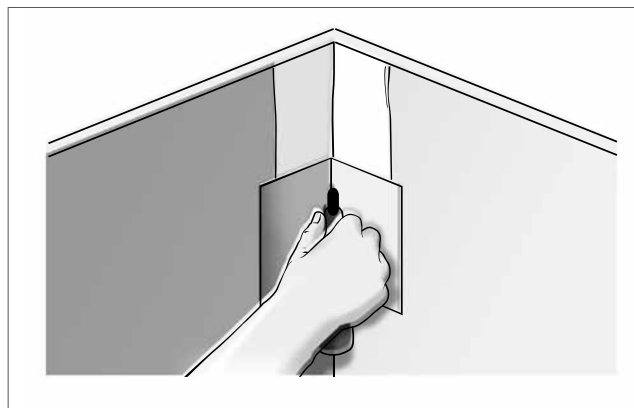
### Method A:

1. Apply James Hardie Base Coat to both sides of the corner using a 70mm broad knife. Fold the perforated paper tape to form a corner and embed it into the corner using 50mm wide corner trowel.
2. Cover the paper tape with James Hardie Base Coat using a 100mm corner trowel. Allow the base coat to dry. This will normally take up to 24 hours depending upon the temperatures and humidity conditions.
3. Once the base coat has dried then apply a thin finishing coat over it with a corner trowel and smooth it out. Allow the compounds to fully dry before sanding.

Note: Step 3 is only required for untiled walls.

### Method B:

Embed and fix a paper faced rigid spine corner mould (Goldline) in the corner and then stop over it using a James Hardie Base Coat. Follow steps 2 and 3 mentioned above to finish the corner joint.

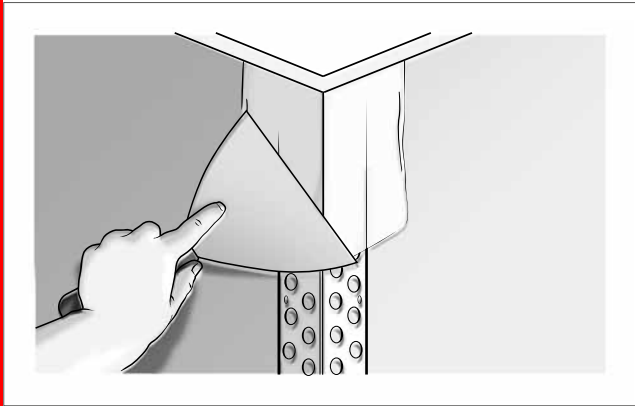


## 6.8 EXTERNAL CORNERS

Setting of external corners is required for untiled applications only as follows:

- Fit a perforated corner angle supplied by James Hardie or a paper faced rigid spine corner mould (Goldline) over the external corner and ensure straightness before fixing with HardieFlex nails at 300mm centres.
- Apply James Hardie Base Coat to both sides of the corner angle to a width of 150mm using a broad knife. Allow to dry before applying a second coat.
- Using a straight trowel, build up the edges to 250mm from the corner. Allow to dry.

- When dry, use the straight trowel to apply a thin finishing coat, 300mm wide, to both sides of the corner angle, feathering out the edges.
- Allow to fully dry before sanding.



## 6.9 CONTROL JOINTS

Control joints are required in long runs of Villaboard Lining walls or ceilings in either direction. These joints are designed to take up the structural movement between the sheets and the building frame. They may also be required in ceilings where they change direction or continue into passage ways. Control joints should also be provided at frame junctions / joints such as wall intersections.

See Table 8 for maximum control joint spacings and Figure 18 for a typical detail.

Table 8

Maximum spacing for control joints (m)			
	Steel framing		Timber Framing
	0.55 – 0.75mm BMT	greater than 0.75 – 1.6mm BMT	
General	9.0	6.0	7.2
Tiles walls	4.8		4.2*

\*The maximum wall area should be restricted to 10m<sup>2</sup> between control joints

Figure 18: Control joint

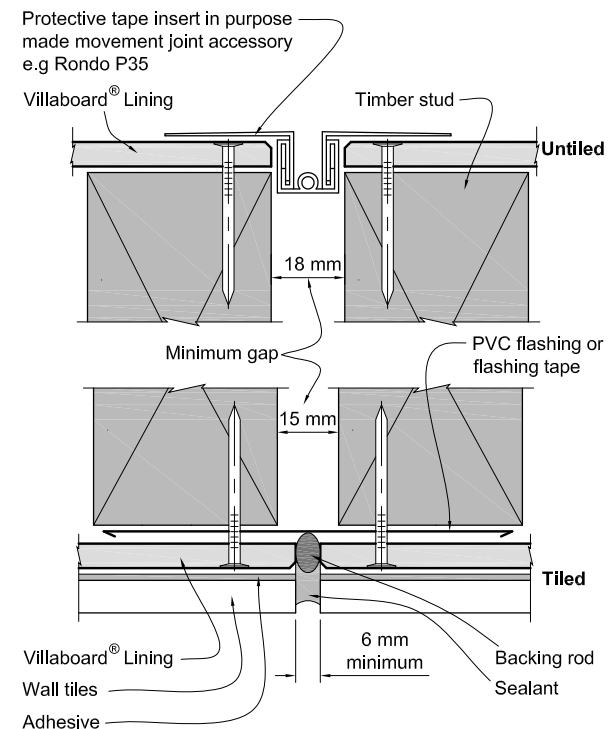
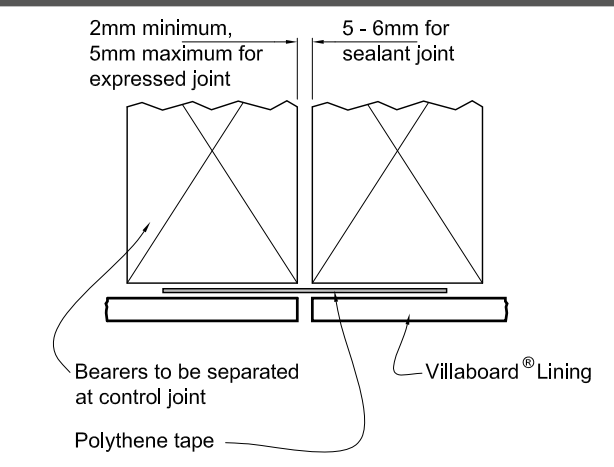


Figure 19: Control joint



Note: Alternatively a PVC control jointer supplied by James Hardie can also be used to form a control joint.

# 7 Wet area application

## 7.1 BATHROOM AREAS

Villaboard Lining is most suitable for use in wet area applications. Villaboard Lining must be covered with a water proofing membrane in a shower application before the installation of tiles.

Note: Paints are not suitable for wet area applications (splash zone) and must not be relied upon to achieve water tightness.

## 7.2 INTERNAL SWIMMING POOL APPLICATION

To fix Villaboard Lining in internal swimming pool areas;

- The sheets must be back and edge sealed before installation.
- All sheet joints to be stopped.
- Only stainless steel fasteners must be used.
- Full perimeter fixing required.

In addition, it is recommended that H3.1 treated timber framing and ceiling battens are used to enhance the durability considering the high condensation levels.

Figure 20: Sealing around splash zones (showers)

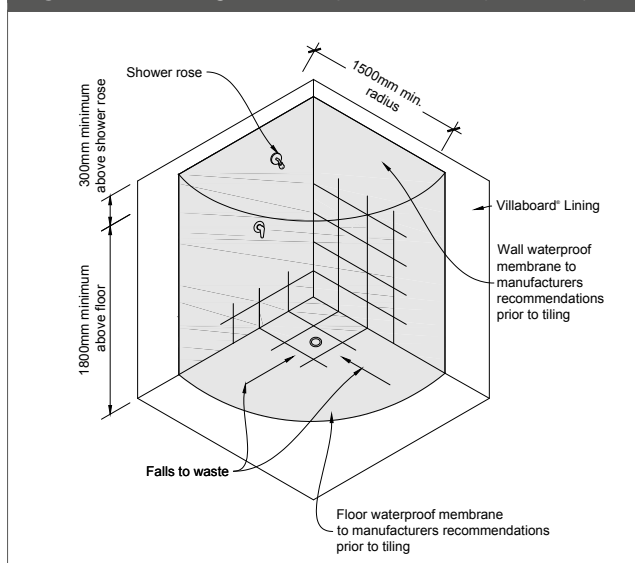


Figure 21: Sealing around splash zones (vanities)

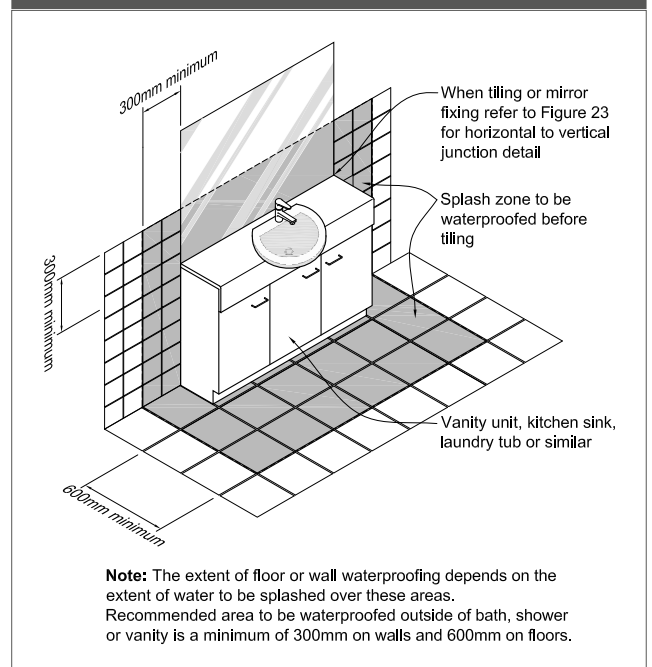


Figure 22: Wall to wall wet area tiled wall internal corner

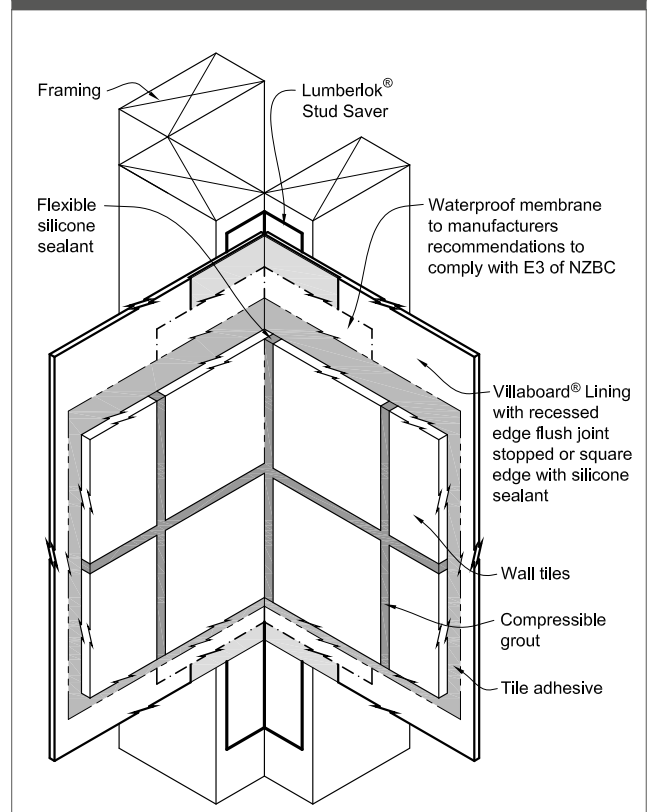
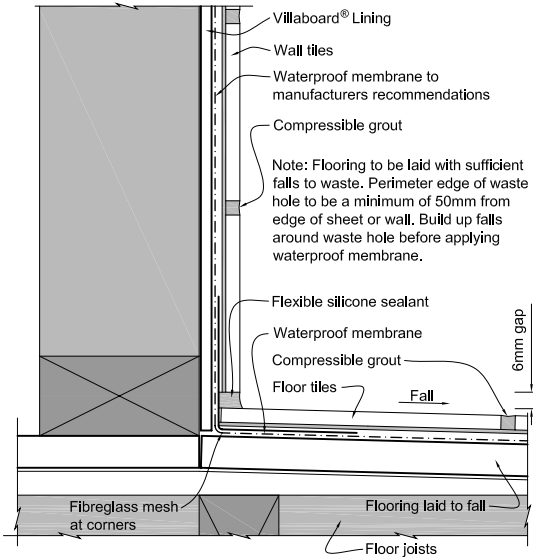


Figure 23: Wall to floor junction



Note for screeds:

1. The thickness of screeds should be applied to achieve the desired slope in accordance with the manufacturers recommendations.
2. Clean down the surface of the sheet flooring thoroughly. Apply a coat of bonding chemical to improve the bonding of the mortar bed to the floor.
3. To prevent cracking of the floor tiles, the mortar bed must be reinforced over all joints in floor sheets with 150mm wide galvanised mesh placed centrally over joints and in the centre of bedding.
4. Control joints in the flooring must be continued through the tiles.
5. Epoxy mortar screeds may also be used.

