

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 1098675
Land Registration District Canterbury
Date Issued 26 May 2023

Prior References

732293

Estate Fee Simple
Area 596 square metres more or less
Legal Description Lot 12 Deposited Plan 583646

Registered Owners

JNF Properties Limited

Interests

Subject to Part IV A Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

10768871.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 16.5.2017 at 4:42 pm

10768871.3 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 16.5.2017 at 4:42 pm

1194157.3 Mortgage to ASB Bank Limited - 21.1.2022 at 12:58 pm

12613183.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 26.5.2023 at 3:47 pm

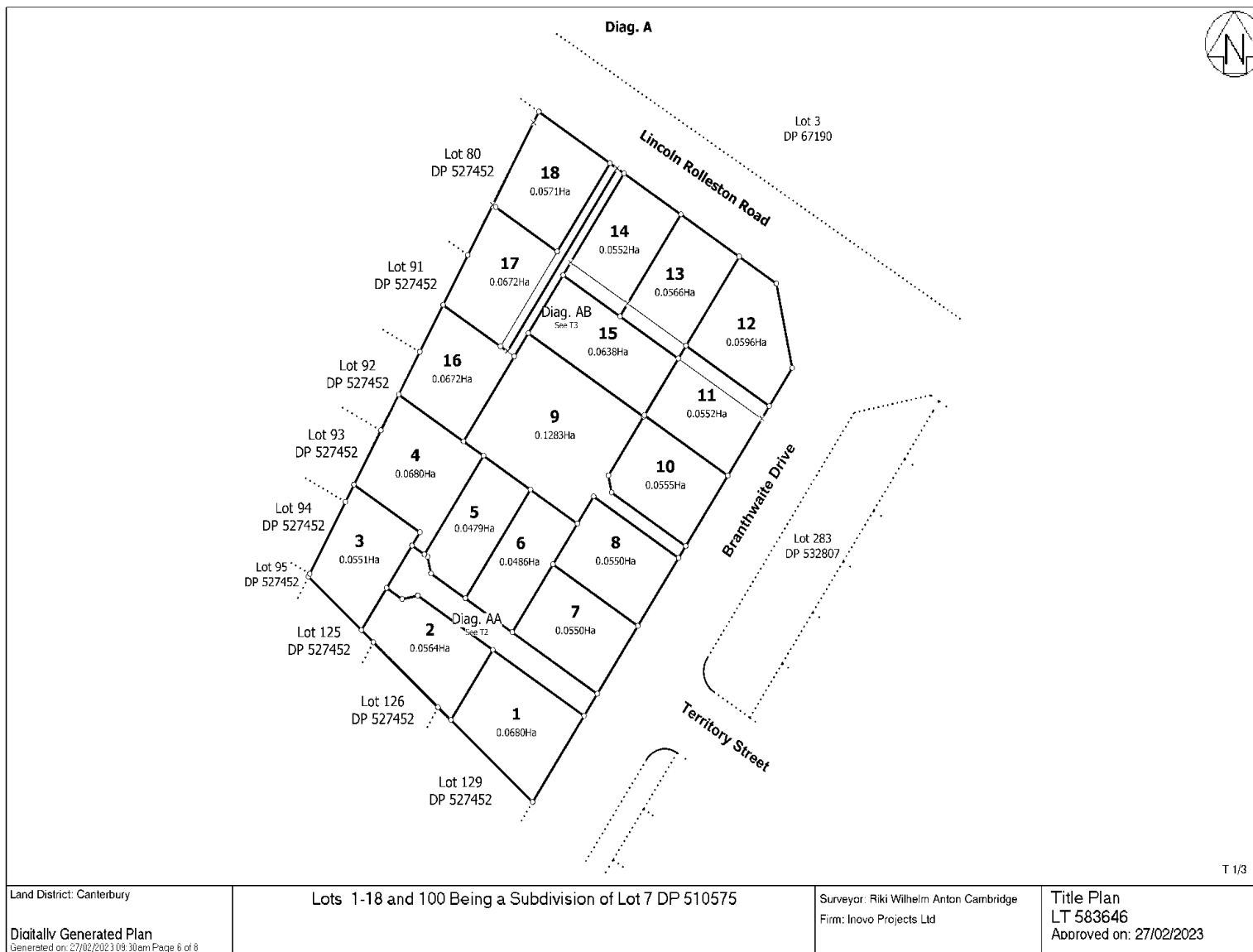
12613183.3 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 26.5.2023 at 3:47 pm

Appurtenant hereto is a right to drain water created by Easement Instrument 12613183.5 - 26.5.2023 at 3:47 pm

The easements created by Easement Instrument 12613183.5 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Covenant Instrument 12613183.9 - 26.5.2023 at 3:47 pm

SDC - Approved Building Consent Document - BC231907 - Pg 2 of 446 - 21/03/2024 - helen.fowler





IN THE MATTER of the Resource Management
Act 1991

AND

IN THE MATTER of Resource Consent 165663

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, unless a resource consent has been granted otherwise, the maximum height of any fence between the front building façade of any residential development and the street, or a private Right of Way or shared access over which the allotment has legal access, shall be one metre. For allotments with frontage to more than one road or a private Right of Way or shared access, any fencing on the secondary road boundary is to be no higher than 1.8 metres;

&

Any other fence shall be a maximum height of one metre if it is located within three metres of the street boundary or private right of way or shared access over which the allotment has legal access."

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 1, 2, 5 – 10, 17 and 18 DP 510575 as held in Computer Freehold Registers 782289 - 782298

DATED this 8th day of May 2017

SIGNED for and on behalf of Selwyn District Council

A handwritten signature in black ink, appearing to read 'P. Rollat'.

Authorised Officer



IN THE MATTER of the Resource Management
Act 1991

AND

IN THE MATTER of Resource Consent 165663

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 connection of the dwelling/s to reticulated sewer and water services has not been required through this subdivision. However, when the balance lot associated with each dwelling site is further subdivided the existing dwelling/s will be required to connect to reticulated water and sewer and an associated development contribution will be charged:
&
That the septic tank shall be decommissioned or removed and backfilled once the reticulated sewer connection has been made."*

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 1, 5, 7, 9 and 18 DP 510575 as held in computer freehold registers 782289, 782291, 782293, 782295 and 782298

DATED this 8th day of May 2017

SIGNED for and on behalf of Selwyn District Council

A handwritten signature in black ink, appearing to read 'J. P. [unclear]', written over a horizontal line.

Authorised Officer



IN THE MATTER of the Resource Management
Act 1991
AND
IN THE MATTER of Resource Consent 215748 and
Deposited Plan 583646

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

"Additional geotechnical testing specific to each new building to be erected on Lots 1 – 18 shall be carried out prior to building consent."

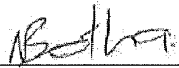
AND THAT you are hereby requested to register the same pursuant to Section 221 of the Resource Management Act 1991.

DESCRIPTION OF LAND

All those pieces of land being Lots 1 – 18 DP 583646 as held in Records of Title 1098664 - 1098681.

DATED this 20th day of June 2023

SIGNED for and on behalf of Selwyn District Council

 Authorised Officer



IN THE MATTER of the Resource Management
Act 1991

AND

IN THE MATTER of Resource Consent 215748 and
Deposited Plan 583646

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

"Any fencing or freestanding wall shall comply with the requirements of the District Plan unless a resource consent has otherwise been granted. For further information please refer to the relevant rule in the District Plan or contact the duty planner at 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 1 - 18 DP 583646 as held in Records of Title 1098664 - 1098681.

DATED this 9th day of March 2023

SIGNED for and on behalf of Selwyn District Council

 Authorised Officer

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Covenant Instrument to note land covenant

(Section 116(1)(a) & (b) Land Transfer Act 2017)

Covenantor

JNF Properties Limited

Covenantee

JNF Properties Limited

Grant of Covenant

The **Covenantor**, being the registered owner of the burdened land(s) set out in Schedule A, **grants to the Covenantee** (and, if so stated, in gross) the covenant(s) set out in Schedule A, with the rights and powers or provisions set out in the Annexure Schedule(s).

Schedule A
required

Continue in additional Annexure Schedule, if

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title)	Benefited Land (Record of Title) or in gross
Land Covenant	Lot 1 DP 583646	Lot 1 DP 583646 (RT 1098664)	Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ¹	Benefited Land (Record of Title) ² or in gross
Land Covenant	Lot 2 DP 583646	Lot 2 DP 583646 (RT 1098665)	Lot 1 DP 583646 (RT 1098664), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 3 DP 583646	Lot 3 DP 583646 (RT 1098666)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676) Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

SDC - Approved Building Consent Document - BC231907 - Pg 9 of 446 - 21/03/2024 - helen.fowler

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ³	Benefited Land (Record of Title) ⁴ or in gross
Land Covenant	Lot 4 DP 583646	Lot 4 DP 583646 (RT 1098667)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 5 DP 583646	Lot 5 DP 583646 (RT 1098668)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ⁵	Benefited Land (Record of Title) ⁶ or in gross
Land Covenant	Lot 6 DP 583646	Lot 6 DP 583646 (RT 1098669)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 7 DP 583646	Lot 7 DP 583646 (RT 1098670)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ⁷	Benefited Land (Record of Title) ⁸ or in gross
Land Covenant	Lot 8 DP 583646	Lot 8 DP 583646 (RT 1098671)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 10 DP 583646	Lot 10 DP 583646 (RT 1098673)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ⁹	Benefited Land (Record of Title) ¹⁰ or in gross
Land Covenant	Lot 11 DP 583646	Lot 11 DP 583646 (RT 1098674)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 12 DP 583646	Lot 12 DP 583646 (RT 1098675)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ¹¹	Benefited Land (Record of Title) ¹² or in gross
Land Covenant	Lot 13 DP 583646	Lot 13 DP 583646 (RT 1098676)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 14 DP 583646	Lot 14 DP 583646 (RT 1098677)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ¹³	Benefited Land (Record of Title) ¹⁴ or in gross
Land Covenant	Lot 15 DP 583646	Lot 15 DP 583646 (RT 1098678)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 16 DP 583646	Lot 16 DP 583646 (RT 1098679)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 17 DP 583646 (RT 1098680), Lot 18 DP 583646 (RT 1098681)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Schedule A (continued)

Purpose of covenant	Shown (plan reference)	Burdened Land (Record of Title) ¹⁵	Benefited Land (Record of Title) ¹⁶ or in gross
Land Covenant	Lot 17 DP 583646	Lot 17 DP 583646 (RT 1098680)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 18 DP 583646 (RT 1098681)
Land Covenant	Lot 18 DP 583646	Lot 18 DP 583646 (RT 1098681)	Lot 1 DP 583646 (RT 1098664), Lot 2 DP 583646 (RT 1098665), Lot 3 DP 583646 (RT 1098666), Lot 4 DP 583646 (RT 1098667), Lot 5 DP 583646 (RT 1098668), Lot 6 DP 583646 (RT 1098669), Lot 7 DP 583646 (RT 1098670), Lot 8 DP 583646 (RT 1098671), Lot 9 DP 583646 (RT 1098672), Lot 10 DP 583646 (RT 1098673), Lot 11 DP 583646 (RT 1098674), Lot 12 DP 583646 (RT 1098675), Lot 13 DP 583646 (RT 1098676), Lot 14 DP 583646 (RT 1098677), Lot 15 DP 583646 (RT 1098678), Lot 16 DP 583646 (RT 1098679), Lot 17 DP 583646 (RT 1098680)

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Insert instrument type

Covenant Instrument to note land covenant

Covenant rights and powers (including terms, covenants and conditions)

Delete phrases in [] and insert memorandum number as required.

Continue in additional Annexure Schedule if required.

The provisions applying to the specified covenants are those set out in:

[Memorandum number _____, registered under section 209 of the Land Transfer Act 2017].

[Annexure Schedule ____].

Annexure Schedule

BACKGROUND

- A. The Covenantor intends that the Burdened Land be subject to a general scheme applicable to and for the benefit of the Benefited Land ("**Scheme**") for the Term.
- B. The Covenantor intends this Instrument shall be and remain registered against the record(s) of title to the Burdened Land to give effect to the Scheme so that for the Term:
 - (a) Owners or occupiers for the time being of the Burdened Land shall be bound by the provisions of this Instrument; and
 - (b) Owners or occupiers for the time being of the Benefited Land can enforce the observance of the provisions of this Instrument by the owners or occupiers for the time being of the Burdened Land.

1. DEFINITIONS AND INTERPRETATION

DEFINITIONS

1.1 In this Instrument, unless the context requires otherwise:

- Benefited Land** means those parcels of land so described in Schedule A of this Instrument;
- Burdened Land** means those parcels of land so described in Schedule A of this Instrument;
- Consents** means any building consent required under the Building Act 2004 and any resource consent required under the Resource Management Act 1991;
- Covenantor** shall (where applicable) include and bind:
- (a) The person executing this Instrument as Covenantor; and
 - (b) All the Covenantors for the time being under this Instrument; and
 - (c) All respective executors, administrators, successors, assigns and successors in title of each Covenantor, and if more than one jointly and severally;
- Covenantee** shall (where applicable) include and bind:
- (a) The person executing this Instrument as Covenantee; and
 - (b) All the Covenantees for the time being under this Instrument; and
 - (c) All respective executors, administrators, successors, assigns and successors in title of each Covenantee, and if more than one jointly and severally;

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

- (b) All the Covenantors for the time being under this Instrument; and
- (c) All respective executors, administrators, successors, assigns and successors in title of each Covenantor, and if more than one jointly and severally;

Covenants means all or any of the covenants contained in this Instrument;

Deposited Plan means the Deposited Plan so described in Schedule A of this Instrument;

Developer means JNF Properties Limited and includes any assignee and/or successor who is nominated as such in writing by JNF Properties Limited from time to time;

dwelling house means a residential building or residential buildings designed, built and used in accordance with these Covenants;

Instrument means this Instrument and includes all the annexure schedules incorporated within this Instrument;

Landscaping includes the completion on a Lot of all fences, paths, planting of trees, shrubs and plants and for any unpaved areas viewable from road frontage to be grassed or planted;

Local Authority means Selwyn District Council;

Lot means a particular parcel of land comprised in the Burdened Land;

Resource Consent means the subdivision resource consent reference RC215748;

Term means a period of twenty (20) years commencing on and from the date that this Instrument is registered;

Working Day means any day of the week other than:

- (a) Saturday, Sunday, Waitangi Day, Good Friday, Easter Monday, Anzac Day, the Sovereign's Birthday and Labour Day; and
- (b) If Waitangi Day or Anzac Day fall on a Saturday or Sunday, the following Monday; and
- (c) A day in the period commencing on the 24th of December in any year and ending on the 5th of January the following year, both days inclusive;
- (d) The day observed as the anniversary Canterbury province; and
- (e) Matariki (Matariki Observance Day) being the public holiday observed under the Holidays Act 2003.

INTERPRETATION

1.2 In this Instrument, unless the context indicates otherwise:

- (a) All monetary amounts are stated and are payable in New Zealand dollars;
- (b) Singular words include the plural and vice versa and words importing one gender include the other gender;
- (c) References to any "**party**" mean a party to this Instrument and include the successors, executors, administrators and permitted assigns (as the case may be) of that party;
- (d) References to clauses means a clause in this Instrument (unless stated otherwise);
- (e) References to a "**person**" include an individual, firm, company, corporation or unincorporated body of persons, any public, local authority, any government and any agency of any government or of any such authority;
- (f) Headings appear as a matter of convenience and do not affect the construction of this Instrument;

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

- (g) A reference to an enactment or any regulations is a reference to that enactment or those regulations as amended, or to any enactment or regulations substituted for them;
- (h) Any obligation on the Covenantor not to do anything shall be deemed also to be an obligation not to suffer, permit and or cause that thing to be done;
- (i) An obligation by two or more persons binds those persons jointly and severally.

2. GENERAL COVENANTS

2.1 The Covenantor covenants and agrees:

- (a) To observe and perform all the Covenants at all times during the Term; and
- (b) The Covenants shall run and bind the Burdened Land for the benefit of the Benefited Land to the intent that each of the Covenants will be appurtenant to the Benefited Land for the Term.

2.2 The Covenantor covenants and agrees to pay the Covenantee's and the Developer's legal costs (as between solicitor and client) of and incidental to the enforcement or attempted enforcement of the Covenantee's rights, remedies and powers under this Instrument in relation to any breach by the Covenantor of any of its obligations set out in this Instrument.

3. COVENANTS

Building

3.1 The Covenantor covenants and agrees:

- (a) The Covenantor shall not erect, or permit to be erected or placed on the Lot:
 - (i) any dwelling house without first obtaining the written approval of the Developer to the final building plans and specifications (in the form to be submitted to the Local Authority for a building consent) and which must include full details of all exterior colour schemes and finishes and details of the Landscaping. The approval of the Developer may be given or refused in the sole, absolute and unfettered discretion of the Developer;
 - (ii) any relocated dwelling house or any dwelling house other than one constructed on site from new, unused materials;
 - (iii) any dwelling house, which has a floor area of less than 140m² (including garages);
 - (iv) any garage or carport which is not incorporated as an integral part of the dwelling house; and
 - (vi) any building other than a dwelling house provided that the Covenantor is entitled to erect, construct or place on the Lot any separate free standing garden shed or similar outbuilding constructed and completed in new materials and appropriately painted or finished so as to blend in with the dwelling house.
- (b) The Covenantor shall not:
 - (i) use any less than two different exterior claddings (or one cladding with a gable) of any material for any dwelling house other than brick, colour steel, natural stone, textured plaster, stained timber plywood or stained timber weatherboard, surface coated concrete block, stucco, linear weatherboards, solid plaster or glazing or a combination of the above;
 - (ii) leave the outside of any dwelling house unfinished, or any exterior walls or doors unpainted or unstained except where cedar cladding or decorative brick/stone are used;
 - (iii) use as a roofing material on any dwelling house any material other than tiles, (including clay, ceramic concrete, decramastic, pre-coated or pressed steel), colour steel (including pre-painted, long-run pressed or rolled steel), wooden shingles, slate, membrane roofing or copper.

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

- (c) Despite the provisions of clause 3.1(b), the Developer may approve the use of alternative exterior cladding and/or roof materials provided the Developer considers, in its absolute discretion, that such materials are consistent with the Developer's requirements to maintain minimum standards for a modern, well-designed residential subdivision. Any use of alternative exterior cladding or roof materials so approved shall not be in breach of clause 3.1(b).
- (d) The Covenantor shall construct and complete:
 - (i) the dwelling house within twelve (12) months of laying down the foundations; and
 - (ii) the Landscaping within twelve (12) months of laying the foundations for the dwelling house; and
 - (iii) the driveway comprising permanent continuous surface in concrete, concrete block, tar sealing or similar within fifteen (15) months of laying down the foundations for the dwelling house.
- (e) The Covenantor shall not permit or cause the Lot to be occupied or used unless:
 - (i) the dwelling house has been substantially completed in accordance with the terms of these Covenants, and
 - (ii) the dwelling house meets the requirements of the Local Authority.

Use

3.2 The Covenantor covenants and agrees:

- (a) Not to permit the Lot to be used for any purpose other than residential purposes or as a home office, provided that use of a Lot:
 - (i) as a sales office by the Developer; or
 - (ii) as a show home by a building company with the Developer's consent, shall not be a breach of this provision;
- (b) Not to erect or place, or permit to be erected or placed on the Lot any caravan, mobile home, hut, boat or any structure (other than a dwelling house) capable of providing temporary accommodation or other vehicles provided that the storage of mobile homes, caravans, cars, boats and other such items is permitted on the Lot once the dwelling house has been constructed and completed on the Lot;
- (c) To ensure that all services and utilities are located below ground on the Lot;
- (d) To keep the Lot neat and tidy and free of significant noxious weeds and overgrowth, including (but not limited to) keeping all grass below 10cm in length;
- (e) Not to permit any rubbish or waste material to be or remain on the Lot other than within suitable enclosed structures or otherwise appropriately screened from view;
- (f) Not to permit the parking of trucks or any large commercial or agricultural vehicles on or adjoining the Lot or on any thoroughfare or road near the Lot, other than for temporary delivery purposes;
- (g) Not to permit parking of any vehicles which do not have a current warrant of fitness and/or registration, in view of any dwelling house on any neighbouring Lot, or in view of any thoroughfare or road near the Lot;
- (h) To ensure all heat pumps, gas cylinders and washing lines are suitably screened from the road frontage of the Lot;
- (i) To do all things reasonably required to comply with the conditions of the Resource Consent;
- (j) To comply with the terms and conditions of any Consent Notice registered against the title to the Lot to be complied with by the Lot owner on a continuing basis.

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

4. BREACH OF COVENANTS

- 4.1 If the Covenantor breaches or fails to observe part of or any of the Covenants, then without prejudice to any other liability which the Covenantor may have to the Covenantee or any person or persons having the benefit of the Covenants, the Covenantor, upon written demand being made by the Covenantee or any person or persons having the benefit of the Covenants will cease any activity which is in breach or non-observance of the Covenants and otherwise rectify the breach or non-observance.
- 4.2 The Covenantor will indemnify and keep indemnified the Covenantee and the Developer from and against any loss, damage, cost, expense or charge incurred or sustained at any time by the Covenantee or the Developer as a result of any failure or breach by the Covenantor in complying with any obligation imposed on the Covenantor pursuant to this Instrument.
- 4.3 Despite any other provisions of this Instrument, the Covenantor will only be liable for breaches of the Covenants which occur or exist while the Covenantor is the owner or occupier of the Lot in respect of which a breach or non-observance occurs (and will only be liable to indemnify the Covenantee accordingly) but without prejudice to any antecedent breach.

5. ENFORCEMENT

- 5.1 The Covenantor and Covenantee acknowledge and agree that:
- (a) The Covenants are intended to create obligations on the Covenantor, for the benefit of the Developer (as well as the Covenantee);
 - (b) The Developer may (but is not obliged to) facilitate the observance of this instrument by the Covenantor by taking all necessary steps to enforce its observance on behalf of any Covenantee;
 - (c) The Covenantee irrevocably appoints the Developer to be its attorney and in its name to do anything which the Developer considers necessary to enforce or attempt to enforce the Covenantee's rights or powers under this Instrument, provided that the Developer shall not be obliged to do so;
 - (d) Without limiting the appointment made in clause 5.1(c) that appointment may specifically extend to the Developer issuing proceedings in the name of any Covenantee, provided that in doing so the Developer indemnifies such Covenantee against all costs arising from or incidental to those proceedings.
- 5.2 In the event that the Covenantor breaches or fails to observe and perform part of or any of the Covenants, the Covenantee and/or the Developer shall have a right (but not an obligation) to do whatever may be reasonably required to remedy such failure on the part of the Covenantor, and the cost incurred by the Covenantee or the Developer in remedying the default shall be refunded by the Covenantor to that Covenantee or the Developer as the case may be upon demand.
- 5.3 The Covenantor acknowledges that neither the Covenantee nor the Developer shall be liable to the Covenantor for any loss, damage, claim or expense arising in relation to any matters under this Instrument (including without limitation where such loss, damage, claim or expense arises from any approval or non-approval by the Developer of an application under clauses 3.1(a)(i) or 3.1(c) or from any failure on the part of the Covenantee or the Developer to remedy a breach of the Covenants by the Covenantor or to enforce the Covenants).

6. OPERATION OF COVENANTS

- 6.1 The Covenants shall expire and be of no further effect on expiry of the Term.

7. GENERAL

Waiver

- 7.1 No exercise or failure to exercise or delay in exercising any right or remedy by a party shall constitute a waiver by that party of that or any other right or remedy available to it.

This approved format may be used for lodgement as an electronic instrument under the Land Transfer Act 2017

Partial Invalidity

- 7.2 If any provision of this Instrument or its application to any party or circumstance is or becomes invalid or unenforceable to any extent, the remainder of this Instrument and its application shall not be affected and shall remain enforceable to this greatest extent permitted by law.

Notices

- 7.3 Any notice required to be served on any party under this Instrument shall be served in the manner prescribed in Part 7 of the Property Law Act 2007 for the type of notice being served.

Governing Law

- 7.4 This Instrument shall be governed by New Zealand law, and the parties submit to the non-exclusive jurisdiction of the courts of New Zealand.

Professional partnership consent checklist

(to be completed by the designer)

Note: SDC reserves the right to accept or deny an application made under the professional partnership programme on review of the application.

Site details

Address of site	
Address/legal	2 Branthwaite Drive, Rolleston

Application criteria

Click each relevant box to verify that you've met the criteria

Build criteria	yes	No	n/a
Is a new build of R2 complexity ('or less*') * 'or less' means R1 complexity buildings – eg - unlined garages with no services, - rural pole/portal sheds with no services, and - solid fuel burners	New build (R2 complexity) ☒	☐	
A single detached dwelling (used only as a single household unit)	☒	☐	☐
Located on fully serviced site within subdivision	☒	☐	☐
Fully meets all district plan requirements, with no resource consent approvals needed from the territorial authority	☒	☐	
Does not need any approvals from the regional authority	☒	☐	
Application criteria	Yes	No	n/a
Application is for a BC only	☒	☐	
"PPP" has been added in the description of application to allow easy identification of the application to fast track eg PPP – New detached dwelling with 3 bedrooms and attached garage	☒	☐	

Application criteria		Yes	No	n/a
Application is complete and project specific		☒	☐	
Fully completed LBP Design Memorandum specific to the project provided		☒	☐	
Documents submitted are complete and provided in the correct order and locations in our online consenting system		☒	☐	
Any fire appliances fully comply with Environmental Protection Agency (EPA) National Emissions Standards		☐	☐	☒
I confirm that this application is: • within the scope of the professional partnership programme, • submitted with all relevant information included, and • meets all the required criteria.		☐	☐	☒
Confirmation SUPERSEDED Consented building practitioner signoff				
I confirm that this application is:				
• within the scope of the professional partnership programme, • submitted with all relevant information included, and • meets all the required criteria.				
Full name	Ben Solomon	Business name	Nomolos Architecture	
Phone	03 578 2349	Licence/ registration number	BP113632	
Email	admin@nomolos.co.nz			

Next step – save this form and **submit with your building consent application.**

SDC - Approved Building Consent Document - BC231907 - Pg 24 of 446 - 21/03/2024 - helen.fowler

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: 2 Branthwaite Drive

Suburb:

Town/City: Rolleston

Postcode: 7615

THE OWNER

Name(s): Jack William Lamb and Lara Martins Alves

Mailing address: 6 Emily Place

Suburb:

PO Box/Private Bag:

Town/City: Rolleston

Postcode: 7615

Phone number: +64277200041

Email address: jwlamb646@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, Ben Solomon carried out / supervised the following design work that is restricted building work

PRIMARY STRUCTURE: B1

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
Primary structure			
All RBW Design work relating to B1 (✓)		(✓) Carried out () Supervised	
Foundations and subfloor framing (✓)	<i>Concrete Foundation to NZS3604-2011</i>	(✓) Carried out () Supervised	A02, A11, A13, A15, S01, S02, S03
Walls (✓)	<i>Timber framing as per NZS3604-2011</i>	(✓) Carried out () Supervised	A04, A10, A11
Roof (✓)	<i>Battens, Soffit framing and roof bracing as per NZS3604-2011, Truss design verified (only)</i>	(✓) Carried out (✓) Supervised	A09, A10, A11, A12, A13, A15
Columns and beams (X)		() Carried out () Supervised	
Bracing (✓)	<i>Sheet Bracing</i>	(✓) Carried out () Supervised	A05, A06, A07
Other (X)		() Carried out () Supervised	

EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2

All RBW design work relating to E2 (✓)		(✓) Carried out () Supervised	
Damp proofing (✓)	<i>Under slab</i>	(✓) Carried out () Supervised	A02, A11, A13, A15, S01, S02, S03
Roof cladding or roof cladding system (✓)	<i>Metal tiles on roof underlay</i>	(✓) Carried out () Supervised	A09, A10, A11, A12, A13, A15
Ventilation system (for example, subfloor or cavity) (✓)	<i>Cavity to wall cladding</i>	(✓) Carried out () Supervised	A04, A10, A11, A13, A15
Wall cladding or wall cladding system (✓)	<i>Brick veneer / weatherboard on wall underlay</i>	(✓) Carried out () Supervised	A04, A10, A11, A13, A14, A15
Waterproofing (X)		() Carried out () Supervised	
Other (X)		() Carried out () Supervised	

FIRE SAFETY SYSTEMS: C1 – C6

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

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

Note: continue on another page if necessary.

WAIVERS AND MODIFICATIONS

Waivers or modifications of the building code are required () Yes (✓) No

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

Clause	Waiver/modification required
<i>[List relevant clause numbers of building code]</i>	<i>[Specify nature of waiver or modification of building code]</i>

Note: continue on another page if necessary.

ISSUED BY

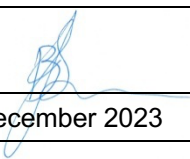
Name: Ben Solomon	LBP or Registration number: BP113632
The practitioner is a: ☒ Design LBP ☐ Registered architect ☐ Chartered professional engineer	
Design Entity or Company (optional): Nomolos Architecture	
Mailing address (if different from below):	
Street address / Registered office: 18 Wynen Street	
Suburb: Blenheim	Town/City: Blenheim
PO Box/Private Bag:	Postcode: 7240
Phone number: 03 578 2349	Mobile: 021 277 6436
After Hours:	Fax:
Email address: ben@nomolos.co.nz	Website:

DECLARATION

I Ben Solomon *[name of practitioner]*, LBP,

state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW:

- Complies with the building code; or
- ~~Complies with the building code subject to any waiver or modification of the building code recorded on this form.~~

Signature: 

Date: 12 December 2023

Flood Assessment Certificate

FC240189

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



Property Address:	2 Branthwaite Drive, Rolleston
Legal Description:	Lot 12 DP 583646
Date of Issue:	19/03/2024
This certificate is valid until:	19/03/2026

This site is not located on land within a high hazard area.

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

Minimum finished floor level shall be **+41.20m LVD37**

Disclaimers:

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

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

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

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

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

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

Advice notes:

- a) For a new residential unit or principal building or the alteration of, or addition to any residential unit or principal building to be a permitted activity under the Selwyn District Plan as a whole, all other relevant rules must be complied with.
- b) If the certified level is for a particular location on the site, the certified level is the minimum floor level for the proposed building location shown on the attached plan. If you wish to build elsewhere on the site the minimum floor level may be different, and you will need to request another certificate for the new location.

- c) For the purposes of this certificate, ground level means:
- a. The actual finished surface level of the ground after the most recent subdivision that created at least one additional allotment was completed (when the record of title is created);
 - b. If the ground level cannot be identified under paragraph (a), the existing surface level of the ground;
 - c. If, in any case under paragraph (a) or (b), a retaining wall or retaining structure is located on the boundary, the level of the exterior surface of the retaining wall or retaining structure where it intersects the boundary.
- d) You must reference this certificate when applying for a building consent or the building consent will not be accepted.

Signed for and on behalf of the Selwyn District Council:



Emma Larsen

Head of Resource Consents

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



SURVEYED	AT	12/02/2024	APPROVED	DATE
DRAWN	AT	14/02/2024	ANSHU THAPA	14/02/2024
CHECKED	DM	14/02/2024		
REVISION	CHANGES		CHECKED	DATE
A	Client Issue		AT	14/02/2024

- NOTES:
- Coordinates are in terms of Geodetic Datum 2000, Mount Pleasant Circuit.
Origin of Coordinates:
IT 104 DP 583646
 - Heights are in terms of Lyttelton Vertical Datum 1937.
Origin of Heights:
MA 9 DP 527452
RL = 41.87m (NZVD16 Height Retrieved 09/02/2024; Converted to LVD37 Via LINZ Online Coordinate Converter)
 - Areas and Dimensions adopted from DP 583646.
 - Boundaries have been adopted from adopted from DP DP 583646.
A boundary survey should be carried out to determine exact boundary positions on site.
 - Underground service locations shown have not been surveyed.
Exact position of services to be confirmed on site prior to works.
 - This survey has been carried out to topographical standards.
Critical dimensions and levels should be verified.
 - This plan is issued for a specific project and may not be altered or used for any other purpose without the prior written consent from Fraser Thomas Ltd.

TOTAL AREA: 596m²
Comprised in RT 1098675

Client
GJ GARDNER HOMES

Project
2 BRANTHWAITE DRIVE

Title
TOPOGRAPHIC SURVEY
PLAN
LOT 12 DP 583646



ENGINEERS · RESOURCE MANAGERS · SURVEYORS

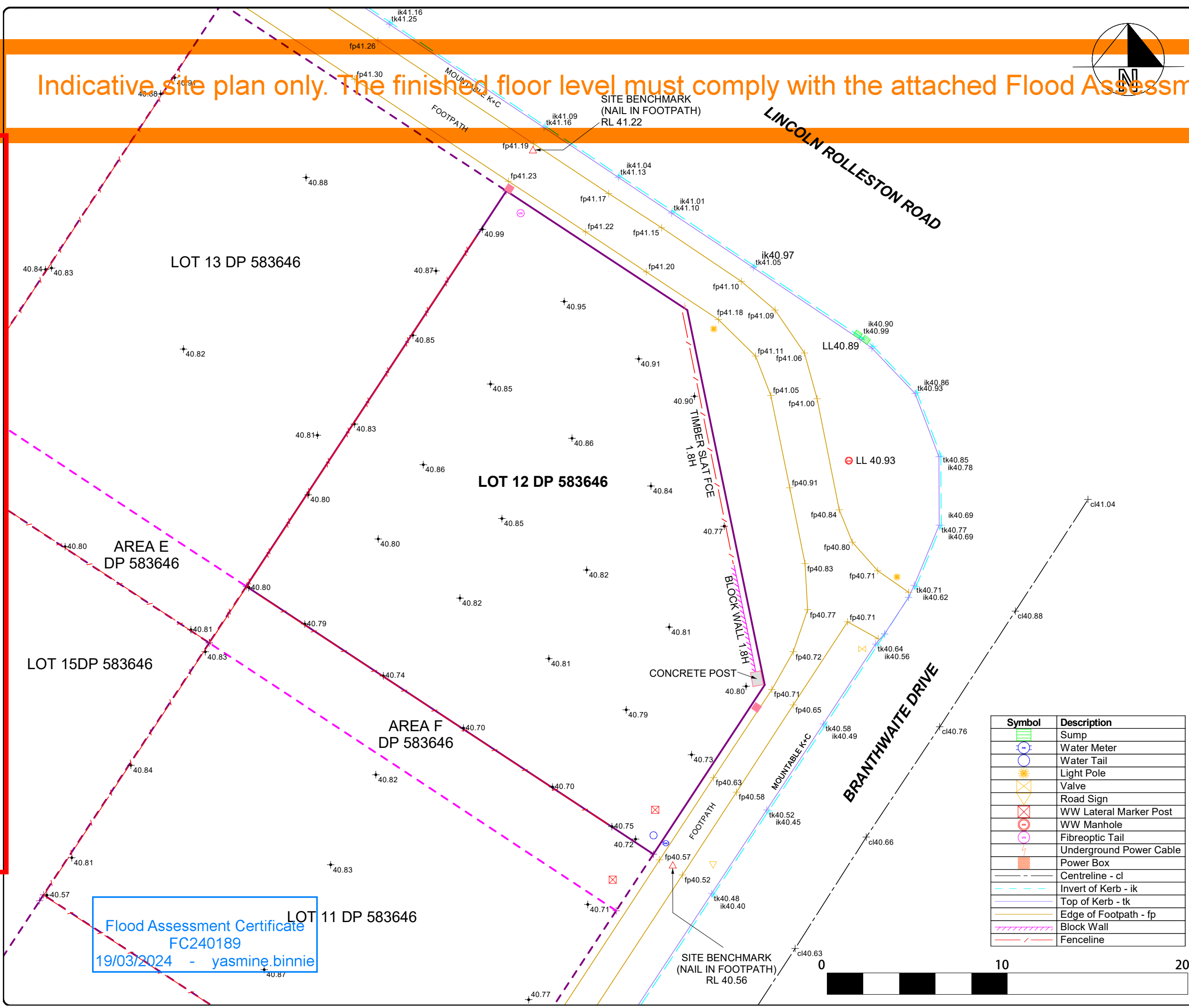
AUCKLAND 09 278 7078
HAWKE'S BAY 06 211 2766
CHRISTCHURCH 03 358 5936
DUNEDIN 03 428 3292
NELSON 03 222 1132

The copyright of this design and drawing is vested in Fraser Thomas Ltd unless otherwise indicated.

SCALE: (A3) 1:200

DRAWING NUMBER - REVISION

CH01977-SU-TO-01A





03 May 2023

14769

C/o Kate Dirkzwager
G.J. Gardner

Email: kate.dirkzwager@gjgardner.co.nz

Dear Kate,

**SOIL BEARING INVESTIGATION
LOT 12, 8 BRANTHWAITE DRIVE, ROLLESTON**

Testing & Results

We confirm that a soil bearing investigation was completed on 01 May 2023 at the above property and now report as follows.

The section is located the Western side of Branthwaite Drive in the new development. The section is a relatively flat grass covered site.

The investigation consisted of two 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 adjacent lots were also tested (separate reports) to confirm that the soil conditions were consistent.

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 locations '1' revealed topsoil to approximately 200mm overlying light brown silt on gravels. The scala penetrometer results were quite similar in both locations with low bearing capacity at the surface and refusal at shallow depths.

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

Other Information Reviewed

The geotechnical report by Kirk Roberts, ref 161188 dated 16 November 2016 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:

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



constructure
structural engineering

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

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

Please contact me should any further information be required.

Yours faithfully

Cory Bedford

BEng (HONS) CEngNZ CPEng IntPE (NZ)

Christchurch Office:

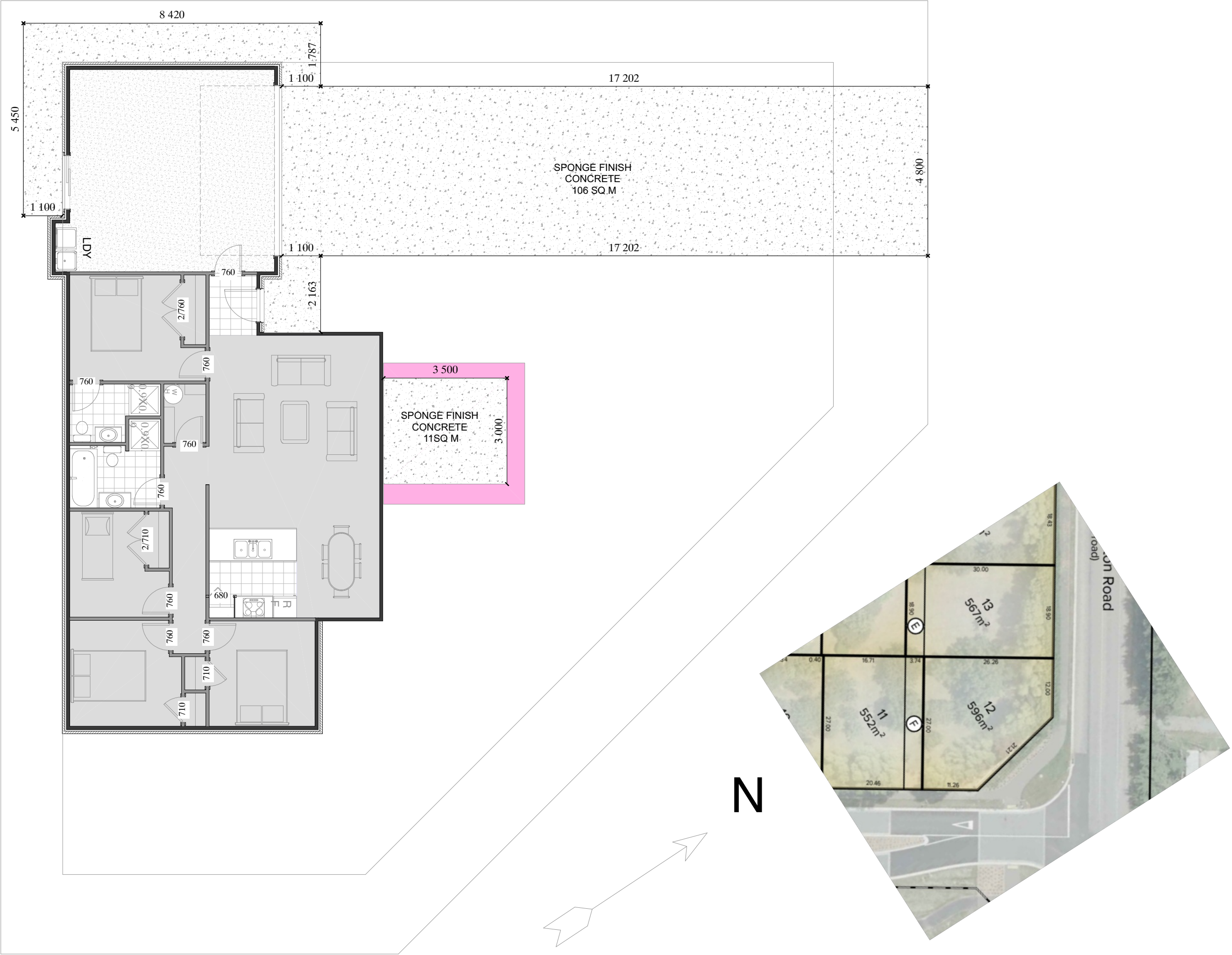
6/75 Peterborough Street, Christchurch 8013
PO Box 21381, Christchurch 8143
Phone 03 365 3243 Email cory@constructure.co.nz

Auckland Office:

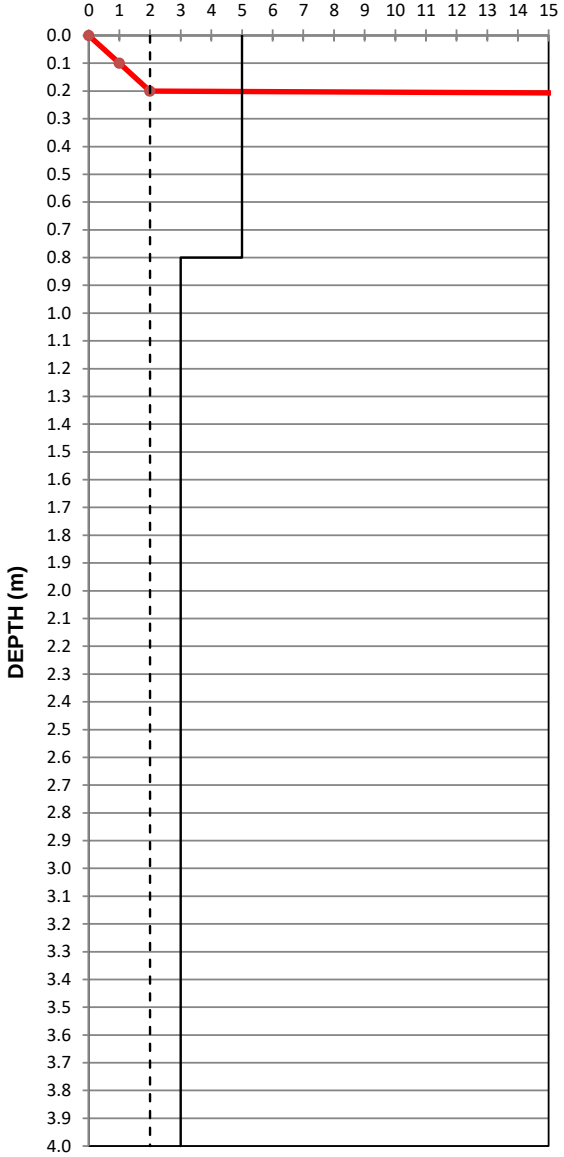
Suite 2.1, 63 Ponsonby Road, Auckland 1011
PO Box 21381, Christchurch 8143
Phone 09 320 5226 Email james@constructure.co.nz

LOT 12, 8 BRANTHWAITE DRIVE

SDC - Approved Building Consent Document - BC231907 - Pg 34 of 446 - 21/03/2024 - helen.fowler



soil investigation record

Project:	LOT 12, 8 BRANTHWAITE DRIVE, ROLLESTON		no.	1 OF 3
Ref:	14769		date	3/05/2023
By:	CH		checked	RD
Test Location 1				
Bore Log (Hand Auger)			Scala Penetrometer	
Depth (m)			(Blows/100mm)	
	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. • Based on Stockwell, M.J. , 1997: Determination of allowable bearing pressure under small structures, New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC. • The allowable bearing pressure has been calculated using a factor of safety = 3. • 100 kPa allowable bearing pressure corresponds to the NZS 3604:2011 requirements for "Good ground". • 65 kPa allowable bearing pressure corresponds to the MBIE Guidelines requirements for use of foundation options 1-4 (TC2).			  Blows/100mm  100 kPa Allowable Bearing Capacity  65 kPa Allowable Bearing Capacity	

soil investigation record

Project:	LOT 12, 8 BRANTHWAITE DRIVE, ROLLESTON		no.	2 OF 3
Ref:	14769		date	3/05/2023
By:	CH		checked	RD

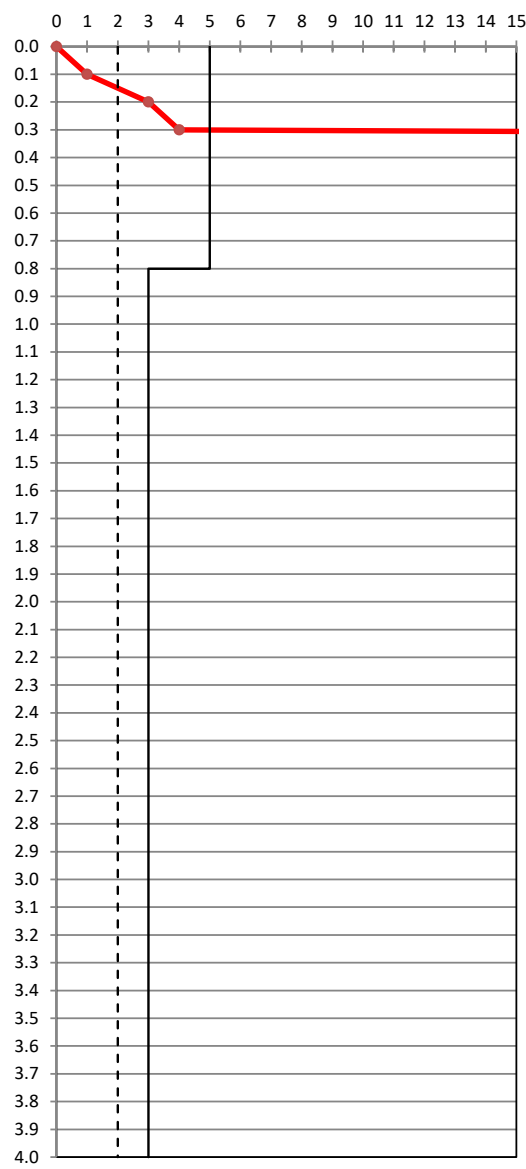
Test Location 2

Depth (m)	Bore Log (Hand Auger)		Scala Penetrometer (Blows/100mm)
	Symbol	Description	
GL		Topsoil	
0.2		Light Brown Silt	
0.4		End (Drop-weight Bounced)End of	
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.
- Based on Stockwell, M.J. , 1997: Determination of allowable bearing pressure under small structures, New Zealand Engineering (32:6), dated 15 June 1977, using a factor of safety of three to back calculate the UBC.
- The allowable bearing pressure has been calculated using a factor of safety = 3.
- 100 kPa allowable bearing pressure corresponds to the NZS 3604:2011 requirements for "Good ground".
- 65 kPa allowable bearing pressure corresponds to the MBIE Guidelines requirements for use of foundation options 1-4 (TC2).

