SDC - Approved Building Consent Document - BC230719 - Pg 1 of 522 - 22/06/2023 - phillda

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	**1046093**
Land Registration District	**Canterbury**
Date Issued	02 May 2022

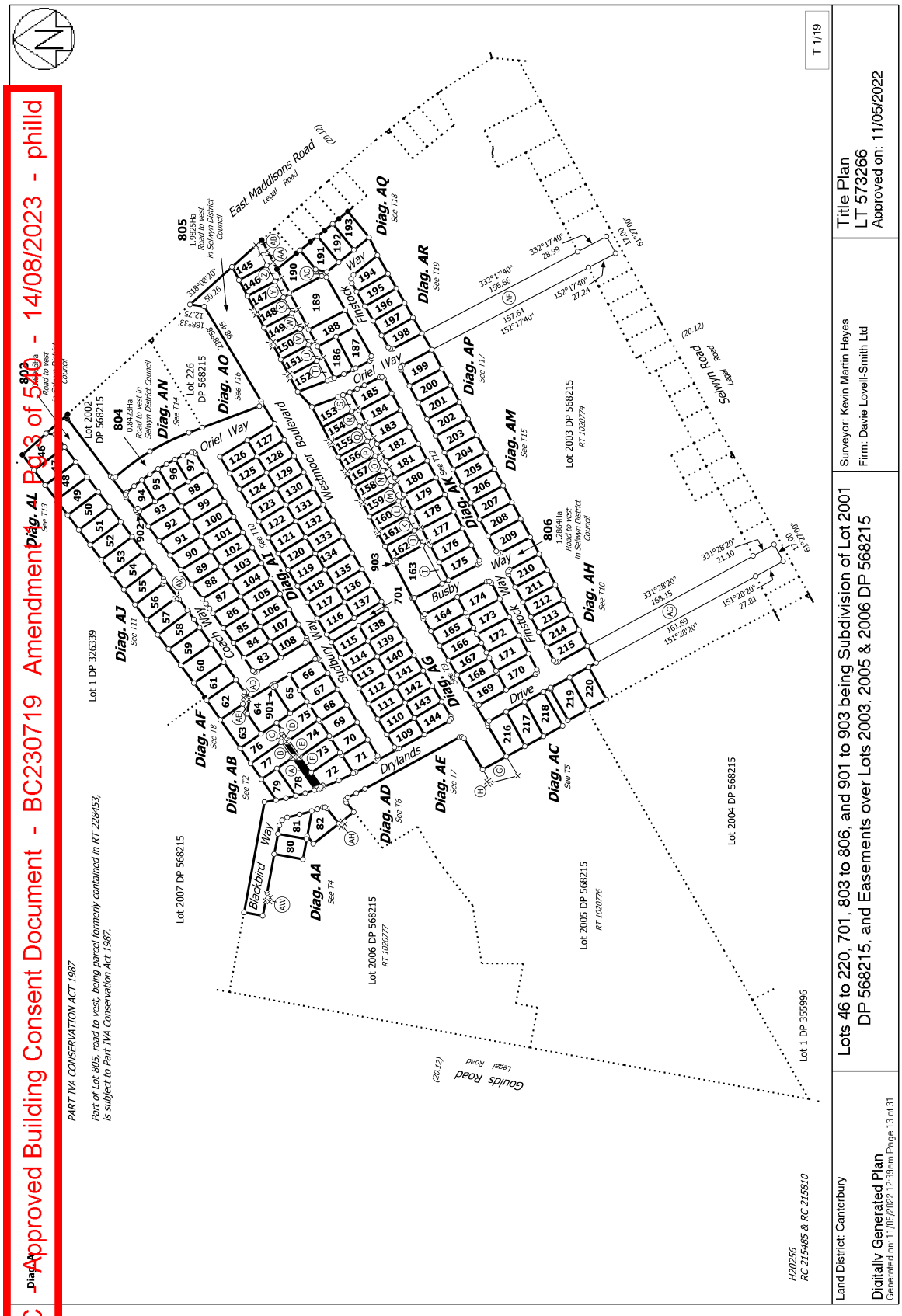
Prior References
1020772

Estate	Fee Simple
Area	479 square metres more or less
Legal Description	Lot 128 Deposited Plan 573266

Registered Owners
Kashish Bhutani and Monika Puri

Interests
12398305.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 2.5.2022 at 5:26 pm
12398305.7 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 2.5.2022 at 5:26 pm
Land Covenant in Covenant Instrument 12398305.18 - 2.5.2022 at 5:26 pm (limited to duration)
12452574.2 Mortgage to ANZ Bank New Zealand Limited - 10.6.2022 at 5:03 pm

SDC - Approved Building Consent Document - BC230719 - Pg 2 of 522 - 22/06/2023 - phild
SDC - Approved Building Consent Document - BC230719 Amendment 1 - Pg 2 of 40 - 14/08/2023 - phild


SDC - Approved Building Consent Document - BC230719 - Pg 3 of 522 - 22/06/2023 - philld
SDC - Approved Building Consent Document - BC230719 Amendment - Pg 3 of 522 - 14/08/2023 - philld
Diag. AL See T13
PART IVA CONSERVATION ACT 1987
Part of Lot 805, road to vest, being parcel formerly contained in RT 228453, is subject to Part IVA Conservation Act 1987.
Lot 1 DP 326339
Lot 2007 DP 568215
Lot 2006 DP 568215 RT 1020777
Lot 2005 DP 568215 RT 1020776
Lot 2004 DP 568215
Lot 1 DP 355996
Lot 2002 DP 568215
Lot 226 DP 568215
Lot 2003 DP 568215 RT 1020774
804 0.8423Ha Road to vest in Selwyn District Council
805 1.8935ha Road to vest in Selwyn District Council
806 1.2864Ha Road to vest in Selwyn District Council
East Maddisons Road (21.02) Legal Road
Oriel Way
Westmoor Parkway
Finstock Way
Busby Way
Finstock Drive
Blackbird Way
Drylands
Goulds Road (20.12) Legal Road
Selwyn Road (20.12) Legal Road
Diag. AA See T4
Diag. AB See T2
Diag. AC See T5
Diag. AD See T6
Diag. AE See T7
Diag. AF See T8
Diag. AG See T9
Diag. AH See T10
Diag. AJ See T11
Diag. AK See T12
Diag. AM See T15
Diag. AN See T14
Diag. AO See T16
Diag. AP See T17
Diag. AQ See T18
Diag. AR See T19
T 1/19
Land District: Canterbury
Digitally Generated Plan
Generated on: 11/05/2022 12:39am Page 13 of 31
Lots 46 to 220, 701, 803 to 806, and 901 to 903 being Subdivision of Lot 2001 DP 568215, and Easements over Lots 2003, 2005 & 2006 DP 568215
Surveyor: Kevin Martin Hayes
Firm: Davie Lovell-Smith Ltd
Title Plan
LT 573266
Approved on: 11/05/2022
H220256
RC 215485 & RC 215810

View Instrument Details

Instrument No	12398305.2
Status	Registered
Date & Time Lodged	02 May 2022 17:26
Lodged By	Rankin, Timothy Eric
Instrument Type	Consent Notice under s221(4)(a) Resource Management Act 1991

Affected Records of Title	Land District
1046070	Canterbury
1046071	Canterbury
1046072	Canterbury
1046073	Canterbury
1046074	Canterbury
1046075	Canterbury
1046076	Canterbury
1046063	Canterbury
1046064	Canterbury
1046065	Canterbury
1046066	Canterbury
1046067	Canterbury
1046068	Canterbury
1046069	Canterbury
1046060	Canterbury
1046061	Canterbury
1046062	Canterbury
1046053	Canterbury
1046054	Canterbury
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1046048	Canterbury
1046049	Canterbury
1046040	Canterbury
1046041	Canterbury
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1046035	Canterbury
1046036	Canterbury
1046037	Canterbury
1046078	Canterbury
1046079	Canterbury
1046080	Canterbury

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SDC -Approved Building Consent Document - BC230719 -Amendment - Pg 4 of 540 - 14/08/2023 - phillcl

1046081	Canterbury
1046082	Canterbury
1046083	Canterbury
1046084	Canterbury
1046085	Canterbury
1046086	Canterbury
1046087	Canterbury
1046088	Canterbury
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1046126	Canterbury
1046127	Canterbury

SDC - Approved Building Consent Document - BC230719 - Pg 5 of 522 - 22/06/2023 - phild
SDC - Approved Building Consent Document - BC230719_Amendment 1 - Pg 5 of 540 - 14/08/2023 - phild

1046130	Canterbury
1046131	Canterbury
1046132	Canterbury
1046133	Canterbury
1046134	Canterbury
1046157	Canterbury
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1046162	Canterbury
1046163	Canterbury
1046165	Canterbury
1046166	Canterbury
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1046168	Canterbury
1046169	Canterbury
1046170	Canterbury
1046171	Canterbury
1046172	Canterbury
1046173	Canterbury
1046175	Canterbury
1046176	Canterbury
1046177	Canterbury
1046178	Canterbury
1046179	Canterbury
1046180	Canterbury

Annexure Schedule Contains 1 Pages.

Signature

Signed by Judith Ellen Bullin as Territorial Authority Representative on 07/04/2022 09:57 AM

***** End of Report *****

SDC - Approved Building Consent Document - BC230719 - Pg 6 of 522 - 22/06/2023 - phillcl
SDC - Approved Building Consent Document BC230719 Amendment 1 Pg 6 of 522 - 14/08/2023 - phillcl

Selwyn DISTRICT COUNCIL

www.selwyn.govt.nz

SDC - Approved Building Consent Document - BC230719 - Pg 7 of 522 - 22/06/2023 - phildd

SDC - Approved Building Consent Document - BC230719 Amendment 1 - Pg 7 of 540 - 14/08/2023 - phildd

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Resource Consent 215485 & 215538 & 215810 and Deposit Plan 573266

CONSENT NOTICE PURSUANT TO S. 221 RESOURCE MANAGEMENT ACT 1991

To: The District Land Registrar
Canterbury Land Registration District

TAKE NOTICE that the land hereinafter described is subject to conditions in relation to a subdivision

"That these lots are small-lot medium density lots. The Living Z rules in the Operative District Plan for small-lot medium density development shall apply to any future development on these lots."

AND THAT you are hereby requested to register the same pursuant to Section 221 of the Resource Management Act 1991.

DESCRIPTION OF LAND

All those pieces of land being Lots 65-71, 78-92, 94-97, 100-162, 165-169, 192-198, 200-208, and 210-215 DP 573266 as held in Record of Titles 1046030-1046036, 1046043-1046057, 1046059-1046062, 1046065-1046127, 1046130-1046134, 1046157-1046163, 1046165-1046173 and 1046175-1046180.

DATED this 16th day of March 2022

SIGNED for and on behalf of Selwyn District Council



_____Authorised Officer

www.selwyn.govt.nz
Selwyn District Council, 2 Norman Kirk Drive Rolleston / PO BOX 90, Rolleston 7643
Tel: 03 347 2800 Fax: 03 347 2799 Email: admin@selwyn.govt.nz

View Instrument Details

Instrument No	12398305.7
Status	Registered
Date & Time Lodged	02 May 2022 17:26
Lodged By	Rankin, Timothy Eric
Instrument Type	Consent Notice under s221(4)(a) Resource Management Act 1991

Affected Records of Title	Land District
1046011	Canterbury
1046012	Canterbury
1046013	Canterbury
1046014	Canterbury
1046015	Canterbury
1046016	Canterbury
1046017	Canterbury
1046018	Canterbury
1046019	Canterbury
1046020	Canterbury
1046021	Canterbury
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SDC - Approved Building Consent Document - BC230719 - Amendment 1 - Pg 8 of 540 - 14/08/2023 - phildl

1046053	Canterbury
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SDC Approved Building Consent Document - BC230719 Amendment 1 Pg 9 of 540 - 14/08/2023 - phildd

1046100	Canterbury
1046101	Canterbury
1046102	Canterbury
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1046146	Canterbury

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SDC - Approved Building Consent Document - BC230719_Amendment 1 - Pg 10 of 540 - 14/08/2023 - philld

1046147	Canterbury
1046148	Canterbury
1046149	Canterbury
1046150	Canterbury
1046151	Canterbury
1046152	Canterbury
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1046179	Canterbury
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1046182	Canterbury
1046183	Canterbury
1046184	Canterbury
1046185	Canterbury

Annexure Schedule Contains 1 Pages.

Signature

Signed by Judith Ellen Bullin as Territorial Authority Representative on 07/04/2022 09:58 AM

***** End of Report *****

SDC - Approved Building Consent Document - BC230719 - Pg 11 of 522 - 22/06/2023 - phillid
SDC - Approved Building Consent Document - BC230799 Amendment - Pg 1 of 540 - 4/08/2023 - phillid

Selwyn DISTRICT COUNCIL

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SDC - Approved Building Consent Document - BC230719 Amendment 1 - Pg 12 of 540 - 14/08/2023 - phillo

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Resource Consent 215485 & 215538 & 215810 and Deposit Plan 573266

CONSENT NOTICE PURSUANT TO S. 221 RESOURCE MANAGEMENT ACT 1991

To: The District Land Registrar
Canterbury Land Registration District

TAKE NOTICE that the land hereinafter described is subject to conditions in relation to a subdivision

"That any fencing or freestanding wall not shown on the Approved Landscape and Fencing Plans or subject to condition 89 of RC215485 shall comply with the requirements of the Operative District Plan. For further information please refer to the relevant rule in the District Plan or contact the duty planner at the Selwyn District Council."

AND THAT you are hereby requested to register the same pursuant to Section 221 of the Resource Management Act 1991.

DESCRIPTION OF LAND

All those pieces of land being Lots 46 - 220 DP 573266 as held in Record of Titles 1046011 – 1046185.

DATED this 16th day of March 2022.

SIGNED for and on behalf of Selwyn District Council

_____Authorised Officer

www.selwyn.govt.nz
Selwyn District Council, 2 Norman Kirk Drive Rolleston / PO BOX 90, Rolleston 7643
Tel: 03 347 2800 Fax: 03 347 2799 Email: admin@selwyn.govt.nz

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Form 2A

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: **24 Westmoor Blvd**	
Suburb:	
Town/City **Rolleston**	Postcode:

THE OWNER

Name(s): **Bhutani & Puri**	
Mailing address: **3/31 Buffon Street**	
Suburb:	PO Box/Private Bag:
Town/City: **Christchurch**	Postcode:
Phone number: **0212 405 668**	Email address: **kashishbhutani99@gmail.com**

BASIS FOR PROVIDING THIS MEMORANDUM

I am providing this memorandum in my role as the: Please tick the option that applies (√)	
( )	**sole** designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project
( )	**lead** designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and no other person will be providing any additional memoranda for the project
✓	**lead** designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design
( )	**specialist** designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work

IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK (RBW)

I **Andrew Siegenthaler** carried out in part the following design work that is restricted building work

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PRIMARY STRUCTURE: B1

Design work that is restricted building work	**Description**	**Carried out/ supervised**	**Reference to plans and specifications**
Tick(√)if included *Cross (X) if excluded*	*[If appropriate, provide details of the restricted building work]*	*[Specify whether you carried out this design work or supervised someone else carrying out this design work]*	*[If appropriate, specify references]*
Primary structure			
All RBW Design work relating to B1 ( )		( ) Carried out ( ) Supervised	
Foundations and subfloor framing ✓	*Ribraft*	✓ Carried out in part ( ) Supervised	Foundation Plan & Construction Details
Walls ✓	*Timber Framed Walls*	✓ Carried out in part ( ) Supervised	Floor Plan, Sections & Details
Roof ✓	*Timber Truss*	Carried out in part (✓) Supervised	Roof Plan & Truss Manufactures Design
Columns and beams		Carried out in part ( ) Supervised	
Bracing ✓	*Sheet Bracing*	✓ Carried out in part ( ) Supervised	Bracing Plan & Bracing Calcs
Other ( )		( ) Carried out ( ) Supervised	
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2			
All RBW design work relating to E2 ( )		( ) Carried out ( ) Supervised	
Damp proofing ✓	*DPM underside of slab & DPC under bottom plate*	✓ Carried out in part ( ) Supervised	Cross Section & Construction Details
Roof cladding or roof cladding system ✓	*Roof Cladding on Building Paper plus fixings*	✓ Carried out in part ( ) Supervised	Roof Plan & Construction Details
Ventilation system (for example, subfloor or cavity) ✓	*Mechanical Vents*	✓ Carried out in part ( ) Supervised	Floor Plan & Electrical Plans Cross Sections &

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		20mm Cavity System		Construction Details
Wall cladding or wall cladding system	✓	*Exterior Wall Claddings*	✓ Carried out in part ( ) Supervised	Elevations, Cross Sections & Construction Details
Waterproofing	✓	*Bath, Shower, WHB*	✓ Carried out in part ( ) Supervised	Details
Other	( )		( ) Carried out ( ) Supervised	

FIRE SAFETY SYSTEMS: C1 – C6

Emergency warning systems, evacuation and fire service operation systems, suppression or control systems, or other	✓	*Smoke Alarms*	✓ Carried out in part ( ) Supervised	Floor Plan & Electrical Plan

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: **Andrew Siegenthaler**	LBP or Registration number: **108550**

The practitioner is a: ✓ Design LBP ( ) Registered architect ( ) Chartered professional engineer

Design Entity or Company (optional): **a.s.c.a.d. ltd**

Mailing address (if different from below):

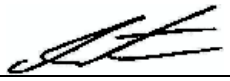
Street address / Registered office: **59 Warwick Road**	
Suburb: **Ohoka**	Town/City: **Rangiora**
PO Box/Private Bag:	Postcode:
Phone number: **03 329 2092**	Mobile:
After Hours:	Fax:
Email address: **ascadltd@snap.net.nz**	Website:

DECLARATION

I **Andrew Siegenthaler** LBP **108550**

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: **26/04/2023**

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SDC Approved BuildingConsent Document - BC230719 Amendment - Pg 17 of 40 14/08/2023 - phillid

constructure
structural engineering

21 April 2023 14694

C/o Ashish Sapra
Homes by Parklane

E-mail: ashish@homesbyparklane.co.nz

Dear Ashish,

SOIL BEARING INVESTIGATION
LOT 128 WESTMOOR BOLEVARD, WESTWOOD STAGE 2, FARINGDON, ROLLESTON

Testing & Results

We confirm that a soil bearing investigation was completed on 20 April 2023 at the above property and now report as follows.

The section is located at the Northern side of Westmoor Boulevard in Stage 2 of the new Westwood borough of the Faringdon Estate subdivision in Rolleston. The section is a relatively flat grass covered site.

The investigation consisted of four scala penetrometer tests and one hand auger 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.

Due to the gravels encountered, it was difficult to penetrate the ground to a significant depth with a scala penetrometer or hand auger. Hand auger at test location '1' revealed topsoil to approximately 100mm overlying dark brown stoney silts on gravels. The scala penetrometer results were similar in all locations with low bearing capacity at the surface and refusal at shallow depth.

The penetrometer results showed that an ultimate bearing capacity of **300kPa** is available at approximately **100-200mm** below existing ground level, beneath the topsoil layer.

Other Information Reviewed

The geotechnical report by EngGeo dated 18 May 2018, Ref: 12903.000.000_30 has classified the site as TC1 with reference to the MBIE guidance document "Repairing and rebuilding houses affected by the Canterbury earthquakes".

Conclusion

Based on the testing results and other information reviewed, the site complies with the "good ground" criteria of NZS3604:2011.

We would infer that normal NZS3604:2011 type foundation details can be utilised for this site provided that the construction of the proposed dwelling is in accordance with NZS3604:2011.

Christchurch Office:
6/75 Peterborough Street, Christchurch 8013
PO Box 21381, Christchurch 8143
Phone 03 365 3243 **Email** cory@constructure.co.nz

Auckland Office:
10 Fitzroy Street, Ponsonby, Auckland 1021
PO Box 21381, Christchurch 8143
Phone 09 320 5226 **Email** james@constructure.co.nz

constructure
structural engineering

SDC - Approved Building Consent Document - BC230719 - Pg 18 of 522 - 22/06/2023 - philld

SDC - Approved Building Consent Document - BC230719 Amendment 1 - Pg 18 of 240 - 4/08/2023 - philld

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) CPEng CMEngNZ IntPE (NZ)
Encl.

Christchurch Office:
6/75 Peterborough Street, Christchurch 8013
PO Box 21381, Christchurch 8143
Phone 03 365 3243 **Email** cory@constructure.co.nz

Auckland Office:
10 Fitzroy Street, Ponsonby, Auckland 1021
PO Box 21381, Christchurch 8143
Phone 09 320 5226 **Email** james@constructure.co.nz



14694
Test location
20.04.2023.
JF

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soil investigation record

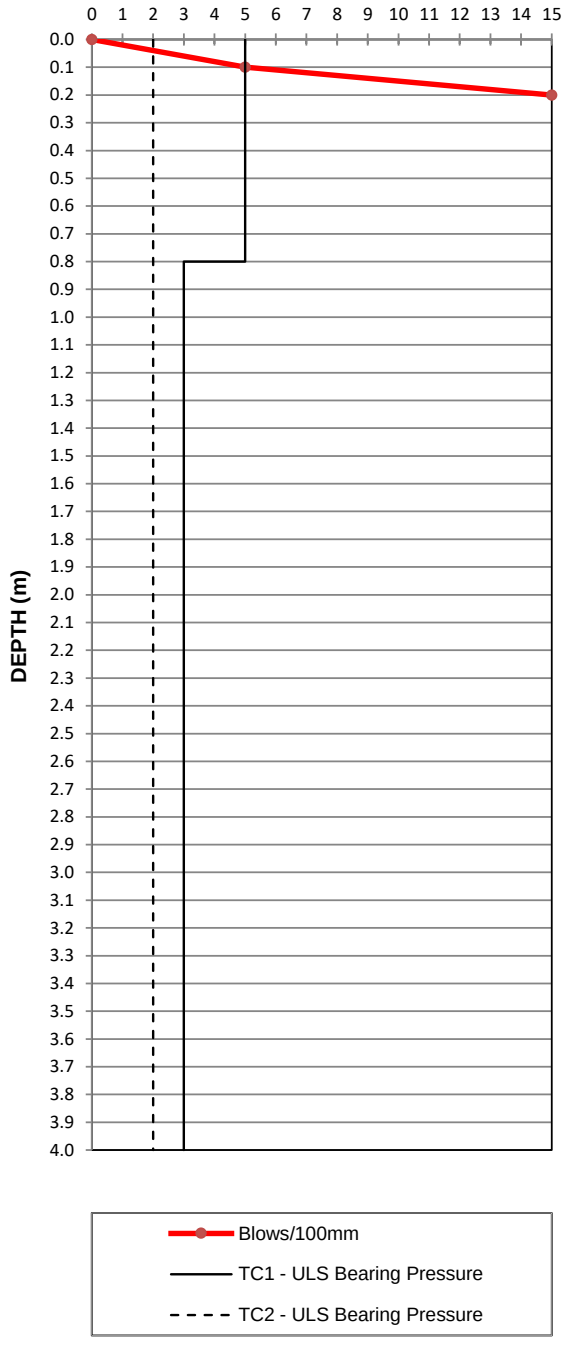
Project:	**LOT 128 WESTMOOR BOLEVARD, WESTWOOD, FARINGDON, ROLLESTON**	**No.:**	**1 OF 5**
Ref:	**14694**	**Date:**	**21/04/2023**
By:	**CH**	**Checked**	**CB**

Test Location 1

Depth (m)	Symbol	Description
GL		Topsoil
0.2		Dark Brown Stoney Silt
		End (Drop-weight Bounced)End o

Bore Log (Hand Auger)

Scala Penetrometer **(Blows/100mm)**



Notes:
- Refer to attached site plan for location.
- TC1 ULS bearing pressure in accordance with NZS3604:2011 and based on a 400mm D x 240mm W footing.
- TC2 ULS bearing pressure in accordance with the MBIE Guidance document “Repairing and rebuilding houses affected by the Canterbury Earthquake”, dated December 2012.

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SDC - Approved Building Consent Document - BC230719 Amendment 1 - Pg 21 of 540 - 14/08/2023 - phillld

constructure structural engineering

soil investigation record

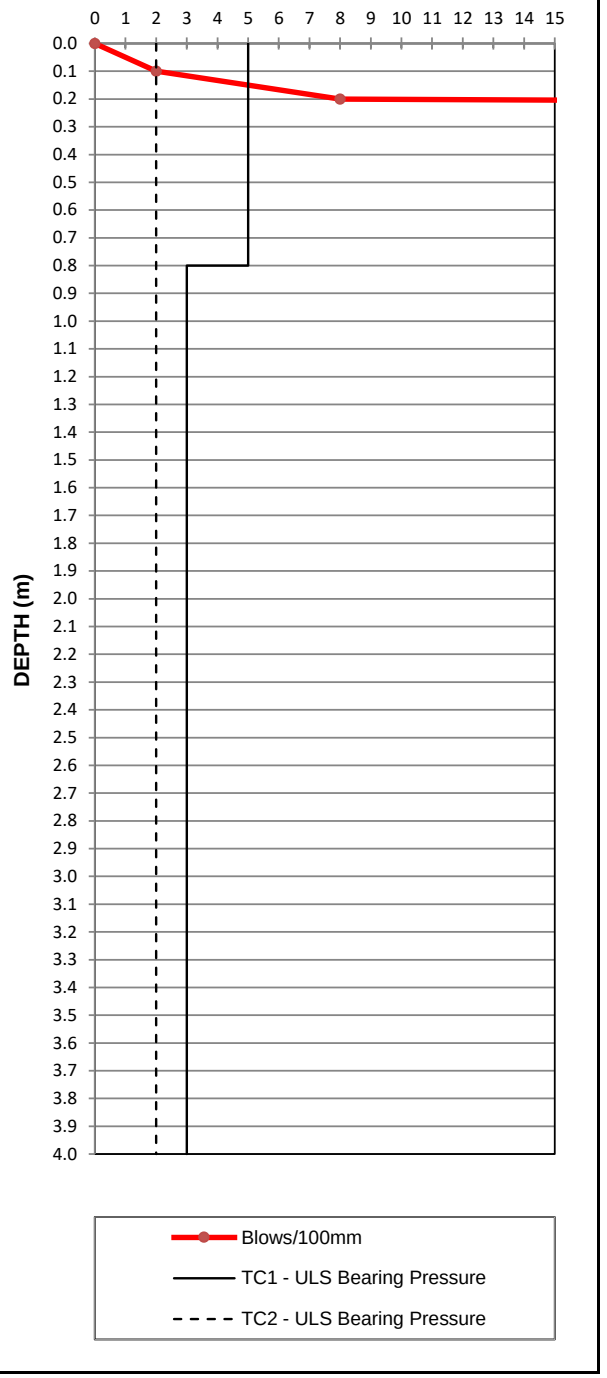
Project:	**LOT 128 WESTMOOR BOLEVARD, WESTWOOD, FARINGDON, ROLLESTON**	**No.:**	**2 OF 5**
Ref:	**14694**	**Date:**	**21/04/2023**
By:	**CH**	**Checked**	**CB**

Test Location 2

Depth (m)	Bore Log (Hand Auger) Symbol	Description
GL		
0.2		End (Drop-weight Bounced)
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		

Notes:
- Refer to attached site plan for location.
- TC1 ULS bearing pressure in accordance with NZS3604:2011 and based on a 400mm D x 240mm W footing.
- TC2 ULS bearing pressure in accordance with the MBIE Guidance document “Repairing and rebuilding houses affected by the Canterbury Earthquake”, dated December 2012.

Scala Penetrometer **(Blows/100mm)**



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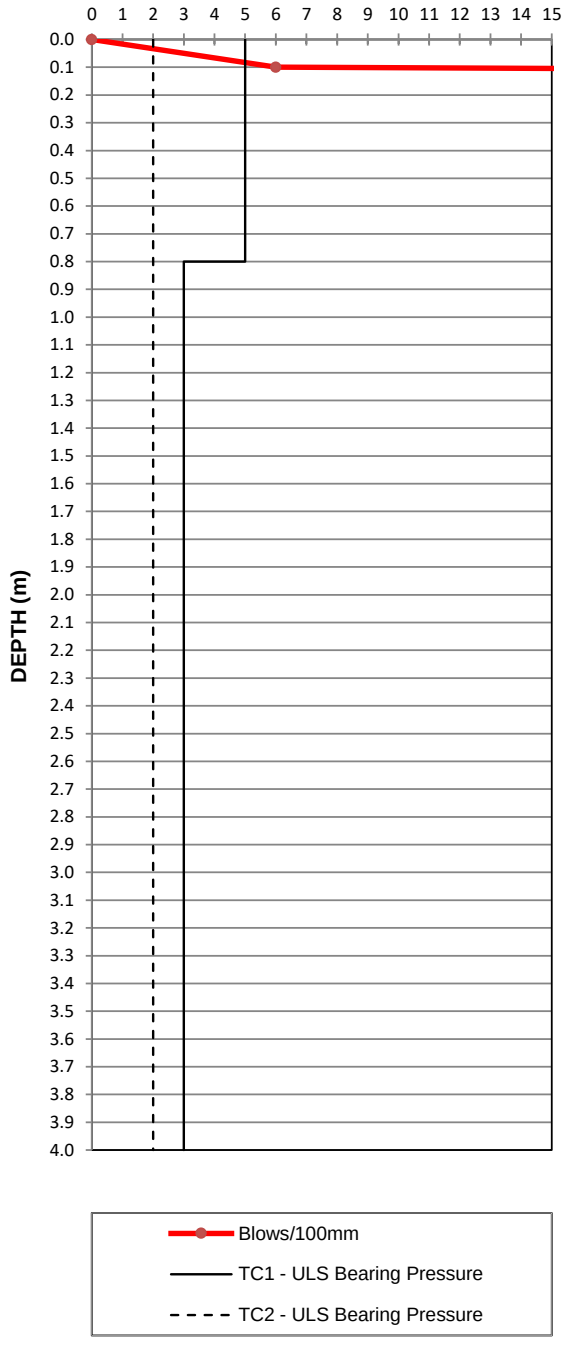
Project:	**LOT 128 WESTMOOR BOLEVARD, WESTWOOD, FARINGDON, ROLLESTON**	**No.:**	**3 OF 5**
Ref:	**14694**	**Date:**	**21/04/2023**
By:	**CH**	**Checked**	**CB**

Test Location 3

Depth (m)	Bore Log (Hand Auger) Symbol	Description
GL		End (Drop-weight Bounced)
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		

Notes:
- Refer to attached site plan for location.
- TC1 ULS bearing pressure in accordance with NZS3604:2011 and based on a 400mm D x 240mm W footing.
- TC2 ULS bearing pressure in accordance with the MBIE Guidance document "Repairing and rebuilding houses affected by the Canterbury Earthquake", dated December 2012.

Scala Penetrometer **(Blows/100mm)**



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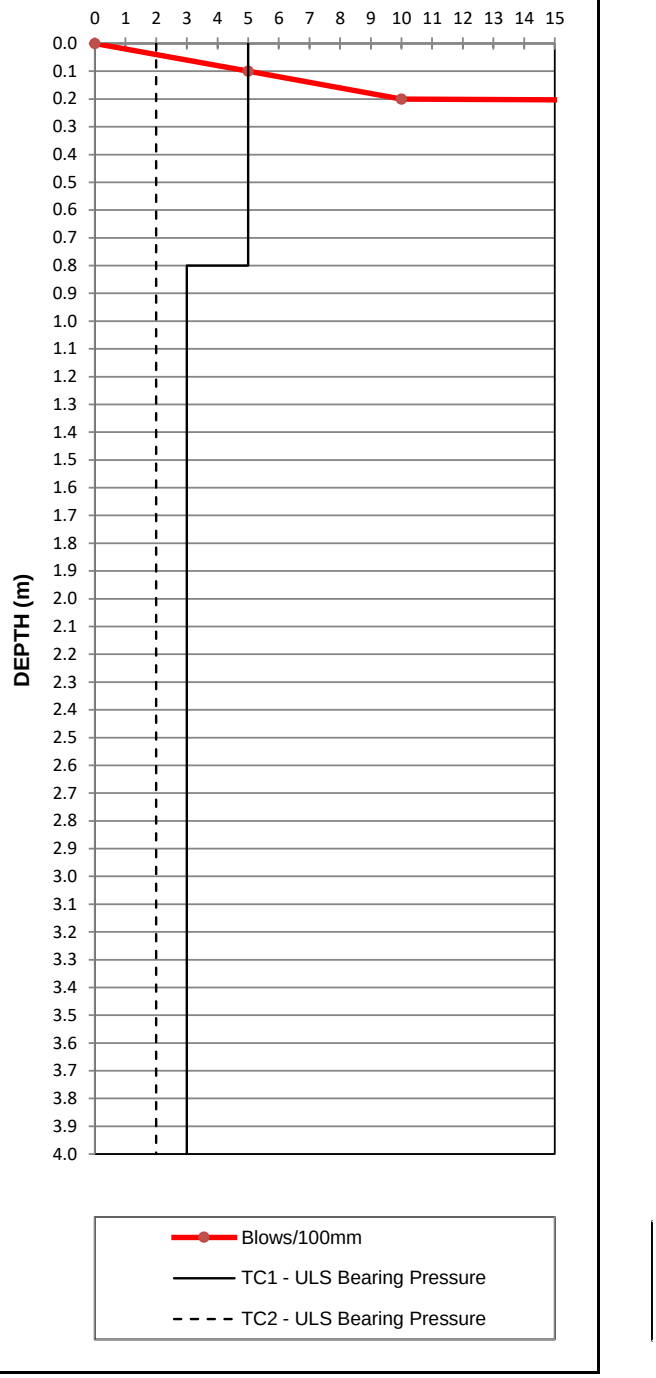
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structural engineering

soil investigation record

Project:	**LOT 128 WESTMOOR BOLEVARD, WESTWOOD, FARINGDON, ROLLESTON**	**No.:**	**4 OF 5**
Ref:	**14694**	**Date:**	**21/04/2023**
By:	**CH**	**Checked**	**CB**

Test Location 4

Depth (m)	Bore Log (Hand Auger) Symbol	Bore Log (Hand Auger) Description	Scala Penetrometer (Blows/100mm)
GL		End (Drop-weight Bounced)	
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			



Notes:
1. Refer to attached site plan for location.
2. TC1 ULS bearing pressure in accordance with NZS3604:2011 and based on a 400mm D x 240mm W footing.
3. TC2 ULS bearing pressure in accordance with the MBIE Guidance document "Repairing and rebuilding houses affected by the Canterbury Earthquake", dated December 2012.

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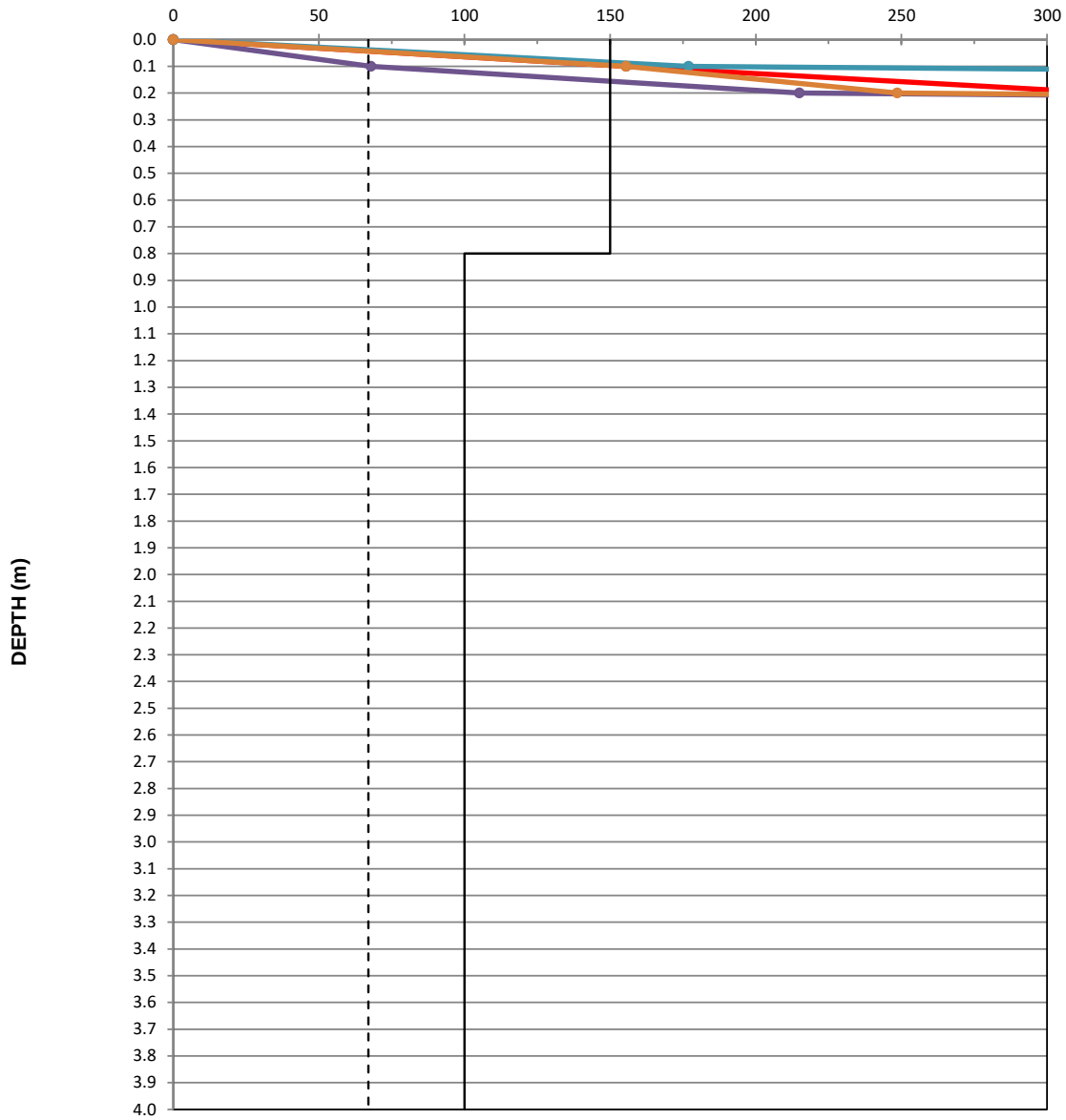
constructure
structural engineering

soil investigation record

Project:	**LOT 128 WESTMOOR BOLEVARD, WESTWOOD, FARINGDON, ROLLESTON**	**no.**	**5 OF 5**
Ref:	**14694**	**date**	**21/04/2023**
By:	**CH**	**checked**	**CB**

Scala Penetrometer

(kPa)

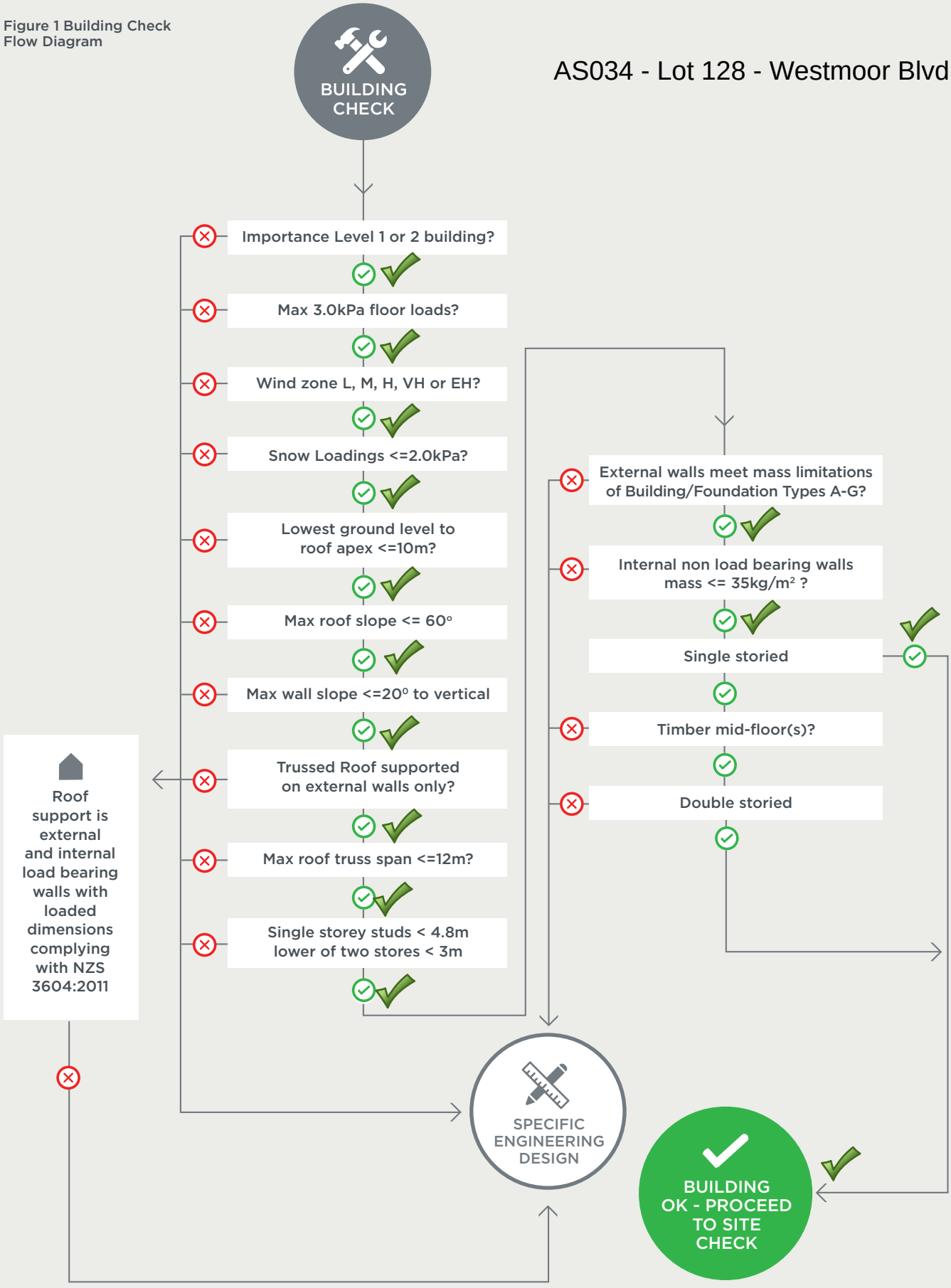


Notes:
Based on Stockwell, M.J. , 1997: Determination of allowable
earing pressue under small structures, New Zealand Engineering
32:6), dated 15 June 1977, using a factor of safety of three to back
alculate the UBC

Test Location 1
Test Location 2
Test Location 3
Test Location 4
TC1 - ULS Bearing Pressure
TC2 - ULS Bearing Pressure

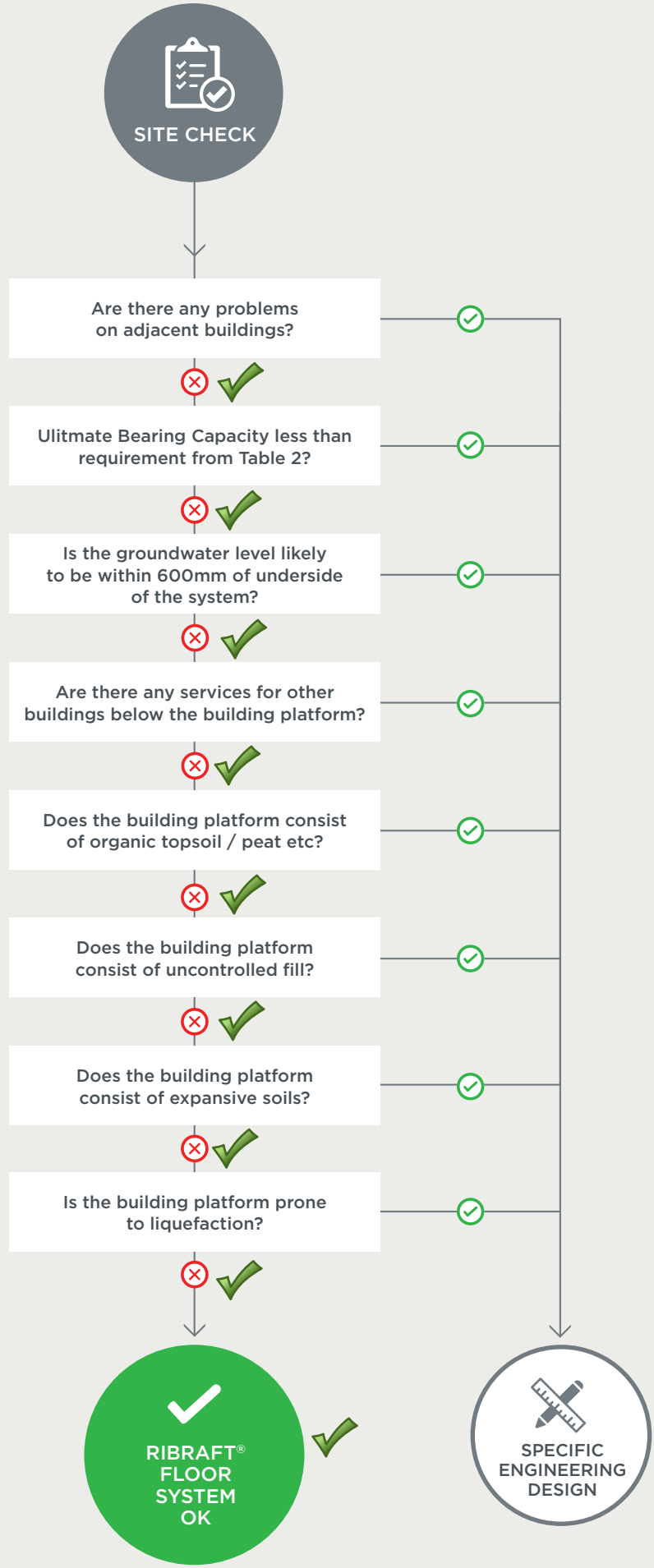
Figure 1 Building Check Flow Diagram

AS034 - Lot 128 - Westmoor Blvd



SDC - Approved Building Consent Document - Building Act 2004 - Section 45 - 25-oP5225 - 24/06/2025 - 2:38:08 pm - phillid

Figure 2 Building Check
Flow Diagram



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810 Great South Rd, Penrose
Private Bag 99904, Newmarket, Auckland 1149
t: 0800 FIRTH 1 w: firth.co.nz

Date: 1st June 2023

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Producer Statement design review for wing wall and footing to Rib Raft Floor for Lot 128 24 Westmoor Boulevard Rolleston

Issued by	D.R.L Cook, Divisional Technical Manager, Firth Industries, CPEng number 125529.
To	Selwyn District Council
In Respect of	Design Review of wing wall extension from code marked Firth Rib Raft floor for Lot 128 24 Westmoor Boulevard Rolleston

- Job Title Bhutani & Puri House
- For Homes By Parklane
- At 24 Westmoor Boulevard Rolleston
- Drawn by Andrew Siegenthaler
- Numbered 08a
- Dated 30/05/2023

We can confirm we have reviewed the above drawings for the foundation wing wall extension from the proposed code marked Firth RibRaft foundation and have identified that the proposed structure complies with the limitation placed on the system for the Firth Rib Raft floor system manual. The review of the drawings confirms that subject to the conditions below, the wing wall extensions complies with the following compliance documents of the Department of Building and Housing.

- B1 (structure)
- B2 (durability)

Subject to the following conditions, the provided detail as proposed complies with the relevant provisions of the building code.

1. Ground conditions are as defined in the Soil Bearing Investigation done by Constructure Structural Engineering no.14694
2. Constructure Structural Engineering will be engaged to inspect the excavations and to verify the ground conditions.
3. The TA is responsible for all necessary inspections required for the issue of code compliance including fill (if required) within the limitations of 7.5.3.1 of NZS3604.
4. Construction is in accordance with the project drawing and the Firth RibRaft Floor system manual.
5. Concrete is supplied by Firth Industries. Any substitution of concrete voids this producer statement.
6. Global slope stability or liquefaction potential has not been assessed and does not form part of this producer statement.

I believe on reasonable grounds that the wing wall extensions of the Rib Raft floor if constructed in accordance with the drawing specification and conditions above will comply with the relevant sections of the building code.

Fletcher Building Limited holds a current policy of Professional Indemnity Insurance no less than $200,000*.

Dene Cook, CPEng (125529), FIPENZ, ME, BE (Hons)

** Note this statement shall only be relied upon but the Building Consent Authority named above. 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 $200,000*

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JANUARY 2020

RibRaft®

TECHNICAL MANUAL







CodeMark
CM70056

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This document contains design and installation information. A variation to any of the information given requires specific engineering design and is hence beyond the scope of this document.

The Firth RibRaft® Floor System can be constructed for all slab-on-ground concrete floors for domestic or residential buildings that fall within the scope of NZS 3604:2011 “Timber Framed Buildings” and Clause 3 “Scope” of Section 1 of this Manual. The design and installation details in this Manual shall be used to design and construct such a floor.

The Firth RibRaft® Floor System is covered by the MBIE Codemark®. This is conditional on the system being used as described in CertMark Australasia certification decision, which in turn requires design in accordance with Section 1 and installation in accordance with Section 2 of this Manual and on site verification in accordance with Section 3.

Note that a MBIE Codemark® means that if this Manual is rigidly followed the relevant Building Control Authority will automatically provide a building permit without the need for producer statements. To comply with the Manual does mean that Firth Certified Concrete® must be used.

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THIS MANUAL CONSISTS OF 3 SECTIONS:

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Contains information principally useful for the specifier or building designer

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Primarily aimed at the person on site installing the Firth RibRaft® Floor system

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SECTION 3 VERIFICATION

Describes the required verification checks

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1

1.0 THIS SECTION OF THIS MANUAL CONTAINS DESIGN INFORMATION NOT REQUIRING SPECIFIC ENGINEERING INPUT FOR THE FIRTH RIBRAFT® FLOOR SYSTEM (THE SYSTEM). FULL INFORMATION ON THE INSTALLATION PROCEDURES IS DESCRIBED IN SECTION 2 OF THIS MANUAL (INSTALLATION INFORMATION). WHERE STANDARDS ARE REFERENCED IN THIS MANUAL, THESE SHALL INCLUDE THE LATEST AMENDMENTS.

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2.0 TECHNICAL INFORMATION

2.1 Overview

The Firth RibRaft® Floor System is a reinforced concrete waffle raft floor slab-on-ground. Typically it consists of an 85mm thick slab supported by a grid of ribs normally 100mm wide at 1200mm x 1200mm centres. The overall depth is 305mm. Edge beams and ribs under load bearing walls are 300mm wide to provide for the extra load carried by these members. Where heating coils of less than 25mm diameter are embedded in the topping, the slab concrete thickness shall be 110mm meaning the overall thickness is 330mm. Where the top floor surface is honed to provide a decorative finish, a slab thickness of 100mm (before honing) should be specified.

2.2 Pods

Firth RibRaft® polystyrene pods 1100mm square and 220mm thick are placed directly on levelled ground and are arranged in such a way as to form a reinforced concrete floor slab with a grid of reinforced concrete ribs and edge beams when concrete is placed onto them. Pods may be cut to suit specific architecture layout and also to accommodate services. 300mm thick pods are available if needed for deeper edge beams and internal ribs.

2.3 Steel

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m^2, a lower characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 200mm centres, and ductility class L or E, hereafter referred to “mesh”. The presence of Class E reinforcing bars in the ribs and beams provides adequate ductility of the system which allows the use of class L mesh. Typically the topping mesh reinforcement will be 665 mesh (class L) or SE62 ductile mesh, each being equally applicable. The reinforcing bars in the ribs and edge beams shall conform to AS/NZS 4671:2001 “Steel Reinforcing Materials”. Specifically designed spacers are used to position the polystyrene pods and the rib and edge beam reinforcing steel bars in a secure manner until the concrete is placed. The reinforcing mesh is held in place by mesh chairs. Conventional timber or steel formwork is used to form the edge of the slab.

2.4 Concrete

One of the following Firth concrete products shall be used in the system:

1) Raftmix: a 20MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix.

2) Raftmix25: a 25MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix. This mix shall be specified for buildings constructed in the ‘sea spray zone’ (i.e. within 500m of the sea including harbours, within 100m of tidal estuaries or inlets, on offshore islands and elsewhere defined as exposure zone D in 4.2.3.3 of NZS3604).

Note: Additional admixtures to standard RibRaft® mixes to be approved by the Firth Plant Engineer.

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3.0 SCOPE

This Clause sets out the limitations that apply to the use of the system to ensure that specific engineering input is not required. The concrete floor slab for buildings or ground conditions that do not meet this scope must be subjected to specific engineering design to comply with the requirements of the New Zealand Building Code.

3.1 Structure Limitations

Specific engineering input shall not be required only where the structure supported by the system complies with the following criteria:

- The structure supported by the system is constructed in a location where the Seismic Hazard Factor Z (defined in NZ1170.5) is less than or equal to 0.45 (refer to Figure 6).
- The system is laid level, or has a maximum step of 600mm detailed in accordance with this Manual.
- The structure supported by the system has no basement, part basement or foundation walls.
- The total height from the lowest ground level to the highest point of the roof shall not exceed 10m.
- The structure supported by the system has a roof pitch limited to 60 degrees maximum from the horizontal.
- The maximum height of a single or top storey is 4.8m and any other storey is 3m.
- Only ground floor walls of the structure supported by the system are permitted to be "heavy external walls" (as defined in Clause 3.3).
- The roof truss span shall be less than or equal to 12m when the roof and ceiling loads are supported entirely by the external walls. Where internal support of roof trusses is used the footings below point loads identified by the truss designer shall comply with this Manual.
- Where internal load bearing walls are used to support the roof and floor, the loaded dimensions stated in tables 8.2 and 14.10 of NZ3604:2011 shall apply, and these load bearing walls shall be supported on a 300mm wide load bearing rib as detailed in this manual.
- Floors may be of unlimited size provided that the maximum dimension between free joints shall not exceed 30m. Where free joints are required they should be detailed in accordance with this Manual.

3.2 Live Loading

The live loading cases of structures covered by these designs are:

- 1.5kPa and 3.0kPa as per NZS3604 "Timber Framed Buildings".
- 13kN concentrated load in garage over area of 0.3 x 0.3m (vehicle limited to 2500kg gross).

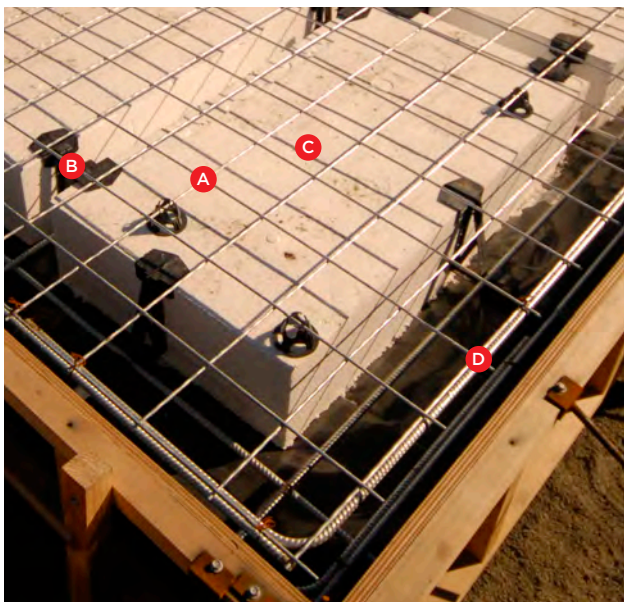
3.3 Snow Loading

Open ground snow loading as defined in NZS3604 of up to 2kPa.

3.4 Dead Loading for Use with This Manual

The dead load cases of structures covered by these designs are:

- Light external walls with total mass not exceeding 60kg/m² – e.g. timber framing with weather boards and interior wall linings.
- Heavy external walls with total mass greater than 60kg/m² but not exceeding 290kg/m² – e.g. timber framing with masonry veneer or partially filled 20 series masonry blocks.
- Internal walls with total mass not exceeding 45kg/m² – e.g. timber framing and linings.
- Light roofs with total mass not exceeding 45kg/m² – e.g. ceiling linings and metal roof, including framing.
- Heavy roofs with total mass greater than 45kg/m² but not exceeding 85kg/m² – e.g. ceiling lining and concrete tiles or slates, including framing.
- Mid-floors with total mass not exceeding 60kg/m² – e.g. timber framing and flooring, including ceiling linings.
- Heavy internal walls and/or load bearing internal walls supported on a load bearing rib.



The RibRaft® System

A Steel mesh reinforcing **B Firth 100mm spacer**
C Firth RibRaft® polystyrene pods **D Steel reinforcing**

3.5 Foundation Requirement for Different Building Types

The designs given in this Manual are limited to where the system supports Building Types as described in Table 1. The classification of wall and roof weights are as detailed in Clause 3.4 of this Section. Single and two storey shall be as defined in NZS 3604:2011.

Table 1 Foundation Type Identifier

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

3.6 Foundation Soils

The system may be used when the supporting ground meets the definitions of "good ground" given in Section 3 of NZS 3604:2011 (as modified by B1 of the Building Compliance Documents). In addition, the system shall not be used for damp sites i.e. where it can be reasonably expected that the ground water level could come within 600mm of the underside of the system. The acceptability of the ground shall be verified in accordance with Clause 3.1.3 of NZS 3604:2011.

Solutions for soils prone to liquefaction or expansive soils are available using the Firth RibRaft® technology, however these are outside the scope of this Manual and require specific engineering design.

Where the ultimate bearing capacity required of the supporting ground is verified by Scala Penetrometer testing in accordance with Clause 3.3 of NZS3604:2011 or for cohesive soils using a calibrated shear vane in accordance with the NZGS Guideline for Hand Held Shear Vane Test, the bearing capacity shall exceed the values in Table 2 for the proposed building type. For scala penetrometer testing, the bearing capacity shall be considered adequate when the number of blows per 300mm depth of penetration below the underside of the system at each test site exceeds the values given in Table 2 below.

For RibRaft® foundations compliance with Table 2 allows ultimate bearing capacities of less than 300kPa. However, with the exception of bearing capacity all other requirements in NZS3604:2011 for "good ground" shall be complied with.

Table 2 Scala Penetrometer Blows Required and Ultimate Bearing Capacity

FOUNDATION TYPE	ULTIMATE BEARING CAPACITY (KPA)	MIN. BLOWS PER 300MM DEPTH FOR SCALA TESTING
A	140	4
B	175	5
C	210	6
D	240	7
E	275	8
G	Good ground	9

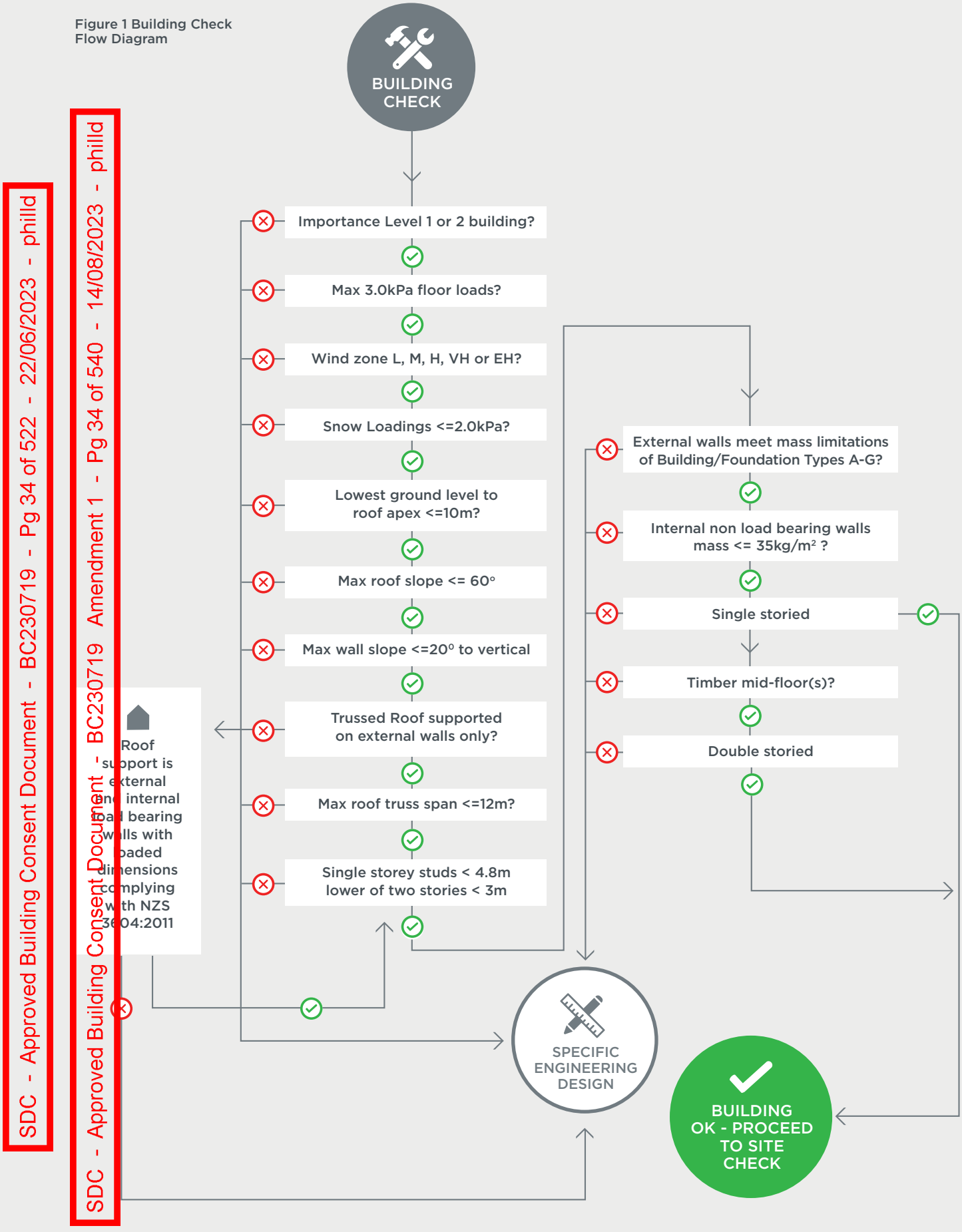
3.7 Flow Diagrams

The flow diagrams on the following pages (adapted from NZS3604:2011) will help in determining whether the foundation specific details for the system can be used for the purposes of the concrete floor slab construction. There are two checks in the process. The first is to determine whether the proposed building complies with the requirements set out in this Manual (Building Check), and the second is to determine whether the site complies with the requirements set out in this Manual (Site Check).

(Note: NZS3604:2011 provides for parts of buildings to be considered as individual buildings. These flow diagrams apply to those parts of the building where slab-on-ground is being considered and where the part of the building can be considered as an individual building under NZS3604:2011).

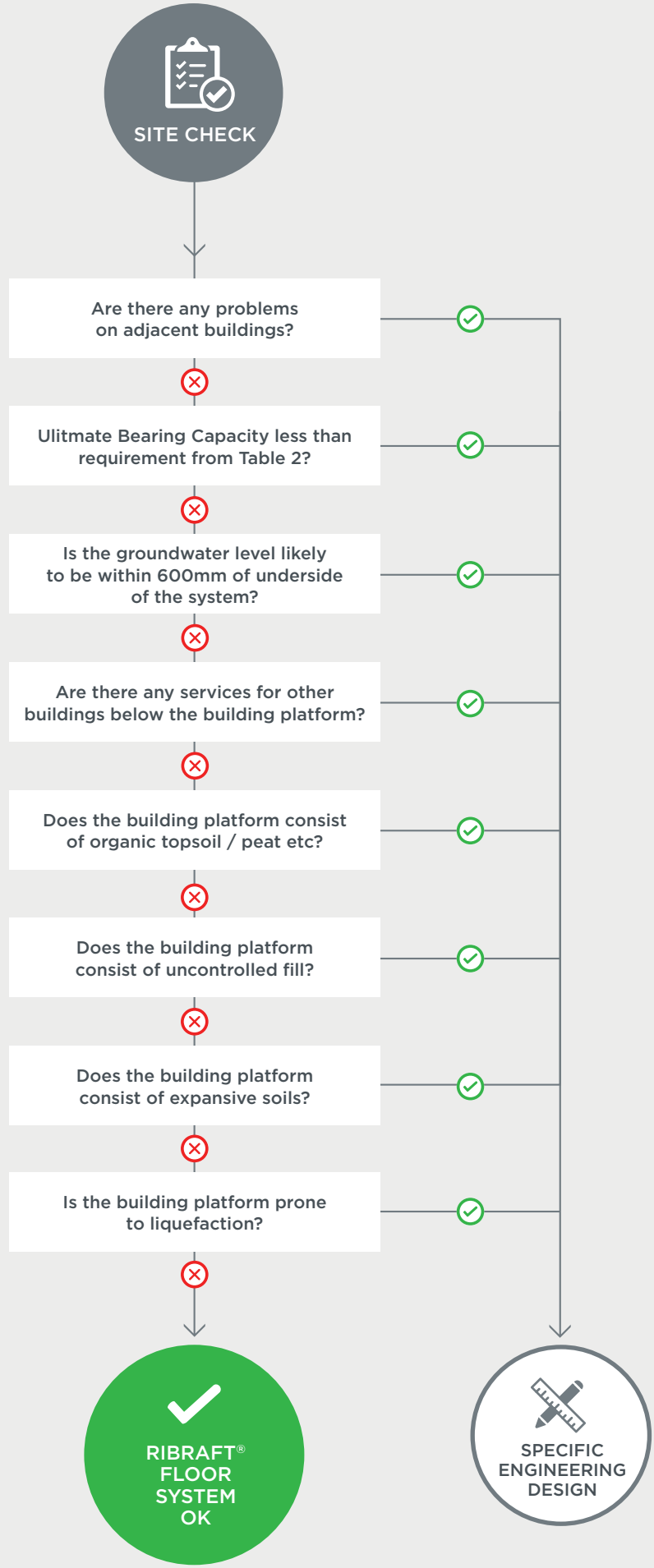
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Figure 1 Building Check Flow Diagram



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Figure 2 Building Check
Flow Diagram



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4.0 CONSTRUCTION DETAILS

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

4.1 Pod Layout

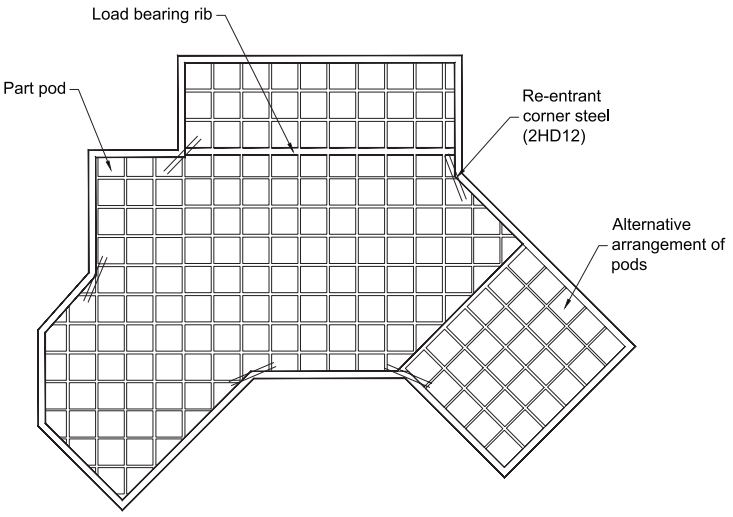
RibRaft® polystyrene pods supplied by Firth (1100 x 1100 x 220mm thick) shall be placed on levelled ground and arranged in a waffle pattern. The pods are used as void formers while the concrete is curing. These pods are an integral component of the system and shall not be substituted.

Pods shall be placed so as to provide the necessary spacing between the edge beams and ribs as described below. The first rib out from the edge beam shall have a maximum clear separation of 1100mm however in all other cases the centre to centre distance between the ribs, whether they are 100mm or 300mm wide, shall be 1200mm. In the case of 100mm ribs this centre to centre spacing is achieved by the 1100mm square pods however between 100mm and 300mm ribs, or between two 300mm ribs, the pods shall be cut down to suit. Pods may be cut down to size but shall not be added to, where this is necessary to suit the building layout, penetrations or orientation of beams and ribs.

Figure 3 shows a typical layout of the pods and ribs. Note the part pods around the edge, where the building shape dictates, and adjacent to the 300mm rib.

Firth suggests that when drawing the building plan, a generic RibRaft® grid (100mm wide ribs at 1200mm centres) is set out using the corner of the building as a starting point. The location of any load bearing ribs, or point loads greater than 10kN, are identified and pods cut to establish 300mm wide ribs or foundation pads as described in this Manual. The most cost effective solution being a simple grid layout which requires minimum cutting of the pods. Ribs can be used at less than 1200mm centres, however it is more cost effective to use the 1200mm centres wherever practicable.

Figure 3 Typical RibRaft® Plan



4.2 Edge Beam Width and Reinforcement

Edge beams around the perimeter of the floor slab shall be 300mm to provide bearing capacity for external load bearing walls, and contain 2-HD12 bars (Grade 500E) as bottom steel and 1-HD12 bar (Grade 500E) in the top. This top bar shall be tied to the underside of the reinforcement mesh. Refer Figure 5, below for construction details. The edge beam shall be rebated for brick veneers where necessary as shown in Figure 5(C).

4.3 Internal Ribs (non load bearing) Width and Reinforcement

Each standard internal rib shall be 100mm wide and shall contain 1-HD12 steel bar (Grade 500E) held in place at the bottom of the rib by a Firth spacer. Refer Figure 5E for construction details.

4.4 Internal Ribs (load bearing) Width and Reinforcement

For load bearing walls that support the roof and floors and heavy internal walls, the pods shall be cut to create a 300mm wide rib directly under the load bearing wall, Refer Figure 5(D) for construction details under load bearing walls. Where the load bearing ribs meet and terminate at an edge beam or internal rib the bottom reinforcement from the load bearing rib shall be bent into the adjacent rib and tied together. The reinforcement shall lap for at least 720mm.

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4.5 Point Loads

Truss manufacturers often support the roof trusses internally on posts or studs within a wall, which are described on the truss manufacturer's drawings as falling into various ultimate limit state categories. Table 3 summaries when individual footings are required below the reactions, and the form these should take.

Table 3 Foundation Requirements for Individual Point Loads

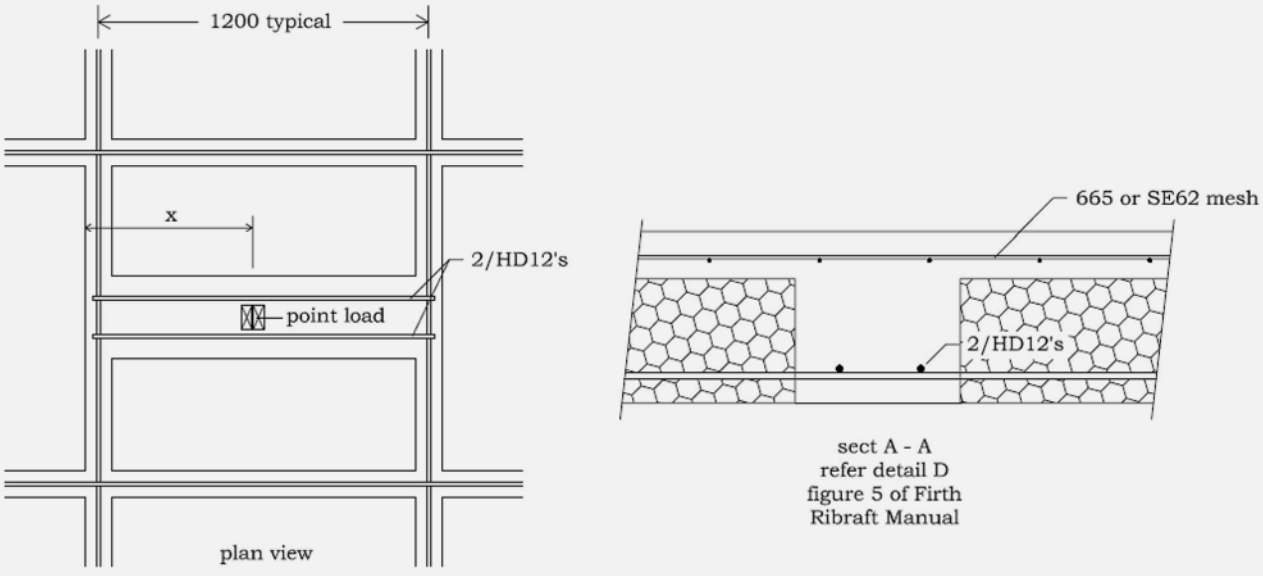
	FOUNDATION OPTIONS BELOW POINT LOAD:	
ULTIMATE LIMIT POINT LOAD REACTION	PAD OPTION, GOOD GROUND	BEAM OPTION, BEARING CAPACITY GREATER THAN 140KPA [3]
Up to 10kN	No thickening required	No thickening required
Up to 20 kN	375x375 pad[1]	300mm wide load under point load as detailed in Figure 5
Up to 30kN	450x450 pad[2]	300mm wide load under point load as detailed in Figure 5

Notes
(1) Pad thickness to match depth of pods plus topping (bears on ground not polystyrene) and reinforced with 2 x D12 Bars both ways
(2) Pad thickness to match depth of pods plus topping (bears on ground not polystyrene) and reinforced with 3 x D12 Bars both ways
(3) Refer section 3.6 for confirmation of bearing capacity. With exception of bearing capacity all other requirements in NZS3604 for good ground shall be complied with.

Figure 4 Details for Beam Option Thickening Under Point Loads

ULTIMATE LIMIT LOAD P FROM TRUSS DESIGNER	MINIMUM EDGE DISTANCE X IN MM
20kN	200 *
30 kN	400 *

* If minimum edge distances cannot be achieved extend thickening to next 100mm ribs



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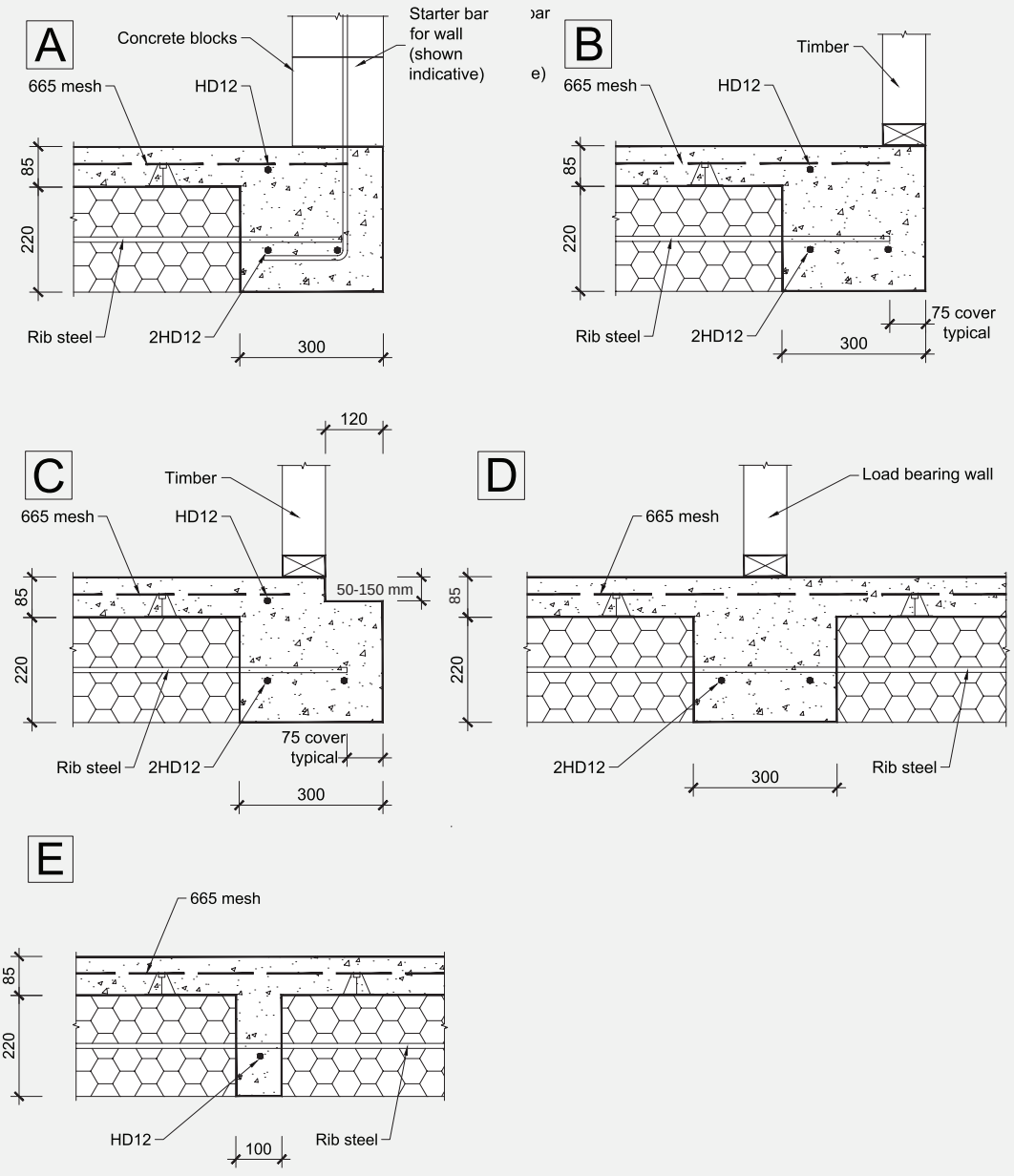
4.6 Mesh Reinforcement

The entire floor slab shall be reinforced with 665 or SE62 mesh supported on 40mm mesh chairs sitting on the polystyrene pods.

4.7 Re-entrant Corners

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

Figure 5
Standard RibRaft®
Construction Details



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5.0 LATERAL RESISTANCE

5.1 Earthquake Resistance

Unlike conventional foundation systems, the Firth RibRaft® system is not embedded into the ground. Sliding resistance to horizontal seismic loads is provided by frictional contact with the soil. In locations where the Seismic Hazard Factor Z is greater than 0.45, shear keys maybe required to resist seismic loads. Such buildings require specific engineering design and are outside the scope of this document. Refer to Figure 6.

Depending on the wind zone and the weight of the building elements this frictional resistance may not be sufficient to provide sliding resistance to wind loads, and specific shear keys may be required, as detailed in Clause 5.2.

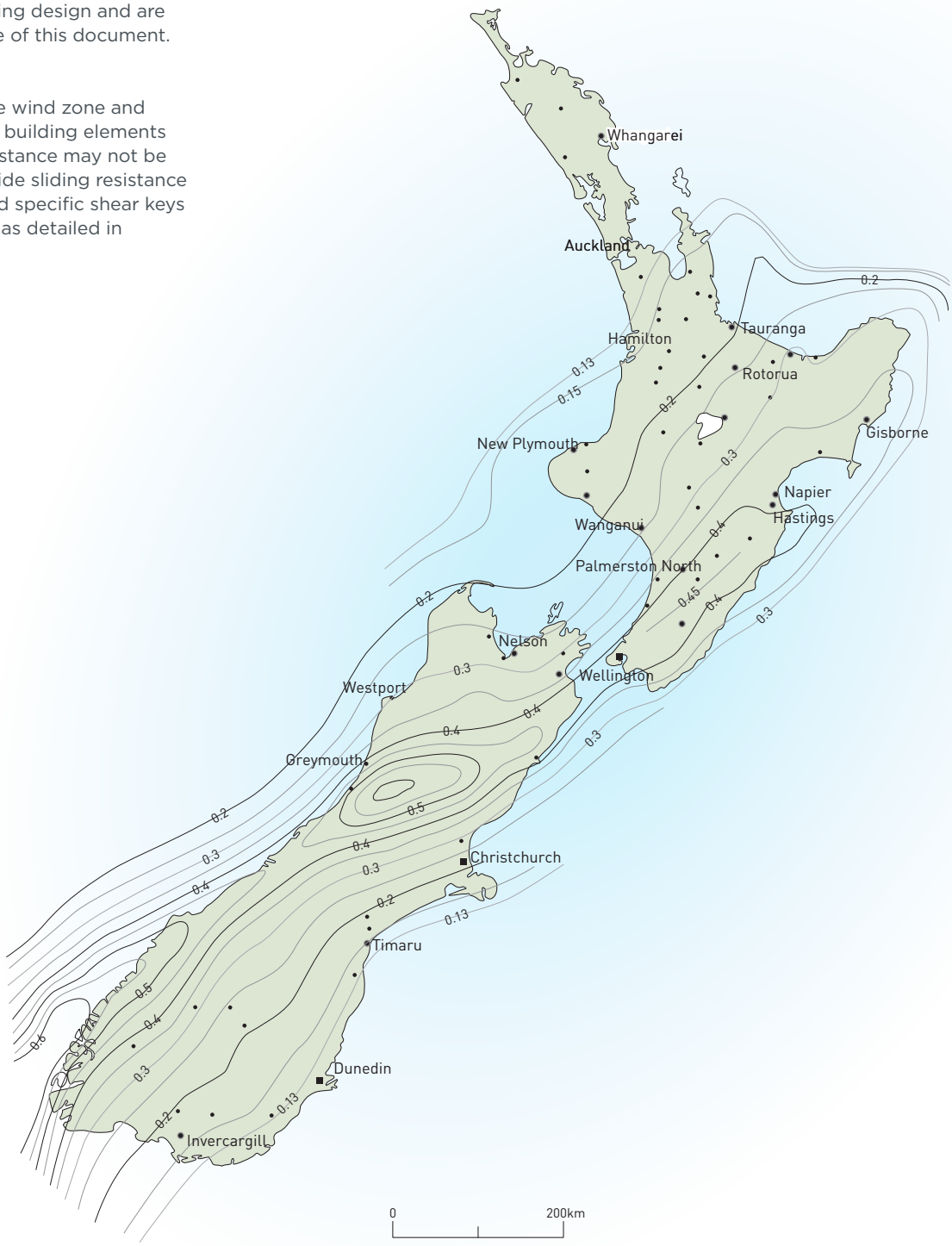


Figure 6
Seismic Hazard Factor Z to NZS 1170.5

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5.2 Wind Resistance

The building's bracing demand from wind loading shall be assessed from Section 5 of NZS 3604:2011 for both directions (i.e. along and across the building). The bracing capacity of the system must exceed the greater of the bracing demands determined.

The bracing capacity of the system shall be determined as the sum of the bracing capacity provided by frictional resistance (i.e. friction between the system and the ground) and the bracing capacity provided by the shear keys (if any) necessary to meet the requirements of Clause 5.2.

The bracing capacity provided by frictional resistance shall be determined from Table 4 depending on the building type, roof weight, and floor live loading. The bracing capacity provided by the shear keys shall be the sum of the bracing capacity of the individual shear keys determined as follows. If the shear key is in clay, each shear key shall be considered to contribute 170 BU's. If the shear key is in sand, each shear key shall be considered to contribute 200 BU's. If the bracing capacity of the system, determined from the frictional resistance and the shear keys as described above, is less than the bracing demand further shear keys shall be added until the bracing demand is met.

BUILDING TYPE	ROOF TYPE	GROUND FLOOR EXTERNAL WALLS	SECOND STOREY EXTERNAL WALLS	BU's PROVIDED PER 100M² 1.5KPA	FOR LIVE LOADING OF: 3.0KPA
Single Storey	Light	Light		1630	1746
Single Storey	Heavy	Light		1737	1857
Single Storey	Light	Heavy		1802	1922
Single Storey	Heavy	Heavy		1909	2029
Double Storey	Light	Light	Light	2163	2403
Double Storey	Heavy	Light	Light	2270	2510
Double Storey	Light	Heavy	Light	2335	2575
Double Storey	Heavy	Heavy	Light	2442	2682

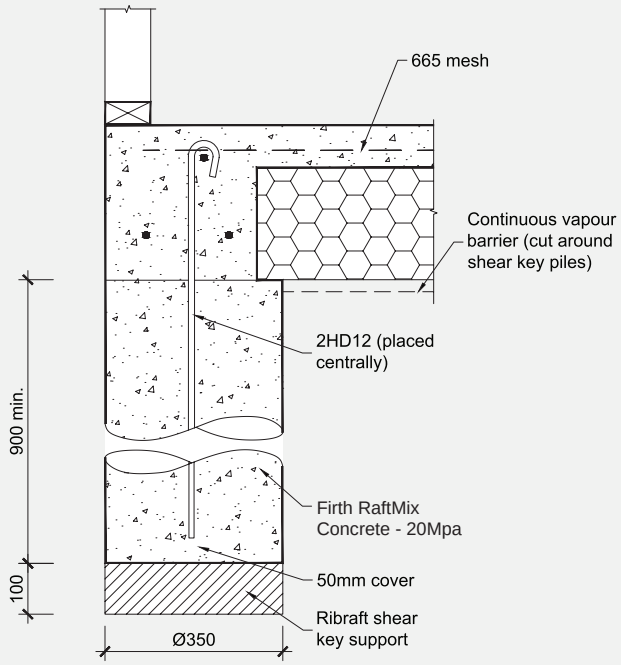
Table 4 Bracing Capacity Provided By Frictional Resistance Per 100m² Of Ground Floor Area

5.3 Shear Keys

Shear key piles required by Clause 5.2 must be uniformly distributed around the perimeter of the building, and be located at the edge beam/internal rib junction. Where a shear key is required, the minimum number of shear keys shall be two per floor plan. Where two shear keys are used they shall be placed at diagonally opposite ends of the floor plan.

Construction details of the shear keys shall be as shown on Figure 7. Shear keys shall be a minimum of 900mm long. The holes shall be over-drilled at least 100mm and a polystyrene RibRaft® Shear Key Support placed into the bottom of each hole. This will support only the plastic (wet) concrete and then allow movement of the shear key if settlement of the supporting ground occurs. The effective end bearing of the shear keys is therefore eliminated.

Figure 7 RibRaft® Shear Key



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5.4 Design Example For Lateral Resistance Calculation

The following is a short example to demonstrate the process of determining whether shear piles are required.

Consider a 180m^2 single storey home with a light roof located in Palmerston North in a VH wind zone as defined by NZS3604. Assume the building height is 6m with 3m above the eaves. The length for across wind considerations is 15m and the width (along wind) is 12m.

First consider seismic actions. From Figure 6 the seismic hazard factor is 0.4. Since this is less than 0.45 shear keys will not be required for earthquake resistance.

Now consider wind loading. Table 5.5 of NZS3604 requires 95 bracing units per meter (BU/m) across the building and 90 BU/m along. As it's a very high wind zone these figures need to be increased by a factor of 1.3.

The BU demand for across building wind is therefore = 95 x 1.3 x 15 = 1853BU
The BU demand along the building = 90 x 1.3 x 12 = 1404BU

From Table 4 for a single storey light weight roof with 1.5kPa live load the capacity is 1630BU per 100m^2. Therefore for 180m^2 the capacity is 2934BU. As the capacity (2934) is greater than the demand (1853) no shear keys are required.

If the demand had exceeded the capacity then any shortfall can be provided by supplying shear keys in accordance with Section 5.3 with each shear key providing the BU specified in Section 5.2.

6.0 OTHER DESIGN DETAILS

6.1 R-Values

The insulation performance of a building element is measured by the "R-Value". The schedule method is the simplest method to achieve compliance with Clause H1 of the Building Code. Using this method the minimum R-Values required for floors are R1.3 for light timber frame construction, and typically R1.5 for masonry construction. R-values of R1.3 can be used for masonry construction if glazing with greater insulation is used (refer NZBC, Clause H1). If in-floor heating is used the minimum required R-Value is increased to R1.9, and the resistance to thermal movement into the room must be one tenth of that to the outside environment.

The fourth edition of H1 (amendment 3, January 2017) states that "Concrete slab-on-ground floors are deemed to achieve a construction R-value of 1.3, unless a higher R-value is justified by calculation or physical testing". RibRaft® is therefore a deemed to comply solution however in some instances designers may wish to determine the R-value as part of the design process. There are numerous methods for calculating R-values for slabs on ground, with many of the processes giving quite different R-values. NZBC clause H1 prescribed that an "Acceptable methods for determining the thermal resistance (R-values) of building elements are contained in NZS 4214."

The R-values provided in this Manual use the NZS4214 methodology.

If the R-value calculation is required to demonstrate compliance with the Building Code, then the NZS4214 methodology is probably the best alternative due to its refrerence in H1. However, more technically robust calculation methodologies exist and and where the R-values are important, for example heated floors, use can be made of the BRANZ Home Insulation Guide. For these instances edge insulation is also recommended.

When slab edge insulation is specified, it is recommended that Firth HotEdge® is used as it has been designed to be compatable with Firth RibRaft®.

The R-Value of a concrete floor is dependent on the floor area to perimeter ratio, and the details of the floor perimeter. The R-Value for various solutions are illustrated below. The R-Values have been independently calculated using NZS4214:2006 "Methods of Determining the Total Thermal Resistance of Parts of Buildings," though modified for perimeter heat loss using recommendations from the Building Research Establishment.

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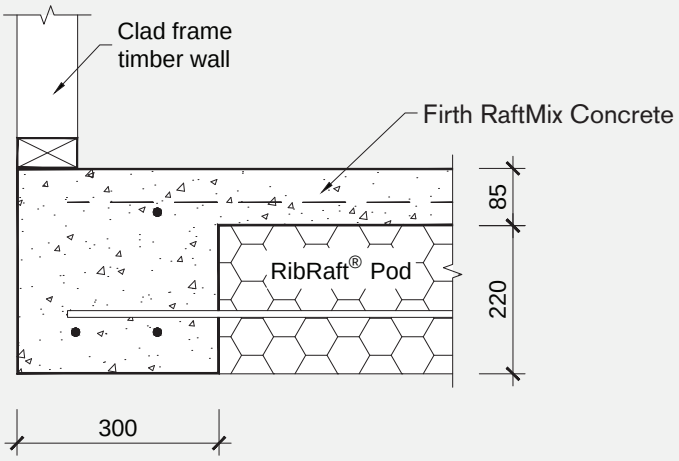


Figure 8
RibRaft® R Values For 90mm Thick Walls On The Floor Edge

	FLOOR AREA TO PERIMETER RATIO M²/M										
	1.00	1.25	1.50	1.75	2.00	2.25	2.5	2.75	3.0	3.5	4.00
R-Value m² °C/W	1.28	1.40	1.52	1.64	1.75	1.86	1.97	2.07	2.17	2.38	2.57

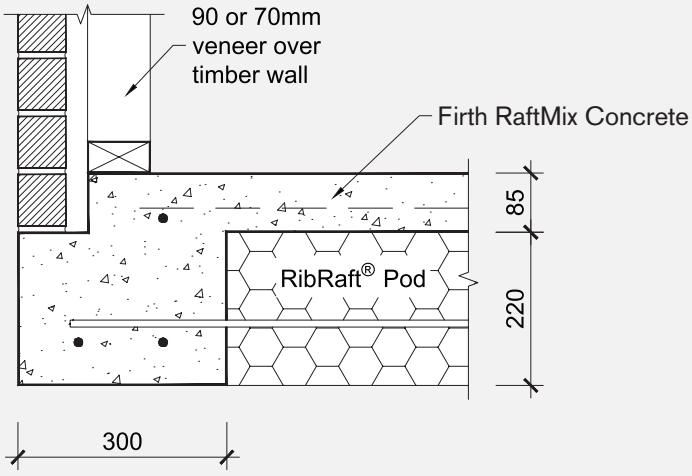


Figure 9
RibRaft® R Values For 70-90mm Thick Veneer, Cavity, and 90mm Walls.

	FLOOR AREA TO PERIMETER RATIO M²/M									
	1.25	1.50	1.75	2.00	2.25	2.5	2.75	3.0	3.5	4.00
R-Value m² °C/W	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84

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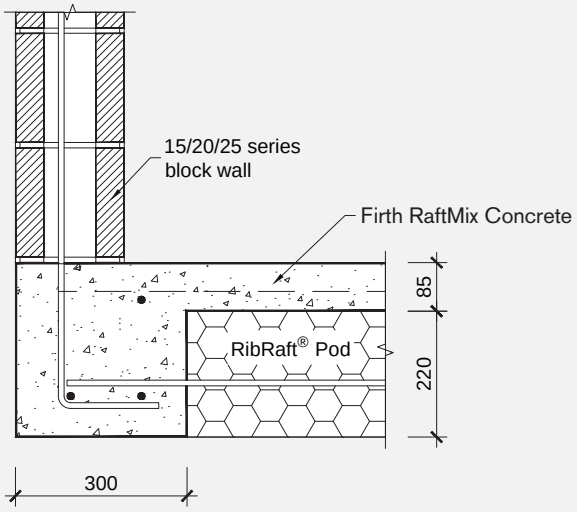


Figure 10
RibRaft® R Values For Various Thicknesses Of Masonry Walls

	BLOCK	FLOOR AREA TO PERIMETER RATIO M²/M									
		1.25	1.50	1.75	2.00	2.25	2.5	2.75	3.0	3.5	4.00
R-Value m² °C/W	15 SERIES	1.48	1.60	1.73	1.85	1.96	2.08	2.19	2.30	2.51	2.72
	20 SERIES	1.54	1.67	1.80	1.93	2.05	2.17	2.28	2.40	2.62	2.84
	25 SERIES	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95

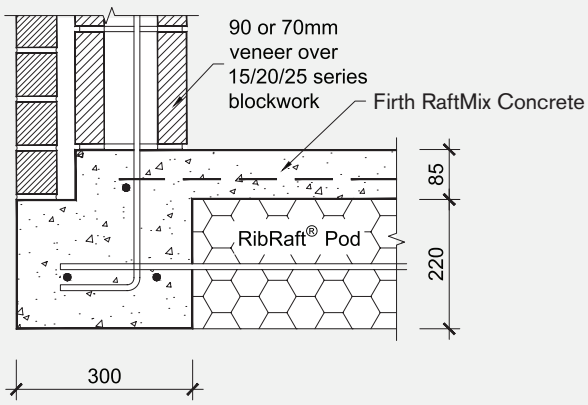


Figure 11
RibRaft® R-Values For 70-90mm Thick Veneer, Cavity, And Various Thickness Masonry Walls

	BLOCK	FLOOR AREA TO PERIMETER RATIO M²/M									
		1.25	1.50	1.75	2.00	2.25	2.0	2.75	3.0	3.5	4.00
R-Value m² °C/W	15 SERIES	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95
	20 SERIES	1.64	1.78	1.92	2.06	2.19	2.32	2.44	2.56	2.81	3.04
	25 SERIES	1.69	1.83	1.98	2.11	2.25	2.38	2.51	2.64	2.88	3.12

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6.2 Shrinkage Control

Shrinkage control joints reduce the risk of unwanted cracks, and their placement needs to be carefully considered where uncontrolled cracking could be unacceptable. Two types are described here: saw cut joints (which are tied joints), and free joints.

6.2.1 Saw Cut Joints

Saw cuts are located at positons in which the concrete is likely to crack due to stresses induced by restrained shrinkage. The aim of providing them is for the concrete to crack at the bottom of the saw cut thus minimizing the potential for a visible crack wandering over the surface. The level of reinforcement provided in a RibRaft® mean that cracks have no structural implications being only an aesthetics issue. Factors to consider are the type of floor finish, the location of ribs and ground beams, underfloor heating, and the effect of piles restraining shrinkage.

Preference should be given to using early entry saws which are used immediately after finishing. Shrinkage control joints cut using diamond blades shall be cut as early as possible which is typically within 24 hours of hardening in summer, and 48 hours in winter. They shall be cut to a depth of 25mm. Shrinkage control joints do not guarantee elimination of all visible or unwanted cracks but should minimise number.

Joints shall be positioned to coincide with major changes in floor plan. Where concrete is to be exposed, for example in a garage, or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 5m. Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 1.5:1. Shrinkage control joints shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib, then the joint shall be located directly above one edge of that rib.

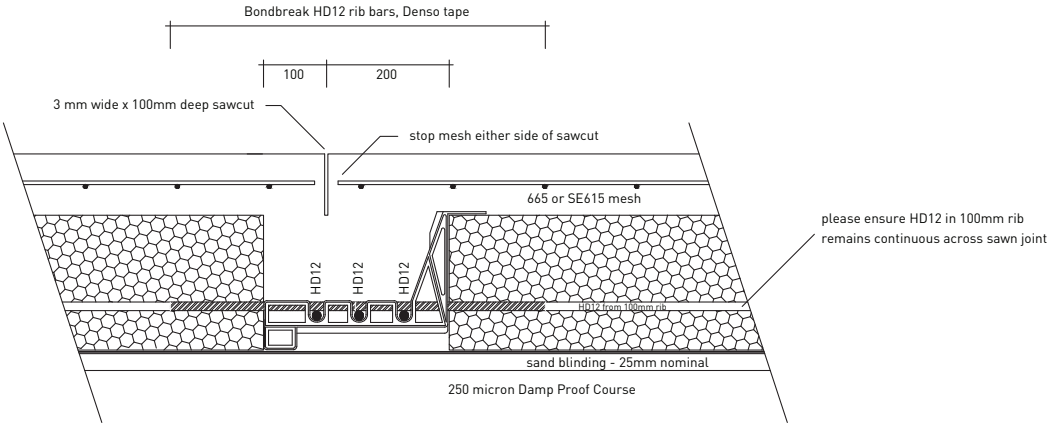
In order to limit the width of cracks at re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 3.

6.2.2 Free Joints

Where the length of the floor exceeds 30m a free joint shall be provided as detailed in Figure 12. Movement, shrinkage and thermal, will occur over this joint so it shall be positioned to minimize the impact of this movement on floor coverings and wall elements.

Where the bottom of the RibRaft® is not flat (for example the floor incorporates a step down), free joints shall be provided if the distance from the step down to edge of slab exceeds 15m.

Figure 12
Free Joint Details



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

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6.3 Services Detailing

Two options exist for running services, both of which are appropriate, however some regional Building Control Authorities and Builders have clear preferences. The options being within slab, or under slab. Experience from the Christchurch earthquakes shows that the most seismically robust solution is for services to run within the plane of the pods (within slab).

6.3.1 Within Slab Running of Services

Pipes services can be run within the plane of the pods either exiting out of the side of the perimeter ring beam or going underground at the edge beam. Pipes shall be laid at a fall to comply with NZBC G13/AS1. For pipe up to 65mm diameter the minimum gradient is typically 1 in 40, while for 100mm pipes it's 1 in 60, however greater falls may be required dependent upon the required number of discharge units. Table 5 provides distances from the edge of the slab to pipe surface penetration to achieve minimum pipe gradients. A 300mm pod alternative is often used where the proposed positioning of the service means minimum required gradients cannot be achieved. Where gradients cannot be achieved with a 300mm pod, then service will require to be run under the slab.

Pipes shall be located to pass perpendicular to the ribs and beams and shall not be laid along the length of ribs or beams. Pods are cut as required to achieve the required fall and position. Pipes shall be laid to ensure 15mm concrete cover between pipe and reinforcement in the perimeter beam. All pipes in contact with concrete shall be lagged with an impermeable material of at least 6mm thickness.

Table 5 Maximum Distance From Exterior To Entrance Point Of Plumbing Pipes

PIPE DIAMETER (ID)MM	GRADIENT	MAXIMUM DISTANCE TO EDGE WITH 220MM THICK POD	MAXIMUM DISTANCE TO EDGE WITH 300MM THICK POD
40	1 in 40	3400	6600
50	1 in 40	3000	6200
65	1 in 40	2400	5600
100	1 in 60	1200	4400

6.3.2 Under Slab Running Of Services

For this option, services ducts shall be conveyed underground to their plan location then brought up through the polystyrene pod and the concrete floor slab, within the limitation imposed by Table 8. Services shall not be placed within any concrete except to cross that section of concrete i.e. services shall not run along ribs or edge beams. In accordance with AS/NZS3500.4:2015 pipes penetrating through concrete shall be:

> Installed at right angles to the slab surface.

> Lagged with an impermeable material for the full depth of the concrete penetration.

> Lagging must be at least 6mm thick.

The maximum diameter of the services shall be as outlined in Table 6.

Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in Figure 13, services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in Figure 15 at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

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Table 6 Maximum Diameter Of Pipe Services

ELEMENT	VERTICAL SERVICE	HORIZONTAL SERVICE
300mm wide edge beam	50mm nominal bore pipe	100mm NB pipe
500mm localized wide edge beam (1)	100mm NB pipe	100mm NB pipe
300mm wide internal load bearing rib	50 NB pipe	100mm NB pipe
100mm wide internal rib	Nil	100mm NB pipe
Slab	100 NB pipe, or for large services 450mm square see also Note 3	Nil

Notes:

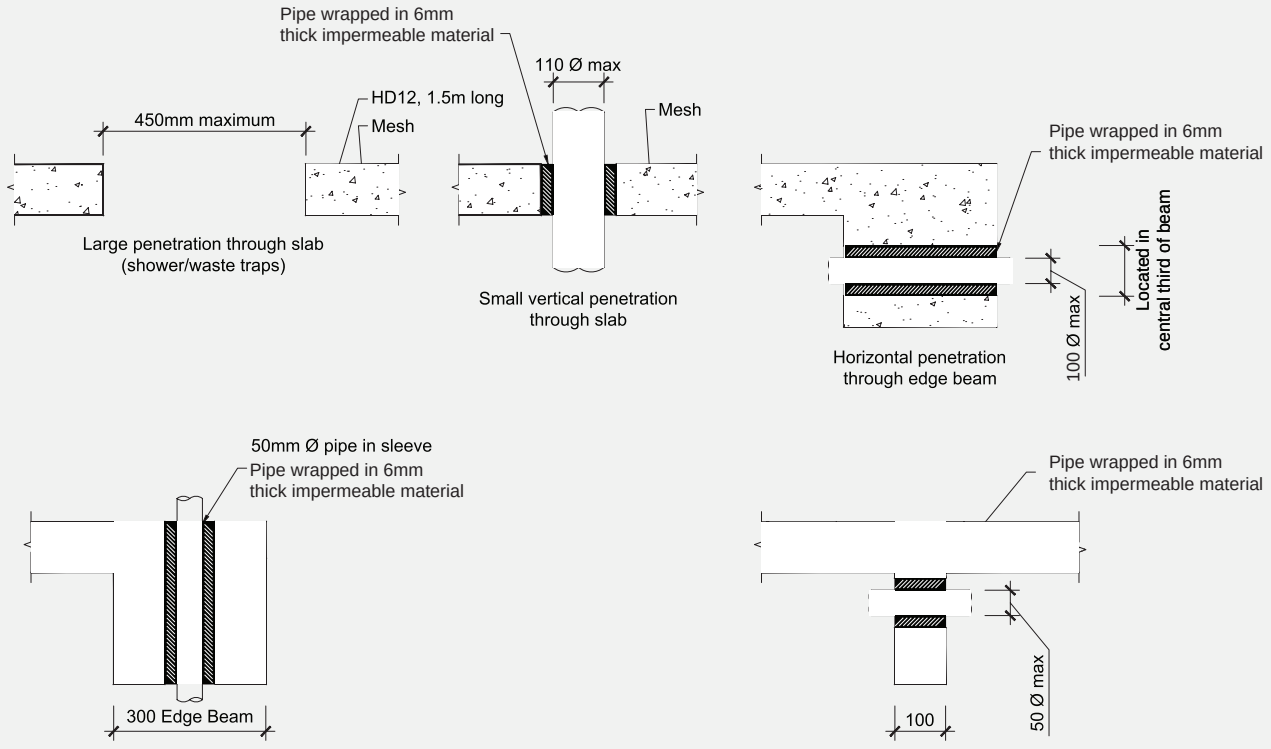
(1) For situations where a 100mm diameter pipe is required to pass vertically through the edge beam, the edge beam shall be locally increased in width to a minimum of 500mm wide. This shall be achieved by keeping flush the outside face of the edge beam and removing 200mm from the pod. The width shall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

(2) Where a gas pipe line runs through the RibRaft® floor system, in addition to the requirements above, the pipeline shall enter the building through the outside face of the perimeter foundation beam and be located in the plane of the pods. The aim being to ensure that damage to the gas pipe will most likely occur outside the building envelope should movement occur between the ground and RibRaft® in a large earthquake.

(3) Larger penetrations or voids up to 450mm square (e.g. for shower waste/traps) are permitted through the slab provided all the conditions of this paragraph are met. These openings shall be trimmed with 1 HD12 (Grade 500E) bar 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall not be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower will ensure that the void is sealed/covered).

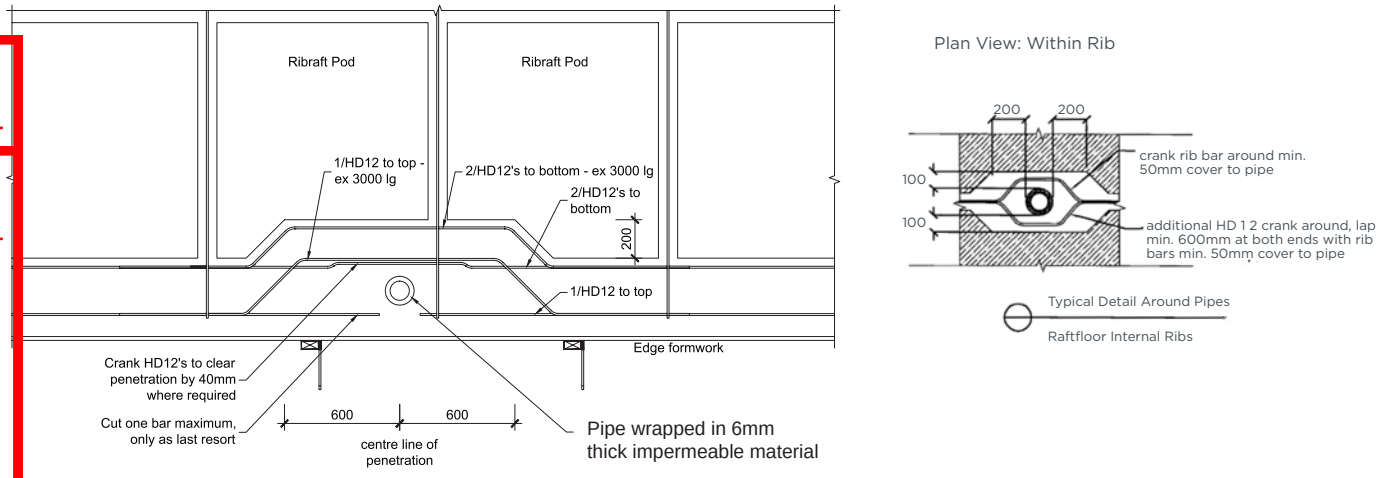
A pictorial of some of the above requirements is illustrated in Figure 13 and 14.

Figure 13 Example of Detailing Requirements For Services



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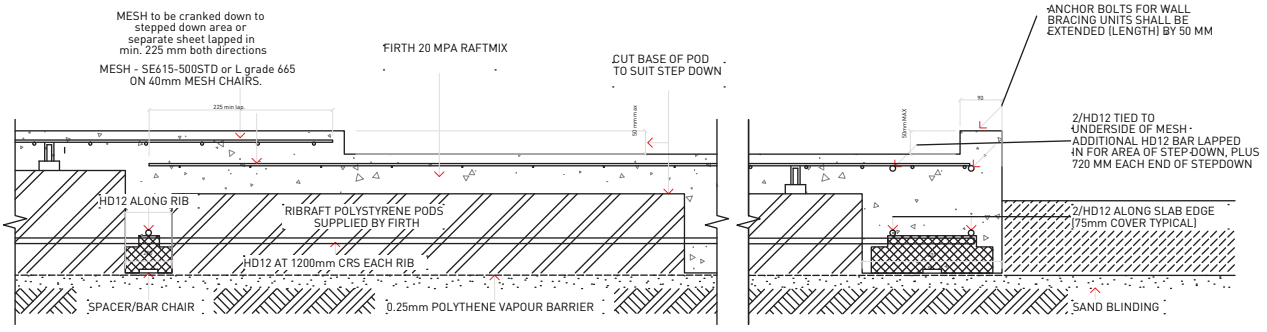
Figure 14
Localised Increase In Width At Edge Beam Where Vertical Service Up To 100mm Diameter Are Required



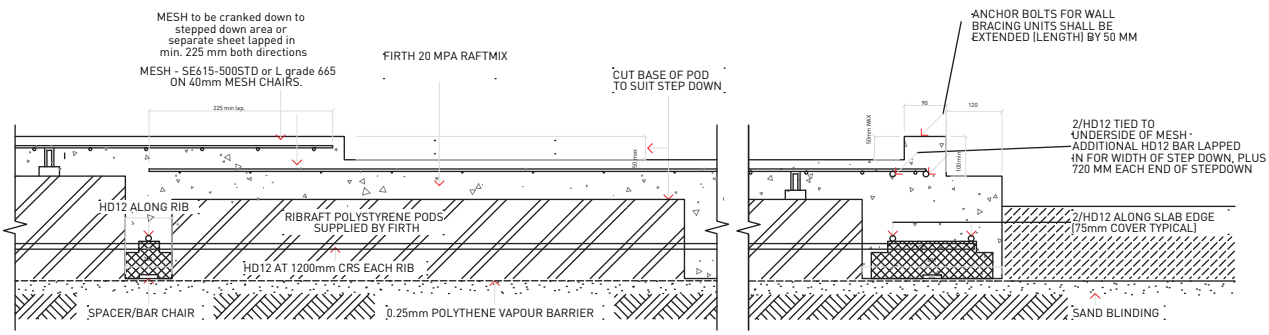
6.3.3 Recesses for Showers

Where showers are rebated up to 50mm into the RibRaft® concrete topping, the details specified shall be in accordance with Figure 15.

Figure 15 Details where recesses of up to 50mm are required for rebated showers



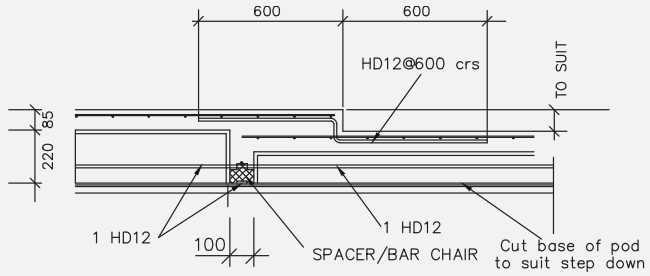
RIB RAFT FLOOR - SET-DOWN DETAIL FOR MAX. 50mm REBATED SHOWER



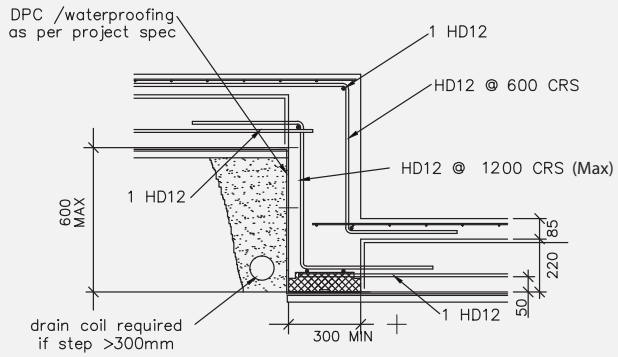
RIB RAFT FLOOR - SET-DOWN DETAIL FOR MAX. 50mm REBATED SHOWER

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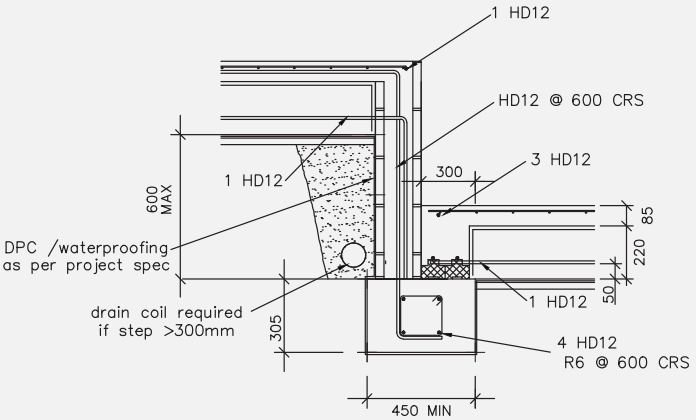
Figure 16 Details where step downs are required in the floor



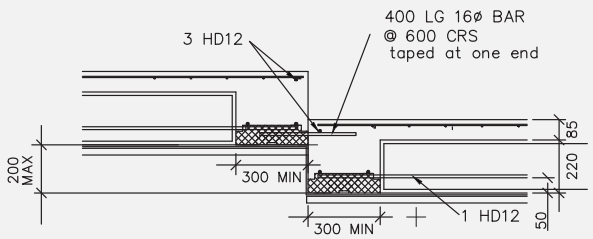
7/S2 SET–DOWN DETAIL FOR STEP UP TO 100mm
1:20



9/S2 SET–DOWN DETAIL IN CONCRETE FOR STEP LESS THAN 600mm
1:20



8/S2 SET–DOWN DETAIL IN MASONRY FOR STEP LESS THAN 600mm
1:20



10/S2 SET–DOWN DETAIL FOR STEP 100 TO 200mm FOR SEPARATELY POURED SLABS
1:20

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

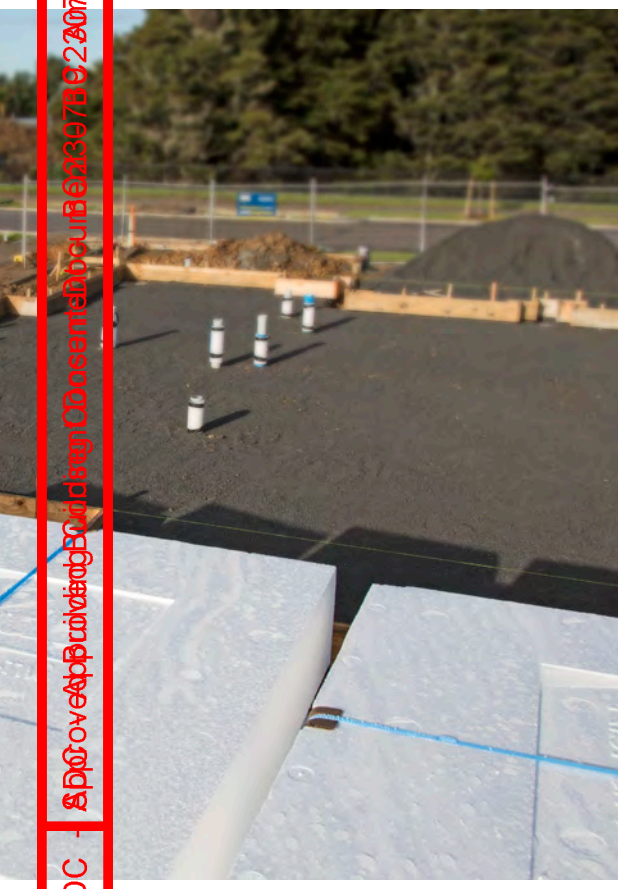
Where the site topography requires a step down in the slab, steps of up to 600mm can be accommodated using one of the details provided in Figure 16. A step down in the RibRaft® floor system anchors the floor in that location with respect to volume changes associated with drying shrinkage. As required by 6.2.2, a free joint shall be provided if the distance from the step down to the slab edge exceeds 15m.

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SECTION: INSTALLATION INFORMATION

2

THIS SECTION DETAILS THE INSTALLATION INFORMATION REQUIRED FOR THE FIRTH FIBRAFT® FLOOR SYSTEM (THE SYSTEM). FULL INFORMATION ON THE DESIGN PROCEDURES NOT REQUIRING SPECIFIC ENGINEERING INPUT, AND REQUIREMENTS FOR THE SITE ASSESSMENT ARE DESCRIBED IN SECTION 1 OF THIS MANUAL (DESIGN INFORMATION). WHERE STANDARDS ARE REFERENCED INTHIS MANUAL THESE SHALL INCLUDE THE LATEST AMENDMENTS.



2.0 SITE REQUIREMENTS

2.1 General

The site requirements of this Manual are concerned solely with the soil conditions under or immediately adjacent to the system. If a site does not comply with this Manual, the system shall be subject to specific engineering design.

This Section shall only apply for building sites such that:

> The ground is as specified in Section 1 of this Manual;

> Any system erected at the top of a slope (whether fill compacted in accordance with NZS4431, or natural ground) shall be located as shown in Figure 1 so that the finished ground is always outside the dashed line shown. (The vertical distance, V, shall be measured to 50mm below the underside of the slab).

Where the finished ground does not comply with Figure 1, the slope shall be retained by a specifically designed retaining wall.

2.2 Temporary Excavations

No excavation shall take place at a location or in a manner where the stability of the foundation material is likely to be compromised. The backfilled material shall match the compaction and strength of, and have similar properties to, the surrounding material. The sides of the excavation shall be propped as necessary.

Temporary excavations shall be open for no longer than 48 hours and shall take place only above the critical depth line as shown on Figure 2. Should temporary excavations be required below this line, specific engineering design is required.

2.3 Surface Water

Surface water from the site shall not flow across the slab platform. For example, on cut and fill sites the ground uphill from the system shall be graded to direct any surface run-off away from the system as shown in Figure 3.

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Figure 1
Relationship
Of RibRaft®
To Sloping
Ground Surface

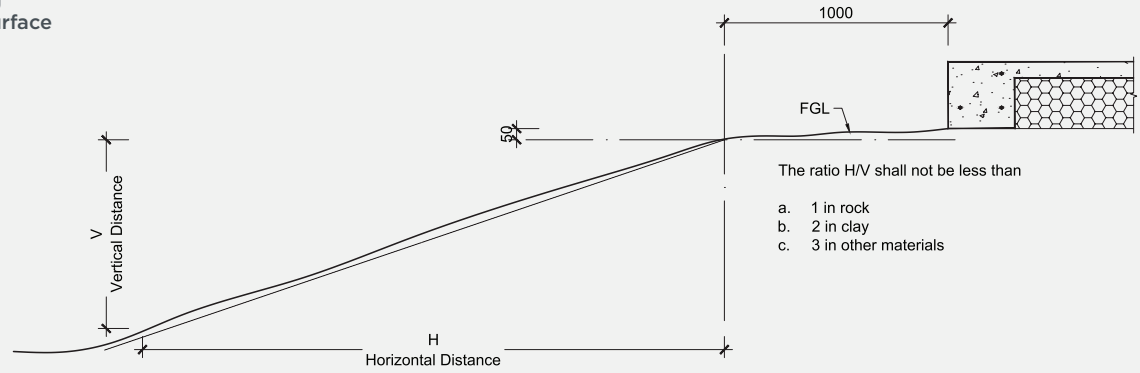


Figure 2
Temporary
Excavation
Limited

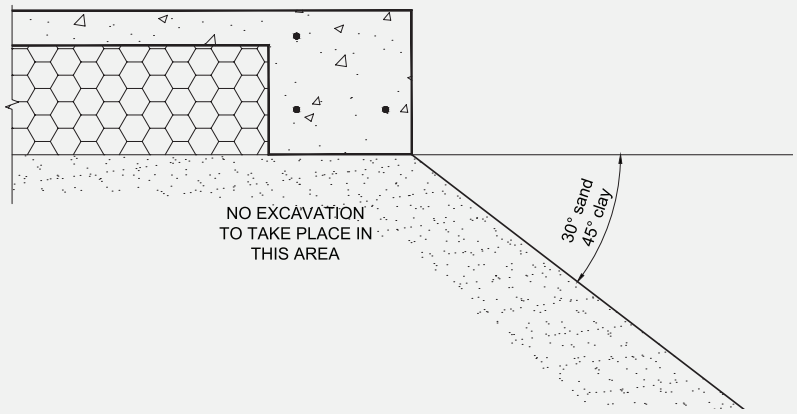
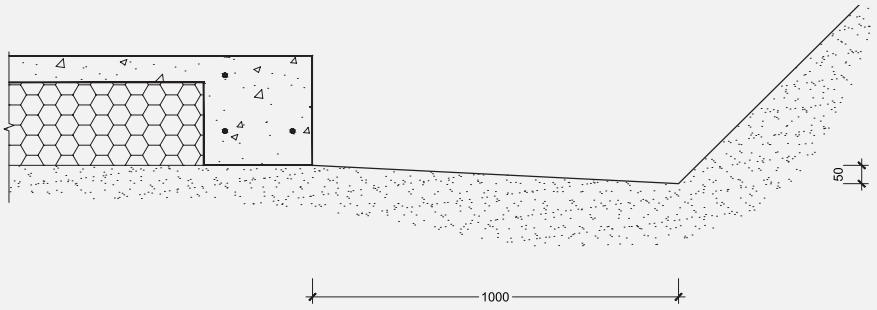


Figure 3
Site Grading



3.0 INSTALLATION PROCEDURE

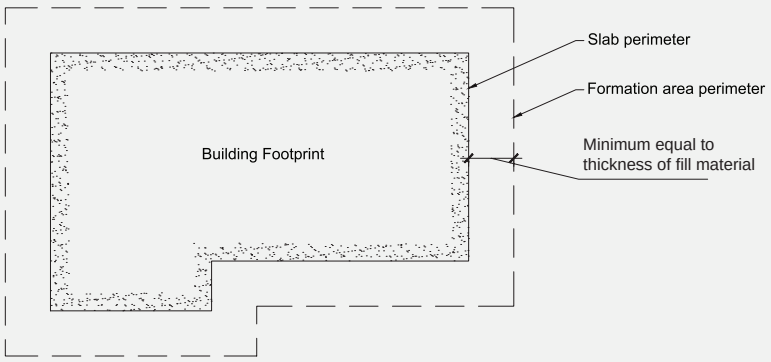
3.1 Site Preparation

All vegetation, topsoil and other organic or deleterious material shall be removed from the area to be covered by the building (formation area) prior to commencing construction of the system.

3.2 Earthworks

The formation area shall be cut or filled to a level approximately 330mm below finished floor level. Where fill is required to achieve this level, the fill shall be certified by a geotechnical engineer (outside the scope of this Manual) or shall be granular fill in accordance with Clause 7.5.3 of NZS 3604:2011 "Timber Framed Buildings". The formation area shall also extend a distance equal to the thickness of the fill material beyond the slab perimeter as shown in Figure 4. The installer shall confirm the acceptability of the ground over the entire building platform before proceeding with the construction. Refer to Clause 3.5 of Section 1 (Design Information) for requirements.

Figure 4 Plan of Formation Area



3.3 Shear Keys

Where shear keys are required, the holes shall be drilled following the site clearing and earthworks, in accordance with Clause 4 in this section, and prior to the construction of the system commencing.

3.4 Plumbing and Services

Plumbing and services required beneath the system should preferably be conveyed underground to their plan location then brought up through the system.
The trenching, placing, and bedding of the pipes/ducts and the backfilling of the trenches shall conform to the requirements of the consent documentation. Services shall not run along ribs or edge beams. The maximum diameters of the services shall be as dictated in Clause 6.3 of Section 1.

Where required, the services can be installed by removing unnecessary polystyrene and placing pipes within the pod depth. All pipes shall be held firmly in place and have temporary end covers. Any services crossing ribs or the edge beam horizontally shall be placed only within the middle third of the member. Except as noted in Figure 14 (Section 1) services crossing the ribs vertically shall also be constrained to the middle third of the width of the edge or internal load bearing rib. Except as noted in Figure 13 (section 1) at no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the ribs. The pods shall be cut to allow for this and if necessary, the spacing of the ribs shall be decreased locally. There shall be 600mm minimum clear spacing in each direction between penetrations through the system.

Where the services pass through the top of the pods, the opening shall be sealed to prevent materials entering the subfloor cavities. (This can be achieved with Denso tape and a type of easily compressible foam.)

Larger penetrations or voids that are required, up to 450mm square (e.g. for shower waste/traps), shall be installed in accordance with all the conditions of this paragraph. These openings shall be trimmed with 1 HD12 bar (Grade 500E) 1500mm long placed along each side of the opening, tied to the mesh. One set of parallel bars shall be placed on top of the mesh and the other set placed under the mesh. These openings shall not be placed over a rib or edge beam. If necessary, the rib spacing shall be reduced or the pod layout altered to ensure that the opening occurs solely in the slab above a polystyrene pod. Penetrations such as these shall not be installed in garages or other areas where large (>3kN) point loads could be present. Only one penetration greater than 110mm is permitted in the slab above any single pod or part pod. Where two large openings are required to be in close proximity, an internal rib shall separate them. For these large penetrations/voids in the slab, the services shall not be within 25mm of the edges of the void through which they pass, and the opening shall be sealed to prevent materials entering the subfloor cavities. (This type of opening is normally only required for a shower waste/trap and the installation of the shower ensure that the void is sealed/covered).

Where a recess of up to 50mm is required in the topping to provide a rebate for a shower, the construction details shall be as shown in Figure 15 (Section 1).

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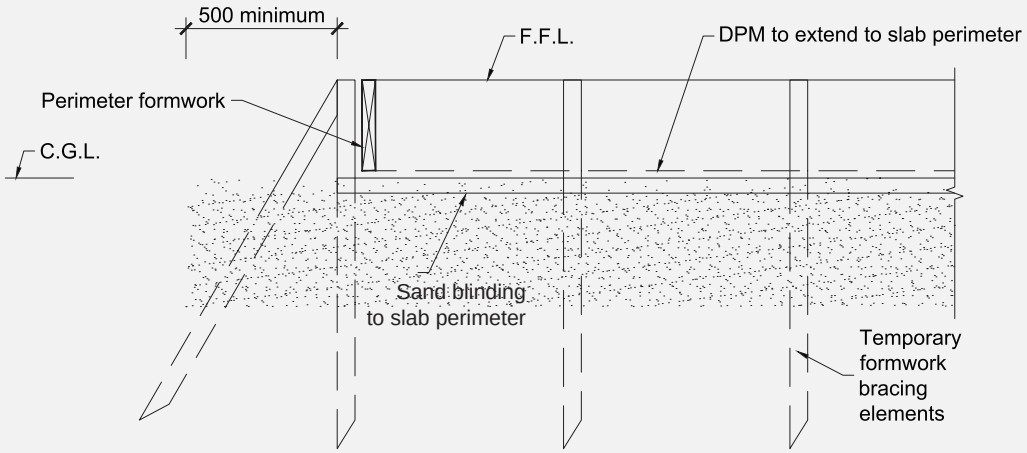
3.5 Sand Blinding

A layer of sand shall be placed, screeded and compacted over the building platform, extending to the outside edge of the perimeter foundation, refer Figure 5. The maximum thickness of this blinding layer shall be 50mm. The surface shall be level and a minimum of 305mm below finished floor level. A small plate compactor, vibrating roller or similar, should be used to compact the sand blinding layer. When the building platform is clay, it is essential that the blinding sand is compacted onto a clay surface that has not been softened by construction activities. If the clay has been softened (i.e. has a muddy surface layer due to construction activities), remove the softened material from under the RibRaft® ribs before placing the sand. If excavation lowers the clay surface to more than 50mm below the underside of the RibRaft®, fill shall be placed in accordance with Clause 7.5.3 of NZS 3604:2011 "Timber Framed Buildings". The sand is required to be level to ensure that pods remain stable throughout the installation of the system.

3.6 Damp Proof Membrane

The damp proof membrane (DPM) material shall be polyethylene sheet in accordance with NZS 3604:2011. The DPM shall be laid over the entire building platform directly on top of the sand blinding layer, extending to the outside of the edge beam – refer Figure 5 below. The joints shall be lapped not less than 150mm and sealed with pressure sensitive tape not less than 50mm wide. All penetrations of the DPM by plumbing and services or punctures during construction shall also be sealed with pressure sensitive tape. The DPM may extend beyond the edge of the slab i.e. underneath the formwork, or may be folded and stapled up the inside of the formwork. The minimum requirement is that the DPM extends to the outside of the edge beam. It is very important that the DPM is not bunched up at the formwork. The installer shall ensure a square and tidy finish at the underside and at all corners of the edge beam.

Figure 5 Sand blinding / DPM / Formwork Details



3.7 Edge Formwork

The edge formwork shall be constructed ensuring that the requirements of NZS 3109:1997 "Concrete Construction" are adhered to. The formwork shall be adequately supported and braced to prevent any buckling or warping. If the wall is to be constructed in masonry veneer, formwork for a masonry veneer rebate should be adequately fixed to the perimeter formwork.

Thorough cleaning of re-useable formwork and the use of release agents enhances the life and performance of formwork and maintains a quality surface finish.

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3.8 Laying the Pods and Spacers

The Firth RibRaft® polystyrene pods shall be laid out over the DPM in a regular waffle pattern ensuring direct contact with the ground across the entire pod. The edge beam shall be formed using the Firth approved 300mm spacers (refer Figure 9). These shall be placed at a maximum of 1200mm centres along the perimeter of the slab and one per pod or part pod. Ribs supporting a load bearing wall shall be formed using a minimum of one Firth approved 300mm spacer along the edge of each pod or part pod.

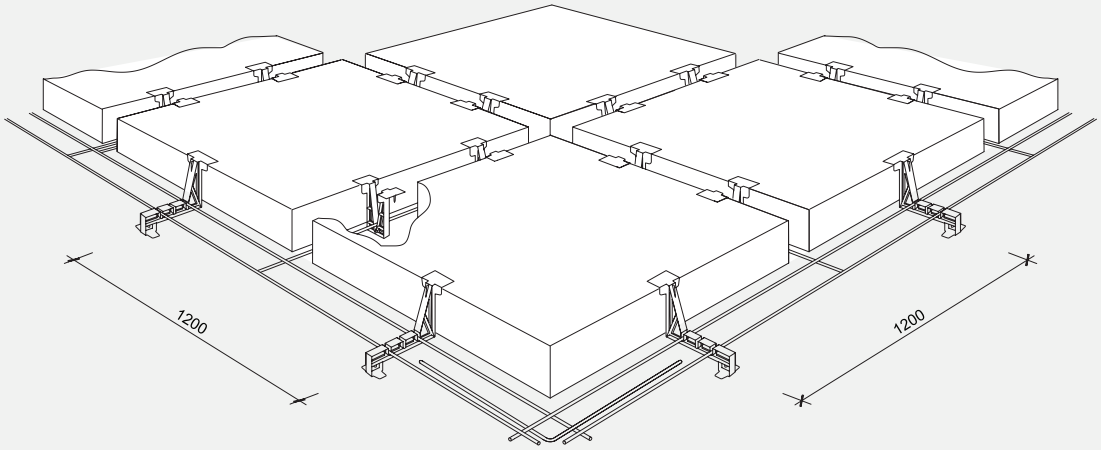
Except where a 300mm wide rib is required, each pod or part pod shall always be separated by 100mm using a minimum of one Firth approved 100mm spacer along each edge of each pod or part pod. The ribs in both directions shall form a waffle pattern throughout the slab. It is essential that the ribs and edge beams are straight when the concrete is poured, i.e. the pods need to be lined up. Figure 6 shows a detailed layout of the pods and spacers.

Where the shape of the house plan dictates, it may be more practical to consider the floor to be made up of different segments. The pods in each segment shall be in a regular waffle pattern – refer right hand side of Figure 7. Where these segments meet, the pods shall be cut to suit and the ribs made to join.The non right-angle rib junctions created by this approach are acceptable.

Alternatively, it is also acceptable to keep the orientation of the pods constant throughout the plan and have non right-angle junctions between the ribs and edge beam – refer left hand side of Figure 7.

As can be seen from Figure 7, it is not necessary for the pods to line up perfectly with the edge beam. It is acceptable to cut the pods (i.e. use part pods).

Figure 6
Detailed layout of Pods and spacers (mesh and top steel omitted for clarity)



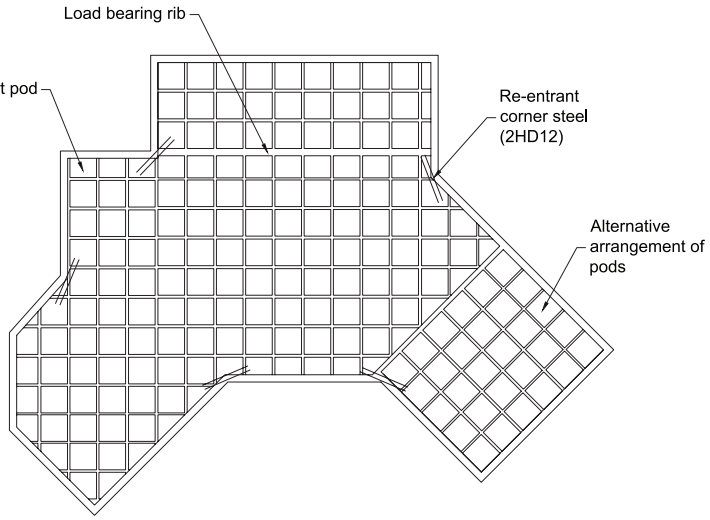


Figure 7 Typical Pod And Rib Layout

3.9 Reinforcing Steel

Reinforcing bars shall conform to NZS 4671:2001 “Steel Reinforcing Materials”. All bars shall be of deformed type (Grade 500E). All bends shall be made cold without fracture and in accordance with the bend diameters given in NZS 3109 “Concrete Construction”. Welded lap joints are not permitted.

Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m, a lower characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 200mm centres, and ductility class L or E, hereafter referred to as “mesh”. The presence of Class E reinforcing bars in the ribs and beams provides adequate ductility of the system which allow the use of class L mesh. Typically the topping mesh reinforcement will be 665 mesh (class L) or SE62 ductile mesh, each being equally applicable

Figure 10 shows the detailed layout of the spacers and the steel in the edge beam and the standard ribs.

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3.9.1 Edge Beam Steel

Two edge beam reinforcing bars shall be placed in the bottom of the edge beam and supported in the correct position by the Firth spacers, as shown in Figure 10. One edge beam bar shall be tied below the mesh at the perimeter of the area covered by the polystyrene pods as shown in Figure 10.

All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). Tying of the edge beam steel is only required at corners. Figure 8 shows the layout for the edge beam bottom steel bars at the corner. The inner bottom bars and the top bars shall cross each other and extend to 75mm from the outside face of the edge beam as shown. These bars shall be tied together where they cross. For solutions using veneer rebates the top bars shall terminate 50mm from the inside face of the rebate and be tied where they cross.

3.9.2 Rib Steel

Rib reinforcing steel shall be placed in the bottom of the internal ribs and supported in the correct position by the Firth or Wilton Joubert spacers (WJ). Figure 9 shows the detail of the Firth and WJ spacers, and Figure 10 shows a detailed section identifying how the steel is located in the spacers. The 300mm spacer shall be used for the 300mm wide internal ribs. These spacers ensure that cover to DPM below the base is greater than 45mm and cover to the exterior perimeter is 75mm.

All steel shall be lapped a minimum of 60 bar diameters (720mm for 12mm steel). At junctions with the edge beam, each rib steel bar shall sit on top of the edge beam bars, and extend to the outermost bar. The 75mm cover to the edge of the beam shall still be allowed for. One HD12 bar (Grade 500E) shall be placed in the bottom of each 300mm wide rib. For perimeter 300mm ribs a HD12 bar is also required in the top at the beam.

3.9.3 Mesh Reinforcing

Mesh reinforcing shall be placed over the pods and supported on 40mm mesh chairs spaced at a minimum of 1200mm centres, with at least two mesh chairs placed per pod and at least one per part pod. At laps the overlap of the outermost cross wires of the sheets shall be the spacing of the wires plus 50mm.

3.9.4 Re-entrant Corner Steel

Two HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner as detailed in Figure 7 (this steel is to help reduce the width of cracks that may develop at this location)

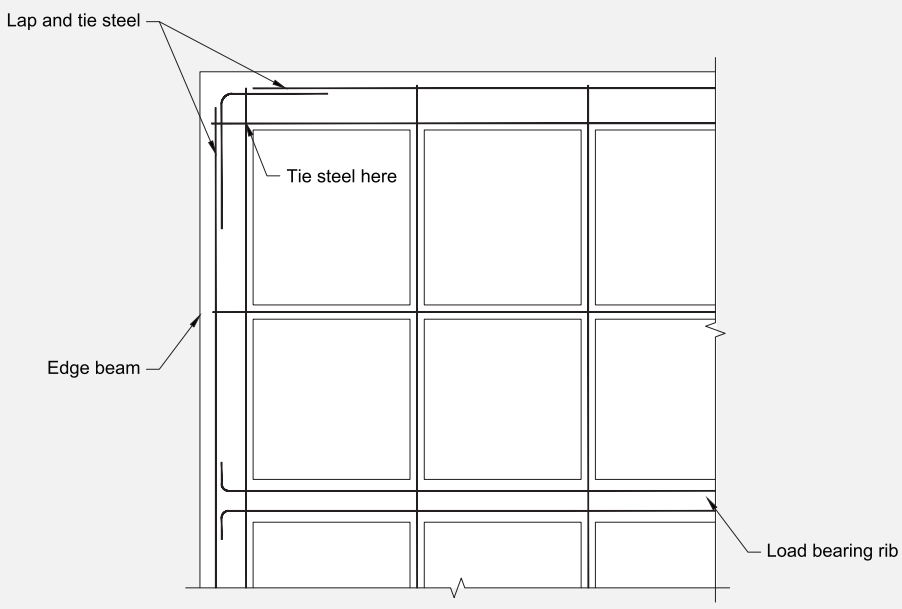


Figure 8 Corner steel layout

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3.10 Concrete Installation

To comply with this manual, Firth Certified Concrete® must be used. Concrete placing, finishing and curing shall be in accordance with NZS 3109:1997, Clause 7.

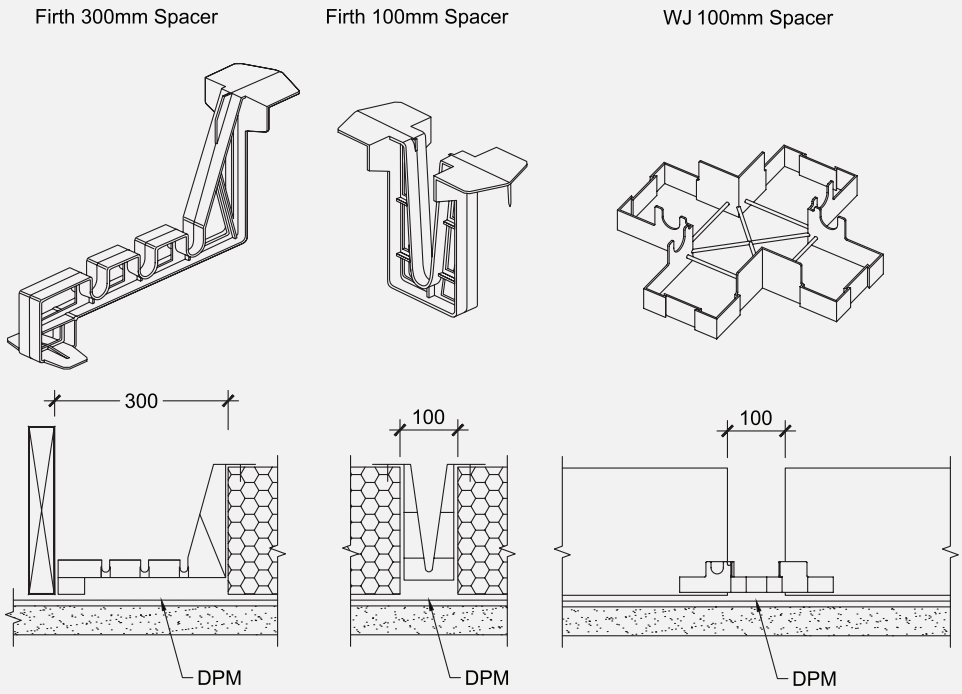
3.10.1 Placing

Only Raftmix or Raftmix25 concrete supplied by Firth Industries, shall be used in the floor. These two different concrete mixes shall be used in the following instances:

> Raftmix – a 20MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix

> Raftmix25 – a 25MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix. This mix shall be specified for buildings constructed in the 'sea spray zone' (i.e. within 500m of the sea including harbors, within 100m of tidal estuaries or inlets, on offshore islands and elsewhere defined as exposure Zone D in 4.2.3.3 of NZS3604).

Figure 9
Spacer
Details



The concrete supplied by Firth shall be poured in such a way to ensure that the pods remain in position during placing (Firth recommends that small amounts of concrete be placed on top of the pods prior to the ribs being filled). The concrete shall be compacted with the use of an immersion vibrator around all steel and into all corners of the formwork.

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3.10.2 Finishing

Screeding with the aid of a level shall commence immediately after compaction. Unless specifically installed as a screeding datum, the top of the formwork shall not be assumed as level and thus shall not be used for screeding purposes. Final finishing with a trowel shall take place after all the bleed water has evaporated. The edge of the slab and rebates shall be tooled to prevent chipping of the top of the slab.

Early age care of the slab shall be in accordance with good trade practice appropriate for the weather conditions – refer CCANZ website sections if further guidance is required:

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

The surface shall be a blemish-free surface to class U3 finish (Refer NZS 3114:1987 “Specification for Concrete Finishes”).

3.10.3 Curing

Proper curing of the concrete must take place immediately after finishing the concrete. One of the following methods of curing is recommended:

> Ponding or continuous sprinkling of water.

> Placing a wet covering or plastic membrane over the slab.

> The use of liquid membrane curing compounds. However if these are used, they must be compatible with any subsequent applied surfacing.

3.11 Shrinkage Control Joints

Shrinkage control joints reduce the risk of unwanted cracks, and their placement needs to be carefully considered where uncontrolled cracking could be unacceptable. Two types are described here: saw cut joints (which are tied joints), and free joints.

3.11.1 Saw Cut Joints

Saw cuts are located at positons in which the concrete is likely to crack due to stresses induced by restrained shrinkage. The aim of providing them is for the concrete to crack at the bottom of the saw cut thus minimizing the potential for a visible crack wandering over the surface. The level of reinforcement provided in a RibRaft® mean that cracks have no structural implications being only an aesthetics issue. Factors to consider are the type of floor finish, the location of ribs and ground beams, underfloor heating and the effect of piles restraining shrinkage.

When warm sunny days are followed by cool nights, the change in temperature can cause cracking. Hence preference should be given to using early entry saws which are used immediately after finishing. Shrinkage control joints cut using diamond blades shall be cut as early as possible which is typically within 24 hours of hardening in summer, and 48 hours in winter. They shall be cut to a depth of 25mm. Shrinkage control joints do not guarantee to eliminate all visible or unwanted cracks.

Joints shall be positioned to coincide with major changes in floor plan. Where concrete is to be exposed, for example in a garage, or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 5m. Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 1.5:1. Shrinkage control joints shall be placed over 100mm wide internal ribs wherever possible. Where a shrinkage control joint runs along the line of a 300mm wide load bearing rib, then the joint shall be located directly above one edge of that rib.

In order to limit the width of cracks at re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 7.

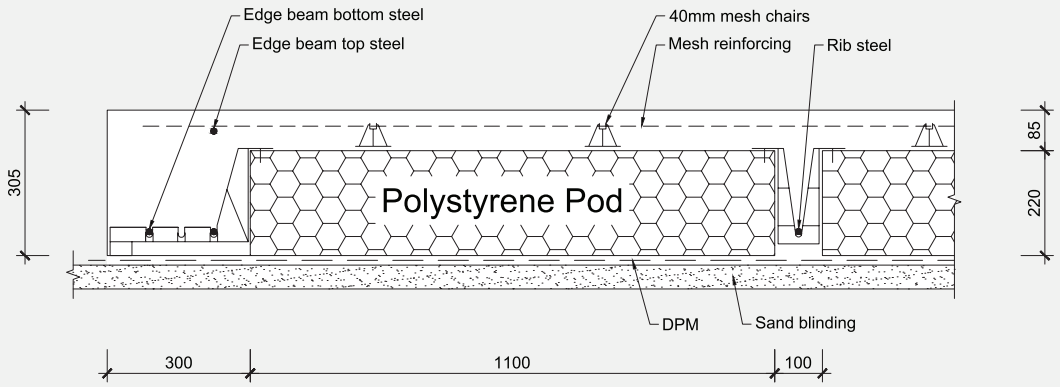
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3.11.2 Free Joints

Where the length of the floor exceeds 30m a free joint shall be provided as detailed in Section 1, Figure 12. Movement, shrinkage and thermal, will occur over this joint so it shall be positioned to minimize the impact of this movement on floor coverings and wall elements.

Where the bottom of the RibRaft® is not flat (for example the floor incorporates a step down), free joints shall be provided if the distance from the step down to edge of slab exceeds 15m.

Figure 10 Detailed Section



3.12 Removal of Formwork

The formwork shall not be removed prior to 12 hours after the slab has been finished. No installation loads are to be placed on the system before adequate curing has taken place.

3.13 Masonry Veneer

Where the building is to be clad with masonry veneer, the rebate in the edge beam shall be waterproofed with a bituminous sealer due to the possibility of ponding of water. Firth recommends a Flintcote® or equivalent coating on both the vertical and horizontal faces of the rebate.

3.14 Landscaping/Paving

Landscaping and/or paving adjacent to the slab shall be kept as a minimum the specified distance below finished floor level as required by NZS 3604:2011. The landscaping shall allow for large trees to be kept sufficiently away from the edge of the slab.This is to prevent the tree roots from disturbing the soil moisture conditions under the slab. As a guide, trees should be as far away from the edge of the slab as they are tall when fully grown.

3.15 Ongoing Maintenance

The building owner shall ensure that the ground surrounding the system be maintained so that the integrity of the system is not jeopardised. In other words, at no time shall the ground immediately adjacent to the system be allowed to settle away to expose the underside of the slab.

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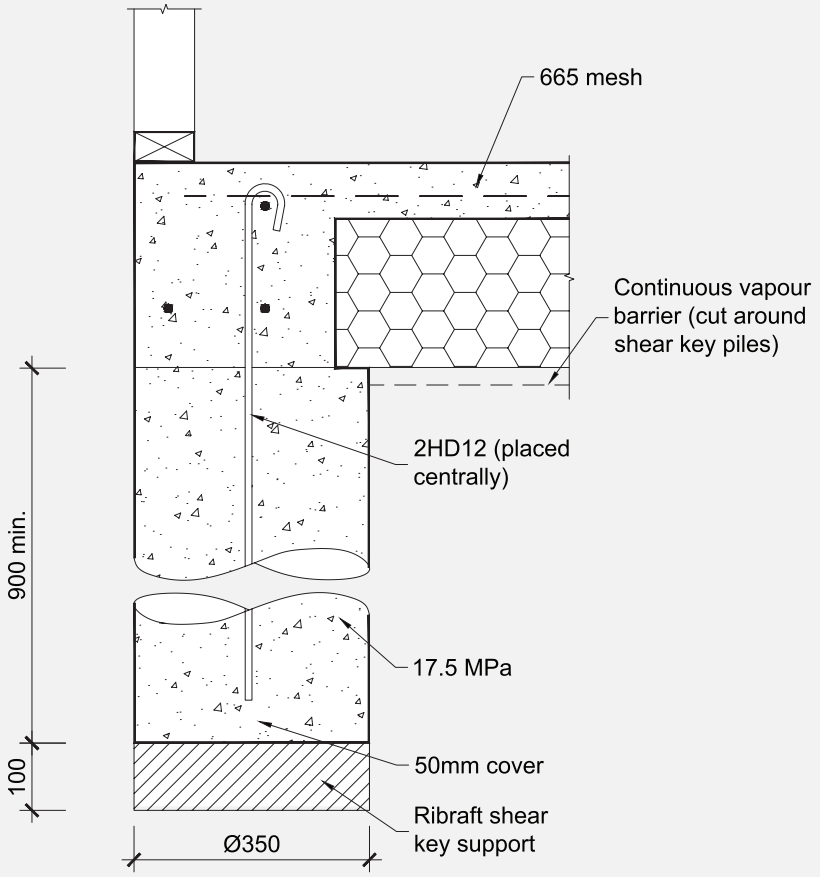
4.0 SHEAR KEYS

Shear keys, if required, shall be provided to conform to the requirements of Section 1 of this Manual. Holes for the shear keys shall be drilled at least 1000mm deep. Into the bottom of each hole a RibRaft® Shear Key Support shall be placed. Every precaution shall be taken to ensure that the shear key support is laid level and at the base of the hole. The minimum depth of concrete placed on the support shall be 900mm. Refer to Figure 11 for construction details.

The connection steel (2HD12 Grade 500E) shall be secured in place and held during pouring to ensure the bars are correctly located. The concrete for the shear keys can be placed separately to the rest of the floor and shall be finished level to the top of the sand blinding layer, or poured in one pour with the RibRaft® floor. If poured separately the top surface of the shear key shall be finished rough to ensure a good join to the Firth Raftmix concrete in the system and the DPM shall be neatly cut around the shear keys.

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Figure 11 Shear Pile Construction Detail



SECTION: VERIFICATION

3

1.0 DESIGN

Verification that the design complies with the structural limitation outlined in this Manual is the responsibility of the designer, and shall be confirmed by the Building Control Authority issuing the Building Consent. Solutions outside the limitations outlined in this Manual will require specific engineering design.

2.0 CONSTRUCTION

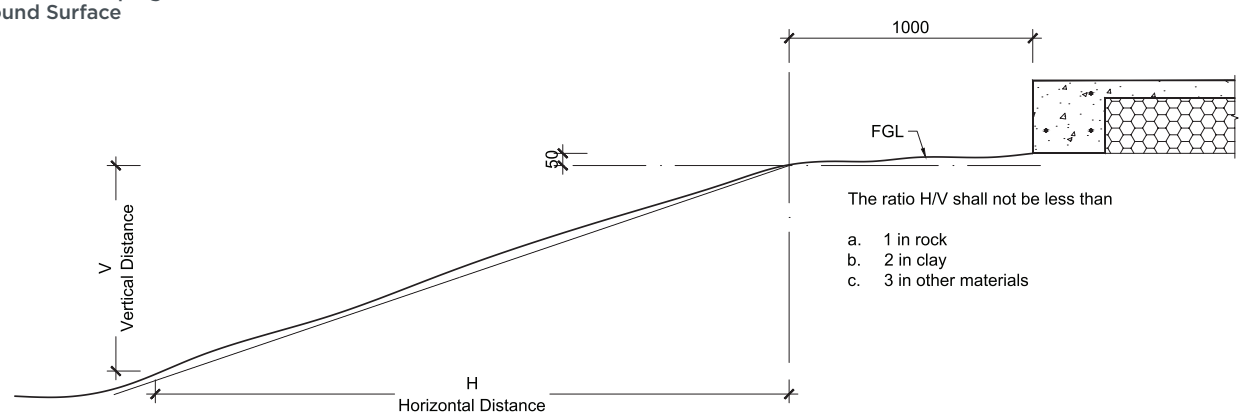
The RibRaft® foundation system has been designed to accommodate structures complying with the non specific design standards NZS3604 or NZS4229. With these types of structures the Building Control Authority specifies the inspections required and often conducts these. A similar construction verification process shall be applied to the RibRaft® system.

To assist inspection the following check list has been prepared for structures complying with the limitation:

PRE-POUR INSPECTION CHECK LIST

- GOOD GROUND CONFIRMED AS PER NZS3604, CLAUSE 3.1.3. OR SCALA OR SHEAR VANES TESTS CONFIRM ADEQUATE BEARING CAPACITY.
- VEGETATION, TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL REMOVED.
- PROXIMITY TO SLOPE-GROUND SURFACE IS ALWAYS ABOVE DASH LINE SHOWN IN FIGURE 1.
- SHEAR PILES (WHERE REQUIRED) IN PLACE AND REINFORCEMENT PROTRUDING.
- FORMATION AREA EXTENDS AT LEAST THE DEPTH OF GRANULAR FILL BEYOND BUILDING FOOTPRINT.
- STEPS IN THE FORMATION ARE DETAILED IN ACCORDANCE WITH THIS MANUAL.

Figure 1
Relationship of RibRaft® To Sloping Ground Surface



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CODEMARK
CM70056

PRE-LAYOUT INSPECTION CHECK LIST: DAMP PROOF MEMBRANE IN PLACE

PERIMETER FOUNDATION	WIDTH 300MM(1) REINFORCEMENT 2 X HD12 BOTTOM, 1 X HD12 TOP FIRTH SUPPLIED SPACER USED AT 1.2M MAXIMUM CENTRES
INTERNAL RIBS	WIDTH 100MM REINFORCEMENT 1 X HD12 FIRTH SUPPLIED SPACER, MAX SPACING OF ONE PER POD OR PART POD
LOAD BEARING RIBS	WIDTH 300MM REINFORCEMENT 2 X HD12 BOTTOM FIRTH SUPPLIED SPACER, MAX SPACING OF ONE PER POD OR PART POD
PODS	FIRTH SUPPLIED RIBRAFT® POD
MESH	40MM CHAIRS, 1.2M MAX CENTRES, MIN TWO PER POD OR ONE PER PART POD MESH IN PLACE AND 665 OR SE62 MESH LAPS OVERLAP OF OUTERMOST CROSSWIRE = MESH SPACING + 50MM
REINFORCEMENT	2 X HD12 BARS 1.2M LONG PROVIDED AT RE-ENTRANT CORNERS LAPS FOR 12MM REINFORCEMENT MINIMUM OF 720MM
CONCRETE	COVER TO PODS MINIMUM OF 85MM OR 110MM IF INFLOOR HEATING USED. FIRTH RAFTMIX ORDERED
SERVICE PENETRATIONS	NO REINFORCEMENT (WITH EXCEPTION OF MESH) CUT TO ALLOW PASSAGE OF SERVICE PIPES. REFER CLAUSE 6.3 OF SECTION 1 FOR EXCEPTIONS PIPES WRAPPED WITH MINIMUM 6MM THICKNESS OF IMPERMEABLE COMPRESSIBLE MATERIAL WHERE IN CONTACT WITH CONCRETE DIAMETER/SIZE OF PENETRATIONS AS PER TABLE 6, SECTION 1 OF THIS MANUAL

(1) At locations of service penetrations the width of the perimeter foundation maybe locally increased. Refer Figure 14 Section 1 for details.



CONCRETE & MASONRY PRODUCTS: A SUSTAINABLE BUILDING OPTION & SOLUTION

- Environmentally compliant manufacturing plants
- Surplus water and some aggregates recycled
- Low transport impacts
- Leftover concrete returned from construction sites
- Passive solar heated thermal mass makes completed buildings more energy-efficient
- Most wash water returned from construction sites
- Highly durable, low maintenance buildings and no rot
- High degree of noise control
- Inherent fire resistance
- Overall longer effective building life
- Demolished concrete can be recycled as hard fill or aggregate

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

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

KEY INFORMATION

1 CERTIFICATE HOLDER DETAILS

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

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

2 PRODUCT CERTIFICATION BODY

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

Ph: 1800 855 190
www.bureauveritas.com.au

Bureau Veritas Australia Pty Ltd

The complaints process for this certificate can be found here:
www.bureauveritas.com.au/your-feedback

3 SUMMARY OF DESCRIPTION OF BUILDING METHOD OR PRODUCT

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

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

4 SUMMARY OF INTENDED USE OF BUILDING METHOD OR PRODUCT

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

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

5 BUILDING CODE PROVISIONS

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

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

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

This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.
The Ministry does not in any way warrant, guarantee, or represent that the building method or product that is the subject of this certificate conforms with the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product.
The Ministry disclaims to the extent permitted by law, all liability (including negligence) for claims of losses, expenses, damages, and costs arising as a result of the use of the building method(s) or product(s) referred to in this certificate.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website http://www.building.govt.nz.

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

6 CONDITIONS AND LIMITATIONS OF USE

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

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

7 HEALTH AND SAFETY INFORMATION

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

8 SIGNATURES

Sam Guindi
Product Certification Manager

For and on behalf of
Bureau Veritas Australia Pty Ltd

Dene Cook
Divisional Technical Manager

For and on behalf of
Firth Industries

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CERTIFICATE V1.3

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

SCHEDULE: INFORMATION THAT SUPPORTS KEY INFORMATION

9 SUPPORTING INFORMATION ABOUT DESCRIPTION

The system consists of the following components:

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

10 SUPPORTING INFORMATION ABOUT INTENDED USE

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

11 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE

N/A

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

12 BASIS FOR CERTIFICATION

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

13 SUPPORTING DOCUMENTATION FOR CERTIFICATION

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

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PRODUCT CERTIFICATE

Firth Ribraft® Floor System

14 CONDITIONS RELATING TO NOTIFICATION

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

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

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

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

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

This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.
The Ministry does not in any way warrant, guarantee, or represent that the building method or product that is the subject of this certificate conforms with the New Zealand Building Code, nor accept any liability arising out of the use of the building method or product.
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MiTek New Zealand Limited

Correspondence from : **AUCKLAND**
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Phone: 09 274 7109
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CHRISTCHURCH
14 Pilkington Way, Wigram 8042
PO Box 8387, Riccarton 8440
Phone: 03 348 8691
Fax: 03 348 0314

www.miteknz.co.nz

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

ISSUED BY: **MiTek New Zealand Limited**

TO: **VIP Frames & Trusses**

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

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **200475** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

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

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

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

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

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

On behalf of MiTek New Zealand Limited, **Date: Wednesday, 7 June 2023**



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

SDC - Approved Building Consent Drawing - Do not remove this page - Building Act 2004 - Section 7 - Building Code Clause B1 - Structure - Verification Method B1/VM1 - Section 3.1.3 - Producer Statement - PS1 - Design - 20/06/2012 - 2008/42/0

Job: 200475 Client: Homes By Parklane Site: New House
Phone: Lot 128 Westwood
Description: Rolleston
Building Consent No.: Phone:
MiTek 20/20 Engineering 4.7.346.0 MiTek New Zealand Limited Printed: 14:00:42 07 Jun 2023

MITEK FABRICATOR DESIGN STATEMENT

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

SDC - Approved Building Consent Document - BC230738 - 68-of-P5220-07-24-06-2023 Issued

MiTek 20/20® TRUSS DESIGN DATA

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

Job Details Importance Level : 2 Design Working Life : 50 years

Roof Truss
Timber Group: ~MSGx45 H1.2 Pitch: 25.000 deg Nominal Overhang: 450 mm

Roof **Ceiling** **Wind**
Material: Longrun Iron Material: Gib Board 13mm Area: High (44.0 m/s)
Dead Load: 0.210 kPa Dead Load: 0.200 kPa Pressure Coeff: Cpe = varies; Cpi = -0.30, 0.20
Restraints: 900 mm centres Restraints: 600 mm centres **Snow**
Live Load: Qur = 0.250 kPa Live Load: Qc = 1.400 kN Location: at 50 m
Qc = 1.100 kN Open Ground Load: 0.900 kPa
Basic Roof Load: 0.441 kPa

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

MiTek® Truss List

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

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
GE	2D	3180	25.000	900	J24	1	2512	25.000	900	S15	2	6280	25.000	900
GE	1	1850	25.000	900	J25	1	2512	25.000	900	T6	1	4296	25.000	900
*H1	2	5486	18.249	900	J27	1	1612	25.000	900	V1	1	2049	25.000	900
*H2	3	5921	18.249	900	J28	1	1612	25.000	900	V2	1	1149	25.000	900
*H3	1	832	18.249	900	J29	1	2512	25.000	900	V3	1	4480	25.000	900
*H4	1	5440	18.249	900	J30	1	1612	25.000	900	V4	1	2680	25.000	900
*H5	2	2524	18.249	900	J32	2	1568	25.000	900	V5	1	880	25.000	900
*H6	1	1163	18.249	900	J33	1	1568	25.000	900	V6	1	944	25.000	900
*H7	1	2853	18.249	900	*R1	1	1208	25.000	900	V7	1	1717	25.000	900
J1	1	2455	25.000	900	*R2	7	763	25.000	900	V8	1	817	25.000	900
J2	1	2455	25.000	900	*R3	7	763	25.000	900	J4	1	2545	25.000	900
J3	1	2455	25.000	900	*R4	1	1208	25.000	900	J7	1	2545	25.000	900
J5	1	1645	25.000	900	*R5	1	1515	25.000	900	J13	1	2852	25.000	900
J6	1	1645	25.000	900	*R6	2	1515	25.000	900	J16	1	2852	25.000	900
J8	1	1645	25.000	900	*R7	1	1175	25.000	900	J21	1	2852	25.000	900
J9	1	1645	25.000	900	R8	1	913	25.000	900	J26	1	2512	25.000	900
J10	1	2852	25.000	900	*R9	1	1131	25.000	900	J31	1	1612	25.000	900
J11	1	2852	25.000	900	S1	2	6935	25.000	900	M1	1	2612	25.000	900
J12	1	2852	25.000	900	S3	1	4402	25.000	900	T1	1	6935	25.000	900
J14	1	1952	25.000	900	S4	3	4703	25.000	900	T2	1	7550	25.000	900
J15	1	1952	25.000	900	S6	1	6870	25.000	900	T3	1	4402	25.000	900
J17	1	1952	25.000	900	S7	1	2512	25.000	900	T4	1	6780	25.000	900
J18	2	1952	25.000	900	S8	2	6870	25.000	900	T5	1	4206	25.000	900
J19	1	2852	25.000	900	S9	1	6280	25.000	900	S5	1	4703	25.000	900
J20	1	2852	25.000	900	S10	7	6280	25.000	900	S13	1	3412	25.000	900
J22	1	1952	25.000	900	S12	2	3412	25.000	900	S2	1D	7550	25.000	900
J23	1	2512	25.000	900	S14	1	2612	25.000	900	S11	1	6870	25.000	900

Total quantity : 113

The computer design input has been carried out by:

Signed: ..... Date: ...Wednesday, 7 June 2023....