Note: Refer to Clause 8.5 for further information

Figure 24: Wall to acrylic bath/shower

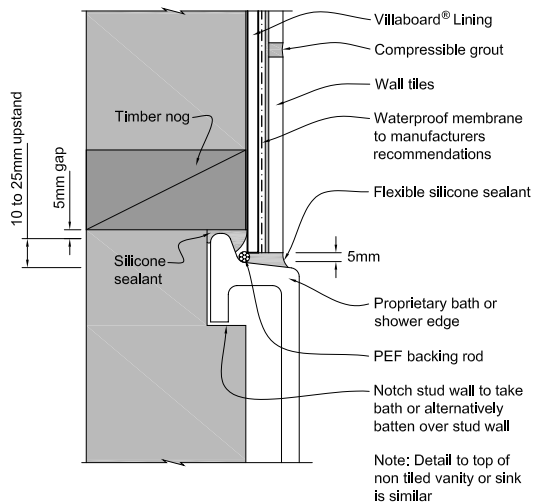
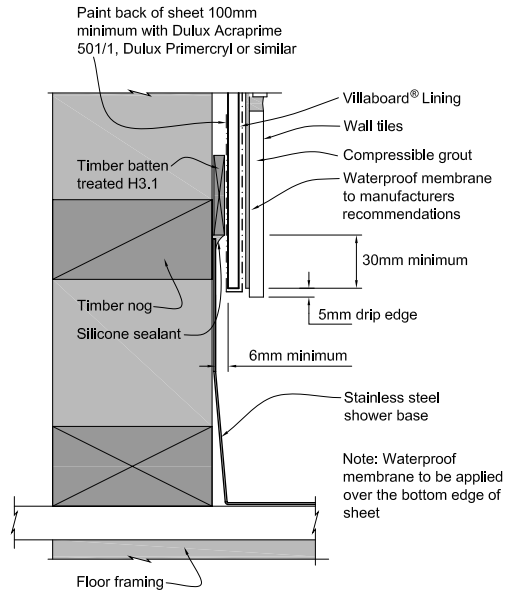


Figure 25: Wall to stainless steel shower

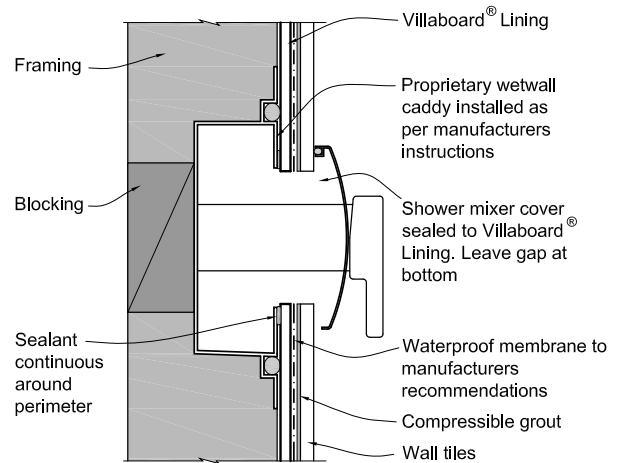


## 7.3 WATERPROOFING MEMBRANE

A waterproofing membrane must be applied to Villaboard Lining when used in wet area or water splash area applications. A reinforcing fibre glass/band must be used in corners and walls to floor junctions. Always follow the recommendations of waterproofing membrane manufacturers. BRANZ appraised water proofing membranes are recommended for use in this application.

## 7.4 WET AREA PENETRATION

Figure 26: Wet wall caddy



Note: Seal cut edges of Villaboard® Lining

# 8 Finishes and maintenance

## 8.1 GENERAL

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Villaboard Lining is finished with either paint, tiles or wallpaper as per application requirements. The application and maintenance of these finishes must be in accordance with the manufacturer's specifications.

### Notes

1. For wet areas, the waterproofing requirements of all relevant codes, standards and regulations must be met.
2. Refer to the manufacturers' specifications on application, compatibility and suitability of waterproofing membranes.

## 8.2 GLANCING LIGHT

---

In some instances, due to glancing light, set joints may be noticeable in Villaboard Lining walls, especially where paint finishes have a high gloss level. Work closely with your builder or designer to minimise this.

Artificial lighting needs to be considered in relation to walls and ceilings (e.g. down-lights in ceilings above set joints in walls). Ceilings and wall joints should run in the direction of the light source (at right angles to windows).

Where glancing light is an issue its effect can be lessened by:

- The use of curtains or blinds.
- Artificial light shading devices.
- The use of light coloured, matt finish paints.

## 8.3 LEVEL OF FINISHES

---

Different levels of finishes are typically specified for different applications. Higher levels of finishes are used to address the glancing light issues with painted Villaboard Lining referred to above. A description of the various levels of finishes and the jointing/coating requirements can be found in Table 9.

Table 9

Levels of finishes			
Level of Finish	Definition*	Typical Jointing/Setting	Finish
0	This level of finish may be useful in temporary construction.	No stopping, taping, finishing or accessories are required. The work is confined to gluing or screwing/nailing sheets in place.	For use in areas where finishing and stopping is not considered necessary.
1	For use in plenum areas above ceilings, in areas where the work would generally be concealed, or in building service corridors and other areas not normally open to public view.	Joints and corner joints will be set with James Hardie Base Coat reinforced with perforated paper tape.	Surface free from excess jointing compound. Tool marks and ridges are generally acceptable.
2	For use in warehouse, storage or other areas where surface appearance is not of primary concern.	Joints and corner joints will be set with James Hardie Base Coat reinforced with perforated paper tape and James Hardie Top Coat.	Minor tool marks and ridges are generally acceptable.
3	For use in areas which are to receive heavy or medium texture (spray or hand applied) finishes or where heavy wall paper coverings are to be applied as the final decoration. This level of finish is not generally suitable where smooth painted surfaces or light to medium wall coverings are specified.	Joints and corner joints will be set with James Hardie Base Coat reinforced with perforated paper tape and James Hardie Top Coat.	This level of finish must be sufficiently smooth to accept heavy vinyl, tiles or textured coatings without blemishes.
4	This is generally the accepted level of finish for domestic construction. It is used where light textures or wall coverings and smooth textured finishes and satin/flat/low sheen paints are illuminated by non-critical lighting.	<p>Refer to flush jointing recommendations on page 16–17, steps 1–7 recessed edge joints.</p> <p>All joints and corner joints will have tape embedded in James Hardie Base Coat applied over all joints, angles, fastener heads and accessories.</p> <p>This application is applicable to recessed edge sheets only.</p> <p>The use of square edge sheets will require a high build application and coating finish.</p>	<p>For use where light-texture coatings or wallpaper or other lightweight wall coverings are to be applied. For painted finishes in non-critical lighting areas flat and low-sheen textured paints are to be applied. Gloss and semi-gloss paints are not generally suitable over this level of finish as any minor blemish will show under critical light.</p> <p>The weight, texture and sheen level or wall coverings applied over this level of finish must be carefully evaluated. Joints and fasteners must be adequately concealed if the wall-covering material is lightweight, contains limited pattern, has a gloss finish, or any combination of these features is present. Unbacked vinyl wall coverings are not suitable over this level of finish.</p>
5	This level of finish is for use where gloss or semi-gloss paints are specified or where critical lighting conditions occur on satin, flat or low sheet paints.	<p>Refer to page 16 steps 1–4 for jointing.</p> <p>Final James Hardie Base Coat application should be feathered out to approximately 200mm + each side of the joint. Then a full skim coat of James Hardie Top Coat must be applied over entire sheet surface in order to achieve a uniform finish.</p> <p>This application is applicable to recessed edge sheets only.</p> <p>The use of square edge sheets will require a high build application and coating finish.</p>	This level of finish is for use where gloss, semi-gloss, low-sheen or non-textured paints are specified or where critical lighting conditions occur.

\*Reference: AS/NZS 2589.1: 'Gypsum lining in residential and light commercial construction — Application and finishing. Part 1: Gypsum plasterboard'

## 8.4 PAINT FINISHES

Prior to the application of paint finishes, remove any residual sanding dust and ensure the surface is suitable for paint application.

Always follow the paint manufacturer's recommendations for paint suitability, mixing and application.

Note: Use of a 'sealer coat' or 'preparation undercoat' is recommended.

## 8.5 TILED APPLICATIONS

Before commencing tiling it is suggested that you refer to BRANZ 'Good Tiling Practice' guide to fully understand the substrate preparation/installation before tiling, also refer Table 10 for Villaboard Sheet thickness, stud spacing and tile thickness.

Refer to Clause 5.3 Tiled Walls for fixing Villaboard Lining to Framed walls.

Control joints must be provided to accommodate thermal/framing movement and stresses which will generate during the life of the building. Control joints must be carried out through the tiles to the exterior face. Refer Figure 18.

James Hardie only recommends the use of flexible tile adhesive for tile applications. Refer to adhesive manufacturer for suitability and application information. The size of tiles used over Villaboard Lining are restricted based on thickness of sheet. Refer Table 10 below.

Square edge sheets can be used for tiled applications. The sheet joint can either be stopped as per Figure 13 or it can be filled with a sealant as per Figure 16.

Note

1. Do not tile ceilings.
2. Tiling must not exceed 3m in height.
3. Provide control joints as per Table 8.
4. The Villaboard Lining joints can be staggered.

Table 10

Villaboard Thickness (mm)	Tile Thickness (mm)	Sizes		Stud Spacing
		Maximum Tile Weight per m2 (Kg)	Tile Size Max	
6	≤ 8mm	Up to 15	300 x 300mm	400mm centres maximum
9	> 8mm	15 - 30	300 x 600mm/ 400 x 400mm	600mm centres maximum
9	> 8mm	31 - 60	300 x 600mm/ 400 x 400mm/ 300 x 900mm	400mm centres maximum

Support angles are required to transfer the weight of tiles to the framing.

A support angle must be fixed at the base of the wall into the bottom plate. When tiling the full height of the wall, it is recommended that an intermediate support angle fixed into framing is also used to support the weight of tiles. The overall mass of tiles and the support required must be considered and the c/c distance between the support angles should be reduced for tiles thicker than 18mm. Refer Table 11 for recommended spacing of angle supports.

Table 11

Guidance for consideration	
Tile Weight per m2 (Kg)	Vertical Spacing of Support Angles (Metres, Max.)
20 - 30	1.6
31 - 42	1.2
43 - 60	0.8

## 8.6 MAINTENANCE

James Hardie recommends that the cleaning and maintenance of all finishes be undertaken regularly as per the recommendations of the manufacturer. Joints must also be maintained and be free of dirt and grime. Special attention must be given to water proofing membranes and tile adhesives. These must be suitable for the intended application and compatible with other materials they are used in conjunction with.



# 9 Product information

## 9.1 GENERAL

Villaboard Lining is a cellulose fibre reinforced cement building product. The basic composition is Portland cement, ground sand, cellulose fibre and water.

Villaboard Lining is manufactured to AS/NZS 2908.2 'Cellulose-Cement Products Part 2: Flat Sheets' (ISO 8336 'Fibre Cement Flat Sheets').

Villaboard Lining is classified Category 3, Type B in accordance with AS/NZS 2908.2.

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

## 9.2 PRODUCT MASS

Based on equilibrium moisture content the approximate mass of Villaboard Lining is:

- 6mm thick — 8.3kg/m<sup>2</sup>
- 9mm thick — 12.4kg/m<sup>2</sup>

## 9.3 DURABILITY Resistance to Moisture/Rotting

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

- Water permeability (Clause 8.2.2)
- Warm water (Clause 8.2.4)
- Heat rain (Clause 6.5)
- Soak dry (Clause 8.2.5)

## 9.4 FIRE PROPERTIES

Maximum service temperature for the Villaboard Lining is 60°C.

Villaboard Lining sheet has been tested for heat release rate as per AS/NZS 3837 and the product has a Heat Release Rate below 50 kw/m<sup>2</sup>.

Villaboard Lining has a 'Group Number' classification of 1-S as per the requirements of clause C of the NZBC.

# Product Warranty



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

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

## CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

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

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested the performance of the Villaboard™ Lining when installed in accordance with the Villaboard™ Lining installation manual, 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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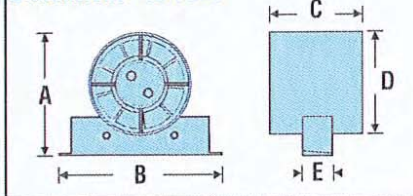
# Technical Data

## IN-LINE FANS - ID Fan Models

### DIMENSION INFORMATION

Models	A	B	C	D	E
ID100	130	155	90	100	27
ID125	150	155	99	118	27
ECO150 (white)	187	153	109	150	27
ID150	187	153	109	150	27
ID230 (square model)	286	286	155	230	-

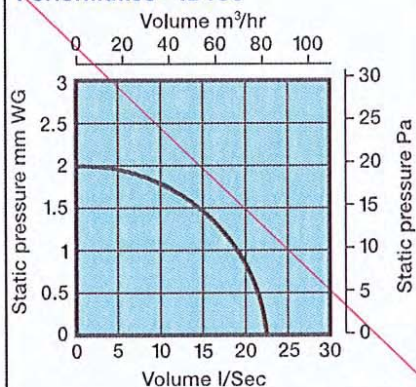
Dimensions - ID Fans



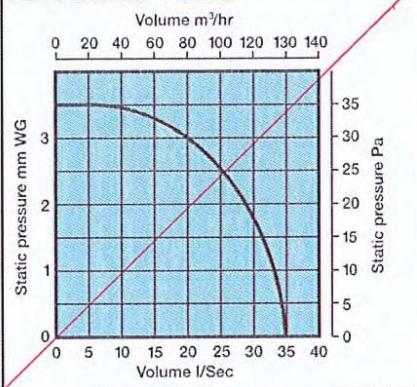
### TECHNICAL SPECIFICATION

Models	ID100	ID125	ECO150	ID150	ID230
Power	220 - 240V	220 - 240V	220 - 240V	220 - 240V	220 - 240V
Fan Performance	23l/s, 85m <sup>3</sup> /hr	36l/s, 130m <sup>3</sup> /hr	64l/s, 230m <sup>3</sup> /hr	87l/s, 313m <sup>3</sup> /hr	152l/s, 550m <sup>3</sup> /hr
Fan Wattage	20W	25W	25W	25W	80W
Maximum Pressure	20Pa	35Pa	50Pa	60Pa	50Pa
Fan Speed	2400 rpm	2000 rpm	2400 rpm	2400 rpm	1250rpm
Sound Level	41 dB(A)	41 dB(A)	40 dB(A)	40 dB(A)	50dB(A)
Max. Operating Temp	40°C	40°C	40°C	40°C	40°C
IP Rating	IPX4	IPX4	IPX4	IPX4	IPX4

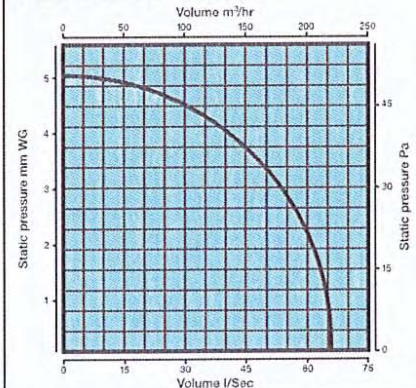
Performance - ID100



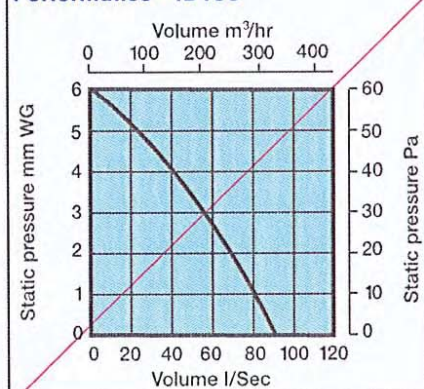
Performance - ID125



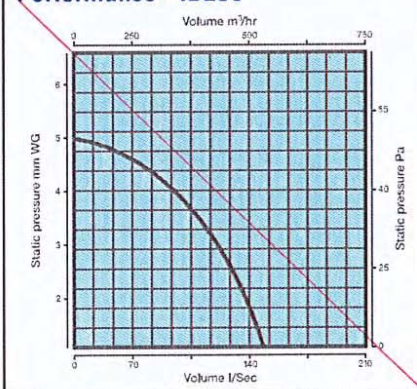
Performance - ECO150



Performance - ID150



Performance - ID230



Note: PERFORMANCE - ID Fans maximum fan performance stated, this can vary depending on the length of ducting used.