DEPTH (m)



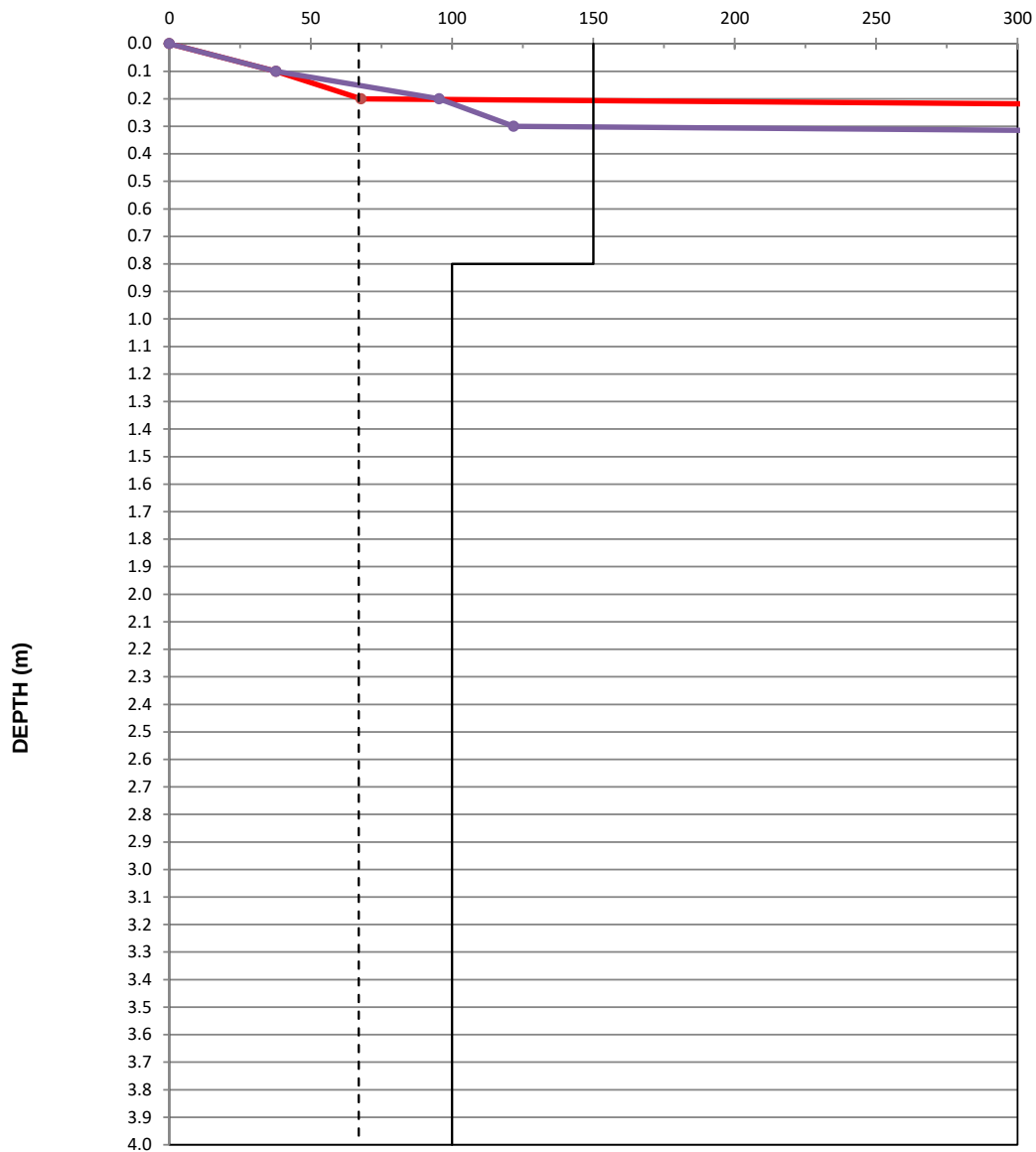
Legend:

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

soil investigation record

Project:	LOT 12, 8 BRANTHWAITE DRIVE, ROLLESTON	no.	3 OF 3
Ref:	14769	date	3/05/2023
By:	CH	checked	RD

Scala Penetrometer

Allowable Bearing Pressure (kPa)**Notes:**

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

—●— Test Location 1
—●— Test Location 2
—— 100 kPa Allowable Bearing Capacity
- - - 65 kPa Allowable Bearing Capacity



PERCOLATION TEST

Carried out by Certifying Drainlayer Nathan Williamson: PGDB registration 26658

SITE: 8 Branthwaite Dr

DATE: 6.12.23

LOCAL AUTHORITY: Selwyn District Council

We have carried out a percolation test out at the above address. We excavated down to 3.0m which is the anticipated depth of the base of the soak pit. We applied 2 buckets of water to the base of the excavation, and the water soaked away within 20 seconds. This indicates that the ground has good drainage and a conventional soakpit will be the best solution for disposal of stormwater.

Soak Pit Design:

Using the formula set out in E1 of the NZBC for determining the size of the soakpit we have calculated that the dimension of the soakpit should be 2m L x 2m W x 1.1m D and at least 4.1 m³ in volume and installed in accordance with the attached diagram.

We recommend that when the soak pit is being installed on site that the drainlayer confirms soakage at the base of the soak pit prior to filling it with boulders incase there has been a change in ground conditions or location of the soak pit.

Figure 1. Soakpit Design

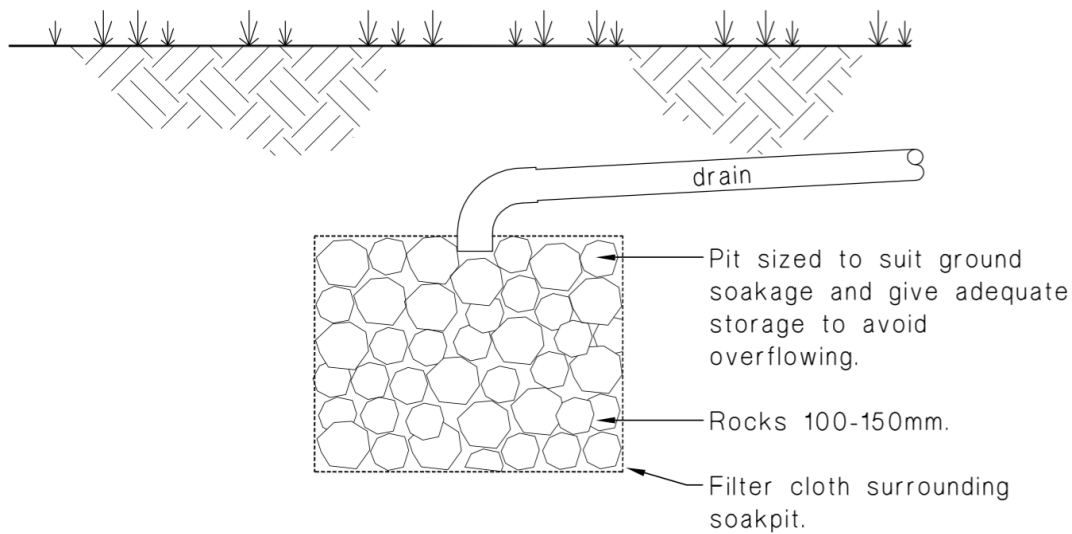


Figure 2. Soakpit Capacity Calculations

9.0.5 The volume of storage required in the soak pit, V_{stor} (m^3), shall be calculated by:

$$V_{stor} = R_c - V_{soak}$$

where

R_c = run-off discharged from catchment to soak pit in 1 hour (m^3).

V_{soak} = volume disposed of by soakage in 1 hour (m^3).

and

$$R_c = 10CIA$$

where

C = run-off coefficient (see Table 1).

I = rainfall intensity (mm/hr) based on 1 hour duration of an event having a 10% probability of occurring annually.

A = area (hectares) of the catchment discharging to the soak pit.

and

$$V_{soak} = A_{sp} S_r / 1000$$

where

A_{sp} = area of the base of the soak pit (m^2).

S_r = soakage rate (mm/hr) determined from 9.0.2.

Figure 3. Rainfall Factors for SDC

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

Figure 4. Rainfall intensities for SDC

Table 2 Arthurs Pass design rainfall table (1955-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
2.33	7.1	12.2	16.9	28.3	49.0	106.7	160.8	225.9
5	9.7	15.5	20.6	33.5	57.5	125.2	189.2	265.7
10	12.1	18.4	23.5	37.4	63.8	139.1	211.5	296.6
20	14.4	21.2	26.2	41.0	69.2	151.6	232.1	324.9
50	17.5	24.8	29.7	45.4	75.6	166.6	257.7	359.9
100	19.9	27.4	32.2	48.6	80.0	177.1	276.3	385.2

Table 3 Cheeseman design rainfall table (1990-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
2.33	4.2	7.1	9.5	14.3	22.2	43.6	62.7	79.3
5	5.5	9.1	11.9	16.9	25.9	51.7	75.0	94.9
10	6.8	11.1	14.2	19.1	28.9	58.2	84.7	107.6
20	8.5	13.3	16.8	21.3	31.8	64.6	93.9	119.8
50	11.1	16.8	20.6	24.2	35.5	72.8	105.7	135.5
100	13.6	19.9	24.0	26.5	38.2	79.0	114.4	147.3

Table 4 Christchurch Aero design rainfall table (1955-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
2.33	4.4	6.9	8.5	12.0	16.3	27.8	39.2	51.8
5	6.2	9.7	11.7	15.9	22.1	36.1	51.0	66.9
10	7.7	11.9	14.2	19.0	27.2	44.1	61.5	79.3
20	9.1	14.1	16.7	22.0	32.3	53.1	72.5	91.1
50	10.9	16.9	19.9	25.9	38.8	66.8	89.0	106.3
100	12.3	19.0	22.2	28.8	43.8	78.9	101.0	117.8

Table 5 13 Mile Bush design rainfall table (1988-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
2.33	5.6	8.9	10.9	14.4	21.2	35.4	47.5	64.0
5	8.2	12.8	15.3	19.3	25.8	42.8	60.7	86.4
10	10.6	16.4	19.3	23.9	29.5	48.8	72.1	106.2
20	13.0	19.9	23.3	28.4	33.1	54.4	83.2	125.7
50	16.2	24.5	28.5	34.5	37.7	61.5	97.7	151.2
100	18.6	28	32.5	39.0	41.2	66.7	108.4	170.4

Table 6 Ridgens Road design rainfall table (1990-2009) without the 15/11/09 storm event
(rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
2.33	3.8	5.3	7.3	9.9	14.6	25.6	38.4	50.7
5	5.6	7.8	10.5	13.1	18.0	30.5	45.1	62.7
10	7.4	10.2	13.4	15.9	20.9	34.5	49.9	72.2
20	9.2	12.6	16.2	18.6	23.6	38.3	53.9	81.1
50	11.7	15.7	19.9	22.2	27.1	43.1	58.5	92.5
100	13.6	18.1	22.7	24.8	29.8	46.6	61.5	100.8

Table 7 Whitecliffs design rainfall table (1988-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
2.33	4.9	6.4	8.1	12.2	19.2	34.8	46.2	55.9
5	6.5	8.8	11.3	15.9	23.9	40.2	56.5	75.4
10	8.0	11.1	14.2	19.2	27.6	43.7	64.9	94.4
20	9.6	13.3	17.1	22.5	31.1	46.5	72.9	114.2
50	11.8	16.2	21.0	26.8	35.3	49.8	83.4	141.1
100	13.3	18.4	23.9	30.0	38.3	51.9	91.2	161.8

Figure 5. Run-off Coefficient

Description of surface	C
Natural surface types	
Bare impermeable clay with no interception channels or run-off control	0.70
Bare uncultivated soil of medium soakage	0.60
Heavy clay soil types:	
– pasture and grass cover	0.40
– bush and scrub cover	0.35
– cultivated	0.30
Medium soakage soil types:	
– pasture and scrub cover	0.30
– bush and scrub cover	0.25
– cultivated	0.20
High soakage gravel, sandy and volcanic soil types:	
– pasture and scrub cover	0.20
– bush and scrub cover	0.15
– cultivated	0.10
Parks, playgrounds and reserves:	
– mainly grassed	0.30
– predominantly bush	0.25
Gardens, lawns, etc.	0.25
Developed surface types	
Fully roofed and/or sealed developments	0.90
Steel and non-absorbent roof surfaces	0.90
Asphalt and concrete paved surfaces	0.85
Near flat and slightly absorbent roof surfaces	0.80
Stone, brick and precast concrete paving panels	
– with sealed joints	0.80
– with open joints	0.60
Unsealed roads	0.50
Railway and unsealed yards and similar surfaces	0.35
Land use types	
Industrial, commercial, shopping areas and town house developments	0.65
Residential areas in which the impervious area is less than 36% of gross area	0.45
Residential areas in which impervious area is 36% to 50% of gross area	0.55

PERCOLATION TEST CALCULATIONS 8 Branthwaite Dr

$$V_{stor} = R_c - V_{soak}$$

R_c = run off discharged from catchment to soakpit in 1 hour (m³)

V_{soak} = volume disposed of by soakage in 1 hour (m³)

$R_c = 10CIA$

C = Run off coefficient

I = rainfall intensity (mm/hr) based on 1 hour duration of an event having a 10% probability of occurring annually

A = area (hectares) of the catchment discharging to the soakpit

$V_{soak} = A_{sp} S_r / 1000$

A_{sp} = area of the base of the soak pit (m²)

S_r = soakage rate (mm/hr)

R_c	3.5626446
C	0.9
I	20.1
A	0.019694

Hectares	Sqaure meters
0.019694	196.94

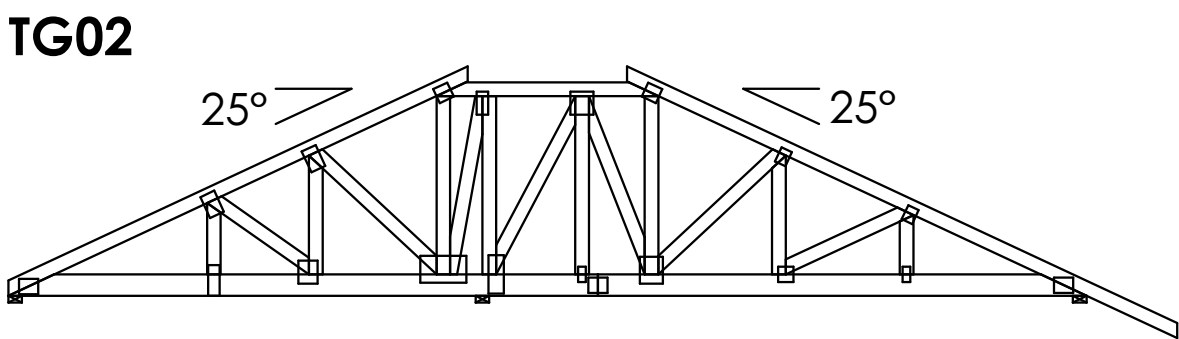
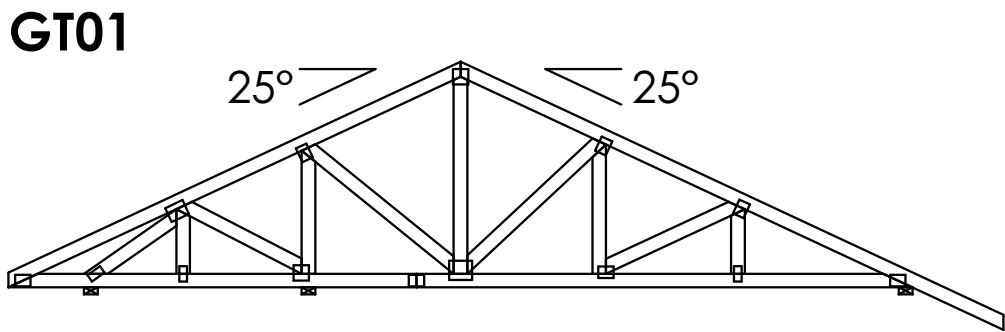
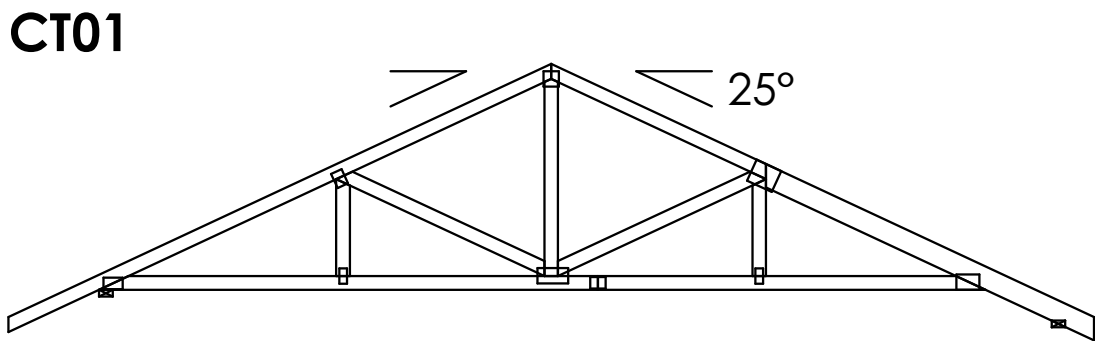
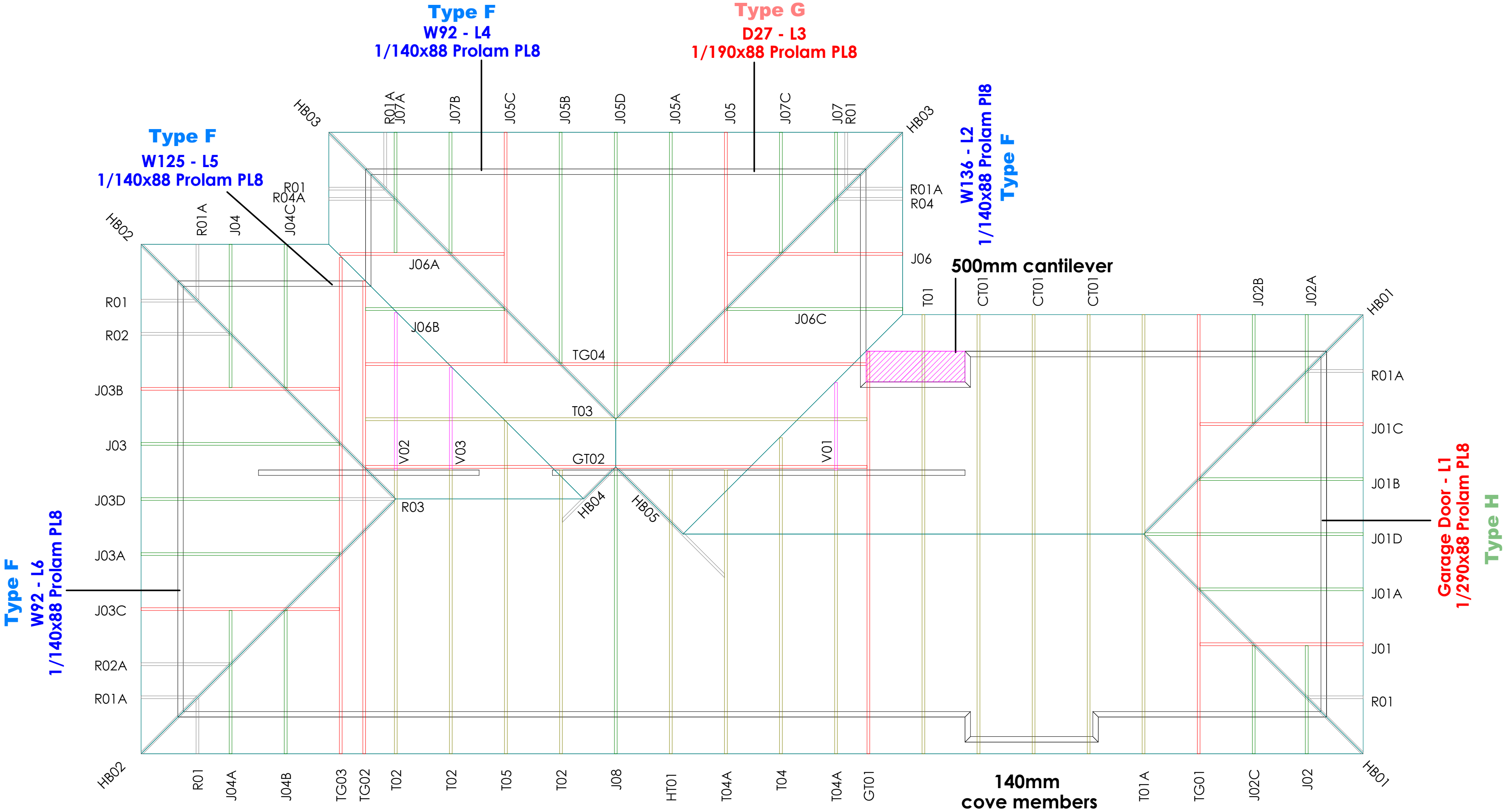
V_{soak}	2
A_{sp}	2
S_r	1000

V_{stor} (in meters)*
4.11

* soakpit volume includes factor of 0.38 for void space

** where the calculated size of the soakpit is less than 3.5m³
we have adopted a conservative size of 3.5m³

Layout is null and void if trusses not supplied by PlaceMakers



Site Address :
Lamb and Alves Dwelling
Lot 12, 8 Branthwaite Drive
Rolleston
Christchurch

Sheet Title :
**For Building Consent
Buildable Truss Layout**

Date : 8 Dec,2023	Drawn : Sonia Aurelio
Scale : 1: 50	System : MiTek 20/20

Job Details:
Roof Pitch : 25°
Roof Material : Metal Tiles
Ceiling Material : Rondo Direct Fixed
Wind Zone : High
Roof Snow Load : 0.490kPa

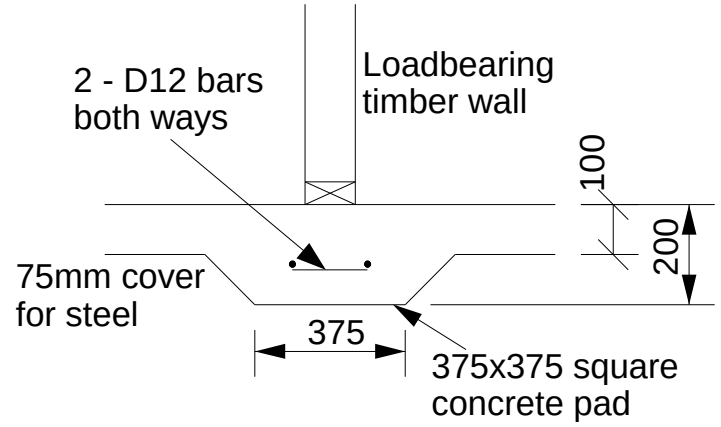
Truss Centres : 900mm
Roof Live Load : 0.250kPa
Overhang : 600mm / 190mm
Wind Speed : 44m/s

Job Title :
246128
Sheet :
1
Revision Number :

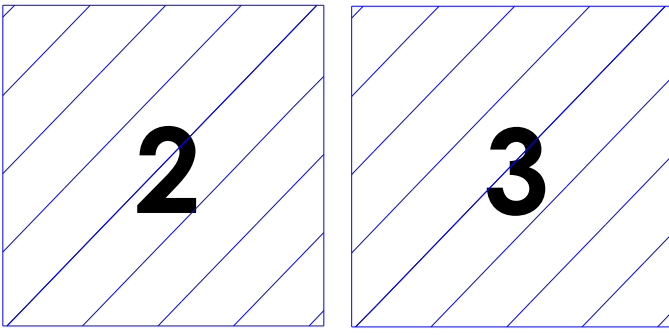


SDC - Approved Building Consent Document - BC231907 - Pg 46 of 446 - 21/03/2024 - helen.fowler

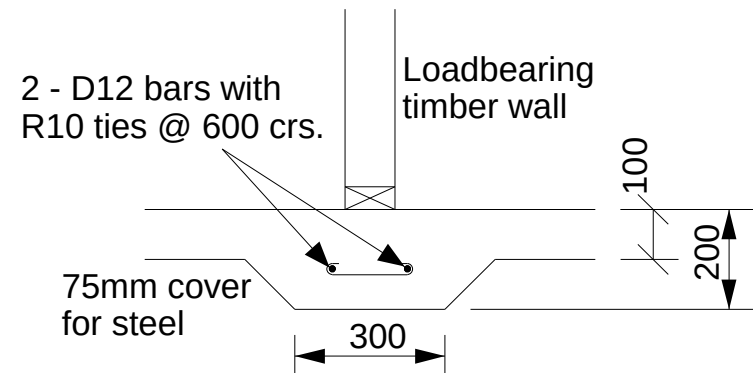
Slab Thickening Details



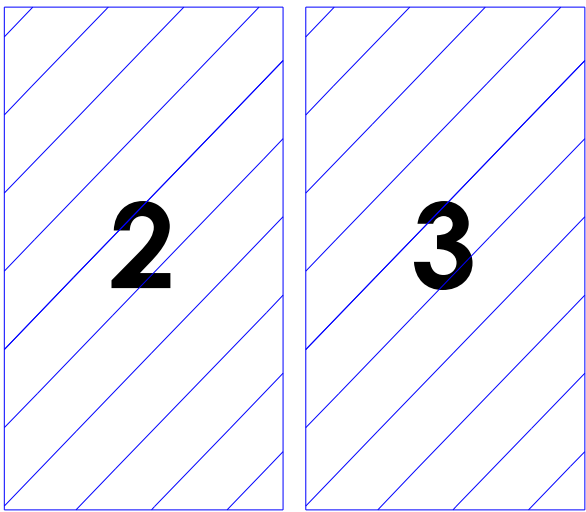
TYPE FP1 - 375x375mm Pad



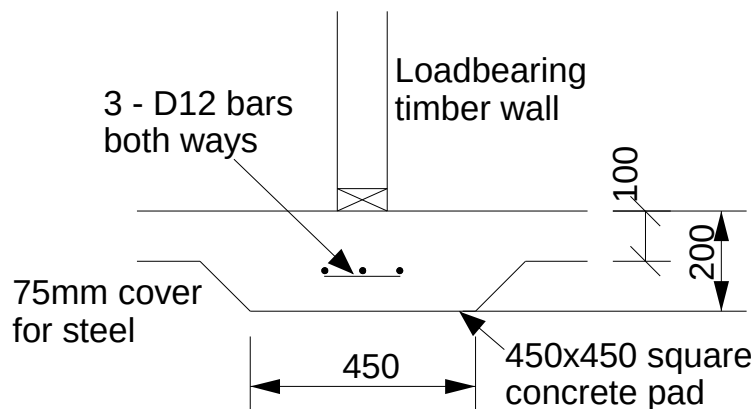
Number of Understuds



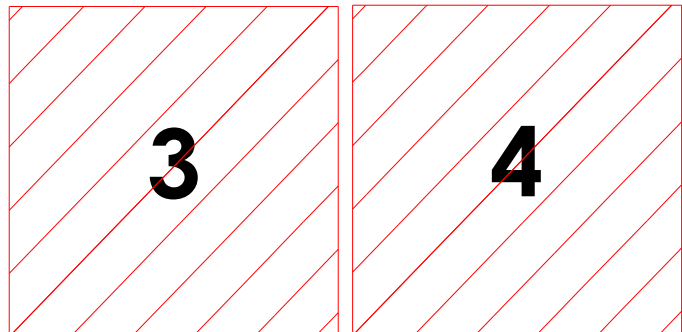
TYPE FS1 - 300mm Strip footing



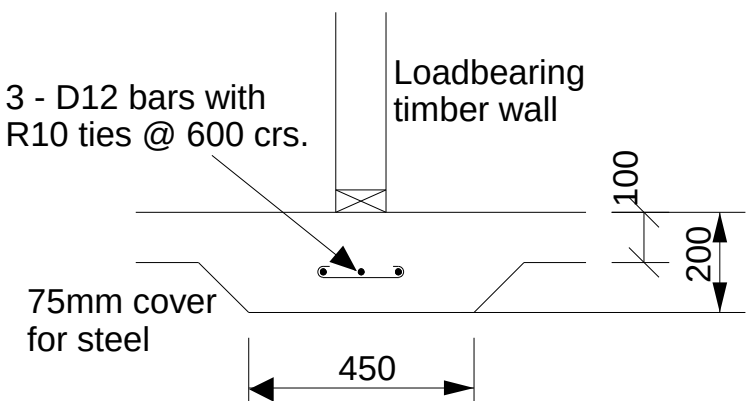
Number of Understuds



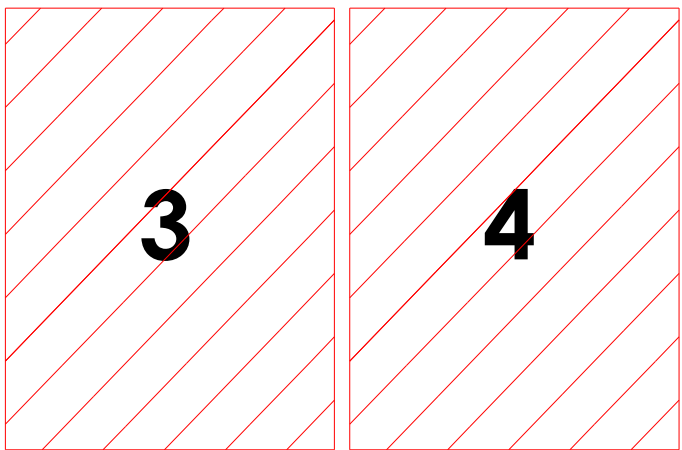
TYPE FP2 - 450x450mm Pad



Number of Understuds



TYPE FS2 - 450mm Strip footing

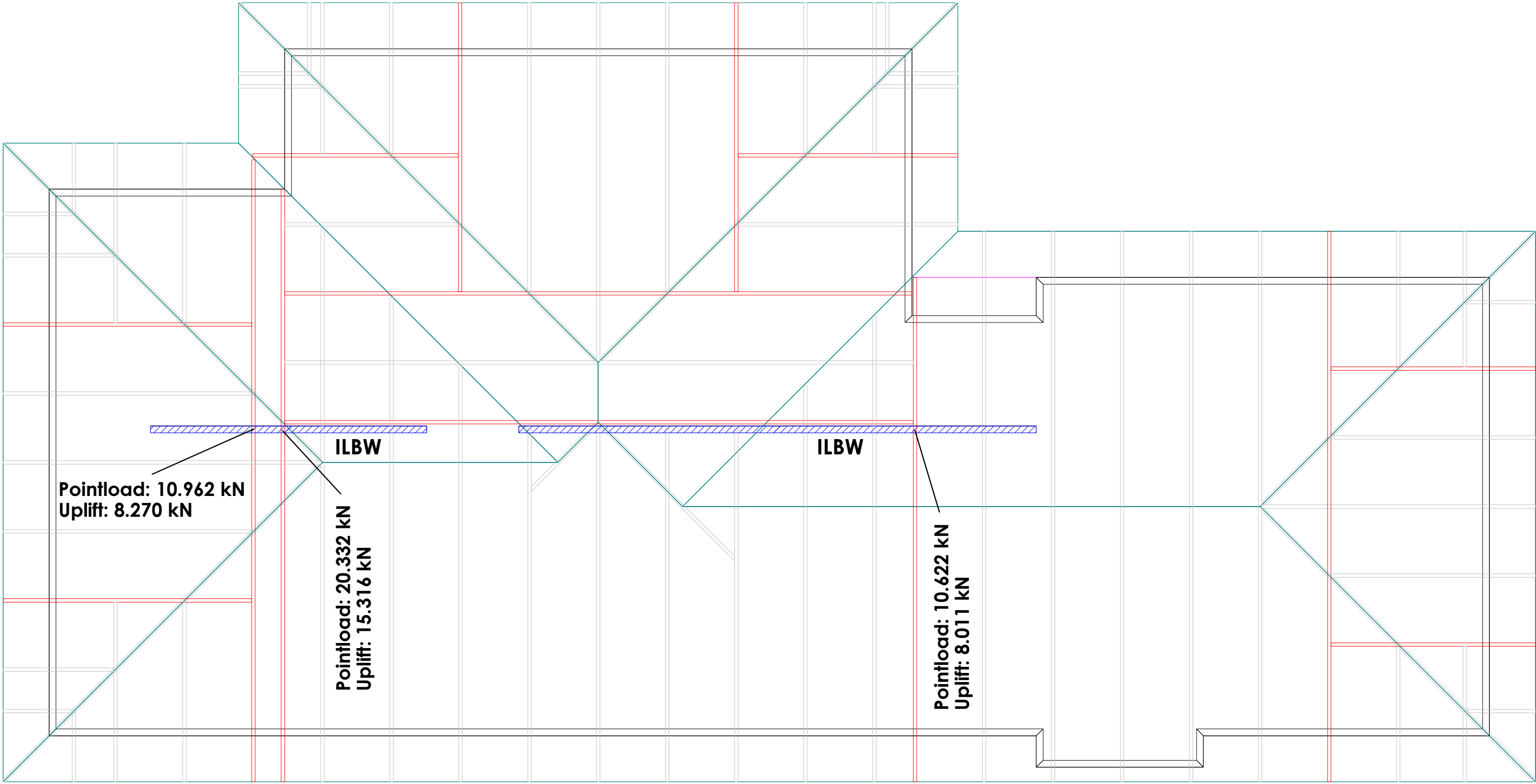


Number of Understuds

NOTES:

The numbers found within the hatched area is the number of studs required below each truss. Refer to: GANG-NAIL Internal Load Bearing on Concrete Floor Slabs brochure 12/2006

Layout is null and void if trusses not supplied by PlaceMakers



Site Address :
Lamb and Alves Dwelling
Lot 12, 8 Branthwaite Drive
Rolleston
Christchurch

Sheet Title :
**For Building Consent
Slab Thickening**
Date : 8 Dec,2023
Scale : 1: 50
Drawn : Sonia Aurelio
System : MiTek 20/20

Job Details:
Roof Pitch : 25°
Roof Material : Metal Tiles
Ceiling Material : Rondo Direct Fixed
Wind Zone : High
Roof Snow Load : 0.490kPa
Truss Centres : 900mm
Roof Live Load : 0.250kPa
Overhang : 600mm / 190mm
Wind Speed : 44m/s

Job Title :
246128
Sheet :
2
Revision Number :



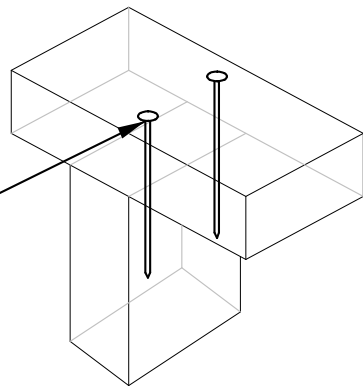
BOWMAC
STUD-LOK

STUD TO TOP PLATE FIXING OPTIONS

TYPE A - 0.7kN

Non-Load Bearing Walls

2 x 90mm x 3.15 Ø plain
steel wire nails driven
vertically through single Top
Plate into stud.



*Images are indicative only.
Timber Sizes may vary.

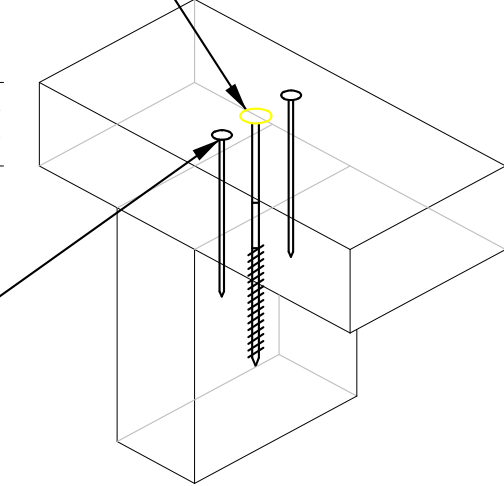
TYPE B- 4.7kN

Load Bearing Walls

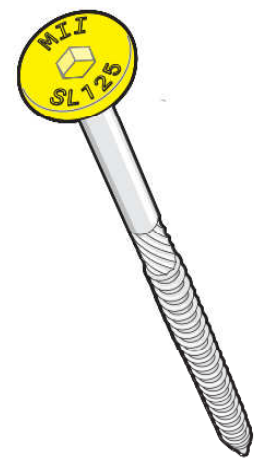
1x STUD-LOK SL125
screwed vertically through
SINGLE Top Plate into stud.

Max. Top Plate
Depth = 45mm

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



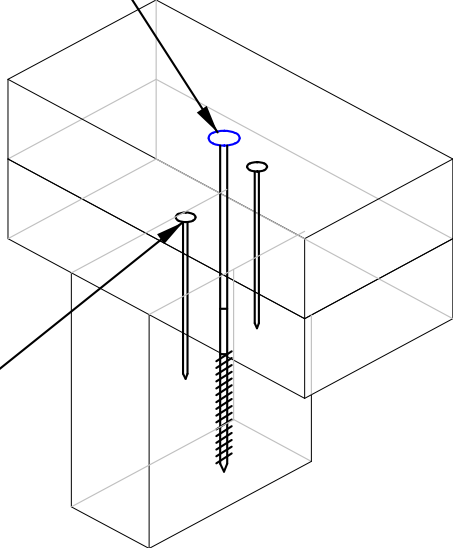
STUD-LOK SL125
Yellow Head
125mm Long



1x STUD-LOK SL70
screwed vertically through
SINGLE OR DOUBLE
Top Plate into stud.

Max. Top Plate
Depth = 90mm

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



STUD-LOK SL170
Blue Head
170mm Long



STUD-LOK Wall Fixing Chart - Stud to Top Plate Fixing Schedule

(Alternative to NZS3604:2011 Table 8.18)

Loaded Dimension (m) Stud Centres			Light Roof Wind Zone					Heavy Roof Wind Zone				
300mm	400mm	600mm	L	M	H	VH	EH	L	M	H	VH	EH
3.0	2.3	1.5	2N	2N	SL	SL	SL	2N	2N	SL	SL	SL
4.0	3.0	2.0	2N	2N	SL	SL	SL	2N	2N	SL	SL	SL
5.0	3.8	2.5	2N	SL	SL	SL	SL	2N	2N	SL	SL	SL
6.0	4.5	3.0	2N	SL	SL	SL	SL	2N	2N	SL	SL	SL
7.0	5.3	3.5	2N	SL	SL	SL	SL	2N	2N	SL	SL	SL
8.0	6.0	4.0	2N	SL	SL	SL	SL	2N	2N	SL	SL	SL
9.0	6.8	4.5	SL	SL	SL	SL	SL	2N	2N	SL	SL	SL
10.0	7.5	5.0	SL	SL	SL	SL	SL	2N	2N	SL	SL	SL
11.0	8.3	5.5	SL	SL	SL	SL	SL	2N	2N	SL	SL	SL
12.0	9.0	6.0	SL	SL	SL	SL	SL	2N	2N	SL	SL	SL



Site Address :
Lamb and Alves Dwelling
Lot 12, 8 Branthwaite Drive
Rolleston
Christchurch

Sheet Title :
For Building Consent
Stud To Top Plate Fixing

Date : 8 Dec,2023	Drawn : Sonia Aurelio
Scale : 1: 50	System : MiTek 20/20

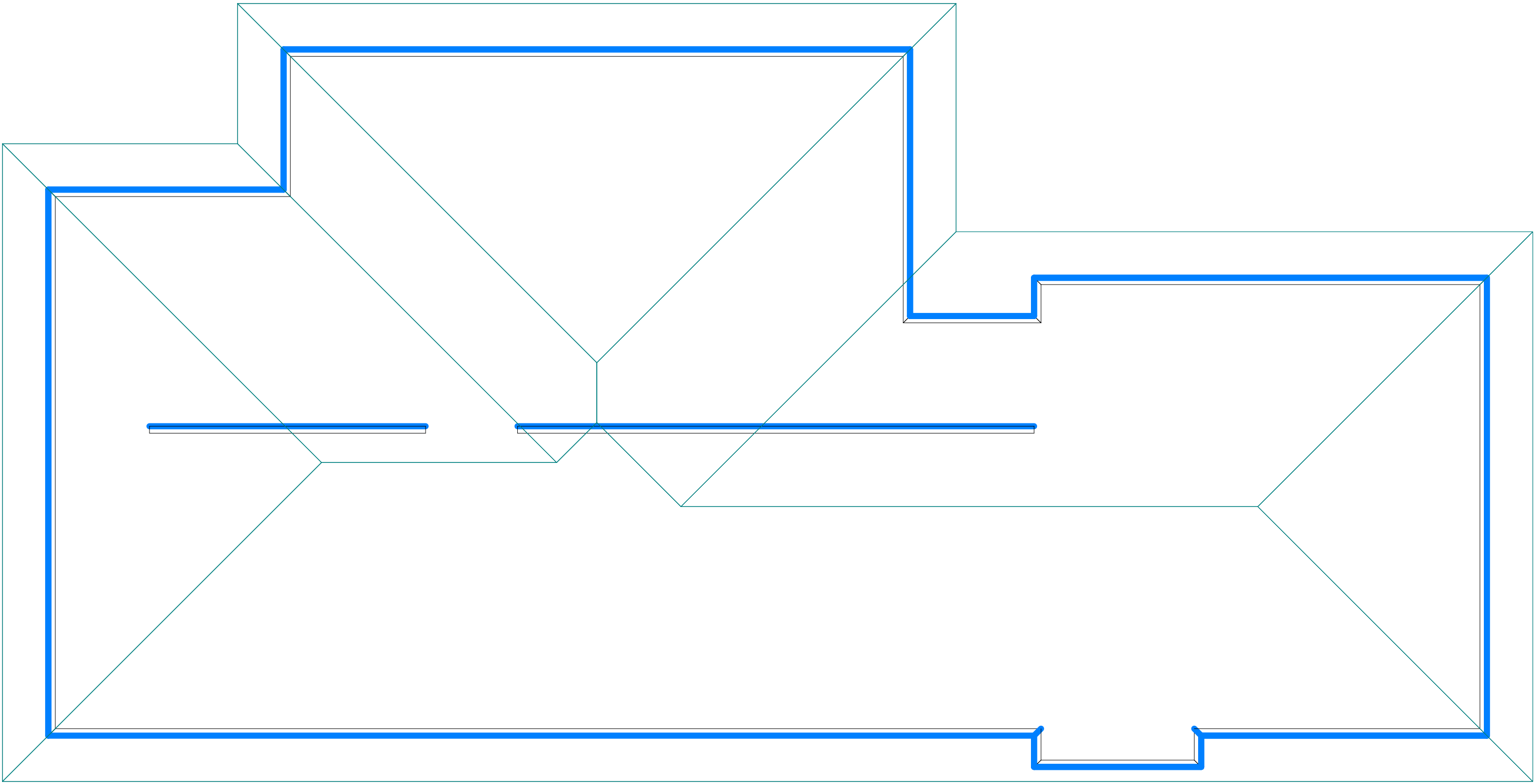
Job Details:
Roof Pitch : 25°
Roof Material : Metal Tiles
Ceiling Material : Rondo Direct Fixed
Wind Zone : High
Roof Snow Load : 0.490kPa

Truss Centres : 900mm
Roof Live Load : 0.250kPa
Overhang : 600mm / 190mm
Wind Speed : 44m/s

Job Title :
246128
Sheet :
3
Revision Number :

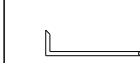
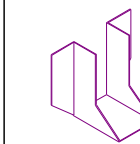
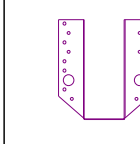
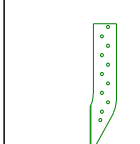
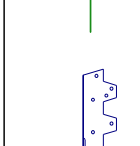
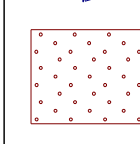
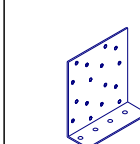
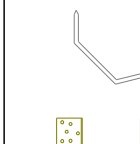
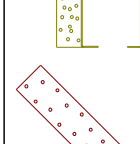
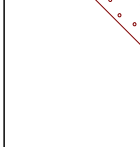
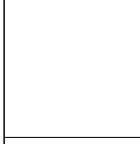
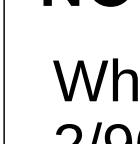
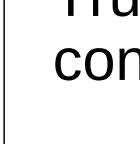
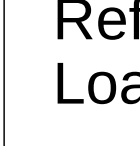


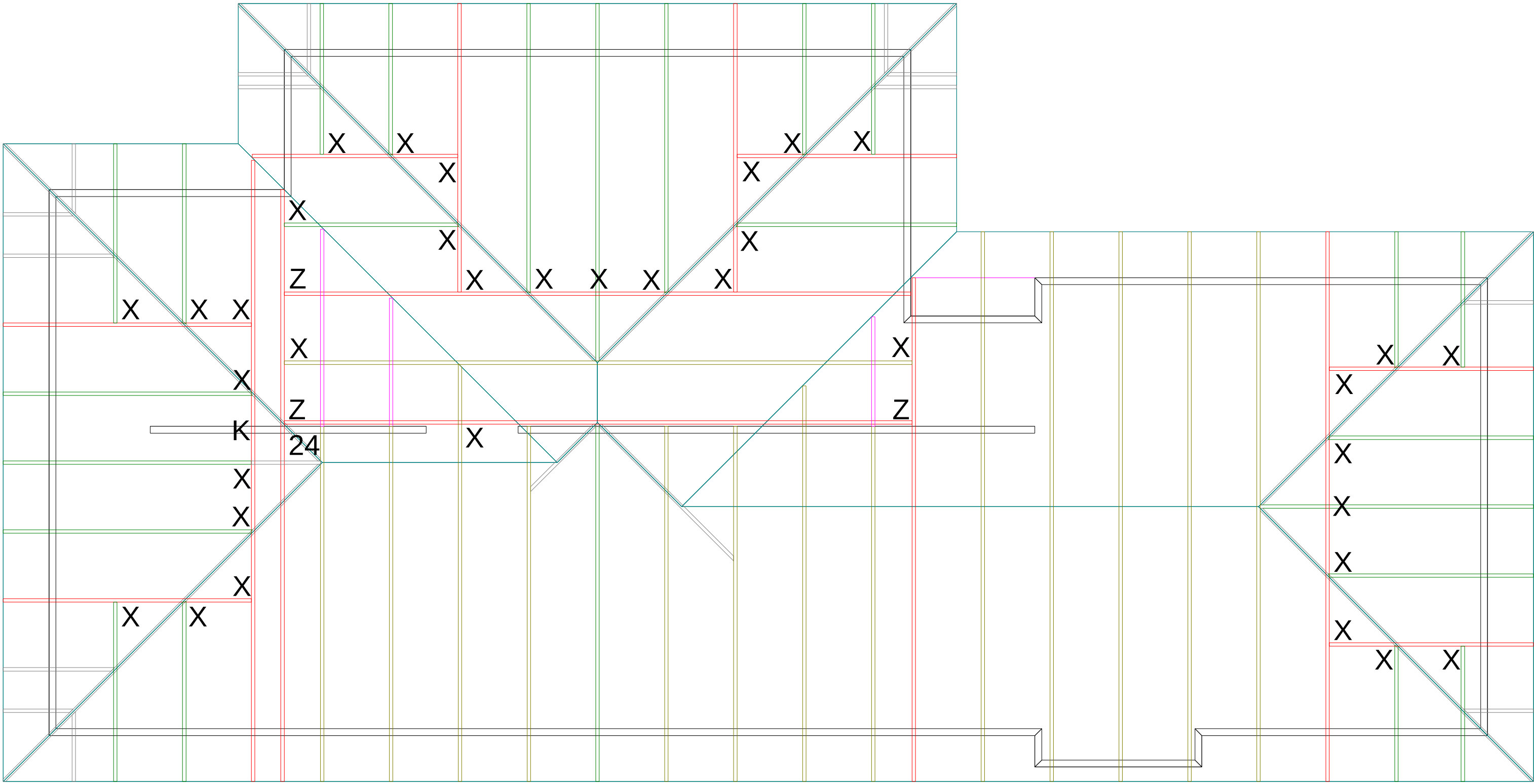
Layout is null and void if trusses not supplied by PlaceMakers



SDC - Approved Building Consent Document - BC231907 - Pg 47 of 446 - 21/03/2024 - Helen Fowler

Truss Fixings

-  D - Pair of LUMBERLOK Wire Dogs
-  X - LUMBERLOK JH47x90 Joist Hanger
-  Z - LUMBERLOK JH47x120 Joist Hanger
-  P - LUMBERLOK JH47x190 Joist Hanger
-  E - LUMBERLOK JH95x165 Joist Hanger
-  O - Pair of LUMBERLOK CT200 Ceiling Ties
-  H - LUMBERLOK CT400 Cyclone Tie
-  B - LUMBERLOK CT600 Cyclone Tie
-  M - Pair of LUMBERLOK Multi Grips
-  NP - LUMBERLOK Nailon Plate
-  N - LUMBERLOK N21 Diagonal Cleat
-  V - Single LUMBERLOK CPC40 Cleat
-  G - LUMBERLOK TTP 9kN Truss to Top Plate set
-  K - LUMBERLOK TTP 16kN Truss to Top Plate set
-  D - Pair of Wire Dogs + 2/90x3.15mm skew nails
-  S - LUMBERLOK Split Hanger SPH140
-  F - LUMBERLOK Split Hanger SPH180
-  T - LUMBERLOK Split Hanger SPH220
-  SB - LUMBERLOK 600mm Sheet Brace Strap
-  24 - MiTek Engineered 24kN Uplift Fixing
-  34 - MiTek Engineered 34kN Uplift Fixing
-  45 - MiTek Engineered 45kN Uplift Fixing



NOTES:

Where there are no fixings indicated, please use 2/90x35.15 skew nails + 2 wire dogs to standard heels. In situations where there are no overhangs shown, raised heels or internal LBW are indicated, a LUMBERLOK 9kN Truss to Top plate set is required for truss to Top Plate connections.