Name of Detailer: Caleb Qualifications and Title: Detailer Designer

On behalf of: VIP Frames & Trusses

Job: 200475 Client: Homes By Parklane Site: New House
Phone: Lot 128 Westwood
Description: Rolleston
Building Consent No.: Phone:

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	Fixing Selected
GE1	2D	3180	H	0.320	0.228	Wide		No fixing selected
			B	2.338	0.409	Wide		No fixing selected
			J	1.142	0.860	Wide		No fixing selected
			I	0.863	0.628	Wide		No fixing selected
			K	0.684	0.165	Wide		No fixing selected
			L	1.084	0.854	Wide		No fixing selected
			M	0.991	0.672	Wide		No fixing selected
GE2	1	1850	A	0.835	0.546	Wide		No fixing selected
			C	0.835	0.546	Wide		No fixing selected
			D	1.446	0.758	Wide		No fixing selected
*H1	2	5486						Refer NZS3604:2011 Tables 15.6
*H2	3	5921						Refer NZS3604:2011 Tables 15.6
*H3	1	832						Refer NZS3604:2011 Tables 15.6
*H4	1	5440						Refer NZS3604:2011 Tables 15.6
*H5	2	2524						Refer NZS3604:2011 Tables 15.6
*H6	1	1163						Refer NZS3604:2011 Tables 15.6
*H7	1	2853						Refer NZS3604:2011 Tables 15.6
J1	1	2455	A	2.455	0.593	Butt	1	JH 47x90
			D	0.567	0.401	Butt	1	Pair of 3.15d Nails
			C	3.585	2.305	Cross	1	Pair of Wire Dog Staples
J2	1	2455	A	2.531	0.883	Butt	1	JH 47x90
			E	1.772	1.048	Butt	1	JH 47x90
			C	0.756	0.520	Butt	1	Pair of 3.15d Nails
J3	1	2455	A	2.531	0.883	Butt	1	JH 47x90
			E	1.772	1.048	Butt	1	JH 47x90
			C	0.756	0.520	Butt	1	Pair of 3.15d Nails
J5	1	1645	B	2.543	0.653	Cross	1	Pair of Wire Dog Staples
			D	0.482	0.048	Butt	1	Pair of 3.15d Nails
			C	1.279	0.955	Butt	1	JH 47x90
J6	1	1645	B	2.253	0.775	Cross	1	Pair of Wire Dog Staples
			E	0.826	0.489	Butt	1	JH 47x90
J8	1	1645	B	2.543	0.653	Cross	1	Pair of Wire Dog Staples
			D	0.482	0.048	Butt	1	Pair of 3.15d Nails
			C	1.279	0.955	Butt	1	JH 47x90
J9	1	1645	B	2.253	0.775	Cross	1	Pair of Wire Dog Staples
			E	0.826	0.489	Butt	1	JH 47x90
J10	1	2852	B	3.692	0.830	Cross	1	Pair of Wire Dog Staples
			E	0.531	0.385	Butt	1	Pair of 3.15d Nails
			D	3.968	2.527	Cross	1	Pair of Wire Dog Staples
J11	1	2852	B	3.769	1.109	Cross	1	Pair of Wire Dog Staples
			F	2.007	1.206	Butt	1	JH 47x90
			D	0.865	0.579	Butt	1	JH 47x90
J12	1	2852	B	3.769	1.109	Cross	1	Pair of Wire Dog Staples
			F	2.007	1.206	Butt	1	JH 47x90
			D	0.865	0.579	Butt	1	JH 47x90
J14	1	1952	B	2.859	0.777	Cross	1	Pair of Wire Dog Staples
			F	1.336	0.719	Butt	1	JH 47x90
			D	0.714	0.468	Butt	1	Pair of 3.15d Nails
J15	1	1952	B	2.602	0.888	Cross	1	Pair of Wire Dog Staples
			F	1.106	0.682	Butt	1	JH 47x90
J17	1	1952	A	1.997	0.727	Cross	1	Pair of Wire Dog Staples
			E	1.360	0.731	Butt	1	JH 47x90
			C	0.674	0.464	Butt	1	Pair of 3.15d Nails
J18	2	1952	B	2.602	0.888	Cross	2	Pair of Wire Dog Staples
			F	1.106	0.682	Butt	2	JH 47x90
J19	1	2852	A	2.862	0.783	Cross	1	Pair of Wire Dog Staples
			D	0.546	0.386	Butt	1	Pair of 3.15d Nails
			C	4.009	2.531	Cross	1	Pair of Wire Dog Staples
J20	1	2852	A	2.934	1.062	Cross	1	Pair of Wire Dog Staples
			E	2.102	1.215	Butt	1	JH 47x90
			C	0.831	0.576	Butt	1	JH 47x90
J22	1	1952	B	2.859	0.777	Cross	1	Pair of Wire Dog Staples
			F	1.336	0.719	Butt	1	JH 47x90
			D	0.714	0.468	Butt	1	Pair of 3.15d Nails
J23	1	2512	B	3.352	0.705	Cross	1	Pair of Wire Dog Staples
			E	0.563	0.406	Butt	1	Pair of 3.15d Nails
			D	3.577	2.291	Cross	1	Pair of Wire Dog Staples
J24	1	2512	B	3.427	0.983	Cross	1	Pair of Wire Dog Staples
			F	1.752	1.067	Butt	1	JH 47x90
			D	0.762	0.504	Butt	1	Pair of 3.15d Nails
J25	1	2512	B	3.427	0.983	Cross	1	Pair of Wire Dog Staples
			F	1.752	1.067	Butt	1	JH 47x90
			D	0.762	0.504	Butt	1	Pair of 3.15d Nails
J27	1	1612	B	2.511	0.640	Cross	1	Pair of Wire Dog Staples
			D	0.472	0.047	Butt	1	Pair of 3.15d Nails
			C	1.249	0.935	Butt	1	JH 47x90
J28	1	1612	B	2.215	0.763	Cross	1	Pair of Wire Dog Staples
			E	0.797	0.468	Butt	1	Pair of 3.15d Nails

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VIP Frames & Trusses

Job: 200475
Client: Homes By Parklane
Phone:
Site: New House
Lot 128 Westwood
Rolleston
Phone:
Description:
Building Consent No.:

Truss	Qty	Span (mm)	Joint	Down (kN)	Uplift (kN)	Bearing	Fixing Qty	Fixing Selected
J29	1	2512	B	3.218	1.096	Cross	1	Pair of Wire Dog Staples
			F	1.369	1.035	Butt	1	JH 47x90
J30	1	1612	B	2.317	0.017	Cross	1	Pair of Wire Dog Staples
			F	0.472	0.047	Butt	1	Pair of 3.15d Nails
			E	0.639	0.455	Butt	1	Pair of 3.15d Nails
			C	2.595	1.939	Cross	1	Pair of Wire Dog Staples
			D	1.360	0.889	Cross	1	Pair of Wire Dog Staples
J32	2	1568	A	1.609	0.583	Butt	2	JH 47x90
			C	0.459	0.045	Butt	2	Pair of 3.15d Nails
			B	1.348	0.938	Butt	2	JH 47x90
J33	1	1568	A	1.440	0.694	Cross	1	Pair of Wire Dog Staples
			D	0.776	0.450	Butt	1	Pair of 3.15d Nails
*R1	1	1208						Refer NZS3604:2011 Tables 15.6
*R2	7	763						Refer NZS3604:2011 Tables 15.6
*R3	7	763						Refer NZS3604:2011 Tables 15.6
*R4	1	1208						Refer NZS3604:2011 Tables 15.6
*R5	1	1515						Refer NZS3604:2011 Tables 15.6
*R6	2	1515						Refer NZS3604:2011 Tables 15.6
*R7	1	1175						Refer NZS3604:2011 Tables 15.6
R8	1	913	A	0.955	0.304	Butt	1	JH 47x90
			B	0.955	0.590	Butt	1	JH 47x90
*R9	1	1131						Refer NZS3604:2011 Tables 15.6
S1	2	6935	B	6.336	3.510	Cross	2	CT400
			F	6.336	3.510	Cross	2	CT400
S3	1	4402	B	4.456	1.959	Cross	1	Pair of Wire Dog Staples
			G	3.530	2.486	Butt	1	JH 47x90
S4	3	4703	E	3.820	2.483	Butt	3	JH 47x90
			D	3.985	2.221	Cross	3	Pair of Wire Dog Staples
S6	1	6870	A	5.672	3.436	Cross	1	CT400
			E	5.672	3.436	Cross	1	CT400
S7	1	2512	B	2.776	1.282	Cross	1	Pair of Wire Dog Staples
			F	2.001	1.273	Butt	1	JH 47x90
S8	2	6870	B	6.301	3.480	Cross	2	CT400
			F	5.654	3.434	Cross	2	CT400
S9	1	6280	A	5.185	3.141	Cross	1	Pair of Wire Dog Staples
			E	5.185	3.141	Cross	1	Pair of Wire Dog Staples
S10	7	6280	B	5.796	3.183	Cross	7	Pair of Wire Dog Staples
			F	5.796	3.183	Cross	7	Pair of Wire Dog Staples
S12	2	3412	F	2.714	2.016	Butt	2	JH 47x90
			D	3.651	1.443	Cross	2	Pair of Wire Dog Staples
S14	1	2612	B	2.850	1.338	Cross	1	Pair of Wire Dog Staples
			F	2.088	1.316	Butt	1	JH 47x90
S15	2	6280	B	5.796	3.183	Cross	2	Pair of Wire Dog Staples
			F	5.796	3.183	Cross	2	Pair of Wire Dog Staples
T6	1	4296	B	4.204	2.036	Cross	1	Pair of Wire Dog Staples
			I	3.505	2.304	Butt	1	JH 47x90
V1	1	2049	A			Wide		No fixing selected
V2	1	1149	A			Wide		No fixing selected
V3	1	4480	A			Wide		No fixing selected
V4	1	2680	A			Wide		No fixing selected
V5	1	880	A			Wide		No fixing selected
V6	1	944	A			Wide		No fixing selected
V7	1	1717	A			Wide		No fixing selected
V8	1	817	A			Wide		No fixing selected
J4	1	2545	B	3.967	1.700	Cross	1	Pair of Wire Dog Staples
			F	2.326	1.491	Butt	1	JH 47x90
J7	1	2545	B	3.967	1.700	Cross	1	Pair of Wire Dog Staples
			F	2.326	1.491	Butt	1	JH 47x90
J13	1	2852	B	4.489	1.938	Cross	1	Pair of Wire Dog Staples
			F	3.033	1.938	Butt	1	JH 47x90
J16	1	2852	B	4.516	1.941	Cross	1	Pair of Wire Dog Staples
			F	3.094	1.944	Butt	1	JH 47x90
J21	1	2852	A	3.654	1.891	Cross	1	Pair of Wire Dog Staples
			E	3.094	1.944	Butt	1	JH 47x90
J26	1	2512	B	3.908	1.672	Cross	1	Pair of Wire Dog Staples
			F	2.253	1.444	Butt	1	JH 47x90
J31	1	1612	A	2.142	0.251	Cross	1	Pair of Wire Dog Staples
			B	3.443	2.157	Cross	1	Pair of Wire Dog Staples
			C	2.397	0.786	Cross	1	Pair of Wire Dog Staples
M1	1	2612	B	3.722	1.876	Cross	1	Pair of Wire Dog Staples
			G	3.478	2.272	Butt	1	JH 47x90
T1	1	6935	B	11.449	6.821	Cross	1	CT400
			G	11.449	6.821	Cross	1	CT400
T2	1	7550	B	13.233	7.908	Cross	1	CT400
			I	12.629	7.865	Cross	1	CT400
T3	1	4402	B	7.114	3.805	Cross	1	CT400
			I	8.789	5.582	Butt	1	Pair of MultiGrips
T4	1	6780	A	10.488	6.592	Cross	1	CT400
			F	11.185	7.114	Butt	1	JH 47x120
T5	1	4206	A	7.263	4.489	Butt	1	Pair of MultiGrips
			I	7.698	4.814	Butt	1	Pair of MultiGrips
S5	1	4703	F	10.903	7.171	Butt		No fixing selected. Specific engineering design required for down loads.
			E	7.801	4.681	Cross	1	CT400
S13	1	3412	F	8.508	5.713	Butt	1	Pair of MultiGrips
			D	7.624	3.931	Cross	1	CT400

SDC - Approved Building Consent Document BC230746 - Dated 30/6/2023 - Page 70 of 220 - phillid

VIP Frames & Trusses

Job: 200475
Client: Homes By Parklane
Phone:
Site: New House
Lot 128 Westwood
Rolleston
Description:
Building Consent No.:
Phone:

Truss	Qty	Span (mm)	Joint	Down (kN)	Uplift (kN)	Bearing	Fixing Qty	Fixing Selected
S2	1D	7550	B	12.326	7.362	Cross	1	CT400
			H	19.689	12.540	Cross	1	16kN Truss to Top Plate
S11	1	6870	B	9.660	5.769	Cross	1	CT400
			H	13.623	9.097	Cross	1	CT400

Fixing List

Qty	Selected Fixing
47	JH 47x90
20	Pair of 3.15d Nails
68	Pair of Wire Dog Staples
21	CT400
4	Pair of MultiGrips
1	JH 47x120
1	16kN Truss to Top Plate
26	No fixing selected

SDC - Approved Building Consent Document - Page 11 of 24 - 06/12/2023 10:20:10 - phillid

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.

SDC - Approved Building Consented Document BC230738 - 12-of-52 - 20/06/2023 10:24:00 am - phillid

Date: **7 June 2023**

Fabricator: **VIP Frames & Trusses**

Job Name: New House
Lot 128 Westwood, Rolleston
Homes by Parklane

Building Consent No:_____
(Provided by relevant Consenting Authority at time of Consent application)

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:

Wind Zone	**High**	**Altitude**	**50m**
		Snow (Open Ground Load)	**0.900 kPa**
Roof Material	**Longrun**	**Snow (Basic Roof Load)**	**0.441 kPa**

Treatment Definition:

External Walls -	H1.2 Treated
Internals Walls -	H1.2 Treated
Trusses -	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.

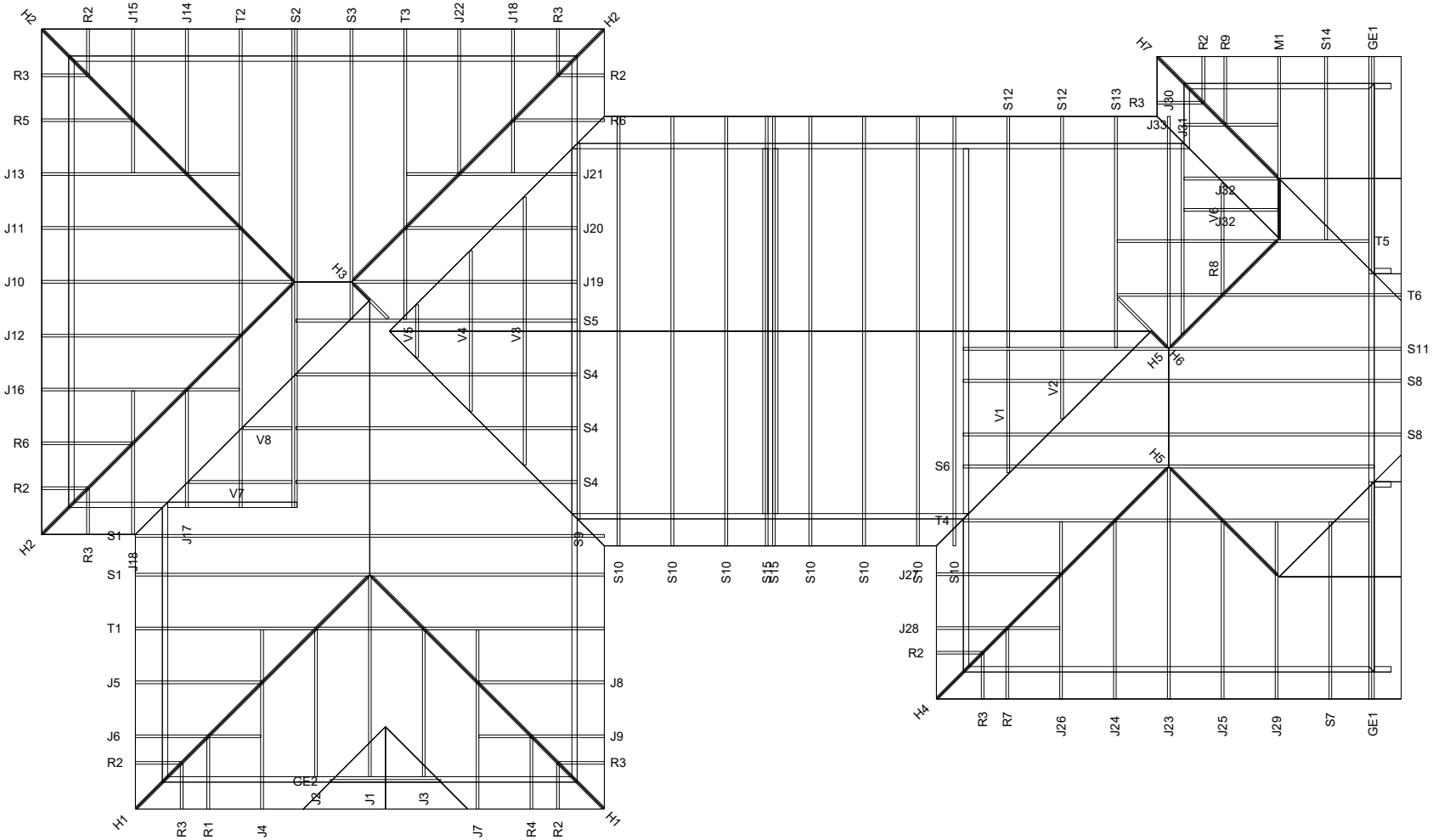
Council Contacts:

Consents Officer:_____
Email #: _____
Phone: _____

Please forward to:

VIP Frames & Trusses
65-67 Wickham Street
Ph (03) 389 8200

Roof Bracing Layout



SDC - Approved Building Consent Document - BC230719 - Pg 73 of 522 - 22/06/2023 - phild
SDC - Approved Building Consent Document - BC230719 - Page 73 of 522 - 14/06/2023 - phild

VIP FRAMES & TRUSSES
200 Maces Road
PO Box 35-193 Christchurch
Ph (03) 389 8200

JOB No **200475**

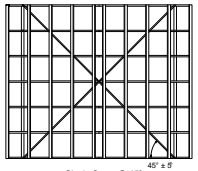
Client: Homes By Parklane
Job Name: New House
Address: Lot 128 Westwood
Rolleston

Pitch: 25.000
Roof Material: Longrun Iron
Soffit Overhang: 450
Wind Area: High
Snow Load: 0.441

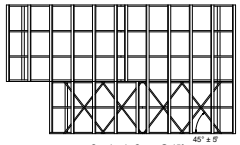
Trusses And Rafters At 900 Centres
Unless Stated Otherwise

DRAWN BY Caleb
DATE 20 Apr,2023 PAGE 1 of

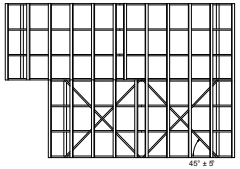
Roof Bracing Details



Single Cross @ 45°



Quadruple Cross @ 45°

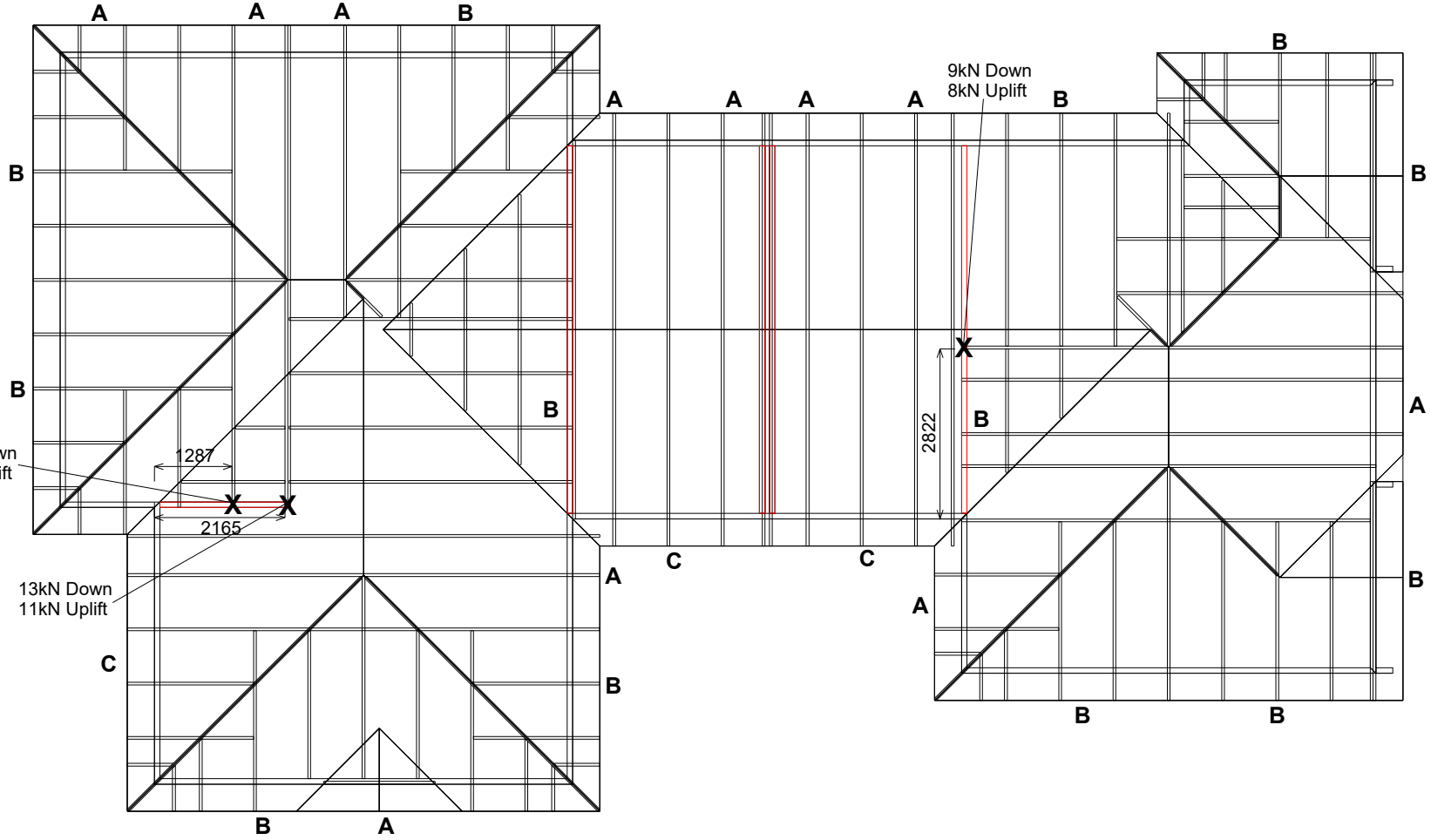


Double Cross @ 45°
(as diagram above)

NOTES:
Refer to:
Lumberlok roof bracing brouchure
07/2006

SDC - Approved Building Consent Document - BC230719 - Pg 74 of 522 - 22/06/2023 - phillip

Lintel Sizes & Slab Thickening Layout



All walls shown are considered load bearing /Architect / Engineer to confirm all top floor loads are transferred to foundation / slab below X = Point load over 8kN (Ultimate Limit State Load)
WHERE THERE IS DESIGN CONFLICT LINTELS DESIGNED BY ENGINEERS SUPERSEED THE TRUSS DESIGN Lintels & beams not shown are to be designed by architect/engineer
Fabricating Detailer MUST confirm both lintel sizing and truss & lintel Fixings based off consented plans before detailing for fabrication
No allowance for heat pump / air conditioning units or ducting in roof space unless noted - Architect MUST advise if required
If there are trusses that butt into Intertenancy / firewalls architect / engineer need to allow for this / Architect to ensure there is enough space / height for lintels allocated or advise otherwise

Red Highlights Internal load bearing wall (Individual point loads of trusses under 8kN) Blue Highlights Beam By others (Individual point loads of trusses under 8kN / unless noted otherwise)

VIP FRAMES & TRUSSES
200 Maces Road
PO Box 35-193 Christchurch
Ph (03) 389 8200

JOB No **200475**

Client: Homes By Parklane
Job Name: New House
Address: Lot 128 Westwood
Rolleston

Pitch: 25.000
Roof Material: Longrun Iron
Soffit Overhang: 450
Wind Area: High
Snow Load: 0.441

Trusses And Rafters At 900 Centres Unless Stated Otherwise

DRAWN BY Caleb
DATE 20 Apr,2023 PAGE 1 of

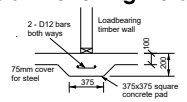
These lintels have been sized as per the GANGLAM and FLITCH BEAM selection manuals as provided by MiTek NZ Ltd.

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

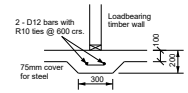
Unless otherwise stated all lintels are as per NZS3604 2011

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

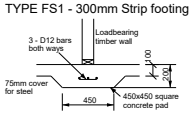
Slab Thickening Details



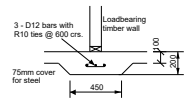
TYPE FP1 - 375x375mm Pad



TYPE FS1 - 300mm Strip footing



TYPE FP2 - 450x450mm Pad



TYPE FS2 - 450mm Strip footing

GIB EzyBrace® Bracing Software

Demand Calculation Sheet

Job Details

Name:	Bhutani & Puri
Street and Number:	24 Westmoor Boulevard
Lot and DP Number:	Lot 128 DP 573266
City/Town/District:	Rolleston
Designer:	AS
Company:	
Date:	26/04/23

Building Specification

Number of Storeys	1
Floor Loading	2 kPa
Foundation Type	Slab
	Single
Cladding Weight	Heavy
Roof Weight	Light
Room in Roof Space	No
Roof Pitch (degrees)	25
Roof Height above Eaves (m)	2.12
Building Height to Apex (m)	4.53
Ground to Lower Floor (m)	0.2
Average Stud Height (m)	2.4
Building Length (m)	22.72
Building Width (m)	13.04
Building Plan Area (m²)	209.5

Building Location

Wind Zone = High

Earthquake Zone 2

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

Bracing Units required for Wind

	Along	Across
Single Level	**630**	**1016**

Bracing Units required for Earthquake

	Along & Across
Single Level	**1275**

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GIB EzyBrace® Bracing Software

Single Level Along Resistance Sheet

Job Name: Bhutani & Puri

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	Wind Demand 630 Achieved 1262 200%	EQ Demand 1275 Achieved 1319 103%
a	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	3	0.60		2.4	EP1 0.6	CHH	57	63		
	4	0.60		2.4	EP1 0.6	CHH	57	63		
	5	0.60		2.4	EP1 0.6	CHH	57	63		
	6	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 22.10								342 OK	378 OK
b	1	1.80		2.4	GS1-N	GIB®	124	108		
	2	1.80		2.4	GS1-N	GIB®	124	108		
	External Length = 0.28								248 OK	216 OK
c	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	1.00		2.4	GBF220/2.4	Gamma	37	44		
	3	1.00		2.4	GBF220/2.4	Gamma	37	44		
	4	1.00		2.4	GBF220/2.4	Gamma	37	44		
	5	1.00		2.4	GBF220/2.4	Gamma	37	44		
	6	1.80		2.4	GS1-N	GIB®	124	108		
	External Length = 8.30								329 OK	347 OK
d	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	3	0.60		2.4	EP1 0.6	CHH	57	63		
	4	0.60		2.4	EP1 0.6	CHH	57	63		
	5	0.60		2.4	EP1 0.6	CHH	57	63		
	6	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 14.08								342 OK	378 OK

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GIB EzyBrace® Bracing Software

Single Level Across Resistance Sheet

Job Name: Bhutani & Puri

									Wind	EQ
									Demand	
									1016	1275
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1555 153%	1537 121%
m	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	3	0.60		2.4	EP1 0.6	CHH	57	63		
	4	0.60		2.4	EP1 0.6	CHH	57	63		
	5	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 12.14								285 OK	315 OK
n	1	1.80		2.4	GS1-N	GIB®	124	108		
	2	1.80		2.4	GS1-N	GIB®	124	108		
									248 OK	216 OK
o	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	3	0.60		2.4	EP1 0.6	CHH	57	63		
	External Length = 5.86								171 OK	189 OK
p	1	1.80		2.4	GS1-N	GIB®	124	108		
	2	1.80		2.4	GS1-N	GIB®	124	108		
									248 OK	216 OK
q	1	0.60		2.4	EP1 0.6	CHH	57	63		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	3	1.80		2.4	GS1-N	GIB®	124	108		
	External Length = 2.56								238 OK	234 OK
r	1	1.80		2.4	GS1-N	GIB®	124	108		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
									181 OK	171 OK
s	1	0.60		2.4	GS1-N	GIB®	34	35		
	2	0.60		2.4	EP1 0.6	CHH	57	63		
	3	0.60		2.4	EP1 0.6	CHH	57	63		
	4	0.60		2.4	GS1-N	GIB®	34	35		
	External Length = 9.84								182 OK	196 OK

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Stormwater soakpit: design to NZBC E1/VM1:1992

Dynamic Drainage & Excavation Ltd

Client Name:	HOMES BY PARKLANE		
Site address:	24 WESTMOOR BOULEVARD ROLLESTON	**Servicing 6 Downpipes & Driveway**	
Site location (NZMG):	mN	mE	***Date:*** 27-Apr-23
Local Authority:	SELWYN DISTRICT COUNCIL		***Designer:*** Grant Wooster

INPUT

Catchment area, Ac	**(ha)**	**Ac (TOTAL) =**	**0.0332**	**ha**
	roof (non-absorbent)		234.8	m^2
	paved surfaces (asphalt / concrete)		96.9	m^2
	other			m^2
Run-off co-efficient, C	**(unitless)**	**C (TOTAL) =**	**0.89**	
Rainfall Intensity, I	**(mm/hr)** 10 yr / 10 minute	$I_{10\text{-}10}$		mm/hr
	DESIGN: 10 yr / 60 minute	$I_{10\text{-}60}$	**43.61**	**mm/hr**

OUTPUT

Run-off, Rc	(flow discharged from catchment in 1 hr)	**12.8**	m^3
Soakage volume, Vsoak	(disposed of by way of soakage in 1 hour)	**3.8**	m^3
Storage volume, Vstor	(required storage to prevent overflow)	**9.0**	m^3

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)					**23.7**	**m3**
Overall dimensions (m)		**3.8**	**m wide**	by	2.0	**m long**
Base area of soakpit, Asp		**7.6**	**(m^2)**	by	3.1	**m deep**
Total design volume (actual)		**23.7**	**m3**	*(Check if >*	*23.7*	*=> 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^2)**	by	0.0	**m deep**
Total design volume (actual)		**N/A**	**m3**	*(Check if >*	*9.0*	*=> OK ?)*

DESIGN SUMMARY: Course soakage test in gravel medium 3.8m 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.
The SDC Engineering Code of Practise, Part 5 Stormwater has been used to select the rainfall data. This is summarised : Rolleston scaling factor: 1.03 * Rolleston. Additional scaling : + 16% for climate change. Design rainfall depth for site (2% AEP, 1 hr): 1.2*36.5 mm/hr* 1.16 = 43.61mm/hr

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Table 1 Scale factors for each township within the Selwyn District

Township	Rainfall Gauge	Scale Factor
Arthurs Pass	Arthurs Pass	1.00
Burnham	Christchurch Aero	1.06
Castle Hill	Cheeseman	1.02
Coalgate	Whitecliffs	0.91
Darfield	Ridgens Road	1.20
Doyleston	Christchurch Aero	1.01
Dunsandel	Ridgens Road	1.05
Glentunnel	Whitecliffs	0.92
Hororata	Ridgens Road	1.06
Kirwee	Christchurch Aero	1.06
Lake Coleridge	Highpeak Station	0.72
Leeston	Christchurch Aero	1.01
Lincoln	Christchurch Aero	0.96
Lower Selwyn Huts	Christchurch Aero	0.98
Motukarara	Christchurch Aero	1.01
Prebbleton	Christchurch Aero	1.03
Rolleston	Christchurch Aero	1.03
Sheffield	Whitecliffs	1.00
Southbridge	Christchurch Aero	0.98
Springfield	13 Mile Bush	0.83
Springston	Christchurch Aero	0.99
Tai Tapu	Christchurch Aero	0.98
Templeton	Christchurch Aero	1.02
Terrace Downs	Highpeak Station	1.01
Upper Selwyn Huts	Christchurch Aero	0.96
Waddington	Whitecliffs	1.00
West Melton	Christchurch Aero	1.03
Whitecliffs	Whitecliffs	1.00
Windwhistle	Highpeak Station	0.92

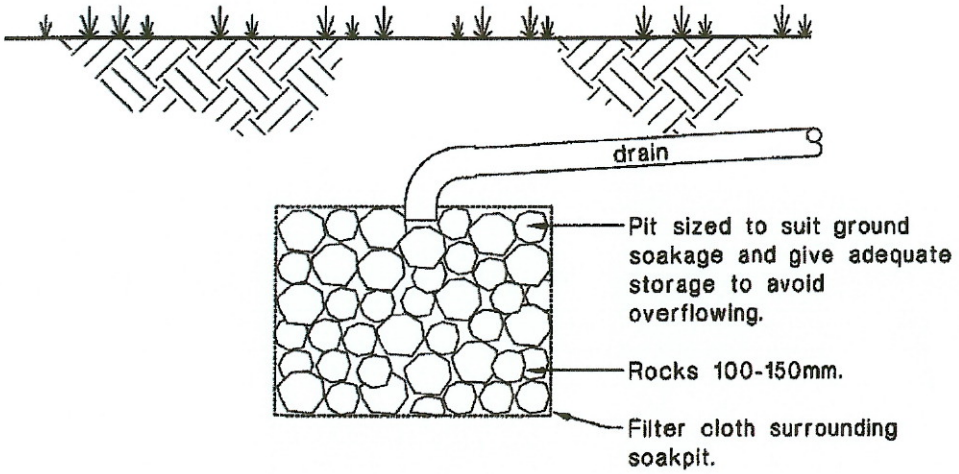
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HIRDS V4 Depth-Duration-Frequency Results
Sitename: 24 WESTMOOR BOULEVARD ROLLESTON
Coordinate system: WGS84
Longitude:
Latitude:

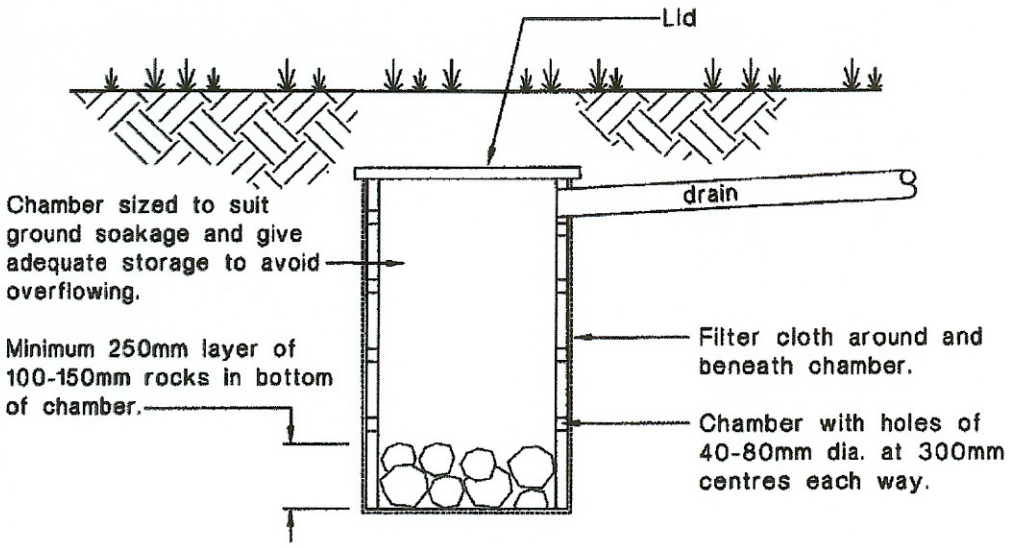
Rainfall depths (mm) :: RCP8.5 for the period 2081-2100													
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	5.27	6.99	8.38	11.7	16.2	27	36.4	48.1	60.9	68.3	73.4	77.2
2	0.5	6.03	7.97	9.54	13.2	18.4	30.4	41	53.6	67.8	76.1	81.7	85.6
5	0.2	8.88	11.6	13.8	19	26.1	42.6	56.8	73.5	92	103	110	115
10	0.1	11.3	14.6	17.3	23.6	32.3	52.2	69.2	88.9	111	123	131	137
20	0.05	13.9	18	21.3	28.8	39.2	62.7	82.4	105	130	144	153	159
30	0.033	15.7	20.2	23.8	32.1	43.5	69.2	90.5	115	142	157	166	173
40	0.025	17	21.8	25.6	34.5	46.6	74	96.6	122	150	166	176	183
50	0.02	18.1	23.1	27.2	36.5	49.2	77.8	101	128	157	173	184	190
60	0.017	18.9	24.2	28.4	38.1	51.3	81	105	133	163	180	190	196
80	0.013	20.4	26.1	30.5	40.8	54.8	86.1	112	141	172	189	199	207
100	0.01	21.6	27.5	32.2	42.9	57.6	90.3	117	147	179	196	207	214
250	0.004	26.8	33.9	39.5	52.2	69.4	107	138	172	208	227	239	246

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Figure 13 Soak Pit for Surface Water Disposal
Paragraph 9.0.4



(a) Rock soak pit



(b) Chamber soak pit

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NZBC H1 - Calculation Method

Client	Bhitani & Puri - Front
Address	24 Westmoor Blvd
	Rolleston

REFERENCE BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	(Heat loss = Area/R-value)
Roof Type 1	Corrugated on trusses @ 900crs	77.05	6.60	11.67	
Roof Type 2	Trimed Insulation area	7.23	6.60	1.10	
Wall Type 1	60% Total Wall Area	62.03	2.00	31.01	
Wall Type 2		0.00	2.00	0.00	
Wall Type 3		0.00	2.00	0.00	
Glazing (>40%)	Double Glazed Windows	0.00	0.63	0.00	
Sklights	Skylight	0.00	0.62	0.00	
				179.16	TOTAL LOSS

SUPERSEDED 14/08/2023 with Amendment 1

Note: Total area of glazing (including Skylights) must be 50% or less than the total wall area

PROPOSED BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	
Roof Type 1	Corrugated on trusses @ 900crs	77.05	5.38	14.32	
Roof Type 2	Trimed Insulation area	7.23	3.71	1.95	
Wall Type 1	Brick Cladding	75.18	2.21	34.02	
Wall Type 2	Linea Cladding	9.87	2.16	4.57	
Wall Type 3		0.00	1.00	0.00	
Floor	Concrete slab on ground	84.28	1.28	65.84	
Glazing (40%)	Double Glazed Windows	18.33	0.50	36.66	
Glazing (>40%)	Double Glazed Windows	0.00	0.63	0.00	
Sklights	Skylight	0.00	0.62	0.00	
				157.36	TOTAL LOSS

Component	Description	Area sq m	
Wall Type	Total Area East, South & West	79.22	
Glazing (30%)	Total Area East, South & West	18.33	23.14%

Trimmed Insulation Area: (90mm Rafter & 2 x R3.6 batts 180mm)

Roof Pitch	Cut Height	Cut Width	% of batt cut	New R Value
15	80	372	44.44%	3.45
20	87	255	48.33%	3.74
25	95	182	52.78%	4.1
30	105	130	58.33%	4.53

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NZBC H1 - Calculation Method

Client	Bhitani & Puri - Back
Address	24 Westmoor Blvd
	Rolleston

REFERENCE BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	(Heat loss = Area/R-value)
Roof Type 1	Corrugated on trusses @ 900crs	107.72	6.60	16.32	
Roof Type 2	Trimed Insulation area	8.55	6.60	1.30	
Wall Type 1	60% Total Wall Area	70.31	2.00	35.15	
Wall Type 2		0.00	2.00	0.00	
Wall Type 3		0.00	2.00	0.00	
Floor	Concrete slab on ground	116.27	1.60	72.67	
Glazing (40%)	Double Glazed Windows	46.87	0.50	93.74	
Glazing (>40%)	Double Glazed Windows	0.00	0.63	0.00	
Sklights	Skylight	0.00	0.62	0.00	
				219.18	TOTAL LOSS

Note: Total area of glazing (including Skylights) must be 50% or less than the total wall area

PROPOSED BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	(Heat loss = Area/R-value)
Roof Type 1	Corrugated on trusses @ 900crs	107.72	5.38	20.02	
Roof Ty					
Wall Ty	Brick Cladding	88.14	2.21	39.88	
Wall Ty	Linea Cladding	1.10	2.16	0.51	
Wall Ty		0.00	1.00	0.00	
Floor	Concrete slab on ground	116.27	1.43	81.31	
Glazing	Double Glazed Windows	27.94	0.50	55.88	
Glazing					
Sklights					
				199.90	TOTAL LOSS

SUPERSEDED 14/08/2023 with Amendment 1

Component	Description	Area sq m	
Wall Type	Total Area East, South & West	87.37	
Glazing (30%)	Total Area East, South & West	16.05	18.37%

Trimmed Insulation Area: (90mm Rafter & 2 x R3.6 batts 180mm)

Roof Pitch	Cut Height	Cut Width	% of batt cut	New R Value
15	80	372	44.44%	3.45
20	87	255	48.33%	3.74
25	95	182	52.78%	4.1
30	105	130	58.33%	4.53

Construction R-value Calculator

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

I have recently implemented some changes to the way assemblies with multiple adjacent insulation layers such as truss roofs with a second layer of insulation are calculated. Check out the details here.

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

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors (●)
- Walls ( )
- Roofs ( )

Date: 26/04/2023

Element Name (optional) 2.49 m²°C/W

Type: Floor: Slab Floor - H1/AS1 Edition 5 and H1/AS2 Edition 1

Slab Floor - H1/AS1 Edition 5 and H1/AS2 Edition 1 view detail

Slab Insulation (H1 Edition 5)

Slab floor area [m²]: 116.2

Perimeter length [m]:

masonry veneer walls: 47.73

other walls:

External wall thickness [mm]: 90

Underslab insulation: Full Polystyrene EPS 150mm (INS Grade) 5.7

Slab edge insulation: no

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SUPERSEDED 12/06/2023

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H1 Solution

305mm Slab using RibRaft® 220mm Brick veneer no foundation insulation

The minimum R-value for this zone is 1.6

With a calculated A/P ratio of 2.3

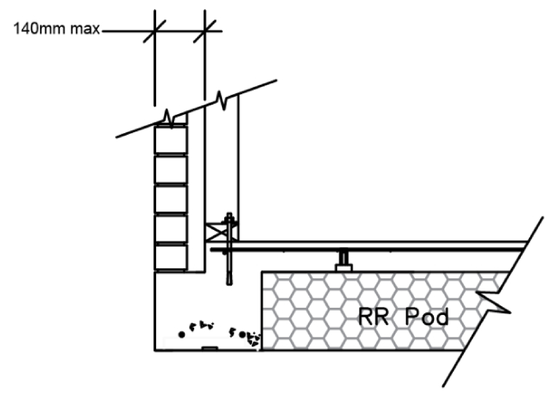
The R-value for your selected solution is:

1.43

Exterior Area	116.27m²
Exterior Perimeter	47.73m
Embedded floor heating	No
Wall Width	90mm

SUPERSEDED 14/08/2023 with Amendment 1

For a full set of CAD drawings for RibRaft solutions, please refer to the Firth Resources web page
https://www.firth.co.nz/resources/drawings/
Check the RibRaft Foundations filter to show only relevant files.



⑧ 220mm FIRTH RIBRAFT POLYPOD
BRICK VENEER
FIRTH RAFTMIX 20 OR 25MPa

Firth's H1 Online Solution Calculator uses the specification data entered by the user and applies the methodology, as described in the Building Code amendment H1 Energy Efficiency Acceptable Solution H1/AS1 - 5th Edition for all housing, and buildings (up to 300m²), to recommend concrete slab foundation insulation solutions using CodeMark certified Firth products and systems (only).

The recommended solution in this pdf document, can be used as part of a Building Consent application however, Firth accepts no liability for Building Code compliance or thermal performance of the house or building. Firth also accepts no liability through misrepresentation or improper use of the Firth H1 Online Solution Calculator to obtain or prove Building Code compliance.

Firth has worked to ensure the accuracy of the solution provided by its H1 Online Solution Calculator. Firth cannot guarantee the accuracy of the recommend solution under any other methodology than that described in H1/AS1 5th Edition.

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H1 Solution

305mm Slab using RibRaft® 220mm Brick veneer no foundation insulation

The minimum R-value for this zone is 1.6

With a calculated A/P ratio of 1.9

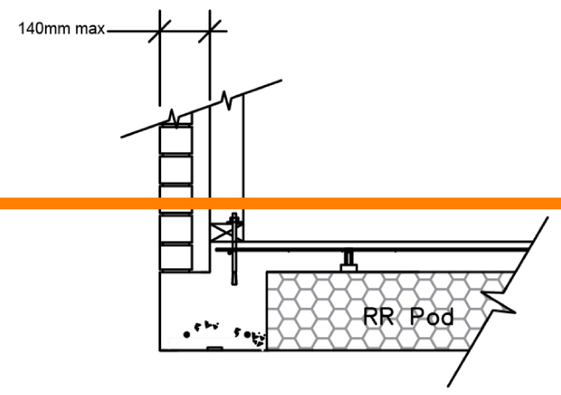
The R-value for your selected solution is:

1.28

Exterior Area	84.28m²
Exterior Perimeter	42.11m
Embedded floor heating	No
Wall Width	90mm

For a full set of CAD drawings for RibRaft solutions, please refer to the Firth Resources web page
https://www.firth.co.nz/resources/drawings/
Check the RibRaft Foundations filter to show only relevant files.

SUPERSEDED 14/08/2023 with Amendment 1



⑧ 220mm FIRTH RIBRAFT POLYPOD
BRICK VENEER
FIRTH RAFTMIX 20 OR 25MPa

Firth's H1 Online Solution Calculator uses the specification data entered by the user and applies the methodology, as described in the Building Code amendment H1 Energy Efficiency Acceptable Solution H1/AS1 - 5th Edition for all housing, and buildings (up to 300m²), to recommend concrete slab foundation insulation solutions using CodeMark certified Firth products and systems (only).

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Firth has worked to ensure the accuracy of the solution provided by its H1 Online Solution Calculator. Firth cannot guarantee the accuracy of the recommend solution under any other methodology than that described in H1/AS1 5th Edition.

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Construction R-value Calculator

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

I have recently implemented some changes to the way assemblies with multiple adjacent insulation layers such as truss roofs with a second layer of insulation are calculated. Check out the details here.

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

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors
- Walls
- Roofs

Date: 26/04/2023

Element Name (optional) — 5.38 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :
90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 7.2

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: 77.05 Number of downlights: 13 Clearance from lamp holder side [m]:

[Print Page]

SUPERSEDED 14/08/2023 with Amendment 1

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Construction R-value Calculator

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

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If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors
- Walls
- Roofs

Date: 26/04/2023

Element Name (optional) **5.38** m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :
90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 7.2

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: 107.7 Number of downlights: 17 Clearance from lamp holder side [m]:

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

Floors ○
Walls ○
Roofs ◉

Date: 26/04/2023

Element Name (optional) 3.71 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :
90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 4.1

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: 7.23 Number of downlights: Clearance from lamp holder side [m]:

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

- Floors
- Walls
- Roofs

Date: 26/04/2023

Element Name (optional) — 3.71 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :
90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 4.1

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: 8.55 Number of downlights: Clearance from lamp holder side [m]:

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 31/05/2023

Element Name (optional) **2.16** m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : James Hardie Linea weatherboard
R-value: 0.08

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 600mm

Wall Frame Area: 16.2%	*Cavity Area: 83.8%*
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : *R-value: 0.75*	Insulation : 2.6

Wall Lining : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

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Construction R-value Calculator

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 03/03/2023

Element Name (optional) **2.21** m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : generic - Brick 70mm
R-value: 0.06

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

cavity will be halved), R: 0.08 | cavity will be halved), R: 0.08

Framing : *R-value: 0.75* | Insulation : 2.6

still Airgap: none
R-value: 0.00

Wall Lining : generic - gypsum Plasterboard 10mm

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NZBC H1 - Calculation Method

Client	Bhitani & Puri - Back
Address	24 Westmoor Blvd
	Rolleston

REFERENCE BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	(Heat loss = Area/R-value)
Roof Type 1	Corrugated on trusses @ 900crs	113.71	3.30	34.46	
Roof Type 2	Trimed Insulation area	7.56	3.30	2.29	
Wall Type 1	70% Total Wall Area	83.26	2.00	41.63	
Wall Type 2		0.00	2.00	0.00	
Wall Type 3		0.00	2.00	0.00	
Floor	Concrete slab on ground	121.27	1.30	93.28	
Glazing (30%)	Double Glazed Windows	35.68	0.37	96.44	
Glazing (>30%)	Double Glazed Windows	0.00	0.33	0.00	
Sklights	Skylight	0.00	0.37	0.00	
				268.11	TOTAL LOSS

Note: Total area of glazing (including Skylights) must be 50% or less than the total wall area

PROPOSED BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	(Heat loss = Area/R-value)
Roof Type 1	Corrugated on trusses @ 900crs	113.71	3.37	33.74	
Roof Type 2	Trimed Insulation area	7.56	2.07	3.65	
Wall Type 1	Brick Cladding	67.77	2.21	30.67	
Wall Type 2	Linea Cladding	0.64	2.16	0.30	
Wall Type 3	Intertenancy Wall	15.41	2.02	7.63	
Wall Type 4	Insulated Garage Door	5.16	1.34	3.85	
Wall Type 5	Front Door	2.02	0.18	11.22	
Floor	Concrete slab on ground	121.27	1.46	83.06	
Glazing (30%)	Double Glazed Windows	27.94	0.30	93.13	
Glazing (>30%)	Double Glazed Windows	0.00	0.33	0.00	
Sklights	Skylight	0.00	0.37	0.00	
				267.25	TOTAL LOSS

Trimmed Insulation Area: (90mm Rafter & R3.6 batts 180mm)

Roof Pitch	Cut Height	Cut Width	% of batt cut	New R Value
15	80	372	44.44%	1.6
20	87	255	48.33%	1.74
25	95	182	52.78%	1.9
30	105	130	58.33%	2.1

H1 Solution

305mm Slab using RibRaft® 220mm Brick veneer no foundation insulation

The minimum R-value for this zone is 1.6

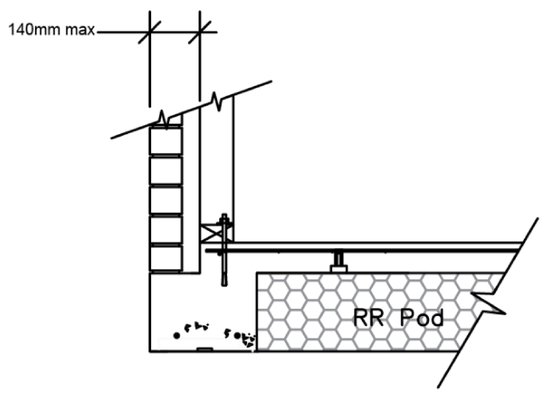
With a calculated A/P ratio of 2.4

The R-value for your selected solution is:

1.46

Exterior Area	121.27m²
Exterior Perimeter	48.45m
Embedded floor heating	No
Wall Width	90mm

For a full set of CAD drawings for RibRaft solutions, please refer to the Firth Resources web page
https://www.firth.co.nz/resources/drawings/
Check the RibRaft Foundations filter to show only relevant files.



⑧ 220mm FIRTH RIBRAFT POLYPOD
BRICK VENEER
FIRTH RAFTMIX 20 OR 25MPa

Firth's H1 Online Solution Calculator uses the specification data entered by the user and applies the methodology, as described in the Building Code amendment H1 Energy Efficiency Acceptable Solution H1/AS1 - 5th Edition for all housing, and buildings (up to 300m²), to recommend concrete slab foundation insulation solutions using CodeMark certified Firth products and systems (only).

The recommended solution in this pdf document, can be used as part of a Building Consent application however, Firth accepts no liability for Building Code compliance or thermal performance of the house or building. Firth also accepts no liability through misrepresentation or improper use of the Firth H1 Online Solution Calculator to obtain or prove Building Code compliance.

Firth has worked to ensure the accuracy of the solution provided by its H1 Online Solution Calculator. Firth cannot guarantee the accuracy of the recommend solution under any other methodology than that described in H1/AS1 5th Edition.

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 03/03/2023

Element Name (optional) **2.21** m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : generic - Brick 70mm
R-value: 0.06

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

Wall Frame Area: 14.4%	*Cavity Area: 85.6%*
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : *R-value: 0.75*	Insulation : 2.6
	still Airgap: none *R-value: 0.00*

Wall Lining : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

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If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 31/05/2023

Element Name (optional) — 2.16 m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : James Hardie Linea weatherboard
R-value: 0.08

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 600mm

Wall Frame Area: 16.2%	*Cavity Area: 83.8%*
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : *R-value: 0.75*	Insulation : 2.6
	still Airgap: none *R-value: 0.00*

Wall Lining : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 10/08/2023

Element Name (optional) **2.02** m²°C/W

Type: Wall: Timber Frame (direct fixed Cladding)

Timber Frame (direct fixed Cladding) [view detail]

external surface 0.03

Cladding : generic - None (facing inside air, i.e. internal bulkhead into roof space)
R-value: 0.09

Air Barrier : generic - none
R-value: 0.00

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

Wall Frame Area: 14.4% *Cavity Area: 85.6%*

Framing :
R-value: 0.75

Insulation : 2.2

still Airgap: none
R-value: 0.00

Wall Lining : generic - double Layer gypsum Plasterboard 10mm+10mm
R-value: 0.09

internal surface 0.09

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DOMINATOR®

10 YEAR TOTAL CONFIDENCE WARRANTY

*Available for specific Door & Opener packages. Regular Servicing Required.

Dominator Insulated Garage Door R-Value 1.34 W/m²K

Background

The R-value is used in the building industry to specify the thermal rating of particular building products. This is defined as a **material resistance to the flow of heat**. It is expressed as the thickness of the material divided by the thermal conductivity (k).

R-values usually given in SI units, typically Kelvin square-meter per Watt ($K.m^2/W$). In the United States R-values are given in units of $h{\cdot}ft^{2}{\cdot}^{\circ}$ F/Btu. The two R-value ratings can be easy confused because the designated units are not usually transcribed after the R-value in marketing information. According to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, the conversion between imperial units and SI units of R-value is: 1 $h{\cdot}ft^{2}{\cdot}^{\circ}$ F/Btu = 0.176110 $K{\cdot}m^2/W$.

The R-value can be determined by two different methods; manual calculation of the panels or testing the complete door system. Both methods can result in an entirely different value, therefore careful consideration needs to be made in interpreting the values correctly.

R-Value Calculation

The R-value of an individual panel can be achieved by manual calculation. DASMA (Door & Access Systems Manufacturing Association International) provide guidelines in determining the calculated R-value.

A Dominator Insulated panel has an exterior surface, interior surface, and an insulating core material. Also present is the insulating effect of air on a vertical surface, referred to as "air film". Each of these elements has a unique R-value (depending on the material) that are added together to create the overall R-Value of the panel. This is shown in figure 1.

For this exercise, we have used the manual calculation method as stated in DASMA Technical Data Sheet #163

Figure 1: Section of Dominator Insulated door

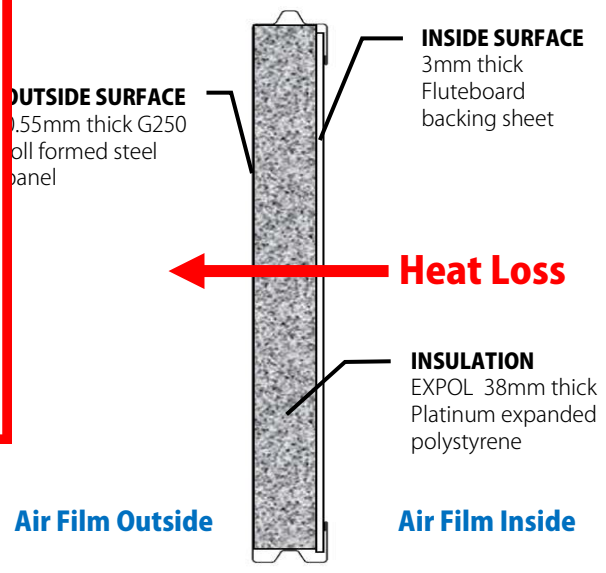


Table 1: R-value table

Property	Material Description	Thermal Conductivity –k (W/mK)	R-Value ($K.m^2/W$)
Air Film Outside	Moving Air – 15MPH, Non-reflective	-	0.0299
Outside Surface	0.55mm thick, G300 roll-formed steel panel	50.2	0.00001
Insulation	EXPOL 38mm thick, Platinum, M-Grade, expanded polystyrene	0.032	1.19
Inside Surface	3mm thick, Fluteboard backing sheet	0.22	0.0027
Air Film Inside	Still Air, vertical surface, Non-reflective	-	0.1197

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R-Value calculation – Individual Materials

Example calculation - Insulation

R-value = material thickness/ thermal conductivity

R-value = 0.038/ 0.032

Insulation Core R-value = 1.1875

R-Value calculation – Panel Assembly

Calculation – Panel Assembly

$$R\text{-value}_{\text{Panel Assembly}} = R\text{-value}_{\text{air film outside}} + R\text{-value}_{\text{outside surface}} + R\text{-value}_{\text{Insulation}} + R\text{-value}_{\text{Inside Surface}} + R\text{-value}_{\text{air film inside}}$$

$$R\text{-value}_{\text{Panel Assembly}} = 0.0299 + 0.00001 + 1.1875 + 0.0027 + 0.1197$$

$$\textbf{Panel R-value}_{\text{calc Panel Assembly}} = 1.3398\ W/m^2K$$

Summary

The calculated R-value for a Dominator Sectional insulated panel is R_{calc}=1.34 W/m^{2}K.

As a comparison this is 5X higher than Aluminium double-glazed windows*.

If you need any further information on our insulation product or have any questions, please do not hesitate to contact your local Dominator Dealer.

References

The American Society of Heating, Refrigerating and Air-Conditioning Engineers.

Clopay Building Products Company – The True Value of Insulation.

DASMA - Technical Data Sheet #163 R-Value and U-Factor as Applied to A Residential or Commercial Garage Door.

2005 ASHRAE Handbook of fundamentals – Air film R-Values

Wikipedia – R-value (Insulation).

**Source: NZS:4218:2009 – Standard Aluminium Double Glazed window with 8mm spacer.*

Information Provided by Manufacturer

46 Braeburn Drive, Hornby, Christchurch 8042
PO Box 24131 City East, Christchurch 8141
T 03 384 5145 www.bnd.co.nz

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

- Floors ○
- Walls ○
- Roofs ◉

Date: 10/08/2023

Element Name (optional) — 3.37 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :

90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 3.6

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights

Ceiling Area [m²]: 113.7 Number of downlights: Clearance from lamp holder side [m]:

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Construction R-value Calculator

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If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors ○
- Walls ○
- Roofs ◉

Date: 10/08/2023

Element Name (optional) **2.07** m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :
90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 1.9

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: 7.56 Number of downlights: Clearance from lamp holder side [m]:

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NZBC H1 - Calculation Method

Client	Bhitani & Puri - Front
Address	24 Westmoor Blvd
	Rolleston

REFERENCE BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	(Heat loss = Area/R-value)
Roof Type 1	Corrugated on trusses @ 900crs	82.48	3.30	24.99	
Roof Type 2	Trimed Insulation area	5.46	3.30	1.65	
Wall Type 1	70% Total Wall Area	74.43	2.00	37.21	
Wall Type 2		0.00	2.00	0.00	
Wall Type 3		0.00	2.00	0.00	
Floor	Concrete slab on ground	87.94	1.30	67.65	
Glazing (30%)	Double Glazed Windows	31.90	0.37	86.21	
Glazing (>30%)	Double Glazed Windows	0.00	0.33	0.00	
Sklights	Skylight	0.00	0.37	0.00	
				217.72	TOTAL LOSS

Note: Total area of glazing (including Skylights) must be 50% or less than the total wall area

PROPOSED BUILDING

Component	Description	Area sq m	Construction R-value	Heat Loss	(Heat loss = Area/R-value)
Roof Type 1	Corrugated on trusses @ 900crs	82.48	3.37	24.47	
Roof Type 2	Trimed Insulation area	5.46	2.07	2.64	
Wall Type 1	Brick Cladding	56.72	2.21	25.66	
Wall Type 2	Linea Cladding	8.69	2.16	4.02	
Wall Type 3	Intertenancy Wall	15.41	2.02	7.63	
Wall Type 4	Insulated Garage Door	5.16	1.34	3.85	
Wall Type 5	Front Door	2.02	0.18	11.22	
Floor	Concrete slab on ground	87.94	1.28	68.70	
Glazing (30%)	Double Glazed Windows	18.33	0.30	61.10	
Glazing (>30%)	Double Glazed Windows	0.00	0.33	0.00	
Sklights	Skylight	0.00	0.37	0.00	
				209.30	TOTAL LOSS

Trimmed Insulation Area: (90mm Rafter & R3.6 batts 180mm)

Roof Pitch	Cut Height	Cut Width	% of batt cut	New R Value
15	80	372	44.44%	1.6
20	87	255	48.33%	1.74
25	95	182	52.78%	1.9
30	105	130	58.33%	2.1

H1 Solution

305mm Slab using RibRaft® 220mm Brick veneer no foundation insulation

The minimum R-value for this zone is 1.6

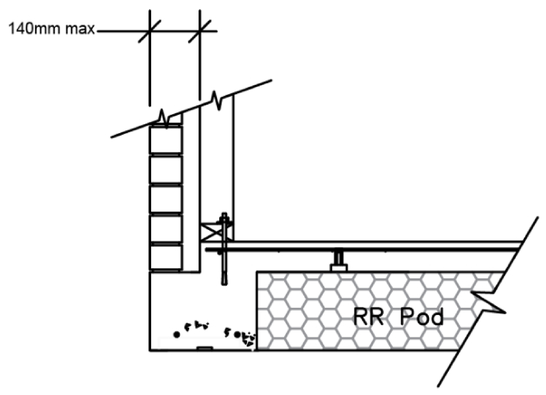
With a calculated A/P ratio of 1.9

The R-value for your selected solution is:

1.28

Exterior Area	87.94m²
Exterior Perimeter	43.31m
Embedded floor heating	No
Wall Width	90mm

For a full set of CAD drawings for RibRaft solutions, please refer to the Firth Resources web page
https://www.firth.co.nz/resources/drawings/
Check the RibRaft Foundations filter to show only relevant files.



⑧ 220mm FIRTH RIBRAFT POLYPOD
BRICK VENEER
FIRTH RAFTMIX 20 OR 25MPa

Firth's H1 Online Solution Calculator uses the specification data entered by the user and applies the methodology, as described in the Building Code amendment H1 Energy Efficiency Acceptable Solution H1/AS1 - 5th Edition for all housing, and buildings (up to 300m²), to recommend concrete slab foundation insulation solutions using CodeMark certified Firth products and systems (only).

The recommended solution in this pdf document, can be used as part of a Building Consent application however, Firth accepts no liability for Building Code compliance or thermal performance of the house or building. Firth also accepts no liability through misrepresentation or improper use of the Firth H1 Online Solution Calculator to obtain or prove Building Code compliance.

Firth has worked to ensure the accuracy of the solution provided by its H1 Online Solution Calculator. Firth cannot guarantee the accuracy of the recommend solution under any other methodology than that described in H1/AS1 5th Edition.

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Construction R-value Calculator

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

I have recently implemented some changes to the way assemblies with multiple adjacent insulation layers such as truss roofs with a second layer of insulation are calculated. Check out the details here.

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

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 03/03/2023

Element Name (optional) — **2.21** m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : generic - Brick 70mm
R-value: 0.06

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

Wall Frame Area: 14.4%	*Cavity Area: 85.6%*
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : *R-value: 0.75*	Insulation : 2.6
	still Airgap: none *R-value: 0.00*

Wall Lining : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

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Construction R-value Calculator

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

I have recently implemented some changes to the way assemblies with multiple adjacent insulation layers such as truss roofs with a second layer of insulation are calculated. Check out the details here.

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

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 31/05/2023

Element Name (optional) — **2.16** m²°C/W

Type: Wall: Timber Frame with vented Cavity

Timber Frame with vented Cavity [view detail]

external surface 0.03

Cladding : James Hardie Linea weatherboard
R-value: 0.08

Air Barrier : generic - Building paper
R-value: 0.01

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 600mm

Wall Frame Area: 16.2%	*Cavity Area: 83.8%*
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : *R-value: 0.75*	Insulation : 2.6
	still Airgap: none *R-value: 0.00*

Wall Lining : generic - gypsum Plasterboard 10mm
R-value: 0.04

internal surface 0.09

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Construction R-value Calculator

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

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

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors ○
- Walls ◉
- Roofs ○

Date: 10/08/2023

Element Name (optional) **2.02** m²°C/W

Type: Wall: Timber Frame (direct fixed Cladding)

Timber Frame (direct fixed Cladding) [view detail]

external surface 0.03

Cladding : generic - None (facing inside air, i.e. internal bulkhead into roof space)
R-value: 0.09

Air Barrier : generic - none
R-value: 0.00

Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm

Wall Frame Area: 14.4% *Cavity Area: 85.6%*

Framing :
R-value: 0.75

Insulation : 2.2

still Airgap: none
R-value: 0.00

Wall Lining : generic - double Layer gypsum Plasterboard 10mm+10mm
R-value: 0.09

internal surface 0.09

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DOMINATOR®

10 YEAR TOTAL CONFIDENCE WARRANTY

*Available for specific Door & Opener packages. Regular Servicing Required.

Dominator Insulated Garage Door R-Value 1.34 W/m²K

Background

The R-value is used in the building industry to specify the thermal rating of particular building products. This is defined as a **material resistance to the flow of heat**. It is expressed as the thickness of the material divided by the thermal conductivity (k).

R-values usually given in SI units, typically Kelvin square-meter per Watt ($K.m^2/W$). In the United States R-values are given in units of $h{\cdot}ft^{2}{\cdot}^{\circ}$ F/Btu. The two R-value ratings can be easy confused because the designated units are not usually transcribed after the R-value in marketing information. According to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, the conversion between imperial units and SI units of R-value is: 1 $h{\cdot}ft^{2}{\cdot}^{\circ}$ F/Btu = 0.176110 $K{\cdot}m^2/W$.

The R-value can be determined by two different methods; manual calculation of the panels or testing the complete door system. Both methods can result in an entirely different value, therefore careful consideration needs to be made in interpreting the values correctly.

R-Value Calculation

The R-value of an individual panel can be achieved by manual calculation. DASMA (Door & Access Systems Manufacturing Association International) provide guidelines in determining the calculated R-value.

A Dominator Insulated panel has an exterior surface, interior surface, and an insulating core material. Also present is the insulating effect of air on a vertical surface, referred to as "air film". Each of these elements has a unique R-value (depending on the material) that are added together to create the overall R-Value of the panel. This is shown in figure 1.

For this exercise, we have used the manual calculation method as stated in DASMA Technical Data Sheet #163

Figure 1: Section of Dominator Insulated door

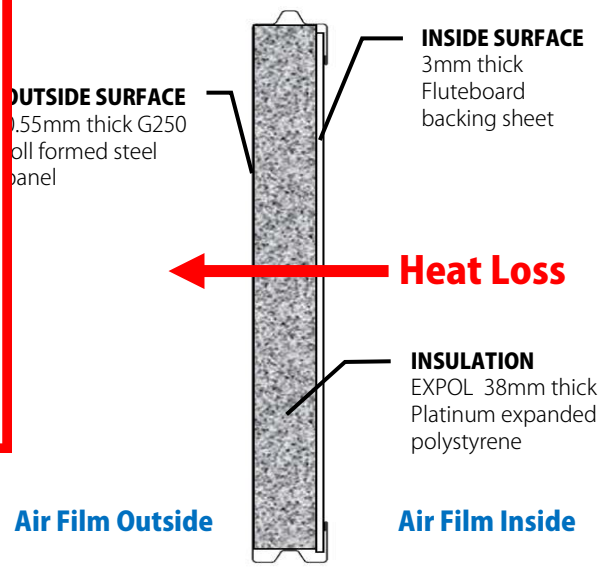


Table 1: R-value table

Property	Material Description	Thermal Conductivity –k (W/mK)	R-Value ($K.m^2/W$)
Air Film Outside	Moving Air – 15MPH, Non-reflective	-	0.0299
Outside Surface	0.55mm thick, G300 roll-formed steel panel	50.2	0.00001
Insulation	EXPOL 38mm thick, Platinum, M-Grade, expanded polystyrene	0.032	1.19
Inside Surface	3mm thick, Fluteboard backing sheet	0.22	0.0027
Air Film Inside	Still Air, vertical surface, Non-reflective	-	0.1197

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R-Value calculation – Individual Materials

Example calculation - Insulation

R-value = material thickness/ thermal conductivity

R-value = 0.038/ 0.032

Insulation Core R-value = 1.1875

R-Value calculation – Panel Assembly

Calculation – Panel Assembly

$$R\text{-value}_{\text{Panel Assembly}} = R\text{-value}_{\text{air film outside}} + R\text{-value}_{\text{outside surface}} + R\text{-value}_{\text{Insulation}} + R\text{-value}_{\text{Inside Surface}} + R\text{-value}_{\text{air film inside}}$$

$$R\text{-value}_{\text{Panel Assembly}} = 0.0299 + 0.00001 + 1.1875 + 0.0027 + 0.1197$$

$$\textbf{Panel R-value}_{\text{calc Panel Assembly}} = 1.3398\ W/m^2K$$

Summary

The calculated R-value for a Dominator Sectional insulated panel is R_{calc}=1.34 W/m^{2}K.

As a comparison this is 5X higher than Aluminium double-glazed windows*.

If you need any further information on our insulation product or have any questions, please do not hesitate to contact your local Dominator Dealer.

References

The American Society of Heating, Refrigerating and Air-Conditioning Engineers.

Clopay Building Products Company – The True Value of Insulation.

DASMA - Technical Data Sheet #163 R-Value and U-Factor as Applied to A Residential or Commercial Garage Door.

2005 ASHRAE Handbook of fundamentals – Air film R-Values

Wikipedia – R-value (Insulation).

**Source: NZS:4218:2009 – Standard Aluminium Double Glazed window with 8mm spacer.*

Information Provided by Manufacturer

b&d group Garage Doors & Secure Access Systems

46 Braeburn Drive, Hornby, Christchurch 8042
PO Box 24131 City East, Christchurch 8141
T 03 384 5145 www.bnd.co.nz

Construction R-value Calculator

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

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

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors ○
- Walls ○
- Roofs ◉

Date: 10/08/2023

Element Name (optional) — 3.37 m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :
90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 3.6

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights
Ceiling Area [m²]: 82.48 Number of downlights: Clearance from lamp holder side [m]:

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Construction R-value Calculator

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

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

If your construction is not listed, please send an e-mail to designnavigator@gmail.com with a description and a detail drawing (pdf) of it.

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

- Floors ○
- Walls ○
- Roofs ◉

Date: 10/08/2023

Element Name (optional) **2.07** m²°C/W

Type: Roof: Timber framed truss Roof, direct fixed or battened flat Ceiling

Timber framed truss Roof, direct fixed or battened flat Ceiling [view detail]

external surface 0.03

Roofing : generic - Metal corrugate Iron with building paper
R-value: 0.01

Insulation :

Timber Frame & Cavity :

90mm rafters or joists @ 900mm, battens covered with insulation

Roof Frame Area: 5.0%	*Cavity Area: 95.0%*
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : *R-value: 0.75*	Insulation : 1.9

Roof Lining : generic - gypsum Plasterboard 13mm
R-value: 0.06

internal surface 0.09

Non-IC-rated recessed downlights

Ceiling Area [m²]: 5.46 Number of downlights: Clearance from lamp holder side [m]:

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NZBC E2 - Risk Matrix	
Client	Bhutani & Puri
Address	24 Westmoor Blvd
	Rolleston

Risk Factor	Low	Medium	High	Very H	Score	Select
Wind Zone	0	0	1	2	**1**	Wind High
No. of Storeys	0	1	2	4	**0**	1 Storey
Roof / Wall	0	1	3	5	**0**	Roof/Wall Low
Eaves Width	0	1	2	5	**2**	Eaves High
Envelope	0	1	3	6	**1**	Envelope Medium
Decks/Balcony	0	2	4	6	**0**	Deck/Balcony Low
			Total Score		**4**	

Note: Claddings in Extra High Wind Zones require Rigid Underlays & Drained Cavities.
Scores are the same as Very High Wind Zone

	Cladding	Cavity	Risk Score
North Elevation	Masonary	Drained Cavity	4
East Elevation	Masonary	Drained Cavity	4
South Elevation	Bevel-back Weatherboards	Drained Cavity	4
West Elevation	Bevel-back Weatherboards	Drained Cavity	4

Wind Zone	
Low Risk	NZS3604 Low Wind Zone
Medium Risk	NZS3604 Medium Wind Zone
High Risk	NZS3604 HIgh Wind Zone
Very High Risk	NZS3604 Very High Wind Zone
Extra High Risk	NZS3604 Extra HIgh Wind Zone

Number of Storeys	
Low Risk	One Storey
Medium Risk	Two Storey in part
High Risk	Two Storey
Very High Risk	More than Two Storeys

Roof / Wall Junctions	
Low Risk	Roof/wall intersections fully protected eg hip & gable roof with eaves
Medium Risk	Roof/wall intersections partly protected eg hip & gable roof no eaves
High Risk	Roof/Wall intersection fully exposed eg parapets, reverse slope eaves
Very High Risk	Roof elements finishing within wall clad eg lower ends of aprons, chimneys

Eaves Width	
Low Risk	Greater then 600mm at first level
Medium Risk	450-600mm at first level or greater than 600mm at second level
High Risk	100-450mm at first level or 450-600mm at second level
Very High Risk	0-100mm at first level or 100-450mm at second level of 450-600mm at third level

Envelope Complexity	
Low Risk	Simple rectangle, L, T or bommerang shape, single cladding
Medium Risk	Complex, angular or curved building shapes, single wall claddings
High Risk	Complex, angular or curved building shapes, multiple wall claddings
Very High Risk	As for High Risk but with junctions not covered in Table 1C or !F, box windows, pergolas

Decks & Balconies	
Low Risk	None or timber slatted deck or porch at ground level
Medium Risk	Fully roofed waterproof deck or timber slatted deck at 1sy or 2nd level
High Risk	1st level waterproof deck or 1st level cantilevered slatted deck
Very High Risk	2nd level waterproof deck or 2nd level cantilevered slatted deck

Suitable Wall Claddings		
Risk Score	**Direct Fix**	**Drained Cavity**
0 - 6	Timber Weatherboards Fibre Cement Weatherboards Vertical Profiled Metal - Corro or Trim Fibre Cement Sheet (Jointed) Plywood Sheet	Masonry Stucco Horizontal Profiled Metal - Corro or Trim Fibre Cement Sheet (flush finish) EIFS
7 - 12	Bevel-backed Timber Weatherbds Vertical Timber Board & Batten Vertical Profiled Metal - Corro Only	Masonry Stucco Horizontal Profiled Metal - Corro or Trim Rusticated Weatherboards Fibre Cement Weatherboards Fibre Cement Sheet (flush & jointed) Plywood Sheet EIFS
13 - 20	Vertical Profiled Metal - Corro Only	Masonry Stucco Horiz Profiled Metal - Corro/Trim Rusticated Weatherboards Fibre Cement Weatherboards Fibre Cement Sheet (flush & jointed) Plywood Sheet EIFS Bevel-back Weatherboards
Over 20	Redesign Specific Design	

SDC - Approved Building Consent Drawings 5221-022406/2024 08/2024 phillid

SDC - Approved Document E2/AS1 Table 23 Item 1.0 - Consented Drawing - Building Consent Document - Do not alter - Approved by philld

The information in this supplement and James Hardie's technical literature is ony intended for use in relation to the relevant products by James Hardie

Hardie™ Mineral Insulation

Technical Supplement – November 2022

Accessory	Code
	304904

1. INSULATION

Hardie™ Mineral Insulation is used in James Hardie's fire rated system in accordance with the system specification. Hardie™ Mineral Insulation has been tested with James Hardie's fire rated systems and cannot be substituted with any other insulation material.

Also refer to clause H1 of the NZBC for further information on construction R-value requirements.

2. PHYSICAL PROPERTIES

- Size: 600 x 800 x 90mm - 2.4m^2 per bale.
- R-Value: 2.74m^{2}K/W.
- Density: 80kg/m^3.

3. APPLICATION

Fit the specified insulation tightly in all framing cavities against the flexible underlay. Always ensure that the flexible underlay is not pushed out of the framing plane as it will tend to block off the cavity ventilation/drainage when the cladding is fixed over cavity battens. Hardie™ Mineral Insulation is pre-cut 50mm bigger in length and width than the cavity size to ensure a tight friction fit in the cavity.

If the cavity to be insulated is smaller than the size of insulation supplied, the insulation may be cut on site to fit to size. Ensure that insulation is at least 50mm bigger in each direction than the size of frame cavity to be filled so that a tight friction fit is achieved.

4. SAFE WORKING PRACTICES

Storage

Hardie™ Mineral Insulation should be stored in the packaging provided in a clean dry space where it will not get wet, knocked or damaged.

Handling and safety

Protective clothing must be worn when handling this product.

Engineering Controls

In industrial situations, it is expected that employee exposure to hazardous substances will be controlled to a level as far below the WES as practicable by applying the hierarchy of control required by the Health and Safety at work Act (2015) and the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016. Exposure can be reduced by process modification, use of local exhaust ventilation, capturing substances at the source, or other methods. If you believe air borne concentrations of mists, dusts or vapours are high you are advised to modify processes or increase ventilation. Follow the Health and Safety Guidelines for the Selection and Safe Handling of Synthetic Mineral Fibres, published by the WorkSafe.

Personal Protective Equipment

Eyes:

Avoid contact with eyes. Use safety glasses or goggles if irritant levels of fibres and dusts are present.

Skin:

Protective gloves and clothing should be work when handling mineral insulation.

To prevent irritation which occurs by contact of the loose fibres with the skin, it is advisable to wear either disposable or single-use overalls or light weight nylon overalls complete with hoods when handling the insulation material. The overalls should be close fitting at the neck wrists and ankles to prevent problems of skin irritation, where overalls are to be laundered, they should be laundered in separate laundry facilities and not in the home.

This technical supplement must be read in conjuction with the current technical product literature. James Hardie's products must be installed in accordance with the applicable technical product literature. All components and accessories must be installed in accordance with the respective manufacturer's specifications. For the product warranty, terms and conditions refer to the applicable product technical literature by James Hardie.

Respiratory:



In general use, a respirator is not likely to be required. A respirator should be used when airborne concentrations approach the WES, if there is airborne dust or fibres. It is recommended to use an half face air purifying respirator with a minimum of a P1 particulate filter. If using a respirator, ensure that the cartridges are correct for the potential air contamination and are in good working order.

WES Additional Information

Formaldehyde is included in the above information, as traces of formaldehyde may be emitted from the product, especially immediately after removing the plastic packaging. The concentration of formaldehyde emissions has been tested by James Hardie New Zealand Limited and was found to be below the 8 hour workplace exposure standard.

Work Safe New Zealand Health and Safety Guidelines for the Selection and Safe Handling of Synthetic Mineral Fibres requires lightweight nylon overalls, gloves, appropriate eye protection and a respirator with a minimum of a class P1 filter. Handling the product as if it is fragile will greatly reduce the potential dust creation and loose fibres. A SDS is available by visiting www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

Cutting

A straight edge and stiff blade knife or similar will neatly cut this product with the minimum of dust creation.

WARRANTY

James Hardie New Zealand Limited ("James Hardie") warrants for a period of 15 years from the date of purchase that the Hardie™ Mineral Insulation supplied by James Hardie will be free from defects due to defective factory workmanship or materials. Serviceable life is 50 years.

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 Hardie™ Mineral Insulation must be installed strictly in accordance with the relevant Fire and Acoustic fire rated system by James Hardie 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 Hardie™ Mineral Insulation must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice;

d) the project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("NZBC"), regulations and standards;

e) the claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product;

f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces);

g) all warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law;

h) if meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested/assessed the performance of the Hardie™ Mineral Insulation when installed in accordance with the Fire and Acoustic Design Manual by James Hardie, 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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This technical supplement must be read in conjuction with the current technical product literature. James Hardie's products must be installed in accordance with the applicable technical product literature. All components and accessories must be installed in accordance with the respective manufacturer's specifications. For the product warranty, terms and conditions refer to the applicable product technical literature by James Hardie.

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GIB® EzyBrace® Systems

Specification and installation manual



CBI 5113

AUGUST 2016

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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[1]
- Encourages more even bracing distribution throughout the building.

[1] 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.

BRANZ Appraised
Appraisal No.928 [2016]

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GIB EzyBrace® Systems — August 2016

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

USE ONLY THE CURRENT SPECIFICATION

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

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

PATENTS

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

Beware of substitution

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

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

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

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

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

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

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

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Scope of use

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

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

Finish quality — framing and substrates

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

New GIBFix® Framing System

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

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

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

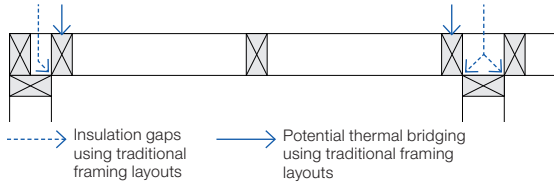
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

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

Bracing 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.

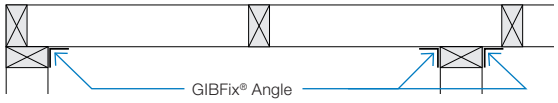
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

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[1].
- Encourages more even bracing distribution throughout the building.

1. Actual savings dependent on building and bracing design.

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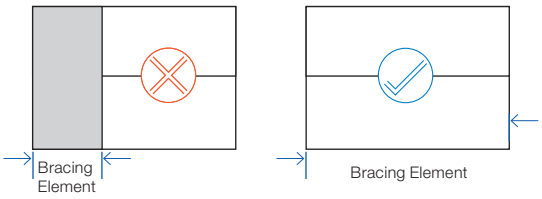
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Bracing resistance

WALL BRACING LAYOUT

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

FIGURE 3: WALL BRACING LAYOUT



BRACING DISTRIBUTION

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

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

Space bracing lines no more than:

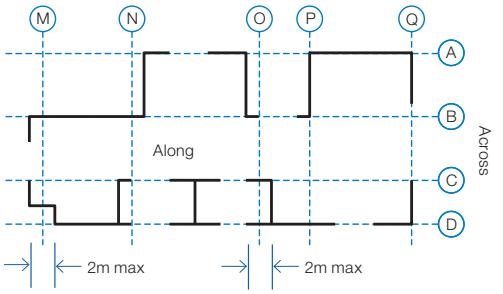
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

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

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

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

FIGURE 4: BRACING GRID LAYOUT



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

GIB EZYBRACE® SYSTEMS

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

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

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

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

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

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

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

SDC - Approved Application Document B2/VM1 Clause 3.0 7 B2 2307 Bracing Design Methods Pty 104 of 522 - 22406/2024 08/2024 phillid

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 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.

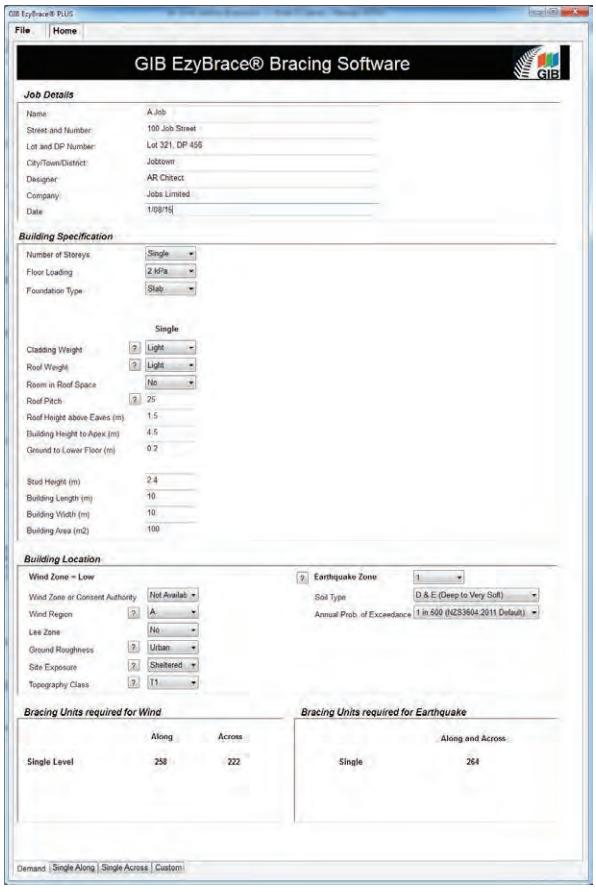
Bracing resistance sheets ('tabs') are added depending on the building specification entered. For example, subfloor bracing resistance tabs only show when a 'subfloor' foundation type has been selected.

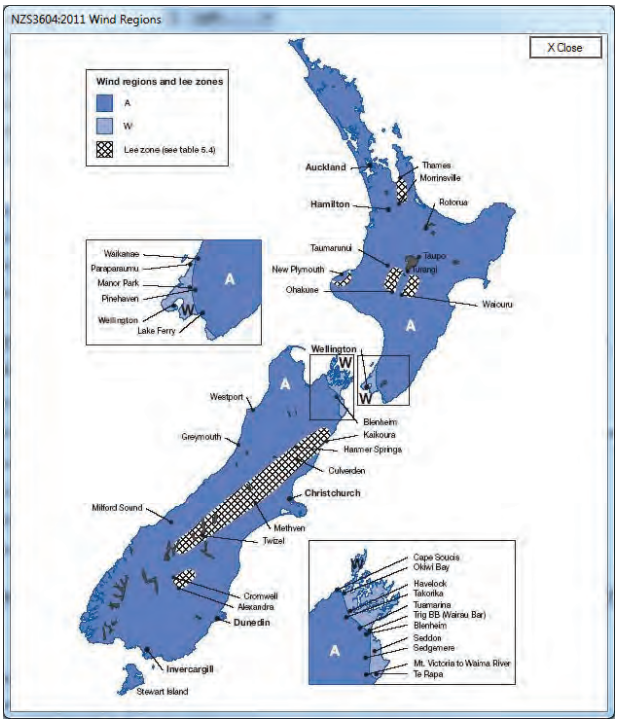
The Demand sheet gives the designer the option to select a longer earthquake return period which represents a higher earthquake design force. The default for buildings constructed in accordance with NZS3604:2011 is an earthquake that has a 10% chance of being exceeded within the assumed 50 year 'design 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





Download GIB EzyBrace® 2016 design software from gib.co.nz/ezybrace

SDC - Approved Document B (2019) - Compliance Document for New Zealand Building Code - Clauses B1 Structure, B2 Durability - Amendment 1 - 105 of 523 - 2406/2024 08:20:16

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

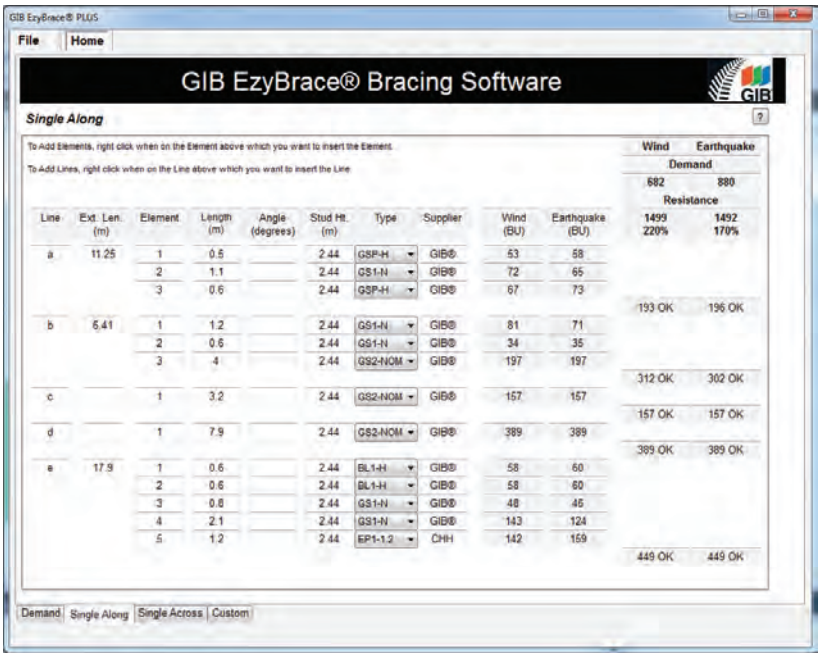
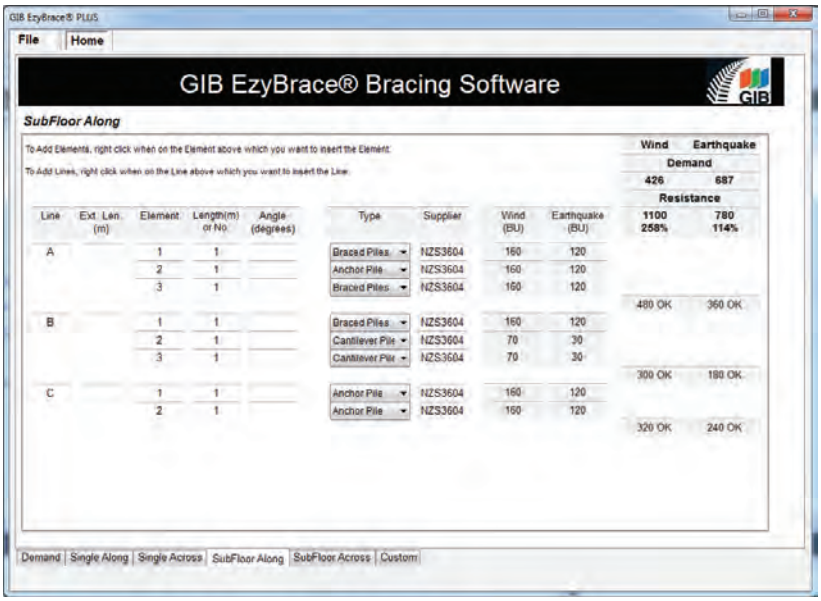


FIGURE 7: GIB EZYBRACE® 2016 — SUBFLOOR BRACING RESISTANCE CALCULATION SHEET



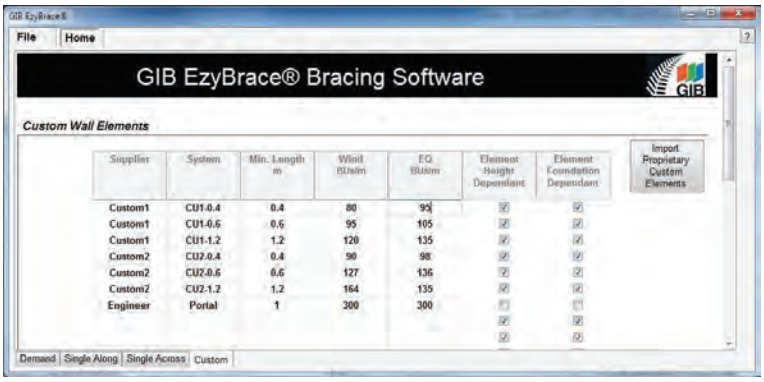
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SDC - Approved Application Document BC2307/B1/VM1 dated 19 Jun 2024 - Page 106 of 224 - 24/06/2024 08:42:10 - phillid

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



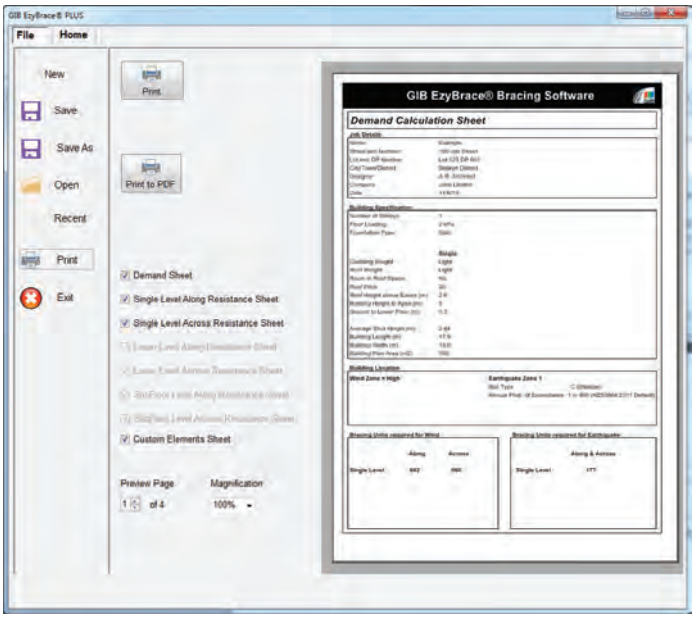
Note: Values and systems shown in Custom Elements Sheets are for illustrative purposes only.

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

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Timber framing

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

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

GIBFix® Framing System (alternative layout)

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

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

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

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

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

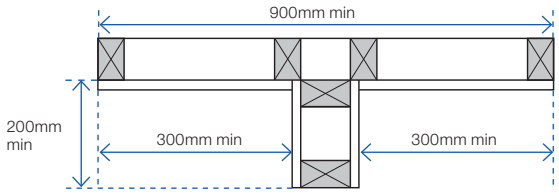
Guidelines for intersection walls

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

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

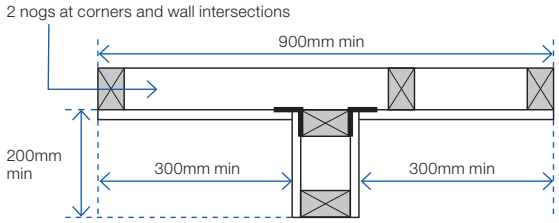
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



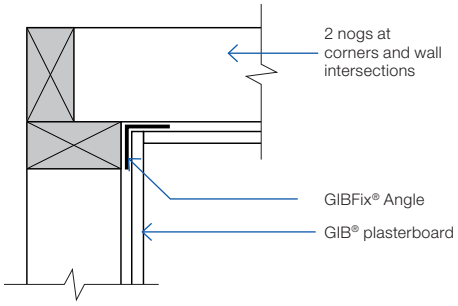
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FIGURE 13: WALL INTERSECTION (GIBFIX® FRAMING SYSTEM)



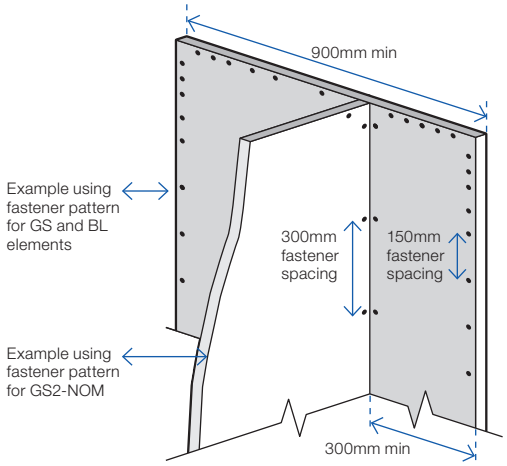
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFIX® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

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

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Top plate connections

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

Parapets and gable end walls

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

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

or

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

Bottom plate fixing

TIMBER FLOOR

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

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

CONCRETE FLOOR — EXTERNAL WALL BRACING ELEMENTS

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

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

CONCRETE FLOOR — INTERNAL WALL BRACING ELEMENTS

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

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

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

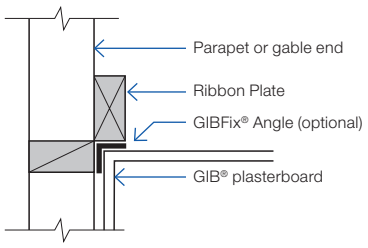
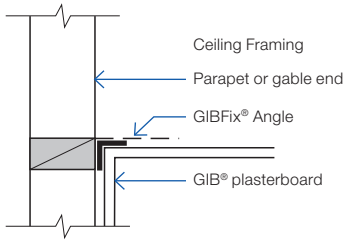


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

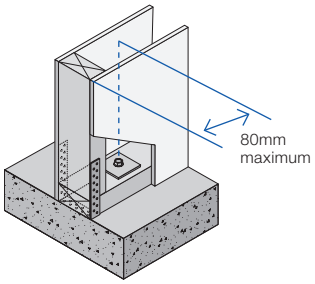
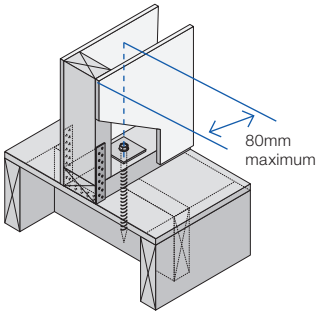
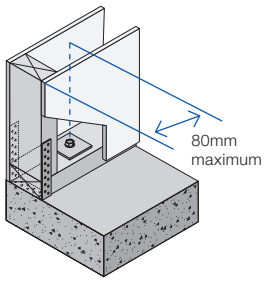
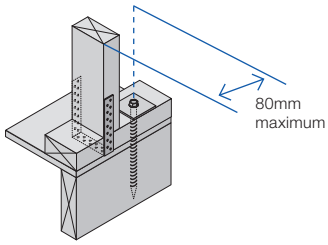
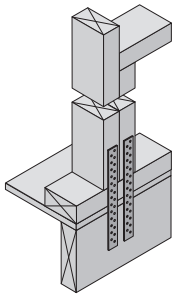
BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

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

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Bracing strap installation

Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard and positioned in such a way that the corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the corner fastenings to be installed without having to penetrate the bracing strap.

Concrete floor	Timber floor
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.	
Internal wall	
 GEB004	 GEB005
External wall	
 GEB006	 GEB007
Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library.	2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Block to nog fixed with 3/100 x 3.75mm nails to stud.
	 GEB008

Hold-down fastener requirements	
Concrete floor	Timber floor
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.	12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element

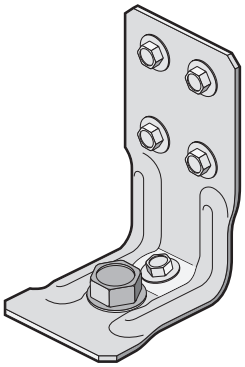
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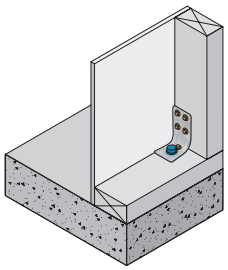
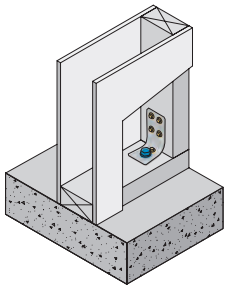
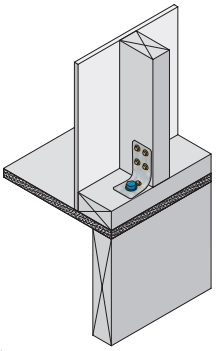
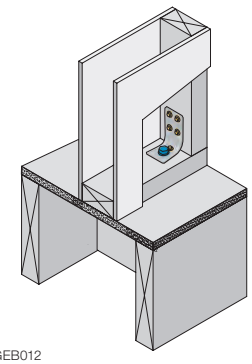
GIB HandiBrac® installation

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

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

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



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

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GIB HandiBrac® placement with GIBFix® Framing System for concrete floors

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

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

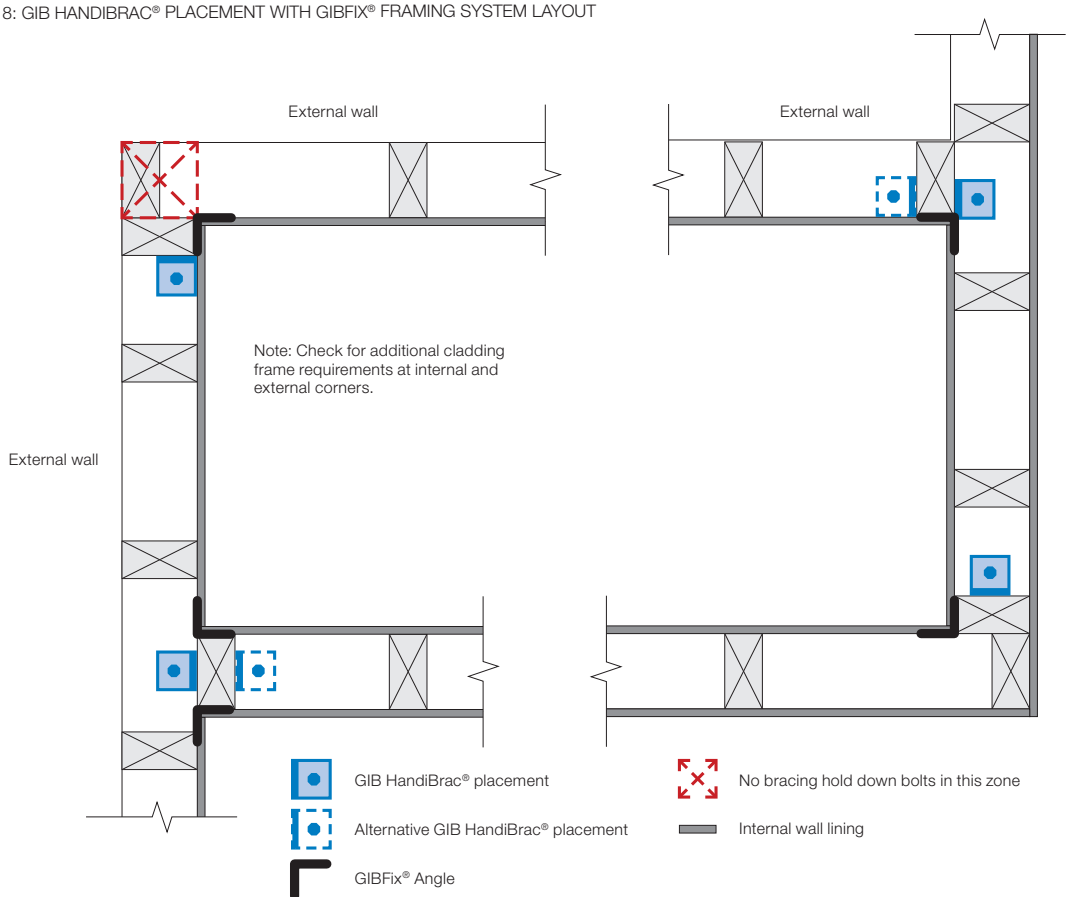
The GIB HandiBrac® is fixed to the stud which has the GIBFix® Angle.

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

TIMBER FLOORS

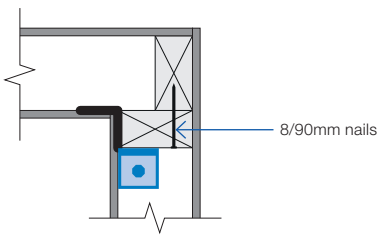
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

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



GEB013

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



GEB014

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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

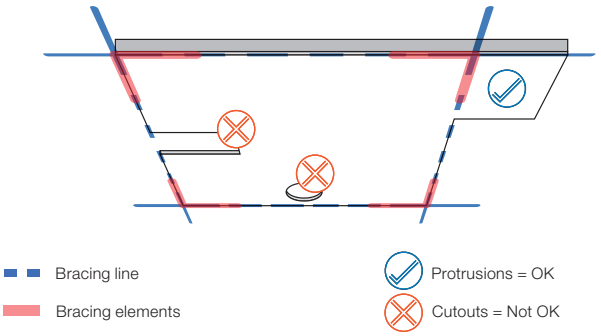


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

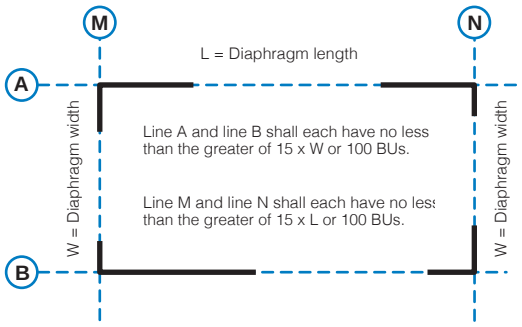
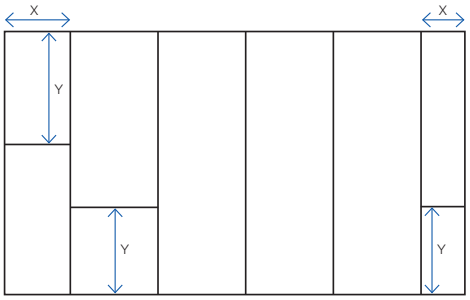


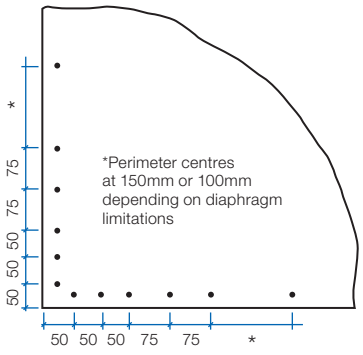
FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS



X = 900mm min or 600–900mm min provided all adjacent joints are back-blocked.

Y = 1800mm min sheet lengths at ends of ceiling diaphragms.

FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



Unless stated all fastener spacings are maximums.

GEB015

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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.

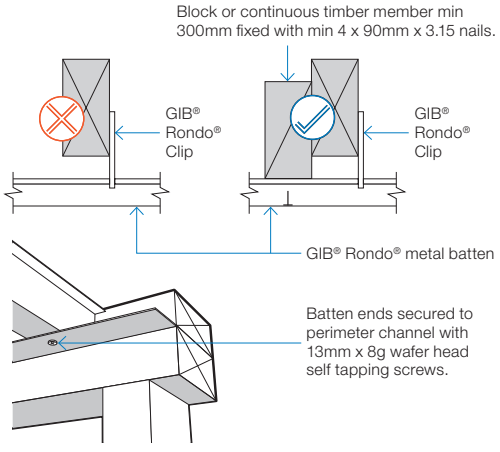
GIB® Rondo® metal battens must be fixed directly to the roof framing. If a clip system has been used, a timber block (min 300mm) or a continuous timber member can be fixed alongside the bottom chord to permit a direct connection to the batten, see figure 26.

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.

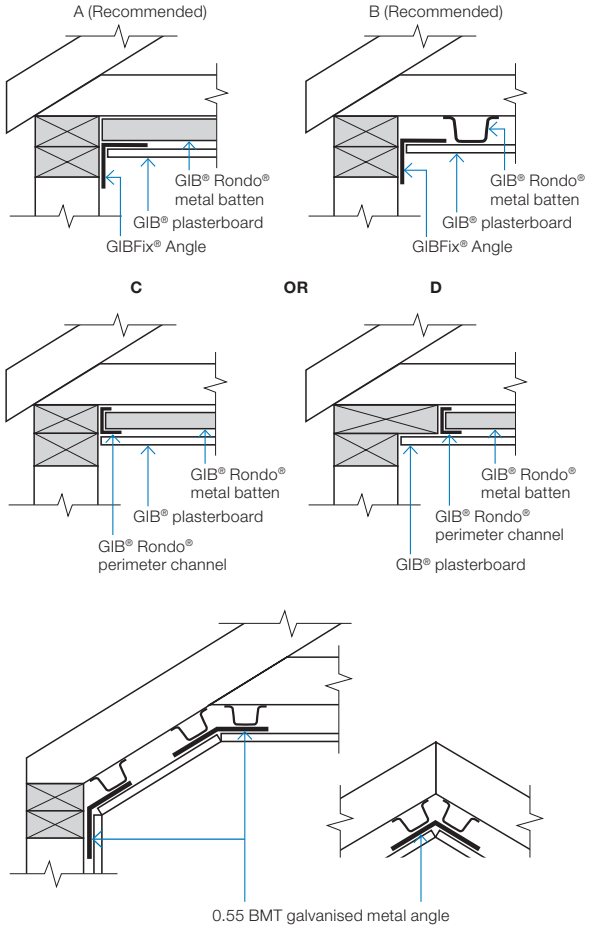
Coved ceiling diaphragms can be achieved by using nominally 32 x 32 x 0.55mm proprietary galvanised metal angles ("back-flashing") at the changes in direction. These angles shall be:
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm 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



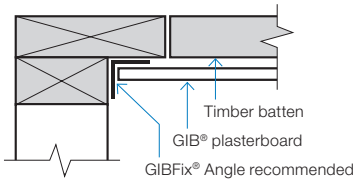
GEB016

FIGURE 27: GIB® RONDO® METAL CEILING BATTENS WITH CORNER ANGLES



GEB017

FIGURE 28: TIMBER CEILING BATTENS*



GEB018

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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 withing 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 galvansed 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

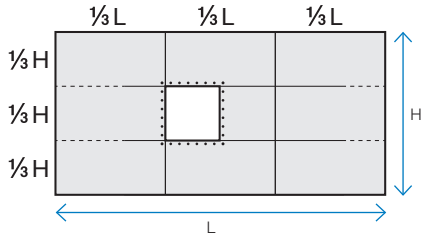
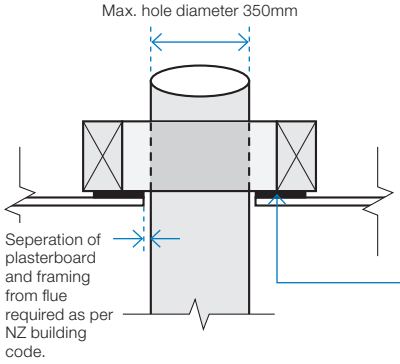


FIGURE 25: FIREPLACE FLUES AND RANGE HOOD OPENINGS

Section view

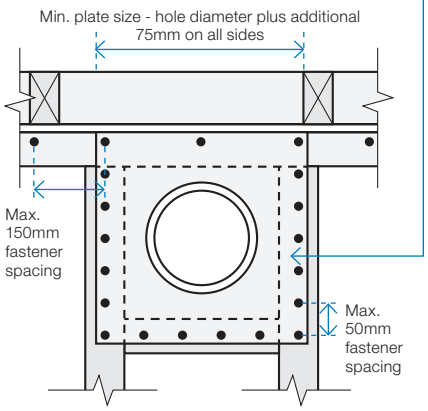


Steel plate
0.55 BMT Galvanised sheet Max. opening 350mm diameter. Installed prior to GIB® plasterboard.

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.

Plan view



Plasterboard ceiling not shown in plan view

SDC - Approved Document B, C/AS1, C/AS2, C/AS3, C/AS4, C/AS5, C/AS6, C/AS7, H1, 1 of 1, 116 Pg, 07/10/2013, 20/06/2014, 24/06/2014, 24/06/2014, 24

SDC - Approved Document B, C/AS1, C/AS2, C/AS3, C/AS4, C/AS5, C/AS6, C/AS7, H1, F7 - 117 of 225 - 06/12/2024 08:20:16 - phillid

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

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

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

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

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

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

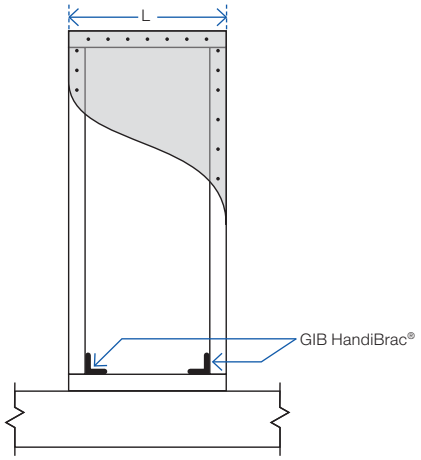
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

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

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

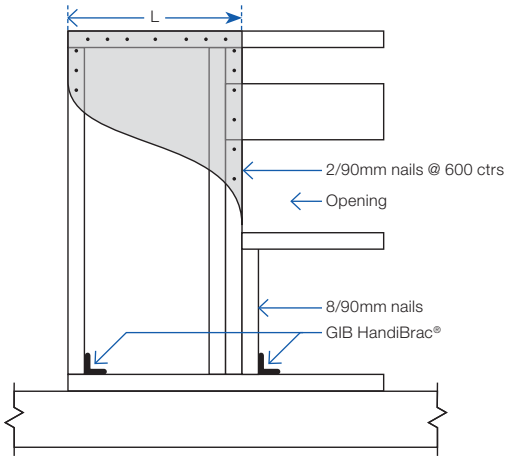
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



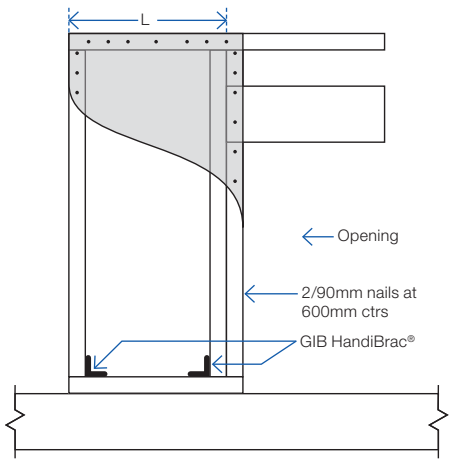
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



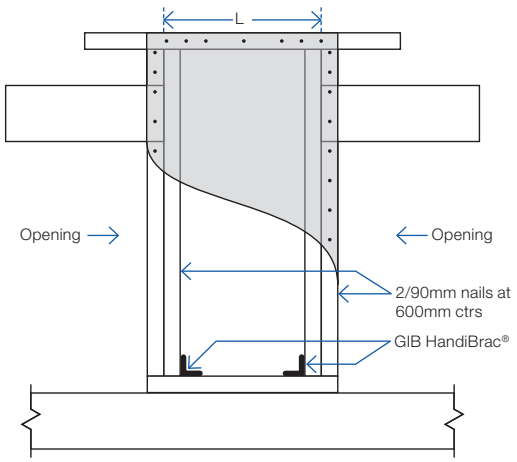
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



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

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



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

SDC - Approved Document B1/VM1 Clause 9.0 Timber Framed Buildings 118 of 226 - 22/06/2020 10:08:42 philld

GIB EzyBrace® Systems specification GS1-N

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

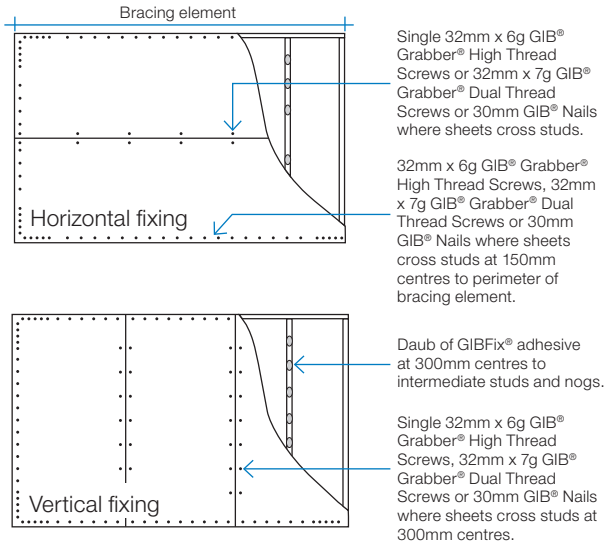
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

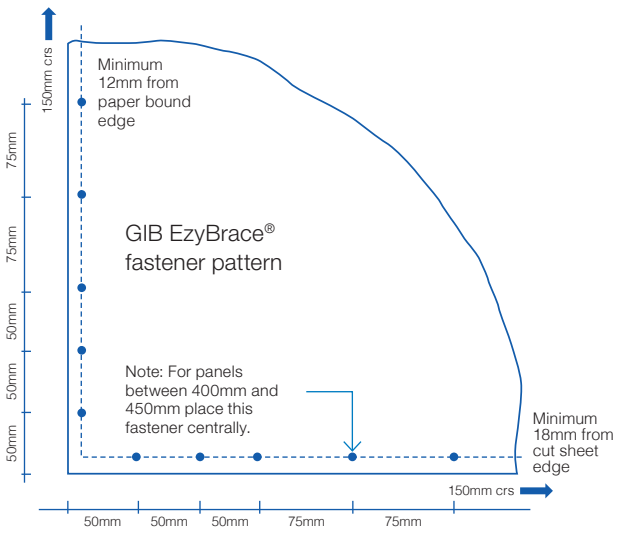
Fastener centres

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

JOINTING

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





Unless stated all fastener spacings are maximums.

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

SDC - Approved Document B2/AS1 Clause 3.7 Timber Framing Compliance Document Dated 30/07/2007 - Page 119 of 227 - 06/2014 - 08/2016 - phillid

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

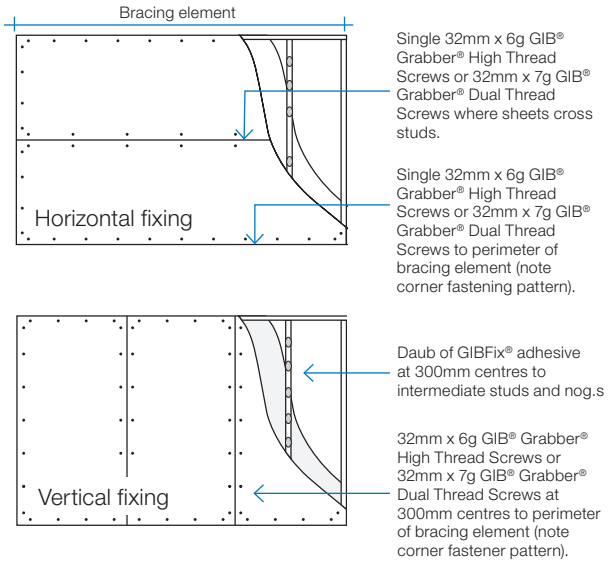
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

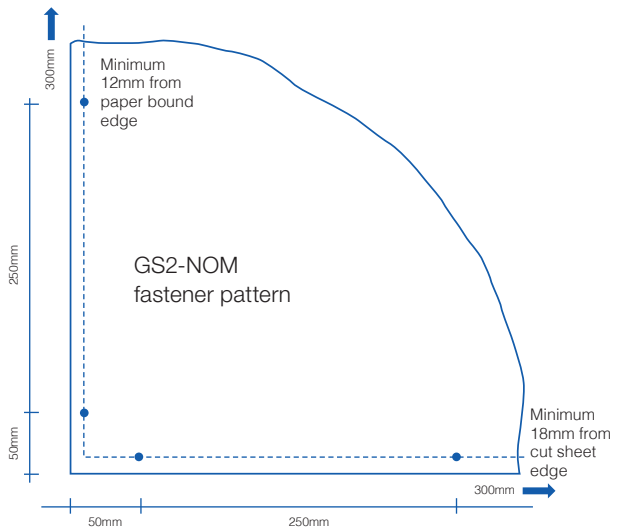
Fastener centres

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.





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

SDC - Approved Application Document B2/VM1 Amendment 1 20 May 2013 - 2240763 - 2013/07/30 - 2240763 - 2013/07/30 - 2240763 - 2013/07/30

SDC - Approved Document B Clause 9 Timber Buildings and Mansonry Buildings - Amendment 1 - 24 May 2019 - 5239 of 5239 - 24/06/2019 8:08:20 a.m.

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

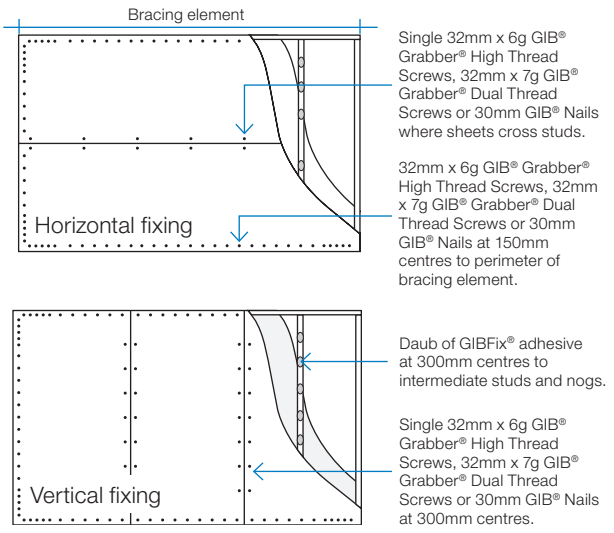
32mm x 6g GIB® Grabber® High Thread Screws,32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

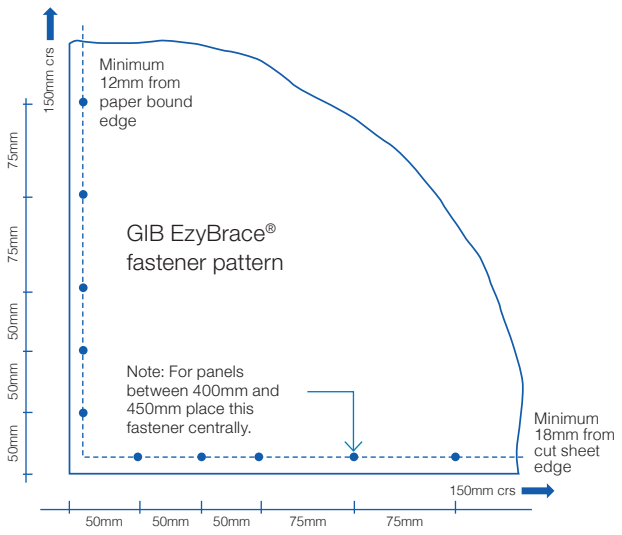
Fastener centres

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.





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

SDC - Approved Document B Clause B2 2007 Amendment 1 22 May 2008 - 2 June 2008 - 2 June 2010 - 2 June 2012 - 2 June 2014 - 2 June 2016 - 2 June 2018 - 2 June 2020 - 2 June 2022 - 2 June 2024 - 2 June 2026 - phillid

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.

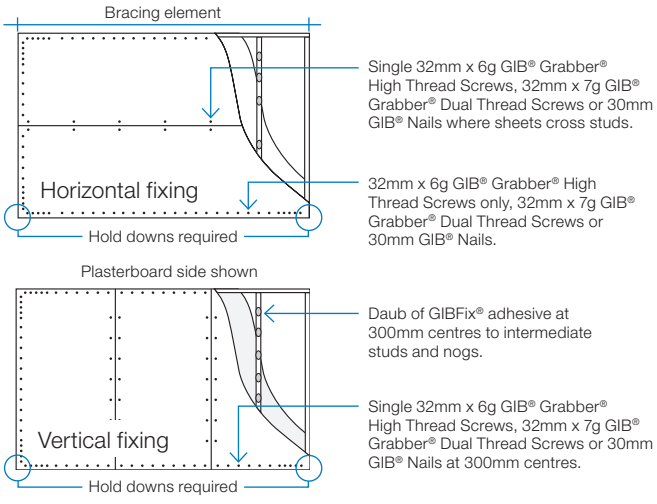
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

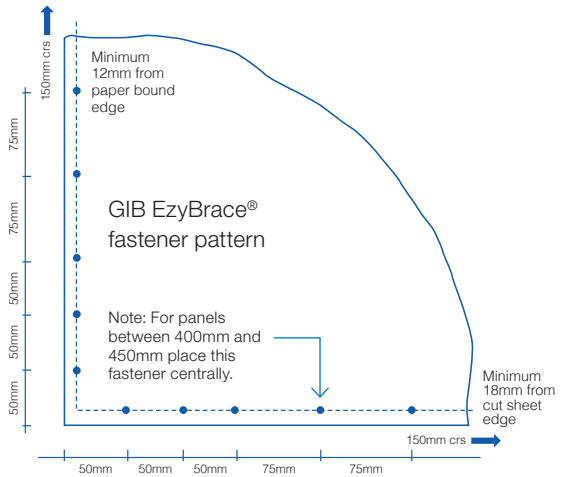
Fastener centres

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.





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

SDC - Approved Document B1/VM1 Clause 3.7 Timber Buildings and Clause 3.2 Durability - Compliance Document for New Zealand Building Code - Dated 30/7/2021 - Page 123 of 522 - 06/2024 - 08/2024 - phillid

GIB EzyBrace® Systems specification BL1-H

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

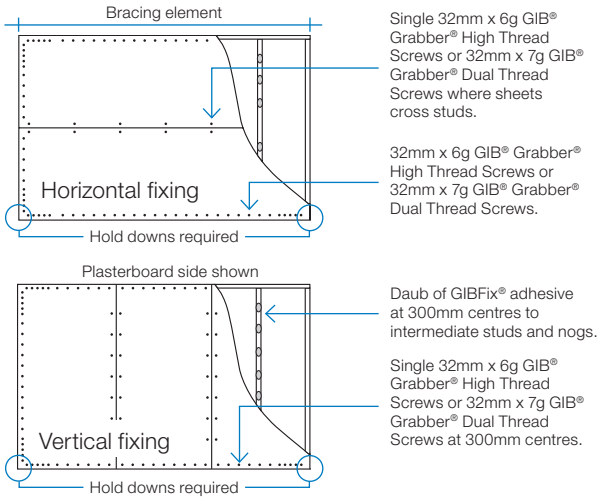
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

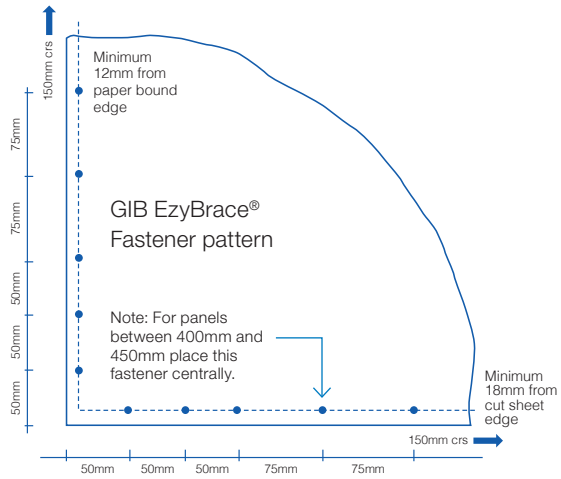
Fastener centres

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

JOINTING

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





Unless stated all fastener spacings are maximums.

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

SDC - Approved Document B1/2 Clause 3 Timber 2007 Amendment 1 24 May 2022 - 2 of 22 - 06/2024 - 08/2024 - 2021 - phillid

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.

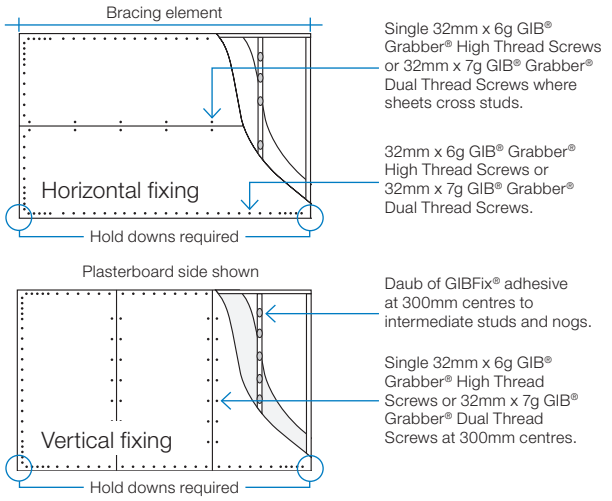
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

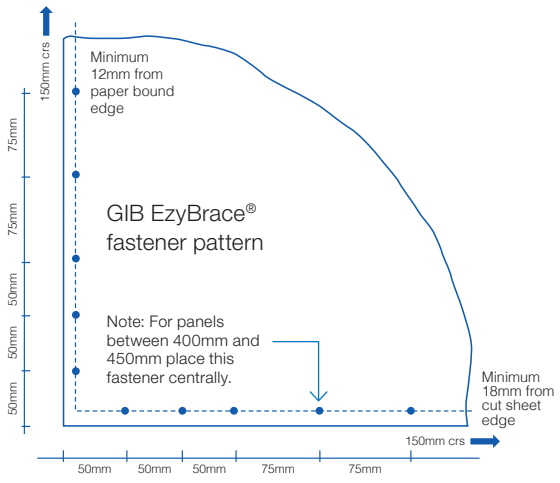
Fastener centres

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.





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

SDC Approved Document B2/AS1 Amendment 1 25 May 2023 effective 7 November 2023 Approved Document B2/AS1 Amendment 1 25 May 2023 effective 7 November 2023 phillid

GIB EzyBrace® Systems specification BLP-H

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

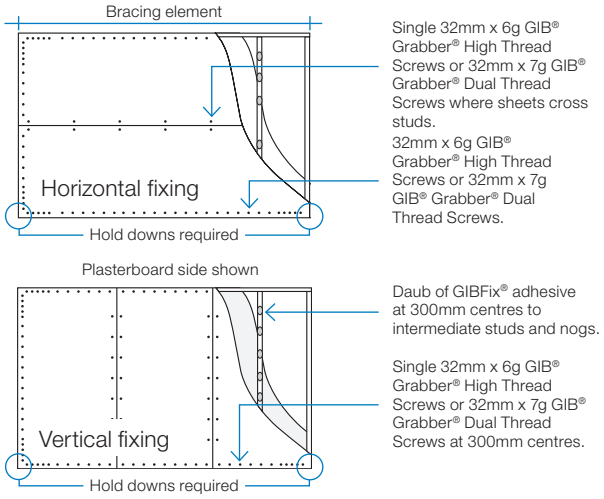
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread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

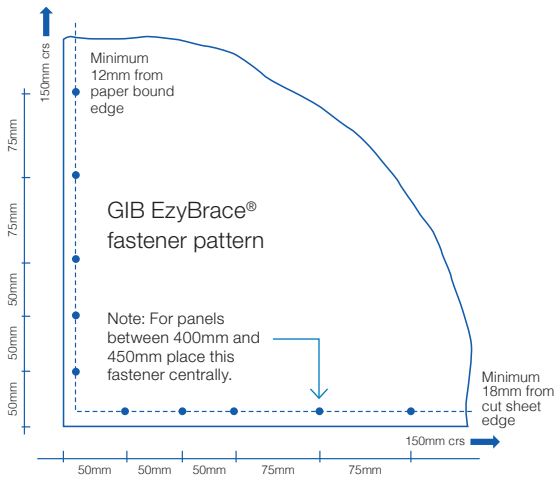
Fastener centres

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

JOINTING

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





Unless stated all fastener spacings are maximums.

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

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^{CERTTM}

The Global GreenTag^{CertTM} certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag.^{CertTM}

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.

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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 Fyreline,® GIB Ultraline,® 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 Fyreline,® 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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OR CALL THE GIB® HELPLINE

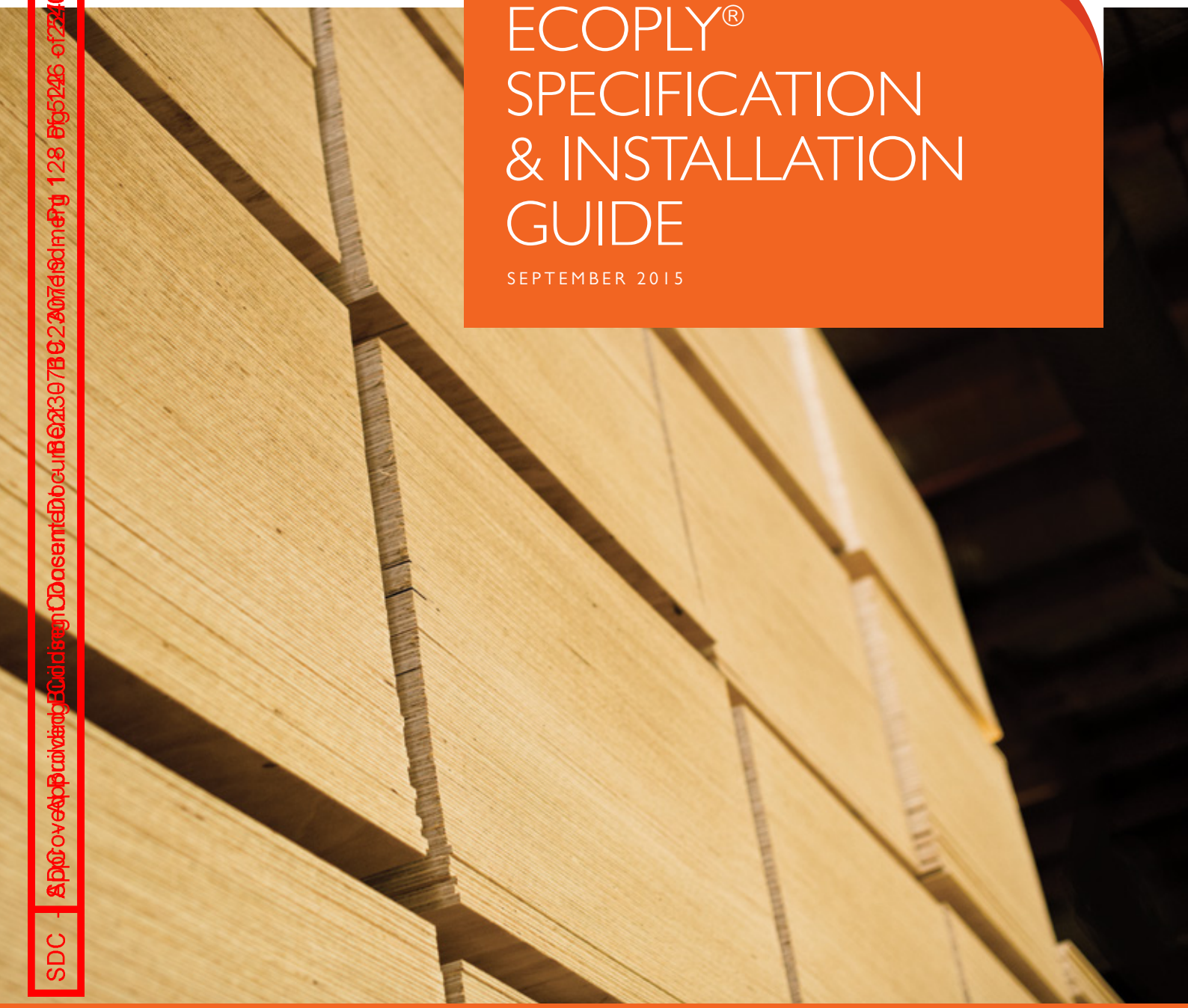
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ecoply
Proven. Durable. Strong

ECOPLY® STRUCTURAL FLOORING
ECOPLY® STRUCTURAL ROOFING
ECOPLY® STRUCTURAL Square EDGE
ECOPLY® STRUCTURAL BARRIER

ECOPLY® SPECIFICATION & INSTALLATION GUIDE

SEPTEMBER 2015



SDC - Approved Document - Building Code - 22/06/2016 - 22/08/2016 - phillid

CarterHoltHarvey Woodproducts New Zealand

Information contained within is specific to Ecoply® structural plywood products and must not be used with any other plywood products, no matter how similar they may appear.

ECOPLY® SPECIFICATION & INSTALLATION GUIDE

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Woodproducts New Zealand



1.0 ECOPLY® PRODUCT RANGE

Manufactured in New Zealand by Carter Holt Harvey Woodproducts, the Ecoply® portfolio represents a range of structurally rated plywood products.

Ecoply is manufactured under a third party audited quality control programme to monitor compliance with AS/NZS 2269 Plywood Structural. All Ecoply products carry Engineered Wood Products Association of Australasia (EWPAA) Joint Accreditation System - Australia and New Zealand (JAS-ANZ) certification.

For information relating to Shadowclad® panels and plywood used as an exterior cladding, refer to the current Shadowclad Specification & Installation Guide for Cavity Construction. For information relating to Ecoply Barrier used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide. Both of these documents can be downloaded from www.chhwoodproducts.co.nz.

Ecoply products must be competently installed in accordance with good building practices and sound design principles to satisfy the requirements of the Building Act 2004, the New Zealand Building Code (NZBC), and applicable New Zealand Standards. This is the responsibility of building owners and the design professionals and builders that they engage. This document contains information, limitations, and cautions regarding the properties, handling, installation, usage, and the maintenance of Ecoply products. However, to the maximum extent permitted by law, Carter Holt Harvey Woodproducts assumes no legal liability to you in relation to this information.

1.1 TECHNICAL INFORMATION AND CAD DETAILS

When specifying or installing any Ecoply® plywood products visit www.chhwoodproducts.co.nz or call 0800 326 759 to ensure you have current specification material and any relevant technical notes.

The information contained in this document is current as at September 2015. It is your responsibility to ensure you have the most up to date information available.

The information contained in this publication relates specifically to Ecoply structural plywood products manufactured by Carter Holt Harvey Woodproducts and must not be used with any other plywood manufacturer's product no matter how similar they may appear.

Alternative plywood products can differ in a number of ways which may not be immediately obvious and substituting them for Ecoply structural plywood products is not appropriate, and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the NZBC.

1.2 PRODUCT DESCRIPTION AND RANGE

Ecoply structural plywood panels are manufactured from radiata pine wood veneers. The veneers are placed at right angles to each other for maximum strength and stability then bonded together with synthetic phenolic (PF) resin to form a strong and permanent Type A bond.

The strength of Ecoply plywood is optimised for maximum performance parallel to the face grain with cross plies providing enhanced stability across the grain.

The Ecoply plywood range can be specified for:

- Surface grade (e.g. CD) - where the first letter describes the face veneer appearance and the second letter describes the back veneer of the Ecoply sheet. Surface grades are defined in AS/NZS 2269 and summarised in Tables 2A & 2B
- Stress grade - utilises the symbol F and a suffix, for example;
  - F8 as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. F8 is the standard stress grade for Ecoply products
  - Ecoply 19 mm Longspan Flooring and 15 mm Ecoply Roofing are F11[1] stress grade (See Tables 1, 4 and 5). Other Ecoply products are also available in F11[1] upon request
- Thickness - ranging from 7 mm to 25 mm. (Thicknesses above 25 mm subject to availability)
- Length - being 2400 mm and 2700 mm with a standard nominal width of 1200 mm
- Preservative treatment - being untreated, H3.2 CCA or H3.1 LOSP Azole treated
- Edge finish - being square edge or for Ecoply Flooring and Roofing, routed on the long edges of the sheet with a polypropylene plastic tongue inserted into one side for a tongue-in-groove joint

For general installation advice refer to section 2.0: General Installation Guide.

For specification and installation advice for Ecoply used in typical applications refer to the following sections.

Typical Application	Section
Structural bracing and ceiling diaphragms	3.0
Roofs and decks	4.0
Flooring	5.0

Note: Technical notes referenced in this guide can be downloaded from www.chhwoodproducts.co.nz or contact Carter Holt Harvey Woodproducts on 0800 326 759.

Table 1: Ecoply® Product Range

Nominal Thickness (mm)		7		9		12		15		17		19		21		25	
Sheet length (x 1200 mm width)		2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
Ecoply Structural Square Edge	BD			●		●	●	●		●							
	CD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	DD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ecoply Flooring (pt)	CD							●	●	●	●	● LS	● LS	●	●		●
Ecoply Roofing (pt)	DD							●	●	●	●						

- ● Available untreated only
- ● Available either untreated or H3.2 CCA
- ● Available either untreated or H3.1 LOSP

pt Machine grooves on both long edges with a plastic polypropylene tongue in one groove, 1200 mm cover

LS Ecoply 19 mm F11/F8 Longspan Flooring

- Full range may not always be available ex stock, check with your Ecoply supplier to ensure availability
- Non standard specifications, including thicker sheets may be available to special order in significant quantities
- All products are F8 stress grades
- Ecoply 15 mm/17 mm Roofing and Ecoply 19 mm Longspan Flooring are supplied as standard in F11 stress grade[1]
- Other Ecoply products are also available in F11[1] upon request

[1] Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

1.3 SURFACE GRADES

Table 2A summarises the surface appearance grades in which Ecoply structural plywood is available with some typical applications for each surface grade.

The surface grade specifications are defined in AS/NZS 2269. Table 2B details surface appearance grades for specialty Ecoply plywood and typical applications.

Table 2A: Ecoply® Structural Square Edge Products

Face Grade B	Face Grade C	Face Grade D
		
Appearance grade with a solid sanded surface. Suitable for a higher quality finish.	Solid sanded surface with filled holes and splits, with intergrown knots. Suitable for a basic paint finish.	Non appearance grade allowing open imperfections up to 75 mm across the face veneer. Splits and knots allowable
Possible Uses:	**Possible Uses:**	**Possible Uses:**
• Furniture/Joinery/Signs • Interior Linings • Sheathing • Engineering components where a superior visual finish is required	• Structural gussets • Stressed skin panels • Bins, boxes, crates • Hoardings • Membrane substrate	• Non visual bracing • Strength critical pallets • Structural components • Portal frame gussets

Table 2B: Speciality Ecoply® Products

Flooring CD	Roofing DD
	
Solid sanded C grade surface with tongue and groove profile on long edges. Features void free second layer under the face veneer for increased protection against high point loads	Unfilled D grade surface with tongue and groove profile on long edges
Possible Uses:	**Possible Uses:**
• Substrate for flooring overlays such as linoleum, tiles and rigid coverings • Substrate for membrane roofing and decking where visible appearance is critical	• Substrate for asphalt shingles • Substrate for roof systems where a smooth substrate is not required

Notes: A higher visual grade may be substituted if required. e.g. Ecoply CD can be used anywhere DD is used. Pictures shown above are scaled down versions of typical Ecoply sheets. Grain pattern and colour may vary. If sheet appearance is critical select panels individually.

1.4 PRESERVATIVE TREATMENT

Ecoply structural plywood is available untreated or treated in accordance with AS/NZS 1604.3. If treated, Ecoply structural plywood is treated with either H3.2 CCA (Copper Chrome Arsenate) or H3.1 LOSP (Azole) clear treatment. H3.1 LOSP is the standard preservative treatment for BD Structural Square Edge products and by special request for other Ecoply plywood products.

H3.2 CCA and H3.1 LOSP treated plywood in accordance with AS/NZS 1604.3 is described as suitable for: "outside, above ground, subject to periodic moderate wetting and leaching."

Ecoply plywood is envelope preservative treated. Where sheets are cut, cuts must be coated with a brush on timber preservative. Holdfast® Metalex® Concentrated Timber Preservative Clear (Holdfast® Metalex® Clear) is recommended. Failure to do so will affect the long term durability of the panel.

The characteristics of the treatments are shown in Table 3.

Table 3: Preservative Treatment

	Untreated	H3.2 CCA	H3.1 LOSP (Azole)
Preservative carrier	N/A	Water	Light organic oil (white spirits)
Colour	Natural	Green	Clear (i.e. natural)
Fungicide	Heat treated dry wood	Copper	Propiconazole and Tebuconazole
Insecticide	Heat treated dry wood	Arsenate	Permethrin
Other chemicals	N/A	Chrome (to fix preservative in wood)	Butyl Oxitol (co-solvent to assist active stability)
Mouldicide	N/A	Copper (limited efficacy)	IPBC
Notes	Plywood for dry interior use, supplied ex mill at <15% moisture content	Dried after treatment to average 18% moisture content for use in service at higher moisture contents	Solvent does not affect dimensions. Solvent smell disappears over time
Availability	Readily available	Standard treatment except for Ecoply BD	Treated to order for CD, DD, flooring and roofing products. Standard treatment for Ecoply BD
Applications (Refer NZ3602)	Interior dry protected	Exterior/Interior damp (service performance subject to detailing & coatings)	

H3.2 CCA

Ecoply structural plywood, which is H3.2 CCA treated (waterborne preservative with a green colour), is dried following treatment so that sheets may return to the correct dimensions. The moisture content after treatment with CCA and drying will be higher than the limits placed in AS/NZS 2269 on untreated product. The target is for an average moisture content of approximately 18% to provide a panel closer to the expected equilibrium moisture content for most H3.2 CCA applications.

The fillets used to separate sheets in drying may leave marks on the sheet surface. These will fade over time as the plywood weathers, and can be disguised with paint but may be visible under stain. The process of treating with H3.2 CCA and subsequent drying is likely to increase the face checking of the panel.

For more information on face checking refer to section 1.8 General Design Considerations - Aesthetics.

H3.1 LOSP

H3.1 LOSP treated Ecoply retains the wood colour and does not contain moisture so the plywood remains at the same dimensions and moisture content during treatment. However, the plywood when freshly treated may contain more than 60 litres of organic fluid per cubic metre. When coating H3.1 LOSP treated plywood, traces of residual solvent may be present on the sheet surface from the treatment process. Sheets feeling greasy to touch should be placed in a well ventilated area and allowed to flash off to ensure proper adhesion of paints and stains to the sheet surface.

The H3.1 LOSP solvent smell can be quite strong and venting is recommended until most of the solvent has evaporated. Untreated plywood is recommended for internal applications where NZS 3602 allows the use of untreated plywood

Mechanical fasteners are recommended to fix H3.1 LOSP treated Ecoply to framing. If adhesives are required, thorough venting is recommended and H3.1 LOSP tolerant adhesives should be applied according to the adhesive manufacturer's instructions. See section 2.3 Adhesives.

1.5 SECTION PROPERTIES

Table 4A: Section Properties of Ecoply® Structural Plywood

		Section properties per mm width						
		Parallel to the face grain			Perpendicular to the face grain			
Nominal plywood thickness[2] (mm)	**ID code[3]**	**Mass** (kg/m²)	**Parallel Moment of Inertia** (mm⁴)	**Section Modulus** Z (mm³)	**Shear Constant** I/Q (mm²)	**Perpendicular Moment of Inertia** I (mm⁴)	**Section Modulus** Z (mm³)	**Shear Constant** I/Q (mm²)
7	7-24-3	4.0	30.0	8.3	5.2	2.0	1.7	2.3
9	9-30-3	5.0	58.6	13.0	6.4	4.0	2.7	2.9
12	12-24-5	6.6	115.0	19.2	9.3	33.4	9.3	5.4
15	15-30-5	8.3	225.0	29.9	11.6	65.2	14.5	6.8
17	17-24-7	9.2	285.0	33.9	12.2	122.0	20.4	9.4
17	17-24-6	9.2	273.0	32.5	12.3	134.0	22.3	9.5
19	19-30-7	10.6	451.0	46.9	13.7	157.0	23.8	10.7
21	21-30-7	11.6	556.0	52.9	15.2	239.0	31.9	11.8
25	25-30-9	13.5	897.0	72.9	17.8	381.0	41.0	13.9

Table 4B: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F8 Grade

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F8)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	**ID code[3]**	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)
12	12-24-5	1046.5	480.0	15.6	303.9	231.7	9.2
15	15-30-5	2047.5	747.5	19.5	593.3	362.5	11.4
17	17-24-7	2593.5	847.5	20.5	1110.2	510.0	15.9
17	17-24-6	2484.3	812.5	20.7	1219.4	557.5	16.0
19	19-30-7	4104.1	1172.5	23.0	1428.7	595.0	18.0
21	21-30-7	5059.6	1322.5	25.5	2174.9	797.5	19.8
25	25-30-9	8162.7	1822.5	29.9	3467.1	1025.0	23.4

Table 4C: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F11[1] Grade (Including Longspan Flooring)

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F11)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	**ID code[3]**	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)
12	12-24-5	1207.5	595.2	16.7	303.9	231.7	9.2
15	15-30-5	2362.5	926.9	20.9	593.3	362.5	11.4
17	17-24-7	2992.5	1050.9	22.0	1110.2	510.0	15.9
17	17-24-6	2866.5	1007.5	22.1	1219.4	557.5	16.0
19	19-30-7	4735.5	1453.9	24.7	1428.7	595.0	18.0
21	21-30-7	5838.0	1639.9	27.4	2174.9	797.5	19.8
25	25-30-9	9418.5	2259.9	32.0	3467.1	1025.0	23.4

1 Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

2 Actual thickness of Ecoply sheets manufactured to thickness tolerances stated in AS/NZS 2269

3 Identification code: panel thickness – outermost veneer thickness x 10 – number of plies

4 I/Q values for rolling shear are for stress at the neutral axis calculated as in NZS 3603

Notes:

- Use Tables 4A & B values for all F8 stress grade Ecoply products
- Use Tables 4A & C values for all F11 stress grade Ecoply (including 19 mm Ecoply Longspan Flooring)
- The section properties in Tables 4A, B & C have been calculated in accordance with AS/NZS 2269
- For section properties for other thicknesses and Shadowclad® products contact CHH Woodproducts on 0800 326 759

Structural properties of Ecoply® plywood

The majority of Ecoply plywood is F8 grade (exceptions are identified in section 1.2: Product Description & Range) and the characteristic values may be used in conjunction with both NZS 3603 and AS 1720 for the design of timber components. The characteristic strengths in Table 5 have been used to provide the nominal strengths in Tables 4B and 4C.

Table 5: Structural Properties of Ecoply® Plywood

	Characteristic Strength MPa	
Stress Grade	**F8**	**F11**
Bending (f_{pb})	25.0	31.0
Tension (f_{pt})	15.0	18.0
Panel shear (f_{ps})	4.2	4.5
Rolling shear (f_{pr})	1.7	1.8
Compression in plane of sheet (f_{pc})	20.0	22.0
Compression normal to the plane of the sheet (f_{pp})	9.7	12.0
Modulus of elasticity (E)	9100	10500
Modulus of rigidity (G)	455	525

Source: AS/NZS 2269

Wood is strongest when stressed parallel to the grain and weakest across the grain, so the lay up or arrangement of veneers in the panel determines the properties. Because of its cross banded construction, plywood possesses significant strength and stiffness both parallel and perpendicular to the direction of the face grain, but is generally strongest and stiffest along the direction of the face grain.

The section properties of structural plywood in Table 4A are calculated in accordance with AS/NZS 2269 to allow for the reduced contribution of veneers perpendicular to the direction of stress. For engineering design to NZS 3603, the section properties are multiplied by stresses and 'k' and ø factors to determine resistances for limit states design.

Resistances and nominal strengths in Tables 4B and 4C assume all 'k' factors are equal to 1.0. Multiply tabled values by the strength reduction factor ø and 'k' factors for specific in-service conditions for design to a structural code such as NZS 3603.

Table 5A: Strength Reduction Factors

Structural Timber Material	**Application of Structural Member**		
	Category 1	**Category 2**	**Category 3**
	Structural members for houses for which failure would be unlikely to affect an area[1] greater than 25 m²; OR secondary members in structures other than houses	Primary structural members in structures other than houses; OR elements in houses for which failure would be likely to affect an area[1] greater than 25 m²	Primary structural members in structures intended to fulfil essential services or post disaster function
	Value of Strength Reduction Factor Ø		
Structural Plywood – AS/NZS 2269.0	0.95	0.85	0.75

[1] In this context area should be taken as plan area.

1.6 PRODUCT IDENTIFICATION

In accordance with AS/NZS 2269, Ecoply structural plywood sheets have the following information marked on the back:

- Brand name: e.g. ECOPLY
- Face grade, back grade: e.g. CD
- Intended application: e.g. STRUCTURAL
- Panel construction code: e.g. 19-30-7 (Thickness (mm)-Face veneer thickness (mm x 10)-Number of veneers)
- Glue bond: eg. A BOND
- Formaldehyde emission class: E0 for A Bond Ecoply
- Australasian Standard: e.g. AS/NZS 2269
- Treatment Standard (if applicable): eg. AS/NZS 1604.3:2012
- Date and time of manufacture: e.g. 01/12/15 12:23:45
- Stress grade: e.g. F8 (exceptions include Shadowclad® and Grooved Lining which are performance rated)
- The Engineered Wood Products Association of Australasia (EWPAA) brand and mill number: e.g. 911 (Tokoroa mill)

Untreated example:

ECOPLY CD FLOORING STRUCTURAL
19-30-7 A BOND E0 AS/NZS 2269.0:2012
PAT 01/12/15 12:23:45 F11/F8
911

Treated example:

ECOPLY CD STRUCTURAL
25-30-9 A BOND E0 AS/NZS 2269.0:2012
AS/NZS 1604.3:2012 046 01 H3 E CCA
RETREAT CUTS PAT 01/12/15 12:23:45 F8/F8
911

Note: Performance based products like Grooved Lining and Shadowclad may include brand identification instead of visual quality, stress grade, and panel code. These panels, when accompanied with specification literature, are still deemed to comply with AS/NZS 2269

1.7 CODE COMPLIANCE

Ecoply plywood manufacture is third-party audited through the product quality control programme of the Engineered Wood Products Association of Australasia (EWPAA) which is itself audited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

CHH Woodproducts is licensed by the EWPAA to stamp plywood with the EWPAA/JAS-ANZ Product Certification Mark. This certifies it has been manufactured under the third party audited Joint Product Certification programme to monitor compliance with joint Australian/New Zealand Standard AS/NZS 2269 Plywood – Structural. Plywood to this standard is referenced in the NZBC Acceptable Solutions and Verification Methods through:

- NZS 3602 The Use of Timber and Wood-based products for Use in Building
- NZS 3603 Timber Structures
- NZS 3604 Timber Framed Buildings
- AS/NZS 1604.3 Specification for Preservative Treatment, Part 3:Plywood
- E2/AS1 External Moisture

WARNING: Plywood which is non-certified or is manufactured to standards other than AS/NZS 2269, such as US voluntary standard PS1-95, is not referenced in the NZBC. There can be significant differences between AS/NZS 2269 certified and non certified plywood around bond durability, structural ratings and veneer quality.

Structure B1

Design to NZS 3603 Timber Structures complies with the NZBC in Verification Method B1/VM1 Clause 6.0 Timber. Plywood is the only sheet material with properties listed in NZS 3603. Ecoply structural plywood is available in F8 stress grade. Some specialty products are available F11 or with specifically designed properties for specialised applications.

1.8 GENERAL DESIGN CONSIDERATIONS

Durability (Clause B2) and exterior moisture (Clause E2)

Ecoply plywood is made from softwood solid radiata pine veneer. Designers should assess the level of exposure to biological, moisture, and other hazards and apply appropriate preservative treatment and detailing to minimise exposure to these hazards.

Information in this manual outlines suggested practices for detailing building components to exclude moisture to comply with the durability requirements of the NZBC.

Formaldehyde

Ecoply plywood is manufactured using phenol formaldehyde resins which are fully cured in the hot press. Cured resin is thermally and moisture stable and formaldehyde emissions for the glued plywood are similar to background levels for the wood by itself when tested to AS/NZS 2098.11 Determination of formaldehyde emissions for plywood. Accordingly every panel is branded with the lowest emission class (less than 0.5 mg/litre for E_0).

Actual formaldehyde emissions for Ecoply plywood have been tested and approved as having an actual formaldehyde emission level of less than 0.3 mg/ litre (equivalent to a Super E_0 emission level).

Moisture content and dimensional change

At the time of leaving the factory, the moisture content of untreated Ecoply plywood should generally be in the range of 8% to 15% as required by AS/NZS 2269. All wood products including plywood respond to changes in ambient humidity so the eventual moisture content of plywood varies according to how dry or how wet the environment is. After manufacture, the moisture content will move to equilibrium with the environment, and the veneers swell or shrink across the grain in response. The total expansion both along and across a 2400 x 1200 mm panel can be in the order of 1.5 mm to 3 mm as the plywood changes from a dry to a saturated state.

Ecoply that is treated with waterborne preservatives (e.g. H3.2 CCA) is expected to be used in applications that have higher humidity than interior dry use, so following treatment it is dried to a higher average moisture content of approximately 18%. This provides for a more stable panel in service than placing a dry (less than 15%) sheet in a higher moisture environment.

Detailing and construction must allow for movement if the plywood will be subject to cycles of moisture change. Seasonal and daily cycles can be significant depending on the end use.

Temperature

Wood will expand upon heating as do practically all solids. The thermal expansion of plywood is quite small and there is little effect on the structural performance or durability of plywood when used in temperatures below 54°C. The average co-efficient of thermal expansion of plywood is 4.5 x 10-6 mm/mm/°C. At temperatures above 55°C wood begins to deteriorate. Colours of coatings and finishes should be selected to reduce heat gain. For extreme conditions, further technical information is available by calling CHH Woodproducts on 0800 326 759.

The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214 Methods of determining the total thermal resistance of parts of buildings. e.g. Plywood has a Conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance R = 0.012/0.13 = 0.09.

Aesthetics

Ecoply plywood products can be selected for decorative or weather protection functions as well as structural performance. Acceptable Solution E2/AS1- External Moisture allows plywood manufactured to AS/NZS 2269, (minimum CD appearance grade, minimum 12 mm thickness and treated as required by NZS 3602) to be used for exterior cladding. For exterior cladding applications CHH Woodproducts strongly recommends Shadowclad® exterior cladding rather than smooth faced plywood such as Ecoply.

Shadowclad® features a textured (bandsawn) face which reduces the visibility of face checking and other appearance related issues which can occur on smooth faced plywood if not regularly maintained by the homeowner. For more information on plywood used as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction.

Face checks on plywood exposed to weather

Face checks are lengthwise separations of wood fibres in the face veneer of the plywood. They result from the normal swelling and shrinking of wood as it gains and loses moisture. It is important to realise that these checks are superficial, being confined to the face veneer. They do not alter the structural integrity of the plywood in any way. If you are the specifier, it is important to discuss these issues with your client and consider the length of exterior exposure, climate conditions and protection offered by the surface coating before finalising product choice.

Durability

The durability of Ecoply structural plywood will depend on the application. Detailing, treatment and installation details need careful consideration to satisfy the requirements of the NZBC.

Normally, 50 year durability can be achieved with untreated Ecoply in dry, interior exposure. For internal environments subject to high humidity or condensation H3.2 CCA treated Ecoply should be used.

For plywood as a rigid air barrier (including rigid air barrier acting as bracing) refer to the current Ecoply Barrier Specification and Installation Guide which can be downloaded from www.chhwoodproducts.co.nz.

Fire, spread of flame and smoke development

The following data on early fire hazard properties of uncoated Ecoply plywood are the result of tests carried out by Australian Wool Testing Authority AWTA to test structural plywood manufactured to AS/NZS 2269 in accordance with ISO 5660, reaction to fire tests (heat release, smoke production and mass loss rate). Part 1: Heat Release rate (cone calorimeter method).

Table 6 summarises the test configurations and associated material groups.

For plywood with decorative finish coatings or intumescent coating, performances depend on spread rates of the coating. For advice on specific coating systems and their suitability for use with Ecoply products, always refer to the coating manufacturer.

Table 6: Early Fire Hazard Properties of Ecoply® Plywood

Material	Species	Origin	Thickness	Treatment	Material groups
Plywood	Radiata Pine	New Zealand	7mm	CCA Treated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	CCA Treated	Group 3

1.9 SUSTAINABILITY

Ecoply is manufactured from radiata pine. It is grown on tree farms which are tended and harvested to provide wood for plywood manufacture. The crop is managed on a sustainable basis to yield millable trees.

New Zealand plantations are managed in compliance with the New Zealand Forest Accord.

Ecoply is manufactured in New Zealand at CHH Woodproducts Tokoroa plywood mill.

Ecoply is available Forestry Stewardship Council (FSC) (SCS-COC-001316) certified upon request.

1.10 HEALTH & SAFETY

Ecoply should be handled in accordance with the Material Safety Data Sheets (MSDS) for untreated, H3.2 CCA and H3.1 LOSP treated Ecoply, which can be downloaded from www.chhwoodproducts.co.nz.

Always wear safety glasses or non-fogging goggles when machining Ecoply panels.

If wood dust exposures are not controlled when machining (sawing, routing, planing, drilling etc) a class P1 or P2 replaceable filter or disposable face piece respirator should be worn.

Wear comfortable work gloves to avoid skin irritation and the risk of splinters. Wash hands with mild soap and water after handling panels.

1.11 STORAGE & HANDLING

Ecoply panels must be stored and handled with care to maintain good condition before use and after installation:

- The storage area must be protected from sun, rain and wind that would otherwise bring about rapid changes in temperature and humidity
- Support for the sheets must be provided at both ends and middle to avoid distortion. Ensure bearers in packs above are aligned over bearers below (to avoid inducing curves in sheets)
- The stack must be kept dry and clear of ground contact, and placed so that it will not be exposed to mechanical damage
- The sheets must be stacked flat, NOT on edge
- Store in well-ventilated areas away from sources of heat, flame or spark
- To avoid staining, fading and surface checking, the sheets must not be exposed to the weather while awaiting installation
- Store in well-ventilated areas away from sources of heat, flames or sparks

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2.0 GENERAL INSTALLATION GUIDE

The following is a general guide to be followed unless otherwise specified. For additional installation instructions for typical applications refer to sections 3, 4 and 5.

2.1 FRAMING

Use kiln dried framing e.g. Laserframe® in accordance with timber framing manufacturer's specifications and treated in accordance with NZS 3602. All timber frame sizes and set out must comply with NZS 3604 (or be specifically designed to NZS 3603). The current Laserframe Product Guide can be downloaded from www.chhwoodproducts.co.nz. Ecoply may be specified for frame spacing determined by design, or using tables in section 3 for specific product applications such as bracing, flooring and as a substrate for shingle roofs or membrane roofs and decks.

H3.1 LOSP treated framing should be vented before fixing and if construction adhesives are required (for example to screw and glue floor panels) the adhesive must be compatible with H3.1 LOSP. See section 1.4: Preservative Treatment.

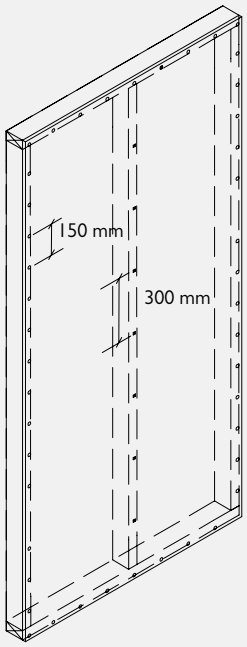
For plywood used as exterior cladding refer to the current Shadowclad® Specification & Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz

For plywood used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide which can be downloaded from www.chhwoodproducts.co.nz

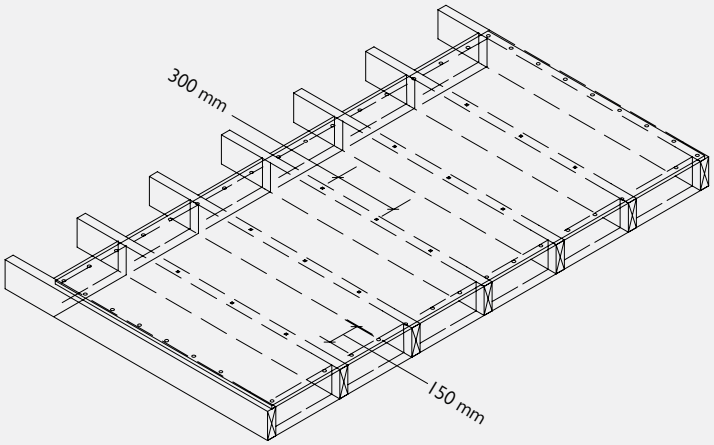
2.2 SHEET FASTENERS AND FIXING

- Where there is risk of panel size change due to changes in moisture levels, allow a 2 to 3 mm expansion gap between sheets
- Use only flathead nails or screws, with or without construction adhesives
- Fastener length should penetrate at least 10 nail diameters into the framing or be three times the sheet thickness, whichever is the greater. Longer or ring shank nails may be specified
- Fasteners must be at least 3 fastener diameters or 7 mm from the edge of the sheet
- For tongue and groove products such as flooring and roofing fasten 15 mm from tongue and groove edges
- Standard fixing pattern: unless otherwise specified fasten edges and ends of sheets at 150 mm centres, and within the panel at no more than 300 mm centres (see diagram below)
- Use hot dipped galvanised fasteners or corrosion resistant fasteners (i.e. stainless steel) determined by design for specific hazards
- Where using stainless steel nails, nails must be annular grooved
- Refer to Table 7 for minimum fastener sizes
- Do not overdrive power driven nails

EC001: Fastener spacings for Ecoply®



Ecoply® fastened in vertical plane



Ecoply® fastened in horizontal plane

EC002: Fastener spacings from edges

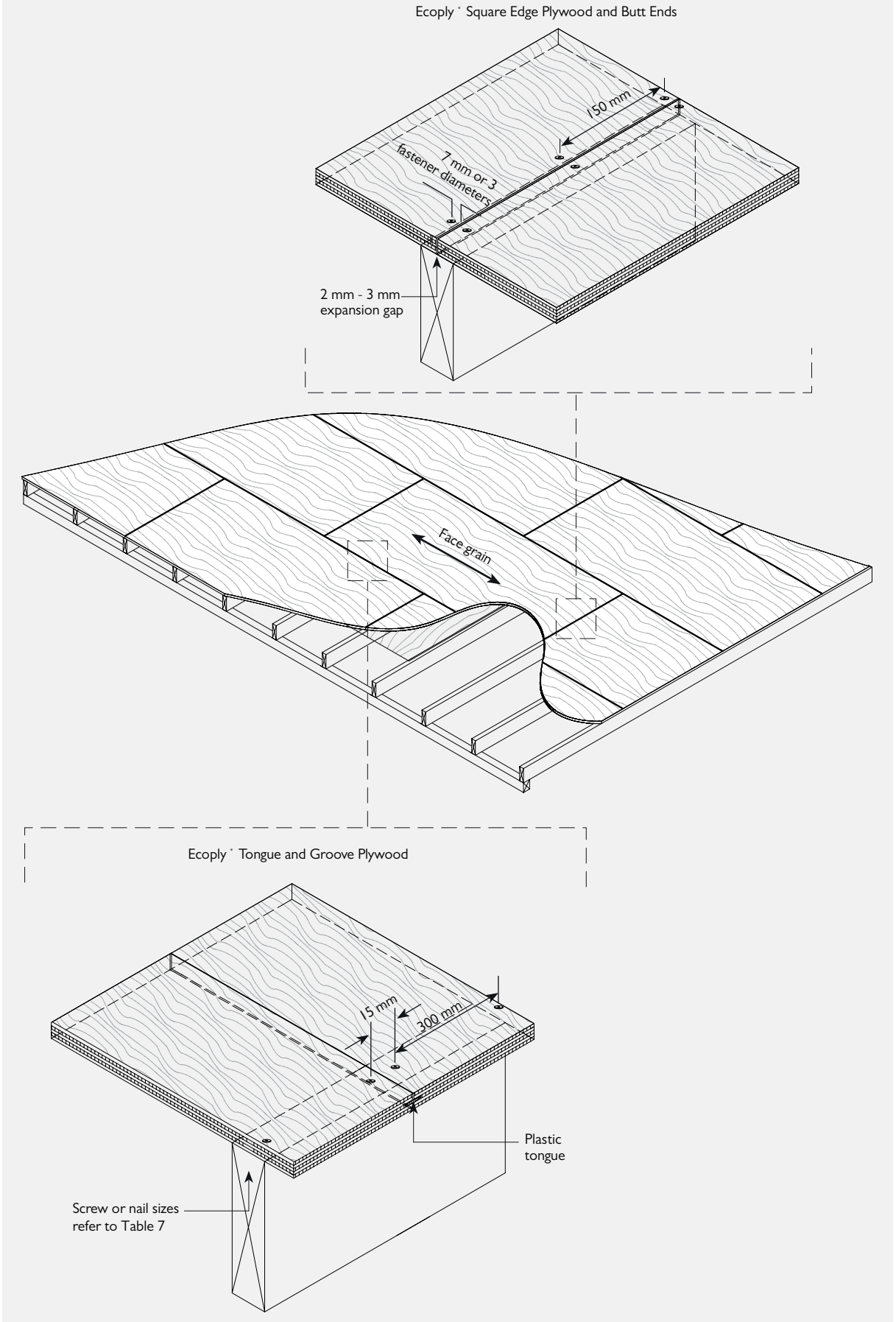


Table 7: Fasteners and Characteristic Shear Loads for Ecoply®

Nominal Thickness (mm)	7mm / 9mm	Load[1]	12mm / 15 mm	Load[1]	17 mm	Load[1]	19mm / 21mm	Load[1]	25 mm	Load[1]
Minimum nail size in timber framing[2]	40 x 2.5 mm	570	60 x 2.8 mm	736	60 x 2.8 mm	736	60 x 2.8 mm	736	75 x 3.15 mm	883
Screw size in timber framing[2]	8g x 30 mm	1230	8g x 40 mm	1230	10g x 40 mm	1650	10g x 45 mm	1650	10g x 50 mm	1650
1.15 mm steel framing[3]	10-24-35[4]	1300	10-24-40[4]	2000	10-16-45[4]	2100	10-16-45[4]	2100	10-16-45[4]	2100
Screw size in 2.80 mm steel framing[3]	10-24-35[4]	1200	10-16-404	1200	14-20-45[4]	3000	14-20-45[4]	4000	14-20-45[4]	5000

1 The load is the characteristic load (N) for one fastener in single shear

2 Characteristic load based on fixing into a timber of J5 joint group or better

3 Self tapping, self countersinking screw

4 Screw Numbers indicate: Gauge – Threads per inch – Length (mm)

Notes

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested
- Other screw sizes may be used. Screw properties vary between screw suppliers and the suitability of a particular size should be verified by the designer for performance under changing physical conditions and cyclic loading
- Non-standard nailing may be specifically designed with NZS 3603 or similar

Fasteners for H3.2 CCA treated Ecoply®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Notes

H3.2 CCA treated timber should not be fixed in direct contact with light gauge steel products. Refer to the framing manufacturer for advise on fixing and treatments.

2.3 ADHESIVES

Tube applied construction adhesives

Site applied construction adhesives may be used together with nails and screws for non permanent loads, reduced fastener popping, and to lower the risk of squeaking in floors. Available types include polyurethane (e.g. Holdfast® Gorilla Nailpower®) and elastomeric (e.g. Bostik® Wallboard Gold) based adhesives.