# Dektite Premium

the versatile solution

Most extensive range of Dektites for flashing penetrations 0 – 510mm, available in black and grey EPDM and silicone red for high temperatures.

Designed to enable practically any pipe flashing operation to be carried out within minutes, simple to install and very effective.

The low profile cone not only looks good but provides a generous internal clearance, so even the steepest roofs are handled with ease.

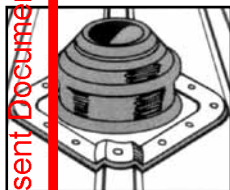
Suitable for flashing pipes that penetrate wall claddings.

Can also be used to flash square penetrations. Just add 30% to the pipe diameter and trim the cone to suit.

- ✓ EPDM withstands temperatures from -50°C to 115°C and up to 150°C intermittently.
- ✓ Silicone withstands temperatures from -60°C to 200°C and up to 250°C intermittently.

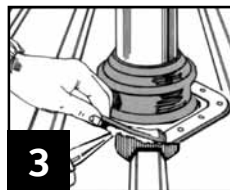


## Installation Instructions:



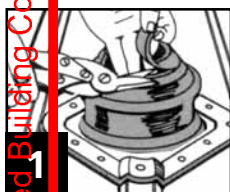
### NOTE:

For more effective drainage, always fit the Dektite on the diamond or bias.  
Dektites are suitable for flashing pipes that penetrate wall claddings.

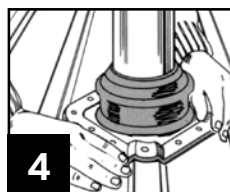


Apply a neutral-cure silicone sealant by turning back the flexible flange. The following silicones have been trialled and provided a suitable bond:

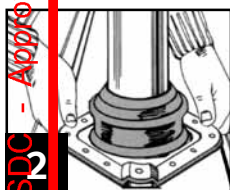
- OCI Roof & Gutter N-192
- Selleys roof & Gutter
- Bostik Findley Roof & Gutter
- Dow Corning 791
- Sikasil AP Multi Purpose



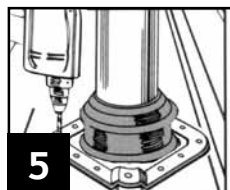
Cut a neat hole in roofing sheet with minimum clearance for pipe and insert pipe through hole. Trim the cone to suit pipe size using sharp tin snips. Where required, support cut sections of sheet with additional framing.



Press base to the roof profile by hand, smooth out any awkward creases. Don't fully extend to allow for vibration.



Slide Dektite flashing down over pipe. Lubricating the pipe with water allows the pipe to slide snugly into position.



Fasten using self-drilling washed screws or sealed rivets. Fit fasteners progressively outward in opposing pairs to avoid gaps.

# Dektite Premium

## the versatile solution

Code:	Code:	Code:	Base (mm)	Pipe (mm)	Pitch
Black EPDM	Grey EPDM	Red Silicone			
DFE100MB			71 x 71	0-20	0-60
DFE100B	DFE100G		100 x 100	0-35	0-60
DFE100BS		DFE200RES	100 x 100	0-35	0-60
DFE101B	DFE101G		139 x 139	5-55	0-45
DFE101BS		DFE201RES	139 x 139	5-55	0-45
DFE102BA	DFE102GA	DFE202REA	181 x 181	50-70	0-45
DFE103B	DFE103G	DFE203RE	218 x 218	5-127	0-45
DFE104B	DFE104G	DFE204RE	279 x 279	75-175	0-45
DFE105B	DFE105G	DFE205RE	309 x 309	100-200	0-45
DFE106B	DFE106G	DFE206RE	363 x 363	125-230	0-45
DFE107B	DFE107G	DFE207RE	456 x 456	150-300	0-45
DFE108B	DFE108G	DFE208RE	495 x 495	170-355	0-45
DFE109B	DFE109G	DFE209RE	680 x 680	230-508	0-45



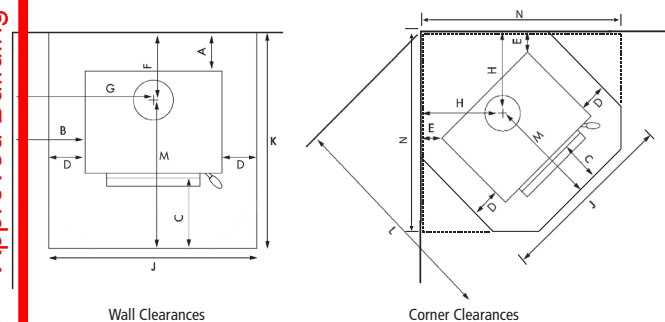
### FEATURES

- Clean air approved mid-size radiant wood fire
- Heat is emitted directly and warms all objects in its path before heating the air
- Ideal for draughty homes or higher ceilings
- Traditional matt black design, 6mm steel
- Vermiculite brick lined firebox
- Multi-burn firebox helps glass remain clear
- Convenient dry wood storage using open base design
- Steel plate top for cooking use

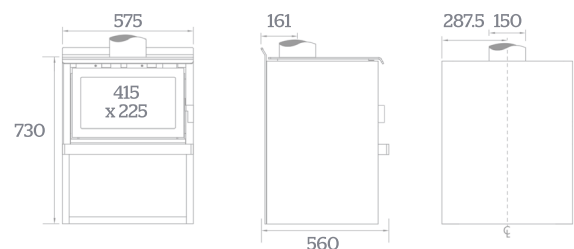
### SPECIFICATIONS

- Estimated maximum heat output: 18kW
- Heats area up to 210m<sup>2</sup> (typically up to four standard rooms)
- Average emission rate: 0.98g/kg
- Overall average efficiency: 66%
- ECAN Authorisation No. 144662
- Rural airslide available (KWF299-7128)

### INSTALLATION CLEARANCES



### DIMENSIONS (MM)



### RECOMMENDED FLUE KITS

Standard	KWF298-7005
Energy Saver	KWF298-7006

Flue kits are tested to AS/NZS2918 Appendix F report no. 02/649.







# INSTALLATION & OPERATING INSTRUCTIONS

## Clean Air Freestanding Wood Fires

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### GENERAL INFORMATION

1. This Kent freestanding wood fire must be installed by an approved installer, ideally registered with the New Zealand Home Heating Association. Do not allow any makeshift or compromising installation methods as this could result in a house fire. This Kent freestanding wood fire must be installed according to these instructions.
2. A Building Consent from the Local Authority must be obtained before installing this wood fire, and we suggest that the Insurance Company covering building insurance be advised of the installation.
3. This Kent freestanding wood fire, when installed according to these instructions, complies with the provisions of AS/NZS 2918-2001 "Installation of Domestic Solid Fuel Burning Appliances".
4. The clearances given in these instructions are necessary to prevent overheating of nearby combustibles and drying out of the house structure. They may not be reduced without authorisation.
5. Important: Read all instructions carefully before starting installation. Failure to follow these instructions could result in a fire hazard, and may void warranty.

### RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

**Important: the installer or seller must leave these instructions with the purchaser**



## SPECIFICATIONS

Model	Model No.	External fire dimensions (mm)			Performance		ECAN NO *
		Width	Depth	Height	Average emissions	Average efficiency	
Cardrona	KWF295-6960	535	490	648	0.80g/kg	69%	165498
Oxford	KWF295-6961	535	490	648	0.80g/kg	69%	165500
Benmore	KWF295-6962	535	490	648	0.80g/kg	69%	165499
Haast	KWF295-6950	575	560	730	0.98g/kg	66%	144660
Murchison	KWF295-6952	575	560	730	0.98g/kg	66%	144662
Aspiring	KWF295-6951	575	560	730	0.98g/kg	66%	144661
Ruapehu	KWF295-6965	760	588	718	0.54g/kg	66%	191312

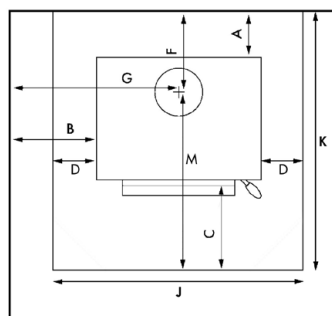
\* ECAN NO = Environment Canterbury authorisation number.

TABLE 1

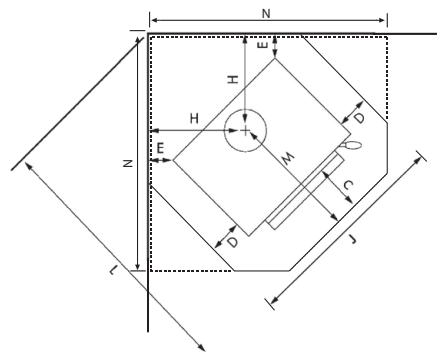
## RECOMMENDED FLUE KITS FOR KENT FREE STANDING WOOD FIRES

Description	Model No.	
Standard - 4.2m	KWF298-7005	Tested to AS/NZS 2918, Appendix F, ARS report No;02/649
Energy Saver - 4.2m	KWF298-7006	Tested to AS/NZS 2918, Appendix F, ARS report No;02/649
Sloping Ceiling - 4.2m	KWF298-7354	Tested to AS/NZS 2918, Appendix F, ARS report No;14/2718

## MINIMUM INSTALLATION CLEARANCES



Wall Clearances



Corner Clearances

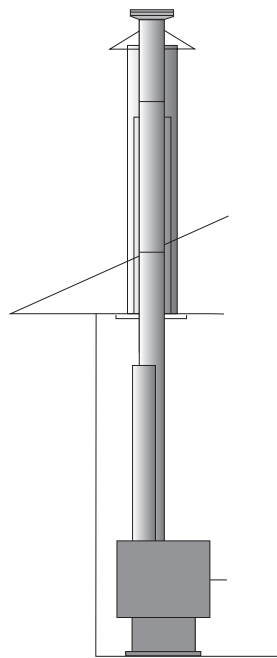
FIG. 1

Model	Model No.	Minimum Installation Clearances (with flue shield) mm								Hearth Clearances (mm)				
		A	B	C*	D	E	F	G	H	J	K	L	M	N
Cardrona	KWF295-6960	135	350	300	130	120	270	610	395	795	855	1140	585	1000
Oxford	KWF295-6961	135	350	300	130	120	270	610	395	795	855	1140	585	1000
Benmore	KWF295-6962	135	350	300	130	120	270	610	395	795	855	1140	585	1000
Haast	KWF295-6950	160	360	300	130	190	320	645	500	835	960	1340	640	1160
Murchison	KWF295-6952	160	360	300	130	190	320	645	500	835	960	1340	640	1160
Aspiring	KWF295-6951	160	360	300	130	190	320	645	500	835	960	1340	640	1160
Ruapehu	KWF295-6965	150	200	300	100	170	315	580	540	960	913	1375	640	1180

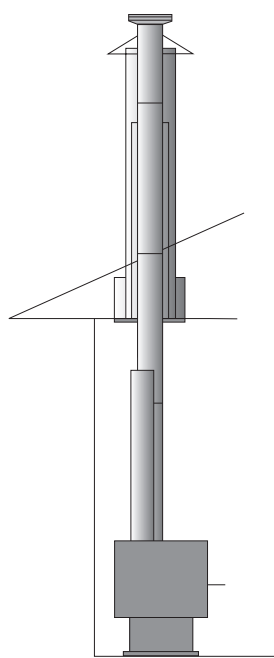
\* Fuel loading opening to end of floor protector.

TABLE 2

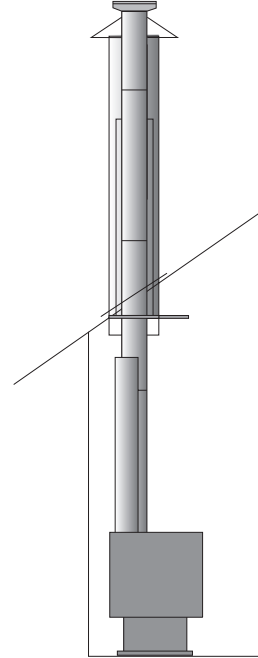
## Single story flue installation options (side elevation)



KWF298-7005



KWF298-7006



KWF298-7354

Model No.	Description
KWF298-7005	Kent standard flue kit 4.2m
KWF298-7006	Kent energy saver flue kit 4.2m
KWF298-7354	Kent sloping ceiling flue kit 4.2m

## Extra flue components available

Model No.	Description
KWF298-6033	Kent single length stainless steel flue 150 x 1200mm
KWF298-6022	Kent stainless steel flue reflector
KWF298-6029	Kent stainless steel flue twin pack 150mm
KWF298-6049	Kent black stainless steel flue twin pack 150 x 1200mm
KWF298-6051	Kent floor penetration 200/250mm diameter
KWF298-6053	Kent 360 degree flue pipe guard
KWF298-6328	Kent stainless steel hat and cowl
KWF298-6614	Kent extension flue 150-200-250 - 1200mm
KWF298-7025	Kent galvanised flue 200 x 1200mm
KWF298-7026	Kent galvanised flue 250 x 1200mm
KWF298-7351	Kent black flue 150 x 1200mm

# FREESTANDING WOOD FIRE INSTALLATION

To adequately install a Kent freestanding wood fire the following items are required: an assembled wood fire, a floor protector, a flue system and a suitable flashing system for flashing the roof penetration.