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

If MiTek Engineered Fixings are specified
Refer to the details attached to this document.

Layout is null and void if trusses not supplied by PlaceMakers



Correspondence from : **AUCKLAND**
40 Neales Road, East Tamaki 2013
PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

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

www.mitek.nz.co.nz

MiTek 20/20 Engineering 4.7.346.0

Printed: 04:56:15 11 Dec 2023

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

ISSUED BY:

MiTek New Zealand Limited

TO:

Placemakers National Estimating Unit (NEU)

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 **246128** 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:

- All proprietary products meeting their performance specification requirements
- The provision of adequate roof bracing and overall building stability
- Correct selection and placement of GANG-NAIL connector plates
- Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
- The design being undertaken by the accredited fabricator under the terms of the software licence
- Timber is graded to the requirements of NZS 3603:1993
- 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: Monday, 11 December 2023

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

SDC - Approved Building Consent Document - BC231917 - Figs 0446 - 21/03/2024 - helen.fowler

Job: 246128	Client: G J Gardner Christchurch South	Site: Lamb and Alves Dwelling Lot 12, 8 Branthwaite Drive Rolleston Christchurch	Phone:
Description: Building Consent No.: MiTek 20/20 Engineering 4.7.346.0			Printed: 04:56:15 11 Dec 2023

MITEK FABRICATOR DESIGN STATEMENT

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

MiTek 20/20® TRUSS DESIGN DATA

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

Job Details	Importance Level : 2	Design Working Life : 50 years
Roof Truss		
Truss Group: NEU-H1.2	Pitch: 25.000 deg	Nominal Overhang: 600 mm
Ceiling		
Material: Metal Tiles	Material: Rondo Direct Fixed	Wind
Dead Load: 0.210 kPa	Dead Load: 0.200 kPa	Area: High (44.0 m/s)
Restraints: 400 mm centres	Restraints: 400 mm centres	Pressure Coeff: Cpe = varies; Cpi = -0.30, 0.20
Live Load: Q _{ur} = 0.250 kPa	Live Load: Q _c = 1.400 kN	Snow
Q _c = 1.100 kN		Location: Christchurch (N4) at 112 m
		Open Ground Load: 1.000 kPa
		Basic Roof Load: 0.490 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, ✕ = 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)
CT01	3	6390	25.000	900	J02B	1	1167	25.000	900	J06A	1	2267	25.000	900
GT01	1	5980	25.000	900	J02C	1	1167	25.000	900	J06B	1	2267	25.000	900
GT02	1	8180	25.000	900	J03	1	2642	25.000	900	J06C	1	2267	25.000	900
T01	1	5980	25.000	900	J03A	1	2642	25.000	900	J07	1	1367	25.000	900
T03	1	8180	25.000	900	J03B	1	2642	25.000	900	J07A	1	1367	25.000	900
TG01	1	5980	25.000	900	J03C	1	2642	25.000	900	J07B	1	1367	25.000	900
TG02	1	7130	25.000	900	J03D	1	2642	25.000	900	J07C	1	1367	25.000	900
TG03	1	7130	25.000	900	J04	1	1742	25.000	900	J08	1	4040	25.000	900
TG04	1	8180	25.000	900	J04A	1	1742	25.000	900	T01A	1	5980	25.000	900
HT01	1	4040	25.000	900	J04B	1	1742	25.000	900	T02	3	4040	25.000	900
J01	1	2067	25.000	900	J04C	1	1742	25.000	900	T04	1	4040	25.000	900
J01A	1	2067	25.000	900	J05	1	3167	25.000	900	T04A	2	4040	25.000	900
J01B	1	2067	25.000	900	J05A	1	3167	25.000	900	T05	1	4068	25.000	900
J01C	1	2067	25.000	900	J05B	1	3167	25.000	900	V01	1	1428	25.000	900
J01D	1	2067	25.000	900	J05C	1	3167	25.000	900	V02	1	2573	25.000	900
J02	1	1167	25.000	900	J05D	1	3167	25.000	900	V03	1	1673	25.000	900
J02A	1	1167	25.000	900	J06	1	2267	25.000	900					

Total quantity : 55

The computer design input has been carried out by:

Signed: *Sonia Aurelio*

Name of Estimator: Sonia Aurelio.....

On behalf of: Placemakers National Estimating Unit (NEU)

Date: ...Monday, 11 December 2023....

Qualifications and Title: MiTek COC - Estimator



PROLAM SUMMARY

11 December 2023

Lamb and Alves Dwelling

Lot 12, 8 Branthwaite Drive, Rolleston, Christchurch

1. Lintel Supporting Girder Truss

a) D27 - L3

PL8H1-200100

(Prolam Non-visual Beam)

Lintel Span	2.7 m	Building Type	House
Supported Girder Truss		Importance Level	IL2
Span	3.2 m	Wind Zone	High
Girder Truss Setback	2.3 m	Wet in Service	No
Eaves Width	0.6 m	Snow Zone	N4
Stud Height	2.4 m	Site Elevation	112
Lintel Head Height	2.1 m	Roof Type	Light (0.25 kPa)
Truss Position on Lintel	1.6 m	Ceiling Type	Standard (0.15 kPa)
Roof Pitch	25.0 °	Attic Floor Type	None
Member Depth	190 mm	Capacity Ratio	2.2
Member Width	90 mm	Rigidity Ratio	3.7
Max. Movement	3.2 mm	Support Reaction	4.1 kN
Deflection	1.5 mm	Uplift Restraint Required	2.1 kN

Notes Deflection is long-term deflection measured below horizontal after the upward pre-camber has been taken out under load. Maximum movement is absolute member deflection excluding pre-camber.

b) W125 - L5

PL8H1-150100

(Prolam Non-visual Beam)

Lintel Span	0.6 m	Building Type	House
Supported Girder Truss		Importance Level	IL2
Span	3.1 m	Wind Zone	High
Girder Truss Setback	2.6 m	Wet in Service	No
Eaves Width	0.6 m	Snow Zone	N4
Stud Height	2.4 m	Site Elevation	112
Lintel Head Height	2.1 m	Roof Type	Light (0.25 kPa)
Truss Position on Lintel	0.3 m	Ceiling Type	Standard (0.15 kPa)
Roof Pitch	25.0 °	Attic Floor Type	None
Member Depth	140 mm	Capacity Ratio	7.3
Member Width	90 mm	Rigidity Ratio	43
Max. Movement	0.1 mm	Support Reaction	2.0 kN
Deflection	<1 mm	Uplift Restraint Required	1.1 kN

Notes Deflection is long-term deflection measured below horizontal after the upward pre-camber has been taken out under load. Maximum movement is absolute member deflection excluding pre-camber.

c) W136 - L2

PL8H1-150100

(Prolam Non-visual Beam)

Lintel Span	1.5 m	Building Type	House
Supported Girder Truss		Importance Level	IL2
Span	2.3 m	Wind Zone	High
Girder Truss Setback	1.4 m	Wet in Service	No
Eaves Width	0.6 m	Snow Zone	N4
Stud Height	2.4 m	Site Elevation	112
Lintel Head Height	2.1 m	Roof Type	Light (0.25 kPa)
Truss Position on Lintel	0.8 m	Ceiling Type	Standard (0.15 kPa)
Roof Pitch	25.0 °	Attic Floor Type	None
Member Depth	140 mm	Capacity Ratio	3.6
Member Width	90 mm	Rigidity Ratio	9.5
Max. Movement	0.8 mm	Support Reaction	1.9 kN
Deflection	<1 mm	Uplift Restraint Required	1.0 kN

Notes Deflection is long-term deflection measured below horizontal after the upward pre-camber has been taken out under load. Maximum movement is absolute member deflection excluding pre-camber.

d) W92 - L4

PL8H1-150100

(Prolam Non-visual Beam)

Lintel Span	1.5 m	Building Type	House
Supported Girder Truss		Importance Level	IL2
Span	3.2 m	Wind Zone	High
Girder Truss Setback	2.3 m	Wet in Service	No
Eaves Width	0.6 m	Snow Zone	N4
Stud Height	2.4 m	Site Elevation	112
Lintel Head Height	2.1 m	Roof Type	Light (0.25 kPa)
Truss Position on Lintel	1.4 m	Ceiling Type	Standard (0.15 kPa)
Roof Pitch	25.0 °	Attic Floor Type	None
Member Depth	140 mm	Capacity Ratio	3.8
Member Width	90 mm	Rigidity Ratio	9.8
Max. Movement	0.8 mm	Support Reaction	2.8 kN
Deflection	<1 mm	Uplift Restraint Required	1.5 kN

Notes Deflection is long-term deflection measured below horizontal after the upward pre-camber has been taken out under load. Maximum movement is absolute member deflection excluding pre-camber.

e) W92 - L6

PL8H1-150100

(Prolam Non-visual Beam)

Lintel Span	1.5 m	Building Type	House
Supported Girder Truss		Importance Level	IL2
Span	2.6 m	Wind Zone	High
Girder Truss Setback	1.7 m	Wet in Service	No
Eaves Width	0.6 m	Snow Zone	N4
Stud Height	2.4 m	Site Elevation	112
Lintel Head Height	2.1 m	Roof Type	Light (0.25 kPa)
Truss Position on Lintel	0.8 m	Ceiling Type	Standard (0.15 kPa)
Roof Pitch	25.0 °	Attic Floor Type	None
Member Depth	140 mm	Capacity Ratio	3.3
Member Width	90 mm	Rigidity Ratio	8.1
Max. Movement	0.9 mm	Support Reaction	2.2 kN
Deflection	<1 mm	Uplift Restraint Required	1.2 kN

Notes Deflection is long-term deflection measured below horizontal after the upward pre-camber has been taken out under load. Maximum movement is absolute member deflection excluding pre-camber.

2. Lintel Supporting Multiple Girder Trusses

a) Garage Door - L1

PL8H1-300100

(Prolam Non-visual Beam)

Lintel Span	4.8 m	Building Type	House
Supported Girder Truss		Importance Level	IL2
Span	2.1 m	Wind Zone	High
Supported Roof Width	6.0 m	Wet in Service	No
Eaves Width	0.6 m	Snow Zone	N4
Stud Height	2.4 m	Site Elevation	112
Lintel Head Height	2.1 m	Roof Type	Light (0.25 kPa)
Roof Pitch	25.0 °	Ceiling Type	Standard (0.15 kPa)
Member Depth	290 mm	Capacity Ratio	1.7
Member Width	90 mm	Rigidity Ratio	1.5
Max. Movement	7.9 mm	Support Reaction	5.5 kN
Deflection	3.0 mm	Uplift Restraint Required	2.5 kN

Notes Deflection is long-term deflection measured below horizontal after the upward pre-camber has been taken out under load. Maximum movement is absolute member deflection excluding pre-camber.

PRODUCER STATEMENT

Tasman Consulting Engineers Limited has been engaged by Prowood Limited to provide the design services that are as used for the Prolam on-line calculator (the Prolam Specifier). The design has been carried out using sound and widely accepted engineering principles to the requirements of AS/NZS1170:2002, NZS3603:1993 and with reference to NZS3604:2011. This producer statement covers that design work.



Provided that the Prolam Specifier has been used correctly and that all entered values are correct I believe, on reasonable grounds, that the resulting design will meet the requirements of NZBC clause B1 (structure) through reliance on B1/VM1.

Substitution of any of the Prowood products listed is not provided for and if substitution occurs then this statement is nullified.



30 November 2023 (2.2.0)

David King

ME(civil) CMEngNZ CPEng(no 145511) IntPE(NZ)

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

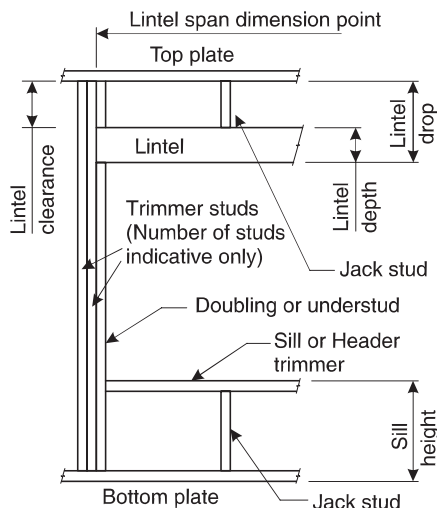


LINTEL FIXING SCHEDULE ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

NOTE:

- ★ All fixings are designed for vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20kPa.
- ★ Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist horizontal loads.
- ★ These fixings assume the correct choice of rafter/truss to top plate connections have been made.
- ★ All fixings assume bottom plate thickness of 45mm maximum. Note: TYLOK options on timber species.
- ★ Wall framing arrangements under girder trusses are not covered in this schedule.
- ★ All timber selections are as per NZS 3604:2011.

DEFINITIONS



Lintel Supporting Girder Trusses

Roof Tributary Area	Light Roof			Heavy Roof		
	Wind Zone			Wind Zone		
	L, M, H	VH	EH	L, M, H	VH	EH
8.6m ²	G	G	H	G	G	H
11.6m ²	G	H	H	G	G	H
12.1m ²	G	H	H	G	H	H
15.3m ²	H	H	-	G	H	H
19.1m ²	H	-	-	G	H	-
20.9m ²	H	-	-	H	H	-
21.8m ²	H	-	-	H	-	-
34.3m ²	-	-	-	H	-	-

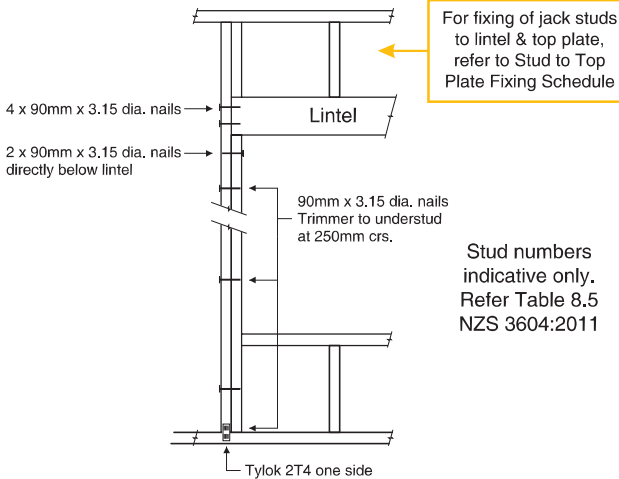
NOTES:

1. Roof Tributary Area = approx. 1/2 x (Total roof area on girder and rafter trusses supported by lintel)
2. Assumed girder truss is at mid-span or middle third span of lintel
3. Use similar fixings for both ends of lintel
4. All other cases require specific engineering design

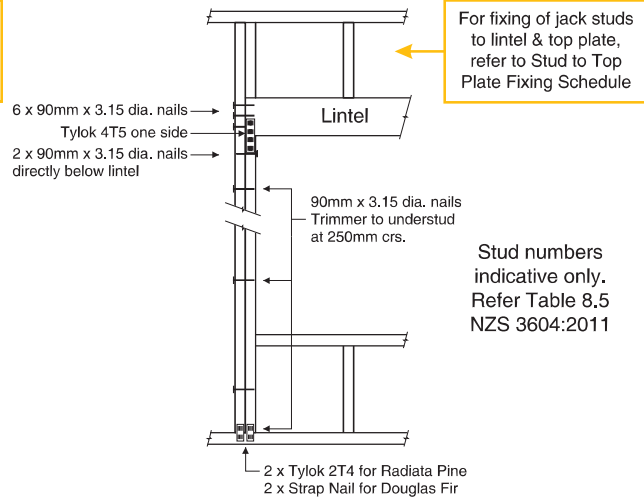
Lintel Span (m)	Loaded Dimension (m) (See Fig. 1.3 NZS 3604:2011)	Light Roof Wind Zone					Heavy Roof Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
1.0	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	F	F	E	E	E	F	F
	4.0	E	F	F	F	G	E	E	F	F	F
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	E	F	F	G	G	E	E	F	F	G
1.2	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	E	F	F	F	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	F	F	G	G	H	E	E	F	G	G
1.5	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	F	F	F	G	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	F	F	G	G	H	E	E	F	G	G
	6.0	F	F	G	H	H	E	E	F	G	H
2.0	2.0	E	F	F	F	G	E	E	F	F	F
	3.0	E	F	F	G	G	E	E	F	F	G
	4.0	F	F	G	G	H	E	E	F	G	G
	5.0	F	F	G	H	H	E	E	F	G	H
	6.0	F	G	G	H	H	E	F	G	H	H
2.4	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	G	H	E	E	F	G	G
	4.0	F	F	G	H	H	E	E	F	G	H
	5.0	F	G	G	H	H	E	F	G	H	H
	6.0	F	G	H	H	-	E	F	G	H	H
3.0	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	H	H	E	E	F	G	H
	4.0	F	G	G	H	H	E	F	G	H	H
	5.0	F	G	H	H	-	E	F	G	H	H
	6.0	F	G	H	-	-	E	F	G	H	-
3.6	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	F	G	H	H	E	F	G	G	H
	4.0	F	G	H	H	-	E	F	G	H	H
	5.0	F	G	H	-	-	E	F	G	H	-
	6.0	G	H	H	-	-	E	F	H	-	-
4.2	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	H	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
4.5	2.0	F	F	G	G	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.4	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
4.8	2.0	F	F	G	G	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.2	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
5.1	2.0	F	F	G	G	H	E	F	G	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.5	F	G	H	-	-	E	F	G	H	-
	4.0	G	G	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
5.4	2.0	F	F	G	G	H	E	E	F	G	H
	2.8	F	G	H	H	-	E	F	G	H	H
	3.0	F	G	H	-	-	E	F	G	H	-
	4.0	G	H	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
6.0	2.0	F	F	G	G	H	E	E	F	G	H
	6.0	G	H	-	-	-	E	G	H	-	-

LINTEL FIXING OPTIONS

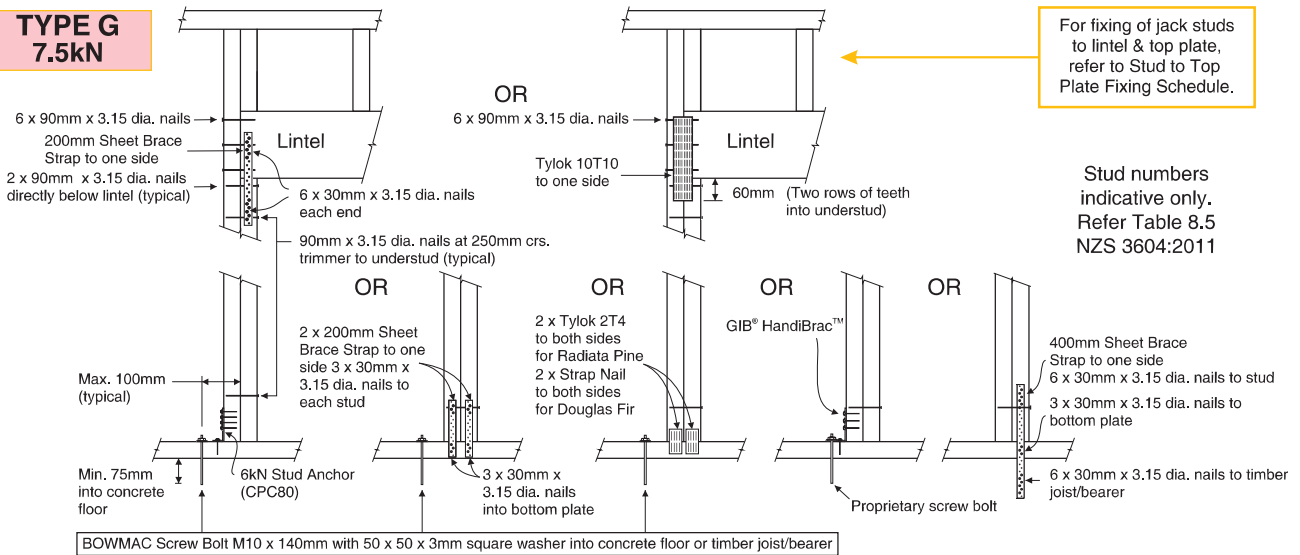
TYPE E 1.4kN



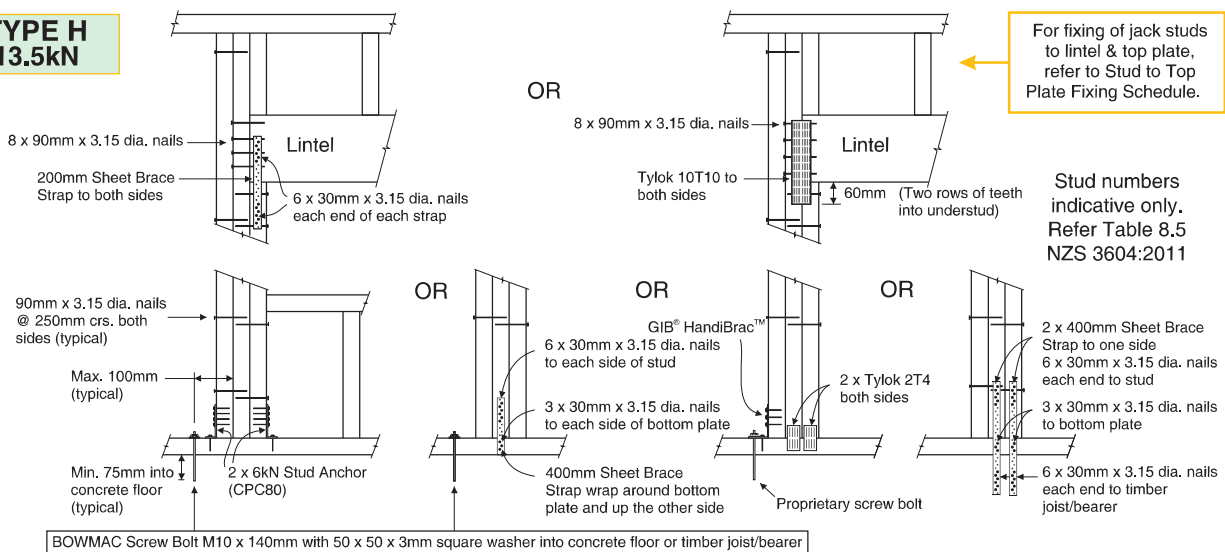
TYPE F 4.0kN



TYPE G 7.5kN



TYPE H 13.5kN





BRANZ Appraised

Appraisal No. 964 [2017]

ALLIED SUPERSLAB CONCRETE FLOORS

Appraisal No. 964 [2017]

Amended 15 October 2021

BRANZ Appraisals

Technical Assessments of products
for building and construction.



Allied Concrete Limited

Tel: 0800 425 5433

Email: concrete@alliedconcrete.co.nz

Web: www.alliedconcrete.co.nz



BRANZ

11/22 Moonshine Rd,

Rimutaka, Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

branz.co.nz



Product

- 1.1 Allied Superslab floors are reinforced concrete slab-on-ground floors incorporating polystyrene or QPOD moulded plastic pods and may also include the QuickSet permanent insulated formwork system.

Scope

- 2.1 Allied Superslab has been appraised for use as reinforced concrete slab-on-ground floors incorporating polystyrene or QPOD moulded plastic pods for buildings within the following scope:
 - timber-framed buildings, up to 2-storeys high, within the scope of NZS 3604; and,
 - with a maximum height of 10 m measured from the ground to the apex; and,
 - supported on "good ground" as defined for Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure; and,
 - with a floor maximum length of 30 m unless detailed with free joints in accordance with the Technical Literature; and,
 - situated in NZS 3604 Wind Zones up to, and including, Extra High.
- 2.2 Allied Superslab is not suitable for soils that are expansive or prone to liquefaction or differential settlement.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Allied Superslab Concrete Floors, if designed, installed, used 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. Allied Superslab Concrete Floors meet the requirements for loads arising from self-weight, imposed gravity loads, earthquake, wind, differential movements and time dependent effects including creep and shrinkage. [i.e. B1.3.3 (a), (b), (f), (h), (m) and (q)]. See Paragraphs 7.1–7.6.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. Allied Superslab Concrete Floors meet this requirement. See Paragraphs 8.1–8.4.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.3. Allied Superslab Concrete Floors meet this requirement. See Paragraphs 10.1–10.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Allied Superslab Concrete Floors meet this requirement.

Technical Specification

General

- 4.1 Allied Superslabs are reinforced concrete slab-on-ground floors incorporating polystyrene or QPOD moulded plastic pods, constructed using the following:

Concrete

- 4.2 The concrete for use with Allied Superslab is either 20 MPa, 25 MPa or 30 MPa, Allied CSS or RSS mixes only. These mixes must be manufactured in accordance with NZS 3104 and in Allied Concrete plants audited by the New Zealand Ready-Mixed Concrete Association Audit Committee.

Reinforcing Steel

- 4.3 Three types of reinforcing steel can be used in Allied Superslab:
- **Steel Mesh** – Allied Superslab top reinforcement is SE62 grade 500E steel mesh which must meet the requirements of Paragraph 14.0 in NZBC Verification Method B1/VM1.
 - **Reinforcing Bar [steel mesh alternative]** – D10 grade 300, class E steel reinforcing bar at 300 mm centres each way.
 - **Reinforcing Bar** – HD12 grade 500, class E steel reinforcing bar.

Polystyrene Pods

- 4.4 Polystyrene pods that have dimensions of 1,100 mm x 1,100 mm x 220 mm or 1,100 mm x 1,100 mm x 300 mm.

Bar Chairs and Pod Spacers

- 4.5 Generic pod spacers are used to provide the correct spacing for the polystyrene pods and to support the reinforcing steel at the correct location at the bottom of the Allied Superslab ribs. Over the top of the polystyrene pods, 40 mm bar chairs are used for positioning the reinforcement (steel mesh/loose bars) to achieve a minimum of 25 mm cover to the polystyrene pods.

QPODs

- 4.6 QPODs are manufactured from recycled plastic. They have two closed sides and two opened sides for clipping the pods together. Each pod is 550 mm x 550 mm x 220 mm and when four are clipped together, they form an 1,100 mm x 1,100 mm pod. They have a raised section in the center of each pod to hold the reinforcing steel mesh at the correct height. QPOD extensions and end caps are available. Beam spacers 100 mm, 300 mm and 400 mm are used to space pods to form ribs and footings, and to locate and support reinforcing steel.

QuickSet Components

- 4.7 The components of the Quickset include:
- **QuickSet Top Cap** – manufactureed from grade 6060 aluminium, these come in two sizes to give either an 85 mm or 100 mm slab topping.
 - **QuickSet Back Rail** – manufactured from grade 6060 aluminium, these are supplied already clipped and secured to the top of the insulated form.
 - **QuickSet Joiner** – manufactured from grade 6060 aluminium and powder coated, these are used to join shutter sections.
 - **QuickSet Corner** – manufactured from grade 6060 aluminium and powder coated, these are used for joining shutter sections at corners.
 - **QuickSet Form Receiver** – made from grade 6060 aluminium, used to lock the shutter at the base.
 - **QuickSet Insulated Form** – grey PVC foam sheet with an R-value of 0.22 m²K/W. Attached to the inner face is a 20 mm [for 90 mm wall framing and with an R-value of 0.63 m²K/W] or 25 mm [for 140 mm wall framing and with an R-value of 0.78 m²K/W] thick layer of XPS board.
 - **QuickSet Stirrup Widget** – manufactured from 100% recycled NZ plastic, these slide into the QuickSet Back Rail to allow QuickSet Stirrups to be clipped to the QuickSet Insulated Form.

- **QuickSet Stirrup** – manufactured from 100% recycled NZ plastic, these hold reinforcing steel in place as well as internally bracing the form until concrete is placed.
- **QuickSet Insulated Base Member** – manufactured from H grade polystyrene or XPS, these locate the QuickSet Form Receivers and QuickSet Stirrup Locks. They are 2,400 mm long, 600 mm wide and 25 mm thick with an R-value of 0.69 m²K/W.
- **QuickSet Stirrup Lock** – manufactured from the PVC foam sheet as used in the QuickSet Insulated Form, these secure the QuickSet Stirrups to the QuickSet Insulated Base Member.

Damp-Proof Membrane

- 4.8 A damp-proof membrane [DPM] in accordance with NZS 3604, Clauses 7.5.4–7.5.7.

Handling and Storage

- 5.1 The polystyrene pods, QPODs and/or QuickSet components must be stored so that they are secure on-site, and remain free from dirt. Protection from direct ultraviolet [UV] exposure should be provided. Installation of the pods must only be undertaken once the reinforcing steel and mesh is also ready to place, as this is needed to hold the pods in position and prevent them from being blown around.
- 5.2 Reinforcing steel should be stored supported up off the ground and kept clean.

Technical Literature

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

Design Information

General

- 7.1 Allied Superslabs designed and constructed in accordance with the Technical Literature will meet the requirements of NZBC Clause B1 Structure. Allied Superslab floors are intended for single and 2-storey, timber-framed buildings.
- 7.2 Allied Superslabs must be supported on “good ground” as described in Paragraph 2.1.
- 7.3 Pipes and services are not permitted to run along or within ribs and footings, or penetrate up through ribs and footings without special detailing. Pipes are permitted to cross perpendicular through a rib or footing if they are located in the middle third depth of the waffle slab and are 50 mm in diameter or less.
- 7.4 Pipes penetrating concrete or under buildings must be in accordance with NZBC Verification Method G12/VM1, NZBC Acceptable Solution G12/AS1, NZBC Acceptable Solution G13/AS2 and NZBC Acceptable Solution G13/AS3, as applicable.
- 7.5 Shrinkage control joints in Allied Superslab floors must be made by saw cuts at maximum 6 m centres. Saw cutting of Allied Superslab should be carried out as soon as the concrete surface can endure the saw cutting process, but not later than 24 hours after placement. It is recommended that shrinkage control joints extend from re-entrant corners.
- 7.6 Where QuickSet permanent insulating formwork is used, hold downs as per the Technical Literature must be installed at the slab edges.

Durability

Serviceable Life

- 8.1 Allied Superslab is expected to have a serviceable life equal to that of standard concrete floors and slabs.
- 8.2 The concrete mix used to construct the Allied Superslabs will be determined by the NZS 3604 Exposure Zone. Allied Superslabs in Zones B and C are constructed using a 20 MPa concrete mix, and in Exposure Zone D a 25 MPa concrete mix.
- 8.3 Cover to steel must meet minimum values set out in NZS 3604, Paragraph 4.5.1.
- 8.4 The exposed QuickSet Insulated Form must be protected from UV with a maintained protective coating or covering, in accordance with the Technical Literature.

Maintenance

- 9.1 Conventional maintenance procedures may be used for floors and slabs constructed using Allied Superslab.

External Moisture

- 10.1 A suitable DPM in accordance with NZS 3604, Clauses 7.5.4–7.5.7 must be used under Allied Superslabs.
- 10.2 Ground clearances in accordance with NZS 3604, Figure 7.11 and NZBC E2/AS1, Paragraph 9.1.3.1 must be maintained throughout the life of the building.

Energy Efficiency

- 11.1 Concrete slab-on-ground floors are deemed to achieve a construction R-value of 1.3 m²K/W, as is required for unheated floors for construction in accordance with NZS 4218. A higher R-value may be achieved by calculation or physical testing. The Technical Literature contains information on the R-value of Allied Superslab floors based on the area to perimeter ratio. The QuickSet permanent insulating formwork will also aid in increasing the R-value of the flooring system.
- 11.2 If the Allied Superslab floor is heated then it must achieve a construction R-value of 1.9 m²K/W.

Installation Information

- 12.1 Installation of Allied Superslab must be in accordance with the Technical Literature. The main items for consideration are summarized here.
 - Site preparation – a flat, level platform must be prepared. Any services that are to be placed under Allied Superslab must be done at this stage.
 - DPM – the DPM must be correctly placed on the prepared site.
 - Boxing – this must be of the correct height and levels, ensuring that boxing supports do not penetrate the DPM layer. All rebates for brickwork, garage door thresholds or joinery should be allowed for in the boxing. Where the QuickSet formwork is used, this must be installed in accordance with the installation instructions.
 - Pod set out – the polystyrene pods or QPODs must be placed on the DPM in accordance with the set-out drawings, ensuring the correct dimensions for all perimeter footings and internal ribs. Polystyrene pod layout and cutting should be arranged so that no pod is less than 200 mm wide.
 - If QPODs are used with extensions, the overall dimension of each pod must not exceed 1,100 mm x 1,100 mm
 - Reinforcing – all steel reinforcing must be laid out in accordance with the set-out drawings. Correct covers must be ensured.
- 12.2 The concrete for Allied Superslab must be placed, finished and cured in accordance with the requirements of NZS 3109.

Health and Safety

- 13.1 Wet concrete is a highly alkali substance and all necessary protective clothing should be worn when handling, placing and working with it.

Basis of Appraisal

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

BRANZ Investigations

- 14.1 The structural engineering for Allied Superslab Technical Literature was undertaken by a Chartered Professional Engineer. This has been reviewed by BRANZ structural engineers and found to be satisfactory.
- 14.2 The Technical Literature has been reviewed by BRANZ and found to be satisfactory.
- 14.3 Inspections of Allied Superslab installations being placed and completed installations have been made by BRANZ.

Quality

- 15.1 Allied Concrete Limited is responsible for the quality of the concrete supplied for Allied Superslab.
- 15.2 Quality on-site is the responsibility of the building contractor.
- 15.3 Designers are responsible for incorporating Allied Superslab into the design of buildings.
- 15.4 Building owners are responsible for the maintenance of Allied Superslab in accordance with the instructions of Allied Concrete Limited.

Sources of Information

- AS/NZS 4671:2001 Steel reinforcing materials.
- NZS 3104:2003 Specification for concrete production.
- NZS 3109:1997 Concrete construction.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4218:2009 Thermal insulation – Housing and small buildings.
- Ministry of Business, Innovation and Employment Record of Amendments – Acceptable Solutions, Verification Methods and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment 1, dated 11 December 2018

This Appraisal has been amended to include the QPODs.

Amendment 2, dated 15 October 2021

This Appraisal has been amended to include the option to use QuickSet permanent insulating framework system and steel bars as an alternative to steel mesh reinforcement in the slab.

In the opinion of BRANZ, **Allied Superslab Concrete Floors** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Allied Concrete 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. **Allied Concrete 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 **Allied Concrete 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 **Allied Concrete Limited** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

21 April 2017

CodeMark

Certificate no: CMNZ30086

Version: H

Original issue date: 03 September 2020

Version date: 20 September 2023

Renewal date: 03 September 2026

1. Certificate Holder Details



Allied Concrete Ltd

3 Inglewood Road, Invercargill 9810.

info@alliedconcrete.co.nz

Tel: .03 2171600 or 0800 4 255433

www.alliedconcrete.co.nz

2. Product Certification Body

Global-Mark Pty Ltd

Trading as Global-Mark

5 Willis Street, Wellington, 6011

customer.service@global-mark.co.nz

+4 9 889 0622

www.global-mark.co.nz

Complaints: The complaints process for this certificate can be found here:

www.global-mark.co.nz/complaints

Global-Mark Managing Director.



Hervé Michoux



Product Certificate

Allied SuperSlab Concrete Floors System

3. Description of Building Method or Product

Allied SuperSlab Concrete Floors are reinforced concrete, slab-on-ground floors, The method uses polystyrene void formers or QPOD moulded plastic pod void formers.

4. Intended use of Building Method or Product

Allied SuperSlab Concrete Floors has been designed to support timber framed or light steel framed residential houses up to 2 storeys.

5. New Zealand Building Code Provisions

Allied SuperSlab Concrete Floors System if designed, used, installed and maintained in accordance with the conditions of this Certificate will comply with or contribute to compliance with the following performance provisions of the NZ Building Code:

Clause B1 STRUCTURE:	Performance B1.3.1, B1.3.2 and B1.3.4 for the relevant physical conditions of B1.3.3 (a), (b), (f) (h), (j), (m) & (q)
Clause B2 DURABILITY:	Performance B2.3.1 (a) and B2.3.2 (a) – not less than 50 years
Clause E2 EXTERNAL MOISTURE:	Performance E2.3.3 and E2.3.7
Clause F2 HAZARDOUS BUILDING MATERIALS:	Performance F2.3.1
Clause H1 ENERGY EFFICIENCY:	Performance H1.3.1 and H1.3.2E for the relevant physical conditions of H1.3.3 (a) & (e)

6. Conditions and Limitations of Use

1. Allied SuperSlab Concrete Floors have been certified for use in buildings within the following scope limitations:
 - a. buildings, up to two storeys high, either:
 - i. timber framed within the scope of NZS 3604:2011 (paragraph 1.1.2), or
 - ii. steel framed within the scope of NASH standard Residential and low -rise Steel Framing-Part1: design criteria 2005 for steel framed buildings
 - b. with a maximum height of 10 m measured from the ground to the apex,
 - c. supported on “good ground” as defined by the Acceptable Solutions and Verification Methods for New Zealand Building Code Clause B1 Ministry of Business, Innovation and Employment, First Edition, July 2005 (Amendment 19, 28 November 2019),



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 advice 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.



Product Certificate

Allied SuperSlab Concrete Floors System



Certificate no: CMNZ30086

Version: H

Original issue date: 03 September 2020

Version date: 20 September 2023

Renewal date: 03 September 2026

- d. with a floor maximum length of 30 m unless detailed with free joints in accordance with Allied Concrete SuperSlab Technical Manual Rev I, July 2023; and
 - e. situated in Wind Zones up to and including Extra High
2. Allied SuperSlab Concrete Floors shall be specified, designed, installed and maintained in accordance with the following Technical Documentation:
 - a. BRANZ Appraisal No. 964 [2023] Issued 19 May 2023 Allied SuperSlab Concrete Floors
 - b. Allied Concrete SuperSlab Technical Manual Rev I, July 2023
3. Reinforcing Steel, Polystyrene Pods or QPOD, Bar Chairs, Pod Spacers and Damp Proof Membrane must be selected, used, handled and stored in compliance with the requirement of the Technical Documentation
4. The installation must be either done or supervised by an LPB who holds either a carpentry or a foundation license and have access to the Technical Documentation
5. A minimum of 20 MPa Allied CSS or RSS mixes must be used except in Exposure Zone D where the minimum requirement is 25 MPa concrete. The specified concrete mixes must be manufactured in accordance with NZS 3104:2010 and in Allied Concrete plants.
6. Compliance with H1.3.1(a) and H1.3.2E for buildings incorporating the Allied SuperSlab concrete floor shall be established by specific design using
 - a. the Schedule Method in H1/AS1 Fifth Edition Amendment 1, (4 August 2022) and H1/AS2 First Edition Amendment 1, (4 August 2022), or
 - b. the Calculation Method in H1/AS1 Fifth Edition Amendment 1, (4 August 2022) and H1/AS2 First Edition Amendment 1, (4 August 2022), using construction R-values:
 - i. from the performance tables described in Acceptable Solution H1/AS1 Fifth Edition Amendment 1, (4 August 2022) Section F.1.2 or H1/AS2 First Edition Amendment 1, (4 August 2022) Section F.1.2 or
 - ii. calculated by the method in Verification Method H1/VM1 Fifth Edition Amendment 1, (4 August 2022) Appendix F Section F.1.2 or Verification Method H1/VM2 First Edition Amendment 1, (4 August 2022) Appendix F Section F.1.2.

7. Health and Safety Information

Standard industry safety practices and manufacturer safety requirements as detailed in the technical literature including the applicable SDS must be observed at all times.



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 advice 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 no: CMNZ30086

Version: H

Original issue date: 03 September 2020

Version date: 20 September 2023

Renewal date: 03 September 2026

Product Certificate

Allied SuperSlab Concrete Floors System



8. 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:	Acceptable Solution – Testing and assessment	Items 1, 2, 3 & 4
B2 DURABILITY:	Acceptable Solution – Reference to use of acceptable materials	Items 1 & 2
E2 EXTERNAL MOISTURE	Acceptable Solution – Reference to New Zealand Standard	Items 1 & 2
F2 HAZARDOUS BUILDING MATERIALS	Alternative solution – Expert judgement	Item 5
H1 ENERGY EFFICIENCY	Acceptable solution based on H1/AS1 and H1/AS2	Items 1 & 2

9. Supporting Documentation for Certification

Rev	Author	Description	Date and/or Revision
1.	Allied Concrete Ltd	Allied Concrete SuperSlab Technical Manual	Rev I, July 2023
2.	BRANZ	BRANZ Appraisal No. 964 (2023) – Allied SuperSlab Concrete Floors	19 May 2023
3. *	Allied Concrete Ltd	Quick Set Structural Review	December 2019
4. *	Allied Concrete Ltd	Quick Set Engineering Calculations	December 2019
5.	Allied Concrete	Material Safety Data Sheet for Ready Mixed Concrete (plastic concrete, concrete slurry, concrete bleed water, wet concrete)	20 January 2020

* These documents were provided commercial in confidence and are not publicly available

10. Supporting Information About Description (Optional)

Nil



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 advice 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.



Product Certificate

Allied SuperSlab Concrete Floors System



Certificate no: CMNZ30086

Version: H

Original issue date: 03 September 2020

Version date: 20 September 2023

Renewal date: 03 September 2026

11. Supporting Information About Intended Use (Optional)

Nil

12. Supporting Information About Conditions and Limitations of Use (Optional)

Nil

All CodeMark certificates that are current must be registered with MBIE. MBIE maintains a register of valid product certificates. [Please find the register here.](#)

If the certificate is not listed on this register or it appears as (SUSPENDED), it is not a valid CodeMark certificate and does not have to be accepted by a building consent authority as establishing compliance with the New Zealand Building Code.



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 advice 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.

SuperSlab | SuperSlab⁺

TECHNICAL MANUAL

SDC - Approved Building Consent Document - BC231907 - Pg 67 of 446 - 21/03/2024 - helen.fowler



CONTENTS

1.0 GENERAL	3
2.0 SUPERSLAB COMPONENTS	3
2.1 Pod void formers	3
2.2 Topping slab and rib reinforcement	3
2.3 Typical Superslab layout and details	4
2.4 Concrete	4
3.0 SCOPE OF USE	5
3.1 Building types and loading suitable for the SuperSlab system	5
3.2 Ground conditions	8
3.3 Lateral resistance under wind and earthquake	10
3.4 Weights and loadings	15
4.0 INSTALLATION INFORMATION	16
4.1 Site preparation and Earthworks	16
4.2 Damp proof membrane (DPM)	16
4.3 Set out & boxing	16
4.4 Pod set out	17
4.5 Perimeter foundations	17
4.6 Internal ribs, Load bearing thickenings and Pads	17
4.7 Mesh and Topping thickness	18
4.8 Reentrant corners	18
4.9 Concrete placing, finishing and curing	18
4.10 Saw cutting (control joints) and free joints	19
4.11 Plumbing and pipe penetrations	19
4.12 Shower Rebates	20
4.13 Wing walls	20
4.14 Polished Concrete floors	20
5.0 LANDSCAPING AND ONGOING MAINTENANCE	20
5.1 Paving and landscaping heights	21
5.2 Excavation and retaining walls	21
5.3 Drainage of the site	21
5.4 Gardens, trees and shrubs	21
6.0 STANDARD DETAILING	22
6.1 Qpod substitutions detailing	26
7.0 INSULATED SLABS	32
7.1 SuperSlab+	32
7.2 QuickSet standard detailing	35
8.0 CHECK LIST	41

DISCLAIMER

This document provides design and installation information for the SuperSlab systems as per Codemark and Branz appraisal to comply with the New Zealand building code. Providing the conditions of the Codemark are adhered too rigidly, the foundation will not require specific design or a producer statements from an engineer to gain building consent. If the conditions are not able to be met, the system will require Specific Engineering Design (SED)

1.0 - GENERAL

This document outlines the specifications, construction requirements and Codemark conditions and limitations for the SuperSlab systems.

The document covers the components, site requirements, details and construction of a standard SuperSlab system. For more advice, please contact your local Allied Concrete supplier.

SuperSlab+ provides a fully insulated foundation which includes QuickSet's pre-finished insulated side wall panel and full blanket ground insulation providing a fully thermally broken slab. QuickSet's form (side wall) is pre-finished in grey with a protective wrap to be removed before building is finished.

SuperSlab+ comprises QuickSet which is made in New Zealand, with the plastic components being made from 100% NZ recycled plastics.

2.0 - SUPERSLAB COMPONENTS

The SuperSlab floor system consists of a reinforced insitu concrete perimeter footing, internal square polystyrene void formers (pods) spaced at 1200mm centers to form 100mm wide voids which are filled with concrete. Concrete is poured on top and within the 100mm wide gap between the pods (ribs) to form a 'waffle raft'. The polystyrene pods act as a formwork to minimize the concrete consumption and achieve the depth. The depth and alternate spacing of the reinforced concrete ribs create a stiff and robust foundation solution which is suitable on most soil conditions.

2.1 Pod Void Formers

SuperSlab uses 1100mm x 1100mm square and 220mm deep polystyrene pods. 1100mmx1100mm square and 300mm deep polystyrene pods can also be used where extra height is needed.

Often sites with deep topsoil or flood risks require compacted hard fill or certified fill to build up the site to achieve the required finished ground level. Adopting a SuperSlab system can save you time and cost. A deeper pod can be selected to reduce the cost of fill as well as increasing the strength and stiffness of your foundation.

Where the geometry of the slab dictates the polystyrene pods to be smaller than 1100mm x 1100mm these can be easily cut on site to fit. The 100mm internal rib and perimeter footing width (300mm) need to be maintained at all times.

Qpod's can be used with SuperSlab systems as a greener alternative to polystyrene pods. Qpod is a recycled plastic dome system which clips together to form a 1100mmx1100mm and 220

deep void former which can be substituted for the polystyrene pods. Refer to section 6.1 for the alternative detailing using the Qpod void fillers.

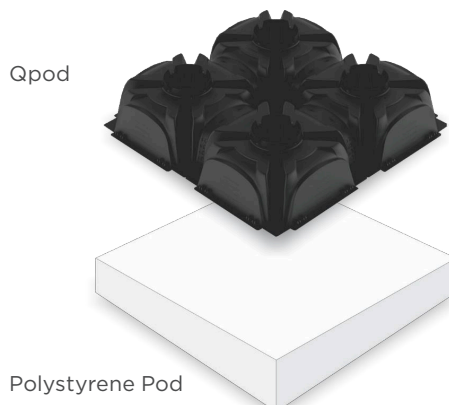
2.2 Topping Slab and Rib Reinforcement

SuperSlab requires 85mm (minimum) and 100mm (maximum) thick topping slab as outlined in section 4.7. The topping slab shall be reinforced with ductile steel mesh (SE62 - minimum weight of 2.29kg/m²). The mesh must comply with the minimum requirements of the New Zealand Building Code. The mesh is to have a tensile strength of 500 MPa and needs to be ductile, achieving 10% elongation when tested to NZS4671 and the building code testing requirements. As an alternative topping reinforcement, SE62 mesh can be substituted with 10mm diameter, grade 300, class E reinforcing bars placed at 300 centers each way. Loose bars shall be chaired and tied as per NZS3109, cover shall be as outlined per section 4.7.