Elastomeric adhesives should meet the requirements of APA Performance specification AFG 01 Adhesives for field gluing plywood to wood framing. Other types should have appraisal from an independent authorising body such as BRANZ or equivalent authorities for the specific applications proposed. Follow manufacturer's recommendations. In addition:

- Use a bead or daubs of adhesive as per manufacturer's recommendations
- Apply pressure using fastener patterns outlined in section 2.2: Sheet Fasteners and Fixing
- Work from the middle of the sheet outwards to develop glueline pressure
- Ensure adhesives are compatible with treatment in the framing timber, see section 1.4: Preservative Treatment

Structural adhesive joints

Structural bonds are generally only achievable in factory controlled conditions using approved structural adhesives in accordance with approved standards for glue lamination, e.g. Resorcinol formaldehyde joints made to AS/NZS 1328 Glued laminated structural timber. Site gluing is not recommended for structural plywood components. Contact CHH Woodproducts on 0800 326 759 for further information.

3.0 STRUCTURAL BRACING & CEILING DIAPHRAGMS

The Ecoply bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading, to meet the requirements of the NZBC - B1 Structure, and NZS 3604 *Timber Framed Buildings* or specifically designed to NZS 3603 *Timber Structures Standard.*

Any Ecoply structural panel may be used for bracing as long as it is 7 mm, 9 mm or 12 mm thick, has a minimum wall length as described in Table 9, treated for the specific application in accordance with NZS 3602 (summarised in Table 8) and fixed in accordance with Ecoply bracing specifications outlined in this guide.

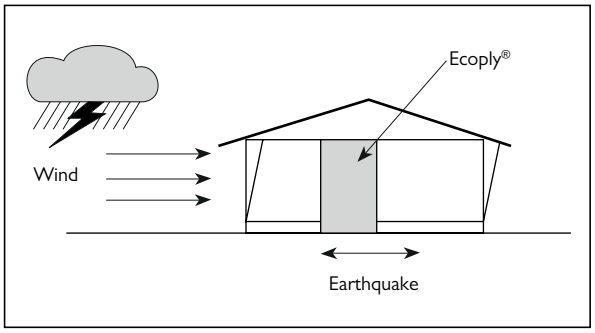
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

Structure

Timber framed buildings to NZS 3604 Timber Framed Buildings is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution B1/AS1 Structure.

CHH Woodproducts have developed a range of wall bracing elements tested using P21 testing methods referenced in NZS 3604.

Specific design



Ecoply structural plywood is manufactured to AS/NZS 2269, and it is suitable for design and use in earthquake and wind bracing systems constructed in accordance with NZS 3603 and AS/NZS 1170.

Structural plywood to AS/NZS 2269 is the only sheet brace material with properties defined in a published New Zealand engineering design code, NZS 3603 Timber Structures, and so can be designed in compliance with Verification method B1/VM1 under Clause 6.0 Timber for use in buildings over three storeys in height.

Demand is calculated by following section 5, Bracing Design of NZS 3604 or using the GIB EzyBrace® software, downloadable from www.gib.co.nz

EP bracing systems properties can be easily loaded into the EzyBrace software by way of an Excel patch downloadable from www.chhwoodproducts.co.nz together with loading instructions.

Timber Floors

When carrying out a bracing design for buildings with timber floor structures, the maximum bracing rating that can be accounted for when summing up the bracing units is 120 BUs/m. This does not exclude the installation of bracing elements that are rated higher than 120 BUs/m, however the extra bracing capacity can not be accounted for in the bracing design.

Specific design of floor and sub-floor framing is required for elements rated higher than 120 BUs/m.

Durability

Ecoply plywood is manufactured to meet the requirements of NZS 3602 Timber and Wood based products for use in buildings. If the product is used, handled and installed in accordance with CHH Woodproducts product literature it will meet the durability Clauses of the NZBC.

Table 8 summarises the applications in which Ecoply can be used as structural bracing together with the required preservative treatment and fastener material.

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Table 8: Ecoply® Suitability for Bracing Applicatons Including Treatment Type & Fastener Material

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray): E.g. Interior linings	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/ without building paper/ wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/without building paper/wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply® Barrier Specification and Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones[1] D	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones, as per section 4 of NZS 3604 (including sea spray)	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

Note: Power driven nails are suitable for use. Do not overdrive, nails must be full round head

Rain wetting and construction bracing

Untreated Ecoply will withstand normal exposure conditions during construction for up to 3 months however aesthetically the sheet appearance will deteriorate as the level of exposure increases. Rain and exposure can cause thinner plywood panels to buckle. Plywood stability is related to the number of veneers and thickness of the panel. Where panel stability is critical, consider using thicker panels.

Humidity and condensation

In conditions where the moisture content may exceed 18% for prolonged periods, Ecoply must be H3.1 LOSP or H3.2 CCA treated to resist decay or insect hazard.

Subfloor sheet bracing

H3.2 CCA treated Ecoply can be used as sheet bracing where dampness does not allow the use of untreated plywood or other sheet materials (section 5 of NZS 3604). Where Ecoply subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, 100% acrylic exterior coating system with a light reflectance value of 50% or greater.

Adjustments for wall height

Use section 5 of NZS 3604 to calculate bracing values: "Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

(a) For wall bracing elements of heights other than 2.4 m, the bracing rating determined by test or from Table 9 should be multiplied by 2.4 ÷ element height in metres, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
(b) Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height."
(c) Walls with heights < 1.5m, Specific Engineering Design is required.

Joining panels for walls higher than maximum sheet length

Ecoply bracing panels must be fixed from top plate to bottom plate. For wall heights over 2.4 m, Ecoply and Shadowclad® is available in 2.7 m sheet lengths. Alternatively, a part sheet can be stacked above a full sheet, butt joined on a single row of nogs with each sheet/part sheet independently nailed off as per the nail spacing in the Ecoply bracing specifications (e.g. 2.4 m x 1.2 m sheet with a 0.3 m x 1.2 m part sheet above it to give a 2.7 m x 1.2 m bracing element).

Cladding as bracing

12 mm Ecoply (CD face grade or better) can be H3 treated to meet the requirements of Acceptable Solution E2/AS1 and will perform as a structural, durable and weathertight cladding and bracing element when installed in accordance with E2/AS1.

It should be noted smooth faced plywood such as Ecoply may be prone to appearance related issues such as face checking which occurs naturally and is not considered by CHH Woodproducts to be a manufacturing or product fault. For more information refer to section 1.8: General Design Considerations - Face Checks on Plywood Exposed to Weather. H3.2 CCA treated Ecoply may also have a green tinge to the wood surface and may have fillet marks on the face of the sheet.

Plywood for exterior cladding applications where a high visual appearance is desired, CHH Woodproducts recommends the use of Shadowclad as an exterior cladding. Shadowclad has a textured (bandsawn) face which reduces the visibility of face checking and is most commonly H3.1 LOSP treated (clear preservative treatment) which does not leave fillet marks on the panel face.

For further information on Shadowclad as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz.

Soil

Ecoply must not be allowed to come in contact with soil. The bottom edge of the plywood sheet must be a minimum of 100 mm above decks or paved ground and a minimum of 175 mm above unprotected ground.

Service penetrations in bracing elements

Small openings (e.g. power outlets) of 90 x 90 mm or less may be placed no closer than 90 mm to the edge of the braced element, or waste pipe outlets of max. 150 mm diameter placed at no closer than 150 mm to the edge of the braced element.

3.2 ECOPLY® BRACING SPECIFICATIONS SUMMARY

CHH Woodproducts has a range of bracing specifications called the EP bracing series. The EP bracing series simplifies the design and construction of bracing elements using plywood, by itself or in conjunction with GIB® Plasterboard and features:

- Single sided and double sided bracing elements High performance bracing element utilising GIB® Standard plasterboard
- A single type, GIB Handibrac®, hold-down for all bracing elements
- Specifications for each bracing element type

Table 9: Summary P21 Ratings for 2.4m High Ecoply® Wall Elements

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EP1	0.4 m	Ecoply one side	80	95
	0.6 m		95	105
	1.2 m		120	135
EPG	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
	1.2 m		150	150

Note: Bracing and other technical information has been specifically tested using Ecoply branded structural plywood. This information cannot be used with any other plywood brand and bracing data must be sought directly from the specific plywood manufacturer.

More information

The following pages provide a full specification of EP bracing elements. Copies of specifications can be downloaded from www.chhwoodproducts.co.nz

NZS 3604 provides the method of calculating demand on a building. Calculation sheets are available from BRANZ or GIB EzyBrace® software is available as a free download from www.gib.co.nz. Information is available at www.chhwoodproducts.co.nz which can be placed in the custom elements of GIB EzyBrace® for ease of calculation

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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Table 10: Singled Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EP1_0.4	0.4 m	Ecoply one side	80	95
EP1_0.6	0.6 m	Ecoply one side	95	105
EP1_1.2	1.2 m	Ecoply one side	120	135

Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

One layer of 7 mm, 9 mm or 12 mm Ecoply plywood fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Fastening the Ecoply® panels

Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

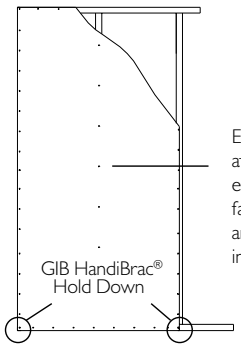
Fasteners for H3.2 CCA treated Ecoply® panels

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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Table 11: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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3.4 ECOPLY® BRACING SPECIFICATION – EPG

Table 12: Structural Plywood Brace with Plasterboard Other Side

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EPG_0.4	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
EPG_1.2	1.2 m		150	150

Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

Side 1: One layer of 7 mm, 9 mm or 12 mm Ecoply plywood exterior wall cladding fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Side 2: One layer of 10 or 13 mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

Fastening the Ecoply® panels

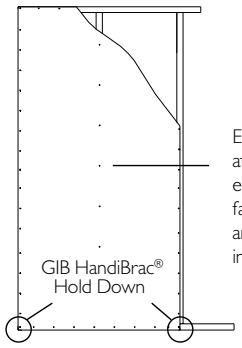
Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

Fasteners for H3.2 CCA treated Ecoply®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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Fastening the GIB® Plasterboard

32 mm x 6 g GIB® Grabber® Screws or 35 mm GIB® Nails

Fastening centres

Fasten 50, 100, 150, 225 and 300 mm from each corner and 150 mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300 mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12 mm from paper bound edges and 18 mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.

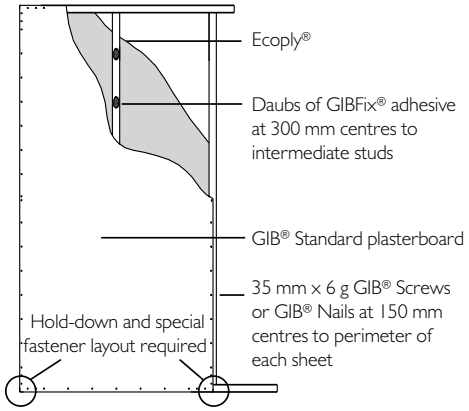


Table 13: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones including sea spray, as per section 4 of NZS3604):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones1 B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone1 D (sea spray), as per section 4 of NZS3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in eexposure zone D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

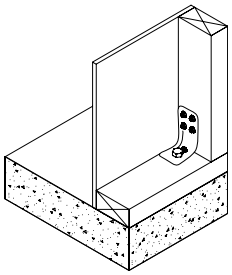
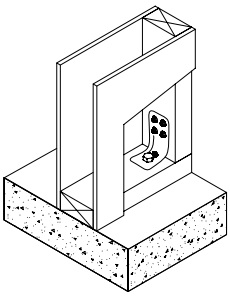
* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

3.5 GIB HANDIBRAC® – RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as the hold-down in all EP bracing elements.

- The GIB HandiBrac® registered design provides for quick and easy installation
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to check in the framing as recommended with conventional straps
- The GIB HandiBrac® is suitable for both new and retrofit construction
- The design also allows for installation and inspection at any stage prior to fitting internal linings

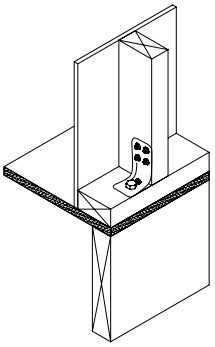
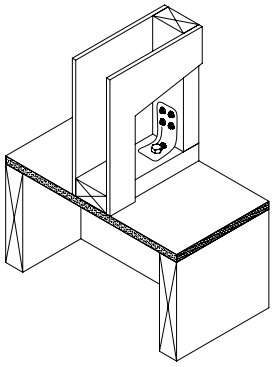
Concrete Floor

External Walls	Internal Walls
	
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate	Position GIB HandiBrac® at the stud/plate junction

Hold-down fastener requirements

A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket

Timber Floor

External Walls	Internal Walls
	
Position GIB HandiBrac® in the centre of the perimeter joist or bearer	Position GIB HandiBrac® in the centre of the floor joist or full depth solid block

Hold-down fastener requirements

M12 x 150 mm galvanised coach screw

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3.6 STRUCTURAL CEILING DIAPHRAGMS

Diaphragms are used to transfer lateral loads to braced walls and allow for greater spacing between bracing lines. Diaphragms do not have a BU rating themselves.

Plywood diaphragms are an acceptable solution as described in section 13 of NZS 3604 13.5.2 which allows for plywood not less than 6 mm thick and a minimum of three ply for:

(a) Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
(b) Diaphragms not steeper than 45 degrees to the horizontal and not exceeding 7.5 metres long under light or heavy roofs

Plywood ceiling diaphragms required to comply with NZS 3604 must be constructed as follows:

(a) The length of diaphragm shall not exceed twice its width measured between supporting walls
(b) The ceiling lining must consist of plywood over the entire area of the diaphragm
(c) Complete sheets with a minimum size of 1800 x 900 must be used
(d) Framing size and spacing must comply with NZS 3604
(e) Fastener size should comply with Table 7 of this guide. E.g. 40 mm x 2.5 mm flat head nails for 7 mm and 9 mm Ecoply
(f) Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
(g) Fixings are no closer than 10 mm from sheet edges
(h) Perimeter ceiling framing must be connected to wall framing by a perimeter 140 mm x 35 mm ribbon plate nailed to the top of the top plate or alternative such as a 0.55 mm thick steel angle or proprietary steel channel
(i) Sheets must be layed in a staggered pattern
(j) The basic shape of a ceiling diaphragm should be rectangular. Protrusions are permitted but cut-outs are not (see Figure 13.4 NZS 3604)

4.0 ROOFS AND DECKS

The section below covers the use of Ecoply plywood used as a substrate for flexible membrane and tile systems in roofing and decking applications. The information below should be considered as supplementary to system specifications from roofing and decking suppliers.

Further guidance on installation and detailing factors can be found in the EWPAA Technical Note; Plywood Roofing and Flooring: Installation and Detailing Factors. This can be downloaded from www.ewp.asn.au

Ecoply is not recommended as a substrate for exterior decks without a properly detailed barrier material such as butyl rubber, vinyl or E.P.D.M to protect the surface from weathering.

Always refer to the roofing and decking system supplier for installation, plywood selection and surface preparation requirements for specific roofing and decking products.

4.1 FLEXIBLE MEMBRANE SYSTEMS

- Roofing and decking membranes may comprise synthetic rubber sheeting glued to the Ecoply, or torch welded bitumen membranes
- Always ensure Ecoply is dry and free of imperfections such as surface dust and blemishes as membranes coatings will telegraph any substrate imperfections
- Use Ecoply Flooring or Structural Square Edge (CD Grade)
- Where Ecoply Flooring is used consider the use of a small daub of glue or nail in the Tongue & Groove of each sheet if potential movement of the plastic tongue joint is not acceptable
- For trafficable decks use a minimum 17 mm thickness, refer to Table 15A and 15C for specification
- Use countersunk stainless steel screws and adhesive on framing to avoid head popping. Apply adhesive between screw locations
- Use kiln dried timber framing such as Laserframe® or appropriate LVL framing from the Futurebuild® range
- Consult the membrane manufacturer regarding use of bond breaker tapes over joints to allow elongation with natural plywood movement
- Where treatment is required use only H3.2 CCA treated Ecoply. Do not use H3.1 LOSP treated Ecoply (solvent based carrier). It is not compatible with most membrane systems. If there is evidence of treatment salt crystals on the Ecoply surface remove by scrubbing with a small amount of water and allow the surface to dry prior to laying the membrane system

Plywood substrates, face checking and flexible membrane systems

All natural wood based products (including Ecoply) have the potential to develop natural surface face checks when exposed to external environmental conditions. The degree of face checking is dependent on a number of factors including the length of time and level of exposure to weather during construction which is outside the manufacturing control of CHH Woodproducts. For more information see section 1.8: General Design Considerations - Face Checking on Plywood Exposed to Weather.

Face checks, while typically not present after manufacture, do not affect structural performance of the sheet and are acceptable under AS/ NZS 2269. They are not a manufacturing fault.

Designers and membrane suppliers must carefully consider the suitability of plywood as a substrate for the membrane system in question if the potential of telegraphing of face checks onto the membrane surface is not acceptable.

The risk of telegraphing can be reduced by protecting the plywood surface from weather and moisture during the construction process.

Where the potential of face checking in the plywood substrate is not acceptable designers should consult the membrane supplier for a more suitable membrane or an alternative substrate.

Allowing for moisture expansion of plywood under roof and floor coverings

Membrane suppliers have held different views on the requirements for plywood substrates. The fixing instructions within this guide are the starting point but designers must detail joints that allow for expansion in accordance with practices recommended by the chosen membrane supplier.

CHH Woodproducts' view, and the recommendation of a number of suppliers here and in North America is that expansion and contraction at sheet edges should be allowed for by loosely butting tongue and grooved edges so that the tongues can absorb movement and providing a small gap (2 to 3 mm) between square sawn edges. Use a bond breaking tape over these joints to spread elongation in the membrane over a longer distance than the narrow gap in the joint itself. This tape can double as a rain seal over the sheet edges during construction.

Other membrane suppliers believe that sheets should be tightly butted and glued and screwed hard up to each other. This practice constrains movement at the small joint between sheets, but over a wider area requires significant allowance for movement around the perimeter of a roof segment. Junctions between the roof slopes and walls need careful detailing to allow for the potential movement. Movement control joints should be provided at regular intervals following the recommendation of the membrane manufacturer, especially if this method is adopted.

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4.2 ROOF TILE SYSTEMS

Most fibreglass, asphalt or wooden shingle and tile systems will tolerate DD grade surface characteristics.

- Use unsanded Ecoply Roofing (DD grade), or sanded Ecoply of the required thickness in Table 15A
- The unsanded surface provides extra grip on steeper roofs for roofers
- Fix tiles according to the tile manufacturer's specification
- Under asphalt shingles use felt underlay over the Ecoply

4.3 ROOFING & DECKING – PRODUCT SELECTION GUIDE

Table 14: Roofing and Decking Product Selection Guide

	Structural Square Edge (CD Grade)	Flooring (CD Grade)	Roofing (DD Grade)
Product Description	CD face grade sheets are available in a range of thicknesses and size	Solid sanded C grade surface with tongue and groove profile on long edges	Unfilled D grade surface with tongue and groove profile on long edges
Recommended Applications	Substrate for flexible coverings requiring a smooth substrate and where avoidance of visible surface indentations is critical. Use as a substrate for flexible roof and deck membranes and thin roofing tiles		Substrate for coverings with the ability to span holes in the D face grade (up to 75 mm in diameter) such as asphaltic roof tiles and torch welded polyester reinforce membranes. Do not use under flexible membrane coverings or where avoidance of visible surface indentation is critical
Face Grades	Front: C solid sanded Back: D unsanded		Front & Back: D unsanded
	Refer to Table 1 for range and treatment options		
Product Features	Blocking required to support all edges	Second void free layer under surface veneer for increased protection against punching through the first veneer under high point loads & increased moisture resistance. Blocking not required to support tongue and groove edges (unless otherwise specified)	15 and 17 mm thickness specifically designed for use under shingles and tiles that have a courser finish. Unsanded surface for extra strength and grip for installers on steep roofs Blocking not required to support[2] tongue and groove edges (unless otherwise specified)
Thicknesses Available	12, 15, 17, 19, 21, 25 mm	15, 17, 19, 21, 25 mm	15, 17 mm
Sheet Sizes Available	2400/2700 x 1200m		
Stress Grades Available	F8 (F11[1] available upon request)	F8 (F11[1] available upon request) 19 mm Longspan supplied F11[1] as standard	F11[1]
Treatment	Untreated, H3.2 CCA and H3.1 LOSP	Untreated, H3.2 CCA, (H3.1 LOSP available upon request)	
Span Capabilities	Refer to frame spacings in Tables 15A to 15C		

1 Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain.

2 Where roofing products use tongue and groove CHH Woodproducts recommends fastening the tongue to rafters/joists at a minimum of one point

4.4 FRAME SPACINGS FOR ECOPLY® ROOFS AND DECKS

Table 15A: Roofing - Sheathing, Non Trafficable, Above 2 Degree Pitch

Application	Roof Pitch	Stress Grade	Maximum Wind Zone	Maximum frame centres (mm) for Ecoply® with face grain across framing				
				Ecoply nominal thickness (mm)				
				15	17	19	21	25
Sheathing, non trafficable roof for all roof pitches above 2 degrees Suitable for roof mass up to 30 kg/m² (additional to Ecoply weight or 40 kg/m² including Ecoply)	>2°	F8	Extra High	600	600	800	800	900
		F11	High	900	900			
			Very High	800	900			
			Extra High	800	800			
	>20°	F11	Very High	900	900			
			Extra High	800	800			

Suggested applications include substrates for Asphalt Shingle and Membrane type roofs. The above suggested maximum framing spans are based on the following deflection criteria:

- Under a short term 1kN point load, deflection is less than Span/130
- Under a long term self weight load, deflection is less than Span/400
- Under a short term wind gust load, deflection is less than Span/150

Table 15B: Sub-Sheathing

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing					
	Ecoply nominal thickness (mm)					
	12	15	17	19	21	25
Under steel or self supporting cladding for support of building paper or lateral diaphragm action. Sag not critical.	800	1200				

Table 15C: Decking

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing			
	Ecoply nominal thickness (mm)			
	17	19	21	25
1. Trafficable roof decking Limited by dynamic response of roof as floor	540	600	600	750
2. Roof decking to Clause 8.5.5.1 c) of E2/AS1	400	400	400	400

- The current requirement in E2/AS1 is extremely conservative when compared with calculations determined for other applications using VM1 Clause 6 and calibrating the spans against codes of practice from North America and Australia. CHH Woodproducts recommends designers consider the alternative solution in row 1 of Table 15C for membrane decking in consultation with the membrane manufacturer.

  Unless otherwise stated spans apply equally to square edge or tongue and groove panels. Check Table 1 for availability of grades and lengths to match span multiples in Table 16
- Use the next lower recommended frame spacing or thicker Ecoply® where appearance is critical
- To suit trusses at 900 centres, 2700 long sheets are available. See Table 16

Table 16: Frame Set Outs to Match 2400mm and 2700mm Sheet Modules

Length (mm)	Typical Frame Spacing to Suit Sheet Length			
2400	400	480	600	800
2700	450	540	675	900

Limitation for the use of Table 16.

CHH Woodproducts does not have access to information about designs for specific sites. Table 16 is a guide to estimate the initial selection of a span for design. Each site should be evaluated by qualified persons to ensure all loading parameters and site conditions have been considered, and appropriate changes should be made by the building designer.

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4.5 ROOFING – DESIGN CONSIDERATIONS

Durability

In general, H3.2 CCA treatment of Ecoply plywood with waterborne preservatives is recommended for roofing.

Roofing materials

Various roofing materials used over Ecoply plywood have different durability expectations, normally in excess of the 15 years required by the NZBC Clause B2. Durability of the roofing is subject to the specifications, installation and maintenance requirements of the roofing manufacturer. The durability of the Ecoply can only be assured as long as the overlying roofing and detailing excludes moisture. With good building practice and maintenance, roofing materials can be repaired or replaced at regular intervals to achieve life from the Ecoply in excess of the original roofing. The durability of Ecoply structural plywood will continue to satisfy the relevant requirements of the NZBC for 50 years, if installed in accordance with the instructions and limitations within this guide and the roof system is adequately maintained.

High humidity, condensation and solar driven moisture

Where the moisture content of wood may exceed 18% for prolonged periods, Ecoply must be H3.2 CCA treated, to resist decay hazard. This includes Ecoply used under roof coverings that may be subject to condensation, or where rain moisture soaked in the roof covering can be driven into the Ecoply by the sun. Appropriate building detailing and ventilation is recommended which can reduce the need for treatment.

Roof ventilation

Good ventilation and the avoidance of moisture are important design considerations when using H3.2 CCA treated Ecoply panels. Poorly ventilated spaces can develop very high temperature and moisture levels. The most likely source of moisture is the condensation of vapour from warm interior air on the underside of cold roofing. Good ventilation can limit the build up of excess moisture vapour in warmer climates but in regions where winter nights are consistently colder, H3.2 CCA treated Ecoply should be used. Moisture induced decay is only one risk that needs to be managed. If incorrectly detailed, roof spaces can be very tight and the dark colour of many roofing materials means that excessive heat can build up causing distortion in plywood or even framing members. Use the suggested details or alternatives to suit. Designers must consider roofing type, seasonal conditions, wind effects and the intended use of the building.

As a minimum, CHH Woodproducts recommends a vent area of 1/300th of the ceiling plan area (approx 3350 mm^2 per square metre of ceiling) equally distributed at the eaves and ridge to allow free flow under the Ecoply, up the roof slope, and out.

Roofing material suppliers should detail vent systems suited to their specific membrane or tile roofing. Proprietary ridge capping profiles or vents are available from roofing suppliers.

Detail gaps of 25 mm in the plywood at ridges, and at walls where a roof slopes up to an upper storey. For flat roofs, natural ventilation flows may be impeded. Use proprietary roof vents. Consider forced ventilation as appropriate.

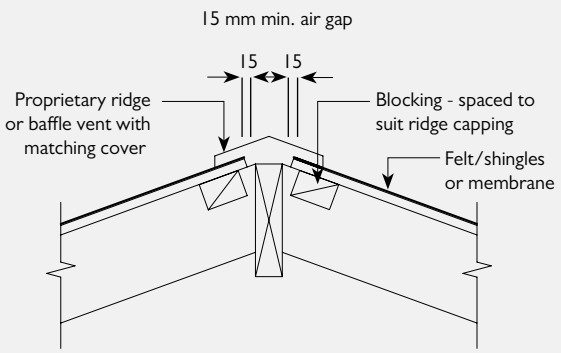
Bubbling

Plywood bubbling occurs when moisture trapped in knot holes in inner veneers expands as the temperature rises. This moisture will dissipate through the face veneer and will not affect the structural integrity of the plywood panel. As membrane coverings can prevent moisture dissipation, Ecoply Flooring and Structural Square Edge CD is recommended if the visual appearance of bubbling is not acceptable, or a high visual finish is required.

Soil

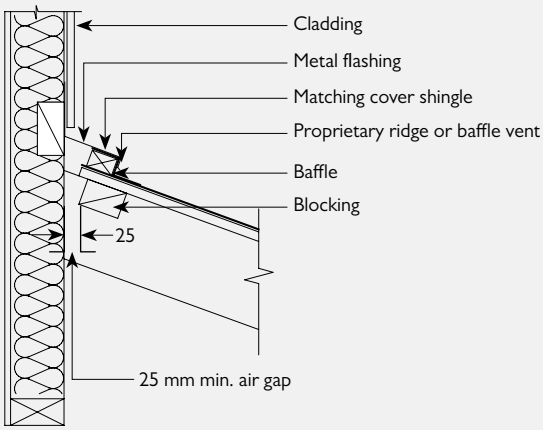
Ecoply plywood (untreated or H3.1 LOSP/H3.2 CCA treated) must not be allowed to come in contact with soil. Surfaces, flashings and gutters should be detailed to avoid trapping detritus and moisture.

EC003: Ridge detail with ridgeboard

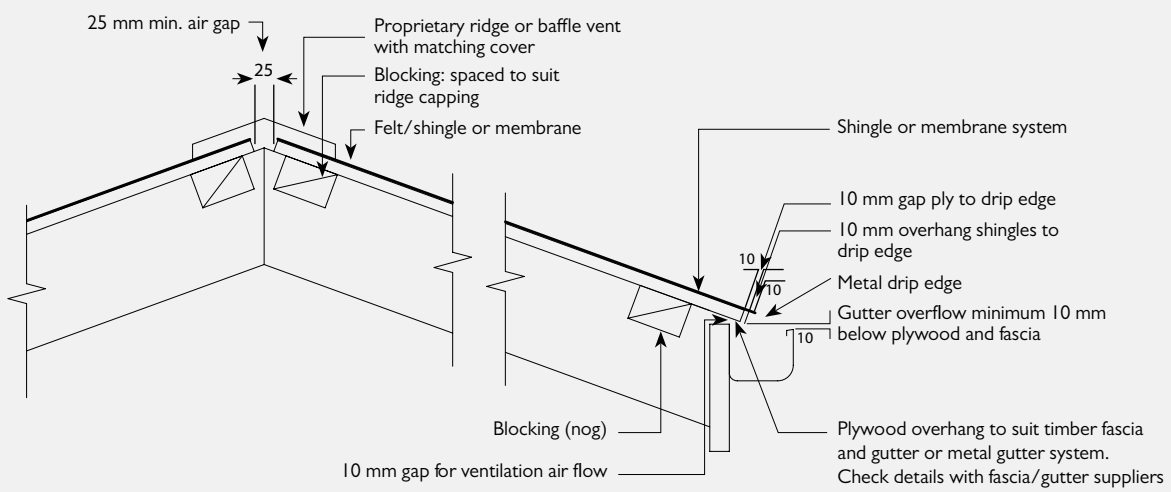


(use also with Hip Rafter if extra ventilation required)

EC004: Roof to wall junction vent



EC005: Truss ridge detail



Rain wetting and construction time

Untreated Ecoply will withstand a reasonable amount of rain wetting and exposure during construction for up to three months. In extreme weather conditions of high temperature and/or high rainfall this period may be less. Appearance issues such as discolouration and face checking of the sheet surface can be expected if Ecoply is exposed. For roofs uncovered for longer periods use H3 treated Ecoply to lower the risk of decay. Return Ecoply to below 18% moisture content before installing moisture sensitive materials, coverings, coatings or adhesives. Where a high visual finish is desired (such as membrane roofing and decking) protect Ecoply from exterior moisture during construction. For detailed information see section 4.1 Flexible Membrane Systems.

Gutter details

Where Ecoply structural plywood sub-sheathing supports roofing at gutters, a metal drip edge must be provided with appropriate gaps to shed water. Gutters should have a front edge overflow or ends lower than the back to shed water overflow away from framing and sub-sheathing Ecoply.

H3.2 CCA treatment is recommended for Ecoply sheets that protrude into gutters, with regular maintenance to avoid leaf mould (soil) development. Untreated Ecoply must not be exposed to gutter splash or moisture.

Fastener spacing for wind suction

Wind pressure applies withdrawal loads to nails holding plywood to purlins and trusses. For the frame spacing in Table 15A designers may use the following guidelines for wind zones expressed in NZS 3604.

Note: Full penetration of fasteners into the supporting member is assumed.

The main body of the roof

For wind zones up to and including high, use 60 x 2.8 mm nails spaced at 150 mm centres on all cross framing. For very high and extra high wind zones, use 75 x 3.15 mm nails spaced at 150 mm centres on all cross framing.

Roof edges

All Ecoply structural plywood used at local pressure suction zones at the roof edges, gutters, eaves and gable ends must be supported on framing, and fixed at 75 mm centres with minimum 60 x 2.8 mm nails for regions up to, and including high wind zones (use 75 x 3.15 mm nails for very high and extra high wind zones). Local pressure zones are interpreted from AS/NZS 1170 as being within 20% of the building length, width or the average of the gutter and ridge height.

Designers and builders should review site conditions to ensure adequate fixing is applied. Buildings in exposed sites and lee zones should be specifically designed using the loading standard (AS/NZS 1170) and the timber structures standard NZS 3603. In some wind conditions, the tiles themselves may be sucked from the plywood. Use a consulting engineer to assess site conditions, calculate wind pressures for the specific site, and determine the fastening and span requirements, and to check that the truss system can resist the loads being applied through the plywood.

Fixing of roofing

Fixing methods for tile, shingle and membrane systems must be designed for the expected wind and weather exposure to protect the Ecoply substrate. Some shingle systems may not be suitable for use in very high or cyclonic wind zones.

Follow the specifications of the roofing manufacturer and refer to the appropriate BRANZ Appraisals.

SDC - Approved Application Document - Building Code Clauses B1/VM1, B2, E2, E3, F2, F5, F7, H1 - 154 pages - 30/06/2022 - 27/06/2024 - 08/2022 - phillid

4.6 ROOFING – INSTALLATION

Framing

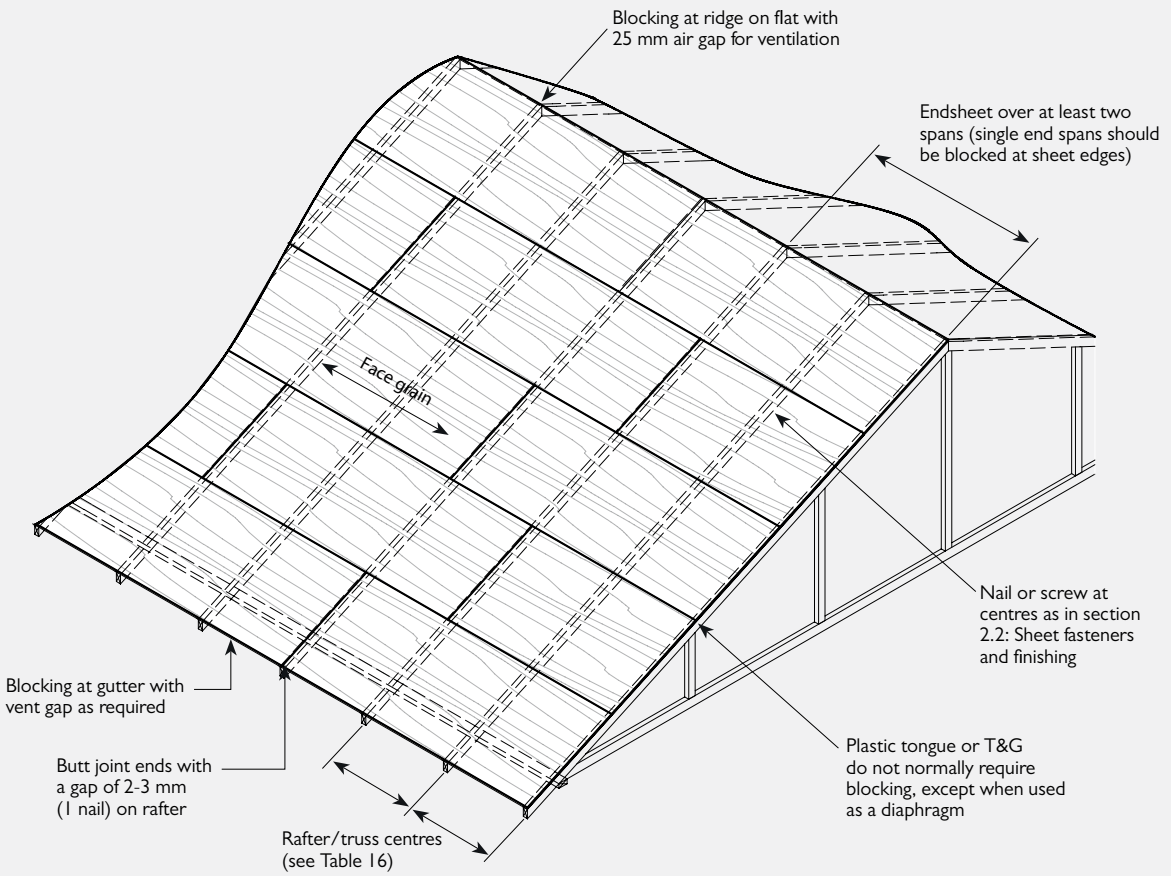
Frames should be at spacings to suit plywood thicknesses in Table 15A, page 25. Additional requirements for roof framing are:

- Ensure top edges of framing are properly aligned
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to lower moisture level in roof spaces, second floor spaces, and reduce differential truss, rafter or joist deflections

Blocking (nogs, dwangs)

- Block all edges of Ecoply Structural Square Edge plywood
- Block all edges at the ridge and gutter lines to prevent sag at capping or gutters
- Block for high face loads or under areas accessed for maintenance
- Blocking within the body of the roof is not required under tongue and grooved edges when using Ecoply Flooring & Roofing, unless required for framing stability or the plywood is being used as a diaphragm to resist horizontal wind or earthquake loads. In this case fixings transfer shear across the joints and details should be specified on drawings
- Use blocking on the flat to provide gaps where air flow is needed for ventilation
- Specific roofing suppliers may require blocking to suit their system

EC006: Sheet and framing layout



Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- Lay the sheets in a staggered pattern
- Allow sufficient clearance inside confining structure such as concrete or brick walls adjacent to the roof. Use extra allowances with large areas
- Allow clearance for ventilation as required

Fixing of sheets

Ecoply may be fixed to different types of framing with nails, screws or a combination of fasteners and construction adhesives.

Fasteners should be corrosion resistant to a level appropriate to the end use life expectancy (15 or 50 years) and expected exposure to moisture. Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

The integrity of a plywood based roof system is directly related to how well the panels are fixed to the framing. Ecoply must be fixed to resist wind suction loads, and to maintain surface qualities of the overlying roof covering.

- Always refer to the roofing system supplier for system requirements
- For roofing, check the additional requirements according to wind exposure
- For very exposed sites, cyclonic conditions or roofs above 10 metres in height, carry out specific structural design to the relevant standards
- Screw fixing must be used for membrane roofing, and is preferred for all systems because of increased holding power and avoidance of head popping
- For minimum fastener spacing for wind suction, refer section 4.5 Roofing - Design Considerations - Fastener spacing for wind suction

Fixing to timber frames

- Ring shank nails or annular grooved nails or screws are recommended for additional holding power
- Use flathead nails. Do not use jolt or bullet head nails
- Stainless steel nails must be annular grooved
- Ensure fastener is compatible with the roofing cover (consult roofing system supplier)
- Staples may be used provided that the withdrawal load is equivalent to the hand driven galvanised flathead nail. A suggested minimum is a 50 mm long staple with 12 mm crown and legs 1.8 mm diameter. Space staples 20% closer than nails. Refer to the manufacturer's information for corrosion resistance and durability

Fixing to steel frames

- Fix directly to roll formed steel (up to 2 mm thick) with self-drilling, self-tapping screws. If plywood gets damp and expands, screws in thicker steel may shear. Keep Ecoply dry or use larger screws or;
- Bolt or screw battens to the steel and apply Ecoply as above for timber. Ensure that battens have adequate thickness for the minimum nail or screw length
- H3.2 CCA treated plywood must not be fixed to steel framing

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5.0 FLOORING

The following section covers the use of Ecoply Flooring plywood used as a flooring substrate with flexible and rigid overlays. Ecoply Flooring is suitable as a substrate for overlays such as carpet, tiles and some membrane products (refer to flooring manufacturer).

5.1 FLOORING – RANGE

- Ecoply Flooring features a void free second layer under the surface veneer for increased protection against moisture bubbles and punch through of the first veneer under high point loads than normal Ecoply Structural Square Edge plywood
- The tongue and groove on long sheet edges does not require support blocking under the joint (unless otherwise specified)
- Supplied in F8 stress grade (F11 available upon request)
- Ecoply 19 mm Longspan Flooring supplied as standard in F11/F8 stress grade
- Supplied standard with a sanded C grade surface with D grade back
- Sanded B grade surface is available in 19 mm thickness (untreated only) for clear finish applications. Designers must expect the surface to dent or mark more easily than hardwood flooring systems as Ecoply is manufactured from relatively soft radiata pine.
- Available untreated or H3.2 CCA treated, (H3.1 LOSP treated available upon request)
- LOSP treated plywood is not recommended for internal applications
- Refer to Table 1 for range and treatment options

5.2 FLOORING – INSTALLATION

Table 17: Flooring Frame Spacings

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing				
	Ecoply nominal thickness (mm)				
	15	17	19	21	25
1. Domestic flooring 2kPa - 1.8kN	480	540	600 F11[1] Longspan	600	750
2. Institutional and public assembly up to 4kPa - 2.7kN		300	480	540	750
3. Institutional and crowd assembly up to 5kPa - 3.6kN			400	450	600
4. Corridors, industrial up to 5kPa - 4.5kN			300	400	540
5. Domestic garage floor** 2.5kPa - 9kN					270

** Provide blocking to all edges of the sheet.

- Use the next lower recommended frame spacing or thicker Ecoply flooring where appearance is critical
- To suit frames at 900 centres, 2700 long sheets are available. See Table 16

[1] Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain. Please contact CHH Woodproducts for Span/360 deflection limits for internal membrane areas

Floor loads

For domestic garage floors blocking is required under all edges to control wheel loads on the tongue. Testing with 113 mm diameter load head (0.01 m^2) confirms commercial floor capabilities.

Refer to Table 16 to match frame set outs with 2400 mm and 700 mm sheet modules.

Framing

- Joist spacings should be at spacings to suit plywood thicknesses in Table 17
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to achieve a moisture content of 18% or less

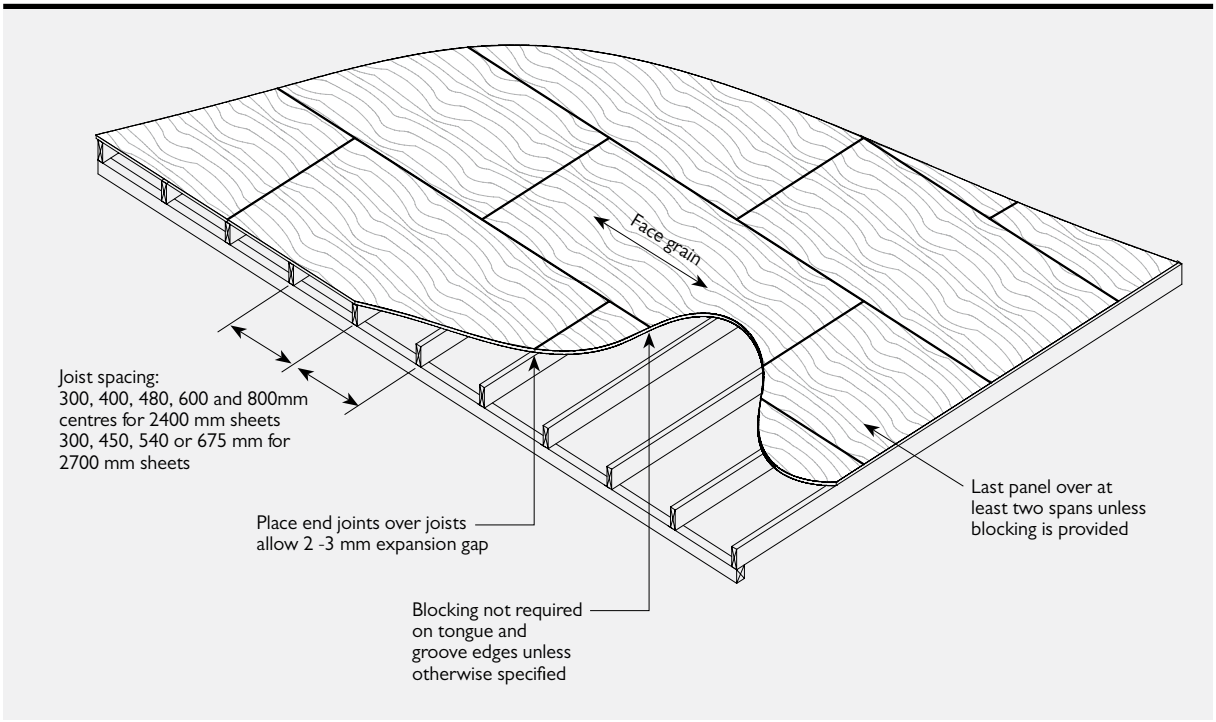
Blocking

- Blocking within the body of the floor is not required under tongue and groove edges unless otherwise specified (such as in domestic garage floors)

Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- For panels at floor edges where a continuous two span coverage is not possible, sheet edges must be supported by blocking
- Lay sheets in a staggered pattern
- Allow clearance for ventilation as required

EC007: Ecoply® Flooring layout



Fastener selection and treatment

Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture.

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Fasteners and fixing of sheets

- Ecoply Flooring may be fixed with nails or screws or a combination of mechanical fasteners and construction adhesives
- For fastener specifications (including lay out and sizes) refer to section 2.2: Sheet Fasteners and Fixing
- For construction adhesive specifications refer to section 2.3: Adhesives
- Ring shank or annular grooved nails, or screws are recommended for additional holding power
- To reduce the risk of fastener popping or floor squeak the use of construction adhesives is advised.
- Do not use jolt or bullet head nails

5.3 FLOORING – FINISHING

- Overlays and coatings should be applied following the manufacturer's specifications
- Avoid heavy sanding that may remove the critically important structural face veneer
- Adhesives must be compatible with CCA (Copper Chrome Arsenic) treatment in H3.2 CCA treated sheets. Compatibility can often be improved by lightly washing, scrubbing and drying the plywood surface prior to fixing
- Where clear or stained finishes are desired, designers should select sheets and protect the floor as much as possible from the weather and construction activities
- Ecoply is made from relatively soft radiata pine and as such will dent or mark more easily than hardwood flooring systems. This is to be expected and designers must consider the long term appearance requirements of the project. Ecoply Flooring is a good substrate for harder wearing flooring overlays, and is not primarily intended for clear finishing, especially if it is exposed to moisture during construction
- For improved surface finish, floors should be protected from weather during construction as soon as possible

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6.0 FREQUENTLY ASKED QUESTIONS

Q: How much space should be allowed for expansion?
A: Allow a 2 - 3mm expansion gap between square edges of Ecoply® sheets. If using Ecoply Flooring, a 5 mm expansion gap is recommended at the perimeter of the floor or deck. Check by calculation for large areas.

Q: Can power driven nails be used to fix Ecoply?
A: Paslode power driven nails have been tested for fixing Ecoply and Shadowclad® plywood products for particular bracing and cladding applications. For power driven nail specifications refer to the Paslode Special Fixing Applications document available from http://www.paslode.co.nz/images/fix-app-CHH-woodproducts.pdf. Use the Paslode Impulse Compact Nailer fitted with a No Mar(k) work contact element to eliminate any contact marks on the plywood. Adjust the work contact element to the flush position and fire the nail at 90° to the work surface. Hammer any nails flush which are left proud. Do not overdrive.

Q: How close to sheet edges can I nail?
A: Fixings must be at least 3 fastener diameters or 7 mm from the sheet edge.

Q: Do I have to use stainless steel nails when using Ecoply for bracing?
A: Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances.Where stainless steel nails are required, annular grooved nails must be used.

Q: What is the weight of Ecoply?
A: Refer to Table 4A for weight (kg/m^2) of different Ecoply thicknesses.

Q: What is the R-value of Ecoply?
A: The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214. Plywood has a conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance R = 0.012/0.13 = 0.09.

Q: Are there any compatibility issues when using Ecoply with other materials?
A: Adhesives for flexible rubber membranes may react with LOSP treatment and should therefore only be applied to H3.2 CCA treated Ecoply unless the membrane supplier advises differently. Check with the membrane manufacturer if in doubt. H3.2 CCA treatment is also corrosive and this must be taken into account when specifying H3.2 CCA treated plywood next to metals. For further guidance, refer to Tables 21 and 22 in Acceptable Solution E2/AS1.

Q: Can Ecoply be used as a rigid sheathing (air barrier)?
A: CHH has a specific system called Ecoply Barrier. Ecoply Barrier has been developed as a rigid air barrier. Refer to the current Ecoply Barrier Specification & Installation Guide for further information. 7mm H3.2 CCA treated Ecoply can also be used if combined with building underlay in accordance with E2/AS1 for a rigid air barrier system.

Q: What is the relevance of AS/NZS 2269?
A: Ecoply structural plywood is manufactured to AS/NZS 2269 Plywood Structural. This Standard is referenced by the NZBC Compliance Documents including NZS 3602 Timber and Wood-based Products for Use in Building, NZS 3603 Timber Structures, NZS 3604 Timber Framed Buildings, AS/NZS 1604.3 Specification for Preservative Treatment, Part 3:Plywood and Acceptable Solution E2/AS1 - External Moisture. Plywood not manufactured to AS/NZS 2269 does NOT meet the requirements of these NZBC Compliance Documents.

Q: What is the relevance of the PAA stamp?
A: Ecoply is manufactured under a third party audited, product quality control programme by the Engineered Wood Products Association of Australasia (EWPAA) to monitor compliance with AS/NZS 2269. Given that compliance with Standards is not actively policed by Standards New Zealand, this third party auditing provides important peace of mind for users and consumers of Ecoply plywood products.

Q: What is marine ply?
A: Marine plywood manufactured to AS/NZS 2272 Plywood Marine may contain species of low durability (source: BRANZ Good Practice Guide – Timber Cladding). Whilst marine plywood has a Type A glue bond, it is generally specified for its high surface appearance grade and lack of core knots as opposed to structural performance. AS/NZS 2272 limits marine plywood to a number of approved species that pass stringent property requirements for things like moisture permeability. These requirements are different from those in standards from other countries. Marine plywood is rarely treated as it is usually coated with resin, fibreglass, or a paint finish for long term durability.

Q: What should a specification for structural plywood include?
A: A specification for structural plywood should include:

Specification check list	Example
Quantity/size	20 sheets of 2400 x 1200
Thickness	12 mm
Edge finish	Square edge
Brand name	Ecoply® structural plywood
Reference to Standard	To AS/NZS 2269
Stress grade[1]/layup	F8 (12-24-5)
Surface grade/bond type	CD A-Bond[2]
Accreditation	EWPAA product certified[3]

1 Stress grades may vary between different manufacturers and products.
2 Type A-bonds are suitable for permanent exposed applications and structural applications.
3 The EWPAA JAS-ANZ Product Certification Mark certifies that Ecoply structural plywood products have been manufactured under a third party audited joint product certification programme to monitor compliance with AS/NZS 2269

Q: What are F-grades?

A: The stress grading system is a ranking system which utilises the symbol F and a suffix 8, 11 etc as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. For plywood of a given thickness, the higher the F-grade, the further it will span. For load bearing applications (e.g. flooring, roofing) the required F-grade as well as the plywood thickness must be specified to achieve the required span. F8 is the most common structural plywood grade found in New Zealand. All Ecoply® structural products are F8. Ecoply 15 mm roofing and Ecoply 19 mm Longspan Flooring are F11/F8. Other Ecoply Flooring products are also available in F11 upon request.

Q: What are surface/appearance grades (eg CD)?

A: Appearance grades (eg BD, CD, DD) denote the appearance grade of the plywood including the number and size of knot holes as defined in AS/NZS 2269 and summarised in Table 2A & 2B of this guide. The first letter describes the appearance of the face veneer and the second letter describes the back face.

Q: How long can Ecoply be left exposed to the weather?

A: Untreated Ecoply will typically maintain its structural integrity when exposed to the weather during construction for up to 3 months. The surface colour will start to silver off and face checking will become evident. Where the finished appearance of the Ecoply is important, it should be protected during construction. Ecoply is also available H3 treated to resist decay or insect hazard. When used in accordance with this guide, it can be specified to meet the durability requirements of the NZBC, however appearance issues such as face checking may still occur dependent upon the degree of exposure to weather during construction.

Q: What treatment levels and types are used for Ecoply?

A: Ecoply is available untreated or preservative treated. Ecoply is treated to the H3 hazard class for above ground use. The standard Ecoply treatment type is H3.2 CCA (Copper Chrome Arsenate) although H3.1 LOSP Azole (Light Organic Solvent Preservative) may also be specified where a clear treatment is required. LOSP Azole is the standard treatment type for BD, Grooved Lining and Shadowclad®. CCA treatment gives the plywood sheets a green tinge and the drying process after CCA treatment may leave fillet marks on the face of the sheet.

Q: Does Ecoply have to be treated when used as structural bracing?

A: Ecoply used as bracing must be treated unless it is installed in an interior dry situation. Note, behind exterior cladding and in cavities (even if the Ecoply is covered with building wrap) are not considered to be an interior dry situation.

Q: Do I have to re-treat cut edges of treated Ecoply?

A: It is important to re-treat any cuts and holes with a brush on remedial treatment such as Holdfast® Metalex® Clear.

Q: What type of glue is used to manufacture Ecoply?

A: Phenol formaldehyde (PF) resins are used to bond the plywood veneers. This forms a Type A (Marine) bond suitable for structural applications and exterior use. Phenol formaldehyde resins are dark red/brown in colour. Product details printed on the back of Ecoply sheets indicate the 'A Bond'.

Q: Does Ecoply emit formaldehyde?

A: Formaldehyde occurs naturally in the environment and is emitted by processes such as combustion, decay and naturally by all timber species. Ecoply and Shadowclad meets the lowest formaldehyde emission class (E_0 - less than 0.5 mg/litre). Actual formaldehyde emissions have been tested to be less than 0.3 mg/litre.

Q: How should Ecoply be installed to maximise its stiffness properties?

A: Structural plywood has greatest stiffness along the long grain of the sheet (i.e. along its length). Therefore, flooring/roofing should be laid across joists/rafters rather than parallel to them.

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7.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code (NZBC)
- CHH Woodproducts technical notes - downloadable from www.chhwoodproducts.co.nz/document-library
- NZS 3640:2003 "Chemical Preservation of Round and Sawn Timber"
- NZS 3602:2003 "Timber and Wood-based products for use in Buildings"
- NZS 3603:1993 "Timber Structures Standard"
- NZS 3604:2011 "Timber Framed Buildings"
- AS/NZS 1170:2011 "Structural design actions"
- AS/NZS 2269:2012 "Plywood Structural"
- AS/NZS 1604.3:2010 "Specification for Preservative Treatment, Part 3: Plywood"
- AS 1684:2010 "Residential Timber Framed Construction"
- US Product Standard PS1-95
- Acceptable Solution 'E2/AS1 – External Moisture'
- Acceptable Solution 'B2/AS1 – Durability'
- BRANZ Bulletin 345: Flat membrane roofs – design and installation
- BRANZ Bulletin 346: Flat membrane roofs – materials
- BRANZ Bulletin 289: Asphalt shingle roofing
- BRANZ Appraisals 307, 404, 411
- Shadowclad® Specification & Installation Guide for Cavity Construction
- Ecoply® Barrier Specification & Installation Guide
- Material Safety Data Sheets
  - MSDS Azole Treated Plywood, LVL & I-Joists
  - MSDS H3 CCA Treated Plywood & I-Joist
  - MSDS Untreated Plywood
- APA (www.buildabetterhome.org)
- EWPAA (www.ewp.asn.au)
- Product Technical Statement for Ecoply available online (www.chhwoodproducts.co.nz/product-technical-statements)
- EWPAA Technical Note - Plywood Roofing and Flooring: Installation and detail factors

Standards can be purchased online at www.standards.co.nz
Building Code Compliance Documents can be downloaded free of charge at www.dbh.govt.nz

8.0 LIMITATIONS

The information contained in this document is current as at September 2015 and is based on data available to CHH Woodproducts at the time of going to print.

All photographic images are intended to provide a general impression only and should not be relied upon as an accurate example of Ecoply products installed in accordance with this document or NZBC compliance documents.

This publication replaces all previous CHH Woodproducts design information and literature relating to Ecoply structural plywood products. CHH Woodproducts reserves the right to change the information contained in this document without prior notice.

It is your responsibility to ensure that you have the most up to date information available, including at the time of applying for a building consent. You can call toll free on 0800 326 759 or visit www.chhwoodproducts.co.nz to obtain current information.

CHH Woodproducts has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document. However, to the maximum extent permitted by law, CHH Woodproducts assumes no responsibility or liability for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

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September 2015

JAS-ANZ

PRODUCT CERTIFIED paa ENGINEERED WOOD

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NEW ZEALAND MANUFACTURED

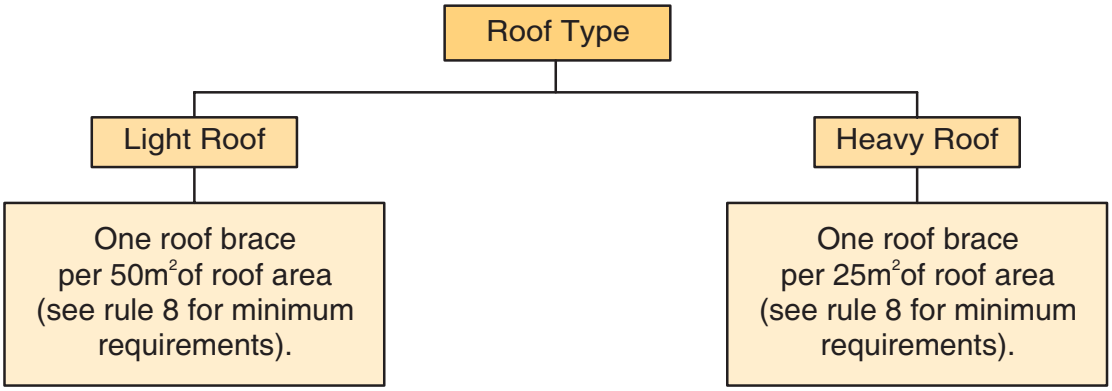
LUMBERLOK®

ROOF BRACING SPECIFICATION
AS PER NZS 3604:2011

★ Covers roof bracing requirements to resist horizontal loads as set out in NZS 3604:2011 Section 10.

★ A definitive guide to the description and installation of Roof Plane Braces and Roof Space Braces.

Roof Bracing Requirements



Roof Bracing - Rules & Definitions

1. The bracing described in this brochure covers both framed roofs and fully trussed roofs.
2. Roof planes less than 6m² (e.g. dormers & porches) do not require bracing.
3. Roof braces can consist of either i) Roof Plane Brace or ii) Roof Space Brace or combination of the two.
4. Roof braces are not required on roofs where sarking is installed as per NZS 3604:2011 Clause 10.4.4 or where a ceiling diaphragm is installed and is attached to the rafters.
5. Roof area is the actual plan area of the roof and includes overhangs.
6. A hip or valley rafter running continuously from ridge to top plate can be classed as one roof plane brace.
7. A pair of crossed LUMBERLOK Strip Brace (preferred for ease of installation) can be classed as one roof plane brace and shall be installed as detailed in this brochure.
8. There must be at least one roof plane brace in each roof plane. Each ridge line shall have a minimum of two roof braces.
9. Every design effort should be made to distribute the roof braces as evenly as possible over the entire roof area and run alternately in opposite directions.

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Roof Bracing Options

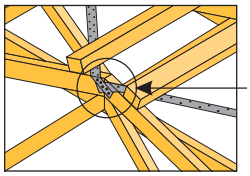
i) ROOF PLANE BRACE

Each roof plane brace can be:

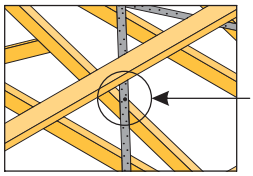
- A hip or valley rafter running continuously from ridge to the top plate in accordance with NZS 3604:2011 Clauses 10.2.1.3.2 or 10.2.1.3.3

OR

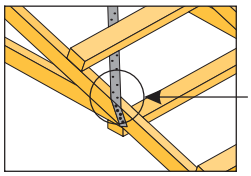
- A pair of tensioned and crossed LUMBERLOK Strip Brace running continuously from ridge to top plate installed as detailed below.



5 x 30mm x 3.15 dia. nails each end

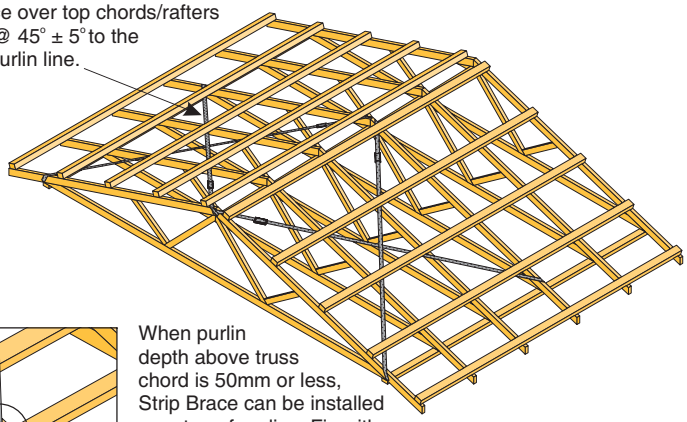


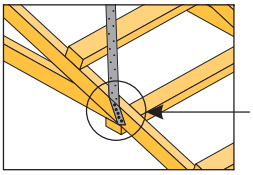
1 x 30mm x 3.15 dia. nail at crossing (after tensioning)



5 x 30mm x 3.15 dia. nails each end

A pair of tensioned and crossed LUMBERLOK Strip Brace over top chords/rafters installed @ 45° ± 5° to the rafter or purlin line.

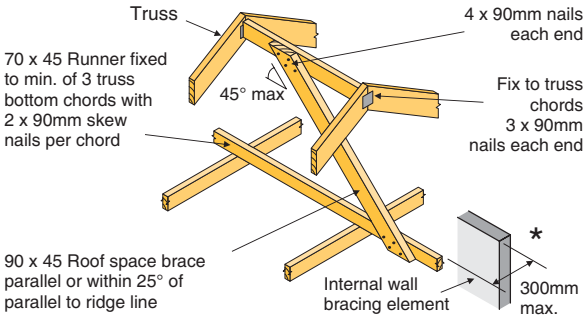




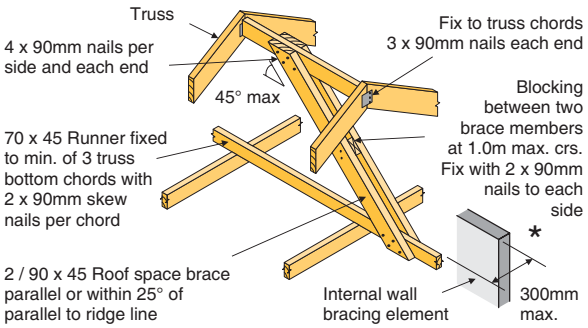
When purlin depth above truss chord is 50mm or less, Strip Brace can be installed over top of purlins. Fix with 1 x 30mm x 3.15 dia. nail at the purlin closest to the rafter/truss crossing.

ii) ROOF SPACE BRACE

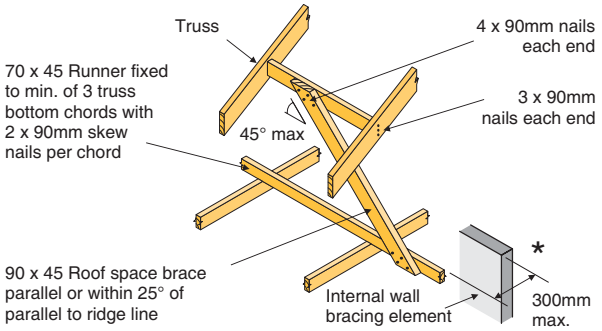
(A) Less than 2m long.



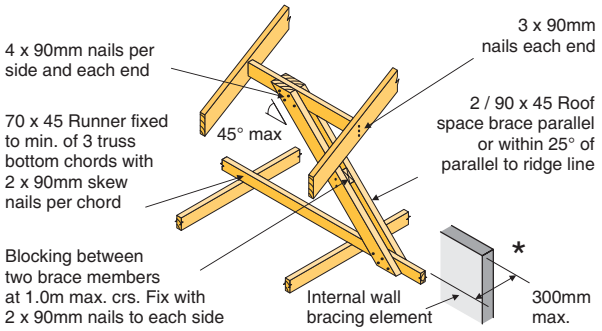
(B) More than 2m long (Max. 4.8m).



(C) Not directly under the ridge - less than 2m long.



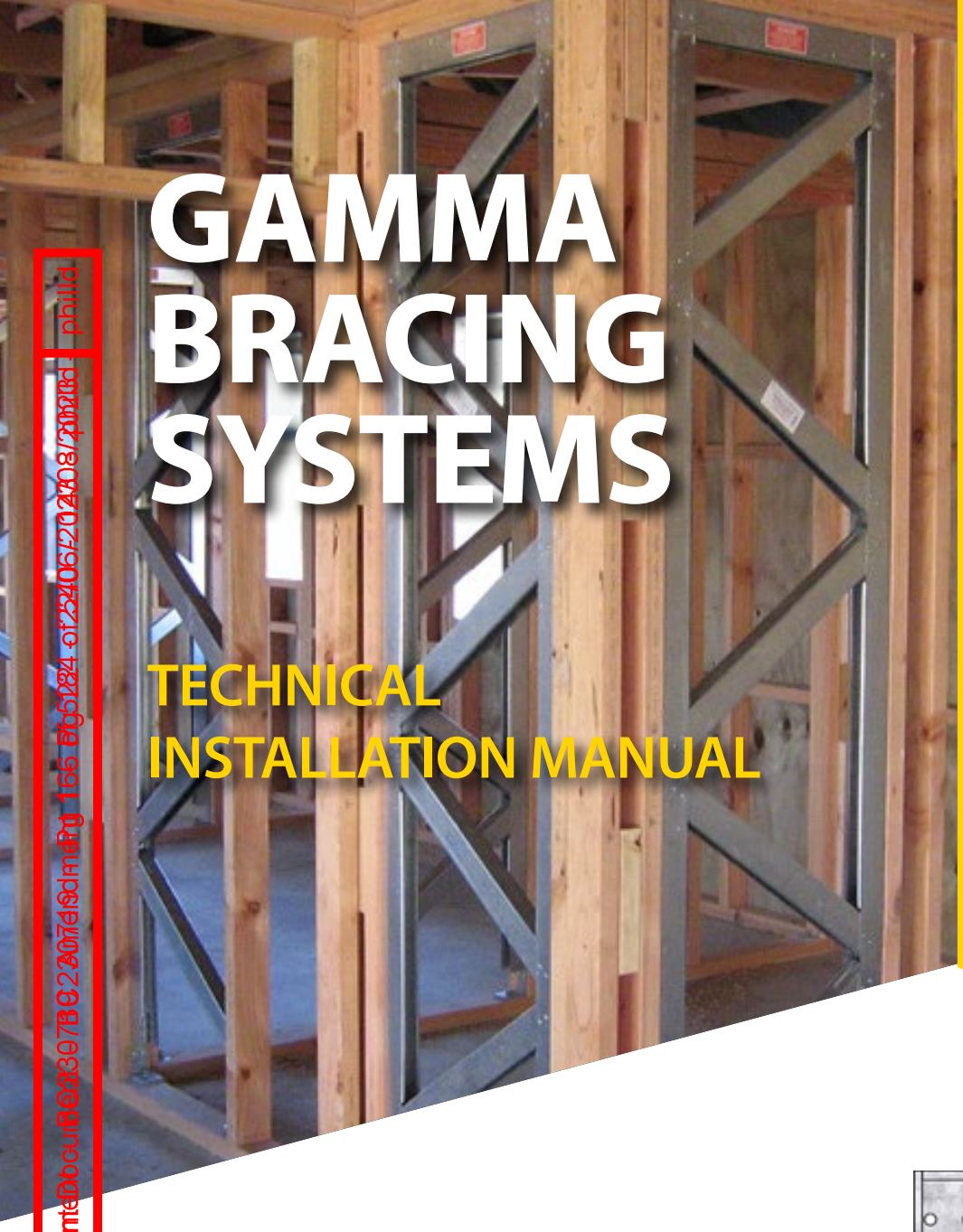
(D) Not directly under the ridge - more than 2m long.



* Not required when a ceiling diaphragm complying with Clause 13.5 of NZS 3604:2011 is used.

SDC - Approved Document B (Durability) 2nd edition, Amendment 1 (2024) - 1 May 2024 - Compliance Document for New Zealand Building Code Clauses B1 Structure, B2 Durability, E2 External Moisture, E3 Internal Moisture - Approved by the Chief Executive of the Ministry of Business, Innovation and Employment - phillid

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GAMMA BRACING SYSTEMS

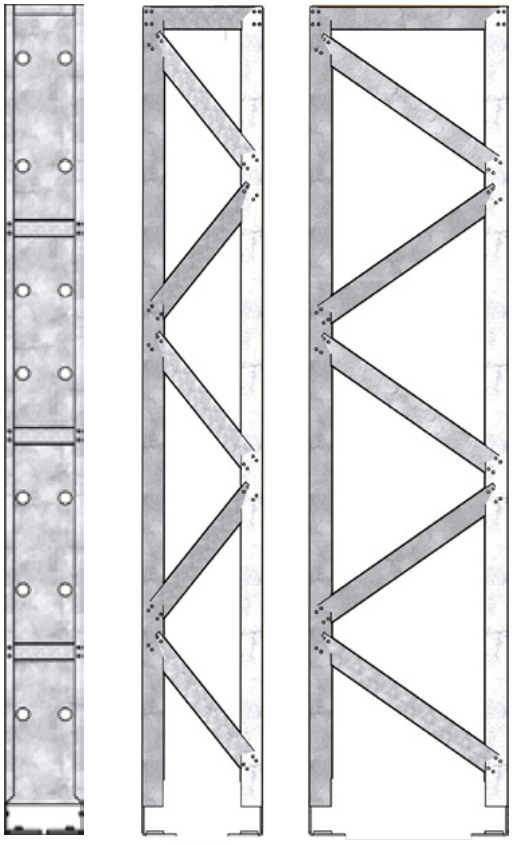
TECHNICAL INSTALLATION MANUAL

GAMMA™

BRANZ Appraised
Appraisal No.1079 [2020]

NEW ZEALAND'S MOST ADVANCED BRACING SYSTEM FOR TIMBER FRAME CONSTRUCTION

ISSUE JANUARY 2020



GBF220 GBF400 GBF600

DESIGNED BY GAMMA BRACING TECHNOLOGIES LTD
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SDC - Approved Document B2/AS1 Dated 7 July 2014 Amendment 1 Page 167 of 225 Dated 26/06/2024 20/08/2024 20/08/2024 phillid

1.0 General Information

1. Gamma Bracing Frames (GBFs) withstands multiple wind and/or earthquake traumas and maintains its structural integrity.
2. GBF has a high "Ductility" so it can flex without failure.
3. GBFs are best installed early in the construction to immediately provide bracing performance.
4. GBFs eliminate the majority of temporary bracing.
5. It's fast and easy to install either onsite or in a frame & truss plant.
6. GBF comes with pre-punched fixing & service holes.
7. GBFs are lightweight and of a robust construction (12.5kg).
8. GBFs are suitable for remedial work for buildings affected by leaky building syndrome.
9. GBFs can be installed in wet areas and areas where no linings are installed.
10. GBFs provide up to 150 BUs per metre (1 kN = 20 BUs).
11. GBFs have a conditional 50 year B2 durability.
12. GBFs are cost competitive within the total construction costs.
13. GBFs are suitable for standard timber framing, either 600, or 400/450 or 220mm stud spacing.
14. Effective on both Concrete and Timber bases.
15. Designed and manufactured for New Zealand environments.
16. 100% Recyclable so very small environmental footprint.
17. Will provide structural bracing for the lifetime of the building.
18. It is fully compliant with New Zealand Building Code.
19. GBFs may be used in combination with other bracing systems, eg. plasterboard and plywood.

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1.0 General Information

1.1. Introduction

Gamma Bracing System technology has been specifically designed and rigorously tested in New Zealand to provide structural bracing for both residential and light commercial buildings within the scope and limitations of NZS3604:2011.

The Gamma Bracing System has been tested in accordance with the P21 {2010} racking test limited states design; cited in NZS3604 Timber Framed Buildings to determine wind and earthquake ratings of bracing elements. This aligns with the loadings standard AS/NZS 1170.

1.2. Warranty

The Gamma Bracing System carries the following warranty. This warranty is given by Gamma Bracing Technology Ltd ("The Manufacturer")

The manufacturer warrants that the products produced by the manufacturer shall be free of defects in materials and manufacture. If the products produced by the manufacturer do not meet the manufacturers standards, they will replace with the equivalent product. The manufacturer advises that only products, components and systems recommended by Gamma Bracing Technologies Ltd be used. At all times these must be used in accordance with the relevant product manufacturers usage recommendations.

If this is not done, the manufacturer will need to be satisfied that any defect in it's product is attributable to the failure of the manufactured product to meet the manufacturers standard (and not another clause) before this warranty applies. This warranty excludes all other warranties and liability for damage or loss in connection with the defects in the manufacturers product other than those imposed by legislation.

1.3. Benefits of using Gamma Bracing System

The design of the Gamma Bracing System allows for easy installation for both new and existing buildings. No additional, specialty bracing linings are required other than to provide standard interior finishings.

Once the Gamma Bracing System has been installed, the bracing requirements of the building are completed and therefore the need for temporary timber bracing is significantly reduced; saving time and cost as well as providing a safer working environment.

Inspection by the Building Consent Authority of the bracing system can be done early in the construction programme. No further inspections of bracing elements are required, thus another saving of time and money.

Using the Gamma Bracing System removes the need for other types of bracing such as galvanised straps, which connect the stud with the bottom plate. By removing the need for these straps a flatter surface is provided for the installation of the interior lining.

Provided the timber frame moisture levels, as detailed in NZS3604:2011 and NZS3602; are followed and the Gamma Bracing System is used in a closed environment, the Gamma Bracing frames once installed do not require maintenance. Provided the requirements of NZ Steel's Galvsteel® (Axxis 550) Durability Statement are met, the Gamma Bracing frames are unaffected by weather conditions.

Gamma Bracing frames are provided with a warning label advising that the structural integrity of the building must be maintained at all times. This is to prevent the possible removal or modification of the Gamma Bracing System during renovation work.

Each Gamma Bracing frame provides significant bracing values for both wind and earthquake demand. Total bracing integrity can be achieved wherever Gamma Bracing frames are positioned throughout the buildings structure.

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2.1. The New Zealand Building Code (NZBC)

The Gamma Bracing System when installed in accordance with the installation details will comply with the New Zealand Building Code requirements as detailed in this document.

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4 Gamma Wall Bracing Systems meet the requirements for loads arising from earthquake and wind [ie. B1.3.3 (f), and (h)].

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. Gamma Wall Bracing Systems meet this requirement.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1 Gamma Wall Bracing Systems meet this requirement and will not present a health hazard to people.

The bracing demand calculation and bracing distribution rules contained in the Gamma Wall Bracing Systems 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.

Bracing Resistance is provided by bracing element ratings determined in accordance with NZS3604, Paragraph 8.3.1.2.

2.2. Purpose of product

To provide a durable, reliable and cost effective building element for the structural and bracing performance levels as specified within this manual.

2.3 Scope of acceptable use

Acceptable use as structural bracing systems for both residential and light commercial buildings and within the scope and limitations of NZS3604:2011.

If the Gamma Bracing System is to be considered for installation other than in accordance with the manual, specific engineering will be required.

The Gamma Bracing frame is located within the cavity of the wall and is not to be exposed to external weather conditions. The frame is manufactured from materials that have protective coatings to resist corrosion during the construction period.

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2.4. Limitations of use

For use:

- In the interior cavity of internal and external walls in accordance the manufacturers installation instructions.
- To be used within the scope and limitations of NZS3604:2011

2.5. Who may install the Gamma Bracing System

Installation of the Gamma Bracing System must be undertaken or the installation be installed by a Licensed Building Practitioner with the appropriate license category where the building work has been identified as Restricted Building Work.

2.6. Health & Safety

It is important to follow good site practice at all times and to ensure appropriate safety precautions are taken when installing the Gamma Bracing System and all supporting components.

2.7. Compatibility with associated products

The Gamma Bracing System and its components are compatible with most associated building products, however it is recommended that the installer refers to NZS3604:2011 Section 4 Durability to ensure compatibility with other materials.

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The performance and construction of the Gamma Bracing Systems is detailed in Table 1. The values for wind and earthquake bracing ratings are obtained from testing and evaluation that has been carried out in accordance with NZS3604:2011 and P21[2010] and evaluation procedures.

GBF 220 S

- GBF — Gamma Bracing Frame
- 220 — Gamma Frame/Wall Length
- S — Short (Wall Height)
- P - Portal

3.1 SYSTEM SUMMARY TABLE

TABLE 1	Performance Bracing Units (BUs)		Performance & Construction						
			Stud Qty & Configuration (Min Stud Size 90 x 45mm)			System Size Including Framing			
Gamma System Reference	Wind	Earth	Stud Centres (mm)	Left Side	Right Side	Wall Length (m)	Minimum Wall Height (m)	Maximum Wall Height (m)	Page #
GBF220S/2.1	37	44	310	2	2	0.4	2.1	2.4	14
GBF220/2.4	37	44		2	2		2.4	2.7	16
GBF400S/2.1	45	55	400	1	1	0.445	2.1	2.4	18
GBF400/2.4	45	55		1	1		2.4	2.7	20
GBF400/2.7	40	47		1	1		2.7	3.0	21
GBF400/3.0	35	44		1	1		3.0	3.3	22
GBF535S/2.1	69	75	400	2	2	0.535	2.1	2.4	23
GBF535/2.4	69	75		2	2		2.4	2.7	24
GBF535/2.7	61	67		2	2		2.7	3.0	25
GBF535/3.0	55	60		2	2		3.0	3.3	26
GBF600S/2.1	84	90	600	1	1	0.6	2.1	2.4	28
GBF600/2.4	84	90		1	1		2.4	2.7	30
GBF600/2.7	70	70		1	1		2.7	3.0	31
GBF600/3.0	55	60		1	1		3.0	3.6	32

Portal System Reference	Performance Bracing Units (BUs)					
	Wind	Earth	Maximum Wall Height (mm)	Maximum Opening (mm)	Maximum Portal Length (mm)	Page #
GBFP/2.4	124	137	2400	5200	6000	33
GBFP/2.7	110	122	2700			34

COMBINATIONS OF GBF TYPES - TYPICAL SYSTEMS

	Wind	Earth				Wind	Earth
GBF220/2.4 + GBF600/2.4	(37 + 84)	(44 + 90)	2	220mm + 645mm	2400mm	121 BUs	134 BUs
GBF400/2.4 + GBF600/2.4	(45 + 84)	(55 + 90)	1	220mm + 645mm	2400mm	129 BUs	145 BUs
GBF220/2.4 + GBF535/2.4	(37 + 69)	(44 + 75)	2	45mm + 535mm	2400mm	106 BUs	129 BUs

OR ANY OTHER COMBINATION TO MEET DESIRED DESIGN AND BRACING REQUIRED.

4.0 Gamma Bracing Software & Design Procedure

The Gamma Bracing System provides bracing performance to resist and achieve Wind and Earthquake demands. To calculate both the Wind and Earthquake demands Gamma Bracing Technologies Ltd has developed a spread sheet calculator that is in accordance with the requirements of the NZS3604:2011 Standard. This section details the method of calculating both the demand and achieved requirements using the Gamma spread sheet calculator. The Gamma Bracing Technologies Ltd spread sheet calculator can be easily downloaded from the Gamma web site **www.gammabracing.co.nz**.

4.1 Gamma Bracing Software - Demand

The Gamma Bracing Calculator Software has been designed to work in conjunction with NZS3604:2011.

The Demand and Achieved sheets within the Gamma Bracing Calculator software allow for a fast and simple way to calculate the structural bracing requirements of a timber framed structure.

The Gamma Bracing Software is preloaded with Gamma Bracing Systems values. The software allows the user to use other bracing systems. (Other bracing system values will require loading into the designated calculation sheets by the user – refer to terms and conditions).

It is acceptable to use a combination of different bracing systems along the same bracing line. However it is not permitted to place more than one bracing element in the same position.

Designing the structural aspects of a building require a good knowledge and understanding of the principles of building timber framed structures.

Instructions

Project Details

Type in the name of the owner and the property address details including the Lot number and the DP number. Details for the Architect, Designer and Engineer can also be added should they be required.

Calculating the Demand

Input the information of the building into the required cells. Cells with drop down lists provide options to choose from – choosing the "specify" option allows for a custom option or value to be loaded.

Building dimensions, roof and wall cladding weights need to be inputted to enable a bracing demand to be calculated. Incorrect information or information not inputted will not provide a result and a warning notification will be indicated.

Wind demand requirements can be further refined by choosing from the drop down lists in the Yellow panel.

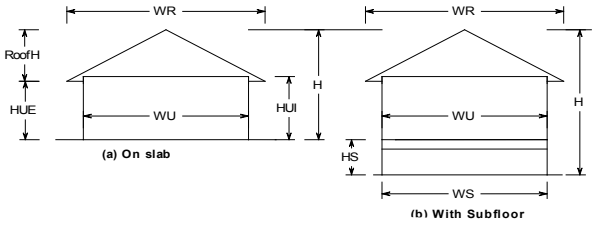
Gamma Bracing solution V1

Job Description - what is typed here will be reproduced on print sheet.

Warning. This spreadsheet calculates the bracing rating for the building defined. It does not check that the building defined complies NZS 3604 scope.

Building and roof description

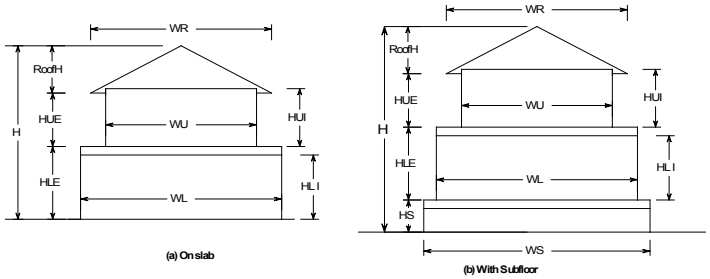
How many storeys above slab or subfloor?	Two storey
Foundation type	Subfloor
RoofH = Roof height above eaves (m)	0.00
LR = Maximum roof length (m)	0.00
WR = Maximum roof width (m)	0.00
Roof pitch (degrees)	0 to 25 degrees
Specified maximum pitch (degrees) option	0.00
Room in roof space?	No
Roof cladding weight	Light
Specified roof cladding weight option (kg/m^2)	0.00
Floor live load	2 kPa
Specified floor loading option (kPa)	2.20



Upper or single storey details

Average exterior wall cladding weight	Light
Specified wall cladding weight option (kg/m^2)	0.00
LU = Building length (m)	0.00
WU = Building width (m)	0.00
Gross building plan area (m^2)	0.00
HUI = Interior wall height (m)	0.00
HUE = Exterior wall height (m)	0.00

Single storey building definitions



Lower storey details

Average exterior wall cladding weight	Medium
Specified wall cladding weight option (kg/m2)	0.00
LL = Building length (m)	0.00
WL = Building width (m)	0.00
Gross building plan area (m2)	0.00
HLI = Interior wall height	0.00
HLE = Exterior wall height	0.00

Subfloor details

Average exterior wall cladding weight	Light
Specified wall cladding weight option (kg/m2)	0.00
LS = Building length (m)	0.00
WS = Building width (m)	0.00
Gross building plan area (m2)	0.00
HS = Subfloor height	0.00

Two storey building definitions

Wind speed

Choose which option you wish to use to specify wind speed. (a) Specify the wind zone such as from Table 5.4 of NZS 3604.

(a) Specify the wind zone such as from Table 5.4 of NZS 3604. High

(b) Specify the wind speed in m/sec directly in the adjacent blue cell. Wind speed = 50.0 m/sec

(c) Get the wind speed calculated in the yellow zone below as per Table 5.1 of NZS3604.

Wind Zone

Wind Region from Figure 5.1 of NZS 3604	A
Roughness from Section 5.2.3 of NZS 3604	Open / Sheltered
Exposure from Section 5.2.4 of NZS 3604	Yes a Lee Zone
Is it a Lee Zone - see Figure 5.1 of NZS 3604?	T1
Topography from Section 5.2.5 of NZS 3604	

Wind zone determined = Very High

Earthquake Zone from Figure 5.4 of NZS 3604	1
Subsoil classification from Section 5.3.3 of NZS 3604	D

Summary of bracing demand and resistance:

	Upper storey		Lower storey		Subfloor	
Total Wind Demand/Provided in BU's	Demand	Provided	Demand	Provided	Demand	Provided
Wall along direction	0	0	4	0	4	0
Wall across direction	0	0	0	0	0	0
Total EQ Demand/Provided in BU's	Demand	Provided	Demand	Provided	Demand	Provided
Wall along direction	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0
Wall across direction	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0
Check of bracing capacity						
Wall along direction	OK		Inadequate		Inadequate	
Wall across direction	OK		OK		OK	

4.2 Gamma Bracing Software - Achieved

CALCULATING THE ACHIEVED

The bracing calculation sheets listed below are available within the Gamma Bracing software to calculate the bracing achieved requirements for house types that are accordance with the NZS3604:2011 standard. Depending on the type of house refer to Table 2 when choosing the achieved sheets

Subfloor Along Sheet
Subfloor Across Sheet
Lower Along Sheet
Lower Across Sheet
Upper Along Sheet
Upper Across Sheet

Each achieved sheet allows the option to choose from the preferred Gamma Bracing Systems individual bracing elements as well as the bracing systems listed below. These systems will require the correct references and values to be inputted prior to being used in each of the achieved sheets.

Strictly follow the manufacturer's instructions and ensure the correct Wind and Earthquake values are used. When panel or sheet bracing systems are used the wall length will be required to calculate the bracing values of each bracing element.

Foundations
Plywood
Plasterboard
User Defined (Customer bracing systems)

The wind and earthquake demand values from the demand sheet are displayed cells at the top of the achieved sheet. Calculate the bracing achieved until the demand value is achieved or exceeded.

For exterior wall bracing lines load in the exterior wall length in meters and ensure the demand value detailed for that bracing line is achieved.

A warning note will be visible if the demand is not achieved.

PRINT SHEET

The Print Sheet automatically stores data from the Main Menu and each of the Along and Across sheets to provide a print version of the bracing calculations. Once the calculations have been completed go to the Print Sheet to print off the information.

TABLE 2 House Type	Achieved Sheets to use
Single level on concrete	Upper along/across
Two levels on concrete	Lower along/across & Upper along/across
Single level on timber floor	Subfloor along/across & Upper along/across
Two levels on timber floor	Subfloor along/across, Lower along/across & Upper along/across

Achieved Sheet

Gamma bracing solution V1

Upper or single storey bracing walls
This sheet defines bracing walls in the along direction

	Wind BU's	EQ BU's
Total bracing achieved	0	0
Total bracing required	0	0
	OK	OK

							Values achieved			Check minimum bracing rating in Section 5.4.7 of NZS 3604				
Line name	Bracing element label	Source of published bracing rating	Bracing wall type	1 or wall length in metres	Wall Height (metres)	Wall angle in degrees	Wind BU's	EQ BU's	Is bracing element length specified less than minimum?	Bracing line bracing capacity BU's	If external wall give length (m)	Requirement for internal walls	Requirement for external walls	
A	A1	None	None	1	2.4	0	0	0	OK	0	0			
	A2	None	None	1	2.4	0	0	0	OK					
	A3	None	None	1	2.4	0	0	0	OK					
	A4	None	None	1	2.4	0	0	0	OK					
	A5	None	None	1	2.4	0	0	0	OK					
	A6	None	None	1	2.4	0	0	0	OK					
B	B1	None	None	1	2.4	0	0	0	OK	0	0			
	B2	None	None	1	2.4	0	0	0	OK					
	B3	None	None	1	2.4	0	0	0	OK					
	B4	None	None	1	2.4	0	0	0	OK					
	B5	None	None	1	2.4	0	0	0	OK					
	B6	None	None	1	2.4	0	0	0	OK					
C	C1	None	None	1	2.4	0	0	0	OK	0	0			
	C2	None	None	1	2.4	0	0	0	OK					
	C3	None	None	1	2.4	0	0	0	OK					
	C4	None	None	1	2.4	0	0	0	OK					
	C5	None	None	1	2.4	0	0	0	OK					
	C6	None	None	1	2.4	0	0	0	OK					
D	D1	None	None	1	2.4	0	0	0	OK	0	0			
	D2	None	None	1	2.4	0	0	0	OK					
	D3	None	None	1	2.4	0	0	0	OK					
	D4	None	None	1	2.4	0	0	0	OK					
	D5	None	None	1	2.4	0	0	0	OK					
	D6	None	None	1	2.4	0	0	0	OK					
E	E1	None	None	1	2.4	0	0	0	OK	0	0			
	E2	None	None	1	2.4	0	0	0	OK					
	E3	None	None	1	2.4	0	0	0	OK					
	E4	None	None	1	2.4	0	0	0	OK					
	E5	None	None	1	2.4	0	0	0	OK					
	E6	None	None	1	2.4	0	0	0	OK					
F	F1	None	None	1	2.4	0	0	0	OK	0	0			
	F2	None	None	1	2.4	0	0	0	OK					
	F3	None	None	1	2.4	0	0	0	OK					
	F4	None	None	1	2.4	0	0	0	OK					
	F5	None	None	1	2.4	0	0	0	OK					
	F6	None	None	1	2.4	0	0	0	OK					
G	G1	None	None	1	2.4	0	0	0	OK	0	0			
	G2	None	None	2.5	2.4	0	0	0	OK					
	G3	None	None	1	2.4	0	0	0	OK					
	G4	None	None	1	2.4	0	0	0	OK					
	G5	None	None	1	2.4	0	0	0	OK					
	G6	None	None	1	2.4	0	0	0	OK					

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5.0 Installation Procedure

Detailed within Table 3 is the procedure for installing the Gamma Bracing Frames (GBFs). The installation procedure is designed for onsite installations however the GBFs can also be installed at the pre nail framing stage of the construction. Should the GBFs be installed at the prenail-stage the GBFs will have temporary fasteners installed to hold them in place for the purpose of transportation to the job site. Completion of the installation of the GBFs must be carried out once the pre nail framing has been erected using the same procedures as detailed within Table 3.

TABLE 3

GAMMA INSTALLATION PROCEDURE

1	Once the positions of the Gamma Bracing Frames (GBFs) have been determined from the bracing design remove any cross noggins/dwangs where the GBFs are to be installed. Ensure the inside dimension of the framing provides a suitable fit for the GBFs. A tolerance of +2.0mm and – 0.0mm between the GBF and the timber framing is acceptable. The GBFs need to fit snuggly into the framing.
2	For wall heights of 2.7m and 3.0m install the required timber framing members above as detailed.
3	**Concrete Floors – External & Internal Walls** Where GBFs are located in external walls position the GBFs flush with the inside face of the timber framing to ensure the hold down fastener is away from the edge of the concrete slab (minimum edge distance = 60mm). For internal walls the GBFs can be positioned centrally within the framing. **Timber Floors – External & Internal Walls** Where GBFs are located in external walls and/or internal walls the GBFs can be positioned anywhere within the framing ensuring the position of the hold down bolt is secured in to solid timber framing. Once the GBFs are positioned mark the positions for the hold down fasteners through the slot in the hold down bracket on to the bottom plate. Remove the GBF or where possible swing the GBF to one side to allow access for drilling the holes for the hold down fasteners. To swing the GBF to one side it is useful to install a single Tek screw fastener into each stud (do not fully tighten these until the GBF is fully installed). Drill the holes for the hold down fasteners.
4	**Concrete Floors – Hold Down Anchors** Use M12 x 150mm masonry fasteners or M10 x 140mm Masonry Screw in Anchors (Refer Section 15.2 for recommended types of anchor). **Timber Floors – Hold Down Anchors** Use M12 x 200mm galvanized coach screw to be fastened into solid timber framing (Refer Section 15.2 for recommended types of anchor).
5	Reposition the GBF in between the studs ensuring that the slotted holes in the brackets are aligned with holes in the bottom plate.
6	Install the slotted washer provided and install the hold down anchor and tighten.
7	Each of the hold-down brackets are secured to the GBF framing with a temporary rivet to allow for shipping and have been pre drilled with 8 holes. Using the 12g x 40mm Tek screws fasten each bracket to the timber framing (8 screws per bracket). It is permitted to adjust the brackets up to no greater than 50mm and down by no greater than 39mm to allow for any small deviation in wall framing height. (Refer section 15.8 for further details on height adjustment). Rivet to be removed to enable adjusting.
8	Using 12g x 40mm Tek screws provided fix through the pre punched holes located in the GBFs and into the timber framing.
9	If insulation is to be installed then cut the thermal insulation to fit within the timber framing and Gamma framing members and ensure that insulation protrudes from both sides of the Gamma Bracing Frame (Refer Section 15.3).
10	If interior sheet linings are to be installed, fix as per the manufacturers instructions or as per AS/NZS 2589:2017. Minimum drywall fixing centres to be no greater than 300mm.

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5.0 Installation Procedure

GAMMA

1 If receiving the framing from the Pre nail manufacture with the Gamma Bracing Frames pre-installed there will be 4, 12g x 40mm Tek screws securing the Gamma Bracing Frame within the timber framing. 2 screws positioned at the upper part of the Gamma Bracing Frame and 1 screw in each of the brackets. Mark the position of the hold down bolt hole on to the timber base plate for each bracket.

When installing Gamma Bracing Frame directly on site position the Gamma Bracing Frame within the timber framing and mark the timber base plate as previously described.

Please note: Observe edge distance requirements for external walls on concrete floors.



2 Remove the 2 screws from the brackets only to allow the Gamma Bracing Frame to be swung to one side to allow access for drilling the holes for the hold down bolts.

Drill holes for the hold down bolts for each bracket. Ensure correct size drill bit is used and the correct depth of the hole is achieved.

The temporary rivet can be removed at this point to allow for any minor adjustment of the GBF hold down bracket. Refer Section 14.8 for details on height adjustment.



3 Reposition the Gamma Bracing Frame within the framing.

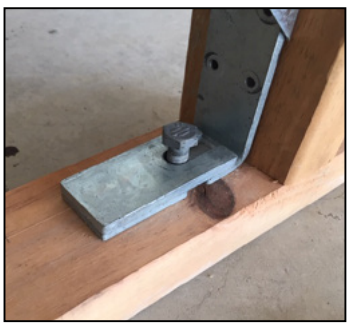


4 Install the 2 washers provided, 1 for each bracket.



5 Position the hold down bolts in each bracket, 2 per Gamma Bracing Frame (not provided).

Refer to Section 15.2, Table 4 to when choosing the correct hold down bolt.



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5.0 Installation Procedure

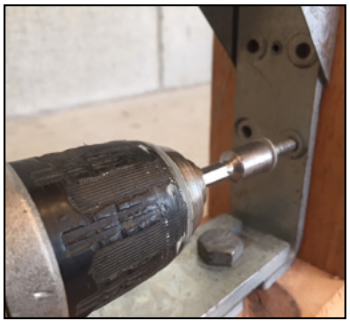
6 Install the hold down bolts to secure Gamma Bracing Frame to the substrate.



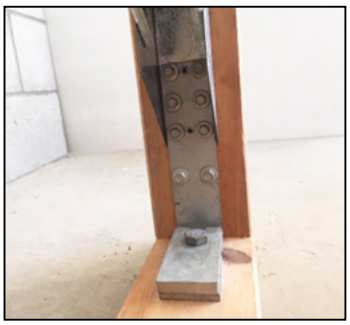
7 Fully tighten the hold down bolts



8 Install eight 12g x 40mm Tek screws in each Bracket. (Provided)



9 Quantity of 8 screws per bracket. (Provided)



10 Install the 12g x 40mm Tek screws to the Gamma Bracing Frame. Pre punched holes are positioned in the up-right sections and the top end cap of the Gamma Bracing Frame.

The Gamma Bracing Frame is now fully installed and providing its structural performance.

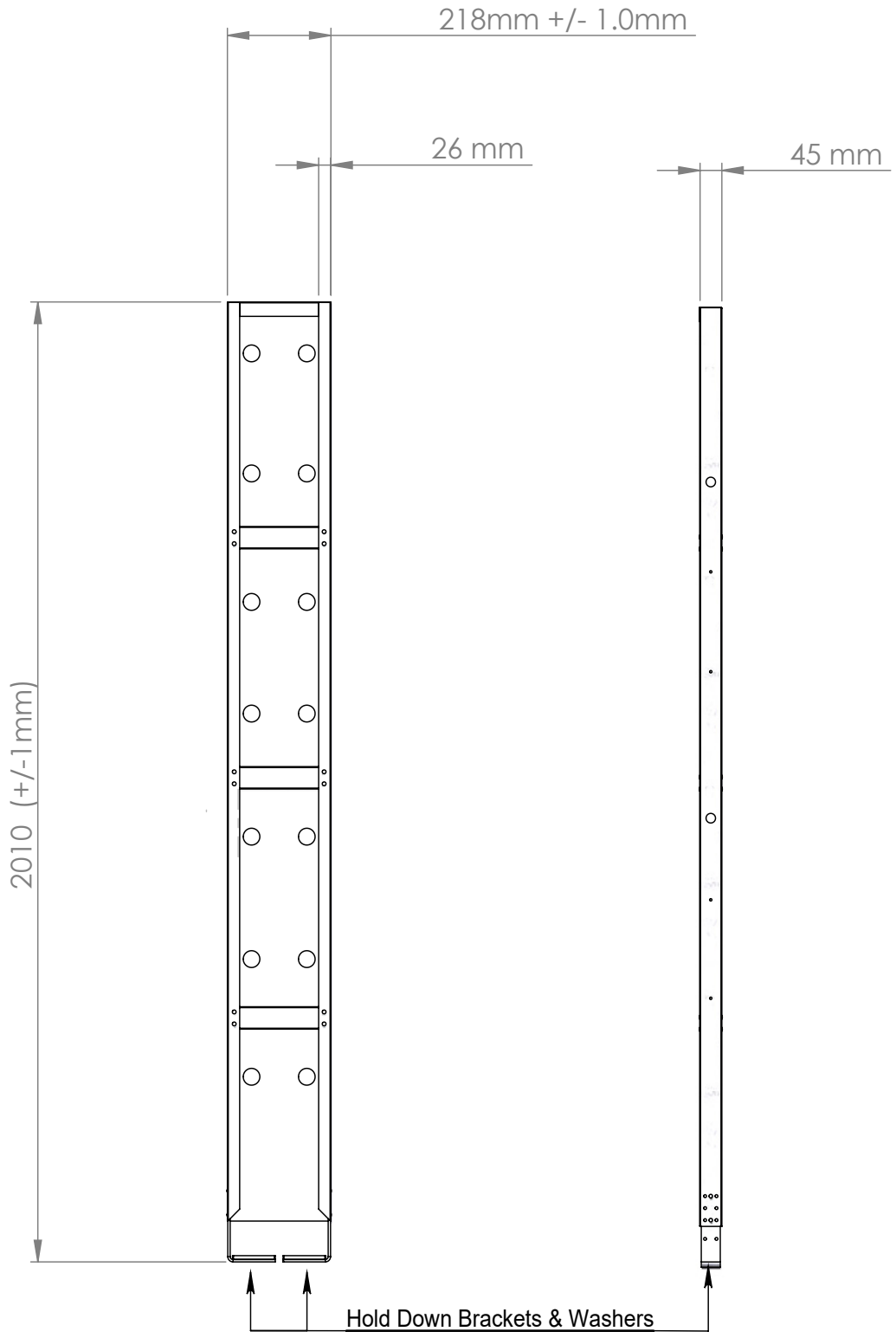
The quantities of Tek Screws vary for each system. Refer to the components list for Tek Screw quantities on each system page.



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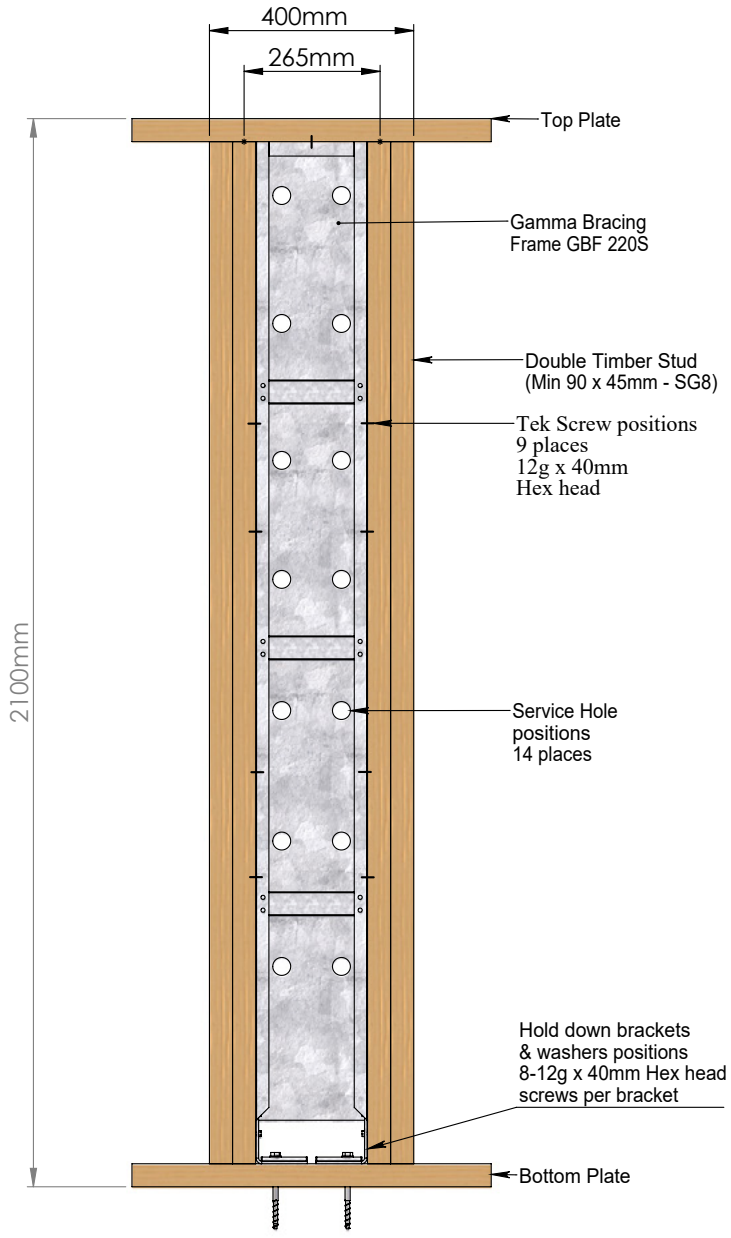
6.0 Gamma Bracing Frame GBF220S

Detailed in the drawing below is the Gamma Bracing Frame GBF220S as it is supplied, along with the GBF hold-down brackets, GBF washers, and Tek Screws. Timber framing and hold-down bolts are not supplied.



Detailed in the drawing below is the GBF220S as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 37BU - Earthquake 44BU

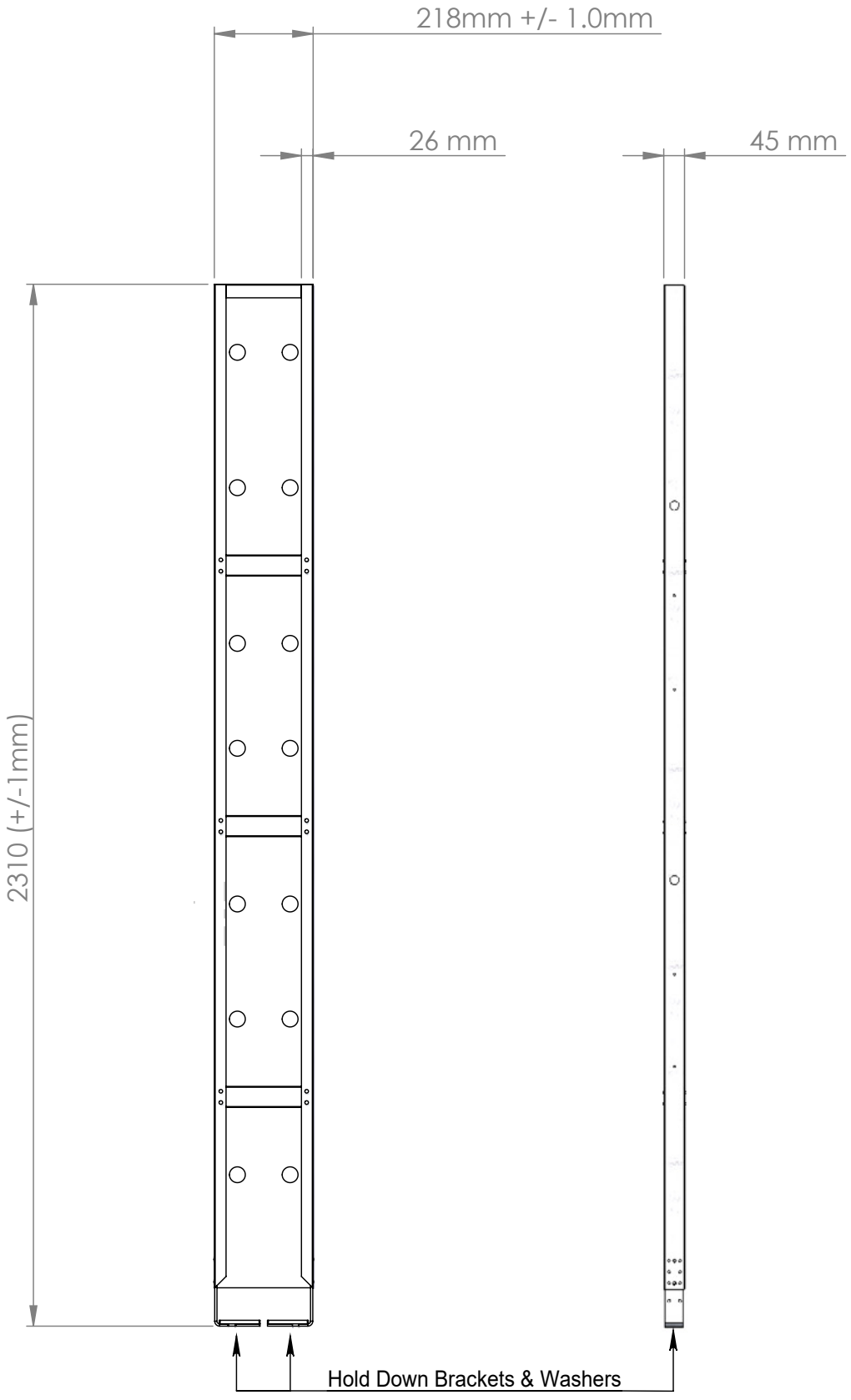


SPECIFICATIONS	
SYSTEM REF	GBF220S
WIND BUs	37
EARTHQUAKE BUs	44
WALL HEIGHT (m)	2.1
WALL LENGTH (m)	0.4

GBF 220S COMPONENTS LIST	
QTY	COMPONENT
1	GBF 220S FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

7.0 Gamma Bracing Frame GBF220

Detailed in the drawing below is the GBF220 as it is supplied, along with the GBF hold-down brackets, GBF washers, and Tek Screws. Timber framing and hold-down bolts are not supplied.

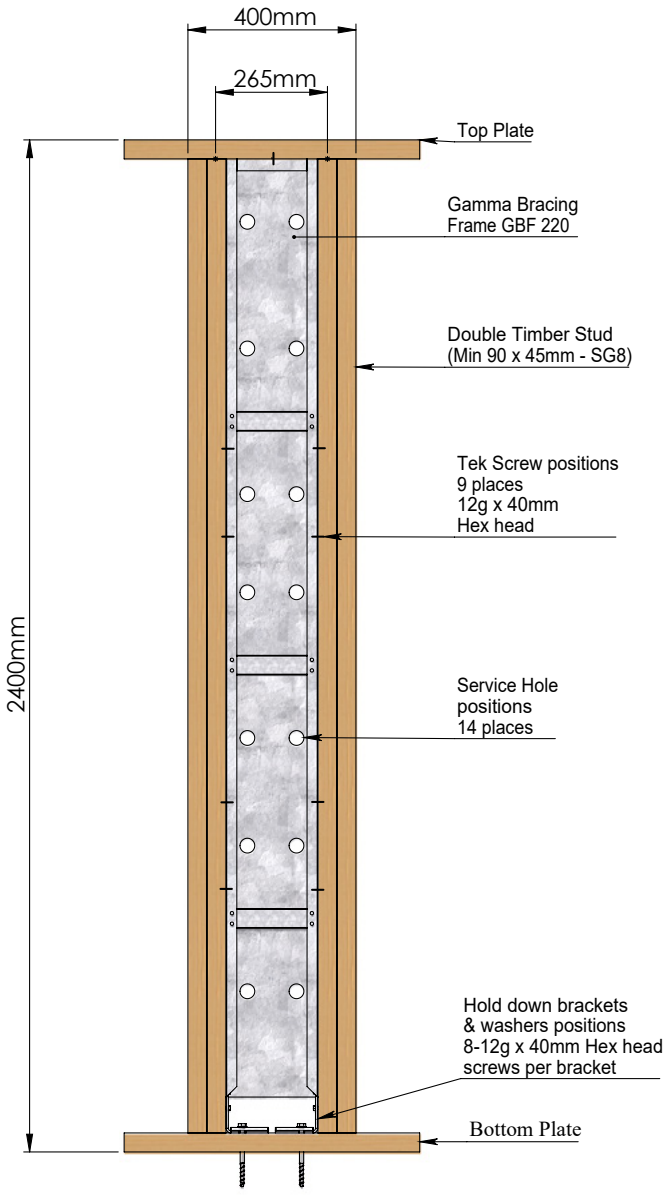


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7.1 Gamma Bracing System Construction GBF220/2.4

Detailed in the drawing below is the GBF220 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 37BU - Earthquake 44BU

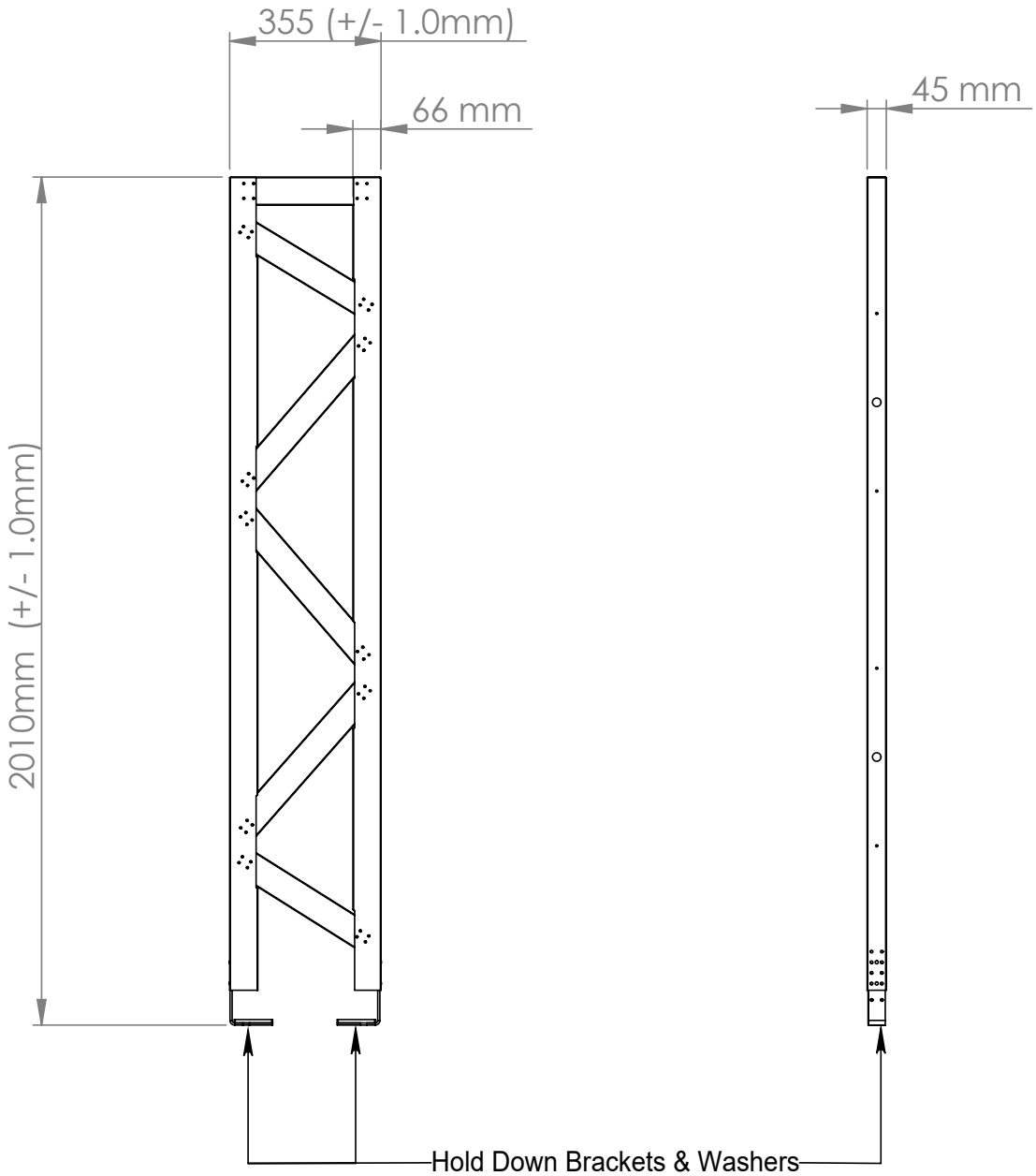


SPECIFICATIONS	
SYSTEM REF	GBF220
WIND BUs	37
EARTHQUAKE BUs	44
WALL HEIGHT (m)	2.4
WALL LENGTH (m)	0.4

GBF 220 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 220 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

8.0 Gamma Bracing Frame GBF400S

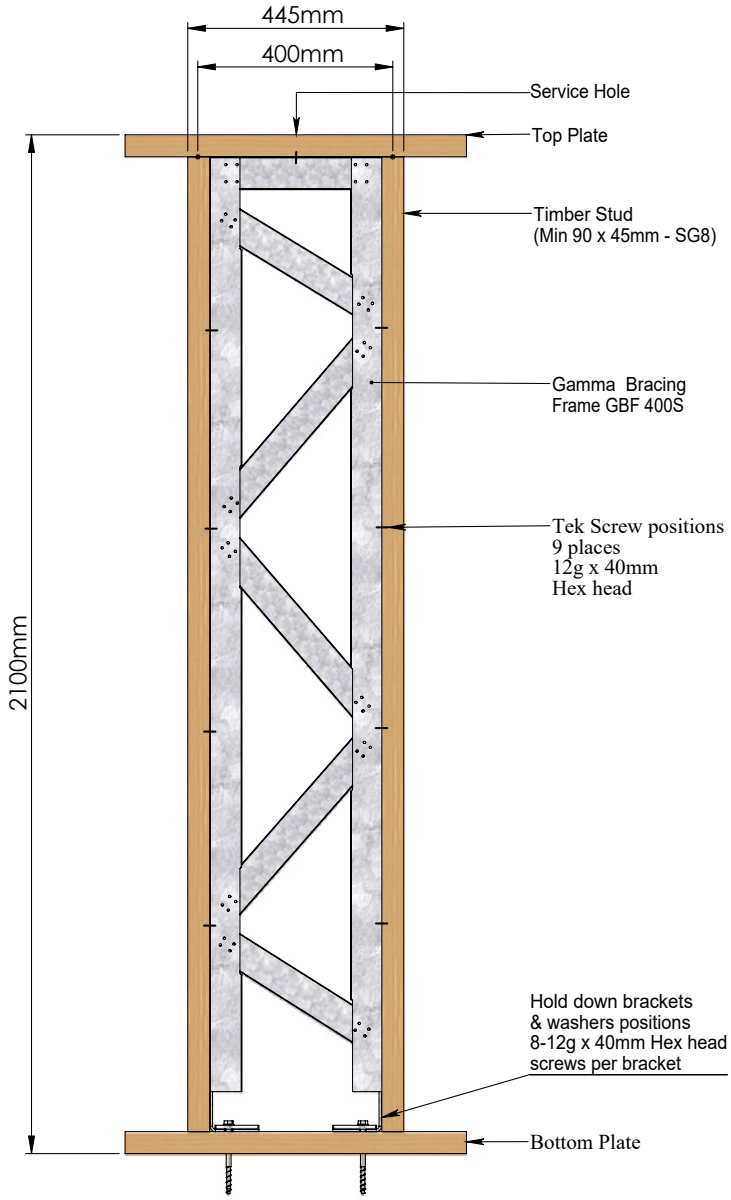
Detailed in the drawing below is the GBF400S as it is supplied, along with the GBF hold-down brackets, GBF washers, and Tek Screws. Timber framing and hold-down bolts are not supplied.



8.1 Gamma Bracing System Construction GBF400S/2.1

Detailed in the drawing below is the GBF400S as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 45BU - Earthquake 55BU

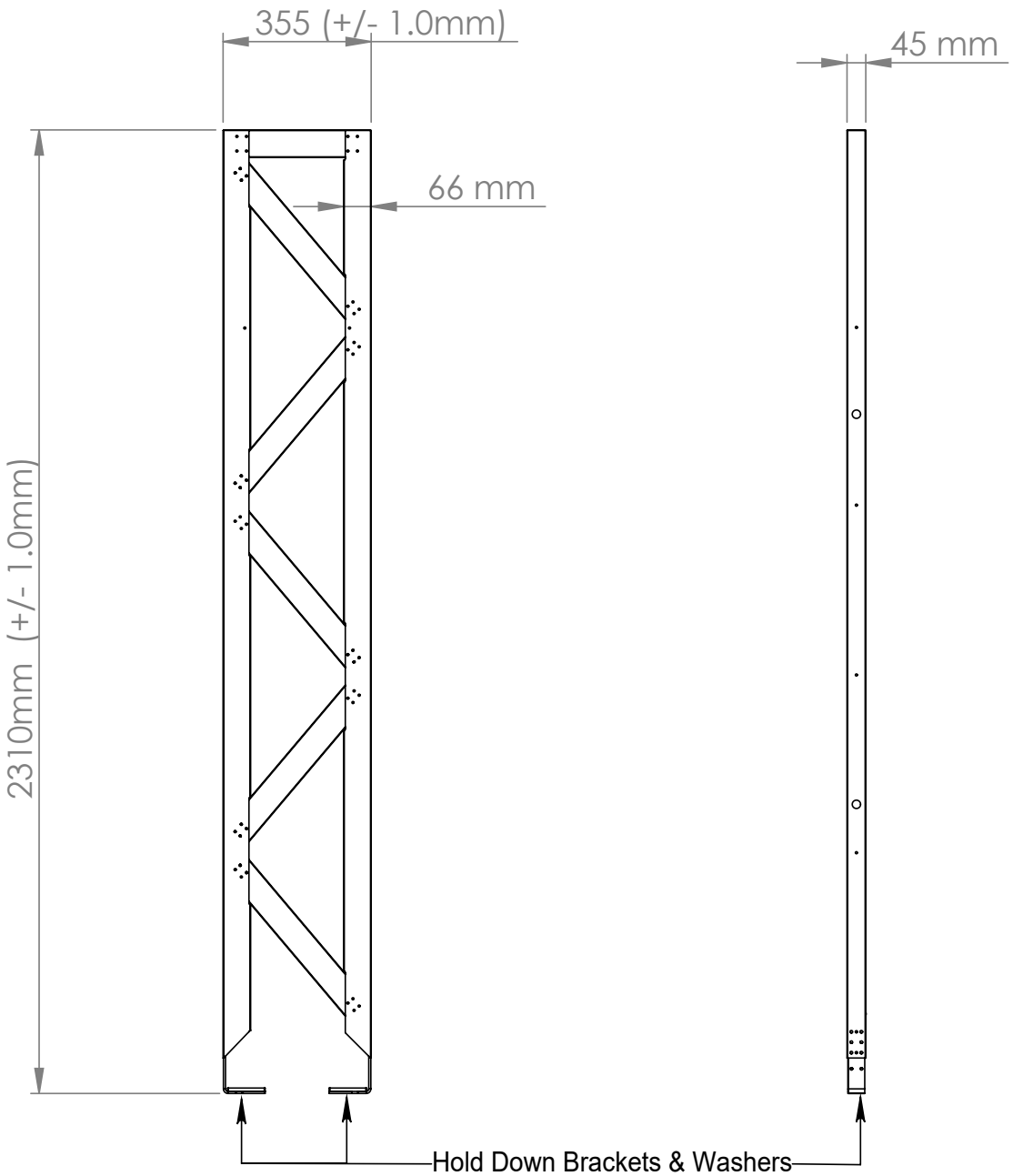


SPECIFICATIONS	
SYSTEM REF	GBF400S
WIND BUs	45
EARTHQUAKE BUs	55
WALL HEIGHT (m)	2.1
WALL LENGTH (m)	0.445

GBF 400S COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400S FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

9.0 Gamma Bracing Frame GBF400

Detailed in the drawing below is the GBF400 as it is supplied, along with the GBF hold-down brackets, GBF washers, and Tek Screws. Timber framing and hold-down bolts are not supplied.

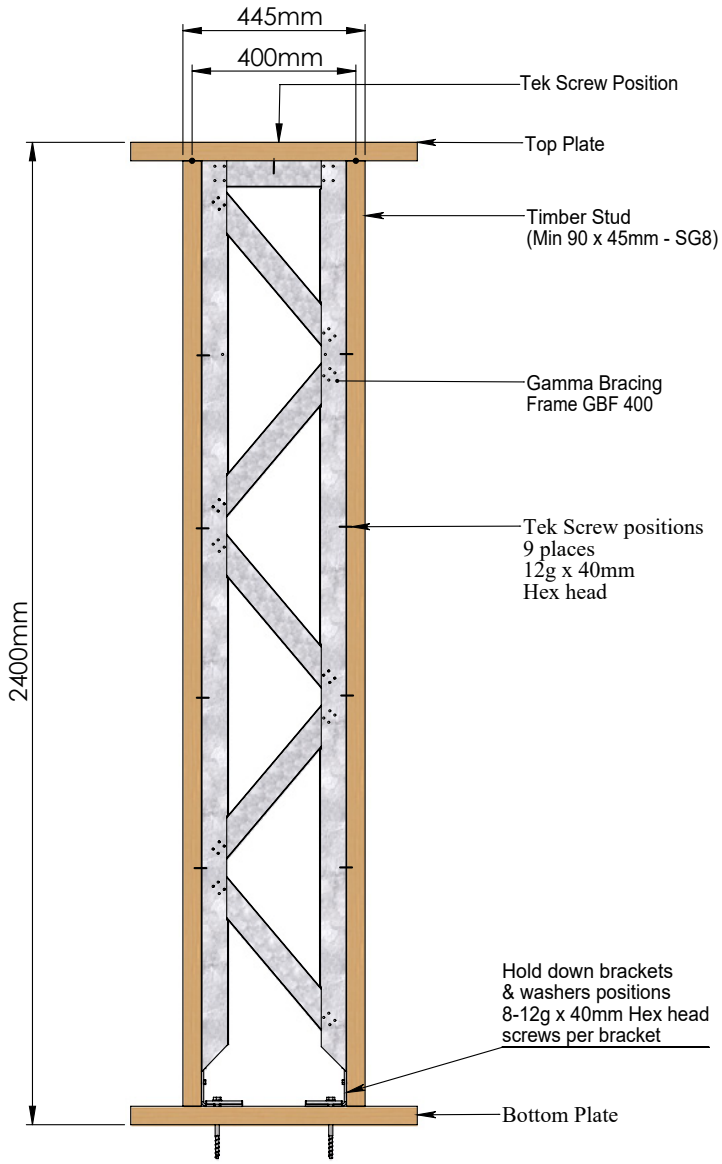


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9.1 Gamma Bracing System Construction GBF400/2.4

Detailed in the drawing below is the GBF400 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 45BU - Earthquake 55BU

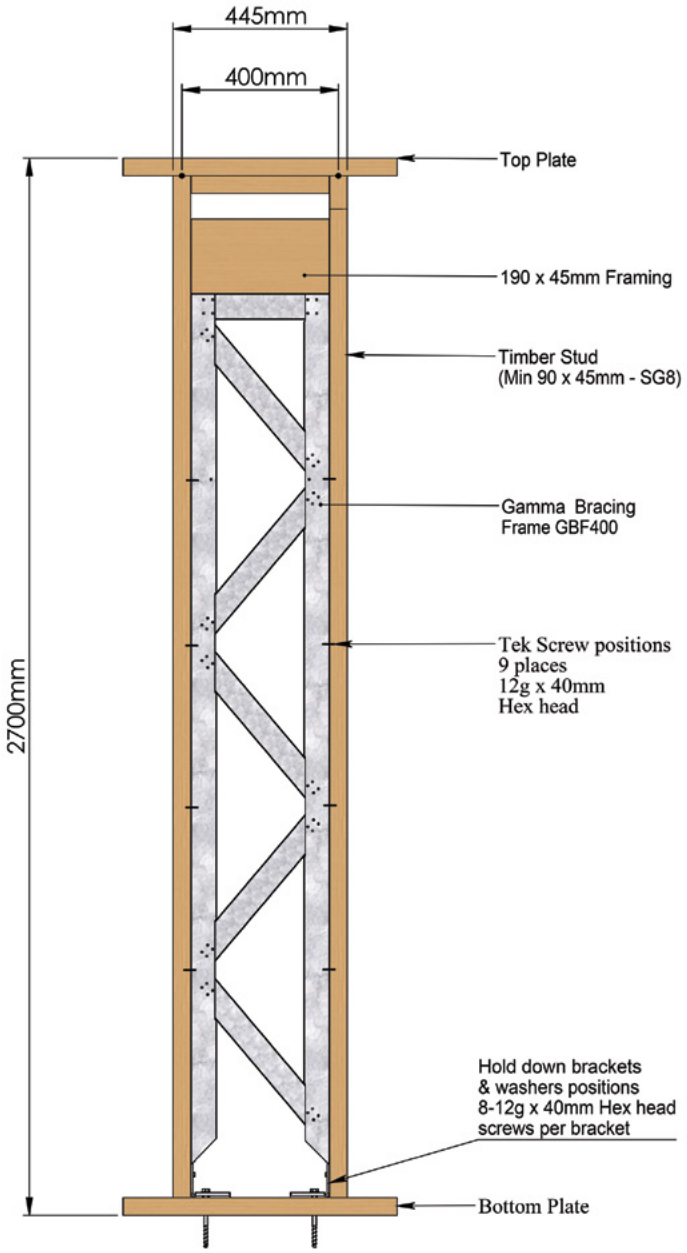


SPECIFICATIONS	
SYSTEM REF	GBF400/2.4
WIND BUs	45
EARTHQUAKE BUs	55
WALL HEIGHT (m)	2.4
WALL LENGTH (m)	0.445

GBF 400/2.4 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

Detailed in the drawing below is the GBF400 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 40BU - Earthquake 47BU



GBF 400/2.7

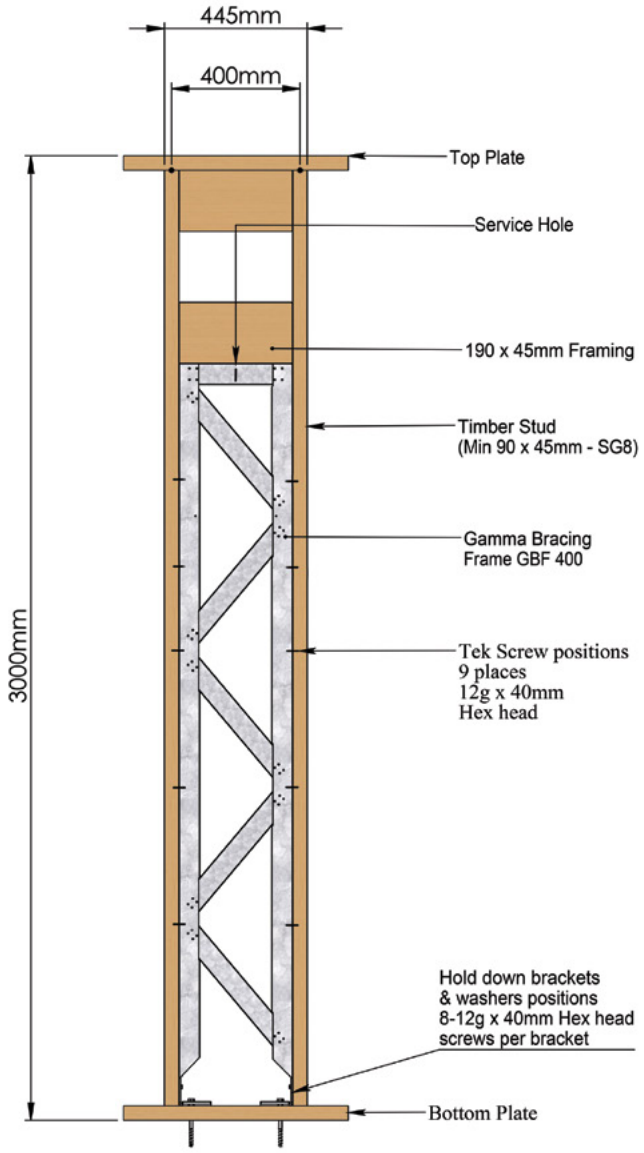
SPECIFICATIONS	
SYSTEM REF	GBF400/2.7
WIND BUs	40
EARTHQUAKE BUs	47
WALL HEIGHT (m)	2.7
WALL LENGTH (m)	0.4

GBF 400/2.7 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

9.3 Gamma Bracing System Construction GBF400/3.0

Detailed in the drawing below is the GBF400 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 35BU - Earthquake 44BU

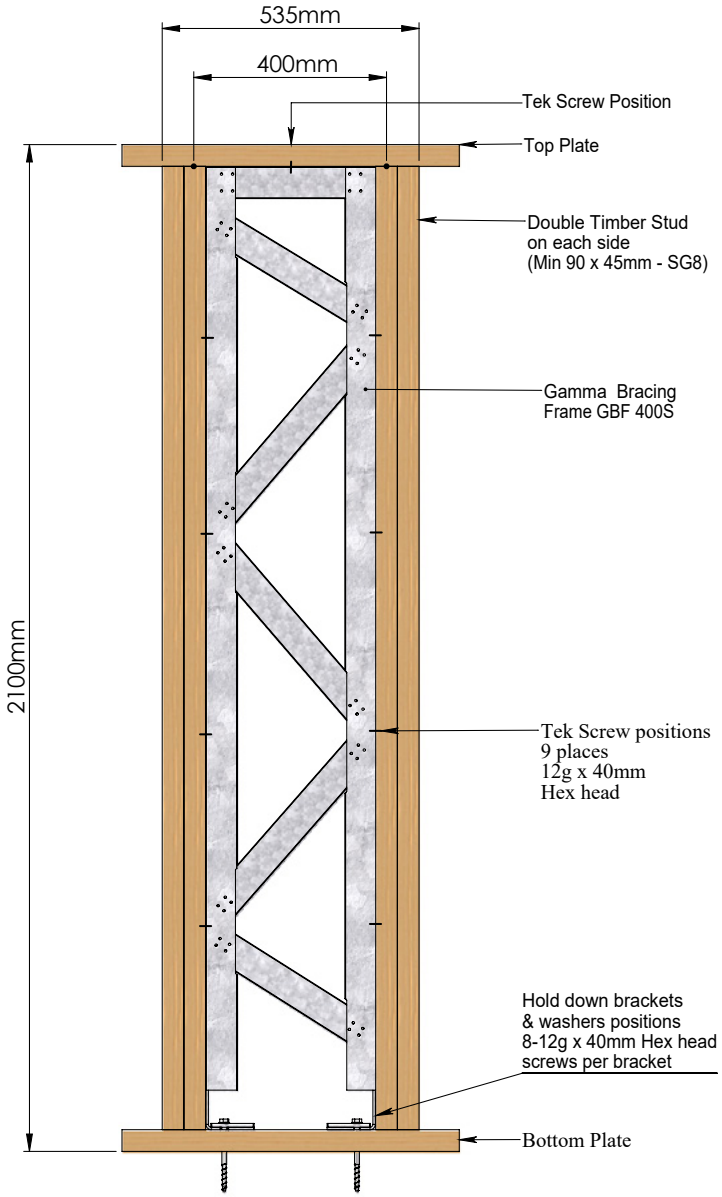


SPECIFICATIONS	
SYSTEM REF	GBF400/3.0
WIND BUs	35
EARTHQUAKE BUs	44
WALL HEIGHT (m)	3.0
WALL LENGTH (m)	0.445

GBF 400/3.0 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

Detailed in the drawing below is the GBF535S as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 69BU - Earthquake 75BU



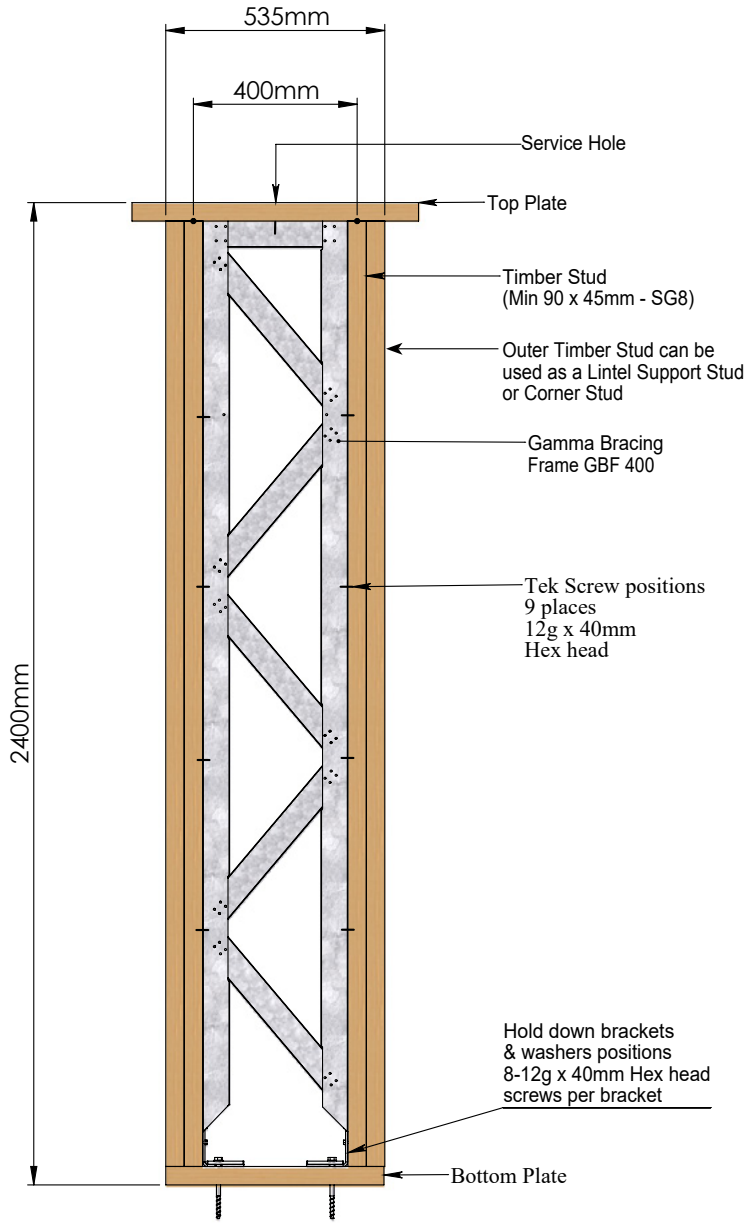
SPECIFICATIONS	
SYSTEM REF	GBF535S
WIND BUs	69
EARTHQUAKE BUs	75
WALL HEIGHT (m)	2.1
WALL LENGTH (m)	0.535

GBF 535S COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400S FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

10.1 Gamma Bracing System Construction GBF535/2.4

Detailed in the drawing below is the GBF535 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 69BU - Earthquake 75BU

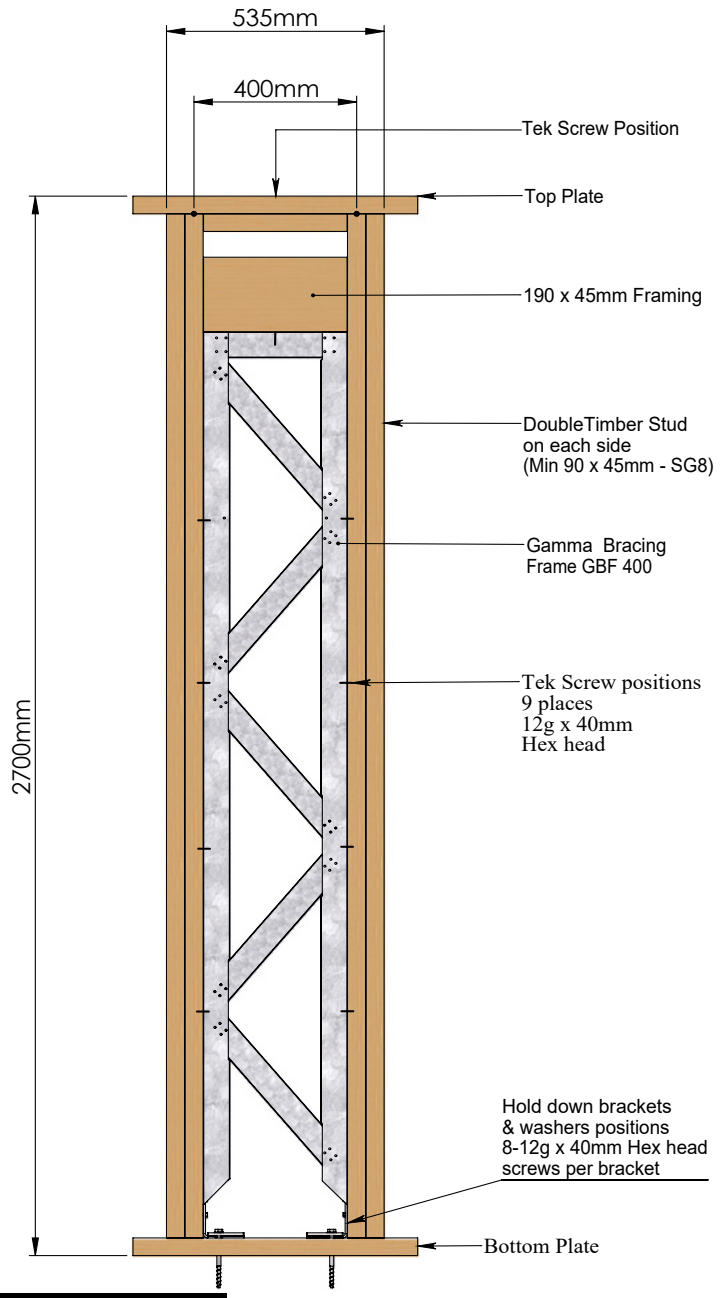


SPECIFICATIONS	
SYSTEM REF	GBF535/2.4
WIND BUs	69
EARTHQUAKE BUs	75
WALL HEIGHT (m)	2.4
WALL LENGTH (m)	0.535

GBF 535/2.4 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

Detailed in the drawing below is the GBF535 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 61BU - Earthquake 67BU

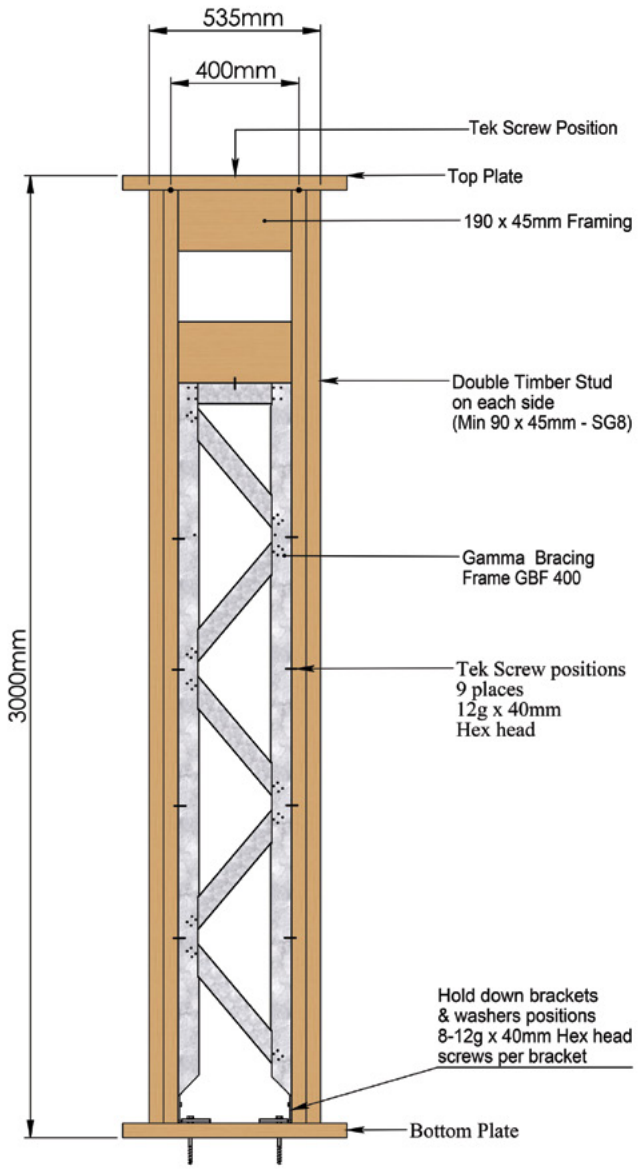


SPECIFICATIONS	
SYSTEM REF	GBF535/2.7
WIND BUs	61
EARTHQUAKE BUs	67
WALL HEIGHT (m)	2.7
WALL LENGTH (m)	0.4

GBF 535/2.7 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

Detailed in the drawing below is the GBF535 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 55BU - Earthquake 60BU

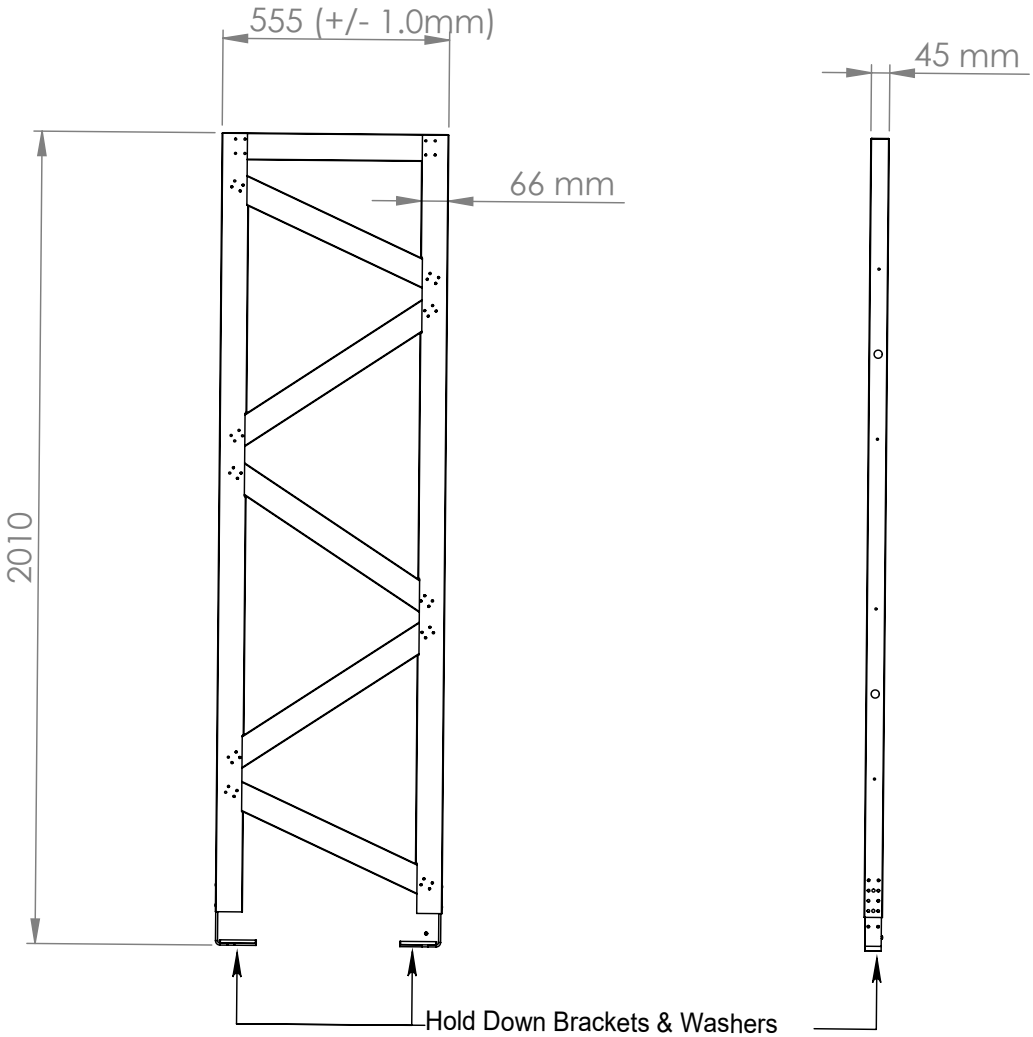


SPECIFICATIONS	
SYSTEM REF	GBF535/3.0
WIND BUs	55
EARTHQUAKE BUs	60
WALL HEIGHT (m)	3.0
WALL LENGTH (m)	0.535

GBF 535/3.0 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 400 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

11.0 Gamma Bracing Frame GBF600S

Detailed in the drawing below is the GBF600S as it is supplied, along with the GBF hold-down brackets, GBF Washers and TEK Screws. Timber framing and hold-down bolts are not supplied.

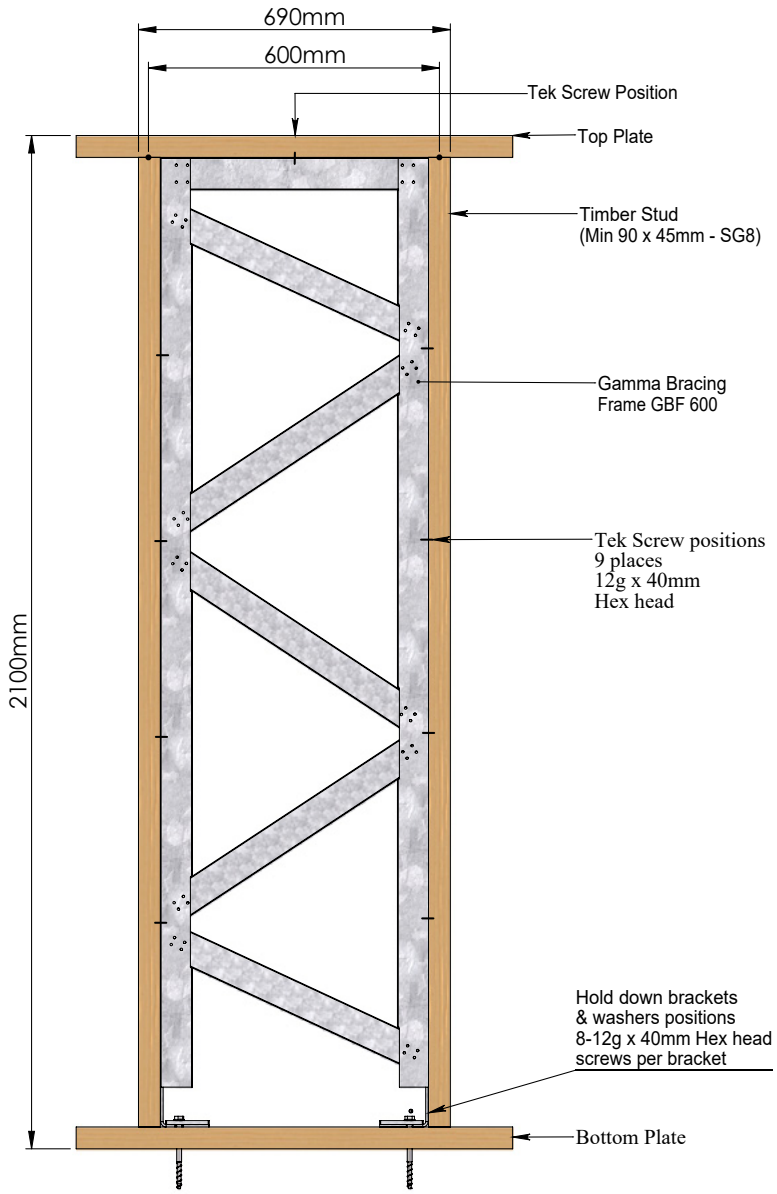


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11.1 Gamma Bracing System Construction GBF600S/2.1

Detailed in the drawing below is the GBF600S as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 84BU - Earthquake 90BU

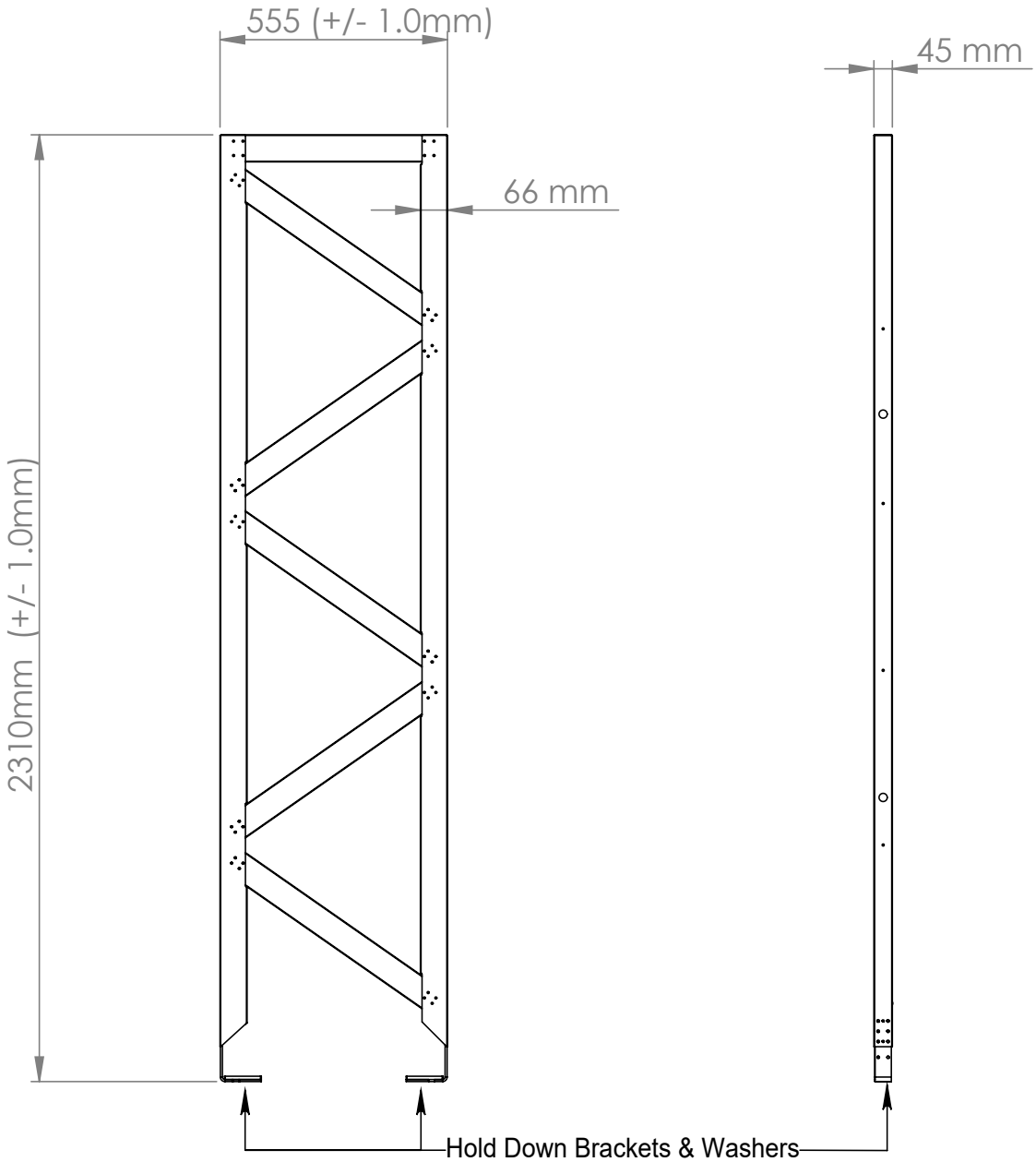


SPECIFICATIONS	
SYSTEM REF	GBF600S
WIND BUs	84
EARTHQUAKE BUs	90
WALL HEIGHT (m)	2.1
WALL LENGTH (m)	0.690

GBF 600S COMPONENTS LIST	
QTY	COMPONENT
1	GBF 600S FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

12.0 Gamma Bracing Frame GBF600/2.4

Detailed in the drawing below is the GBF600 as it is supplied, along with the GBF hold-down brackets, GBF Washers and TEK Screws. Timber framing and hold-down bolts are not supplied.

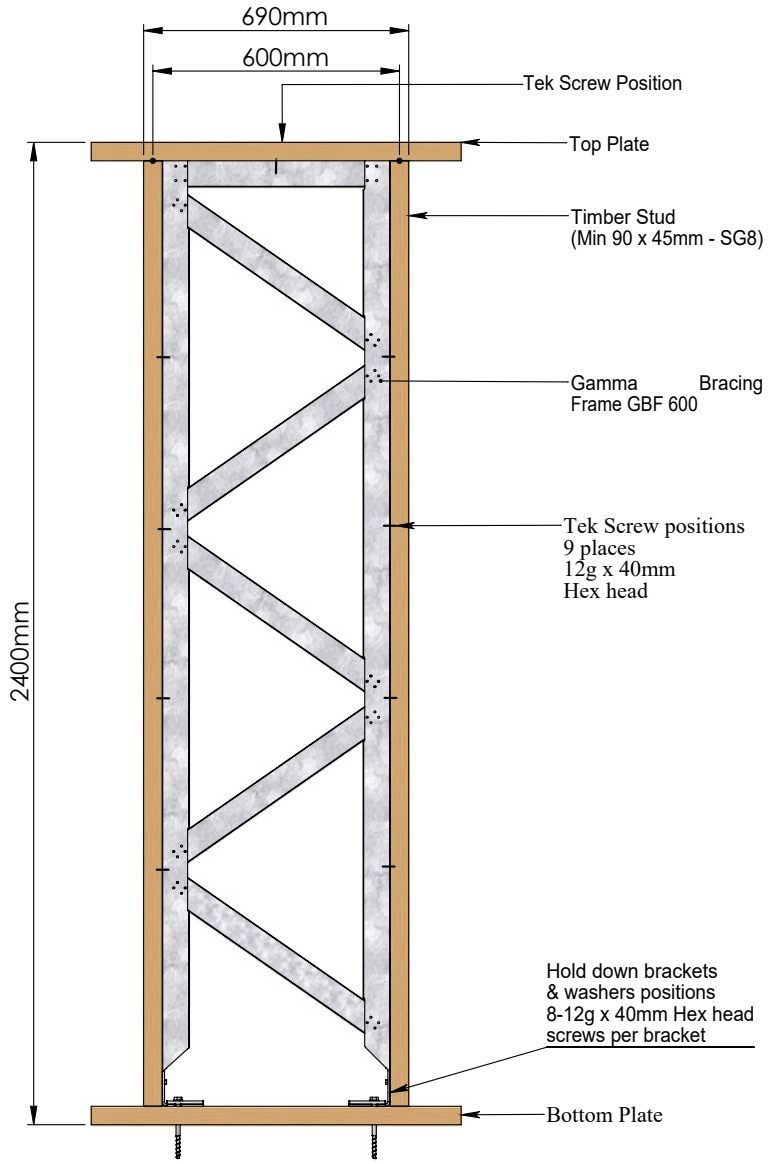


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12.1 Gamma Bracing System Construction GBF600/2.4

Detailed in the drawing below is the GBF600 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 84BU - Earthquake 90BU

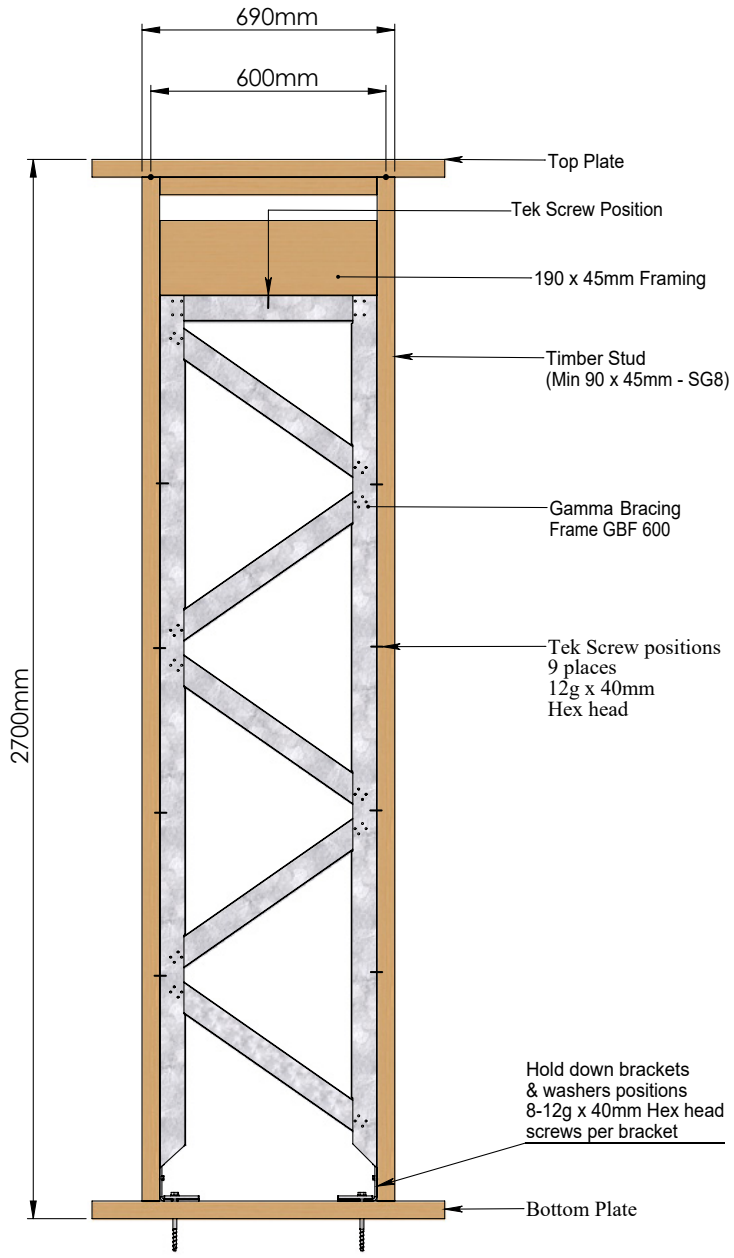


SPECIFICATIONS	
SYSTEM REF	GBF600/2.4
WIND BUs	84
EARTHQUAKE BUs	90
WALL HEIGHT (m)	2.4
WALL LENGTH (m)	0.690

GBF 600/2.4 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 600 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

Detailed in the drawing below is the GBF600 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

Performance - Wind 70BU - Earthquake 70BU

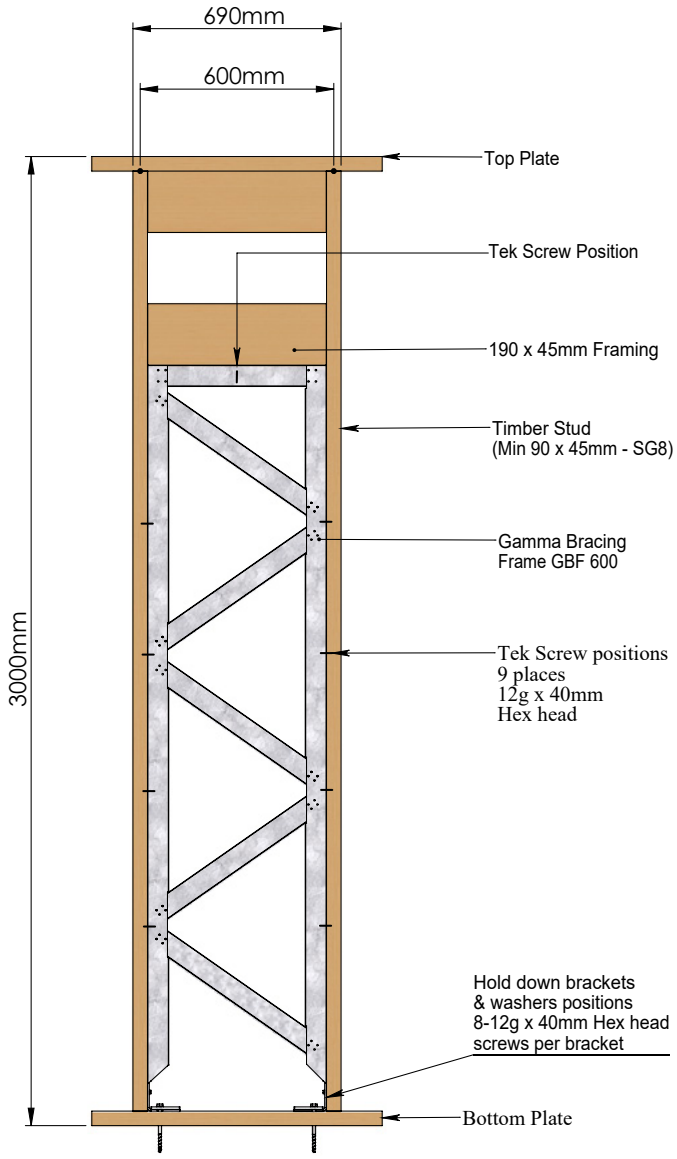


SPECIFICATIONS	
SYSTEM REF	GBF600/2.7
WIND BUs	70
EARTHQUAKE BUs	70
WALL HEIGHT (m)	2.7
WALL LENGTH (m)	0.690

GBF 600/2.7 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 600 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

Detailed in the drawing below is the GBF600 as it must be constructed within the timber framing to provide the described wind and earthquake performance values.