An insulating floor protector is not required for the Kent freestanding wood fire, but a single layer ash floor protector of non-combustible material must be used. The floor protector must extend under the appliance and not less than 300mm in front of the fuel-loading and ash removal openings. The width of the floor protector shall not be less than the width of the appliance and shall extend not less than 200mm from each side of any ash removal or fuel-loading openings.

Select a location for the wood fire, considering the minimum clearances required (Refer Fig.1, table 2, ).

Place the wood fire into the desired position and plumb for the ceiling and roof penetrations. Allow for 150mm diameter flue pipe, 200mm diameter inner casing and 250mm outer casing. Check the proposed route of the flue to ensure it is clear of roof trusses and rafters in the ceiling space or other obstructions. It may be necessary to move the location of the wood fire to ensure this.

Once the location is confirmed, the wood fire must be restrained against movement due to earthquakes. The Kent freestanding wood fire is restrained by fixing the wood fire to the floor with two bolts of 6mm minimum diameter through the holes provided in the plinth base, through the floor protector and floor. For solid concrete floors, use 8mm DYNABOLTS® or similar, with a minimum depth of engagement into the floor of 50mm.

## STANDARD FLUE INSTALLATION

Cut a 260mm square hole for the passage of the flue and casings through the ceiling. Trim timber as necessary and reframe to fix 250mm outer flue casing at ceiling height.

Extend plumb line up to roof and cut a hole for the passage of the 250mm flue casing to pass out through the roof.

Position starter section of 250mm Ø galv flue casing with swaged end up and bottom flush with the underside of the ceiling. Fix in position with adequate screws fitted from inside the flue through to the framing of the 260mm square opening in the ceiling at the 4 intersecting points. Back off each screw 5mm so each fixing point has a 5mm gap between 250mm Ø flue casing and 260mm timber framed hole.

Start with the black sections of s/s flue. Join the required number of 150mmØ flue pipes together by inserting the swaged end of the upper piece into the plain end of the lower piece so the flue will terminate in the desired position (See Fig.2). Drill and fix each length with 3 stainless steel rivets or self-tapping screws. It is important that each flue joint is sealed with commercially available flue sealing compound, including the join between fire and first section of flue pipe.

Before fitting the flue to the fire, place the ceiling plate over fire spigot ensuring it is the right way up.

The 150mm Ø s/s flue sections can either be lowered from the top fully assembled onto the fire, or fed up from the bottom a length at a time ensuring all joints are sealed and fixed properly.

Slide the 200mm Ø inner casing/s into place crimped end up, between the outer casing and the 150mm Ø flue pipes. Slide down so the bottom flue spacer of the 200mm Ø section sits on the crimped seat of the 250mm Ø starter flue casing. Extend the 200mm Ø flue casing/s up until it is through the roof and between 200mm and 600mm from the top of the 150mm Ø flue that is finished in the desired position. Trim flues as required.

Extend up 250 Ø outer casing/s as required noting that the slip section supplied with the standard flue kit is the last casing to be added this section is adjustable slide in position and secure so the top of this section is 180mm below the top of the 150 Ø flue.

Fit a suitable flashing over the flue and roof penetration hole to flash the outer casing to the roof. Seal and fix flashing to roof and outer casing with an appropriate waterproof seal.

Place the top flue spacer bracket in position and tighten. Slide weather cowl over flue pipe until it sits firmly on spacer bracket. Fit the rain hat cowl. NOTE: it must be removable for cleaning.

Where the flue terminates more than one full section above the roof penetration, it must be restrained with guy wires or bracing support bars for stability in high wind conditions.

NOTE: The flue pipe shall extend not less than 4.6m above the top of the floor protector.

The flue cowl must be at least 0.6m above the highest point of the roof, if within 3 metres of the ridge. The flue cowl must be at least 1m above the roof penetration if more than 3 metres from the ridge (Refer Fig. 2).

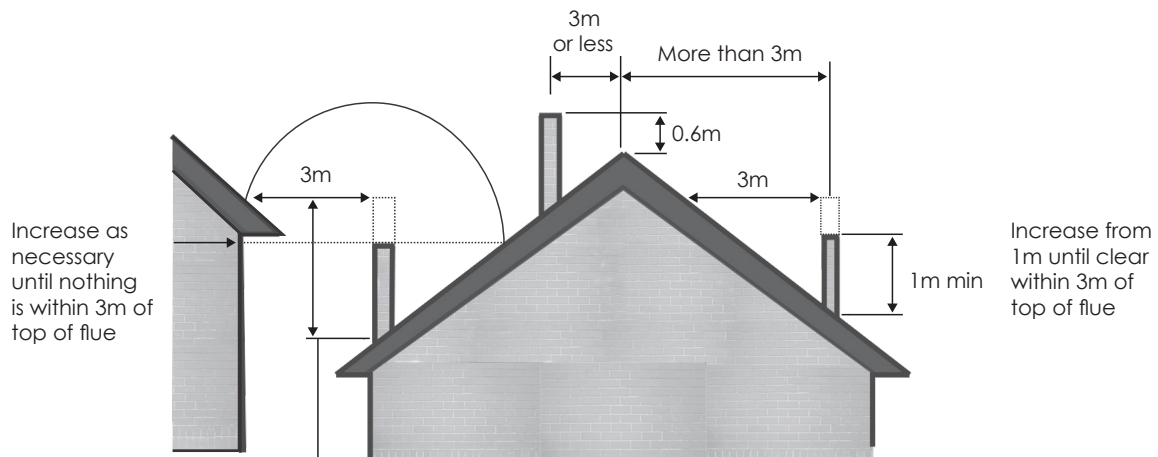


FIG. 2

No part of a building, or any adjacent object, may be above flue in a circular area of 3 metres from the flue exit.

These heights are given as a minimum, and in actual practice the presence of surrounding structures, trees, fences, etc. may necessitate additional flue height for satisfactory performance.

**FOR MORE INFORMATION, REFER TO THE INSTALLATION INSTRUCTIONS INCLUDED WITH THE FLUE KIT.**

**Before the wood fire is used, ensure that a Compliance Certificate (supplied by a Registered Installer and/or Territorial Authority Inspector) is obtained for the user. We encourage initial demonstrations on how to light and operate the fire to ensure the user can confidently operate the fire for safe and efficient performance.**

## DOOR HANDLE AND DOOR

The door handle is pre-fitted and should not require any adjustment on assembly of the fire.

To ensure the door is shutting correctly cut a plain piece of paper about 50mm wide and place between the open door and the door frame. Close the door and try to pull the piece of paper out. If the paper can be freely pulled out, the door will need to be adjusted so when the door and handle is in the locked closed position pressure is applied to the paper strip ensuring the door is sealed correctly.

If the handle has too much sideways movement the back nut on the hinge screw will need to be released. Tighten the hinge screw with an Allen key until the desired movement is achieved (not too tight, not too loose), then re-tighten the back nut to hold screw in position.

Any adjustment required to maintain the correct fit of the door is made at the door catch pin on the right side of the door lip. To adjust the fit of the door catch, loosen the lock nut and turn the catch pin to loosen or tighten the fit. Re-tighten the lock nut (Refer Fig.3).

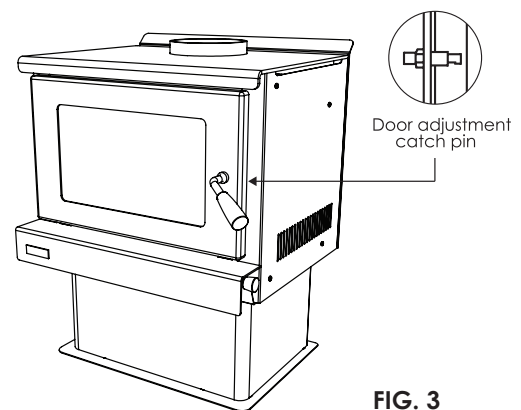


FIG. 3

## TOPOGRAPHY OF THE LAND

Given that the topography of the land and atmospheric conditions vary considerably from house to house, it is possible for a wood fire flue to comply with the minimum requirements set out in Fig.2 but still fail to extend upward far enough to establish ambient updraft. It is not uncommon for fireplaces in houses that are surrounded by hills or trees, or that are located by large bodies of water to need more flue height than the minimum required by code.

## WIND CONDITIONS

Wind causes pressure changes inside as well as outside a house. The design of the house can influence the pressure environment around and in your home, the effect of wind on the home can be complex and unpredictable. Care needs to be taken to ensure the flue termination is in a good clear position. Your installer should be able to give advice on the best flue termination position for your situation. Problems associated with wind noise or draft are almost never caused by the wood fire itself and in general a flue that penetrates the roof near the peak and is more than 600mm above the ridge is unlikely to be affected by wind.

## PRESSURE DIFFERENTIAL, VENTING AND EXTERNAL AIR INTO THE BUILDING

Negative house pressure is a common problem that can cause wood burning appliances to have trouble lighting and performance issues, in some cases causing smoke to be spilled back into the room. Kitchen and bathroom exhaust fans air-conditioning units, and well-sealed, insulated homes are more likely to have a negative pressure problem. Larger homes with multiple levels are also likely candidates, however any house can have a negative pressure problem. Care needs to be taken at the design or installation stage to ensure the building has adequate ventilation to ensure draft in the flue system is always to the outside.

# OPERATION

Thank you for purchasing a Kent wood fire. Used and maintained correctly, it will provide you with many years of warmth in your home. Kent wood fires have been the main source of heating for many Kiwi homes, for over 40 years.

**Please ensure your installer completes and signs the warranty registration card in this booklet. We encourage you to read the warranty conditions and draw your attention to improper fuel use.**

## FIREWOOD

Modern clean burning wood fires are designed to burn seasoned dry natural soft wood only, such as pine.

The moisture content of the wood affects the performance of your wood fire greatly. The most important thing you can do to operate your wood fire correctly is to use the correct seasoned dry wood. All types of seasoned natural wood will burn in your wood fire, but your wood fire is tuned to burn seasoned clean, dry soft woods.

Fossil fuels such as coal are not suitable. Do not burn garbage or large quantities of paper, cardboard or similar materials. Do not use chemically impregnated timber, reclaimed wood from wet environments and do not use drift wood. These corrode the components of the wood fire and flue systems reducing the life of your wood fire.

**Important:** Kent freestanding wood fires with a wood box are designed for temporary wood storage only. Store your "ready-to-use" firewood away from the wood fire while in use. If firewood is placed near or under the wood fire it must be there for reloading use only, and be rotated through often to stop the firewood becoming tinder dry and a potential fire safety hazard.

**Handy Hint:** When preparing firewood for use, store it in an open shed exposed to wind. If stored in an enclosed garage or shed it will take longer to dry out.

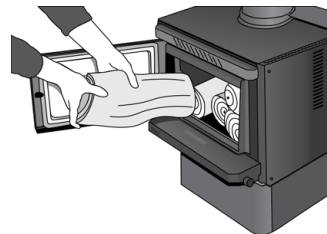
## **DO NOT BURN TREATED TIMBER**

## **DO NOT BURN WET OR UNSEASONED WOOD**

### **LIGHTING**

On initial light up, the presence of smoke may be noticed. This is normal and will dissipate quickly. **DO NOT BURN YOUR WOOD FIRE TOO QUICKLY TO BEGIN WITH.** Allow several small fires to build up a layer of ash in the wood fire, and cure the paint before using maximum power. 1. Adjust the air control knob, until it is fully open.

2. Place several pieces of crumpled newspaper in the base of the firebox, and criss-cross with 8-10 pieces of dry split kindling. Stack several pieces of dry split firewood no greater than 30cm in length on top of the kindling.
3. Ignite the paper and leave the door slightly ajar (resting it on the latch). Let the fire establish itself for 4-5 minutes, then open the door and add some more pieces of wood. Do not leave the fire unattended during this process.
4. Close the door fully, but leave the air control fully open until the wood is well alight and burning brightly.



**Note:** It may be necessary in some cases to leave the door ajar for longer periods and use more small kindling in order to establish enough heat to warm up the flue. Only when the flue is sufficiently warm to create the necessary draft to maintain the fire may the door be fully closed. It may take trial and error to find a lighting procedure that suits your situation.

### **NORMAL OPERATION ONCE THE FIRE IS ESTABLISHED**

The Kent wood fire requires fresh air for optimal burning, and this must come from outside the house. A normal house will allow enough air in through incidental openings to satisfy this. We recommend that a source of air be located near the wood fire for best performance. This can be simply a window that is left ajar while the wood fire is in use. If this is not possible, and the house is particularly air-tight, a vent may need to be installed next to the wood fire to provide the air required. Lack of air will lead to a wood fire that is hard to light and get going, or in bad cases, to smoke spilling back into the room.

While an air control is fitted, it is recommended that, for the cleanest operation, this is left fully open and the amount of heat generated is adjusted by the amount of fuel that is used. The heater burns cleanest when it is running at a high rate.

Once the fire is well established, the output can be regulated by the amount of wood that is used.

To reload the fire, open the air control fully, and then open the door. Note that the fire burns hottest at the front of the firebox and so there may be unburnt wood at the back when it comes time to reload. This is normal. Rake through the contents to move any unburnt wood forward and then place the desired amount of wood into the firebox. Close the door.

The view of the flame through the glass door will give you the best indication of how your wood fire is performing. In order to accomplish maximum combustion performance, the fire should give a rolling, boiling flame pattern. At reduced setting the flame will be slower.

For all practical purposes, the air control should be fully open when there is unburnt wood in the wood fire. Fire holding periods may be increased by turning down the air control, this is at the cost of greater emissions and creosote production. At low settings, creosote may condense on the glass, reducing the visibility of the fire. The best indication that the fire is operating correctly is that the glass remains clean, without build-up of black or brown deposits. Some whitish bloom on the glass is normal and does not generally indicate a fault in operation.