The 100mm wide ribs are reinforced with 12mm diameter steel reinforcing rods grade 500, class E (HD12 seismic grade). These HD12 bars are located at the bottom of the ribs with 50mm minimum bottom cover and extending across the slab in two orthogonal directions. HD12 "hockey stick" bars are located in the top of the ribs. The hockey stick bars are tied to the underside of the mesh at the top of ribs intersecting at right angles to the perimeter footing. These bars are 1350mm long and have a 150mm hook to anchor the perimeter footing to the floor slab.

Perimeter reinforcement typically consists of 2 x HD12 bottom bars and a single HD12 top bar. Additional perimeter or rib reinforcement can also be adopted for specific design cases to accommodate higher loads or spanning capabilities such as: expansive soils, liquefiable soils or piled foundations. These cases are outside the scope of this document and require specific engineering design.

Bar chairs and spacers are used to ensure the correct cover to all the reinforcement and to keep the pods in place while the slab is poured.



2.3 Typical SuperSlab layout and details

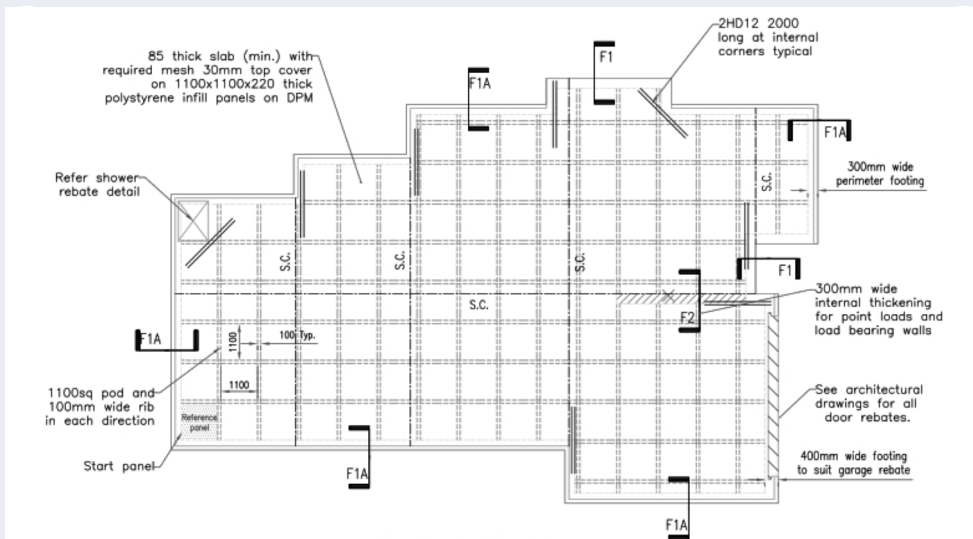


FIGURE 1 – SuperSlab layout (slab area: = 197 m²)

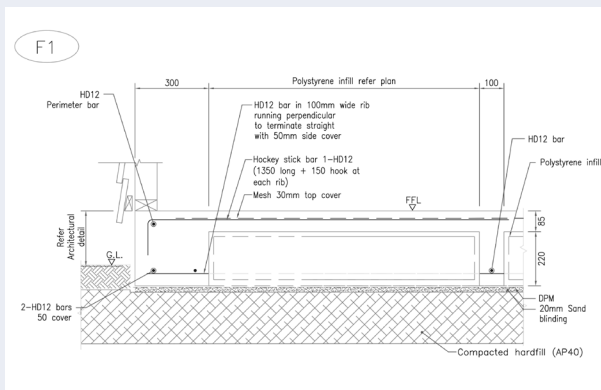


FIGURE 2 – Light clad perimeter footing detail

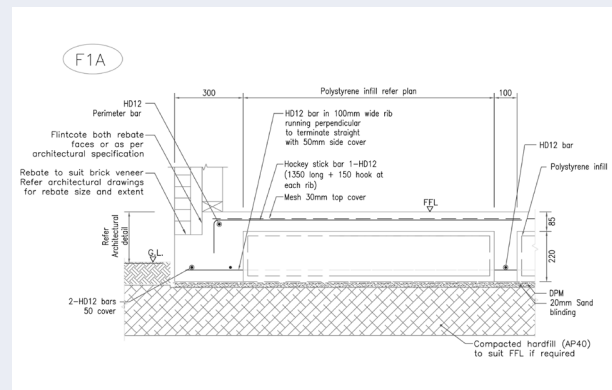


FIGURE 3 – Brick clad perimeter footing detail

2.4 Concrete

SuperSlab mixes shall be used for all SuperSlab systems. The strength of the concrete is dependent on the exposure category of the proposed foundation.

Sites located near coastal areas may be subject to windblown sea salt deposits resulting in a greater risk of corrosion. As such a higher concrete strength is required to satisfy the NZBC durability requirements of the foundation. NZS3604 clause 4.2.3.3 defines such areas as Zone D (all outer islands and coastal areas within 500m from the sea or within 100m from tidal estuaries and sheltered inlets). Foundations proposed in Zone D are to be 25 MPa minimum. For sites located away from corrosive environments (greater than 500m from the sea – Zone B or C) 20 MPa concrete can be used. The designer shall select one of the appropriate concrete mixes as per the following:

- Mix code 252CSS is used for 25 MPa applications for foundations within 500m to

the sea or 100m to fresh water.

- Mix code 202CSS is used for 20 MPa applications for foundations beyond sea spray and corrosive environments.

Note: foundations located in tidal slash zones within 50m of the beach frontage may require higher strength concrete and are subject to specific advice. So too are contaminated sites or soils within 500m of geothermal bores, mud pools, steam vents or other such sources which pose a chemical or corrosive environments. Such conditions are beyond the scope of this document.

The builder and designer shall also discuss the desired finish and the placement method with the Allied Concrete when ordering the concrete to ensure the best mix for the specific application can be delivered.

3.0 - SCOPE OF USE

Designers need to understand and adhere to the conditions and limitations as outlined below. If in doubt, please check with Allied Concrete for advice on your SuperSlab project.

3.1 Building types and loading suitable for SuperSlab Systems

SuperSlab systems has been designed to support timber framed residential houses generally satisfying the requirements of NZS3604 and as detailed below. The verification of the compliance of the design with this document is the responsibility of the designer and shall be confirmed by the building control authority issuing the building consent. Items 1-6 shall be verified by the designer. Refer to check list procedure in section 7 for further guidance.

1. **SOIL CONDITIONS** - Buildings founded on 'good ground' as defined by the New Zealand Building Code (B1) and NZS3604. This is summarised in section 3.2 below
2. **BUILDING TYPE** - Importance level 1 and 2 structures as per NZS1170 and NZS3604 - Standard residential house
3. **HOUSE SIZE** - No more than two storey timber framed buildings with max height of 10m (to apex). Maximum length of 30m unless detailed with free joints in accordance with this manual as per figure

21 and 33. The foundation needs to be a regular shape with a minimum area (m²) to perimeter (m) ratio of 1. Irregular shaped foundations need specific engineering input and are beyond the scope of this document. Refer Table 2 below for guidance on shape requirements.

4. **WEIGHTS** - Permanent (gravity) and imposed (live) loads as defined in section 3.4 - The foundation system is designed to accommodate a standard residential house generally as defined in NZS3604:2011 and defined in section 3.4
5. **MAXIMUM SPAN AND HEIGHTS** - Maximum Roof span of 12m, first floor joist span of 5m, and maximum storey height of 3m (Cladding combinations as per table 1 and building types A-E)
6. **WIND AND SEISMIC LOADING** - Maximum wind loading of Extra High as per NZS3604:2011 and maximum seismic hazard factor (Z) of 0.45 and soil classes A-E as per NZS1170. Also, refer section 3.4

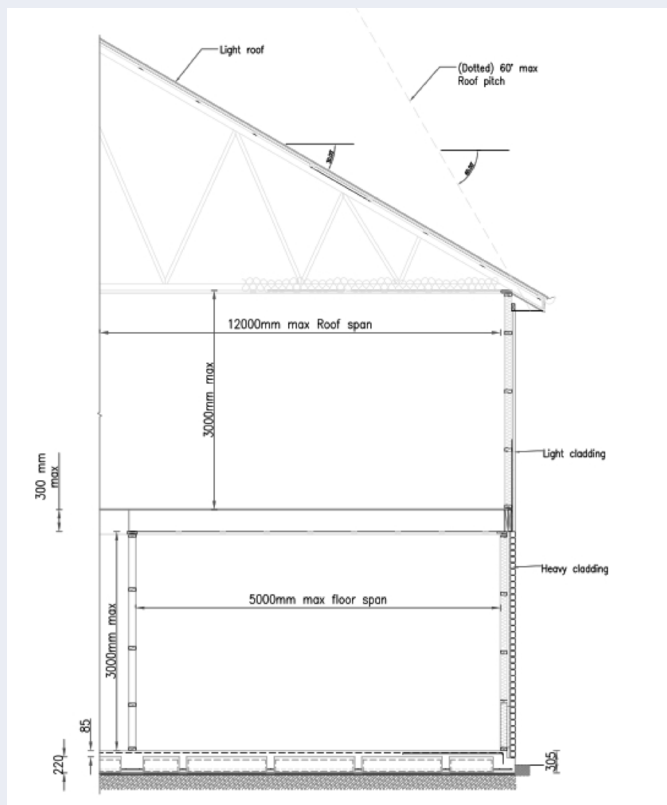


FIGURE 4 - Typical house layout

Table 1

Building type	Number of levels ¹	Level 1 Wall cladding ²	Upper storey cladding	Roof Type ³	Minimum bearing capacities and penetrometer blows ⁴	Within scope of this document
A	Single	Light	–	Light	150 kPa	Yes
B	Single	Heavy	–	Light	200 kPa	Yes
C	Single	Heavy	–	Heavy	200 kPa	Yes
D	Two Storey	Light	Light	Light	200 kPa	Yes
E	Two Storey	Heavy	Light	Light	300 kPa	Yes
F	Two Storey	Heavy	Light	Heavy	300 kPa	No, Specific Design
G	Two Storey	Heavy	Heavy	Heavy	300 kPa	No, Specific Design

Notes as referenced in table 1 above

- Two Storey external wall supporting a timber floor with maximum floor joist span of 5.0m.
- Maximum brick wall cladding height of 3.0m to lower level of two-storey building. 4.5m on a single storey building.
- External wall supporting a maximum 12m clear span of roof trusses.
- The designer shall confirm minimum bearing capacities as required for building type as per table 1. The building platform is to have consistent bearing capacity across the house floor plan. Specific design or geotechnical input is required if bearing capacities vary significantly across the building platform. Penetrometer testing and soil investigations are to be completed as per NZS4402, NZBC (B1) and NZS3604. If the designer adopts a less conservative testing criteria to determine the bearing capacity from penetrometer testing such as Stockwell 1977 or MBIE guidance document for repairing and rebuilding houses affected by the Canterbury earthquakes (section A 3.4.1), they shall be suitably qualified to interpret the “index” bearing strengths as described in the document. Suitably qualified as defined in the MBIE document includes soil technicians or other suitably trained and supervised people. Refer table 2 for penetrometer blow count criteria. Cohesive soils could also be tested using shear vanes as penetrometer testing often underestimates the strength of cohesive soils. A geotechnical engineer can provide the bearing strength to be adopted in

the design. Generally, the geotechnical ultimate bearing strength can be taken as 5 times the undrained shear strength of the cohesive soil. E.g. Undrained shear (S_u) = 60 kPa would equate to 300 kPa geotechnical ultimate bearing or 100 kPa allowable bearing – “good bearing” as per NZS3604.

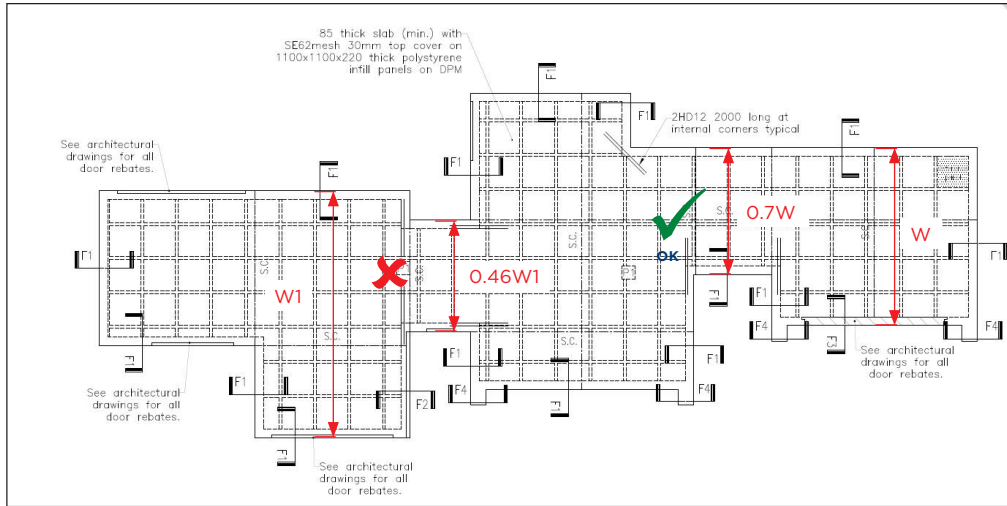
Buildings deviating from the limitations listed are outside the scope of this document. However, an economical SuperSlab solution can still be adopted with specific engineering design. Contact Allied Concrete for further information and advice.

Table 2

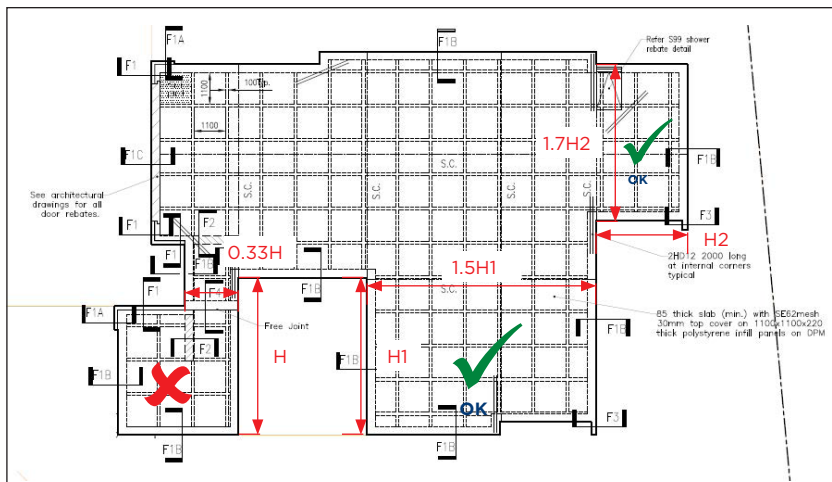
NZS3604/B1 penetrometer testing criteria for Geotechnical ultimate bearing	Number of blows per 100mm – upper 600mm subgrade	Number of blows per 100mm – below 600mm subgrade
300 kPa (good ground)	5	3
200 kPa	3.33	2
150 kPa	2.5	1.5
MBIE/Stockwell penetrometer Criteria testing criteria for Geotechnical ultimate bearing	Number of blows per 100mm – upper 600mm subgrade	Number of blows per 100mm – below 600mm subgrade
300 kPa	3	3
200 kPa	2	2
150 kPa	1.5	1.5

Foundations shape requirements

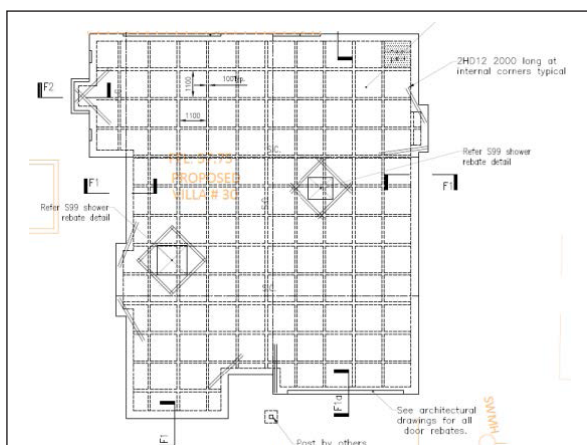
Two foundations connected by a narrow corridor will require specific engineering design (SED) and appropriate free joint detailing. Narrow corridors can be defined as a width less than 50% of the width of the smaller of the adjacent slab (W) areas as per example below. Foundations of this layout are beyond the scope of this document.



Projections which extend out from the slab by H need to be maintain a minimum width of $0.5H$ to fall within the scope of this manual. Projections smaller than $6m^2$ need not comply with this requirement



Projections are permitted providing they are regular and a minimum area to perimeter ratio of 1 is maintained for the foundation has a whole. Detailing of control joints (saw cuts) and re-entrant corners is important to minimize the risk of shrinkage cracking for buildings with projections.



3.2 Ground conditions

SuperSlab systems have been developed for 'good ground' in accordance with NZS3604 (and the definition from the New Zealand Building Code B1) with custom bearing requirements as per Table 1 for the different building types A-E.

The New Zealand Building Code places the responsibility on the designer to confirm the soil conditions or to nominate a representative to undertake site verification of the of the soil conditions prior to construction. Refer B1/VM4 - 2.0.8. The conditions of SuperSlab require confirmation of "good ground" by the designer and local building authority prior to construction. The designer shall discuss with the local building authority and obtain their geotechnical reporting requirements for the building consent process. Often local building authorities will have hazard maps for liquefaction, expansive soils, instability and low bearing strengths that can be utilized to aid the designer with establishing "good ground". It is highly recommended the designer obtain a project specific geotechnical report prior

to building consent to establish the site soil conditions and confirm the site is suitable for a SuperSlab.

"Good ground" is defined by NZS3604 and items 1-4:

1. Consistent bearing capacities of the building platform and underlying soils as per NZS3604 and per Table 1 for given building types A-E.
2. Stable platform, free from any instability or settlement from any scenario where vertical movement greater than 25mm over the 50-year design life is expected. Refer NZS3604 - site requirements for further information.
3. Slightly expansive soils, with a maximum characteristic movement (Y_s) of 20mm as per AS2870.
4. Filled platform - Confirm Items 1-3 on the cut platform. Imported fill (well graded compacted hard fill or suitable fill material approved by a geotechnical engineer) less than 600mm deep placed as per NZS4431 and NZS3604. Cut and fill batters to be completed in accordance with NZS3604 and figure 5 and 6.

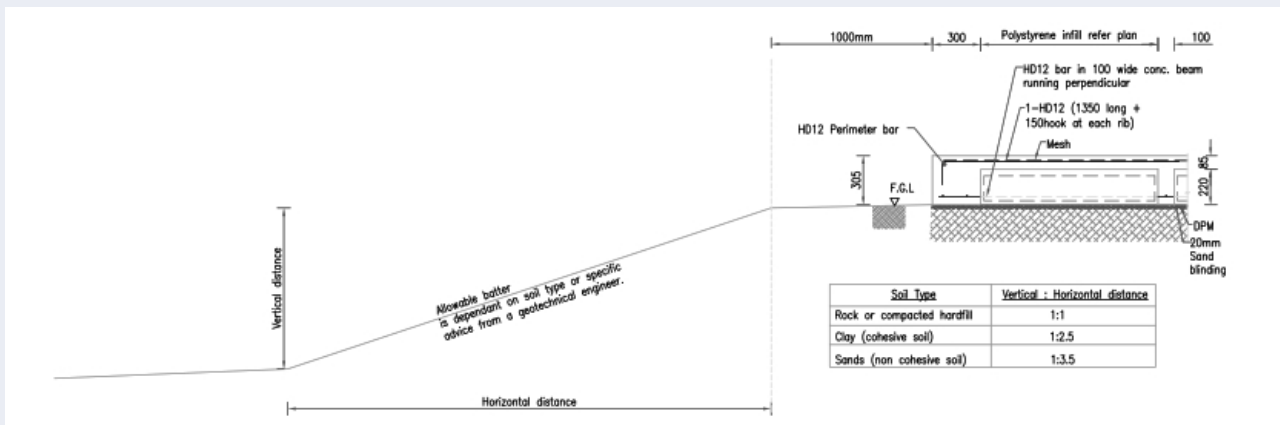


FIGURE 5 – Safe batters for raised building platform

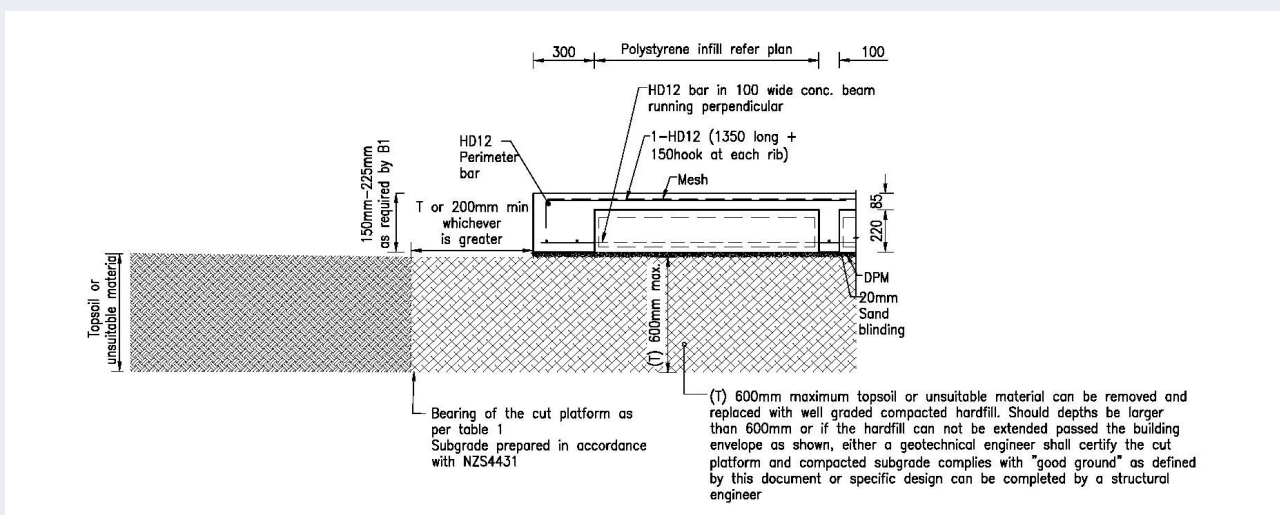


FIGURE 6 – Deep top soil subgrade limitations (Updated)

The following are conditions excluded from the definition of “good ground” and are beyond the scope of the SuperSlab Technical Manual.

5. EXPANSIVE SOILS – Cohesive clays may be prone to drying out and shrinking or expanding and heaving with seasonal moisture changes. Clay or cohesive soil with liquid limits of more than 50% or linear shrinkage of more than 15% as per NZS4402 (test 2.2 & 2.6) shall be classified as expansive soil, prone to seasonal shrink swell movement. Any movement greater than 25mm is beyond the scope of NZS3604 and the definition of good ground. For example, class M (moderately expansive, $Y_s = 40\text{mm}$) or class H1/H2 (Highly expansive, $Y_s = 60, 75\text{mm}$). The soil class as per B1 NZBC shall be determined before building on any cohesive soils.

6. TOPSOIL AND PEAT - Construction on organic topsoil or buried organic material (peat). Peat and any organic material can be prone to decay and settlement over time and when loaded. Buried top soil is common in swampy areas or sites with uncertified fill such as landfills or re-contoured sites (Uncertified earthworks).

7. BUILDING PLATFORM AND BEARING STRENGTH - Soft or weak soils with bearing strengths below 50-67 kPa allowable bearing as required for given building type as per table 1. Soil can be soft for a number of reasons however the most common reason is due to poor compaction and consolidation. Fluctuating ground water can also cause soils to lose bearing strengths. Consistent bearing capacity across the building platform is also very important. If there is significant variability of the bearing strength across the building platform this can result in differential settlement which needs to be considered with specific engineering design of the foundations.

8. SITE INSTABILITY - whether global or local.

- Construction within “close proximity” (1:2, vertical to horizontal) of any retaining walls, existing or proposed
- Construction on sites within slopes steeper than 5 degrees and as defined by NZS3604. If there are any signs or historical instability a full investigation by a chartered geotechnical engineer is required to determine the conditions and recommend foundation design parameters

9. UNCERTIFIED FILL AND BRIDGING.

Construction on any uncertified fill of any depth is prohibited. Uncertified fill can be defined as disturbed soil which has not been placed and properly compacted and as such is prone to settle under self or imposed load. Construction near any buried services, detention tanks or soakage trenches also requires specific design. Construction above or near services or soakage trenches can often encounter uncertified trench back fill or ground that is unstable. Where public services are identified near the foundations, the local building authorities shall be consulted as there are often minimum design standards required to protect their assets. If piling and bridging is required, piling parameters shall be provided in the geotechnical report and will need to be designed by a structural engineer and are beyond the scope of this document.

10. LIQUEFACTION - Construction on sites with liquefaction risks (resulting in settlement beyond B1 limits as defined in item 2 above). Loose sand and silts soils (non-cohesive) in combination with high ground water. Sites with significant risk are usually located around river deltas or reclaimed land with extensive silt and or sand deposits. Most local councils have hazard risk maps to aid in identifying these sites as Liquefiable soils are excluded by the building code

NOTE:

Foundations constructed or proposed on sites with any of the above soil conditions (items 5-10) may still be accommodated by a SuperSlab system however will require specific engineering design from a structural engineer. The structural engineer will most likely require design parameters covering the items 1-10 and these shall be addressed by a geotechnical engineer carrying out the investigation. A geotechnical engineer is able to certify ground improvements (cut and fill) to confirm the building platform achieves “good ground” and satisfies the requirements of this manual to allow the designer to proceed with an SuperSlab system. It is recommended the designer obtain a statement and inspection schedule from a chartered geotechnical engineer confirming the conditions of this manual are achieved by their subgrade design which shall be submitted to the building consent authority.

3.3 Lateral resistance under wind and earthquake

Lateral resistance to sliding under wind or seismic actions is generally resisted by friction between the slab and the ground surface. Seismic action generally governs the design for sliding rather than wind loading.

SuperSlab systems have been designed for seismic loading allowing for a maximum hazard factor of 0.45 and class E soils as per NZS1170. Refer figure 7 and 8 below for seismic hazard map of New Zealand.

The design criteria set by NZS1170.5 allows for a serviceability limit state earthquake (SLS) and an ultimate limit state earthquake (ULS). The severity, probability and required performance for these two events are very different.

A SLS event is a relatively small earthquake which has a higher probability of occurring over the design life of the building (50 years). As such the required performance of the foundation is to withstand the earthquake with no structural damage and minimal cosmetic damage. The building is to remain useable following the earthquake. The frictional resistance provided by the slab against the ground will be sufficient to resist that SLS sliding force of the earthquake. Any movement is very unlikely in an SLS event.

An ULS event is a large earthquake which has a lower probability of occurring over the design life of the building. Given the lower probability of such an event the required performance is to preserve life safety. Structural and major cosmetic damage is expected. In higher seismic areas with Z factors of 0.15 and above, it is likely the acceleration of the earthquake will be large enough to overcome the frictional resistance provided by slab against the ground surface. Thus, the slab would be expected to slide. The foundation is designed to withstand the sliding forces generated (based on a co-efficient of friction of 0.6).

Protection of services (refer figures 9, 10,11 &12)

Following the Canterbury earthquakes MBIE released a guidance document that recommends specific detailing of the plumbing services either within the foundation depth or beneath the slab. Both options require flexible connections outside the building perimeter and flexible lagging around the pipe where the pipes penetrate up through the slab. This is to avoid critical damage to the services under the slab in the event of an ULS earthquake. There is no requirement for this detail, as major structural and cosmetic damage is permitted in a large earthquake, however the services are a critical element in maintaining the economical repair of the house following a large earthquake.

SuperSlab systems require all plumbing pipes to be installed as per Figure 9 for any sites with Z factors larger than 0.15. It is also recommended that the pipe penetration details are adopted on all other foundations.

Shear Keys (refer Figures 13 &14)

An alternate option which is more robust would be install shear keys. Shear keys consist of drilled piles (900mm deep) and are spread around the perimeter of the slab. These piles are designed to lock the slab into the ground and prevent the foundation from sliding. The number of shear keys required is dependent on the seismic zone, building type and the area of the floor slab. Shear keys are not to be used in areas where there is a risk of lateral spreading from liquefiable soils. If shear keys are desired they shall be specifically designed and are outside the scope of this document.

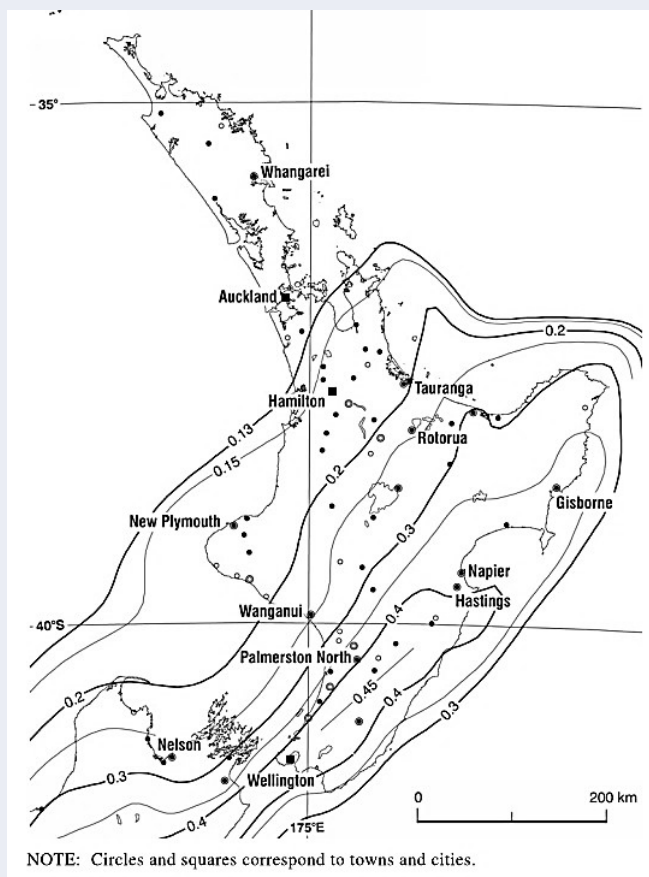


FIGURE 7 – Seismic hazard factors North Island © Standards NZ NZS1170

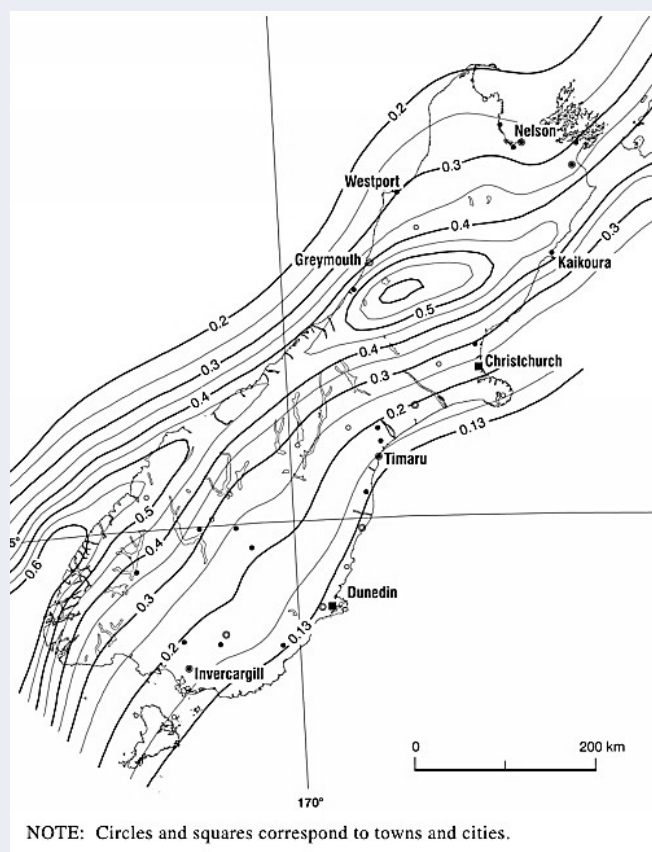


FIGURE 8 – Seismic hazard factors South Island © Standards NZ NZS1170

Pipe Penetration Details For High Seismic Zones
Refer to MBIE Guidelines Section A figure S14 & S15 and building code clause G13

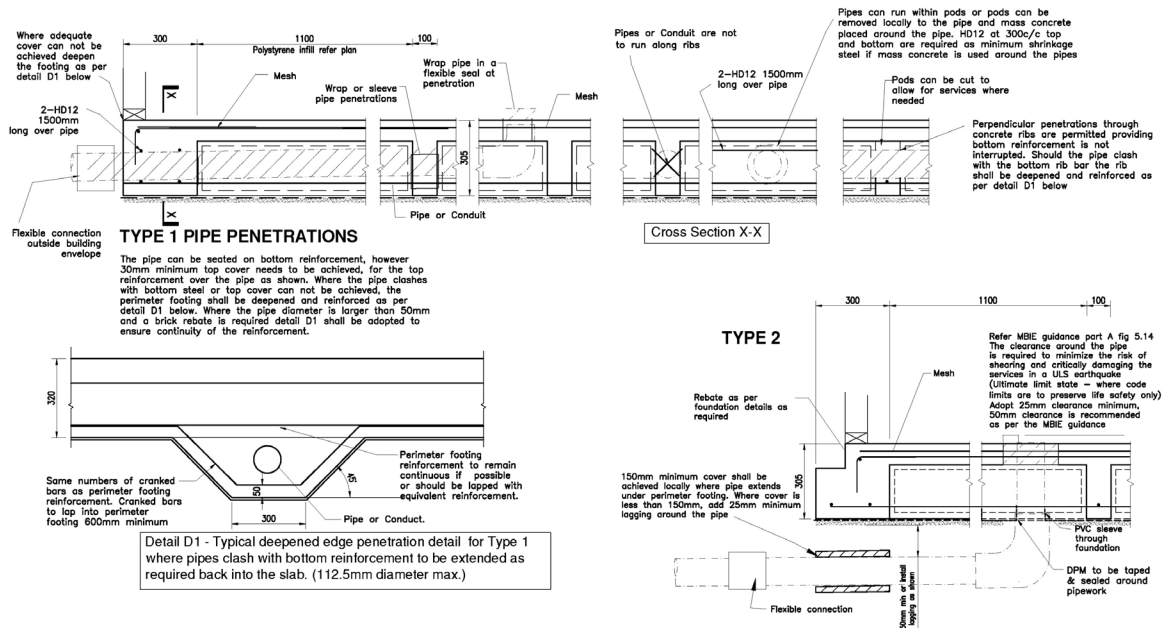


FIGURE 9 – Pipe penetration details

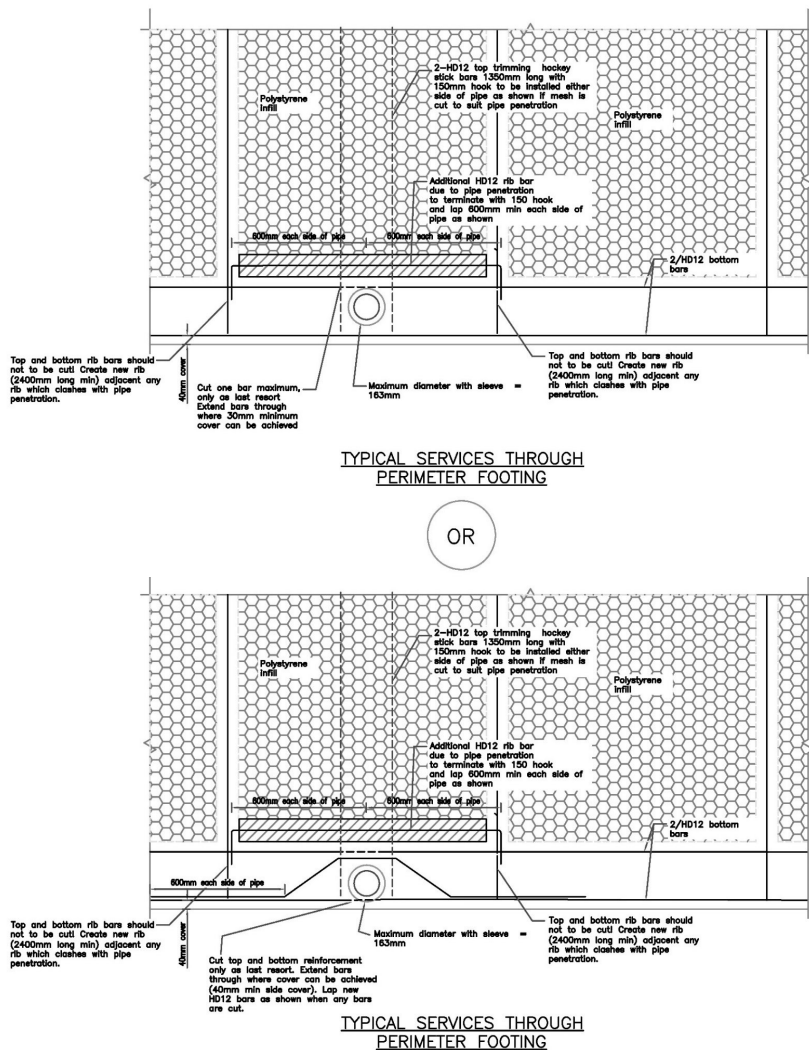


FIGURE 10 – Pipe penetration in perimeter footing

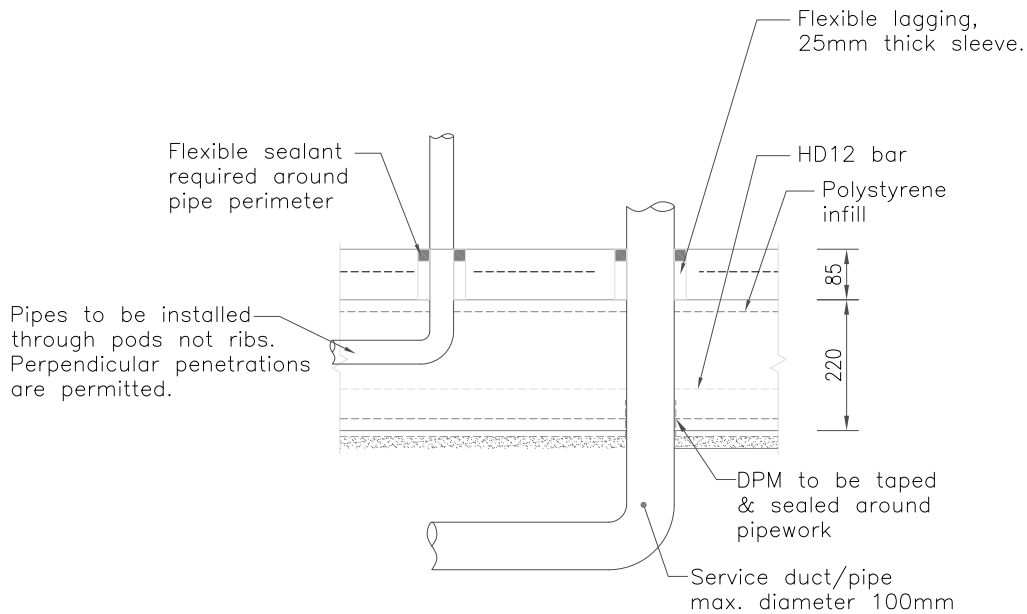
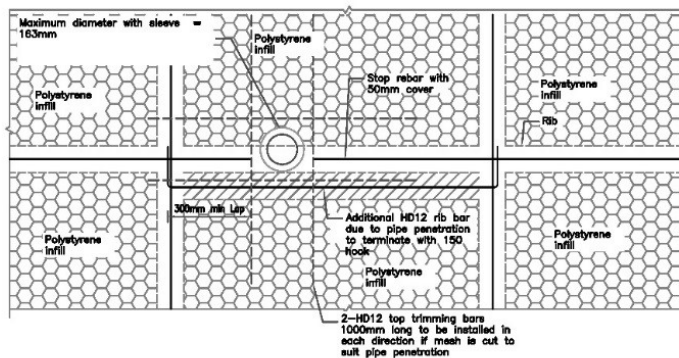
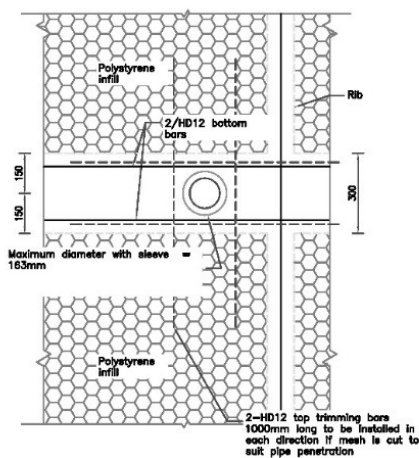


FIGURE 11 - vertical penetrations

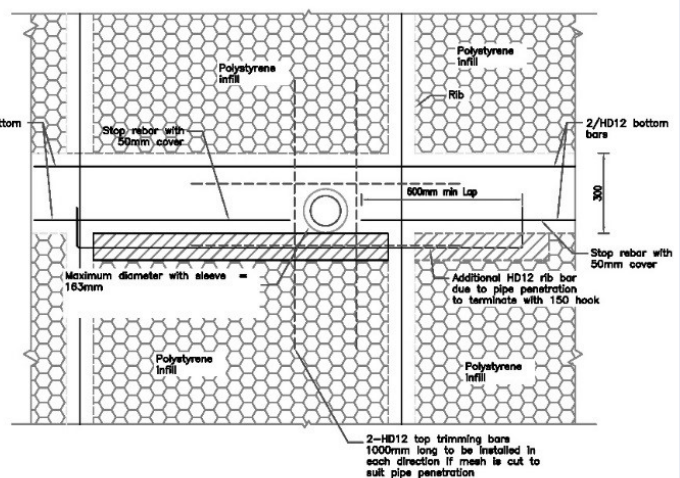


TYPICAL SERVICES THROUGH RIBS



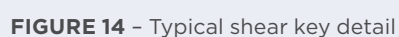
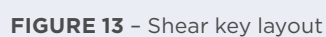
TYPICAL PENETRATION IN LOAD BEARING THICKENING - PIPE CENTRAL

OR



TYPICAL PENETRATION IN LOAD BEARING THICKENING - PIPE NOT CENTRAL

FIGURE 12 - vertical penetration through external footing or rib



3.4 Weights and loadings

SuperSlab systems allows for standard residential and garage loading as per NZS3604, NZS1170 and maximum loading as per the below.

Dead or permanent loads

- Heavy roof loading 1.0 kPa - including cladding, roof framing, insulation and ceiling
- Light roof loading 0.5 kPa - including cladding, roof framing, insulation and ceiling
- First floor (timber) - 0.6 kPa - Including joists, nogs and services, flooring and lower level ceiling
- Lower level heavy cladding - 2.2 kPa (220 kg/m²)
- Upper/lower level light cladding - 0.6 kPa (60 kg/m²)

Live or imposed loading

- First floor loading 2 kPa
- Slab loading 3 kPa with 2.7 kN point load
- Slab loading of 2.5 kPa with 13 kN point load applied over an area of 300mm x 300mm
- Max vehicle weight of 25 kN or 2500 kg
- Max Snow loading as per sections 15 of NZS3604 - (2kPa, refer figure 15.1 of NZS3604)

Load bearing walls and point loading from beams, lintels and girder trusses.

Where line loads from load bearing walls exceed 10kN/m, internal thickenings shall be installed as per figure 18. Where thickenings are used the designer shall also confirm loadings do not exceed limitations as defined in 3.1 and 3.4 above.

Internal point loads (larger than 13kN) from posts or studs supporting beams, lintels or girder trusses will require a pad or thickening (1.2m long minimum and 300mm wide, located centrally to the load) as per figure 19. Point loading shall not exceed 30kN (ultimate limit state, 1.2G+1.5Q). Larger point loads are beyond the scope of this document however could be detailed by specific design such as by the truss designer.

Point loading on the perimeter footing exceeding 20kN shall require a pad as per figure 20. Point loading exceeding 30kN are beyond the scope of this document.

4.0 - INSTALLATION INFORMATION

The following section outlines the standard installation details for SuperSlab systems designed in accordance with this technical literature. Nonstandard or specially designed projects may require site specific specifications. The consented drawings, NZ Building Code and current best practice shall be adhered to at all times.

If Specific engineered design (SED), all construction shall be inspected by an engineer, the council and/or an approved representative of Allied Concrete who has been specifically trained prior to pouring any concrete.

Codemark compliant SuperSlab systems must be supervised by suitably qualified LBP with relevant carpentry or foundation qualification.

All bending of bars shall be carried out in accordance with NZS 3101. Minimum bend diameters for main reinforcing bars (between 6-20mm dia.) bar shall be 5 x diameter of the bar (db) measured to the inside face of the bend.

All bar laps shall be 50 x db or greater.

4.1 Site preparation and Earthworks

All topsoil, organic material and any soft soil (below design bearing strength) shall be removed from the building platform (refer figure 6) and in accordance with the building consent specification and as per section 3.0 above. Any isolated soft spots shall be excavated to a depth where adequate bearing is achieved.

Compacted hard fill (well graded AP40) or geotechnically approved fill material may be required to achieve the finished floor levels.

It is very important to achieve adequate compaction of a filled subgrade. The earthworks contractor shall compact granular fill in 150mm maximum layers in accordance with NZS4431 and NZS3604 (section 7.5.3). Fill depths exceeding 600mm thick, will need to be certified by a geotechnical engineer to achieve a minimum of 95% compaction of the maximum dry density as determined by test 4.1.1 per NZS4402. The geotechnical engineer shall also confirm the building platform meets all the requirements of section 3.2 of this document.

Clay or cohesive fill shall be compacted to achieve the below as per NZS4431. Clay or cohesive fill shall be certified by a geotechnical engineer:

Minimum Shear Strength and Maximum Air Voids Method

AIR VOIDS PERCENTAGE

(As defined in NZS 4402)

Average value less than	8%
Maximum single value	10%

UNDRAINED SHEAR STRENGTH

(Measured by Pilcon shear vane - calibrated using NZGS 2001 method)

Average value not less than	150 kPa
Minimum single value	120 kPa

The average value shall be determined over any ten consecutive tests

The cut platform shall not be left exposed to dry out, this is particularly important in areas where expansive soils (clay soil) have been identified. Where a platform has been left exposed and there are prevalent cracks (10mm or greater) through the building platform it is important to consult with a geotechnical engineer to confirm remedial action prior to constructing the floor slab.

A clean sand blinding layer (10mm minimum, 20mm maximum) shall be installed on the cut ground level or on top of the certified subgrade layer. The blinding layer will create a level platform, reduce shrinkage forces in the floor slab and protect the DPM from being punctured by shape aggregates.

4.2 Damp proof membrane (DPM)

A continuous damp proof membrane shall be placed on top of the sand blinding layer over the entire slab area in accordance with NZS3604 section 7.5.4 - 7.5.6

Where polyethylene (polythene) sheet damp proof membrane is to be used, the material shall be not less than 0.25mm thick, have lapped joints not less than 150mm wide which are sealed with pressure sensitive plastic tape not less than 50mm wide. The DPM shall be protected from damage during construction. Refer section 4.14 for polished concrete

4.3 Set out & boxing

Site profiles, levels and positions on site shall be determined by the builder and/or surveyor. Any discrepancies in the dimensions shall be discussed with the architect as soon as possible.

Boxing of correct height and levels shall be erected around the perimeter of the slab

ensuring that any boxing supports do not penetrate the DPM layer.

All rebates whether for brickwork, garage door thresholds or joinery shall be allowed for in the boxing as per the architectural drawings.

4.4 Pod set out

The polystyrene pods shall be placed on the DPM layer within the perimeter boxing generally as per the set-out drawings provided.