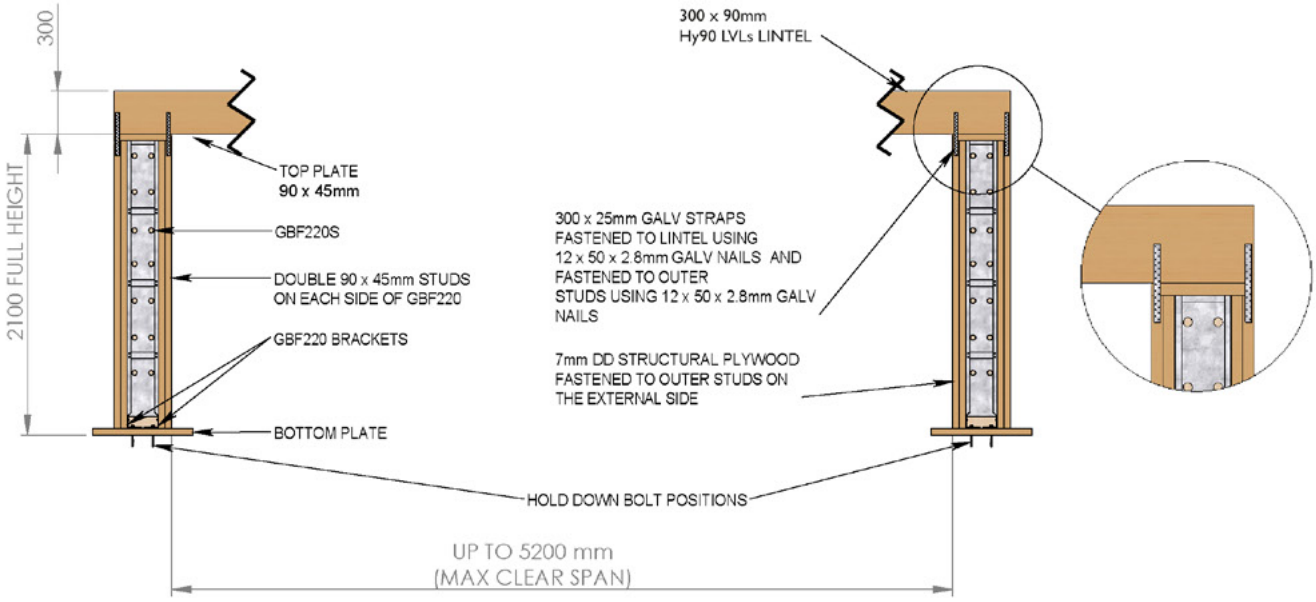
Performance - Wind 55BU - Earthquake 60BU



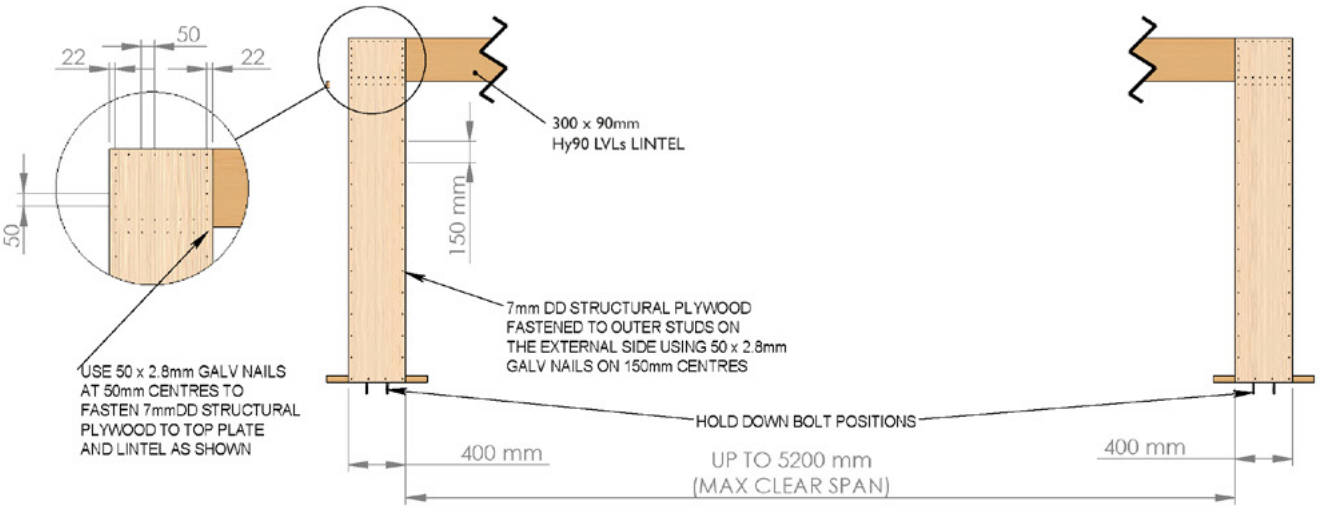
SPECIFICATIONS	
SYSTEM REF	GBF600/3.0
WIND BUs	55
EARTHQUAKE BUs	60
WALL HEIGHT (m)	3.0
WALL LENGTH (m)	0.690

GBF 600/3.0 COMPONENTS LIST	
QTY	COMPONENT
1	GBF 600 FRAME
2	GBF HOLD DOWN BRACKETS
2	GBF HOLD DOWN WASHERS
25	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

GAMMA PORTAL (6.0 X 2.4m) INTERNAL SIDE SHOWN
PERFORMANCE: WIND =124 BU's / EARTHQUAKE = 137 BU's



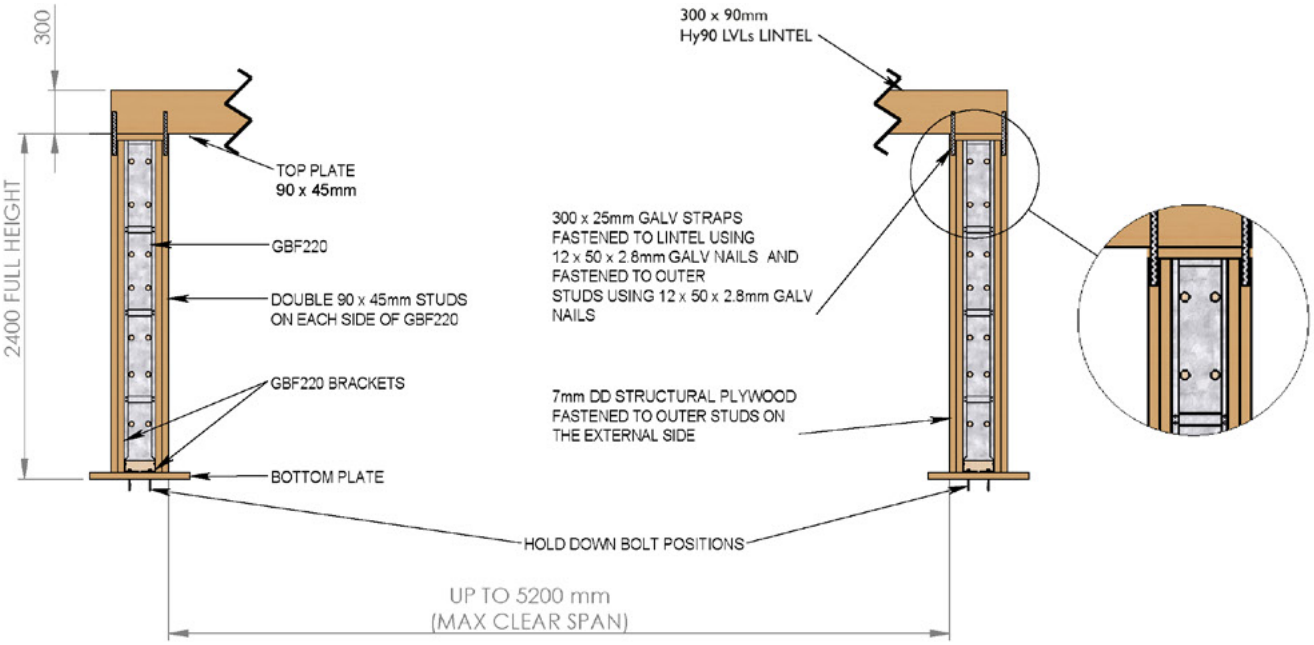
GAMMA PORTAL (6.0 X 2.4m) EXTERNAL SIDE SHOWN
PERFORMANCE: WIND =124 BU's / EARTHQUAKE = 137 BU's



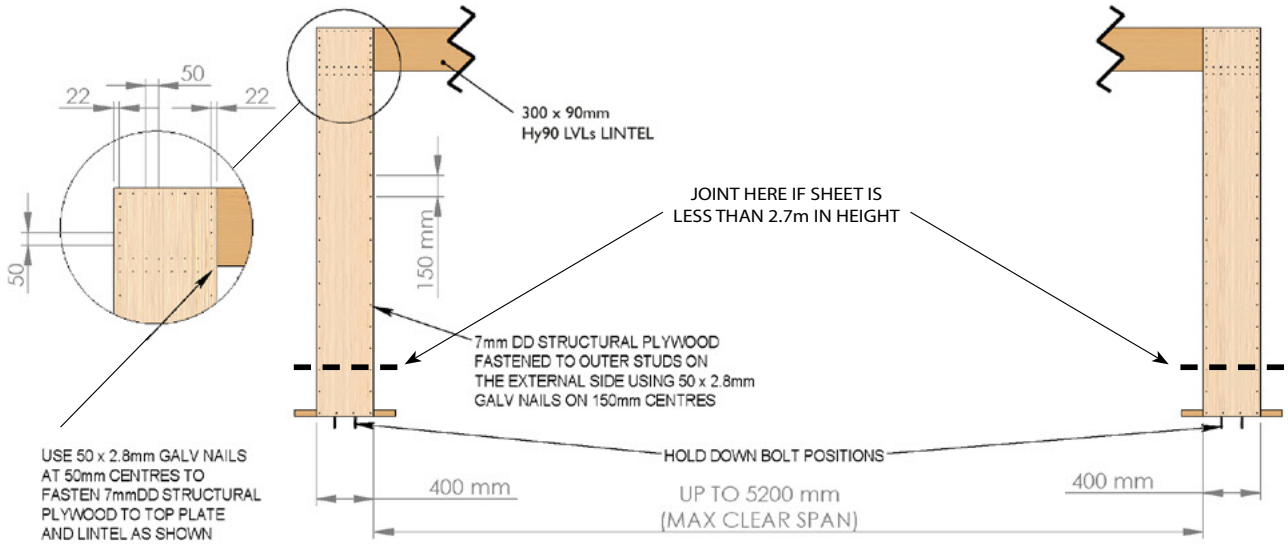
GBPF/2.4 COMPONENTS LIST	
QTY	COMPONENTS
2	GBF220S
4	GBF HOLD-DOWN BRACKETS
4	GBF HOLD-DOWN WASHERS
50	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 X 45mm AND 300 X 90 (BY OTHERS)	

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GAMMA PORTAL (6.0 X 2.7m) INTERNAL SIDE SHOWN
PERFORMANCE: WIND = 110 BUs / EARTHQUAKE = 122 BUs

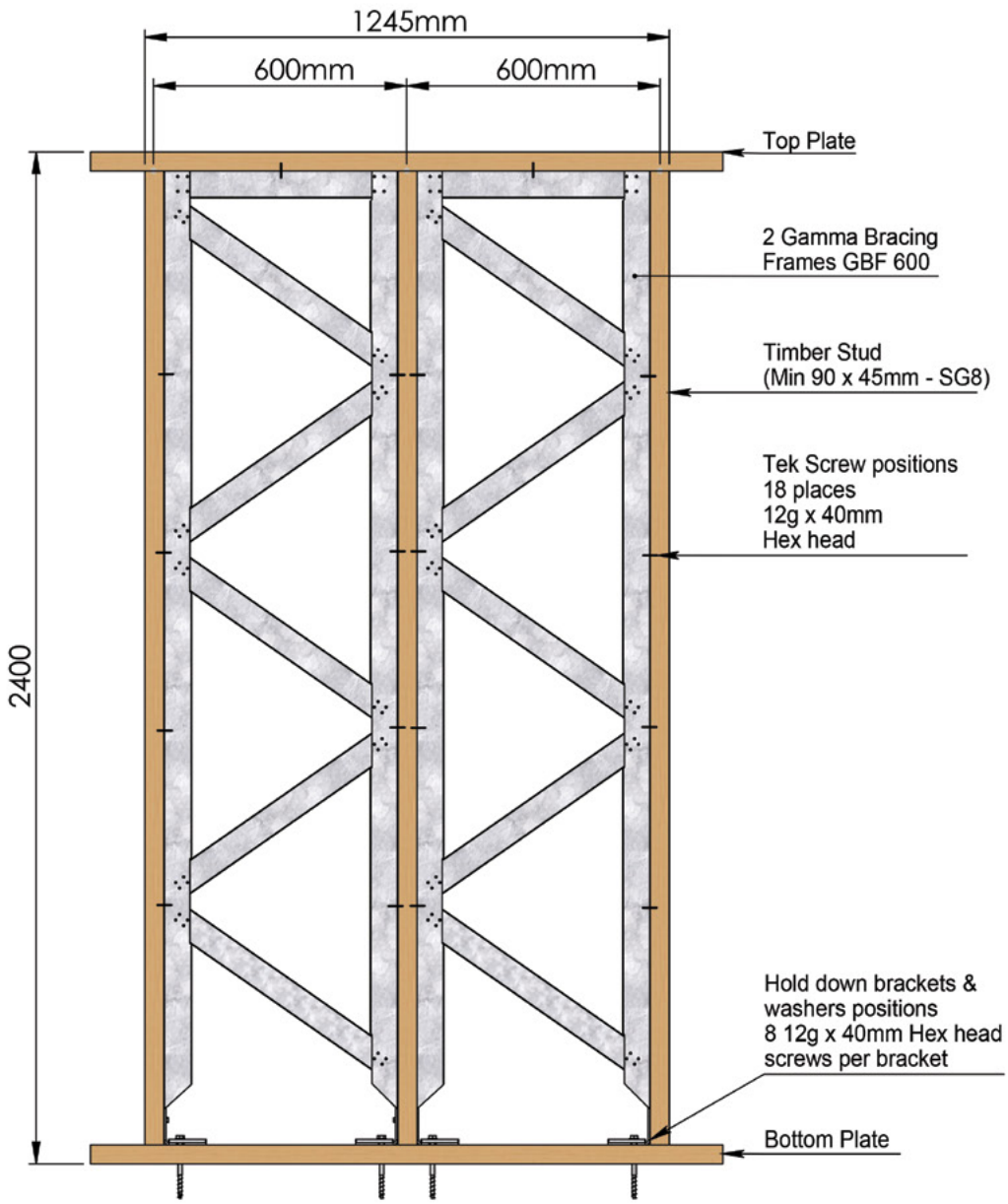


GAMMA PORTAL (6.0 X 2.7m) EXTERNAL SIDE SHOWN
PERFORMANCE: WIND =110 BU's / EARTHQUAKE = 122 BU's



GBPF/2.7 COMPONENTS LIST	
QTY	COMPONENTS
2	GBF220
4	GBF HOLD-DOWN BRACKETS
4	GBF HOLD-DOWN WASHERS
50	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 X 45mm AND 300 X 90 (BY OTHERS)	

Detailed in the drawing below is the GBF600 Twin System as it must be constructed to provide the described Wind and Earthquake performance values.

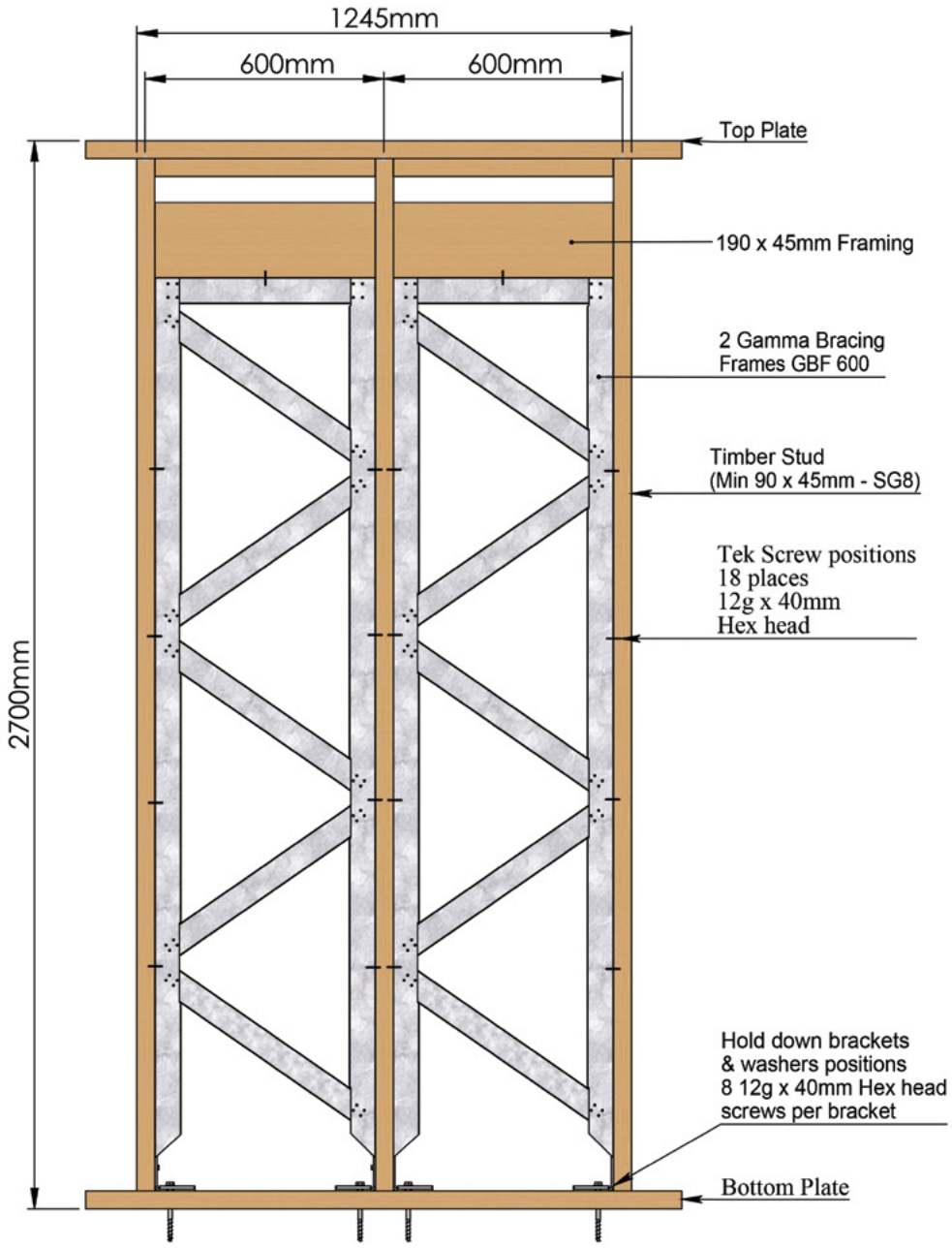


SPECIFICATIONS	
SYSTEM REF	GBF600/2.4 TWIN
WIND BUs	168
EARTHQUAKE BUs	180
WALL HEIGHT (m)	2.4
WALL LENGTH (m)	1.245

GBF 600/2.4 TWIN COMPONENTS LIST	
QTY	COMPONENT
2	GBF 600 FRAMES
4	GBF HOLD DOWN BRACKETS
4	GBF HOLD DOWN WASHERS
50	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

14.1 Construction Details - GBF600 TWIN (2.7m wall height)

Detailed in the drawing below is the GBF600 Twin System as it must be constructed to provide the described Wind and Earthquake performance values.

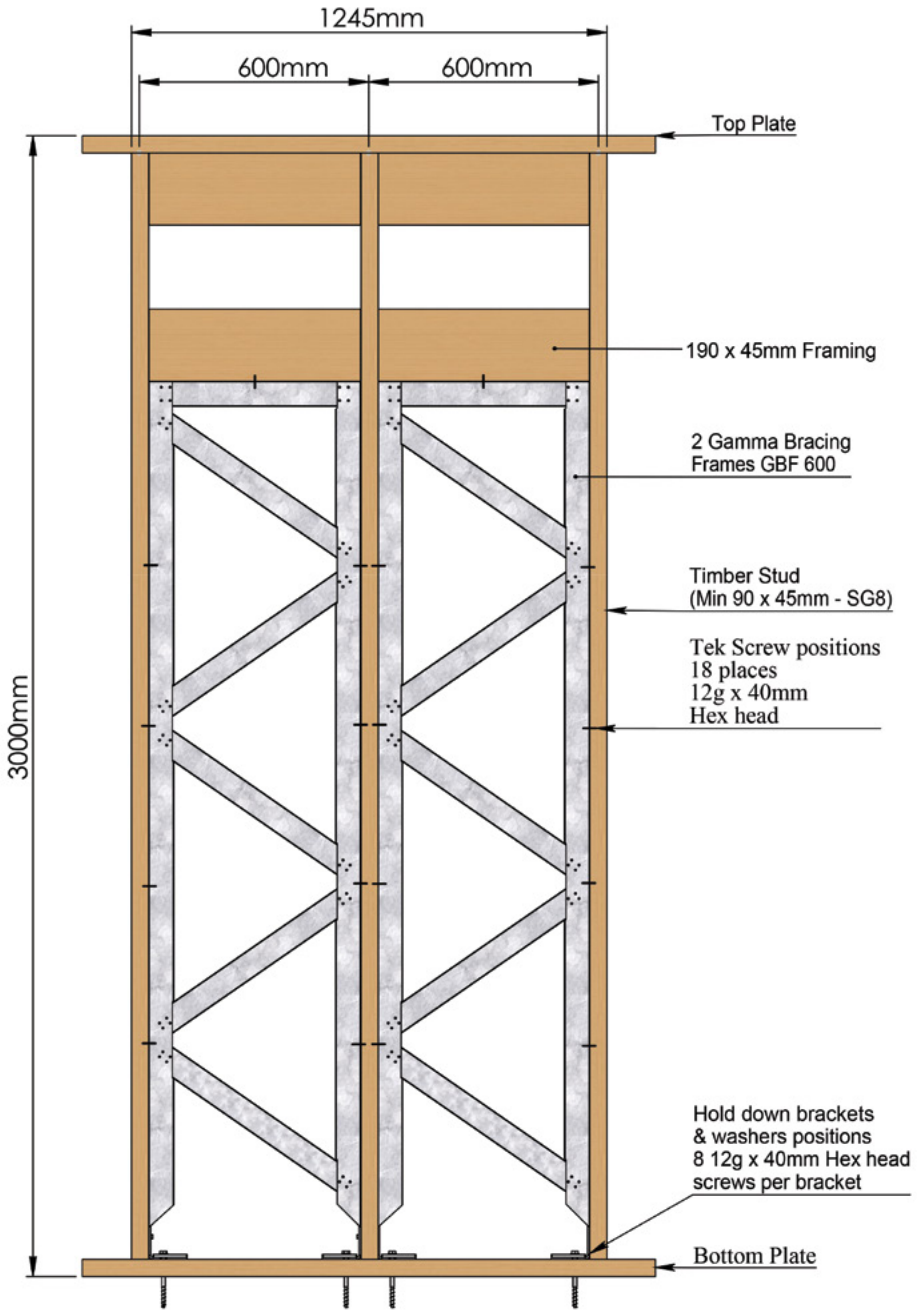


SPECIFICATIONS	
SYSTEM REF	GBF600/2.7 TWIN
WIND BUs	140
EARTHQUAKE BUs	140
WALL HEIGHT (m)	2.7
WALL LENGTH (m)	1.245

GBF 600/2.7 TWIN COMPONENTS LIST	
QTY	COMPONENT
2	GBF 600 FRAMES
4	GBF HOLD DOWN BRACKETS
4	GBF HOLD DOWN WASHERS
50	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

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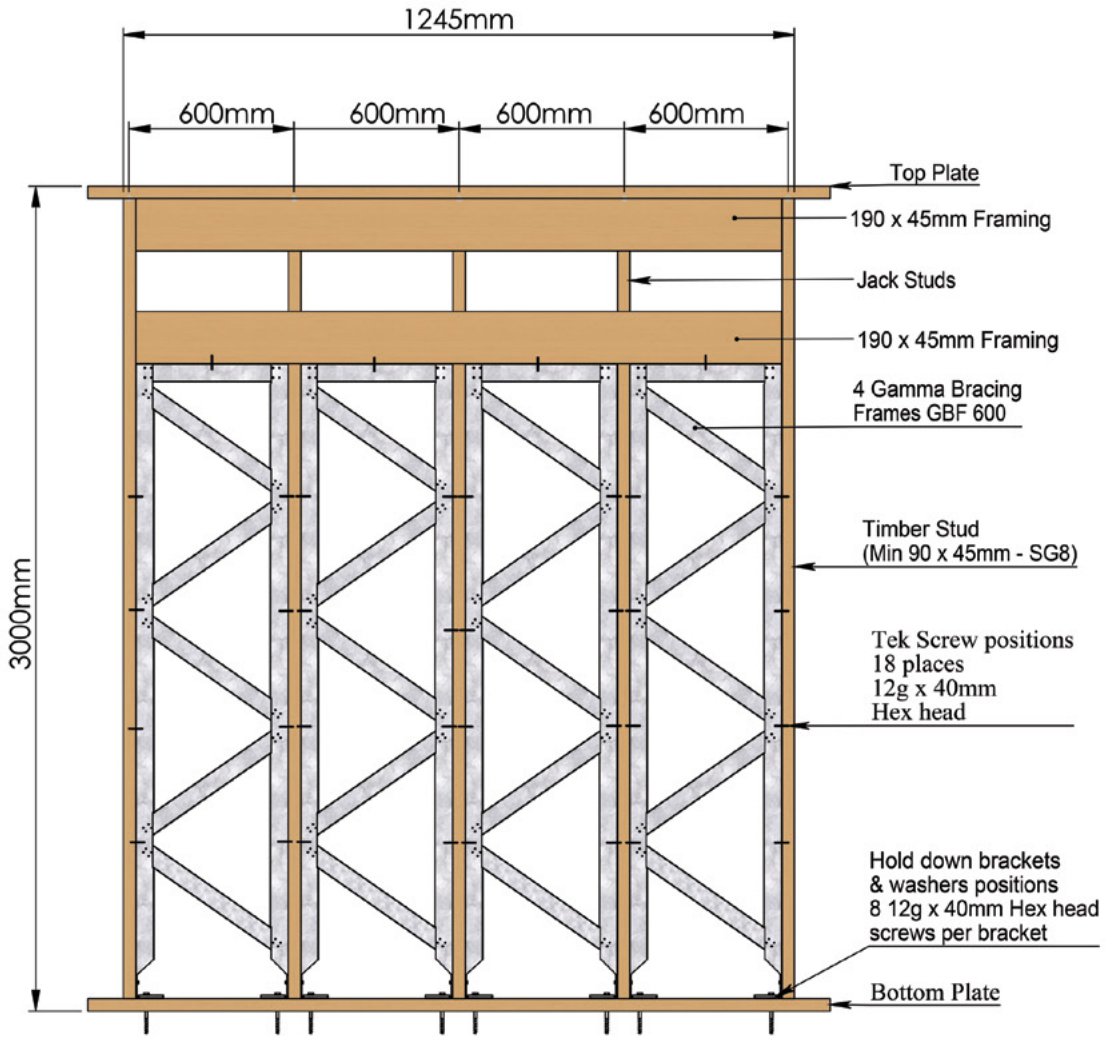
Detailed in the drawing below is the GBF600 Twin System as it must be constructed to provide the described Wind and Earthquake performance values

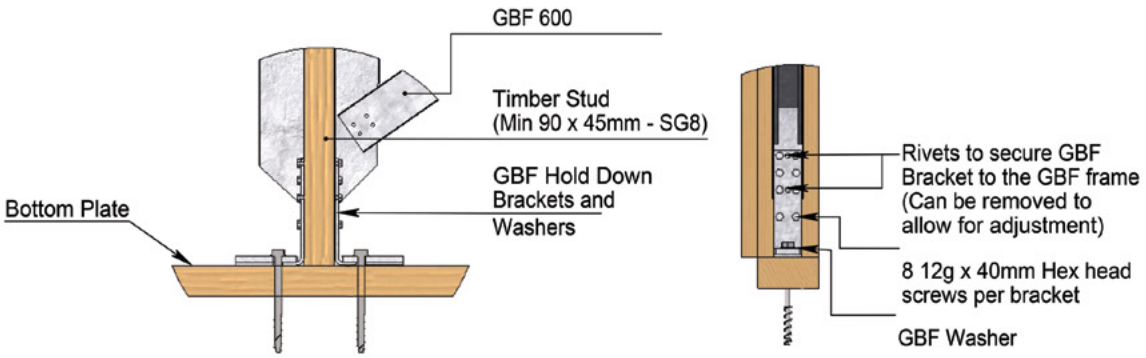


SPECIFICATIONS	
SYSTEM REF	GBF600/3.0 TWIN
WIND BUs	110
EARTHQUAKE BUs	120
WALL HEIGHT (m)	3.0
WALL LENGTH (m)	1.245

GBF 600/3.0 TWIN COMPONENTS LIST	
QTY	COMPONENT
2	GBF 600 FRAMES
4	GBF HOLD DOWN BRACKETS
4	GBF HOLD DOWN WASHERS
50	12 g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

14.3 Construction Details - Multiple GBF Frames



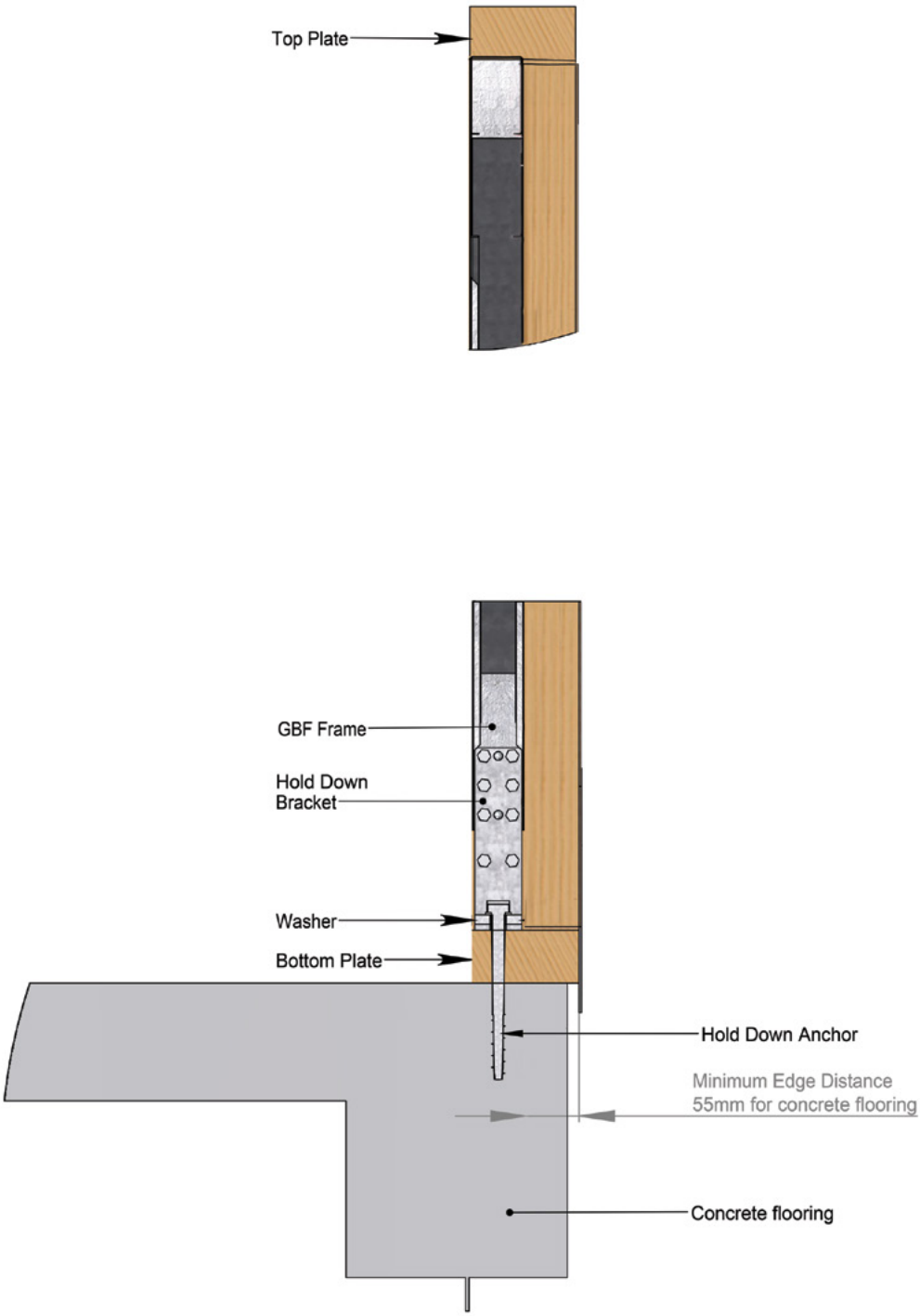


SPECIFICATIONS	
SYSTEM REF	GBF600 MULTI/3.0
WIND BUs	220
EARTHQUAKE BUs	240
WALL HEIGHT (m)	3.0
WALL LENGTH (m)	1.245

GBF 600 MULTI COMPONENTS LIST	
QTY	COMPONENT
4	GBF 600 FRAME
8	GBF HOLD DOWN BRACKETS
8	GBF HOLD DOWN WASHERS
100	12g X 40mm TEK SCREWS
TIMBER FRAMING MIN OF 90 x 45mm SG8 (BY OTHERS)	

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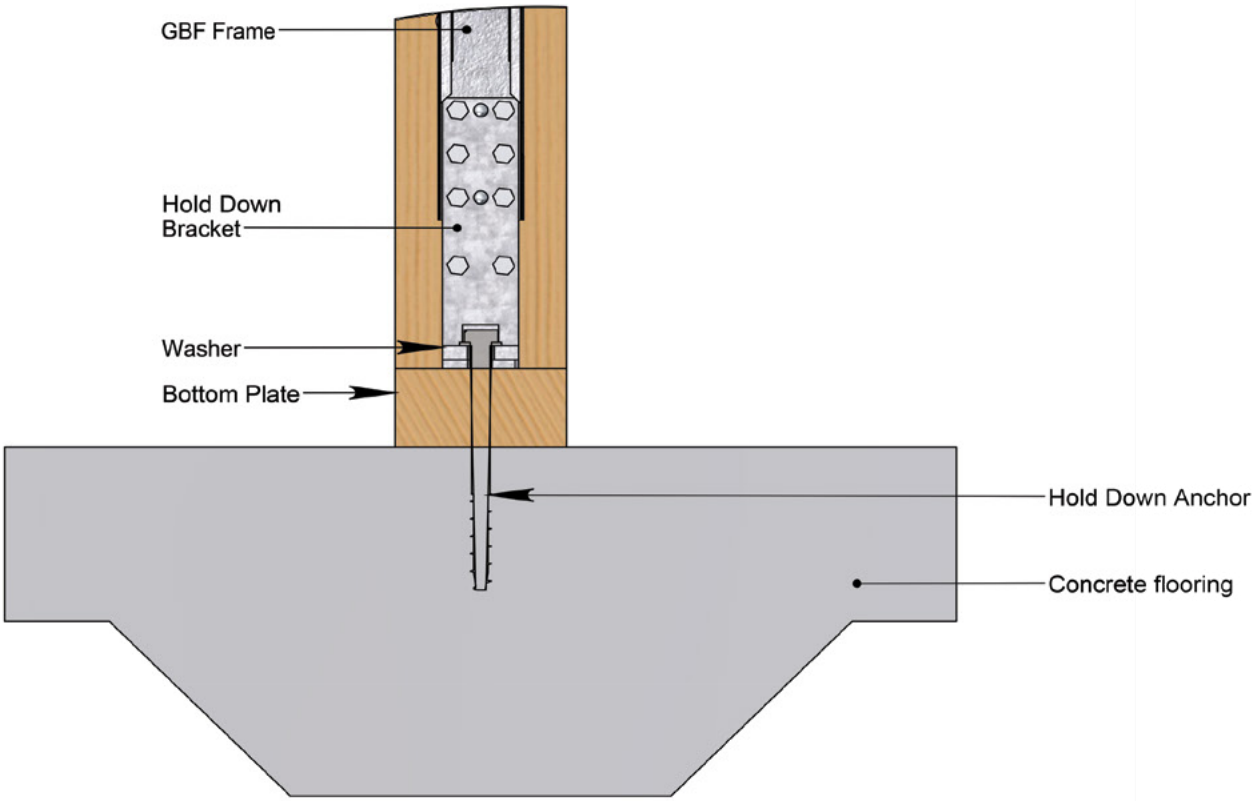
EXTERIOR WALL ON CONCRETE FLOOR



SIDE SECTION VIEW

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phillid
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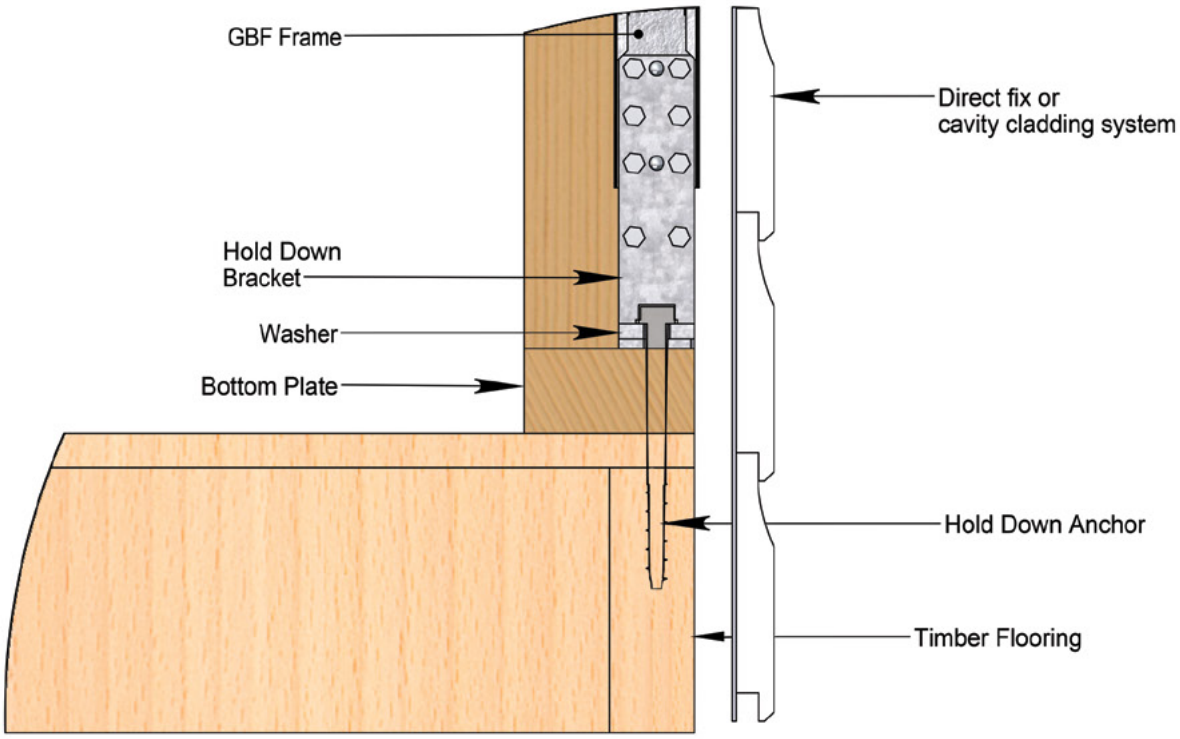
INTERIOR WALL ON CONCRETE FLOOR



SIDE SECTION VIEW

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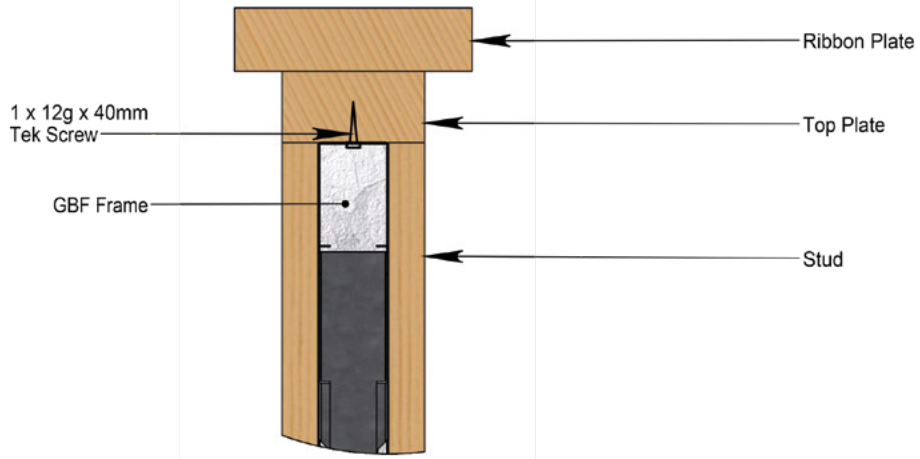
EXTERIOR WALL ON TIMBER FLOOR

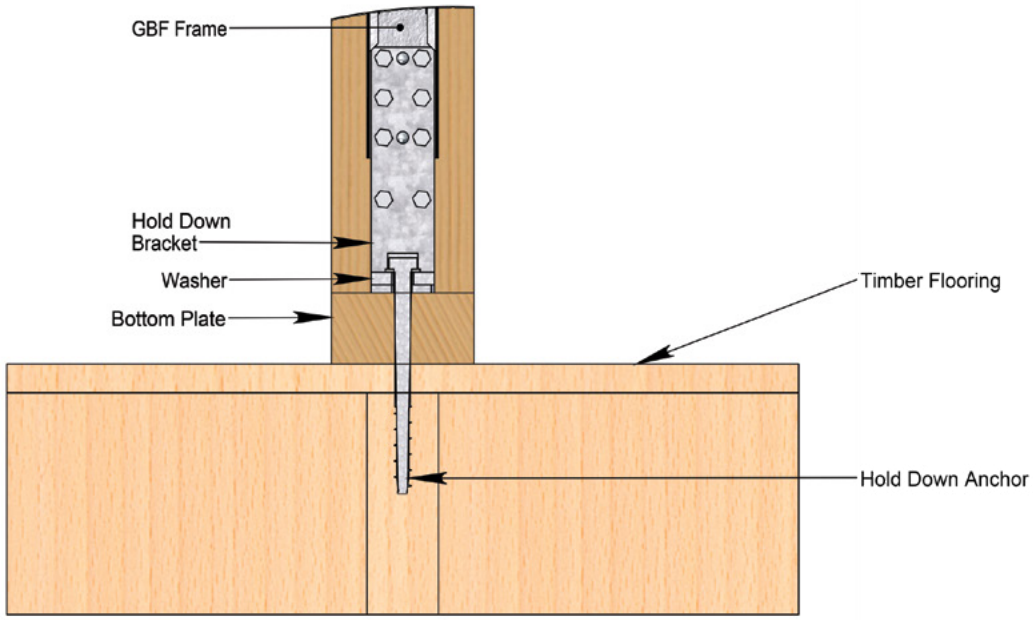


SIDE SECTION VIEW

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INTERIOR WALL ON TIMBER FLOOR





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14.8 Construction Details - GBF Height Adjustment

The height of the Gamma Bracing frame can be adjusted to suit variations in the wall framing height or the alignment of the wall framing.

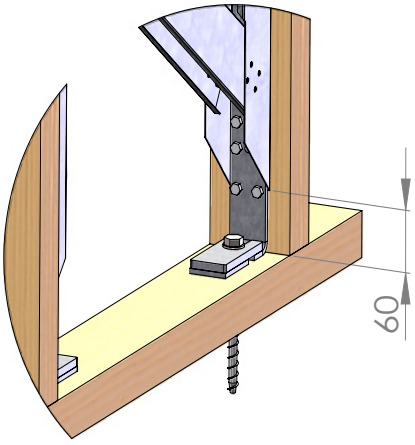
The height of the Gamma Bracing Frame can be increased by no greater than 50mm and decreased by no greater than 39mm to allow for any small deviation in wall framing height.

To adjust the height of the GBF it is permitted to remove the temporary rivet that hold each of the hold down brackets in place which allows the brackets to be adjusted up or down.

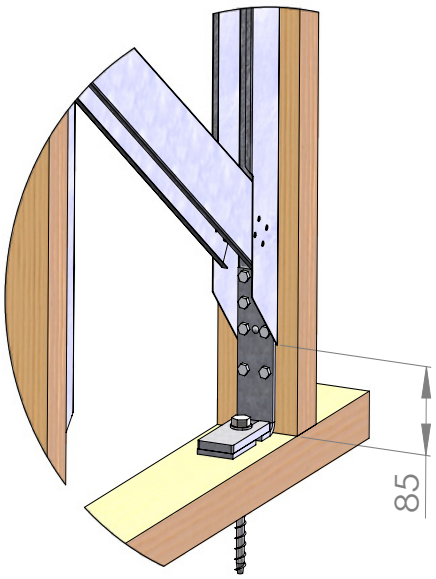
To increase the height of the GBF each of the hold down brackets will require adjusting downwards from the side channels of the GBF by a maximum of 50mm.

To decrease the height of the GBF each of the hold down brackets will require adjusting upwards into the side channels by a maximum of 39mm.

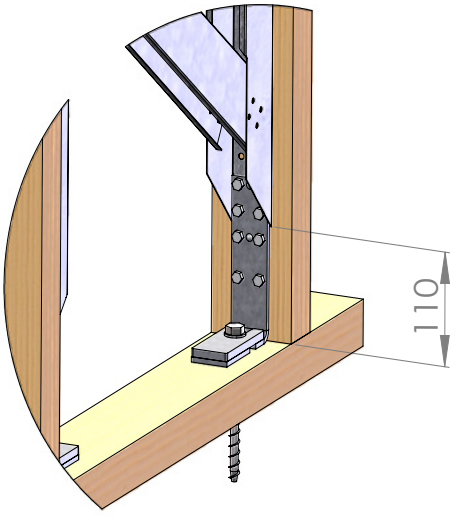
All 12g x 40mm Tek Screws MUST be installed to each of the hold down brackets and the GBF frame. (Qty of 8 Screws per Hold down bracket - supplied).



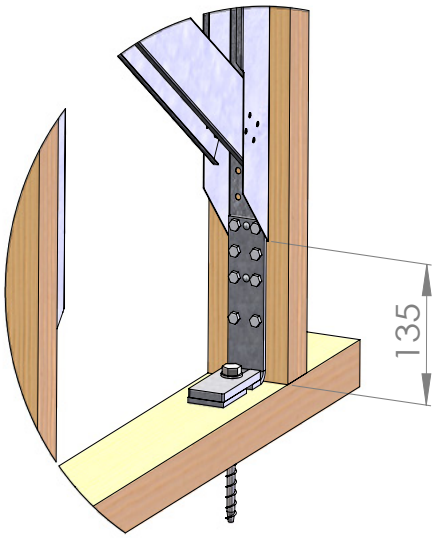
'25mm DOWN' POSITION



'AS SUPPLIED' POSITION



'25mm UP' POSITION



'50mm UP' POSITION

15.0 Ancillary Products

15.1 Fasteners

12g x 40mm Tek Screw



All Gamma Bracing Systems require fixing to the timber frame by the use of 12g x 40mm Tek Screws (provided). The quantity of Tek Screws varies for each system. Check the components list on each system page for the quantity of Tek Screws required.

15.2 Hold Down Anchors

TABLE 4	Hold Down Anchors		
Floor Type	**Wall Type**	**Anchor Type**	**Uplift Capacity**
Concrete	External Wall	**Masonry Screw Chemical Set Anchor "J" Bolt set into Concrete	15kN
Concrete	Internal Wall	**Masonry Screw Chemical Set Anchor Expansion Bolt	15kN
Timber	External/Internal Wall	M12 Coach Screws	12kN
** Gamma recommends the use of the Hilti HUS-H 10/140 Masonry Screw Anchor			

15.3 Insulation

Where Gamma Bracing Frames are installed in exterior walls insulation is to be installed to meet the requirements of the New Zealand Building Code.

Insulation is to be installed within all areas and cavities of the Gamma Bracing Frame.

For further information regarding the types of insulation, please contact Gamma Bracing Technologies Ltd, Ph. 0800 272 733.



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Fittings to Gamma Bracing Frames

15.4 Electrical Equipment

All electrical equipment must be installed by a Registered Electrician in accordance with AS/NSZ 3000:2017. Tables 5 & 6 below detail accessory fittings that can be installed to the Gamma Bracing frame. Other larger and heavier items such as sinks, toilet cistern's and wall mounted television screens will require mounting directly to the timber studs.

* Do not cut or modify the Gamma Bracing Frames as this will impede structural performance.

Additional timber frame may be required. Follow manufacturers installation instructions.

TABLE 5	Electrical Equipment		
	Fastener Types		
Electrical Accessories Type	**Rivets**	**Tek Screws**	**Bolts/Threaded Rod**
Electrical switch mounting box	1/8" to ¼"	6g to 14g	M4 to M12
Electrical socket outlet box			
Electrical cables + mounting brackets clips			
Electrical wall mounted light fittings			
Telephone socket outlets			
Internet/Computer socket outlet			
Television Aerial outlets			
Data Cables + mounting bracket & Clips			
*Note - All electrical cables to be properly insulated. Use grommets where electric cables pass through service holes.			

Electrical flush mount boxes






15.5 Plumbing Equipment

TABLE 6	Plumbing Fitting Equipment		
	Fastener Types		
Plumbing Accessories Type	**Rivets**	**Tek Screws**	**Bolts/Threaded Rod**
Tap fittings + brackets	1/8" to ¼"	6g to 14g	M4 to M12
Shower Head fittings + brackets			
Pipe work + mounting brackets/clips • Galvanized Pipe • PVC Pipe • Copper Pipe (*Refer Note)			
*Note - Ensure copper pipe is well insulated when installing with Gamma Bracing Frames. Contact between Copper and Galvanized Steel causes electrolysis resulting in the corrosion of components. Use of grommets in access holes and insulated brackets and saddles when mounting directly to Gamma Bracing Frames will be required.			

Insulated pipe mounting brackets and wing backed plumbing fittings






Notes

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GAMMA BRACING FRAME

GAMMA

Contact:
FreePhone 0800 272 733
website www.gammabracing.co.nz

692A Beach Road
Browns Bay
New Zealand 0630

SDC - Approved Application Document - BC-23076 - Gamma Bracing Frame - Page 1 of 2 - 24/06/2014 08:20:10 - phillid

For detailed specifications the most current Gamma Bracing System's technical manual should always be referred to.

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In order for **Gamma Bracing 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.

Where specified, correct components must be used when installing and specifying **Gamma Bracing Systems**.

Gamma Bracing Technologies™

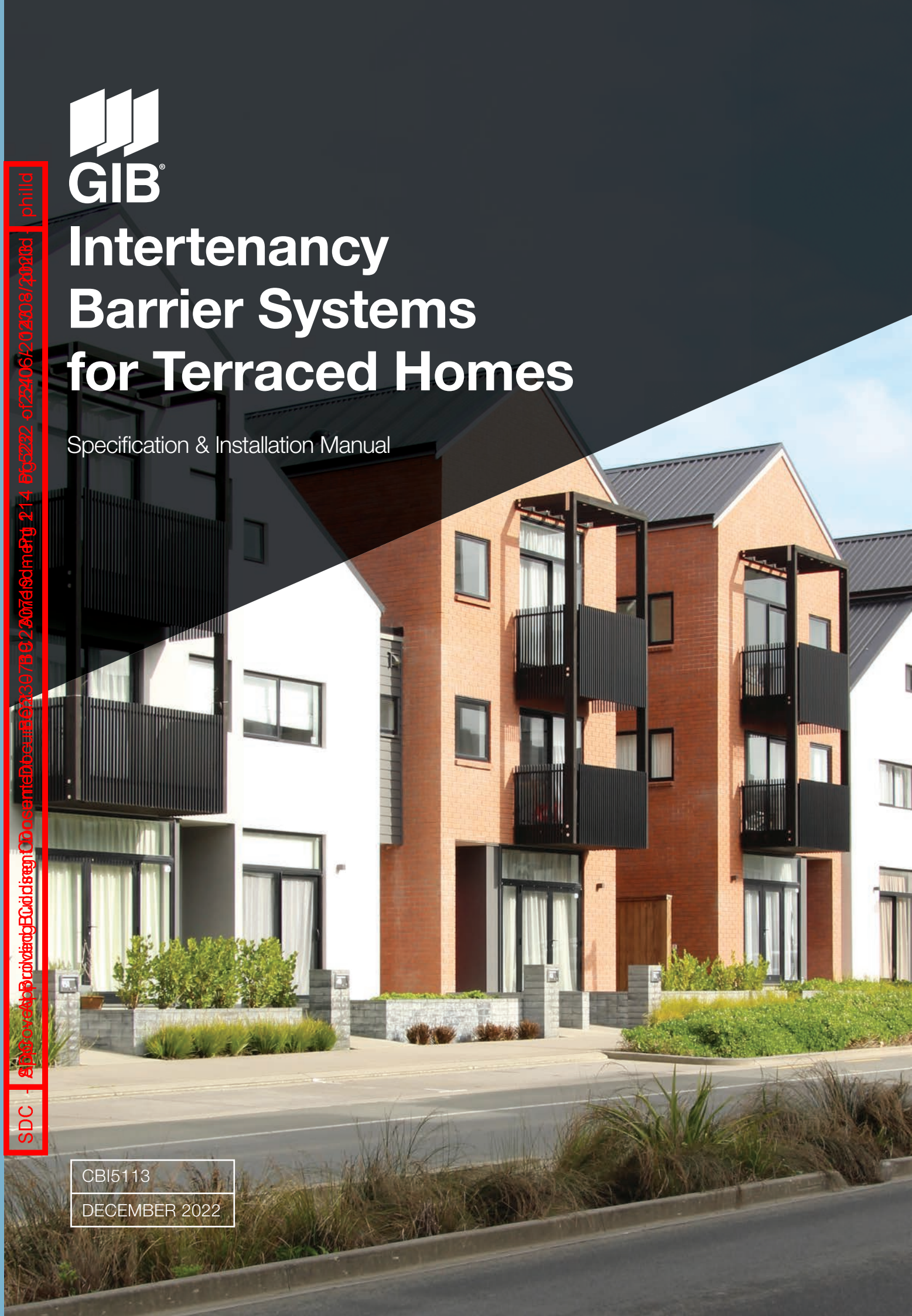
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TECHNICAL & SALES 0800 272 733

www.gammabracing.co.nz

GIB® Intertenancy Barrier Systems for Terraced Homes

Specification & Installation Manual



CBI5113

DECEMBER 2022

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NATIONAL SUPPORT

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This document is intended for Terraced Housing. GIB® Intertenancy Barrier Systems for Terraced Homes provide peace of mind, delivering fire, noise and security performance.

BENEFITS OF THE GIB® INTERTENANCY BARRIER SYSTEMS INCLUDE:

- High fire protection and noise control performance.
- No acoustic or fire sealing required where services penetrate wall linings within limitations.
- Cost effective.
- Narrow footprint, maximise the available tenancy of each unit.
- Options for timber and steel framing.
- Lightweight construction, no need for specific foundation designs.
- Easy and fast to install, no additional trades required for installation.

GIB® INTERTENANCY BARRIER SYSTEMS

GIB Barrierline® sheets include a water and mould resistant core. Despite this it is important to remember that paper-faced gypsum plasterboard should only be handled when dry. Therefore GIB Barrierline®, GIB Weatherline® and GIB Fyreline® sheets must be kept dry after delivery and before installation.

Once installed GIB Barrierline®, GIB Weatherline® and GIB Fyreline® sheets can be exposed to the elements before the building is closed in for the following maximum time periods:

- GIB Barrierline®: 12 weeks
- GIB Weatherline®*: 12 weeks
- GIB Fyreline®: 4 weeks

* when used in GIB® Intertenancy Barrier Systems

BRANZ Appraised
Appraisal No.940 [2022]

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GIB® Intertenancy Barrier Systems

Winstone Wallboards Ltd accepts no liability if the GIB® Intertenancy Barrier 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. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. You should check the current index of publications contained in your GIB® Technical Manual before using this publication. If you are unsure whether this is the current publication, simply call the GIB® Helpline on 0800 100 442.

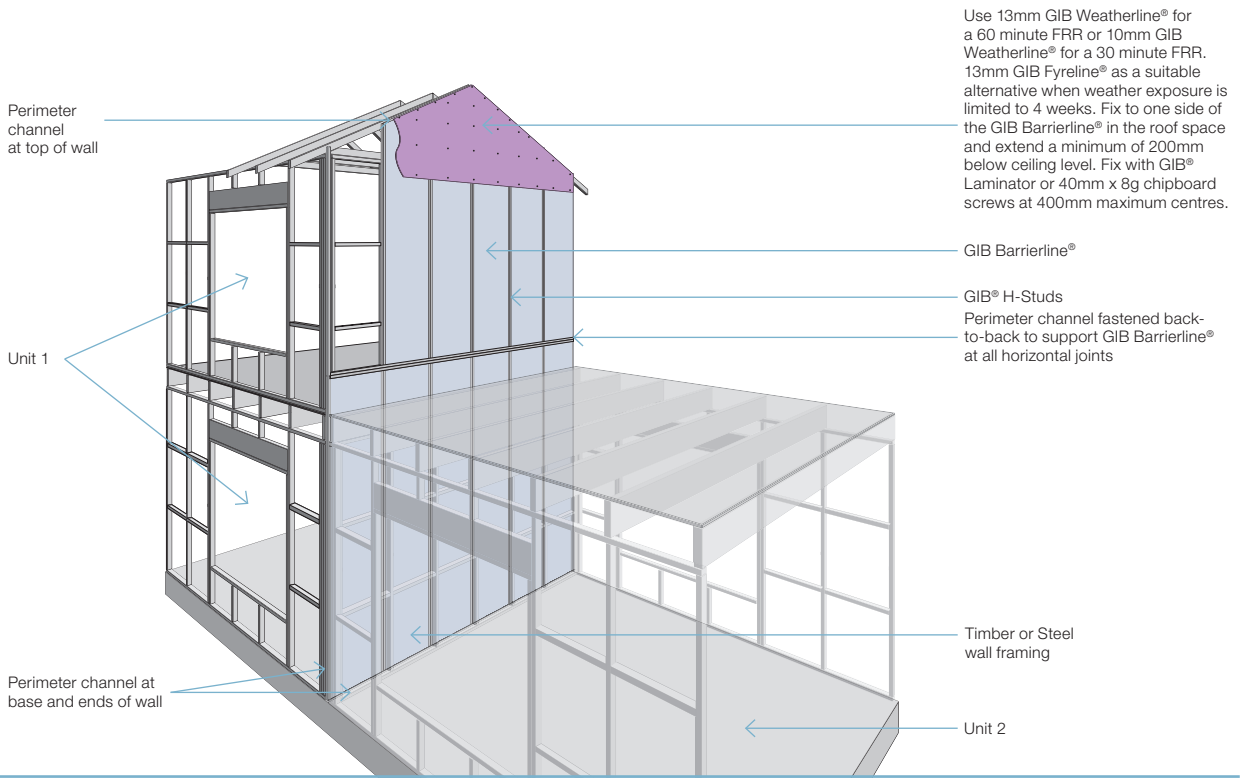
Timber Frame Walls - with GIB Barrierline® Central Barrier

Specification	STC	Rw	FRR	Lining requirements	Page
GBTLAB 60a	68	66	60/60/60	2 x 10mm GIB® Standard plasterboard each side	16
GBTLAB 60b	64	63	60/60/60	1 x 10mm GIB Braceline® GIB Noiseline® each side	18
GBTLAB 60c	67	65	60/60/60	1 x 13mm GIB Braceline® GIB Noiseline® each side	20
GBTLAB 60d	61	60	60/60/60	1 x 13mm GIB® Standard plasterboard each side	22

Steel Frame Walls - with GIB Barrierline® Central Barrier

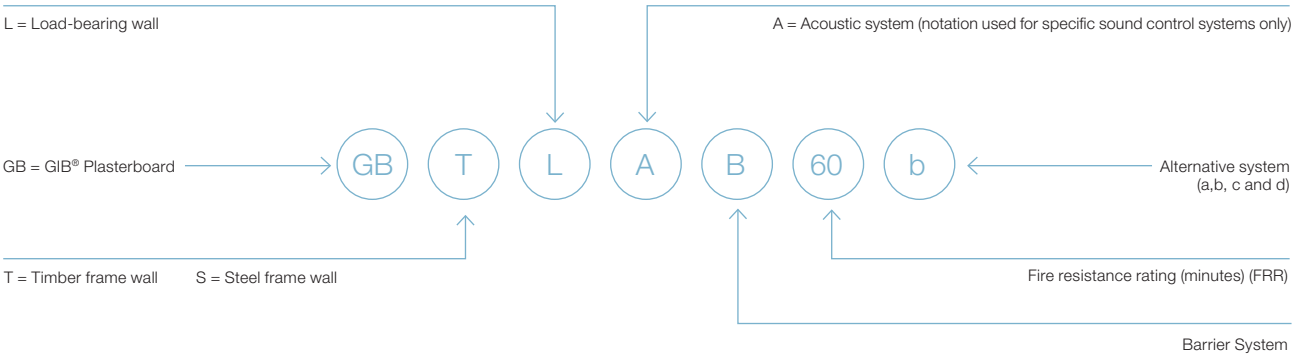
Specification	STC	Rw	FRR	Lining requirements each side	Page
GBSLAB 60a	61	60	60/60/60	1 x 13mm GIB® Standard Plasterboard each side	24
GBSLAB 60b	67	65	60/60/60	1 x 13mm GIB Braceline® GIB Noiseline® each side	26

FIGURE 1: GIB® INTERTENANCY BARRIER SYSTEM FOR TERRACE HOMES



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Specification reference example



Scope of use

GIB® Intertenancy Barrier Systems are designed to provide a NZBC compliant separating wall between attached dwellings. The system consists of a double timber or steel frame wall with a 25mm thick plasterboard barrier between the frames. The primary fire resistance is provided by the plasterboard barrier, with the wall linings contributing to some extent. This allows the wall linings to be used for structural bracing and to incorporate penetrations.

The basis of the acoustic performance is a double cavity system. This provides isolation from airborne sound. Insulation in both cavities is used to meet various performance levels and allows certain services to penetrate the wall linings.

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® Intertenancy Barrier Systems have been designed and tested using only the products specified. For permitted bracing substitutions see the latest version of the GIB EzyBrace® Systems literature.

Compliance with the NZ Building Code

NZBC CLAUSE B1 – STRUCTURE

The design and material specification for timber and steel framing used in conjunction with this literature must be in accordance with the performance requirements of NZBC Clause B1.

Acceptable Solution B1/AS1 cites the following relevant documents.

— NZS 3604:2011 Timber-framed buildings

— NASH Standard Part 2: May 2019 Light Steel Framed Buildings

Alternatively specific engeneering design must comply with Verification Method B1/VM1

NZBC CLAUSE B2 – DURABILITY

Under normal conditions of dry internal use the products detailed in GIB® Intertenancy Barrier 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.

* Otherwise components must comply with acceptable solution B2/AS1

NZBC CLAUSES C1-C6 – PROTECTION FROM FIRE

GIB® Intertenancy Barrier Systems can be used to provide passive fire protection in accordance with the requirements of NZBC Clauses C1-C6 – Protection from Fire.

NZBC CLAUSE F2 – HAZARDOUS BUILDING MATERIALS

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

NZBC CLAUSE G6 – AIRBORNE AND IMPACT SOUND

GIB® Intertenancy Barrier Systems for Terrace Homes provide airborne noise control ratings that exceed the minimum requirements of NZBC Clause G6 – Airborne and Impact Sound.

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Appraisal

GIB® Intertenancy Barrier Systems for Terraced Homes have been appraised by the Building Research Association of New Zealand (BRANZ), Appraisal No. 940 (2022).

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

Building design

GIB® Intertenancy Barrier Systems consist of vertically spanning elements extending from the ground slab or footing up to the roof. Consideration of roof framing is also important to avoid penetrating the barrier with trusses, ties, hip beams, etc.

GIB® Intertenancy Barrier Systems are ideally suited to buildings with aligned external facades. A detail for an off-set façade is provided.

The maximum height for GIB® Intertenancy Barrier Systems in terraced homes is 12m.

Structural design

Timber framing shall be in accordance with NZBC B1 Structure – B1/AS1 Clause 3.0 Timber – NZS 3604 or Verification Method B1/VM1.

Steel framing shall be in accordance with NZBC B1 Structure – B1/AS1 Clause 9.1 National Association of Steel Framed Housing Inc (NASH) – NASH Standard Part 2: May 2019 Light Steel Framed Buildings or Verification Method B1/VM1.

GIB® H-Studs form the vertical joints between sheets of GIB Barrierline®. They must be continuous lengths and be fitted into the GIB® Rondo® 140 Perimeter Channel at their top and bottom. No mechanical fixings are required between the GIB® H-Stud and the channels, or the GIB® H-Stud and the GIB Barrierline®.

GIB® Wall Clips provide lateral support to the central barrier and are required within 600mm below the top of every GIB® H-Stud, on both sides, and at 3000mm maximum centres vertically.

GIB BARRIERLINE® WALL HEIGHTS

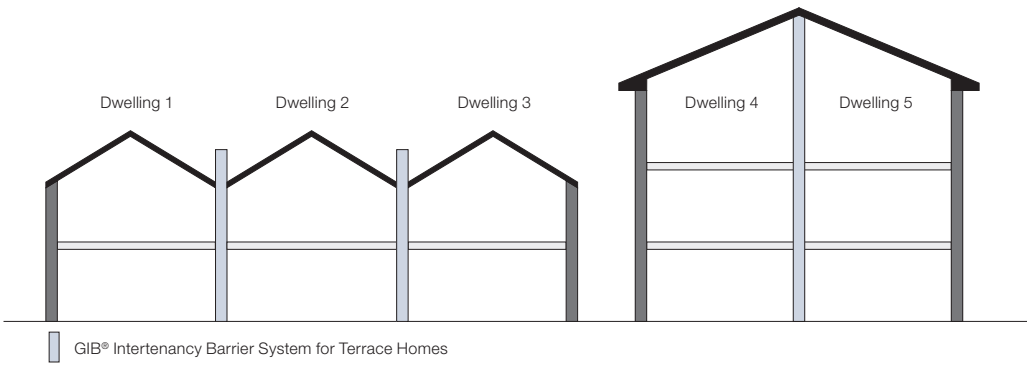
GIB Barrierline® sheets are produced in 3000mm lengths which are installed vertically. If wall heights of 3300mm or 3600mm are required to reach the roof or soffit line a 300mm or 600mm GIB Barrierline® strip may be laid horizontally into the bottom perimeter channel to provide additional height.

The bottom strip is capped with a GIB® Rondo® 140 perimeter channel fixed to wall framing with GIB® wall clips at 600 mm centres. A second perimeter channel is fixed back to back at 600mm centres.

GIB Barrierline® sheets can then be installed vertically on top of the horizontal strip.

Scan this QR Code to see a GIB® Video of the installation process.

FIGURE 2: TYPICAL LOCATIONS OF INTERTENANCY WALLS



SDC - Approved Document C/AS1 Dated 7 July 2014 Building Consent Number BC230768 Dated 22 Aug 2023 - Page 224 of 239 - Amendment 1 Dated 6/2024 - 20/08/2024 - phillid

Fire resistance

The GIB® Intertenancy Barrier Systems in this document are suitable for the stated Fire Resistance Rating (FRR) when designed in accordance with the building and structural considerations on the previous page, and installed in accordance with the details in this manual.

GIB® Intertenancy Barrier Systems are designed for one side to collapse in a fire, leaving the central barrier and the opposing wall in place. The GIB® Wall Clips are designed to melt in a fire-affected unit to detach whilst leaving the central barrier attached to the framing of the adjacent wall.

The contribution of the units linings ensure that the published FRR is achieved.

In the roofspace to maintain a 60 minute FRR 13mm GIB Weatherline® or 13mm GIB Fyreline® is to be laminated to the GIB Barrierline®. In applications requiring a 30 minute FRR a layer of 10mm GIB Weatherline® or 13mm GIB Fyreline® is required.

Noise control performance

The noise control performance of GIB® Intertenancy Barrier Systems are expressed in terms of Sound Transmission Class (STC) and Weighted Sound Reduction Index (Rw). The ratings are based on tested laboratory performance. The site performance of the system may be affected by sound flanking, workmanship and the inclusion of structural and bridging elements. The building designer must pay special attention to airborne and structural flanking paths to minimise the difference between laboratory and field performance.

GIB® Wall Clips are only to be installed as shown in the details. Using additional clips within the storey height can reduce the acoustic performance of the wall.

For flanking sound control it is required that each storey ceiling consists of GIB® plasterboard 10mm or thicker and that fibrous insulation, such as Pink® Batts® (115mm) ceiling, extends 1200mm minimum on each side of the wall over the ceiling.

It is assumed no noise control rating is required between the two adjoining roof spaces and that the spaces are not occupied.

The GIB Barrierline® systems in this manual provide noise attenuation well in excess of NZBC requirements. Potential noise flanking via rigid facade connections and exterior joinery are unlikely to affect NZBC compliance, however, it is important to minimise flanking paths via the surrounding structure to achieve satisfactory on-site performance.

Durability during construction

GIB Barrierline® sheets have a water and mould resistant core. Despite this, it is important to remember that paper-faced gypsum plasterboard should only be handled when dry and must be kept dry after delivery and before installation. Reusable waterproof covers can be supplied with all deliveries of GIB® Intertenancy Barrier System components, including GIB Barrierline®.

Leave a 5mm gap between length of bottom perimeter channel. This will let any collected rain water escape more readily. Once installed GIB Barrierline®, GIB Weatherline® and GIB Fyreline® sheets can be exposed to the elements before the building is closed in for the following maximum time periods*:

— GIB Barrierline®: 12 weeks

— GIB Weatherline®: 12 weeks*

— GIB Fyreline®: 4 weeks

* When used in GIB® Intertenancy Barrier Systems.

Security

The presence of the central barrier provides added security. The 25mm thick GIB Barrierline® with galvanised steel GIB® H-Studs at the sheet joints forms a secure separation in the centre of the intertenancy wall.

Quality of finish

For timber frame buildings GIB® Intertenancy Barrier System specification number GBTLAB 60a minimises the possibility of surface imperfections by reducing the number of fasteners used to fix the outer layer wall lining in timber frame buildings due to the outer layer being fixed with both adhesive and fasteners.

SDC - Approved Application Document B2/AS1 - 7 July 2023 - Building Consent Drawings - 22 Dec 2023 - 6:52:40 pm - 22 of 240 - 06/12/2024 - 08/12/2024 - phillid

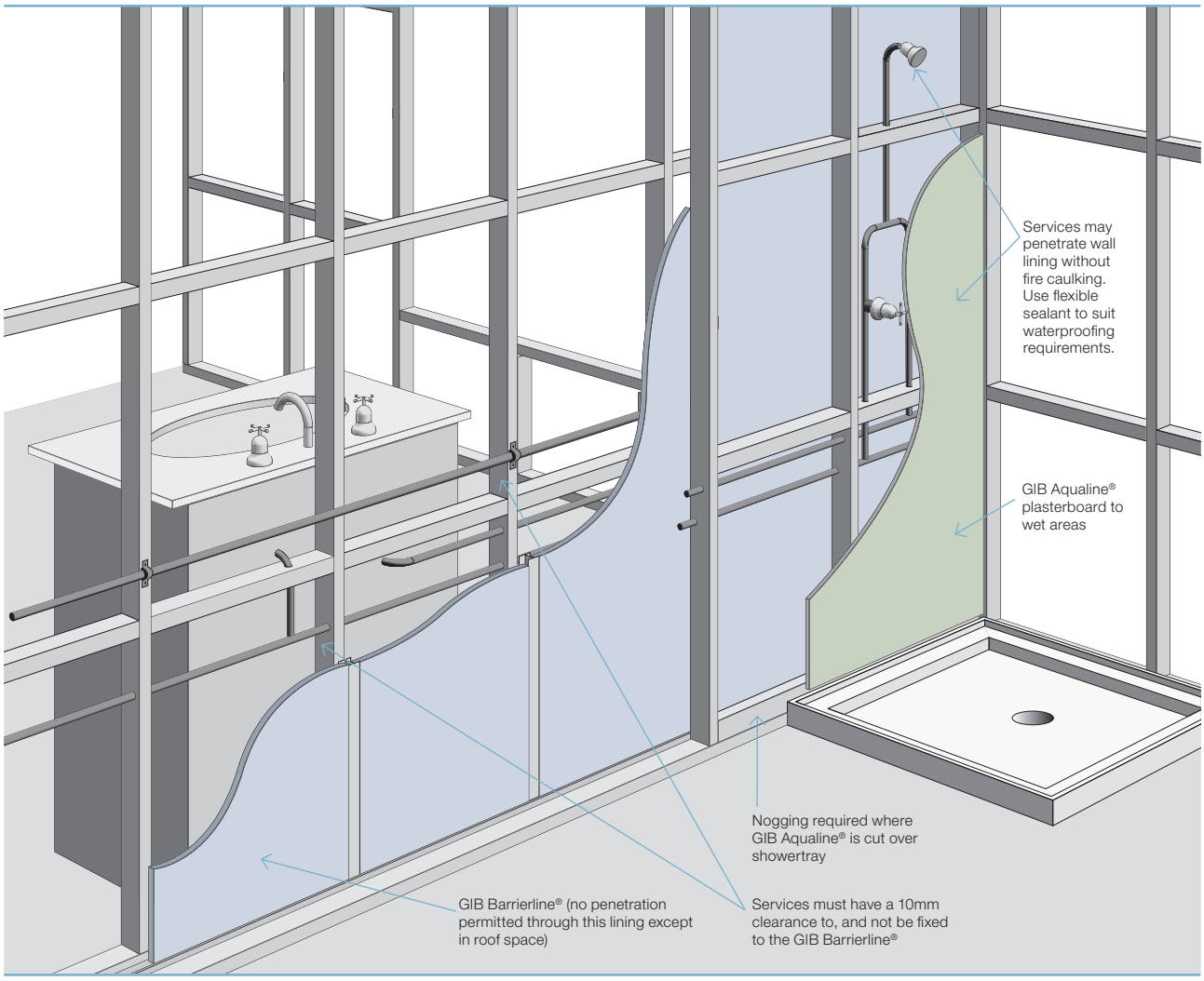
Building services

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally 600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

FIGURE 3: TYPICAL PENETRATION FEATURES



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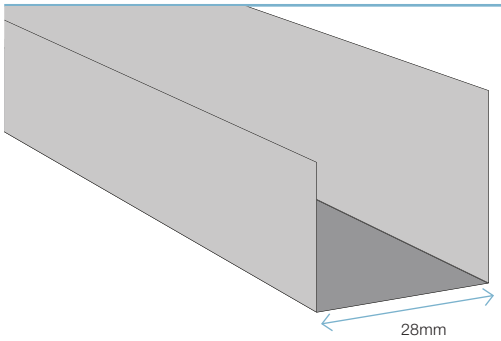
Linings

GIB® Plasterboard	Use	Sheet Length (mm)	Sheet Width (mm)	Thickness (mm)	Max kg/m²
GIB Barrierline®	Central Barrier Lining	3000	600	25	19.8
GIB® Standard	Unit Lining Options	2400-6000	1200	10	7
		2400-6000	1200	13	9
GIB Braceline®/ GIB Noiseline®		2400-4800	1200	10	9.3
		2400-3600	1200	13	12.5
GIB Weatherline®	Ceiling Space Wall Laminate*	2750-3000	1200	10	9
		2750-3000	1200	13	11.5
GIB Fyreline®		2400-3600	1200	13	11.0

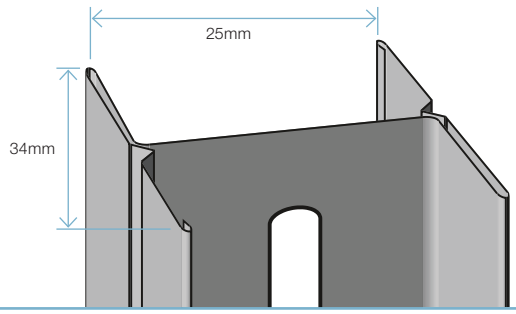
Components

Product	Use	Size (mm)	GIB® SKU Number	Suggested Qty per GIB Barrierline® Sheet
GIB® Rondo® 140 Perimeter Channel	Supports GIB Barrierline® at sheet top and bottom and wall ends	3000	14936	0.5
GIB® H-Stud	Supports GIB Barrierline® at vertical joins	3000	15618	1
GIB® Wall Clip	Provides lateral support to the GIB® H-Studs	40 x 90 x 50	15619	2
GIB® Wall Strap	Provides lateral support to the GIB® Rondo® 140 Perimeter Channel	110 x 30	15664	0.5
Exterior Fire and Acoustic Sealant	Sealant to one side of GIB® Rondo® 140 Perimeter Channel and floor slab		Suitable supplier	n/a

GIB® RONDO® 140 PERIMETER CHANNEL



GIB® H-STUD



SDC - Approved Document C/VM1 - Compliance Document for New Zealand Building Code - Clauses C1, C2, C3, C4, C5, C6 - Fire Safety - 30 June 2023 - Page 224 of 242 - 30/06/2023 12:08:42 pm

Fasteners

Fastener	Use	Supplier	Suggested Qty per GIB® Barrierline Sheet*
GIB® Laminator screws, 38mm x 10g Or Chipboard screws, 40mm x 8g	Fixing layer in roof space to GIB Barrierline®	GIB® (15758) Any Supplier	5
Drill-point wafer head screws, 16mm x 10g	Joining of metal components	Any	8
Drill-point wafer head screws, 30mm x 10g	Fixing GIB® Wall Clips to GIB® H-Studs	Any	4
Wood screws, 25mm x 6g	Fixing metal components to timber	Any	6
Concrete Nails: 30mm x 3.5mm diameter or 25mm x 4.0 mm diameter. Or, Steel Expansion Anchors or Screw Anchors: 40mm x 6mm diameter	Fixing GIB® Rondo® 140 Perimeter Channel to concrete floor slab	Any	n/a

** Quantities are an indicative guide for accessory ordering purposes.*

Insulation

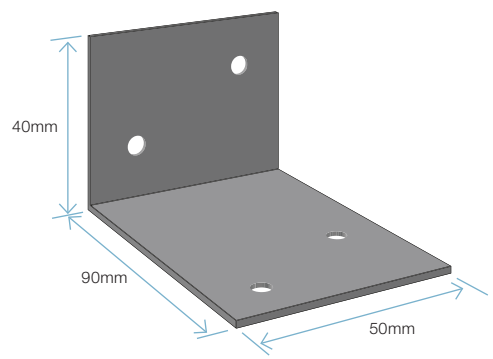
Product	Use	Supplier
Pink®Batts® R2.2 (90mm) Glass Wool Insulation (for steel frame systems) Pink®Batts® R2.2 (90mm) Glass Wool Insulation	Installed between the studs and nogs in both wall frames	Pink®Batts®*
Mineral Wool or Ceramic Fibre Cavity Insulation	Installed to seal the top of the GIB Barrierline® wall. Thickness to match cavity. Minimum density 40kg/m^3.	Any

**or refer to online GIB Noise® Control Supplement for additional options*

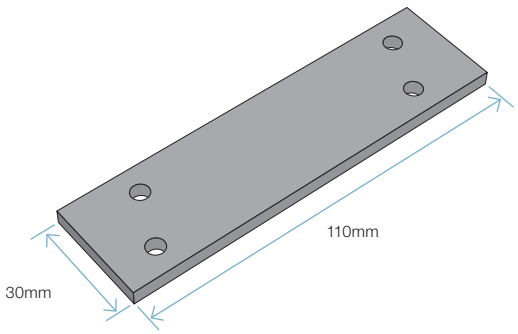
Weather Protection

GIB Barrierline®, GIB Fyreline® and GIB Weatherline® sheets are required to be protected from weather on site prior to installation. Sheet pallets come by default shrink wrapped with a premium recyclable wrap and an additional charge to apply at the time of order placement. Alternatively reusable pallet covers may be purchased at the time of order placement (GIB® Sku 15651). For more information on pallet shrink wrapping or reusable pallet covers contact your merchant or GIB® Customer Services 0800 475 475.

GIB® WALL CLIP

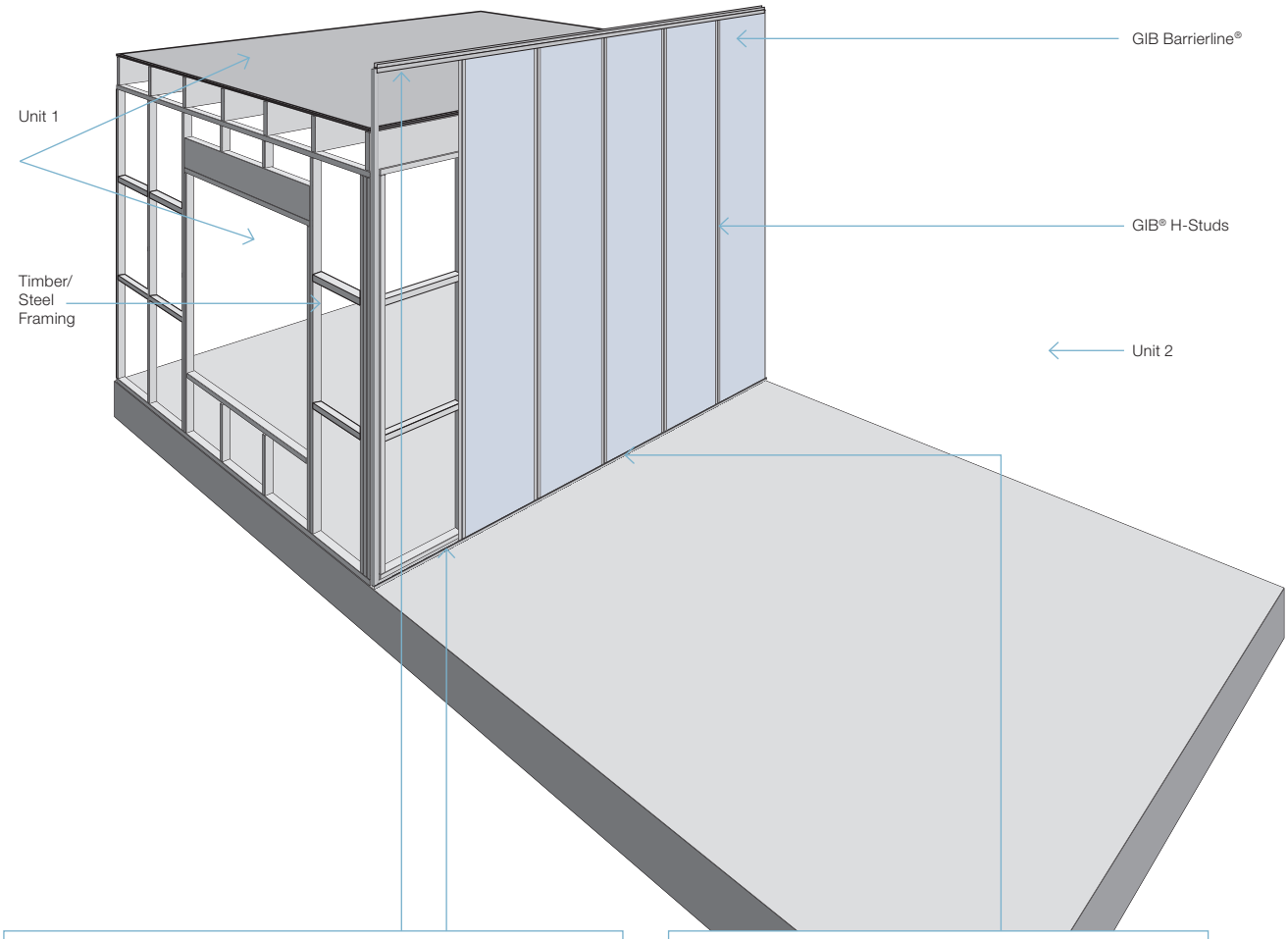


GIB® WALL STRAP

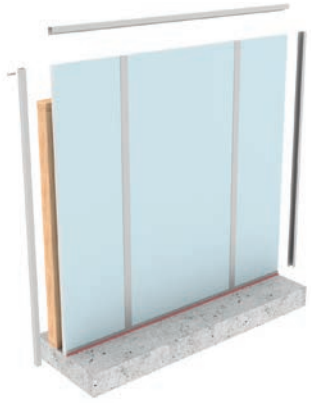


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STEP 1
FIGURE 4 - GROUND FLOOR BARRIER INSTALLED

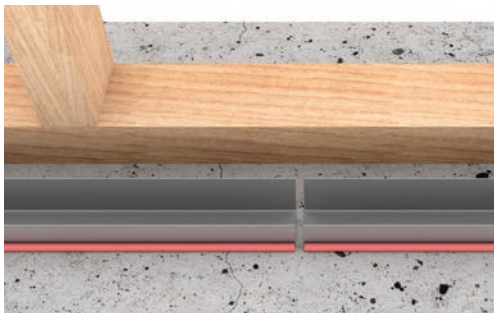


PERIMETER CHANNEL



- GIB® Rondo® 140 perimeter channel to base, ends and horizontal joins of wall.
- Optional screw in wall corners to hold perimeter channels in place.
- Wafer head screw 16mm x 10g

FLOOR SLAB

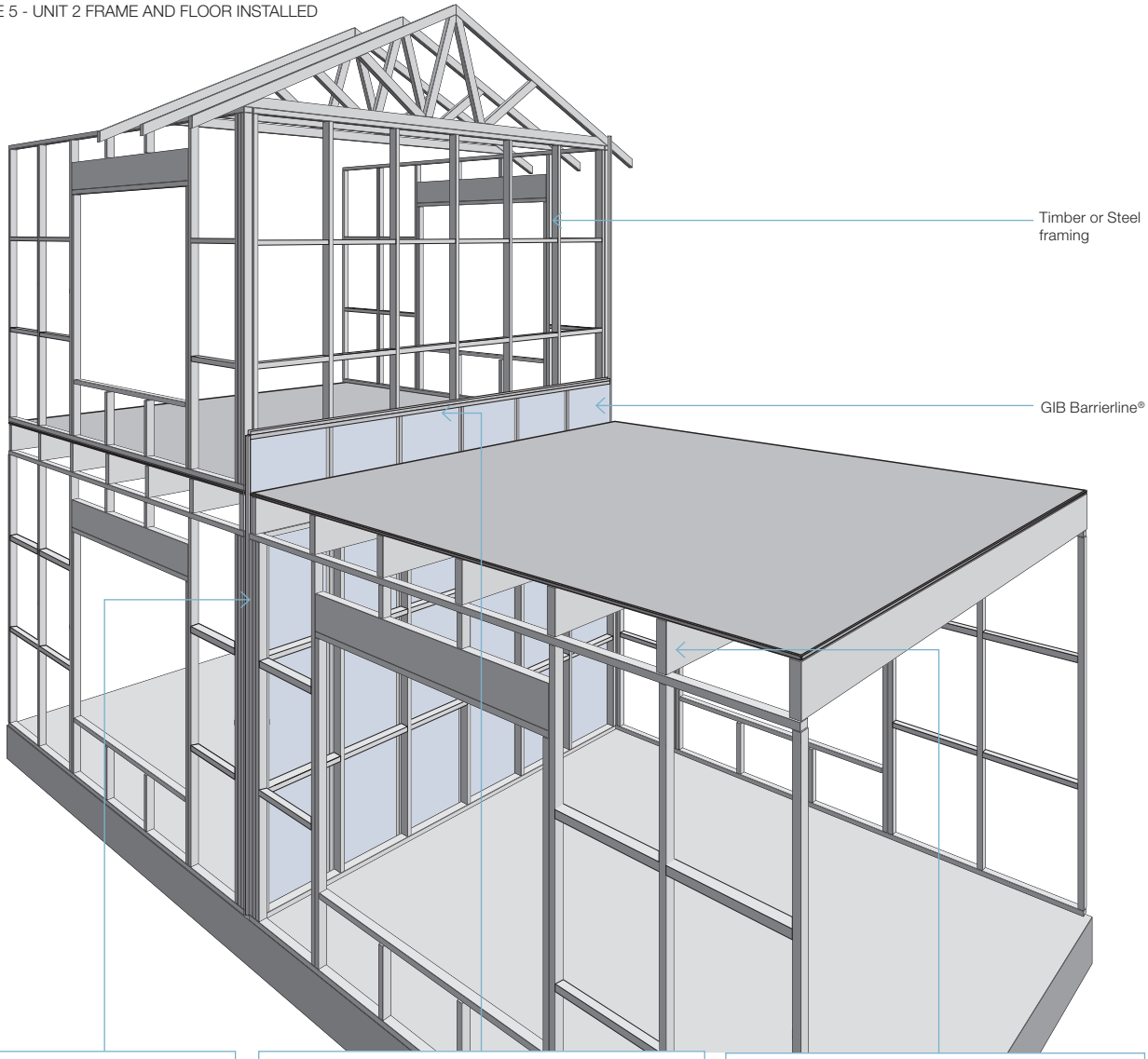


- Bead of exterior rated fire/acoustic sealant on one side at Perimeter channel and floor slab.
- 5mm drainage gap between perimeter channels.

Scan this QR Code to see the construction sequencing of this GIB® detail.

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STEP 2
FIGURE 5 - UNIT 2 FRAME AND FLOOR INSTALLED



GIB® WALL STRAPS



— Use GIB® wall straps on the ends of the walls.

HORIZONTAL JOINTS



— GIB® Rondo® 140 perimeter channel fastened back to back to support GIB® Barrierline sheets at all horizontal joints.
— Drill-point wafer head screws 16mm x 10g.

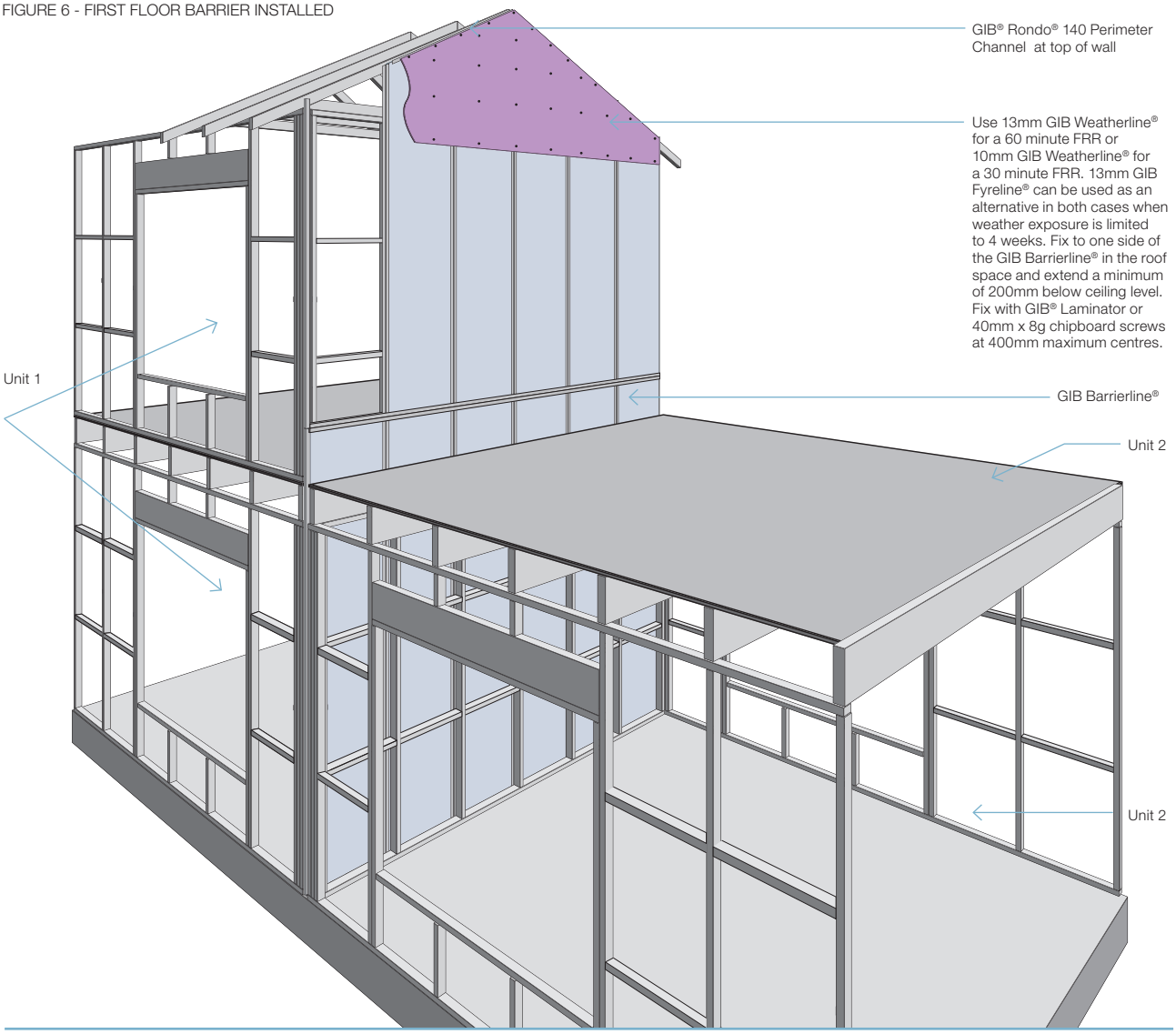
GIB® WALL CLIPS



— GIB® wall clips attached to H-studs and framing

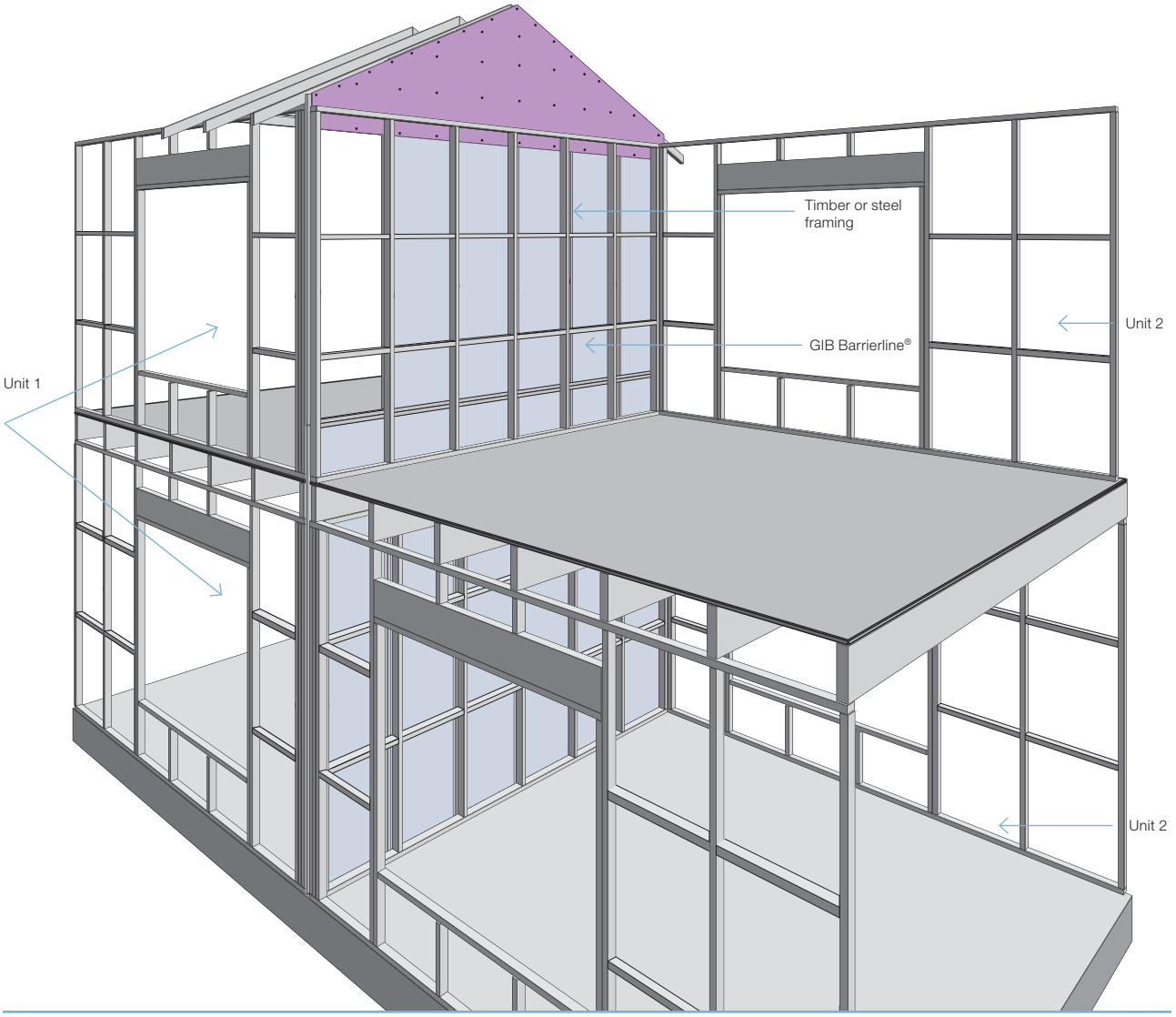
Scan this QR Code to see the construction sequencing of this GIB® detail.

STEP 3
FIGURE 6 - FIRST FLOOR BARRIER INSTALLED



Scan this QR Code to see the construction sequencing of this GIB® detail.

STEP 4
FIGURE 7 - UNIT 2 FIRST FLOOR FRAMING INSTALLED



Scan this QR Code to see the construction sequencing of this GIB® detail.

SDC - Approved Document C/VM1 Compliance Document for New Zealand Building Code Clauses C1 to C6 Protection from Fire - 30 June 2017 - Amendment 1 - 29 May 2019 - Amendment 2 - 24 June 2021 - Amendment 3 - 8 August 2022 - Amendment 4 - 2 December 2022 - phillid

Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60a	**STC**	68	**Lining**	2 x 10mm GIB® Standard plasterboard each side
	Rw	66	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	300–330mm wide

TIMBER FRAMING

Stud size	Space between frames
90mm	80–110mm

Framing to comply with:

- NZBC B1 – Structure: AS1 Clause 3 – Timber (NZS 3604) or VM1 Clause 6 – Timber (NZS 3603).
- NZBC B2 – Durability: AS1 Clause 3.2 – Timber (NZS 3602).

Maximum height as determined by NZS 3604 stud and top plate tables for load-bearing walls.

CENTRAL BARRIER

- Allow a 25–40mm gap between each timber frame and the GIB Barrierline® central barrier.
- Fix GIB® Rondo® 140 Perimeter Channels to the concrete floor with steel fasteners at 600mm centres and no more than 50mm from channel ends using 3.5mm x 30mm or 4.0mm x 25mm concrete nails or 6mm x 40mm concrete anchors.
- A 5mm gap between GIB® Rondo® 140 Perimeter Channels will let any collected rain water escape.
- GIB® Rondo® 140 Perimeter Channel to be sealed to the floor slab on one side with exterior fire/acoustic sealant.
- Install 25mm GIB Barrierline® into GIB® H-Studs at 600mm centres.
- Cap GIB Barrierline® ends with GIB® Rondo® 140 Perimeter Channel.
- Offset GIB® H-Studs from wall studs to allow attachment of GIB® Wall Clips to both frames. Nog as required where no framing exists.
- Place two GIB® Wall Clips (one each side) no more than 600mm below the top of each GIB® H-Stud, no further apart than 3000mm vertically.
- Fix GIB® Rondo® 140 Perimeter Channel at wall ends to both timber frames with GIB® Wall Clips or GIB® Wall Straps placed no further apart than 3000mm vertically.
- Use no more than two GIB® Wall Clips or GIB® Wall Straps (one each side) for each 3000mm length of GIB® H-Stud or GIB® Rondo® 140 Perimeter Channel.
- In the roof space, fix a 13mm GIB Weatherline® or 13mm GIB Fyreline® Laminate to one side of the GIB Barrierline® with GIB® Laminator Screws or 40mm x 8g chipboard screws on a 400mm grid, and at no more than 100mm from sheet edges.
- Extend the laminate at least 200mm below ceiling level
- Once erected, protect the GIB Barrierline® and laminate from rain. The use of suitable sheeting can avoid delays in allowing the board to dry before wall linings are installed.
- If the specification calls for a 30 minute FRR a 10mm GIB Weatherline® laminate can be used.

SOUND CONTROL INFILL

Install Pink® Batts® R2.2 (90mm) glass wool insulation between the studs and nogs in both frames.

WALL LINING

2 layers of 10mm GIB® Standard each side.

Fix inner sheets vertically. Where sheet end butt joints are unavoidable they must be formed over framing. Use full height sheets where possible.

Outer layer sheets can be fixed vertically or horizontally. If fixed vertically, outer layer sheet joints must be offset 600mm from those of the inner layer. Use full height sheets where possible.

If the wall lining forms part of the structural bracing system, the inner layer lining type and fixings must comply with the published bracing system. Check requirements for specific bracing element hold-down connections.

FASTENING THE LINING

Fasteners

Inner layer: 32mm x 6g GIB® Grabber® High Thread Drywall Screws.

Outer layer: 41mm x 6g GIB® Grabber® High Thread Drywall Screws.

Fastener centres

Fix inner layer sheets to each stud and plate with fasteners at 300mm centres. When fixing outer layer sheets vertically, offset sheet joints from the inner layer. Fix the perimeter of each outer layer sheet to the frame with fasteners at 300mm centres. Adhesive fix the outer layer to the inner layer with daubs of GIBFix® adhesive down the centre line at 300mm centres. Do not place GIBFix® adhesive at sheet edges or within 200mm of screw fixings.

If fixing outer layer sheets horizontally, fasteners to be placed at 300mm centres to top and bottom plates and perimeter studs. Install pairs of single fasteners to each stud where the horizontal joint crosses. Adhesive fix the outer layer to the inner layer with daubs of GIBFix® adhesive down the centre line at 300mm centres. Do not place GIBFix® adhesive at sheet edges or within 200mm of screw fixings. Place screws no closer than 12mm from paperbound sheet edges and 18mm from any sheet end or cut edge.

BUILDING SERVICE PENETRATIONS

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally

SDC - Approved Application Document B2/AS1 Amendment 23 07/12/2023 of 22406/2024 08/2024 phillid

Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60a	**STC**	68	**Lining**	2 x 10mm GIB® Standard plasterboard each side
	Rw	66	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	300–330mm wide

600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

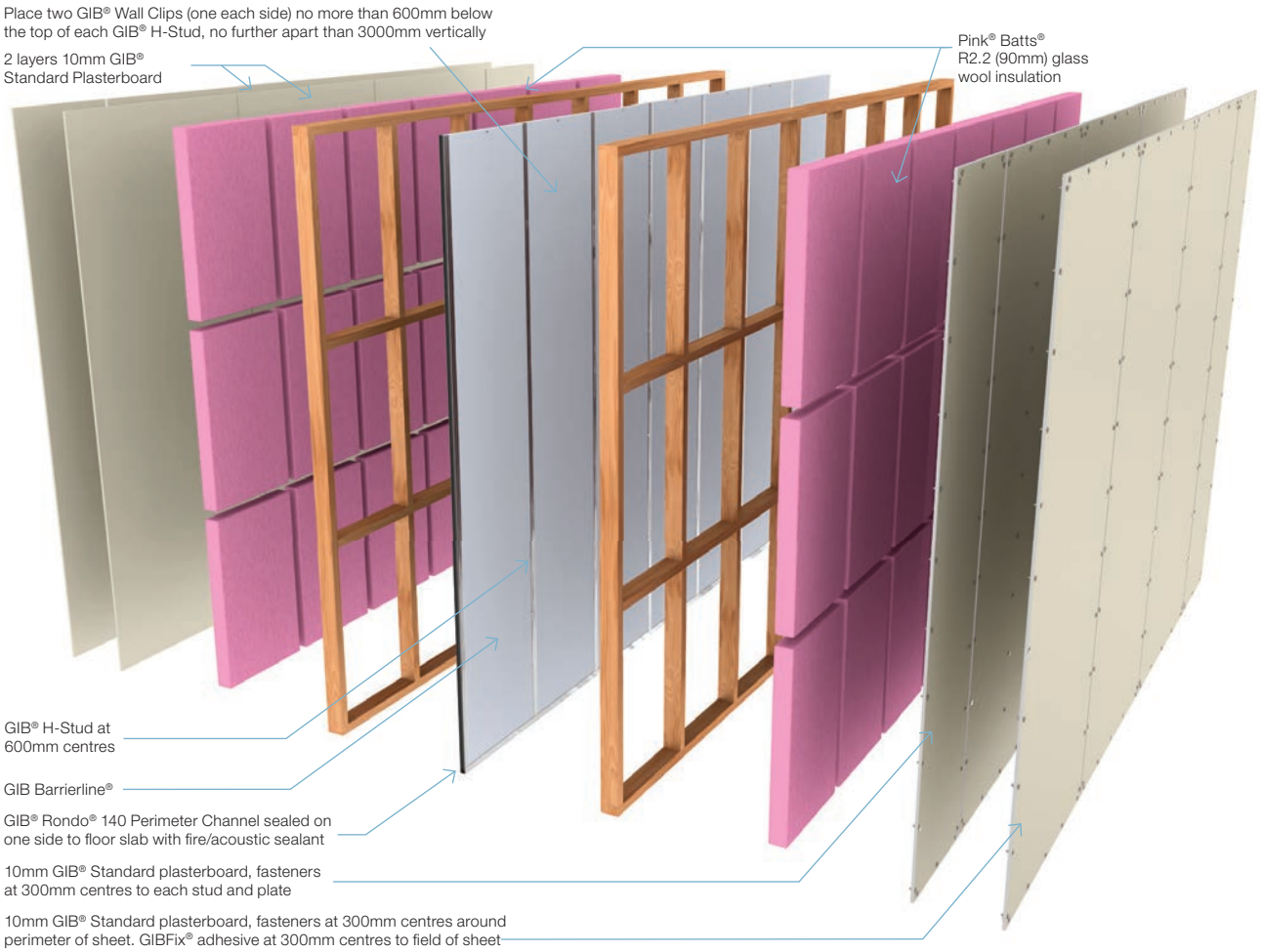
WET AREA WALL LINING

If the outer layer of 10mm GIB® Standard plasterboard wall lining is substituted with 10mm GIB Aqualine®, the FRR and noise control rating will be retained.

JOINTING

Central Barrier: Unstopped.
Inner layer wall lining: Unstopped.
Roof Laminate Layer: Unstopped

Outer layer wall lining: All fastener heads stopped and all sheet joints tape reinforced and stopped in accordance with the publication entitled GIB® Site Guide. Wall to ceiling junctions are to be reinforced with paper tape and square stopped or finished with GIB-Cove®.



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Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60b	**STC**	64	**Lining**	1 x 10mm GIB Braceline®/GIB Noiseline® each side
	Rw	63	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	280–310mm wide

TIMBER FRAMING

Stud size	Space between frames
90mm	80–110mm

Framing to comply with:

- NZBC B1 – Structure: AS1 Clause 3 – Timber (NZS 3604) or VM1 Clause 6 – Timber (NZS 3603).
- NZBC B2 – Durability: AS1 Clause 3.2 – Timber (NZS 3602).

Maximum height as determined by NZS 3604 stud and top plate tables for load-bearing walls.

CENTRAL BARRIER

- Allow a 25–40mm gap between each timber frame and the GIB Barrierline® central barrier.
- Fix GIB® Rondo® 140 Perimeter Channels to the concrete floor with steel fasteners at 600mm centres and no more than 50mm from channel ends using 3.5mm x 30mm or 4.0mm x 25mm concrete nails or 6mm x 40mm concrete anchors.
- A 5mm gap between GIB® Rondo® 140 Perimeter Channels will let any collected rain water escape.
- GIB® Rondo® 140 Perimeter Channel to be sealed to the floor slab on one side with exterior fire/acoustic sealant.
- Install 25mm GIB Barrierline® into GIB® H-Studs at 600mm centres.
- Cap GIB Barrierline® ends with GIB® Rondo® 140 Perimeter Channel.
- Offset GIB® H-Studs from wall studs to allow attachment of GIB® Wall Clips to both frames. Nog as required where no framing exists.
- Place two GIB® Wall Clips (one each side) no more than 600mm below the top of each GIB® H-Stud, no further apart than 3000mm vertically.
- Fix GIB® Rondo® 140 Perimeter Channel at wall ends to both timber frames with GIB® Wall Clips or GIB® Wall Straps placed no further apart than 3000mm vertically.
- Use no more than two GIB® Wall Clips or GIB® Wall Straps (one each side) for each 3000mm length of GIB® H-Stud or GIB® Rondo® 140 Perimeter Channel.
- In the roof space, fix a 13mm GIB Weatherline® or 13mm GIB Fyreline® Laminate to one side of the GIB Barrierline® with GIB® Laminator Screws or 40mm x 8g chipboard screws on a 400mm grid, and at no more than 100mm from sheet edges.
- Extend the laminate at least 200mm below ceiling level.
- Once erected, protect the GIB Barrierline® and laminate from rain. The use of suitable sheeting can avoid delays in allowing the board to dry before wall linings are installed.
- If the specification calls for a 30 minute FRR a 10mm GIB Weatherline® laminate can be used.

SOUND CONTROL INFILL

Install Pink® Batts® R2.2 (90mm) glass wool insulation between the studs and nogs in both frames.

WALL LINING

A single layer of 10mm GIB Braceline®/GIB Noiseline® fixed vertically or horizontally.

Use full height sheets where possible.

Sheet joints are touch fitted and must occur over framing. Where sheet end butt joints are unavoidable they must be formed over framing.

If the wall lining forms part of the structural bracing system, the lining type and fixings must comply with the published bracing system. Check requirements for specific bracing element hold-down connections.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Drywall Screws.

Fastener centres

300mm centres to each stud, plate and sheet edge. Place screws no closer than 12mm from paperbound edges and 18mm from any sheet end or cut edges.

BUILDING SERVICE PENETRATIONS

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally 600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60b	**STC**	64	**Lining**	1 x 10mm GIB Braceline®/GIB Noiseline® each side
	Rw	63	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	280–310mm wide

WET AREA WALL LINING

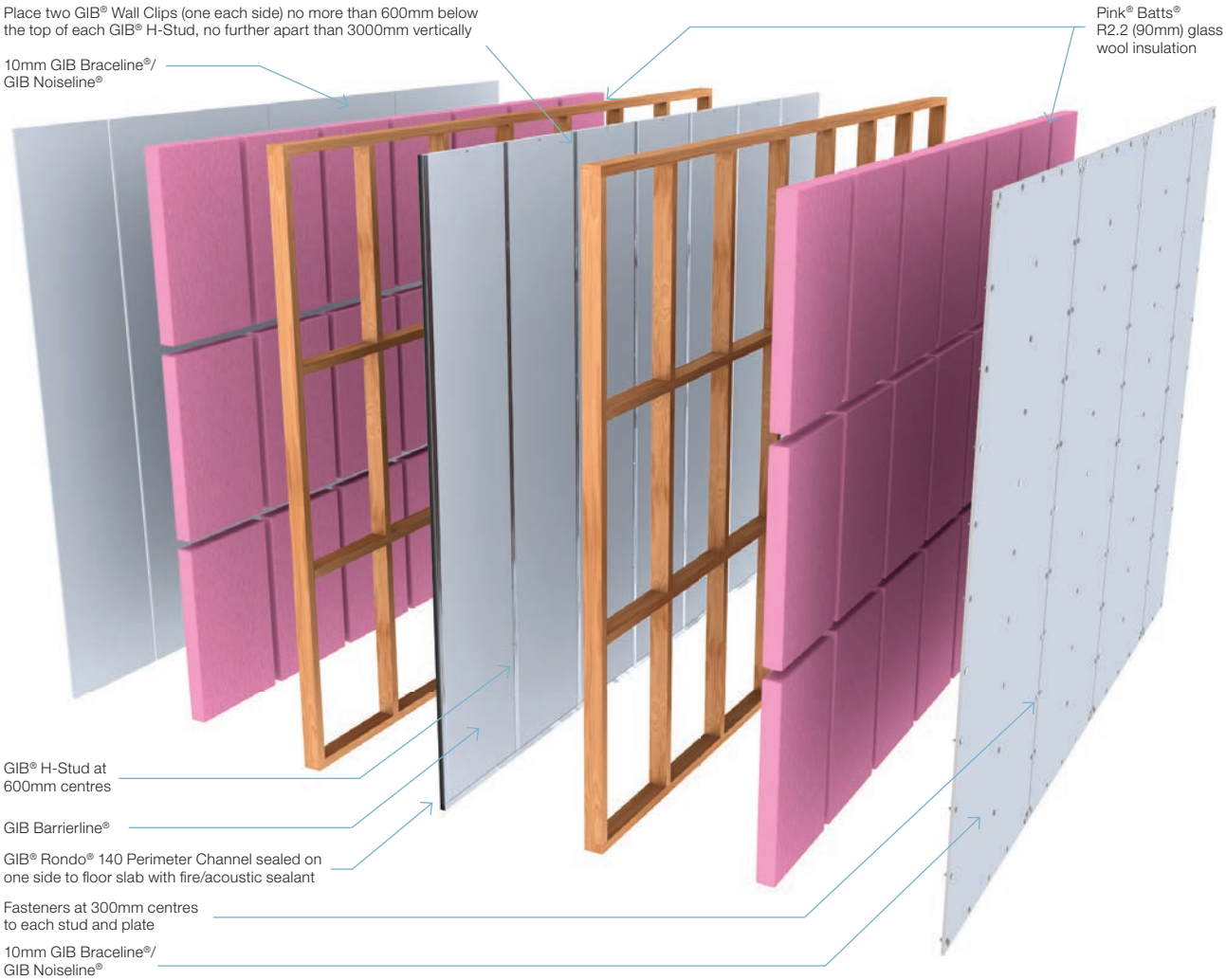
If the 10mm GIB Braceline®/GIB Noiseline® wall lining is substituted with 10mm GIB Aqualine® on both sides, the FRR will be retained but a noise control reduction of 4 STC/Rw points can be expected.

If the 10mm GIB Braceline®/GIB Noiseline® wall lining is substituted with 13mm GIB Aqualine®, the FRR and noise control rating will be maintained.

JOINTING

Central Barrier: Unstopped.
Roof Laminate Layer: Unstopped

Wall lining: All fastener heads stopped and all sheet joints tape reinforced and stopped in accordance with the publication entitled GIB® Site Guide. Wall to ceiling junctions are to be reinforced with paper tape and square stopped or finished with GIB-Cove®.



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Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60c	**STC**	67	**Lining**	1 x 13mm GIB Braceline®/GIB Noiseline® each side
	Rw	65	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	286–316mm wide

TIMBER FRAMING

Stud size	Space between frames
90mm	80–110mm

Framing to comply with:

- NZBC B1 – Structure: AS1 Clause 3 – Timber (NZS 3604) or VM1 Clause 6 – Timber (NZS 3603).
- NZBC B2 – Durability: AS1 Clause 3.2 – Timber (NZS 3602).

Maximum height as determined by NZS 3604 stud and top plate tables for load-bearing walls.

CENTRAL BARRIER

- Allow a 25–40mm gap between each timber frame and the GIB Barrierline® central barrier.
- Fix GIB® Rondo® 140 Perimeter Channels to the concrete floor with steel fasteners at 600mm centres and no more than 50mm from channel ends using 3.5mm x 30mm or 4.0mm x 25mm concrete nails or 6mm x 40mm concrete anchors.
- A 5mm gap between GIB® Rondo® 140 Perimeter Channels will let any collected rain water escape.
- GIB® Rondo® 140 Perimeter Channel to be sealed to the floor slab on one side with exterior fire/acoustic sealant.
- Install 25mm GIB Barrierline® into GIB® H-Studs at 600mm centres.
- Cap GIB Barrierline® ends with GIB® Rondo® 140 Perimeter Channel.
- Offset GIB® H-Studs from wall studs to allow attachment of GIB® Wall Clips to both frames. Nog as required where no framing exists.
- Place two GIB® Wall Clips (one each side) no more than 600mm below the top of each GIB® H-Stud, no further apart than 3000mm vertically.
- Fix GIB® Rondo® 140 Perimeter Channel at wall ends to both timber frames with GIB® Wall Clips or GIB® Wall Straps placed no further apart than 3000mm vertically.
- Use no more than two GIB® Wall Clips or GIB® Wall Straps (one each side) for each 3000mm length of GIB® H-Stud or GIB® Rondo® 140 Perimeter Channel.
- In the roof space, fix a 13mm GIB Weatherline® or 13mm GIB Fyreline® Laminate to one side of the GIB Barrierline® with GIB® Laminator Screws or 40mm x 8g chipboard screws on a 400mm grid, and at no more than 100mm from sheet edges.
- Extend the laminate at least 200mm below ceiling level
- Once erected, protect the GIB Barrierline® and laminate from rain. The use of suitable sheeting can avoid delays in allowing the board to dry before wall linings are installed.
- If the specification calls for a 30 minute FRR a 10mm GIB Weatherline® laminate can be used.

SOUND CONTROL INFILL

Install Pink® Batts® R2.2 (90mm) glass wool insulation between the studs and nogs in both frames.

WALL LINING

A single layer of 13mm GIB Braceline®/GIB Noiseline® fixed vertically or horizontally.

Use full height sheets where possible.

Sheet joints are touch fitted and must occur over framing. Where sheet end butt joints are unavoidable they must be formed over framing.

If the wall lining forms part of the structural bracing system, the lining type and fixings must comply with the published bracing system. Check requirements for specific bracing element hold-down connections.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Drywall Screws.

Fastener Centres

300mm centres to each stud, plate and sheet edge. Place screws no closer than 12mm from paperbound edges and 18mm from any sheet end or cut edges.

BUILDING SERVICE PENETRATIONS

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally 600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

WET AREA WALL LINING

If the 13mm GIB Braceline®/GIB Noiseline® wall lining is substituted with 13mm GIB Aqualine® on both sides, the FRR will be retained but a noise control reduction of 3 STC/Rw points can be expected.

SDC - Approved Document C/disputed by Council 07/12/2023 - Page 234 of 252 - 06/2406/2024 08:20:10 - phillid

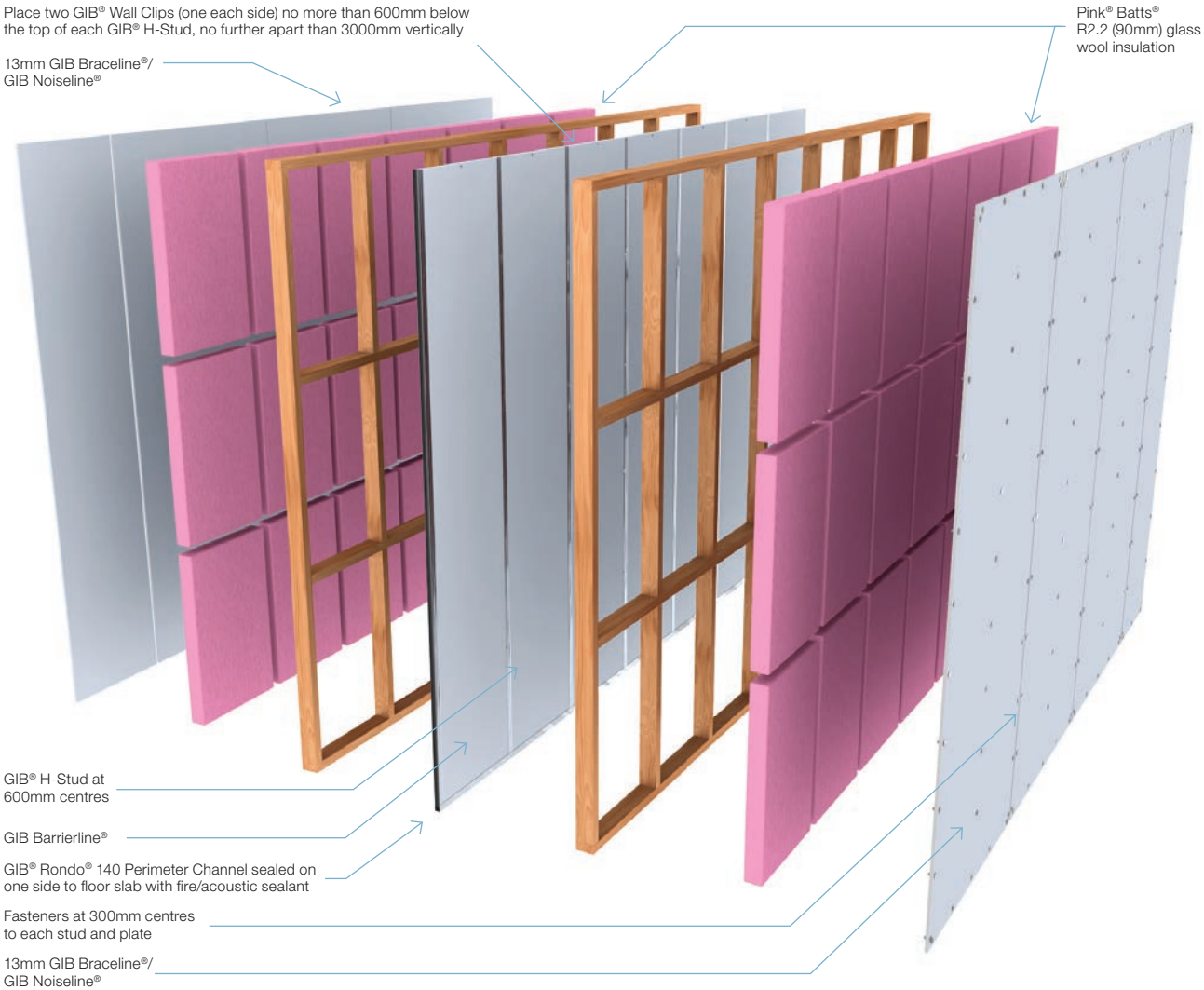
Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60c	**STC**	67	**Lining**	1 x 13mm GIB Braceline®/GIB Noiseline® each side
	Rw	65	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	286–316mm wide

JOINTING

Central Barrier: Unstopped.
Roof Laminate Layer: Unstopped

Wall lining: All fastener heads stopped and all sheet joints tape reinforced and stopped in accordance with the publication entitled GIB® Site Guide. Wall to ceiling junctions are to be reinforced with paper tape and square stopped or finished with GIB-Cove®.



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Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60d	**STC**	61	**Lining**	1 x 13mm GIB® Standard plasterboard each side
	Rw	60	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	286–316mm wide

TIMBER FRAMING

Stud size	Space between frames
90mm	80–110mm

Framing to comply with:

- NZBC B1 – Structure: AS1 Clause 3 – Timber (NZS 3604) or VM1 Clause 6 – Timber (NZS 3603).
- NZBC B2 – Durability: AS1 Clause 3.2 – Timber (NZS 3602).

Maximum height as determined by NZS 3604 stud and top plate tables for load-bearing walls.

CENTRAL BARRIER

- Allow a 25–40mm gap between each timber frame and the GIB Barrierline® central barrier.
- Fix GIB® Rondo® 140 Perimeter Channels to the concrete floor with steel fasteners at 600mm centres and no more than 50mm from channel ends using 3.5mm x 30mm or 4.0mm x 25mm concrete nails or 6mm x 40mm concrete anchors.
- A 5mm gap between GIB® Rondo® 140 Perimeter Channels will let any collected rain water escape.
- GIB® Rondo® 140 Perimeter Channel to be sealed to the floor slab on one side with exterior fire/acoustic sealant.
- Install 25mm GIB Barrierline® into GIB® H-Studs at 600mm centres.
- Cap GIB Barrierline® ends with GIB® Rondo® 140 Perimeter Channel.
- Offset GIB® H-Studs from wall studs to allow attachment of GIB® Wall Clips to both frames. Nog as required where no framing exists.
- Place two GIB® Wall Clips (one each side) no more than 600mm below the top of each GIB® H-Stud, no further apart than 3000mm vertically.
- Fix GIB® Rondo® 140 Perimeter Channel at wall ends to both timber frames with GIB® Wall Clips or GIB® Wall Straps placed no further apart than 3000mm vertically.
- Use no more than two GIB® Wall Clips or GIB® Wall Straps (one each side) for each 3000mm length of GIB® H-Stud or GIB® Rondo® 140 Perimeter Channel.
- In the roof space, fix a 13mm GIB Weatherline® or 13mm GIB Fyreline® Laminate to one side of the GIB Barrierline® with GIB® Laminator Screws or 40mm x 8g chipboard screws on a 400mm grid, and at no more than 100mm from sheet edges.
- Extend the laminate at least 200mm below ceiling level
- Once erected, protect the GIB Barrierline® and laminate from rain. The use of suitable sheeting can avoid delays in allowing the board to dry before wall linings are installed.
- If the specification calls for a 30 minute FRR a 10mm GIB Weatherline® laminate can be used.

SOUND CONTROL INFILL

Install Pink® Batts® R2.2 (90mm) glass wool insulation between the studs and nogs in both frames.

WALL LINING

A single layer of 13mm GIB® Standard Plasterboard fixed vertically or horizontally.

Use full height sheets where possible.

Sheet joints are touch fitted and must occur over framing. Where sheet end butt joints are unavoidable they must be formed over framing.

If the wall lining forms part of the structural bracing system, the lining type and fixings must comply with the published bracing system. Check requirements for specific bracing element hold-down connections.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Drywall Screws.

Fastener centres

300mm centres to each stud, plate and sheet edge. Place screws no closer than 12mm from paperbound edges and 18mm from any sheet end or cut edges.

BUILDING SERVICE PENETRATIONS

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally 600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60d	**STC**	61	**Lining**	1 x 13mm GIB® Standard plasterboard each side
	Rw	60	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	286–316mm wide

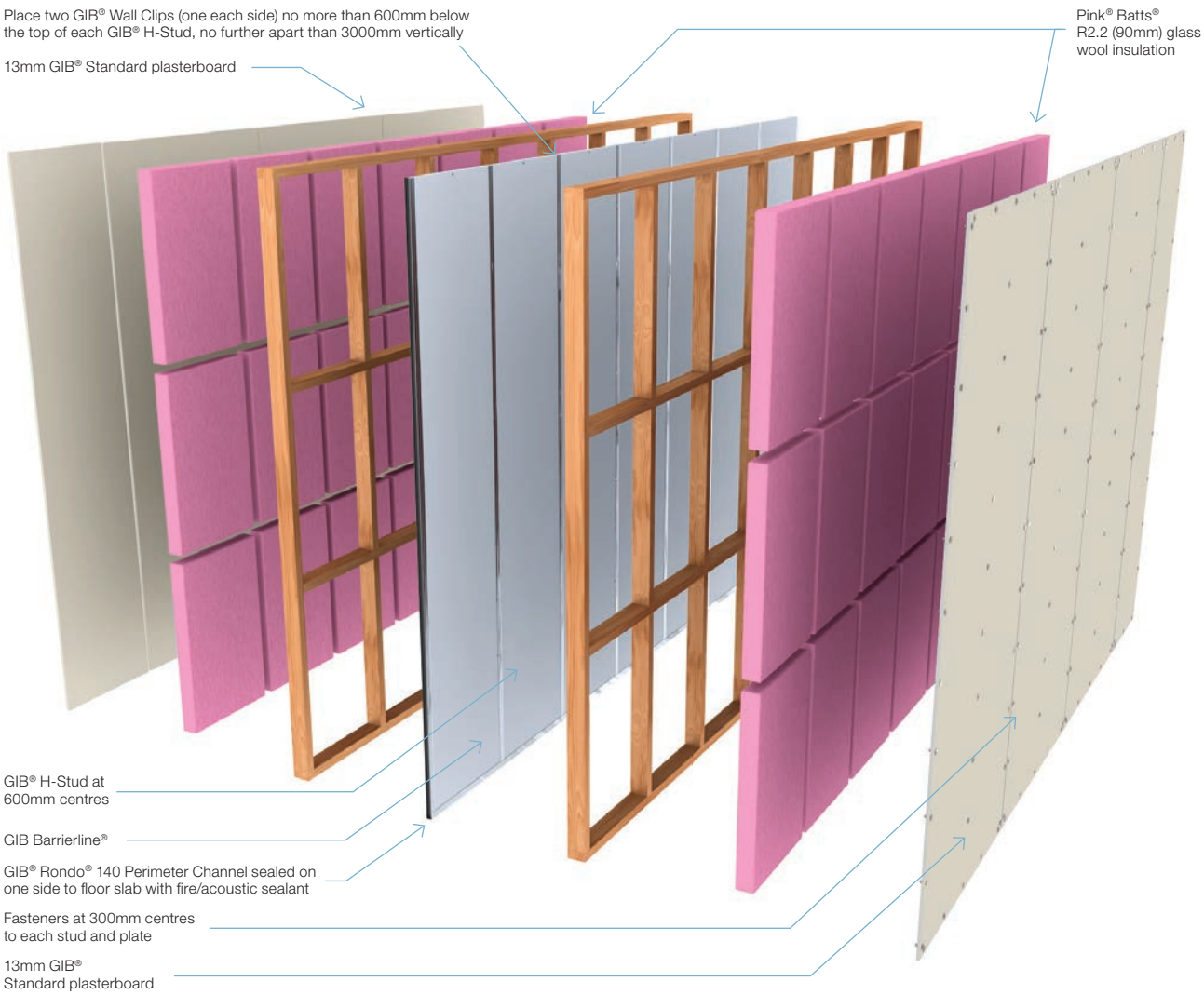
WET AREA WALL LINING

If the 13mm GIB® Standard Plasterboard wall lining is substituted with 13mm GIB Aqualine®, the FRR and noise control rating will be retained.

JOINTING

Central Barrier: Unstopped.
Roof Laminate Layer: Unstopped

Wall lining: All fastener heads stopped and all sheet joints tape reinforced and stopped in accordance with the publication entitled GIB® Site Guide. Wall to ceiling junctions are to be reinforced with paper tape and square stopped or finished with GIB-Cove®.



SDC - Approved Document C/sign 2 of 2 - 07/10/2021 - 236 of 324 - 2021/0230/BCA

SDC - Approved Application Document B2/AS1 Clause 9.1 - NASH Standard Part 2: May 2019 Light Steel Framed Buildings, Verification Method B1/VM1 - Page 237 of 325 - 26/06/2024 8:08:42 pm - philld

Two way FRR — double steel frame with GIB Barrierline® central barrier

Specification	Performance		Specifications	
GBSLAB 60a	**STC**	61	**Lining**	1 x 13mm GIB® Standard plasterboard each side
	Rw	60	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	290-320mm wide (with nominal 90mm stud)

STEEL FRAMING

Framing to comply with:

- NZBC B1 – Structure: Acceptable Solution B1/AS1 Clause 9.1 – NASH Standard Part 2: May 2019 Light Steel Framed Buildings, or Verification Method B1/VM1
- NZBC B2 – Durability: Acceptable Solution B2/AS1.

C section studs shall have a minimum thickness of 0.75mm and minimum nominal depth of 90mm with 35mm wide flanges.

CENTRAL BARRIER

- Allow a 25-40mm gap between each steel frame and the GIB Barrierline® central barrier.
- Fix GIB® Rondo® 140 Perimeter Channels to the concrete floor with steel fasteners at 600mm centres and no more than 50mm from channel ends using 3.5mm x 30mm or 4.0mm x 25mm concrete nails or 6mm x 40mm concrete anchors.
- A 5mm gap between GIB® Rondo® 140 Perimeter Channels will let any collected rain water escape.
- GIB® Rondo® 140 Perimeter Channel to be sealed to the floor slab on one side with exterior fire/acoustic sealant.
- Install 25mm GIB Barrierline® into GIB® H-Studs at 600mm centres.
- Cap GIB Barrierline® ends with GIB® Rondo® 140 Perimeter Channel.
- Offset GIB® H-Studs at least 100mm from steel studs to allow attachment of GIB® Wall Clips to both frames. Nog as required where no framing exists.
- Place two GIB® Wall Clips (one each side) no more than 600mm below the top of each GIB® H-Stud, no further apart than 3000mm vertically.
- Fix GIB® Rondo® 140 Perimeter Channel at wall ends to both steel frames with GIB® Wall Clips or GIB® Wall Straps placed no further apart than 3000mm vertically.
- Use no more than two GIB® Wall Clips or GIB® Wall Straps (one each side) for each 3000mm length of GIB® H-Stud or GIB® Rondo® 140 Perimeter Channel.
- In the roof space, fix a 13mm GIB Weatherline® or 13mm GIB Fyreline® Laminate to one side of the GIB Barrierline® with GIB® Laminator Screws or 40mm x 8g chipboard screws on a 400mm grid, and at no more than 100mm from sheet edges.
- Extend the laminate at least 200mm below ceiling level
- Once erected, protect the GIB Barrierline® and laminate from rain. The use of suitable sheeting can avoid delays in allowing the board to dry before wall linings are installed.
- If the specification calls for a 30 minute FRR a 10mm GIB Weatherline® laminate can be used.

SOUND CONTROL INFILL

Pink® Batts® wall R2.2 (90mm) glass wool insulation installed between the studs in both frames.

WALL LINING

A single layer of 13mm GIB® Standard plasterboard each side of the frame.

Vertical or horizontal fixing permitted. For vertical fixings, full height sheets shall be used where possible. When sheet end butt joints are unavoidable, they shall be formed over nogs and staggered. When fixing horizontally all longitudinal sheet joints must be formed over nogs.

Sheets fitted hard to floor. Sheet joints are touch fitted and must occur over framing.

FASTENING THE LINING

Fasteners

25mm x 6g GIB® Grabber® Self Tapping Drywall Screws.

Fastener centres

300mm centres up each stud. Place fasteners 12mm from longitudinal sheet edges and 50mm from sheet ends. Place fasteners at 200mm centres along sheet end butt joints.

BUILDING SERVICE PENETRATIONS

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally 600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

SDC - Approved Application Document B2/AS1 Dated 30 July 2021 Effective 1 July 2022 Amendment 1 Dated 23 May 2022 Page 238 of 252 Dated 24 June 2022 Amendment 2 Dated 24 August 2022 phillid

Two way FRR — double steel frame with GIB Barrierline® central barrier

Specification	Performance		Specifications	
GBSLAB 60a	**STC**	61	**Lining**	1 x 13mm GIB® Standard plasterboard each side
	Rw	60	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	290-320mm wide (with nominal 90mm stud)

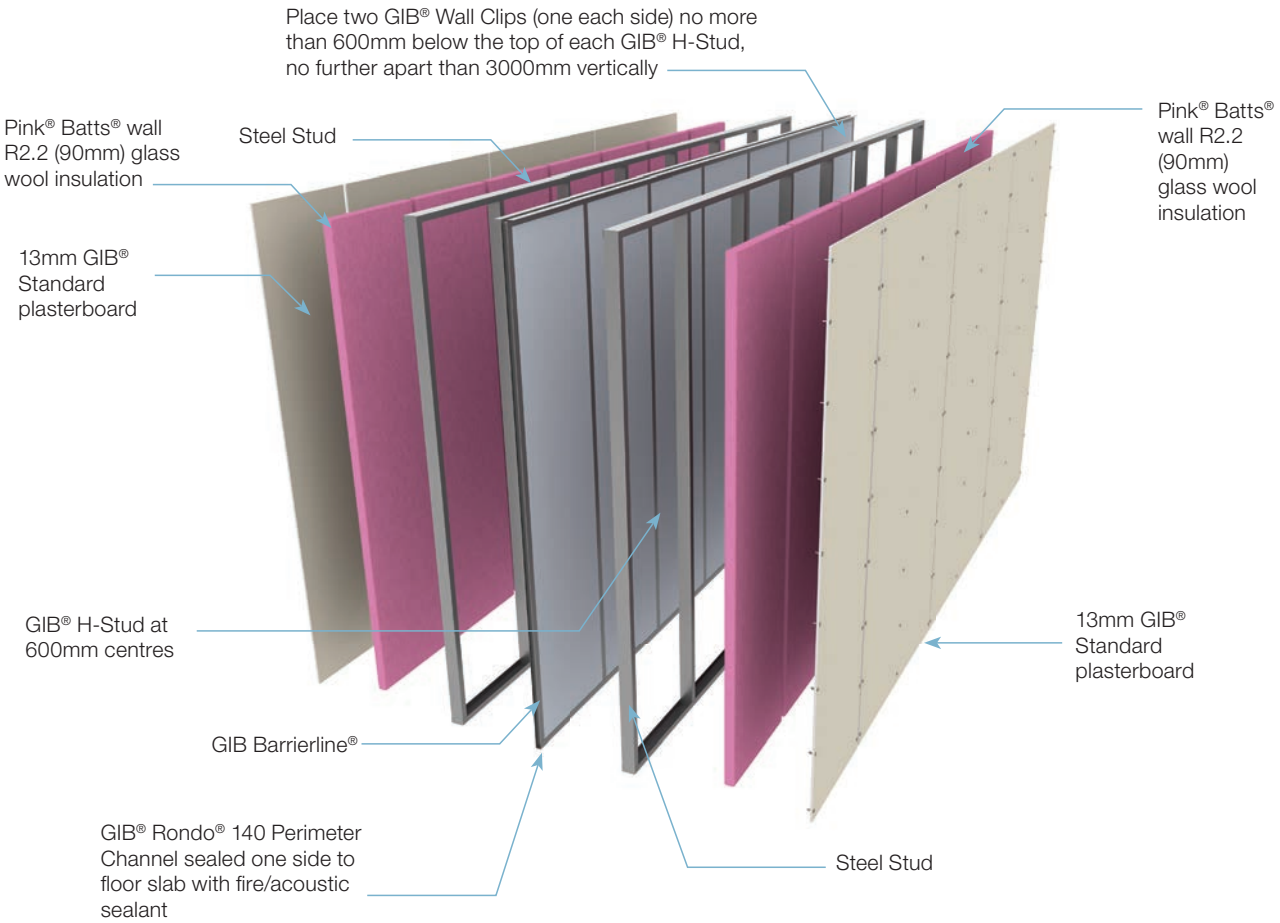
WET AREA WALL LINING

If the 13mm GIB® Standard plasterboard wall lining is substituted with 13mm GIB Aqualine®, the FRR and noise control rating will be retained.

JOINTING

Central barrier: Unstopped.

Wall lining: All fastener heads stopped and all sheet joints tape reinforced and stopped in accordance with the publication entitled GIB® Site Guide. Wall to ceiling junctions are to be reinforced with paper tape and square stopped or finished with GIB-Cove®.



SDC - Approved Application Document B2/AS1 Clause 9.1 NASH Standard Part 2 May 2019 Light Steel Framed Buildings 239 of 2240 6/2024 8:08:42 pm phillid

Two way FRR — double steel frame with GIB Barrierline® central barrier

Specification	Performance		Specifications	
GBSLAB 60b	**STC**	67	**Lining**	1 x 13mm GIB Braceline®/GIB Noiseline® each side
	Rw	65	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	290-320mm wide (with nominal 90mm stud)

STEEL FRAMING

Framing to comply with:

- NZBC B1 – Structure: Acceptable Solution B1/AS1 Clause 9.1 NASH Standard Part 2: May 2019 Light Steel Framed Buildings, or Verification Method B1/VM1
- NZBC B2 – Durability: Acceptable Solution B2/AS1.

C section studs shall have a minimum thickness of 0.75mm and minimum nominal depth of 90mm with 35mm wide flanges.

CENTRAL BARRIER

- Allow a 25-40mm gap between each steel frame and the GIB Barrierline® central barrier.
- Fix GIB® Rondo® 140 Perimeter Channels to the concrete floor with steel fasteners at 600mm centres and no more than 50mm from channel ends using 3.5mm x 30mm or 4.0mm x 25mm concrete nails or 6mm x 40mm concrete anchors.
- A 5mm gap between GIB® Rondo® 140 Perimeter Channels will let any collected rain water escape.
- GIB® Rondo® 140 Perimeter Channel to be sealed to the floor slab on one side with exterior fire/acoustic sealant.
- Install 25mm GIB Barrierline® into GIB® H-Studs at 600mm centres.
- Cap GIB Barrierline® ends with GIB® Rondo® 140 Perimeter Channel.
- Offset GIB® H-Studs from steel studs to allow attachment of GIB® Wall Clips to both frames. Nog as required where no framing exists.
- Place two GIB® Wall Clips (one each side) no more than 600mm below the top of each GIB® H-Stud, no further apart than 3000mm vertically.
- Fix GIB® Rondo® 140 Perimeter Channel at wall ends to both steel frames with GIB® Wall Clips or GIB® Wall Straps placed no further apart than 3000mm vertically.
- Use no more than two GIB® Wall Clips or GIB® Wall Straps (one each side) for each 3000mm length of GIB® H-Stud or GIB® Rondo® 140 Perimeter Channel.
- In the roof space, fix a 13mm GIB Weatherline® or 13mm GIB Fyreline® Laminate to one side of the GIB Barrierline® with GIB® Laminator Screws or 40mm x 8g chipboard screws on a 400mm grid, and at no more than 100mm from sheet edges.
- Extend the laminate at least 200mm below ceiling level
- Once erected, protect the GIB Barrierline® and laminate from rain. The use of suitable sheeting can avoid delays in allowing the board to dry before wall linings are installed.
- If the specification calls for a 30 minute FRR a 10mm GIB Weatherline® laminate can be used.

SOUND CONTROL INFILL

Pink® Batts® wall R2.2 (90mm) glass wool insulation installed between the studs in both frames.

WALL LINING

A single layer of 13mm GIB Braceline®/GIB Noiseline® each side of the frame.

Vertical or horizontal fixing permitted. For vertical fixings, full height sheets shall be used where possible. When sheet end butt joints are unavoidable, they shall be formed over nogs and staggered. When fixing horizontally all longitudinal sheet joints must be formed over nogs.

Sheets fitted hard to floor. Sheet joints are touch fitted and must occur over framing.

FASTENING THE LINING

Fasteners

25mm x 6g GIB® Grabber® Self Tapping Drywall Screws.

Fastener centres

300mm centres up each stud. Place fasteners 12mm from longitudinal sheet edges and 50mm from sheet ends. Place fasteners at 200mm centres along sheet end butt joints.

BUILDING SERVICE PENETRATIONS

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally 600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

SDC - Approved Document C/VM1 Compliance Document for New Zealand Building Code Clauses C1-C6 Protection from Fire - 30 June 2023 - Page 240 of 252 - 24/06/2024 08:20:10

Two way FRR — double steel frame with GIB Barrierline® central barrier

Specification	Performance		Specifications	
GBSLAB 60b	**STC**	67	**Lining**	1 x 13mm GIB Braceline®/GIB Noiseline® each side
	Rw	65	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	290-320mm wide (with nominal 90mm stud)

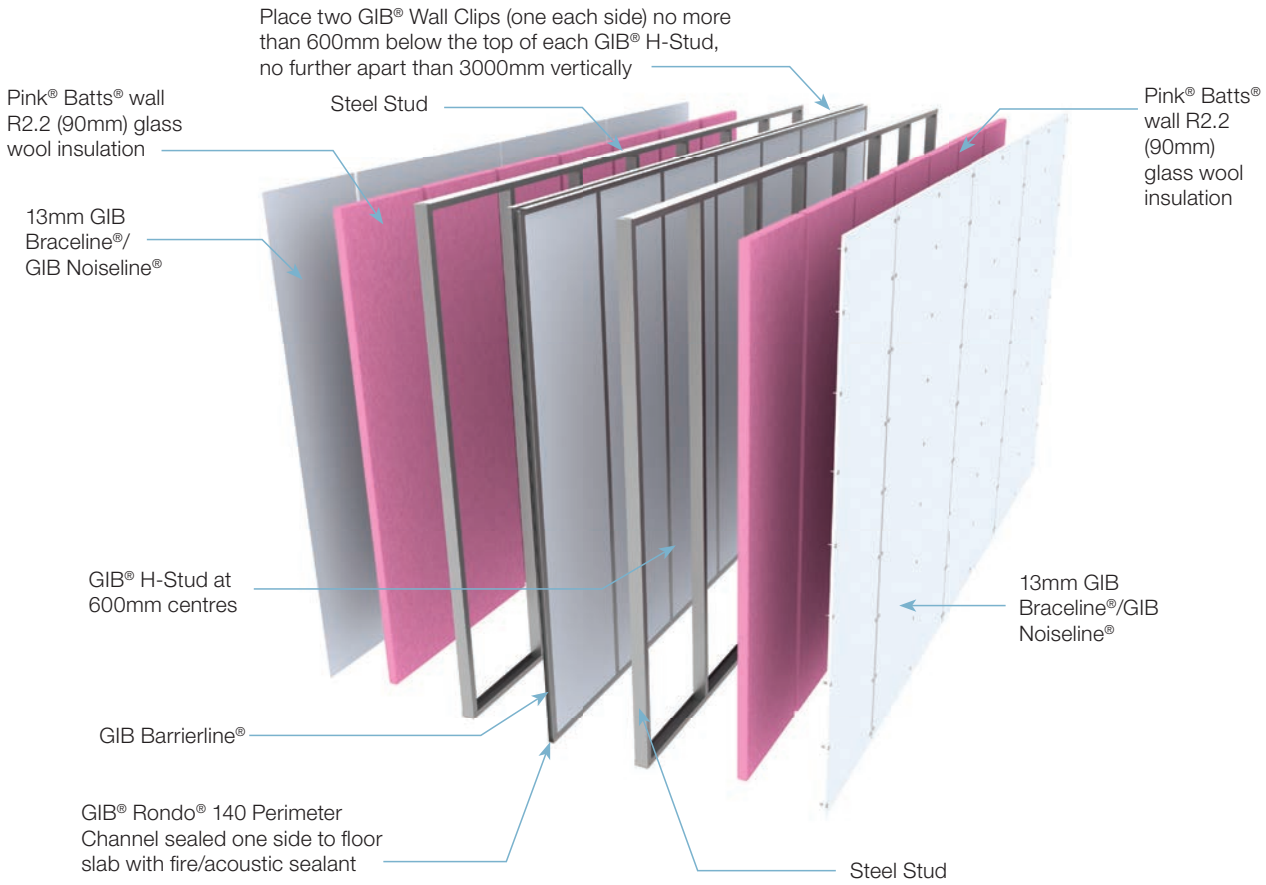
WET AREA WALL LINING

If the 13mm GIB Braceline®/GIB Noiseline® wall lining is substituted with 13mm GIB Aqualine®, the FRR will be retained but a noise control reduction of up to 3 STC/Rw points can be expected.

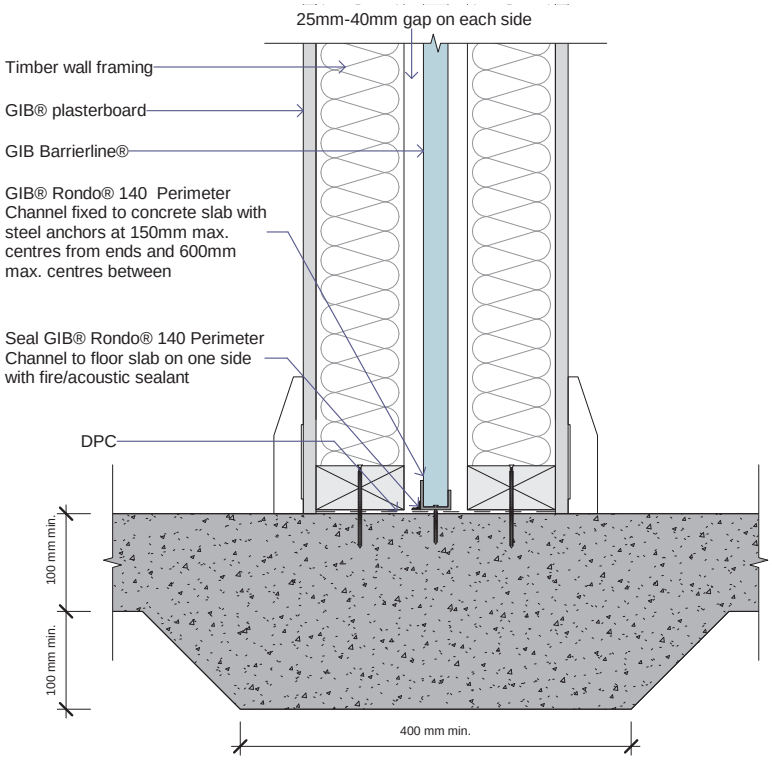
JOINTING

Central barrier: Unstopped.

Wall lining: All fastener heads stopped and all sheet joints tape reinforced and stopped in accordance with the publication entitled GIB® Site Guide. Wall to ceiling junctions are to be reinforced with paper tape and square stopped or finished with GIB-Cove®.

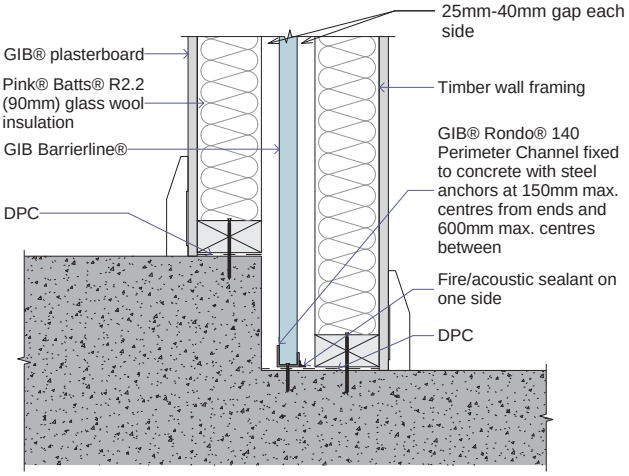


BASE DETAIL AT SLAB (END ELEVATION)



GNS101

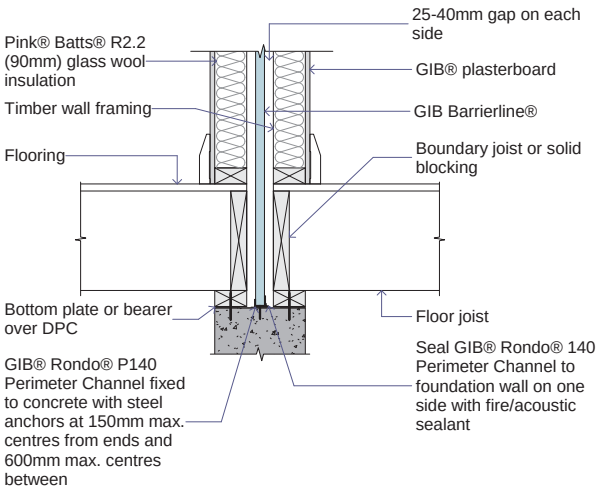
STEPPED FLOOR



GNS121

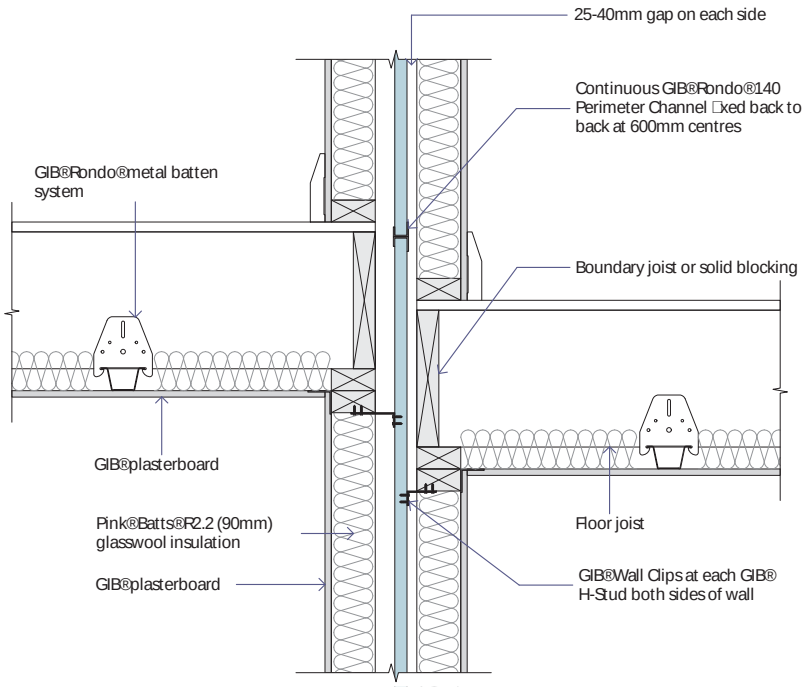
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DETAIL AT FOUNDATION WALL



GNS120

DETAIL AT UPPER STOREY FRAMED FLOOR (END ELEVATION)



GNS100

SDC - Approved Document C/VM1 - 24 June 2021 - Page 243 of 322 - 22/08/2024 10:16:16 - phillid

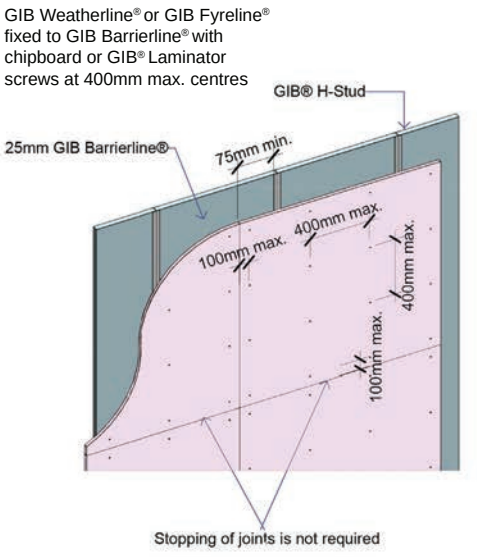
FIXING DETAIL FOR GIB WEATHERLINE® OR GIB FYRELINE® LAMINATE

60 minute FRR

— 13mm GIB Weatherline® or
— 13mm GIB Fyreline®

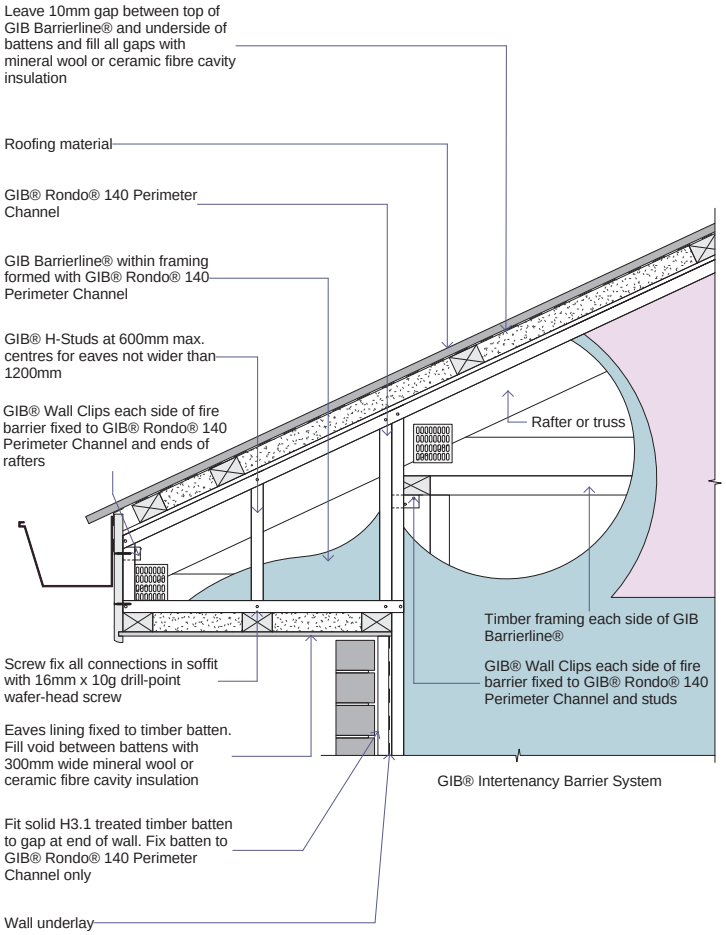
30 minute FRR

— 10 mm GIB Weatherline® or
— 13 mm GIB Fyreline®



GNS111

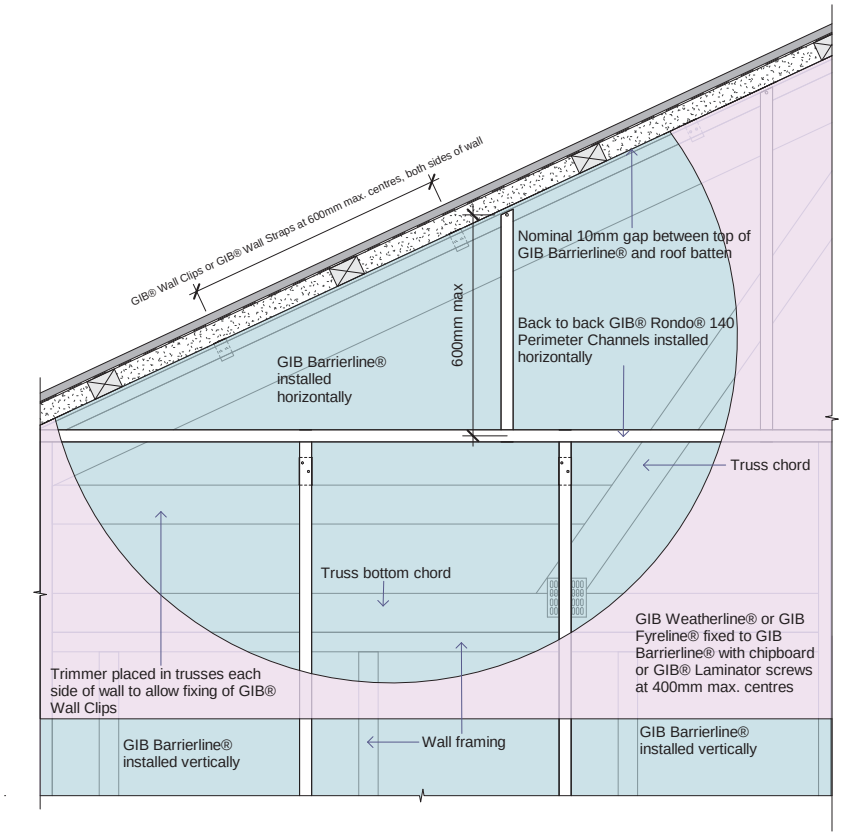
EAVES DETAIL (SIDE ELEVATION)



GNS112

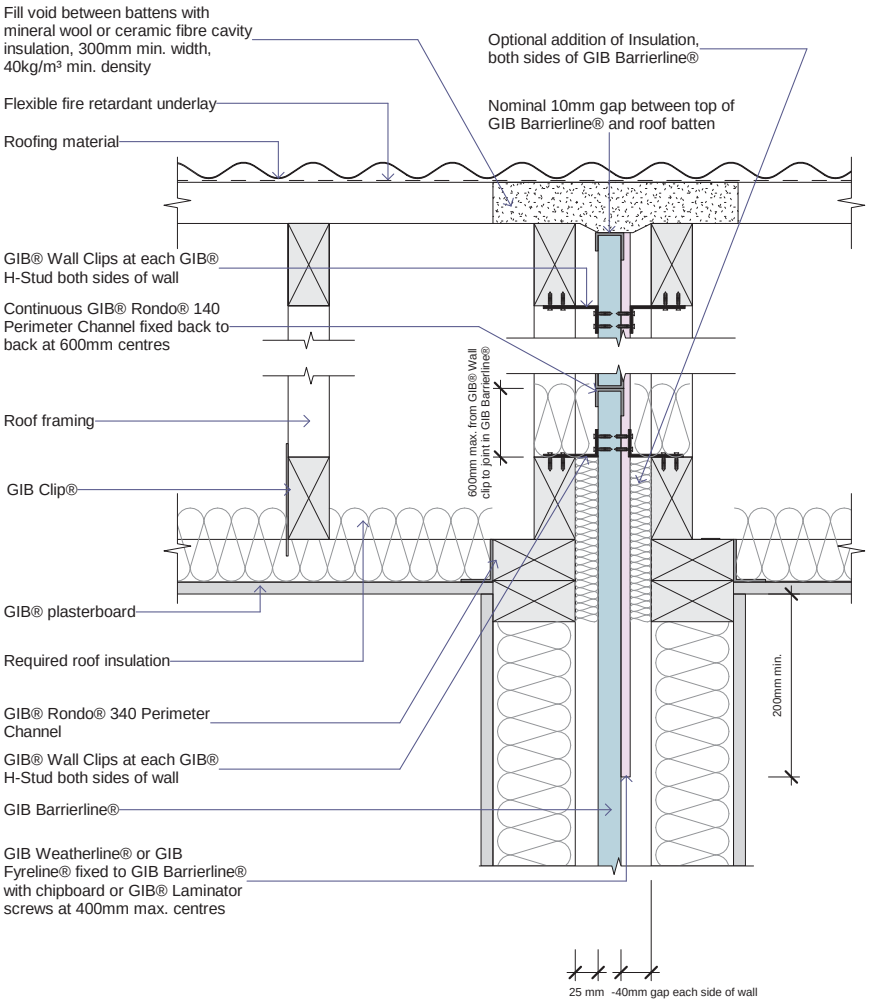
SDC - Approved Document - Do not distribute - Copyright - Provided by philld - 244 of 252 - 07/10/2023 - 2:24:06 pm

ROOF VOID DETAIL WITH HORIZONTAL SHEETING (SIDE ELEVATION)



GNS113

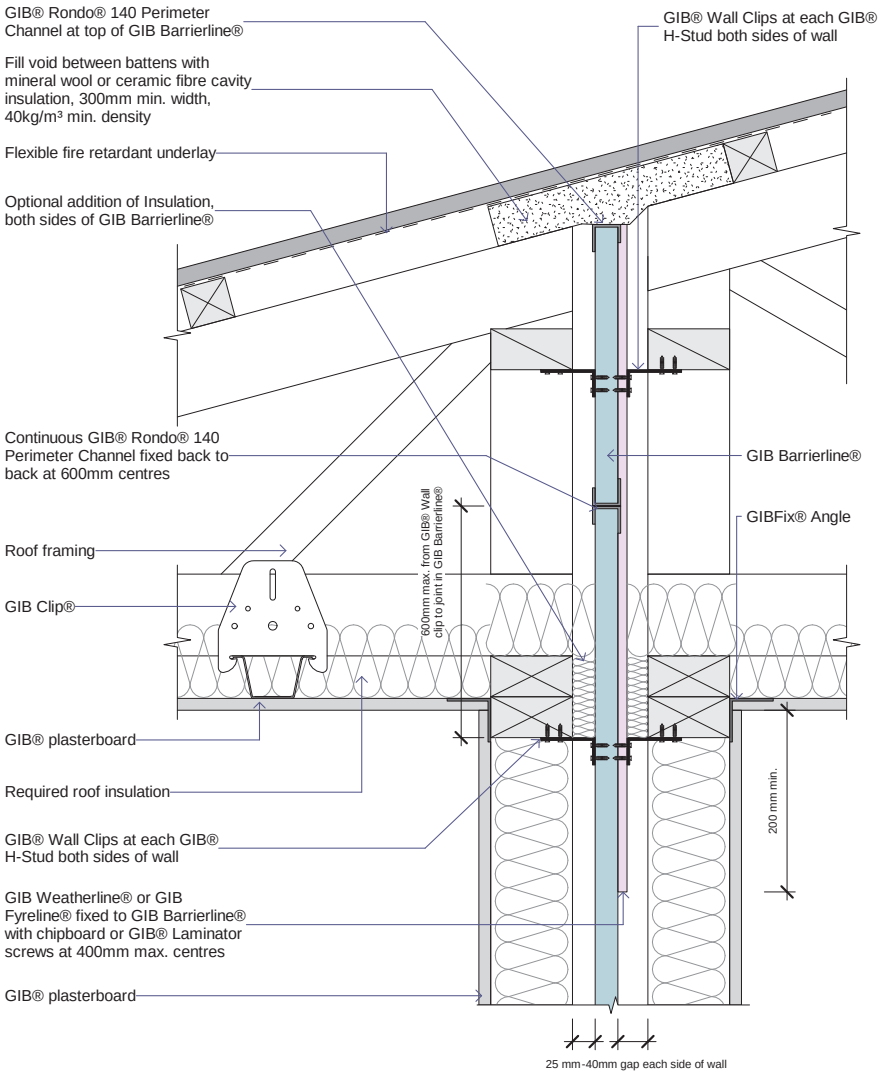
DETAIL AT CEILING AND ROOF (END ELEVATION)



GNS105

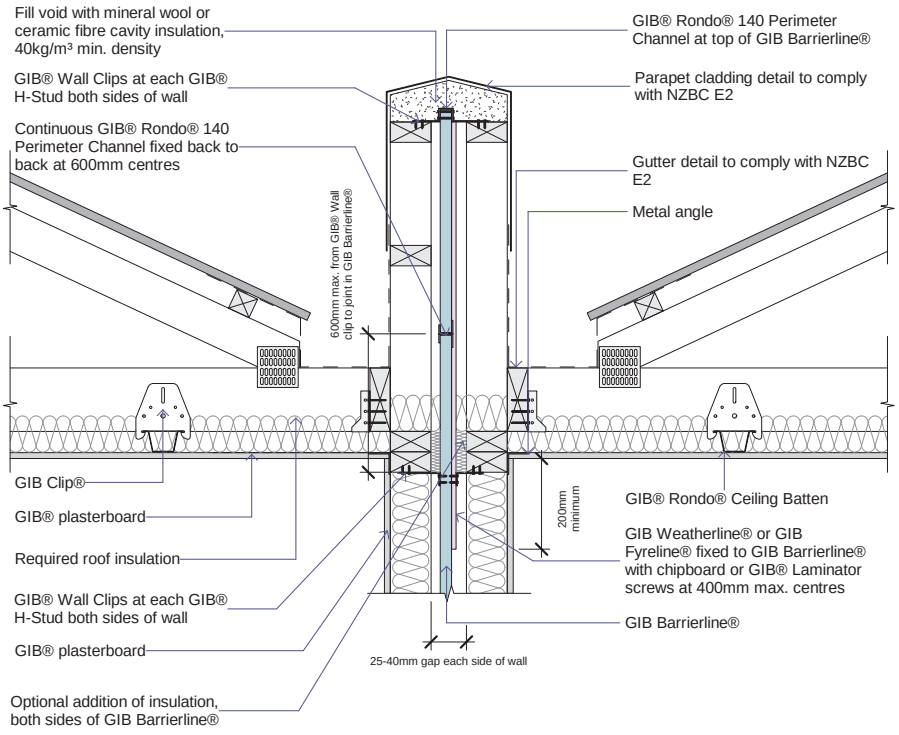
SDC - Approved Document C/VM1 Compliance Document for New Zealand Building Code Clauses C1 C2 C3 C4 C5 C6 C7 C8 C9 - 1 July 2021 - 246 of 324 - 24/06/2024 - 2:08:20 pm - phillid

DETAIL AT ROOF/CEILING (END ELEVATION)



GNS108

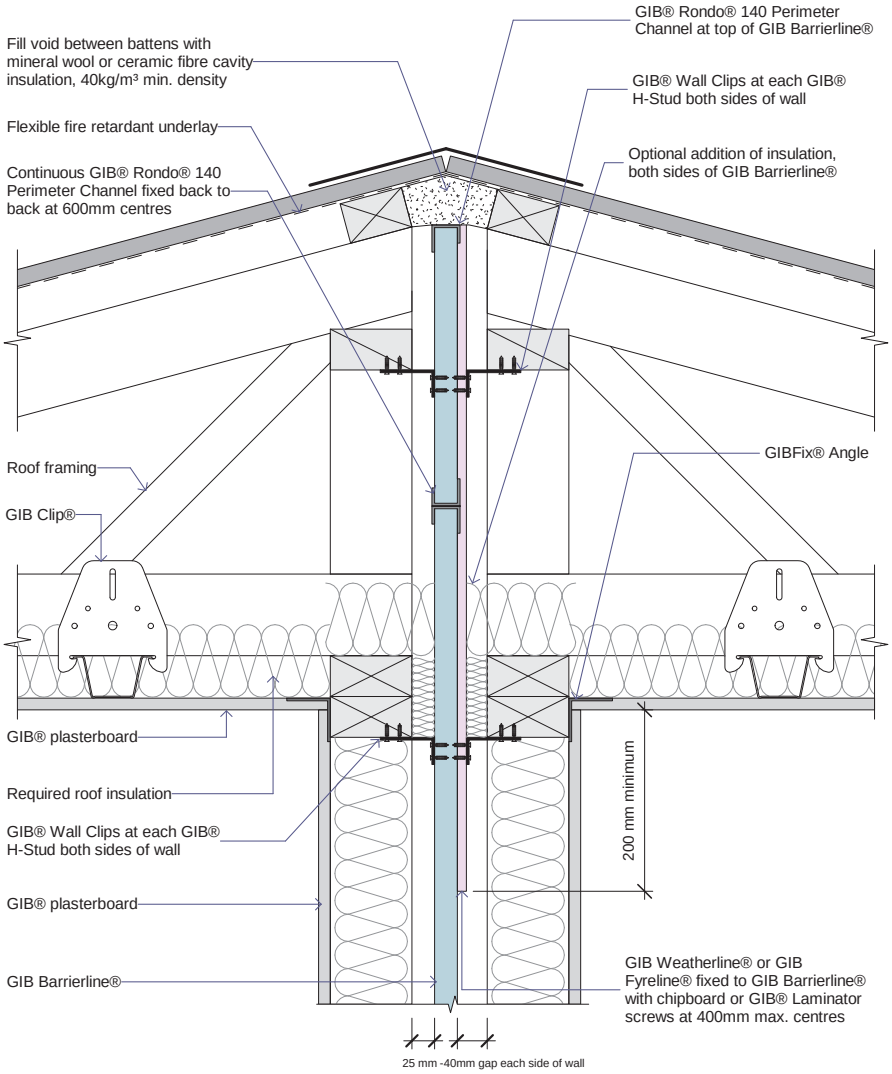
DETAIL AT ROOF/CEILING AND PARAPET (END ELEVATION)



GNS109

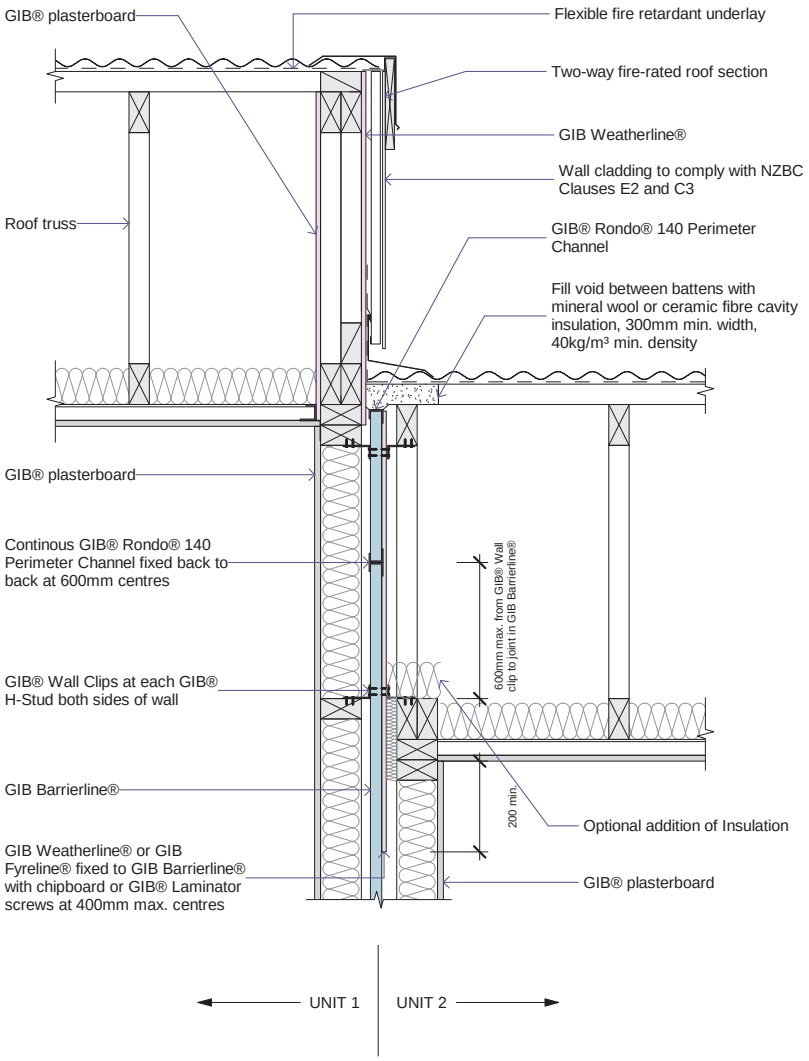
SDC - Approved Document - Do not distribute - Copyright 2023 - Page 248 of 256 - 24/06/2024 08:20:16

DETAIL AT ROOF APEX



GNS122

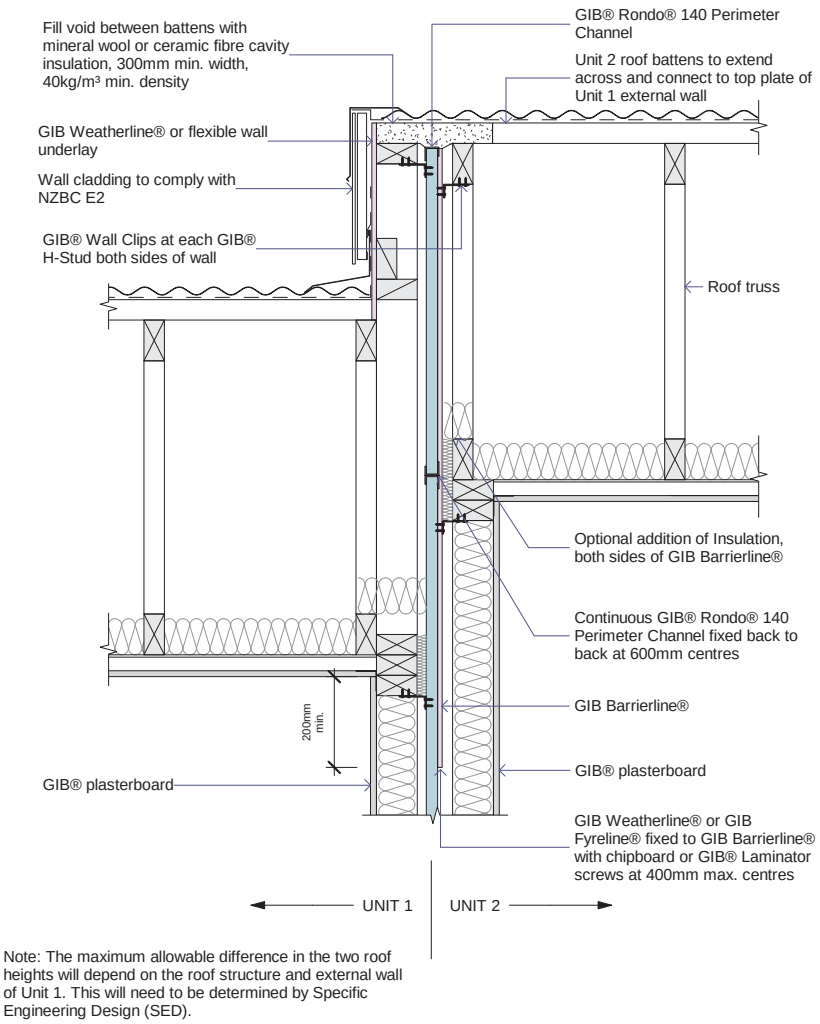
STEPPPED ROOF OPTION A (GIB WEATHERLINE®)



GNS342

SDC - Approved Document B (Fire Safety) 2019 Amendment 1 - 250 of 252 - 7/06/2021 2:08:20 pm

STEPPPED ROOF OPTION B (GIB WEATHERLINE®)

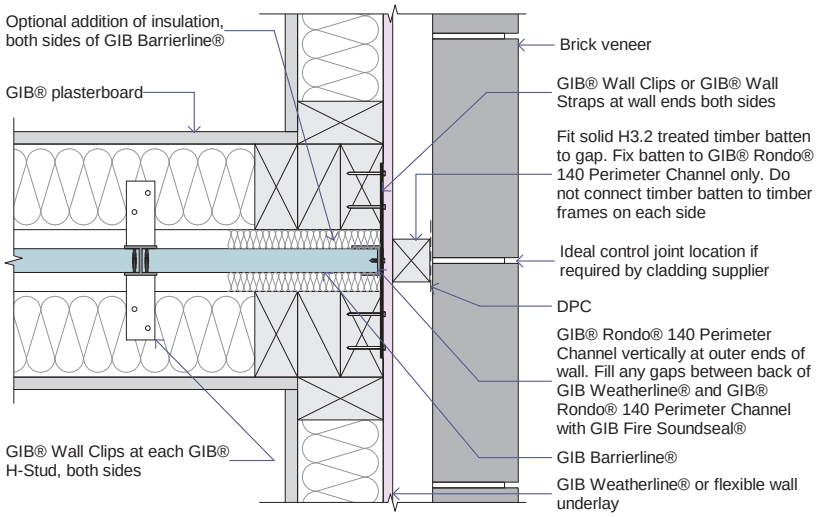


Note: The maximum allowable difference in the two roof heights will depend on the roof structure and external wall of Unit 1. This will need to be determined by Specific Engineering Design (SED).