The way you burn your wood fire will also determine what is happening up the flue. Continued burning at high rates with a good clean flame will minimise soot and creosote deposits in the flue.



## FOR FIRST FIRE

All Kent wood fires are finished in a high temperature quality stove paint. The paint has not been fully cured until it has been heated. If the fire is run too hot, too fast, the paint will burn off before it has had a chance to fully bond to the steel. When the fire is first used, it should be run on "low" for the first 4 hours to allow the paint time to fully cure.

## CLEANING OUT THE WOOD FIRE

Your wood fire should require minimum cleaning. If the wood fire is operated correctly, and according to the instructions most of the ash will be consumed by the fire and a bed of ash will be maintained that does not build up to any great extent.

If you find that you have to clean out ashes every day or so, it indicates that the wood fire is not being operated correctly. Either excessively wet wood, unseasoned wood or foreign materials are being burnt, or the air control is being turned down too much.

Don't clean out the firebox completely during the heating season. Leave about 25mm of ash in the bottom of the firebox after cleaning. These ashes in the bottom of the wood fire assist the burning process, by insulating the firebox and allowing air circulation under the fire bed.

When emptying ashes use a metal container with a tight fitting lid. Do not use this container for any other purpose. The closed container of ashes should immediately be taken outdoors to a location well away from any combustible materials, pending final disposal. If the ashes are to be disposed of by burial in the garden or otherwise locally dispersed, they should be retained in the container until they are completely extinguished and cold. This may take several days.

## CREOSOTE FORMATION AND NEED FOR REMOVAL

We recommend the flue of your wood fire is inspected before use at the start of each heating season and also periodically during the season. When you are able to operate the wood fire without creating creosote deposits, the interval between inspections may be increased, but the flue must always be inspected and cleaned at least once a year.

The flue should be swept by a professional chimney sweep to remove any build-up of creosote and soot. A professional sweep should also advise of any problems that may be detected in the inspection of the flue and offer advice on any repair and replacements. Your Kent wood fire requires minimal maintenance, and will keep its good looks for a long time with just a little attention.

## RUST

Your Kent wood fire is manufactured using steel components. Due to the extreme operating temperatures and inconsistent fuel that wood fires are subjected to, a small amount of rusting over time on the inside of the fire box is normal. Without adequate care it is realistic to expect that the steel fire box and internal components will show signs of corrosion.

All steel, including stainless steel requires a level of care and protection to retain its appearance. No steel is immune to corrosion and neither is it maintenance free.

If your fire box and internal components are showing signs of more than a small amount of surface rust, and a water leak can be eliminated, moisture in the fire box can only be due to the environment the fire is installed in, and or, through the fuel that is being used.

Seasoned wood is a very vague term as it depends on how the wood has been kept and stored since it was felled. Just because a log was felled 2 years ago, does not mean that it is seasoned enough to be considered "good wood" and suitable fire wood.

Visual inspection takes a lot of experience to tell if a piece of wood is sufficiently seasoned and dry enough to be "good wood". Wet or unseasoned wood is not good for heat output as it produces more smoke. The moisture released from wet wood combined with the smoke is in most cases corrosive.

Purchasing a moisture meter is an inexpensive way to test how dry your wood is. Always test a new load of fire wood to gauge if it is "good wood". This will help determine how your fire wood needs to be handled - use now, to be aired or stored for next season.

The exterior surfaces of the wood fire should be cleaned when needed with a damp cloth and non-abrasive cleaner. Use of caustic or abrasive cleaners will damage the finish on the wood fire. If, due to continued burning at low temperature, the door glass is dirty, use a paper towel moistened with water and dipped in the cold ashes from the fire to lightly scrub the inside of the glass. Remember that a properly operated wood fire will keep the glass clean by itself.

The door hinges, door handle spindle and air slide mechanism should be lubricated periodically with a suitable high temperature grease. Do not use too much as this can melt and drop down onto the hearth staining it.

All Kent wood fires are finished in high temperature paint. If marks and scratches occur, or the paint is damaged by over firing or aggressive cleaning agents the appliance can easily be touched up by using stove paint. Any rust or other stubborn marks that may appear can be cleaned up and removed with the help of a steel wool pad and hot soapy water, then repainted if necessary. Touch up paint is available from your Kent retailer. Any unprotected steel surface left exposed in an environment where moisture may sit on it for extended periods will require cleaning and care to maintain a quality appearance. Without adequate care it is realistic to expect that steel may show signs of corrosion.

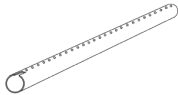
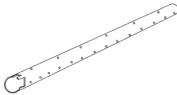
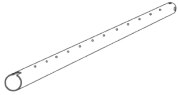
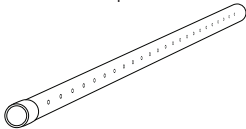

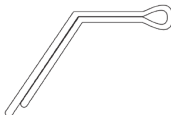
If the fire is not in use for extended periods and you want to protect the surface of your fire, sparingly wipe some extra virgin cooking oil onto the steel with the aid of a paper towel or rag. Buff off with a clean rag or new paper towel until no residue is left. This will protect the steel and make it easier to clean in the future (do not apply any oil to the flue pipes). Only clean flue pipes with fresh clean water and a damp cloth, or dust with a dry clean cloth.

[illegible]

# REPLACEMENT PARTS

Replacement parts must be original Kent parts. Maintenance required should be carried out by qualified service people. Please consult your Kent retailer for their details. The wood fire should not be modified in any way except in accordance with instructions supplied by Kent.

## KENT AIR TUBES

<p>Cardrona, Oxford &amp; Benmore</p>  <p>KWF299-6903</p>	<p>Haast, Aspiring, Murchison &amp; Forbes</p> <div><p>Top front KWF299-6905</p><p>Top rear KWF299-6906</p></div>	
<p>Ruapehu</p>  <p>KWF299-7235</p>	<p>All Fires</p>  <p>Air Tube Spacer KWF299-6257</p>	<p>All Fires</p>  <p>Air Tube Pin KWF299-6900</p>

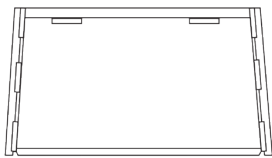
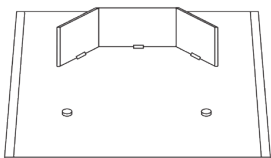
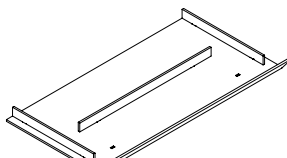
The air tube in your Kent wood fire is an important part of the appliance and helps ensure a clean, efficient and controllable burn. However, air tubes are a consumable item and are designed to be replaced as they are likely to degrade with use due to the exposure to the extreme heat of the fire.

The life of the air tube will depend on what is burnt in the fire, how hot the fire usually burns and also the ash level. If the ash level is allowed to build up means hot embers are in closer proximity to the tube, increasing the temperature exposure. Keep ember levels to the recommended maximum height of 3cm below air tubes.

### Replacing air tubes:

1. Remove bricks from both sides
2. Remove the pin from the end of the old tube
3. Slide tube to one side; this will release the opposite end
4. Pull released end up and towards the door and remove
5. Reverse process for new tube

## KENT BAFFLES

<p>Cardrona, Oxford &amp; Benmore</p>  <p>Dimensions (mm): 400 x 208 KWF299-6190</p>	<p>Haast, Aspiring, Murchison &amp; Forbes</p>  <p>Includes Promat bricks Dimensions (mm): 480 x 200 KWF299-7043</p>	<p>Ruapehu</p>  <p>Dimensions (mm): 640 x 340 KWF299-7233</p>
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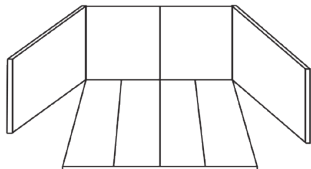

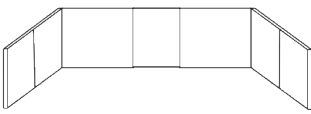
The baffle in your Kent wood fire is an important part of the appliance and helps ensure a clean, efficient and controllable burn. However, baffles are a consumable item and are designed to be replaced as they are likely to degrade with use due to the exposure to the extreme heat of the fire.

The life of the baffle will depend on what is burnt in the fire and how hot the fire usually burns.

### Replacing baffle:

1. Remove front air tube by pulling locking pin out of air tube spacer slide ring on the left top side. Slide spacer ring to the right and slide air tube horizontally to the left. Right hand side of the air tube will drop out of the keyed side.
2. Swing air tube out through door.
3. Lift baffle plate up off side support rails and pull forward 40mm. Push one side up as high as you can while letting the other side drop over the side support rail.
4. Keep at a 30° angle and remove it through the door.
5. Reverse process to install new baffle. And air tube.
6. Ensure baffle is sitting firm against back.

## KENT FIRE BRICKS

<p>Cardrona, Oxford &amp; Benmore</p>  <p>Dimensions (mm): 4 - 220 x 115 x 28 2 - 221 x 221 x 25 2 - 229 x 220 x 25 KWF299-6123</p>	<p>Haast, Aspiring, Murchison &amp; Forbes</p>  <p>Dimensions (mm): 2 - 240 x 190 x 25 2 - 245 x 177 x 25 KWF299-7089</p>
<p>Ruapehu</p>  <p>Dimensions (mm): 5 - 150 x 160 x 25 2 - 150 x 234 x 25 KWF299-7234</p>	

The fire bricks in your Kent wood fire are an important part of the appliance and helps ensure a clean and efficient burn. However, fire bricks are a consumable item and are designed to be replaced as they are likely to degrade with use due to the exposure to the extreme heat of the fire.

The life of the fire bricks will depend on what is burnt in the fire and how hot the fire usually burns and also any damage sustained from wood not being positioned correctly.

**At the risk of damaging the fire box, fire bricks should be replaced when they are damaged enough that they no longer remain in place and cannot perform their intended function. Fire bricks which are only cracked but still remain in place do not need to be replaced and are safe to use.**

**Note:** For all other fire parts please contact your Kent dealer.

# WARRANTY

Please read this warranty carefully and keep it, and your purchase receipt in a safe place. You must produce the required Kent product warranty registration information and proof of purchase in the event of any warranty repair being required.

## WARRANTY TERMS & CONDITIONS

Kent agrees to replace, or repair as necessary any part of the appliance which is proven at the time of delivery, or within the warranty periods shown below to be defective through faulty materials or workmanship.

This warranty is for normal domestic use. Your Kent wood fire is warranted for up to 15 years, with the exception of the following parts; door glass, door and glass seals, fire bricks, flue, secondary air systems and baffle plates, which all have a 12 month (part only) warranty.

The warranty does not cover damage or failure due to incorrect or faulty installation, misuse, negligence, water damage, burning improper fuel or environmental conditions. Any unauthorised alteration, modification or substitution of any part of this appliance or use of this appliance not in accordance with the instructions supplied, will render this warranty void.

Your Kent wood fire must be installed in accordance with the manufacturers instructions and with the appropriate approved flue system. Installation must comply with applicable standards, regulations and local by-laws. Failure to do so will void any warranty offered in its entirety.

If the appliance needs repair and is installed outside the normal service area (25km) of the nearest authorised service agent the purchaser is responsible for any additional expenses incurred. In the event that an appliance needs to be replaced, the warranty does not extend to any consequential materials required or additional expenses incurred.

In the event of a whistling air tube caused due to environmental circumstances, Aber Living will replace the air tube. The warranty does not extend to related installation, labour or travel costs.

All claims against the warranty must be directed in the first instance to the store of purchase. Any repairs undertaken without the manufacturers authority will invalidate this warranty.

In order to claim on the warranty, you will need to supply; proof of purchase, installation, servicing details and a completed warranty form (below).

Your Kent wood fire warranty is transferable on the sale of the home where the wood fire is installed. Nothing in this warranty is intended to limit any conditions of the warranty right or remedy pursuant to the Consumer Guarantee Act 1993, except to the extent permitted under the Act. Your Kent wood fire is intended for domestic use only and the warranty is not valid for wood fires to be used for business purposes. Kent reserves the right to alter or amend specifications or designs of its product without prior notice.

### KENT 15 YEAR WARRANTY FORM

Please keep this copy for your records.

MODEL:.....

SERIAL NUMBER:.....

RETAILER:.....

PURCHASE DATE:.....

INVOICE NUMBER:.....

(Please keep your invoice attached to your warranty record)

INSTALLER NAME:.....

DATE INSTALLED:.....

NZ HOME HEATING  
ASSOCIATION NUMBER:.....

INSTALLER SIGNATURE:.....



Kent products are distributed by: Aber Holdings Ltd T/A Aber Living, 17 Mainstreet Place, Te Rapa, Hamilton 3200  
Free Phone: 0800 161 161 | Free Fax: 0800 163 163 | [www.aberliving.co.nz](http://www.aberliving.co.nz)

**Rinnai**

# Installation guide

## Rinnai INFINITY A-Series continuous flow water heaters

REU-A2626WG-ZK



REU-A2426WG-ZK



REU-A2024WG-ZK



REU-A1620WG-ZK



**The Rinnai INFINITY A-Series models are not suitable for commercial or solar applications**

## Important

This appliance must be installed in accordance with:

- Manufacturer's installation instructions
- Current AS/NZS 3000, AS/NZS 3500, AS/NZS 5601.1 and G12/AS1

For use with Natural Gas or Universal LPG as indicated on the appliance.

Not suitable as a spa or swimming pool heater.

Not suitable for commercial or solar applications.

Appliance must be installed, commissioned and serviced by an authorised person, being in New Zealand a licensed gasfitter, in accordance with these instructions and all applicable local rules and regulations.

## Warning

Improper installation, adjustment, alteration, service and maintenance can cause property damage, personal injury or loss of life.

For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624).

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[youtube.com/rinnainz](https://youtube.com/rinnainz)  
[facebook.com/rinnainz](https://facebook.com/rinnainz)



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# Before installation

- **Check for damage:** Unpack the appliance and check for damage. DO NOT install any damaged items.
- **Check components and gas type:** Check all components have been supplied and that you have the correct gas type.
- **Read these instructions:** Get an overview of the steps required before starting the installation. Failure to follow these instructions could cause a malfunction of the appliance. This could result in serious injury and property damage.
- **Applicable models:** These instructions apply only to the Rinnai A-Series continuous flow water heater models listed on the cover page of this guide.