Proprietary spacers can be supplied with the SuperSlab pods by Allied Concrete.

The set out of the pods shall ensure that the perimeter footing width (300mm wide) and rib width (100mm) is always maintained. The drawings and details shall be carefully checked to ensure the construction matches the consented design drawings.

Internal load bearing walls will be marked on the drawings and these also need to be accommodated in the pod set out (or cut into the pods if preferred).

A new reference point can be created providing the footing and rib thicknesses are maintained, ribs are kept continuous and all internal point loads or load bearing walls are supported.

Where pods require cutting to suit the dimensions and set out of the floor, care shall be taken to ensure that the remaining pods are no less than 200mm wide. Where narrow pods occur (less than 200mm width) then the pod shall be removed or the set out merged with an adjacent full width pod to create two narrower pods of 600-800mm wide with a standard 100mm wide rib between. Where footings or ribs are to be wider than detailed an extra HD12 bar shall be installed in the bottom of the footing or rib per 100mm increase in width.

The maximum pod size in all cases shall not exceed 1100mm x 1100mm square. Either depth of 220 or 300 deep polystyrene pods are acceptable providing they are detailed and installed in accordance with this document.

Qpods can be used as an alternative to polystyrene pods. The 1100mm x 1100mm square (maximum) void former is created by clipping four 550mm square Qpods together. Qpods can easily be omitted to allow for pipe service penetrations or pads to be installed. 100mm wide extension pods can also be clipped onto the side of the pod where the spacing is less than 550mm wide to reduce concrete consumption. Refer section 6.1 for detailing.

4.5 Perimeter foundations

The perimeter edge beam is typically 300mm wide however larger widths could be specified when ground conditions or edge detailing of cladding dictate this in the specific design.

Typically, 2 HD12 bars (Grade 500E deformed bars) are used for bottom steel in the footing and 1 HD12 used as top reinforcement where required. The bottom bars shall be placed onto bar chairs to achieve 50mm bottom and side cover.

HD12 starter bars (Hockey stick bars) are used at 1200mm centers (or at the top of each rib). These are 1350mm long with a 150mm hook anchoring the footing to the floor slab. This is particularly important for slabs with large rebates such as brick veneer clad houses. The large rebates prevent the mesh from achieving the required anchorage into the perimeter footing. The Hockey stick bars also give the Superslab the strength it needs to tolerate up to 25mm differential settlement as defined by B1 NZBC. Hockey stick bars of varying lengths are specified in specially designed foundations depending on site conditions and levels of soil expansiveness. Hockey stick bars shall be tied underneath the mesh to ensure 30mm minimum top cover to all the reinforcement. The top HD12 longitudinal bar is tied perpendicular to the underside of the hockey stick bars. All the reinforcement shall be sufficiently chaired so that the mesh maintains 30mm top cover and all reinforcement maintains 50mm side cover.

The perimeter footing may have rebates to accommodate exterior cladding details such as bricks, garage door rebates, and full height joinery rebates. The rebates shall be coordinated and set out in accordance with the architect's drawings. The maximum permitted rebates are 150mm wide by 120mm deep or 200mm wide and 25mm deep.

4.6 Internal ribs, Load bearing thickenings & Pads

A standard internal rib is 100mm wide and has 1 HD12 bar located in the bottom of the rib with 50mm cover to the DPM.

Extra wide ribs or ribs with additional reinforcement including links (shear reinforcement) can be specified to suit site specific design requirements and where required will be detailed on the engineering drawings.

Ribs shall run from one side of the slab to another in a straight line. If an offset is created a 300mm slab thickening is required and terminating rib bars shall be anchored into the 300mm thickening with a 150mm hook and 250mm development length. HD12 rib bars shall be lapped (600mm minimum) where required. See

figure 18 for the internal slab thickening detail.

Load bearing walls, internal and external point loads shall be detailed in accordance with figures 18, 19 and 20.

Proprietary 15kN hold downs for brace walls often require a 100mm minimum slab thickness to achieve the required embedment. The Designer shall either detail thickenings (figure 18) under brace walls or alternatively adopt 100mm topping (if required in the anchor specification). The designer may also seek SED of the anchors to achieve the required rating into 85mm topping.

4.7 Mesh and Topping thickness

The mesh used in the 85mm topping is SE62 (or 2.29kg/m² minimum) grade 500 E as per NZS4671 and NZBC clause B1.

The mesh shall be supported on 40mm chairs for an 85mm topping. Proprietary Castle G25/40 bar chairs are to be used or equivalent bars chairs complying to AS/NZS 2425:2015. Longitudinal rail bar chair chairs without specific testing to confirm there is no reduced performance in shear and flexural capacity of the topping slab are excluded from this document and shall not be used. The chairs shall be located on top of the polystyrene pods and be of sufficient number to ensure the mesh does not sag excessively between support points. Top covering on mesh shall be 45mm maximum and 30mm as a minimum. Qpods have bar chairs built into the pods to support mesh to the appropriate cover and have been load tested to confirm topping performance is not compromised.

Topping thickness shall be a minimum thickness of 85mm in all locations. There is no acceptable construction tolerance for the topping thickness less than 85mm especially in the garage area. Where underfloor heating or polished concrete is specified the topping shall be increased to 100mm. Bar chairs and top cover to mesh to shall be maintained as specified above. Toppings greater than 100mm thick will require increased mesh reinforcement to meet minimum shrinkage requirements of NZS3101 and will require specific engineering input and are beyond the scope of this document.

Where underfloor heating is specified, the pipes shall be no larger than 16mm diameter. It is recommended the underfloor heating pipes are installed below the mesh. This is to avoid increasing the top cover to mesh and to avoid the risk of damaging the heating pipes when saw cuts are installed. Increasing the mesh top cover would increase the risk of shrinkage

cracking and as such shall be avoided.

As outlined in 4.6, 100mm topping may also be selected by the designer to comply with minimum slab thickness which are required by proprietary bracing hold downs

4.8 Reentrant corners

At re-entrant (internal) corners additional steel is required to reduce the risk of cracks propagating from the internal corner into the slab. The additional steel will be indicated on the drawings and consist of 2 HD12 bars, 2000mm long placed diagonally across the corners. Spaced 100mm apart with the first being located with 50mm side cover to the corner. Corner bars shall be installed parallel with a sawcut if there is a sawcut to be installed at the reentrant corner. Should sawcuts be installed in each orthogonal direction of the corner than diagonal bars are not required, refer figure 1.

4.9 Concrete placing, finishing and curing.

PLACING

The design documentation will specify the required mix code for each design.

It is important to explain the placement method to Allied Concrete to ensure the appropriate mix is supplied.

Only Allied Mix code 252CSS shall be used for 25 MPa applications or Mix code 202CSS used for 20 MPa applications. Refer polished concrete section below (4.14 for polished concrete mix code).

Failure to use the correct Allied concrete mix specified will breach the conditions of the Codemark and may prevent the foundation from obtaining a Code Compliance Certificate (CCC).

Concrete placing shall be carried out by experienced personnel and shall be carried out strictly in accordance with NZS3109

No water shall be added to the as delivered concrete unless approved by the design engineer within the restrictions of NZS3104 clause 2.9.3.1

Concrete shall not be placed until all reinforcement has been inspected by the engineer, council and/or an approved engineer's representative. Failure to carry out a pre-pour inspection may result in difficulties in obtaining a CCC.

Care shall be taken during the pouring process to ensure that the polystyrene pods do not

move around. Ideally concrete shall be placed on top of each pod prior to infilling between the ribs to prevent pod flotation or movement during concrete placing.

The concrete shall be placed so that its working face is generally vertical, and normal to the direction of placing. It shall be placed over the width of the slab in such a manner as to minimize segregation.

Concrete shall be thoroughly vibrated around all steel and against all boxing and formed rebates within the perimeter of the slab, as per code and best practice requirements.

Where good access exists around the site and sufficient labor is employed then the concrete can be placed directly from the truck using the chute or wheel barrows. If these methods are used it is important that the mesh reinforcement and pods are protected from wheel barrow traffic and correct covers are maintained.

Alternatively, a slump pump can be used with either 13mm or 19mm aggregate.

FINISHING

The top surface of the slab shall be screeded immediately after placing/vibration has been completed.

Screeding shall be carried out with a level as a reference to ensure the top surface is finished within tolerance.

A trowel and an edging tool shall be used to finish the slab to a U3 finish in accordance with NZS3114. The finish surface shall be blemish free with all slab edges tooled off to form a rounded edge to help prevent cracking.

CURING

Foundations shall be cured for at least 7 days in accordance with NZS3109. If this process is omitted or modified the contractor will need to take responsibility for controlling shrinkage.

When the possibility of heat, wind, rain or low humidity could induce premature drying of the top surface the contractor shall either delay the pour or take appropriate actions to mitigate plastic cracking forming in the surface of the slab. One such option is to apply an anti-evaporation agent over the concrete surface after screeding to mitigate excessive evaporation of water from the concrete surface. Additional curing measures including ponding of water on the surface of the slab, sprinkling the slab surface regularly or the use of wet sacking placed over the slab can also be adopted.

Where a large change in ambient temperature is expected during the first 24 hours such as a very cold night then continuous wet curing via ponding or sprinkling is recommended to

mitigate thermal shock and cracking in the slab.

Mitigating shrinkage cracking shall also be discussed with the concrete supplier to allow for an adequate mix or concrete additives to be utilized where appropriate.

The surface finishes specified in the building consent documentation need to be achieved by the contractor. These may include colored or polished concrete. The concrete mix and curing method shall be selected to achieve the specified finish.

4.10 Saw cutting (control joints) and free joints.

Saw cut joints shall be cut into the slab within the 24 hours or as early as possible, once the slab is sufficiently hard to walk on.

Saw cuts shall be 20-25mm deep (for the standard 85mm topping). For thicker toppings deeper saw cuts will be required of approximately 1/4th of the topping thickness. Saw cuts shall be made where indicated on the drawings.

Re-entrant corners are at higher risk of cracking due to differential stresses developing in the slab with different rates of curing on the exposed edges than compared with the internal slab. Saw cuts shall be installed at re-entrant corners and at 6m x 6m (maximum) spacing or located to create squares where possible. Refer 4.14 below for polished concrete. Creating a square or regular cut patterns will aid in mitigating differential curing in the topping resulting in shrinkage cracking.

Slabs longer than 30m will require a free joint, which shall be installed as per figure 21 and 33 of this manual. It is important that top reinforcement stops either side of the sawcut and the bottom reinforcement extends perpendicular to the free joint. Should the free joint not be perpendicular to the length of the slab it will not work, and this detail will require specific design. The bottom reinforcement is to extend a minimum of 1200mm either side of the joint and be debonded as per figure 21 and 33. Cladding and floor coverings in particular which cross the free joint need to be detailed appropriately to tolerate the horizontal movement which could occur.

4.11 Plumbing and pipe penetrations

There are two options for installing the plumbing services in combination with waffle slabs. The pipes can either be installed within the subgrade beneath the pods and concrete foundation or within the depth of the waffle slab itself.

Where falls allow and for all gas or critical ducting it is recommended the pipes are installed within the depth of the floor slab

(type 1) flexible lagging shall also be included around the pipes. Installing the pipes within the depth of the slab will mitigate the risk of damage occurring underneath the floor (where it would be difficult to repair) in the event of an earthquake.

Where pipes cannot achieve the required fall, or if the diameter is too large, these can be installed within the subgrade (type 2) and penetrate up vertically through the slab. Again, a clearance around the pipe shall be maintained (25mm minimum or recommended 50mm as per the MBIE guidance).

Pipes are not permitted to run along or within ribs and footings or penetrate up through ribs and footings without special detailing. Pipes are permitted to cross perpendicular through a rib or footing providing they can achieve the required cover refer figure 9.

Standard detailing requirements are to be followed for all standard SuperSlab foundation. Detailing beyond the limitations provided are beyond the scope of this document and would require specific engineering design.

4.12 Shower Rebates

SuperSlab systems have been designed to accommodate a 50mm deep shower rebate. Refer standard details as per figure 15. All pods in contact with the shower rebate are cut down by 50mm and mesh is lowered and chaired appropriately with the correct cover and lap. Trimming bars are required around the shower as per Figure 15. It is important the reinforcement of any perimeter footings, ribs or internal slab thickenings extending across or adjacent to a shower rebate are kept continuous. The maximum area of any shower rebate for SuperSlab systems is 4m². Larger or deeper rebates can be accommodated with specific engineering design and are beyond the scope of this document.

4.13 Wing walls

Small wing wall projections are permitted providing they are detailed as per section 6 of this manual and comply with the below:

- Maximum projection or cantilever from the slab envelope is 600mm
- Single storey with light weight cladding and a maximum height of 2700mm
- No point loading from girder trusses or beams on the 600mm cantilever

Any wing walls not complying with the above are beyond the scope of this document and may require specific design or detailing to NZS3604.

4.14 Polished Concrete floors

Where a Polished aesthetic is selected it is important to take extra precautions to mitigate shrinkage cracking. It is not practical to assume any slab will be crack free however the below will mitigate the risk of shrinkage cracking:

- The mix design may be tailored for the conditions and desired finish. As such it is important to discuss the conditions with your local Allied Concrete supplier before the pour.
- Sawcuts shall be reduced to 4x4m. These shall be installed as soon as practical and no later than 24 hours
- The slab shall be cured in accordance with NZS3109. I.e., flooding the slab for 7 days
- A double layer of DPM shall be adopted
- The polisher shall check the compatibility of the surface hardener with the concrete mix supplied prior to the pour and adjust as required
- Polished mix codes for 13mm or 19mm aggregate shall be as per the below
 - » 3013GRN
 - » 3019GRND

5.0 - LANDSCAPING AND ONGOING MAINTENANCE

Foundation maintenance shall be broadly in accordance with AS2870: Appendix B. Care shall be taken on clay sites which are expansive within the limits of section 3.2, as work and planting around the slab perimeter can have a detrimental effect on the slabs performance.

5.1 Paving and landscaping heights

The level of permanent paved, concreted and landscaped surfaces shall be kept within the limits stated in NZS3604 clause 7.5 (Figure 7.11 of NZS3604)

For paved or concreted surfaces the minimum step from the internal finished floor level to the finished exterior level shall be no less than 150mm.

For grassed or permeable surfaces the minimum step from the internal finished floor level to the ground level shall be no less than 225mm.

There may be further requirements by the architect or the local building authority in flood prone areas.

5.2 Excavation and retaining walls

Excavation next to the edge of the SuperSlab system shall be avoided where possible. Under no circumstances shall excavation take place which will undermine the edge of the slab

Excavation or construction of retaining walls (lower than the slab level) within a 1:4 gradient from the underside of the slab to the base of the excavation/wall shall be avoided. A qualified engineer shall design all retaining walls within this zone to ensure that loss of vertical and lateral support (during construction or permanently) does not occur.

5.3 Drainage of the site

Sands, silts and clays shall be protected from becoming extremely wet by adequate attention to site drainage and prompt repair of plumbing leaks.

The site shall be graded or drained so that water cannot pond against or near the building. The ground immediately adjacent to the building shall be graded to a uniform fall of 50mm minimum away from the building over the first meter. The site drainage shall be maintained for the design life of the building (normally 50 years)

The development of the gardens shall not interfere with the site drainage requirements. Garden beds immediately adjacent to the slab edge or undermining the slab edge in anyway are not permitted.

5.4 Gardens, trees and shrubs

Planting of trees shall be avoided near the foundations as they can cause damage due to drying of clay and result in excessive seasonal ground movement.

To reduce, but not eliminate, the possibility of foundation damage, tree planning shall be restricted to a horizontal distance equal to that of the mature height of the tree. Where rows or groups of trees are involved the above distances may need to be increased and specific advice shall be sort. Please note that removal of mature trees from the site can also cause issues with ground movement.

6.0 - STANDARD DETAILING

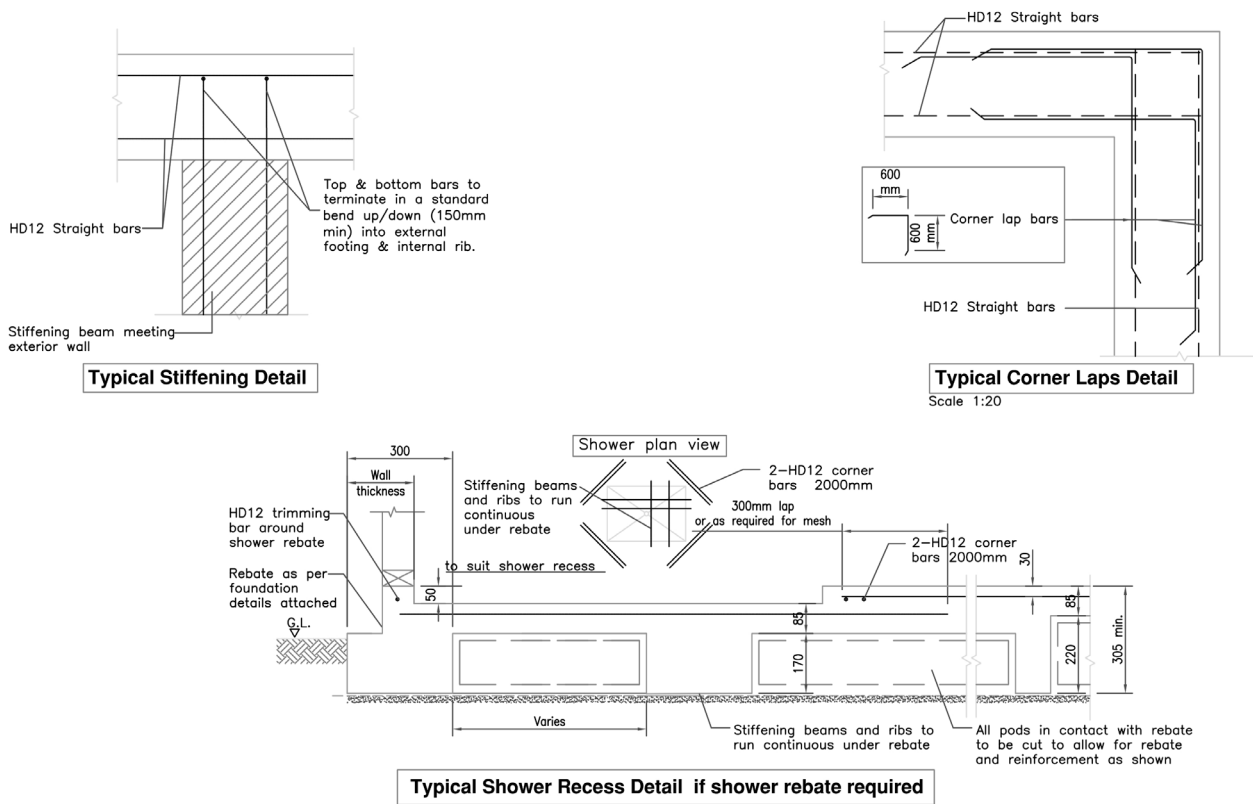
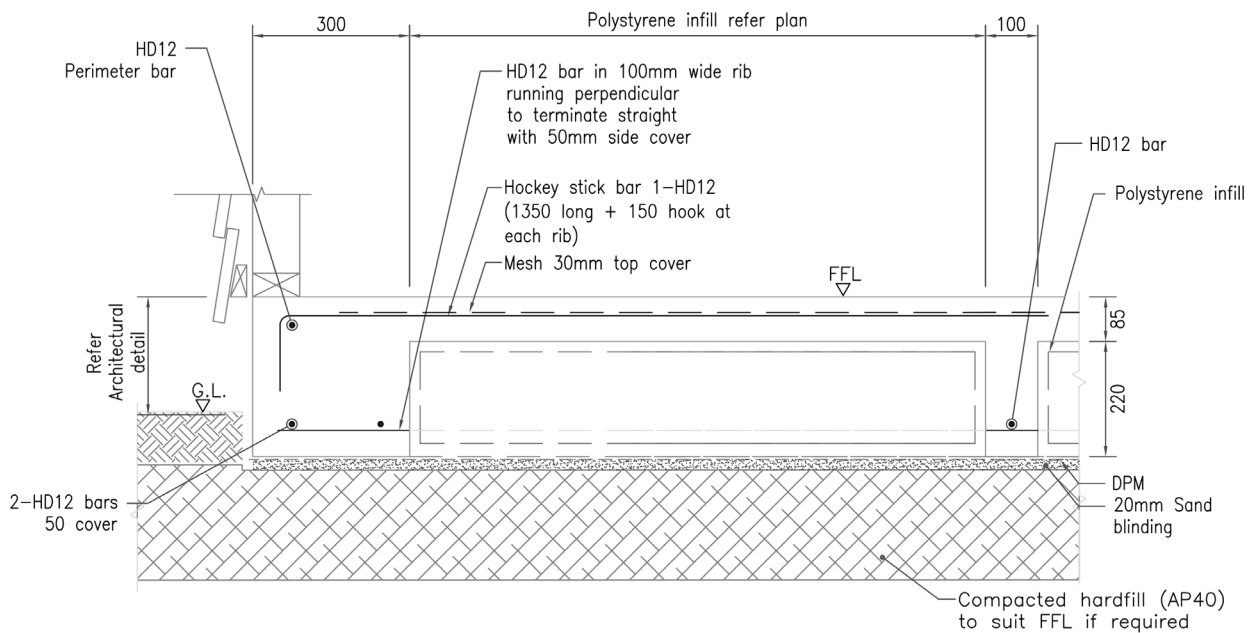


FIGURE 15 - Typical shower rebate details and corner bar lap detail



TIMBER WEATHER PERIMETER DETAIL

FIGURE 16 - Typical details - Lightweight cladding

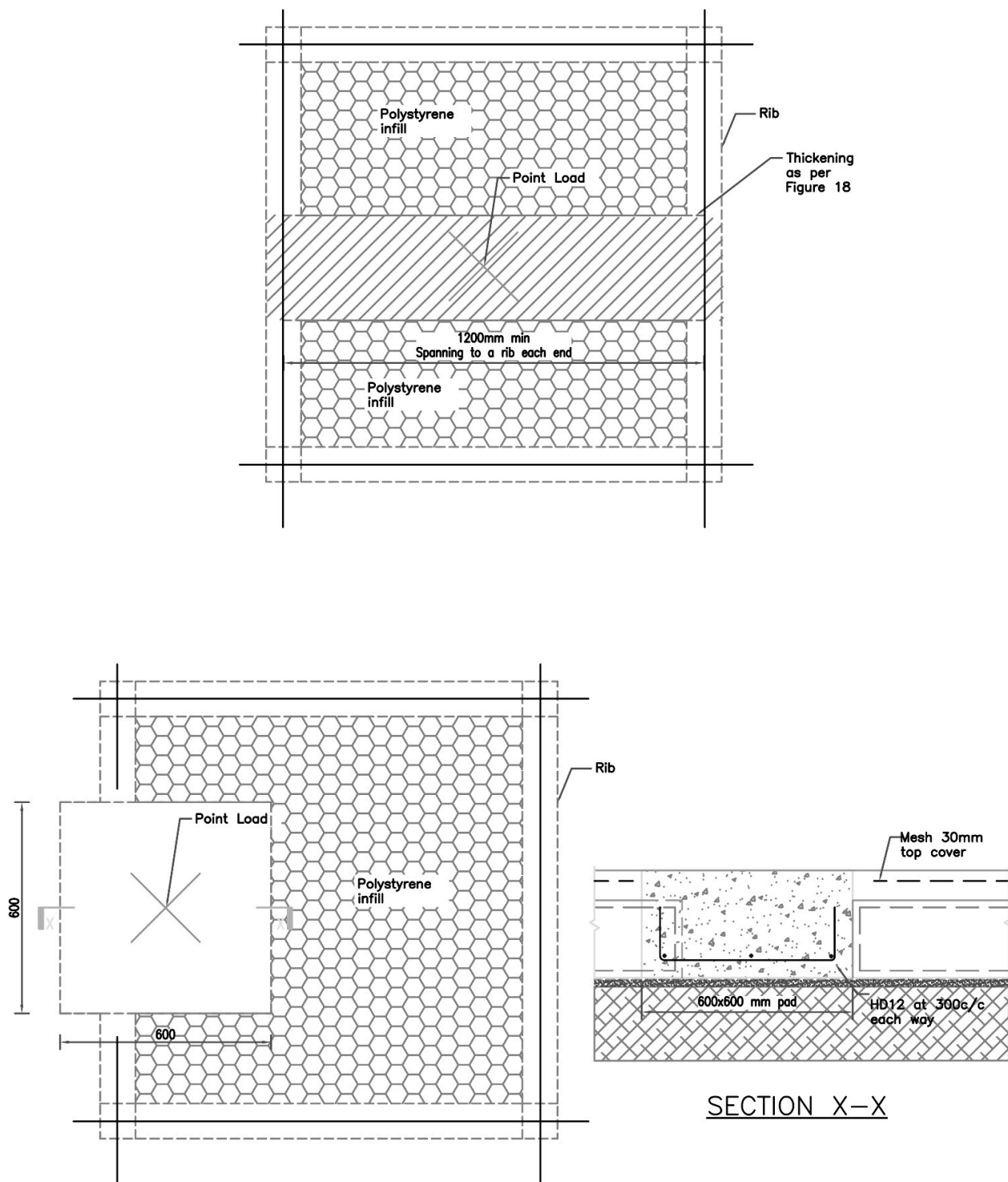


FIGURE 19 - Internal point loads larger than 13kN

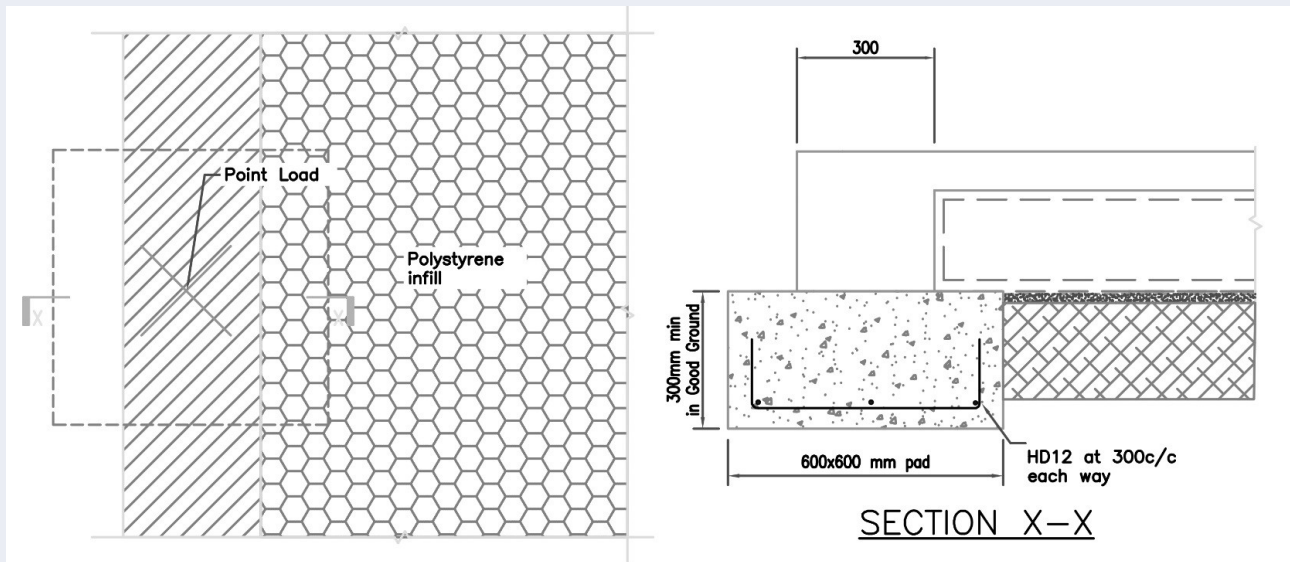
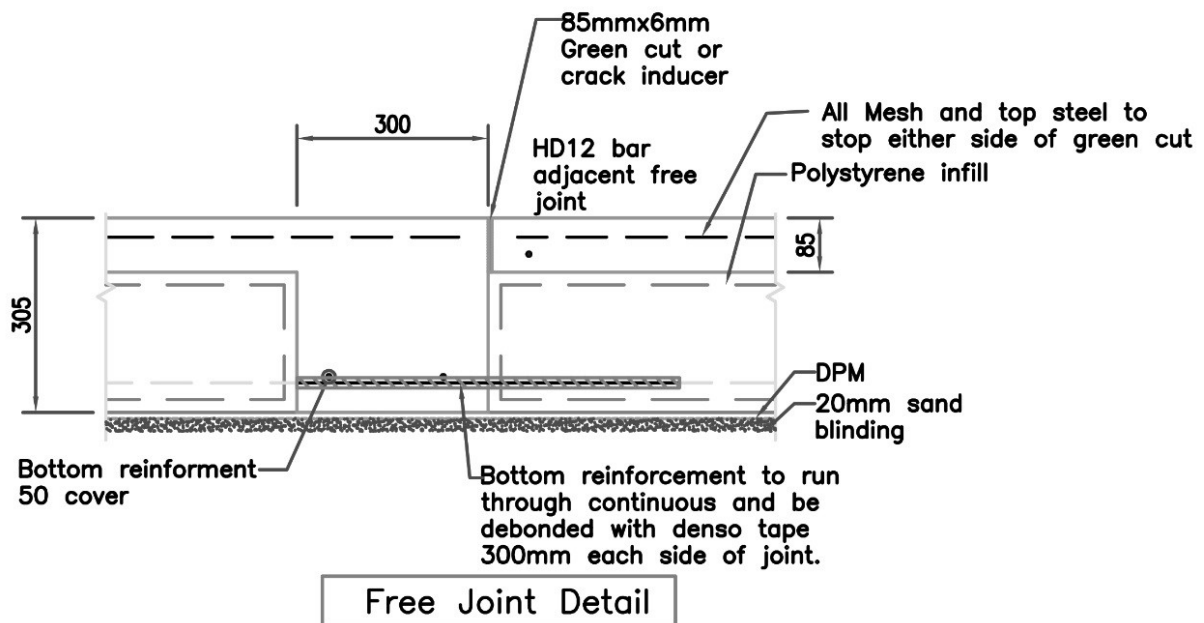


FIGURE 20 – Perimeter point loads larger 20kN



Floor coverings and cladding crossing this joint should be detailed appropriately as per product specifications.

FREE JOINT DETAIL

FIGURE 21 – Free Joint

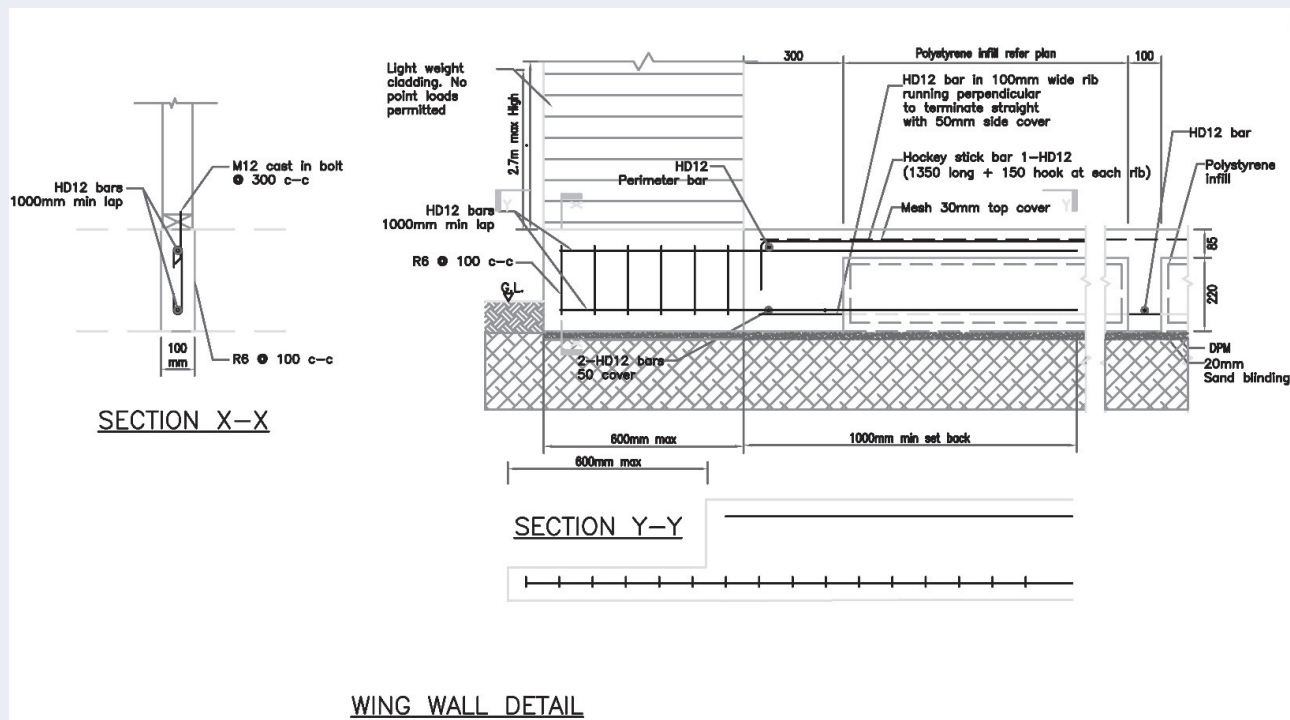


FIGURE 22 - Wingwall detail

6.1 Qpod substitutions detailing

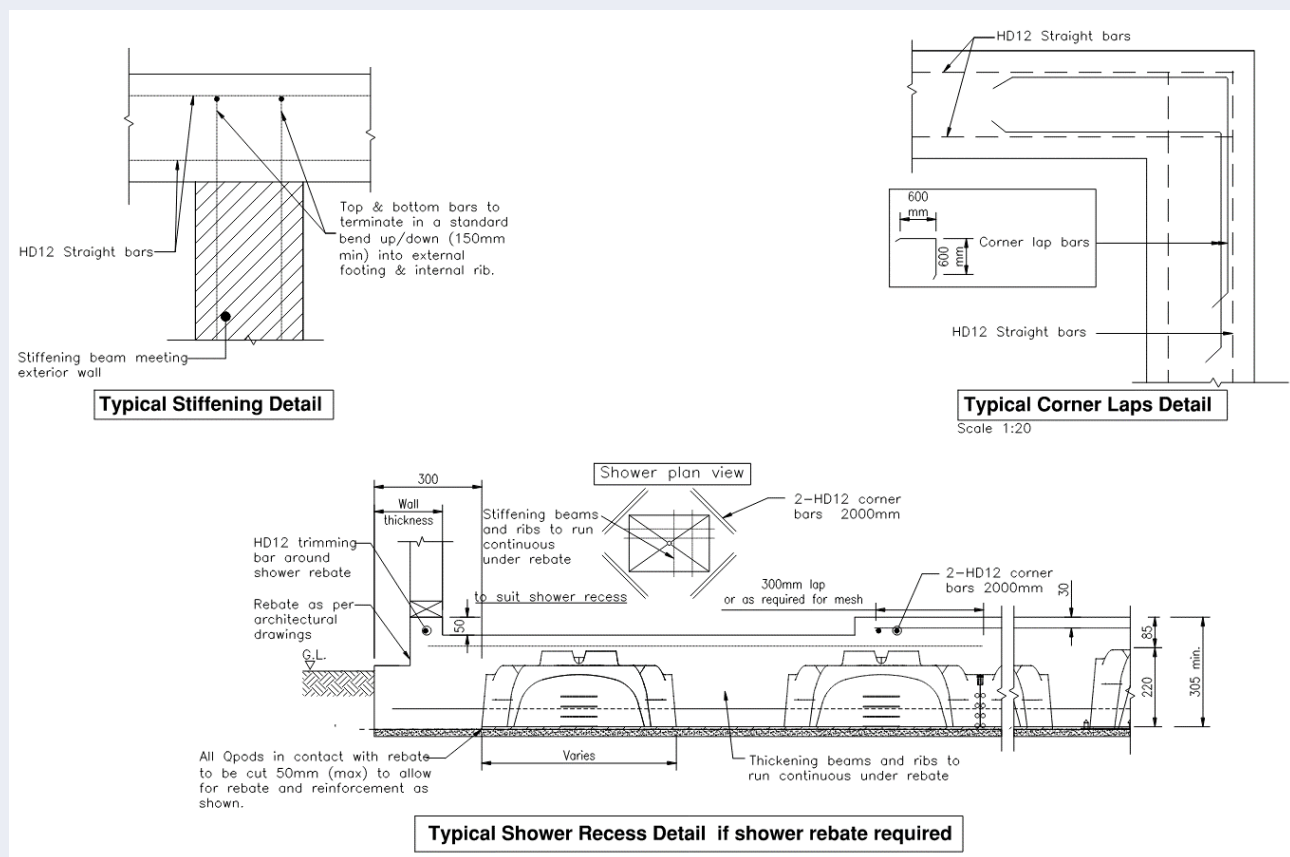


FIGURE 23 - Qpod rebate and corner details

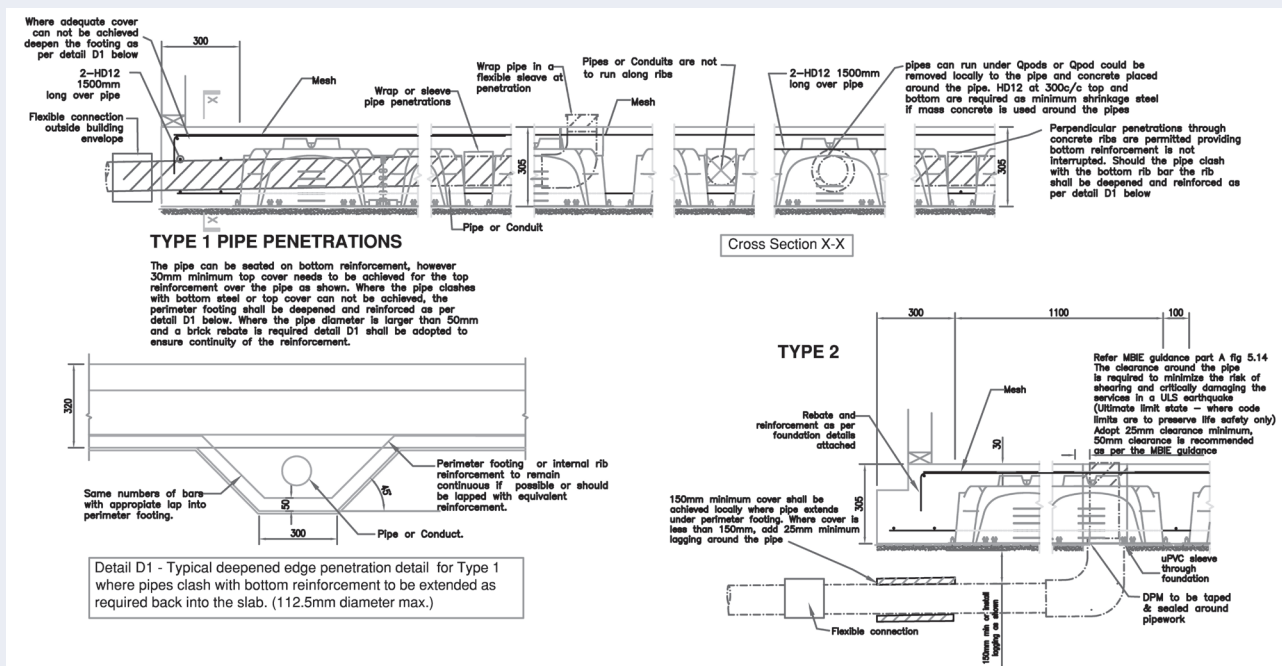


FIGURE 24 – Qpod pipe penetration details for high seismic zones. Refer to MBIE guideline section A figure S14 & S15 and building code clause G13

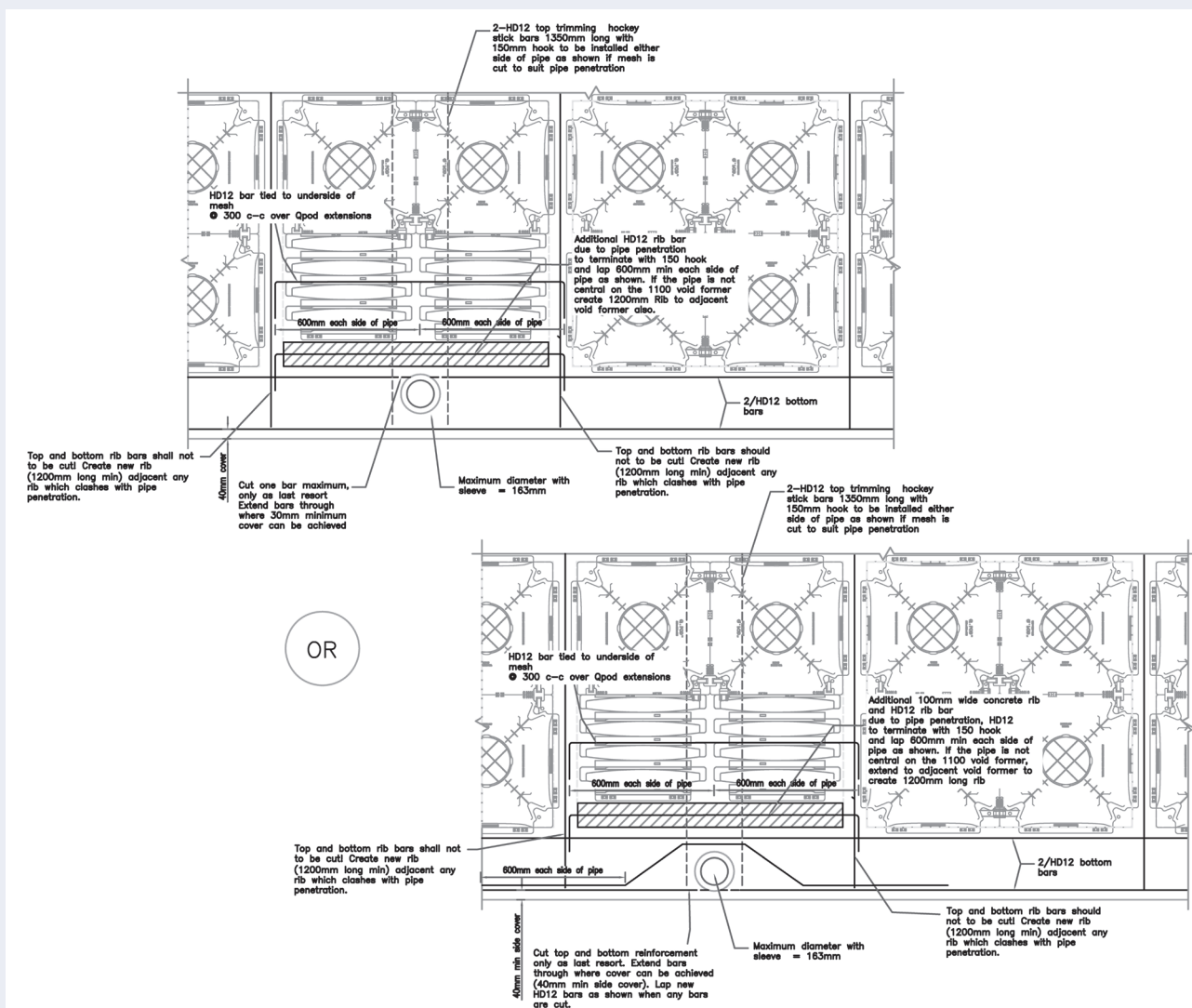
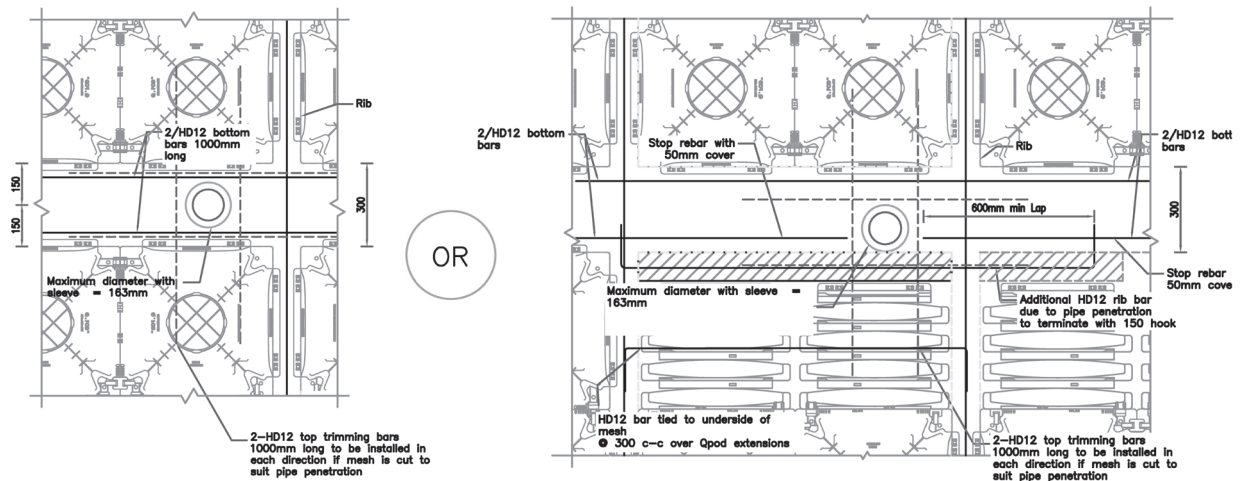
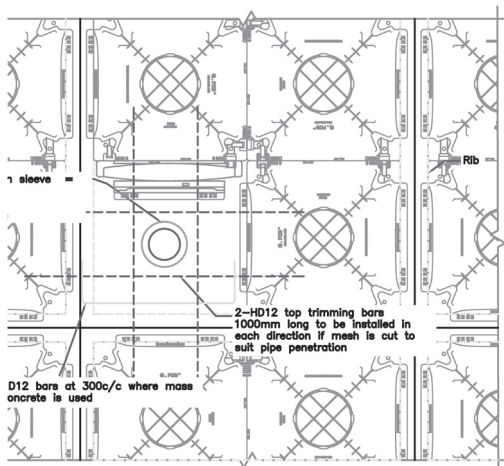