GNS343

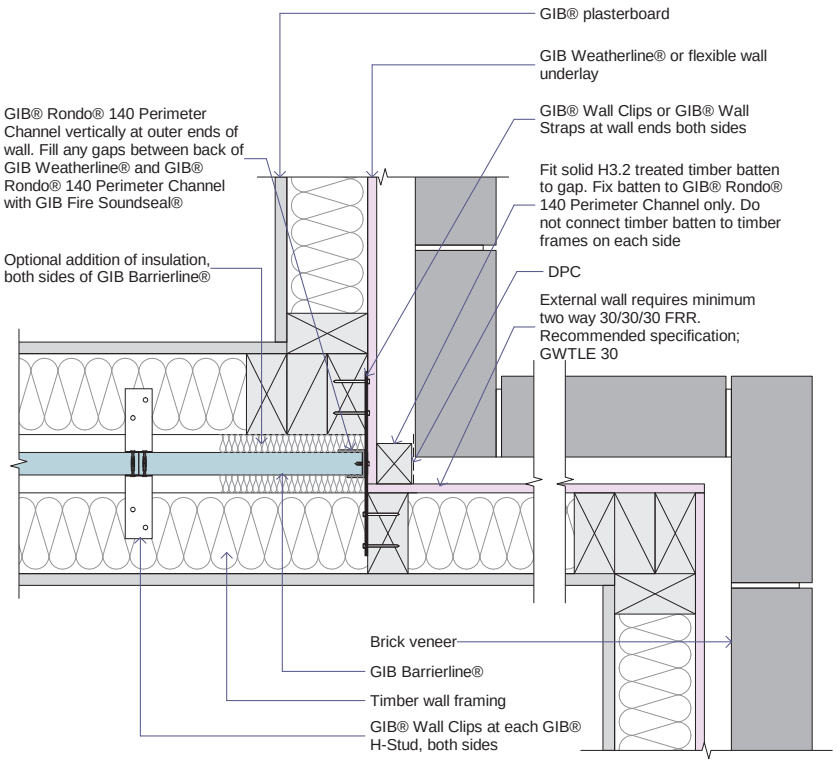
SDC - Approved Document B Volume 1 - Fire safety - 7 June 2019 - Pg 254 of 259 - 23/06/2021 10:23:07 - Document Uncontrolled when printed

EXTERNAL BRICK VENEER WALL (WITH GIB WEATHERLINE®)



GNS128

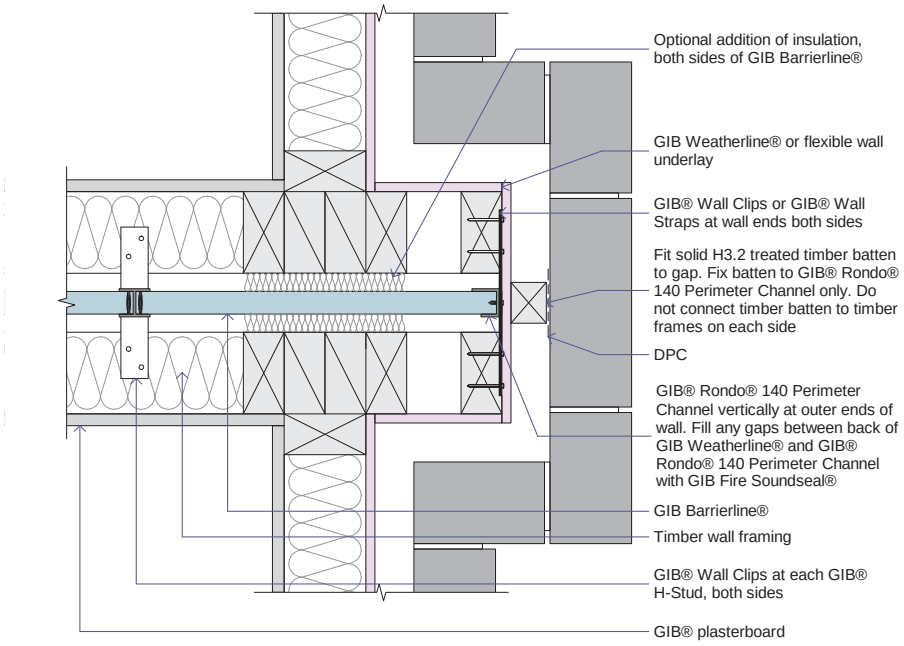
RETURN DETAIL EXTERNAL BRICK VENEER (WITH GIB WEATHERLINE®)



GNS126

SDC - Approved Document - Building Code Compliance - 07/10/2022 - Page 252 of 272 - 24/06/2024 08:20:16 - phillid

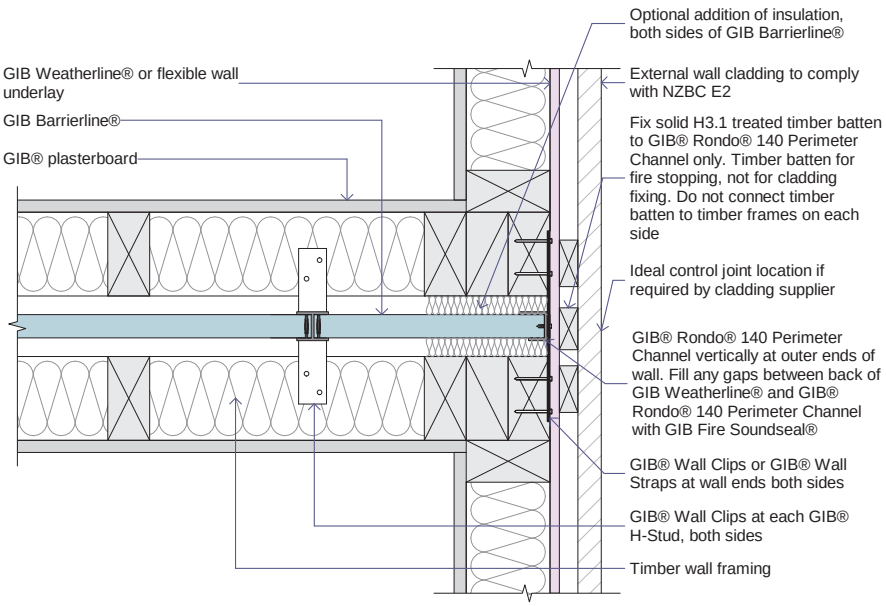
DETAIL AT EXTERNAL BRICK VENEER WALL (WITH GIB WEATHERLINE®)



Note: Maximum allowable length of intertenancy wall projection will depend on building height and supporting structure. This will need to be determined by Specific Engineering Design (SED).

GNS125

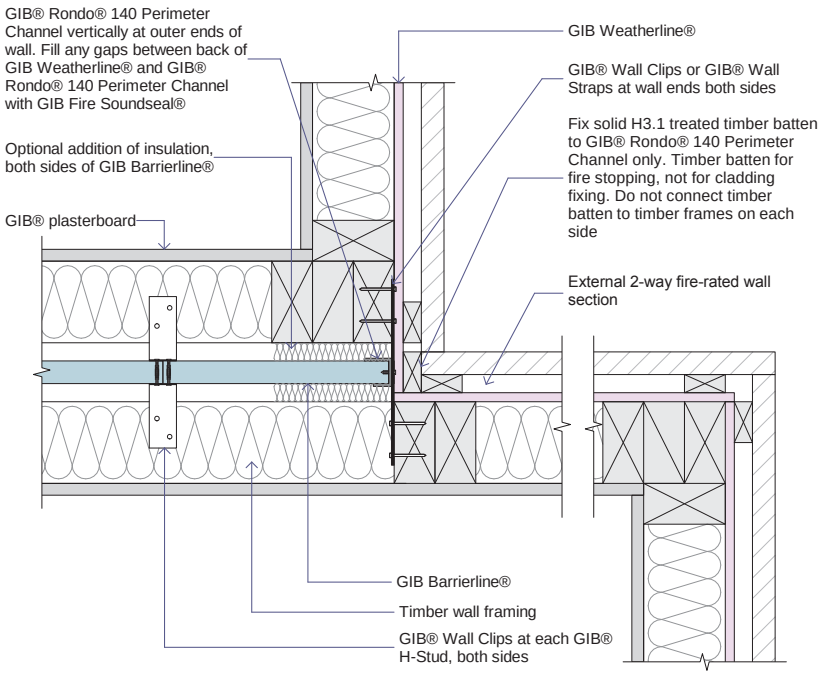
EXTERNAL TIMBER FRAME (WITH GIB WEATHERLINE®)



GNS123

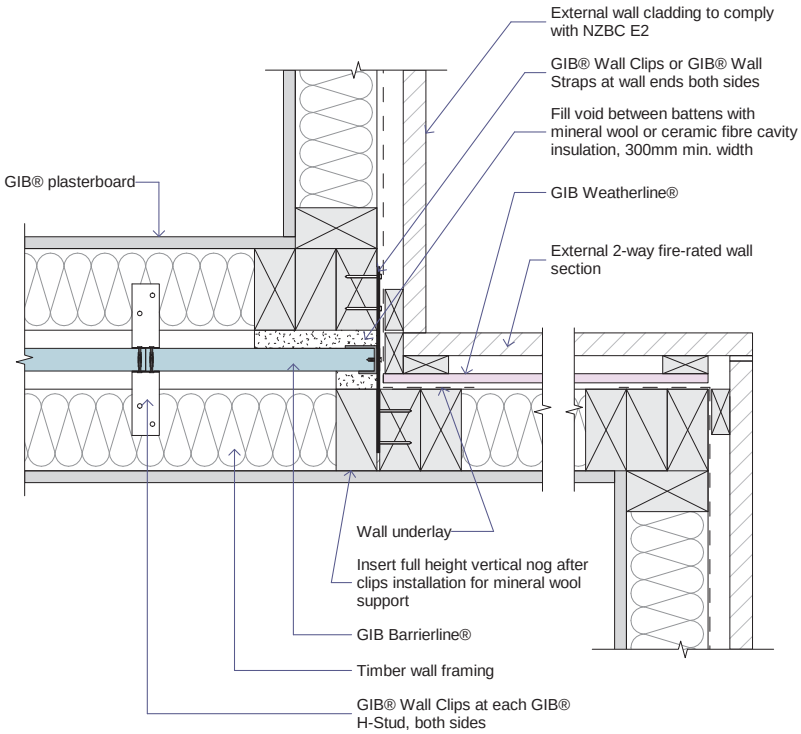
SDC - Approved Document B Compliance Document for New Zealand Building Code Clauses B1, B2, E2, E3, H1 - 7 July 2021 - 253 of 272 - 24/06/2022 20:08:42 - phillid

DETAIL AT RETURN IN EXTERNAL LIGHTWEIGHT CLADDING (WITH GIB WEATHERLINE®)



GNS127

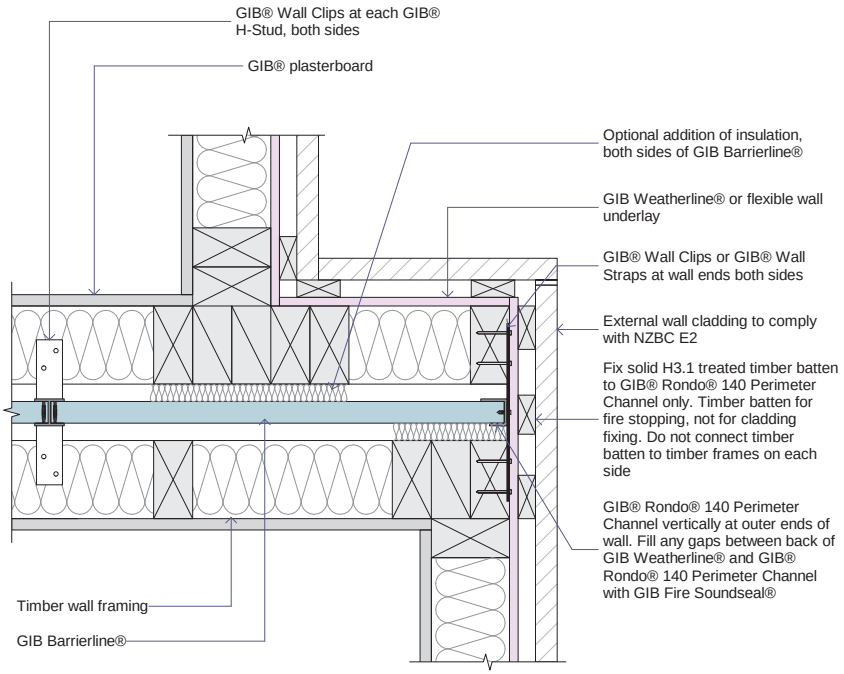
DETAIL AT RETURN IN EXTERNAL TIMBER FRAME WALL (WITH GIB WEATHERLINE®)



GNS330

SDC - Approved Document B Fire safety Compliance Pathway 2.4 for 7.5.2 of 2.4.6 2.4.8 2021 phillid

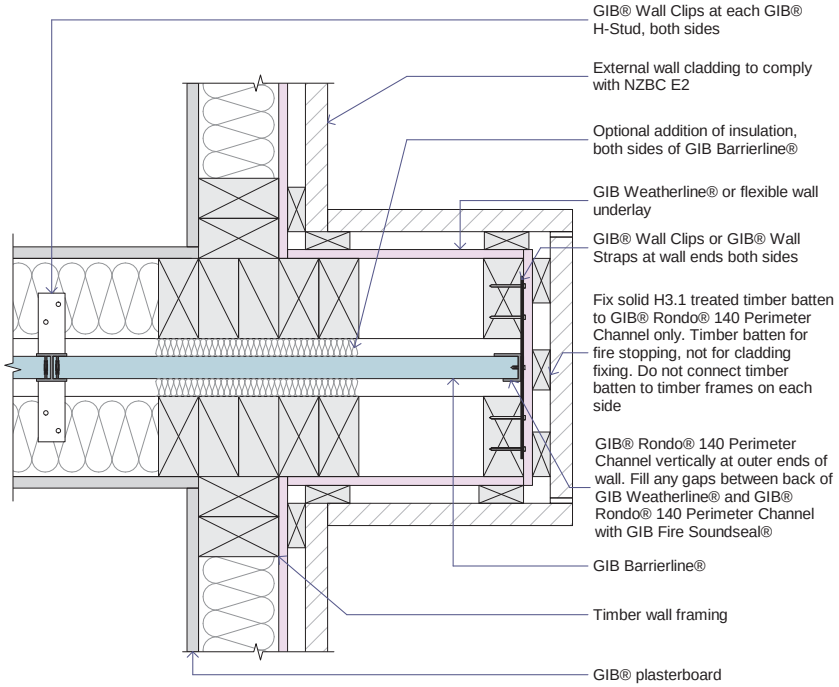
INTERTENANCY WALL PROJECTION AT EXTERNAL TIMBER FRAME WALL (WITH GIB WEATHERLINE®)



Note: Maximum allowable length of intertenancy wall projection will depend on building height and supporting structure. This will need to be determined by Specific Engineering Design (SED).

GNS331

INTERTENANCY WALL PROJECTION AT EXTERNAL TIMBER FRAME WALL (WITH GIB WEATHERLINE®)

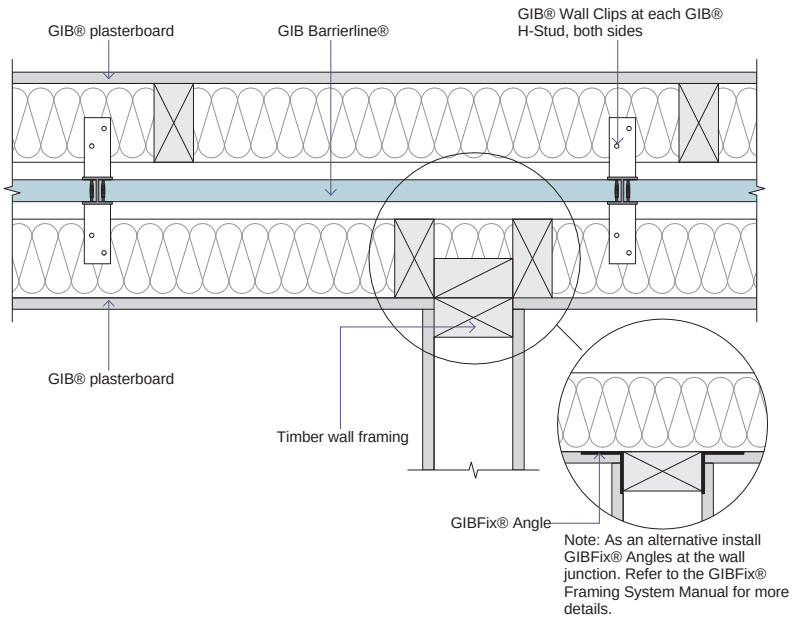


Note: Maximum allowable length of intertenancy wall projection will depend on building height and supporting structure. This will need to be determined by Specific Engineering Design (SED).

GNS124

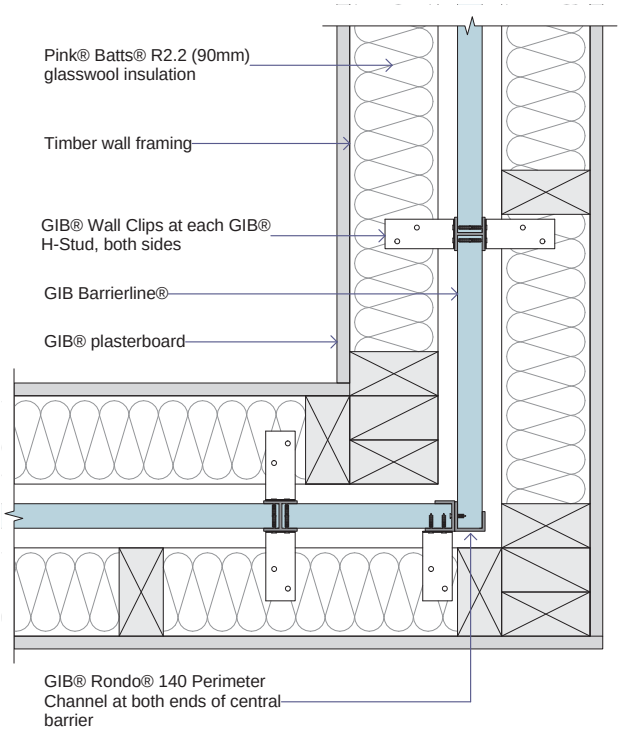
SDC - Approved Document - Building Code Compliance - 2021-07-30 - 2021-10-25 - Page 255 of 322 - 2024-06-27 - 2024-08-20 - phillid

DETAIL FOR JUNCTION WITH NON-FIRE RELATED WALL



GNS110

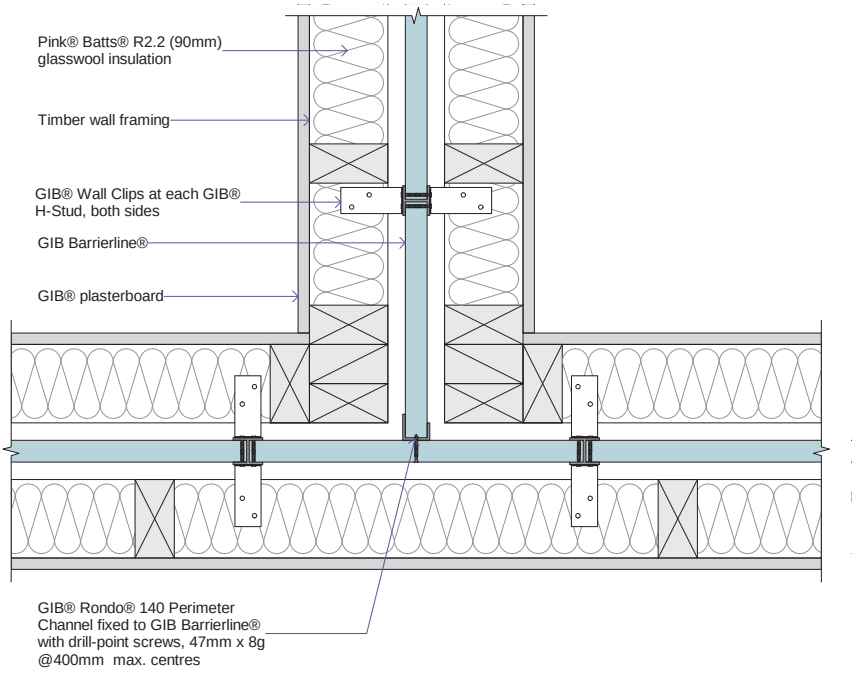
DETAIL AT CORNER (PLAN VIEW)



GNS102

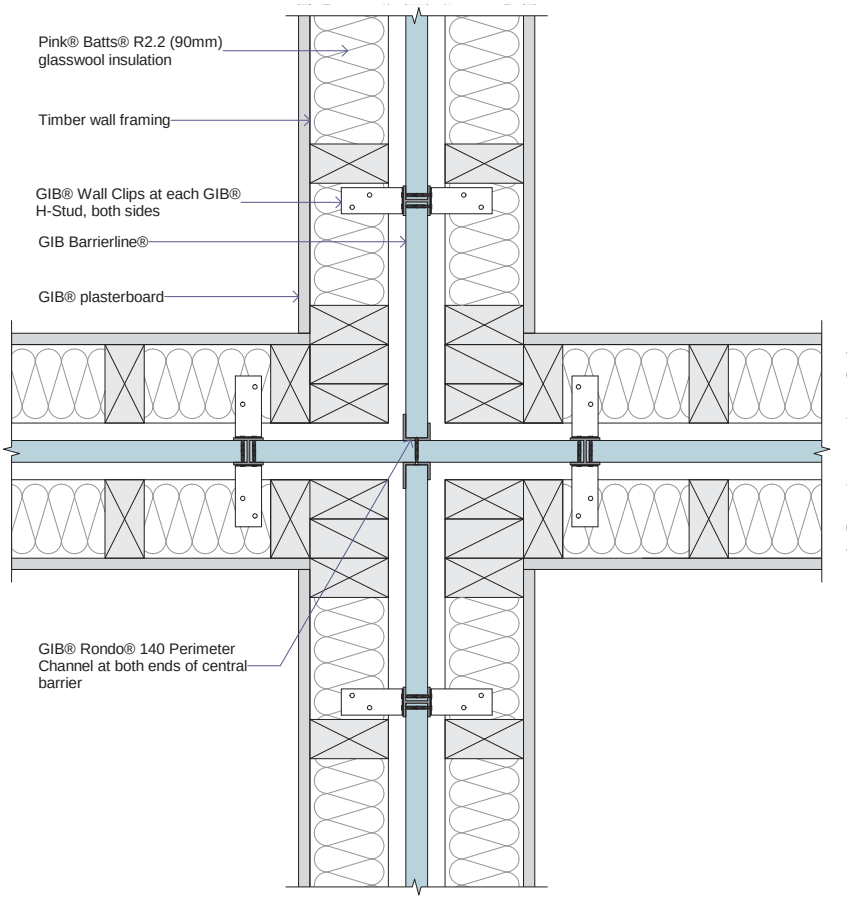
SDC - Approved Document C/2 Fire safety - Dwellings - Pg 256 of 324 - 06/24 - 07/08/2024 - phillid

MULTI-UNIT JUNCTION - 3 UNITS



GNS332

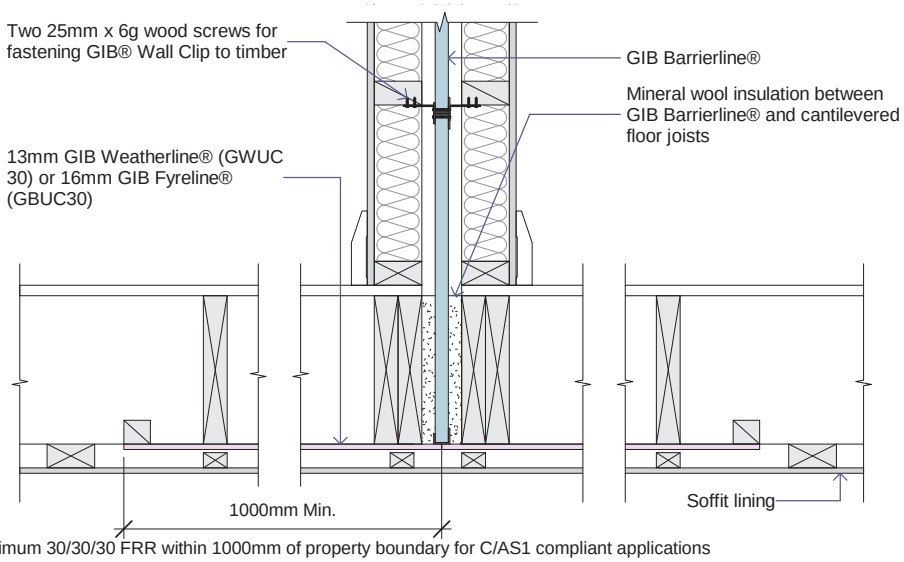
MULTI-UNIT JUNCTION - 4 UNITS



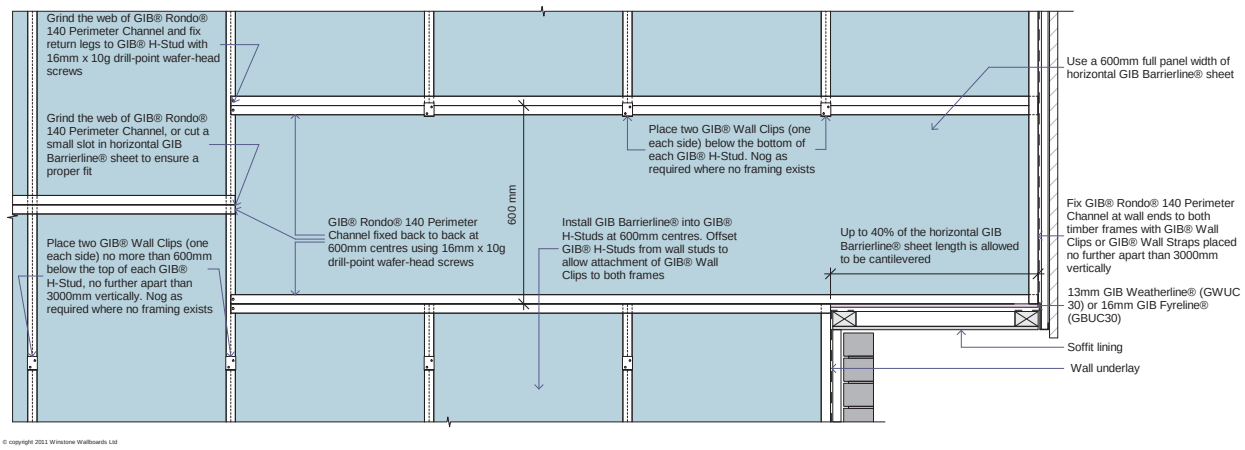
GNS333

SDC - Approved Document - Building Code Compliance - Pg 257 of 325 - 24/06/2024 8:08:40 pm - phillid

CANTILEVERED GIB BARRIERLINE DETAIL – DETAIL SUITABLE FOR CANTILEVER UP TO 1.2M



Soffit requires minimum 30/30/30 FRR within 1000mm of property boundary for C/AS1 compliant applications



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GNS311

SDC - Approved Document - Building Code Compliance - 230726 - 2024-06-24 08:20:16 - Page 258 of 322 - phillid

Sustainability and the Environment

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^{CERTTM}

The Global GreenTag^{CertTM} certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag:^{CertTM}

GIB® Standard, GIB Fyreline®, GIB Braceline®/Noiseline®, GIB Toughline® and GIB Wideline® hold Level A certification under GreenTag(^{CertTM}).

GOOD ENVIRONMENTAL CHOICE AUSTRALIA (GECA)

The following products hold Good Environmental Choice Australia Licence which is a Type 1 Ecolabel program managed in accordance to ISO 14024 'Environmental Labels and Declarations:

GIB Aqualine®, GIB Barrierline, GIB Weatherline®, GIB Toughline® and GIB Toughline® Aqua.

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.

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Winstone Wallboards asserts its moral rights and reserves all other intellectual property rights in the materials contained in this brochure.

TRADEMARKS

The names GIB®, GIB Barrierline®, GIB Fyreline®, GIB Ultraline®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, the colour blue for GIB Braceline®, the colour pink for GIB Fyreline®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

COUNTRY OF ORIGIN

We make GIB® plasterboard in New Zealand*, for New Zealand conditions, giving you 100% certainty.

*Note GIB Barrierline® is manufactured both in New Zealand and to specific specification from a reputable overseas manufacturer.

SDC | Approved Publishing Document DO NOT PRINT 259 Pg 327 of 2406 2/12/2022 phild

SDC - Approved Application Document - BC230763 - 26/06/2024 - Page 260 of 272 - 28/08/2024 - philld

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GIB®

FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442



Thermakraft

Thermakraft
ONE WRAP SYSTEM
10 Products - One system
One warranty



Installation Guide

WATERGATE PLUS

New Zealand's premium all-purpose, fire retardant wall wrap.

Watergate Plus is specifically designed as a wall underlay for use behind exterior wall cladding. Made from synthetic materials Watergate Plus is fire retardant, water resistant and vapour permeable. The water vapour transfer rate of the product has been optimised to minimise condensation risk in homes without compromising its primary water barrier properties.

Watergate Plus is part of the Thermakraft One Wrap System. Its unique construction allows for easier installation while maintaining best in class performance qualities.

Smarter products. Better buildings.
thermakraft.co.nz

CodeMark BRANZ-CM-1002

BRANZ Appraised
Appraisal No.695 [2017]

SDC - Approved Application Document B2/AS1 Amendment 19 - 1 July 2024 - Effective 1 July 2024 - Page 262 of 1230 - 7/08/2024 10:16:01 AM - philld

Installation Guide

Application Method

- Fix Watergate Plus underlay with printed side facing the exterior and run horizontally.
- Fix to all exterior walls from below bearers to the top plate. Watergate Plus underlay is available in widths of 2740mm and 1370mm. The 2740mm width product is generally wide enough to cover from below the bottom plate to the top plate.
- **Timber Framing:** Pull the Watergate Plus underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically.
- **Steel Framing:** Ensure frame is free from oil, dust and dirt. Fix securely using construction grade double-sided tape or adhesive or galvanized flat head screws that are appropriate for external framing and roofing use, at 300mm centres.

  Note: Check adhesive compatibility with Watergate Plus and the steel framing materials before use.

  If using a tape: Apply double-sided tape onto steel frame studs and only peel off the forward-facing liner once Watergate Plus is ready to be installed. When ready, peel off approximately 2m of tape liner at a time and press Watergate Plus firmly onto tape, ensuring it is taut.

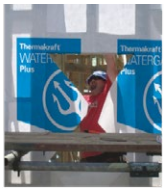
  Note: The double-sided tape is to temporarily hold the Watergate Plus in place until the batten and/or cladding is installed. The screws used to fix these are the permanent fixings for Watergate Plus.
- Minimum of 150mm lap is required at joins. All vertical laps must be made over studs. Horizontal laps to be laid ship lap style allowing water to be shed to the outer face of Watergate Plus.
- Cover all windows and door openings with Watergate Plus underlay. It is recommended that the Watergate Plus underlay is not cut and prepared for window installation until the arrival of the windows.
- When windows and doors are ready for installation, the Watergate Plus underlay covering the openings should be cut at 45° and folded into the opening and securely fastened. Thermakraft window flashing tapes are recommended as the window flashing system.

  Note: In accordance with NZBC Acceptable Solution E2/AS1 and NASH Building Envelope Solutions: 2019 (E2/AS4), wall underlay must be prevented from bulging into the drained cavity. Where stud spacing is greater than 450mm, Thermakraft stud strap or Thermastrap run horizontally at 300 centres is an acceptable means of prevention.
- Once installed, Watergate Plus must not be left exposed to the weather or UV for a maximum of 90 days. Watergate Plus underlays will provide temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZBC B2 Durability.
- Repair small damaged areas with any Thermakraft window flashing tape or Thermakraft Premium Joining Tape. Any large areas which require repair may be covered with a second layer of underlay with a lap of 150mm and then taping.
- Watergate Plus underlay must be installed by, or under the guidance of a licensed building practitioner.



Fix Watergate Plus securely to the frame.

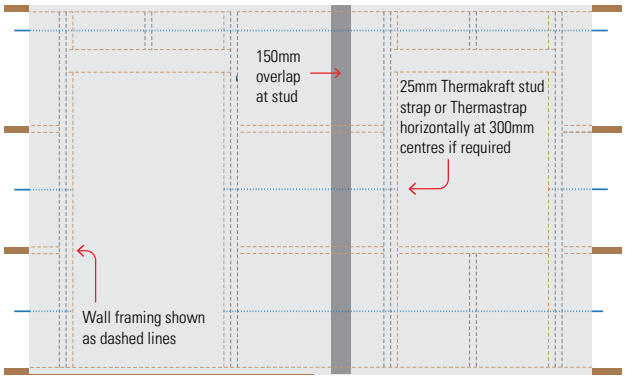




On arrival of doors and windows, cut Watergate at each opening on a 45° angle away from each corner. Pull the Watergate flaps inside and fasten to the inside of frame.

Application Tips

Watergate Plus is unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent to flash off in a well-ventilated area. Recommended minimum 7 days.



Handling and Storage

Watergate Plus underlay must be handled with care to prevent damage such as tearing and roll deformation. Due to the width of the product, care should be taken when installing in windy conditions.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

Thermakraft Limited / 0800 806 595

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. E&OE.

Issue 4, September 2021



SDC - Approved Application Document B2/AS1 Building Code Clause B2 Durability - Clause 9.1.1 Building Code Clause E2 External Moisture - Clause 9.1.1 Building Code Clause E3 Internal Moisture - Clause 9.1.1 Building Code Clause F7 Warning Systems - Clause 9.1.1 Building Code Clause H1 Energy Efficiency - Clause 9.1.1 Building Code Clause H1 Energy Efficiency - Clause 9.1.1 Building Code Clause H1 Energy Efficiency

Watergate Plus

Premium Synthetic Wall Wrap

Watergate Plus comes in five roll sizes and two soffit roll sizes:

Roll Dimensions			
Product Code	**Width**	**Length**	**Coverage**
WGP1370025	1370mm wide	18.5m long	25m² coverage*
WGP1370050	1370mm wide	37.0m long	50m² coverage*
WGP1370100	1370mm wide	73.0m long	100m² coverage*
WGP2740050	2740mm wide	18.5m long	50m² coverage*
WGP2740100	2740mm wide	36.5m long	100m² coverage*

Soffit Roll Dimensions			
Product Code	**Width**	**Length**	**Coverage**
WGP600025SOF	685mm wide	36.5m long	25m² coverage*
WGP600050SOF	685mm wide	73.0m long	50m² coverage*

Custom Branding Available – Contact your Thermakraft Representative for more details

* **Note:** m² is the roll size. For actual coverage, allow for laps and joins.

Product Description

Watergate Plus is a two-layer laminated wall underlay combining a Polyester non-woven layer with a high quality vapour permeable film. This allows water vapour to pass through from inside the wall cavity whilst water from the exterior is kept out.

The product is simply fixed to timber framing using construction staples and is made to stretch around corners providing a tight fit and reducing the risk of staple tear. It will provide temporary weather protection during construction. (Max 90 Days).

Scope of Use

Watergate Plus can be used as a wall underlay on both residential and commercial buildings within the following scope:

- With absorbent wall claddings (e.g. timber, brick or fibre cement) or non-absorbent wall claddings (e.g. metal or plastic).
- Can be used with timber and steel framing, either directly fixed or in conjunction with an 18mm minimum drained cavity.
- With masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 and E2/AS4.
- Situated in NZS3604 and NASH Building Wind Zones up to (and including) 'Very High' when used as a standalone flexible underlay, and "Extra High" when used as a flexible underlay over a rigid wall underlay.
- Is suitable as an air barrier in unlined wall spaces.
- Is suitable to be used in conjunction with thermal breaks on steel framed buildings.
- Refer to BRANZ Appraisal No 695 (2017) and CodeMark Certificate BRANZ-CM-1002 for full details.

General

- Fire retardant.
- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent to flash off in a well ventilated area. Recommended minimum 7 days.

Limitations

- Must NOT be used as a roof underlay.
- Must NOT be exposed to the weather or UV for more than 90 days.
- Watergate Plus is NOT a vapour barrier.

Compliance

- Watergate Plus has been appraised with the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 and E2/AS4, with regards to building height and floor plan area.
- Watergate Plus has also been BRANZ appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Watergate Plus into their design in accordance with the declared properties and the instructions of Thermakraft Ltd.

SDC - Approved Document C/AS1 Building Code Clause E2/AS1 Table 23 - 265 gsm Polyester Non-woven Laminated Breathable Wall Underlay - 2 Layer - Watergate Plus - 1370mm wide x 18.5m long - 25m² coverage - Thermakraft Ltd - 23/06/2021 - 2021/2023 - phillid

Watergate Plus

Premium Synthetic Wall Wrap

Flammability Index

Thermakraft Watergate Plus Wall Underlay has an AS 1530 Part 2 Flammability Index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces.

Durability

Meets the Performance Requirements of NZBC Clauses B2, Durability (B2.3.1 (a) 50 years, B2.3.1 (b) 15 years and B2.3.2), E2 External Moisture (E2.3.2), and F2 Hazardous Building Materials F2.3.1, providing:

- It is not damaged.
- Installed in accordance with instruction guide.
- Is not left exposed for more than 90 days.
- Installed by or under guidance of Licensed Building Practitioners.
- Is compatible with cladding system used.*

* **Note:** specifiers and product user must confirm wall cladding system compatibility with the underlay before installation.

Product Warranty

Standard Thermakraft warranty applies. Refer to Thermakraft Warranty Statement for further details. This is available online at **thermakraft.co.nz** or call **0800 806 595.**

Property Performance

NZBC E2/AS1 Table 23 (NZS2295) Wall Underlay Properties	Absorbency	Vapour Resistance	pH of Extract	Shrinkage	Water Resistance	Air Resistance
Property Performance Requirement	≥ 100gsm	≤ 7 MN.s/g	≥ 6 and ≤ 9	≤ 0.5%	≥ 20mm	≥ 0.1 MN.s/m^3
Property Performance	Pass	Pass	Pass	Pass	Pass	Can be used as an air barrier

SDC - Approved Document E2/AS1 Table 23 Wall Underlay Compliance Document B2/AS1 Table 23 Durability Compliance Document 07/23/2021 Page 266 of 324 06/24/2021 08/20/2021

Thermakraft Limited / 0800 806 595

Smarter products. Better buildings.

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BRANZ Appraised Appraisal No.695 [2017]

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. E&OE.

Issue 9, September 2021

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BRANZ Appraised

Appraisal No. 695 [2023]

WATERGATE PLUS WALL UNDERLAY



Appraisal No. 695 (2023)

This Appraisal replaces BRANZ Appraisal No. 695 [2017]

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 Watergate Plus is a fire retardant, flexible synthetic wall underlay for use under direct fixed and non-direct fixed wall cladding on timber and steel-framed buildings. The product is manufactured from coated, non-woven polyolefin and is coloured white.

Scope

Flexible Wall Underlay

2.1 Watergate Plus has been appraised for use as a flexible wall underlay for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber-framed buildings; or,
- the scope limitations of NASH Building Envelope Solutions, Paragraph 1.1 for steel-framed buildings; and,
- with direct fixed absorbent and non-absorbent wall claddings; or,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; or,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber-framed buildings or to NASH Building Envelope Solutions for steel-framed buildings; and,
- situated in NZS 3604 Wind Zones up to, and including, Very High.

Use over Rigid Wall Underlay

2.2 Watergate Plus has been appraised for use as a flexible wall underlay over rigid wall underlays on buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber-framed buildings; or,
- the scope limitations of NASH Building Envelope Solutions Paragraph 1.1 for steel-framed buildings; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber-framed buildings or NASH Building Envelope Solutions for steel-framed buildings; and,
- situated in NZS 3604 and NASH Standard Part 2 Wind Zones up to, and including, Extra High.

Specific Design

2.3 Watergate Plus has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Watergate Plus into their design in accordance with the declared properties and the instructions of Kingspan Insulation NZ Limited.

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

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Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Watergate Plus, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.2. Watergate Plus meets these requirements. See Paragraphs 9.1 and 9.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.4 (c). Watergate Plus meets this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Watergate Plus will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Watergate Plus meets this requirement.

Technical Specification

4.1 Watergate Plus is a white, 105 g/m^2 non-woven, microporous polyolefin fabric underlay.

4.2 The product is supplied in various sizes. Refer to Table 1. The product is printed with the Watergate Plus logo repeated along the length of the roll and can also be co-branded with custom printing. The rolls are wrapped in clear polythene film.

Table 1: Roll Dimensions

Width (mm)	Length (m)	Coverage (m^2)
1,370	18.5	25
1,370	37	50
1,370	73	100
2,740	18.5	50
2,740	36.5	100

Accessories

4.3 Accessories used with Watergate Plus which are supplied by the installer are:

- **Fixings** - 6-8 mm staples, large head clouts minimum 20 mm long, self-drilling screws, proprietary underlay fixings, double sided tape (for steel framing) or other temporary fixings to attach the wall underlay to the framing.
- **Wall underlay restraint (timber frame)** - polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to restrain the wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.
- **Wall underlay restraint (steel frame)** - polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to restrain the wall underlay in accordance with NASH Building Envelope Solutions, Paragraph 9.1.9.5. Thermal break sheathing installed in accordance with NASH Building Envelope Solutions Paragraph 11.4.3.2.

Handling and Storage

5.1 Handling and storage of the product, whether on-site or off-site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

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

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Technical Literature

6.1 This Appraisal must be read in conjunction with:

- Installation Guide - Watergate Plus, Issue 5.0, September 2022.
- Product Data Sheet - Watergate Plus, Issue 10.0, September 2022.

6.2 All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

7.1 Watergate Plus is intended for use as an alternative to conventional building papers which are fixed over timber or steel-framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain. Refer to Table 2 for material properties.

7.2 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.

7.3 Watergate Plus must not be exposed to the weather or ultraviolet (UV) light for a total of more than 90 days before being covered by the wall cladding.

7.4 Watergate Plus is suitable for use as an air barrier where walls are not lined, such as attic spaces at gable ends, in accordance with NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, Paragraph 9.1.4 (c).

7.5 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be restrained between the battens to prevent the underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity. Refer to NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5 for timber framing or NASH Building Envelope Solutions, Paragraph 9.1.9.5 for steel framing. Wall underlay restraint options include polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens or thermal break sheathing (steel framing only).

Table 2: Material Properties

NZS 2295 Property	Property Performance Requirement	Actual Property Performance
Absorbency	≥ 100 g/m^2	Pass
Vapour Resistance	≤ 7 MN s/g	Pass
Water Resistance	≥ 20 mm	Pass
pH of Extract	≥ 6 and ≤ 9	Pass
Shrinkage	≤ 0.5%	Pass
Mechanical	Edge tear and tensile strength	**Edge tear (Average):** Machine direction = 77 N Cross direction = 56 N **Tensile strength (Average):** Machine direction = 2.5 kN/m Cross direction = 1.8 kN/m
Air Barrier	Air resistance: ≥ 0.1 MN s/m^3	Pass. Watergate Plus can be used as an air barrier.

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

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Claddings

7.6 Watergate Plus is suitable for use under wall claddings as a wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Table 23 on timber-framed buildings and NASH Building Envelope Solutions Table 23 on steel-framed buildings, including non-absorbent wall claddings such as vinyl and metal-based weatherboards in direct fixed situations.

Stucco Plaster

7.7 Watergate Plus is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1 for timber framing or NASH Building Envelope Solutions Paragraph 9.3.5.1 for steel framing. The underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm.

7.8 Watergate Plus may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3.1 b) for timber framing or NASH Building Envelope Solutions, Paragraph 9.3.3.1 b) for steel framing.

Structure

8.1 Watergate Plus is suitable for use in all Wind Zones of NZS 3604 and NASH Standard Part 2 up to, and including, Very High when used as a stand-alone flexible wall underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid wall underlays.

Durability

9.1 Watergate Plus meets code compliance with NZBC Clause B2.3.1 (a) not less than 50 years for wall underlays used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, and code compliance with NZBC Clause B2.3.1 (b) 15 years for wall underlays used where the cladding durability requirement is 15 years.

Serviceable Life

9.2 Provided it is not exposed to the weather or UV light for a total of more than 90 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Watergate Plus is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

10.1 Watergate Plus has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solution C/AS2, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces.

Prevention of Fire Occurring

11.1 Separation or protection must be provided to Watergate Plus from heat sources such as fireplaces, heating appliances, flues and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

12.1 Watergate Plus must be used behind claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, or claddings covered by a valid BRANZ Appraisal.

12.2 Watergate Plus, when installed in accordance with the Technical Literature and this Appraisal will assist in the total cladding systems compliance with NZBC Clause E2.

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

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Installation Information

Installation Skill Level Requirement

13.1 All design and building work must be carried out in accordance with the Watergate Plus Wall Underlay Technical Literature and this Appraisal by competent and experienced tradespersons conversant with wall underlays. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

Underlay Installation

14.1 Watergate Plus must be fixed to all framing members at maximum 300 mm centres with clouts, staples, self drilling screws or proprietary underlay fixings. For steel framing, double-sided tape may be used which is applied to each stud in continuous strips. The underlay must be pulled taut over the framing before fixing.

14.2 Watergate Plus must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 150 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.

14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the underlay by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut underlay must be folded inside the opening and stapled to the penetration framing. Excess underlay may be cut off flush with the internal face of the wall frame.

14.4 Watergate Plus can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3 for timber framing or NASH Building Envelope Solutions Paragraph 9.1.11.3 for steel framing.

14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.

14.6 Any damaged areas of Watergate Plus, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

14.7 The Technical Literature must be referred to during the inspection of Watergate Plus installations.

Basis of Appraisal

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

Tests

15.1 The following tests have been carried out on Watergate Plus in accordance with NZBC Acceptable Solution E2/AS1, Table 23: tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6, pH of extract in accordance with AS/NZS 1301.421s and air resistance to BS 6538.3. A range of these tests were completed before and after Watergate Plus was exposed to UV light.

15.2 The flammability index of Watergate Plus has been evaluated in accordance with AS/NZS 1530.2.

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

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Other Investigations

16.1 A durability opinion has been given by BRANZ technical experts.

16.2 An evaluation of the expected performance of Watergate Plus in direct contact with metal wall cladding has been completed by BRANZ.

16.3 The practicability of installation of Watergate Plus has been assessed by BRANZ and found to be satisfactory.

16.4 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

17.1 The manufacture of Watergate Plus has not been examined by BRANZ, but details of the methods adopted for quality control and the quality of the materials used, have been obtained and found to be satisfactory.

17.2 The quality of supply to the market is the responsibility of Kingspan Insulation NZ Limited.

17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall underlay into their design in accordance with the instructions of Kingspan Insulation NZ Limited.

17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Kingspan Insulation NZ Limited.

Sources of Information

- AS 1530.2:1993 Test for flammability of materials.
- AS/NZS 1301.421s:1998 Determination of the pH value of aqueous extracts of paper, board and pulp - Cold extraction method.
- AS/NZS 4200.1:1994 Pliable building membranes and underlays - Materials.
- AS/NZS 4201.1:1994 Pliable building membranes and underlays - Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2:1994 Pliable building membranes and underlays - Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3:1994 Pliable building membranes and underlays - Methods of test – Shrinkage.
- AS/NZS 4201.4:1994 Pliable building membranes and underlays - Methods of test – Resistance to water penetration.
- AS/NZS 4201.6:1994 Pliable building membranes and underlays - Methods of test – Surface water absorbency.
- BS 6538.3:1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295:2006 Pliable, permeable building underlays.
- NZS 3604:2011 Timber-framed buildings.
- NASH Building Envelope Solutions: 2019 Light steel-framed buildings.
- NASH Standard Part Two: 2019 Light Steel Framed Buildings.
- Ministry of Business, Innovation and Employment Record of Amendments - Acceptable Solutions, Verification Methods and Handbooks.
- The Building Regulations 1992.

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

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In the opinion of BRANZ, Watergate Plus Wall Underlay is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Kingspan Insulation NZ 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. Kingspan Insulation NZ 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 Kingspan Insulation NZ 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 Kingspan Insulation NZ Limited or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
08 February 2023

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

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CodeMark®

Certificate No: BRANZ-CM-1002-Rev 2
Date of Issue: 17 February 2022
Expiry Date: 17 February 2025

CERTIFICATE HOLDER

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Client signature

William Lin

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Cheryda Percy
Chief Executive Officer
BRANZ Limited

PRODUCT CERTIFICATE

THIS IS TO CERTIFY

WATERGATE PLUS WALL UNDERLAY

KEY INFORMATION

1. DESCRIPTION OF BUILDING METHOD OR PRODUCT

1.1 Watergate Plus is a white coloured flexible synthetic wall underlay. The product is printed with the Watergate Plus logo repeated along the length of the roll.

2. USE OF BUILDING METHOD OR PRODUCT

2.1 Watergate Plus is for use as a flexible wall underlay for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber framed buildings; or,
- the scope limitations of NASH Building Envelope Solutions, Paragraph 1.1 for steel framed buildings; and
- with direct fixed wall claddings, or with wall claddings installed over a drained cavity; or,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or in accordance with NASH Building Envelope Solutions for steel framed buildings; and,
- situated in NZS 3604: 2011 Wind Zones up to and including Very High when fixed directly to framing, and Extra High when fixed over a rigid air barrier.

2.2 Watergate Plus is also for use:

- as an air barrier in accordance with NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions Paragraph 9.1.4 (c); or,
- as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, Paragraph 9.3.5.1, or;
- as a slip layer over a rigid backing for stucco cladding in accordance with NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, Paragraph 9.3.3.1 (b).

3. COMPLIES WITH THE FOLLOWING PROVISIONS OF THE NEW ZEALAND BUILDING CODE (NZBC)

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years (for when the cladding durability requirement is not less than 50 years), B2.3.1 (b), 15 years (for when the cladding durability requirement is 15 years) and B2.3.2 (a).

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.4 (c).

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2 (contributes to), E2.3.5 (contributes to) and E2.3.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1.

JAS-ANZ

www.jas-anz.org/register

The Certificate Holder must maintain compliance with the conditions set out in Regulation 15 of the Building (Product Certification) Regulations 2008.

This Certificate is issued by BRANZ Limited, an independent certification body accredited by the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and 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 with 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 products(s) referred to in this certificate.

It is advised to check that this Product Certificate 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.

Information regarding BRANZ's complaints process can be found at the following link: Complaints Process

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CODEMARK®

Certificate No: BRANZ-CM-1002-Rev 2
Date of Issue: 17 February 2022
Expiry Date: 17 February 2025

CERTIFICATE HOLDER

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Client signature

William Lin

Customer Name William Lin
Customer Position Head of Engineering and Inventory
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Cheryda Percy
Chief Executive Officer
BRANZ Limited

4. CONDITIONS AND LIMITATIONS OF USE

4.1 Watergate Plus Wall Underlay must not be exposed to the weather or ultra violet light for more than 90 days before being covered by the wall cladding.

4.2 Framing studs must be at a maximum of 600 mm centres. Timber framing must be in accordance with NZS 3604: 2011 or to a specific design. Steel framing must be in accordance with NASH Standard Part Two: May 2019.

5. HEALTH AND SAFETY INFORMATION

5.1 Watergate Plus is a synthetic wall underlay. The supplier's instructions and typical practices for working with and handling synthetic wall underlays should be observed.

6. REFERENCE DOCUMENTS

6.1 This Product Certificate must be read in conjunction with:

- BRANZ Appraisal No. 695 Watergate Plus Wall Underlay.
- Technical Literature: Product Data Sheet Watergate Plus, Issue 9, dated September 2021; and,
- Technical Literature: Installation Guide Watergate Plus, Issue 4, dated September 2021.

SCHEDULE: INFORMATION THAT SUPPORTS KEY INFORMATION

7. SUPPORTING INFORMATION ABOUT DESCRIPTION OF THE BUILDING METHOD

PRODUCT SPECIFICATION

7.1 Watergate Plus is for use as a flexible wall underlay fixed over timber or steel framed walls to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain.

7.2 Watergate Plus is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1 Table 23 for timber framed buildings and NASH Building Envelope Solutions Table 23 for steel framed buildings. This includes non-absorbent wall claddings such as vinyl and metal-based weatherboards in direct fixed situations.

7.3 Watergate Plus is a synthetic building underlay manufactured from a film coated, non-woven, laminated flexible synthetic fabric. Watergate Plus is coloured white on the top and bottom faces and is printed with the Watergate Plus logo, and can also be co-branded with custom printing.

7.4 The product is supplied in rolls 1.370 m wide x 18.5 m, 37.0 m and 73.0 m long; 2.740 m wide x 18.5 m and 36.5 m long. The rolls are wrapped in clear polythene film.

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The Certificate Holder must maintain compliance with the conditions set out in Regulation 15 of the Building (Product Certification) Regulations 2008.

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Certificate No: BRANZ-CM-1002-Rev 2
Date of Issue: 17 February 2022
Expiry Date: 17 February 2025

CERTIFICATE HOLDER

Thermakraft™

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Email: info@thermakraft.co.nz
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William Lin

Customer Name William Lin
Customer Position Head of Engineering and Inventory
Thermakraft Limited

CERTIFICATION BODY

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Chelyda Percy
Chief Executive Officer
BRANZ Limited

TABLE 1: NZBC E2/AS1 TABLE 23 (NZS 2295:2006) REQUIREMENTS

NZBC E2/AS1 Table 23 (NZS 2295: 2006) Wall Underlay Properties	**Property Performance Requirement**	**Actual Property Performance**
Vapour Resistance	≤ 7 MN s/g	Pass
Absorbency	≥ 100 g/m²	Pass
Water Resistance	≥ 20 mm	Pass
pH of Extract	≥ 6.0 and ≤ 9.0	Pass
Shrinkage	≤ 0.5%	Pass
Mechanical	Edge tear and tensile strength	Edge tear (Average): Machine direction = 77 N (Note 1) Cross direction = 56 N (Pass) Tensile strength (Average): Machine direction = 2.5 kN/m (Pass) Cross direction = 1.8 kN/m (Pass)
Flammability Index	≤ 5	Fire retardant
Air Resistance	≥ 0.1 MN s/m³	Pass

Note 1: Pass of BRANZ criteria for edge tear resistance.

8. SUPPORTING INFORMATION ABOUT INTENDED USE OF THE PRODUCT

DESIGN REQUIREMENTS

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

INSTALLATION REQUIREMENTS

8.2 Installation must be carried out in accordance with the following:

- Technical Literature: Product Data Sheet Watergate Plus, Issue 9, dated September 2021; and,
- Technical Literature: Installation Guide Watergate Plus, Issue 4, dated September 2021.
- NZBC Acceptable Solution E2/AS1; or

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- NASH Building Envelope Solutions.

MAINTENANCE REQUIREMENTS

8.3 No maintenance can be performed on Watergate Plus once the cladding is installed.

BUILDING CODE

B1 STRUCTURE

8.4 Watergate Plus is suitable for use in all Wind Zones of NZS 3604: 2011 up to, and including, Very High when used as a stand-alone flexible wall underlay and all Wind Zones of NZS 3604: 2011 up to, and including, Extra High when used as an overlay for rigid building underlays.

B2 DURABILITY

8.5 Watergate Plus meets code compliance with NZBC Clause B2.3.1 (a), not less than 50 years for building underlays used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, and code compliance with NZBC Clause B2.3.1 (b), 15 years for building underlays used where the cladding durability requirement is 15 years. Watergate Plus is expected to have a serviceable life equal to that of the cladding.

C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE

8.6 Watergate Plus has an AS 1530 - 1993 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solution C/AS2, Paragraph 4.17.8 b) for suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces.

E2 EXTERNAL MOISTURE

8.7 Watergate Plus must be used behind claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions.

9. SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE

9.1 All conditions and limitations provided as stated in this Product Certificate.

10. BASIS FOR CODEMARK CERTIFICATION

10.1 The following tests have been carried out on Thermakraft Watergate Plus Wall Underlay in accordance with NZBC Acceptable Solution E2/AS1, Table 23:

- tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1: 1994
- shrinkage in accordance with AS/NZS 4201.3:1994
- resistance to water penetration in accordance with AS/NZS 4201.4: 1994
- surface water absorbency in accordance with AS/NZS 4201.6: 1994
- pH of extract in accordance with AS/NZS 1301.421s: 1998
- air resistance to BS 6538.3:1987.

10.2 Ultraviolet (UV) light ageing of wall underlays is a critical evaluation requirement to verify a products continued performance after site construction exposure. UV aging of Watergate Plus equivalent to 90 days construction site exposure was completed and the range of tests detailed above were repeated after aging.

10.3 The Flammability Index of Thermakraft Watergate Plus Wall Underlay has been tested in accordance with AS 1530.2 - 1993.

10.4 BRANZ Expert Judgement (Materials Scientist) confirmation of compliance to the NZBC Clause B2 Durability Performance Requirements.

10.5 The practicability of installation of Thermakraft Watergate Plus Wall Underlay has been assessed by BRANZ and found to be satisfactory.

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Chelyda Percy
Chief Executive Officer
BRANZ Limited

10.6 The referenced Technical Literature has been examined by BRANZ and found to be satisfactory.

11. RESPONSIBILITIES FOR USE OF CERTIFIED PRODUCT

- The quality of supply to the market is the responsibility of Thermakraft Limited.
- Building designers are responsible for the design of the building, and for the incorporation of the wall underlay into their design in accordance with the instructions of Thermakraft Limited.
- Quality of installation is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

12. DOCUMENTATION SUPPORTING CERTIFICATION

- AS 1530.2 – 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp – cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays – materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays – Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays – Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays – Methods of test – Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays – Methods of test – Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays – Methods of test – Surface water absorbency.
- ASTM E96: 2005 Standard test methods for water vapor transmission of materials.
- ASTM G155:2013 Standard practice for operating xenon arc light apparatus for exposure of non-metallic underlays.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NASH Building Envelope Solutions: 2019 Light Steel Framed Buildings.
- NASH Standard Part Two: 2019 Light Steel Framed Buildings.
- NZS 2295: 2006 Pliable, permeable building underlays.
- NZS 3604: 2011 Timber-framed buildings.
- TAPPI T470:1986 Edge tearing resistance of paper (Edge-tear stirrup method)
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

13. CONDITIONS RELATING TO NOTIFICATION

13.1 The certificate holder Thermakraft Ltd must notify the product certification body (BRANZ) in writing, of any intended change to any of the following particulars:

- The name, address, or contact details of the certificate holder;
- Any address of a location where a certified product is produced or manufactured.

13.2 The certificate holder shall notify the Product Certification body in writing of any intended change, modification, or alteration to any of the following:

- The certified building method or product;
- The method of its production or manufacture;
- The Product Quality Plan prepared in respect of the certified building method or product;

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Approved Building Consent Document - BC 137613 - 22/06/2023 - phillid - Page 6 of 6

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Chelyda Percy
Chief Executive Officer
BRANZ Limited

- The application or installation instructions for the certified building method or product;
- Any documentation relating to the use and maintenance of the certified building method or product.

13.3 If the certificate holder has any reason to suspect that the certified building method or product does not comply with the Building Code, the certificate holder shall notify the product certification body in writing of the reason for that suspicion.

13.4 If the certificate holder or the product certification body finds that a certified building method or product that has been released on the market does not comply with the Building Code, the certificate holder shall disclose that fact in a published disclosure statement in a form that is acceptable to the product certification body and to MBIE.

13.5 If the certificate is suspended or revoked, the certificate holder—

- Shall notify all customers to whom the building method or product is regularly supplied; and
- Immediately cease using the certificate, the mark of conformity, and any reference to the number of this certificate.

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Product Data Sheet

ALUBAND

Bituminous adhesive flexible window flashing tape.

Aluband is designed specifically as a premium window flashing tape and forms part of the Thermakraft One Wrap System. Made with a heavy bituminous adhesive, the product provides high strength bond and excellent abrasion resistance.

Aluband comes in four roll sizes:

Product Code	Roll Size	Rolls Per Carton
ALU075025	75mm x 25m	12
ALU150010	150mm x 10m	6
ALU150025	150mm x 25m	6
ALU200025	200mm x 25m	4

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BRANZ Appraised
Appraisal No.878 [2019]

Aluband

Bituminous adhesive flexible window flashing tape.

Scope of Use

Thermakraft Aluband Window Flashing Tapes can be used within the following scope:

- Installed into and around frame joinery opening over the wall underlay and exposed frame to cover both the face and edge of the opening framing as a secondary weather resistant barrier.
- Installed at joinery heads to seal flashing upstands to the wall underlay.
- To assist the overall weathertightness performance of window and door joinery installations.
- To be used in conjunction with air seals and joinery flashing systems. Installer must check for air seal product compatibility with Aluband Window Flashing Tape.
- Thermakraft Aluband Window Flashing Tape must be used with Thermakraft Corner Moulded Pieces (on windowsill corners).
- Situated in NZS3604 Wind Zones up to, and including 'Extra High'.

General

- Compatible with all Thermakraft building underlays.
- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.
- Thermakraft corner moulds MUST be used at flashing corners (see installation guide).

Limitations

- Must NOT be exposed to the weather/UV for more than 42 days.
- Should be installed when temperatures are above 5ºC.
- NOT designed to overcome poor detailing and workmanship of the window or door joinery installation.
- Bitumen may react with window sealants. Always check compatibility before use.

Compliance:

- Aluband should be used within the product scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1;
- Can be used on buildings constructed with timber and steel framing complying with the NZBC;
- With a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- Can be used with wall cladding systems complying with NZBC Acceptable Solution E2/AS1.

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.

* **Note:** When the external cladding is maintained according to 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.

- Thermakraft Aluband Window Flashing Tape has a serviceable life expectancy equal to that of the cladding, when installed in accordance with this technical specification and in accordance to the product installation guide, provided it is not exposed to the weather or ultra-violet (UV) light for more than 42 days, or is not damaged upon installation.
- Thermakraft Aluband Window Flashing Tape is 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.

Product Warranty

Standard Thermakraft warranty applies. Refer to Thermakraft Warranty Statement for further details. This is available online at **thermakraft.co.nz** or call **0800 806 595.**

Thermakraft Limited / 0800 806 595

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BRANZ Appraised
Appraisal No.878 [2019]

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. E&OE.

Issue 5, January 2020



Thermakraft

Thermakraft
ONE WRAP SYSTEM
10 Products - One system
One warranty



Installation Guide

ALUBAND

Bituminous adhesive flexible window flashing tape.

Aluband is designed specifically as a premium window flashing tape and forms part of the Thermakraft One Wrap System. Made with a heavy bituminous adhesive, the product provides high strength bond and excellent abrasion resistance.

Product usage

Aluband Window Flashing Tape is installed into and around frame joinery opening over the wall underlay and exposed frame to cover both the face and edge of the opening framing as a secondary weather resistant barrier. It can also be installed at joinery heads to seal flashing upstands to the wall underlay.

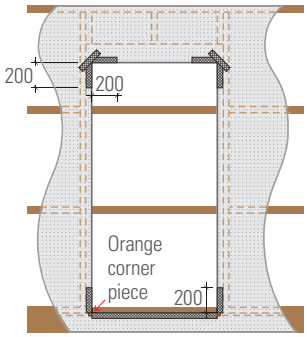
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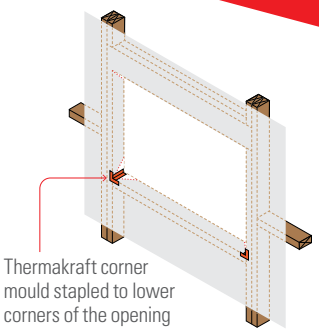
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Installation Guide

Application Method

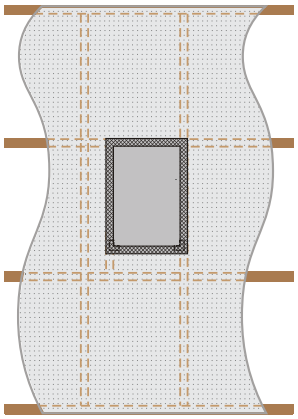
- Cut the wall underlay/air barrier at a 45° angle away from each corner. Fold flaps tightly into the window or door opening and fix with staples on the back faces of the framing.
- Fix the Thermakraft Corner Moulded Piece to the bottom corners by way of staples or clouts to the two jambs. Always ensure that Aluband is applied to surfaces that are clean and free of dust, contaminates, 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).
- Measure 200mm up both jambs, add 400mm to the length of the window sill and cut to suit that measurement.
- First remove the release film from the tape; align the back edge of the tape with the inside edge of the sill.
- 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.
- 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.
- Proceed to fit the Window Flashing Tape to the top corners of the frame (200mm across lintel x 200mm down jamb).
- 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.
- Door frames are to be treated similarly to window openings. The sill may be either a timber or a concrete floor.
- 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).
- Aluband must NOT be left exposed to the weather or UV for more than 42 days.

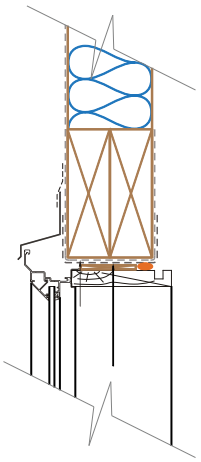




Window and door frames

- 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.
- 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.





Application Tips

- Always use the Thermakraft Aluband Window Flashing Tool to apply firm pressure onto the tape during installation. This will ensure proper adhesion of the tape to the building underlay or other substrates.
- Install the Aluband Window Flashing above 5°C.
- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.

Important Information

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

- In temperatures below 5°C.
- When adhering to difficult to bond substrates such as rough/uneven surfaces.
- When the tape has been lifted or moved after initial application.

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Installation Guide

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, contaminates, 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 substrate is dry and free of dirt before applying the spray adhesive. Apply a light spray/coating of the spray adhesive onto the 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 Sealants:

- After the installation of Aluband window flashing tape, 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 joining tape or a true aluminium foil tape to form a barrier. With a true aluminium foil tape, the installer must test the bonding strength.
- The installer must check the compatibility of the Aluband window flashing tape with the sealant or adhesive product to ensure the components are fully compatible.

Handling and Storage

Aluband window flashing tape must be handled with care to prevent damage such as tearing, excessive puncture and roll deformation.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

SDC - Approved Document E (Sound) - 284 of 322 - 24/06/2021 20:08:40 - phillid

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Issue 4, January 2020

SDC - Approved Document B Volume 1 - Amendment 20 - 1 July 2023 - 285 of 2240 - 07/06/2024 08:40:20 - philld

BRANZ Appraised

Appraisal No. 962 (2023)

THE THERMAKRAFT ONE WRAP SYSTEM



Appraisal No. 962 (2023)

This Appraisal replaces BRANZ Appraisal No. 962 (2017)

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 The Thermakraft One Wrap System consists of Watergate Plus, Thermakraft 220 and Thermakraft Covertek 403 Roof and Wall Underlay; Aluband and Thermaflash flexible flashing tapes, and OneSeal Multi-Fit Pipe and Cable Penetration Seals.

1.2 The system is used behind wall cladding systems and around framed joinery openings as a secondary weather resistant barrier for walls.

Scope

2.1 The Thermakraft One Wrap System has been appraised for use as a flexible wall underlay system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber-framed buildings; or,
- the scope limitations of NASH Building Envelope Solutions, Paragraph 1.1 for steel-framed buildings; or,
- with direct fixed absorbent and non-absorbent wall claddings; or,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; or,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber-framed buildings or NASH Building Envelope Solutions for steel-framed buildings; and,
- situated in NZS 3604 and NASH Standard Part 2 Wind Zones up to, and including, Very High; or,
- situated in NZS 3604 and NASH Standard Part 2 Wind Zones up to, and including, Extra High when used over a rigid wall underlay in accordance with NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions Paragraph 9.1.7.2.

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

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Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the Thermakraft One Wrap System, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.2. The Thermakraft One Wrap System meets these requirements. See Paragraphs 9.1-9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the wall cladding system, the Thermakraft One Wrap System will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Thermakraft One Wrap System meets this requirement.

Technical Specification

4.1 System components and accessories supplied by Kingspan Insulation NZ Limited are as follows:

Flexible Wall Underlays

- **Watergate Plus** is a white, 105 g/m^2 non-woven, micro-porous polyolefin fabric underlay. The product is supplied in rolls 1.37 m wide x 54.8 and 30 m long, 2.74 m wide x 30 m and 18.5m long and 3 m wide x 30 m long. The product is printed with the Watergate Plus logo repeated along the length of the roll and can also be co-branded with custom printing. The rolls are wrapped in clear polythene film.
- **Thermakraft 220 Synthetic Underlay** is a white, 95 g/m^2 spun-bonded polypropylene, non-woven membrane. The product is supplied in rolls 1.37 m wide x 55 m long and 2.74 m wide x 36.5 m long. The product is printed with the Thermakraft 220 logo repeated along the length of the roll and can also be co-branded with custom printing. The rolls are wrapped in clear polythene film.
- **Thermakraft Covertek 403** is a white synthetic underlay consisting of a micro-porous water-resistant film laminated between two layers of non-woven, spun-bonded polyolefin. The product is supplied in rolls 1.35 m wide x 18.6 m, 37 m and 55 m long. The product is printed with the Thermakraft Covertek 403 logo repeated along the length of the roll. The rolls are wrapped in clear polythene film.

Wall Underlay Support

- **Stud Strap** – black, woven and coated polypropylene strapping, 25 mm thick and supplied in a roll length of 250 m.
- **Thermastrap** – blue, embossed polythene strapping, 19 mm thick and supplied in a roll length of 300 m.

Accessories (supplied by the installer)

- **Fixings** – staples, clouts, screws or proprietary underlay fixings, or other temporary fixings to attach the wall underlay to the framing.
- **Wall underlay support** (where Stud Strap or Thermastrap is not used) – polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5 or NASH Building Envelope Solutions Paragraph 9.1.9.5
- **Thermal break sheathing (steel framing)** - in accordance with NASH Building Envelope Solutions, Paragraph 11.4.3.2.

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

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Flexible Flashing Tapes and Accessories

- **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.
- **Thermaflash Flashing Tape** is a self-adhering flexible flashing tape. It is coloured white on the top surface and printed with the name Thermaflash. The tape incorporates a clear release liner. The tape is available in rolls 75, 150 and 200 mm wide x 23 m long. The rolls are supplied individually shrink wrapped.
- **Thermakraft Corner Moulds** are made from polyethylene and are coloured orange. They can be used at the lower corners of joinery openings instead of 'butterflies' of flashing tape.
- **Thermakraft White General Purpose Tape** is used for sealing laps and repairing tears. The tape is supplied in rolls 60 mm wide x 66 m long.
- **Scotch® Super 77™ Multi purpose Adhesive** is a clear spray adhesive primer.

Penetration Seals

- **OneSeal Multi-Fit Pipe and Cable Penetration Seals** are manufactured with a black, soft and flexible 1.2 mm thick EPDM fabric supplied with pre-punched markings. The perimeter of the seal is coated with an acrylic adhesive, which is bonded to the wall underlay. OneSeal Multi-Fit Pipe and Cable Penetration Seals are available in the sizes below:

OneSeal Multi-Fit Cable Seals

- 55 mm Ø to 80 mm Ø
- 4 x 7 mm Ø to 10 mm Ø
- 2 x 10 mm Ø to 22 mm Ø

OneSeal Multi-Fit Pipe Seals

- 15 mm Ø to 25 mm Ø
- 40 mm Ø to 60 mm Ø
- 60 mm Ø to 90 mm Ø
- 90 mm Ø to 110 mm Ø

Handling and Storage

5.1 Handling and storage of all materials supplied by Kingspan Insulation NZ Limited, whether on-site or off-site, is under the control of the installer. The materials must be protected from damage and weather. The products must be stored under cover, in clean, dry conditions, away from direct exposure to sunlight.

Technical Literature

6.1 This Appraisal must be read in conjunction with:

- Product Data Sheet, One Wrap System, Issue 8.0, dated September 2022.
- Product Data Sheet, White General Purpose Tape, Issue 5.0, dated September 2022.
- Install Guide, White General Purpose Tape, Issue 5.0, dated September 2022.
- Product Data Sheet, Stud Strap, Issue 3.0, dated September 2022.
- Install Guide, Stud Strap, Issue 3.0, dated September 2022.
- Product Data Sheet, Thermastrap, Issue 3.0, dated September 2022.
- Install Guide, Thermastrap, Issue 3.0, dated September 2022.

6.2 All aspects of design, use, installation, and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

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

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Design Information

General

7.1 The BRANZ Appraisals covering each of the Thermakraft One Wrap System components must be referred to for full design information. The relevant BRANZ Appraisals are:

Flexible Wall Underlays

- Appraisal No. 695 Watergate Plus Wall Underlay.
- Appraisal No. 912 Thermakraft 220 Synthetic Wall Underlay.
- Appraisal No. 917 Thermakraft Covertek 403 Roof and Wall Underlay.

Flexible Flashing Tapes

- Appraisal No. 878 Thermakraft Aluband Window Flashing Tape.
- Appraisal No. 1122 Thermaflash Flashing Tape.

Penetration Seals

- Appraisal No. 942 OneSeal Multi-Fit Pipe and Cable Penetration Seals.

7.2 The Thermakraft One Wrap System is intended for use behind wall cladding systems, at joinery openings and pipe and cable penetrations as a secondary defence against water penetration into framing cavities.

7.3 The system will also provide a degree of temporary weather protection during construction. However, it will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed-in. The building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.

7.4 Watergate Plus Wall Underlay and Thermakraft Covertek 403 are suitable for use as an air barrier to walls that are not lined, such as attic spaces at gable ends, in accordance with NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, Paragraph 9.1.4 (c). Thermakraft 220 Synthetic Underlay is not suitable for use as an air barrier.

7.5 The flexible flashing tapes used with the Thermakraft One Wrap System meet the requirements of AC148: 2001, which is an alternative solution to the version of AC148 referenced by NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, Paragraph 9.1.5 (b). The installation method for the flashing tapes is an alternative solution to the installation method shown within NZBC Acceptable Solution E2/AS1, Figures 72A and 72B and NASH Building Envelope Solutions, Figures 67A and 67B.

7.6 Two layers of Thermaflash Flashing Tape must be used on the horizontal sill surface (a single layer is used in all other locations). Thermakraft Aluband Window Flashing Tape only requires one layer on the horizontal sill surface.

7.7 OneSeal Multi-Fit Pipe and Cable Penetration Seals provide an alternative solution to the pipe and service penetration detailing specified in NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.3 and Figure 68, and NASH Building Envelope Solutions, Paragraph 9.1.10.3 and Figure 63.

7.8 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be restrained between the battens to prevent the wall underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity. Refer to NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5 for timber frame or NASH Building Envelope Solutions, Paragraph 9.1.9.5 for steel frame. Wall underlay support options include Stud Strap, Thermastrap, polypropylene strap, 75 mm galvanised mesh or galvanised wire, vertical cavity battens or thermal break sheathing (steel frame only).

7.9 The Thermakraft One Wrap System is suitable for use under wall cladding as a wall underlay as specified in NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, Table 23.

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

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7.10 The Thermakraft One Wrap System is not designed to overcome poor detailing and workmanship of the wall cladding or window or door joinery. The system must not be considered in isolation, but be considered as part of the wall cladding system. The Thermakraft One Wrap System is designed to be used in conjunction with air seals and flashing systems, not as a substitute.

7.11 When the Thermakraft One Wrap System 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.

Structure

8.1 The Thermakraft One Wrap System is suitable for use in all Wind Zones of NZS 3604 and NASH Standard Part 2 up to, and including, Very High when used as a stand-alone flexible wall underlay system, and all Wind Zones of NZS 3604 and NASH Standard Part 2 up to, and including, Extra High when used as an overlay system for rigid wall underlays.

Durability

9.1 Assessment of durability to meet the NZBC is based on difficulty of access and replacement, and the ability to detect failure of the Thermakraft One Wrap System both during normal use and maintenance of the building.

Serviceable Life

9.2 Provided the selected wall underlay, flexible flashing tape and penetration seal is not exposed to the weather or ultraviolet (UV) light for longer than stated in the relevant Appraisal, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, the Thermakraft One Wrap System is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

10.1 The flexible wall underlays used with the Thermakraft One Wrap System have an AS 1530 Part 2 flammability index of not greater than 5 and therefore meet the requirements of NZBC Acceptable Solution C/AS2, Paragraph 4.17.8 b) for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces.

Prevention of Fire Occurring

11.1 Separation or protection must be provided to the Thermakraft One Wrap System from heat sources such as fireplaces, heating appliances, flues and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

12.1 The Thermakraft One Wrap System must be used behind claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1, NASH Building Envelope Solutions, or claddings covered by a valid BRANZ Appraisal.

12.2 The Thermakraft One Wrap System, when installed in accordance with the Technical Literature and this Appraisal will assist in the total cladding systems compliance with NZBC Clause E2.

Installation Information

Installation Skill Level Requirement

13.1 All design and building work must be carried out in accordance with the Thermakraft One Wrap System's Technical Literature and this Appraisal by competent and experienced tradespersons conversant with the Thermakraft One Wrap System. Where the work involves Restricted Building Work (RBW), this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License class.

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

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System Installation

Flexible Wall Underlays

14.1 The wall underlay must be fixed to all framing members at maximum 300 mm centres with large-head clouts 20 mm long, 6-8 mm staples, self-drilling screws or proprietary underlay fixings. The underlay must be pulled taut over the framing before fixing.

14.2 The wall underlay must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 150 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the underlay. End laps must be made over framing and be no less than 150 mm wide.

14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the underlay by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut underlay must be folded inside the opening and stapled to the penetration framing. Excess underlay may be cut off flush with the internal face of the wall frame.

14.4 The wall underlay can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3 or NASH Building Envelope Solutions, Paragraph 9.1.11.3. Alternatively, the head flashing upstand may be taped to the wall underlay with Aluband Window or Thermaflash Flashing Tape.

14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created.

14.6 Any damaged areas of the wall underlay, such as tears, holes or gaps around service penetrations, must be repaired. Small tears can be taped, and damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping with Thermakraft White General Purpose Tape.

14.7 If the wall underlay is exposed to the weather or UV light for more than the maximum exposure period detailed within the relevant BRANZ Appraisal, then it must be replaced with new material.

Flexible Flashing Tapes

14.8 Before the 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. When installing Aluband Window or Thermaflash 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. 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.

14.9 Fit a Thermakraft Corner Mould 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.

14.10 A length of 150 or 200 mm wide 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 wall underlay.

14.11 When Thermaflash Flashing Tape is being used, a second layer of 75 mm wide tape must then be installed along the entire length of the sill. The tape is installed flush with the exterior face of the opening. This is a mandatory requirement for horizontal surfaces to ensure nail penetrations self-seal. *[Note: A second layer is not required when Thermakraft Aluband Window Flashing Tape is being used.]*

14.12 A 400 mm length of 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.

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14.13 The flashing tapes must not be stretched. To avoid wastage, the tapes can be lapped 100 mm minimum onto themselves without reducing the performance of the flashing tape system.

14.14 If the flashing tape is exposed to the weather or UV light for more than the maximum exposure period detailed within the relevant BRANZ Appraisal, then it must be replaced with new material.

Penetration Seals

14.15 The OneSeal Multi-Fit Pipe and Cable Penetration Seal must create a tight seal around the pipe or cable penetration. The appropriate OneSeal Multi-Fit Pipe and Cable Penetration Seal must be used based on the diameter of the pipe or cable penetration.

14.16 The wall underlay must be clean, dust free and dry prior to adhering the OneSeal Multi-Fit Pipe and Cable Penetration Seal.

14.17 The OneSeal Multi-Fit Pipe and Cable Penetration Seal must be installed in a diamond pattern, which will assist with moisture run-off.

14.18 If the OneSeal Multi-Fit Pipe and Cable Penetration Seal is exposed to the weather or UV light for more than the maximum exposure period detailed within the relevant BRANZ Appraisal, then it must be replaced with a new seal.

Inspections

14.19 The Technical Literature must be referred to during the inspection of Thermakraft One Wrap System installations.

Basis of Appraisal

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

Tests

15.1 The following tests have been carried out on the flexible wall underlays in accordance with NZBC Acceptable Solution E2/AS1, Table 23: tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6, pH of extract in accordance with AS/NZS 1301.421s and air resistance to BS 6538.3. A range of these tests were completed before and after the underlays were exposed to UV light.

15.2 The flammability index of the flexible wall underlays has been evaluated in accordance with AS 1530.2.

15.3 Testing of the flexible flashing tapes has been completed by BRANZ to the requirements of ICC Evaluation Service Acceptance Criteria for Flashing Materials AC148:2001. The adhesion of the flashing tapes 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.

15.4 Testing after various forms of accelerated aging has confirmed the adhesion of OneSeal Multi-Fit Pipe and Cable Penetration Seals to a range of flexible and rigid wall underlays. The results have been reviewed by BRANZ experts and found to be satisfactory.

Other Investigations

16.1 Durability opinions have been given by BRANZ technical experts.

16.2 Practicability of installation has been assessed by BRANZ and found to be satisfactory.

16.3 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

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

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Quality

17.1 The manufacture of Thermakraft wall underlays has been examined by BRANZ, including methods adopted for quality control. BRANZ also undertakes an ongoing review of product quality on an inwards goods basis. Details of the quality and composition of the materials used within the Thermakraft One Wrap System were obtained and found to be satisfactory.

17.2 The quality of supply to the market is the responsibility of Kingspan Insulation NZ Limited.

17.3 Building designers are responsible for the design of the building, and for the incorporation of the Thermakraft One Wrap System into their design in accordance with the instructions of Kingspan Insulation NZ Limited.

17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Kingspan Insulation NZ Limited.

Sources of Information

- AC 148 (2001) Acceptance criteria for flashing materials ICBO Evaluation Service Inc. July 2001.
- AS 1530.2:1993 Test for flammability of materials.
- AS/NZS 1301.421s:1998 Determination of the pH value of aqueous extracts of paper, board and pulp - cold extraction method.
- AS/NZS 4200.1:1994 Pliable building membranes and underlays - materials.
- AS/NZS 4201.3:1994 Pliable building membranes and underlays - Methods of test - Shrinkage.
- BS 6538-3:1987 Method for determination of air permeance using the Garley apparatus.
- NASH Building Envelope Solutions: 2019 Light steel framed buildings.
- NASH Standard Part Two: 2019 Light steel framed buildings.
- NZS 2295:2006 Pliable, Permeable Building Underlays.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments – Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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

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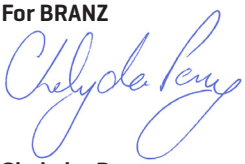
In the opinion of BRANZ, the Thermakraft One Wrap System is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Kingspan Insulation NZ 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. Kingspan Insulation NZ 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 Kingspan Insulation NZ 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 Kingspan Insulation NZ Limited or any third party.

For BRANZ



Chelydra Percy
Chief Executive

Date of Issue:
22 February 2023

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



Thermakraft™

Product Data Sheet

THERMAKRAFT 215

Self-supporting bituminous wall and roof underlay

Commonly referred to as “Building Paper” Thermakraft 215 is a self-supporting, kraft paper based, bituminous building underlay that is suitable for use on roofs and walls in residential buildings. It is vapour permeable, meaning that liquid water from the outside is prevented from penetrating but water vapour from the inside can pass through and escape the building envelope. Thermakraft 215 is easy to install.

Thermakraft 215 comes in two roll sizes:

1250mm wide	20m long	25m^2 coverage*
1250mm wide	40m long	50m^2 coverage*

* **Note:** m2 is the roll size for actual coverage, allow for laps and joins.

Smarter products. Better buildings.
thermakraft.co.nz

Thermakraft 215

Self-supporting bituminous wall and roof underlay

Scope of Use (Roof Application)

- Suitable with masonry tile, metal tile and profiled metal roof cladding.
- Direct fix or cavity fix.
- Can be used on roofs up to and including NZS 3604 'Extra High' wind zones.
- Refer to installation guide regarding underlay support requirements.
- Will provide temporary weather protection during construction (maximum 7 days), same day coverage recommended.

Scope of Use (Wall Application)

- Suitable for use with both timber and steel framing, either direct fix or in conjunction with an 18mm minimum drained cavity.
- Can be used with absorbent wall claddings (e.g. timber, brick or fibre cement) or non-absorbent wall claddings (e.g. metal or plastic).
- Can be used with masonry veneer in accordance with NZS 3604.
- Suitable for buildings situated in NZS3604 Building Wind Zones up to and including 'Very High'.
- Thermakraft 215 can be used as an air barrier to reduce wind entry and is highly water resistant.
- Will provide temporary weather protection during construction (maximum 28 days).

General

Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in well ventilated area. Recommended minimum 7 days.

Limitations

- In roofing applications must NOT be exposed to the weather or UV for more than 7 days.
- In wall applications must NOT be exposed to the weather or UV for more than 28 days.
- Must NOT be used under translucent sheeting.
- Is not fire retardant.
- Not suitable for School Property, please refer to Ministry of Education; Weather-Tightness & Durability requirements for School Property.

Compliance

Thermakraft 215 meets the requirements of NZBC Acceptable Solutions E2/AS1, Table 23 and NZS 2295:2006 for both wall & roof underlay.

Durability

Meets the Performance Requirements of NZBC Clause B2, Durability B2.3.1 (a) 50 years and B2.3.1 (b) 15 years, E2 External Moisture providing:

- It is installed in accordance to Thermakraft Installation Guide.
- Run length is no greater than 10 meters.
- Is NOT left exposed to the weather or UV for more than 7 days on roof.
- Is NOT left exposed to the weather or UV for more than 28 days on walls.
- Is installed by or under guidance of Licensed Building Practitioners.
- Is installed in accordance with the MRM Code of Practice.
- Is compatible with the cladding system used.*

* **Note:** roof cladding system compatibility testing must be done first before installation.

Property Performance

NZBC E2/AS1 Wall Underlay Requirements

NZBC E2/AS1 Table 23 (NZS2295) Roof Underlay Properties	Absorbency	Vapour Resistance	pH of Extract	Shrinkage	Water Resistance
Property Performance Requirement	≥ 150gsm	≤ 7 MN.s/g	≥ 5.5 and ≤ 8	≤ 0.5%	100mm for 24 hrs
Property Performance	Pass	Pass	Pass	Pass	Pass

NZS2295:2006 Classification

NZBC E2/AS1 Table 23 (NZS2295) Roof Underlay Properties	Flammability Index	Wind Zone	NZS2295:2006 Index
Property Performance Requirement		R2	R2
Property Performance	Non-Fire Retardant	Up to Extra High	Self - Support

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Thermakraft 215

Self-supporting bituminous wall and roof underlay

Control of Condensation

In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation method to prevent moisture build-up in the roof cavities.

Factors which adversely affect the condensation risk in roofing systems include:

- Humid, and/or cold climatic regions.
- Warm/Skillion roof construction.
- Low roof cavity air volume and restricted air movement.
- Omitting Vapour Control Layers.
- Occupancy activities which have high moisture loading on conditioned spaces.
- Ceiling penetrations and entry of warm air into roof cavities.
- Low pitched roof.
- Bulk insulation.
- Building structures ability to naturally dry construction moisture.

Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer to MRM Code of Practice for details.

For passive ventilation of the roof space, it is recommended that all roof underlays are terminated at the ridge, and if not it should be slit or slotted to allow for passive ventilation. (For further information refer to the NZ MRM Roofing Code of Practice).

Product Warranty

Standard Thermakraft warranty applies. Refer to Thermakraft Warranty Statement for further details. This is available online at **thermakraft.co.nz** or call **0800 806 595.**

SDC - Approved Application Document - Building Code Clause E2/AS1 - 7.0 Roofing - 7.1 Design - Pg 296 of 324 - 24/06/2021 4:08:20 pm - phillid

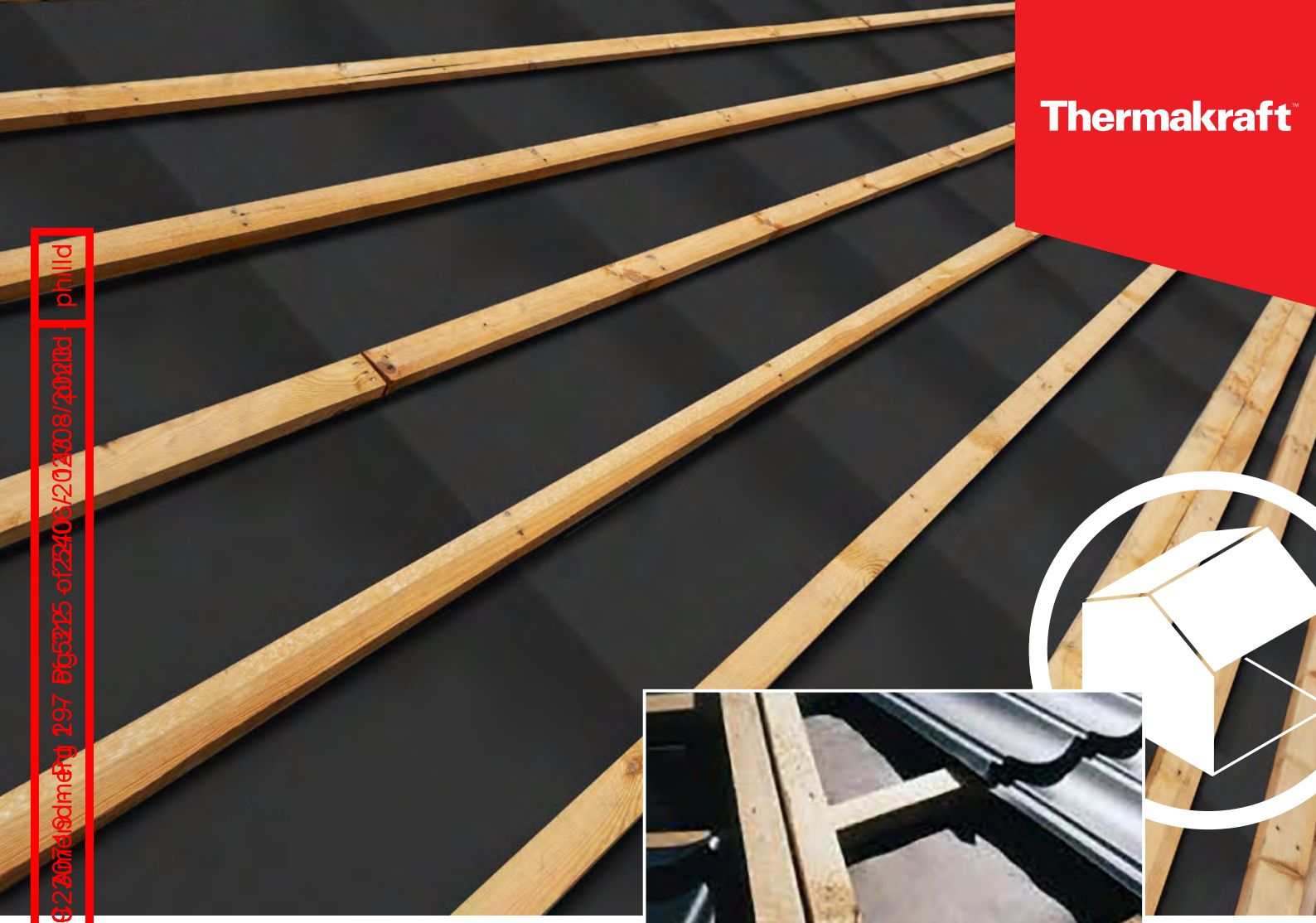
Thermakraft Limited / 0800 806 595

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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. E&OE.

Issue 6, November 2019





Installation Guide

THERMAKRAFT 215

Self-supporting bituminous wall and roof underlay

Commonly referred to as “Building Paper” Thermakraft 215 is a self-supporting, kraft paper based, bituminous building underlay that is suitable for use on roofs and walls in residential buildings. It is vapour permeable, meaning that liquid water from the outside is prevented from penetrating but water vapour from the inside can pass through and escape the building envelope. Thermakraft 215 is easy to install.

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Installation Guide

Application Method (Roofing)

Thermakraft 215 is a bituminous building underlay used on roofs in residential buildings.

- Thermakraft 215 can be used in direct fix or cavity fix for roof construction.
- Run NO longer than 10m.

Long-run metal roofing/vertical or horizontal installation method

- Fix using stainless steel 8-12mm staples or 20mm flat head clouts, or appropriate proprietary fastenings on timber framed structure. Fixing at 300mm centres. Fixing types and requirements for steel framed structure can be found in the MRM Code of Practice.
- Refer to table below to determine underlay support requirements.

Roof Pitch	Span	Underlay Support Required	
		Horizontally Installed	Vertically Installed
≥ 10°	> 1200mm	Yes	Yes
	≤ 1200mm	No	No
< 10° (Min 3°)	> 1200mm	Yes	Yes
	≤ 1200mm	No	Yes

- Thermakraft 215 upper sheet lapped over lower sheets (shiplap) to ensure water is shed to the outer face.
  Note: Thermakraft 215 can move downwards. To prevent this, it must be "Captured" by the fastenings at each purlin. Horizontal fix must not be used on purlin distance greater than 1100mm to allow for 150mm laps.
- Must be laid firmly (tight/taut) without creases. All laps either vertical or horizontal must be a minimum of 150mm lap.
- When underlay support is required, Thermakraft recommend using AUSMESH Safety Mesh, AUSNET hexagonal netting or Thermastrap 201.
- Thermakraft 215 can be installed above the battens or purlins for profiled metal roof claddings and otherwise in accordance with NZBC E2/AS1.
- If required to achieve a lap seal (refer to NZ Metal Roofing Code of Practice), use Thermakraft Aluband window sealing tape or Thermakraft White General Purpose Tape.
- Thermakraft 215 will provide temporary weather protection during construction, same day coverage recommended. DO NOT over expose the product to the weather or UV for more than 7 days in any roof applications.
- Thermakraft 215 may be unwound to the full length from the gutter to the ridge. However, when ridge ventilation is required Thermakraft 215 may be terminated or slit at the ridge purlin to allow a free passage of air.
- Thermakraft 215 must NOT overhang the gutter line by more than 20 mm, or if eaves flashings are used, terminate on the upper side of the flashing. More details can be found in the MRM Code of Practice.
- Flue penetrations must have a minimum distance of 50mm from Thermakraft 215 (refer to NZ Metal Roof and Wall Cladding Code of Practice 10.11.5).
- Thermakraft 215 must be free of tears and punctures, fit tightly and be lap taped around all penetrations (except flue penetrations), to provide drainage for any condensation, or surface water from leaks.

Note: Do not use Aluband on penetrations where Polybutene water pipes have been installed. Refer Pipe Manufacturers for instructions on sealing penetrations.

Concrete/Metal tile roofing

- Thermakraft 215 must be laid over rafters prior to fixing the tile battens. The maximum span between rafters for Thermakraft 215 is 1200mm. Masonry tile roofs must have antiponding boards in accordance with NZBC E2/AS1 Paragraph 8.2.5.
- Installed Thermakraft may be laid over the top of the antiponding boards and draped into the gutter by no more than 20mm. Antiponding boards must be treated in accordance with NZS 3604.
- Do NOT Run Thermakraft 215 longer than 10m in length.

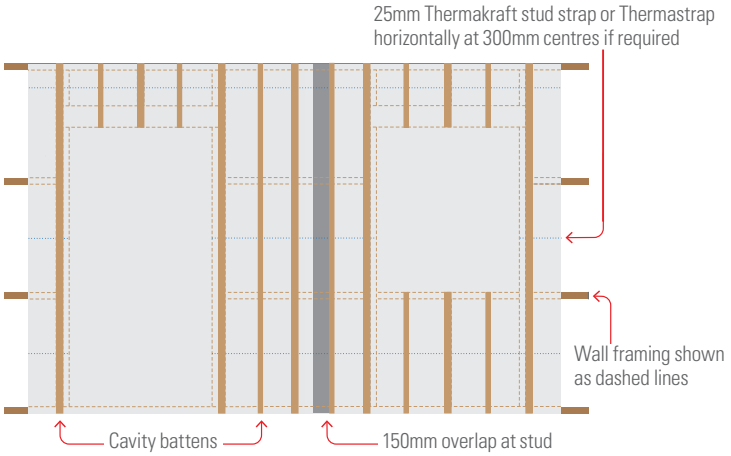
Application Method (Wall)

- Fix Thermakraft 215 underlay with printed side facing the exterior.
- Fix to all exterior walls from below bearers to the top plate. Pull the Thermakraft 215 underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically. Additional fasteners should be used around each opening to be cut out. Fixing types and requirements for steel framed structure can be found in the MRM Code of Practice.

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Installation Guide

- When fixing Thermakraft 215 underlay to Steel framing the same procedures applies, use adhesive spray or tape or flat head screws to fasten to the framing or thermal break, the exterior cladding fastenings will act as the permanent fixings.
- Cover all windows and door openings with Thermakraft 215 underlay.
- It is recommended that the Thermakraft 215 underlay is not cut and prepared for window installation until the arrival of the windows. minimum of 150mm lap is required at joins, all vertical laps must be made over studs. Horizontal laps to be laid ship lap style allowing water to be shed to the outer face of the membrane.
- When windows and doors are ready for installation, the Thermakraft 215 underlay covering the openings should cut at 45° and folded into the opening and securely fastened. Thermakraft window flashing tapes are recommended as the window flashing system.
  Note: In accordance with NZBC Acceptable Solution E2/AS1, wall underlay must be prevented from bulging into the drained cavity. Where stud spacing is greater than 450mm Thermakraft stud strap run horizontal at 300 centres is an acceptable means of prevention.
- Once installed, Thermakraft 215 must not be left exposed to the weather or UV for a maximum of 28 days. Thermakraft 215 underlays will provide temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZS 3604.
- Make good any forced tears with Thermakraft window flashing tapes. Any large areas which require repair may be covered with a second layer of underlay, a lap of 150mm is required.
- For wall cavity systems where stud spacings are greater than 450mm centres, another means of restraint is required on the flexible underlay to prevent insulation bulge (refer to E2/AS1).
- Thermakraft 215 underlay must be installed by a licensed building practitioner.



Application Tips

- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.

Handling and Storage

Thermakraft 215 underlay must be handled with care to prevent damage such as tearing and roll deformation. Due to the width of the product, care should be taken when installing in windy conditions.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

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Thermakraft 215 Underlay

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. E&OE.

Issue 1, November 2019

SDC - Approved Document B (Fire safety) Volume 1 - Part 3 of 3 - 2019 Amendment 1 - 30/06/2021 - 2021 Edition - Page 228 of 228 - 30/06/2021 - BC 230718 - Document Downloaded by philld

BRANZ Appraised
Appraisal No. 1229 [2023]

THERMAKRAFT COVERTEK 215 ROOF UNDERLAY



Appraisal No. 1229 (2023)

BRANZ Appraisals
Technical Assessments of products for building and construction.

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Product

1.1 Thermakraft Covertek 215 Roof Underlay is a non-fire-retardant, synthetic, self-supporting building underlay for use under roof claddings.

Scope

2.1 Thermakraft Covertek 215 Roof Underlay has been appraised for use as a roof underlay on buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber-framed buildings; or,
- the scope limitations of NASH Building Envelope Solutions, Paragraph 1.1 for steel-framed buildings; and,
- with masonry tile roof cladding; and,
- with metal tile roof cladding; and,
- with profiled metal roof cladding; and,
- situated in NZS 3604 and NASH Standard Part 2 Wind Zones up to, and including, Extra High.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Thermakraft Covertek 215 Roof Underlay, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.2. Thermakraft Covertek 215 Roof Underlay meets these requirements. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the roof cladding system, Thermakraft Covertek 215 Roof Underlay contributes to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Thermakraft Covertek 215 Roof Underlay meets this requirement.

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

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Technical Specification

4.1 Thermakraft Covertek 215 Roof Underlay is a synthetic building underlay for use under roof claddings. The product consists of a micro-porous, water-resistant film, laminated between two layers of non-woven spun-bonded polyolefin. Thermakraft Covertek 215 Roof Underlay is coloured white.

4.2 The product is supplied in rolls 1.35 m wide x 18.6 and 37 m long. The product is printed with the Thermakraft Covertek 215 logo repeated along the length of the roll. The rolls are wrapped in clear polythene film.

Accessories

4.3 Accessories used with Thermakraft Covertek 215 Roof Underlay which are supplied by the installer are:

- **Fixings** - stainless steel staples, clouts, screws or proprietary underlay fixings, or other temporary fixings to attach the roof underlay to the framing.

Handling and Storage

5.1 Handling and storage of the product, whether on-site or off-site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

6.1 This Appraisal must be read in conjunction with:

- Installation Guide, Thermakraft™ Covertek 215, Issue 1.0, dated January 2023.
- Product Data Sheet, Thermakraft™ Covertek 215, Issue 1.0, dated January 2023.

6.2 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 Covertek 215 Roof Underlay is intended for use as an alternative to conventional kraft paper roof underlays, which are fixed over timber or steel-framed roofs in order to limit the entry of wind into the roof cavity, and to assist in the moisture management of the roof cladding system.

7.2 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the roof weathertight and some wetting of the underlying structure is always possible before the roof cladding is installed. Hence, the entire building must be closed-in and made weatherproof before moisture sensitive materials such as ceiling linings and insulation materials are installed.

7.3 Thermakraft Covertek 215 Roof Underlay must not be exposed to the weather or ultraviolet (UV) light for a total of more than 7 days before being covered by the roof cladding.

7.4 Thermakraft Covertek 215 Roof Underlay is suitable for use under roof claddings on buildings as a roof underlay in accordance with NZBC Acceptable Solution E2/AS1, Table 23 for timber-framed buildings or NASH Building Envelope Solutions, Table 23 for steel-framed buildings. Refer to Table 1.

7.5 Thermakraft Covertek 215 Roof Underlay is suitable for use at roof pitches 3° and above. When used at pitches less than 10°, Thermakraft Covertek 215 Roof Underlay can be installed horizontally when spanning no greater than 1,200 mm in one direction, or it can be installed vertically when fully supported by a corrosion resistant material.

7.6 At pitches 10° and greater, Thermakraft Covertek 215 Roof Underlay can be installed vertically or horizontally and must span no greater that 1,200 mm in one direction.

7.7 At roof pitches less than 10° (minimum 3°), Thermakraft Covertek 215 Roof Underlay may be run horizontally, or vertically if installed over a roof underlay support.

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

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Table 1: Material Properties

NZBC Acceptable Solution E2/AS1 Table 23 Roof Underlay Properties	Property Performance Requirement	Results
Absorbency	≥ 150 g/m^2	Pass*
Vapour Resistance	≤ 7 MN s/g	Pass
Water Resistance	≥ 100 mm	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Mechanical	Edge tear and tensile strength	Edge tear (Average): Machine direction = 249 N Cross direction = 155 N Tensile strength (Average): Machine direction = 5.4 kN/m Cross direction = 3.5 kN/m

** Evaluated for roofs by testing to section 8 of BRANZ Study Report SR 228 (2010)*

7.8 Refer to Table 2 for a summary of the roof underlay support requirements.

Table 2: Roof Underlay Support Requirements

Roof Pitch	Span	Roof Underlay Support Required?	
		Horizontally Installed	Vertically Installed
10° or more	Greater than 1,200 mm	Yes	Yes
	1,200 mm or less	No	No
Less than 10° (minimum 3°)	Greater than 1,200 mm	Yes	Yes
	1,200 mm or less	No	Yes

Timber and Steel Framing

7.9 Timber and steel roof framing must be provided in accordance with the requirements of the NZBC and the roof cladding manufacturer.

Structure

8.1 Thermakraft Covertek 215 Roof Underlay is suitable for use in all Wind Zones of NZS 3604 up to, and including, Extra High or NASH Standard Part 2 Wind Zones up to, and including, Extra High.

Durability

9.1 Thermakraft Covertek 215 Roof Underlay meets code compliance with NZBC Clause B2.3.1 (a) not less than 50 years for roof underlays used where the roof cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry roof tile cladding, and code compliance with NZBC Clause B2.3.1 (b) 15 years for roof underlays used where the roof cladding durability requirement is 15 years.

Serviceable Life

9.2 Provided it is not exposed to the weather or UV light for a total of more than 7 days, and provided the roof cladding is maintained in accordance with the cladding manufacturer's instructions and the roof cladding remains weather resistant, Thermakraft Covertek 215 Roof Underlay is expected to have a serviceable life equal to that of the roof cladding.

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

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Control of Internal Fire and Smoke Spread

10.1 Thermakraft Covertek 215 Roof Underlay has an AS 1530 Part 2 flammability index of greater than 5. For Risk Groups other than SH, Thermakraft Covertek 215 Roof Underlay must be enclosed by a suitable internal lining in occupied spaces (not exposed to view).

Prevention of Fire Occurring

11.1 Separation or protection must be provided to Thermakraft Covertek 215 Roof Underlay from heat sources such as fireplaces, heating appliances, flues and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

12.1 Thermakraft Covertek 215 Roof Underlay must only be used under roof claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, or roof claddings covered by a valid BRANZ Appraisal.

12.2 Thermakraft Covertek 215 Roof Underlay, when installed in accordance with the Technical Literature and this Appraisal, will assist in the total cladding system's compliance with NZBC Clause E2.

Installation Information

Installation Skill Level Requirement

13.1 All design and building work must be carried out in accordance with the Thermakraft Covertek 215 Roof Underlay Technical Literature and this Appraisal by competent and experienced tradespersons conversant with Thermakraft Covertek 215 Roof Underlay. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License class.

Underlay Installation

14.1 Thermakraft Covertek 215 Roof Underlay must be fixed at maximum 300 mm centres to all framing members with large-head clouts 20 mm long, 6-8 mm stainless steel staples, self-drilling screws or proprietary underlay fixings. The membrane must be pulled taut over the framing before fixing.

14.2 Thermakraft Covertek 215 Roof Underlay may be installed horizontally or vertically at roof pitches 3° and above (refer to Table 2 for further guidance). It must extend from the ridge and overhang the fascia board by 20-25 mm. Vertical laps must be no less than 150 mm wide. Horizontal laps must also be no less than 150 mm, with the direction of the lap ensuring that water is shed to the outer face of the underlay. End laps must be made over framing and be no less than 150 mm wide. To assist with achieving the correct lap dimension, Thermakraft Covertek 215 Roof Underlay has a 150 mm lap line printed continuously along the top face.

14.3 When fixing the product in windy conditions, care must be taken due to the large sail area created.

14.4 Any damaged areas of Thermakraft Covertek 215 Roof Underlay, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

14.5 The Technical Literature must be referred to during the inspection of Thermakraft Covertek 215 Roof Underlay installations.

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

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Basis of Appraisal

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

Tests

15.1 The following tests have been carried out on Thermakraft Covertek 215 Roof Underlay in accordance with NZBC Acceptable Solution E2/AS1 and NASH Building Envelope Solutions Table 23: tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6 and pH of extract in accordance with AS/NZS 1301.421s. A range of these tests were completed before and after the underlay were exposed to UV light.

15.2 Testing was also completed to the Surface Water No-Drip Test method contained in BRANZ Study Report SR 228.

Other Investigations

16.1 A durability opinion has been given by BRANZ technical experts.

16.2 An evaluation of the expected performance of Thermakraft Covertek 215 Roof Underlay in direct contact with metal roof cladding has been completed by BRANZ.

16.3 The practicability of installation of Thermakraft Covertek 215 Roof Underlay has been assessed by BRANZ and found to be satisfactory.

16.4 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

17.1 The manufacture of Thermakraft Covertek 215 Roof Underlay has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

17.2 The quality of supply to the market is the responsibility of Kingspan Insulation NZ Limited.

17.3 Building designers are responsible for the design of the building, and for the incorporation of the roof underlay into their design in accordance with the instructions of Kingspan Insulation NZ Limited.

17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Kingspan Insulation NZ Limited.

Sources of Information

- AS/NZS 1301.421s:1998 Determination of the pH value of aqueous extracts of paper, board and pulp - cold extraction method.
- AS/NZS 4200.1:1994 Pliable building membranes and underlays - materials.
- AS/NZS 4201.3:1994 Pliable building membranes and underlays - Methods of test – Shrinkage.
- AS/NZS 4201.4:1994 Pliable building membranes and underlays - Methods of test – Resistance to water penetration.
- AS/NZS 4201.6:1994 Pliable building membranes and underlays - Methods of test – Surface water absorbency.
- BRANZ Study Report SR 228 (2010) Study of the Moisture Management Properties of Roof Underlays.
- NASH Building Envelope Solutions:2019 Light steel-framed buildings.
- NASH Standard Part Two:2019 Light steel-framed buildings.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

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

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BRANZ

In the opinion of BRANZ, Thermakraft Covertek 215 Roof Underlay is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Kingspan Insulation NZ 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. Kingspan Insulation NZ 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 Kingspan Insulation NZ 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 Kingspan Insulation NZ Limited or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
18 January 2023

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

Linea™ WEATHERBOARD

jameshardie.co.nz

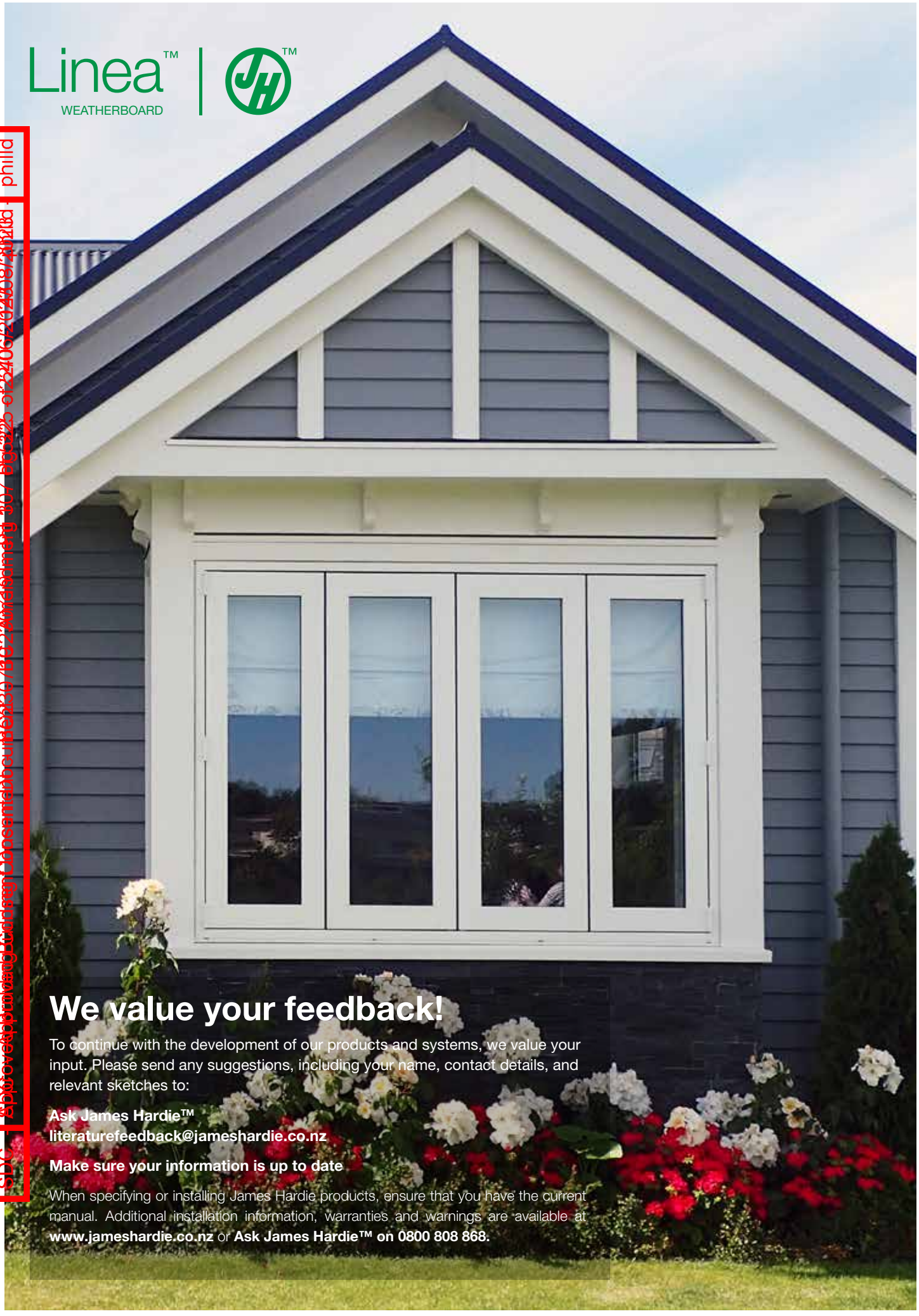
Cavity Fix

Technical Specification

May 2020 New Zealand



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We value your feedback!

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

Ask James Hardie™
literaturefeedback@jameshardie.co.nz

Make sure your information is up to date

When specifying or installing James Hardie products, ensure that you have the current manual. Additional installation information, warranties and warnings are available at **www.jameshardie.co.nz** or **Ask James Hardie™ on 0800 808 868.**

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1 Product Overview

1.1 Product Information

Linea™ Weatherboard is an external cladding.

Linea Weatherboard is a 16mm thick, pre-primed bevel back fibre cement weatherboard. The bottom front edge of Linea Weatherboard is chamfered. It has tongue and groove ends for jointing and is classified as lightweight wall cladding for use in residential and light commercial buildings using timber or lightweight steel framed external walls. Linea Weatherboard is available in 135mm, 150mm and 180mm widths.

James Hardie also has available:

- Axent™ Fascia is a 16mm thick, pre-primed fibre cement product available in two widths. It's designed to accommodate James Hardie soffit linings.
- Axent™ Trim is a 16mm thick, pre-primed fibre cement product available in two widths. For use as decorative trims around openings and external corners.

For fixing to a steel frame. Ask James Hardie™ on 0800 808 868 for specific requirements. Or refer to the James Hardie cladding to steel framing technical supplement about the installation of Linea Weatherboard to steel frame.

Table 1

Linea Weatherboard and Axent Trim sizes									
							Coverage Information		
Product	**Code**	**Length (mm)**	**Width (mm)**	**Thickness (mm)**	**End details**	**Effective cover (mm)**	**No. of planks/ metre height (approx.)**	**Mass kg/ lineal m (approx. at EMC)**	**Mass kg/m² (approx. at EMC)**
Linea Weatherboard 135	401844	4200	135	16	T & G	105	9.5	2.62	25.70
Linea Weatherboard 150	402533	4200	150	16	T & G	120	8.3	3.1	24.93
Linea Weatherboard 180	401847	4200	180	16	T & G	150	6.7	3.57	23.92
Axent Trim 84mm	401943	2600	84	16	Square	N/A	N/A	1.6	N/A
Axent Trim 100mm	401930	2600	100	16	Square	N/A	N/A	1.9	N/A

The effective thickness of finished Linea Weatherboard on the wall at the lap is approximately 33 to 35mm

All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

Linea Weatherboard is categorised as a Light Weight Wall Cladding as described in the NZS 3604.

1.2 Manufacturing and Classification

The manufacturing process of Linea Weatherboard by James Hardie is ISO 9001 Certified.

Linea Weatherboard is an advanced lightweight cement composite cladding manufactured using a basic composition of Portland cement, ground sand, cellulose fibre and water. The product is easily identified by the name 'Linea' printed on the back.

Axent Trim is an advanced lightweight cement composite cladding manufactured using a basic composition of Portland cement, ground sand, cellulose fibre and water. The product is easily identified by the name 'Axent' printed on the back. The trims are factory sealed and primed.

Linea Weatherboard and Axent Trim products are manufactured to Australian/New Zealand Standard AS/NZS 2908.2 'Cellulose-Cement Products' (ISO 8336 'Fibre-Cement Flat Sheet').

Linea Weatherboard is classified Type A, Category 2 in accordance with AS/NZS 2908.2 "Cellulose-Cement Products".

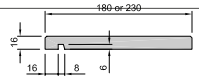
For Safety Data Sheets (SDS) visit **www.jameshardie.co.nz** and view them in the technical literature section or Ask James Hardie on **0800 808 868**.

1.3 Components and Accessories

Table 2

Accessories/tools supplied by James Hardie			
Accessories	**Description**	**Size (mm)**	**Code**
	**External corner soaker 90° for Linea Weatherboards 180mm** • Aluminium • Copper • Stainless Steel	200 long	**301186** **301188** **301197**
	**External corner soaker 135° for Linea Weatherboards 180mm** • Aluminium	200 long	**301178**
	**External corner soaker 90° for Linea Weatherboards 150mm** • Aluminium • Stainless Steel	170 long	**302820** **302821**
	**External corner soaker 90° for Linea Weatherboards 135mm** • Aluminium • Stainless Steel	155 long	**301185** **301196**
	**External Slimline Box Corner Mould** Etched primed aluminium extrusion used to create external corner	2700 long 4000 long	**301195** **305809**
	**Linea 35mm Cavity Closer**	3000 long	**306035**
	**Internal 'W' Mould 90°** Etched primed aluminium extrustion used to create 900 internal corner	2700 long 4000 long	**301184** **305807**
	**Internal 'W' Mould 135°** Etched primed aluminium extrustion used to create 135° internal corner	2700 long	**301183**
Accessories/tools supplied by James Hardie			

Table 2 contd.

Accessories	Description	Size (mm)	Code
	**JH Corner Under Flashing 50 x 50mm** PVC moulding used as under fashing for internal and external corners	3000 long	**303745**
	**Axent Trim 84mm**	84 x 2600 long	**401943**
	**Axent Trim 100mm**	100 x 2600 long	**401930**
	**Axent Fascia** - 180mm - 230mm	4200 long	**401843** **402230**
	**HardieFlex™ Galvanised nail - 5kg**	60 x 3.15mm	**302784**
	**HardieFlex™ Stainless steel nail - 5kg**	60 x 3.15mm	**302782**
	**HardieBlade™ Saw Blade** Diamond tip fibre cement circular saw blade. Spacers not included	4 tooth - 184mm	**300660**
	**HardieBlade™ Saw Blade** Diamond tip fibre cement circular saw blade. Spacers not included	6 tooth - 254mm	**303375**
	**Gecko Gauge** This easy to use tool gauges and supports the weatherboard for a one person install.		**305941**

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Table 3

Accessories not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with its Linea Weatherboard and Axent Trim. James Hardie does not supply these products. There may also be some other accessories required depending upon the application. Please contact component manufacturer for information on their warranties and further information on their products.

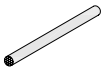
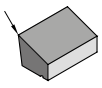
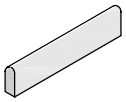
Accessories	Description	Size (mm)	Material/ appearance
	**Flexible Underlay** To comply with Table 23 of E2/AS1		
	D head or RounDrive Nail Gun nail for concealed fixing Linea Weatherboard.	60 x 2.87	Hot Dip Galvanised/ Stainless Steel
	HardieFlex™ Hot Dip Galv. Nails For concealed fixing by hand nail	60 x 3.15mm 75 x 3.15mm	Hot Dip Galvanised/ Stainless Steel
	Jolt Head Nail for face fixing Linea Weatherboard	75 x 3.15mm 90 x 3.55mm	Hot Dip Galvanised/ Stainless Steel
	Titanium Coated High Speed Drill Bit. For pre-drilling prior to face fixing with jolt head.	3.0mm 3.5mm	
	Brad Nail To tie boards together	32mm	
	**Joint sealant** Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information.	Tube	Sika, Bostik or similar Holdfast
	**CRC ADOS Builders Fill** Two part exterior grade fill to finish over jolt head nails.		
	**PEF Rod**	Polyethylene foam	Sika or similar
	**Flexible tape** A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information.	Proprietary tape to adhere to flexible underlay	Tyvek, Marshall Innovations or similar
	**Flashing Material** as per Table 20, 'E2/AS1'		Flashing Fabricator
Dimension to suit 	**Planted Sill**		H3.1 minimum Treated Timber Timber Merchant or cut on site

Table 3 contd.

Accessories not supplied by James Hardie			
Accessories	**Description**	**Size (mm)**	**Material/ appearance**
	**Timber Scriber** To scribe beside window, site cut to suit.	As required	H3.1 minimum Treated Timber Timber Merchant or cut on site
	**Fibre Cement Cutting Blade** Diamond tip 305mm diameter circular saw blade to fit drop saw.	305mm	Diamond Tipped
	**Cavity Closer - aluminium** Used in walls taller than 10m for inter-tenancy fire separation.		
	Primers. Dulux 1-Step Prep, Resene Quick Dry etc.		

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2 Application and Scope

2.1 Application

This specification includes the installation of Linea Weatherboard cavity construction where risk matrix is 13 or more and must be read in conjunction with the current CodeMark Certificate and BRANZ Appraisal. This installation method can also be used for buildings where the risk matrix score is 0 - 12 if desired.

This document is intended for use by architects, designers, specifiers or builders who are involved in specifying Linea Weatherboard. The document also serves the purpose of an installation manual for this product.

For use of Linea Weatherboard outside this published scope, the architect, designer or engineer must undertake specific design. For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

Refer to the Linea Weatherboard Direct Fixed Technical Specification when installing Linea Weatherboard without a cavity.

2.2 Scope

Linea Weatherboard cavity construction is suitable for use in timber framed buildings that fall within the scope limitations of the New Zealand Building Code (NZBC) Acceptable Solution E2/AS1, Paragraph 1.1.

Linea Weatherboard cavity construction is also suitable for use in specific engineering design projects (SED) subject to a wind pressure of 2.5kPa (ULS) maximum for building heights upto 25m.

2.3 Limitations

- Linea Weatherboard cladding must not be used on curved wall applications
- Linea Weatherboard cladding must not be installed vertically or angled
- The minimum ground clearances specified must be maintained
- Timber window joinery/recessed openings is subject to an alternative design by the designer
- Maximum SLS inter-story seismic deflections up to span/180 when used in specific design buildings (SED) buildings above 10m height. To accommodate higher inter-story drifts, a deflection should be used.

2.4 Details

Various typical Linea Weatherboard details are provided within this document. In addition to these, the construction details with HomeRAB™ Pre-Cladding/RAB™ Board have also been developed and are available on our website. These details are available in dwg, dxf, jpg and pdf file format and can be downloaded at **www.jameshardie.co.nz.**

All dimensions shown are in millimetres unless noted otherwise.

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3 Compliance

3.1 NZBC Compliance

When installed in accordance with the conditions of CodeMark number GM-CM30018 Linea Weatherboard complies with all relevant requirements of the NZBC.

CODEMARK™
30018

Please refer to www.building.govt.nz for a copy of the certificate.

Linea Weatherboard cavity fixed cladding also has a BRANZ Appraisal number 447 (2010) available at www.branz.co.nz or www.jameshardie.co.nz.

BRANZ Appraised
Appraisal No.447 [2010]

4 Design

4.1 Responsibility

The specifier or other party responsible for the project must ensure that the information and details in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this technical specification.

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

Specifier

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

Installer

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

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets their aesthetic expectations before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation. James Hardie will only offer a replacement product if Linea Weatherboard or Axent Trim supplied are found to be out of its manufacturing specification.

4.2 Clearances

The clearance between the bottom edge of cladding and the paved/unpaved ground must comply with section 9.1.3 of E2/AS1. On the roofs and decks the minimum clearance must be 50mm. These clearances must be maintained throughout the life of the building.

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

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

Do not install cladding such that it may remain in contact with water or ground, refer to figures in section 9 of this manual.

4.3 Structure

4.3.1 Timber Framing

Timber framing must be in accordance with NZS 3604 (Timber-framed buildings) or designed as for specific engineering design (SED) in accordance with NZS 3603 and AS/NZS 1170 where specific engineering design is required, the framing stiffness must be equivalent to or more than the framing provisions of NZS 3604.

The stud spacing must not exceed 600mm centres maximum for buildings within the scope of NZS 3604 and 400mm centres maximum for wind pressures more than 1.5kPa (ULS).

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

4.3.2 Durability

Timber framing must be treated to a minimum H1.2 treatment requirements and comply with Acceptable Solution B2/AS1 ‘Durability’ of the NZBC. For further timber treatment information refer to the NZS 3602 (Timber and Wood-Based Products for use in Buildings) for minimum timber treatment selection and treatment requirements. Framing must be protected from moisture at sites in accordance with the recommendations of framing manufacturers. Refer to the NZS 3602 for information about the allowable moisture content in timber framing.

4.4 Structural Bracing

Bracing can be achieved by using HomeRAB™ Pre-Cladding or RAB™ Board installed direct to framing instead of a flexible underlay or by using Villaboard™ Lining bracing system on the internal face.

4.5 Energy Efficiency

External walls constructed as per this technical specification, using Linea Weatherboard cladding must use suitable bulk insulation to meet the minimum thermal insulation requirements as per Clause H1/AS1 'Energy Efficiency' of the NZBC.

4.6 Fire Rated Walls

External walls with Linea Weatherboard cavity fix construction method can achieve fire ratings up to 60/60/60 when constructed in accordance with the James Hardie Fire and Acoustic Design Manual. Linea Weatherboard must be face fixed for fire rated applications.

Refer to the Fire and Acoustic Design Manual for further information about fire rated systems.

SDC - Approved Application Document B2/AS1 Durability - Clause 9 Timber Framing - Page 316 of 324 - 24/06/2024 8:08:20 AM

SDC - Approved Document - Building Code Clause B2/AS1 - 1 July 2014 - Page 317 of 325 - 24/06/2014 - 2:08:40 pm

4.7 Control of External Fire Spread

External spread of fire (clause C3.5 and C3.7) apply where:

- Building height is greater than 10m and upper floors have sleeping uses or are different property (C3.5), and
- Where the building is located within 1m of a relevant boundary (C3.7)

Refer to Table 5.1 of Section 5.4 of C/AS1 for group SH or table 5.5 of Section 5.8.1 of C/AS2 for the other risk groups to identify the external fire spread requirement applicable to the external cladding material and surface finish.

For the other situations where 'no requirement' is listed, Linea Weatherboard installed as per the details published in this specification complies.

For buildings that are >10m high and contain tenancies above as per Table 5.5. of C/AS2, Linea Weatherboard installed over timber cavity battens in conjunction with RAB™ Board with R2.2 fibreglass/James Hardie mineral insulation complies. Refer to Figure 38 and 39 for RAB™ Board and cavity batten layout. For the complete set of suitable Linea Weatherboard cavity construction details with RAB™ Board for this application, refer to www. jameshardie.co.nz.

4.8 Alpine regions

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

The Linea Weatherboard has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

5 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 may cause cancer if dust from product is inhaled. Causes damage to lungs and respiratory system through prolonged or repeated inhalation of dust from product.

Intact fibre cement products are not expected to result in any adverse toxic effects. The hazard associated with fibre cement arises from the respirable crystalline silica present in dust generated by activities such as cutting, rebating, drilling, routing, sawing, crushing, or otherwise abrading fibre cement, and when cleaning up, disposing of or moving dust.

When doing any of these activities in a manner that generates dust, follow James Hardie instructions and best practices to reduce or limit the release of dust.

If using a dust mask or respirator, use an AS/NZS1716 P1 filter and refer to Australian/New Zealand Standard 1715:2009 Selection, Use and Maintenance of Respiratory Protective Equipment for more extensive guidance and more options for selecting respirators for workplaces. For further information, refer to our installation instructions and Safety Data Sheets available at www.jameshardie.co.nz.

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

Crystalline Silica is

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

Why is Crystalline Silica a health hazard?

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

When is Crystalline Silica a health hazard?

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

Avoid breathing in crystalline silica dust

Safe working practices

✕ NEVER use a power saw indoors or in a poorly ventilated area

✕ NEVER dry sweep

✓ ALWAYS use M Class or higher vacuum or damp down dust before sweeping up

✕ NEVER use grinders

✓ ALWAYS use a dust reducing circular saw equipped with a sawblade specifically designed to minimise dust creation when cutting fibre cement – preferably a sawblade that carries the HardieBlade™ logo or one with at least equivalent performance – connected to an M Class or higher vacuum

- ✓ Before cutting warn others in the area to avoid dust
- ✓ ALWAYS follow tool manufacturers' safety recommendations
- ✓ ALWAYS expose only the minimum required depth of blade for the thickness of fibre cement to be cut
- ✓ ALWAYS wear a properly-fitted, approved dust mask or respirator P1 or higher in accordance with applicable government regulations and manufacturer instructions
- ✓ Consider rotating personnel across cutting tasks to further limit respirable silica exposures.

When cutting

- ✓ Work outdoors only
- ✓ Make sure you work in a well ventilated area
- ✓ Position cutting station so wind will blow dust away from yourself and others in the working area
- ✓ Rotate employees across cutting task over duration of shift
- ✓ Cut products with a HardieBlade Saw Blade (or equivalent) and a dust reducing circular saw connected to a M Class or higher vacuum
- ✓ When sawing, sanding, rebating, drilling or machining fibre cement products, always:
  - Wear your P1 or higher (correctly fitted in accordance with manufacturers' instructions), ask others to do the same.
  - Keep persons on site at least 2 metres and as far as practicable away from the cutting station while the saw is in operation
  - If you are not clean shaven, then use a powered air respirator with a loose fitting head top
  - Wear safety glasses
  - Wear hearing protection
- ✓ Make sure you clean up BUT never dry sweep. Always hose down with water/wet wipe or use an M Class or higher vacuum

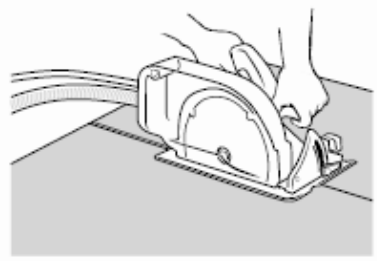
If concern still exists about exposure levels or you do not comply with the above practices, you should always consult a qualified industrial hygienist or contact James Hardie for further information.

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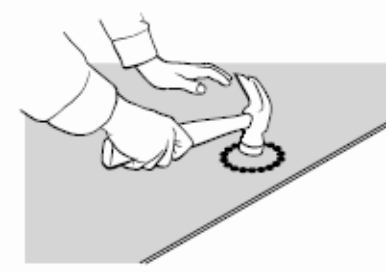
Working Instructions

HardieBlade™ Saw Blade

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



Hole-Forming



For smooth clean cut circular holes:

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

For irregular holes:

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

5.1 Storage and delivery

Keeping products and people safe

Off loading

✓ James Hardie products should be off-loaded carefully by hand or by forklift

✓ James Hardie products should not be rolled or dumped off a truck during the delivery to the jobsite

Storage

James Hardie products should be stored:

✓ In their original packaging

✓ Under cover where possible or otherwise protected with a waterproof covering to keep products dry

✓ Off the ground – either on a pallet or adequately supported on timber or other spacers

✓ Flat so as to minimise bending

James Hardie products must not be stored:

✗ Directly on the ground

✗ In the open air exposed to the elements

James Hardie is not responsible for damage due to improper storage and handling.

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5.2 Tips for safe and easy handling of weatherboard products

Weatherboard products

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

6 Installation

The horizontal lap between the two Linea Weatherboard must be 30mm minimum. In certain scenarios you may require to creep up the lap, this must not exceed 33mm.

Linea Weatherboard must be kept dry whilst in storage prior to and during fixing. Site cut ends that are exposed such as slimline box corners, internal corners etc. and any sanded patches on the boards surface must be primed prior to installation. Dust and loose material must be removed before priming.

6.1 Fastener

6.1.1 Fastener – Size and Method

Linea Weatherboard and Axent Trim must be fixed to timber with the types of nails specified in Tables 4 and 5, in accordance with the following requirements:

- Linea Weatherboard can either be face/exposed fixed or concealed fixed
- Linea Weatherboard must be fixed into studs at maximum 600mm centres. Fixing centres to coincide with stud spacing, refer to figures in section 9 of this manual
- All concealed nails must be driven flush with the board surface
- When concealed fixing Linea Weatherboard, nails must be driven under the lap of boards, except at all corners and vertical edges of openings where Linea Weatherboard must be face fixed, refer to figures in section 9 of this manual
- Nails must be fixed 25mm from the end of the board when hand nailing. For gun nailing refer to Section 6.1.2
- When using concealed fixing method, any gaps that may appear under the lap due to site conditions can be minimised by fixing a jolt head nail through the lap as per the exposed nailing method. Refer to figures in section 9 of this manual
- When using concealed fixing method, Linea Weatherboard may be tied together by face fixing through the lap using a 32mm brad nail if desired.
- When face fixing Linea Weatherboard, the upper board must be pre-drilled before fixing with a jolt head nail

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Table 4

Wind pressure (kPa)	Underlay	Fixing method	Fixing type	Instructions
Up to 1.5 (up to and including VH Wind Zone)	Flexible underlay	Concealed nailing	60 x 3.15mm HardieFlex™ nail or a 60 x 2.87mm D/round head gun nail	Finish flush with the board surface.
		Face nailing	75 x 3.15mm jolt head nails	Hot-dipped galvanised/stainless steel jolt head nail with pre-drilling through the top weatherboard. Use a 3mm drill bit.
	Rigid air barrier	Concealed nailing	75 x 3.15mm HardieFlex™ nail or a 75 x 3.06mm D/round head gun nail	Finish flush with the board surface.
		Face nailing	90 x 3.55mm jolt head nails	Hot-dipped galvanised/stainless steel jolt head nail with pre-drilling through the top weatherboard. Use a 3.5mm drill bit.
1.5 to 2.5 (EH Wind Zone and SED projects)	RAB™ Board	Face nailing	90 x 3.55mm jolt head nail	Hot-dipped galvanised/stainless steel jolt head nail with pre-drilling through the top weatherboard. Use a 3.5mm drill bit.

Table 5

Nail requirements for Axent Trim	
Single thickness	60mm jolt head nails. If fixing over Linea Weatherboard use 75 x 3.15mm jolt head nails through a pre-drilled hole, using a 3mm drill bit.
Single thickness plus packer	If fixing over Linea Weatherboard use 75 x 3.15mm jolt head nails through a pre-drilled hole, using a 3mm drill bit. When fixing to timber support use 60mm jolt head nails.

For fire rated wall applications the Linea Weatherboards must be face fixed. For more information Ask James Hardie on 0800 808 868.

6.1.2 Gun Nailing

Linea Weatherboard can be gun nailed with a D-Head or RounDrive nail when concealed fixing method is used.

- Nails must be no closer than 50mm from the ends of boards when gun nailing is used, double studs will be required.
- Be minimum length and nearest gauge as per Table 4.
- Be finished flush with surface of board.

6.1.3 Fastener Durability

Fasteners must meet the minimum durability requirements of the NZBC. Refer to Table 6 for fixing materials requirements to be used in relation to the exposure conditions.

Table 6

Exposure conditions and nail selection prescribed by NZS 3604		
Zone	**Application**	
D (sea spray) and geothermal hot spots	General	Stainless steel 304/316
	Fire	
*C and B	General	Hot dip galvanised**
	Fire	

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

**Hot dip galvanised must comply with AS/NZS 4680.

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

6.2 Framing

Framing to be in accordance with the NZS 3604. The following must be provided for fixing Linea Weatherboard:

- Studs at 600mm centres maximum for all wind speed zones up to and including very high (VH)
- Studs at 400mm centres maximum for wind pressures more than 1.5 kPa (ULS)
- Double studs are required at internal corners
- Extra packers may be required at external corners
- Extra studs are required for aluminium internal corner sections

6.2.1 Specific Engineering Design (SED)

For EH wind zone and specific engineering design projects the timber framing is required to be designed in accordance with NZS 3603 and AS/NZS 1170. The minimum framing sizes and layout must comply with this specification:

- Stud spacing 400mm centres maximum
- Nog spacing 1200mm centres maximum
- Double studs are required at internal corners
- Extra packers may be required at external corners
- Extra studs are required for aluminium internal corner sections

6.2.2 Gable Ends

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must be in accordance with truss design and specification supplied by the frame and truss manufacturer/supplier supported by independent design producer statement.

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6.2.3 Tolerances

In order to achieve an acceptable wall finish, it is imperative that framing is straight and true. Framing tolerances must comply with the requirements of NZS 3604 and the manufacturer's specifications. All framing must be made flush. The visual aspects of the finished cladding can differ between two different sites or the builders installing the product. It is recommended that you also refer to a building guidance document published by MBIE to understand an acceptable level of tolerances allowed in building materials and workmanship. www.building.govt.nz Guide to tolerances, materials and workmanship in new residential construction 2015

6.3 Flexible Underlay or HomeRAB™ Pre-Cladding

Flexible underlay or HomeRAB™ Pre-Cladding must be provided to comply with the requirements of E2/AS1 up to and including very high wind zone.

Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding. HomeRAB™ Pre-Cladding is suitable for use as an air barrier and must be installed in accordance with HomeRAB™ Pre-Cladding and RAB™ Board Installation Manual.

6.4 Intermediate Support

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

- Intermediate cavity batten between the studs; or
- 75mm galvanised mesh; or
- Polypropylene tape at 300mm centres fixed horizontally and drawn taut.

No intermediate supports are required:

- Where studs are at maximum 400mm centres; or,
- When rigid sheathings instead of flexible underlays are used.

6.5 Rigid Air Barrier

In EH wind zone or for specific design wind zone, a rigid air barrier i.e. RAB™ Board, must be used instead of flexible underlay.

For buildings more than 10m, RAB™ Board must be used. To achieve the temporary weathertightness using HomeRAB™ Pre-Cladding and RAB™ Board, windows/doors need to be installed with required flashing tapes and seals etc. Refer to HomeRAB™ Pre-Cladding and RAB™ Board Installation Manual for information regarding its installation and to achieve temporary weathertightness.

6.6 Vent Strip

Linea 35mm cavity closer vent strip (uPVC) must be installed at the bottom of all walls constructed using the drained and ventilated for cavity construction method. James Hardie Linea 35mm cavity closer vent strip has an opening area of 1000mm^2/m length. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. Alternate cavity closer can be used ensuring compliance of E2 and may need to be used with a cant strip.

6.7 Cavity Battens

The cavity battens provide airspace between the frame and cladding and are considered a "packer" only in this specification.

The timber battens must be minimum H3.1 treated to comply with the durability requirements of B2/AS1.

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Cavity battens must comply with E2/AS1 and:

- Be minimum 18mm thick
- Be minimum 45mm wide
- Until claddings are fixed the battens need only to be tacked to framing with 40 x 2.8mm nails at 800mm centres maximum (batten fixing is required temporarily to keep them straight on the wall during construction)

6.8 Joints

6.8.1 Jointing

The ends of Linea Weatherboard are jointed off-stud by means of a tongue and groove joint. Tongue and groove joints may be located centrally between studs but no closer than 100mm from the edge of a stud. The joints must be staggered by 600mm minimum. Flexible sealant must be applied to the front of tongue before pushing into the groove at the time of installation. From a visual perspective, the joint line will be visible and must not be hard filled.

6.8.2 Drainage Joint

After every two floors a horizontal drainage joint flashing is required, refer to figures Figure 29 in section 9 of this manual.

6.8.3 External Corner Joint

There are a number of options to select from when detailing external corners:

- 90º corner soaker in aluminium, copper or stainless steel
- 135º corner soaker 180mm aluminium
- Aluminium boxed corners
- Box corners using Axent Trim
- Mitred corners to weatherboards

Refer to figures in section 9 of this manual.

6.8.4 Internal Corner Joint

There are a number of options to select from when detailing internal corners:

- 90º or 135º Aluminium W-mould
- Scribed corner

Refer to figures in section 9 of this manual.

6.9 Junctions and Penetrations

All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Linea Weatherboard which meet the performance requirements of E2 ‘External Moisture’, an approved document of the NZBC, refer to figures in section 9 of this manual.

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7 Finishes

Protective coating of Linea Weatherboard and Axent Trim is required in order to meet the durability requirements of the NZBC.

7.1 Preparation and Priming

The Linea Weatherboard and Axent Trim must be dry before painting. Punch and fill all exposed nails a maximum of 2mm below the surface. Fill the hole with an exterior grade 2 part builders fill, eg CRC ADOS Builders Fill, allow to cure and using 60 grit sand paper smooth ready for painting. Prime any sanded patch on board surface or the site cut edges that will be exposed.

It is not recommended to seal gap under the lap of weatherboards as it helps in circulation of air behind the weatherboard cladding. However if sealing of the gap is undertaken, the product warranty still applies.

7.2 Sealants

All sealants must demonstrate the ability to meet the relevant requirements of the NZBC. Application and use of sealants must comply with manufacturer's instructions. Sealants, if coated, must be compatible with the paint system.

7.3 Painting

All Linea Weatherboards are pre-primed on their face and bottom edge with a factory applied acrylic base coat.

Linea Weatherboard and Axent Trim must be painted within 90 days of installation. Dark coloured paints can be used, i.e. there is no restriction on the Light Reflectance Value (LRV) of paint to be applied. All exposed faces, including the top edges under the sills and bottom edges of Linea Weatherboard, Axent Trim and accessories must be finished with an exterior paint system.

For best aesthetic results a low sheen paint is recommended.

The dark colours in certain environments may fade over a period of time. Special paints/coatings are required in certain harsh environments.

Stainless steel soakers are generally left natural. For painting over stainless steel soakers, refer to paint manufacturer as special preparation and paints are required.

Paint selection and the preparation required is dependent on paint chosen. Refer to the paint manufacturer for information before starting painting.

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8 Care and Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. It is the responsibility of the specifier to determine normal maintenance requirements to comply with the NZBC Acceptable Solution B2/AS1. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months* using low pressure water and a brush, and every 3-4 months in extreme coastal conditions or sea spray zones
- Re-coating exterior protective finishes. Always refer to your paint manufacturer for re-coating requirements
- Maintaining the exterior envelope and connections including junctions, penetrations, flashings and sealants
- Cleaning out gutters, blocked pipes and overflow pipes as required
- Pruning back vegetation close to or touching the building as well as ensuring the NZBC ground clearance requirements are maintained especially where gardens are concerned
- The clearances between the bottom edge of Linea Weatherboard and the finished/unfinished ground must always be maintained
- Stainless steel soakers used in extreme coastal conditions or in sea spray zones may show some signs of ‘tea staining’. It is an aesthetic issue and to minimise staining soaker must be washed/polished frequently

*Do not use a water blaster to wash down the cladding. Refer to your paint manufacturer for washing down requirements.

9 Details Section Index

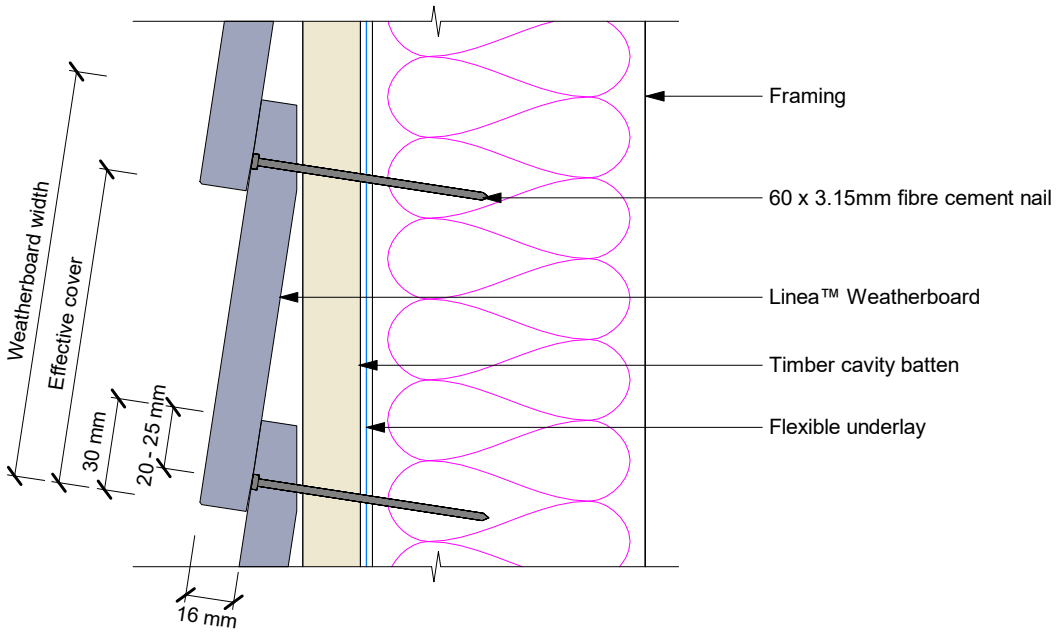
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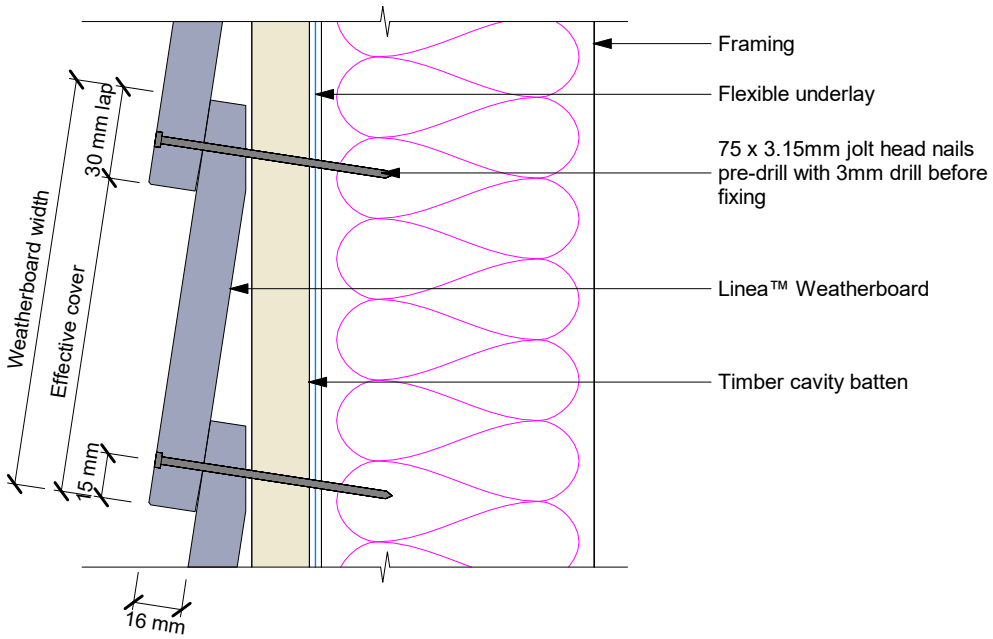
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Figure 1: Weatherboard fixing



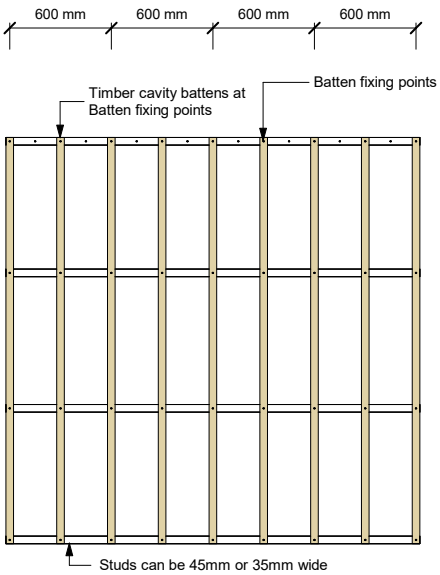
Concealed Nailing

Linea™ Weatherboards to be face fixed at corners and down window and door openings using jolt head nails at 90° to face, punch 2mm below surface and fill. Refer to fixing table 4



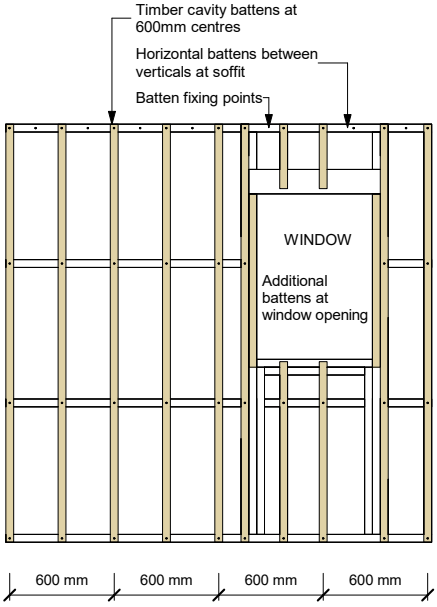
Exposed Nailing

Figure 2: Batten fixing



The intermediate support for insulation between the studs could be a timber cavity batten, polypropylene tape or 75 mm galvanised wire mesh. Refer to E2/AS1 Paragraph 9.1.8.5 Polypropylene tape must be fixed horizontally and drawn taut at 300 mm centres.

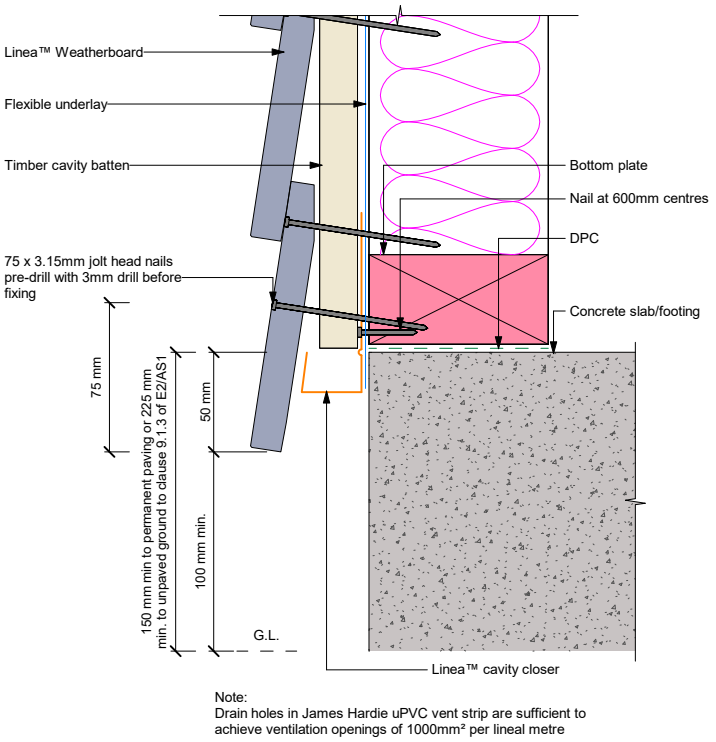
Figure 3: Batten layout at window opening



- Studs can be 45mm or 35mm wide

-The intermediate support for insulation between the studs could be a timber cavity batten, polypropylene tape or 75 mm galvanised wire mesh. Refer to E2/AS1 Paragraph 9.1.8.5 Polypropylene tape must be fixed horizontally and drawn taut at 300 mm centres.