## Appliance location

This appliance is designed for outdoor installations only. It MUST BE located above ground in open air with natural ventilation, without stagnant areas, where gas leakage and products of combustion can be rapidly dispersed by wind and natural convection.

The appliance MUST BE mounted on a vertical structure with the water and gas connections on the underside pointing downwards.

Location of the flue terminal MUST BE in accordance with Section 6 and Figure 6.2 of the AS/NZS 5601.

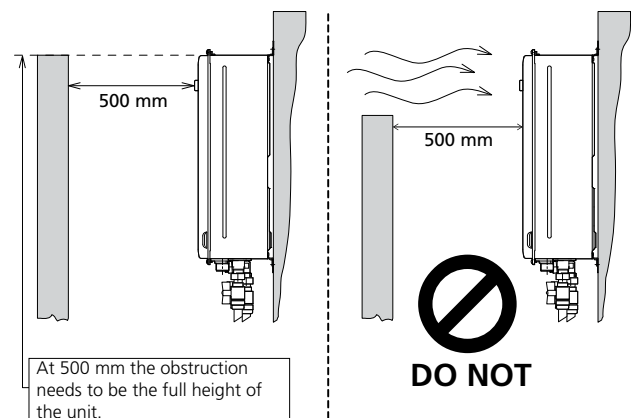
The appliance MUST BE placed **as close as practicable to the most frequently used hot water outlet** or outlets to reduce the delay time for hot water delivery<sup>1</sup>. For installations where the distance between the water heater and the outlets is considerable, a flow and return system can be used to minimise the waiting time for hot water delivery. Alternatively multiple appliances can be strategically placed to serve outlets with minimal delay time.

An AC 230 V, 10 A earthed power point must be provided adjacent<sup>2</sup> to the appliance. This power point must be weatherproof. It must be clear of the gas and water connections to the appliance and also the flue exhaust and water pressure relief valve. The power cord of the appliance is 1.5 m long.

All appliances MUST BE installed to ensure access can be gained without hazard or undue difficulty for maintenance and servicing. Sufficient clearances shall allow access and removal of all serviceable components. Appliances should not be mounted more than 2.5 m above the ground or floor level unless the customer can arrange permanent and safe access, or can provide another means of safe access.

### Horizontal obstructions

AS/NZS 5601 states a minimum horizontal clearance of 500 mm between a building structure and obstruction facing the terminal. At 500 mm the obstruction needs to be the full height of the unit (as shown), and not a partial obstruction. A partial obstruction of less than 1 m could result in wind pushing the flue gases back into the flue terminal.



<sup>1</sup> Rinnai recommend a maximum pipe run of 10 m.

<sup>2</sup> Power point can be within the pipe cover if a pipe cover is installed—must comply with AS/NZS Wiring rules

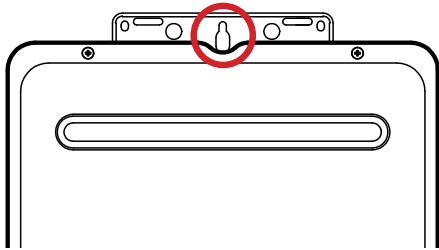
# General installation information

## Securing the Rinnai INFINITY

The wall or structure on which the units are mounted **MUST BE** capable of supporting the weight of the appliance and associated pipe work. Refer p. 7 for the specific model weight.

Ensure that suitable fixing screws or bolts are used to secure the unit to the wall, in accordance with AS/NZS 5601 section 6. Wooden plugs shall not be used.

The top bracket has a keyhole slot so that the appliance can be positioned by hanging it on one screw, once in position the appliance can then be secured with appropriate fittings.



The appliance can be mounted directly against the wall or structure. There is no need to use non-combustible sheeting between the appliance back panel and the wall or structure for the purposes of meeting the temperature hazard requirements of AS/NZS 5601.

## Pipe sizing

If the gas pipe sizing is insufficient the appliance won't perform properly. Gas pipe sizing must consider the gas input into this appliance as well as other gas appliances in the premises. The gas meter and regulator must be specified for this gas rate.

An approved sizing chart such as the one in AS/NZS 5601 should be used. Refer p. 7 for model specific gas consumption details.

Water pipe sizing and layout should be performed in accordance with AS/NZS 3500. All hot water pipe work should be insulated to optimise performance and energy efficiency.

## Water supply

The appliance is intended to be permanently connected to the water mains.

Refer p. 7 for model specific operational water pressure limitations. Approved pressure limiting valves may be required if the maximum rated water supply pressures are exceeded. To achieve the rated flow, the minimum water supply pressures must be met.

The A-Series water heaters will operate at lower pressures than the specifications, but will not achieve the rated flow. Contact Rinnai for gravity fed or low pressure installations.

Water chemistry and impurity limits are detailed in the operation guide within the warranty section. Most metropolitan water supplies fall within the requirements.

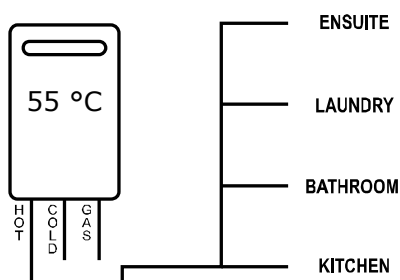
If you are unsure about your local water quality, contact your water authority. If sludge or foreign matter is present in the water supply, a suitable filter or strainer should be incorporated in the water supply to the Rinnai INFINITY.

# Water delivery temperature

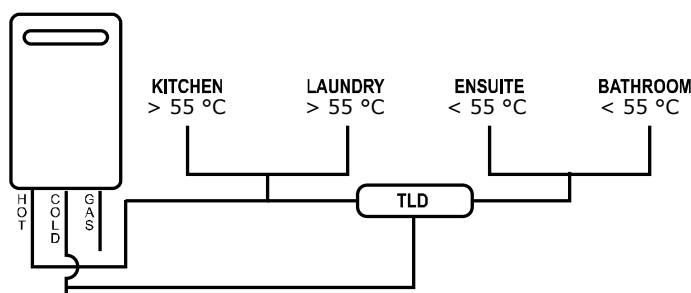
Requirements of AS/NZS 3500 MUST BE considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of these areas may be limited to 55 °C or less.

If the appliance is to deliver water primarily for the purposes of personal hygiene in an early childhood centre, school, nursing home or similar facility as defined in AS/NZS 3500.4, a Temperature Limiting Device (TLD), such as a tempering valve may be required, even if the appliance is set to 55 °C or less. For these types of applications contact Rinnai.

## Requirements for Rinnai INFINITY units installed without controllers



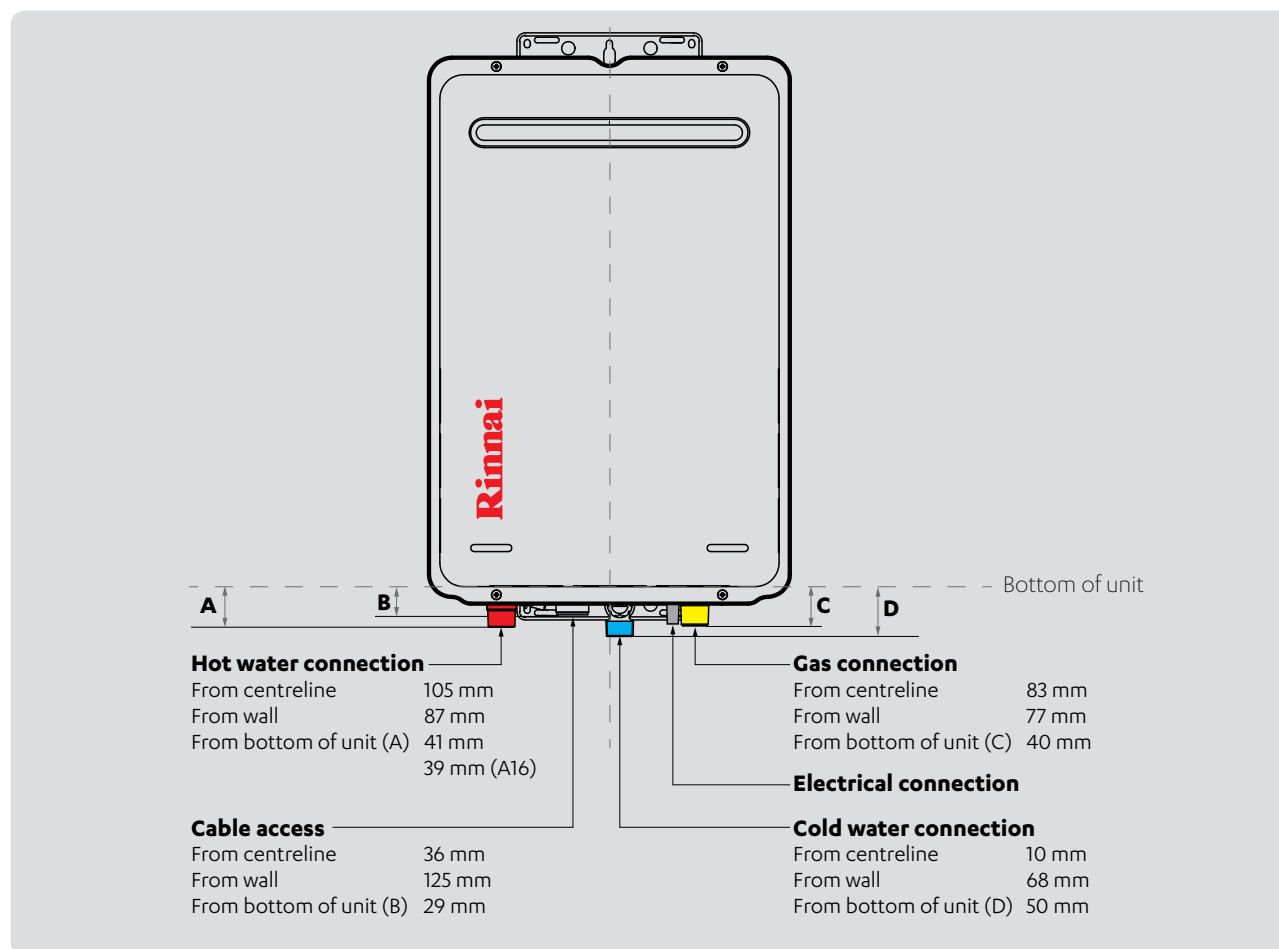
**Diagram 1 - 55 °C Appliance**



**Diagram 2 - Not a 55 °C Appliance**  
(TLD = Temperature Limiting Device)

When the Rinnai INFINITY is set to deliver water at a temperature higher than 55 °C, it will be necessary to fit a Temperature Limiting Device for delivery to areas used for the purposes of personal hygiene.

# Connections and fittings



Model	Gas consumption MJ/h	Water Supply kPa		Weight kg	Fittings		
		Min.	Max.		Hot	Cold	Gas
A16 external REU-A1620WG-ZK	16.3-124	120	1000	13	R $\frac{1}{2}$ (15 mm)	R $\frac{1}{2}$ (15 mm)	R $\frac{3}{4}$ (20 mm)
A20 external REU-A2024WG-ZK	19.9-156	160	1000	14	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)
A24 external REU-A2426WG-ZK	16.3-184	200	1000	15	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)
A26 external REU-A2626WG-ZK	16.3-199	200	1000	15	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)

## Service connection points

An approved full flow isolation valve and disconnection union **MUST BE** fitted to the cold water inlet. A non-return valve is not required unless required by local regulations.

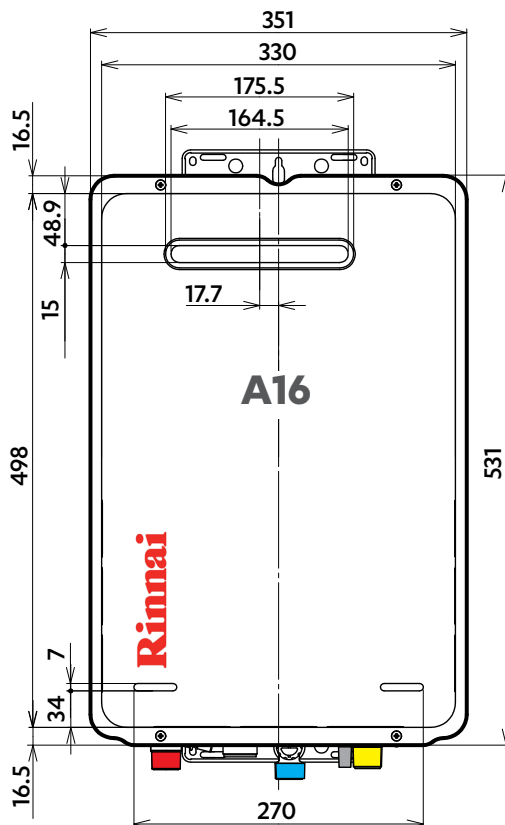
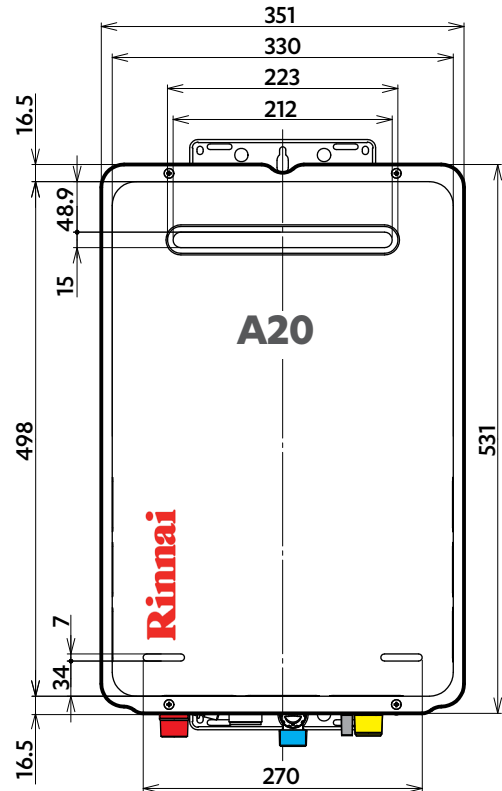
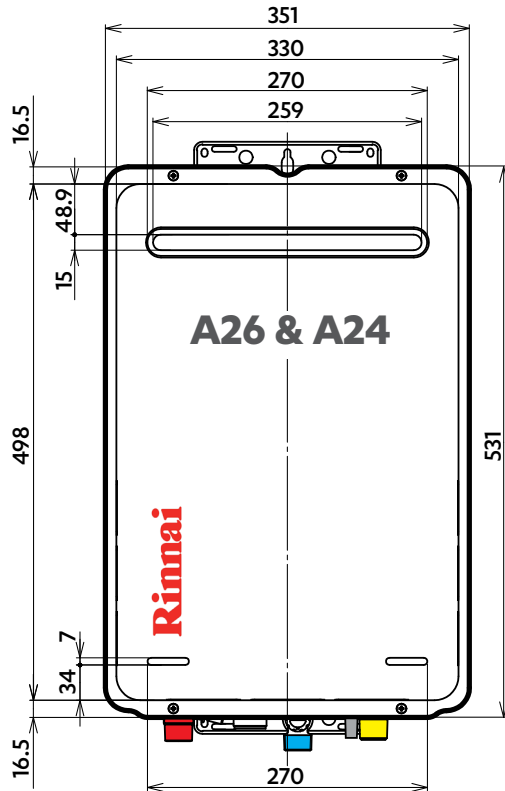
Isolation valves **MUST NOT** be fitted directly to the appliance.