FIGURE 25 – Qpod perimeter footing pipe penetrations

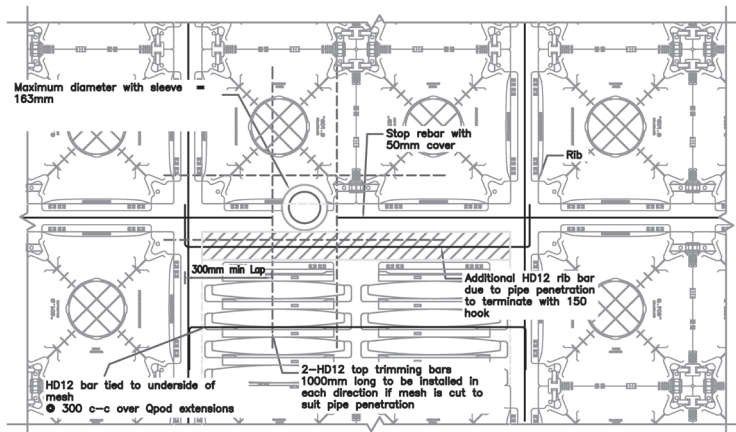


TYPICAL PENETRATION IN LOAD BEARING THICKENING – PIPE CENTRAL

TYPICAL PENETRATION IN LOAD BEARING THICKENING – PIPE NOT CENTRAL



TYPICAL SERVICES



TYPICAL SERVICES THROUGH RIBS

FIGURE 26 – Qpod internal pipe penetrations

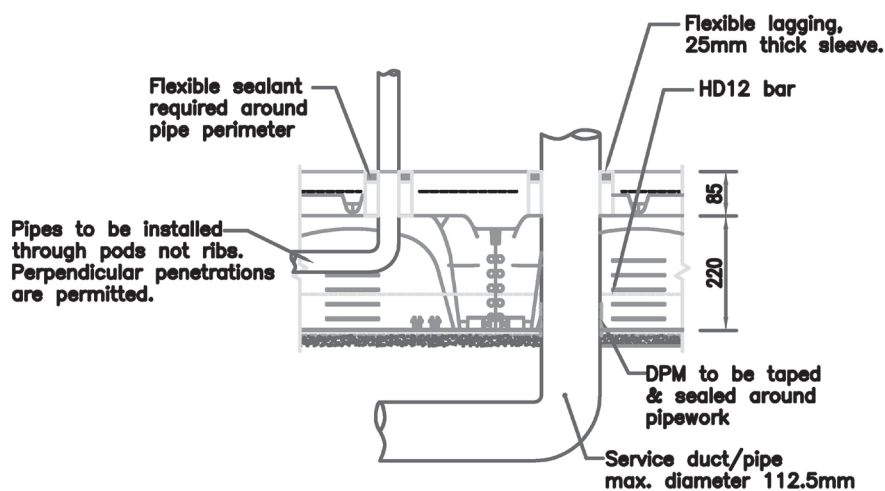


FIGURE 27 – Qpod vertical pipe penetrations

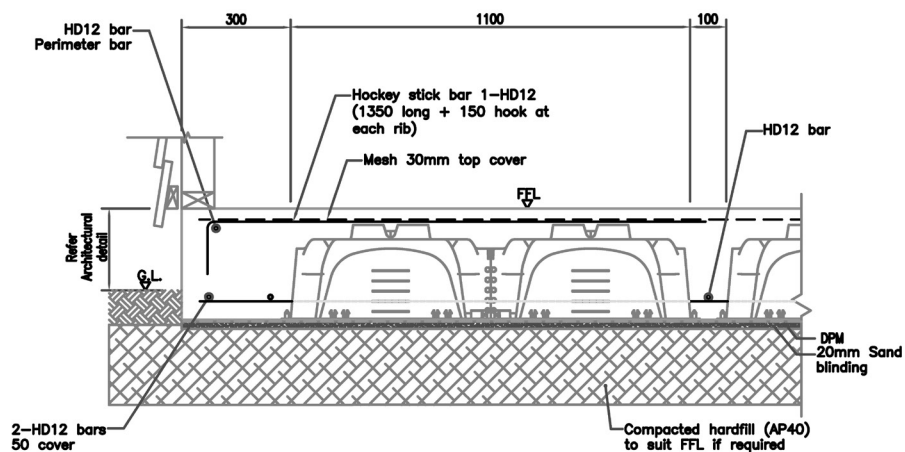


FIGURE 28 - Qpod light cladding perimeter detail

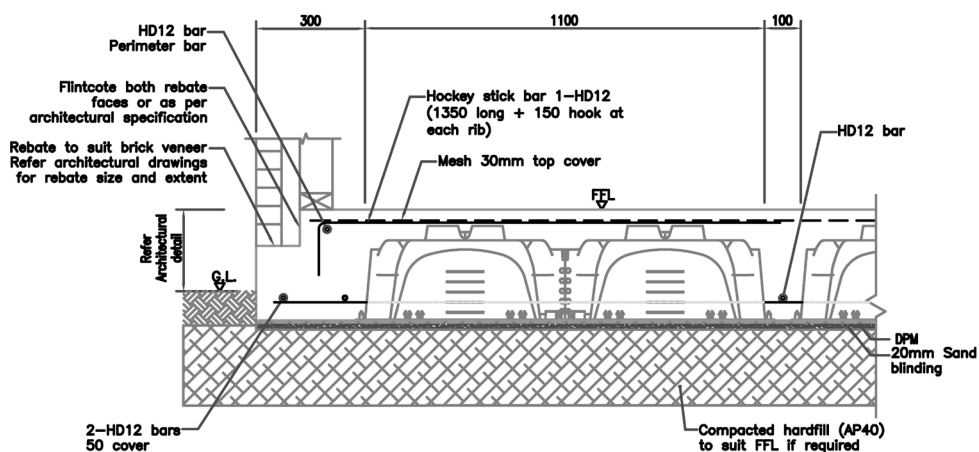


FIGURE 29 - Qpod brick cladding perimeter detail

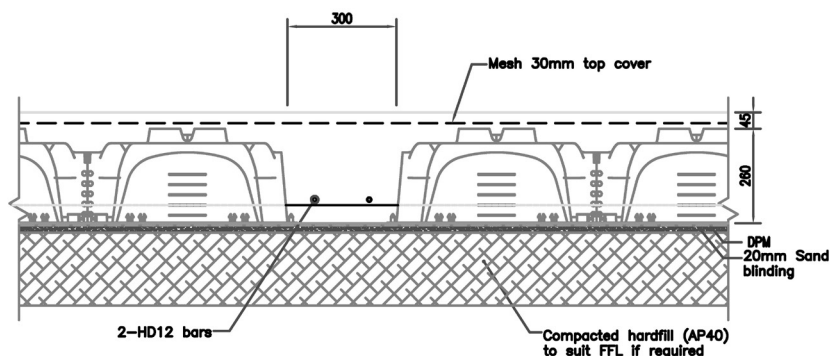


FIGURE 30 - Qpod internal loadbearing wall or slab thickening

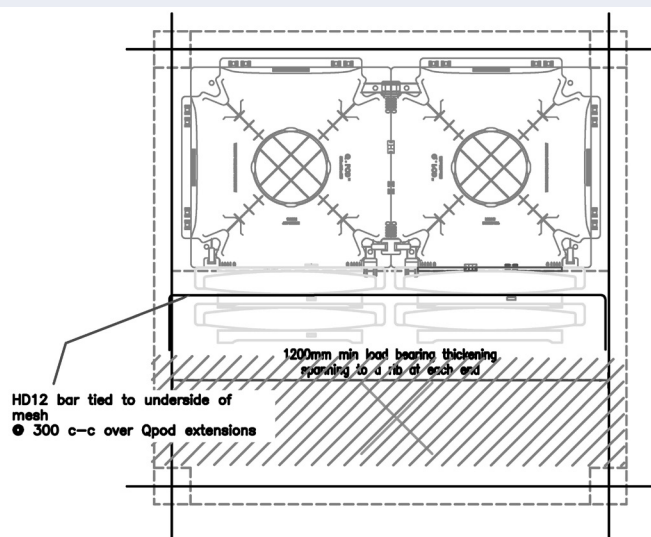


FIGURE 31 - Qpod internal point load - slab thickening

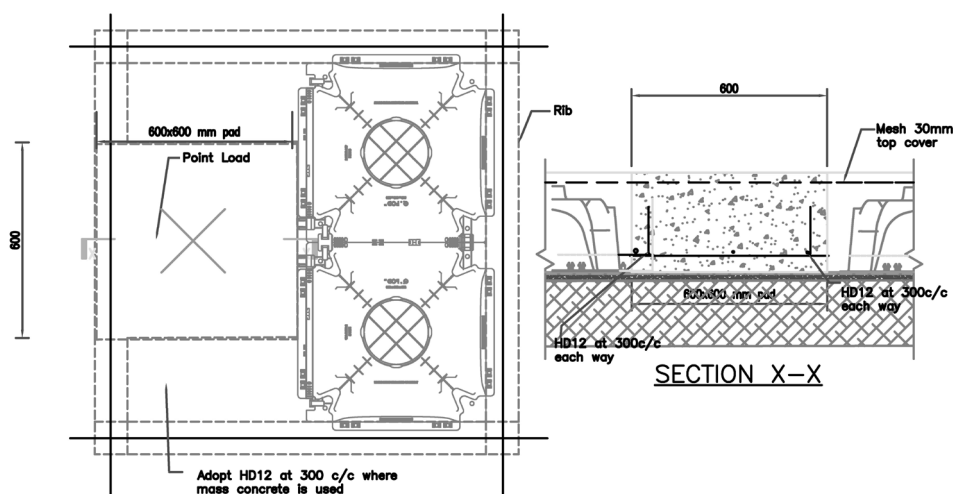


FIGURE 31b - Qpod internal point load - pad footing

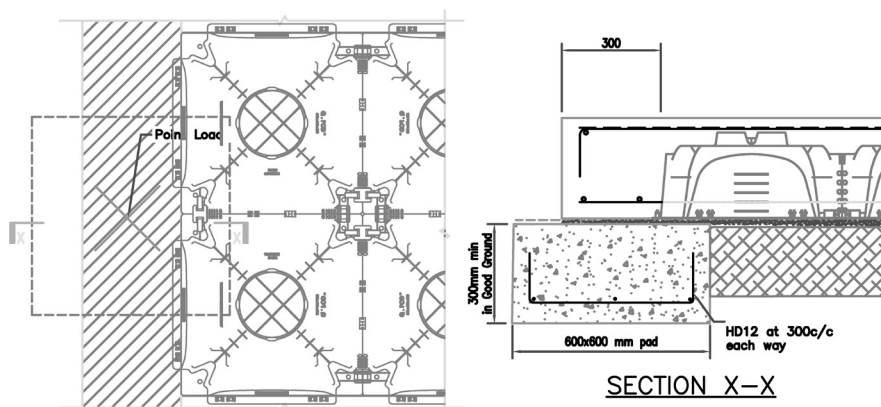
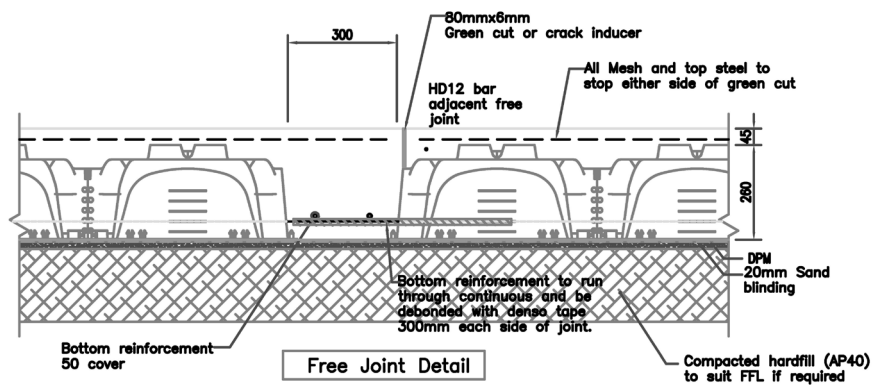


FIGURE 32 - Qpod perimeter point load - pad footing



Floor coverings and cladding crossing this joint should be detailed appropriately as per product specifications.

FREE JOINT DETAIL

FIGURE 33 - Qpod free joint detail

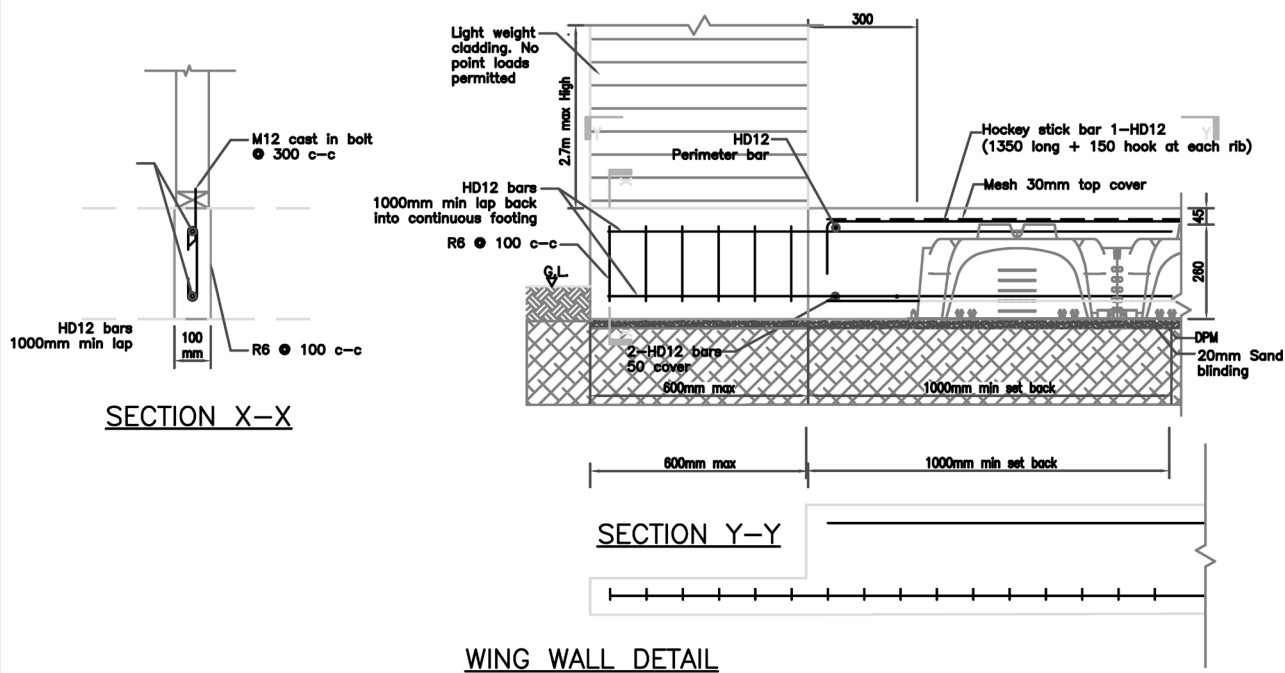


FIGURE 34 - Qpod wingwall detail

7.0 - INSULATED SLABS

The R value required is dependent on the climate zone, whether there is in slab heating built into the foundations and the area to perimeter ratio. The designer shall verify the foundation R value compliance with H1/AS1&AS2.

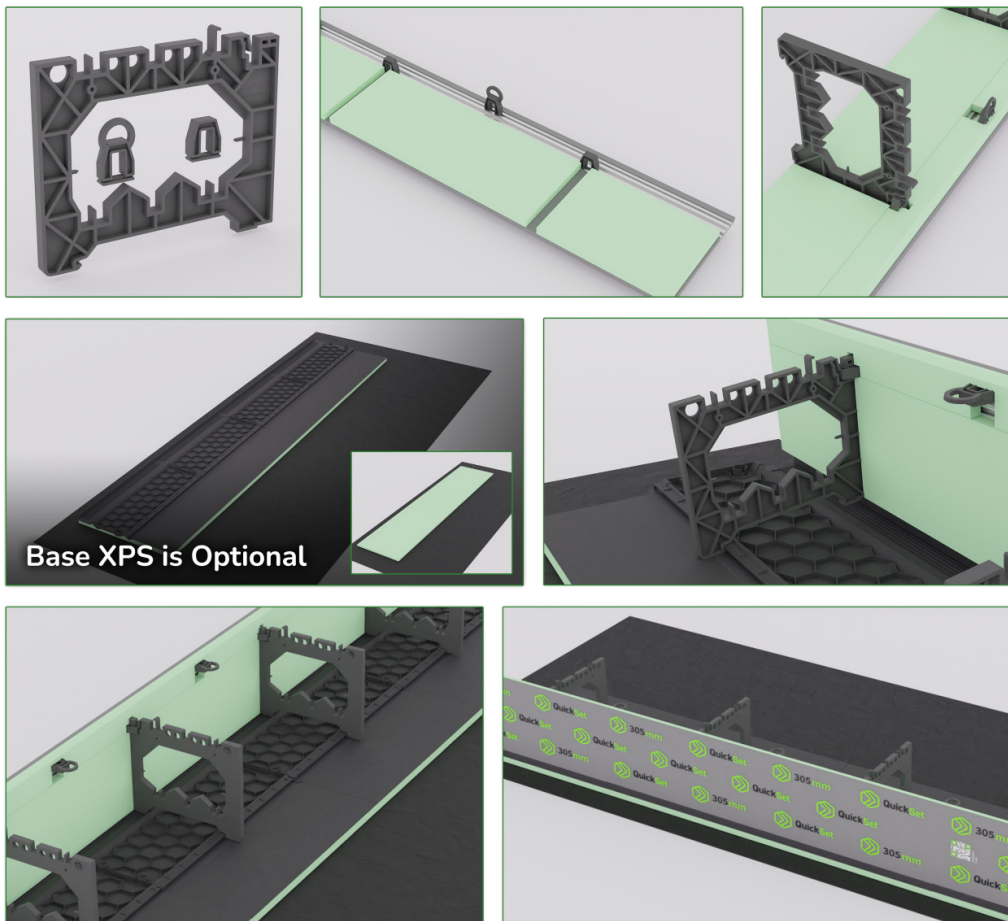
The R-value is mainly dependent on the area to perimeter ratio of the foundation the edge of the foundation around the perimeter of the building is where most of the heat is lost. Insulating the exposed perimeter edge will achieve the best results relative to cost in comparison to underslab insulation. Underslab insulation (without edge insulation) can be used for SuperSlab providing the insulation is VH grade and 50mm thick (max). In colder climates edge and underslab insulation is likely to be required to achieve compliance with H1/AS1&AS2.

SuperSlab+ has been designed using the QuickSet system, refer to tables 3 and 4 below for the building types compatible with SuperSlab+. The designer shall verify the R value of the foundation to ensure it meets the minimum NZBC requirements. Refer to www.QuickSet.co.nz or www.alliedconcrete.co.nz for further information on how to calculate the thermal performance of SuperSlab+.

7.1 SuperSlab+

The QuickSet perimeter edge form work (16mm PVC foam board) is not considered to contribute to the vertical strength of the foundations. 100mm down from the slab surface, 20mm insulation is built into the edge formwork and can also be extended under the slab for a fully insulated slab. The insulation and boxing system creates an overhang, as a result edge loads are limited by the framing size and building cladding type as per the below.

SuperSlab+ can be used when complying with table 3 and 4 below for the selected wall framing (90mm/140mm) respectably. SuperSlab+ shall be installed as per the QuickSet manufacturers installation manual and details as per the below. The wall framing is permitted to overhang the foundations by a maximum of 6mm (measured from the boxing). Brick veneer shall not have any overhang. Hold downs anchors are to be installed with edge distances as indicate by the QuickSet detailing below and shall maintain a minimum edge distance of 56mm from the boxing (40mm from the concrete).



90mm Wall Framing:

The SuperSlab+ system is suitable for perimeter loading for building types A, B and D as per table 1 of the SuperSlab Manual when 90mm wall framing is adopted.

Table 3

Building type	Number of levels ¹	Level 1 Wall cladding ²	Upper storey cladding	Roof Type ³	Minimum bearing capacities and penetrometer blows ⁴	Within scope of this document
A	Single	Light	—	Light	150 kPa	Yes
B	Single	Heavy	—	Light	200 kPa	Yes
C	Single	Heavy	—	Heavy	200 kPa	No, Specific Design
D	Two Storey	Light	Light	Light	200 kPa	Yes
E	Two Storey	Heavy	Light	Light	300 kPa	No, Specific Design
F	Two Storey	Heavy	Light	Heavy	300 kPa	No, Specific Design
G	Two Storey	Heavy	Heavy	Heavy	300 kPa	No, Specific Design

- *Refer section 3 for SuperSlab scope of use
- Point loads larger than 25kN will require specific design.

140mm Wall Framing:

Upgrading the wall framing to 140mm significantly increases the bearing capacity of the timber and edge distance available for the hold down bolts as such heavier building weights are permitted – Types A-E as per the below where 140mm framing is adopted.

Table 4

Building type	Number of levels ¹	Level 1 Wall cladding ²	Upper storey cladding	Roof Type ³	Minimum bearing capacities and penetrometer blows ⁴	Within scope of this document
A	Single	Light	—	Light	150 kPa	Yes
B	Single	Heavy	—	Light	200 kPa	Yes
C	Single	Heavy	—	Heavy	200 kPa	Yes
D	Two Storey	Light	Light	Light	200 kPa	Yes
E	Two Storey	Heavy	Light	Light	300 kPa	Yes
F	Two Storey	Heavy	Light	Heavy	300 kPa	No, Specific Design
G	Two Storey	Heavy	Heavy	Heavy	300 kPa	No, Specific Design

- *Refer section 3 for SuperSlab scope of use
- Point loads larger than 25kN will require specific design.

Hold down fixings

The hold fixings adopted need to meet proprietary requirements as defined by NZS3604 (7.5.12.3 refer below) and the BRANZ technical paper P21 (15kN characteristic uplift) for wall bracing elements where needed. Should specific wall bracing products require higher uplift capacities that foundation is beyond the scope of this document and shall require specific design.

7.5.12.3

For *external walls*, proprietary anchors shall have a minimum *capacity* when tested in accordance with 2.4.7 as follows:

- (a) Horizontal *loads* in the plane of the *wall* 2kN;
- (b) Horizontal *loads* out of the plane of the *wall* 3kN;
- (c) Vertical *loads* in axial tension of the fastener 7kN.

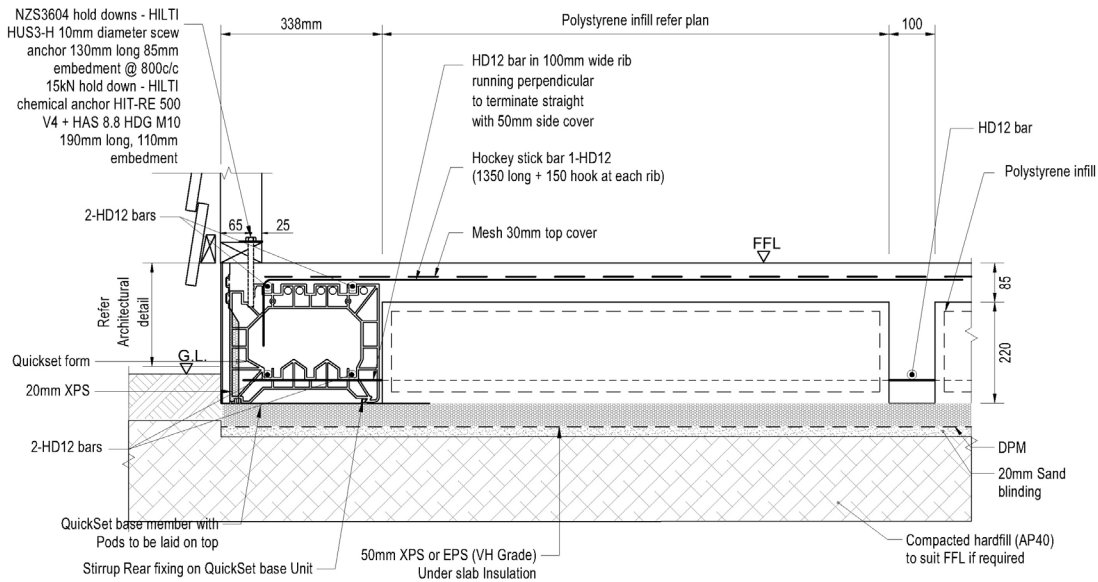
Hilti have carried out verification of the hold downs to meet the NZS3604 loading requirements.

Standard bottom plate fixing: HILTI screw anchor – HUS3-H 10mm diameter (130mm long), 85mm min embedment @ 800c/c – installed as per manufacturers specifications.

15kN brace wall: HILTI chemical anchor – HIT-RE 500 V4 + HAS 8.8HDG M10 (190mm long), 110mm minimum embedment – installed as per manufacturers specifications.

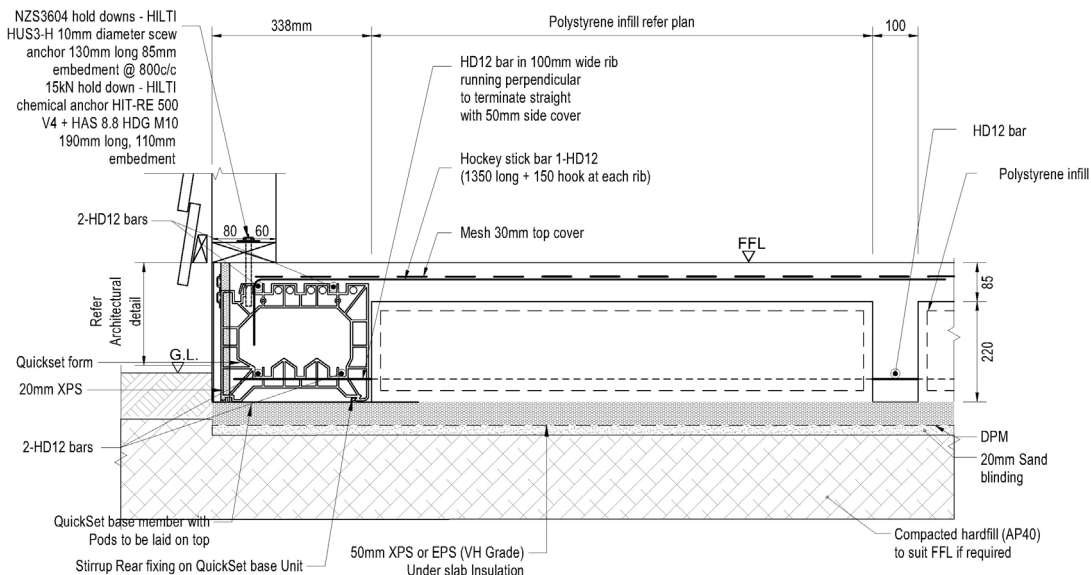
7.2 QuickSet Standard detailing

SuperSlab+ can be specified with QuickSet as edge insulation alone or combined with base insulation for a fully insulated foundation. The SuperSlab CodeMark includes both 25mm and 50mm base insulation options (50mm seen here). Thicker base insulation will require specific design.



**QUICKSET TAPER 305/50
WITH POLY POD**

DETAIL 60



**QUICKSET ULTRA 305/50
WITH POLY POD**

DETAIL 61

FIGURE 35 - QuickSet Taper/Ultra (for standard cladding)

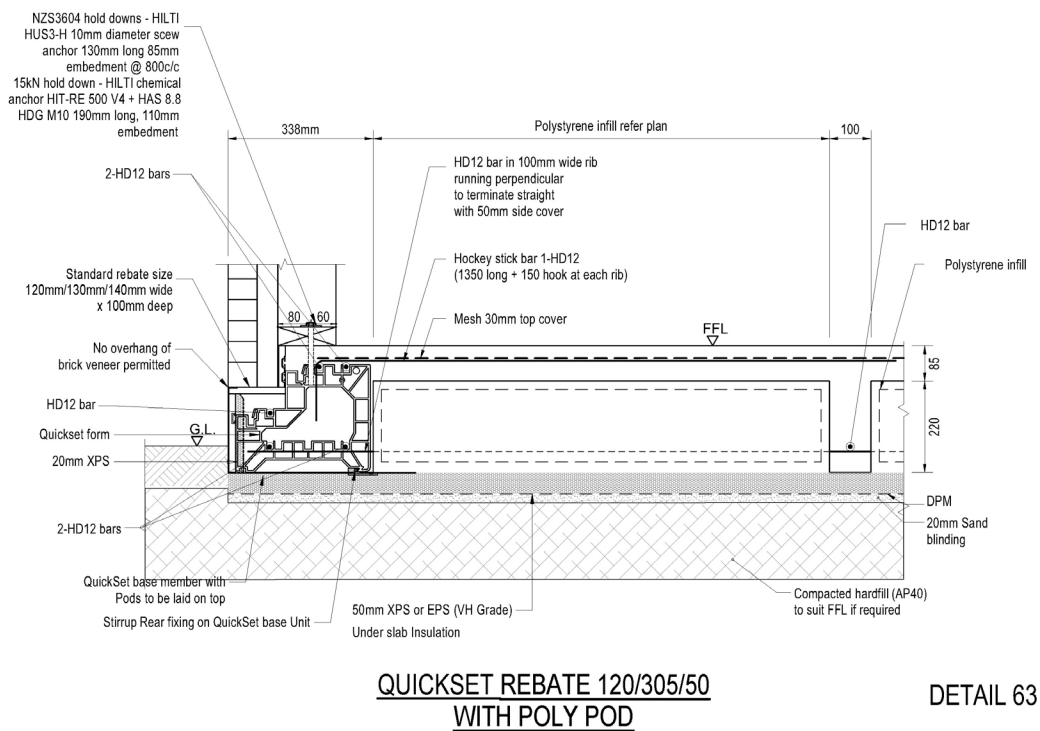
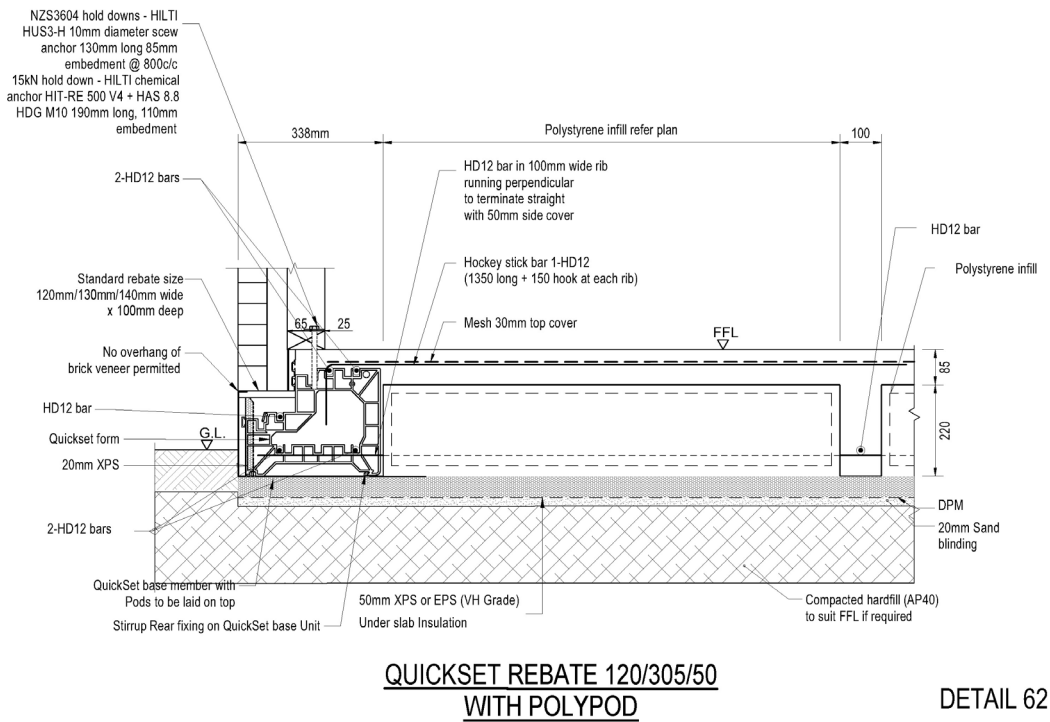
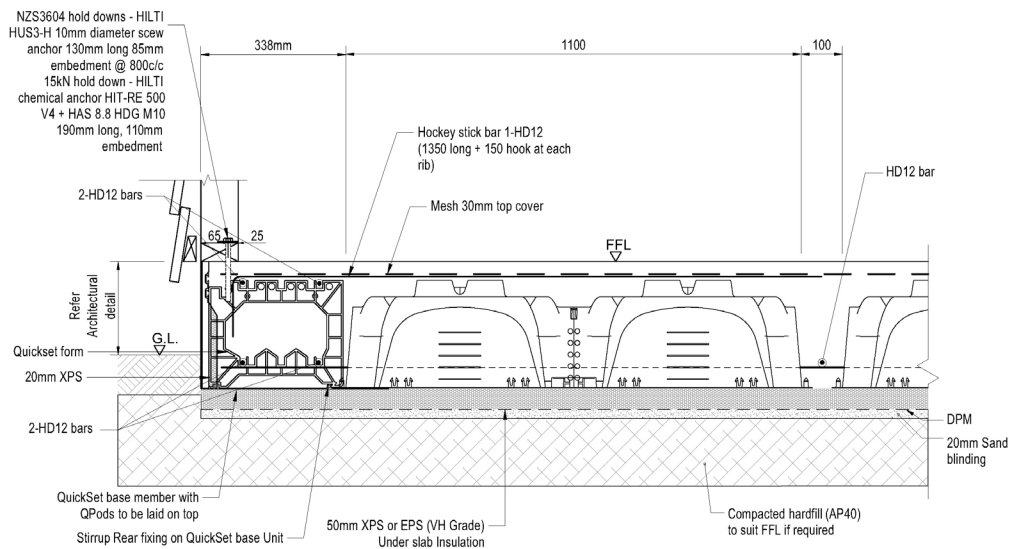
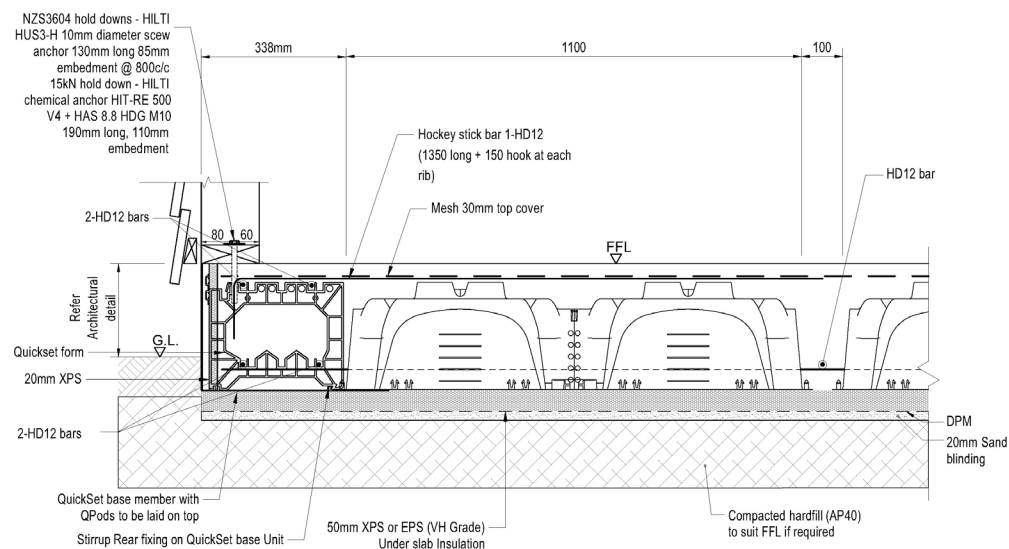


FIGURE 36 - QuickSet Rebate (for brick cladding)



**QUICKSET TAPER 305/50
WITH QPOD**

DETAIL 64



**QUICKSET ULTRA 305/50
WITH QPOD**

DETAIL 65

FIGURE 37 - QuickSet Taper/Ultra (for standard cladding)

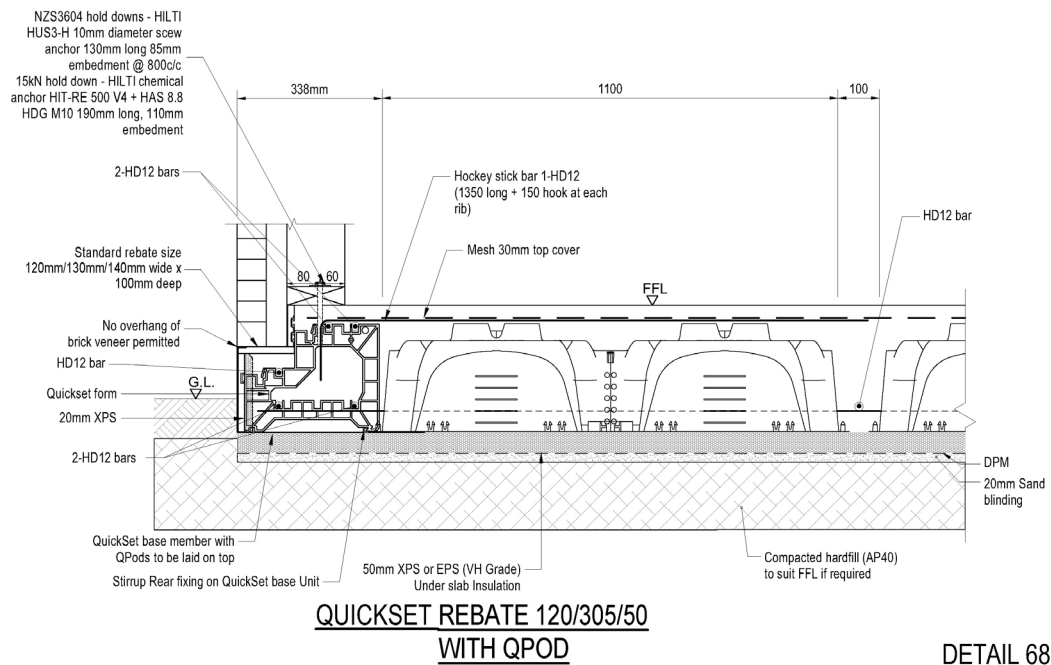
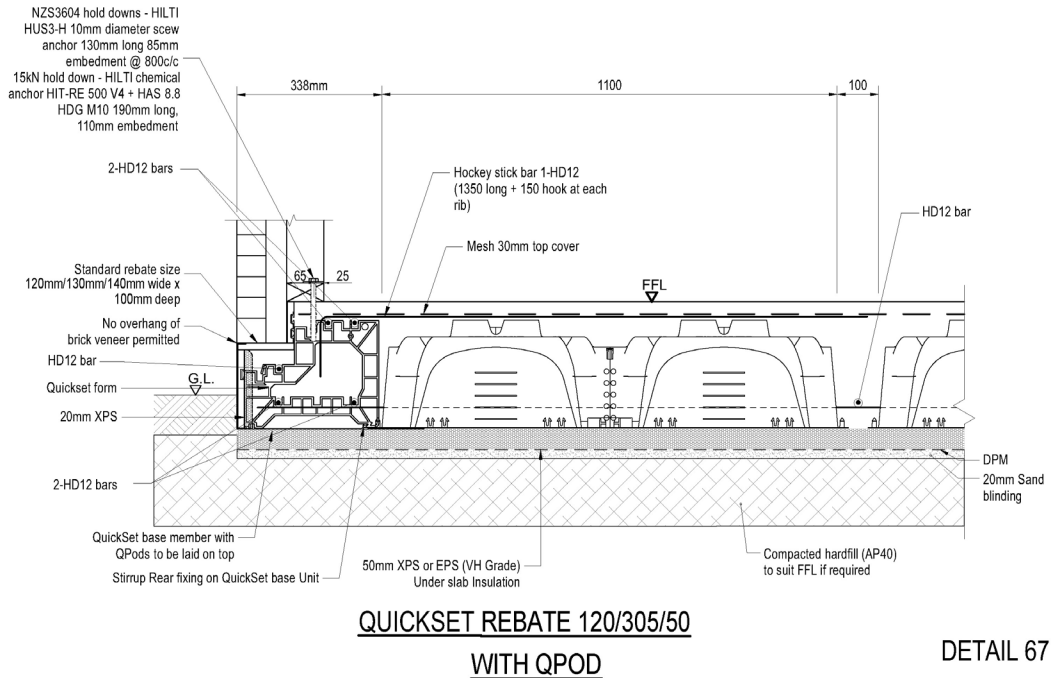
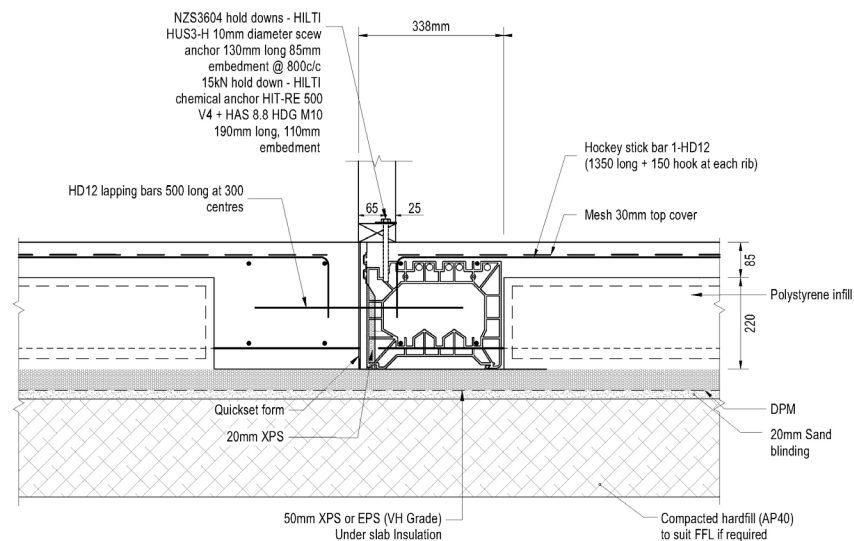
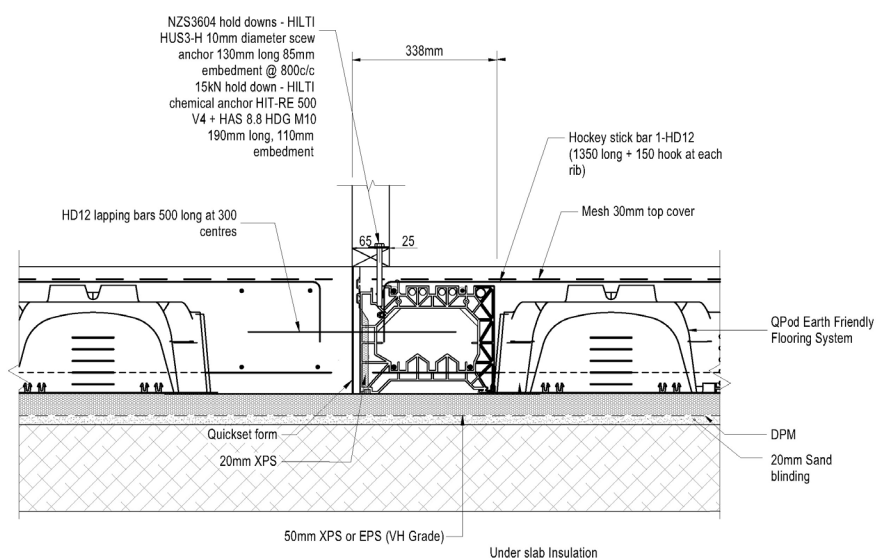


FIGURE 38 - QuickSet Rebate (for brick cladding)



QUICKSET TAPER 305/50
THERMAL BREAK
WITH POLY POD

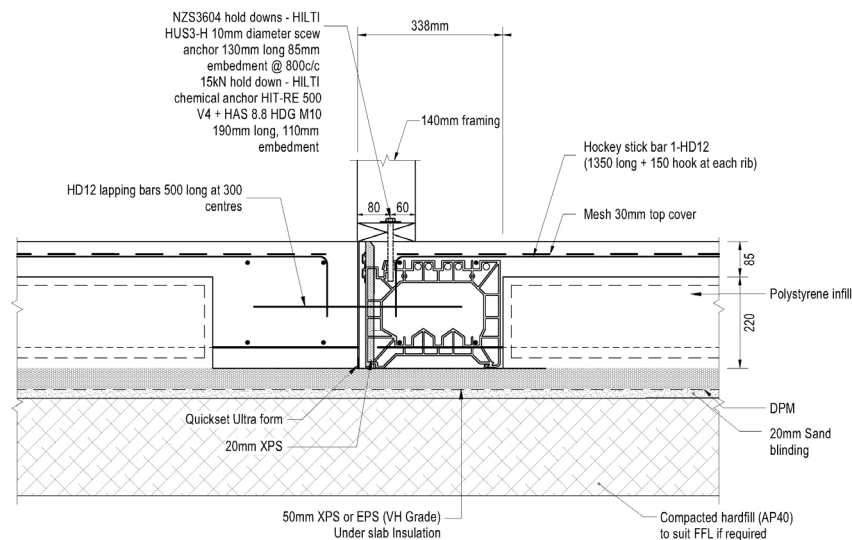
DETAIL 87



QUICKSET TAPER 305/50
THERMAL BREAK
WITH QPOD

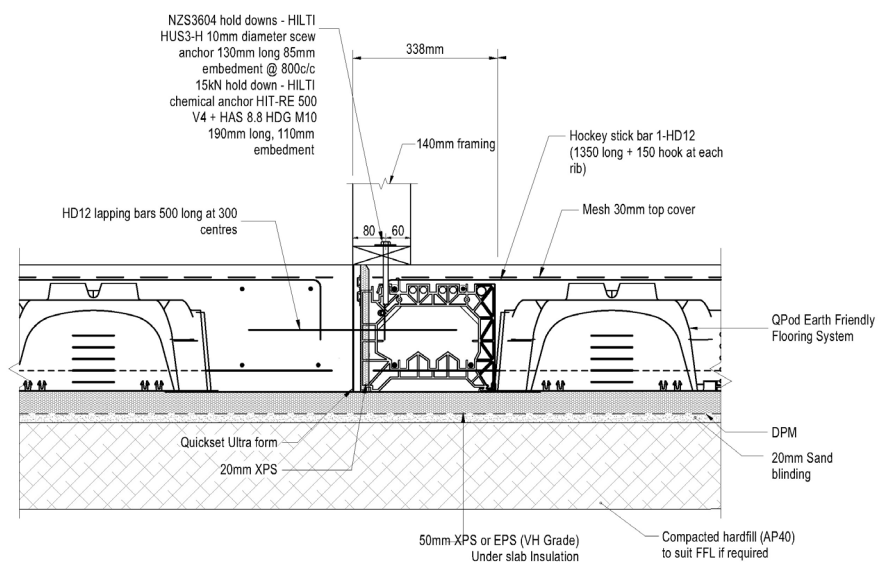
DETAIL 88

FIGURE 39 - QuickSet Taper Thermal Break



QUICKSET ULTRA 305/50
THERMAL BREAK
WITH POLY POD

DETAIL 89



QUICKSET ULTRA 305/50
THERMAL BREAK
WITH QPOD

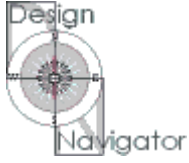
DETAIL 90

FIGURE 40 - QuickSet Ultra Thermal Break

8.0 - CHECK LIST







Design Navigator H1 Compliance Report

Project Summary

H1 Report created by:	Nomolos Architecture
Project Name:	860839 Lamb and Alves Dwelling
Client:	GJ Gardner Homes
Lot No:	2 Branthwaite Drive
Comment:	
Project Id:	178236
Report Date:	12/12/2023

Compliance Result

This report shows compliance of the design with Clause H1 AS1 Fifth Edition from 4 August 2022 and the R-value targets of Clause E3 Second edition Amendment 7 from 5 November 2020.

This building **complies with Clause H1 AS1 Edition 5 Amendment 1 for all housing, and buildings up to 300m².**

In order to comply with Clause H1 the building needs to comply with at least one of the three compliance paths (Schedule, Calculation or Modelling Method). This design complies with the Schedule Method and the Calculation Method.

The building **complies** with Clause E3 Second Edition Amendment 7 from 5 November 2020.

* Note that all floor, wall and roof R-values are rounded to 1 decimal point, window and skylight R-values are rounded to 2 decimal points.

H1 Compliance Details

H1 AS1 Edition 5 - Schedule Method Compliance

The use of the Schedule Method is **permitted**.

Criteria	Proposed Value	
Glazing < 30%	21.8%	✓
ESW Glazing < 30%	14.3%	✓
Skylights < 1.5m ² or 1.5%	0m ² (0%)	✓
Opaque Doors < 6m ² or 6%	0m ² (0%)	✓

In order to comply the R-values for all the construction elements must be the same or larger than the permitted minimum R-values. This design **complies** with the Schedule Method of Clause H1.

Element Type	Minimum permitted R-value	Minimum proposed R-value	
Roof	6.6		✓
Ceiling Perimeter	3.3	7.3	✓
Wall	2.0	2.1	✓
Slab Floor	1.6	2.0	✓
other Floor	3.0		✓
Window and Door	0.50	0.50	✓
Skylight	0.62		✓

H1 AS1 Edition 5 - Calculation Method Compliance

The use of the Calculation Method is **permitted** because the vertical glazing area is **smaller** than 40% of the gross wall area.

In order to comply the heat loss of the proposed building must not be larger than the reference building heat loss AND all component R-values must be at least 50% of the R-values shown in the '50% Rule' table below. This design **complies** with the H1 Calculation Method.

HeatLoss:

Maximum permitted Heat Loss	Proposed Building Heat Loss	
237 W/°C	195 W/°C	✓

The reference building element areas and R-values are shown below. The last column shows the element areas of the proposed building.