Figure 4: Foundation detail



Note:
Drain holes in James Hardie uPVC vent strip are sufficient to achieve ventilation openings of 1000mm² per lineal metre

Figure 5: Enclosed Deck

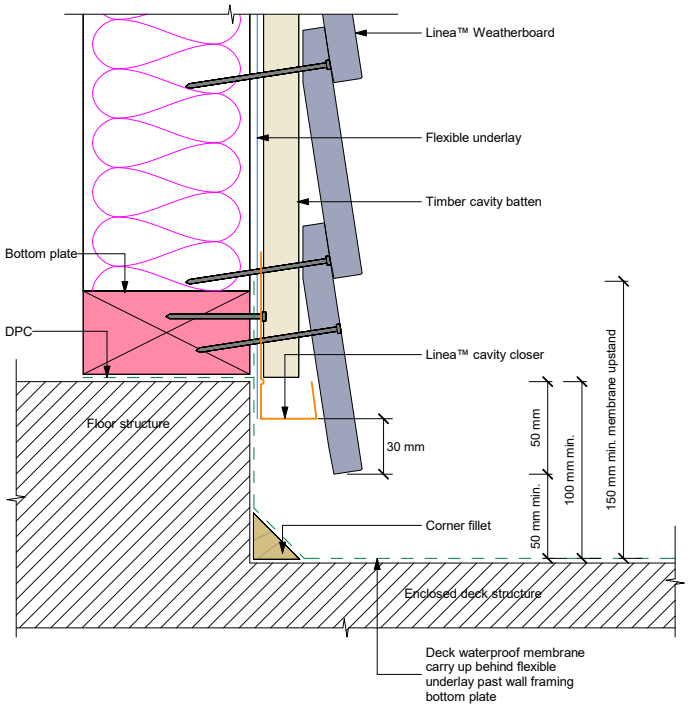


Figure 6: Jointing off stud

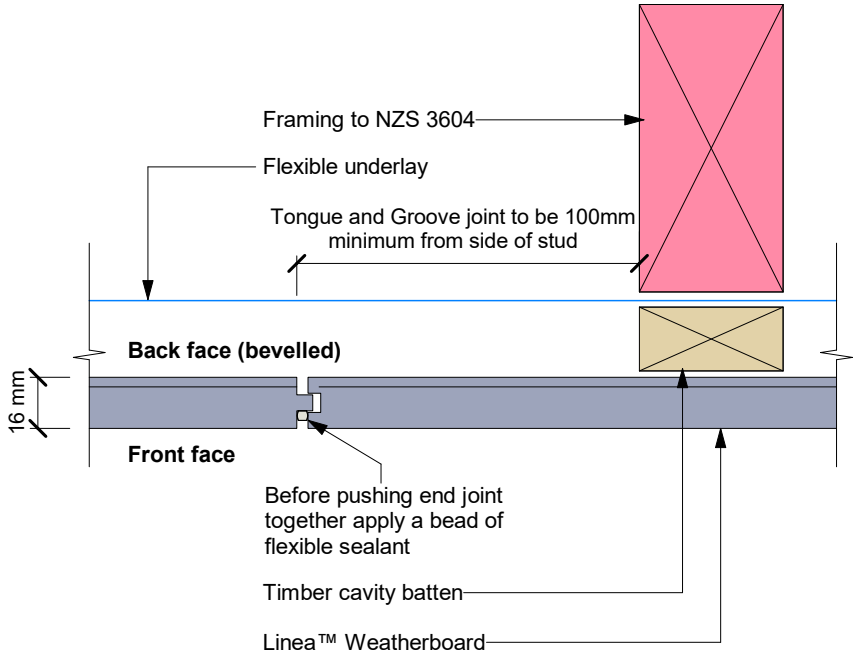
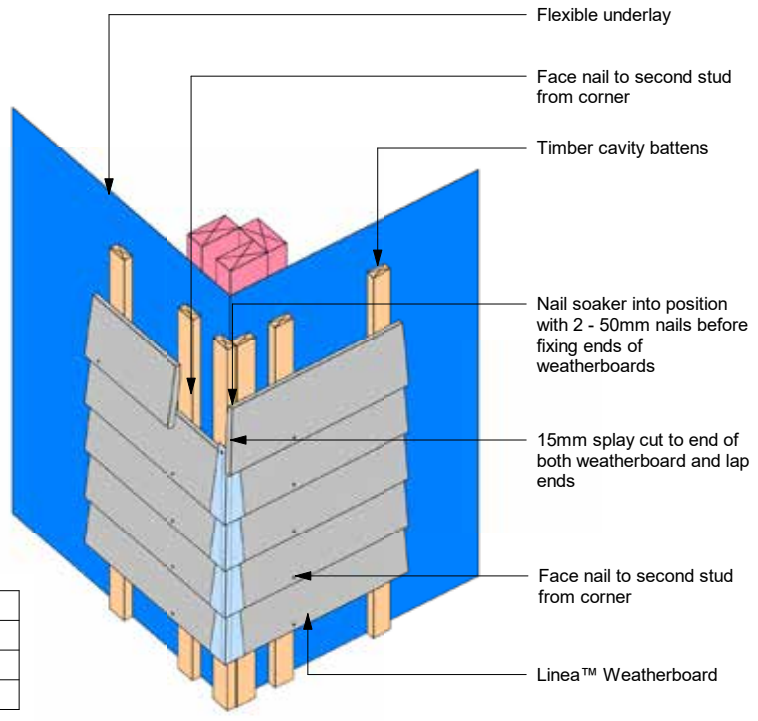


Figure 7: External corner soaker

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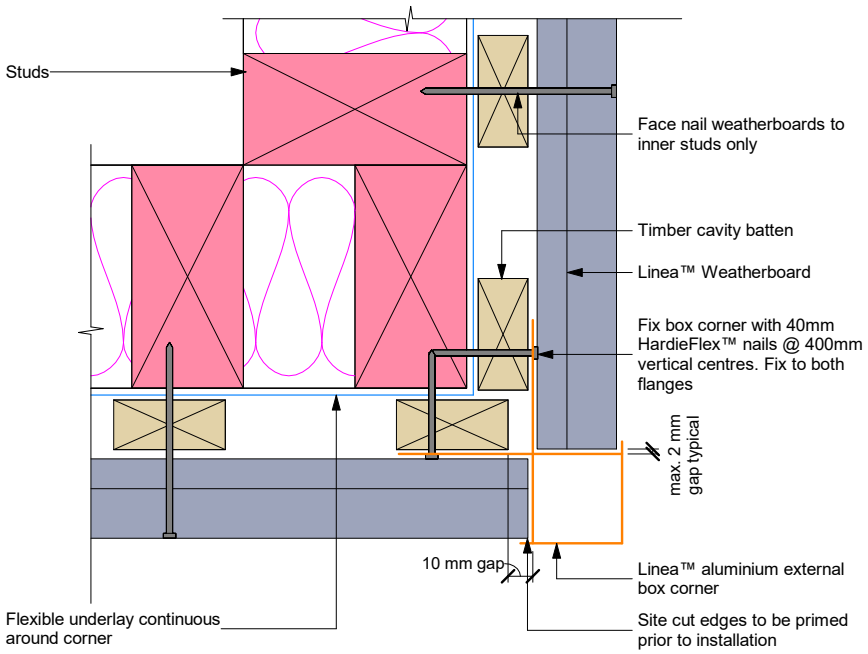
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Soaker material	Nail material
Copper	Copper or phosphor bronze
Aluminium	Hot dip galvanised
Stainless steel	Stainless steel

Figure 8: Aluminium box corner



Note: Site cut edges to be primed

Figure 9: Boxed corner

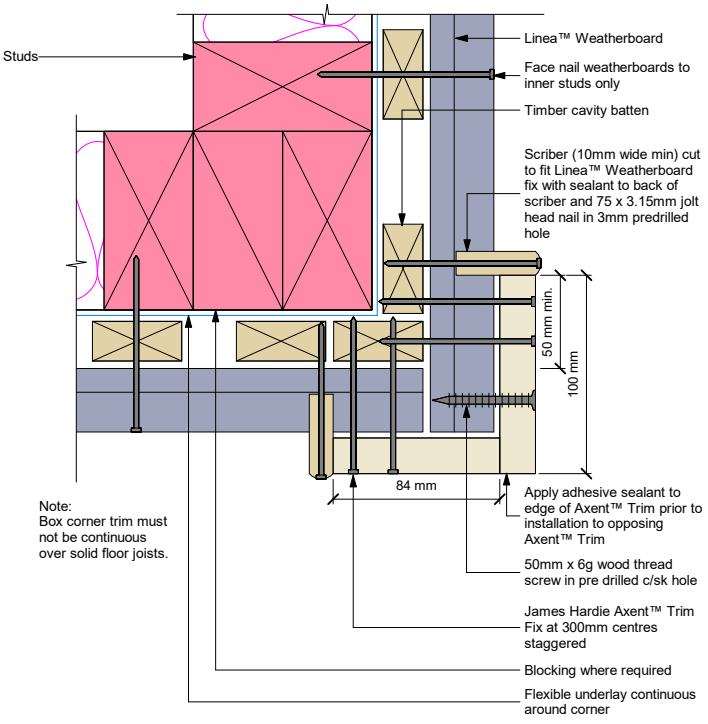
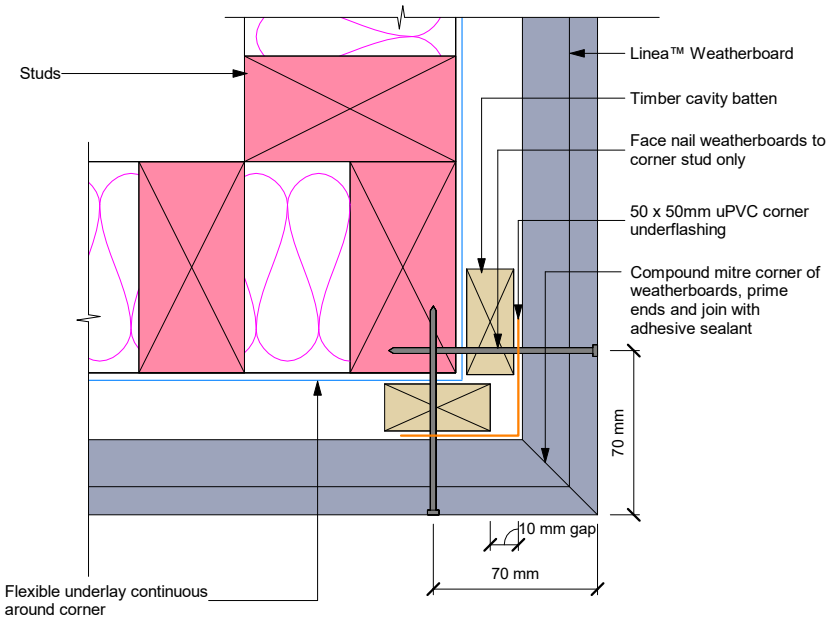


Figure 10: Mitre corner



Note: Adhesive sealant must be used on the full end face of both weatherboards. Push lightly together

Figure 11: Internal 90 º aluminium 'W' mould corner

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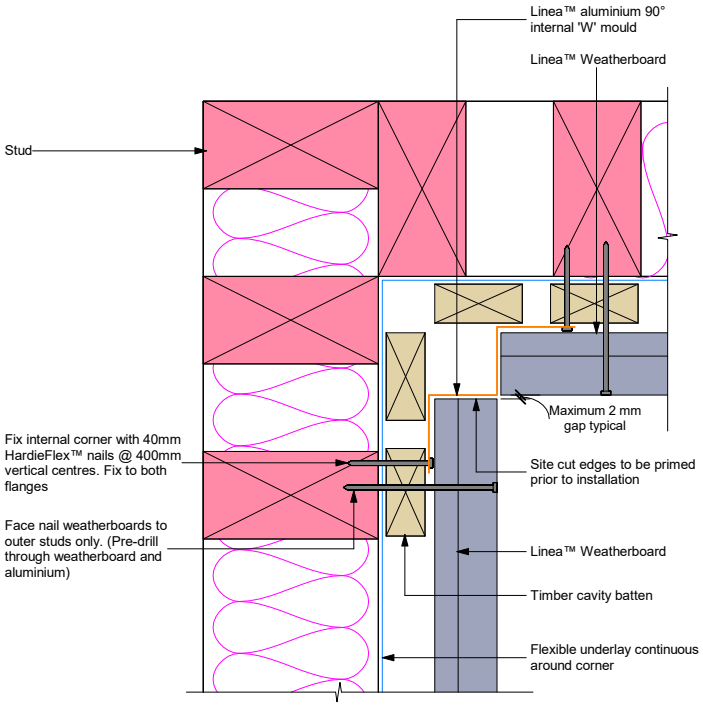


Figure 12: Internal 135 ° aluminium ‘W’ mould corner

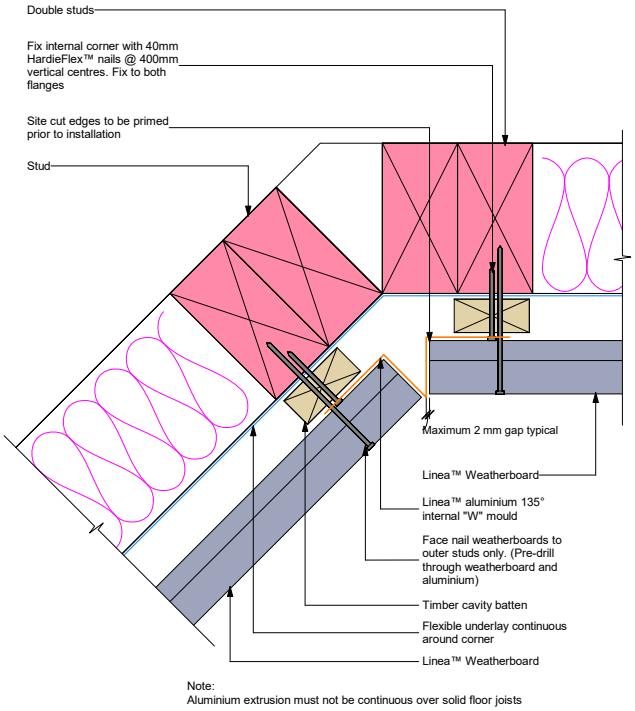


Figure 13: Internal corner joint flashing

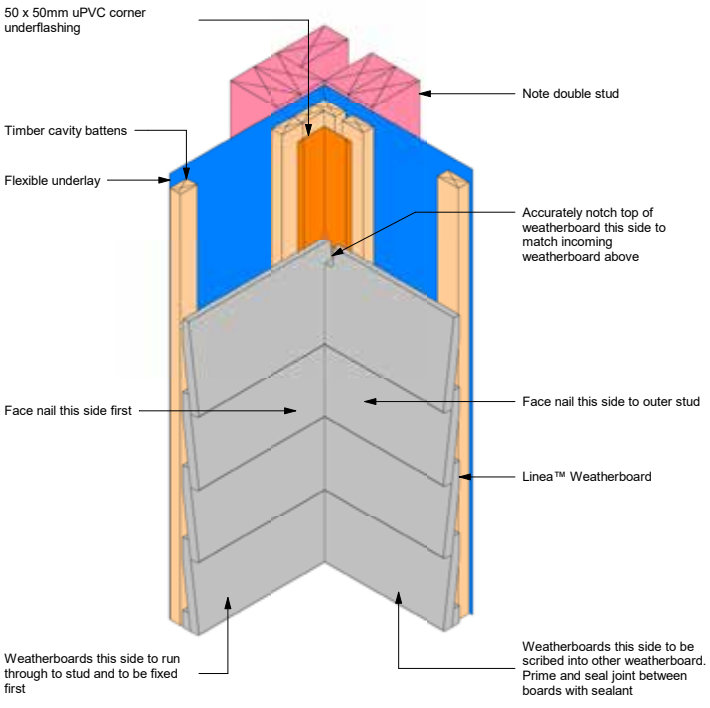
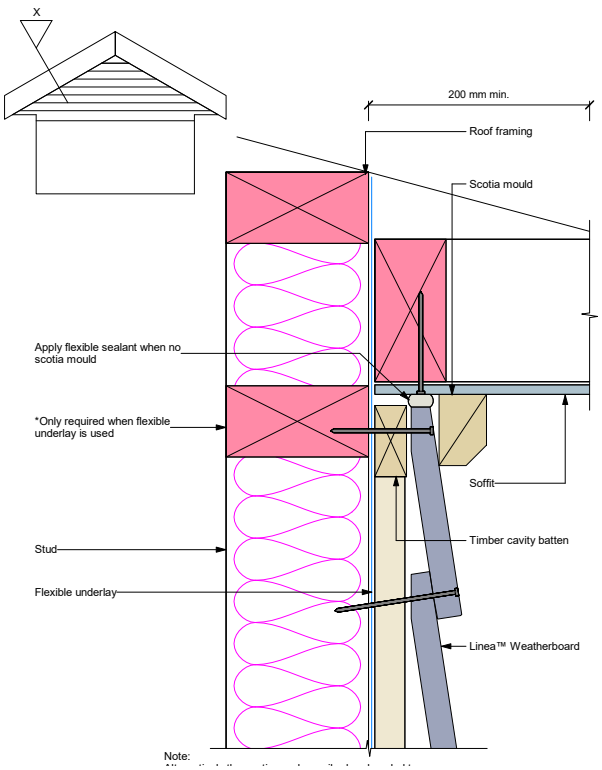


Figure 14: Wall to soffit junction 'X'



Note:
Alternatively the scotia can be scribed and sealed to Linea™ Weatherboard and the soffit lining

For soffits more than 200mm the Linea™ Weatherboard can be neat cut and silicone sealed to angle of soffit

Figure 15: Nil soffit detail

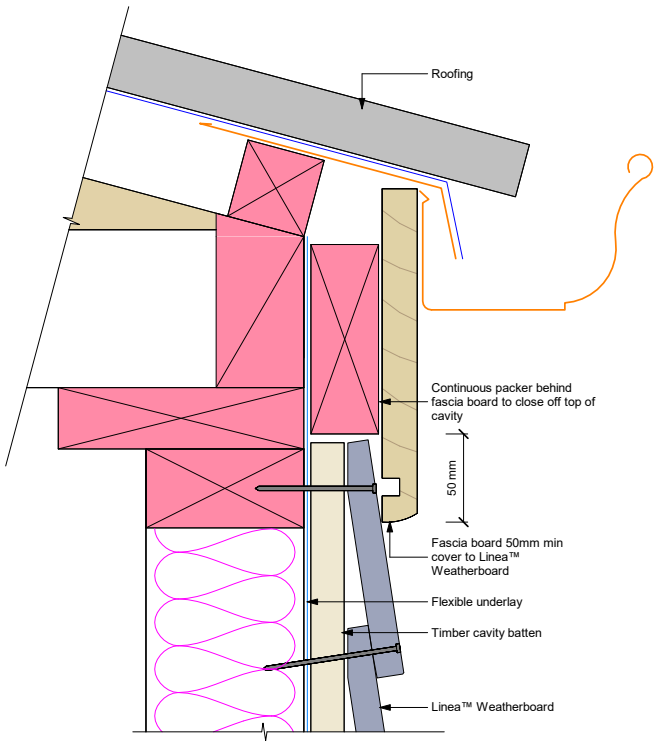
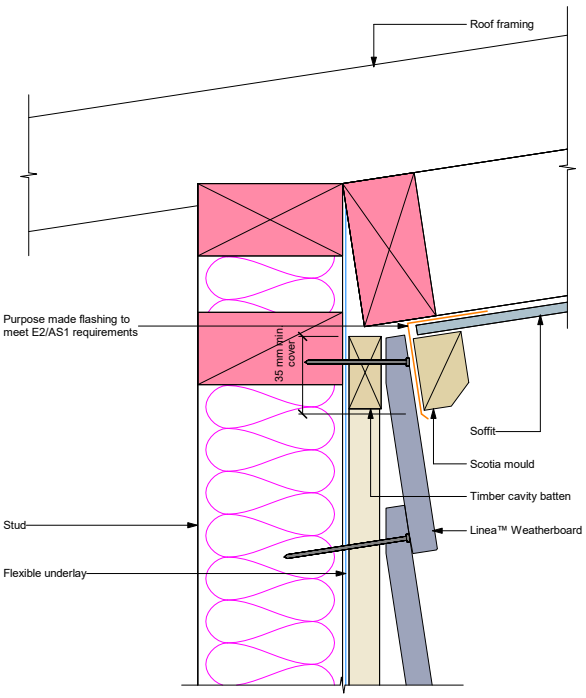


Figure 16: Sloping soffit and wall junction

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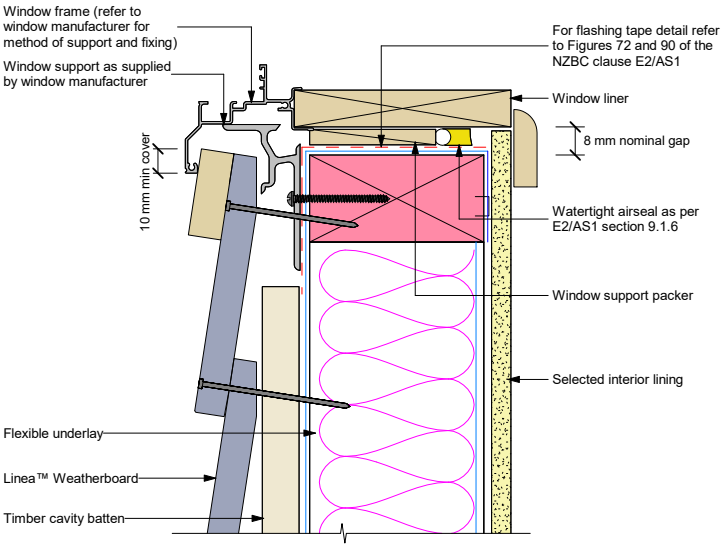
Note: Site cut edges to be primed

Figure 17: Window and door sill

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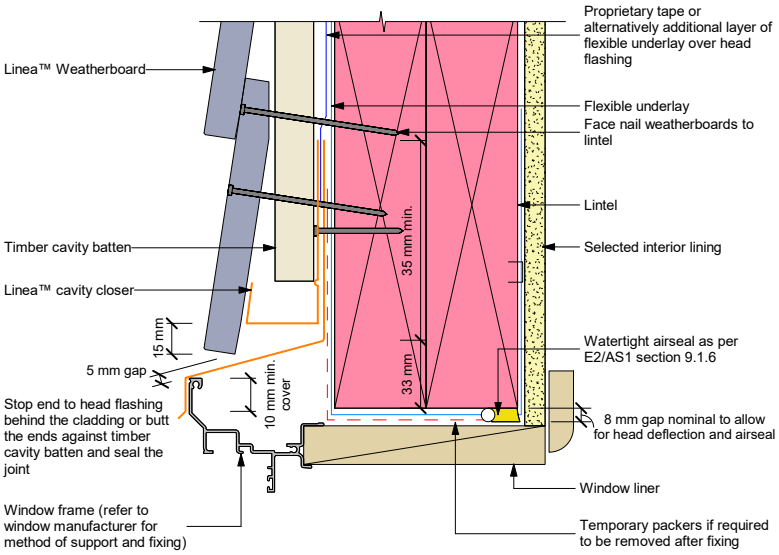


General notes for materials selection

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

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

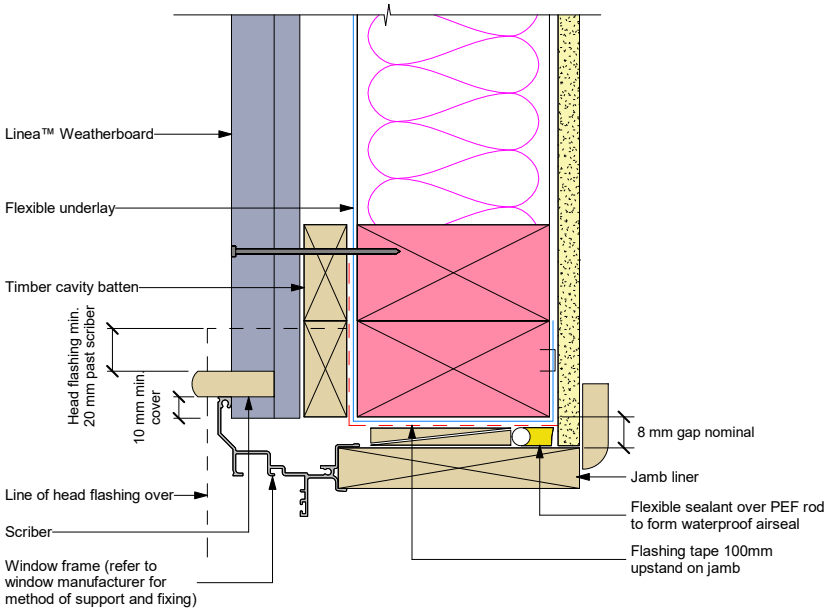
Figure 18: Window head



Note:
- Sealant must be installed between head flashing and window flange in VH and EH wind zones and SED pressures
- Alternatively, the head flashings can be formed with stop ends as per E2/AS1
- Refer to Figure 22 for sealing end battens to head flashing
- Site cut edges to be primed

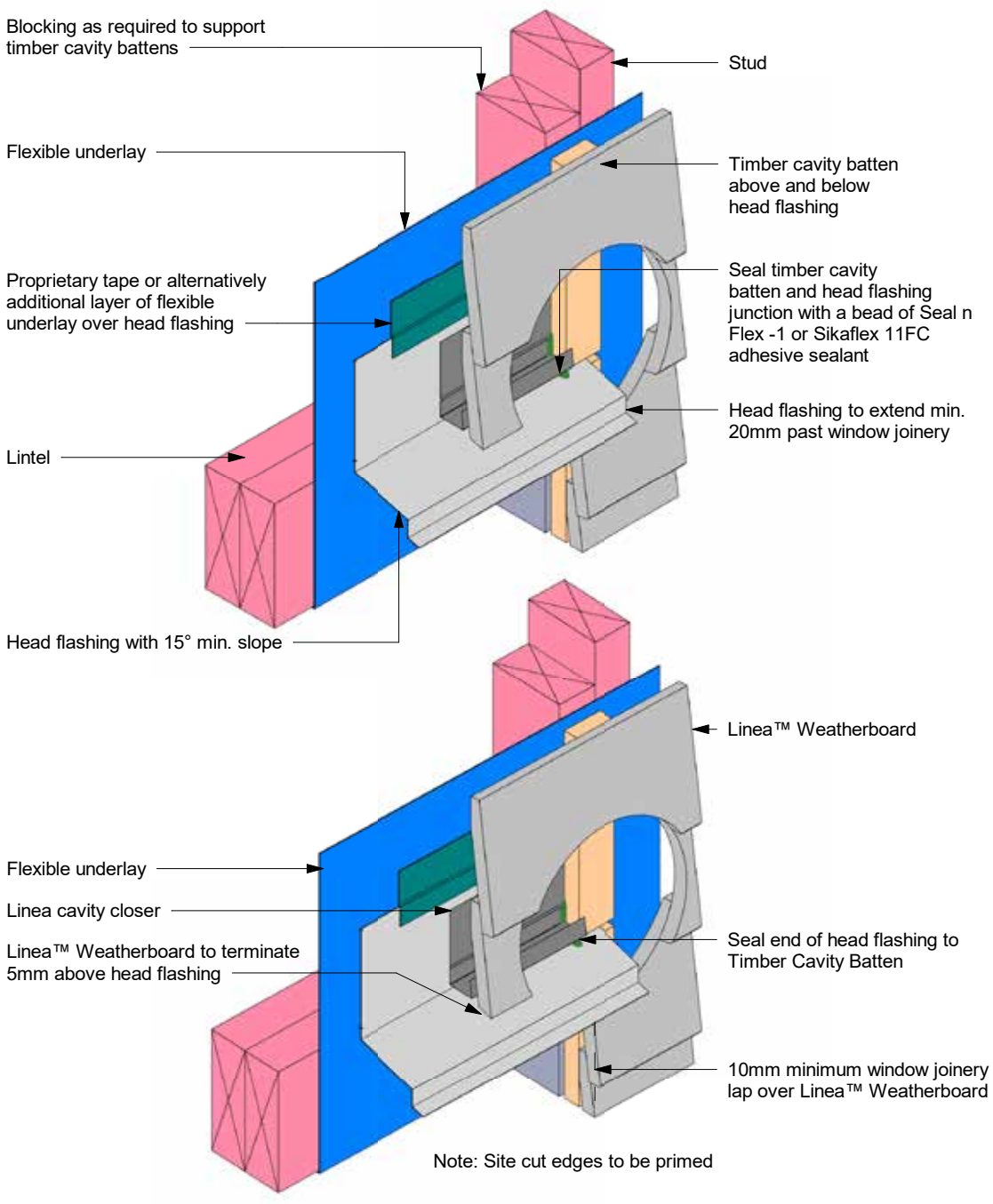
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Figure 19: Window jamb



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Figure 20: Window head stop end

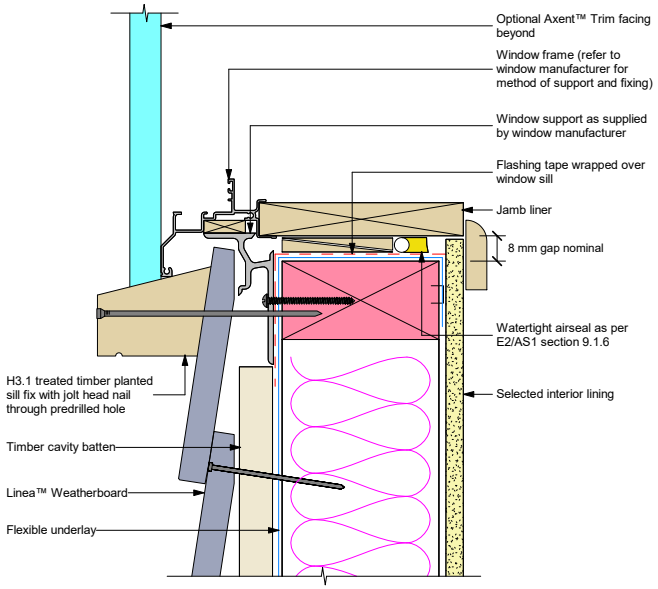


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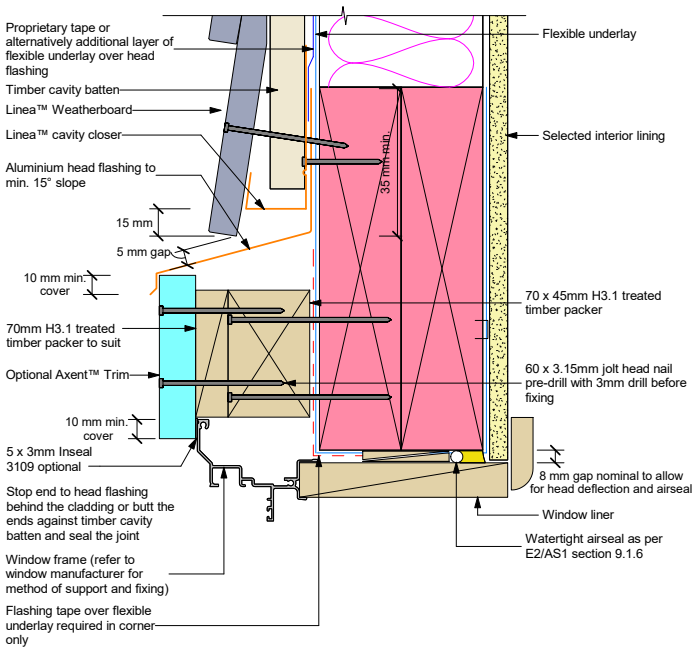
Figure 21: Window sill with facing



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

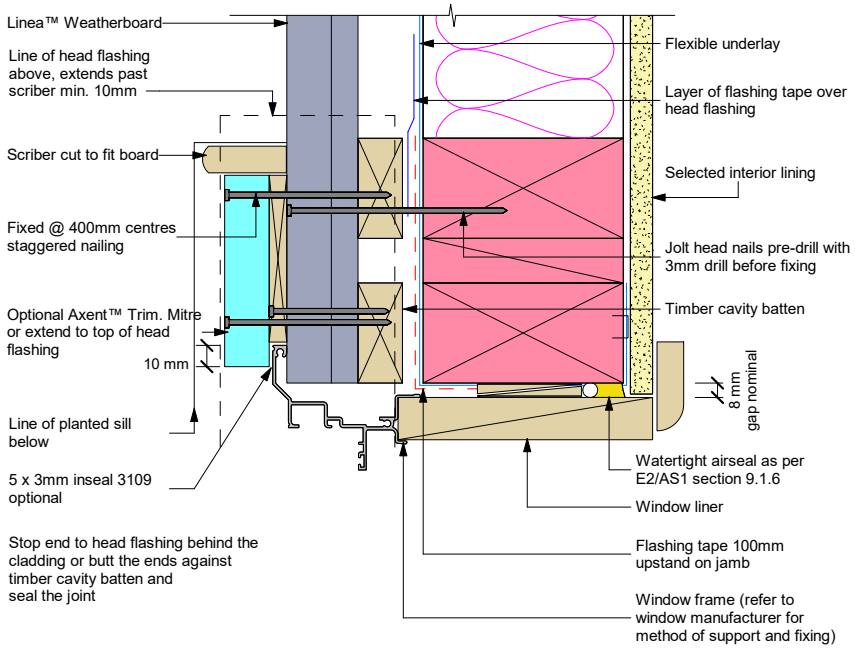
Refer to the manufacturer or supplier for technical information for these materials

Figure 22: Window head with facings



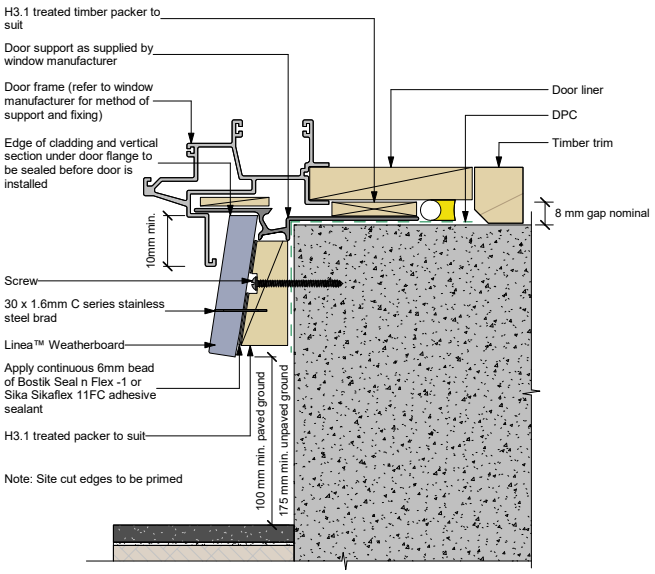
Note:
- Sealant must be installed between head flashing and window flange in VH and EH wind zones and SED pressures
- Alternatively, the head flashings can be formed with stop ends as per E2/AS1
- Refer to Figure 22 for sealing end battens to head flashing

Figure 23: Window jamb with facings



Note:
- Site cut edges to be primed

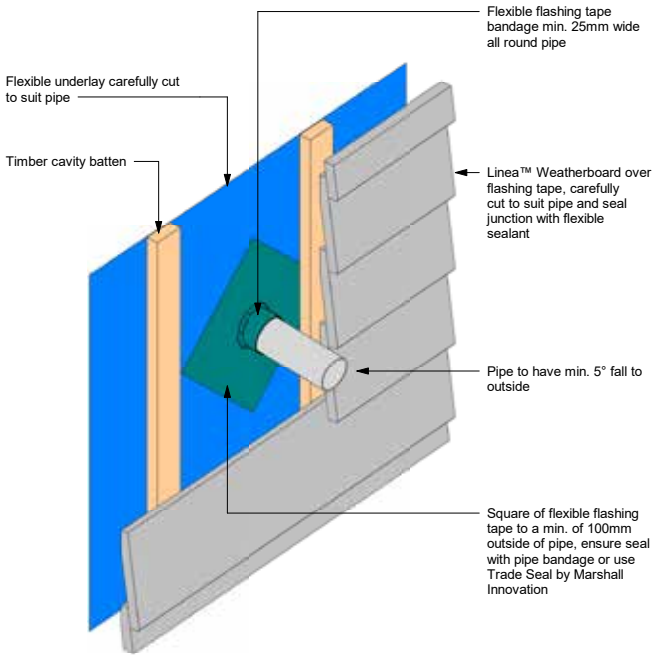
Figure 24: Door sill support detail



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

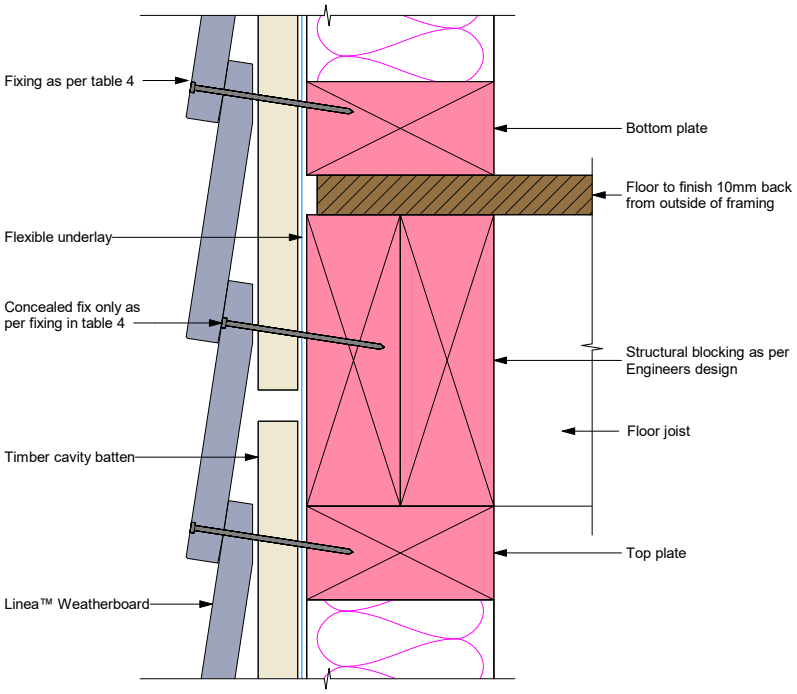
General notes for materials selection
1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of the NZBC E2/AS1
2. Flexible underlay must comply with acceptable solution E2/AS1
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact
4. Linea™ Weatherboard to have sealed butt joint over batten at each corner of opening

Figure 25: Pipe penetration



Note: Site cut edges to be primed

Figure 26: Continous cladding over joist

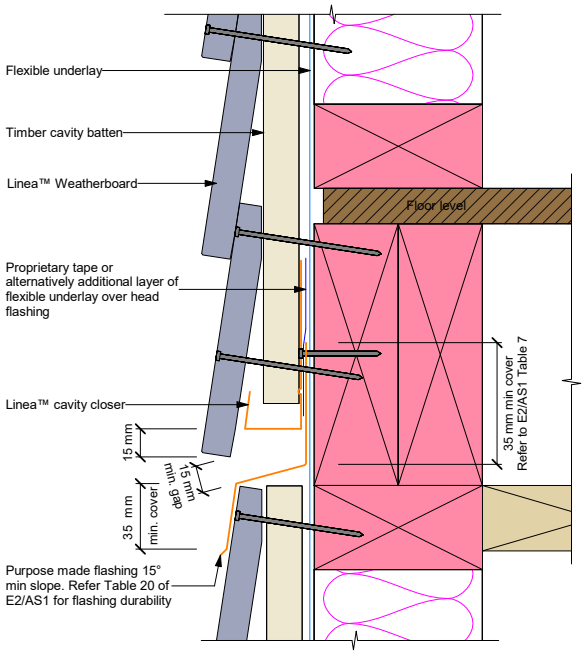


interactive assembly instructions available

http://wksp.nz/jh-lin-flj

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Figure 27: Drained flashing joint at floor level



Note:
This detail is required to limit cavities to a maximum of 2 stories or 7 metres. Refer E2/AS1 clause 9.1.9.4.

Figure 28: Timber deck junction

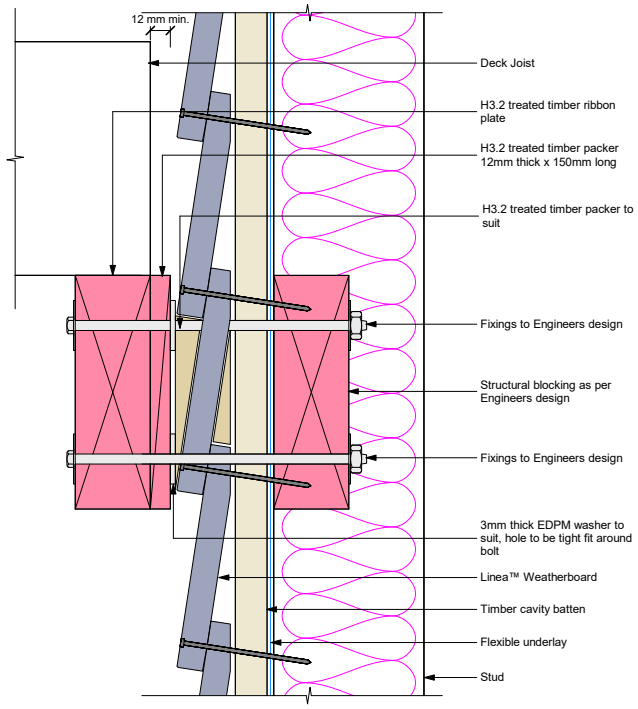


Figure 29: One piece apron flashing joint

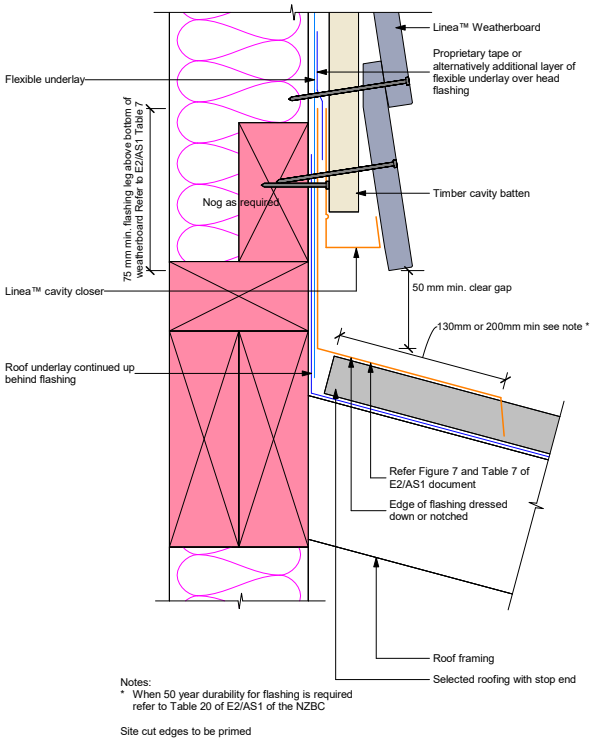
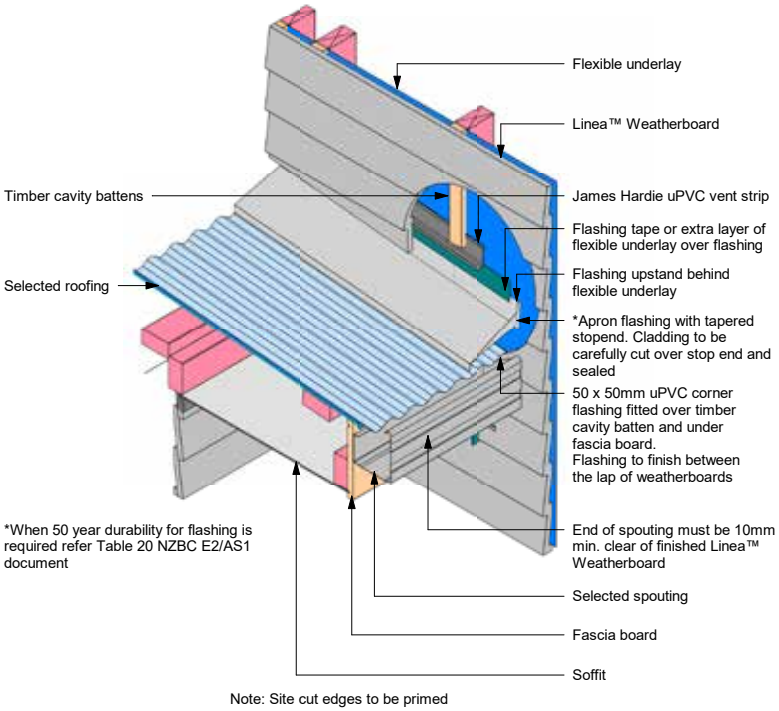


Figure 30: Roof to wall junction detail

Interactive assembly instructions available
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Note: Site cut edges to be primed

Figure 31: Parapet flashing

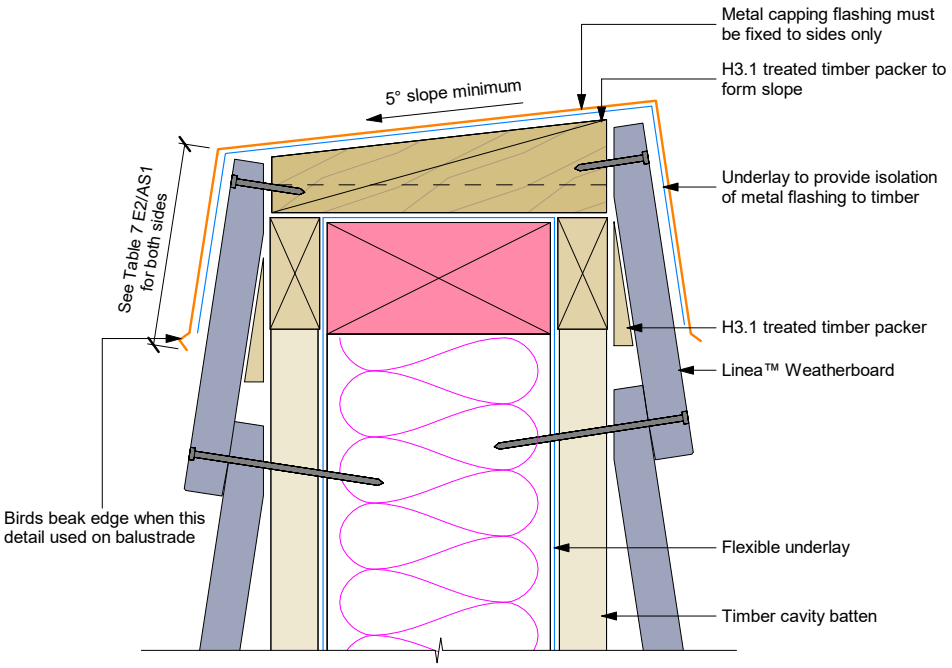


Figure 32: Enclosed deck balustrade to wall

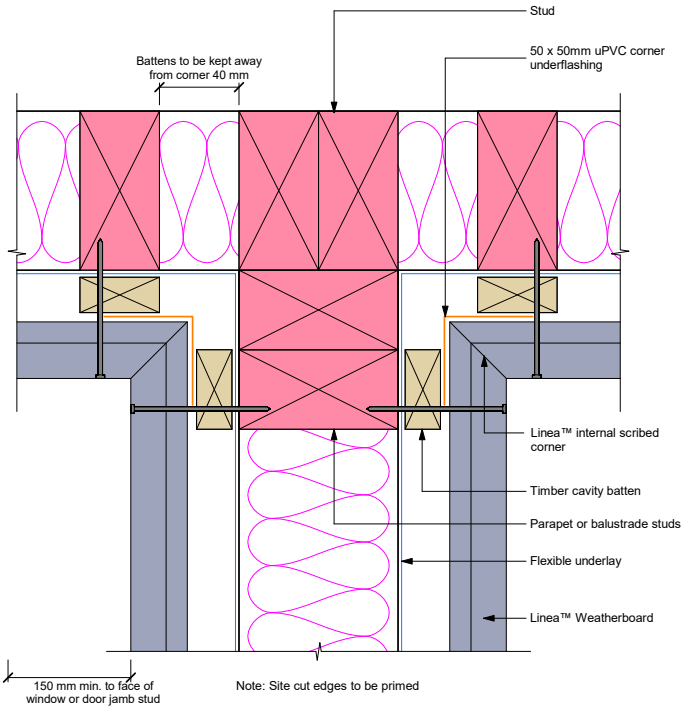
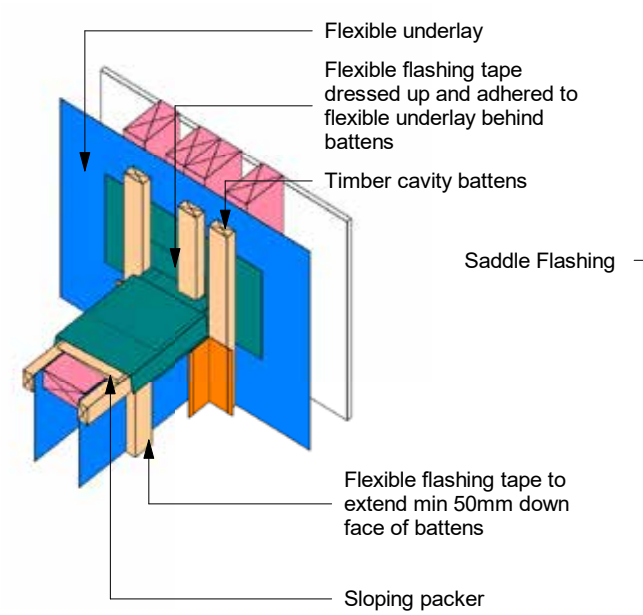
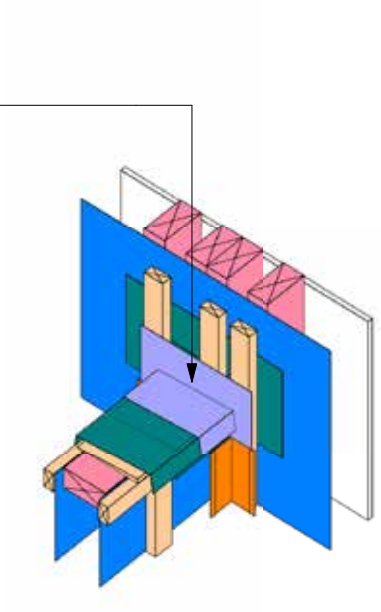


Figure 33: Enclosed balustrade to wall



Batten and Flashing Tape Application Prior to Metal Flashing Fixing



Saddle Flashing Application Prior to Cladding and Cap Flashing Fixing

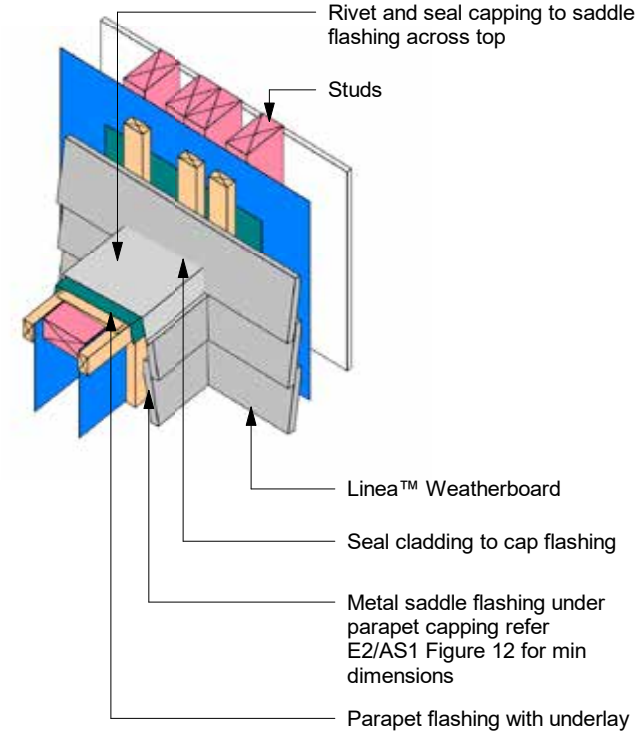
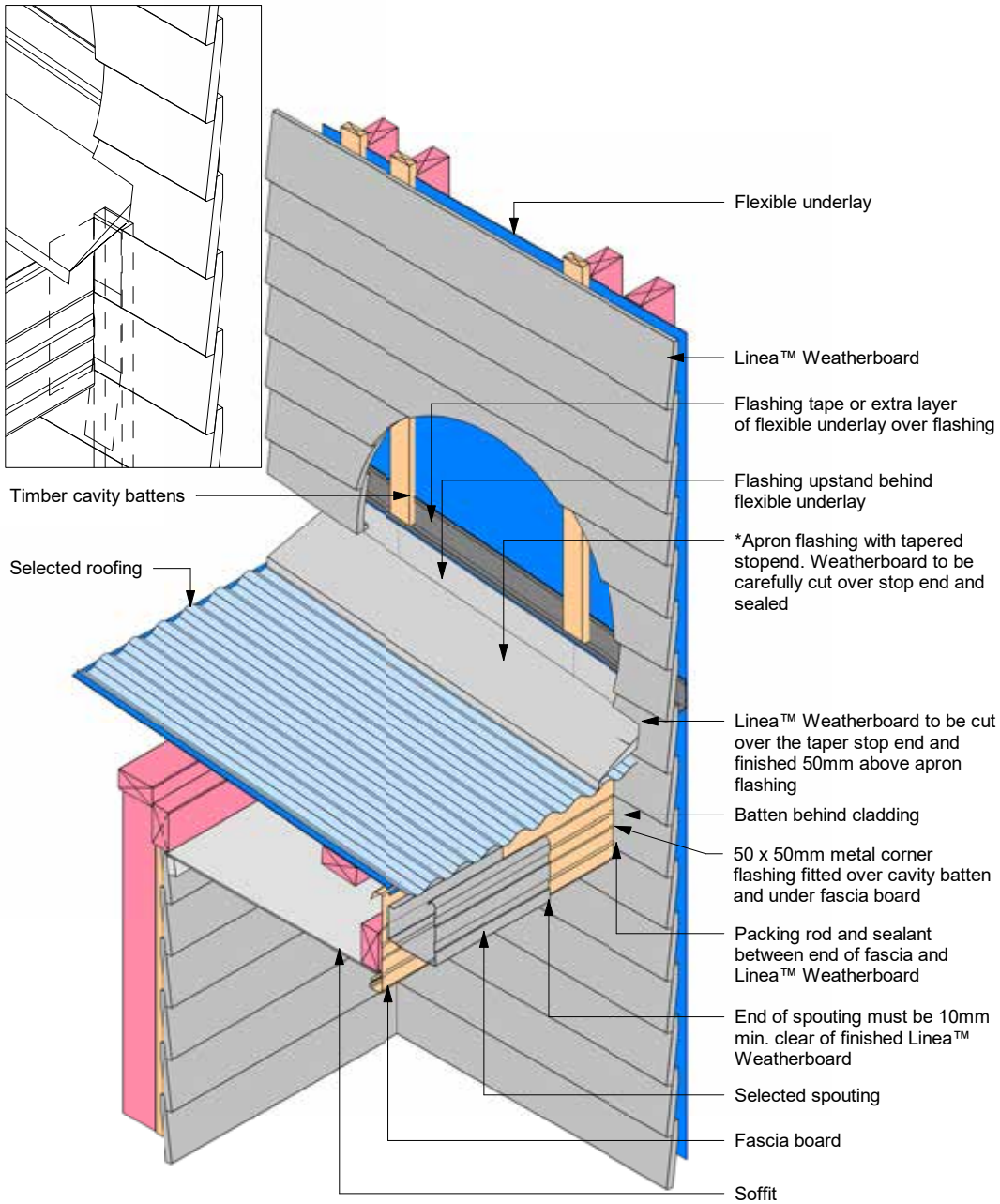


Figure 34: Junction Linea™ Weatherboard and fascia board



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

Note: Site cut edges to be primed

Figure 35: Enclosed roof to wall intersection

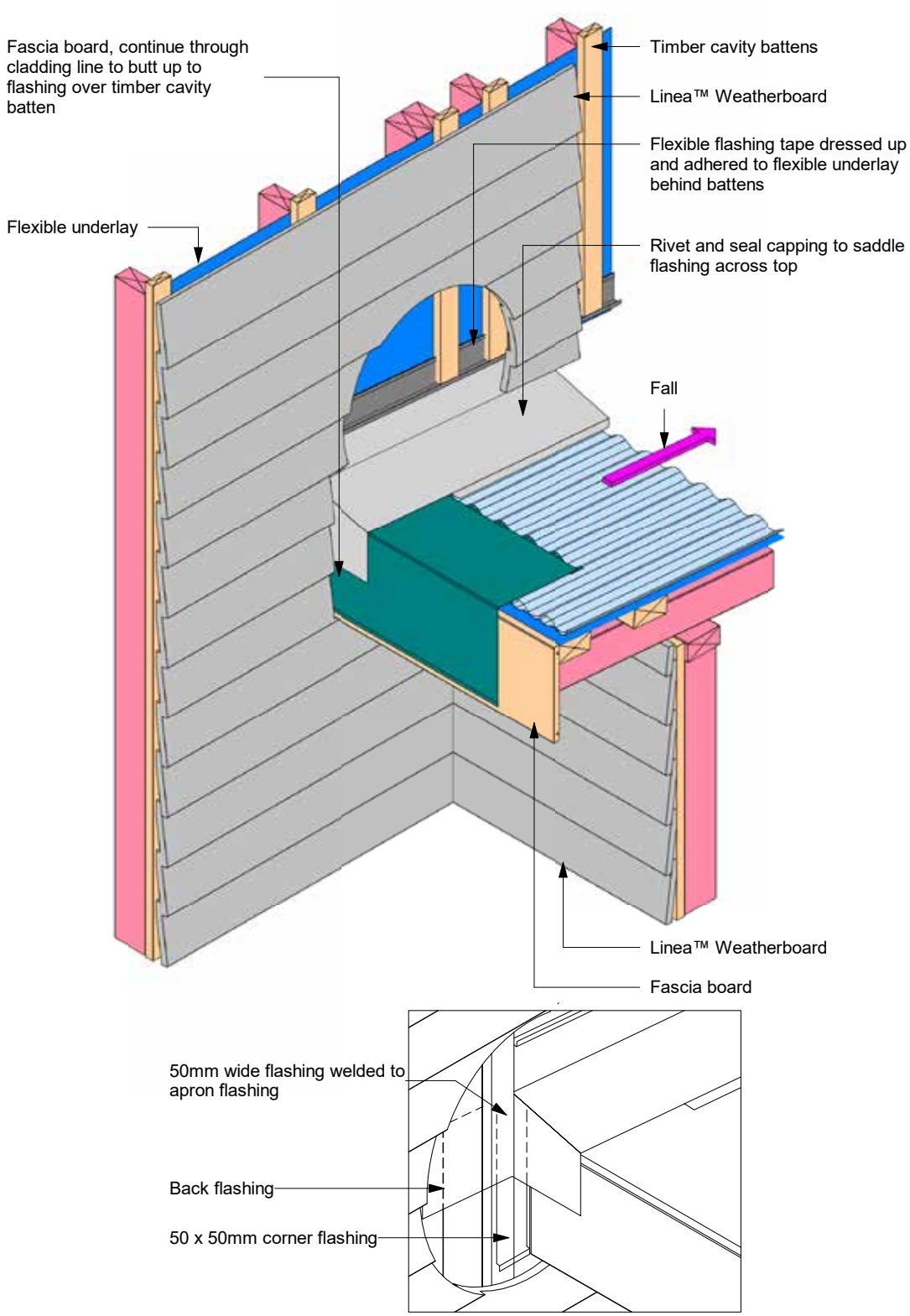
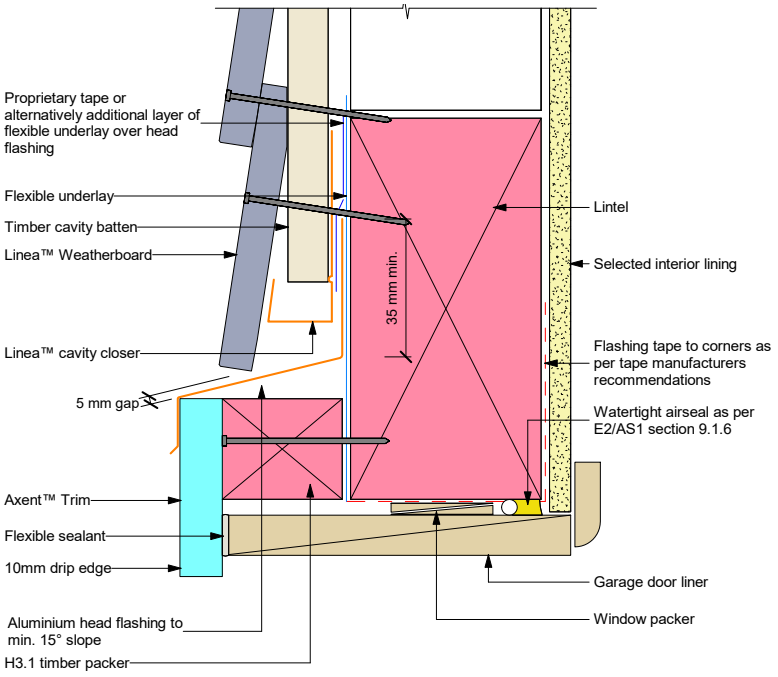
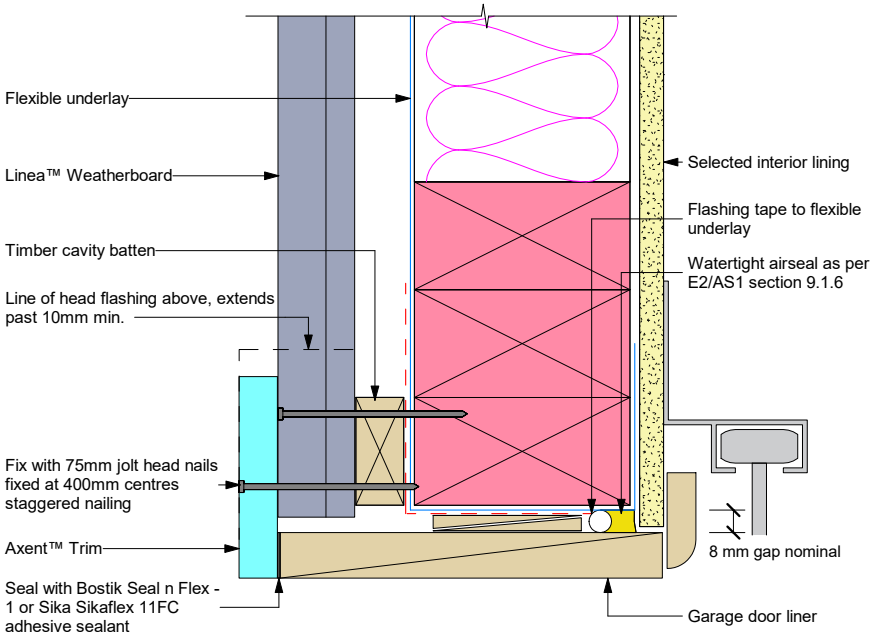


Figure 36: Garage door head



Note:
- Sealant must be applied between head flashing and liner in VH and EH wind zones and SED wind pressures
- Site cut edges to be primed

Figure 37: Garage door jamb



Note: Site cut edges to be primed

Figure 38: Framing setout building height over 10m

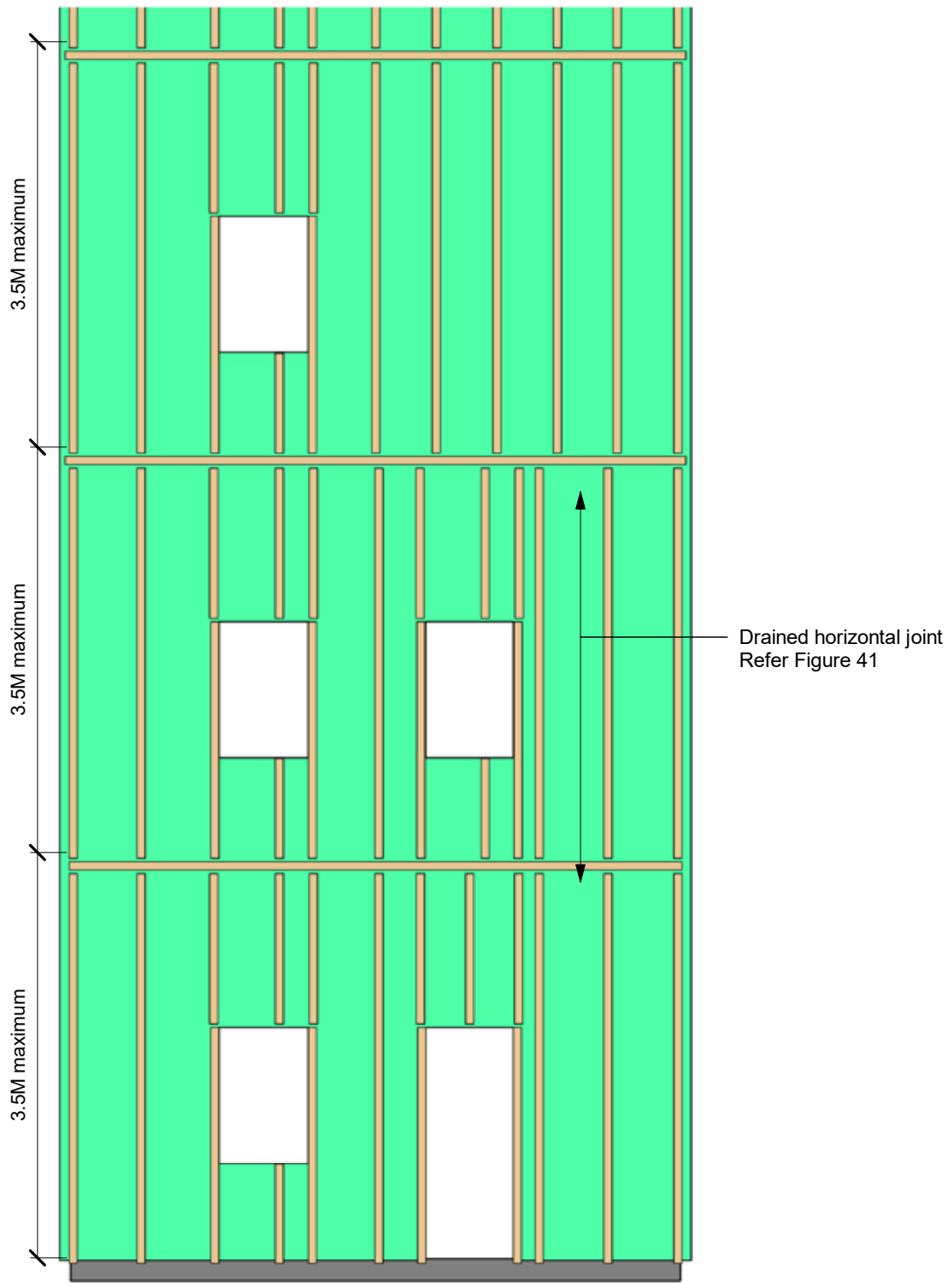
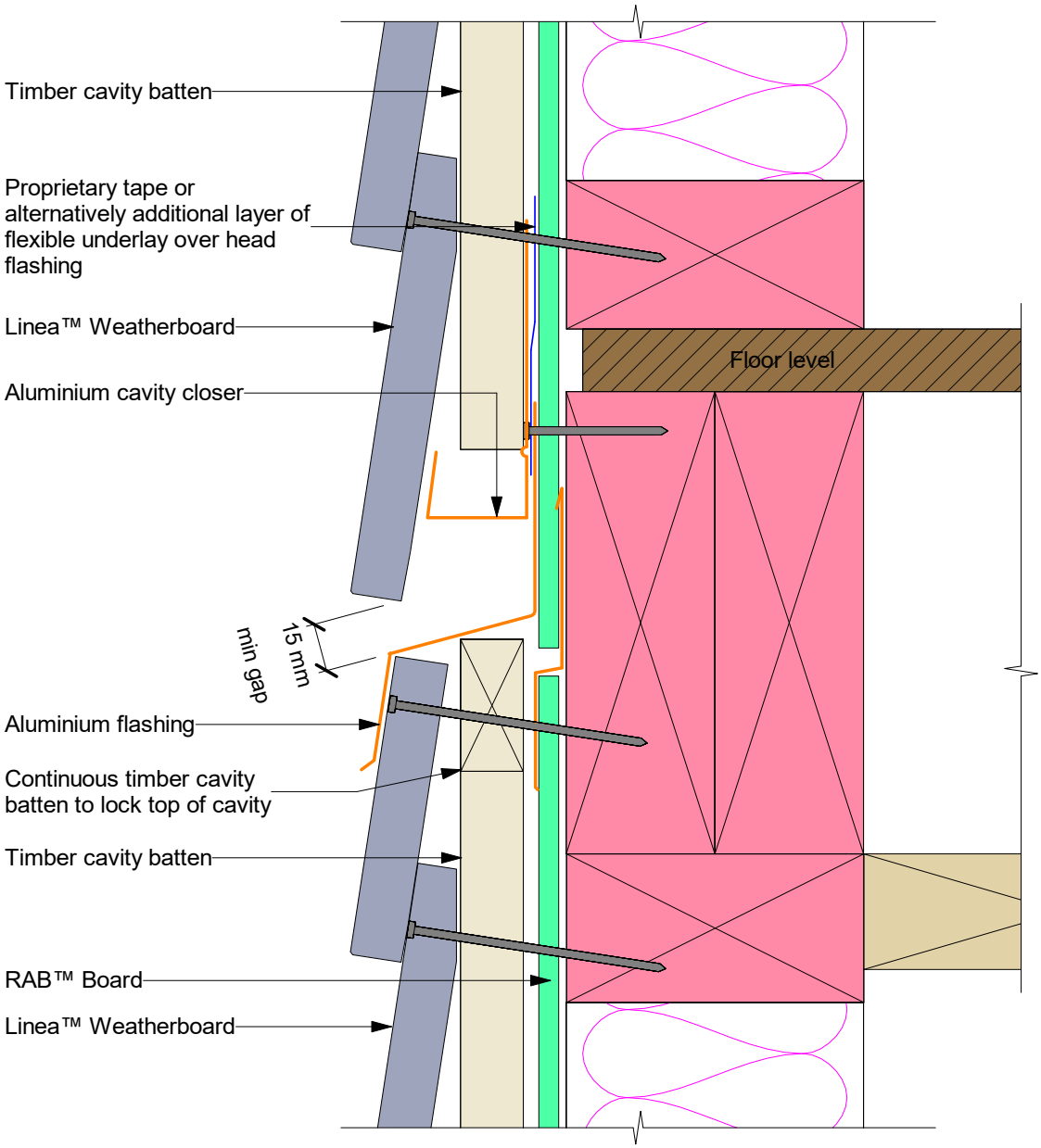


Figure 39: Intertenancy vertical fire separation



Product Warranty

James Hardie New Zealand Limited ("James Hardie") warrants for a period of 25 years from the date of purchase that the Linea™ Weatherboard (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the Axent™ Trim and accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

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

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.

b) This warranty is not transferable.

c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.

d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("The NZBC"), regulations and standards.

e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.

f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).

g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.

h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

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

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phillda



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BRANZ Appraised

Appraisal No. 447 [2020]

LINEA™ WEATHERBOARD CAVITY CLADDING



Appraisal No. 447 (2020)

This Appraisal replaces BRANZ Appraisal No. 447 (2010)

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 Linea™ Weatherboard Cavity Cladding is a cavity-based bevel-back fibre cement weatherboard wall cladding. It is designed to be used as part of an external cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 Linea™ Weatherboard Cavity Cladding consists of Linea™ Weatherboard, which is a bevel-back fibre cement weatherboard, fixed over timber battens to form the cavity. The cladding is finished with a latex paint system.

Scope

2.1 Linea™ Weatherboard Cavity Cladding has been appraised as an external wall cladding for buildings within the following scope:

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

2.2 Linea Weatherboard Cavity Cladding has also been appraised for weathertightness and structural wind loading when used as an external horizontally fixed wall cladding solution for buildings within the following scope:

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

2.3 Linea™ Weatherboard must only be installed horizontally on vertical surfaces.

2.4 Linea™ Weatherboard Cavity Cladding is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(Note: The Appraisal of Linea™ Weatherboard Cavity Cladding relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone.)*

(Note: Linea™ Weatherboard Cavity Cladding can be used to provide fire resistance rated construction, but these aspects have not been assessed by this Appraisal and are outside its scope.)

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

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Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Linea™ Weatherboard Cavity Cladding if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Linea™ Weatherboard Cavity Cladding meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 9.1-9.3.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years and B2.3.2. Linea™ Weatherboard Cavity Cladding meets these requirements. See Paragraphs 10.1-10.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Linea™ Weatherboard Cavity Cladding meets this requirement. See Paragraphs 14.1-14.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Linea™ Weatherboard Cavity Cladding meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 System components and accessories for Linea™ Weatherboard Cavity Cladding supplied by James Hardie New Zealand Limited are:

- **Linea™ Weatherboards** are bevel-back weatherboards with a tongue and groove at each end for jointing. The weatherboards are pre-primed with an acrylic primer on the front face and both edges. Linea™ Weatherboards are 16 mm thick and are available 135 mm, 150 mm and 180 mm wide. All boards are supplied 4,200 mm long. Linea™ Weatherboards are manufactured from a reduced density cellulose fibre cement formulation. The boards are formed, cut to length and then cured by high-pressure autoclaving. After autoclaving, a bevel is cut on the back face of the weatherboards, the front edge at the bottom of the board is chamfered and the ends are tongue and grooved for jointing. Linea™ Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

Accessories

- **Axent™ Trim** - a 16 mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Axent™ Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 84 mm and 100 mm wide by 2,600 mm long.
- **External and internal corner mouldings** - chromate treated aluminium external box corner, 90° internal corner 'W' mould and 135° internal corner 'W' mould. The mouldings are available in 2,700 mm and 4,000 mm lengths.
- **Corner soakers** - 90° soakers are available for 135 mm, 150 mm and 180 mm Linea™ Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.
- **Cavity vent strip** - uPVC, available in 3,000 mm lengths.
- **Rigid wall underlay** – HomeRAB™ Pre-Cladding, RAB™ Board, plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.

4.2 System components and accessories used with Linea™ Weatherboard Cavity Cladding which are supplied by the building contractor are:

- **Flexible wall underlay** – building paper complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
- **Flexible building underlay support** – polypropylene strap at 300 mm centres fixed horizontally and drawn taut, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. *[Note: Mesh and wire galvanising must comply with AS/NZS 4534. Additional vertical battens may also be installed to provide support.]*

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

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- **Flexible sill, head and jamb flashing tape** - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- **Cavity battens** - nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- **Joinery head flashings** - folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.
- **Planted sill and scribers** - timber treated to Hazard Class H3.1, pre-primed before installation.
- **Window and door trim cavity air seal** - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
- **Flexible sealant** - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- **Cavity batten fixings** - 40 x 2.8 mm flathead hot-dip galvanised nails.
- **Linea™ Weatherboard fixings** - 60 x 3.15 mm flathead hot-dip galvanised HardieFlex nails or stainless steel ring shank HardieFlex nails (for concealed nailing in NZS 3604 Wind Zones up to, and including, Very High), 75 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in NZS 3604 Wind Zones up to, and including, Very High), and 90 x 3.55 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa).

(Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).

- **Axent™ Trim fixings** - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolthead nails and stainless steel ring shank jolthead nails.
- **Aluminium joinery head flashing** - as supplied by the joinery manufacturer or the contractor.
- **Flashings** - balustrade and parapet cap flashings, and inter-storey joint flashings. Refer to NZS 3604 Section 4, and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.

Paint System Specification

4.3 Paint systems are not supplied by James Hardie New Zealand Limited and have not been assessed, therefore they are outside the scope of this Appraisal.

4.4 All exposed faces, including top edges at sills and all bottom edges of Linea™ Weatherboard, Axent™ Trim and accessories must be finished with at least 2 coats of an exterior grade latex acrylic paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.

Handling and Storage

5.1 Handling and storage of all materials supplied by James Hardie New Zealand Limited or the building contractor, whether on-site or off-site, is under the control of the building contractor. Linea™ Weatherboards must be stacked flat, off the ground and supported on a level platform. They must be kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Weatherboards must always be carried on edge.

5.2 Accessories must be stored so they are kept clean, dry and undamaged. All accessories must be used within the maximum storage period recommended by the manufacturer.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Linea™ Weatherboard Cavity Cladding. 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.

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

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Design Information

Framing

Timber Treatment

7.1 Timber wall framing behind Linea™ Weatherboard Cavity Cladding must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

7.2 Timber framing must comply with NZS 3604 for buildings or parts of a building within the scope limitations of NZS 3604. Buildings or parts of a building outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. Studs must be at maximum 600 mm centres in Low, Medium, High and Very High Wind Zones and maximum 400 mm centres for the NZS 3604 Extra High Wind Zone and specifically designed buildings. Nogs must be fitted flush between the studs at maximum 800 mm centres (for studs at 600 mm centres) when a flexible wrap is used. The nogs may be omitted when a rigid air barrier is used.

7.3 Timber framing must have a maximum moisture content of 20% at the time of the cladding application. *[Note: If weatherboards are fixed to framing with a moisture content of greater than 20%, problems may occur at a later date due to excessive timber shrinkage.]*

General

8.1 When Linea™ Weatherboard Cavity Cladding is used for specifically designed buildings up to 2.5 kPa ULS wind pressure, only the weathertightness and structural aspects of the cladding are within the scope of this Appraisal. All other aspects of the building need to be specifically designed and are outside the scope of this Appraisal.

8.2 Punchings in the cavity vent strip provide a minimum ventilation opening area of 1,000 mm² per lineal metre of wall in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3 b).

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

8.4 At balcony, deck or low pitch roof/wall junctions, the bottom edge of Linea™ Weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 50 mm.

8.5 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for Wind Zones up to, and including, Very High, a rigid underlay must be used for buildings in the Extra High Wind Zone and SED buildings up to 2.5 kPa design differential ULS wind pressure. Unlined gables and unlined walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Where rigid underlays are used, the cavity batten fixing lengths must be increased by a minimum of the thickness of the underlay.

8.6 Where Linea™ Weatherboard Cavity Cladding abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Inter-storey Junctions

8.7 Inter-storey drained joints must be constructed in accordance with the Technical Literature. Inter-storey drained joints must be provided to limit continuous cavities to the lesser of 2-storeys or 7 m in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4 b).

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

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Appraisal No. 447 [2020]

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Structure

Mass

9.1 The mass of the 135 mm wide Linea™ Weatherboard when installed on the wall is 25.7 kg/m² at equilibrium moisture content (EMC). The mass of the 150 mm wide board is 24.93 kg/m² at EMC and the mass of the 180 mm wide board is 23.92 kg/m² at EMC. Linea™ Weatherboard Cavity Cladding is therefore considered a light wall cladding in terms of NZS 3604.

Impact Resistance

9.2 Linea™ Weatherboard Cavity Cladding will resist impacts likely to be encountered in normal residential use. The likelihood of impact damage to the cladding when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers provided for vulnerable areas.

Wind Zones

9.3 Linea™ Weatherboard Cavity Cladding is suitable for use in all Wind Zones of NZS 3604 up to, and including, Extra High where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, or up to 2.5 kPa ULS wind pressure where buildings are specifically designed.

Durability

Serviceable Life

10.1 Linea™ Weatherboard Cavity Cladding installations are expected to have a serviceable life of at least 50 years provided the paint coating system is maintained in accordance with this Appraisal to ensure the Linea™ Weatherboards and fixings remain dry in service. Linea™ Weatherboards must be painted within 3 months of fixing.

10.2 Coastal locations can be very corrosive to fasteners, especially locations within distances of up to 500 m from the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets, and otherwise as shown in NZS 3604, Figure 4.2. These coastal locations are defined in NZS 3604 as Zone D. To achieve a 50 year serviceable life in Zone D, Linea™ Weatherboards must be fixed with stainless steel fasteners. Fasteners outside Zone D may be hot-dip galvanised steel.

10.3 Microclimatic conditions, including geothermal hot spots, industrial contamination and corrosive atmospheres, and contamination from agricultural chemicals or fertilisers can convert mildly corrosive atmosphere into aggressive environments for fasteners. The fixing of Linea™ Weatherboards in areas subject to microclimatic conditions requires specific design in accordance with NZS 3604, Paragraph 4.2.4, and is outside the scope of this Appraisal.

Maintenance

11.1 Regular maintenance is essential for Linea™ Weatherboard Cavity Cladding installations to continue to meet the NZBC durability performance provision and to maximise their serviceable life.

11.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint coating system, flashings and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress must be repaired immediately. Sealant and paint coatings must be repaired in accordance with the sealant or paint coating manufacturer's instructions.

11.3 Regular cleaning (at least annually) of the paint coating surface is recommended to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Paint systems must be re-coated at approximately 7-15 yearly intervals in accordance with the paint manufacturer's instructions.

11.4 Minimum ground clearances as set out in this Appraisal must be maintained at all times during the life of the cladding. *(Note: Failure to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of Linea™ Weatherboard Cavity Cladding.)*

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

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Fire Affecting Areas Beyond the Fire Source

Vertical Fire Spread

12.1 This Appraisal only covers buildings 10 m or less in height. NZBC Functional Requirement C3.2 identifies that external vertical fire spread to upper floors only needs be considered for buildings with a building height greater than 10 m. Control of external vertical fire spread is therefore outside the scope of this Appraisal.

Horizontal Fire Spread

12.2 Linea™ Weatherboards have a peak heat release rate of less than 100 kw/m^2 and a total heat released of less than 25 MJ/m^2. Testing was carried out as per Paragraph 5.4 of NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of NZBC Acceptable Solution C/AS2, achieving a Type A performance. Linea™ Weatherboards can therefore be used within 1 m of the relevant boundary.

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

Prevention of Fire Occurring

13.1 Separation or protection must be provided to the Linea™ Weatherboards from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Acceptable Solution C/AS1 and C/AS2, and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

14.1 Linea™ Weatherboard Cavity Cladding, when installed in accordance with this Appraisal and the Technical Literature will prevent the penetration of moisture that could cause undue dampness or damage to building elements.

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

14.3 Linea™ Weatherboard Cavity Cladding allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet code compliance with NZBC Clause E2.3.6.

14.4 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Appraisal and are the responsibility of the designer for compliance with the NZBC.

14.5 The use of Linea™ Weatherboard Cavity Cladding where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations, etc to remain weather resistant.

Internal Moisture

15.1 Buildings must be constructed with an adequate combination of thermal resistance and ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

Water Vapour

15.2 Linea™ Weatherboard Cavity Cladding is not a barrier to the passage of water vapour, and when installed in accordance with the Technical Literature and this Appraisal will not create or increase the risk of moisture damage resulting from condensation.

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Installation Information

Installation Skill Level Requirements

16.1 All design and building work must be carried out in accordance with the Linea™ Weatherboard Cavity Cladding Technical Literature and this Appraisal by competent and experienced tradespersons conversant with the cladding system. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence class.

System Installation

Building Underlay and Flexible Sill and Jamb Tape Installation

17.1 The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the Linea™ Weatherboard Cavity Cladding system. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Generic rigid sheathing materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall underlay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

Cavity Battens

17.2 Cavity battens must be installed over the building underlay to the wall framing at maximum 600 mm centres where the studs are at 600 mm centres or at 400 mm centres when studs are at 400 mm centres. The battens must be fixed in place with 40 x 2.8 mm hot-dip galvanised flathead nails at maximum 800 mm centres.

17.3 Where studs are at greater than 400 mm centres, a building underlay support must be installed over the building underlay between the cavity battens at maximum 300 mm centres.

Linea™ Weatherboard Installation

17.4 Linea™ Weatherboards may be cut on-site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.

17.5 Linea™ Weatherboards must be dry prior to installation. Before the weatherboards are installed, cut ends exposed to the exterior such as at aluminium box corners or internal corners must be sealed with an acrylic sealer to reduce the absorbency of the fibre cement.

17.6 Linea™ Weatherboards must be installed starting at the bottom of the wall. A cant strip (H3.1 treated timber or fibre cement) must be fixed behind the bottom course of weatherboards to ensure the weatherboards are set at the correct angle. The cant strip must be continuous around the perimeter of the building. The bottom course of weatherboards must overhang the bottom plate by a minimum of 50 mm.

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

17.8 The first course of weatherboards must be full length, i.e. 4,200 mm and commence from an external corner. Jointing of Linea™ Weatherboards is made off the stud using the pre-cut tongue and groove joint. Tongue and groove joints may be located centrally between the studs, but must be no closer than 100 mm to the edge of a stud. A bead of sealant must be applied to the front side of the tongue before the corresponding board is inserted. Subsequent courses of weatherboards must be installed so that the tongue and groove joints are staggered by 600 mm minimum from joints in the previous course.

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17.9 Linea™ Weatherboards must have a minimum lap of 30 mm, and should be set out so as near to a full board as possible will finish under and over windows and doors and at the top of the wall. A storey rod can be used to accurately position weatherboard courses.

17.10 Linea™ Weatherboards must be fixed to each stud using concealed fixings behind the lap of the boards or face nailing, except that face nailing must be provided at all corners and vertical edges of openings.

17.11 Concealed fixing must be carried out using 60 x 2.8 mm hot-dip galvanised or stainless steel Hardieflex nails depending on the location, see Paragraph 10.2. Nails must be fixed 25 mm from the top edge of the board and must be driven flush with the board surface.

17.12 Face nailing must be carried out using 75 x 3.15 mm hot-dip galvanised or stainless steel jolthead nails in NZS 3604 Wind Zones up to, and including, Very High, or 90 x 4.0 mm hot-dip galvanised or stainless steel jolthead nails in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa, depending on the location, see Paragraph 10.2. Nails must be fixed 15 mm up from the bottom of the board and punched a maximum of 2 mm below the surface of the board. The top board must be pre-drilled for fixing.

17.13 Linea™ Weatherboards can be hand or gun nailed. Nails must not be closer than 25 mm to the end of the board when hand nailing, or closer than 50 mm when gun nailing. *[Note: Gun nailing must only be used for concealed nailing.]*

Aluminium Joinery Installation

17.14 Aluminium joinery and associated head and sill [for direct fixed] flashings must be installed by the building contractor in accordance with the Technical Literature. An 8 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.

17.15 After installing the window and door joinery, Axent™ Trim, planted sills and scribers may be installed in accordance with the Technical Literature to provide additional weatherproofing for the joinery/ weatherboard junction.

Inspections

17.16 The Technical Literature must be referred to during the inspection of Linea™ Weatherboard Cavity Cladding installations.

Finishing

17.17 The paint coating manufacturer's instructions must be followed at all times for application of the paint finish. Linea™ Weatherboards and trim must be clean and dry before commencing painting.

Health and Safety

18.1 Cutting of Linea™ Weatherboards must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

18.2 When power tools are used for cutting, grinding or forming holes, health and safety measures as set out in the Technical Literature must be observed because of the amount of dust generated.

18.3 Safe use and handling procedures for Linea™ Weatherboards and the components that make up the cladding system are provided in the relevant manufacturer's Technical Literature.

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Basis of Appraisal

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

Tests

19.1 The following testing has been completed by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for Linea™ Weatherboard Cavity Cladding was based on testing and evaluation of all details within the scope and as stated within this Appraisal. Linea™ Weatherboard Cavity Cladding was tested to E2/VM1 (as contained within NZBC Clause E2, Third Edition, Amendment 5).
- Uniform wind face load tests to simulate wind pressures on 12 mm thick Linea™ Weatherboards were carried out by BRANZ, and the results were used in assessing 16 mm thick Linea™ Weatherboard used in Linea™ Weatherboard Cavity Cladding.
- Cone calorimeter testing to determine the peak rate of heat release and total heat release of Linea™ Weatherboard was completed by BRANZ. The testing was carried out in accordance with AS/NZS 3837.

19.2 Linea™ Weatherboards have been tested by a National Association of Testing Authorities (NATA) accredited laboratory in accordance with AS/NZS 2908.2. The results have been reviewed by BRANZ and found to be satisfactory.

19.3 Testing has been carried out by James Hardie New Zealand Limited to determine the modulus of rupture and inter-laminar bond strength of carbonated and non-carbonated Linea™ Weatherboard. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

20.1 Weathertightness, structural, fire and durability opinions have been provided by BRANZ technical experts.

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

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

Quality

21.1 The manufacture of Linea™ Weatherboards has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

21.2 The quality of materials, components and accessories supplied by James Hardie New Zealand Limited is the responsibility of James Hardie New Zealand Limited. The quality control system of James Hardie New Zealand Limited has been assessed and registered as meeting the requirements of ISO 9001: 2015.

21.3 Quality on site is the responsibility of the installer.

21.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the building underlay, cavity battens, Linea™ Weatherboard and accessories in accordance with the instructions of James Hardie New Zealand Limited.

21.5 Building owners are responsible for the maintenance of Linea™ Weatherboard Cavity Cladding in accordance with the instructions of James Hardie New Zealand Limited.

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

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BRANZ

In the opinion of BRANZ, Linea™ Weatherboard Cavity Cladding is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to James Hardie New Zealand 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. James Hardie New Zealand 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 James Hardie New Zealand 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 James Hardie New Zealand Limited or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
02 September 2020

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

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

CERTIFICATE: **CMNZ 30018**
Version No: **RevN**

3 DESCRIPTION OF BUILDING METHOD OR PRODUCT

Linea™ Weatherboard is a 16 mm thick bevelback fibre cement weatherboard, which is designed to be used as part of an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

Linea™ Weatherboard Direct Fixed Cladding system consists of Linea™ Weatherboards applied direct to the external wall framing over a flexible underlay.

Linea™ Weatherboard Cavity Cladding system consists of Linea™ Weatherboards fixed over timber battens to form the cavity.

Both cladding methods (referenced as the system) incorporate secondary protection behind all internal and external corners, flashings for window, door and meter box penetrations as well as air seals to all wall penetrations.

4 INTENDED USE OF BUILDING METHOD OR PRODUCT

The system is designed to be used as part of an external cladding system on timber framed building.

5 NEW ZEALAND BUILDING CODE PROVISIONS

The systems if designed, used, installed and maintained in accordance with this certificate will meet the following provisions of the NZBC:

Clause B1 STRUCTURE:	Performance B1.3.1, B1.3.2, B1.3.4 for the relevant physical conditions of B1.3.3 (a), (f), (h), (j) and (q).
Clause B2 DURABILITY:	Performance B2.3.1(b) 15 years and B2.3.2.
Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE:	Performance C3.5, C3.7
Clause E2 EXTERNAL MOISTURE:	Performance E2.3.2, E2.3.5, E2.3.6 and E2.3.7
Clause F2 HAZARDOUS BUILDING MATERIALS:	Performance F2.3.1.

1 CERTIFICATE HOLDER DETAILS

James Hardie New Zealand Limited
Trading as James Hardie
1 O'Rorke Road, Penrose , Auckland 1061, New Zealand,
TechnicalTeam@jameshardie.co.nz
Tel: 0800 808 868,
www.jameshardie.co.nz

ORIGINAL ISSUE DATE	VERSION DATE	RECERTIFICATION
26/05/2020	06/10/2022	03/07/2025

8 SIGNATURE

Herve Michoux, Global Mark Managing Director

2 PRODUCT CERTIFICATION BODY

Global-Mark Pty Ltd
57 Willis Street, Wellington, 6011
customer.service@global-mark.co.nz
+64 9 889 0622
www.global-mark.co.nz

The complaints process for this certificate can be found here:
https://www.global-mark.com.au/?s=complaint

This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.
This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website http://www.building.govt.nz.
The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advise or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.
CERTIFICATE V2

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
Direct Fixed and Cavity Cladding systems

6 CONDITIONS AND LIMITATIONS OF USE

1. The systems (respectively) are certified:
   a. as a direct fixed external wall cladding for buildings:
      i. within the scope limitations of the New Zealand Building Code (NZBC) Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 1.1, and
      ii. with a risk score of 0-12, calculated in accordance with the NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 2, and
      iii. situated in NZS 3604:2011 Wind Zones up to, and including Very High, and
   b. as a cavity fixed external wall cladding for buildings:
      i. within the scope limitations of the NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 1.1,
      ii. with a risk score of up to 20, calculated in accordance with the NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 2,
      iii. situated in in NZS 3604:2011 Wind Zones up to, and including Extra High, and
   c. as a cavity fixed external wall cladding for buildings specifically engineering designed (SED):
      i. up to 25m in height, and
      ii. with an inter-storey drift of span/180 maximum, and
      iii. the design ultimate limit state (ULS)differential wind pressure does not exceed 3.2 kPa, and
      iv. with the stud spacing no more than 600mm centres
   d. located:
      i. in all exposure zones (except microclimates) as defined in NZS 3604:2011 section 4.2, and
      ii. located anywhere in relation to the relevant boundary for building within the scope of:
         - C/AS1, amendment 5, 5 November 2020 or
         - C/AS2, amendment 2, 5 November 2020
2. The system shall be specified, installed, inspected and maintained in accordance with the following sets of documents collectively referenced as the Applicable Technical Specification to the extent that their scope covers that for this Certificate:
   a. For direct fixed external wall cladding application
      i. James Hardie Linea™ Weatherboard Direct Fix Technical Specification (May 2020)
      ii. Fire & Acoustic Design Manual (November 2020) by James Hardie section 4:16 Control of External Fire Spread, figures No's. 1 to 8 and 12 to 20, specifically details JHETGL30 and JHETGL60. These details have only been assessed and certified with respect to external fire spread via Linea™ Weatherboard. For walls located within 1.0m of a relevant boundary, Linea™ Weatherboard may be used as an external façade/cladding attached to the exterior of fire rated wall systems as depicted within the Fire and Acoustic Design Manual (November 2020). Fire Resistance rating performance of the wall assembly falls outside the scope of this certificate
      iii. BRANZ Appraisal No 446 (2020) Linea™ Weatherboard Direct Fixed Cladding
   b. For cavity fixed external wall cladding applications:
      i. James Hardie Linea™ Weatherboard Cavity Fix Technical Specification (May 2020)
      ii. Fire & Acoustic Design Manual (November 2020) by James Hardie section 4:16 Control of External Fire Spread, figures No's. 1 to 8 and 12 to 20, specifically details

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JHETGL30 and JHETGL60. These details have only been assessed and certified with respect to external fire spread via Linea™ Weatherboard. For walls located within 1.0m of a relevant boundary, Linea™ Weatherboard may be used as an external façade/cladding attached to the exterior of fire rated wall systems as depicted within the Fire and Acoustic Design Manual (November 2020). Fire Resistance rating performance of the wall assembly falls outside the scope of this certificate

iii. BRANZ Appraisal No 447 (2020) Linea™ Weatherboard Cavity Cladding

(Note: Provisions within the documents above related to the use of the systems with steel-frame construction are outside the scope of this certification).

3. In wind zones greater than Very High a rigid air barrier which complies with Table 23 of E2/AS1 shall be used. In Buildings exceeding 10 m in height RAB™ Board must be used including horizontal control joints in accordance with the requirements of the CodeMark certificate for RAB™ Board. (Refer to GM-CM30130)
4. The system is certified for use:
   a. with the ancillary components as described in this certificate,
   b. with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. Only joinery compliant with the requirements of NZS 4211:2008 including amendment 1 for the relevant Wind Zone or wind pressure shall be used or have a current CodeMark
5. The weatherboards must only be installed horizontally on vertical surfaces. .
6. All exposed faces, including top edges at sills and all bottom edges of Linea™ Weatherboard and fibre cement ancillary components must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730
7. E2.3.5 and E2.3.6 compliance is limited to cavities created between the internal surface of the panels and the underlay or RAB™ Board's.

7 HEALTH AND SAFETY INFORMATION

Standard industry safety practices and manufacturer safety requirement as detailed in the technical literature including the applicable SDS must be observed at all time. Please refer to James Hardie SDS Fibre Cement Products June 2022

9 BASIS FOR CERTIFICATION

The certification decision is based on independent technical review(s) of test report(s), engineering opinion(s) and other documented evidence(s), factory audit(s) and site review(s)

Code Clause	Compliance pathway	Evidence
B1 STRUCTURE	Alternative solution -Expert judgement	001, 002, 003, 021 and 022
B2 DURABILITY	Alternative solution -Expert judgement	001, 002, 003, 021 and 022
C3 FIRE AFFECTING AREAS BEYOND THE SOURCE	Alternative solution -Expert judgement	001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 021, 022 and 023
E2 EXTERNAL MOISTURE	Alternative solution -Expert judgement	001, 002, 003, 013, 014, 015, 016, 017, 018, 019, 020, 021 and 022
F2 HAZARDOUS BUILDING MATERIALS	Alternative solution -Expert judgement	001, 002, 003, 021, 022 and 024

10 SUPPORTING DOCUMENTATION FOR CERTIFICATION

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PRODUCT CERTIFICATE

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Ref	Author	Title	Date and/or revision
001	BRANZ	LINEA™ - WEATHERBOARD CAVITY CLADDING - Appraisal No. 447 [2020]	02 September 2020
002	BRANZ	LINEA™ - WEATHERBOARD DIRECT FIXED CLADDING - Appraisal No. 446 [2020]	02 September 2020
003*	BRANZ	BRANZ Appraisals Means of Compliance - Basis of Appraisal - LINEA™ WEATHERBOARD DIRECT FIXED AND CAVITY CLADDING - Appraisal No 446 and 447 (2020)	TV10686-001 21/08/2020
004*	BRANZ	Fire Assessment Report based Cone calorimeter test.	FH3182 21 November 2002
005*	BRANZ	Fire Assessment Report based Cone calorimeter test.	FH 2976 15 May 2001
006*	BRANZ	Fire Assessment Report based Cone calorimeter test (BRANZ Project No. FC10254-001).	FSR 4206 Issue2 7 November 2018
007*	BRANZ	Fire technical Opinion: Technical opinion based on NFPA 285 Compliance with NZBC C/AS2, clause 5.8.2 (b) and C/VM2 Part A (a).	FC12172-001 1 November 2019
008*	BRANZ	Fire Assessment Report Review of James Hardie Fire and Acoustic Manual	FAR 4620 – 04 November 2016
009*	BRANZ	Fire technical Opinion: Fire resistance of James Hardie Wall Systems with Service Penetrations	FC12040-004 -03 december2019
010*	BRANZ	Technical Assessment “Fire Resistance of External Wall and Soffit” _Various JH Products	FAR 2597- 5th October 2005
011*	Intertek B&C	JH cavity fix wall assembly fire test as per NFPA 285	J6706.01-121-24 - 20th August 2019
012*	Intertek B&C	JH cavity fix wall assembly fire test as per NFPA 285	J6707.01-121-24 - 21st August 2019
013*	Clarkson Consulting Services	JH NZ_RAB_Weathertightness Assessment_200626_R1.5	26 June 2020
014*	James Hardie Building Product	Weathertightness Testing of Residential Façade Fibre Cement Cladding System On Cavity Battens to the requirement of Verification Method E2/VM1	TS061-05, dated 15 February 2006
015*	James Hardie Building Product	TESTING OF A TITAN RESIDENTIAL FIBRE CEMENT CLAD FAÇADE FOR COMPLIANCE WITH THE REQUIREMENTS OF AS/NZS 4284:1985 “TESTING OF BUILDING FACADES”	TS010-06, dated 14 November 2006
016*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS003-13, dated 4 December 2013
017*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS022-13, dated 12 November 2013
018*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS033-13, dated 8 January 2014
019*	James Hardie Technical Support group	Weathertightness & Façade System (E2/VM1)	TS009-15, dated 14 October 2015
020*	James Hardie Technical Support group	Testing of James Hardie NZ ExoTec Façade panel top hat rainscreen façade system in accordance with AS/NZS 4284:2008	FT-R1005, dated May 2017
021	James Hardie New Zealand Limited	James Hardie Linea™ Weatherboard Direct Fix Technical Specification (May 2020)	May 2020
022	James Hardie New Zealand Limited	James Hardie Linea™ Weatherboard Cavity Fix Technical Specification (May 2020)	May 2020

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023	James Hardie New Zealand Limited	James Hardie Fire & Acoustic Design Manual. Section 4:16 Control of External Fire Spread, figures No's. 1 to 8 and 12 to 20, specifically details JHETGL30 and JHETGL60	November 2020
024	James Hardie New Zealand Limited	LQA8N - SAFETY DATA SHEET- JAMES HARDIE FIBRE CEMENT SHEETS PRODUCTS	Version No.: 2.0 ISSUED Date : 22/06/2022
* These documents were provided commercial in confidence and are not publicly available			

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PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie
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11 SUPPORTING INFORMATION ABOUT DESCRIPTION (OPTIONAL)

Linea™ Weatherboard cladding is finished with a latex paint system

Linea™ Weatherboards are bevel-back profile weatherboards with tongue and grove at each end for jointing. The weatherboards are pre-primed with an acrylic primer on the front face and edges.

Linea™ Weatherboards are 16 mm thick and are available 150mm and 180 mm wide. The boards are supplied 4200 mm long.

Linea™ Weatherboards are manufactured from a reduced density cellulose fibre cement formulation. The boards are formed, cut to length and then cured by high-pressure autoclaving. After autoclaving, a revel profile is machined on the back face of the weatherboard, the bottom of the board is chamfered and the tongue and grove are machined on the ends. Linea™ Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

James Hardie supplies the following ancillary components:

- Hardie™ Axent™ Trim - a 19mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Hardie™ Axent™ Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 70 mm and 89mm wide by 3000 mm long.
- External and internal corner mouldings - chromate treated aluminium external box corner, 90° internal corner 'W' mould and 135° internal corner 'W' mould. The mouldings are available in 2,700 mm and 4,000 mm lengths.
- Corner soakers - 90° soakers are available for 150 mm and 180 mm Linea™ Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.
- Cavity vent strip - uPVC, available in 3,000 mm lengths.
- Rigid wall underlay – HomeRAB™ Pre-Cladding, RAB™ Board or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.

Other components not supplied by James Hardie must meet the following requirements

- Flexible wall underlay – building paper complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 23, or breather-type membranes covered by a valid CodeMark certificate for use as wall underlays.
- Flexible building underlay support – polypropylene strap at 300 mm centres fixed horizontally and drawn taut, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. (Note: Mesh and wire galvanising must comply with AS/NZS 4534. Additional vertical battens may also be installed to provide support.)
- Flexible sill, head and jamb flashing tape - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- Cavity battens - nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- Cavity batten fixings - 40 x 2.8 mm flathead hot-dip galvanised nails.
- Joinery sill and head flashings - folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 20 for durability requirements.
- Planted sill and scribers - timber treated to Hazard Class H3.1, pre-primed before installation.

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- Window and door trim cavity air seal - air seals complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 9.1.6, or self-expanding, moisture-cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
- Flexible sealant - sealant complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- Linea™ Weatherboard fixings
  - Direct fix cladding method:- 40 x 2.8 mm flathead hot-dip galvanised Hardie™ Flex nails or stainless steel ring shank Hardie™ Flex nails (for concealed nailing), and 60 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing).
  - Cavity cladding method - 60 x 3.15 mm flathead hot-dip galvanised Hardie™ Flex nails or stainless steel ring shank Hardie™ Flex nails (for concealed nailing in NZS 3604 Wind Zones up to, and including, Very High), 75 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in NZS 3604 Wind Zones up to, and including, Very High), and 90 x 3.55 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 3.2 kPa).
- Hardie™ Axent™ Trim fixings - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolthead nails and stainless steel ring shank jolthead nails.

(Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).

- Flashings - balustrade and parapet cap flashings and inter-storey joint flashings. Refer to NZS 3604 Section 4, and NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 20 for durability requirements.

Aluminium joinery head flashing - as supplied by the joinery manufacturer or the contractor

12 SUPPORTING INFORMATION ABOUT INTENDED USE (OPTIONAL)

Nil

13 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE (OPTIONAL)

Linea™ Weatherboard Cavity Cladding can be used to provide fire resistance rated construction, but this aspect has not been assessed and is outside the scope of this certificate

End of document

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Linea™ Oblique™ WEATHERBOARD | JH™



Vertical Installation Technical Specification

JULY 2018 | NEW ZEALAND

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WE VALUE YOUR FEEDBACK

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

Ask James Hardie™
literaturefeedback@jameshardie.co.nz

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1 Application and scope

1.1 APPLICATION

Linea™ Oblique™ Weatherboard installed as per this specification gives a vertical rusticated profile weatherboard appearance. Linea Oblique Weatherboard can be fixed to timber-framed external walls. A wide range of colours can be used, varying from light to dark. Linea Oblique Weatherboard is available in 200mm or 300mm wide x 4200mm or 2700mm lengths and is 16mm thick.

Specifiers

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

Installers

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

Make sure your information is up to date

When specifying or installing James Hardie products, ensure that you have the current manual. Additional installation information, warranties and warnings are available at www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

1.2 SCOPE

This specification covers the installation of Linea Oblique Weatherboard fixed vertically over James Hardie horizontal cavity battens on buildings that fall within the scope limitation of NZS 3604 and E2/AS1 of the New Zealand Building Code (NZBC).

This specification also covers the installation of Linea Oblique Weatherboard on projects, which are subject to specific engineering design (SED) up to a wind pressure of 2.5kPa (ULS).

1.3 DETAILS

Various typical Linea Oblique Weatherboard vertical construction details are provided in the Details section of this document. These details are available in dwg, dxf, jpg and pdf file format and can be downloaded from our website at www.jameshardie.co.nz.

All dimensions shown are in millimetres unless noted otherwise.

1.4 SPECIFIC DESIGN

For use of Linea Oblique Weatherboard in a specific engineering design (SED) project that is outside the scope of this literature, the designer, architect or engineer must ensure that applicable clauses of the NZBC have been considered and a specific design has been undertaken.

Linea Oblique Weatherboard is suitable for use in SED project up to a wind pressure of 2.5kPa (ULS).

2 Design

2.1 COMPLIANCE

Linea Oblique Weatherboard has been isued a CodeMark certification number GM-CM30059 which confirms Linea Oblique Weatherboard is deemed to comply with the requirements of the NZBC. Please refer to our website www.jameshardie.co.nz for a copy of the CodeMark certificate. Linea Oblique Weatherboard has been appraised by BRANZ as an alternative solution and found to meet the required provisions of the NZBC when installed in accordance with this Linea Oblique Weatherboard Vertical Installation technical specification. BRANZ Appraisal number 897 (2015) at www.branz.co.nz or www.jameshardie.co.nz.

CODEMARK 30059

2.2 RESPONSIBILITY

The specifier or other party responsible for the project must ensure that the information and details in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this technical specification. For applications outside the scope of this literature and details, which are not provided herein, the architect, designer or engineer must undertake specific design and it should be ensured that the intent of their design meets the requirements of the NZBC.

All New Zealand Standards referenced in this document are current editions and must be complied with.

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

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution E1/AS1 ‘Surface Water’. Foundation design must comply with the requirements of NZS 3604 ‘Timber-framed Buildings’ or be as per specific engineering design. The grade of adjacent finished ground must slope away from the building to avoid any possibility of water accumulation in accordance with the NZBC requirements.

2.4 SURFACE CLEARANCES

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

Linea Oblique Weatherboard must overhang the bottom plate by a minimum of 50mm, as required by E2/AS1.

Linea Oblique Weatherboard must maintain a minimum clearance of 100mm from paved ground, and 175mm from unpaved ground.

On roofs and decks, the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground, refer to Figure 3.

2.5 MOISTURE MANAGEMENT

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

Wall construction design must effectively manage moisture, considering both interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration. The building should also be ventilated sufficiently to control moisture accumulation due to condensation, especially in artificially cooled/heated buildings.

Walls must include those provisions as required by the NZBC Acceptable Solution Clause E2/AS1. In addition, all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in external walls, must comply with the requirements of relevant standards and the NZBC. For further guidance on designing for weathertightness, refer to BRANZ Ltd. and the Ministry of Business Innovation and Employment (MBIE) updates on the following websites respectively, www.branz.co.nz and www.building.govt.nz.

In addition, the following issues must also be considered:

- Sealant must be installed where detailed in this literature
- Where the walls are higher than two storeys, it is necessary to provide a horizontal flashing at the second floor level to drain the cavity
- The installation of smoke chimneys, pipe penetrations and other fixtures etc. must not track moisture into the wall or restrict the drainage of moisture to the exterior

2.6 STRUCTURE

2.6.1 Timber Framing

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

For specific design projects, the timber framing must be designed in accordance with the requirements of NZS 3603 and AS/NZS 1170.

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

2.6.2 Wind Pressures

Linea Oblique Weatherboard is suitable for use in wind zones up to and including EH as defined in NZS 3604.

Linea Oblique Weatherboard is also suitable for use in specific design projects up to wind pressures of 2.5kPa (ULS).

2.7 FIRE RATED WALLS

Linea Oblique Weatherboard when fixed over timber cavity battens to external walls can achieve fire ratings up to 60/60/60 to comply with Clause C/AS1 of the NZBC, when the walls are constructed in accordance with the current James Hardie 'Fire and Acoustic' Design Manual.

Linea Oblique Weatherboard is classified as a 'non-combustible' material suitable for use on walls close to a boundary.

2.8 STRUCTURAL BRACING

Linea Oblique Weatherboard installed as per this specification cannot be used to achieve structural bracing. However, bracing can be achieved by using a James Hardie rigid air barrier board installed direct to framing instead of a flexible underlay or by using the Villaboard™ Lining bracing system on the internal face of the wall. Refer to the James Hardie Bracing Design Manual for further information.

2.9 ENERGY EFFICIENCY

External walls constructed as per this technical specification using Linea Oblique Weatherboard and bulk insulation, where the area of glazing is 30% or less of the total wall area, complies with the insulation requirements for walls in the NZBC Acceptable Solution H1/AS1 (Energy Efficiency Clause H1), Table 1.

To meet thermal insulation requirements for the construction, the bulk insulation as specified in Table 1 must be used. This insulation may be substituted with insulations having higher R-values. The thermal insulation of a wall changes when the size or spacing of timber framing is increased or decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and using an internal lining material such as Villaboard Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate zone	**R-value requirement**	**Minimum cavity insulation infill requirement**
1 and 2	1.9 m^2 °C/W	R2.0*
3	2.0 m^2 °C/W	R2.2*

Total construction R-value depends on the insulation material used and the framing ratio. The insulation material R-values specified in this table are for studs spaced at 600mm centres and nogs spaced at 600mm centres.

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

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

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3 Framing

3.1 GENERAL

Linea Oblique Weatherboard can be fixed either to a timber-frame or steel-frame.

For fixing to a steel frame Ask James Hardie on 0800 808 868 for specific requirements.

For Linea Oblique Weatherboard Vertical Installation:

- Studs must be provided at 600mm centres maximum
- Nogs must be provided at 600mm centres maximum

Note: For fixing Linea Oblique Weatherboard, fastener spacing is provided in Section 5.

3.2 TIMBER FRAMING

3.2.1 Dimensions

A 90 x 45mm minimum framing size is required.

3.2.2 Structural Grade

Timber grade used must be in accordance with timber grades specified in NZS 3604.

3.2.3 Durability

The external framing timber must be treated to a minimum H1.2 treatment. Higher treatment levels may be used, but check for the compatibility of treatment chemicals with other materials. Refer to the NZBC Acceptable Solution B2/AS1 Durability for further information about the durability requirements.

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

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

3.2.4 Frame Construction

Use of timber framing must be in accordance with NZS 3604 and the framing manufacturer's specifications. The framing must be rigid and must not rely on the cladding for stability. Timber framing sizes and its set-out must comply with NZS 3604 and as specified in this technical specification.

The following framing is required:

- Studs must be provided at 600mm centres maximum
- Nogs must be provided at 600mm centres maximum
- An extra stud is required in internal corners
- For specific design projects exposed to wind speeds higher than 55m/sec the stud size and spacing must be as per the design requirements but not exceeding 600mm maximum

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must be in accordance with truss design and specification supplied by the frame and truss manufacturer/supplier supported by an independent design producer statement.

3.3 SPECIAL FRAMING REQUIREMENTS

The following are special framing requirements for both timber and steel framing:

- Double studs are required at internal corners, refer to Figure 10
- Extra packers may be required at external corners

3.4 TOLERANCES

In order to achieve the required performance and an acceptable wall finish, it is imperative that framing is straight and true. Framing tolerances must comply with Table 2.1 of NZS 3604 and the manufacturer's specifications. All framing shall be made flush.

4 Preparation

4.1 FLEXIBLE UNDERLAY/HOMERAB PRE-CLADDING

Flexible underlay/HomeRAB™ Pre-Cladding must be provided as per the requirements of External Moisture Clause E2 of the NZBC. The flexible underlay selected for use must comply with Table 23 of E2/AS1.

The flexible underlay must be fixed in accordance with section 9.1.7 of E2/AS1 and the underlay manufacturer's recommendations.

Walls which are not lined on the inside face (e.g. garage walls or gable ends), must include a rigid sheathing or an air barrier behind the cladding which complies with Table 23 of E2/AS1. For attached garages, flexible underlays must be selected in accordance with the NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. James Hardie HomeRAB Pre-Cladding complies with these requirements and is suitable for use in this situation. It must be installed in accordance with the James Hardie Rigid Air Barriers installation manual.

4.2 RAB BOARD

For EH wind zone or for specific engineering design (SED) projects where the wind pressure is higher than 1.5kPa, James Hardie RAB™ Board must be used.

To achieve temporary weathertightness using James Hardie RAB Board, windows/doors need to be temporarily installed. Refer to the James Hardie Rigid Air Barriers installation manual for further information regarding its installation.

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4.3 CAVITY CLOSURE/VENT STRIP

The James Hardie uPVC cavity vent strip must be installed at the bottom of all walls and above all openings constructed using the drained and ventilated cavity construction method. It is important that the openings in the cavity closure/vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. James Hardie cavity closure/vent strip has an opening area of 1000mm^2/m length.

4.4 CAVITY BATTENS

Linea Oblique Weatherboard must be installed on a cavity. The battens provide ventilation and drainage between the frame and the weatherboard and are considered a “packer” only in this specification.

The James Hardie horizontal cavity battens are H3.1 treated in accordance with NZS 3640 (Chemical preservation of rough and sawn timber) to comply with the durability requirements of B2/AS1.

James Hardie horizontal cavity battens meet the requirements of E2/AS1 and:

- Are minimum 20mm thick and 45mm wide
- Fixed horizontally to nogs
- Fixed vertically to studs at corners and openings
- Must be fixed by the cladding fixings to the main framing over the flexible underlay. Therefore until claddings are fixed the battens only need to be tacked to framing by 40 x 2.8mm or longer nails at 800mm centres
- Permit air circulation and water drainage

4.5 INTERMEDIATE SUPPORT

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

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

No intermediate supports are required:

- When studs are spaced at 400mm centres; or
- When rigid air barriers are used

4.6 FLASHINGS

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to Linea Oblique Weatherboard installation. Refer to moisture management requirements in Clause 2.5. The flexible underlay/rigid air barrier must be appropriately incorporated with penetration and junction flashings using flashing tapes. Materials must be lapped in such a way that water tracks down to the exterior on the face of the flexible underlay or rigid air barrier board.

The selected flashing materials must comply with the durability requirements of the NZBC. For information refer to Table 20 of E2/AS1.

When using James Hardie rigid air barrier boards the entire framing around openings must be protected with a flashing tape. The tape must be finished over the face of the rigid air barrier. Ensure to check the compatibility of flashing tapes and sealants with their manufacturers. Refer to the James Hardie Rigid Air Barriers installation manual for further information.

4.7 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. For an example of window details for Linea Oblique Weatherboard which meet the performance requirements of E2 External Moisture, an approved document of the NZBC, refer to Figures 11 to 13.

5 Installation

5.1 GENERAL

Linea Oblique Weatherboard must be installed vertically using the cavity construction method as per the details and information published in this manual.

The two widths of Linea Oblique Weatherboard can be mixed to create the desired look.

Linea Oblique Weatherboard must be kept under cover whilst in storage or at sites and they must be dry at the time of their installation. All site-cut board edges must be sealed with Dulux Acraprime 501/1, Dulux 1 Step, Resene Quick Dry or a similar sealer compatible with the finish coat before installation.

Linea Oblique Weatherboard must be fully supported and fixed through James Hardie horizontal cavity battens. Ensure that cladding is hard against the battens to avoid drumminess.

This technical specification only covers the vertical installation of Linea Oblique Weatherboard. Refer to the Linea Oblique Weatherboard horizontal installation technical specification for horizontal installation.

5.2 FASTENER DURABILITY

Fasteners must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing materials to be used in relation to exposure conditions and are summarised in Table 2.

Fasteners must be fully compatible with the other materials that they are to be in contact with, to ensure the durability of the complete assembly.

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Table 2

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

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

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

5.3 FASTENER – SIZE AND LAYOUT

Linea Oblique Weatherboard must be fixed vertically to framing using fixings as specified in Table 3 below and follow the edge distance required for nails as shown in the details.

Table 3

Weatherboard fixing up to and including VH wind zone		
CAVITY CONSTRUCTION OVER FLEXIBLE UNDERLAY		
Linea Oblique Weatherboard 200	65x2.87mm D head nail or 65x2.87mm RounDrive ring shank nail or 60x3.15mm HardieFlex nail	Fix one nail 100mm from bottom edge of board per nog/plate, refer to Figure 6
Linea Oblique Weatherboard 300	65x2.87mm D head nail or 65x2.87mm RounDrive ring shank nails or 60x3.15mm HardieFlex nail	Fix one nail 150mm from bottom edge of board per nog/plate, refer to Figure 7

Weatherboard fixing up to and including VH wind zone		
CAVITY CONSTRUCTION OVER HOMERAB PRE-CLADDING/RAB BOARD		
Linea Oblique Weatherboard 200	75x3.06mm D head nail or 75x3.15mm RounDrive ring shank nail or 75x3.15mm HardieFlex nail	Fix one nail 100mm from bottom edge of board per nog/plate, refer to Figure 6
Linea Oblique Weatherboard 300	75x3.06mm D head nail or 75x3.15mm RounDrive ring shank nail or 75x3.15mm HardieFlex nail	Fix one nail 150mm from bottom edge of board per nog/plate, refer to Figure 7

Weatherboard fixing EH wind zone and SED projects		
CAVITY CONSTRUCTION OVER RAB BOARD		
Linea Oblique Weatherboard 200	75x3.06mm D head nail or 75x3.15mm RounDrive ring shank nail or 75x3.15mm HardieFlex nail	Fix one nail 100mm from bottom edge of board per nog/plate Refer to Figure 8
Linea Oblique Weatherboard 300	75x3.06mm D head nail or 75x3.15mm RounDrive ring shank nail or 75x3.15mm HardieFlex nail	Fix one nail at 150mm from bottom edge of board per nog/plate. Refer to Figure 9

For other fixing options Ask James Hardie on 0800 808 868.

- When fixing the weatherboards using nail guns, refer to the nail gun manufacturer for information about nails and the type of nail gun to be used
- D head nails - finish nails 2mm below weatherboard surface
- RounDrive nails - finish nails flush with weatherboard surface
- HardieFlex nails - finish nails flush with weatherboard surface

6 Joints

6.1 VERTICAL JOINT

Linea Oblique Weatherboard vertical joint shall be formed using the ship lap edge of the Linea Oblique Weatherboard. Ensure that the Linea Oblique Weatherboards are securely interlocked before nailing, refer to Figures 6 to 9.

6.2 HORIZONTAL JOINT

Linea Oblique Weatherboard can run continuously over floor joists without a flashed horizontal joint when LVL timber floor joists or engineered joist are used, refer to Figure 17.

When using a solid timber joist, a horizontal joint or a movement joint must be formed at floor joist, refer to Figure 19.

6.3 DRAINAGE JOINT

After every two floors a horizontal drainage joint flashing is required as per E2/AS1, refer to Figure 22.

6.4 EXTERNAL CORNER

An external box corner flashing is used to fix the external corners, refer to Figure 11. Alternatively an Axent™ Trim external boxed corner can also be formed, refer to Figure 12.

6.5 INTERNAL CORNER

An internal corner flashing is to be used to form an internal corner joint, refer to Figure 10.

An extra stud is required in internal corners.

Note: All joint mouldings to be fixed at 400mm centres both sides.

7 Finishes

7.1 PREPARATION

The D head nail must be finished 2mm below the weatherboard surface. The nail holes must be filled with an exterior grade two part builders fill, ie. CRC ADOS Builders Fill or similar two part external grade filler. The RounDrive nail heads must finish flush with weatherboard surface.

7.2 PAINTING

Linea Oblique Weatherboard is pre-primed and is suitable for site applied acrylic paints.

In order to seal cut edges or sanded patches, Dulux 1 Step, Acraprime 501/1, Resene Quick Dry, Taubmans Underproof Acrylic Primer Undercoat or a similar product should be applied. The primer should be compatible with the paint to be used.

Painting of Linea Oblique Weatherboard is mandatory to meet the durability requirements of the NZBC and the 25 year James Hardie product warranty. Linea Oblique Weatherboard must be dry and free of any dust or grime before painting. The weatherboards must be painted within 90 days of their installation. There is no restriction on the LRV of paint to be applied on the Linea Oblique Weatherboard.

James Hardie recommends a minimum of two coats of exterior grade acrylic paint. Follow the paint manufacturer's recommendations to prepare the surface and to adequately cover and conceal the weatherboard fixings.

7.3 FLEXIBLE SEALANT

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

8 Storage and handling

When storing Linea Oblique Weatherboard, they must be laid flat on a smooth level surface. Edges and corners must be protected from chipping.

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

Do not carry weatherboards on the flat, carry on edge to avoid excessive bending.

9 Maintenance

It is the responsibility of the specifier to determine normal maintenance requirements to maintain the effectiveness of the cladding. The extent and nature of maintenance required will depend on the geographical location and exposure of the building.

As a guide, it is recommended that the basic normal maintenance tasks shall include, but not be limited to:

- Washing down exterior surfaces every 6-12 months*
- Re-coating exterior protective finishes**
- Regular inspection and repair if necessary of the cladding joints, sealants, nail head fillers
- Cleaning out gutters, down pipes and overflow pipes as required
- Pruning back vegetation which is close to or touching the building as well as ensuring the NZBC ground clearance requirements are maintained, especially where gardens are concerned
- The clearance between the bottom edge of the Linea Oblique Weatherboard and the finished/unfinished ground must always be maintained

**Do not use a water blaster to wash down the cladding. In extreme coastal conditions or sea spray zones, wash every 3-4 months.*

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

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10 Product information

10.1 MANUFACTURING AND CLASSIFICATION

Linea Oblique Weatherboard is an advanced lightweight cement composite cladding, manufactured using James Hardie formulation. Basic composition is Portland cement, ground sand, cellulose fibre and water. The product is easily identified by the name 'Linea Oblique'.

Linea Oblique Weatherboard is manufactured to Australian/New Zealand Standard AS/NZS 2908.2 ‘Cellulose-Cement Products’ (ISO 8336 ‘Fibre-Cement Flat Sheet’).

Linea Oblique Weatherboard is classified Type A, Category 2 in accordance with AS/NZS 2908.2 “Cellulose-Cement Products”.

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

10.2 PRODUCT MASS

Linea Oblique Weatherboard is manufactured in 16mm thickness and has a mass of 20.57kg/m^2 for 200mm and 19.67kg/m^2 for 300mm.

Linea Oblique Weatherboard is defined as a Light Weight Wall Cladding (not exceeding 30kg/m^2) as per NZS 3604.

10.3 DURABILITY

Linea Oblique Weatherboard and James Hardie rigid air barrier installed and maintained as per this technical specification will meet the durability requirement for cladding as per the NZBC clause B2 Durability.

10.3.1 Resistance to Moisture/Rotting

Linea Oblique Weatherboard is resistant to permanent moisture induced deterioration (rotting) and meets the requirements of the following tests in accordance with the AS/NZS 2908.2:

- Heat Rain (Clause 6.5)
- Water Permeability (Clause 8.2.2)
- Warm Water (Clause 8.2.4)
- Soak Dry (Clause 8.2.5)

10.3.2 Control of External Fire Spread

Linea Oblique Weatherboard meets the requirements of Appendix C C7.1.1 and is classified as ‘Non-Combustible Material’ which is suitable for use as external wall cladding and complies with the requirements of Paragraph 5.4 of the NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of Acceptable Solutions C/AS2 to C/AS6 of the NZBC.

10.3.3 Alpine Regions

In regions subject to freeze/thaw conditions, Linea Oblique Weatherboard and James Hardie rigid air barrier must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions must be protected where snowdrifts over winter are expected.

These products meet the requirements of the AS/NZS 2908.2 Clause 8.2.3.

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11 Safe working practices

11.1 STAY HEALTHY WHEN WORKING WITH BUILDING PRODUCTS CONTAINING CRYSTALLINE SILICA

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

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

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

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

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

11.2 AVOID BREATHING IN CRYSTALLINE SILICA DUST!

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

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

BEST
- HardieKnife™
- Hand guillotine
- Fibreshear

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

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

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

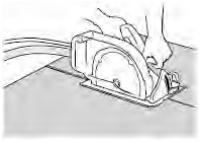
IF CONCERN STILL EXISTS ABOUT EXPOSURE LEVELS OR YOU DO NOT COMPLY WITH THE ABOVE PRACTICES, YOU SHOULD ALWAYS CONSULT A QUALIFIED INDUSTRIAL HYGIENIST.

SDC - Approved Document B Volume 2 2019 Edition incorporating 2020 and 2021 amendments - 382 of 522 - 24/06/2021 08:20:02

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Working Instructions

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



HardieBlade™ Saw Blade

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

Hole-Forming

For smooth clean cut circular holes:



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

For irregular holes:

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

11.3 STORAGE AND DELIVERY

Keeping products and people safe

Off loading

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

Storage

James Hardie products should be stored:

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

James Hardie products must not be stored:

- Directly on the ground
- In the open air exposed to the elements

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

11.4 TIPS FOR SAFE AND EASY HANDLING

Weatherboard products

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

Sheet products

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

12 Product and accessories

Linea Oblique Weatherboard information

Product	Description	Size (mm)			Code
		Thickness	Length	Width	
	**Linea Oblique Weatherboard** A 16mm profiled weatherboard for residential cladding. Factory sealed on all six sides. Each weatherboard has a manila white colour primer applied on its face, which accepts a wide range of paint finishes.	16	2700 4200	200 300 200 300	**404855** **404856** **404849** **404848**

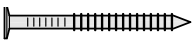
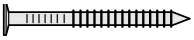
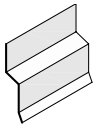
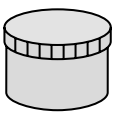
Note: All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

Accessories/tools supplied by James Hardie

Accessories	Description	Size	Code
	**James Hardie Horizontal Cavity Batten 20mm** H3.1 Timber treated batten the cladding is fixed over	2700mm long	**305862**
	**Oblique Trimline Joint Flashing** Aluminium extrusion used behind cladding at horizontal joints.	3000mm long	**305826**
	**JH Weatherboard Internal 'W' Corner** Anodised aluminium extrusion used to create internal corners.	2700mm long	**300386**
	**Linea Oblique Weatherboard External Box Corner** Anodised aluminium extrusion used to create external corners.	2700mm long 4000mm long	**305825** **305873**
	**uPVC Vent Strip** PVC moulding used as vermin proofing.	3000mm long	**302490**
	**Trimline Horizontal Jointer** A jointer to cover the butt joint of Oblique Trimline Joint Flashing	100mm long	**305871**
	**Trimline External Corner Jointer** Joins Trimline Joint Flashing at an external corner		**305870**
	**Trimline Internal Corner Jointer** Joins Trimline Joint Flashing at an internal corner		**305872**
	**Linea Oblique Plug** To fill recess in Linea Oblique Weatherboard		**305930**
Tools			
	**HardieBlade™ Saw Blade** Diamond tip fibre cement circular saw blade. Spacers not included.	184mm 254mm	**300660** **303375**

Accessories/tools not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with Linea Oblique Weatherboard and James Hardie rigid air barrier. James Hardie does not supply these products and does not provide a warranty for their use. Please contact component manufacturer for information on their warranties and further information on their products.

Product	Description
	**Flexible underlay** Must comply with Table 23 of E2/AS1.
	**Flexible window opening flashing tape** A flexible self-adhesive tape used in preparation of a window. Refer to the window installation section in this manual for more information. e.g. Protecto or SUPER-STICK Building Tape® by Marshall Innovations or 3M™ All Weather Flashing Tape 8067 by 3M™ Marshall Innovations: 0800 776 9727 3M™: 0800 474 787
	**Rigid air barrier vertical joint sealing tape** The tape to be used to seal James Hardie rigid air barrier vertical joints. SUPER-STICK Building Tape ® by Marshall Innovations or 3M™ All Weather Flashing Tape 8067 by 3M™ Marshall Innovations: 0800 776 9727 3M™: 0800 474 787
	**Flexible Sealant** Bostik Seal N Flex-1, Sikaflex AT Facade, Sikaflex MS or similar.
	**65 x 2.87mm 'D' head nail or 65 x 2.87 RounDrive nail** (ring shank hot dipped galvanised/stainless steel) For fixing Linea Oblique Weatherboard.
	**75 x 3.06mm 'D' head nail or 75 x 3.15 RounDrive nail** (hot dipped galvanised or ring shank stainless steel) For fixing Linea Oblique Weatherboard.
	**40 x 2.8mm or longer HardieFlex™ nail.** For fixing timber cavity battens and aluminium flashings.
	**Meter box** Refer electrical suppliers.
	**Head flashing** Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.
	**Exterior grade filler** CRC ADOS Builders Fill or similar two part filler to fill over nail holes

13 Details

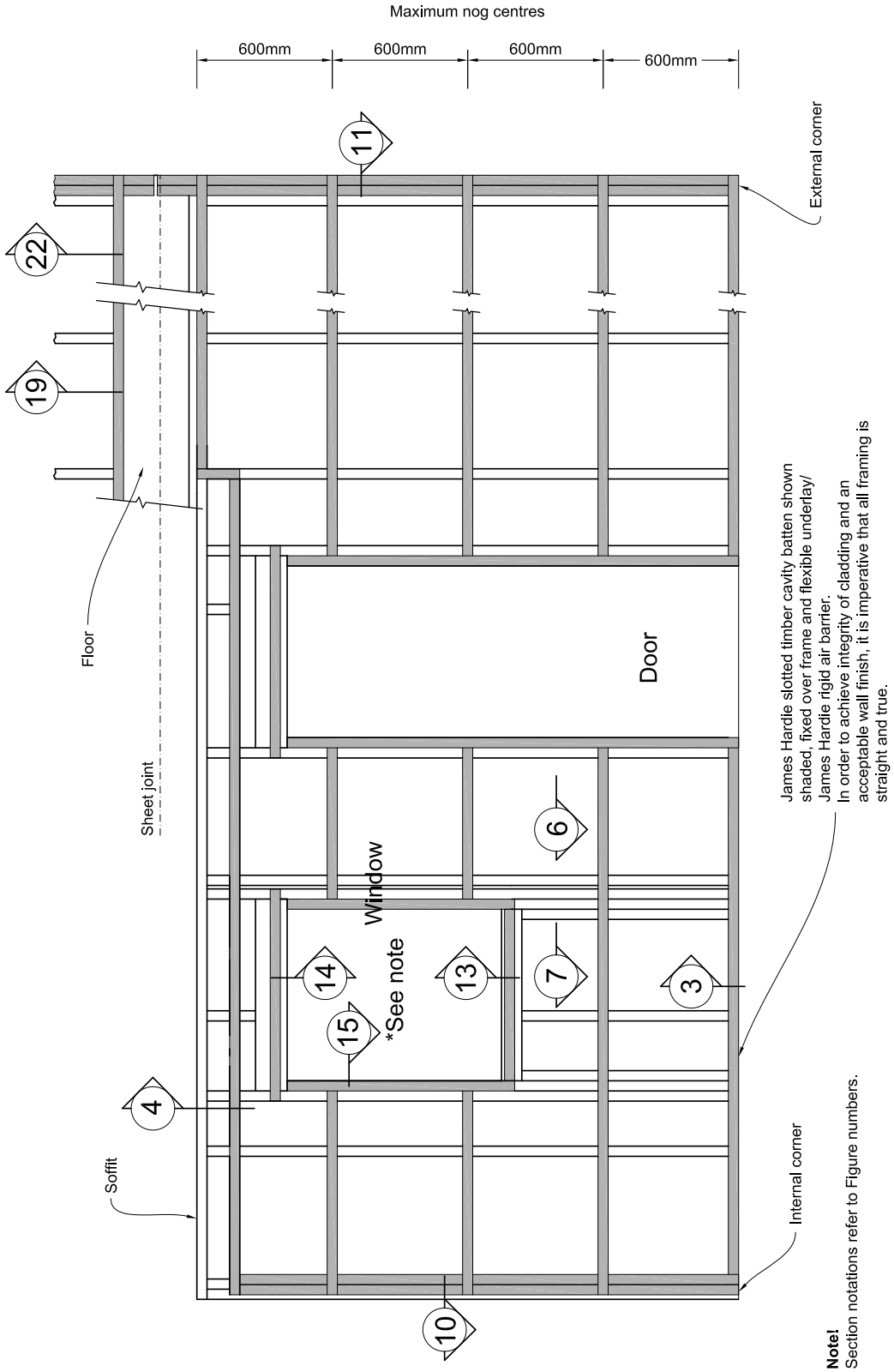
The following generic details have been provided in this document for cavity construction methods.

Table 5

Details		
Description	**Cavity Construction**	
	Figure No.	**Page No.**
Framing set out	Figure 1	15
Cladding and James Hardie horizontal batten setout	Figure 2	16
Ground clearance	Figure 3	17
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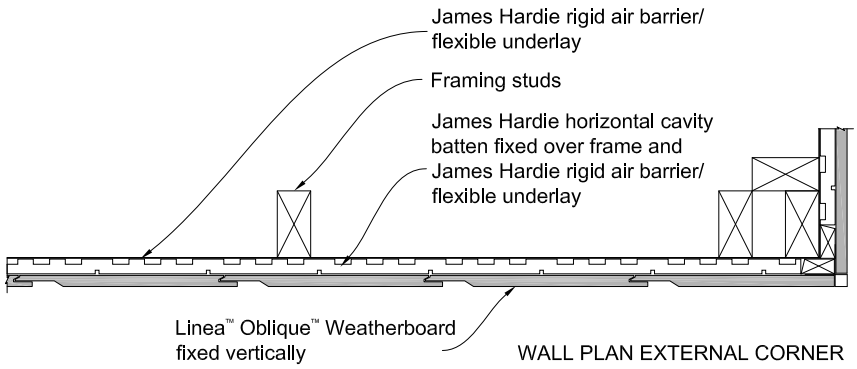
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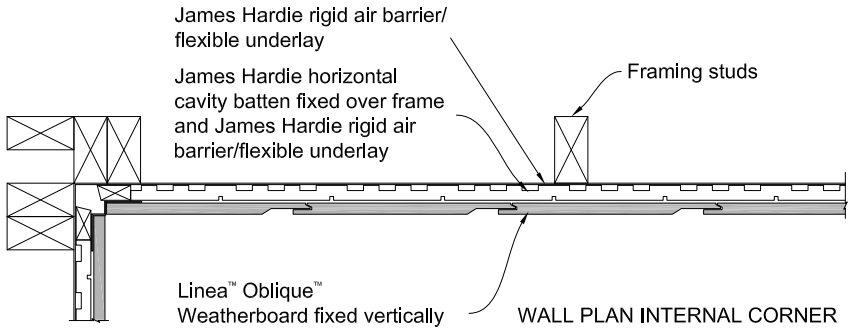
Figure 1: Framing set out

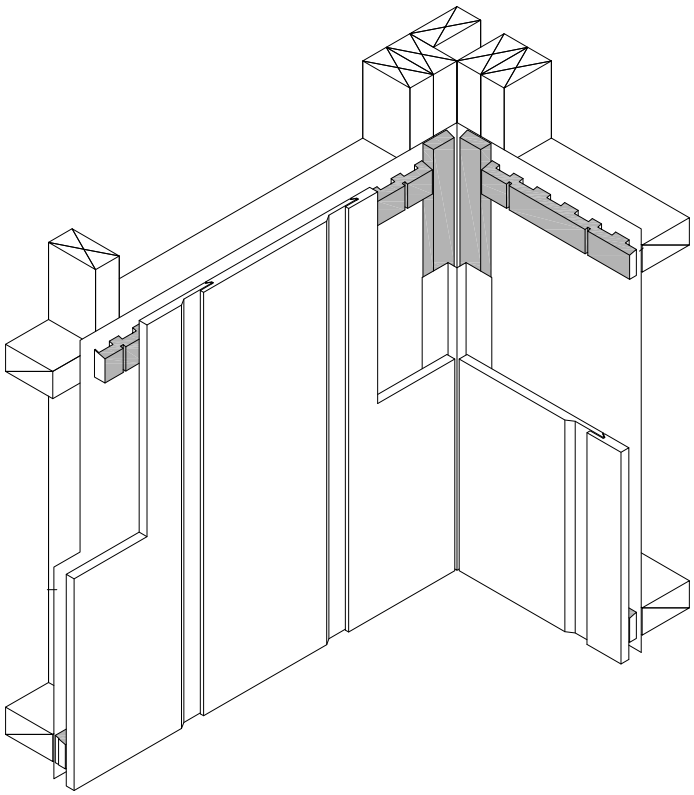


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Figure 2: Cladding and James Hardie horizontal batten setout







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Building Code of Australia
Volume Two
Part 3.7.4
Figure 3.7.4.3
Cladding and James Hardie horizontal batten setout
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Figure 3: Ground clearance

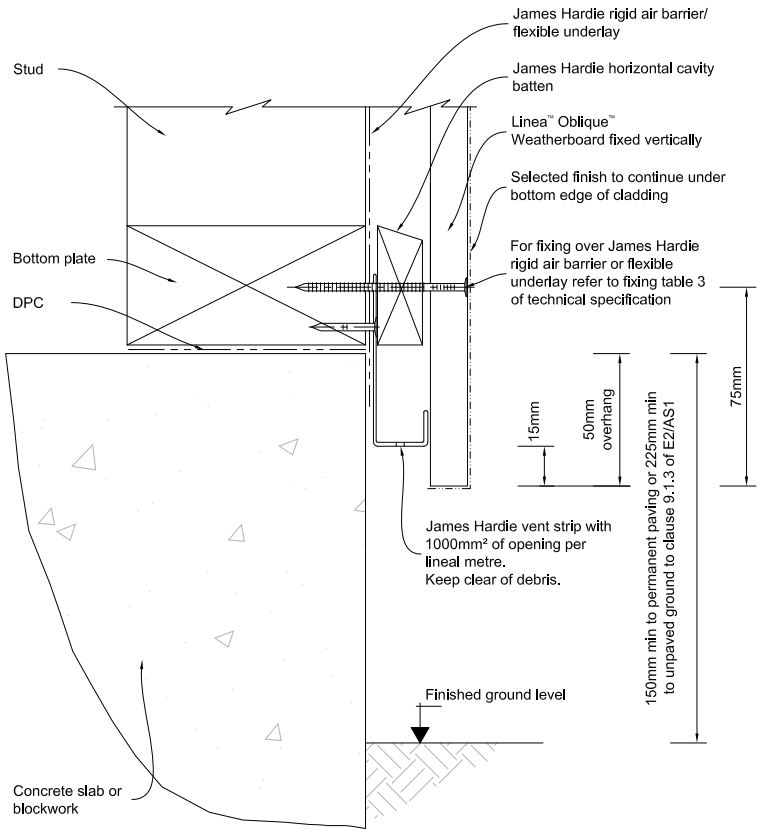


Figure 4: Soffit detail

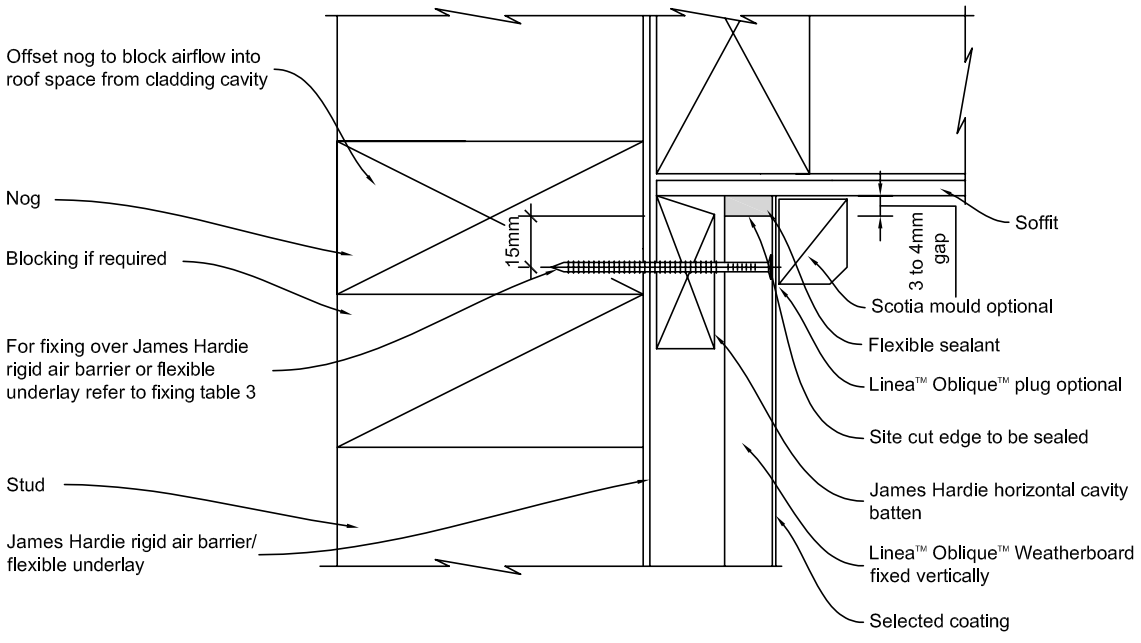


Figure 5: No soffit detail

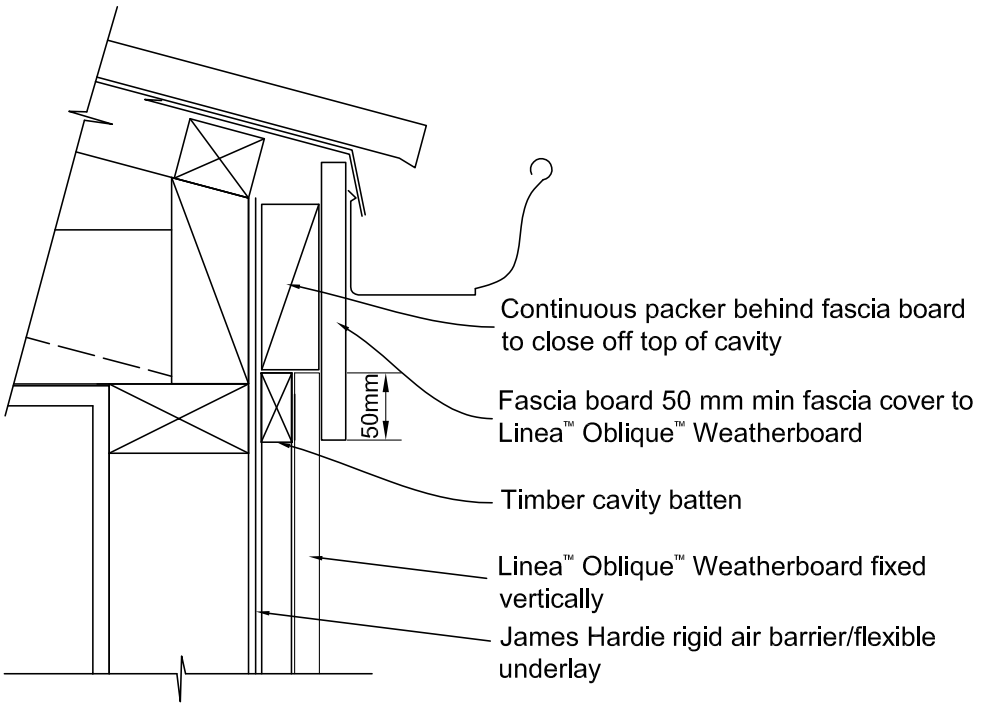


Figure 6: Vertical joint 200mm weatherboard width up to VH wind zone

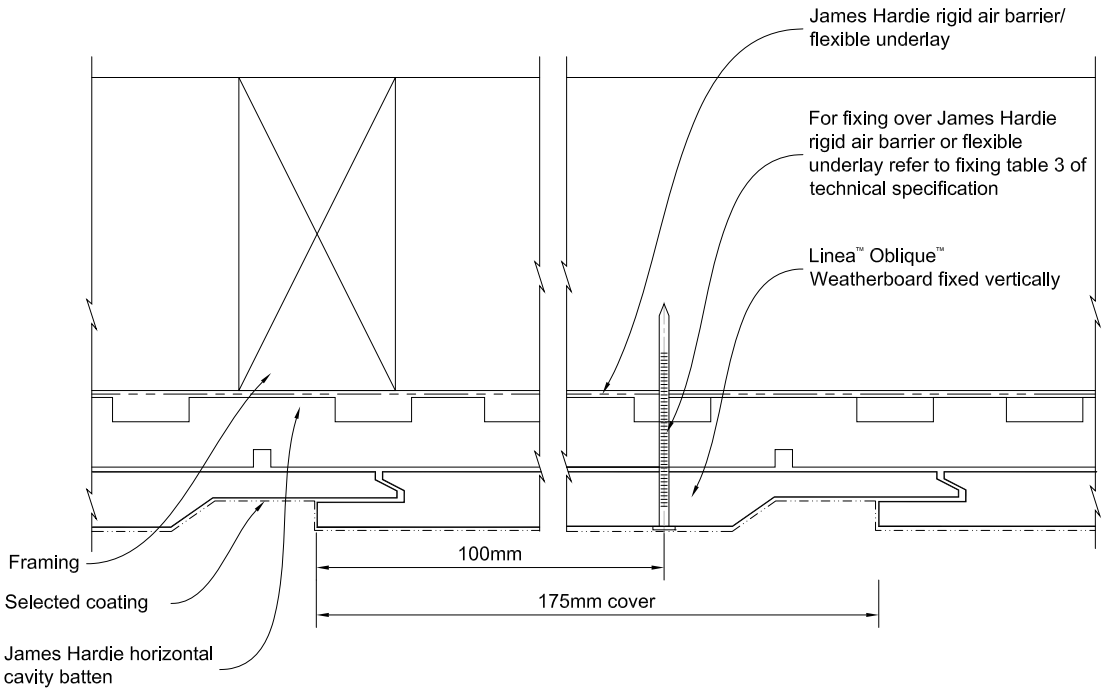


Figure 7: Vertical joint 300mm weatherboard width up to VH wind zone

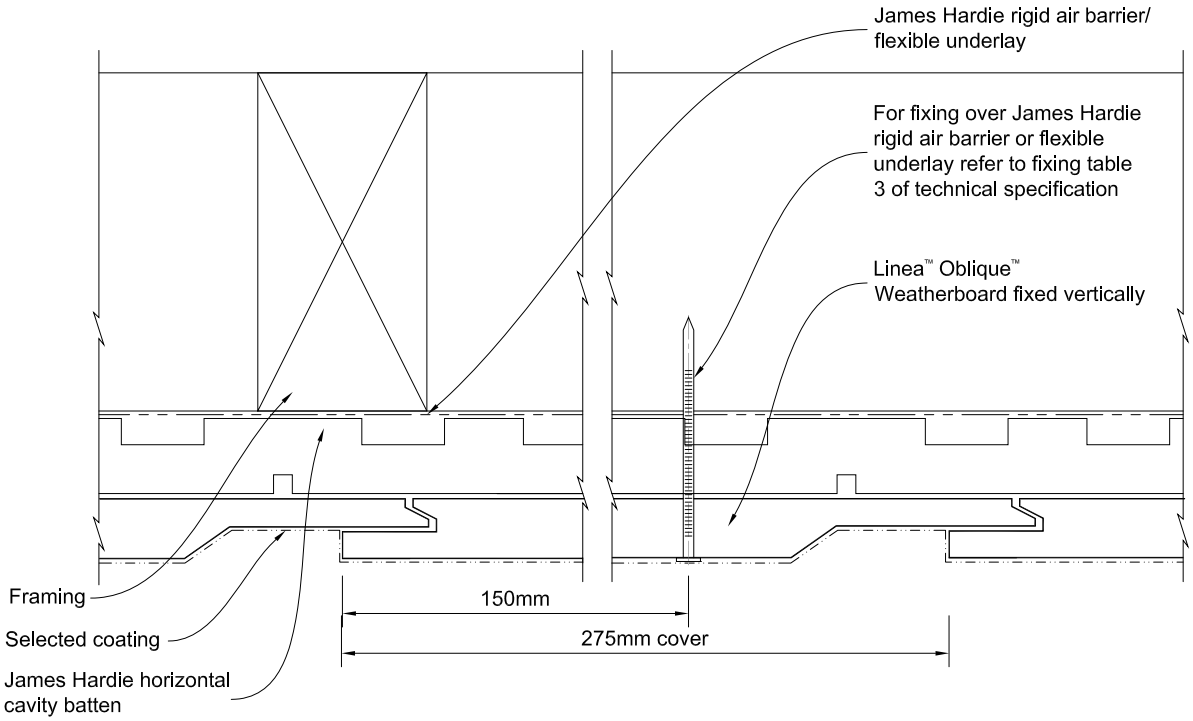


Figure 8: Vertical joint 200mm weatherboard width EH wind zone and SED

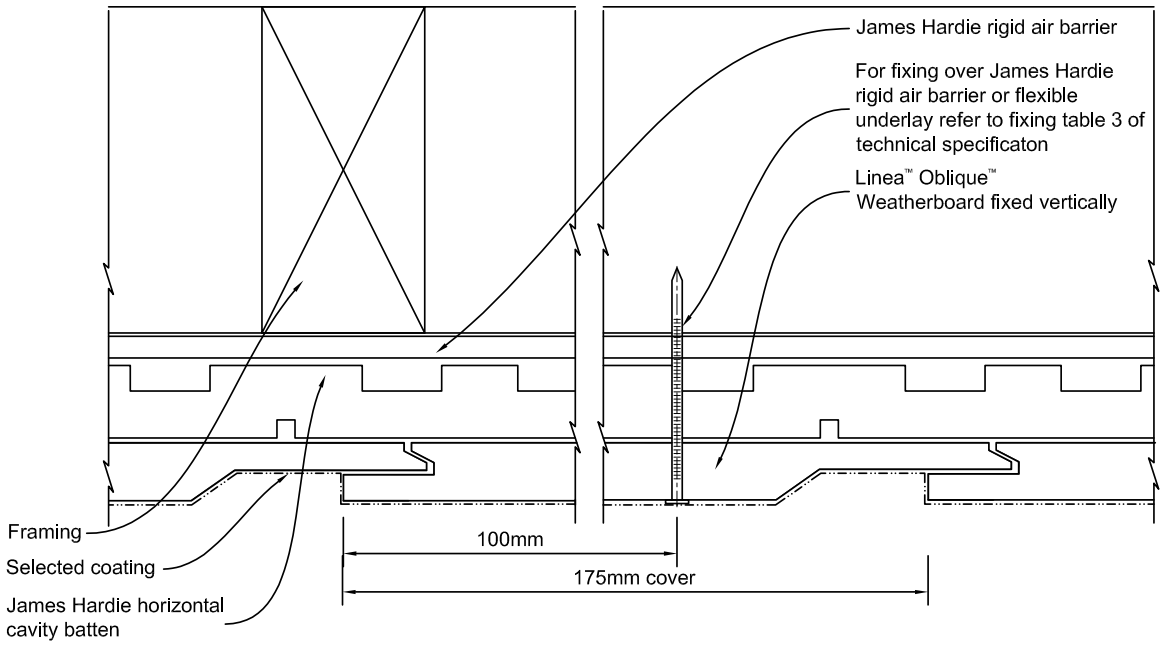


Figure 9: Vertical joint 300mm weatherboard width EH wind zone and SED

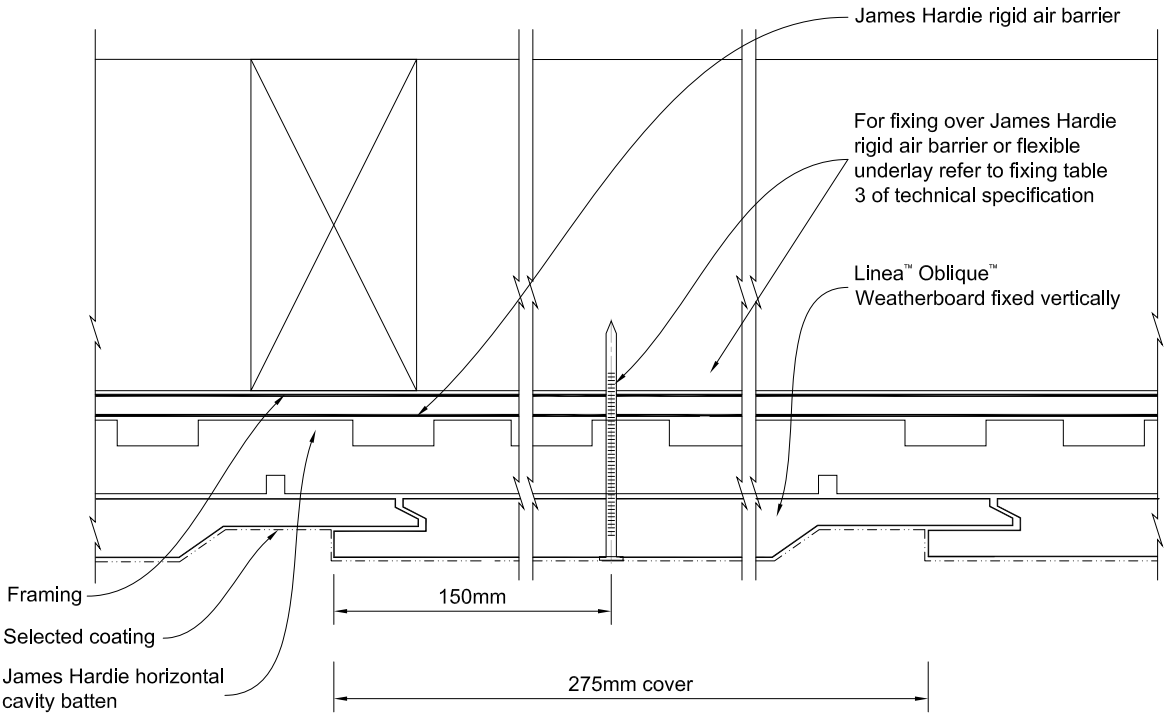


Figure 10: Internal corner

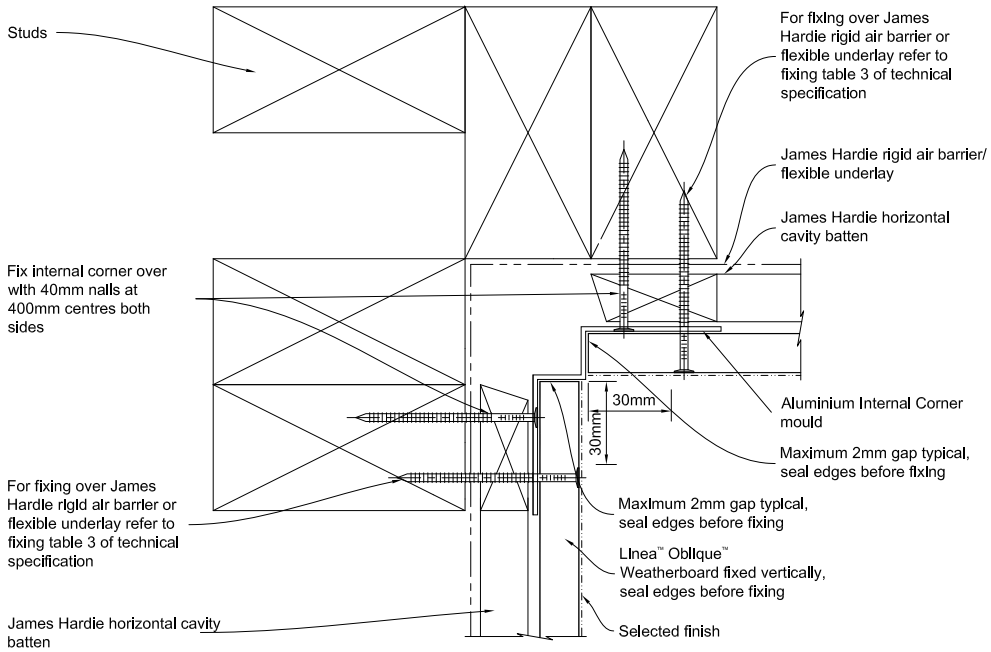


Figure 11: External aluminium box corner

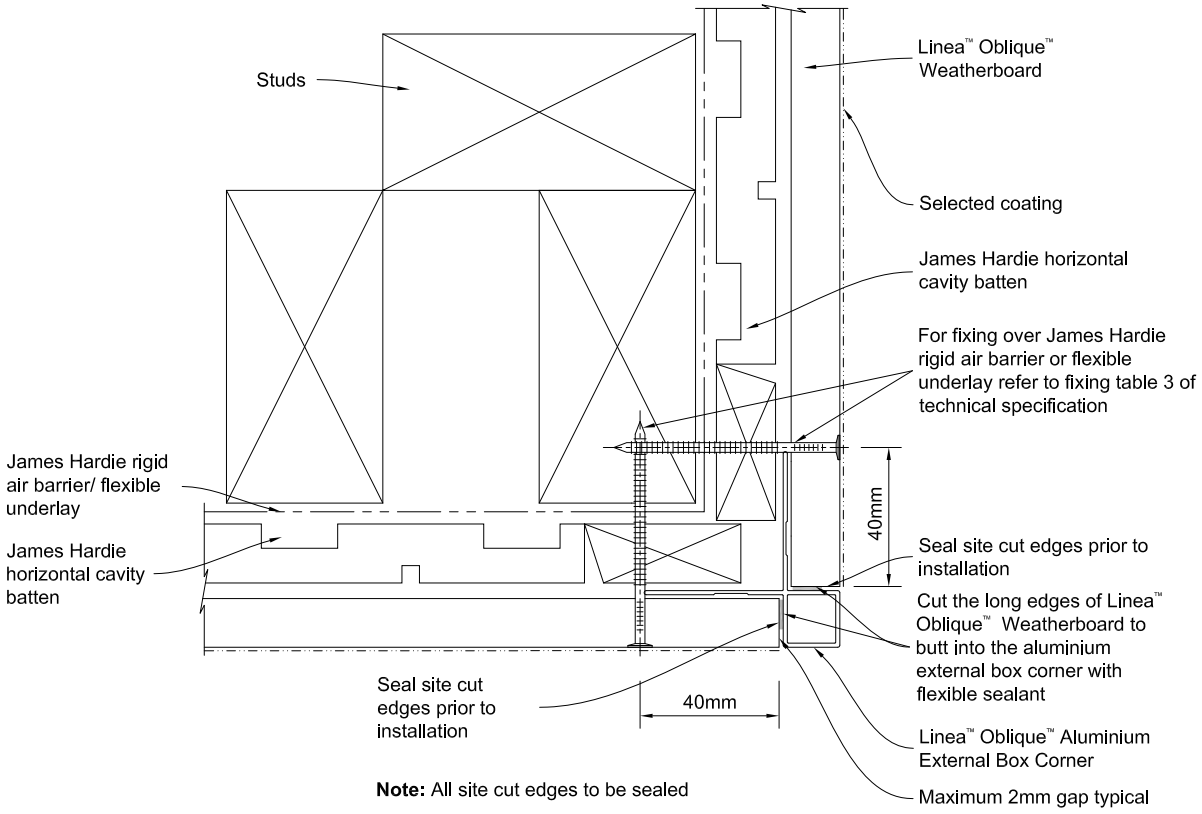


Figure 12: External box corner

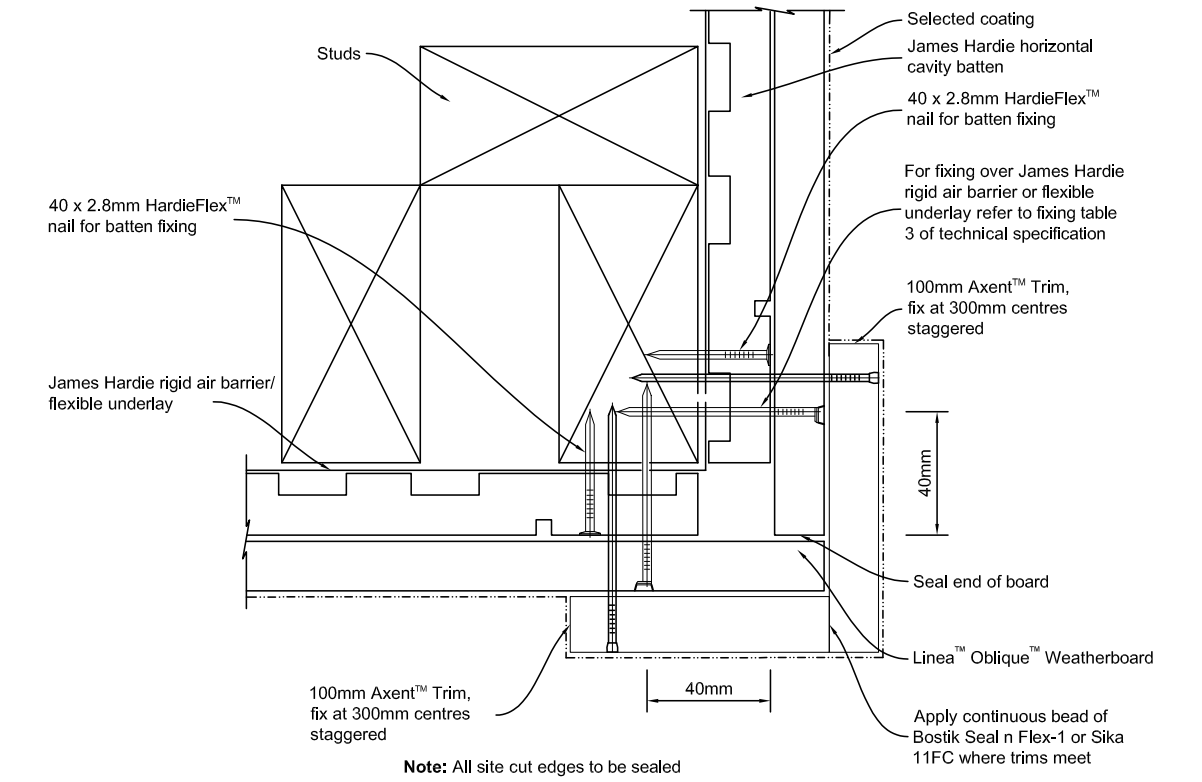
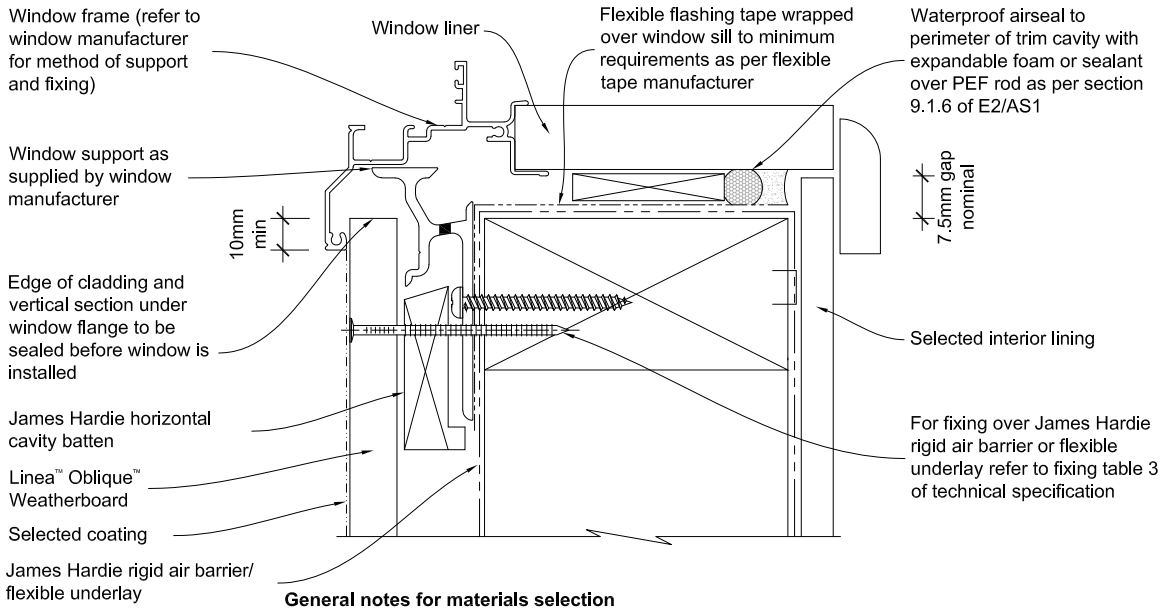


Figure 13: Window sill

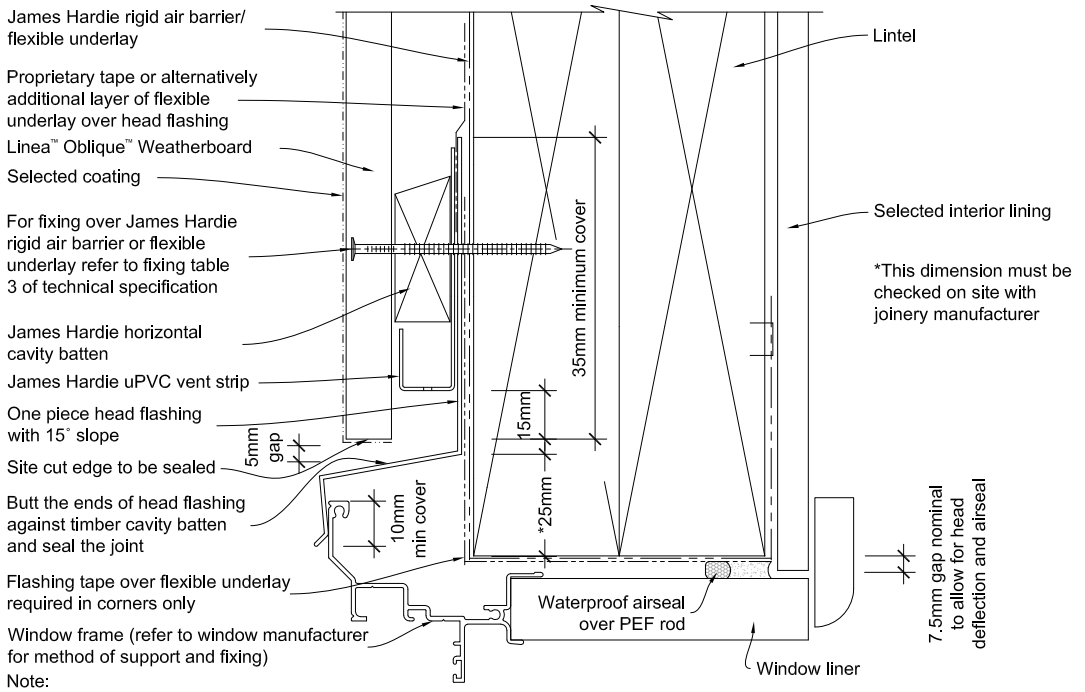


General notes for materials selection

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

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

Figure 14: Window head



Note:

- When James Hardie rigid air barriers are used flashing tape to be applied to the entire window opening
- Sealant must be installed between head flashing and window flange in VH and EH wind zones and SED projects
- Alternatively, the head flashings can be formed with stop ends as per E2/AS1

Figure 15: Window jamb

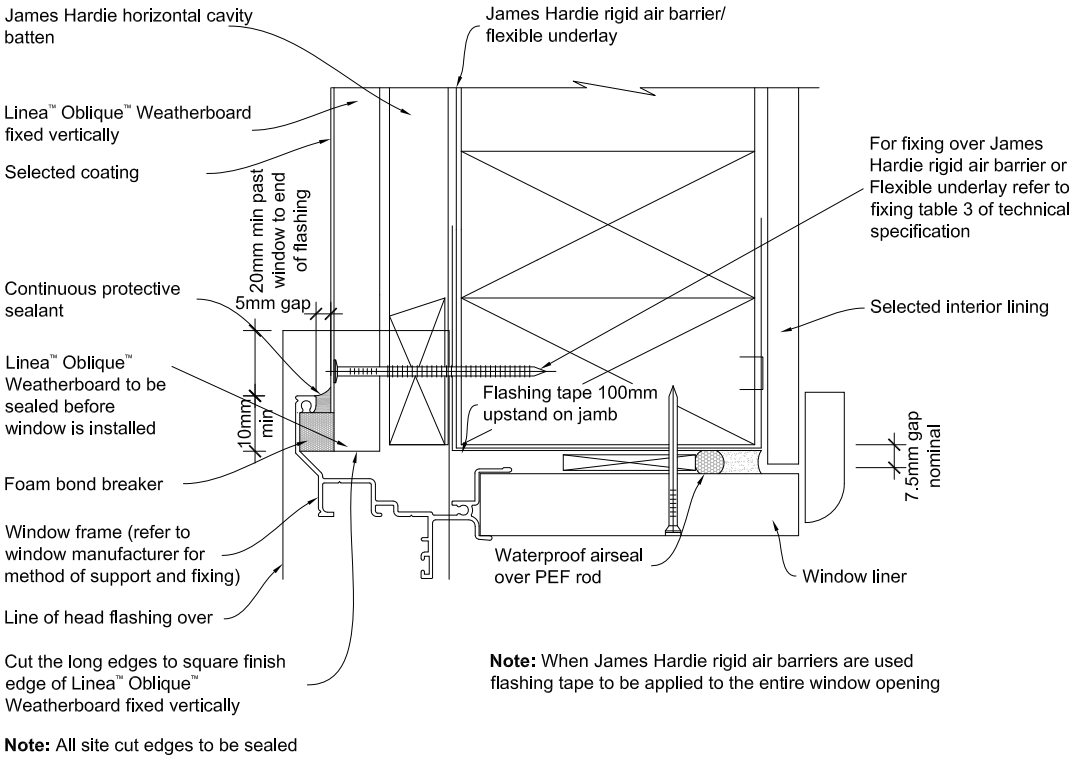


Figure 16: Window jamb flashing

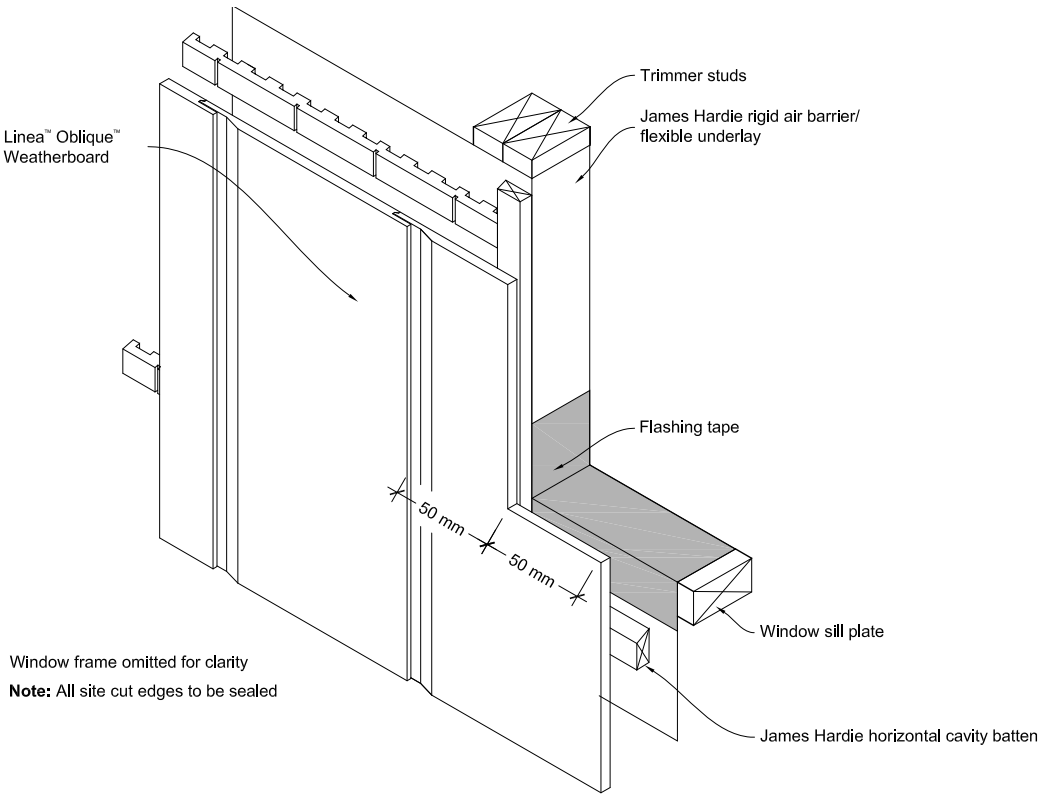


Figure 17: Over joist at floor level

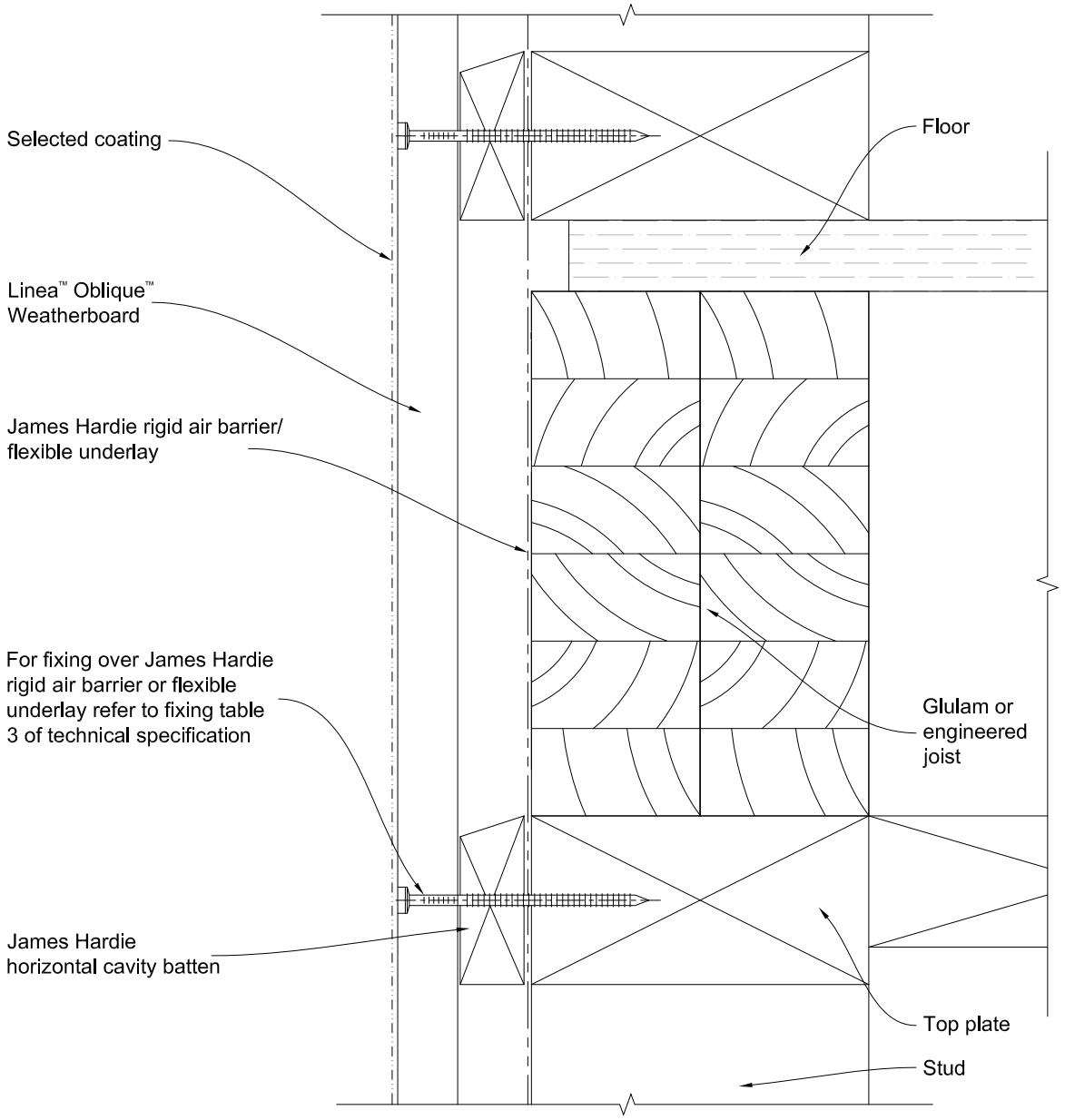


Figure 18: Butt jointing of Vertical Linea Oblique Weatherboard

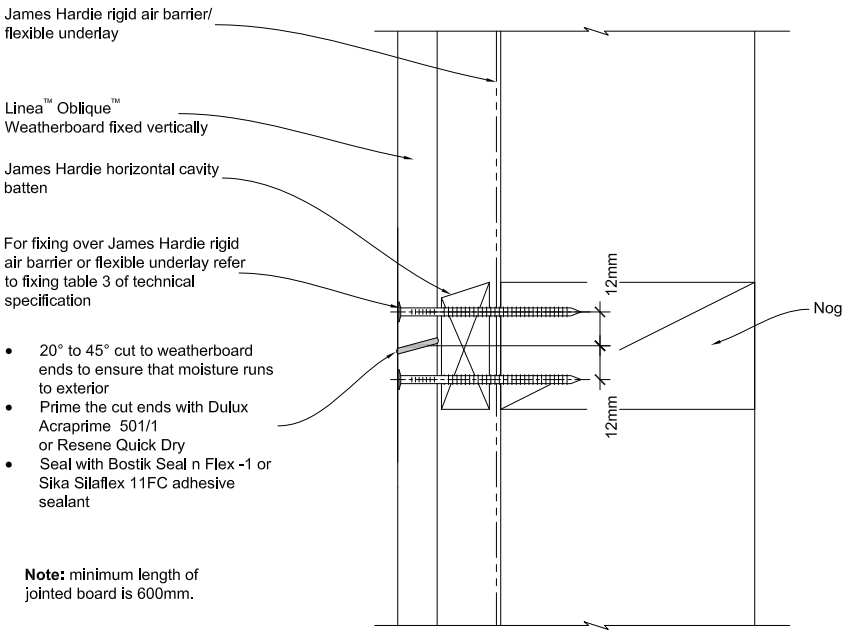
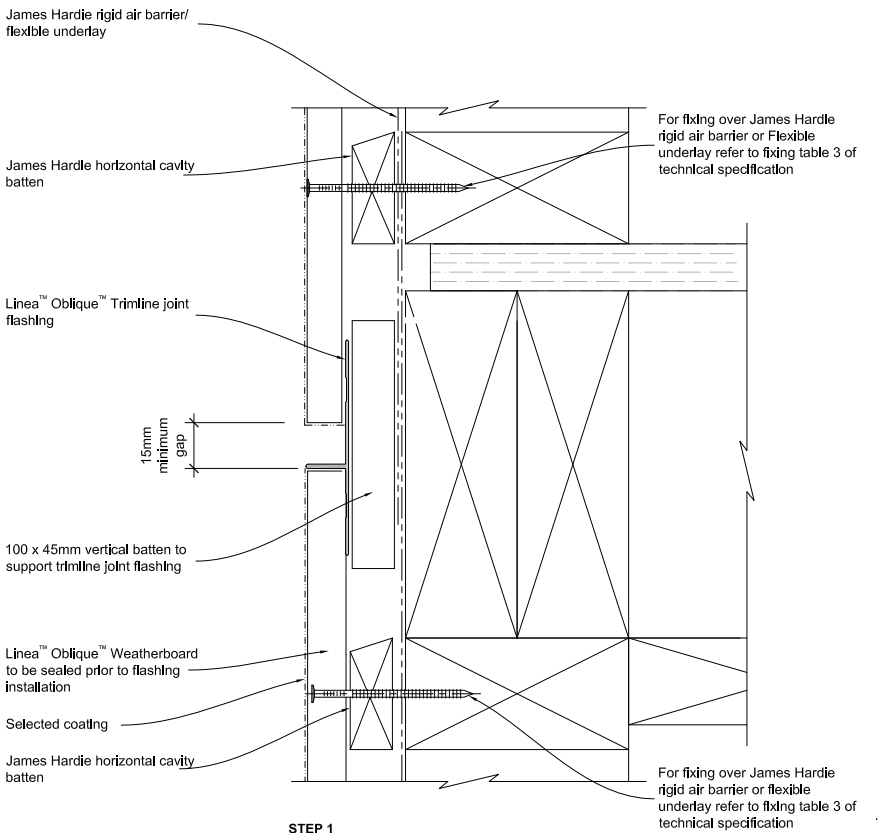


Figure 19: Trimline flashing joint at floor level



STEP 1

STEP 1

- Ensure flat James Hardie rigid air barrier / Flexible underlay is in place.