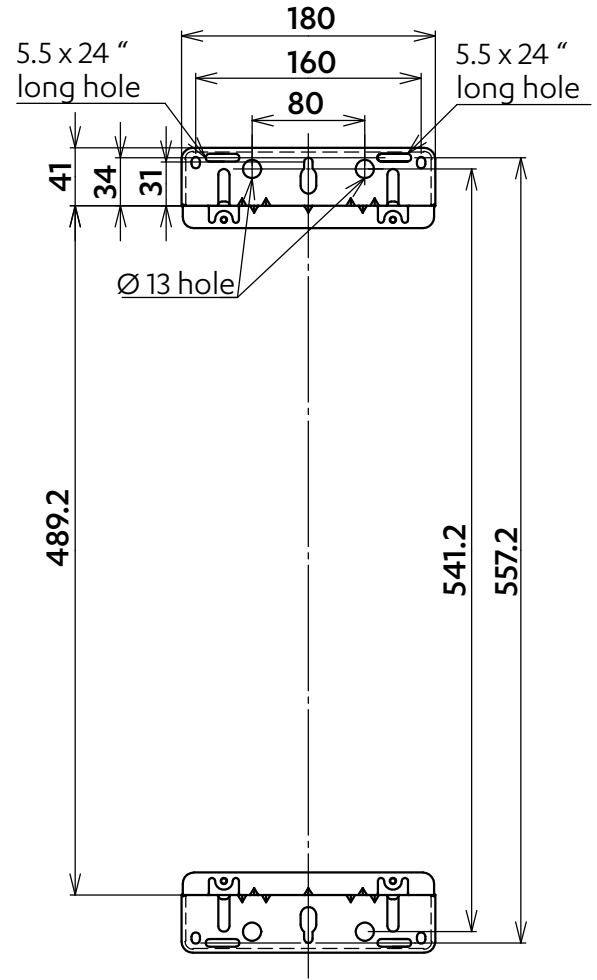
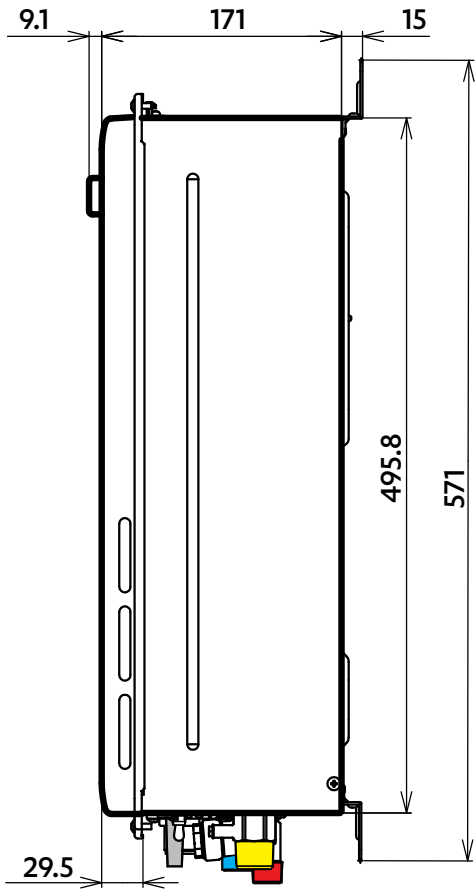
It may be necessary to fit a temperature limiting device for delivery to areas used primarily for the purposes of personal hygiene, refer previous page for 'Water delivery temperature' information.

Purge gas and cold water supply lines to remove air and swarf before final connection. Swarf in the gas or water supplies may cause damage, a common problem, which is not covered by warranty.

## Dimensions (mm)

The basic dimensions, (height, width, and depth) are the same. The difference between the models are the dimensions and position of the flue outlet.







# Commissioning

AS/NZS 5601.1, clauses 2.6.8 and 6.11.2, states that every part of a gas installation shall be commissioned prior to initial use. It is the installer's responsibility to ensure all current AS/NZS 5601 requirements are met. The URL's provided are links to short videos on how key steps are performed.



The appliance operation must be tested after installation. Ensure the building occupants do not have access to the hot water outlets during this procedure.

## Please note

The Rinnai INFINITY A-Series comes with a factory preset outlet temperature of 55 °C. The high and low gas operating pressures are also factory preset. Under normal circumstances the operating pressures do not require adjustment during installation. Make adjustments ONLY if the unit is not operating correctly and all other possible causes for incorrect operation have been eliminated.

Inlet supply pressure to the appliance **MUST BE** checked and set within the operating parameters of the appliance in all instances.

If the appliance can not be adjusted to perform correctly call 0800 RINNAI (0800 746 624) for assistance.

## Steps to commissioning a Rinnai INFINITY A-Series model

- 1 Flush water pipes, and gas line**  
Before final connection of the water heater flush the gas, hot and cold water supply lines. Swarf in the gas or water supplies may cause damage, a common problem, which is not covered by warranty.
- 2 Connect gas line**
- 3 Purge the gas line of air**
- 4 Final connection test**
- 5 Check supply pressure**  
Operate ALL other gas appliances at their maximum gas rate. With all gas appliances on maximum the supply pressure must read between 1.13-3.0 kPa on Natural Gas. On LPG the pressure must be 2.75-3.0 kPa.

If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the installer's responsibility to check the gas meter, service regulator and pipe work for correct operation and sizing, and rectify as required.

## 6 **PCB and/or dip switch settings checked.**

Refer p.12-14.

PCB settings checked if the factory default temperature has been changed.

Dip switch settings checked if a flue diverter is fitted.



Short video: <http://rinnai.co.nz/007>

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## 7 **Operate and test for gas leaks**

Replace the appliance front cover otherwise the unit won't operate correctly, and operate and test for gas leaks using an electronic leak detector.

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## 8 **Operational test—water flow and temperature at the hot water outlets**

Confirm the hot water delivery temperatures using a thermometer.

If water controllers are fitted, it is necessary to test their operation through the complete range of functions, refer separate instructions provided with the water controllers.

---

## 9 **Check cold water inlet filter**

Inspect and clean the water inlet filter. This may need to be repeated to ensure the filter remains clear, especially on new installations.



Short video: <http://rinnai.co.nz/006>

If you feel the customer is capable of doing this check it would be beneficial to show them how to inspect and clean the filter as well.

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## 10 **Customer handover**

After testing is completed, explain to the customer the functions and operation of the water heater and water controllers (if fitted).

Also talk to them about the gas, power, and water connections, how frost protection works, the procedure for draining the water heater, where to find the data plate, maintenance and servicing. If the customer is not there try and contact them by phone to relay the important points.

Ensure the installer details section is completed in the operation guide, the commissioning checklist has been completed and signed, and that guide and checklist are left with the customer.

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# PCB interface and dip switch settings

The PCB interface and dip switch settings must only be changed by a licensed gasfitter. They have been provided as there may be a requirement to change the temperature of the water delivered from the water heater or change the dip switch settings if fitting a flue diverter.



Care must be taken when changing the temperature or dip switch settings as they can be easily switched or bumped into the wrong position. Fully check the operation of the water heater before leaving including the temperature of the water delivered.

The cover of the water heater will need to be removed to carry out this operation. As this will expose live mains voltage wiring **please disconnect the power supply before removing the front cover.**

We wish to draw your attention to the requirements of the New Zealand Building Code and compliance document G12. This requires that water delivered to sanitary fixtures be no more than 55 °C. Increasing the water heater set temperature will require that you protect all sanitary fixtures to which the appliance is plumbed with suitable tempering valves or something similar.

Rinnai will accept no liability for issues arising out of the use of this information.

If you have any doubts about the performance of the water heater, please contact Rinnai by phoning 0800 RINNAI (0800 746 624).

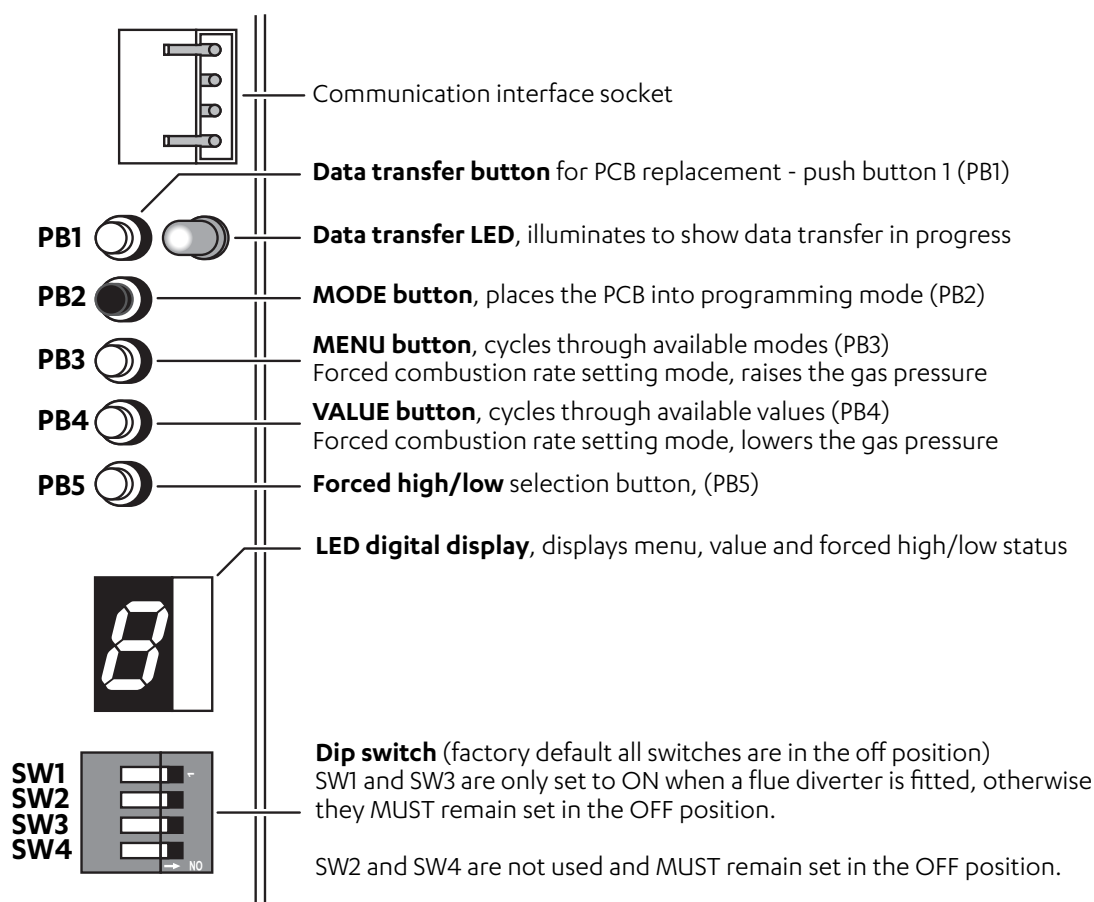
The following information details settings for the Rinnai INFINITY A-Series models only. They are not applicable for other models.

## Basic operation of the PCB interface

- To place the PCB into programming mode press PB2 until the LED digital display shows **1**, noting that the current set value will be displayed shortly afterwards.
- To alter a value press PB4, each press of the button will select the next available value.
- To change to another menu, press PB3, each press of the button will select the next available menu.
- To exit the programming mode and save the selected settings press PB2 until the LED display goes blank.

## Note:

- If no buttons are pressed the PCB will automatically exit programming mode after 10 mins.
- Exiting programming mode sets the value last viewed as the current value.



Menu	Menu description	Value							
		A	b	C	d	E	F	H	J
1	Gas type	ULPG	NG	N/A	N/A	N/A	N/A	N/A	N/A
2*	Model	2626	2426	2024	1620	N/A	N/A	N/A	N/A
3	Fixed / Max. temp	55 °C <sup>1</sup>	65 °C	60 °C	50 °C	42 °C	40 °C	N/A	N/A
4	OFF water flow rate	+ 3 °C <sup>2</sup>	+ 6 °C	N/A	N/A	N/A	N/A	N/A	N/A
5	50 °C delivery adjustment temp.	Min Step 0	Increase Step 1	Increase Step 2	Increase Step 3	Increase Step 4	Increase Step 5	Increase Step 6	Increase Max

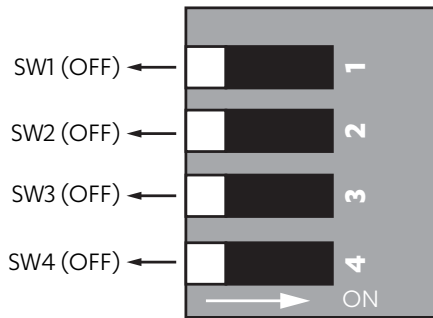
The temperature of outgoing hot water is constantly monitored by a built-in sensor. If the temperature of the outgoing hot water rises to more than 3 °C (6 °C #) above the selected temperature shown on the digital monitor or the preset limit when water controllers are fitted, the burner will automatically go out.