Element	Reference Building Area	Reference Building R-value	Proposed Building Area
Roof	104.6 m ²	6.6	104.6 m ²
Wall	73.7 m ²	2.0	82.3 m ²
Slab Floor	194.0 m ²	1.6	194.0 m ²
Other Floor	0.0 m ²	3.0	0.0 m ²
Window and Door	31.6 m ²	0.50	22.9 m ²
Skylight	0.0 m ²	-	0.0 m ²

Minimum R-values ("50% rule"):

Element Type	Minimum permitted R-value	Minimum proposed R-value	
Roof	3.3	7.3	✓
Wall	1.0	2.1	✓
Slab Floor	0.8	2.0	✓
other Floor	1.5		✓

Lighting Power Density Compliance

Residential buildings are not required to comply with the lighting power density targets.

Compliance with Clause E3

This building **complies** with Clause E3 Second Edition Amendment 7 from November 2020.

Building Element	Minimum permitted R-value	Minimum project R-value	
Light timber frame wall or other framed wall constructions with cavities	1.5	2.1	✓
Single skin normal weight masonry based wall construction without a cavity	0.6		
Solid timber wall systems no less than 60 mm thick	0.6		
Roof or ceilings of any construction	1.5	7.3	✓

Design Details

Climate

Location Selwyn District

Climate Zone 5

Building Dimensions

Total Floor Area 194.0 m²

Slab Floor Area 194.0 m²

Other Floor Area 0.0 m²

Gross Wall Area 105.2 m²

Net Wall Area 82.3 m²

North Wall Area 26.0 m²

East, South and West Wall Area 56.3 m²

Window Area 22.9 m²

North Window Area 13.5 m²

East, South and West Window Area 9.4 m²

Opaque Door Area 0.0 m²

Gross Roof Area 104.6 m²

Net Roof Area 104.6 m²

Skylight Area 0.0 m²

Glazing Areas

Total Window Percentage 21.8 %

Total Windows over 30% no

Total Windows over 40% no

East, South and West Window Percentage 14.3 %

East, South and West Windows over 30% no

Skylight Area over 1.5m² no

Skylight Percentage 0.0 %

Skylight Area over 1.5% no

Opaque Door Area over 6m² no

Opaque Door Percentage 0.0 %

Opaque Door Area over 6% no

Heat Loss Details

	ID	Orient.	Width	Height	Gross Area	Net Area	R	Heat Loss	Type	Heated
<u>Floors</u>										
	F1	Slab			193.9	193.9	2.02	96.0	slab	
<u>Walls</u>										
	W1	Brick	N	9.56	2.40	22.9	17.9	2.11	8.5	
	Wi1-1	W125		0.60	1.80		1.1	0.50	2.2	
	Wi1-2	W92		1.50	1.30		2.0	0.50	3.9	
	Wi1-3	D04		0.93	2.13		2.0	0.50	4.0	
	W2	Brick	S	12.96	2.40	31.1	25.3	2.11	12.0	
	Wi2-1	W92		1.50	1.30		2.0	0.50	3.9	
	Wi2-2	W43		0.60	0.90		0.5	0.50	1.1	
	Wi2-3	W52		1.50	0.90		1.4	0.50	2.7	
	Wi2-4	W92		1.50	1.30		2.0	0.50	3.9	
	W3	Brick	W	8.96	2.40	21.5	19.6	2.11	9.3	
	Wi3-1	W92		1.50	1.30		2.0	0.50	3.9	
	W4	Linea	N	3.40	2.40	8.2	2.4	2.12	1.1	
	Wi4-1	D27		2.70	2.13		5.8	0.50	11.5	
	W5	Linea	N	3.48	2.40	8.4	5.7	2.12	2.7	
	Wi5-1	W136		1.50	1.80		2.7	0.50	5.4	
	W6	Int	E	5.48	2.40	13.2	11.5	2.12	5.4	
	Wi6-1	Door		0.83	2.04		1.7	0.50	3.4	
<u>Roofs</u>										
	R1	Roof			104.5	104.5	7.25	14.4	perimeter	
<u>Total Heat Loss</u>								195.2		

* The floor and roof heatlosses are not included in the heatloss equation for commercial buildings (H1/AS2).

Floor Construction Details

Name: Waffle Slab (Dwelling) 2.02 m²°C/W

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

QuickSet Slab Insulation (H1 Edition 5)
- QuickSet Thermal Performance

Slab floor area [m²]: 104.55

Area Perimeter Ratio: 2.38

Perimeter:

Edge Detail	Length [m]*	Insulation*
insulated masonry veneer	31.48	QuickSet Rebate 120/305/25 with Polypod ▼
insulated other wall	12.36	QuickSet Taper 305/25 with Polypod ▼
uninsulated edge		

* required data. If empty the perimeter will be ignored.

Wall Construction Details

Name: Brick Veneer 2.11 m²°C/W

Type: Wall: Timber Frame with vented Cavity

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 : 2.4
	still Airgap: none ▼ R-value: 0.00
Wall Lining : generic - gypsum Plasterboard 10mm ▼ R-value: 0.04	
internal surface 0.09	

Name: Internal Walls 2.17 m²°C/W

Type: Wall: Timber Frame (direct fixed Cladding)

external surface 0.03	
Cladding :	generic - None (facing inside air, i.e. internal bulkhead into roof space) ▼
R-value: 0.09	
Air Barrier :	generic - gypsum Plaster Board 10mm ▼
R-value: 0.04	
Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 1200mm ▼	
Wall Frame Area: 12.7%	Cavity Area: 87.3%
Framing : R-value: 0.75	Insulation : 2.4
	still Airgap: none ▼
	R-value: 0.00
Wall Lining :	generic - gypsum Plasterboard 10mm ▼
R-value: 0.04	
internal surface 0.09	

Name: Linea 2.12 m²°C/W

Type: Wall: Timber Frame with vented Cavity

external surface 0.03	
Cladding :	James Hardie Linea weatherboard ▼
R-value: 0.08	
Air Barrier :	generic - Building paper ▼
R-value: 0.01	
Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm ▼	
Wall Frame Area: 14.4%	Cavity Area: 85.6%
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : R-value: 0.75	Insulation : 2.4
	still Airgap: none ▼
	R-value: 0.00
Wall Lining :	generic - gypsum Plasterboard 10mm ▼
R-value: 0.04	
internal surface 0.09	

Roof Construction Details

Name:

Trussed, Long run Iron

7.25 m²C/W

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

external surface 0.03

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

Insulation : 3.6

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 10mm
R-value: 0.04

internal surface 0.09

Non-IC-rated recessed downlights

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

Glazing Details

Name:

Double Glazing

0.50 m²C/W

Type: Thermally Broken Aluminium Frame

Glass Type : Double Pane: Low E4/Clear - Argon - Thermally improved Spacer (Ug 1.10)
R-value: 0.50
Solar Heat Gain Coefficient (SHGC):

| Quick Installation | Tamper Resistant |

Product Description

For fixing to concrete, brick and concrete blockwork.



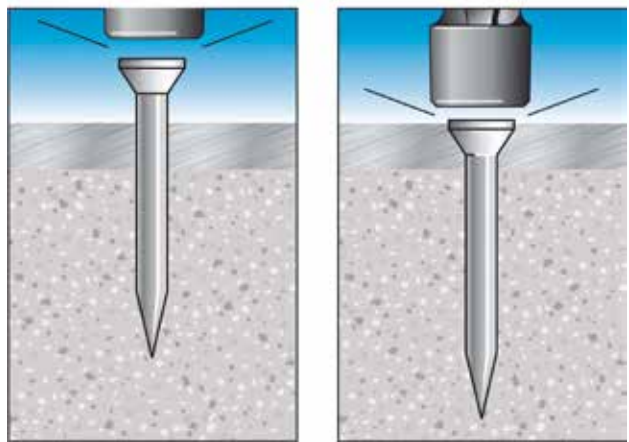
Features and Benefits

- High strength and ductile - will not easily break
- Available pre-assembled with washers to improve pullover strength
- Zinc electroplated with chromate conversion coating
- Carbon Steel

Principal Applications

- Formwork boards
- Timber batten
- Sheet metal signs
- Light gauge steelwork fixing to concrete

Installation



Concrete Nails

Anchor Size, d _a	Length, L (mm)	d _a Head Ø	Shank Style	Order No. Washer		Order No. No Washer	
M2.4	25	4.5	Plain	CW425		CD425	
	30	4.5	Plain	CW430		CD430	
	40	4.5	Plain	CW440		CD440	
M3.2	40	5.0	Plain	-		CD540	
M3.8	50	6.0	Plain	-		CF650	
	60	6.0	Plain	-		CF660	
	75	6.0	Plain	-		CF675	
	100	6.0	Plain	-		CF699	
Road Survey Nails							
M6.5	70	14.0	Plain	-		CR970	

Coating requirements for Prolam products that are exposed or in-ground.

All Prolam products must be coated correctly. This is essential to ensure ongoing performance (durability) as well as maintaining the appearance, where appearance is important.

Compliance with all Prolam requirements, including coating requirements, is a condition of our warranty.

Instructions

These instructions apply where the product is exposed as defined in Figure 4.3(b) of NZS 3604:2011 below.

Mandatory requirements

For Prolam products that will be exposed to moisture:

- All exposed surfaces must be fully coated within 14 days of installation.
- All exposed surfaces, cut ends and joints must be sealed with a good quality stain or alkyd primer. Allow to dry as per manufacturer/supplier instructions.

For paint:

- Apply a single enamel undercoat and then apply two full topcoats compatible with the undercoat.
- Painting is to be carried out in accordance with best practice: 1 x undercoat and 2 x topcoats to achieve a total DFT (dry film thickness) of 80 microns (comprised of undercoat DFT 30 microns, topcoat DFT 25 microns/coat).
- Prowood recommends only light-coloured paints, but where a dark colour is selected it must have a light reflectance value (LRV) of greater than 45 %.
- Recoating requirements are in accordance with the manufacturer/supplier instructions.

For stain:

- Apply three coats of premium oil-based stain to all exposed surfaces including cut ends and joints.
- Prowood recommends only light coloured stains.
- Prowood recommends CD50X or Dryden's Penetrating Wood Oil.
- Recoating requirements are in accordance with the manufacturer/supplier instructions.

For Prolam posts that are to be installed in-ground:

- The in-ground portion of the Prolam post must have a temporary moisture-resistant coating to ensure posts do not absorb moisture prior to the concrete curing. Painting as detailed above is recommended.

Optional requirements

For Prolam products where maintenance of the appearance applies:

- Fill and sand any damage e.g., depressions, temporary fixing holes or unintended transport damage.
- Holes or large imperfections can be filled with a timber plug using an exterior glue.
- Sand the product until the surface is smooth and completely free from dirt and dust.
- Coat as above.

For further information

For our handling and storage requirements and for our warranty refer to:

www.prolamnz.com/technical

MORE INFO

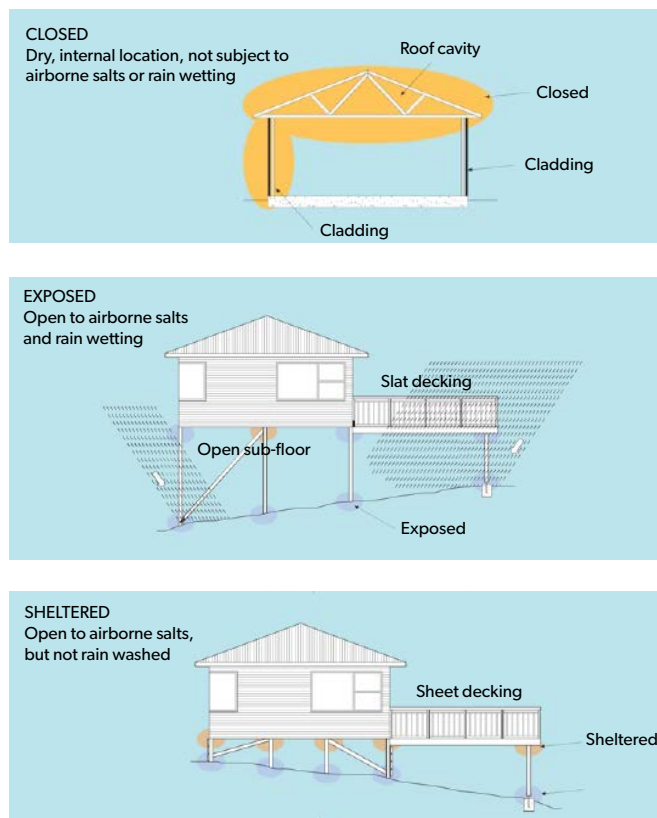


Fig 4.3(a & b) NZS 3604:2011

BOTTOM PLATE FIXING ANCHOR

COMPLIES WITH CLAUSE 7.5.12.2 NZS 3604:2011

- Eliminates the drilling of bottom plates
- Makes the fixing of timber easier and quicker
- Saves hand trowelling around cast-in anchor bolts or rods
- Use at 900mm centres max.

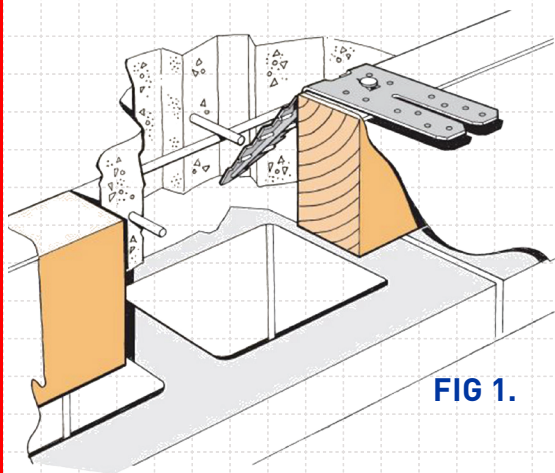


FIG 1.

Bottom Plate Fixing Anchors shall be fixed at 900mm centres max. to the boxing for concrete floor slabs, over a continuous vapour barrier. Each Fixing Anchor is nailed prior to concrete pour, and shall be left undisturbed until concrete has hardened ready for timber frames to be installed. Fig.1.

When timber framing is in place, the Fixing Anchors are folded up and over the bottom plate. Fig. 2.

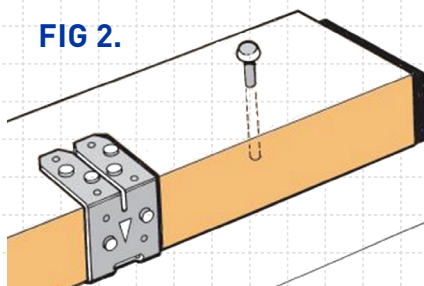
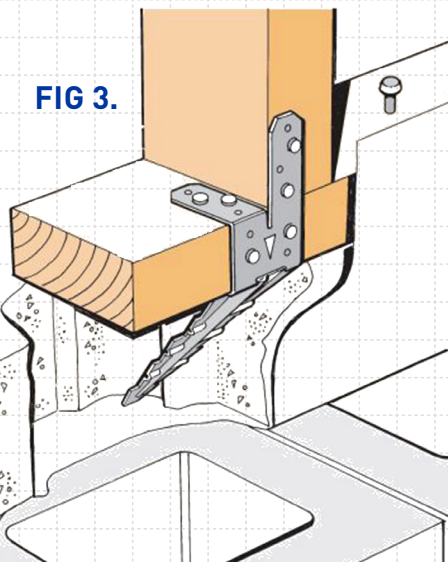


FIG 2.

3. Two LUMBERLOK Product Nails 30mm x 3.15 dia. shall then be driven into the side of the bottom plate and two additional nails applied through each of the lugs. Should a stud coincide with the position of a Fixing Anchor, nail as shown in Fig. 3.

4. A 75mm x 4 dia. concrete nail must be fixed adjacent to each Fixing Anchor, through the bottom plate into the concrete, at no less than 70mm from the concrete edge. When used as a Bracing Wall hold-down, a Fixing Anchor must be positioned within 150mm from the end of that wall. Bracing wall must not exceed 70 BU/m.

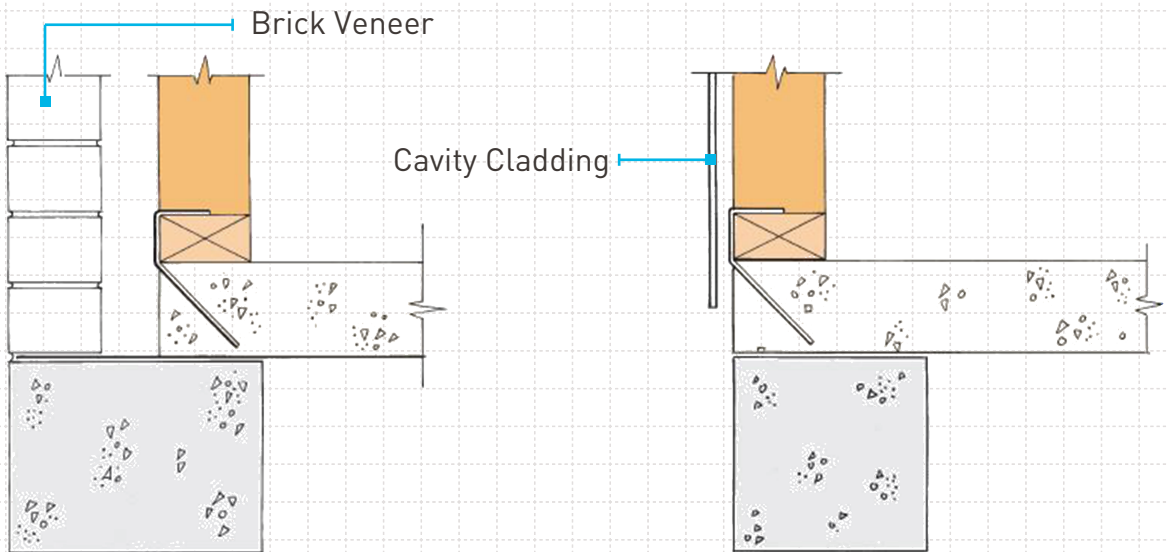
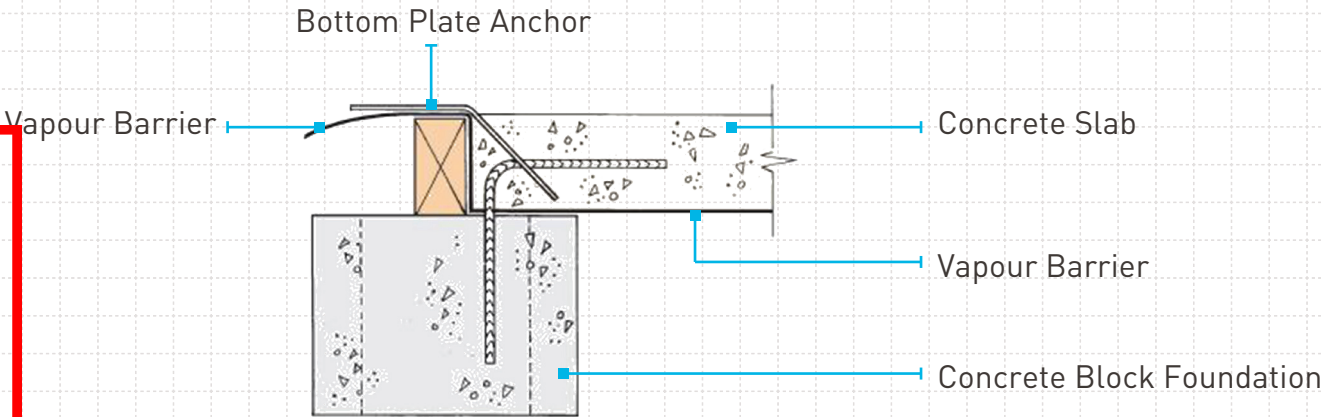
FIG 3.



AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND

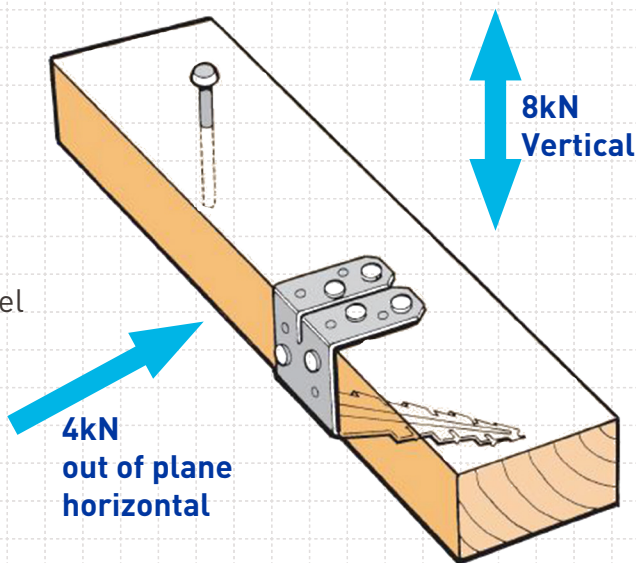


BOTTOM PLATE FIXING ANCHOR



DESIGN LOADS
Concrete compressive strength 20MPa min.

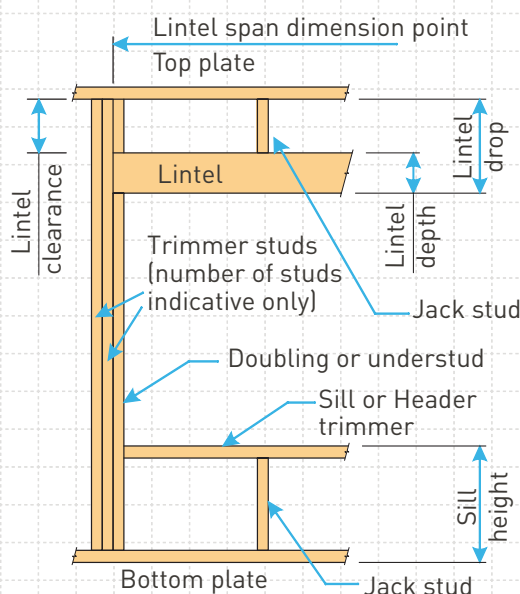
- Code:** BPA
- Material:** 0.95mm G300 Z450 Galvanised Steel
- Code:** SSBPA
- Material:** 0.9mm Stainless Steel 304-2B
- Packed:** 50 per carton



LUMBERLOK® LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

- ➔ All fixings are designed for vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20kPa
- ➔ Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist horizontal loads
- ➔ These fixings assume the correct choice of rafter/truss to top plate connections have been made
- ➔ All fixings assume bottom plate thickness of 45mm maximum. Note: Tylok options on timber species
- ➔ Wall framing arrangements under girder trusses are not covered in this schedule
- ➔ All timber selections are as per NZS 3604:2011



LINTEL SUPPORTING GIRDER TRUSSES

	Light Roof			Heavy Roof		
	Wind Zone			Wind Zone		
Roof tributary Area	Low, Medium, High	Very High	Extra High	Low, Medium, High	Very High	Extra High
8.6m ²	G	G	H	G	G	H
11.6m ²	G	H	H	G	G	H
12.1m ²	G	H	H	G	H	H
15.3m ²	H	H	-	G	H	H
19.1m ²	H	-	-	G	H	-
20.9m ²	H	-	-	H	H	-
21.8m ²	H	-	-	H	-	-
34.3m ²	-	-	-	H	-	-

NOTES:

1. Roof Tributary Area = approx. 1/2 x (total roof area on girder and rafter trusses supported by lintel)
2. Assumed girder truss is at mid-span or middle third span of lintel
3. Use similar fixings for both ends of lintel
4. All other cases require specific engineering design



LUMBERLOK® LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

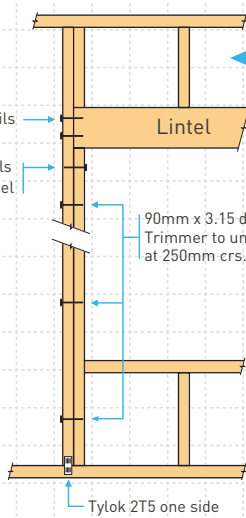
Lintel Span (m)	Loaded Dimension (m)	Light Roof					Heavy Roof				
		Wind Zone					Wind Zone				
		Low	Medium	High	Very High	Extra High	Low	Medium	High	Very High	Extra High
1.0	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	F	F	E	E	E	F	F
	4.0	E	F	F	F	G	E	E	F	F	F
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	E	F	F	G	G	E	E	F	F	G
1.2	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	E	F	F	F	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	F	F	G	G	H	E	E	F	G	G
1.5	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	F	F	F	G	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	F	F	G	G	H	E	E	F	G	G
	6.0	F	F	G	H	H	E	E	F	G	H
2.0	2.0	E	F	F	F	G	E	E	F	F	F
	3.0	E	F	F	G	G	E	E	F	F	G
	4.0	F	F	G	G	H	E	E	F	G	G
	5.0	F	F	G	H	H	E	E	F	G	H
	6.0	F	G	G	H	H	E	F	G	H	H
2.4	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	G	H	E	E	F	G	G
	4.0	F	F	G	H	H	E	E	F	G	H
	5.0	F	G	G	H	H	E	F	G	H	H
	6.0	F	G	H	H	-	E	F	G	H	H
3.0	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	H	H	E	E	F	G	H
	4.0	F	G	G	H	H	E	F	G	H	H
	5.0	F	G	H	H	-	E	F	G	H	H
	6.0	F	G	H	-	-	E	F	G	H	-
3.6	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	F	G	H	H	E	F	G	G	H
	4.0	F	G	H	H	-	E	F	G	H	H
	5.0	F	G	H	-	-	E	F	G	H	-
	6.0	G	H	H	-	-	E	F	H	-	-
4.2	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	H	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
4.5	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.4	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
4.8	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.2	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
5.1	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.5	F	G	H	-	-	E	F	G	H	-
	4.0	G	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
5.4	2.0	F	F	G	H	H	E	E	F	G	H
	2.8	F	G	H	H	-	E	F	G	H	H
	3.0	F	G	H	-	-	E	F	G	H	-
	4.0	G	H	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
5.4	6.0	G	H	-	-	-	E	G	H	-	-
	6.0	G	H	-	-	-	E	G	H	-	-

SDC - Approved Building Consent Document - BC231907 - Pg 122 of 446 - 21/03/2024 - helen.fowler

LUMBERLOK® LINTEL FIXING OPTIONS

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

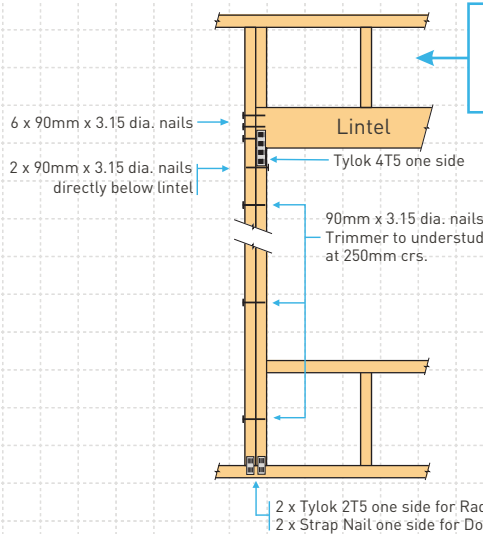
TYPE E 1.4kN



For fixing of jack studs refer to Jack Stud to Top Plate & Lintel Fixing brochure

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

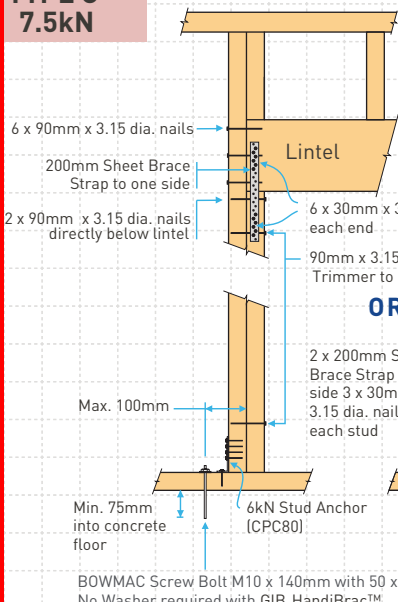
TYPE F 4.0kN



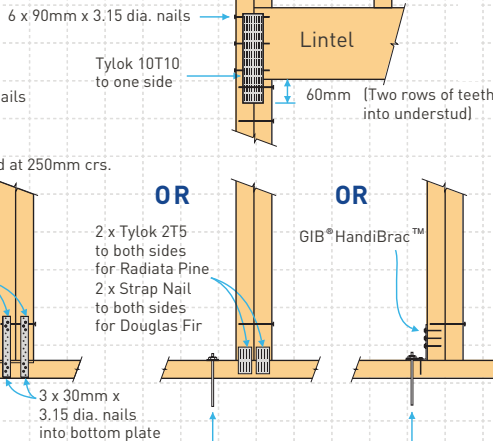
For fixing of jack studs refer to Jack Stud to Top Plate & Lintel Fixing brochure

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

TYPE G 7.5kN



OR



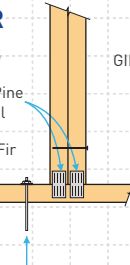
For fixing of jack studs refer to Jack Stud to Top Plate & Lintel Fixing brochure

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

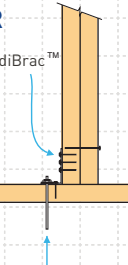
OR



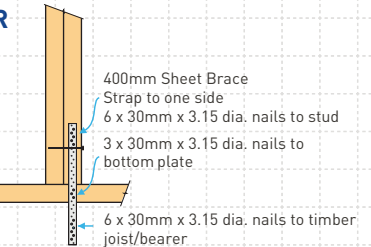
OR



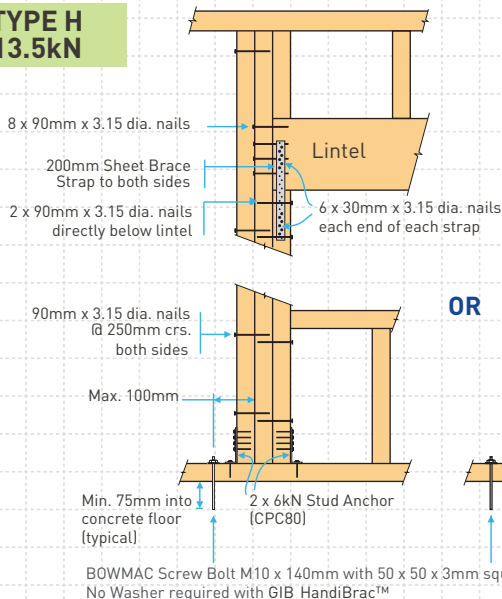
OR



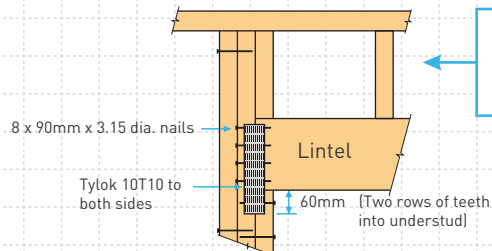
OR



TYPE H 13.5kN



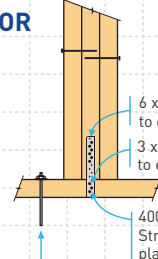
OR



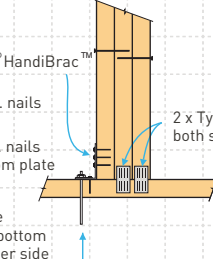
For fixing of jack studs refer to Jack Stud to Top Plate & Lintel Fixing brochure

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

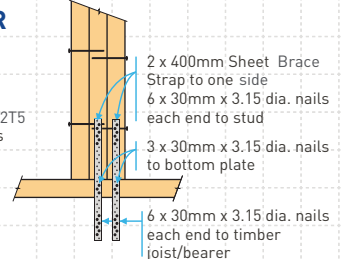
OR



OR



OR

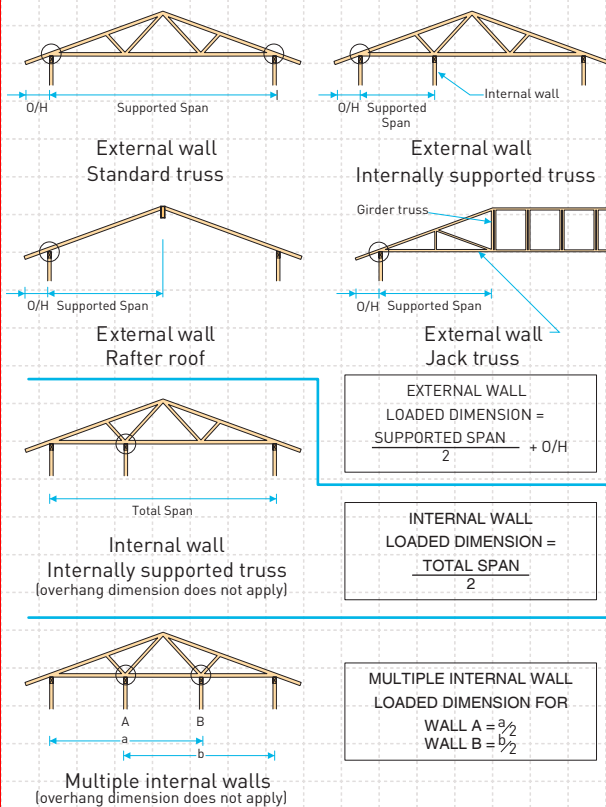


STUD TO TOP PLATE FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.18 NZS 3604:2011

- Fixings are designed to resist vertical loads only. Dead loads include roof weight and standard ceiling weight of .20kPa
- Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist lateral loads
- These fixings assume the correct choice of rafter/truss to top plate connections have been made
- For gable end walls where the adjacent rafter/truss is located within 1200mm and with a maximum verge overhang of 750mm, select stud to top plate fixing using a loaded dimension of 1.5m
- All fixings assume top plate thickness of 45mm maximum
- Wall framing arrangements under girder trusses are not covered in this schedule
- All timber selections are as per NZS 3604:2011

LOADED DIMENSION DEFINITION

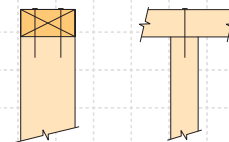


For Fixing Selection Chart refer chart on reverse page

FIXING OPTIONS

FIXING TYPE A 0.7kN

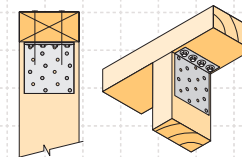
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



FIXING TYPE B 4.7kN

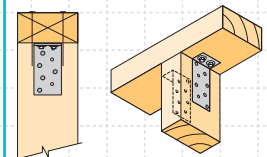
CHOOSE ANY OF THE 3 OPTIONS BELOW

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



Plus
LUMBERLOK
6kN Stud Anchor
(CPC80)

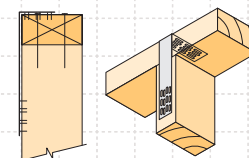
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
2 x LUMBERLOK
CPC40

Recommended for internal wall options to avoid lining issues

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



Plus
LUMBERLOK
Stud Strap
(one face only)

Note:

To calculate the number of B type fixings required, divide the wall length by the stud centres, add 1 to this figure and locate this number of fixings as evenly as possible along the wall length. This figure includes the start and end studs in each wall length.



STUD TO TOP PLATE FIXING SCHEDULE

FIXING SELECTION CHART

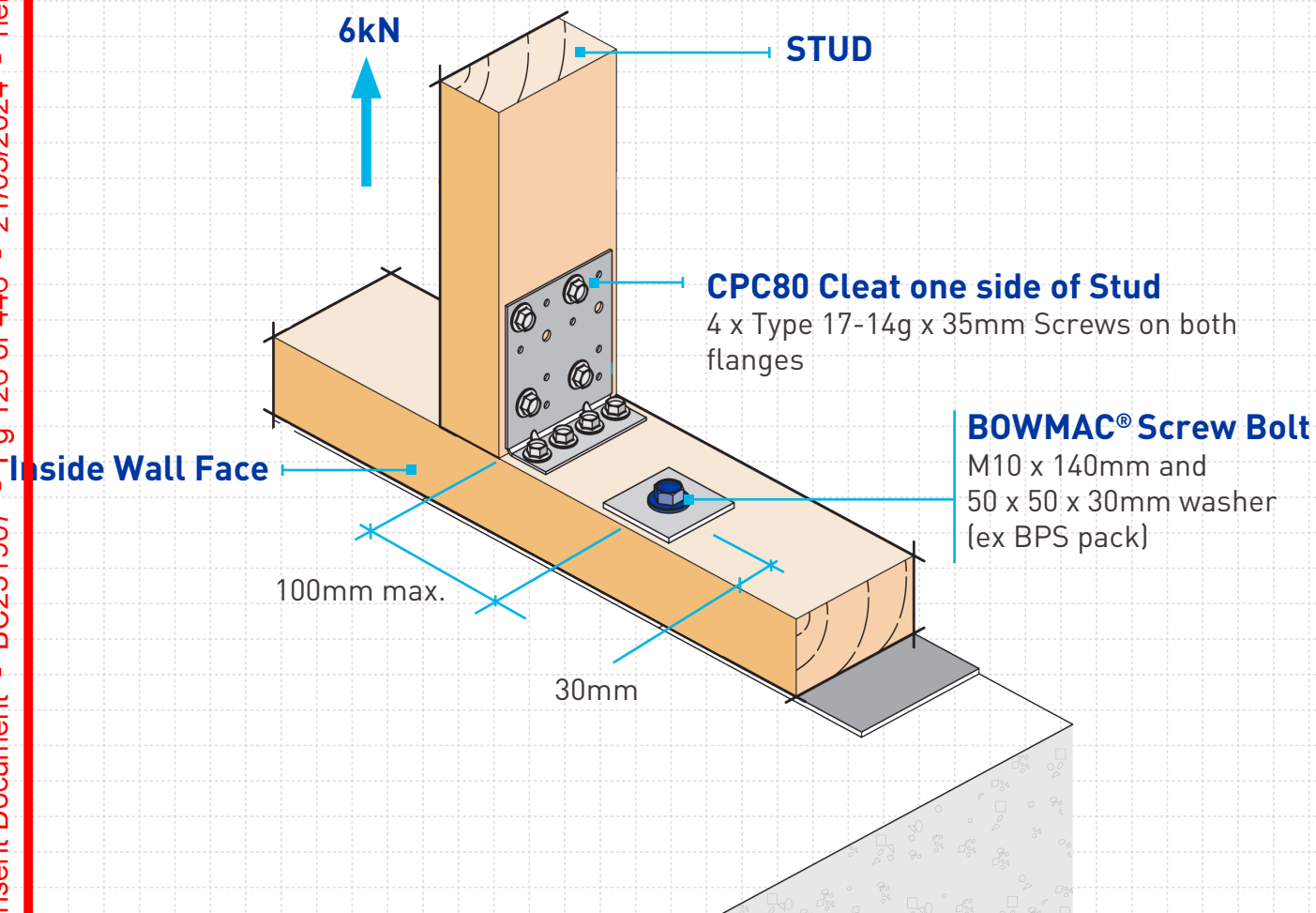
(Suitable for walls supporting roof members at 600, 900 or 1200mm crs.)
Wind Zones L, M, H, VH, EH, as per NZS 3604:2011

LOADED DIMENSIONS (M) STUD CENTRES			LIGHT ROOF WIND ZONE					HEAVY ROOF WIND ZONE				
300MM	400MM	600MM	L	M	H	VH	EH	L	M	H	VH	EH
3.0	2.3	1.5	A	A	B	B	B	A	A	B	B	B
4.0	3.0	2.0	A	A	B	B	B	A	A	B	B	B
5.0	3.8	2.5	A	B	B	B	B	A	A	B	B	B
6.0	4.5	3.0	A	B	B	B	B	A	A	B	B	B
7.0	5.3	3.5	A	B	B	B	B	A	A	B	B	B
8.0	6.0	4.0	A	B	B	B	B	A	A	B	B	B
9.0	6.8	4.5	B	B	B	B	B	A	A	B	B	B
10.0	7.5	5.0	B	B	B	B	B	A	A	B	B	B
11.0	8.3	5.5	B	B	B	B	B	A	A	B	B	B
12.0	9.0	6.0	B	B	B	B	B	A	A	B	B	B

6kN STUD TO BOTTOM PLATE FIXING

IDEAL AS RETRO FIT FIXING AFTER LINING/CLADDING INSTALLED

FOR CONCRETE
FLOOR SLABS



CODE: SBP
MATERIAL: CPC80 1.55mm G300 Z275 Galvanised Steel
PACKED: 2 x CPC80 Cleats
16 x Type 17-14g x 35mm Hex Head Galvanised Screws

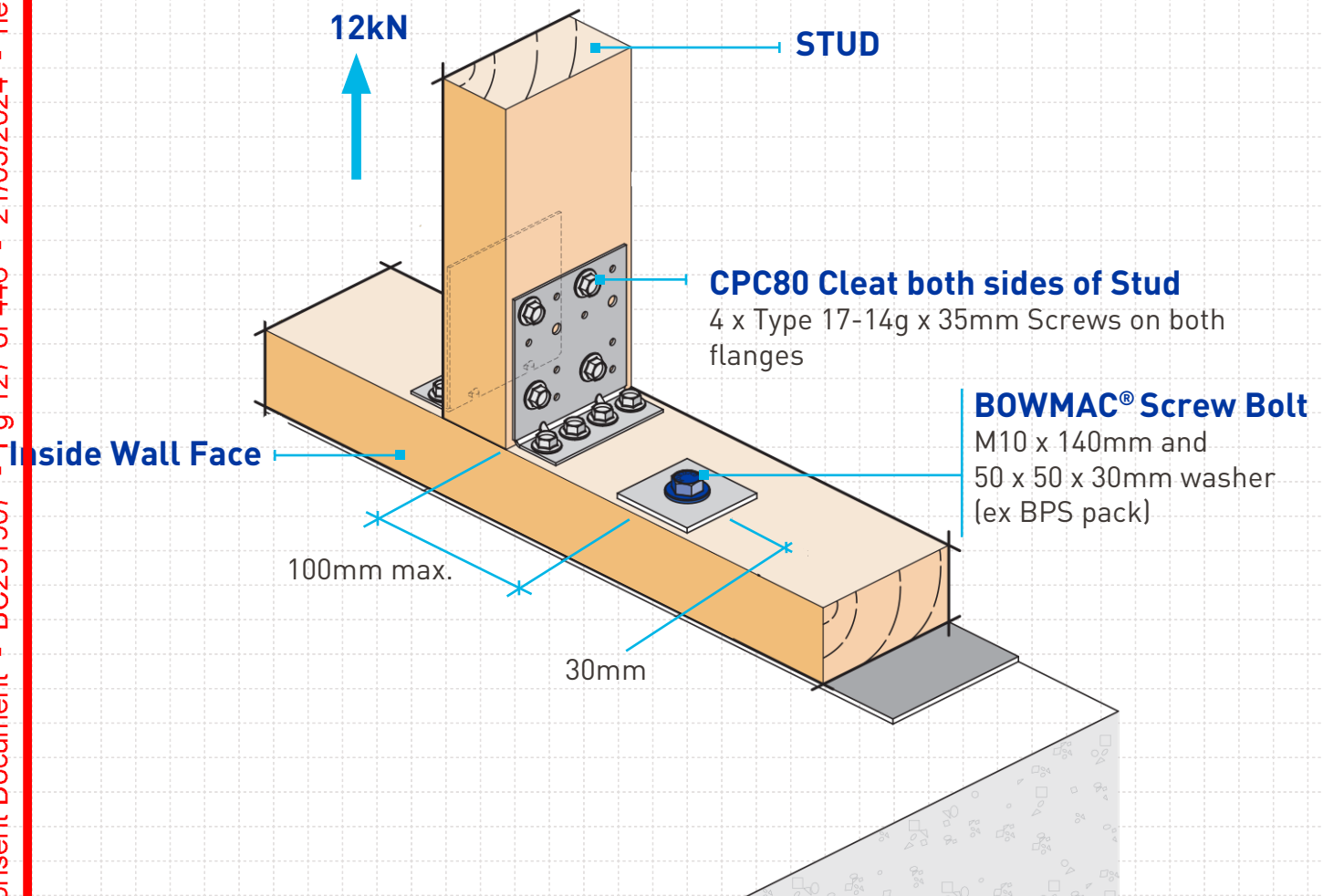
AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



12kN STUD TO BOTTOM PLATE FIXING

IDEAL AS RETRO FIT FIXING AFTER LINING/CLADDING INSTALLED

FOR CONCRETE
FLOOR SLABS



CODE: SBP
MATERIAL: CPC80 1.55mm G300 Z275 Galvanised Steel
PACKED: 2 x CPC80 Cleats
16 x Type 17-14g x 35mm Hex Head Galvanised Screws

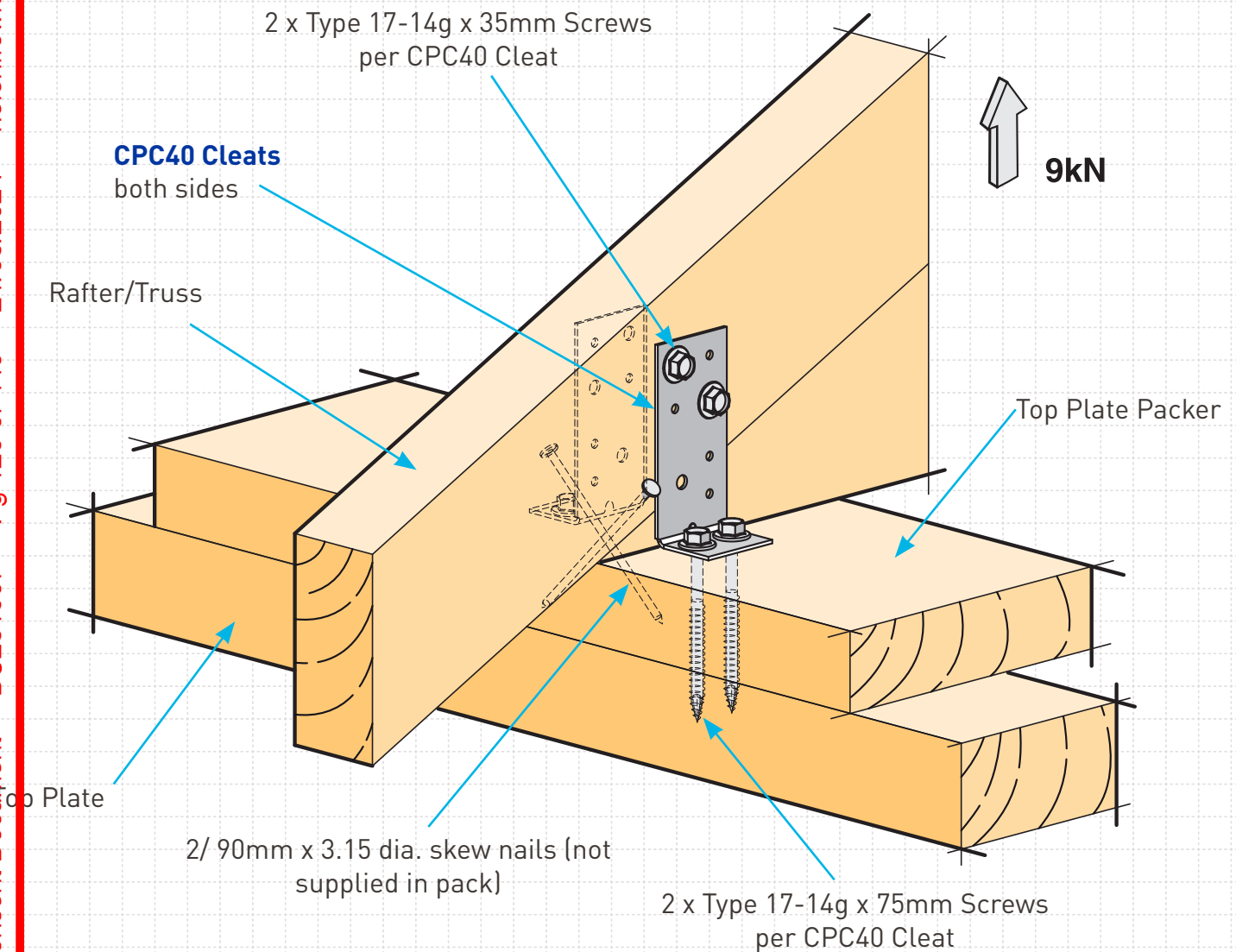
AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



9kN TRUSS TO TOP PLATE FIXING

COMPLIES WITH TABLE 10.15 NZS 3604:2011

→ Top mounted fixing allows additional face fixing if required.