STEP 2

- James Hardie horizontal cavity batten to be installed over the studs and nogs. - Nylon strapping intermediate support to hold insulation in place between studs.

STEP 3

- Install the lower weatherboards with aluminium trimline flashing.
- Install the upper weatherboard keeping a 15mm gap.

Notes:

- The aluminium trimline flashing is installed prior to weatherboard. Apply two 6mm thick lines of adhesive sealant on the bottom portion of aluminium trimline flashing to seal. Take care to ensure continuous seal is formed between weatherboard and aluminium trimline flashing.
- The sealant must continue between flashing flange and weatherboard edge.
- Install purpose-made jointer 50mm over each end of trimline flashing and seal with flexible sealant to prevent water ingress.

Figure 20: Trimline flashing joint external corner

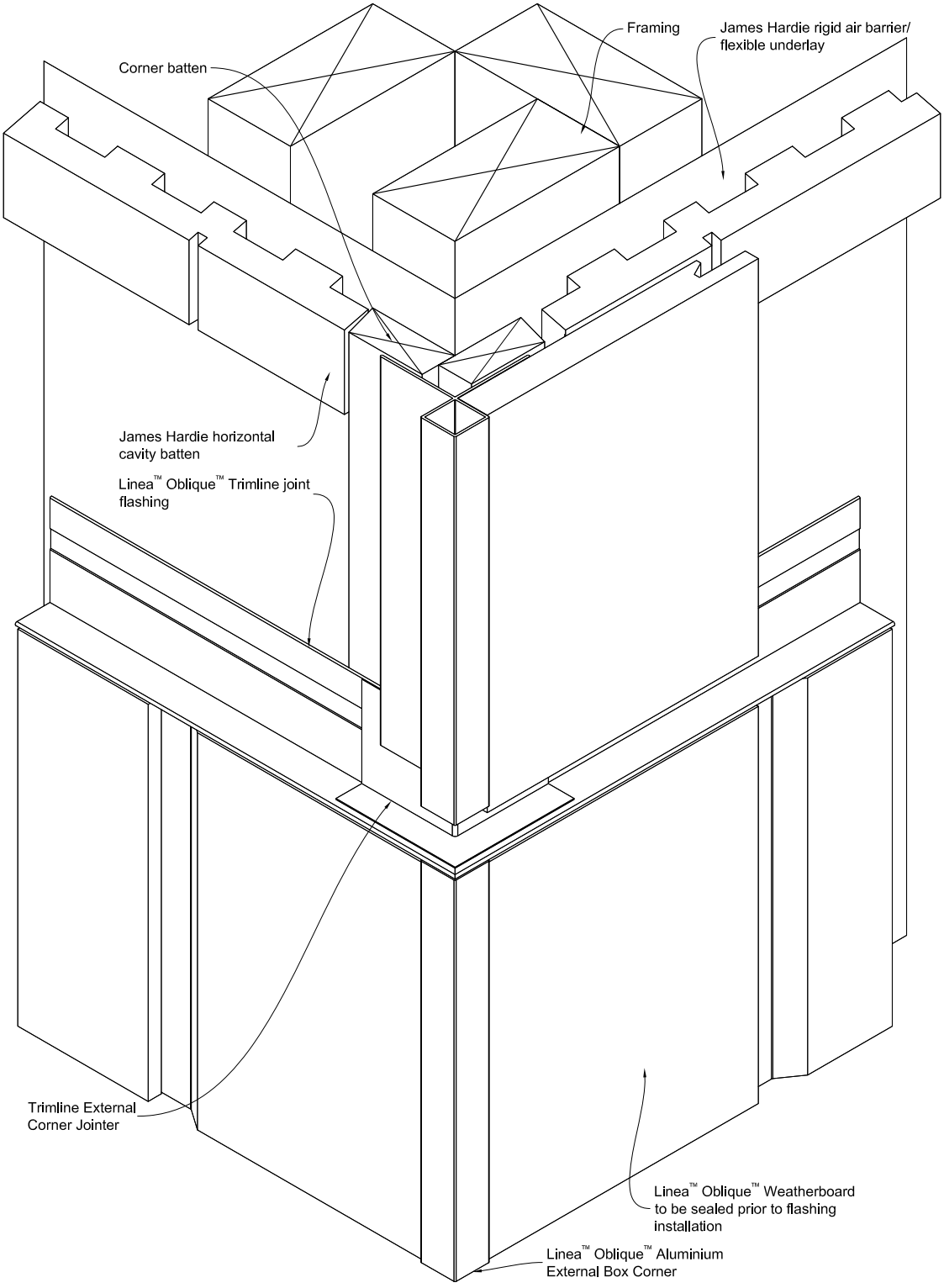
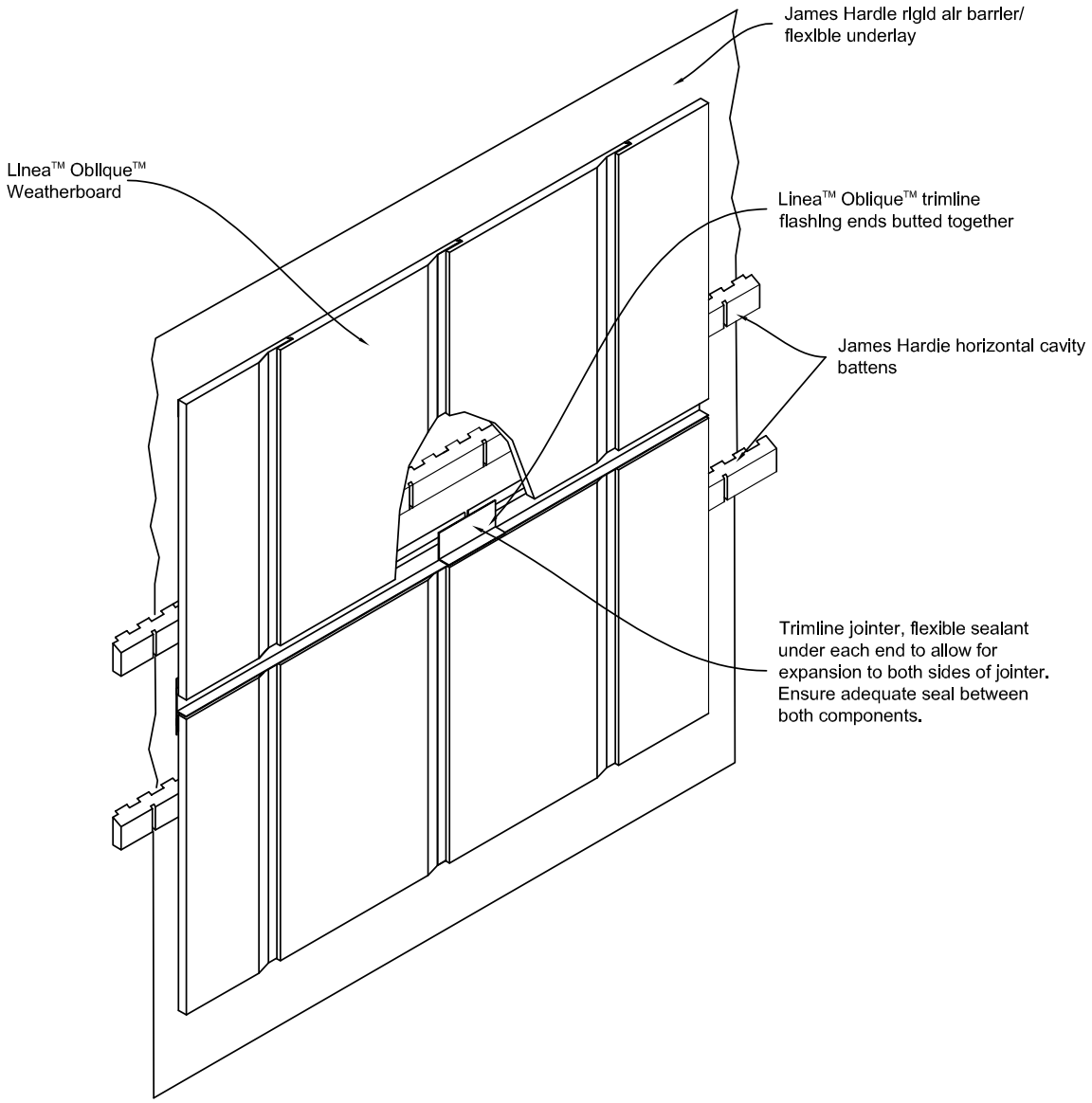
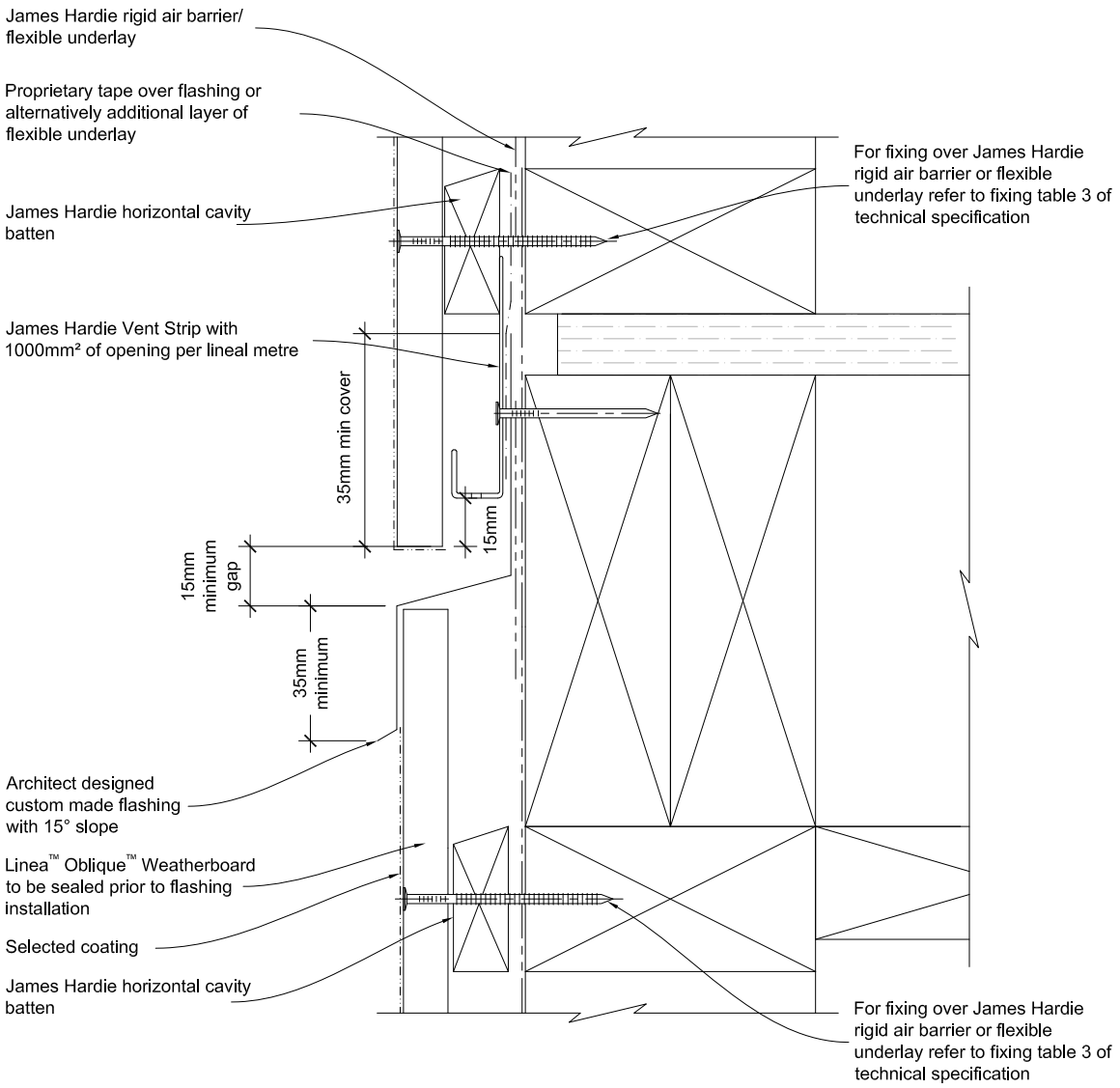


Figure 21: Trimline joint



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Figure 22: Drained flashing joint at floor level



Note:
This detail is required to limit cavities to a maximum of 2 stories or 7 metres
Refer to E2/AS1 clause 9.1.9.4

STEP 1

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

STEP 2

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

STEP 3

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

STEP 4

- The flashing to be placed in the centre of the floor joists. Do not fix James Hardie horizontal cavity batten or cladding into floor joists

Figure 23: Drained flashing joint at floor joist

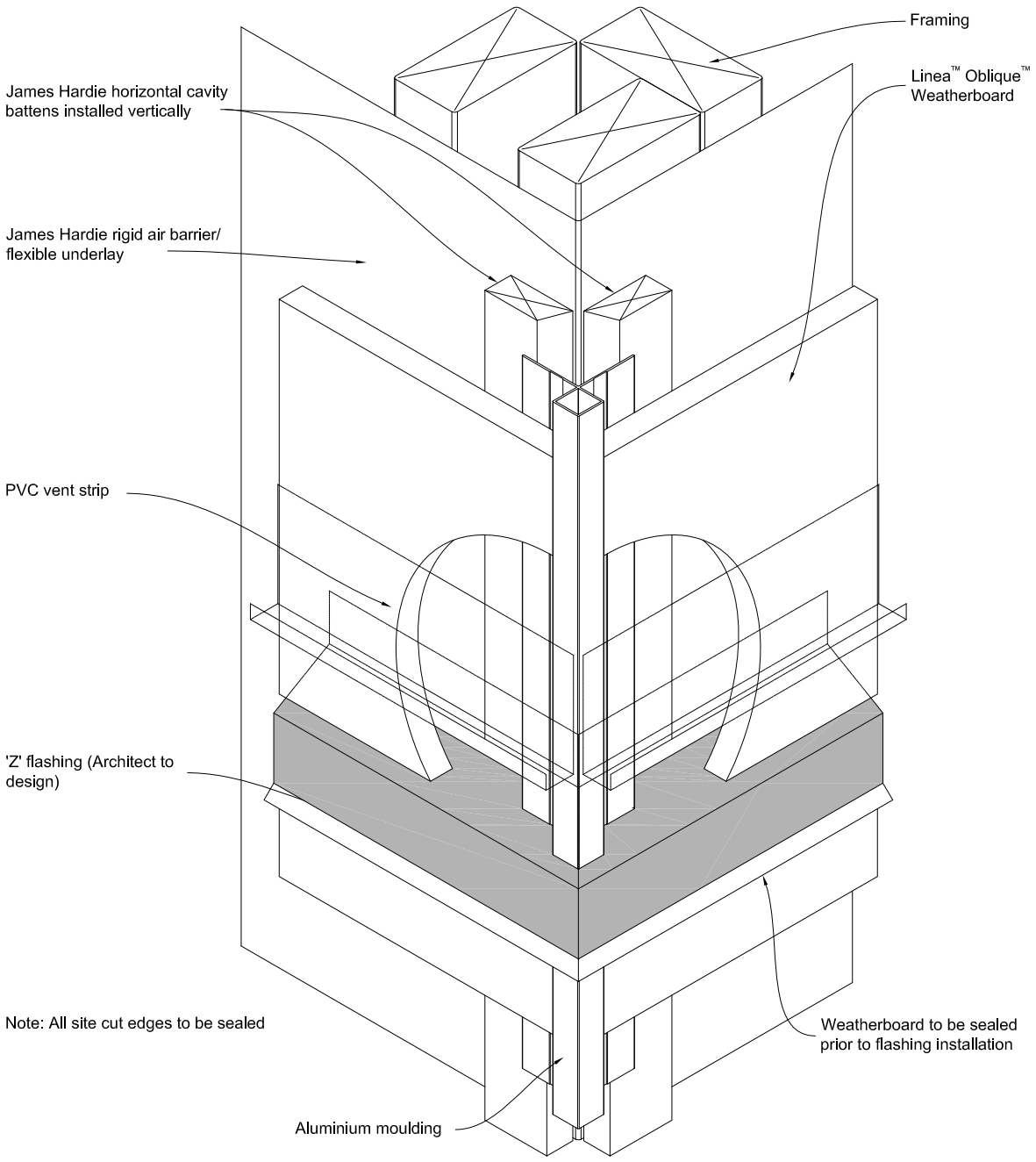


Figure 24: Apron flashing detail

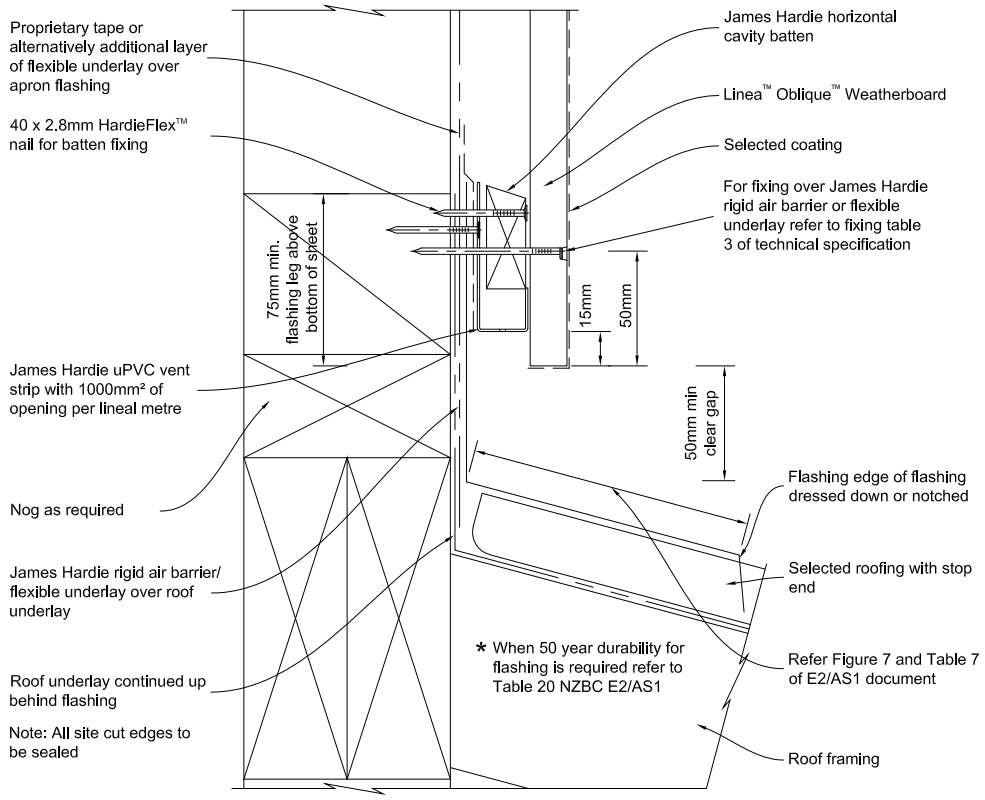


Figure 25: Parapet flashing

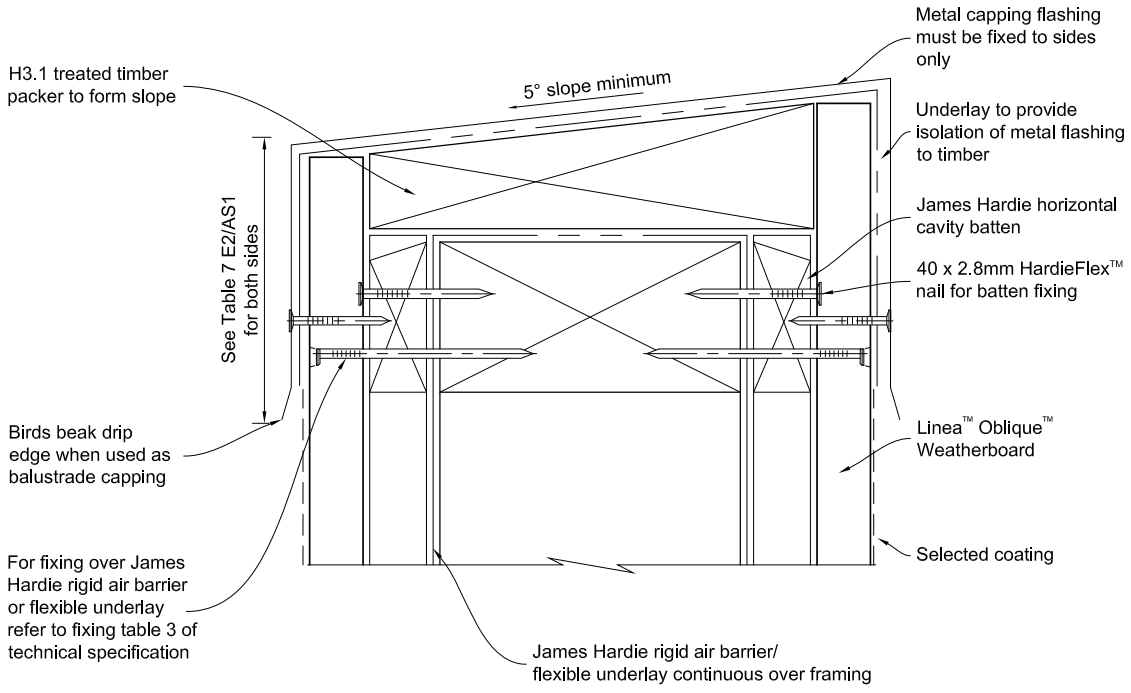


Figure 26: Roof to wall junction detail

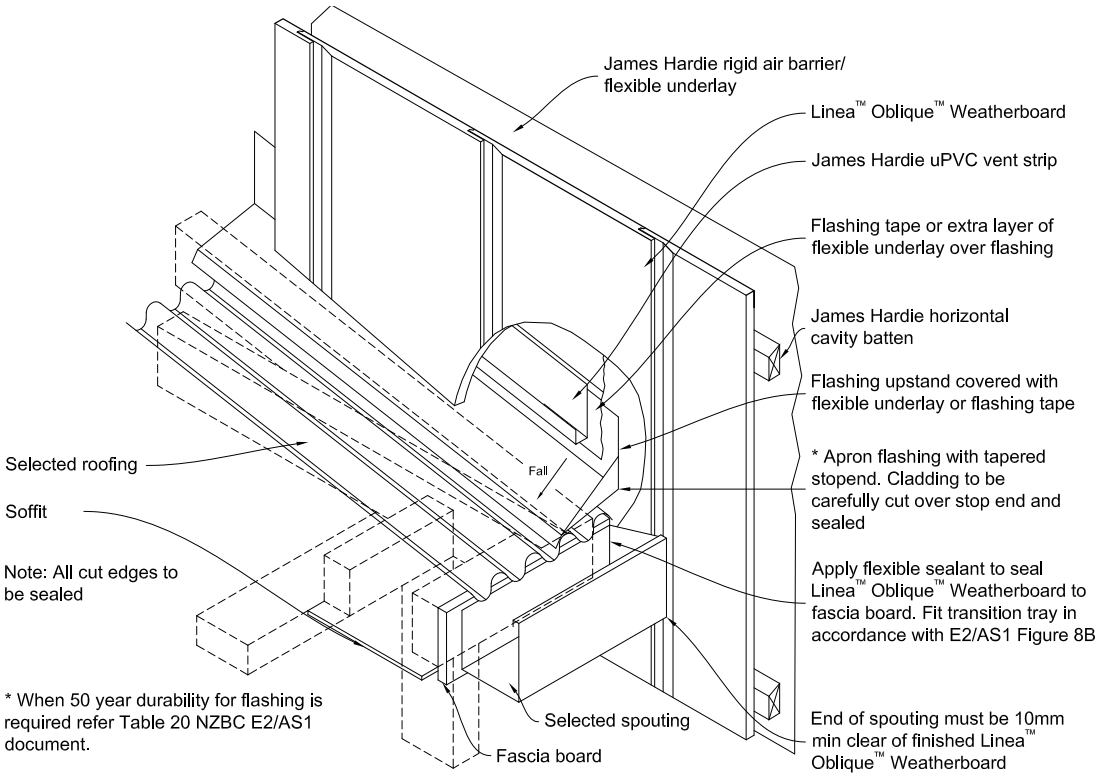


Figure 27: Meter box at sill

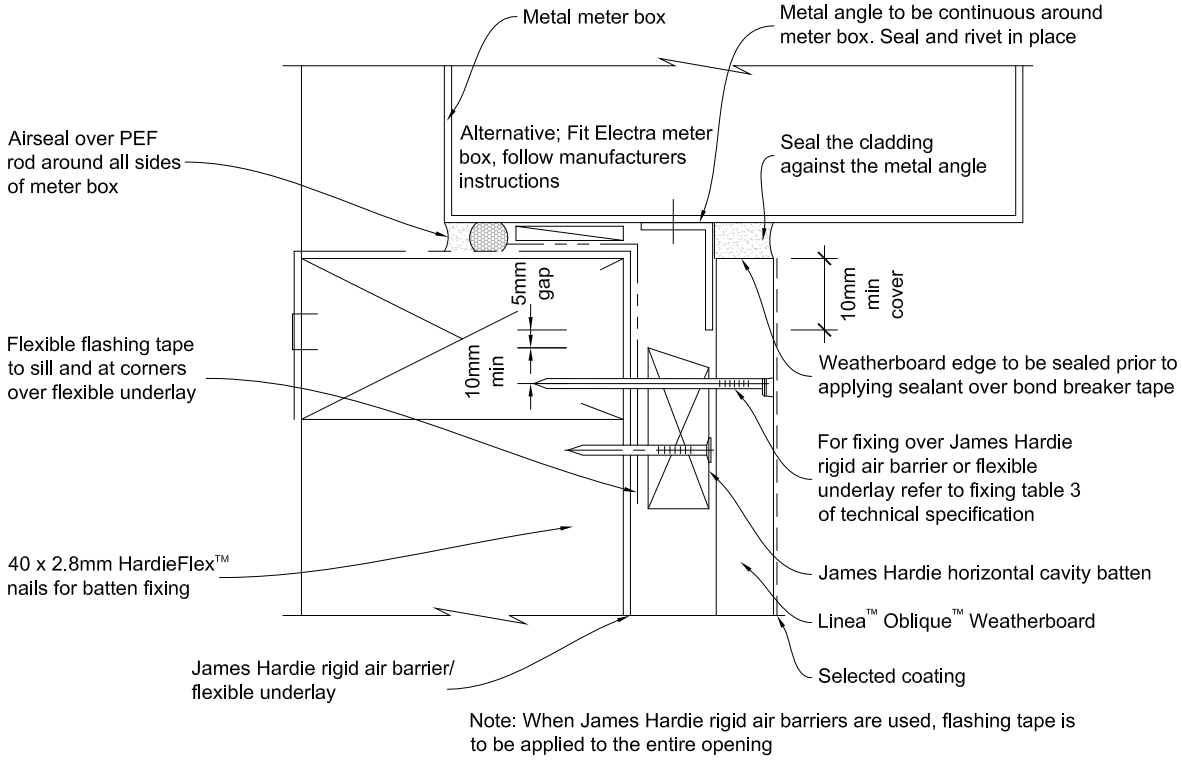


Figure 28: Meter box at jamb

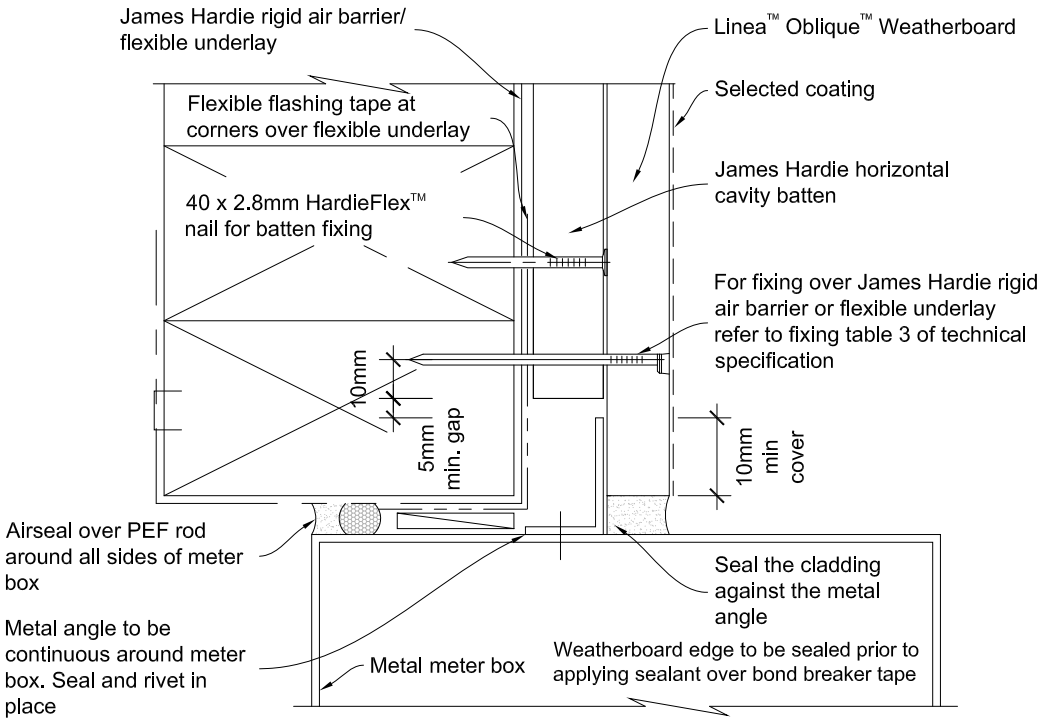
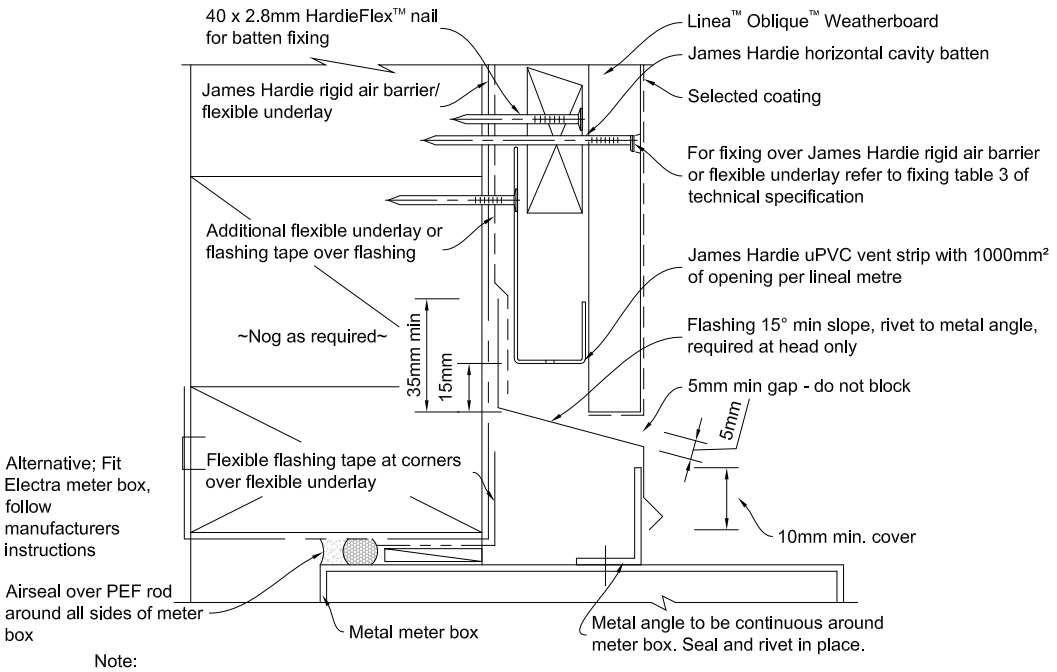


Figure 29: Meter box at head

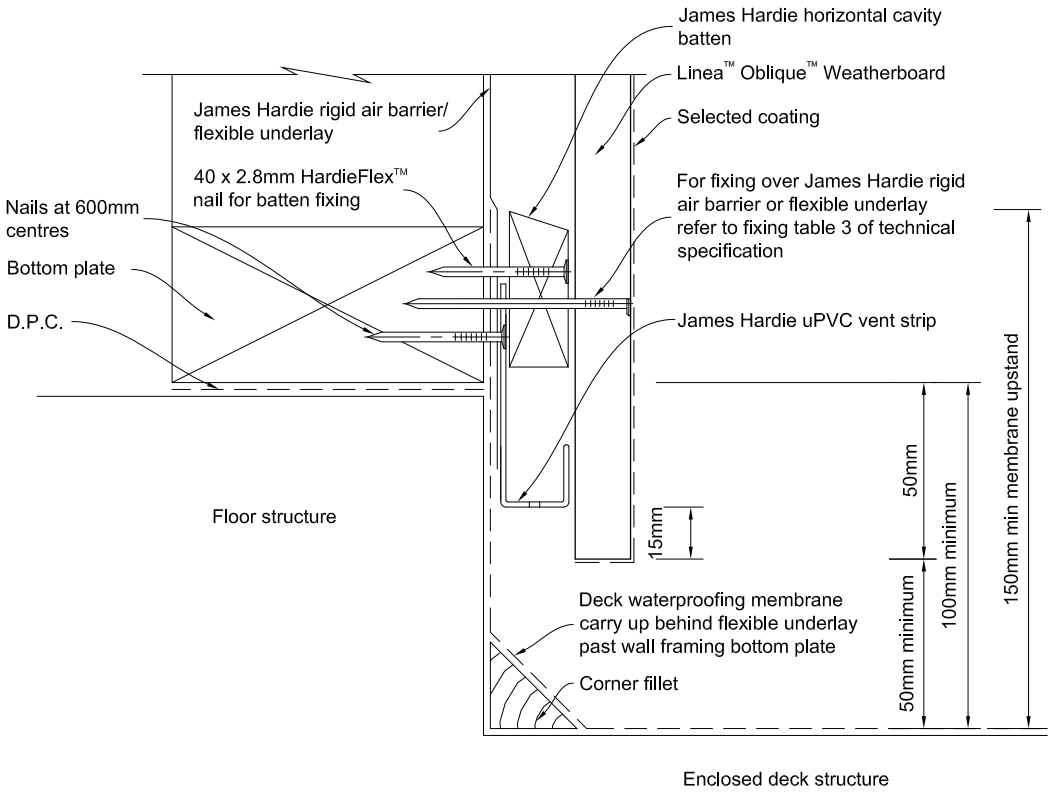


Note:

- When James Hardie rigid air barriers are used flashing tape is to be applied to the entire opening.
- Sealant must be installed between head flashing and flange in VH and EH wind zones and SED projects.
- Alternatively, the head flashings can be formed with stop ends as per E2/AS1
- All site cut edges to be sealed

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Figure 30: Enclosed deck



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Figure 31: Pipe penetration

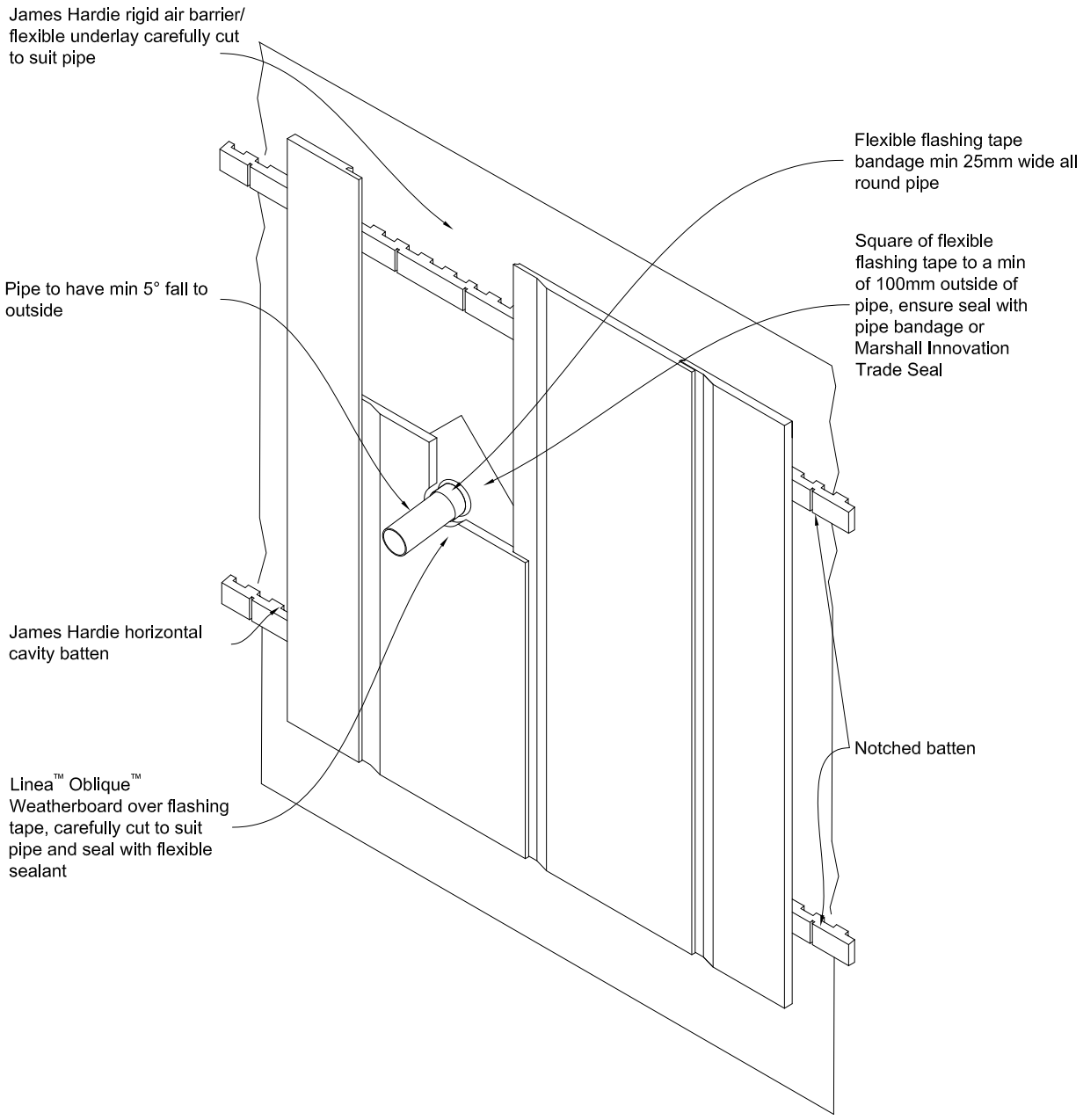
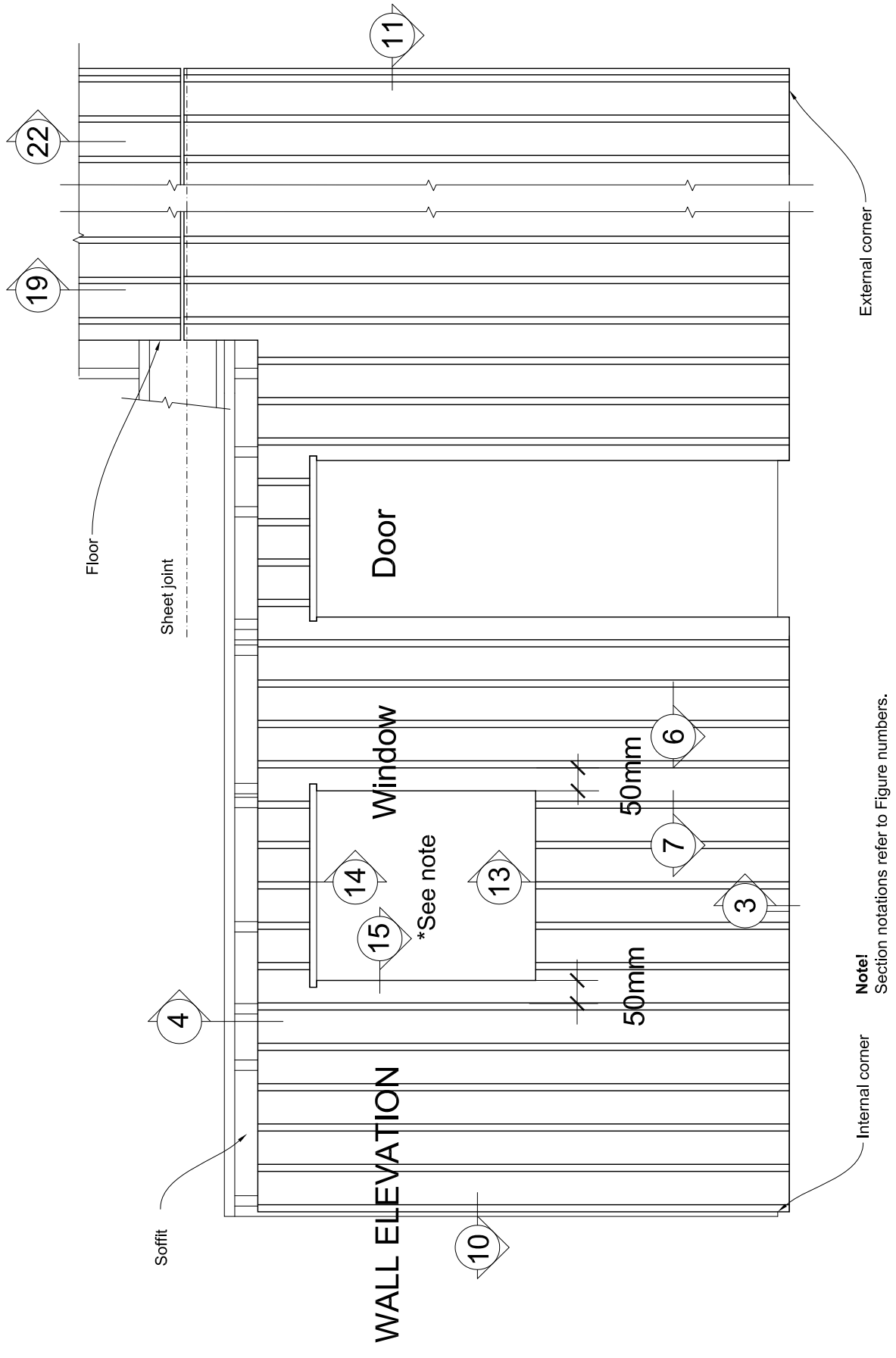


Figure 32: Cladding installed



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Figure 33: Garage head

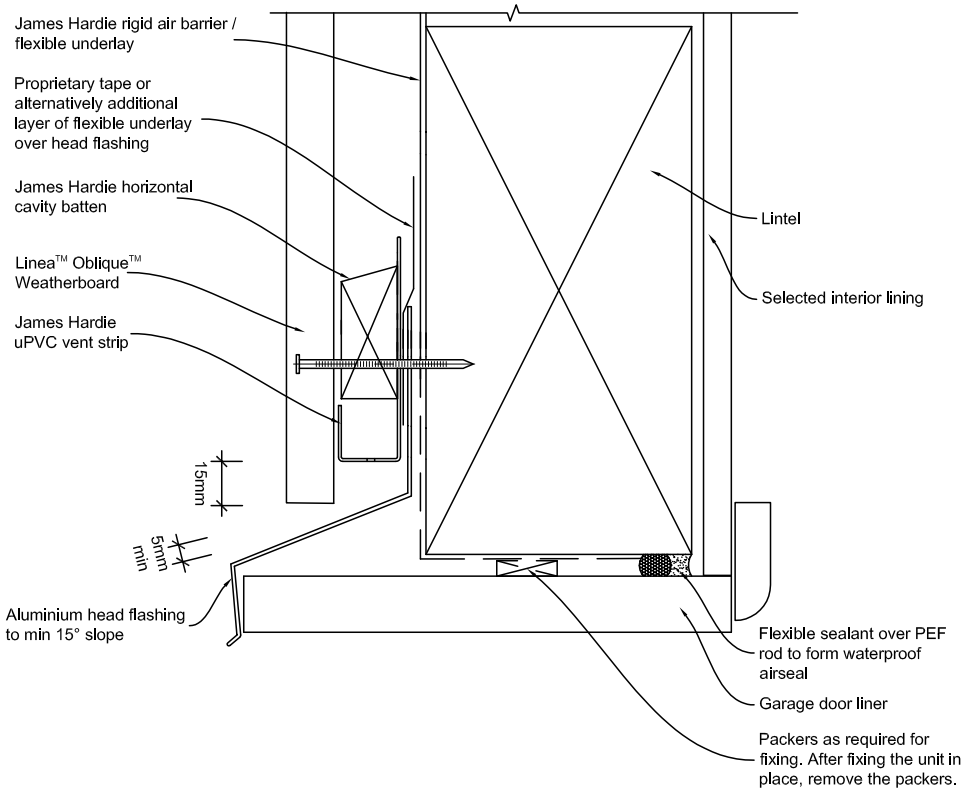
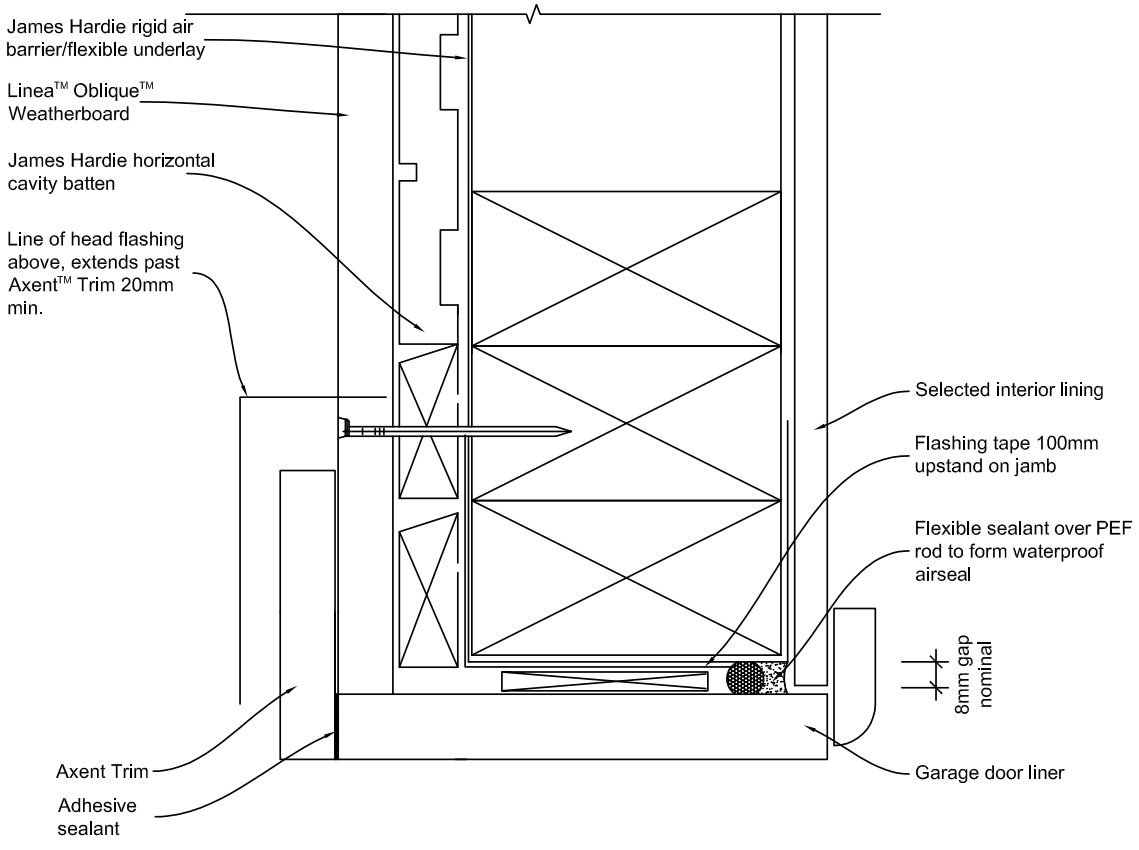


Figure 34: Garage jamb



Notes

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Notes

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Product Warranty

Linea™ Oblique™ WEATHERBOARD

James Hardie New Zealand Limited ("James Hardie") warrants for a period of 25 years from the date of purchase that the Linea™ Oblique™ Weatherboard (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

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

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation;

b) this warranty is not transferable;

c) the Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice;

d) the project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("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. Linea™ Oblique™ Weatherboard has been appraised by BRANZ as an alternative solution and found to meet the required provisions of the NZBC when installed in accordance with the Linea™ Oblique™ Weatherboard Vertical Installation technical specification. 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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James Hardie



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PRODUCT CERTIFICATE

James Hardie Linea™ Oblique™ Weatherboard Cavity Cladding

KEY INFORMATION

CERTIFICATE: **GM-CM30059 RevE**

1 SUMMARY OF DESCRIPTION OF BUILDING METHOD OR PRODUCT

Linea™ Oblique™ Weatherboard Cavity Cladding is a cavity-based fibre cement weatherboard wall cladding.

Linea™ Oblique™ Weatherboard Cavity Cladding consists of Linea™ Oblique™ Weatherboard, which is a rusticated profile fibre cement weatherboard, fixed horizontally or vertically over timber battens to form the cavity. Proprietary ventilated battens are used in the vertical application. The cladding is finished with a latex paint system.

The cladding incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the cladding from the external wall framing with a nominal 20 mm cavity. The cavity allows for any occasional ingress of water that may get past the external skin to drain to the exterior of the building, and any remaining moisture to dry by evaporation.

2 SUMMARY OF INTENDED USE OF BUILDING METHOD OR PRODUCT

Linea™ Oblique™ Weatherboard Cavity Cladding is designed to be used as part of an external cladding system for residential and commercial buildings where domestic construction techniques are used.

3 BUILDING CODE PROVISIONS

Linea™ Oblique™ Weatherboard Cavity Cladding if designed, used, installed and maintained in accordance with this Certificate, will meet the following provisions of the NZBC:

Clause B1 STRUCTURE:	Performance B1.3.1, B1.3.2 and B1.3.4 for the relevant physical conditions of B1.3.3 (a), (h), (j) and (q).
Clause B2 DURABILITY:	Performance B2.3.1 (b), 15 years and B2.3.2.
Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE:	Performance C3.7
Clause E2 EXTERNAL MOISTURE:	Performance E2.3.2. E2.3.5, E2.3.6, E2.3.7
Clause F2 HAZARDOUS BUILDING MATERIALS:	Performance F2.3.1.

4 CERTIFICATE HOLDER DETAILS

James Hardie New Zealand Limited
Trading as James Hardie
1 O'Rorke Road, Penrose , Auckland 1006, New Zealand,
TechnicalTeam@jameshardie.co.nz
Tel: 0800 808 868,
www.jameshardie.co.nz

ISSUED	LAST UPDATE	RECERTIFICATION
26/04/2019	03/05/2022	03/05/2025

5 SIGNATURE

Herve Michoux, Global Mark Managing Director

6 PRODUCT CERTIFICATION BODY

Global-Mark Pty Ltd
57 Willis Street, Wellington, 6011
customer.service@global-mark.co.nz
+64 9 889 0622
www.global-mark.co.nz

The complaints process for this certificate can be found here:
https://www.global-mark.com.au/?s=complaint

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CERTIFICATE V1.5

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PRODUCT CERTIFICATE

James Hardie Linea™ Oblique™ Weatherboard Cavity Cladding

7 CONDITIONS AND LIMITATIONS OF USE

1. Linea™ Oblique™ Weatherboard Cavity Cladding is certified as an external wall cladding for buildings within the following scope:
   a. the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
   b. with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
   c. situated in NZS 3604:2011 Wind Zones up to, and including Extra High.
2. Linea™ Oblique™ Weatherboard Cavity Cladding is certified as an external fixed wall cladding solution for buildings within the following scope:
   a. the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
   b. constructed with timber framing subject to specific engineering design; and,
   c. situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.
3. Specification and Installation shall be undertaken in accordance with all relevant technical information as follow (collectively references as the applicable technical documentation)
   a. For the Horizontal applications, the BRANZ Appraisal No. 896 (2015) Amended 15 December 2015 Linea™ Oblique™ Weatherboard (Horizontal) Cavity Cladding and Linea™ Oblique™ Weatherboard Horizontal Cavity Technical Specification September 2018, and
   b. For the Vertical Application, the BRANZ Appraisal No. 897 (2015) Amended 15 December 2015 Linea™ Oblique™ Weatherboard (vertical) Cavity Cladding and Linea™ Oblique™ Weatherboard Vertical Cavity Technical Specification July 2018
4. Linea™ Oblique™ Weatherboard Cavity Cladding must only be installed vertically or horizontally on vertical surfaces.
5. Linea™ Oblique™ Weatherboard Cavity Cladding is certified for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. Only joinery compliant with the requirements of NZS 4211:2008 including amendment 1 for the relevant Wind Zone or wind pressure shall be used with Linea™ Oblique™ Weatherboard Cavity Cladding.
6. Linea™ Oblique™ Weatherboard Cavity Cladding can only be used with the ancillary components as described in this certificate.
7. All exposed faces, including top edges at sills and all bottom edges of Linea™ Oblique™ Weatherboard and fibre cement ancillary components must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.
8. E2.3.5 and E2.3.6 compliance is limited to cavities created between the internal surface of the weatherboard and the sarking.

8 HEALTH AND SAFETY INFORMATION

Standard industry safety practices and manufacturer safety requirement as detailed in the technical literature including the applicable SDS must be observed at all time. Please refer to James Hardie SDS Fibre Cement Products Nov 2020

9 SUPPORTING INFORMATION ABOUT DESCRIPTION

Linea™ Oblique™ Weatherboards are rusticated profile weatherboards. The weatherboards are pre-primed with an acrylic primer on the front face and edges. Linea™ Oblique™ Weatherboards are 16 mm thick and are available 200 and 300 mm wide. The boards are supplied 2700 and 4200 mm long.

Linea™ Oblique™ Weatherboards are manufactured from a reduced density cellulose fibre cement formulation. The boards are formed, cut to length and then cured by high-pressure autoclaving. After autoclaving, a rusticated profile is machined on the top edge of the front face, and a rebated lap is machined on the bottom of the back face of the weatherboard. The front edge at the bottom of the board and the board ends are finished square. Linea™ Oblique™ Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

James Hardie supplies the following ancillary components:

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PRODUCT CERTIFICATE

James Hardie Linea™ Oblique™ Weatherboard Cavity Cladding

- For the horizontal applications
  - Joint flashings – Oblique Trimline Joint Flashing and Vertical Joint Flashing. The joint flashings are available in extruded aluminium in 3000 mm lengths.
  - External and internal corner mouldings – 90° anodised aluminium external box corner available in 2700 and 4000 mm lengths, and 90° internal corner 'W' mould, available in 2700 mm lengths. Window jamb flashing – aluminium 'L' extrusion available in 3000 mm lengths.
  - Cavity vent strip – Stria aluminium cavity closure or uPVC vent strip, available in 3000 mm lengths.

- For the vertical applications
  - James Hardie horizontal cavity battens – 45 x 20 mm thick Radiata pine batten treated to Hazard Class H3.1. The top edge is bevelled with an 18° slope. The back face is grooved with 50 mm wide x 6 mm deep rebates at 150 mm centres, and the front face is grooved with 5 mm wide x 5 mm deep rebates at 150 mm centres. The grooves are offset on each face.
  - Oblique Trimline joint flashing – extruded aluminium in 3000 mm lengths.
  - Trimline jointers – aluminium horizontal, internal corner and external corner jointers to cover joints in the Trimline joint flashing.
  - External and internal corner mouldings – 90° anodised aluminium external box corner available in 2700 and 4000 mm lengths, and 90° internal corner 'W' mould, available in 2700 mm lengths. Cavity vent strip – uPVC, available in 3000 mm lengths.

Other components not supplied by James Hardie but meet the following requirements

- For the horizontal and vertical applications
  - Flexible wall underlay – building paper complying with NZBC Acceptable Solution E2/AS1, Table 23, or breather-type membranes covered by a valid Codemark Certification for use as wall underlays
  - Flexible wall underlay support – polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible wall underlay in place and preventing bulging of the bulk insulation into the drainage cavity. (Note: mesh and wire galvanising must comply with AS/NZS 4534.)
  - Rigid wall underlay – James Hardie Rigid Air Barriers covered by BRANZ Appraisal No. 611 (2011). Flexible sill, head and jamb flashing tape - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid Codemark Certification for use around window and door joinery openings.
  - Cavity battens - nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
  - Cavity batten fixings - 40 x 2.8 mm flat head hot-dip galvanised nails.
  - Linea™ Oblique™ Weatherboard fixings (with flexible wall underlays) - 65 x 2.87 mm D-head or RounDrive hot-dip galvanised or stainless steel ring shank nails.
  - Linea™ Oblique™ Weatherboard fixings (with rigid wall underlays up to 10 mm thick) 75 x 3.06 mm D-head or RounDrive hot-dip galvanised or stainless steel ring shank nails
  - (Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).
  - Joinery head flashings - extruded or folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.
  - Flexible sealant - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid Codemark Certification for use as a weather sealing sealant for exterior use.

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PRODUCT CERTIFICATE

James Hardie Linea™ Oblique™ Weatherboard Cavity Cladding

- For the horizontal applications
  - Timber trim and moulding for use around windows and door. Timber trim and moulding must be finished in accordance with NZBC.
  - Timber trim and moulding fixings - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolt head nails and stainless steel ring shank jolt head nail.
  - Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).
  - Planted sill and scribers - timber treated to Hazard Class H3.1, pre-primed before installation. Window and door trim cavity air seal - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid Codemark Certification suitable for use around window, door and other wall penetration openings.

- For the vertical applications
  - Window and door trim cavity air seal - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid Codemark Certification suitable for use around window, door and other wall penetration openings.

10 SUPPORTING INFORMATION ABOUT INTENDED USE

NIL

11 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE

Linea™ Oblique™ Weatherboard Cavity Cladding can be used to provide fire resistance rated construction, but this aspect has not been assessed and is outside the scope of this certificate.

12 BASIS FOR CERTIFICATION

The certification decision is based on independent technical review(s) of test report(s), engineering opinion(s) and other documented evidence(s), factory audit(s) and site review(s)

Code Clause	Compliance pathway	Evidence
B1	Alternative solution -Expert judgement	001, 002, 003,004, 005 and 006
B2	Alternative solution -Expert judgement	001, 002, 003,004, 005 and 006
C3	Alternative solution -Expert judgement	001, 002, 003,004, 005 and 006
E2	Alternative solution -Expert judgement	001, 002, 003,004, 005 and 006
F2	Alternative solution -Expert judgement	001, 002, 003,004, 005, 006 and 007

13 SUPPORTING DOCUMENTATION FOR CERTIFICATION

Ref	Author	Title	Date and/or revision
001	BRANZ	LINEA™ OBLIQUE™ - WEATHERBOARD (HORIZONTAL) CAVITY CLADDING - Appraisal No. 896[2015]	Amended 15 December 2015
002	BRANZ	LINEA™ OBLIQUE™ - WEATHERBOARD (VERTICAL) CAVITY CLADDING - Appraisal No. 897[2015]	Amended 15 December 2015
003 *	BRANZ	BRANZ Appraisals Means of Compliance - Basis of Appraisal - LINEA™ OBLIQUE™ - WEATHERBOARD (HORIZONTAL) CAVITY CLADDING - Appraisal No. 896[2015]	19/11/2015
004 *	BRANZ	BRANZ Appraisals Means of Compliance - Basis of Appraisal - LINEA™ OBLIQUE™ - WEATHERBOARD (VERTICAL) CAVITY CLADDING - Appraisal No. 897[2015]	19/11/2015

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PRODUCT CERTIFICATE

James Hardie Linea™ Oblique™ Weatherboard Cavity Cladding

005	James Hardie New Zealand Limited	Linea™ Oblique™ Weatherboard Horizontal Cavity Technical Specification	September 2018
006	James Hardie New Zealand Limited	Linea™ Oblique™ Weatherboard Vertical Cavity Technical Specification	July 2018
007	James Hardie New Zealand Limited	LQA8N - SAFETY DATA SHEET- JAMES HARDIE FIBRE CEMENT SHEETS PRODUCTS	Version No.: 1.0 ISSUED Date : 18/06/2020

* These documents were provided commercial in confidence and are not publicly available

14 CONDITIONS RELATING TO NOTIFICATION

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

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

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

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

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

End of the document

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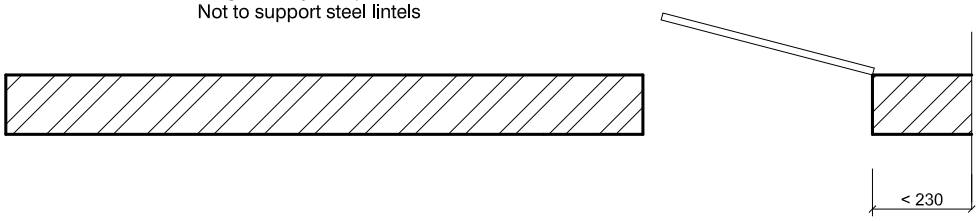
FIG. 98 PIERS & RETURNS - Brick Veneer Openings & Arches

AS

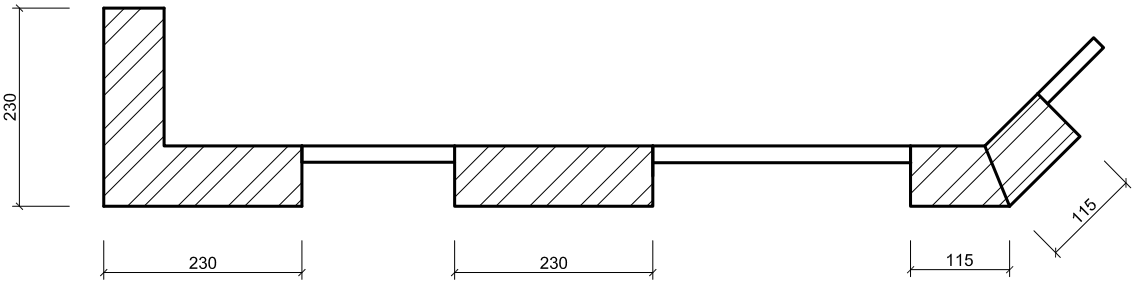
PLAN VIEW

A) Alternative solution for BCA's when piers are less than 230mm wide

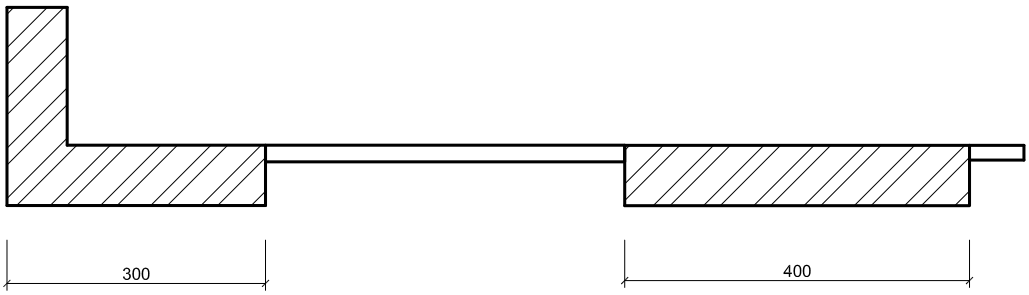
LIMITATIONS
Tie every second brick
Single storey or top floor
Not to support steel lintels



B) Bricks to be tied every second course
230mm piers are too small to support lintels which require 200mm of landing each side.Ignore pier and treat as one large opening.



C) Galvanised steel lintels may be supported on 300mm returns and 400mm piers.



NOTE: In most cases where brick veneer is tied to a timber or steel frame, it is in a non-structural situation and the width of the pier is not critical unless it is carrying a lintel load.
Where the dimension of the end support is in question, the load may be transferred to the structural frame using Shelf Angles provided the specification is followed. Alternatively, consult a structural engineer for specific design.

General Comment on Concrete Reinforced Arches

Avoid placing reinforced concrete (unless in concrete block form) between two skins of brick veneer to form arches.
This may result in long term salt problems on the surface of the bricks due to the salts in the concrete.
Consult a structural engineer as specific design is required.



GIB® Wet Area Systems

Specification and installation manual

CBI 5113

FEBRUARY 2021

NATIONAL SUPPORT

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GIB® HELPLINE

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RESIDENTIAL AND NON-RESIDENTIAL APPLICATIONS. BATHROOMS, LAUNDRIES, TOILETS AND KITCHENS.

Protection from internal moisture is an important consideration when designing interior lining systems for homes, multi-unit apartments, educational, healthcare and commercial applications.

The New Zealand Building Code sets out minimum standards for wet area spaces in residential dwellings. However, often higher levels of performance and protection from internal moisture is demanded.

The GIB® Wet Areas System specification and installation manual provides internal lining options and details for specifiers, builders and building owners.

USE ONLY THE CURRENT SPECIFICATION

This manual supersedes the publication GIB Aqualine® Wet Area Systems March 2007. Winstone Wallboards Ltd accepts no liability for reliance upon publications that have been superseded.

If you are unsure whether this is the current publication, call the GIB® Helpline on 0800 100 442 or go to gib.co.nz

BEWARE OF SUBSTITUTION

The performance of GIB® Wet Area Systems requires accurate design detailing and construction practices. All GIB® Systems have been developed specifically for New Zealand conditions and independently tested, assessed or appraised, to ensure the required level of performance. It is important to use GIB® 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.

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BRANZ Appraised
Appraisal No.427 [2021]

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This publication

This publication is a best practice guide to the design and construction of wall and ceiling linings in wet areas with intermittent water exposure within residential and non-residential buildings, as covered by NZ Building Code Clause E3 Internal Moisture.

The information is designed to be helpful to designers, contractors and home-owners wishing to achieve a result that is easy to incorporate into modern design, simple and clear to construct, and that will satisfy the needs, requirements and expectations of both the NZ Building Code and the end user.

Wet areas in the home often require relatively frequent and expensive renovation or repair, often because of the ingress of water to the structure of the building.

To form a complete wet area system it is important to specify compatible materials and systems, designed to cope with conditions that are common in wet areas, and to ensure correct installation using best practice.

WET AREAS

Generally, wet areas are described as spaces to where fresh water is reticulated, such as bathrooms, toilets, laundries and kitchens. Within wet areas the following requirements apply;

1. NZBC Clause E3.3.4 states that wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.
2. NZBC Clause E3.3.6 states that surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

NZ Building Code Clause E3 also refers to other requirements not covered in this publication, such as ventilation, condensation control and overflow management. Ongoing maintenance of wet areas is also important to maximise service life.

GIB AQUALINE®, GIB TOUGHLINE® AQUA AND GIB WEATHERLINE®

Although able to cope with infrequent short-term exposure, standard gypsum plasterboard will have a shortened life expectancy when frequently exposed to water or a high moisture environment.

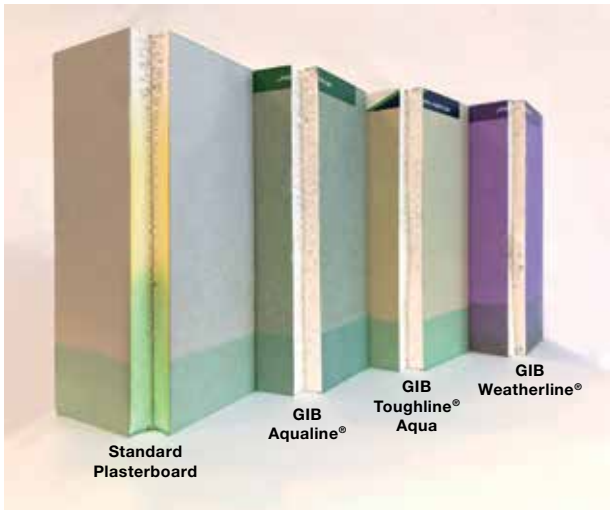
The NZ Building Code does not call for water resistant linings in wet areas but it is desirable to specify lining materials which will maintain their integrity longer when exposed more frequently to moisture, and to one-off events such as leaks or flooding.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® feature a water-resistant polymer impregnated core, designed for wet area applications. These core formulations not only resist penetration of moisture through the lining into the framing behind, but also resist water “wicking” up the core, a common cause of long-term damage where a water-resistant lining has not been used.

WATER ABSORPTION TEST

The illustrations below show how GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® compare with standard plasterboard after soaking for two-hours in green dye.





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WHERE TO USE GIB® WET AREA LININGS

In order to prolong the life expectancy of the space it is highly desirable to include wet area linings in situations where there is an increased risk of water or moisture damage. Applications include walls and ceilings in bath and shower rooms, and walls in laundries, toilets and kitchens.

BENEFITS

- Water resistant and durable linings help protect against water damage
- Proven substrate for paint, wallpaper, waterproofing membranes, tiles, sheet vinyl and rigid sheet shower linings
- Suitable for both residential and non-residential applications
- Dimensionally stable and an excellent substrate for ceramic tiles
- Conventional jointing methods
- Easy to cut and form openings
- Contains glass fibres and other additives to increase strength and fire resistance
- May be used in GIB® Bracing, GIB® Fire Rated and GIB Noise Control® Systems (see Compliance with the NZ Building Code, Clauses B1, C3 and G6). Consult the appropriate GIB® literature for installation details

HANDLING AND STORAGE

- GIB® plasterboard must be stored under cover, stacked flat and clear of the floor with sufficient support to avoid sagging
- GIB® plasterboard must be handled as a finishing material

LIMITATIONS

- GIB® wet area linings must not be used for bracing purposes in shower cubicles or above baths. For more information refer to page 9 of this manual
- Do not use GIB® wet area linings where exposed for extended periods to humidity levels above 90% RH, such as in group shower or steam rooms, or where exposed to moisture and chlorine rich environments such as in indoor swimming pools
- GIB® wet area linings used in a bathroom or other high humidity environment must not be directly applied to solid plaster (gypsum or cement), wood-based sheet linings or similar materials, masonry or concrete, without strapping or steel furring channels
- GIB® wet area linings must not be installed over a vapour barrier or a wall acting as a vapour barrier
- Cracked or damaged sheets must never be used
- GIB Aqualine® or GIB Toughline® Aqua must not be used in external applications
- GIB® plasterboard must not be exposed to temperatures in excess of 52°C for prolonged periods. Heat-generating devices may include halogen lighting, cooking elements, radiant heating, solid fuel exhausts and fire surrounds. Consult the appliance manufacturer for installation details

Table 1: GIB® Wet Area linings sheet dimensions and weights

Product	Sheet face colour	Thickness (mm)	Sheet width (mm)	Edge Type	Sheet length (mm)						Max. Weight (kg/m²)
					2400	2450	2700	3000	3600	4800	
GIB Aqualine®	Green	10	1200	TE/TE	■		■	■	■		8.0
			1200	TE/SE	■					■	
			1350	TE/SE	■				■		
		13	1200	TE/TE	■		■	■	■		11.0
GIB Toughline® Aqua	Mauve	13	1200	TE/TE	■		■	■			11.4
GIB Weatherline®	Purple	10	1200	SE/SE		■	■	■			9.0
		13	1200	SE/SE			■	■			11.5

BOARD SUBSTITUTION OPTIONS

Acceptable GIB Aqualine® alternatives	
10mm GIB Aqualine® can be replaced with:	10mm GIB Weatherline® 13mm GIB Toughline® Aqua
13mm GIB Aqualine® can be replaced with:	13mm GIB Weatherline® 13mm GIB Toughline® Aqua

GIB® Wet Area System construction details in this manual refer to the use of GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® sheets may also be used in place of GIB Aqualine®.

FLEXIBLE SHEET VINYL – SHOWERS AND OTHER WET AREAS

- GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® are suitable substrates for flexible vinyl wall finishes in wet areas of residential, commercial or institutional buildings
- Framing requirements and installation procedures are presented in this literature, except that the lining gap at the floor is no more than 5mm when a pencil cove detail is used
- The installation of galvanised steel reinforcing angles behind internal lining corners is recommended for sheet vinyl applications in showers or shower over bath situations
- The lining must be jointed and stopped to a paint quality finish (Level 4) – trowel marks can telegraph even through a commercial grade 2mm vinyl
- A commercial grade vinyl is recommended in commercial or institutional bathrooms and showers
- In areas directly exposed to liquid water, all joints in flexible sheet vinyl must be heat welded
- Installation of flexible vinyl must be carried out strictly in accordance with the specifications provided by the suppliers/ manufacturers of the vinyl

RIGID SHEET SHOWER LININGS

- The wall surface must be free of dust before installation of the lining
- Avoid lining joints as much as possible and where necessary flush with plaster to achieve a level surface
- Do not preseal or paint areas which are to be covered by the rigid shower linings
- The suppliers of thin (usually 2-3mm) and rigid acrylic shower linings commonly recommend direct adhesive fixing to wall linings using solvent-based adhesives
- Care must be taken to ensure that rooms are adequately ventilated
- Water temperature changes will cause movement of the thin acrylic sheet, which in turn will stress the adhesive and wall lining substrate
- Consult the supplier of the shower lining for full installation details
- Suppliers of rigid sheet acrylic shower linings recommend a minimum of 24 hours for the adhesive to cure fully prior to the shower being put into service

WATERPROOF MEMBRANE SYSTEMS AND TILING

- A waterproof membrane system must be applied to lining materials used as a substrate for ceramic tiles in a shower or shower over bath situation
- The wall surface in a shower or shower over bath situation is not complete and ready for tiling until coated with a waterproof membrane system over the lining and once penetrations for shower mixers, taps and associated fittings are sealed
- The installation of galvanised steel reinforcing angles behind internal lining corners is required for tiled wall applications in showers or shower over bath situations
- In-situ waterproofing membrane materials manufactured to AS/NZS 4858:2004 “Wet Area Membranes” are recommended and must be applied to manufacturer’s recommendations. Typically, these types of membrane systems are not suitable for paint and wallpaper finishes
- Waterproof membrane systems must be fully cured and dry prior to application of tiling adhesives
- Preformed sheet membranes are also available and may be more suitable where curing times or specialist skills are an issue
- The details shown in this manual are generic in nature. For accurate detailing, follow the specifications provided by the supplier of the proprietary waterproof membrane system

For further information on tiling consult the BRANZ Good Practice Guide – Tiling.

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SDC - Approved Application Document - Building Act 2004 - Section 7 - Sec 19 - Sec 22 - Sec 24 - Sec 26 - Sec 49 - 24/06/2021 - 2021/3076 - phillid

PENETRATIONS AND SEALANTS

As leaks and water ingress typically occur at junctions between building elements and at penetrations, it is essential that particular attention is given to these details at the time of installation. Lack of attention to detail can result in water damage that could remain undetected for a long time.

- Ensure that all cut-outs for pipe penetrations are made neatly, and slightly oversize, with a hole saw. These penetrations should be of a diameter no more than 12mm greater than that of the pipe
- Ensure shower mixer and tap penetrations are sealed with a proprietary flange system to prevent the passage of moisture into the wall cavity
- Sealants should be of a mould inhibiting type and be paintable. Neutral cure silicones will generally meet these requirements
- Surfaces should be dry and free from dust before application, a minimum of a 4mm joint width provided and the depth should not exceed the width
- Apply a bead of sealant to the full depth of the lining in the following locations:
  - Around all tap/pipe bodies
  - The gap between the bath rim and the bottom edge of the wet area lining
  - Between the upstand of preformed shower bases and the bottom edge of the lining
  - Where an impervious junction is required at the floor/wall line, carefully seal the gap between the bottom edge of the board and the finished floor. Leave a 5-10mm gap at the bottom of the wall lining for this purpose, ensuring the gap is free from dirt and dust
- Do not locate shower heads or taps on fire rated or intertenancy walls. Should this be unavoidable always use tested and approved proprietary penetration seals

RENOVATIONS

Bathrooms, kitchens and laundries are the most renovated rooms in the house, partly due to fashion considerations and partly because of damage sustained by ingress of water and moisture.

When renovating these rooms it is often easier and more cost-effective to remove the existing linings and replace them. This allows for a new start in the room and offers sound substrates for new surfaces such as tiling and painting, where otherwise flaking paint or damaged plasterboard may compromise good and sound finish or practice. At the very least re-lining will:

- Allow for inspection of framing where damage may have occurred and provide the opportunity to repair such damage
- Allow plumbing and electrics to be checked and altered or replaced where required
- Provide the opportunity to install thermal and acoustic insulation, water-resistant linings, and propriety plumbing penetration flange systems where appropriate
- Make the job easier

MAINTENANCE

Lack of maintenance is frequently the cause of premature and often expensive failure of components and building elements within wet areas.

It is important to regularly inspect and repair any potential problem before it becomes expensive to reinstate. Good maintenance should include:

- Ongoing ventilation. At the very least, good passive ventilation (e.g. window vents); but good active ventilation (e.g. extraction fans) of an appropriate size for the room is recommended
- Impervious coatings and surfaces should be checked for wear and damage and maintained and re-coated before ingress of water to the substrate occurs
- Regular cleaning with appropriate cleaners so that build-up of matter, such as mould, is well controlled
- Sealants at junctions and penetrations should be checked for adhesion on a regular basis and replaced where adhesion failure to substrates occurs
- Where pipe leaks have become evident, however small, they should be repaired promptly and any area around such leaks dried out completely before any other repairs are carried out

Compliance with the NZ Building Code

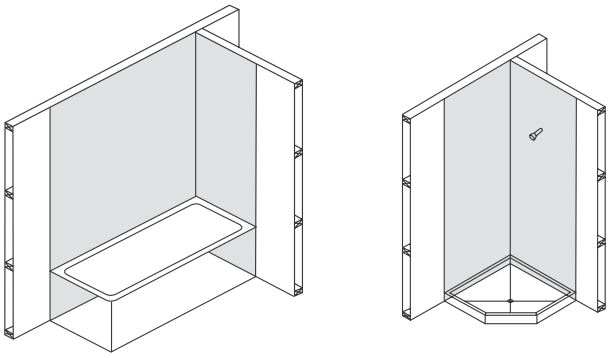
STRUCTURE – CLAUSE B1

The design and material specification for steel and timber framing used in GIB® Wet Area systems must be in accordance with the performance requirements of NZ Building Code Clause B1 (Structure).

Bracing elements are required to have a durability of 50 years. GIB® bracing elements are not to be located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members, such as at bath and shower tray locations.

Otherwise, GIB® Bracing Systems can be used in water-splash areas, provided these are maintained impervious for the life of the building.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. They can also be used in place of GIB Braceline® in GIB® bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB® Grabber 32mm x 6g screws at 100mm centres, using the GIB Braceline® corner fixing pattern. Refer to the GIB® Bracing System literature.



No bracing in the shaded areas.

DURABILITY – CLAUSE B2

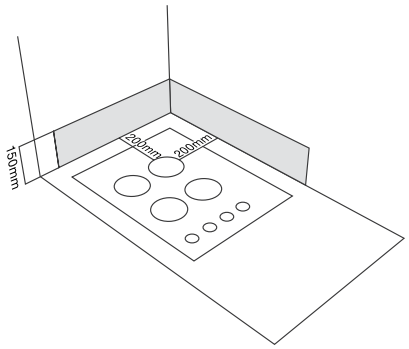
When installed and maintained in accordance with this literature, GIB® Wet Area systems tiled or vinyl covered have a serviceable life of at least 15 years. They comply with the requirements of NZ Building Code Clause B2 (Durability) for use in wet areas directly exposed to liquid water, e.g. showers, showers over baths and splash-backs.

When used as a general wet area lining and maintained under normal dry internal conditions, GIB® Wet Area Systems have a serviceable life of at least 50 years and comply with NZ Building Code Clause B2 (Durability) for use within toilets, kitchens, bathrooms and laundries not directly exposed to liquid water.

FIRE AFFECTING AREAS BEYOND THE SOURCE – CLAUSE C3

GIB® Fire Rated Systems provide passive fire protection in accordance with the requirements of NZ Building Code Clause C3. When GIB Aqualine® or GIB Toughline® Aqua is substituted into fire rated systems in place of the equivalent thickness GIB Fyreline®, the Fire Resistance Rating (FRR) of that system will be maintained.

The protection of combustible surfaces surrounding gas cooking appliances is covered by the latest version of AS/NZS 5601.1.



As a guide the following options are acceptable for wall surfaces within 200mm of the periphery of a gas element to a height of 150mm above the element for the full dimension (width and depth) of the cooktop surface area:

- 5mm tiles on GIB® plasterboard
- 5mm toughened glass on GIB® plasterboard
- or any system that can be demonstrated to meet the specific requirements of AS/NZS 5601.1

GIB® plasterboard products must not be exposed to temperatures in excess of 52°C for sustained periods. Check with the appliance manufacturer that this requirement will be met. It would be unusual for surfaces outside 200mm to exceed 52°C for sustained periods.

SDC - Approved Application Document B2/AS1 Durability - Clause B2 - 30/7/2021 - Page 127 of 225 - 24/06/2022 - phillid

INTERNAL MOISTURE – CLAUSE E3

The New Zealand Building Code Clauses that relate to wall surfaces are;

E3.3.4 - Wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.

E3.3.5 - Surfaces of the building elements likely to be splashed or become contaminated in the course of the intended use of the building, must be impervious and easily cleaned.

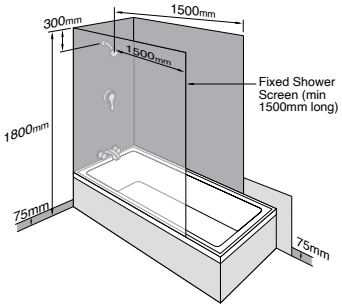
E3.3.6 - Surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

New Zealand Building Code Acceptable Solution E3/AS2 substantially refers to the Waterproof Membrane Association Incorporated (WMAI) Code of Practice for Internal Wet Area Membrane Systems (IWAM), August 2020.

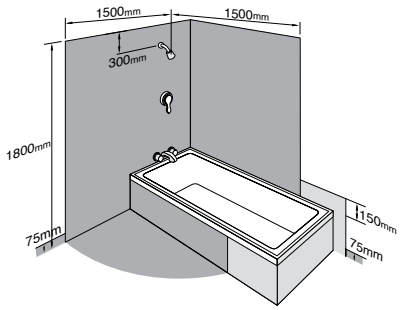
The IWAM Code of Practice refers to wet area membranes and over-surfaces that are easy to clean and suggests an extent as outlined below for a typical bathroom application. For further details refer to the IWAM Code of Practice which also lists suitable rigid sheet materials and tiling membranes.

Shaded areas in the diagrams below represent the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.

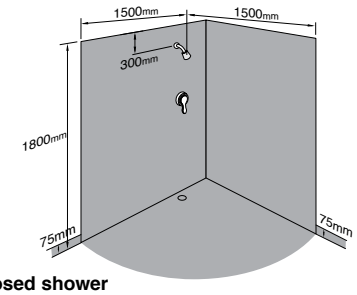
Enclosed shower over bath



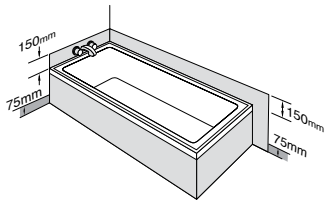
Unenclosed shower over bath



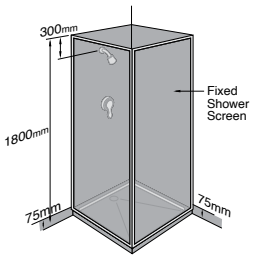
Unenclosed shower



Bath



Enclosed shower



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HAZARDOUS BUILDING MATERIALS – CLAUSE F2

At no stage during its serviceable life does GIB Aqualine® constitute a health hazard. It therefore meets the provisions of NZ Building Code Clause F2 (Hazardous Building Materials). Dust resulting from the sanding of stopping compounds may be a respiratory irritant and the use of a suitable facemask is recommended.

VENTILATION – CLAUSE G4

NZ Building Code Clause G4 (Ventilation) requires buildings to have a means of collecting or otherwise removing steam generated from laundering, utensil washing, bathing or showering. To prolong the life of interior linings and surface finishes and to minimise the risk of moisture related problems such as condensation and mould growth, adequate heating, thermal insulation and mechanical ventilation must be provided in kitchens, bathrooms and laundries.

AIRBORNE AND IMPACT SOUND – CLAUSE G6

GIB® Noise Control Systems can be used to provide ratings for Sound Transmission Class (STC) and Impact Insulation Class (IIC) in accordance with the requirements of NZ Building Code Clause G6 (Airborne and Impact Sound). When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®, the STC and IIC rating of that system will be maintained. When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information refer to the GIB Noise Control® Systems literature or contact the GIB® Helpline 0800 100 442.

TIMBER WALL FRAMING

Framing dimensions must comply with the requirements of NZS 3604:2011.

- The moisture content of timber framing shall be 18% or less at the time of lining
- Studs shall be spaced at 600mm centres maximum for both 10mm and 13mm GIB® plasterboard
- Nogs to be evenly spaced with a maximum spacing of 1350mm. Alternatively, nogs may be staggered 150mm maximum either side of a horizontal joint line
- Nogs are not required behind horizontal joints except in shower situations or specific fire or noise control systems

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread screws.

FASTENER CENTRES

- 300mm centres to top and bottom plates and to perimeter studs
- Single fasteners to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Daubs of GIBFix® adhesive at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners. Sheet edges at door or window openings can be adhesive fixed unless forming part of the perimeter of a bracing element

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

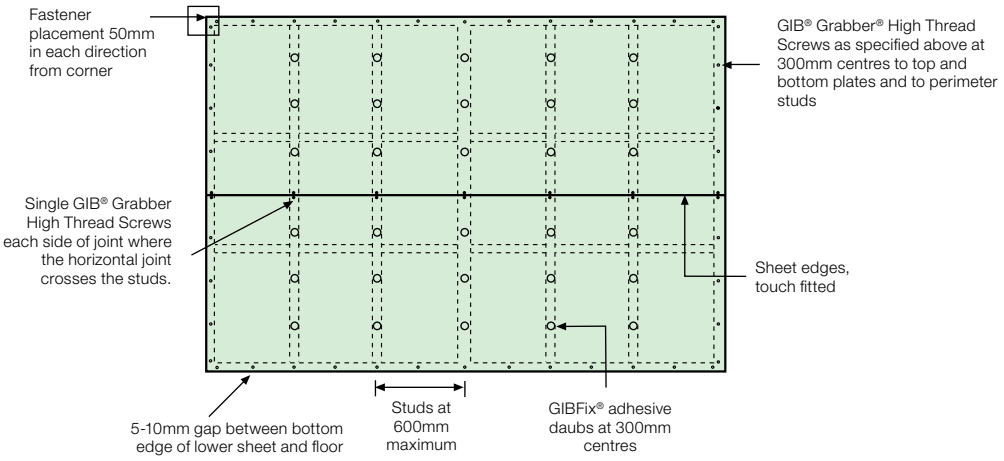
LINING

- Use minimum 10mm GIB® plasterboard
- Install the sheets leaving a 5-10mm gap at the floor line to allow for movement of the framing members and to allow for cleaning dirt and rubbish before sealing
- Sheets to be touch fitted.

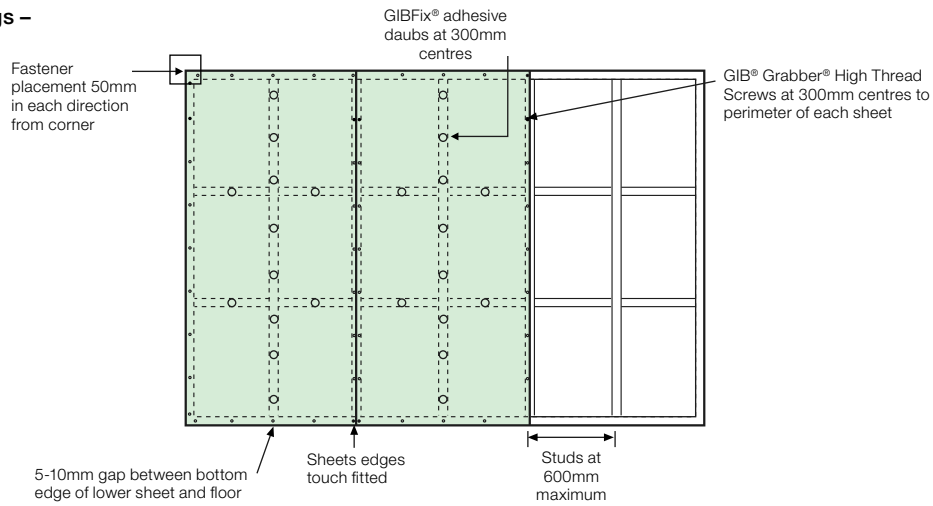
JOINTING

- Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide.

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



STEEL WALL FRAMING

The minimum sheet thickness for fixing on light gauge 0.55mm base metal thickness (BMT) steel framing is 13mm GIB® plasterboard. For bracing, noise control or fire rating applications consult the relevant GIB® technical publication.

Steel frame for residential construction is in accordance with NZBC B1/AS1 9.1 NASH Standard Part 2 Light Steel Framed Buildings, or by specific design. 10mm GIB plasterboard is commonly used on minimum 0.75mm BMT residential steel framing.

FASTENERS

— Minimum 25mm x 6g GIB® Grabber® Self Tapping Screws.

FASTENER CENTRES

— 300mm centres to top and bottom channels and to end studs

— Single screws to each stud where the horizontal joint crosses the studs

— Place fasteners 12mm from sheet edges and 18mm from sheet ends

— Daubs of GIBFix® All-Bond adhesive or screws at 300mm centres to intermediate studs

— Do not place adhesive at sheet edges or under fasteners.

— Sheet edges at door or window openings can be adhesive fixed.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

LINING

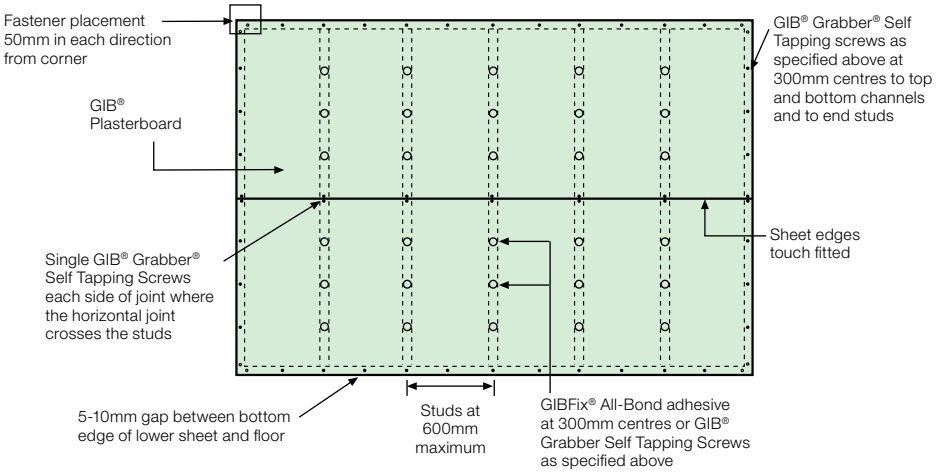
— Lay the sheets, leaving a 5-10mm gap at the floor line. Note: If friction fitted steel studs have been used, sheets must be fitted hard to the floor. Ensure floor is cured and dry

— Sheets to be touch fitted.

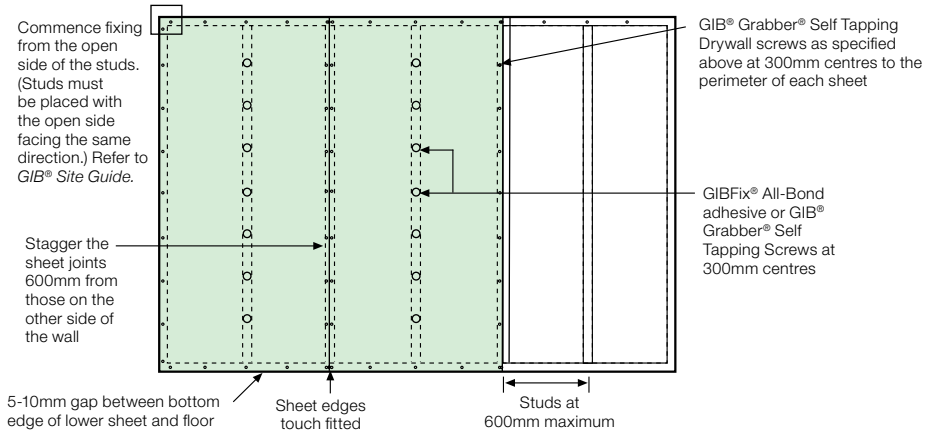
JOINTING

— Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



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TIMBER WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NZS 3604:2011 Timber Framed Buildings, or relevant specific design Standard.

NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Each leg shall be fastened to the framing at 300mm centres

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread Screws

FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Single fasteners to each stud where the horizontal joint crosses the studs
- Where relevant, fastener lengths must comply with the requirements of GIB® Fire Rated Systems or GIB® Noise Control Systems

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

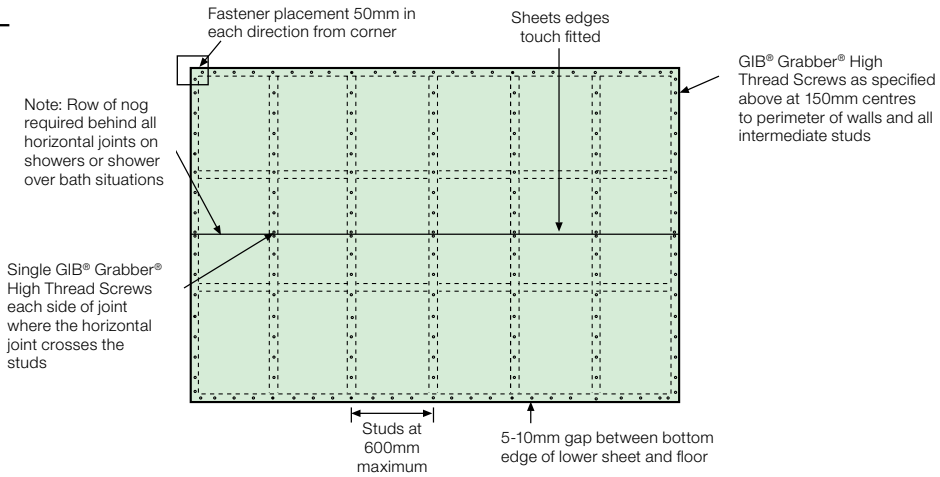
LINING AND TILE WEIGHTS

- Use minimum 10mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

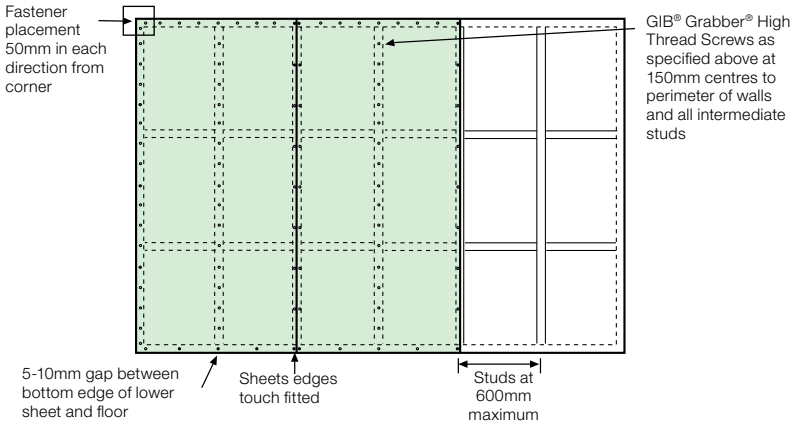
JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only



Fastening the Linings – Vertical Fixing Only



STEEL WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NASH Standard Part 2:2019 Light Steel Framed Buildings, or relevant specific design Standard.

- Linings are placed hard to floor, bedded into a sealant bead
- Steel framing for tiling to have a minimum base metal thickness (BMT) of 0.75mm

NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Each leg is fastened to the framing at 600mm centres

FASTENERS

- Minimum 32mm x 6g GIB® Grabber® Self Tapper screws

FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Single screws to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

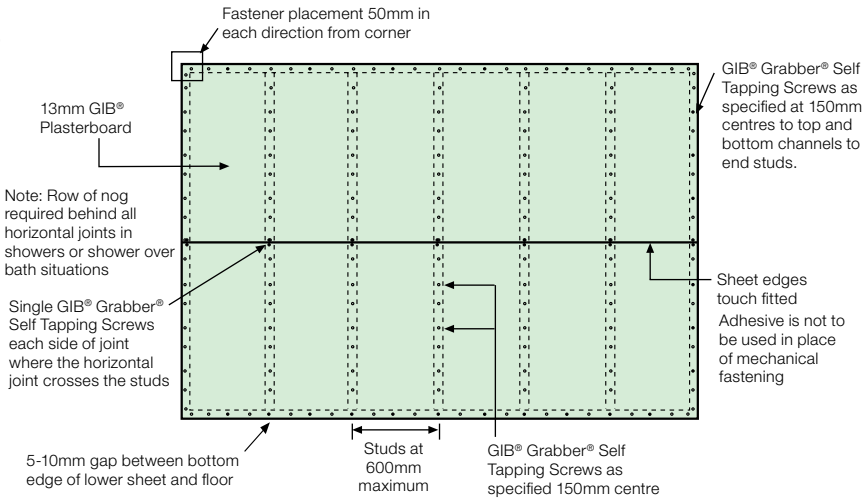
LINING AND TILE WEIGHTS

- Use minimum 13mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

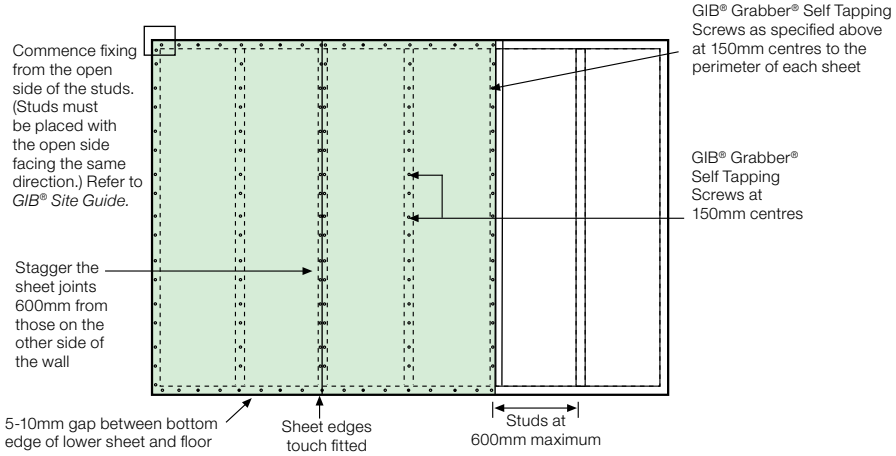
JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only

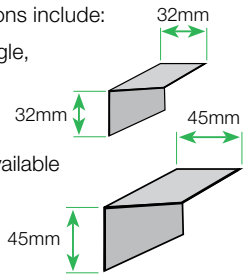


Fastening the Linings – Vertical Fixing Only

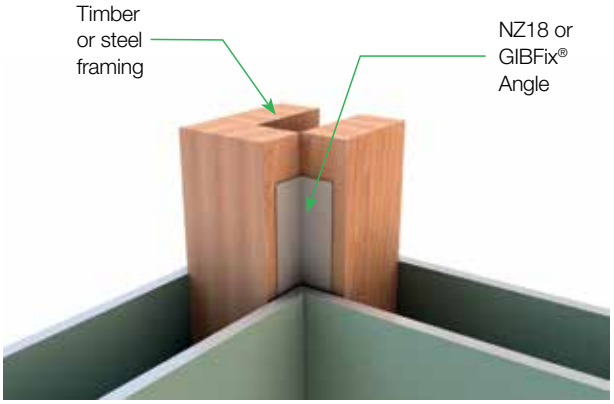


METAL ANGLES FOR TILED INTERNAL CORNERS

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum 32 x 32 x 0.55mm galvanised metal angle.
- Suitable GIB® metal angle options include:
  - GIB® Rondo® NZ18 metal angle, available length: 3.0m
  - GIBFix® Angle metal angle, available lengths: 2.4m and 2.7m



- Each side of the angle is secured to the framing with at 600mm centres
- Minimum height of the metal angle is 1800mm



WATERPROOF MEMBRANE SYSTEMS

A waterproof membrane system must be applied to all lining materials used as a substrate for ceramic tiles in a shower or shower over a bath application, or any other tiled application exposed to frequent water splash.

For further information see p10.

TILES AND TILE WEIGHTS

In areas likely to be directly exposed to water, tiles may be ceramic, porcelain or stone must comply with the over-surface finish requirements of the IWAM Code of Practice and be bedded with a suitable tile adhesive on the waterproof membrane system. See page 10 for the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.

Smaller mosaic tiles are often lighter, but the integrity of grout joints might be more prone to impact, whilst heavier tiles are larger and have less and deeper grout and sealant joints. For more information also see AS 3958:2007 Ceramic tiles – Guide to the installation of ceramic tiles.

Table 2: Recommended maximum tile weights

Maximum Tile Weights for GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline®			
Stud Centre (maximum)	**Fasteners Centre (maximum)**	**Lining Thickness**	**Tile Weight**
600mm maximum	150mm maximum	10mm	26kg/m^2
		13mm	40kg/m^2

ADHESIVE AND GROUT WEIGHTS

The weight of adhesive and grout can vary depending on the type of tile and the installation process used. The maximum tile weights stated in table 2 are conservative and refer to the tile weight excluding grout and adhesive used. An additional 3kg/m^2 has been factored into tile adhesion testing on top of the above stated tile weights to account for adhesive and grout weight used during the installation of the tile.

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CEILING FRAMING

Framing dimensions and spacing must comply with the requirements of NZS 3604:2011, NASH for steel or relevant NZ Standard.

For noise control or fire rating applications consult the relevant GIB® technical publication.

FASTENERS

- Steel battens – 25mm x 6g GIB® Grabber® Self Tapping screws
- Timber battens or Joists – 32mm x 6g GIB® Grabber® High Thread screws

ADHESIVES

- Steel battens - GIBFix® All-Bond
- Timber battens - GIBFix® All-Bond or GIBFix® One

FASTENERS CENTRES

- Single screws to the edges and centre of the sheets across each batten
- Single screw at 600mm maximum to the perimeter of the ceiling
- Screws to be 12mm from sheet edges
- Daubs of adhesive at 200mm centres between the screws
- Do not place adhesive at sheet edges or under fasteners, this may lead to screw pops

LINING

- The lining shall be fixed at right angles to the battens or joists
- Commence fixing from the centre of the sheets outwards.
- Sheets to be touch fitted
- Use long length sheets to minimise sheet end butt joints.
- Back-block sheet end butt joints
- See GIB® Site Guide for sheet edge backblocking requirements

BATTEN SPACINGS

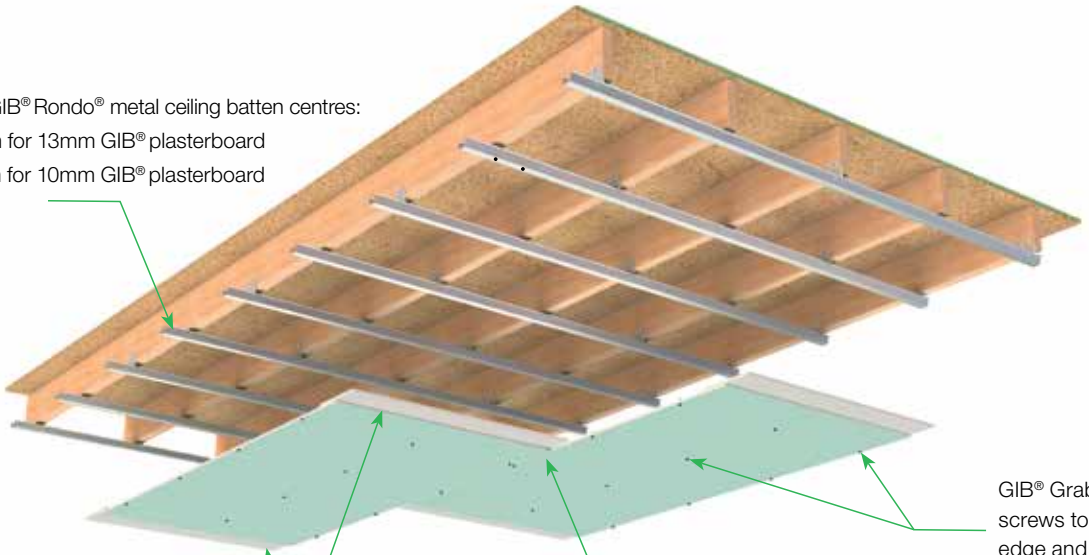
- 13mm GIB® plasterboard – 600mm centres maximum
- 10mm GIB® plasterboard – 450mm centres maximum

JOINTING

- All sheet joints must be paper tape reinforced and stopped in accordance with instructions in the GIB® Site Guide
- Do not fix tiles to GIB® plasterboard ceilings

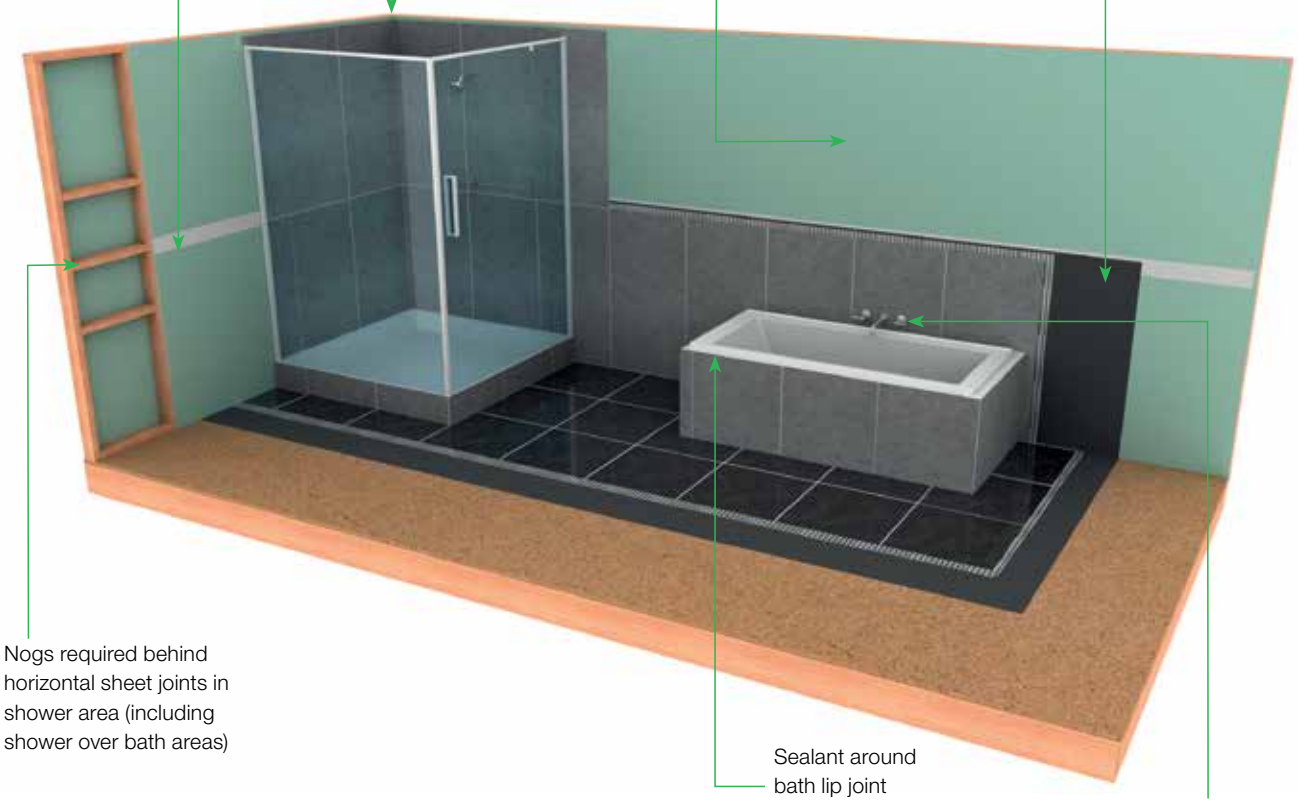
Maximum GIB® Rondo® metal ceiling batten centres:

- 600mm for 13mm GIB® plasterboard
- 450mm for 10mm GIB® plasterboard

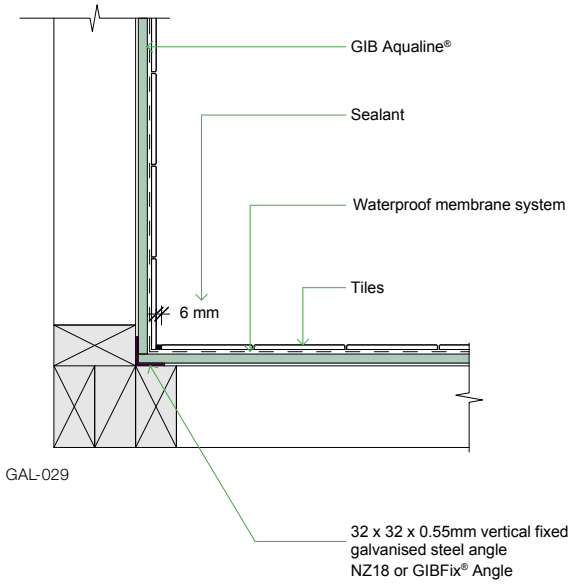


SDC - Approved Document B Fire Safety - Dispensation B1/VM4 - 435 of 2240 - 07/10/2022 - 20210135

SDC - Approved Document - Building Code Clauses B1, B2, E3 - 07/06/2024 4:36 PM - 5 of 224

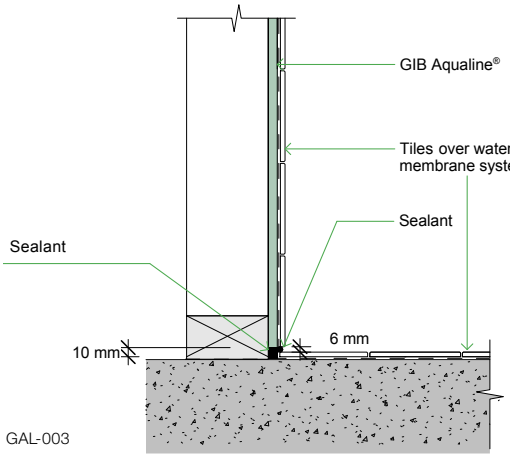


A: TILED INTERNAL CORNER



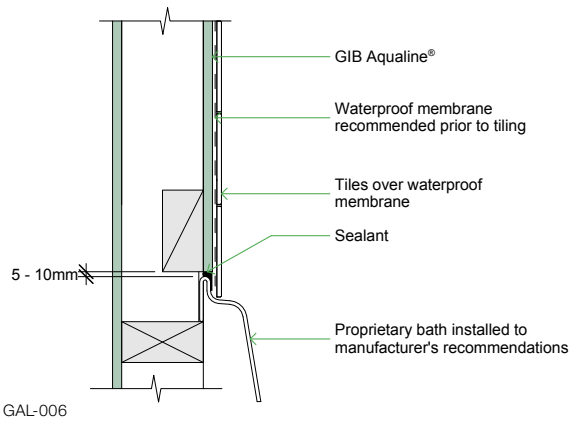
GAL-029

B: CERAMIC FLOOR LINING JUNCTION



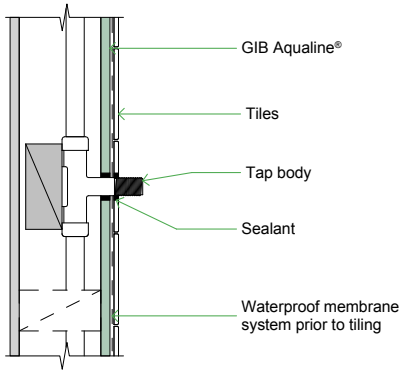
GAL-003

C: BATH LINING JUNCTION



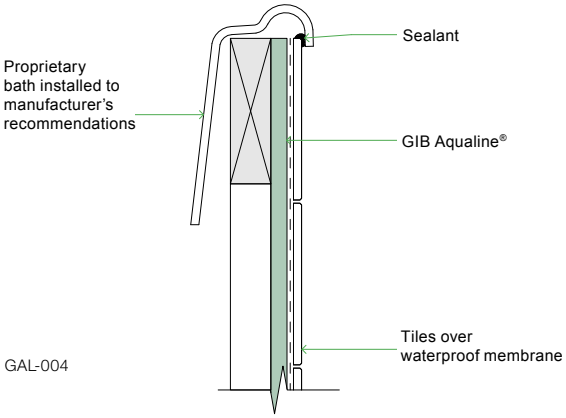
GAL-006

D: SEALING WET AREA PENETRATION



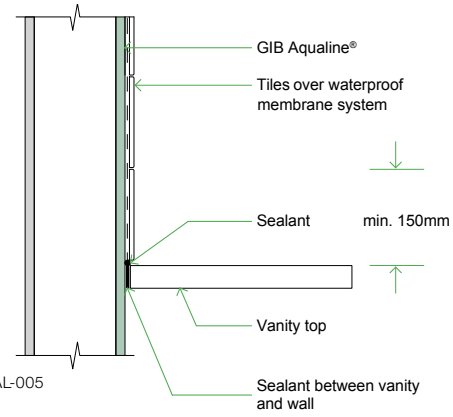
GAL-002

E: BATH CRADLE LINING DETAIL

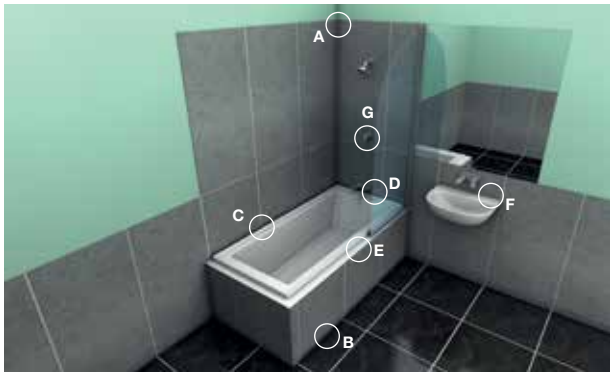


GAL-004

F: VANITY TOP LINING JUNCTION



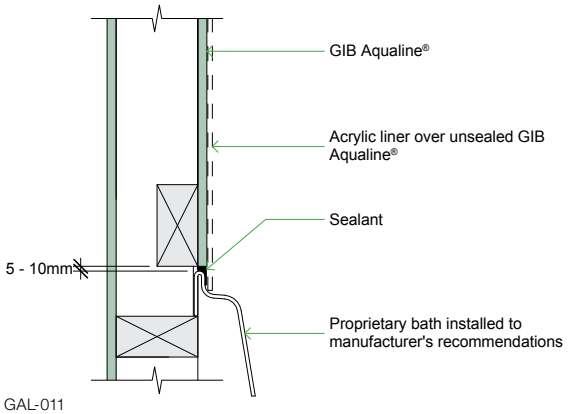
GAL-005



G: SHOWER MIXER PENETRATION IN WET WALL LININGS

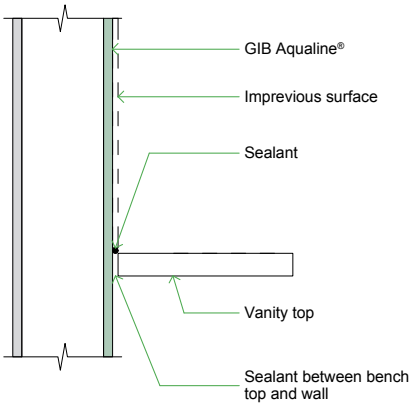
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.

A: BATH LINING JUNCTION



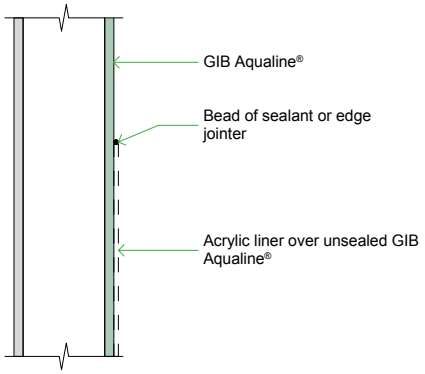
GAL-011

B: VANITY TOP LINING JUNCTION



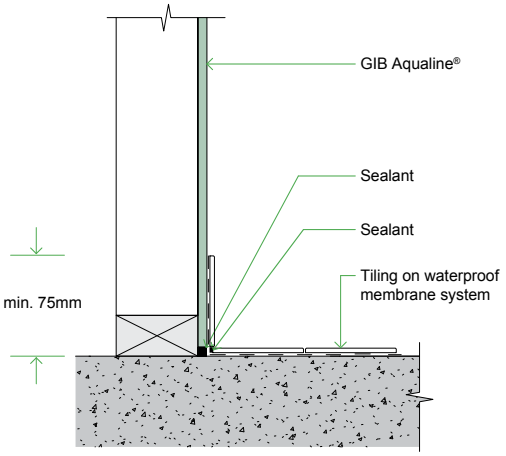
GAL-023A

C: UNSEALED PLASTERBOARD LINING



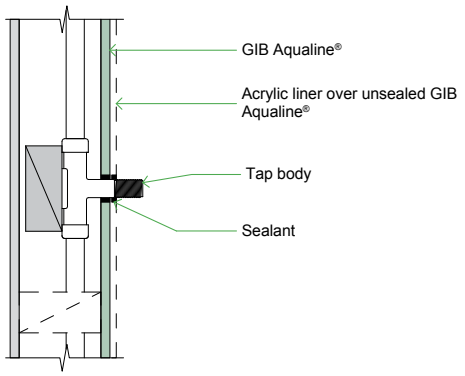
GAL-028

D: CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

E: SEALING SEMI WET AREA PENETRATION



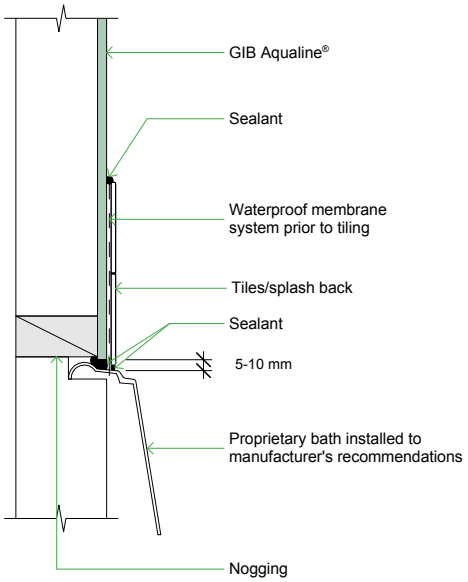
GAL-019

F: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.

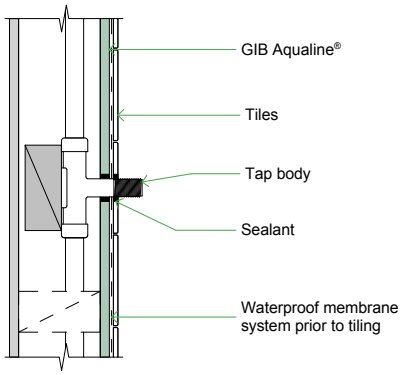


A: BATH LINING JUNCTION



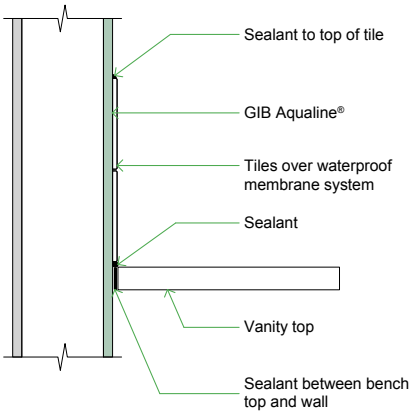
GAL-009

B: SEALING SEMI WET AREA PENETRATION



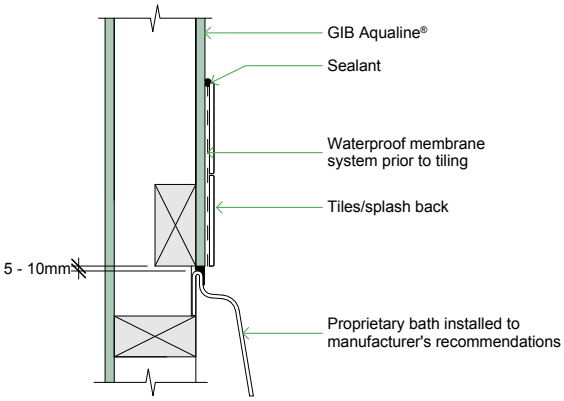
GAL-020

C: VANITY TOP LINING JUNCTION



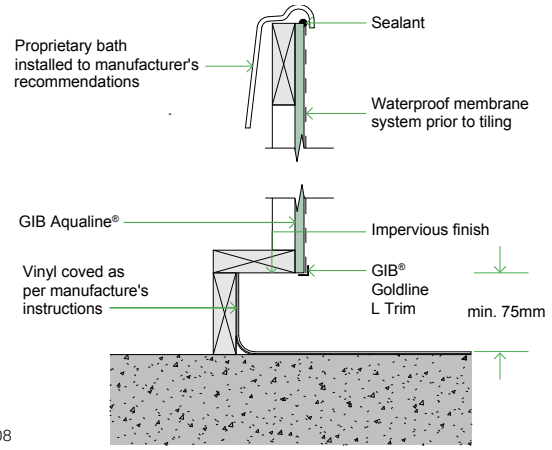
GAL-024

D: BATH LINING JUNCTION

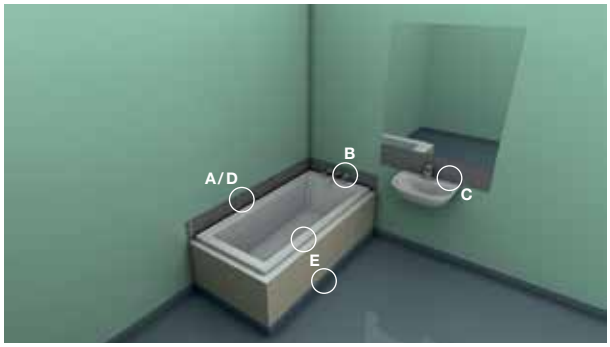


GAL-010

E: CRADLE VINYL LINING JUNCTION

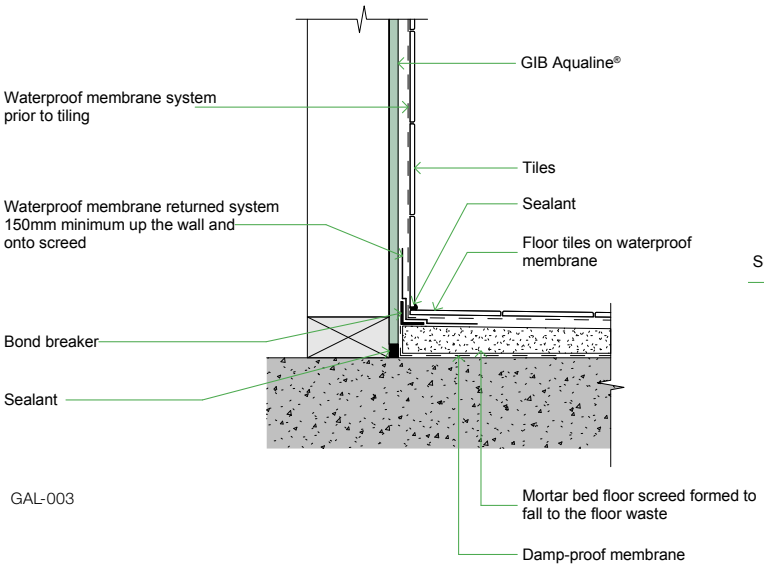


GAL-008

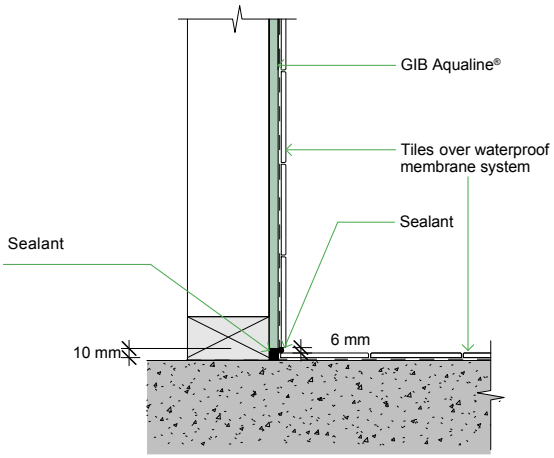


SDC - Approved Document - Building Code Compliance - Pg 139 of 227 - 24/06/2024 2:08:20 pm - phillid

A: MORTAR UNDER CERAMIC FLOOR LINING JUNCTION



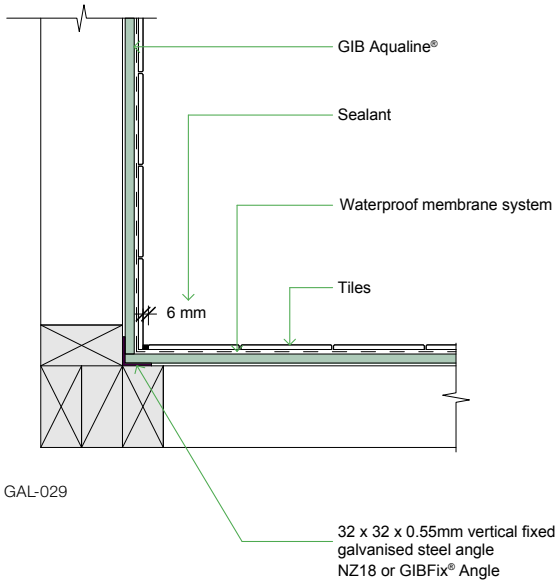
C: CERAMIC FLOOR LINING JUNCTION



PREFORMED SHOWER BASE JUNCTIONS

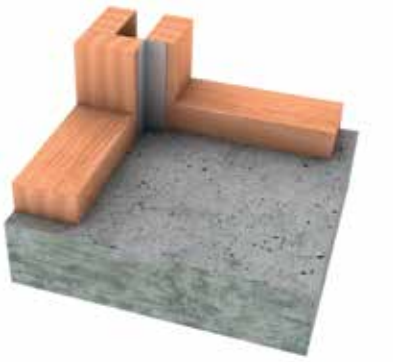
Refer to the shower base manufacturer for proprietary shower tray installation detailing including wet wall lining junction detailing.

B: TILED INTERNAL CORNER



D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.

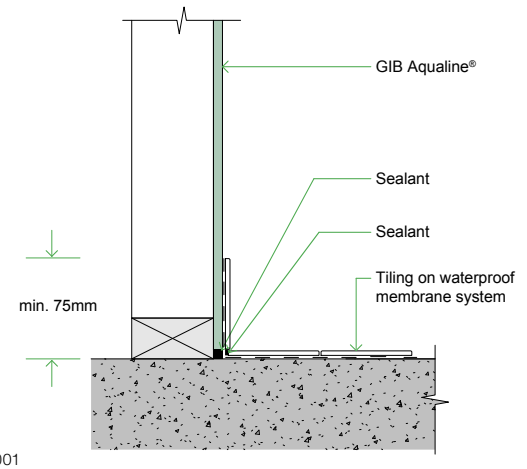


E: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.

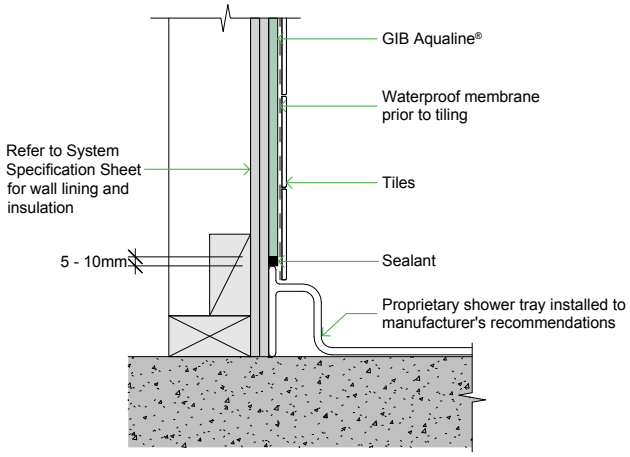


A: CERAMIC FLOOR SKIRTING LINING JUNCTION



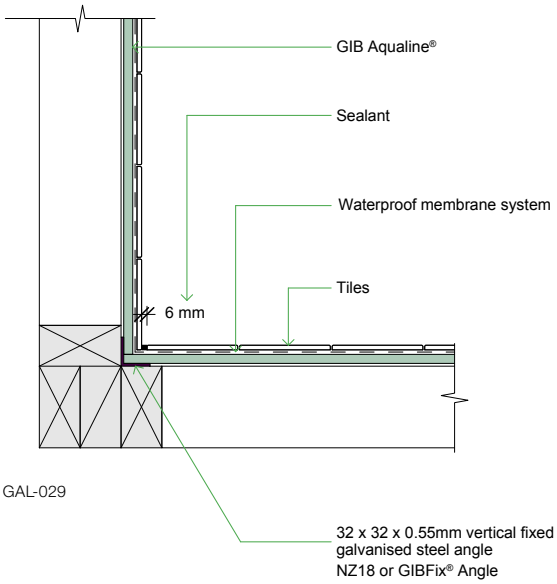
GAL-001

B: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



GAL-016

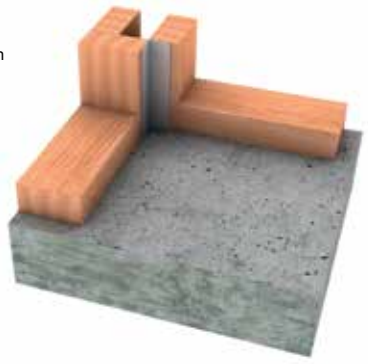
C: TILED INTERNAL CORNER



GAL-029

D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.

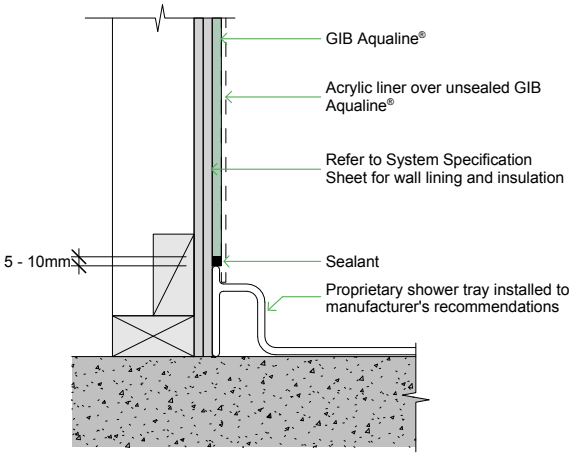


E: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.

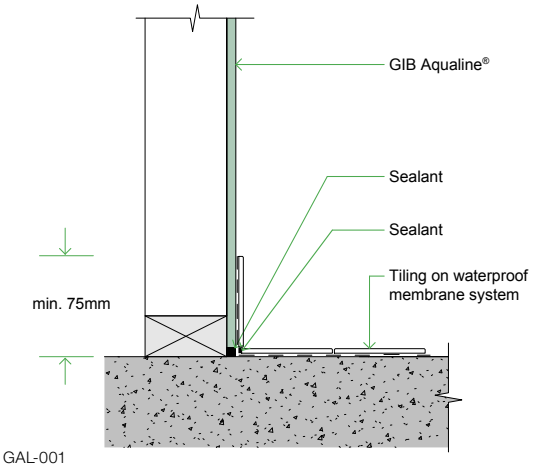


A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



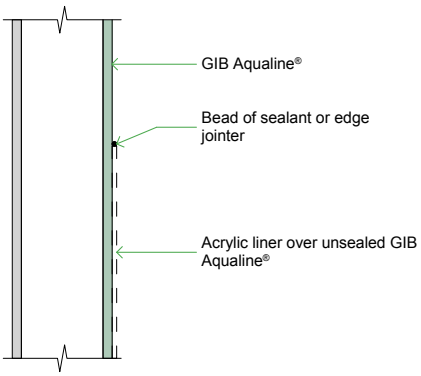
GAL-015

B: CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

C: UNSEALED PLASTERBOARD LINING



GAL-028

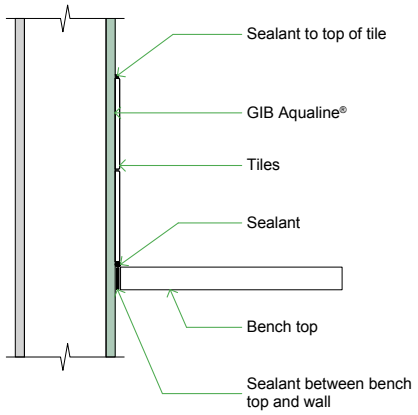
D: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



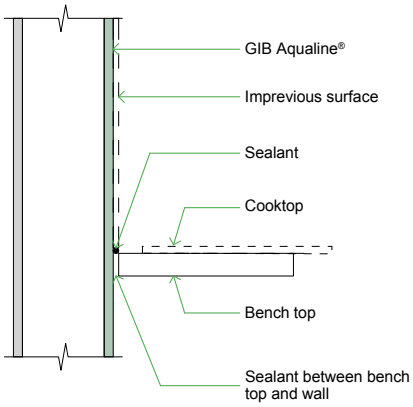
SDC - Approved Document - Building Code Compliance - Pg 142 of 224 - 30/06/2021 10:42:07 - BC220307

A: BENCH TOP LINING JUNCTION



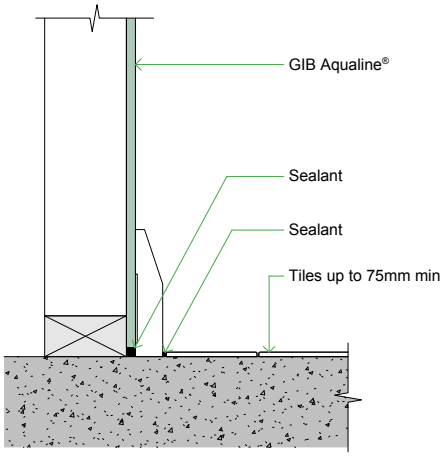
GAL-024

B: COOKTOP LINING JUNCTION



GAL-023B

CERAMIC FLOOR SKIRTING LINING JUNCTION

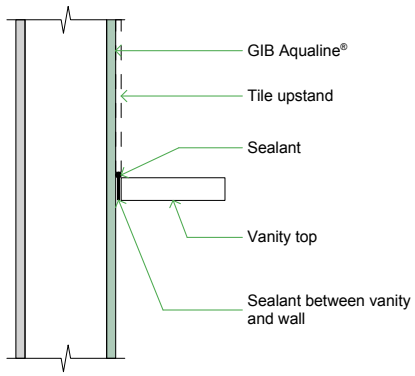


GAL-001A



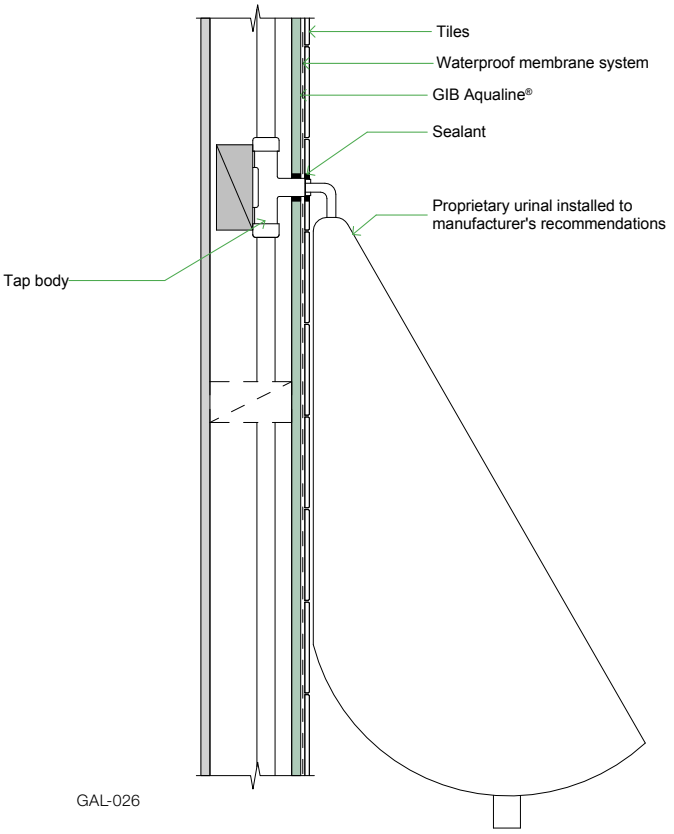
SDC - Approved Application Document B2/AS1 - 143 of 224 - 07/10/2021 - phillid

A: VANITY TOP LINING JUNCTION



GAL-022

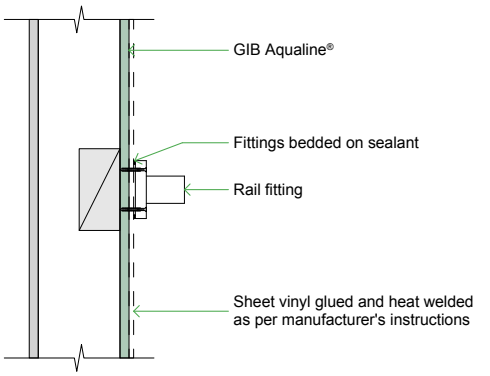
B: SEALING WET AREA PENETRATION LINING JUNCTION



GAL-026

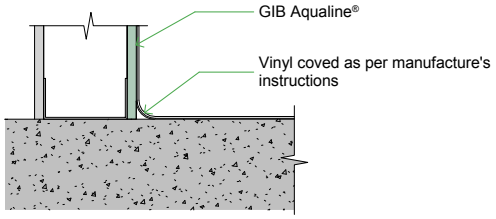


A: SURFACE MOUNTED WITH NOG



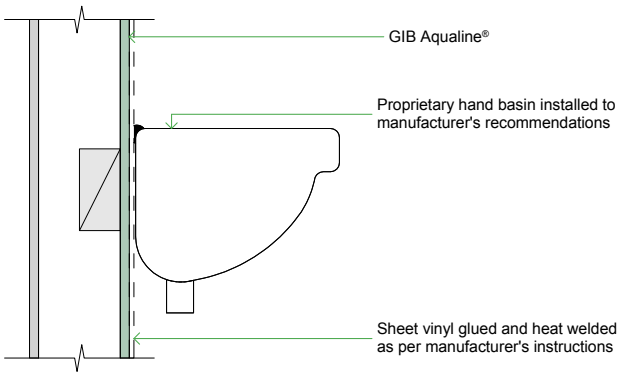
GAL-027

B: VINYL FLOOR LINING JUNCTION



GAL-006A

C: BASIN LINING JUNCTION

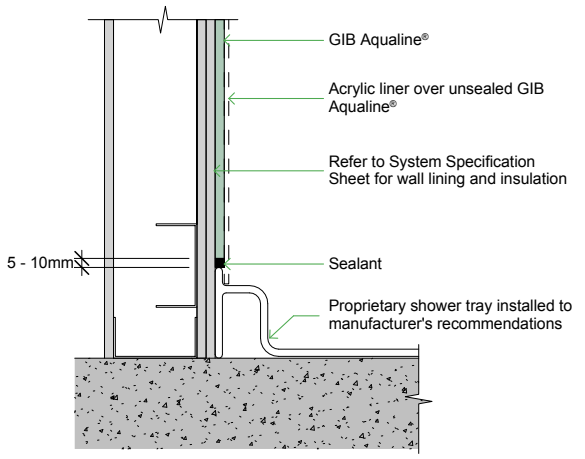


GAL-025



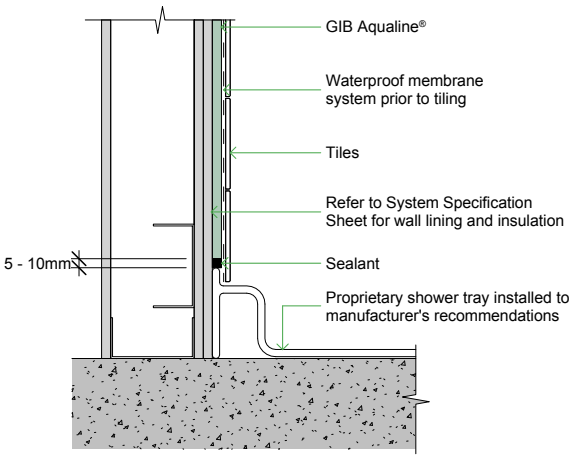
SDC - Approved Document - Building Code Compliance - Page 145 of 223 - 07/06/2024 08:20:16

A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



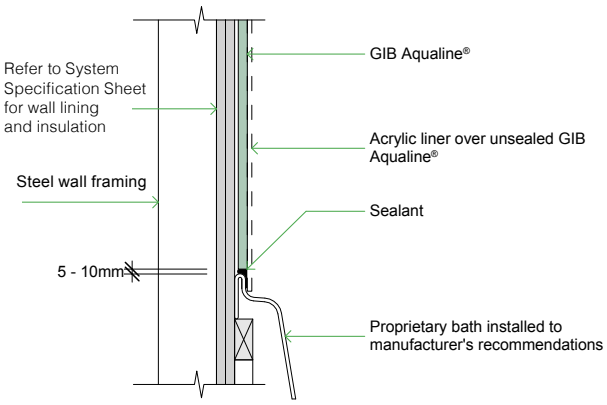
GAL-017

C: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



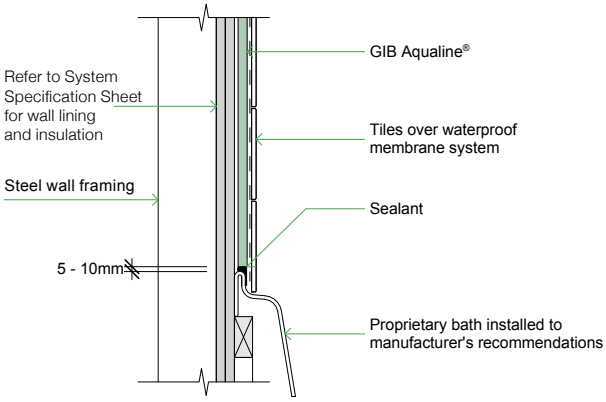
GAL-018

B: BATH DOUBLE LINING JUNCTION



GAL-013

D: BATH DOUBLE LINING JUNCTION



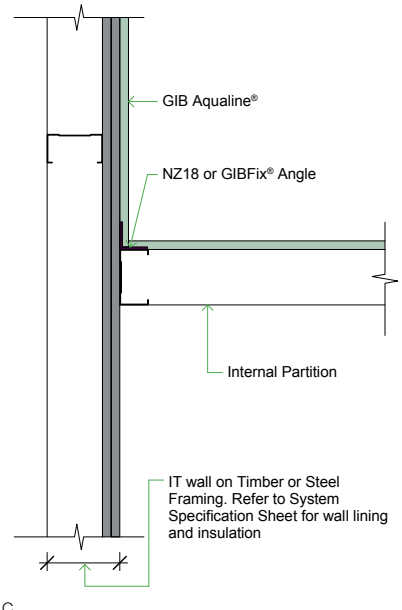
GAL-014

GIB® WET AREA SYSTEMS FIRE RESISTANCE AND NOISE CONTROL PERFORMANCE

Given recesses required for shower trays, bath upstands, etc., and the likelihood of renovations during the service life of the building, it is recommended that GIB® Wet Area linings in water splash areas are installed in addition to and over required fire and noise control systems in commercial or multi-residential applications.

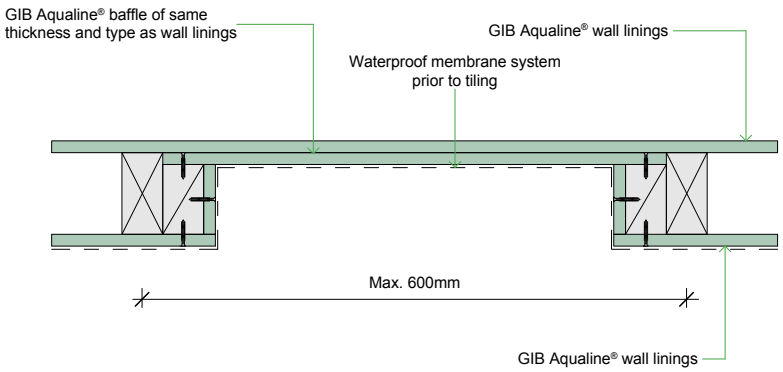
Do not tile on the resilient side of a GIB Rail® or Acoustic Resilient Mount (ST-001) and channel noise control system.

E: INTERTENANCY WALL AND WET AREA WALL JUNCTION

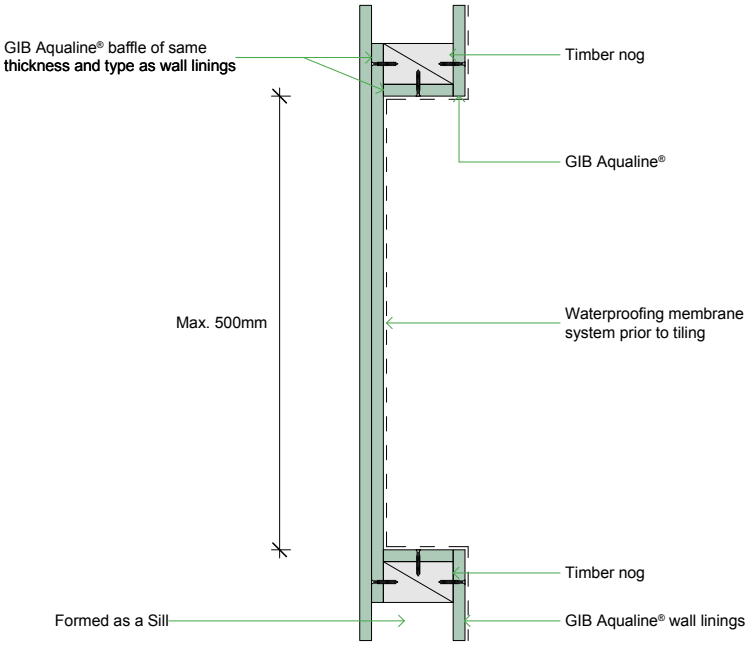


GAL-031C

TIMBER FRAME TILE RECESS

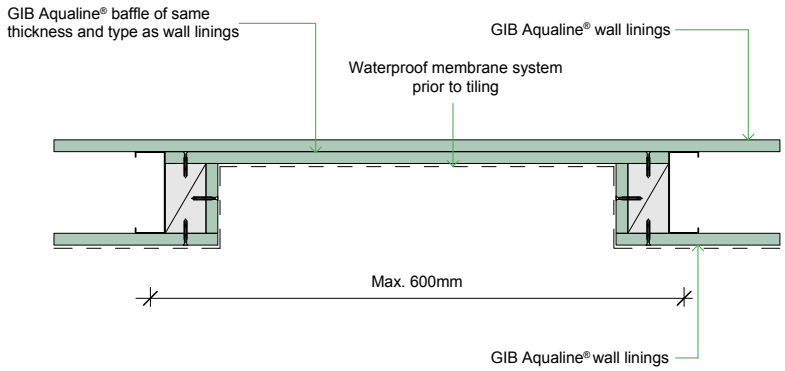


Larger recesses can be accommodated depending on specific framing layout provided 500mm is not exceeded in at least one direction.

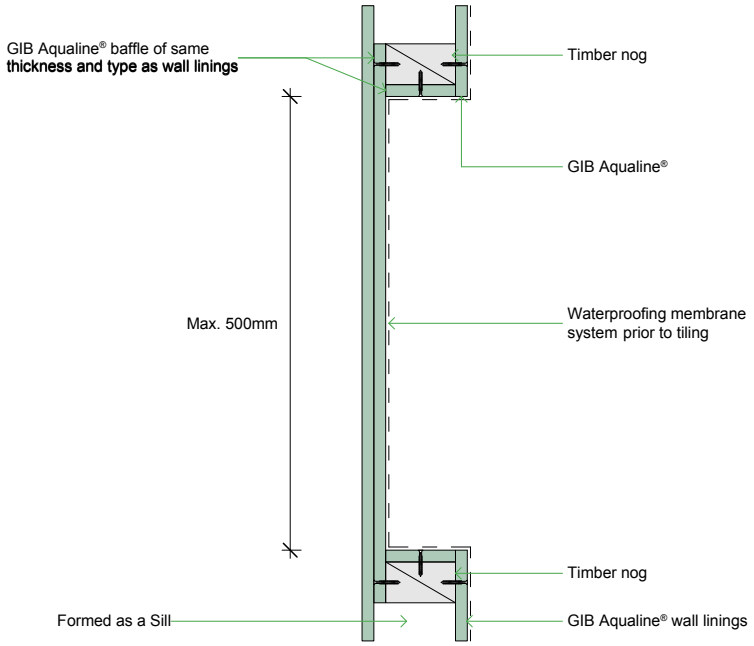


GAL-029B

STEEL FRAME TILE RECESS



Larger recesses can be accommodated depending on specific framing layout provided 500mm is not exceeded in at least one direction.



GAL-030

GIB® Wet Area Systems, February 2021

LIMITATIONS

Winstone Wallboards Ltd accepts no liability if the GIB® Wet Area Systems and junction details are not installed in strict accordance with instructions contained within 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. You should check the GIB® website to ensure you are using the current publication. If you are unsure whether this is the current publication, simply call the GIB® Helpline on 0800 100 442.

SUBSTITUTION

GIB® Wet Area Systems have been specifically designed and tested to achieve the stated performance levels. To maintain the GIB® Product and System Warranty, all system components detailed in this publication must be used when specifying and installing GIB® Wet Area Systems.

TRADEMARKS

The names GIB®, GIB Fyreline®, GIB Ultraline®, GIB Toughline®, GIB Braceline® GIB Noiseline®, GIB Aqualine®, GIB Weatherline®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, GIB® Quiet Stud®, GIB Rail®, GIB Barrierline®, GIB X-Block®, GIB Fire Soundseal®, GIB Clip®, the colour mauve for GIB Toughline®, the colour blue for GIB Braceline® GIB Noiseline®, the colour pink for GIB Fyreline®, the colour green for GIB Aqualine®, the colour purple for GIB Weatherline® and the shield device are registered trademarks of Fletcher Building Holdings Limited.

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SDC Approved Building Document BC230718022 Dated 4/9/2023 Pg 149 of 227 Dated 20/12/2023 phillid

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FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442

February 2021

COLORSTEEL®



Installers Guide

July 2019

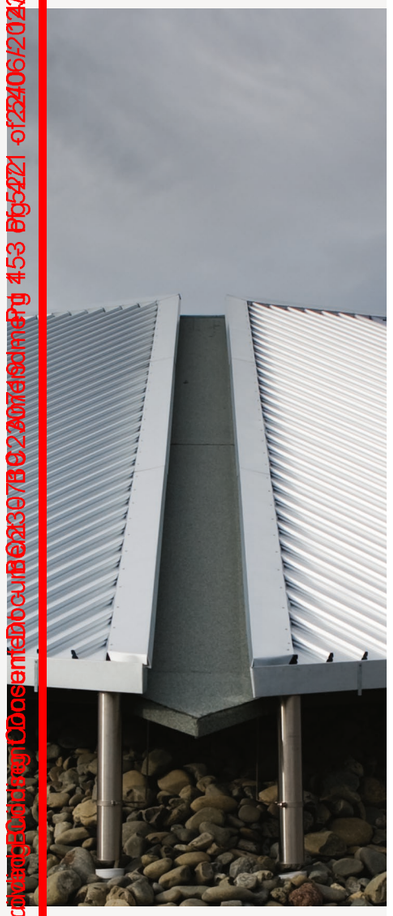


INTRODUCTION

New Zealand Steel takes a great deal of pride in manufacturing top quality products and knows that the final appearance is influenced by the skills and care taken with the material. This guide provides recommendations on the correct installation of COLORSTEEL®, Zincalume® steel and Galvsteel® material. To obtain optimum durability of these products, handling and fixing procedures appropriate to the material, application and environment must be used.

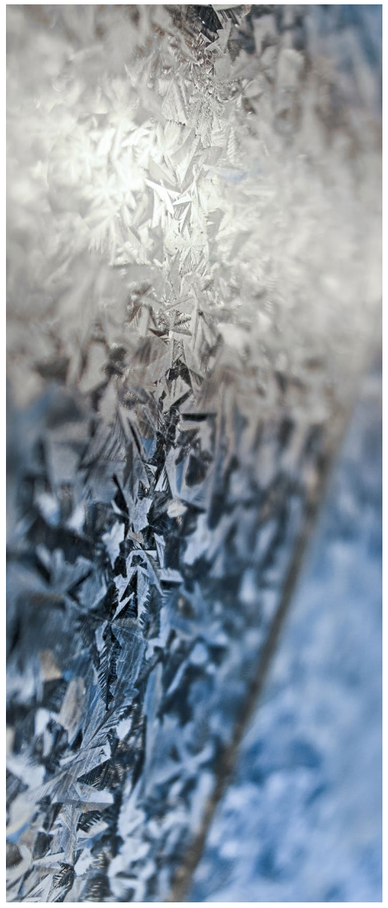
MATERIALS

A variety of steel coating systems are offered:



ZINCALUME®

Steel with an alloy coating consisting of 55% aluminium, 45% zinc by weight which offers superior corrosion resistance compared to galvanised steel in most environments (particularly coastal environments).



GALVSTEEL®

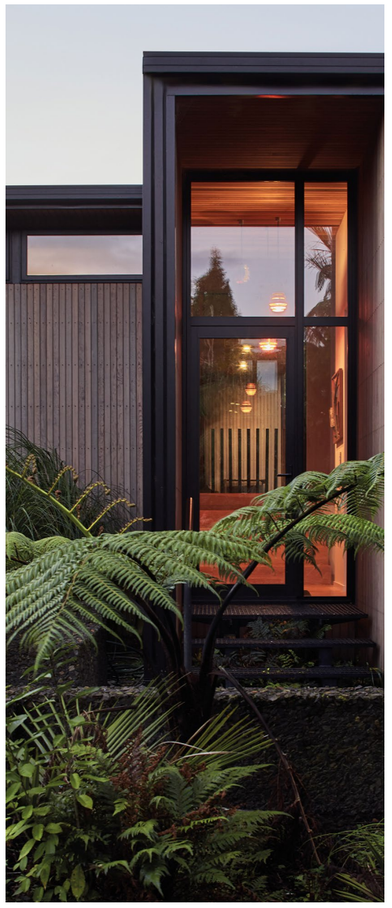
Traditional galvanised steel is offered under the trade name of Galvsteel®. This material is coated in 99% pure zinc.



COLORSTEEL®

COLORSTEEL® describes those steel building materials which have an oven-cured paint system applied to a flat galvanised or Zincalume® base on a continuous 'coil to coil' operation at the New Zealand Steel Glenbrook works. The pre-painting process improves both the looks and the durability of the finished product.

The brand name COLORSTEEL® is unique to materials manufactured by New Zealand Steel and must not be applied generically to other pre-painted products.



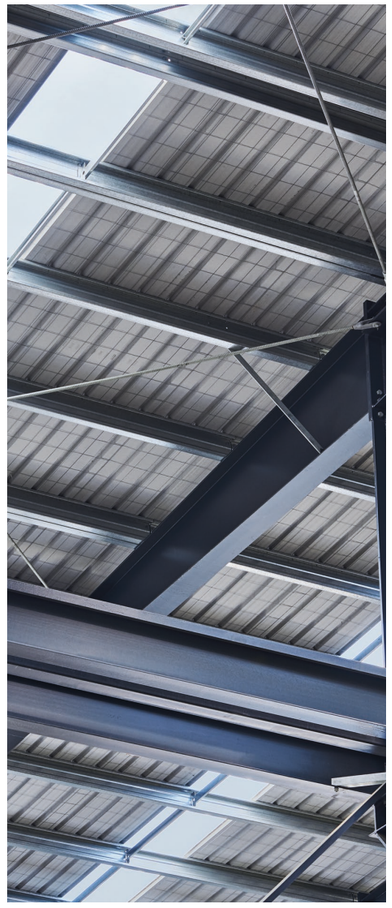
COLORSTEEL® ENDURA®

Has a Zincalume® substrate with an AZ150 coating class, (i.e. 150 g/m^2 of aluminium/ zinc alloy). It is suitable for most moderate to severe marine applications.



COLORSTEEL® MAXX®

Has a Zincalume® substrate with an AZ200 coating class, (i.e. 200 g/ m^2 of aluminium/ zinc alloy), to give enhanced performance in very severe marine environments.



COLORSTEEL® DRIDEX® and DRIDEX+®

Have an absorptive layer of fleece on the underside, negating the need for separate roofing underlay. These products must be installed by an accredited COLORSTEEL® Dridex® installer.
(Contact New Zealand Steel for details on how to become accredited).

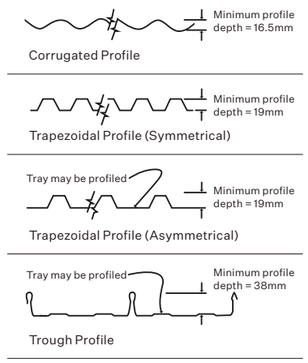
PRODUCT SELECTION

Appearance

Colour
COLORSTEEL® comes in an extensive palette of colours. Refer to your supplier or the New Zealand Steel brochure Choosing COLORSTEEL® for details. New microwrinkle technology has led to the development of COLORSTEEL® Matte colours, in a limited colour range. COLORSTEEL® Matte requires special care during installation, refer to the COLORSTEEL® Matte installation guide bulletin.

Glare
In some areas, colour choice may be limited by Council regulations, and this should be checked where applicable. Glare off light coloured roofs can sometimes be an annoyance to neighbours and if this is to be considered, refer to the COLORSTEEL® Glare Bulletin.

Profile
Profiles may be described as Corrugated, Trapezoidal (rib) or Secret Fix (Trough, Tray, Standing Seam, Decking).





Performance

Strength
Different profiles and profile heights will have different strength characteristics. Generally, the higher the profile height the stronger it will be. Refer to roof manufacturer for specific information.

Environment
The boundaries of different corrosion zones are difficult to define because many factors determine the corrosivity of a particular location. Issues such as difficulty of replacement, and access for maintenance should also be considered when making material choices. The designer should choose the appropriate materials for the location, which meet the minimum durability requirements of the NZBC and satisfy customer expectations.

For information on environments, warranties and maintenance see Environmental Categories, Warranty and Product Maintenance Recommendations brochure.

Compatibility
When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. This is known as galvanic or bi-metallic corrosion. A similar problem commonly occurs with water flowing over dissimilar metals.

Copper
Copper is not compatible with Galvsteel®, Zincalume® or COLORSTEEL® products, especially where the two materials are in contact in the presence of water or where water can flow from copper to the coated product. Every effort must be made to prevent the overflow of water from copper pipes on to the roofing and guttering material.