- \* Values in menu 2 cannot be adjusted.
- 1 Factory default
- 2 OFF water flow rate (+3 °C, factory default)

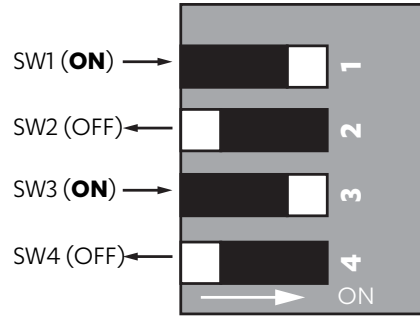
## Flue diverter dip switch changes

When delivered ex-factory, by default SW1, SW2, SW3, and SW4 of the DipSW are set to the OFF position.

If a flue diverter is installed onto the water heater, SW1 and SW3 of the DipSW must be set to the ON position.



Default dip switch settings as they are ex-factory.



Dip switch settings required for flue diverter installation.

The dip switch change for flue diverters is required to increase the combustion fan speed, which helps overcome the friction losses from have a flue diverter installed on the water heater.

# Appendix 1:

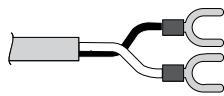
## Water controller communication cables

Wired water controllers operate at an extra low voltage (12 V DC) which is supplied from the water heater, a 10 m long communication cable is supplied for connection to the water heater. Only Rinnai supplied communication cables may be used.

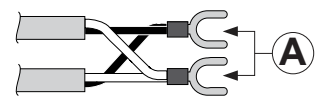
The water heater end of the cables is fitted with spade terminals. Only two pairs of cables (four spade connectors in total) may be terminated. When attaching three or four cables it is necessary to join the cable terminators as shown below.

For each pair cut off the existing spade connectors and re-terminate each pair into a new spade connector (A). Spade connectors are available from your local electrical component retailer

Single cables can be used when terminating up to two communication cables.



Paired cables are to be used when terminating three or four communication cables.

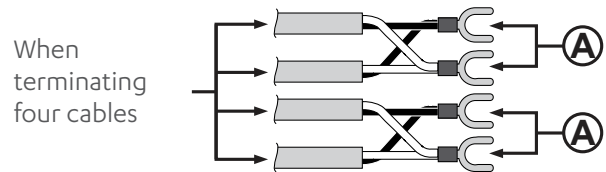
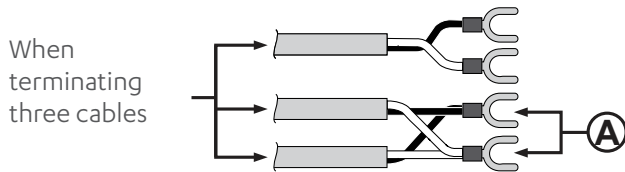


### Connecting one or two communication cables

Follow steps one through five below to terminate the cables to the water heater.

### Connecting three or four communication cables

To connect three or four cables, separate all the cables to be fitted into pairs.

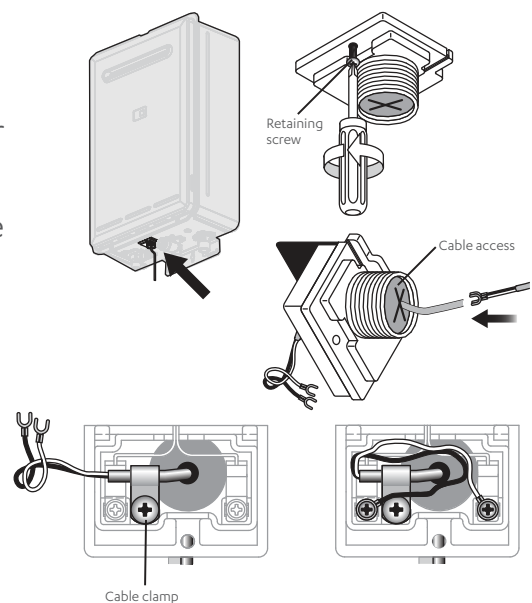


Follow steps one through five below to terminate the joined cable pairs to the water heater.

1. Isolate the power supply by switching the power point off and removing the power plug of the water heater from the electric power socket.
2. Removing the retaining screw of the cable connector at the base of the unit.
3. Swing the cable connector door open and thread the cable through the weather seal of the cable access hole, allowing sufficient cable length so that the sheath of the cable can be secured with the cable clamp supplied with the transceiver.
4. Loosen the screw terminals and connect the cable spade connectors to these terminals and re-tighten.

Polarity is not important, either wire colour can be connected to either terminal.

5. Return the cable connector to the original position, taking care not to damage the cable wires in the process, and replace the retaining screw.



# a touch of magic



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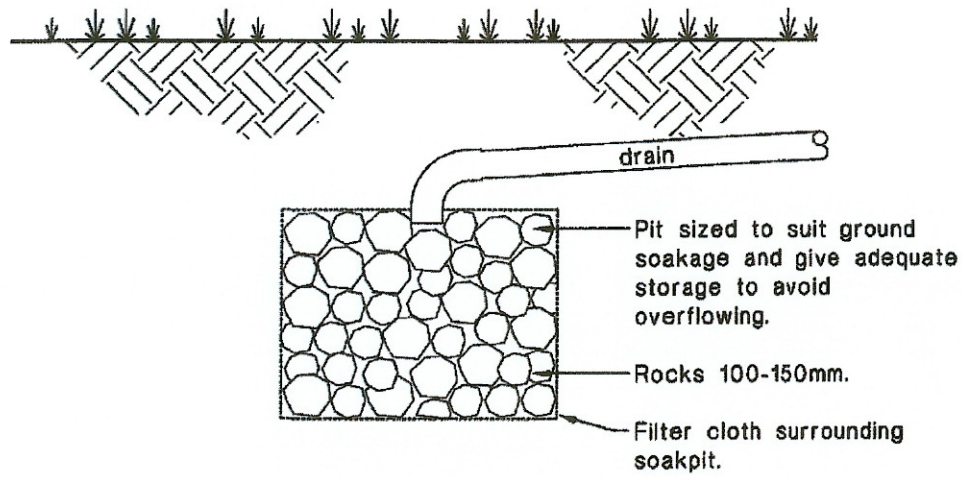
**Rinnai.co.nz** | **0800 746 624**

<http://www.youtube.com/rinnainz>

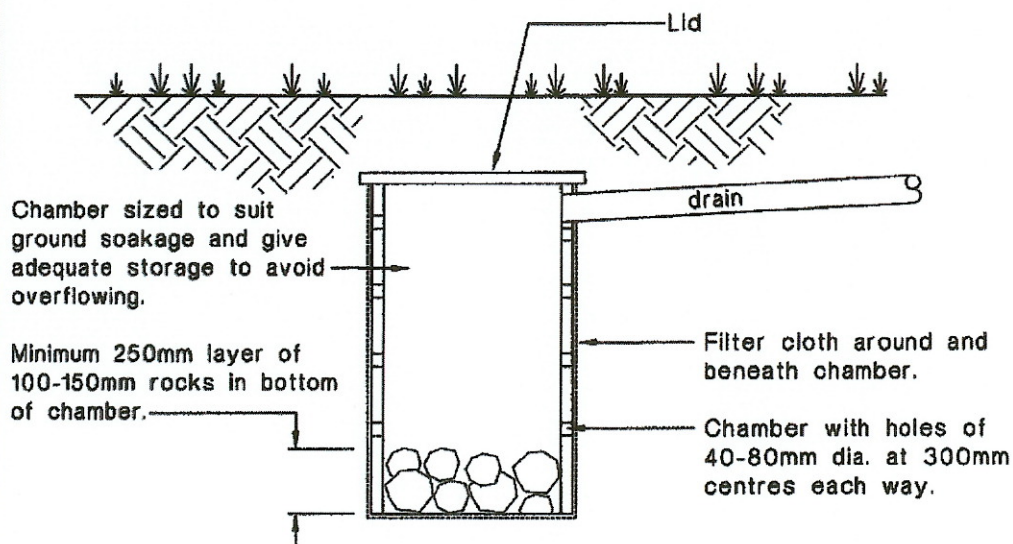
U340-1336(01)



Figure 13. Soak Pit for Surface Water Disposal  
Paragraph 9.0.4



(a) Rock soak pit



(b) Chamber soak pit

**Stormwater soakpit: design to NZBC E1/VM1:1992****Dynamic Drainage & Excavation Ltd**

**Client Name:** MIKE GREER HOMES CANTERBURY

**Site address:** 13 HART PLACE, LAKE COLERIDGE

**Site location (NZMG):**  mN  mE

**Local Authority:** SELWYN DISTRICT COUNCIL

**Servicing 5 Downpipes and Driveway****Date:** 14-Jan-20**Designer:** Grant Wooster**INPUT**

**Catchment area, Ac** (ha) **Ac (TOTAL) =** 0.0311 ha

roof (non-absorbent)  272.3 m<sup>2</sup>

paved surfaces (asphalt / concrete)  38.4 m<sup>2</sup>

other  m<sup>2</sup>

**Run-off co-efficient, C** (unitless) **C (TOTAL) =** 0.89

**Rainfall Intensity, I** (mm/hr) 10 yr / 10 minute  $I_{10-10}$   mm/hr

DESIGN: 10 yr / 60 minute  $I_{10-60}$   15.2 mm/hr

**OUTPUT**

**Run-off, Rc** (flow discharged from catchment in 1 hr)  4.2 m<sup>3</sup>

**Soakage volume, Vsoak** (disposed of by way of soakage in 1 hour)  1.5 m<sup>3</sup>

**Storage volume, Vstor** (required storage to prevent overflow)  2.7 m<sup>3</sup>

**DESIGN**

**Depth of groundwater** (max. depth of soakpit)  m

**Design soakage rate, Sr** (mm/hr)

- from field test results (refer to separate worksheet)  500 mm/hr

**System selected:** (a) **Rock-filled soak pit**  Y (Y/N)

**Min. Volume required (total)** (assume 38% void space)  7.1 m<sup>3</sup>

**Overall dimensions (m)**  1 m wide by  3.1 m long

**Base area of soakpit, Asp**  3.1 (m<sup>2</sup>) by  2.3 m deep

**Total design volume (actual)**  7.1 m<sup>3</sup> (Check if > 7.1 => OK ?)

**or,** (b) **Chamber soak pit**  N (Y/N)

**No. of chambers**  0 **Diameter of chamber**  0 mm

**Base area of soakpit, Asp**  0.00 (m<sup>2</sup>) by  0.0 m deep

**Total design volume (actual)**  N/A m<sup>3</sup> (Check if > 2.7 => OK ?)

**DESIGN SUMMARY:**

Course soakage test in gravel medium 2.3m depths showed high percolation rates, to the extent that water wouldn't pond and a standard percolation test couldn't be carried out. Therefore a max of 500mm/hr has been used in calculations for soakage rate.

## HIRDS V4 Depth-Duration-Frequency Results

Site name: 13 HART PLACE, LAKE COLERIDGE

Coordinate system: WGS84

Longitude: 171.5323

Latitude: -43.3679

Rainfall depths (mm) :: Historical Data													
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	2.8	4.26	5.5	8.53	13.2	25.2	36.3	49.5	63.5	70.9	75.3	78.1
2	0.5	3.11	4.73	6.09	9.44	14.6	27.8	40	54.6	69.9	78	82.8	85.9
5	0.2	4.2	6.37	8.2	12.7	19.5	37.1	53.2	72.4	92.4	103	109	113
10	0.1	5.06	7.66	9.84	15.2	23.3	44.3	63.3	86	110	122	129	134
20	0.05	5.98	9.04	11.6	17.9	27.4	51.9	74	100	128	142	150	156
30	0.033	6.56	9.9	12.7	19.6	30	56.6	80.6	109	139	154	163	169
40	0.025	6.98	10.5	13.5	20.8	31.8	60	85.5	116	147	163	173	178
50	0.02	7.32	11	14.2	21.8	33.3	62.7	89.3	121	153	170	180	186
60	0.017	7.6	11.5	14.7	22.6	34.5	65	92.5	125	159	176	186	192
80	0.012	8.06	12.1	15.6	23.9	36.5	68.6	97.6	132	167	185	196	203
100	0.01	8.42	12.7	16.2	24.9	38.1	71.5	102	137	174	193	204	211
250	0.004	9.98	15	19.2	29.3	44.7	83.7	119	160	202	224	236	244
Depth standard error (mm) :: Historical Data													
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	0.21	0.53	0.36	0.6	0.91	0.94	2.3	2.7	1.5	2.8	1.6	2.3
2	0.5	0.24	0.58	0.39	0.64	0.97	0.96	2.5	2.9	1.5	3	1.6	2.5
5	0.2	0.4	0.85	0.66	0.96	1.5	1.7	3.6	4.3	3.2	5	3.4	4.6
10	0.1	0.59	1.2	1	1.4	2	2.8	5	6.1	5.4	7.3	5.8	7.2
20	0.05	0.87	1.6	1.5	1.9	2.9	4.2	6.9	8.4	8.3	10	9	11
30	0.033	1.1	1.9	1.9	2.4	3.6	5.2	8.3	10	10	13	11	13
40	0.025	1.3	2.2	2.3	2.7	4.1	5.9	9.4	12	12	15	13	15
50	0.02	1.4	2.4	2.5	3	4.6	6.6	10	13	13	16	15	17
60	0.017	1.5	2.6	2.8	3.3	5	7.2	11	14	15	18	16	19
80	0.012	1.8	3	3.2	3.8	5.7	8.1	12	16	17	20	19	21
100	0.01	2	3.3	3.6	4.2	6.3	8.9	14	17	19	22	21	24
250	0.004	3.1	5	5.7	6.3	9.6	13	19	25	28	32	31	35