Lead
Lead is not compatible with Zincalume® products. Corrosion will result from contact between the two products, or from water run-off from lead to Zincalume® or COLORSTEEL®.

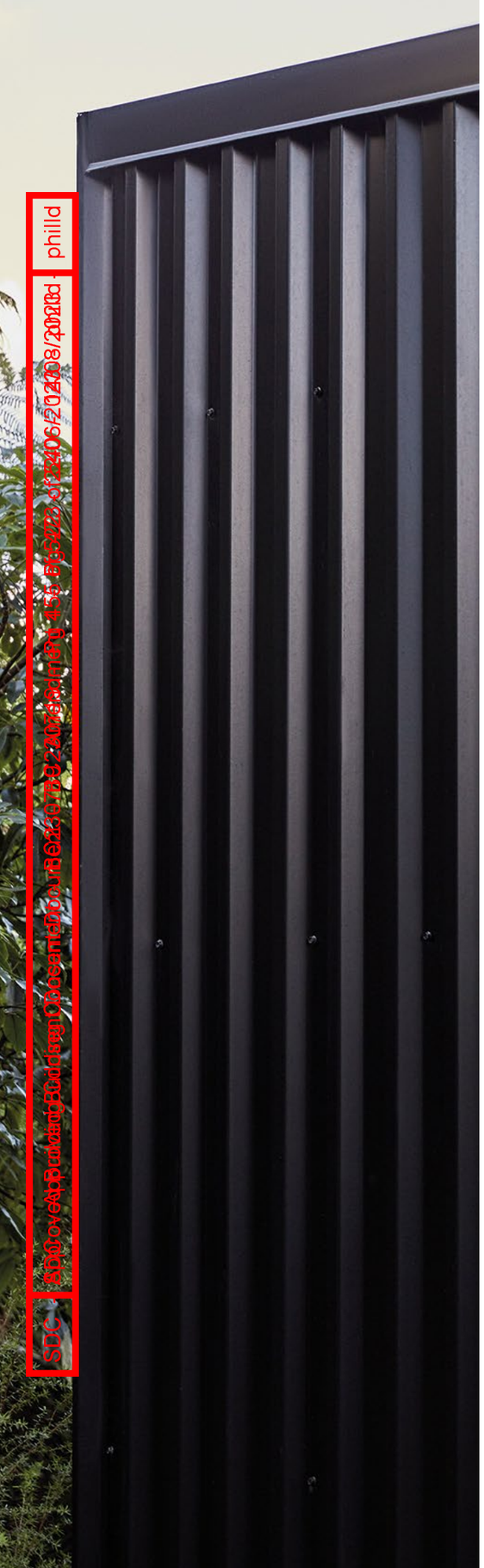
Stainless Steel
Stainless steel must not be in contact with Zincalume® or COLORSTEEL® products, but run off from stainless steel onto these products is acceptable.

Galvanised Steel
Galvanised steel is compatible in contact with Zincalume®, COLORSTEEL®, aluminium or zinc but these materials must not discharge onto unpainted galvanised steel, as they are inert. Other inert surfaces include any painted surface, glass, PVC and glazed clay tiles.

Minimum Pitch
Different profiles have different minimum pitch limitations.

Profile	Rib Height	Minimum Pitch
Trapezoidal asymmetrical	20 – 25 mm	4°
Trapezoidal asymmetrical	25 – 35 mm	3°
Trapezoidal asymmetrical and symmetrical	36 – 60 mm	3°
Trapezoidal symmetrical	20 – 35 mm	4°
Secret-Fix	>30 mm	3°
Secret-Fix	<30 mm	8°
Standing seam fully supported flat sheet metal	>30 mm	3°
All other types of fully supported flat sheet metal		5°
Corrugated and other profiled sheeting	16.5 – 20 mm	8°
Corrugated and other profiled sheeting	21 – 35 mm	4°

Zinc / Zincalume® / Aluminium	**MORE ACTIVE MATERIALS**	This chart lists commonly used metals in a 'Galvanic series'. If any two of these metals are in damp contact or a run-off situation, the metal higher on the table will sacrifice itself to protect the metal lower on the scale. Therefore the simple rule is to remember that you can run water down but not uphill. For example zinc to copper is alright but copper to zinc is not.
Steel		
Lead		
Copper and Brass		
Stainless Steel	**MORE NOBLE METALS**	



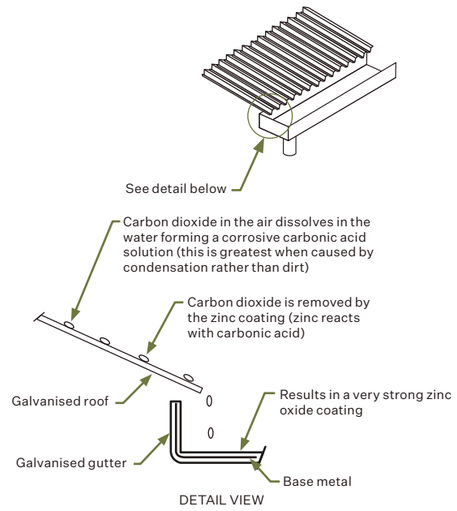
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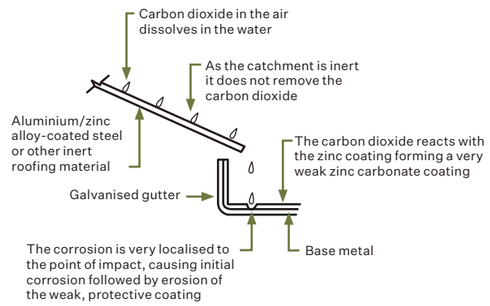
Inert Catchment

Run-off from inert surfaces such as glazed tiles, aluminium and aluminium-dominant metallic coatings, fibreglass, pre-coated metals, glass or any painted surface can cause corrosion of unpainted galvanised steel and other zinc-dominant metallic coatings. This is known as ‘drip-spot corrosion’ or inert catchment corrosion.

Water sitting on a surface absorbs carbon dioxide forming carbonic acid, which is reactive with zinc. On a galvanised surface, the carbonic acid reacts with the zinc and becomes neutral. On an inert surface discharging into an unprotected zinc surface, the carbonic acid is not neutralised, and reaction will be concentrated on the drip points of the inert surface onto the zinc surface.

As the formation of carbonic acid takes time to occur, inert catchment corrosion is normally seen at specific drip points of dew off a roof rather than below rain washed painted walls and windows.





Flashings

Flashings and ridge capping should be manufactured from the same coating system as used for the main roof area, i.e. all COLORSTEEL® products. Higher performance flashings can be used with the main roof i.e. COLORSTEEL® Maxx® flashings with a COLORSTEEL® Endura® main roof, but not the other way around, i.e. COLORSTEEL® Endura® flashings with a COLORSTEEL® Maxx® main roof. Where greater durability is required for flashings behind cladding or other building elements, colour matched alternative metals may be used. It is likely that these flashings will weather at a different rate than the COLORSTEEL®, and differential appearance may occur.

TAKING DELIVERY

Checking

Check the delivery to make sure you have the right product, delivered in prime condition. Verify that it is genuine COLORSTEEL®, Zincalume® or Galvsteel® material. Where different brands of pre-painted material are used on the same building, differences in colour, gloss and weathering performance may appear obvious within a short period of time. This will be due to the different paint formulations used by different manufacturers. New Zealand Steel Limited will not accept liability for problems caused by the mixing of brands.

Ensure that the order is complete including all fasteners, accessories etc required to commence installation.

Unloading

Set out flat area and supporting dunnage to ensure sheets will not be damaged by site debris. When unloading by crane, ensure lifting boom has a spreader bar and that tightening strops do not damage sheet laps. If unloading by hand lift each sheet off the stack without sliding over under sheets, as that may cause damage to the paint.

Storage

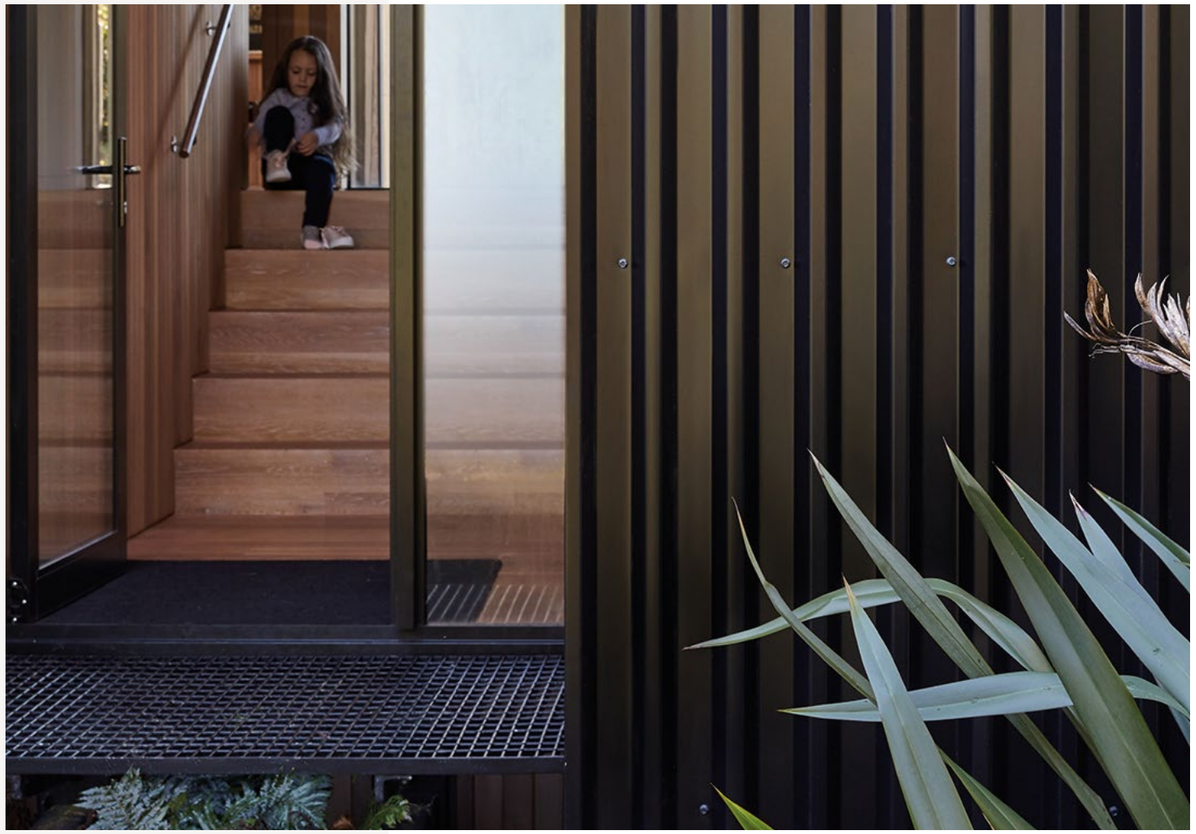
Close stacked sheets may deteriorate rapidly if water enters the pack. Sheets that are delivered wet or become wet in storage must be used immediately or dried. Drying can be done by filleting sheets or cross stacking them on a slope to allow water to drain and air to circulate between the sheets.

Long term storage may only be done in a dry, well ventilated environment.

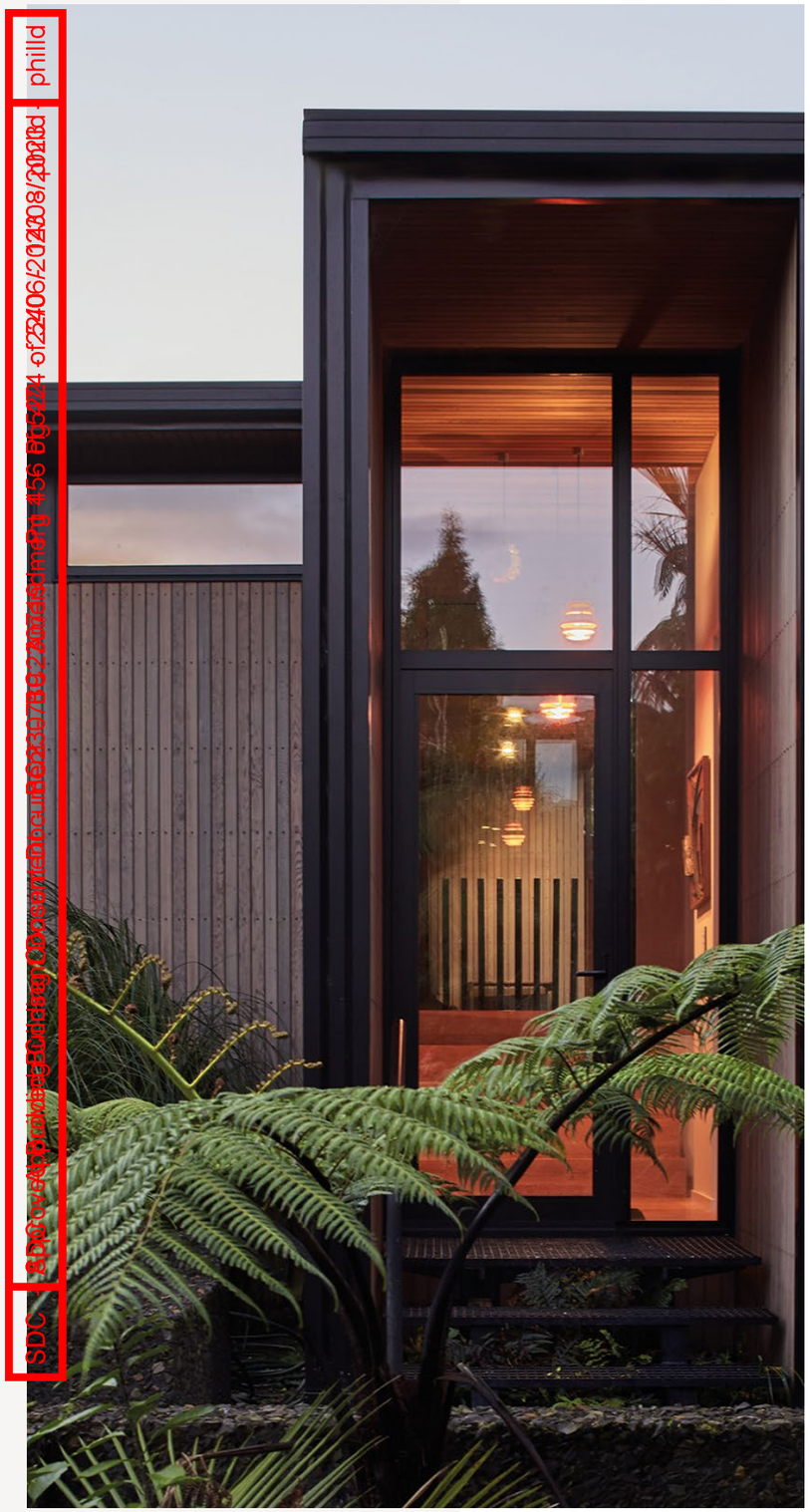
Protect from contamination from corrosive and damaging substances such as acid, cement, swarf etc.

Wet Storage Damage

Failure to follow these handling and storage precautions could result in spoiling the surface appearance of the products and severely reducing their service life. On Galvsteel® material this will appear as a white corrosion product (white rust), whereas on Zincalume® the corrosion product is black. This should not be confused with fretting. On COLORSTEEL®, the result of wet storage damage could be a bubbling of the paint surface. Damage resulting from such failure invalidates the warranty and is not recoverable from New Zealand Steel Limited.



INSTALLATION



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Safety
Installing roofs involves many hazards including laceration, electrocution, puncture and falling from height. Prudent PPE and installation practices must be employed, and the guidelines of MBIE "Best Practices for Safe Working at Height" must be strictly adhered to.

Handling
New Zealand Steel products are of high quality and perform best when handled correctly.

- Don't handle them roughly or carelessly.
- Don't drag or slide new sheets over other sheets or rough surfaces.
- All equipment and materials taken on to the roof should be clean and care taken to prevent damaging the surface.

Footware
- Anyone walking on the roof should wear clean flat rubber-soled footwear to prevent marking.
- Put an old mat or piece of carpet at the base of the ladder so that shoes can be cleaned before going up on the roof, or dirty shoes should be removed and replaced at base of ladder
- Care should be taken walking on roofs as they may be slippery at times.

Strippable protective film
Strippable film is a clear pressure sensitive polyethylene plastic film that is applied to some COLORSTEEL® products in the New Zealand Steel paint line to assist in protecting the COLORSTEEL® surface from damage and scratching during forming, transportation, handling, storage and erection.

Strippable film is designed to provide some protection to the COLORSTEEL® product prior to and during installation on the building. It is not designed to protect against corrosion, humidity or chemicals.

Storage
COLORSTEEL® product with film applied must be stored at temperatures less than 50°C and out of direct sunlight to avoid prolonged UV exposure. The product needs to be kept dry to prevent moisture ingress between the film and the painted surface. In the longer term this may cause issues to the COLORSTEEL® and in the shorter term cause the film adhesive to whiten and breakdown leaving residue on the painted surface when the film is removed.

Usage
Storage requirements for formed products on building sites are as above. The film is intended to protect the painted product up to and during installation, it must be removed directly before or immediately after installation. Failure to do so may result in the film adhesive leaving a residue on the painted surface.

On removal of the film the painted surface must be inspected and any adhesive residue cleaned off. Mild household cleaners be may be used, check that the cleaning product manufacturer recommends the product as being suitable for use with painted surfaces and all of the recommended safety precautions are followed. Ensure the cleaning product is washed off the COLORSTEEL® surface with fresh water after use.

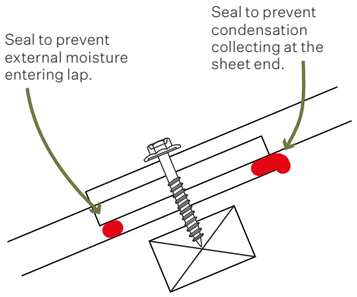
Marking
Black lead pencils must never be used for marking COLORSTEEL®, Zincalume® or Galvsteel® products. The carbon in the pencil promotes corrosion which will etch the surface of the material, leaving a permanent mark. Use a pencil of any colour other than black, a marker pen, chalk or crayon.

Cutting
Cut COLORSTEEL® with care to avoid marring the high-quality finish. Cut by shear only, using nibblers or hand shears. Friction blades and high-speed saw blades must not be used. These blades will damage both the metallic coating and the COLORSTEEL® surface by creating excessive heat, and generate large amounts of hot swarf which may embed into the coating surface.

All debris must be swept off the job at the end of each day. Prevention of swarf damage is far easier than its cure. See Swarf Staining Bulletin for more information.

Sealing and joining
Sealing
Soldering should not be used on COLORSTEEL® or Zincalume®, use only neutral cure silicone rubber or MS polymer sealants. Pre-align the pieces to be joined and pre-drill if possible. Thoroughly clean off surplus sealant and swarf using a dry, lint-free cloth or plastic scraper. Apply two beads of sealant close to each edge of the joint. Align pieces together and fasten with sealed rivets at 50mm centres.

End Laps
End laps in profiled metal roofing should be avoided where possible. When unavoidable, the end laps should be sealed with a double bead of sealant as in the illustration below.



Fastening
The selection of the appropriate form of fastener is important. Fastener durability should equal or exceed that of the material being fastened. Fasteners used on COLORSTEEL® products should be factory colour matched prior to installation.

Screw fasteners
Screw fasteners of a length sufficient to give adequate penetration into supporting structure are to be used. Refer to manufacturer for specific recommendations. Fasteners should be a minimum of Class 4 for severe environments, and Class 5 for very severe. They should be manufactured and coated in materials compatible with the material being fastened, and be fitted with a low carbon, non-conducting sealing washer.

Rivets
Rivets should be minimum 4mm diameter aluminium. Sealed rivets are preferred over unsealed as they do not require the addition of a dab of sealant on the face to achieve weatherproofing.

Spacing
Fasteners should be of grade and type suitable for the application, installed at spacings required by design loads and manufacturer's recommendations. On buildings constructed to NZS 3604 a consistent fixing pattern should be used on all fastener rows, for other buildings, greater fastener density may be required around the periphery. All purlins must be fastened so that they each contribute to resisting uplift forces.

Rivets on flashings should be placed at 50mm centres.

Setting
Fasteners should be seated snugly to give a good seal, without distorting the roofing profile. Overdriving, over-tightening or using too many fasteners can cause purlin marking and other damage, and can contribute to roof noise.

Driving
Impact screw guns can cause damage to the heads of screws and cause damage to protective coatings, as can worn driving sockets. Use only drivers recommended by the fastener supplier, and snug fitting drive sockets.

Allowance for expansion
All roofing and cladding is subject to expansion and contraction due to temperature extremes. This is particularly evident with darker colours and long spans where the expansion may be as much as 8.0mm for a 10.0 metre sheet. Screws fitted with profiled washers for the purposes of allowing thermal expansion must be installed centrally through a 9mm diameter pre-drilled hole in the roof sheeting.

Flashings
For transverse flashings, aluminium soft edging may be used, or flashings may be notched into rib and secret fixed profiles. Where penetration flashings are required, proprietary EPDM boot flashings may be used, or bespoke flashings may be fabricated in accordance with the Profiled Metal Roofing Code of Practice.

Flashings should not have edges that impinge on adjacent coated surfaces, and longitudinal edges such as barge downturns must have a small gap between downturn edge and neighbouring pan.

Sheet ends
The pans at the top end of sheets must be turned up to form a stop end. On roof pitches below 8°, ensure that the gutter end of profiled sheets is turned down.



PREVENTING PROBLEMS

Water ponding

Roofs

Ponding will create prolonged time of wetness, and increase the build-up of debris. Ponding will detract from coated steel product life and will invalidate the product warranty.

Where the roof pitch is low, changes in structure alignment or damage to the roof sheets may result in a negative pitch and consequently lead to water ponding. The following conditions commonly cause water ponding:

- Over-spaced purlins
- Deformation of timber purlins
- Placement of external loads such as air conditioning units
- Careless roof foot traffic
- Excessive canning of the profile pans
- Incorrectly installed penetrations

Gutters

Gutters must be installed with adequate fall to ensure all water is transported to appropriately located downpipes. The installation and downpipe construction should allow the gutter to drain completely. Regular gutter cleaning and maintenance is required to remove leaves and other debris that may restrict water flow to downpipes. Particular care should be taken at the entrance to downpipes and corners, to avoid blockages leading to water ponding.

A gutter protection system (or any other product) that entraps debris and/or water between itself and any steel product surfaces, restricting the coated steel's ability to dry, is not recommended and is an exclusion in the product warranty.

Foot traffic

1. Use purlin spacing guidelines for Heavy Traffic if roofs are to be accessed by maintenance personnel.
2. Consider the use of walkways to prevent damage where the roof may be subject to heavy foot traffic.
3. Do not use the roof surface as staging for work on adjacent building facets.

Colour match paint

Colour match paint is designed for matching accessories to the COLORSTEEL® material. Colour match paint is not designed for repairing marks or blemishes. Fasteners and accessories requiring colour matching should be painted prior to installation.

Minor scratches

Air-dried paints used to disguise marks will weather at a rate different from that of COLORSTEEL®, sometimes dramatically so, and will often become more apparent than the mark they are intended to disguise. Minor scratches are best left alone, they will not affect the performance of the COLORSTEEL® product due to the self-healing qualities of the primer and metallic coating, and become less evident as the coating weathers.

Minor scratches may be described as scratches that do not extend to the metallic coating, are less than 3mm in width, and are not visually noticeable from a distance of 3 metres. This definition will however vary with the concentration of the scratches, and the visibility of the area affected.

Widespread coating damage to any COLORSTEEL® product can only be rectified by replacement of the affected sheets.

Lichen

Temperature, dust and rainfall can create a good environment for lichens to establish and flourish, and this can occur on almost any surface. For more information on Lichen treatment refer to Removal of Lichen bulletin.

Sunscreen

Sunscreen containing titanium dioxide or zinc oxide can accelerate the degradation of organic materials including auto finishes and COLORSTEEL® surfaces. This damage is irreparable so prevention of its occurrence is the only defence. See Sunscreen bulletin for more information.

FIELD PAINTING

Zincalume® and Galvsteel® are readily paintable using good quality primers and topcoats. Metallic coated roofs can be painted immediately after installation. Dirt, grease and any loose materials must be cleaned off so the surface is clean and dry prior to the first coat being applied. A popular solution is to apply a good quality galvanised iron primer and two topcoats, following the manufacturer's recommendations.

COLORSTEEL® can be painted after exposure to weather. Normally 12-18 months exposure is required to achieve surface modification of the surface to allow the new coating to adhere.

Side laps of unpainted Zincalume® steel do not require lap priming.

MAINTENANCE

Regular maintenance will increase the life of your COLORSTEEL®, Zincalume® or Galvsteel® roof. Rain washing will keep most exposed roofs clean and free of contaminants, but regular inspections should be conducted and any localised build-up of debris removed. Unwashed roof areas and wall cladding may require regular manual washing in accordance with New Zealand Steel guide: *Maintenance Recommendations*.

WARRANTIES

Warranties specific to each contract are issued through the Rollformer by New Zealand Steel Limited. In order to ensure the appropriate product is specified for the intended service life in any given environment, New Zealand Steel Limited recommends that they be consulted as early as possible in the design stage to ensure correct material selection and backing by an appropriate warranty. For information on environments, warranties and maintenance see Environmental Categories, Warranty and Product Maintenance Recommendations brochure.

SDC - Approved Document - Building Code Compliance - Roofing - Profiles - Colorsteel - Zincalume - Galvsteel - Roll Former - Steel Roofing - Roof Cladding - Roof Profiles - Roof Colours - Roof Warranty - Roof Maintenance - Roof Installation - Roof Design - Roof Specification - Roof Selection - Roof Guide - Roof Brochure - Roof Catalogue - Roof Manual - Roof Handbook - Roof Technical - Roof Data - Roof Information - Roof Resources - Roof Downloads - Roof PDF - Roof Document - Roof Publication - Roof Literature - Roof Reference - Roof Library - Roof Archive - Roof Collection - Roof Series - Roof Range - Roof Options - Roof Choices - Roof Alternatives - Roof Comparison - Roof Review - Roof Evaluation - Roof Assessment - Roof Analysis - Roof Study - Roof Research - Roof Development - Roof Innovation - Roof Technology - Roof Engineering - Roof Construction - Roof Building - Roof Renovation - Roof Repair - Roof Replacement - Roof Upgrade - Roof Improvement - Roof Enhancement - Roof Protection - 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assistance, please contact:
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Private Bag 92 121, Auckland 1142
Free Phone: **0800 697 833**
Email Address: **info@colorsteel.co.nz**
www.colorsteel.co.nz
www.nzsteel.co.nz

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NEW ZEALAND MADE

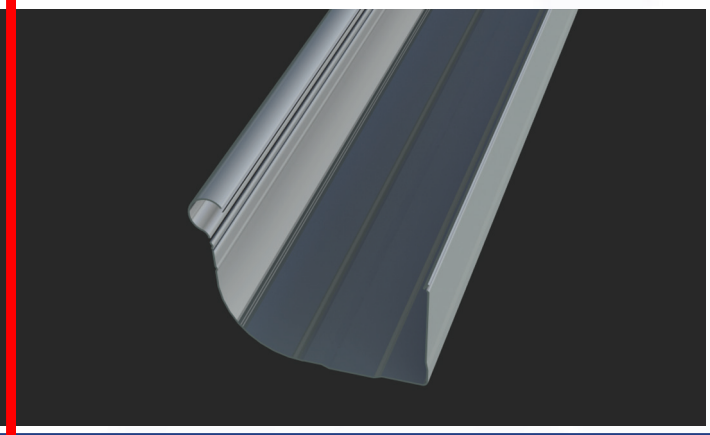
Metalline Quad Gutter

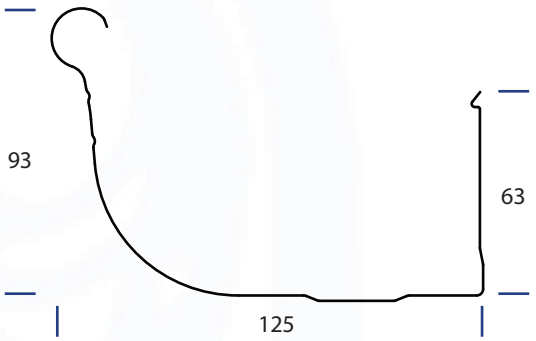
In Christchurch product is known as Colonial Quad Gutter

Metalcraft ROOFING
0800 ROOFNZ (0800 766369)
Issue Date August 2008

Metalline Quad Gutter is our most popular residential profile. Whether you are renovating or involved in a new build, this profile will enhance the appearance of your home. The Metalline system uses concealed brackets and is compatible with Metalcraft Metalline Fascia or timber fascia. Metalline Quad Gutter is available with overflow slots to prevent flooding from blockages, and snow straps are stocked to suit this profile if required. Metalline Quad Gutter is available in Zincalume, Galvsteel, Colorsteel Endura and Colorsteel Maxx.

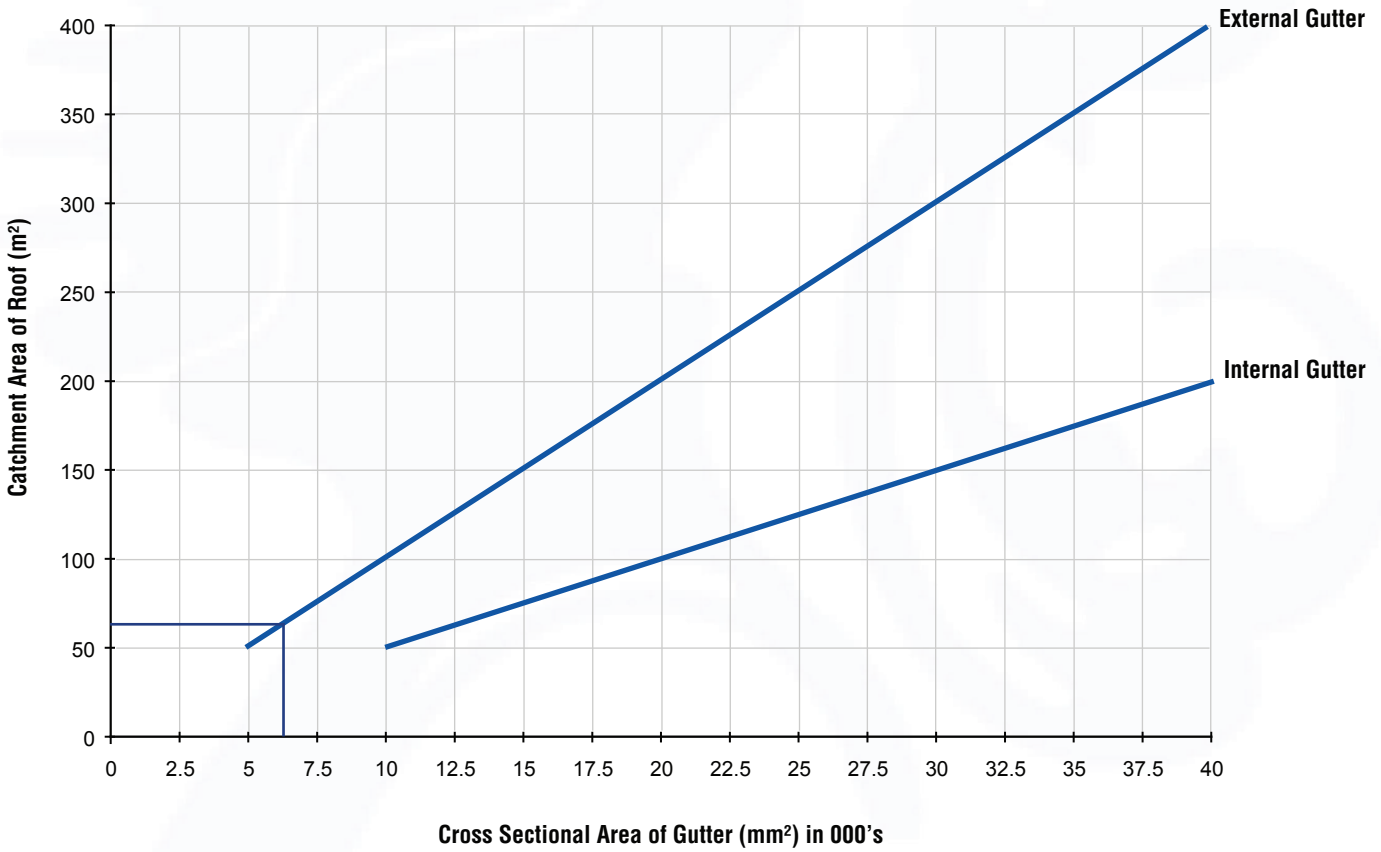
Cross-sectional Area: 5550mm²





all dimensions are nominal

Catchment Area of Roof v Cross Sectional Area of Gutter



Note: The graph is based on a rainfall intensity of 100mm / hour and roof pitches less than 10 degrees.
For more information on roof catchment areas and the effect of gutter cross sectional areas download the document on Roof Drainage

Manufacturing Locations Hamilton, Christchurch

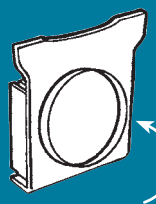
Metalline Quad Gutter is available for purchase from all Metalcraft branch locations

www.metalcraft.net.nz

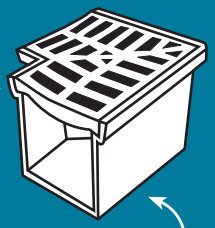
SDC - Approved Application Document B2/AS1 Clause 7.1.3 Figure 7.1 Page 463 of 723 20/06/2012 Uncontrolled when printed

Drainage made simpler.

RELN

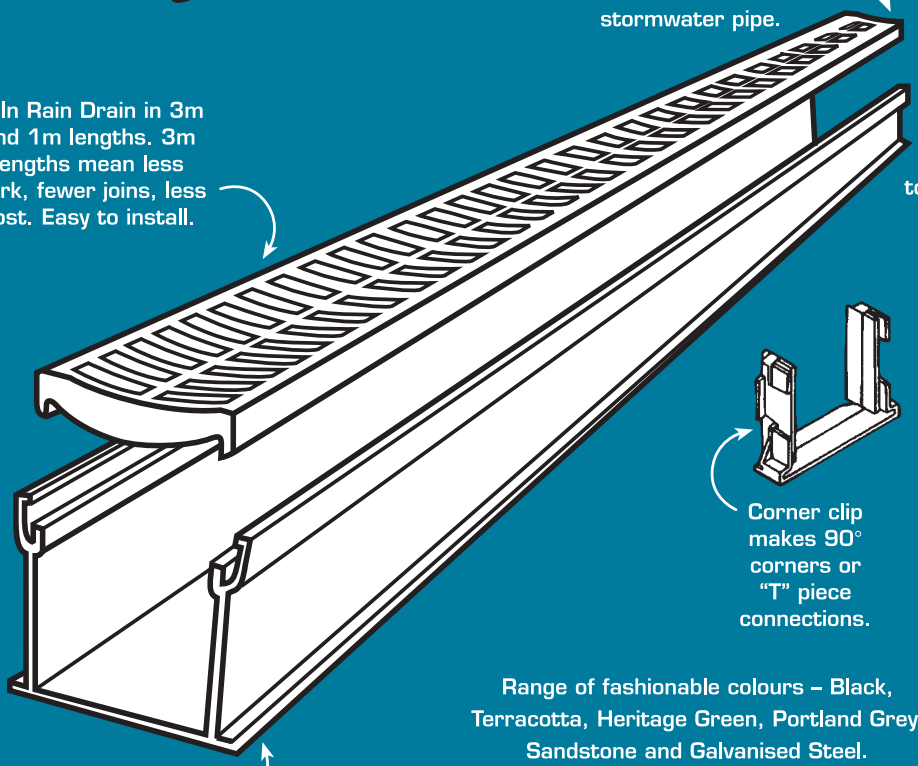


End Cap finishes off end of drain or connects to 90mm stormwater pipe.

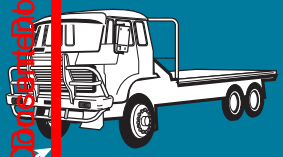


The quick easy way to create 90° corners.

Reln Rain Drain in 3m and 1m lengths. 3m lengths mean less work, fewer joins, less cost. Easy to install.



Corner clip makes 90° corners or "T" piece connections.



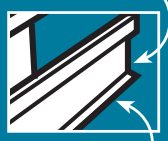
Reln Rain Drain withstands 5 tonne vehicle without moving in the concrete.

Range of fashionable colours – Black, Terracotta, Heritage Green, Portland Grey, Sandstone and Galvanised Steel.

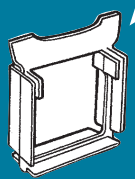




Hold down feet stop movement once concrete sets.



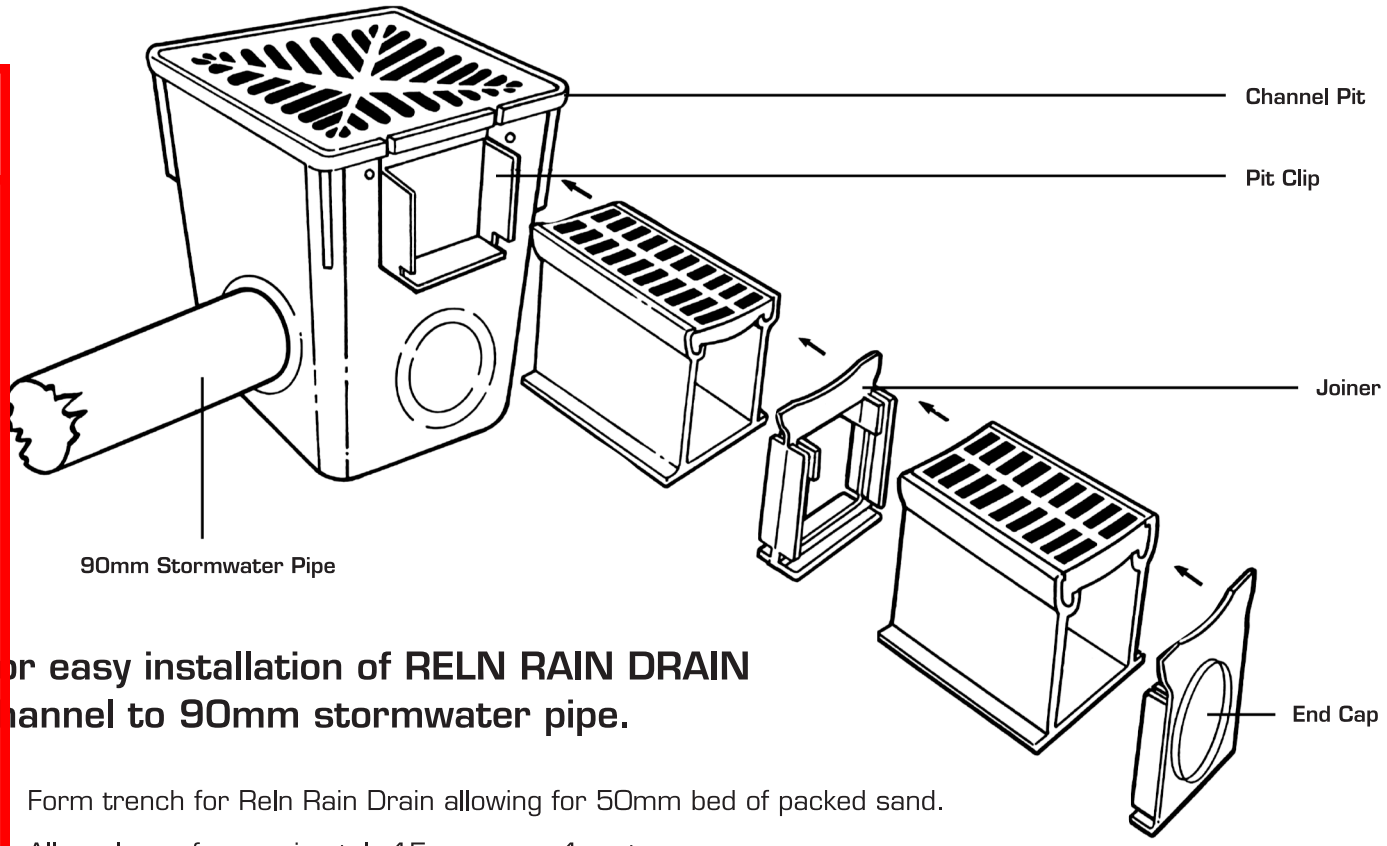
Feet also prevent flotation during concrete pour.



FREE joiner allows easy joining of lengths and reuse of offcuts to avoid waste.

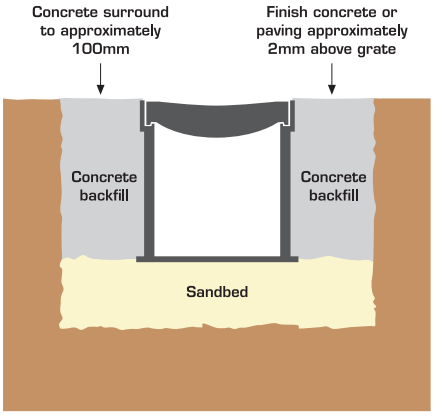
RELN RAIN DRAIN

Use this simple Rain Drain system



For easy installation of RELN RAIN DRAIN channel to 90mm stormwater pipe.

1. Form trench for Reln Rain Drain allowing for 50mm bed of packed sand.
2. Allow slope of approximately 15mm every 1 metre.
3. Join lengths with free Joiner supplied.
4. Use End Cap at highest end of installation.
5. At lowest end use Pit Clip to join channel to Channel Pit which connects to the stormwater pipe to clear away water.
6. Seal joints with silicone.
7. Use Reln Leafguard inside the Channel Pit to collect debris.
8. Install with grate fitted. Protect grate from concrete splash with masking tape.
9. Pour concrete to fill trench on each side of the Rain Drain channel. For efficient water flow into grates, set grates 2mm below concrete or paver surface.
10. Allow 72 hours cure before vehicle use. Remove tape from grates.



RELN RAIN DRAIN

Note: The Reln Rain Drain range is subject to intellectual property protection.

RELN

SDC Approved Drawing Document Set 2230781 Dated 07/10/2022 Approved Building Consent BC 220462 Dated 08/12/2022 of 22406/2024 Dated 4/20/2024 phillid

SDC - Approved Document BCA 2307 BCA 2207 Volume 1 Amendment 1 of 2207 Class 2 to 9 Buildings - Volume 1 of 2207 Class 2 to 9 Buildings - Volume 1 of 2207 Class 2 to 9 Buildings - Volume

ARDEX WPM 001

(Superflex Bathroom and Balcony Premixed) Single Component Undertile Waterproofing Membrane

PRODUCT DESCRIPTION

ARDEX WPM 001 (Superflex Premixed) is a tough, ready to use waterproofing membrane specifically designed for use under tiles. ARDEX WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

ARDEX WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

- Fast drying ARDEX WPM 001 can be tiled over in 48 hours in non critical areas*.
- Fibre reinforced: Excellent strength, eliminates need for reinforcing mat.
- Flexible: Accommodates normal building movement class 3 membrane as per AS 4858: 2004 Wet Area Membranes.
- Advanced acrylic: Will not re-emulsify once cured.
- Designed for tiling – Fully compatible with ARDEX tile adhesive systems.
- Water based, safe to use, low odour and easy cleaning.
- Conforms to the requirements of Australian Standards 4858: 2004 Wet Area Membranes.

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

APPLICATION RANGE

Performance levels

Commercial and residential.

Location

Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic.

Surfaces

Walls and floors.

Substrates

Concrete	Cured for min. 28 days or sealed when set with one coat of ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of ARDEX HydrEpoxy WPM 300 as above.
Renders and screeds	Cured for min. 7 days or sealed when set with one coat of ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of ARDEX HydrEpoxy WPM 300 as above.
Fibre cement	Wet area grade fibre cement.
Plasterboard	Wet area grade only.
Plywood	Structural plywood (PAA branded), marine grade or other wet area grade only. Special preparation is required – contact ARDEX. Not recommended for external use (refer ARDEX).
Particleboard	Wet area grade, internal use only (special preparation is required – contact ARDEX). Not recommended for external use (refer ARDEX).
Permanent Immersion	In conditions of permanent immersion, it is recommended that ARDEX WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.

Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

SPECIFICATION CLAUSE

ARDEX WPM 001 (Superflex Premixed)

The waterproofing membrane shall be ARDEX WPM 001: a one part acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

PACKAGING

Single component: 20kg (approx 15 litres) or 6.5kg (approx 5 litres).

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

TABLE 1

	Thickness per coat		Total dry film thickness (2 coats)	Theoretical coverage		Per unit
	Dry film	Wet film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m²	7.5m²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m²	15m²	20kg(15L) unit

COVERAGE

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5–15m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table 1.

DRYING TIMES

Recoat time

1–2 hours at (23°C / 50% RH) between first and second coats. Alternatively, if a woven cloth reinforcement mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. ARDEX WPM 001 is totally dry in 48 hours at 23°C / 50% RH, but can take up to 72 hours at 10°C / 50% RH in corners or for thick films.

Fully cured

The shower should not be used until the membrane has reached its full strength. ARDEX WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX HydrEpoxy WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the ARDEX WPM 001.

For substrates or situations other than those listed contact ARDEX.

SAFETY DATA

ARDEX WPM 001 is non-hazardous and non dangerous. In case of skin contact, flush with running water. In case of irritation seek medical advice. If swallowed, immediately give a glass of water.

Additional information is listed in the Material Safety Data Sheet.

QUALITY PRODUCT

ARDEX WPM 001 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

ARDEX WPM 001

(Superflex Bathroom and Balcony Premixed) Single Component Undertile Waterproofing Membrane

USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with ARDEX instructions and in applications for which they are intended.

APPLICATION

Apply ARDEX WPM 001 by brush or roller. A medium nap (12–15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and lightly finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25–40 micrometers wet film thickness while ARDEX WPM 001 needs to be applied at between 0.5 and 1.0mm per coat depending on product and application (Refer Table 1).

Critical areas:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian Standards 3740 – 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall and floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber), and that the top of the hob does not slope outwards.
5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS 3740 and the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 100mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Plastic (eg. PVC) fittings should be primed with a solvent based plumbers primer. Prime metal surfaces with a suitable metal primer.
14. Apply the membrane 1800mm up the walls or 80mm above the height of the shower rose within the shower recess.
15. Install the shower screen to inside edge of the hob.

Fig.1 – Shower recess – Critical areas

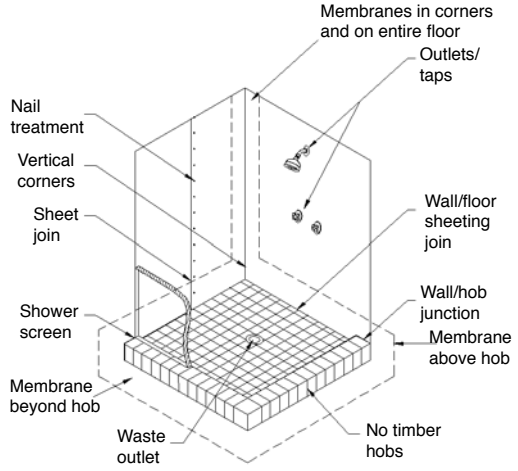
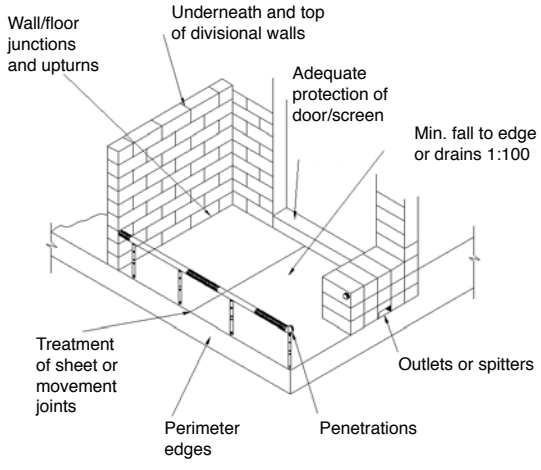


Fig.2 – Balcony – Critical areas



SDC - Approved Application Document BCA 230/07 Balconies and Decks - Page 4 of 7 - 5/2/2008 - 2:16:46 PM

BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.
2. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/sliding door.
3. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
4. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
5. Apply the membrane as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
6. Where possible, apply the membrane prior to building divisional walls.
7. Apply the membrane to the entire balcony floor and at least 100mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
8. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
9. Apply the membrane down over the front edge of the balcony onto the drip rail.
10. Carefully seal any gaps around balcony penetrations with a neutral cure silicone prior to applying the membrane.
11. Apply the membrane down into outlets and drains, ensuring excess material is removed.
12. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2 metre (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of ARDEX WPM 265 water based primer by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the ARDEX WPM 001 membrane. This will take around 20–30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m² per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION

Crack preparation

Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with ARDEX WPM 265 water based primer and allow to dry before applying two coats of ARDEX WPM 001 membrane in a band at least 200mm wide equidistantly across the crack and along the length of the crack.

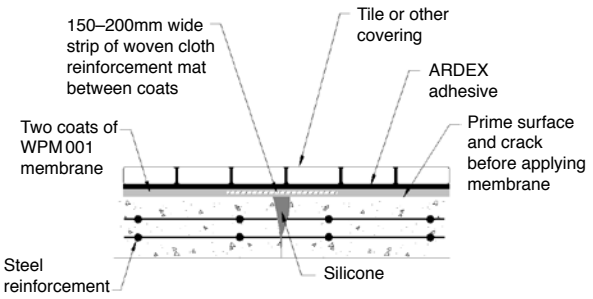
Cracks 2–6mm:

(Refer Fig.3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

Contact your local ARDEX representative.

Fig.3 – Crack treatments



ARDEX WPM 001

(Superflex Bathroom and Balcony Premixed) Single Component Undertile Waterproofing Membrane

MOVEMENT/CONSTRUCTION JOINTS

Movement joints (<6mm)

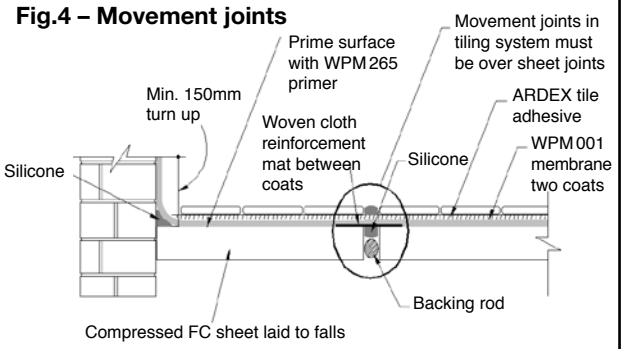
Use same procedure as in crack preparation.

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the mat and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of ARDEX Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)

Fig.4 – Movement joints



Corners and coving areas

After priming with ARDEX WPM 265 water based primer and allowing it to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates in coving areas and corners. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry.

Apply a first coat of ARDEX WPM 001 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be minimum of 1.0mm). Alternatively, if a reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

WALL/FLOOR JUNCTION

After priming with ARDEX WPM 265 water based primer and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX Deckweb woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The ARDEX WPM 001 should be applied to at least 150mm up the wall surfaces as per the recommendations for the application of ARDEX WPM 001 to floors.

Walls

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 0.5mm.

After priming with ARDEX WPM 265 water based primer and allowing to dry, apply two coats of ARDEX WPM 001 (to achieve a minimum dry film thickness of 0.5mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Floors

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 1.0mm. The flooring recommendations should be extended at least 150 mm up all perimeter walls.

Prime the surface with ARDEX WPM 265 water based primer and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1–2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone sealant. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

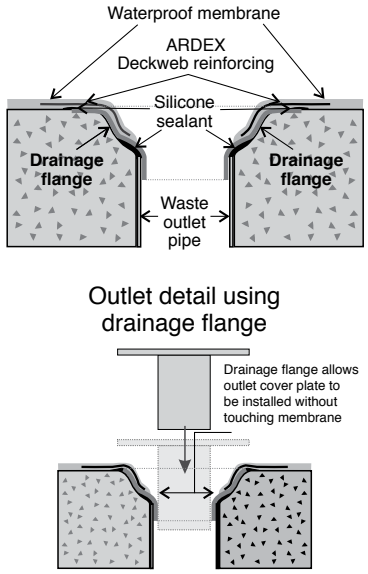
Waste outlet

Prime the surface with ARDEX WPM 265 water based primer and allow to dry. Surfaces of the outlet flange must be primed with an appropriate primer.

Plastic (eg. PVC) fittings should be primed with a solvent based plumbers primer. Prime metal surfaces with a suitable metal primer.

Apply ARDEX WPM 001 over the adjacent floor surface extending down into the waste outlet flange overlapping the edge of flange by at least 30 mm. Place ARDEX Deckweb woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig.5)

Fig.5 – Waste outlet



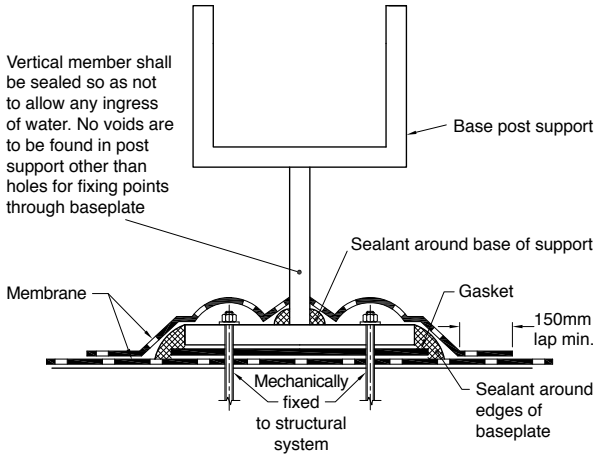
Balcony penetrations (Refer Fig.6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 12mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of ARDEX WPM 001 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.0mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

Fig.6 – Post membrane installation



Tiling systems

It is advisable to conduct a flood test of the waterproofed area once the membrane has cured (normally after 72 hours), and before the tiling commences. A broad range of ARDEX tile adhesives can be used over ARDEX membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

TECHNICAL DATA

ARDEX WPM 001 (Superflex Premixed)
Characteristics of liquid

Form and colour	Blue viscous paste
Type	Single part
Specific gravity	Approx. 1.3kg/litre
pH of liquid	8.5
Tensile strength 7 days dry AS1145	1.04 MPa
Full cure	1.92 MPa
Elongation at break 7 days dry AS1145	780%

Conforms to requirements of class 3 membrane of AS/NZ 4858: 2004 Wet Area Membranes.

VOC content	18g/L

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% R.H).

DISCLAIMER

The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable Australian Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program.

Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations.

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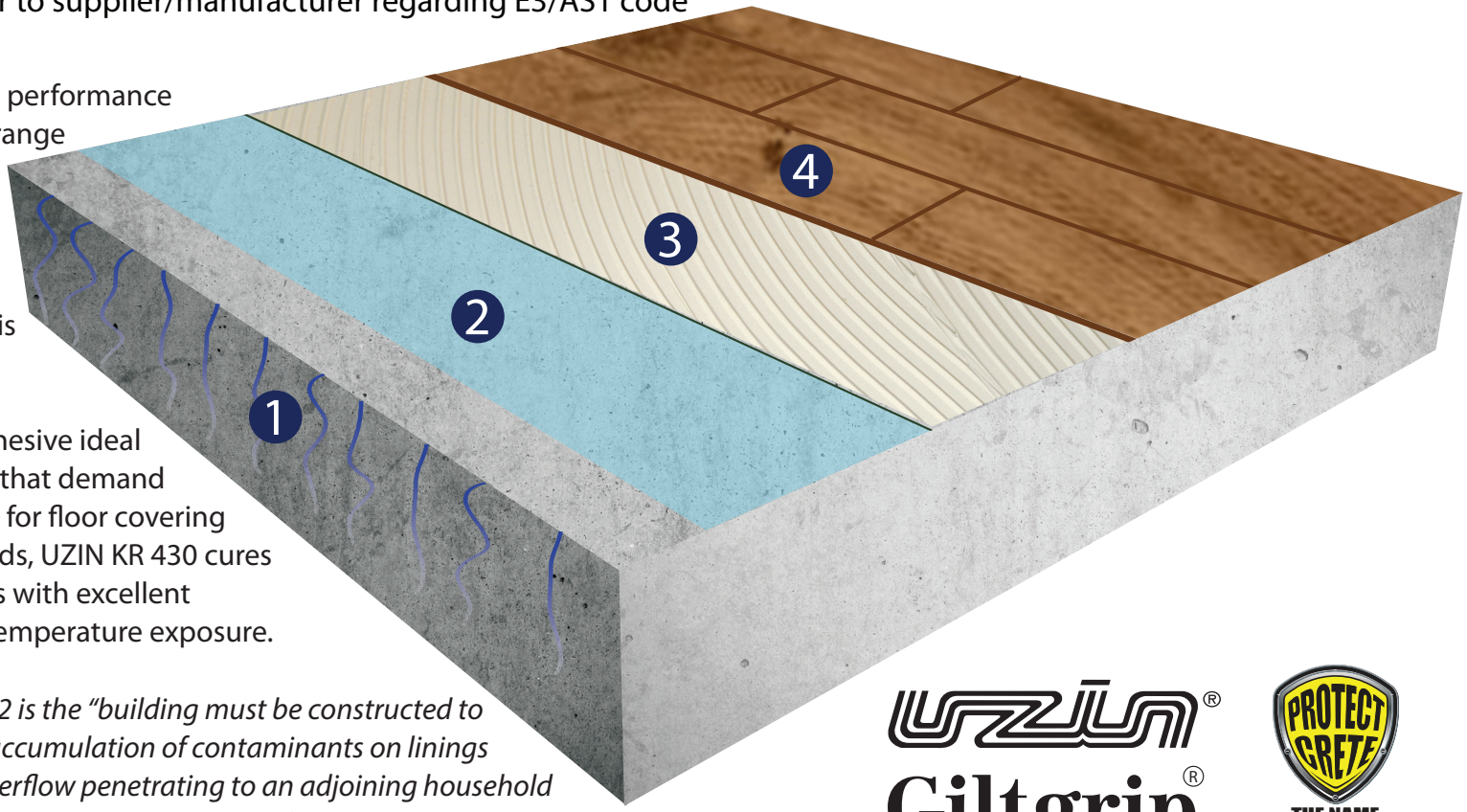
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Wellington	Ph (04) 568 5949	Fax (04) 568 6376
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October 2010

LUXURY VINYL TILE (LVT) WET ROOMS WATERSPLASH INSTALLATION SYSTEM ALTERNATIVE SOLUTION - E3/AS1 BUILDING CODE- INTERNAL MOISTURE FOR FINISHES TO FLOORS: BATHROOMS

Must be read in conjunction with E3/AS1 November 4th 2021 Building Code. The following information is based on adhesive performance only to assist in the Alternative Solutions options for the installer. It is essential the LVT supplier provides their own documentation as to the floorcoverings suitability as required by E3/AS1.

1. Concrete substrate treated with Protect Crete Densi-Proof (Optional.)
2. Subfloor Preparation Systems (Optional site specific as required.)
   Subfloor primed with Uzin PE280 (Non-porous) or Uzin PE520 (Porous)
   OPTION 1.) Uzin NC160 or NC170 Levelling Compound
   OPTION 2.) Uzin NC888 feather Finish
3. **ADHESIVE OPTION 1:** UZIN KE68T 1- Component Hybrid Adhesive
   ADHESIVE OPTION 2: UZIN KR430 2-Part Urethane Adhesive
4. Luxury Vinyl Tile (LVT) as Specified: Refer to supplier/manufacturer regarding E3/AS1 code compliance.



Uzin KE68T adhesive is a single component high performance 'urethane type' adhesive that issuited to a large range of installations requiring high dimensional stability in extreme conditions such as sun-drenched areas, high point loading and areas requiring water-resistance from the top of the floorcoverings (wet areas). Uzin KE68T adhesive is suited to installations on floors and walls.

UZIN KR 430 is a 2-component polyurethane adhesive ideal for the installation of all types of floor coverings that demand reliable bonding in extreme conditions. Suitable for floor covering installations subject to heavy use and rolling loads, UZIN KR 430 cures to an extremely high final strength and hardness with excellent resistance to plasticizers, surface moisture and temperature exposure.

The Functional requirement given in the clause E3.2 is the "building must be constructed to avoid the likelihood of – (a) Fungal growth or the accumulation of contaminants on linings and other building elements; and (b) Free water overflow penetrating to an adjoining household unit, and (c) Damage to building elements being caused by the presence of moisture"

UZIN® Giltgrip®

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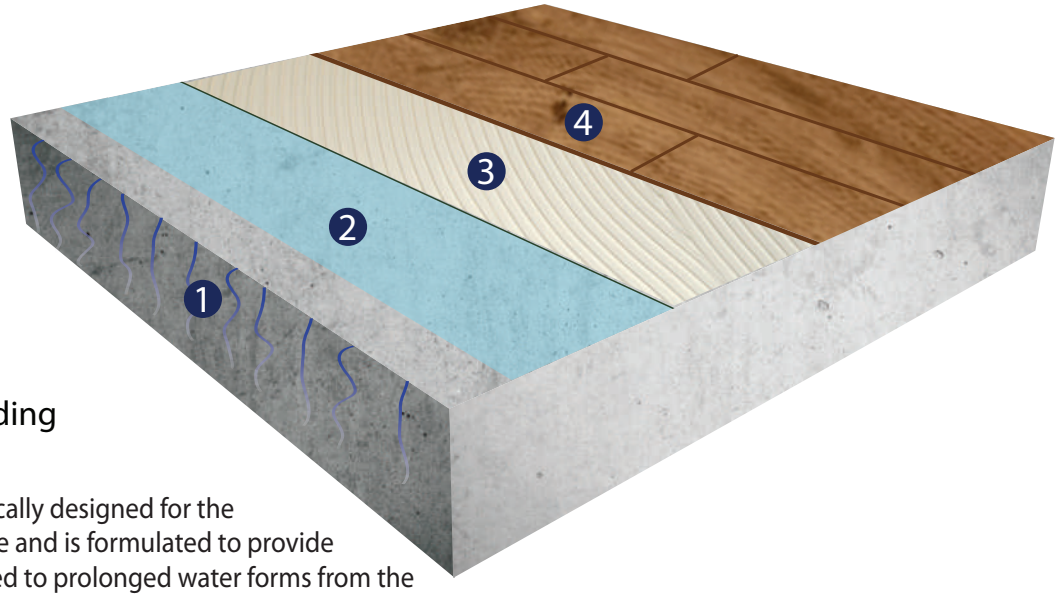
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Uzin KE68T Compliant 1 - Page 489 of 540
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LUXURY VINYL TILE (LVT) WET ROOMS WATERSPLASH INSTALLATION SYSTEM ALTERNATIVE SOLUTION - E3/AS1 BUILDING CODE- INTERNAL MOISTURE FOR FINISHES TO FLOORS: KITCHENS, TOILETS AND LAUNDRIES

Must be read in conjunction with E3/AS1 November 4th 2021 Building Code. The following information is based on adhesive performance only to assist in the Alternative Solutions options for the installer. It is essential the LVT supplier provides their own documentation as to the floorcoverings suitability as required by E3/AS1.

1. Concrete substrate treated with Protect Crete Densi-Proof (Optional.)
2. Subfloor Preparation Systems (Optional site specific as required.)
   Subfloor primed with Uzin PE280 (Non-porous) or Uzin PE520 (Porous)
   OPTION 1.) Uzin NC160 or NC170 Levelling Compound
   OPTION 2.) Uzin NC888 feather Finish
3. **ADHESIVE OPTION 1:** Giltgrip® 88 LVT/Vinyl Adhesive
   ADHESIVE OPTION 2: UZIN KE66 Fibre Reinforced Adhesive
   ADHESIVE OPTION 3: UZIN KE68T 1- Component Hybrid Adhesive
   ADHESIVE OPTION 4: UZIN KR430 2-Part Adhesive
4. Luxury Vinyl Tile (LVT) as Specified: Refer to supplier/manufacturer regarding E3/AS1 code compliance.



Giltgrip®88 PVC Tile & Vinyl Adhesive is a high performance, low VOC, acrylic based adhesive specifically designed for the installation of PVC planks and tiles. This low VOC formulation exhibits excellent plasticizer resistance and is formulated to provide quick initial grab for excellent adhesion. Giltgrip®88 is formulated for interior use only. When exposed to prolonged water forms from the top, a single or 2- component high performance 'urethane type' adhesive such as UZIN KE68T 1-part or UZIN KR 430 2-part must be used. Refer to document Giltgrip®88 Statement of Usage E3AS1 08122021.

UZIN KE66 Fibre-reinforced adhesive is a highly shear-resistant dispersion adhesive contributes greatly in minimizing open joints, e.g. for PVC design floor coverings. Uzin KE66 adhesive can be used in areas subject to elevated temperatures. When exposed to prolonged water forms from the top, a single or 2- component high performance 'urethane type' adhesive such as UZIN KE68T 1-part or UZIN KR 430 2-part must be used. Refer to document Uzin KE66 Statement of Usage E3AS1 12112021

UZIN KE68T adhesive is a single component high performance 'urethane type' adhesive that is suited to a large range of installations requiring high dimensional stability in extreme conditions such as sun-drenched areas, high point loading and areas requiring water-resistance from the top of the floorcoverings (wet areas). Uzin KE68T adhesive is suited to installations on floors and walls.

UZIN KR 430 is a 2-component polyurethane adhesive ideal for the installation of all types of floor coverings that demand reliable bonding in extreme conditions. Suitable for floor covering installations subject to heavy use and rolling loads, UZIN KR 430 cures to an extremely high final strength and hardness with excellent resistance to plasticizers, surface moisture and temperature exposure.

The functional requirement given in the clause E3.2 is the "building must be constructed to avoid the likelihood of – (a) Fungal growth or the accumulation of contaminants on linings and other building elements; and (b) Free water overflow penetrating to an adjoining household unit; and (c) Damage to building elements being caused by the presence of moisture"

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LPG Association of New Zealand

LPG Association Code of Practice
LPGA COP No 2

Installation and maintenance of twin 45kg LPG cylinder systems

July 2014







LPG Association of New Zealand Inc
PO Box 1776
Wellington
New Zealand

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Foreword

The performance of LPG cylinder installations is a critical element in ensuring that gas is supplied to appliances reliably and safely. This Code of Practice has been compiled with advice and input from across the industry in New Zealand and from international authorities. The Code of Practice captures the latest knowledge and design features gained from operating experience and investigative work conducted by the LPG Association.

The purpose of this Code of Practice is to:

- Assist with the reduction of phthalates from LPG systems.
- Assist with the removal of condensate at the regulator.
- Assist with the selection of suitable equipment and fittings.
- Assist with recommendations on equipment maintenance.

It should be read in conjunction with AS/NZS 5601.1.

It is intended that gas fitters will use this Code as a best practice guide for the installation and maintenance of domestic and commercial twin pack installations.

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Section 1: Scope, Interpretation, Definition and General

1.1 Scope

This Code of Practice sets out the requirements for installation and servicing of domestic and commercial 45kg twin cylinder LPG installations.

1.2 Definitions

For the purposes of this code the following definitions shall apply:

Accessible:

Access can be gained without hazard or undue difficulty for inspection, repairs, testing, maintenance, renewal or operational purposes.

Breather vent:

An orifice or opening designed to permit atmospheric pressure to act on the diaphragm of a regulator.

Condensate:

The liquid that separates from the gas down stream of any regulator due to the reduction in temperature resulting from pressure reduction.

Condensate trap (also known as a drip leg or tailpipe):

A device installed in a gas line to trap the condensate liquid.

EPA: Meaning the 'Environmental Protection Authority'.

Gasfitting:

Has the same meaning as in the Plumbers, Gasfitters and Drainlayers Act 2006.

Gas load:

The total gas consumption of all downstream appliances.

Gas Pressure Regulator:

A device that automatically regulates the outlet pressure of the gas passing through it to a predetermined value.

Automatic Change-Over Regulator:

Combination valve / first stage gas pressure regulator, fitted to a LPG multiple-cylinder installation which will automatically change over from a cylinder in use to a reserve cylinder at a predetermined pressure. May be included in a one piece automatic changeover valve assembly comprised of automatic changeover valve, first and second stage regulators and may incorporate pressure relief or over pressure shut off capability.

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HSNO:

Hazardous Substances and New Organisms Act 1996.

LAB number:

Number allocated by EPA when a cylinder is approved.

Lock-up pressure:

The maximum pressure in an installation when the regulator has closed and all appliances are shut down.

Non Return Valve:

A valve designed to operate automatically to prevent reversal flow in a pipe or fitting.

Phthalates:

Plasticisers mainly DOP (DiOctyl Phthalates) predominantly found in hose inner liners.

POL fitting (Prest-O-Lite):

The common name given for a standard union with left hand thread, used for connection to a 45 Kg cylinder.

Pigtail:

A short length of flexible tube or copper pipe completed with end couplings. Use for connecting the cylinder to the manifold or the changeover valve.

Pressure:

Pressure as measured above atmospheric pressure, also called gauge pressure.

Twin cylinder installation:

A cylinder installation where the cylinders are connected separately to the system. Each cylinder is connected to a change over valve that can be operated manually or automatically, to change over the cylinder which is supplying LPG to the installation. Connection may be made using flexible rubber or copper pigtails, or pipe fittings.

REFERENCED DOCUMENTS

AS/NZS 5601.1	Gas Installations
AS/NZS 1596	The storage and handling of LPG
AS/NZS 1869	Hose and hose assemblies for liquefied petroleum gases (LP Gas), natural gas and town gas
UL144	LP- Gas regulators
UL252, AGA 205	Compressed gas regulators
NF M 88-769	1977 Commercial Propane Installations In Movable Containers – Coupling And Automatic Changeover Device – Construction – Operation – Tests

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Section 2: Selection criteria for LPG Cylinders, Pigtails, Change-over valves and Regulators

2.1 Cylinders

(a) All cylinders must comply with the requirements of the EPA's Guide to Gas Cylinders.

(b) Cylinders filled for use in LPG installations must be stamped with an LAB or LABSP number and a current test date.

(c) Consideration should be given to ensure that the demand of the appliances to be connected to the system can be supplied by a 45kg cylinder. As a guide on NZ LPG mix, a 45kg cylinder is capable of supplying a duty cycle of 1kg/50MJ over the period of 1 hour. The instantaneous demand can exceed this rate for short periods. Table J2 of As/NZS 5601.1 provides more guidance on withdrawal rates for propane.

2.2 Pigtails

Refer to clause 4.6 of AS/NZS 5601.1

2.3 Changeover Valves

(a) Changeover valves can be manual or automatic, and may include a non-return valve on each pigtail connection. The valve must comply with the requirements of the Authority.

(b) Changeover valves may be comprised of a first & second stage regulator system in a single body, or as a combination of separate component items.

2.4 Regulators

(a) Regulators shall comply with the requirements of the EPA "Guide to Gas Cylinders".

(b) Regulators shall comply with the requirements of section J6 of AS/NZS 5601.

(c) Consideration must be given to the total expected gas load when sizing the regulator.

(d) A single stage regulator or the first stage of a mult-stage regulator shall be located so that the length of the piping that is subject to cylinder pressure is as short as practicable.

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2.5 Condensate Trap

Condensate traps remove condensate and prevent transfer downstream of most condensates present in the LPG. A condensate trap should be installed between the first and second stage regulator if they are separate items. If the regulator is the combined type then a condensate trap should be installed immediately after the regulator.

(a) Condensate traps must have a vertical limb in a direct line to the first stage regulator and be of a minimum volume of V=N X 5.5 where: V – The volume of the vertical limb in Milliliters (ml) N – The number of 45kg cylinders.

(b) The trap must have a plug or other means of removing the condensate.

Examples of length of condensate trap tube for 10 and 13 mm pipe and various numbers of cylinders.

Number of 45 kg cylinders	Length 10 mm pipe	Length 13 mm pipe
Two	140 mm	88 mm
Four	280 mm	180 mm
Six	370 mm	240 mm
Eight	560 mm	350 mm

2.6 Non-return valves

Where the regulator does not prevent LPG flowing across the changeover system, a non-return valve shall be fitted either in each pigtail connection of the changeover valve, or as part of each pigtail.

2.7 Excess flow valves

For flexible pigtails manufactured to AS/NZS 1869 an appropriately sized excess flow valve must be fitted immediately after the outlet of each cylinder valve. The excess flow valve can be an integral part of the pigtail assembly.

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Section 3: Location of Cylinders

3.1 Location of Cylinders

Refer to section J3 of AS/NZS 5601.1

3.2 Requirements for cylinder deliveries

Cylinder installations should be located such that the delivery of gas can be made safely by one person without excessive manual handling or risk to customers property. In situations where the following conditions cannot be satisfied, other options such as locating the cylinders remotely and piping to the installation should be considered.

(a) Cylinder installation must be designed to be capable of accommodating the size of cylinder intended for use, for either exchange or insitu fill applications.

(b) A minimum distance of 600mm should be provided between front of the cylinder installation and other structures to allow adequate access for the cylinder delivery to be made.

(c) The cylinder compound should be accessible by cylinder trolley.

(d) Paths should have a minimum width of 600mm.

(e) Steps should have a minimum of 2: 1 tread depth to tread rise. Maximum tread rise should be 125mm.

(f) Steps should not exceed 1.5m total rise.

(g) Paths should not exceed 20 deg gradients.

(h) Total distance from cylinder delivery truck parking area and cylinder installation should not exceed 75m.

(i) It must be possible to legally and safely park the truck while making the delivery.

(j) Access route should be firm and compact with adequate grip even in wet conditions.

(k) The access route should not be over delicate or decorative surfaces such as terracotta.

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Section 4: Location and Installation of Cylinders

Refer to section J4 of AS/NZS 5601.1.

4.7 Clearances around Cylinder

Refer to section J5 of AS/NZS 5601.1

4.8 Cylinder Safety Valve Discharge

Refer to section J6 of AS/NZS 5601.1

4.9 Regulators

Refer to section J6 of AS/NZS 5601.1

4.10 Test Points

Refer to section J6 of AS/NZS 5601.1

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Section 5: Maintenance of twin LPG Cylinder Installations

5.1 Cylinders

Cylinders should not be filled unless they have been tested and certified within the last ten years.

5.2 Flexible Pigtails manufactured to AS/NZS 1869

(a) Pigtails should be inspected visually for cracks and deterioration every time the cylinder is exchanged or filled.

(b) Pigtail connections should be checked with a soapy solution every time the cylinder is changed or filled.

(c) Pigtails should be replaced six years from the date of manufacture.

5.3 Change-over Valves

Changeover valves should be checked for correct operation in accordance with manufacturers recommendations or in the absence of any recommendation, at least every ten years.

5.4 First Stage Regulators

(a) The first stage regulator to be checked for correct operation in accordance with the manufacturers recommendations, or in the absence of any recommendation at least every ten years.

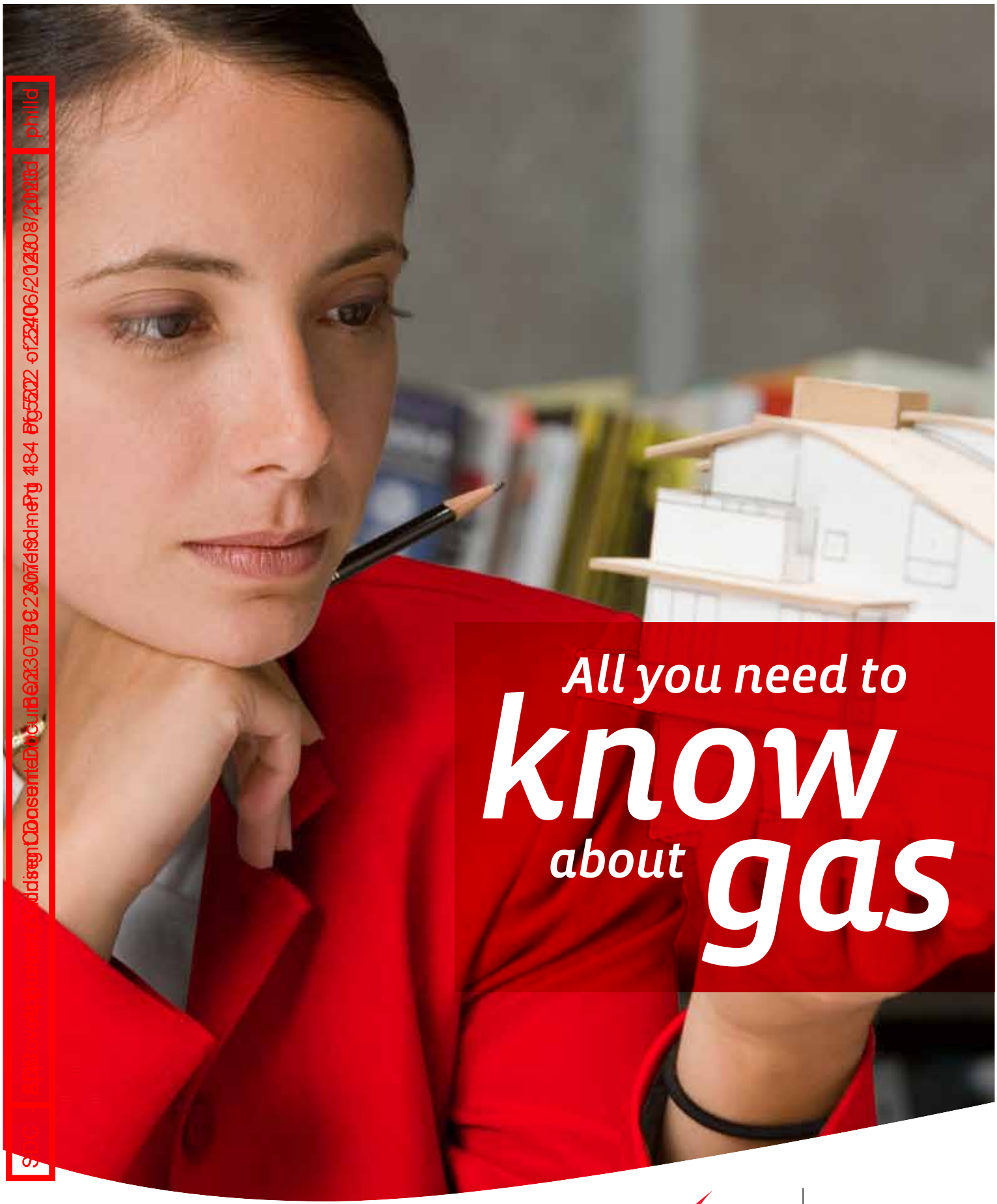
(b) The condensate trap to be drained by removing the drain plug provided) at intervals not exceeding two years, and at every visit of the Gas fitter.

5.5 Second Stage Regulators

The second stage regulator to be checked for correct operation in accordance with the manufacturers recommendations, or in the absence of any recommendation, at least every ten years. The rubber diaphragm and rubber seat must be inspected for deterioration and replaced if necessary.

5.6 Condensate Traps

Condensate traps should be emptied whenever any work is carried out on the installation and at least every 2 years. **NOTE** For the quantities of residue expected to be found in the condensate traps, between 2 to 3 ml maximum, use disposable gloves when emptying the residue into absorbent material. The used absorbent material and the gloves can then be disposed of in general waste.



All you need to know about gas

Contact Energy • February 2010

contact | rockgas

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We're here to help

Whether you're working with clients who are well informed about their energy choices or they're looking to you for guidance, we can help you make good decisions about energy services. That's because we have all the energy options covered – electricity, natural gas and LPG. We'll give you honest, upfront advice on the most efficient options for your project. As well as that, our DualEnergy™ discount means we can offer your customers instant savings if they choose a combination of electricity and natural gas (including Contact Rockgas LPG).

Of course, a supply of electricity is essential from day one of any building project, but the extensive benefits, widespread availability and lifestyle benefits of natural gas and LPG are good reasons to give careful consideration to gas applications as part of the design process.

This guide focuses on the technical requirements for specifying natural gas and LPG. We want to make sure you have all the information you need at your fingertips when you're specifying a new building or advising clients about major renovations.

Please get in touch with us if you want a hand with your design plans for electricity and/or gas services. We have an experienced team ready to help. We'll work with you to make the process easy and straightforward for you and your clients.

Here's how you can get in touch with us:

Phone:	0800 401 234 Monday to Friday, 8.30am to 5.30pm (excludes public holidays)
Email:	energyprojects@contactenergy.co.nz

Benefits of gas

Residential

Hot water

Continuous flow systems

Continuous flow hot water systems can be fuelled by natural gas or LPG. They offer a host of benefits:

- Economy – Water is heated to the required temperature at the time it's needed. Your client only pays for the hot water they use, not to store hot water they don't need.
- Continuous supply – Everyone in the house benefits from an endless supply of hot water, no matter how many showers, baths, dishwashing or laundry cycles are run.
- Control – A digital controller makes it easy to set the temperature. There are no cool surprises in the shower, and it keeps everyone safe from scalding themselves.
- Space saving – Removing the need for a hot water cylinder means you'll have more space to play with.

Storage systems

These systems are good for situations where clients have a steady demand for hot water throughout the day. They are also ideal where clients have specialist bathroom fittings that demand maximum water pressure, for example massage shower heads. In areas where there is intermittent electrical supply, a storage cylinder is a reliable provider of hot water as no electricity is required. We recommend you contact manufacturers such as Rheem for more information.

Home heating

Ducted central heating

Ducted central heating is an easy way to heat an entire home. It also offers space saving and clean lines through discreet flush-mounted outlets. A digital controller allows the user to tailor the warmth in each room, and for year round comfort, dual cycle units are available for air conditioning.

Flame-effect fires

Nothing beats a gas flame-effect fire. No wood or coal to store, no grate to clean, just heart-warming live flames to make the room the ultimate 'snuggle up' zone.

There is a huge choice of appliances in a wide range of styles, including inserts to convert existing fireplaces into super-clean realistic wood fires.

Radiant heating

Radiant heating is like the sun – the flames heat ceramic elements, which warm rapidly, pushing the heat out into the room. Radiant heaters are ideal for heating larger rooms quickly.

Forced convection heating

Forced convection heaters take in cool air and pump out warm air, circulating it outwards and upwards. Forced convection systems suit a variety of room environments and are ideal for heating all of the air in a room at an equal temperature.



Indoor cooking and outdoor lifestyle

Indoors

Almost every professional kitchen in New Zealand runs on gas. Only a gas flame allows for precise temperature control and infinite heat settings. In an instant, the temperature can go from cold to hot and back again.

Outdoors

There are many options now available for outdoor heating to create the perfect outdoor environment all year round. Wall-mounted or canopy-mounted heaters can be installed onto a reticulated gas network or to a Rockgas Cylinder HomePack.

SDC Approved Drawing Document DOC23078 Version 1.0 Page 4 of 24 06/2014 08:48:36 PM

Commercial

Hot water systems

Gas is a clear winner for heating water. It's ideal for:

- Meeting capacity and peak demand
- Quick heating of stored cold water
- Reducing costs through operating efficiency
- Fuelling continuous flow appliances, which eliminates storage losses
- Right to heavy demand range.

Water heating appliances come in a range of sizes. Smaller units are suited to small retail businesses, such as hair salons. Mid-sized appliances cater for applications like apartment blocks, dairy sheds, sports facilities and motels. The largest appliances are designed for businesses like large hotels, hospitals, production processes and commercial laundries.

Talk to one of our sales specialists who can assess your requirements and recommend the appliance and installation option that delivers the best solution.

Laundries

To run at peak efficiency, commercial laundries require a reliable supply of very hot water (usually 82°C). Gas-fired hot water systems are your best option. These range from continuous flow units for smaller systems, to high efficiency gas storage units for larger needs, right up to gas-fired boilers for hot water and/or steam generation.

Space heating

Gas heating offers instant, controllable and economic heat at a good price. It's ideal for heating cold, draughty commercial and industrial premises or where precise temperature control is required to optimise crop yield or livestock production. Potential savings can be achieved by combining the inherent economics of gas with thermostats and other electronic controls.

Radiant heating

Radiant heat is like the heat from the sun: it heats objects in its path so you feel warm, even if the surrounding air is cold. This makes radiant heating ideal for spot-heating draughty areas, such as warehouses.

Air conditioning

Air conditioning appliances perform the same function as heat pumps. Their efficient heating and cooling power has seen them become a popular choice for administrative areas, function centres and hospitality sites.

Forced convection heating

Forced convection air heating systems heat the air in a building. They can be direct-fired, indirect-fired or hot water systems. The very wide range of applications for these systems range from heating single rooms or showrooms through to large buildings, schools, rest homes, factories, warehouses, glasshouses and livestock sheds.



Cooking

Gas is indispensable in a commercial kitchen. Only a gas flame allows for precise temperature control and infinite heat settings. In an instant, the temperature can go from cold to hot and back again.

Drying

Gas-fired laundry equipment for drying and ironing is an ideal choice for any business, from the smallest laundromat or motel, to the largest hotel or hospital. Gas-fired clothes dryers save up to 50% over electricity (depending on tariff). In addition, these highly efficient units can dry large loads up to 20% faster than other fuelled dryers.

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Gas options and installation

We can supply gas almost anywhere in New Zealand. Natural gas is available to many parts of the North Island through the reticulated network. We also offer a wide range of LPG options and can supply most of the country through our Contact Rockgas branches and franchises. These include the popular HomePack (two 45kg cylinders), multi-cylinder banks, bulk tanks or connection to our commercial and residential reticulation networks in Christchurch, Queenstown and Wanaka.

Reticulated gas networks

Natural gas

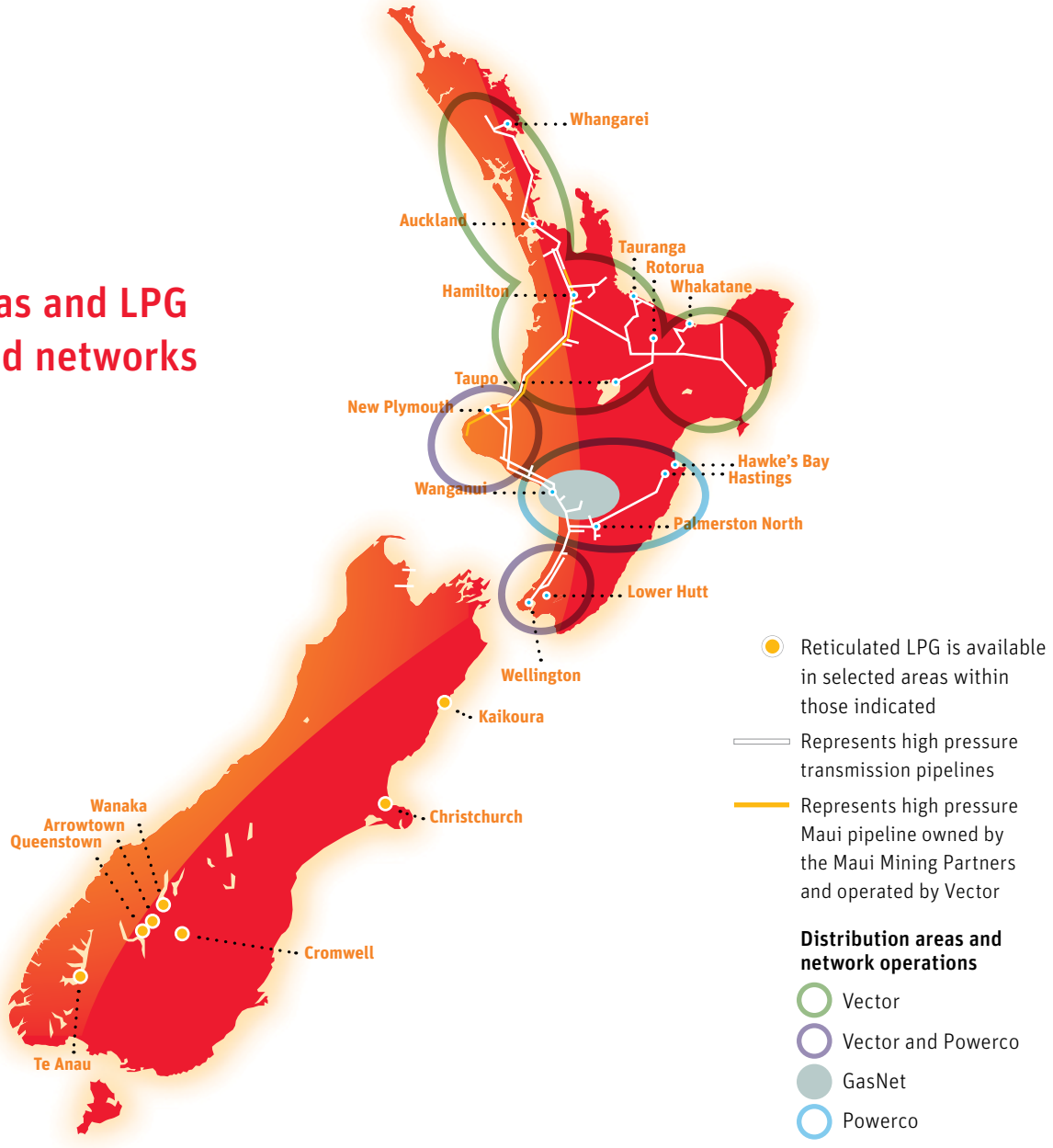
You might be surprised to learn just how widely available piped gas is in New Zealand. The map below shows the coverage of the various natural gas networks, plus our LPG reticulated networks.

LPG networks

Over ten years ago, New Zealand's first major LPG reticulation supply was developed by Rockgas (now part of Contact), with extensive networks in Christchurch and the southern lakes area including Queenstown and the Wanaka area. These networks continue to expand in line with demand. Businesses, in particular, have welcomed these developments. With no peak electricity demand charges to pay, many have been able to reduce their energy costs. Others have been able to reduce smog and pollution by replacing coal, diesel or light fuel oil with cleaner burning LPG.

Reticulation makes sense for large LPG users, offering the convenience of a gas main fuel supply and more efficient use of space by eliminating the need for storage tanks. Contact is currently working on extending its LPG networks to other selected areas.

Natural gas and LPG reticulated networks



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Installation

Installation requirements for gas distribution systems are set by the NZ Standard *NZS5258:2003 Gas Distribution Networks*. This covers natural gas and LPG pipelines. This section provides a general overview of the methods used to install pipelines. You can find more detail about the specific requirements for a Rockgas installation in the *Rockgas Construction and Maintenance Manual*. Just email energyprojects@contactenergy.co.nz, and we'll send you a copy.

The two common methods for installing gas distribution systems are directional drilling and open trenching. One of our engineers can help you work out which option is best suited to your project.

Directional drilling

This is the most common form of trenchless installation and uses a mechanical 'mole' to tunnel below ground. The benefit is that only two small holes need to be dug – one at each end of the pipeline – so there is very little disturbance. The downside is the potential for serious damage to existing underground services. Extreme care needs to be taken.

Open trenching

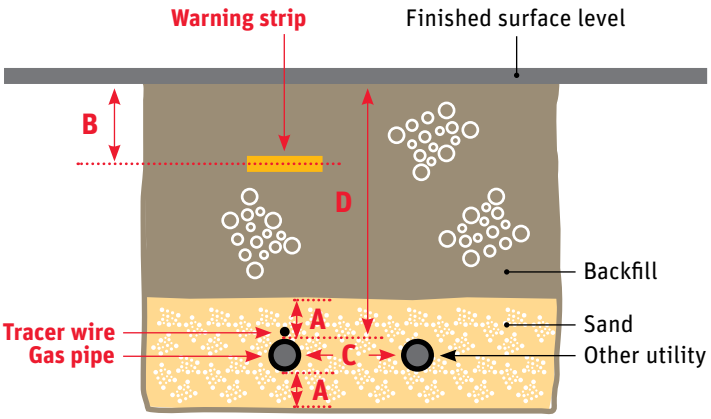


Open trenching involves digging a trench on site to install the gas pipe. It's often used in new developments where all underground services are installed together.

Open trenching can be used through existing streets and is useful in stony areas where directional drilling is not possible. However, it is an expensive option. This is because traffic control, the water table and existing services can make the installation difficult.

Typical services trench*

This diagram shows the specific clearances that need to be met when digging a services trench:



A Sand bedding for pipes 63mm and below – 50mm. 100mm sand bedding for pipes larger than 63mm.

B Warning strip to be located between 150mm and 300mm of the finished surface level.

C Lateral separations when running parallel with other utilities for service connections and mains 200mm diameter and below:

Telecom	200mm
Water	200mm
Storm water	200mm
Sewer	200mm
Other gas	200mm
Power 240V and 400V	300mm
Power >400V	500mm

Minimum lateral separations when running parallel with other utilities for mains above 200mm diameter:

Telecom	300mm
Water	300mm
Storm water	300mm
Sewer	300mm
Other gas	300mm
Power 240V and 400V	300mm
Power >400V	500mm

When crossing other services, a minimum vertical separation of 100mm is required.

D Depth of cover required:

	Mimimum depth of cover	Maximum depth of cover
Inside boundary	500mm	1400mm
Local road 63–200mm diameter	800mm	1400mm
Local road >200mm diameter	1000mm	2000mm
Transit road	1000mm	2000mm

Note: Installation depths outside these ranges may be approved by the engineer on a case-by-case basis.

* Copyright Eliot Sinclair & Partners Limited

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Gas meters

Gas meters are also known as Gas Measurement Systems (GMS). They are made up of a meter, regulator, filter, isolation valves, fittings and covers.

Residential gas meters

Meter sizes vary depending on the Maximum Hourly Quantity (MHQ) of the appliances installed. Standard gas meters sit proud of the outside wall (usually by 250mm), but in-built mounting kits are available. This gives you the option of partially or fully recessing the meter. This option is particularly useful for houses clad in polystyrene, which don't provide adequate fixing for a standard meter.

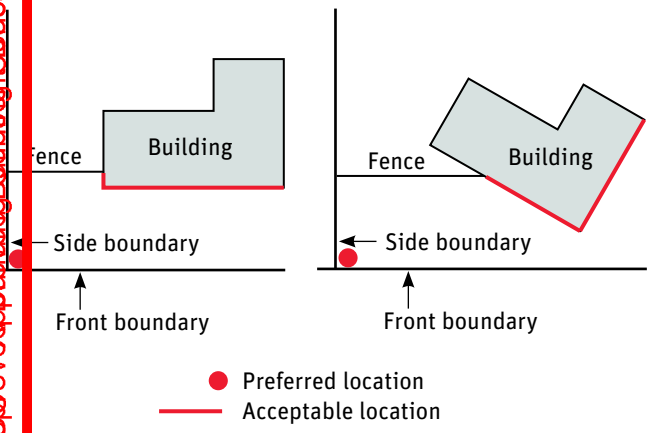
There are specific safety rules for the location of a gas meter. It must be mounted on a wall between 150mm and 2000mm above ground level on the front of the building or within 3000mm of either side. The gas regulator vent also needs to be positioned away from doors and windows, electricity meters and flue terminals. Specific clearances are given in the diagrams on the right.

Please get in touch with us if you would like more details on the types of residential gas meters available.

Commercial and industrial gas meters

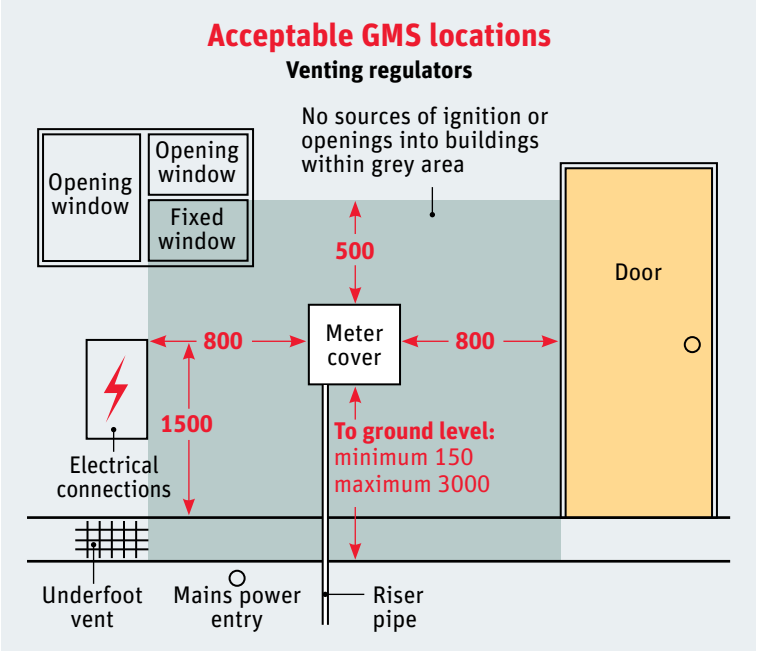
Again, there is a range of commercial and industrial gas meters. The right meter for your project will depend on the likely gas load and the MHQ. We'll work this out for you by assessing the capacity of the equipment you are installing, the gas supply and metering pressure, and factors such as whether the site will use peak or constant loads.

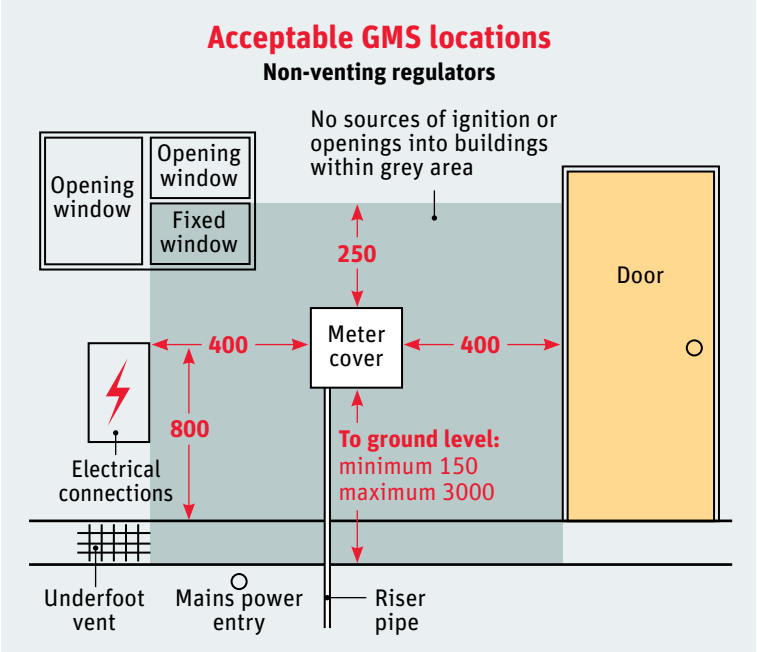
The location will depend in part on the type of meter. Meters are usually installed close to the property boundary. If this is not possible, the meter needs to be located in a well ventilated room on an external wall of the premises, sealed off from the building and accessible from the street.



GMS locations

These diagrams show where gas meters can be located and required clearances. It's a good idea to check the retailer and network requirements, plus the NZ Standards *5258:2003 Gas Distribution Networks* and *5259:2004 Gas Measurement* for more information on acceptable meter locations.





All measurements are in millimetres.

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LPG cylinders

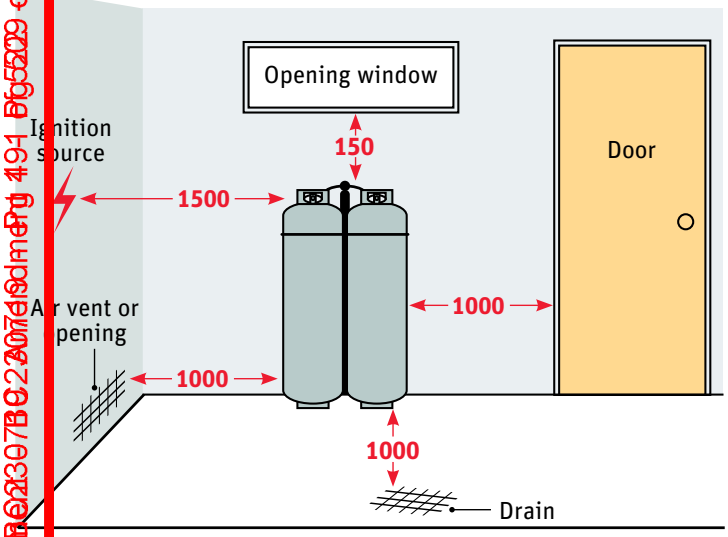
Contact Rockgas HomePack

This system is very popular in a residential setting and for small businesses. The HomePack consists of two 45kg cylinders delivered and connected by us. When the first of the two cylinders is empty, the customer orders a new one, and we exchange the empty cylinder for a full one. We will also undertake a safety check every time we visit. Almost all gas appliances can be connected to a HomePack.

Each gas installation requires a gas fitting certificate issued by a craftsman gasfitter before the gas can be turned on and is available for use.

Choosing a site

This diagram shows the clearances for location of a HomePack.



All measurements are in millimetres.

Each cylinder measures 1260mm high x 360mm wide. We suggest you allow a width of 400mm per cylinder.

Cylinders sit on a concrete slab and are secured with two hooks and a chain. The concrete slab must be at least 50mm above ground level (even if there is a poured concrete pad).

What about site conditions as well?

Installation requirements are covered under NZ Standard *5261:2003 Gas Installation* appendix G1 to G6.

Cylinder refills

Your client will want to know how much LPG they can expect to consume each year. Use this table as a guide.

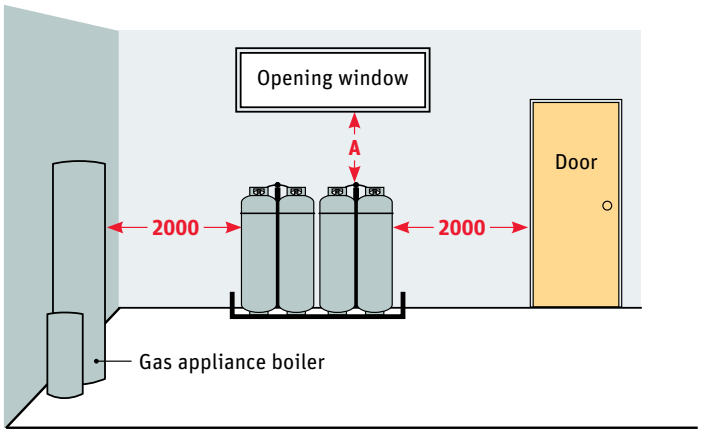
Use of gas	Gas heating	Gas hot water		
		2 person family	4 person family	6 person family
Refills per year	6–9	4–6	6–9	9–12

Multiple 45kg cylinder installation

Multi-cylinder installations are available for commercial connections or large residential connections. These are housed in their own station or cage and can be located anywhere on the property, as long as the area is accessible for delivery, and meets all compliance requirements. Piping is laid from the building to the installation.

Rules on the placement and number of cylinders on site are set out in the Hazardous Substances and New Organisms (HSNO) Act. A Location Test Certificate is required if a site has more than 100kg of LPG storage. This is issued by the Test Certifier employed by the customer and must be approved before cylinders are installed. The customer will also be required to have an approved handler on site.

This diagram shows the clearances for multi cylinder installations if located against a building.



All measurements are in millimetres.

A = 150mm for exchange cylinders or 500mm for cylinders filled on location. The measurement is taken from the top of the cylinder valve.



Bulk tanks

Large industrial and commercial customers may have the option of a bulk supply. Bulk tanks are used for a wide range of applications from horticultural activities, such as heating greenhouses, to running machinery on chicken farms and for laundry activities in the hotel industry.

With a bulk supply, LPG is delivered underground through artificial vaporisers from a bulk storage vessel located on the customer's site. Talk to us if you'd like to explore this option. We can help size your project and advise you on isolation distances and legal requirements.

Ventilation and flueing

The installation requirements for gas burning appliances and equipment are set out in NZ Standard *5261:2003 Gas Installation*. This code of practice covers the important considerations of ventilation and flueing.

All gas flued appliances give off burnt gases that result from the combustion process. These gases are discharged into the atmosphere via metal ducts (flues).

Fresh air also has a role to play in the combustion process, which is why adequate ventilation is needed for gas appliances to work efficiently. Good air flow is also required to circulate heated air within a room to maintain an even temperature.

For these reasons, it's important to follow the manufacturer's specifications when choosing and positioning an appliance. Take note of recommended room sizes: an appliance will not perform well if it is installed in a room that is smaller or larger than it was designed for.

There are certain rooms e.g. bedrooms and bathrooms where gas appliances are unable to be installed. Please refer to *NZS5261:2003*.

Legislation and standards

Industry standards/codes of practice

We've written this document to help make sure gas distribution systems are designed, installed and maintained in a safe manner. The requirements and information set out in this specification are not intended to be all encompassing but they do provide firm guidelines for Contact/Rockgas activities. All activities need to comply with the standards and requirements set out here or issued in writing by us or our duly appointed agent.

All work must comply fully with statutory and local authority regulations. It is the responsibility of the contractor to maintain a good knowledge of Acts, Regulations, Standards, local body and Transit requirements and any amendments that may be issued from time to time.

Standards New Zealand offers an online library service you can use to select the relevant Standards you need. The online library is automatically updated with revisions and amendments to Standards as soon as they're published, so you can be confident you're viewing the most recent version. There is a subscription fee for using this service. See www.standards.govt.nz for more information.

Charges

A number of factors influence what your client is charged for the convenience of gas in their home or business.

Reticulated gas

- Possible metering service installation charges
- Monthly energy account fees and usage
- Appliances and their installation

LPG cylinders

- Cylinder station set up charges (concrete pavers, chain set, regulator, regulator cover and hoses)
- Cylinder rental fees
- Cylinder gas refills (this depends on the delivery area as well as how much gas is used)
- Appliances and their installation

Our energy partnership

Our energy partnership is the formal process we have in place for tailoring energy requirements for commercial clients. The aim is to provide customers with creative fuel solutions aimed at reducing total energy costs. First, we undertake an energy needs analysis. This provides the information we need to:

- design, build and commission all aspects of the installation, including obtaining all necessary resource consents and regulatory requirements
- provide initial and ongoing training for the client's managers
- provide a reliable and flexible fuel supply
- appoint a skilled and experienced LPG specialist to supervise the customer's account and provide ongoing service and support systems for the installation.

No job is too big, and you might be surprised to know the extent of the help available. We'll work alongside you to understand the aspects of your project that affect energy management. We can develop a detailed cost comparison, fuel supply and installation proposal. We can design, build and commission all aspects of the installation, including obtaining any resource consents and approvals. We can also recommend the best-fit gas appliances and coordinate with suppliers where we do not supply them ourselves.

Most of all, you can count on us to provide a reliable fuel supply and to deliver to your requirements.

While this guide focuses on gas installations, remember we're willing and able to help you with all aspects of all energy services design, including LPG, natural gas and electricity.

Getting in touch

We look forward to working with you to achieve the best possible outcome for you and your customer.

If there's anything you want to talk to us about that is not specifically covered in this manual, or that you want further clarification on, please contact us.

Here's how you can get in touch with us:

Phone:	0800 401 234 Monday to Friday, 8.30am to 5.30pm (excludes public holidays)
Email:	energyprojects@contactenergy.co.nz



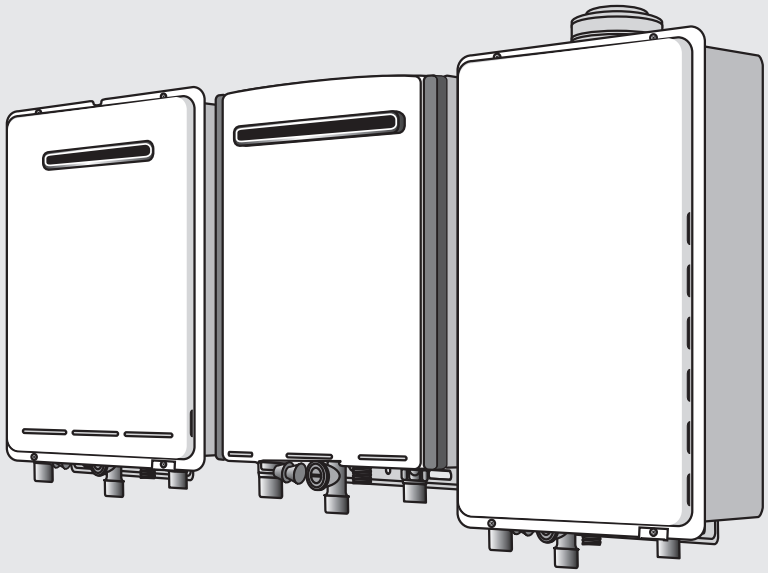
While every effort has been made to ensure the accuracy of the information included at the time of production (February 2010), Contact Energy Group take no responsibility for errors or omissions or for any consequences of reliance on this information. Specific advice should be sought.

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Rinnai
EXPERIENCE OUR INNOVATION

Continuous Flow Water Heaters

Installation Manual



To suit models:

Rinnai Infinity VT16	REU-VR1620WG	Rinnai Infinity HD200	REU-VRM2632WC
Rinnai Infinity VT20	REU-VR2024WG	Rinnai Infinity HDi200	REU-VR2632FFUG
Rinnai Infinity VT24	REU-VR2426WG	Rinnai Infinity HD250	REU-VR3237WG
Rinnai Infinity VT26	REU-VR2626WG	Rinnai Infinity EF24	REU-K2430WG
Rinnai Infinity VTa26	REU-VR2626WGT	Rinnai Infinity EF250	REU-KM3237WD
		Rinnai Infinity EFi250	REU-KM3237FFUD

i = internal
a = aggressive water

Models are not suitable as a spa or swimming pool heater.

Internal Rinnai continuous flow internal water heaters ('i' models) must be installed with an approved Rinnai flue system.

Appliance must be installed, commissioned and serviced by a licensed tradesperson in accordance with these instructions and all applicable local rules and regulations.

Your Rinnai continuous flow water heater complies with NZS 5262. A declaration to this effect can be found on the Energy Safety web site; www.energysafety.govt.nz.

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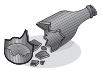
WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

For assistance or additional information contact Rinnai on 0800 TO RINNAI (0800 86 746 624).

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Before installation



Unpack appliance and flue components (if applicable) and check for damage. DO NOT install any damaged items.



Check all components have been supplied and that you have the correct gas type.



Read these instructions to get an overview of the steps required before starting the installation. Failure to follow these instructions could cause a malfunction of the appliance. This could result in serious injury and property damage.



For Rinnai continuous flow water heaters used in solar installations, refer 'Recommended Solar System Layout'.



The Rinnai Infinity EF models are 32 kg. Please use care when lifting and seek assistance if required.



This appliance must be installed in accordance with:

- Current AS/NZS3000, AS/NZS3500, NZS 5261 and G12/AS1
- Rinnai installation instructions
- Local regulations and municipal building codes

Installation, service and removal must be by an authorised person only.

Applicable models

These installation instructions apply to the following Rinnai continuous flow water heaters.

Rinnai Infinity VT16	External	REU-VR1620WG
Rinnai Infinity VT20	External	REU-VR2024WG
Rinnai Infinity VT24	External	REU-VR2426WG
Rinnai Infinity VT26	External	REU-VR2626WG
Rinnai Infinity VTa26	External	REU-VR2626WGT
Rinnai Infinity HD200	External	REU-VRM2632WC
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG
Rinnai Infinity HD250	External	REU-VR3237WG
Rinnai Infinity EF24	External	REU-K2430WG
Rinnai Infinity EF250	External	REU-KM3237WD
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD

i = internal
a = aggressive water unit

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Appliance location

Installation in environments free from corrosive compounds

Air surrounding the water heater, venting and vent termination(s) is used for combustion and must be free from compounds that cause corrosion of internal components. These include corrosive compounds that are found in aerosol sprays, detergents, bleaches, cleaning solvents, oil based paints/varnishes, and refrigerants. Therefore Rinnai recommends outdoor models be used for these locations where possible. The water heater, venting and vent termination(s) should not be installed in any areas where the air may contain these corrosive compounds.

If it is necessary for a water heater to be located in areas which may contain corrosive compounds, Rinnai strongly recommends the following:

Indoor/internal water heaters:

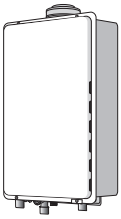
- DO NOT install in areas where contaminated air is present
- Consider before installation where air has the ability to travel within the building
- Chemicals that are corrosive in nature should not be stored or used near the water heater
- Where possible, install the water heater in a sealed closet so that it is free of contaminated indoor air

Outdoor/external water heaters and vent terminations of indoor/internal water heaters:

- Install as far away as possible from exhaust vent hoods
- Install as far away as possible from air inlet vents—corrosive fumes may be released through these vents when air is not being brought in through them
- Chemicals that are corrosive in nature should not be stored or used near the water heater or vent termination

Damage and repair due to corrosive compounds in the air is not covered by warranty.

Internal models



Internal models are designed for indoor installations only. They may be installed in an enclosure if the requirements of NZS 5261 are satisfied. An enclosure is defined as a compartment, enclosed area or partitioned off space primarily used for the installation of the appliance. If installed in an enclosure either internally or externally, the location should be ventilated to allow gas to dissipate.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed in roof spaces or elevated structures, specific requirements apply. Refer to NZS 5261 section 1.6 for details.

This appliance MUST be used with an approved Rinnai flueing system. The use of a non-Rinnai flueing system may result in a dangerous situation and violates regulations.

This appliance must be located so that the flue terminal exits the building at a suitable point, refer 'Minimum Clearances Required for Flue Terminals', NZS 5261:2003.

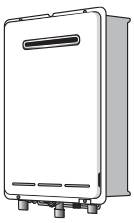
Manufacturer's instructions for model REU-KM3237FFUD (EFi250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

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Appliance location

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External models



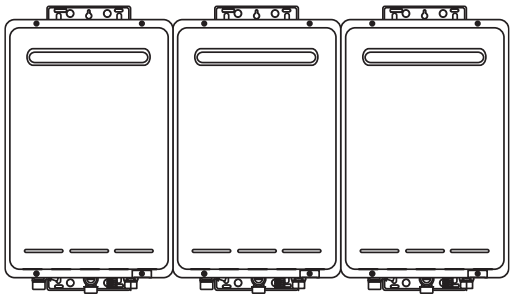
External models are designed for outdoor installations only. They must be located in an above ground open-air situation with natural ventilation, without stagnant areas, and where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed on elevated structures or under floors specific requirements apply. Refer to NZS 5261 for details.

This appliance must be located so that the flue terminal exits the building at a suitable point, refer 'Minimum Clearances Required for Flue Terminals', NZS 5261:2003.

Manufacturer's instructions for model REU-KM3237WD (EF250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

When multiple units of the same model are installed on the same vertical face, with the flue terminals at the same height, they can be installed next to each other (as shown).



All models

This appliance must be placed as close as possible to the most frequently used hot water outlet or outlets to minimise the delay for hot water delivery.

For installations where the distance between the water heater and the outlets is considerable, a flow and return system can be used to minimise the waiting time for hot water delivery. Alternatively, multiple appliances can be strategically placed to serve different outlets. Contact Rinnai for further information.

An AC 230 V, 10 Amp, earthed power point must be provided adjacent to the appliance. For outdoor installations, this power point must be weatherproof. It must be clear of the gas and water connections to the appliance and also the flue exhaust and water pressure relief valve. The power cord of the appliance is 1.5 m long.

All appliances must be installed to ensure access can be gained without hazard or undue difficulty for inspection, repair, renewal or operational purposes. Sufficient clearances shall allow access to and removal of all serviceable components.

Appliances should not be mounted higher than 3.5 m above the ground or floor level unless the customer can arrange permanent and safe access or can provide another means of access such as scissor or boom lifts.

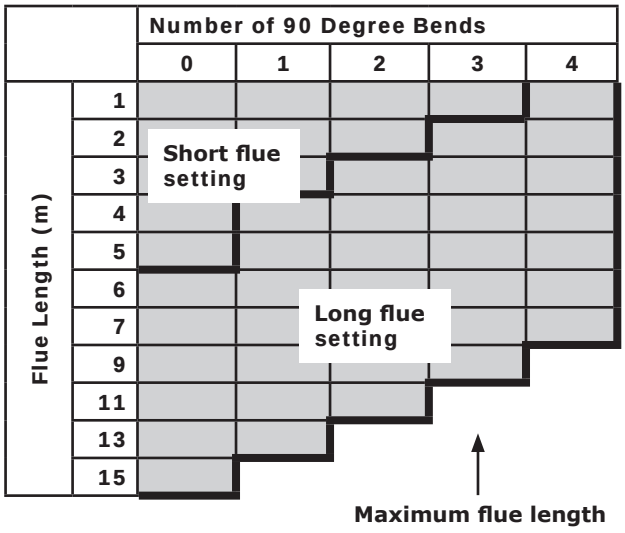
General installation information

Catch pan

It is important a suitably drained catch pan is fitted (especially for internal units) where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

Flued water heaters (internal units)

The chart below highlights the maximum flue length and number of bends. It also shows the difference between a short and long flue—this is important if changing settings (dip switches).

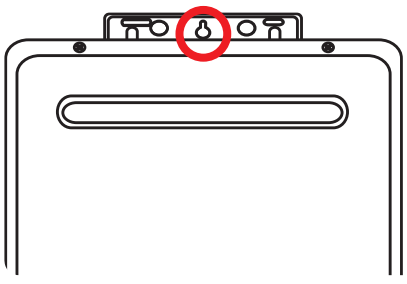


Mounting the appliance

Refer 'Connections and Fittings' for individual appliance weights. The wall or structure on which these units are to be mounted must be capable of supporting these weights and the associated pipe work.

Ensure suitable fixing screws or bolts are used to secure the units to the walls, in accordance with NZS 5261 (section 5.0). Wooden plugs shall not be used.

The top bracket has a keyhole slot (circled below) so the appliance can be positioned by hanging it on one screw while the other screws are secured.



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General installation information

Pipe sizing



Refer 'Connections and Fittings' for appliance gas consumption. If the gas pipe sizing is insufficient the customer will not get the full performance benefit. Gas pipe sizing must consider the gas input to this appliance as well as all the other gas appliances in the premises. The gas meter and regulator must be specified for this gas rate. An approved sizing chart such as the one in NZS 5261 should be used.

Water pipe sizing and layout should be performed in accordance with AS/NZS3500. All hot water pipe work should be insulated to optimise performance and energy efficiency.

Water delivery temperature



Local regulations and/or requirements of AS/NZS3500.4 must be considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of these areas may be limited to 55 °C or less.

If the appliance is to deliver water primarily for the purposes of personal hygiene in an early childhood centre, school, nursing home or similar facility as defined in AS/NZ3500.4 a Temperature Limiting Device (TLD), such as a Tempering Valve may be required (even if the appliance is set to 55 °C or less). For these types of applications contact Rinnai.

Requirements for Rinnai Continuous Flow Units Installed Without Controllers

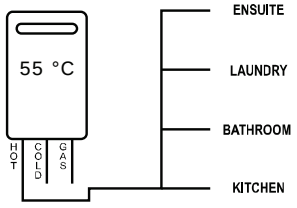


Diagram 1 - 55 °C Appliance

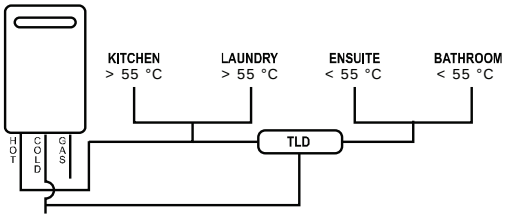


Diagram 2 - Not a 55 °C Appliance
(TLD = Temperature Limiting Device)

When the continuous flow unit is set to deliver water at a temperature higher than 55 °C, it will be necessary to fit a Temperature Limiting Device for delivery to areas used for the purposes of personal hygiene. Refer Department of Building and Housing G12.

Water supply



Refer 'Connections and Fittings' for applicable water pressures. Approved pressure limiting valves may be required if the stated maximum rated water supply pressures are exceeded. To achieve the rated flow, the stated minimum water supply pressures must be supplied. The water heaters will operate at lower pressures but will not achieve the rated flow.

Water chemistry and impurity limits are stated in our detailed warranty statement. Most metropolitan water supplies fall within these requirements. If you are unsure about the quality of the water, please contact Rinnai and we will provide you with the details of an authorised agency who are able to test your water for compliance to Rinnai standards. If sludge or foreign matter is present in the water supply, a suitable filter or strainer should be incorporated in the water supply to the water heater.

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Connections and fittings

Models	Gas Consumption MJ/h	Water Supply kPa		Weight kg	Fittings			Condensate
		Min.	Max.		Hot	Cold	Gas	
VT16 Ext REU-VR1620WG	125	120	1000	15	R½ (15 mm)	R½ (15 mm)	R¾ (20 mm)	
VT20 Ext REU-VR2024WG	160	160	1000	16	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	
VT24 Ext REU-VR2426WG	188	180	1000	17	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	
VT26 Ext REU-VR2626WG	199	180	1000	17	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	
VTa26 REU-VR2626WGT	199	180	1000	17	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	
HD200 Ext REU-VRM2632WC	199	140	1000	21	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	
HDi200 Int REU-VR2632FFUG	195	140	1000	21	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	
HD250 Ext REU-VR3237WG	250	200	1000	29	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	
EF24 Ext REU-K2430WG	162	240	1000	27	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	R½ (15 mm)
EF250 Ext REU-KM3237WD	211	240	1000	32	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	R½ (15 mm)
EFi250 Int REU-KM3237FFUD	211	240	1000	32	R¾ (20 mm)	R¾ (20 mm)	R¾ (20 mm)	R½ (15 mm)

Service connection points

These dimensions are NOT an indication of the pipe sizes required.

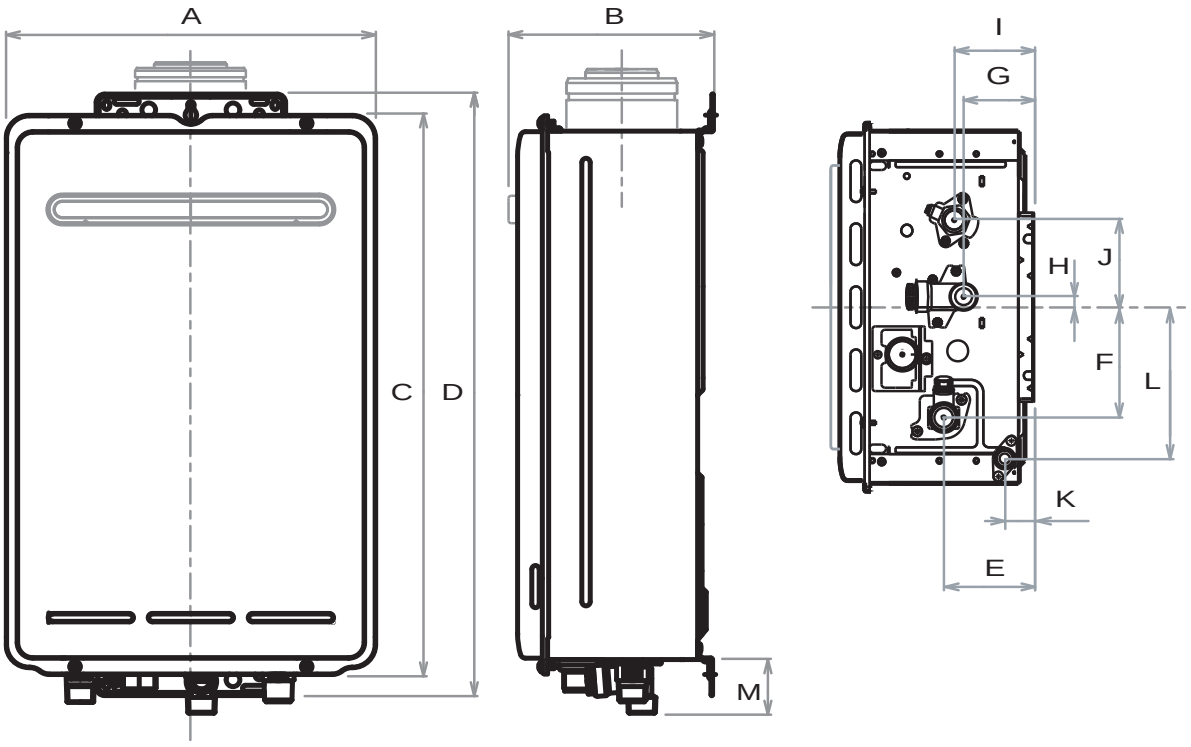
An approved full flow isolation valve and disconnection union MUST be fitted to the cold water inlet. A non-return valve is not required unless required by local regulations.

Isolation valves must be fitted so the appliance can be removed.

Purge gas and cold water supply lines to remove air and swarf before final connection of the appliance. Swarf in the gas or water supplies may cause damage.

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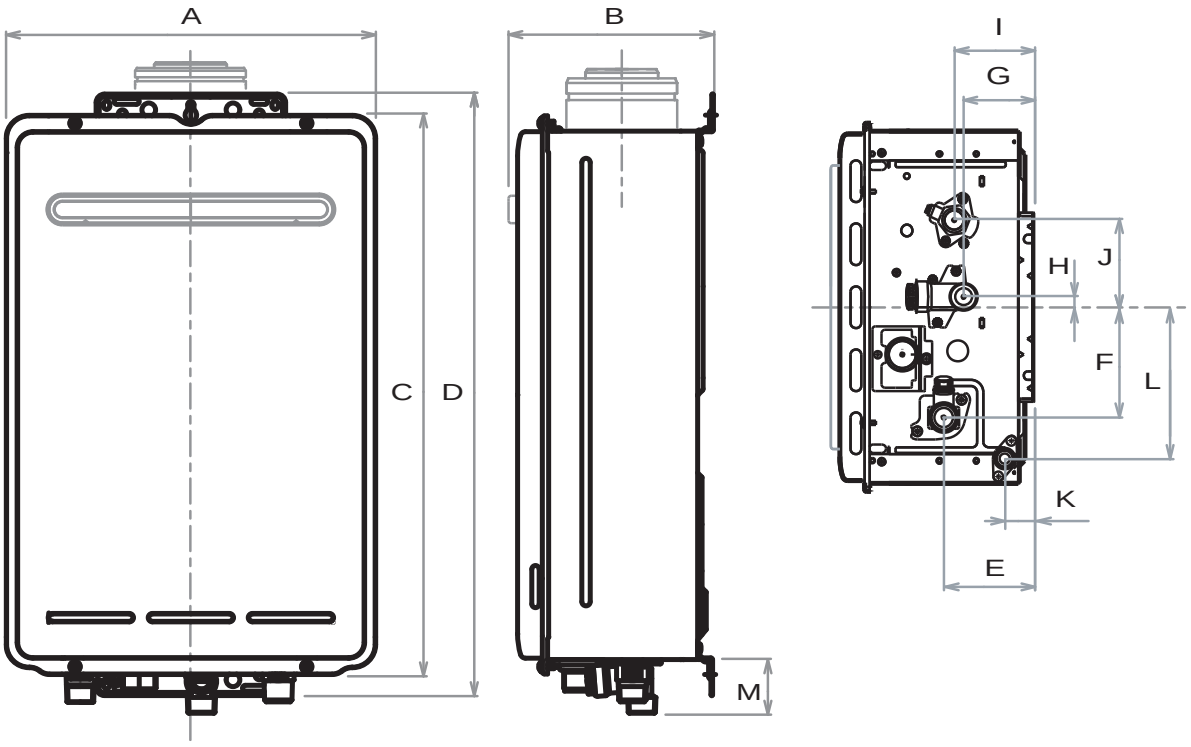
Dimensions - VT and HD range



Dimension (mm)		VT16 Ext (REU-VR1620WG)	VT20 Ext (REU-VR2020WG)	VT24 Ext (REU-VR2426WG)	VT26 Ext (REU-VR2626WG)	VTa26 Ext (REU-VR2626WGT)	HD200 Ext (REU-VRM2632WC)	HDi200 Int (REU-VR2632FFUG)	HD250 Ext (REU-VR3237WG)
A	Width	350	350	350	350	350	350	350	470
B	Depth	194	194	194	194	194	250	235~275	244
C	Height - Unit	530	530	530	530	530	600	600	600
D	Height - Including Brackets	571	571	571	571	571	636	641	644
E	Hot Water Outlet (from wall)	87	87	87	87	87	95	91~131	115
F	Hot Water Outlet (from centre)	105	105	105	105	105	110	110	61
G	Cold Water Inlet (from wall)	68	68	68	68	68	74	70~110	99
H	Cold Water Inlet (from centre)	10	10	10	10	10	27*	27*	52
I	Gas Connection (from wall)	77	77	77	77	77	103	99~139	61
J	Gas Connection (from centre)	83	83	83	83	83	89	89	110
K	Condensate Outlet (from wall)	•	•	•	•	•	•	•	•
L	Condensate Outlet (from centre)	•	•	•	•	•	•	•	•
M	Gas: Length Gas Connection (from base)	40	40	40	40	40	41	41	41
	Cold: Length of Cold Water Inlet (from base)	50	50	50	50	50	51	51	51
	Hot: Length of Hot Water Outlet (from base)	39	39	39	39	39	42	42	42
* this measurement is to the left of the centre line									
HDi200, height of flue spigot from base of unit ≈ 85 mm									

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Dimensions - EF range



Dimension (mm)		EF24 Ext (REU-K2430WG)	EF250 Ext (REU-KM3237WD	EFi250 Int (REU-KM3237FFUD)
A	Width	350	470	470
B	Depth	277	283.1	257~307
C	Height - Unit	600	654	654
D	Height - Including Brackets	644	721.6	721.6
E	Hot Water Outlet (from wall)	164.5	100	100~150
F	Hot Water Outlet (from centre)	100	100	100
G	Cold Water Inlet (from wall)	83	64.6	64.6~114.6
H	Cold Water Inlet (from centre)	53*	27.2	27.7
I	Gas Connection (from wall)	70.5	89	89~139
J	Gas Connection (from centre)	25	103.2	103.2
K	Condensate Outlet (from wall)	33	122.6	122.6
L	Condensate Outlet (from centre)	132	195	195
M	Gas: Length Gas Connection (from base)	51	40.2	40.2
	Cold: Length of Cold Water Inlet (from base)	62	50.2	50.2
	Hot: Length of Hot Water Outlet (from base)	41	41.2	41.2
	Condensate Connection Length (from base)	24	22.4	22.4

* this measurement is to the left of the centre line

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EF250 models: Earthing the unit

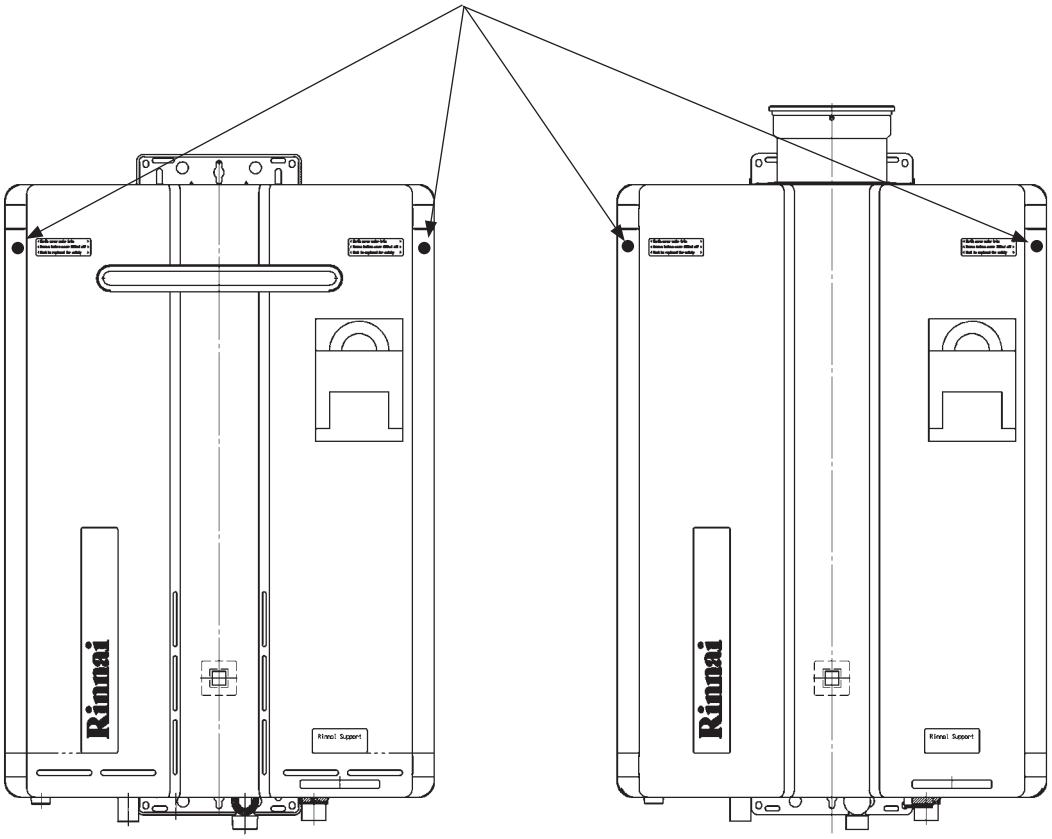
Removing the cover and earthing the unit

For the Rinnai condensing continuous flow water heaters (EF250 & EFi250), the earthing screws are located under the side trim, refer image below. First remove the trim and then the earthing screws before lifting off the cover.

WARNING

For safe operation of the appliance the earthing screws MUST be replaced.

Earthing screws located under side trim



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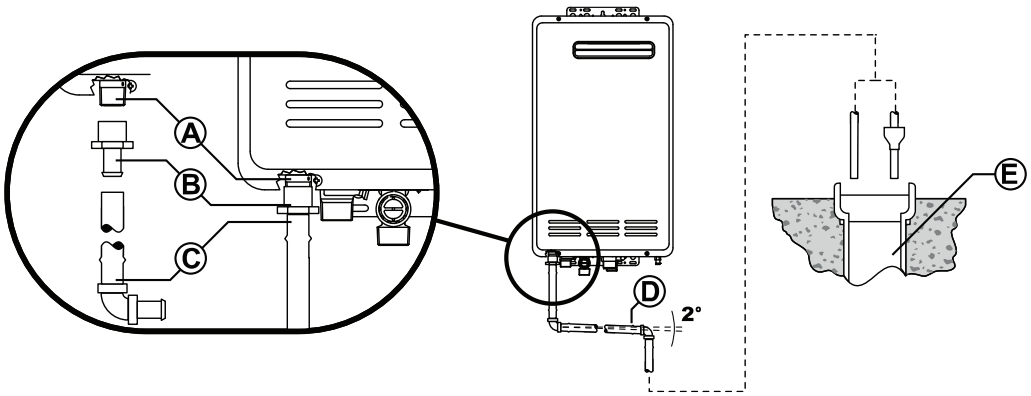
Condensate drain - EF models only

The Rinnai Infinity EF water heaters generate condensate continuously at a rate of up to five litres per hour as a by-product of a highly efficient gas burner. Condensate must be drained via a pipe to a suitable discharge point.

As condensate is a by-product of gas combustion it is mildly acidic. For this reason copper tube and fittings MUST NOT be used as it will corrode. Instead Rinnai recommend plastic pipes and fittings.

Important considerations for condensate drain pipe

Content of AS3500.4.2003 section 5.12 'Temperature/Pressure Relief and Expansion Control Valve Drain Lines' has been used as a guide in preparing these considerations.



A) Water heater drain outlet connection, ½ ″ (15 mm) BSP male.

B) PE ½ ″ BSP (15 mm) female to barbed ignition system connector (13-19 mm) or equivalent plastic fitting.

C) Drain pipe and fittings to match (B).

D) Continuous fall of at least 2° from water heater to discharge point, length and bends in accordance with those stated below.

E) Suitable points of discharge are deemed to be sewers or pits. DO NOT discharge onto electrical connections, earth stakes, copper pipes, concrete paths or into a pond.

Maximum length and changes of direction greater than 45°

Length and Changes of Direction				
Maximum length (m)	9	8	7	6
Maximum changes of direction (> 45°)	3	4	5	6

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Condensate drain - EF models only

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Installation of a condensate drain

Point of discharge from each drain line shall be located so the release of condensate does not cause a nuisance, is readily discernible and incurs no risk of building damage. There shall be no tap, valve or other restrictions in any line. Each line shall fall continuously from the valve to the approved point of discharge.

Drain lines shall not discharge into a storage water heater safe tray. The end of the condensate drain line shall be:

- Not lower than 200 mm or higher than 300 mm above an unpaved surface; or
- Not lower than 75 mm or higher than 300 mm above a gravel pit and not less than 100 mm in diameter in a paved surface.

Where discharging over a tundish or gully trap, drain lines shall have an air gap of a size at least twice the diameter of a drain line.

Joining of condensate drain lines

Condensate drain lines from multiple water heaters may be joined together provided they conform with the installation requirements above.

Common stack discharge

Where individual heaters are installed in a multistorey building, the condensate drain lines may discharge into a common stack subject to the following:

- Drained to a tundish having a discharge line that is not less than the common stack, directly connected to a fixture trap, and installed in a connection with any adjacent soil or waste stack
- Discharge point of the common stack is readily visible and does not cause any nuisance
- Common stack is vented by extending the pipe upwards, above the roof level

Tundish drain lines

The drain line from any tundish shall be not less than DN 20 or less than one size larger than that of the largest drain line discharging into the tundish. Tundish drain lines shall comply with the installation requirements above.

Areas subject to freezing



In areas where water pipes are prone to freezing, the drain pipe from any valve shall be insulated and not exceed 300 mm in length. It shall discharge into a tundish through an air gap of not less than 75 mm and not exceed more than 150 mm measured from the outlet of the drain pipe to the rim of the tundish.

Controllers - general

Water controllers are available as an optional extra. Universal (Compact), Deluxe and Wireless Controllers can be used together. A maximum of four water controllers can be fitted with the following limitations:

- Maximum of one Kitchen Deluxe Controller (MC-100V)
- Maximum of two Bathroom Deluxe Controllers (BC-100V)
- Only one controller can be set to deliver 55 °C, this cannot be a Bathroom Deluxe Controller

This section refers to wired controllers. For details on Wireless Controllers, refer to separate instructions.

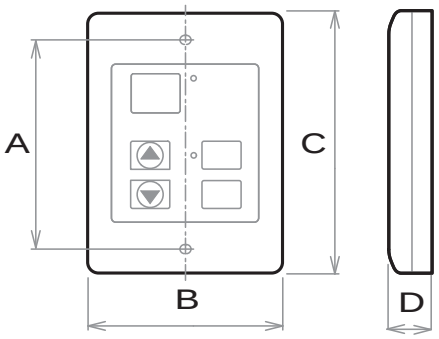
IMPORTANT

Other manufacturers' controllers are not compatible with this appliance.

Do not install controllers:

- near a heat source such as, a cook top, stove or oven (heat, steam, smoke or hot oil may cause damage)
- in direct sunlight
- outdoors unless protection from dust ingress and sunlight are provided
- against a metal wall unless in accordance with AS3000.

Dimensions (mm)



Dim'	Description	Universal (MC-91)	Kitchen Deluxe (MC-100V)	Bathroom Deluxe (BC-100V)
A	Distance between mounting holes	83	83	181
B	Width	90	128	195
C	Height	120	120	97
D	Depth	20	20	22

Controllers - general

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Positioning

Controllers must be installed in shaded and clean locations. They should be fitted out of reach of children (suggested height 1.5 m). The Compact and Bathroom Deluxe Controllers are water resistant, however, durability is improved when positioned outside the shower recess or at least 400 mm above the highest part of a sink, basin or bath.

Water controller cables

Water controllers operate at extra low voltage (12 Volts DC) which is supplied from the water heater. Controllers come with 15 m of electrical cable. The appliance end of the controller cables are fitted with spade terminals.

Extension cabling is available as an accessory from Rinnai. Alternatively, a two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm^2 may be used. Maximum individual cable runs:

One controller	= 100 m
Two controllers	= 50 m (per controller)
Three or more controllers	= 20 m (per controller)

Water controller cables are not polarity sensitive.

Controllers - Universal installation

Fitting the Universal (Compact) Controller

1. Determine the most suitable position for the controller.
2. Drill three holes as shown (Fig.1 and Fig.2) for the securing screws and one to provide cable access.
3. When running cable through the access hole ensure the connector end of the cable is located nearest to the controller (Fig.2).
4. Carefully remove the face plate from the controller using a screwdriver (Fig.3).
5. Fix the controller to the wall using appropriate fittings as shown (Fig.4).
6. Remove protective plastic from the controller face as shown (Fig.4) and replace the face plate.

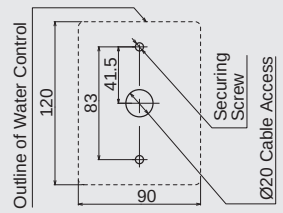


Fig.1

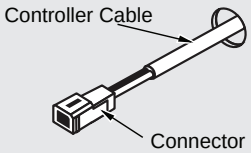


Fig.2

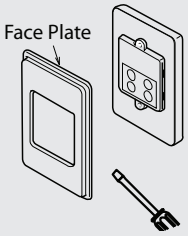


Fig.3

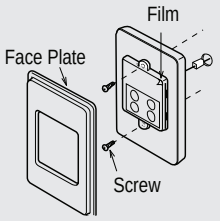
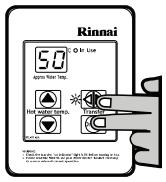


Fig.4

Optional programming of the Universal controller

Step 1

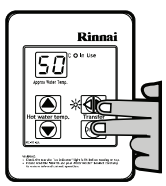




Are four controllers connected? **No**, refer step 2. **Yes**, you will need to activate the fourth controller as follows:

1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).
2. Check display on all four controllers is displaying a temperature when switched on. If any controller displays two dashes, repeat above step.

Step 2

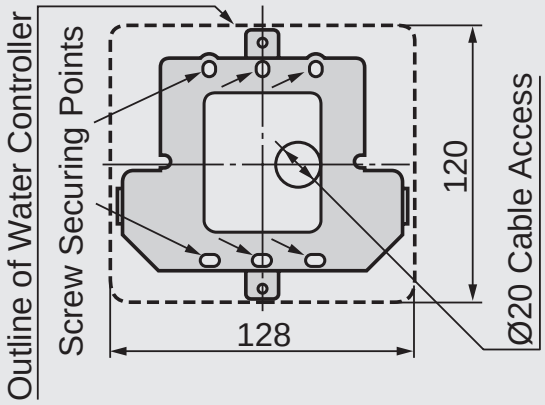


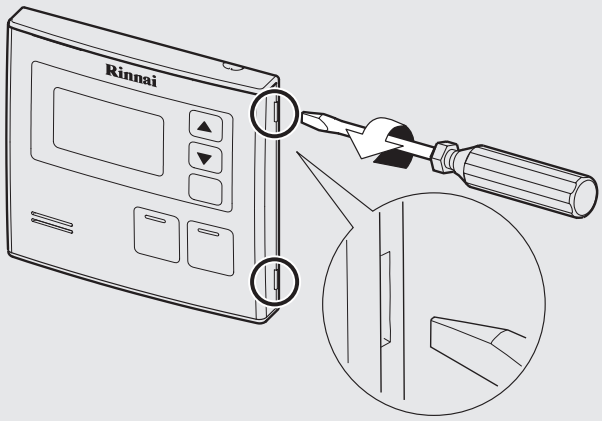
1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).
2. When the controller fitted in the kitchen is switched on it will be possible to select temperatures higher than 50 °C (at this controller). If not repeat above step.

If the kitchen controller is replaced or swapped repeat the programming procedure.

Controllers - Kitchen Deluxe installation

1. Determine the most suitable position for the controller.
2. Use the wall mounting bracket as a template to mark and drill three holes, locating the cable access hole as shown below.
3. Fix the mounting bracket to the wall using the appropriate fixings.
4. Run the water controller cable through the hole in the wall.
5. Carefully remove face plate from the controller, using a screwdriver as shown below.
6. Connect the controller cable to the kitchen water controller. At this point cables from other controllers (if fitted) may also be connected to the kitchen water terminals, eliminating the need for multiple cable runs directly to the water heater. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the water controllers.
7. Fasten water controllers to wall mounting bracket. Avoid the use of impact drills and over-tightening of fixings as this may damage the controllers.
8. Remove the protective plastic from the controller face and replace the face plate.





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Controllers - Bathroom Deluxe installation

1. Determine the most suitable position for the controller.
2. Mark and drill three holes, locating the cable access hole as shown (Fig.1).
3. When running a cable through the access hole ensure the connector end of the cable is located nearest to the controller (Fig.2).
4. Affix the double sided self-adhesive seal to the back of the controller (Fig.3).
5. Carefully remove the face plate from the controller. Do this by placing your thumbs on the front digital display while hooking your fingers behind the top plate and gently push down as shown (Fig.4). Do not use a screwdriver as this may damage the controller.
6. Connect the cable to the bathroom controller. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the controller.
7. Fix bathroom controller to the wall using appropriate fixings. Avoid the use of impact drills and over-tightening of fixings as this may damage the controller.
8. Remove the protective plastic from the controller face and replace the face plate.

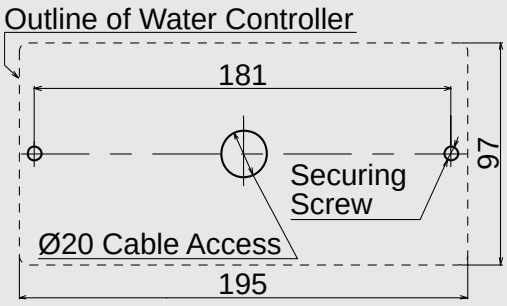


Fig.1

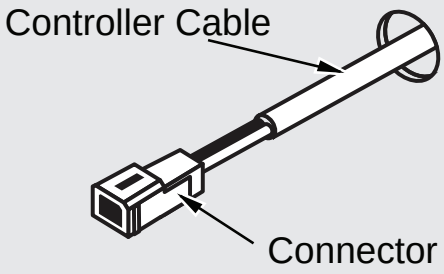


Fig.2

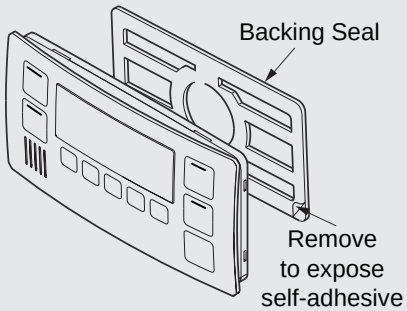


Fig.3

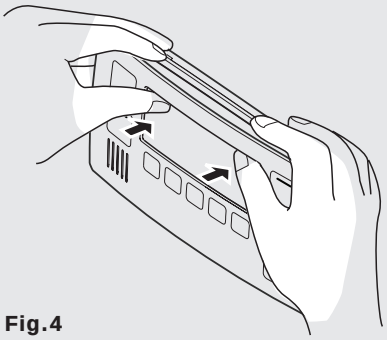


Fig.4

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Controllers - communication cables

Communication cables connect the water heater to the water controllers and operate at an extra low voltage (12 Volts DC) which is supplied from the water heater. Communication cables are supplied with the water controllers (15 m) and are fitted with spade terminals for connection to the water heater. Up to two cables can be connected to the cable connector at the water heater.

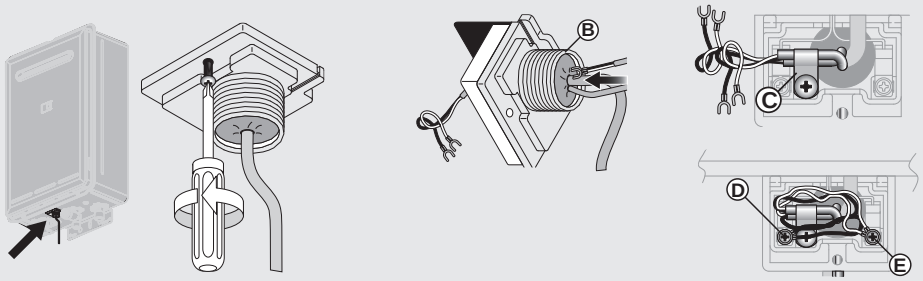
Extension cables are available from Rinnai. Alternatively two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm^2 may be used (refer maximum individual cable lengths on p. 15).

CAUTION Do not attempt to connect cables to the cable connector at the water heater unless the electric power supply to the water heater is switched off otherwise damage to electrical components may occur.

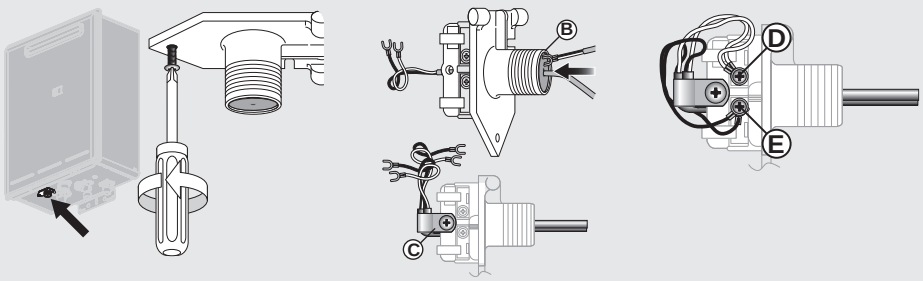
To connect up to two cables to the cable connector

1. Turn off power supply and unplug water heater from the power point.
2. Remove retaining screw of the cable connector at the base of the appliance.
3. Swing the cable connector door open. Thread the cable through the weather seal of the cable access hole (B) in the direction shown allowing sufficient cable length so the cable sheath can be secured with the cable clamp (C) supplied with the transceiver.
4. Loosen screw terminals (D) and (E) and connect cable spade connectors to these terminals and re-tighten. Polarity is not important, either wire colour can be connected to either terminal.
5. Return the cable connector to the original position taking care not to damage cable wires in the process and replace the retaining screw.

Cable connector for VT26, VTa26, VT24, VT20, and VT16



Cable connector for HD250, HD200, HDi200, and EF models



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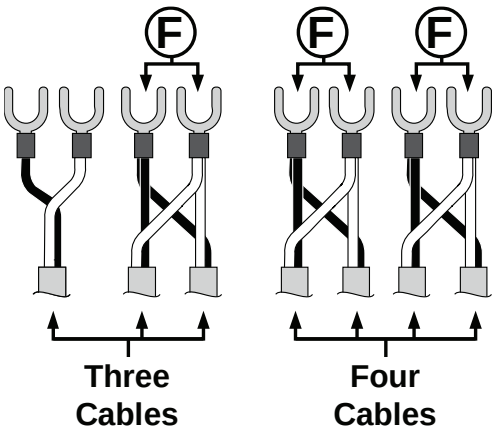
Controllers - communication cables

Connecting three to four controllers

1. Repeat steps 1-3 on previous page.

2. To connect three to four controllers, separate all the cables to be fitted into pairs. Cut off the existing spade connectors from each pair and re-terminate each pair into a new spade connector (F) (available from your local electrical supplier) so there are only two sets of spade connectors. Four spade connectors in total to be terminated.

3. Repeat steps 4 and 5 on previous page.



Spade connectors are available from your local electrical supplier.

Commissioning

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Testing

WARNING Ensure building occupants do not have access to the hot water outlets during this procedure.

1. Before final connection of the water heater, purge the gas and hot and cold water supply lines. Swarf in the gas or water supplies may cause damage.
2. Turn on the gas and water supplies and test for leaks (gas and water) near the unit.
3. Isolate gas supply. Remove test point screw located on the gas inlet and attach pressure gauge.
4. Turn the power on at the power point socket and turn on the gas.
5. If water controllers are fitted ensure they are on. Select the maximum delivery temperature and open all available hot water taps including the shower. If water controllers are not fitted, open all available hot water taps.
6. Operate all other gas appliances at their maximum gas rate.
7. With all gas appliances operating on maximum, the pressure should read between 1.0-3.5 kPa (NG) or 2.75-3.5 kPa (LPG). If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the responsibility of the installer to check the gas meter, service regulator and pipe work for correct operation and sizing. The gas regulator on the appliance is electronically controlled and factory preset. Under normal circumstances it does not need adjustment during installation.
8. Close all hot water outlets.
9. Inspect and clean the strainer located on the cold water inlet connection. This may need to be repeated to ensure the strainer remains clear, especially on new installations.
10. If water controllers are fitted, it is necessary to test their operation through the complete range of functions (refer operation manual).
11. Confirm hot water delivery temperatures using a thermometer. If controllers are fitted, ensure temperatures exceeding 55 °C cannot be selected on bathroom controllers.
12. After testing is completed, explain to the customer how to operate the water heater and water controllers (if fitted). Ensure your details are completed (p. 26 of the operation manual).

Gas pressure setting

The gas regulator on the appliance is electronically controlled and factory preset. Under normal circumstances it does not need adjustment during installation. Make adjustments only if the unit is not operating correctly and all other causes for incorrect operation have been eliminated. Instructions for gas pressure setting are in the instruction pocket located inside the appliance front cover.

Commissioning checklist

Commission the unit in accordance with the Commissioning Checklist supplied with the appliance (front cover of appliance). Ensure you leave the completed checklist with the customer.

Recommended solar system layout

Warning about hot water



Rinnai continuous flow water heaters configured for solar systems produce hot water at 75 °C and are not suitable for use with water controllers. The household water supply MUST be protected by a suitable tempering valve.

Installation

Rinnai continuous flow water heaters in solar installations are only suitable as gas boosters in solar hot water systems. These models produce water at higher than normal temperatures and must be connected to the hot water supply by use of a suitable tempering valve.

Install a Rinnai continuous flow water heater using a flow diversion valve as shown below. Remember 'B to Boiler' when setting up the flow diversion valve.

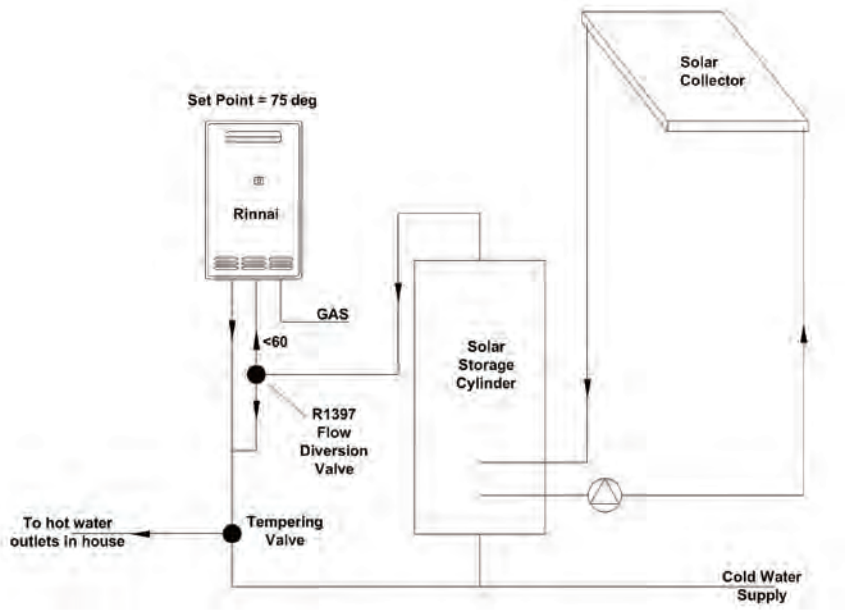
The water heater must be set to 75 °C (refer dip switch settings on following pages).



Rinnai water controllers cannot be used with Rinnai Infinity solar units as the:

- Hot water does not always pass through the Rinnai Infinity
- Rinnai Infinity dip switch setting of 75 °C is unable to be adjusted

Recommended system layout using a Rinnai Continuous Flow water Heater and Flow Diversion Valve



System configuration to protect for Legionella

If the system is configured according to the details above it will meet the requirements of the Acceptable Solution G12/AS2 for protection against Legionella. Section 3.5.2 states:

b) *the instantaneous water heater must heat all water passing through it to not less than 70 °C.*

Dip switch settings - important

Dip switch settings must only be changed by a licensed gasfitter. They have been provided as there may be a requirement to change the temperature of the water delivered from the water heater.

WARNING

Care must be taken when changing the temperature settings as the dip switches are small and can be easily switched or bumped into the wrong position. Please use this information carefully and fully check the operation of the water heater before leaving site including the temperature of the water delivered.

The cover of the water heater will need to be removed to carry out this operation. As this will expose live mains voltage wiring **please disconnect the power supply before removing the front cover**.

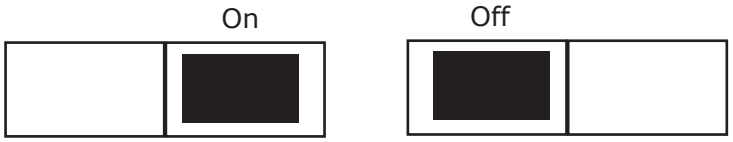
We wish to draw your attention to the requirements of the New Zealand Building Code and compliance document G12. This requires that water delivered to sanitary fixtures be no more than 55 °C. Increasing the water heater set temperature will therefore require that you protect all sanitary fixtures to which the appliance is plumbed with suitable tempering valves or similar.

Rinnai will accept no liability for issues arising out of the use of this dip switch information. If you have any doubts about the performance of the water heater please contact Rinnai by phoning 0800 TO RINNAI (0800 86 746 624).

The setting of water temperatures in domestic model Infinity units (white cases) to greater than 55 °C (with the exception of units set to 75 °C in domestic solar installations) will reduce the warranty period. Refer to warranty information in the Operation Manual for further information.

The following pages detail dip switch settings for the specific Rinnai continuous flow water heaters listed. They ARE NOT applicable for older models.

Legend for Dip Switch Settings (black section indicates position of switch)



Short and long flues

Reference to what is a short and long flue can be found on page 6.

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Dip switch settings

On Off



Applicable models and REU-numbers

Rinnai Infinity VT16	External	REU-VR1620WG
Rinnai Infinity VT20	External	REU-VR2024WG
Rinnai Infinity VT24	External	REU-VR2426WG
Rinnai Infinity VT26	External	REU-VR2626WG
Rinnai Infinity VTa26	External	REU-VR2626WGT
Rinnai Infinity EF24	External	REU-K2430WG

Dip Switch 1: Upper SW(8P)

SW No.	Note							
1		Off						
2	Fixed temperature (with controllers)	Off	Fixed temperature			On	With controllers	
3 4 5	Temperature settings	See Chart A						
6		Off						
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.	
8		Off		Off		On		

Chart A: Temperature Settings

Dip.SW.1-SW No.(8P)			SW No.2 = Off (fixed temperature)	SW No.2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	not to be used	40	40
On	On	On	not to be used	55	75

Dip Switch 2: Lower SW(4P)

SW No.	Note				
1	Gas type	Off	LPG	On	NG
2,3,4	Model settings	See Chart B			

Chart B: Model Settings

Dip.SW.2-SW No.(4P)			Model (REU-number)
2	3	4	
Off	Off	Off	VT26 (VR2626WG), VTa26 (VR2626WGT) and EF24 (K2430WG)
Off	On	Off	VT24 (VR2426WG)
Off	Off	On	VT20 (VR2024WG)
Off	On	On	VT16 (VR1620WG)

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Dip switch settings

On Off

Applicable models and REU-numbers

Rinnai Infinity HD200	External	REU-VRM2632WC
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG
Rinnai Infinity HD250	External	REU-VR3237WG

Dip Switch 1: Upper SW(8P)

SW No.	Note							
1	FF model	Flue setting	Off	Long flue (p. 6)		On	Short flue (p. 6)	
	W model	Model setting	Off					
2	Fixed temperature (with controllers)		Off	Fixed temperature		On	With controllers	
3 4 5	Temperature settings		See Chart A					
6			Off					
7	Gas pressure		Off	Normal	On	Forced min.	On	Forced max.
8			Off		Off		On	

Chart A: Temperature Settings

Dip.SW.1-SW No.(8P)			SW No.2 = Off (fixed temperature)	SW No.2 = On (with controllers)	
3	**4**	**5**	**No controllers (fixed temp.)**	**No controllers (fixed temp.)**	**With controllers (max. set temp.)**
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	85, 95[1]	40	40
On	On	On	85	55	75

[1] 95 °C setting only available for HD250 model

Dip Switch 2: Lower SW(4P)

SW No.	Note				
1	Gas type	Off	LPG	On	NG
2,3,4	Model settings	See Chart B			
5,6	Not in use	Off			

Chart B: Model Settings

Dip.SW.2-SW No.(4P)			Model (REU-number)
2	**3**	**4**	
Off	Off	Off	HD250 (VR3237WG)
Off	Off	On	HD200 (VRM2632WC)
Off	On	On	HDi200 (VR2632FFUG)

Dip switch settings



Applicable models and REU-numbers

Rinnai Infinity EF250	External	REU-KM3237WD
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD

Dip Switch 1: Upper SW(8P)

SW No.	Note							
1	Flue settings	Off	EF250 Ext & EFi250 Int long flue (p. 6)			On	EFi250 Internal short flue (p. 6)	
2	Fixed temperature (with controllers)	Off	Fixed temperature			On	With controllers	
3 4 5	Temperature settings	See Chart A						
6	Not in use	Factory setting is 'Off'						
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.	
8		Off		Off		On		

Chart A: Temperature Settings

Dip.SW.1-SW No.(8P)			SW No.2 = Off (fixed temperature)	SW No.2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	Off	95	40	40
On	On	On	85	55	75

Dip Switch 2: Lower SW(6P)

SW No.	Note				
1	Gas type settings	Off	LPG	On	NG
2		Off		Off	
3	Type settings	Off	External	Off	Internal
4		Off		On	
5	Automatic return	Off	Inactive	On	Active
6	External device	Off	S-BMS	On	AH

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Rinnai

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Consumers: 0800 RINNAI (746 624)
Installers: 0800 TO RINNAI (86 746 624)

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PO Box 53177, Auckland Airport, Manukau 2150

Phone: (09) 257 3800
Fax: (09) 257 3899

Email: info@rinnai.co.nz
Website: www.rinnai.co.nz

All Rinnai appliances meet or exceed the safety standards required by New Zealand gas and electrical regulations.

Rinnai is constantly improving its products and as such information and specifications are subject to change or variation without notice.

Installation Manual

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U298-1272(00)

Rinnai
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Suitable for:

- external domestic applications
- high simultaneous hot water demand applications (homes with 1-2 bathrooms)
- mains and low pressure systems

Hard or acidic water will need to be treated to use this product.

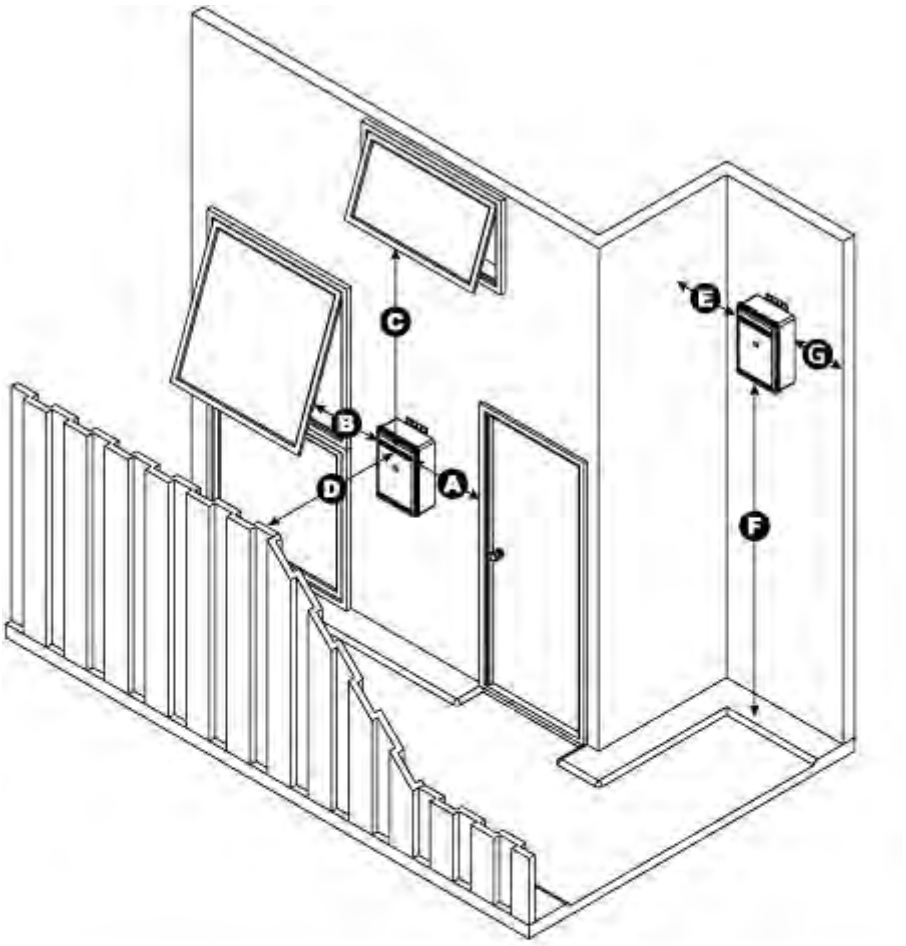
Gas type

Available for Natural Gas or LPG. Specify gas type at time of purchase.

General clearances

The following diagram has been provided to assist you in determining where (and if) an external continuous flow water heater can be positioned. If in doubt, prior to purchase, consult a licensed gasfitter.

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Dimension	Infinity VT models Infinity HD200 models Infinity EF models	Infinity HD250 models
A	Min. 300 mm	Min. 500 mm
B	Min. 300 mm	Min. 500 mm
C	Min. 1.5 m	Min. 1.5 m
D	Min. 500 mm	Min. 500 mm
E	Min. 300 mm	Min. 300 mm
F	Min. 300 mm*	Min. 300 mm*
G	Min. 300 mm	Min. 300 mm

Clearance below eaves, balconies, and other projections, for all models, is 300 mm.

*Rinnai recommend 1.5 m to give enough clearance for the pipe work, and to safely expel flue gases.