Code: 9KNTTP

Material: CPC40 1.55mm G300 Z275 Galvanised Steel

Packed: 2 x CPC40 Cleats

4 x Type 17-14g x 35mm Hex Head Galvanised Screws

4 x Type 17-14g x 75mm Hex Head Galvanised Screws

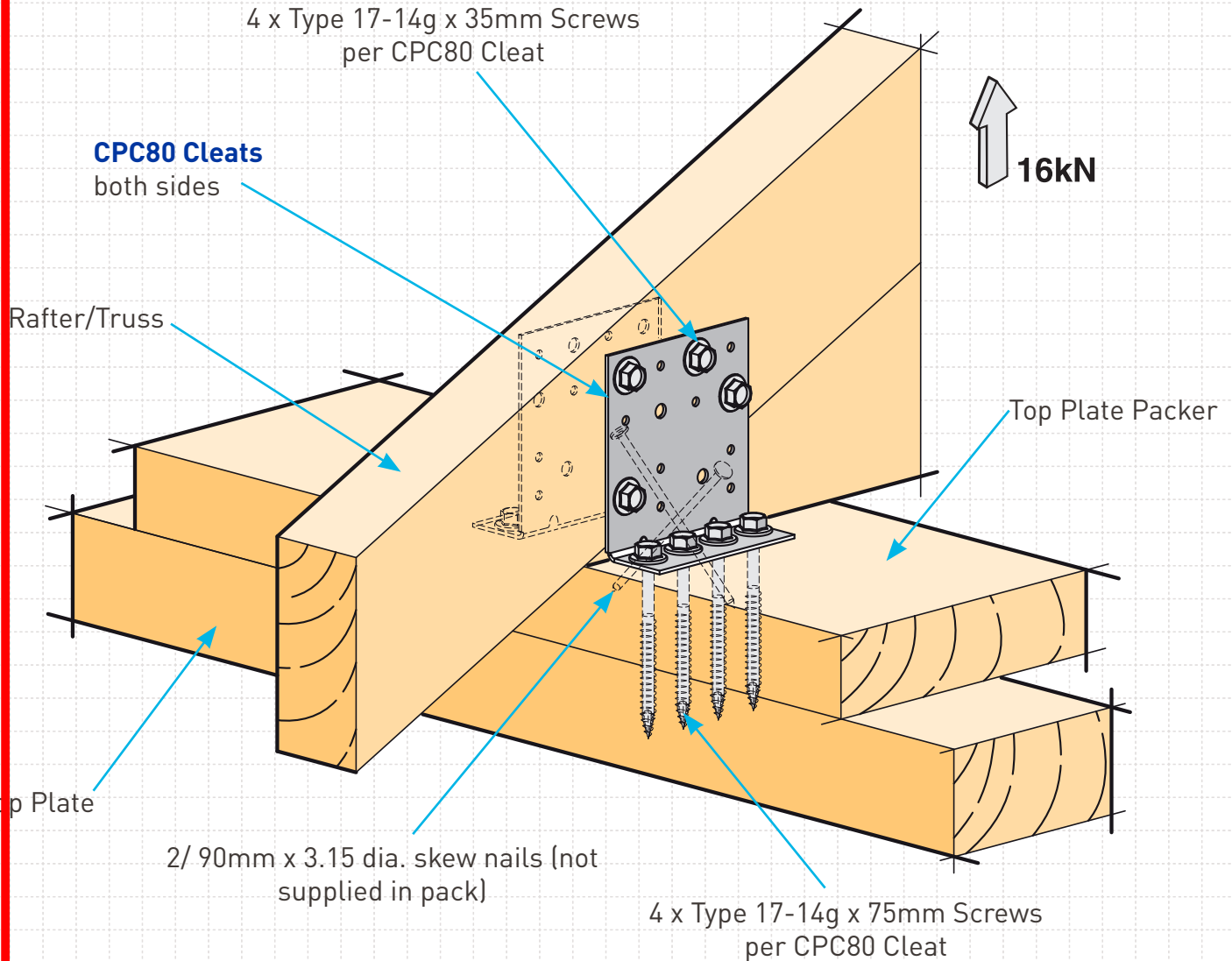
AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



16kN TRUSS TO TOP PLATE FIXING

COMPLIES WITH TABLE 10.15 NZS 3604:2011

➔ Top mounted fixing allows additional face fixing if required.



Code: 16KNTTP
Material: CPC80 1.55mm G300 Z275 Galvanised Steel
Packed: 2 x CPC80 Cleats
8 x Type 17-14g x 35mm Hex Head Galvanised Screws
8 x Type 17-14g x 75mm Hex Head Galvanised Screws

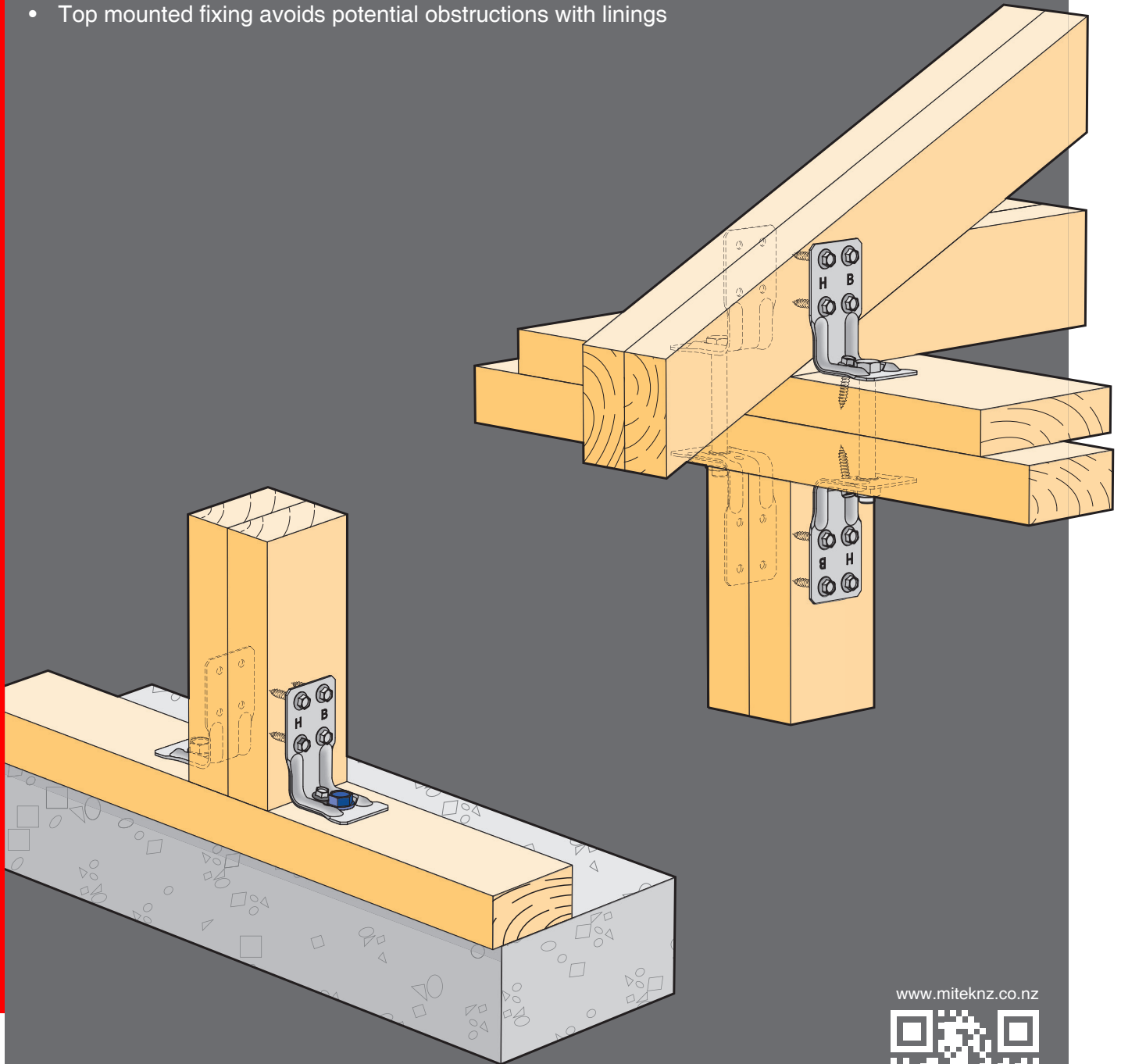
AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



24kN Uplift Fixing

INCLUDES BOTH TRUSS FIXING AND BOTTOM PLATE FIXING

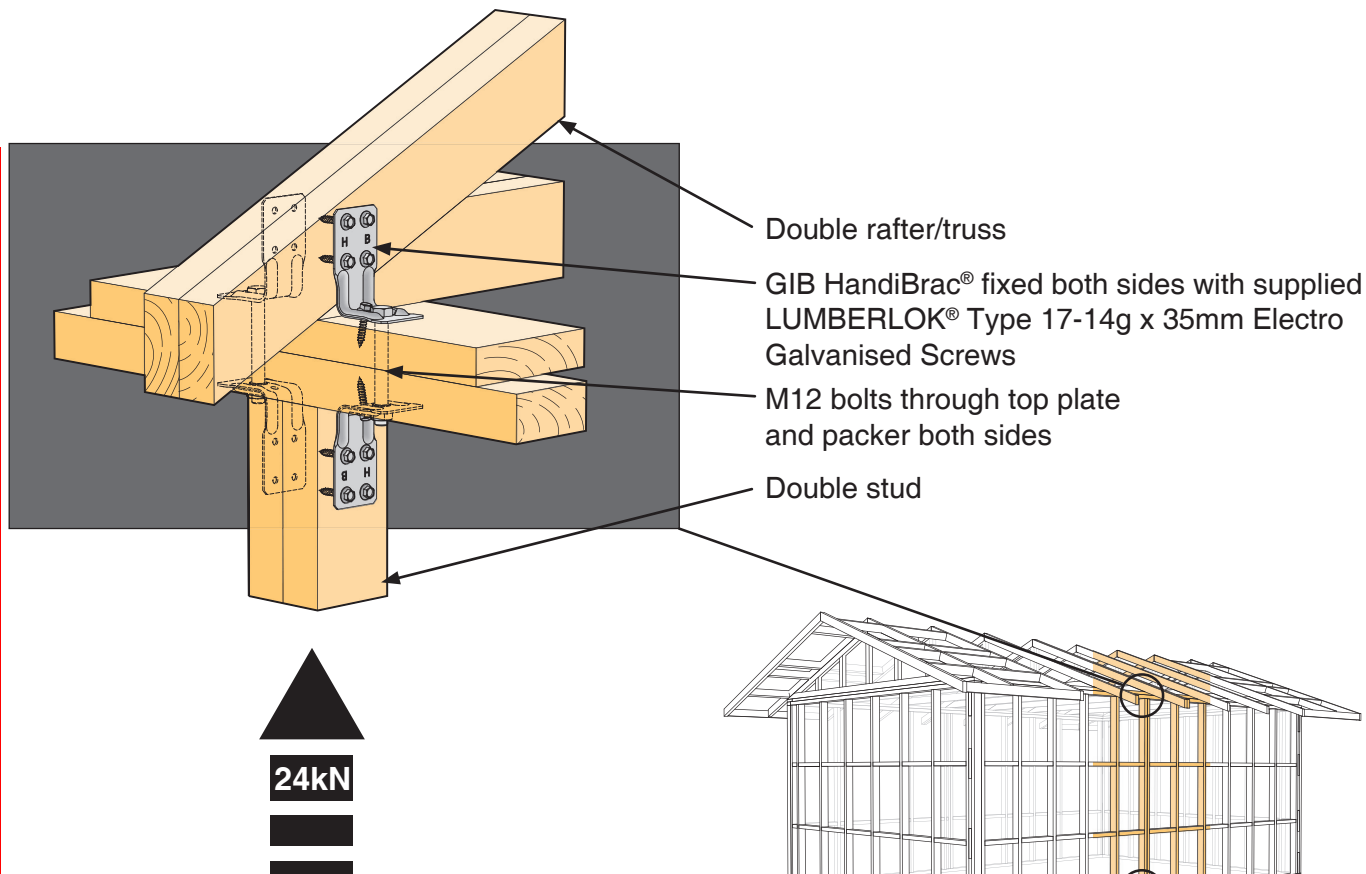
- Complies with Table 10.15 NZS 3604:2011
- Top mounted fixing avoids potential obstructions with linings



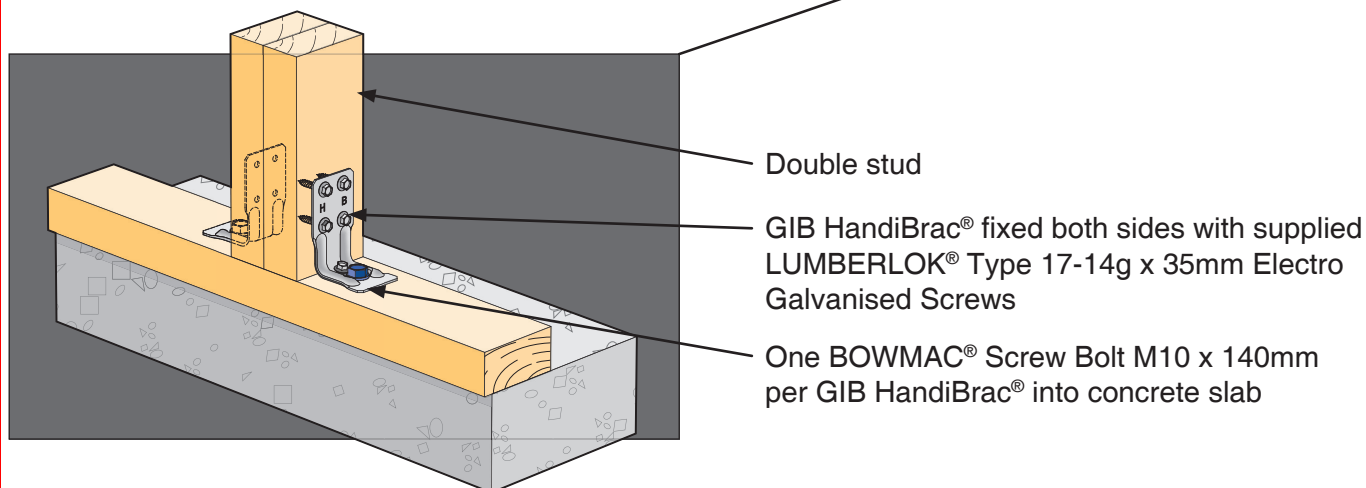
www.mitek.nz.co.nz



Truss To Top Plate Fixing



Stud To Bottom Plate Fixing



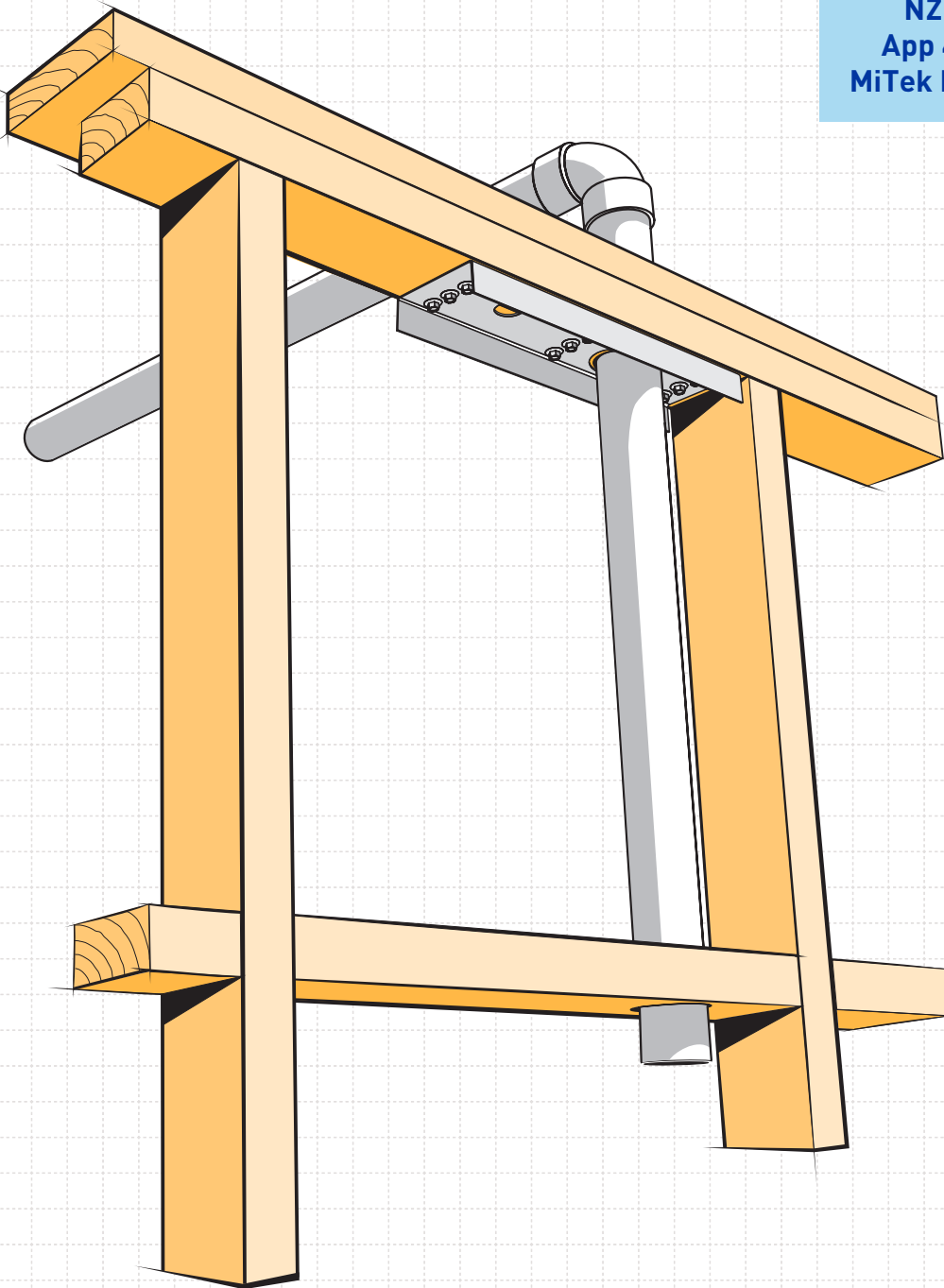
CODE	B24KNUF
MATERIAL	GIB HandiBrac® - 2.0mm G250 Z275 Galvanised Steel
PACKED	6 x GIB HandiBrac®
	2 x M12 120mm bolt and nut set
	2 x BOWMAC® Screw Bolt M10 x 140mm
	30 x LUMBERLOK® Type 17-14g x 35mm Electro Galvanised Screws

TOP PLATE STIFFENER

FOR PLUMBING OR VACUUM SYSTEM DUCTING THROUGH TOP PLATES

- Reinforces the top plate back to FULL STRENGTH
- Alternative solution to figure 8.20 NZS 3604:2011

NZ REG DESIGN
App 408133 © 2006
MiTek New Zealand Ltd.

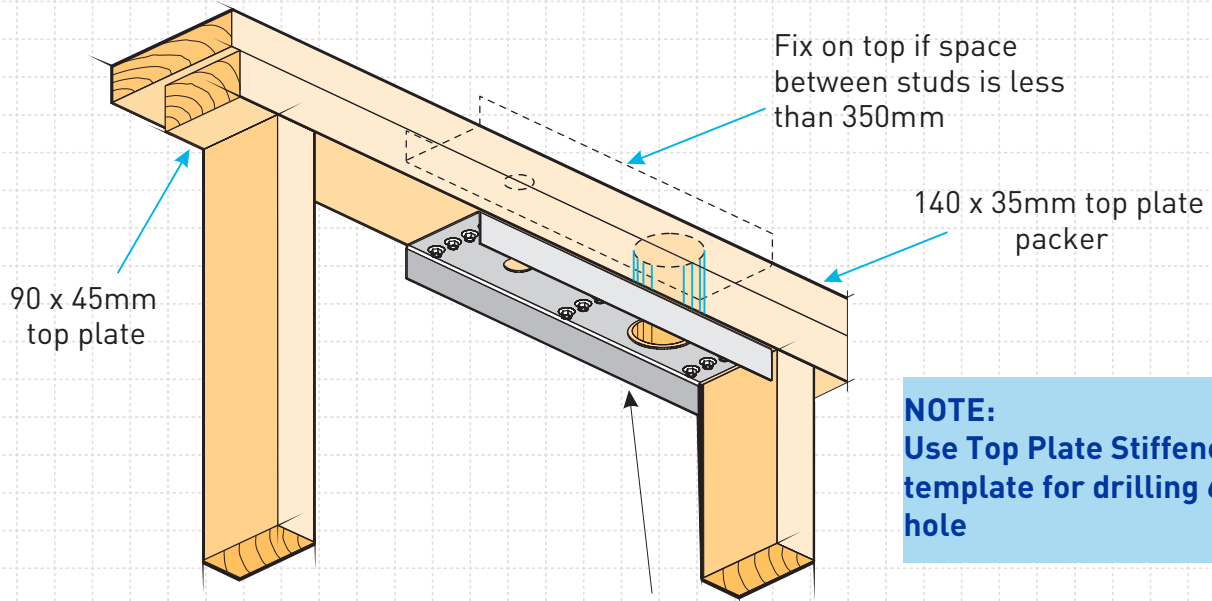


SDC - Approved Building Consent Document - BC231907 - Pg 132 of 446 - 21/03/2024 - helen.fowler

AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND

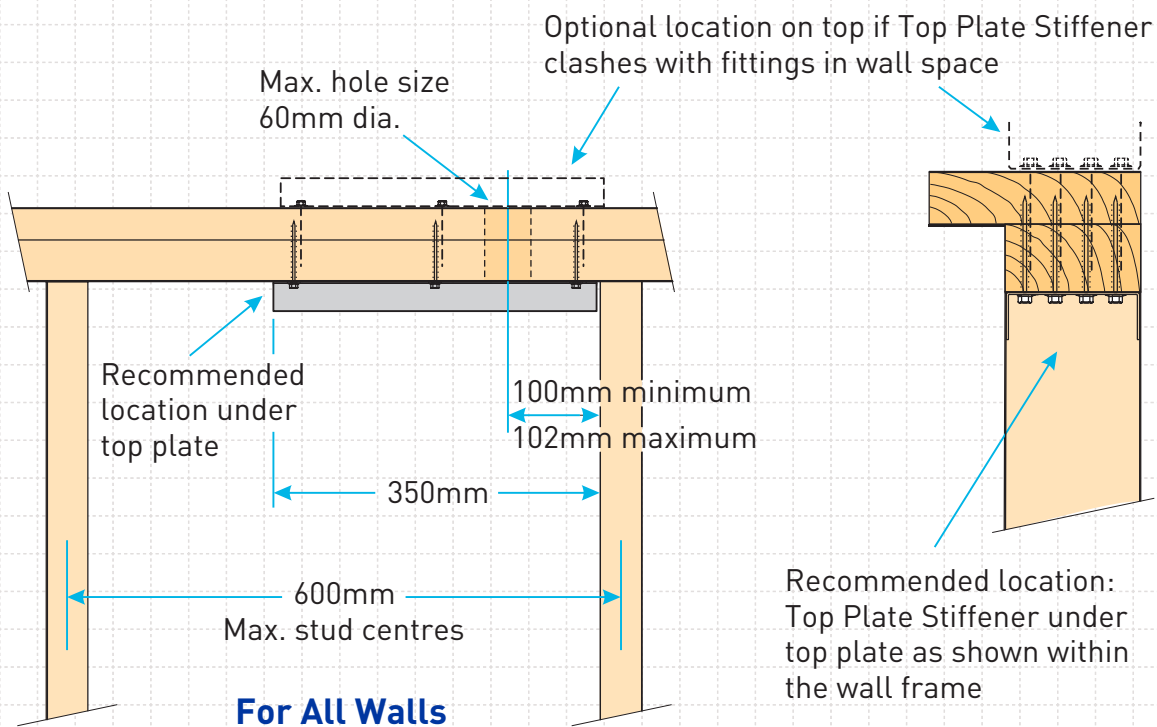


TOP PLATE STIFFENER



NOTE:
For single top plate fix with Type 17-14g x 35mm Hex Head Screws (not supplied)

Fix up into top plate and into packer with 3 rows of 4 x Type 17-14g x 75mm Hex Head Screws (supplied). It may be advisable to drill pilot hole for each screw to assist installation



Code:

Material:

Packed:

TPS

1.55mm G300 Z275 Galvanised Steel

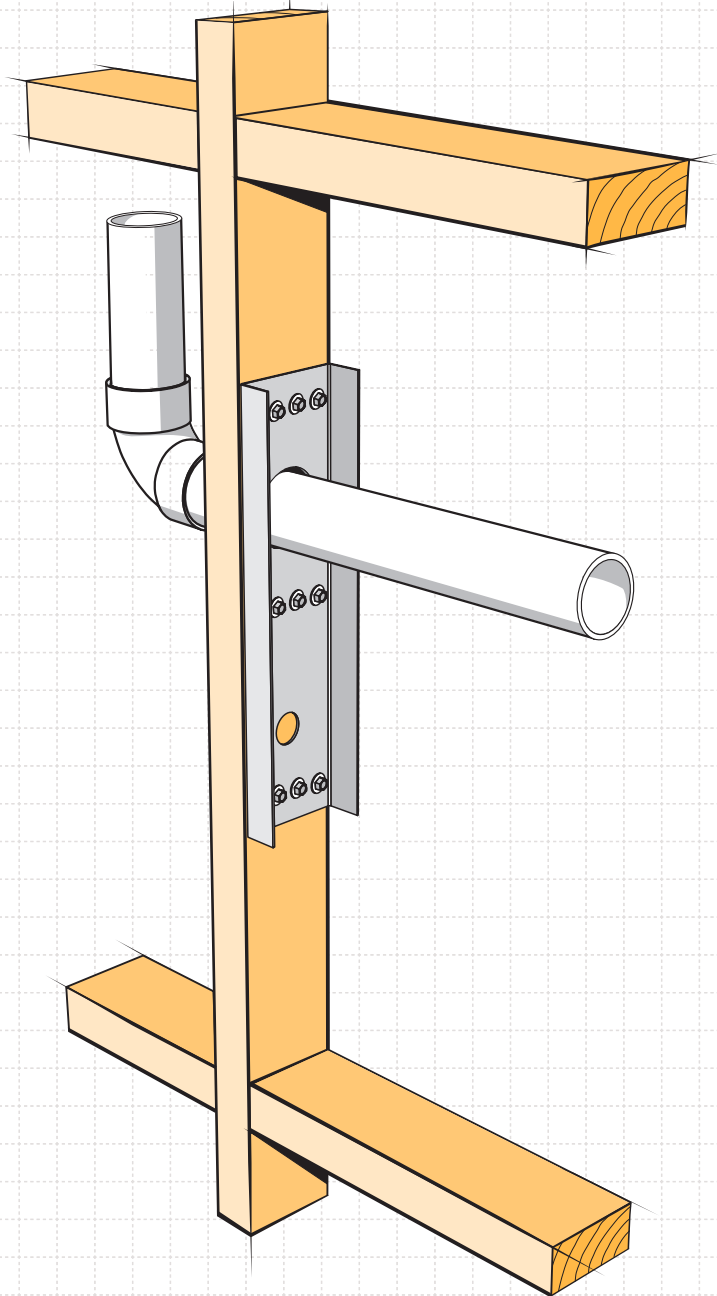
8 x Framing Stud Stiffeners per carton

100 x Type 17-14g x 75mm Hex Head Galvanised Screws

FRAMING STUD STIFFENER

FOR DUCTING THROUGH TIMBER STUDS

- Reinforces 90 x 45mm timber studs back to FULL STRENGTH
- Solution to include holes up to 60mm diameter
- Refer Clause 8.5.1.6 NZS 3604:2011



NZ reg. Design
App. 408133 © 2006
MiTek New Zealand

AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



FRAMING STUD STIFFENER

Centre of hole must be a minimum of 100mm from nog location

Min. 100mm

Maximum stud length
2400mm overall

Maximum hole size
60mm dia.

Note: Use Stud Stiffener as template for drilling 60mm hole

Fix to side of stud with 3 rows of
4 x Type 17-14g x 35mm Hex Head
Screws (supplied)

Code:

Material:

Packed:

FSS

1.55mm G300 Z275 Galvanised Steel

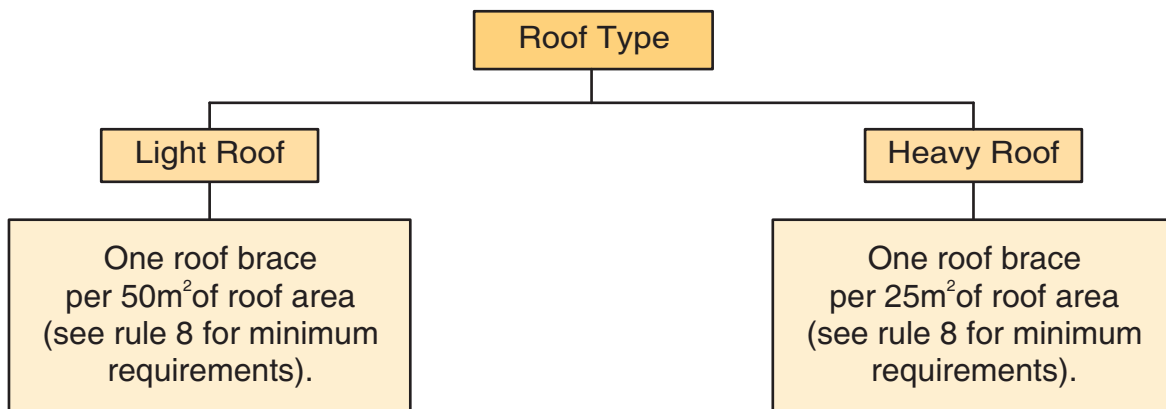
8 x Framing Stud Stiffeners per carton

100 x Type 17-14g x 35mm hex head Galvanised Screws

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.

Roof Bracing Options

i) ROOF PLANE BRACE

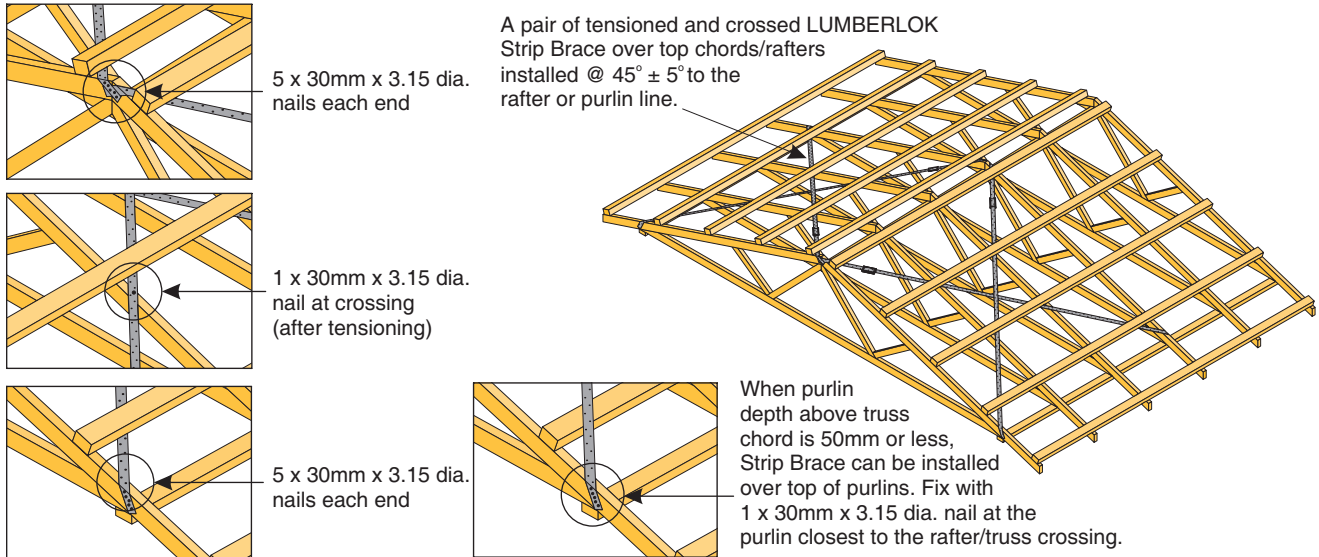


Each roof plane brace can be:

- 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

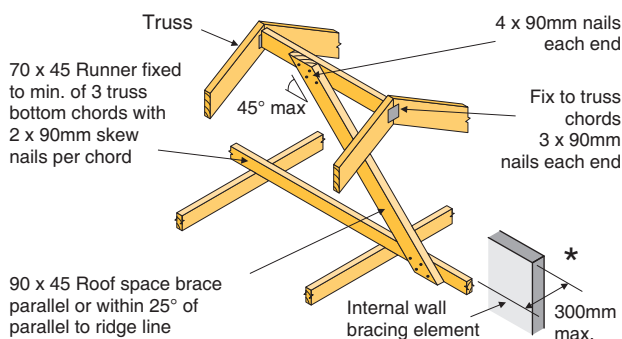
OR

- A pair of tensioned and crossed LUMBERLOK Strip Brace running continuously from ridge to top plate installed as detailed below.

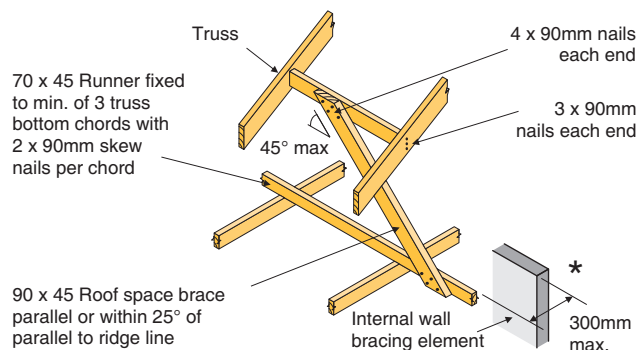


ii) ROOF SPACE BRACE

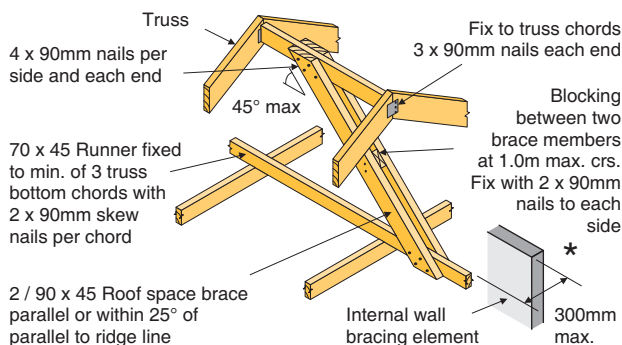
(A) Less than 2m long.



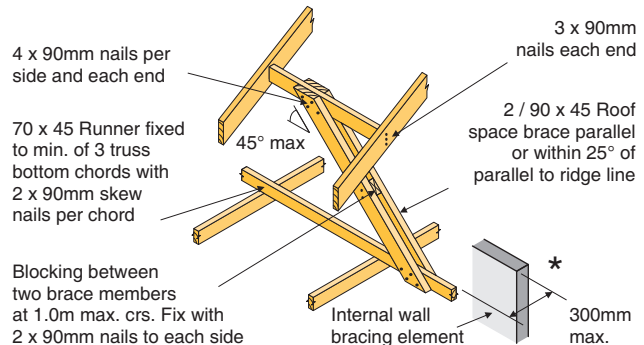
(C) Not directly under the ridge - less than 2m long.



(B) More than 2m long (Max. 4.8m).



(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.



EzyBrace[®] Systems

Specification and installation manual

CBI 5113

AUGUST 2016

NATIONAL SUPPORT

VISIT: Winstone Wallboards Limited
37 Felix Street, Penrose,
Auckland 1061, New Zealand

POST: PO Box 12 256, Penrose 1642,
Auckland, New Zealand

PHONE: +64 9 633 0100

FAX: +64 9 633 0101
Free Fax: 0800 229 222

EMAIL: info@gib.co.nz

WEB: gib.co.nz

GIB® HELPLINE

0800 100 442

Based on learnings derived from the 2011 Canterbury earthquakes GIB EzyBrace® Systems have been updated to offer improved design flexibility and further simplification of the bracing design and build process.

NEW GIB EZYBRACE® 2016 DESIGN SOFTWARE

- Improved user interface with simplified bracing design process.
- Increased functionality including exterior line check function, easy insert/deletion of bracing elements and built in software help function.
- Includes the new GIB® Bracing element GS2- NOM
- Allows the GIBFix® Framing System to be used in GIB EzyBrace® designs.

NEW GIB® BRACING ELEMENT GS2-NOM

- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute to bracing resistance.
- Potentially reduces the amount of fasteners¹
- 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.

CONTENTS

System Summary	5
GIB EzyBrace® Systems — August 2016	5
GIB® Plasterboard Substitution Table	5
Introduction	6
Scope of Use	6
Finish Quality — Framing and Substrates	6
New GIBFix® Framing Systems	6
New GS2-NOM Bracing Element	6
Compliance with the NZ Building Code	7
CAD Design Detail	7
Appraisal	7
Bracing Resistance and Demand	8
Bracing Resistance	8
Bracing Demand	9
Software Functionality	10
Design and Construction	12
GIB® Plasterboard Linings	12
GIB EzyBrace® Systems in Water-Splash Areas	12
Renovation	12
Openings in Bracing Elements	12
Timber Framing	13
GIBFix® Framing System (Alternative Layout)	13
Guidelines for Intersection Walls	13
Top Plate Connections	14
Parapets and Gable End Walls	14
Bottom Plate Fixing	14
Bracing Strap Installation	15
GIB HandiBrac® Installation	16
GIB HandiBrac® Placement with GIBFix® Framing	
System Layout	17
Ceiling Diaphragms	18
Ceiling Battens in Ceiling Diaphragms	19
Openings in Ceiling Diaphragms	20
Length of GIB EzyBrace® Elements ('N' Type)	21
Length of GIB EzyBrace® Elements ('H' Type)	22
System Specifications	23
GIB EzyBrace® Systems Specification — GS1-N	23
GIB EzyBrace® Systems Specification — GS2-NOM	24
GS2-NOM Adhesive Fixing Option at Door Jambs	25
GIB EzyBrace® Systems Specification — GS2-N	26
GIB EzyBrace® Systems Specification — GSP-H	27
GIB EzyBrace® Systems Specification — BL1-H	28
GIB EzyBrace® Systems Specification — BLG-H	29
GIB EzyBrace® Systems Specification — BLP-H	30
Sustainability and the Environment	31

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 further notice.

PATENTS

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

Beware of substitution

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

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

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

	Acceptable alternative GIB® plasterboards								
Specified GIB® plasterboard	GIB® Standard	GIB Ultraliner®	GIB Braceline/ Noiseline®	GIB Aqualiner®	GIB Toughliner®	GIB Fyreliner®			
						10mm	13mm	16mm	19mm
GIB® Standard		OK	OK	OK	OK	Note 1 and 3			
GIB Braceline®	X	X		Note 2	OK	X	Notes 1, 2 and 3		

- Note 1** The fastener type and length must be as required for the relevant FRR system using the perimeter fixing pattern illustrated for the relevant bracing specification.
- Note 2** The element must be 900mm or longer. Decrease perimeter fastener centres to 100mm. The bracing corner fastening pattern, as illustrated for the relevant specification applies to all four corners of the element. Panel hold-down fixings are required.
- Note 3** Specify traditional wall framing layout (see figure 1) where a Fire Resistance Rating (FRR) is required.

Scope of use

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

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

Finish quality — framing and substrates

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

New GIBFix® Framing System

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

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

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

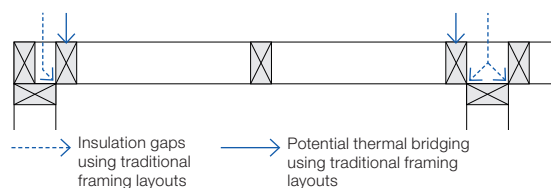
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

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

Bracing resistance is not affected by the GIBFix® Framing System if the use of this alternative timber framing layout is preferred. Refer to the GIBFix® Framing System literature for more information.

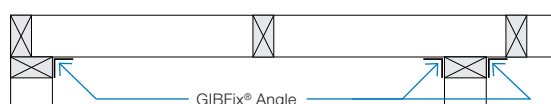
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

FIGURE 1: TRADITIONAL WALL FRAMING LAYOUT



GFS004

FIGURE 2: GIBFix® FRAMING SYSTEM (ALTERNATIVE LAYOUT)



GFS005

NEW GS2-NOM Bracing Element

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

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

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

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

1. Actual savings dependent on building and bracing design.

Compliance with the NZ Building Code

NZBC CLAUSE B1 – STRUCTURE

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

NZBC CLAUSE B2 – DURABILITY

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

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

NZBC CLAUSE F2 – HAZARDOUS BUILDING MATERIALS

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

NZBC CLAUSE H1 – ENERGY EFFICIENCY

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

CAD design details

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

Appraisal

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

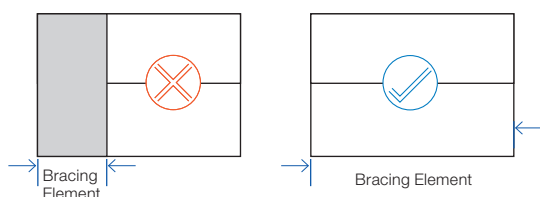
It is of prime importance to comply with the details of design, construction and workmanship in this document.

Bracing resistance

WALL BRACING LAYOUT

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

FIGURE 3: WALL BRACING LAYOUT



BRACING DISTRIBUTION

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

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

Space bracing lines no more than:

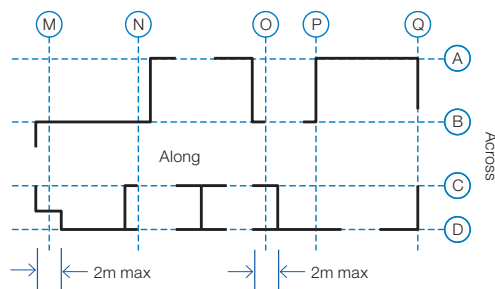
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

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

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

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

FIGURE 4: BRACING GRID LAYOUT



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

GIB EZYBRACE® SYSTEMS

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

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

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

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

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

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

Specifying GIB EzyBrace® elements (minimum wall length 400mm)

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

Bracing demand

GIB EZYBRACE® CALCULATOR

The GIB EzyBrace® calculator is a software tool to determine the wind and earthquake bracing demand and to design the bracing resistance for light timber-framed buildings constructed in accordance with NZS 3604:2011.

The updated GIB EzyBrace® calculator combines an up-to-date user-friendly interface with the latest knowledge relating to the performance of GIB® plasterboard in light timber-framed structures when subjected to high winds or earthquakes. The calculator can be down-loaded free of charge by visiting gib.co.nz/ezybrace and can be installed on either Microsoft® or Apple® Mac environments.

DEMAND

Wind and Earthquake 'Demand' calculates the forces a structure must be able to resist during its 'design life'. The GIB EzyBrace® calculator's Demand sheet determines the number of Bracing Units required depending on building location, building dimensions and materials used. The Demand sheet closely follows the familiar format of our Excel based GIB EzyBrace® calculator, and includes additional features such as a pop-up help facility explaining required input.

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

The Demand sheet gives the designer the option to select a longer earthquake return period which represents a higher earthquake design force. The default for buildings constructed in accordance with NZS3604:2011 is an earthquake that has a 10% chance of being exceeded within the assumed 50 year 'design life' of a light timber framed residential structure, a 'return period' of 500 years.

Many commercial and public buildings are designed for the more stringent requirement of a 10% probability of exceedance in a 100 or 250 year life expectancy.

A screen shot of the GIB EzyBrace® 2016 Demand Sheet and Help Facility is shown in figure 5.

FIGURE 5: GIB EZYBRACE® 2016 — DEMAND CALCULATION SHEET AND 'POP UP' HELP FACILITY

GIB EzyBrace® Bracing Software

Job Details

Name: A Job
 Street and Number: 100 Job Street
 Lot and DP Number: Lot 321, DP 456
 City/Town/District: Johnson
 Designer: AR Client
 Company: John Limited
 Date: 1/08/15

Building Specification

Number of Storeys: Single
 Floor Loading: 2 MPa
 Foundation Type: Slab

Single

Cladding Weight: Light
 Roof Weight: Light
 Room in Roof Space: No
 Roof Pitch: 25
 Roof Height above Eaves (m): 1.5
 Building Height to Apex (m): 4.5
 Ground to Lower Floor (m): 0.2
 Stud Height (m): 2.4
 Building Length (m): 10
 Building Width (m): 10
 Building Area (m²): 100

Building Location

Wind Zone or Consent Authority: Not Available
 Wind Region: A
 Lee Zone: No
 Ground Roughness: Urban
 Site Exposure: Sheltered
 Topography Class: T1

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

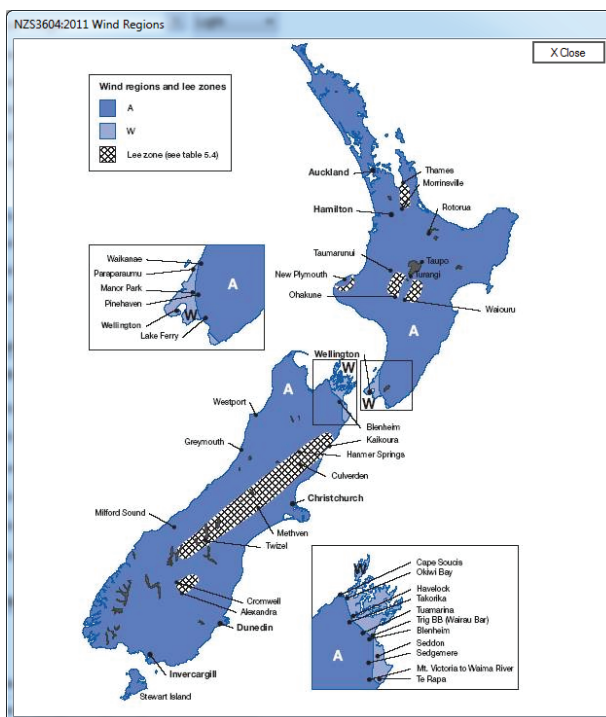
Bracing Units required for Wind

	Along	Across
Single Level	258	222

Bracing Units required for Earthquake

	Along and Across
Single	264

Demand | Single Along | Single Across | Custom



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

Software functionality

Innovations adopted in the GIB EzyBrace® 2016 bracing 'resistance' calculation sheets include the ability to easily add and delete lines and elements during calculations.

The software compares bracing resistance achieved with demand and for wall bracing lines incorporating external walls, the external wall length can now be entered to check minimum

bracing units required on that line. The NZS 3604:2011 rules and associated software output are not the only check. Designers must additionally check the building layout to ensure adequate bracing distribution.

Figures 6 and 7 show screen shots of the Wall and Subfloor Resistance Sheets respectively.

FIGURE 6: GIB EZYBRACE® 2016 — WALL BRACING RESISTANCE CALCULATION SHEET

Line	Ext. Len. (m)	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BU)	Earthquake (BU)
a	11.25	1	0.5		2.44	GSP-H	GIB®	53	58
		2	1.1		2.44	GS1-N	GIB®	72	65
		3	0.6		2.44	GSP-H	GIB®	67	73
b	6.41	1	1.2		2.44	GS1-N	GIB®	81	71
		2	0.6		2.44	GS1-N	GIB®	34	35
		3	4		2.44	GS2-NOM	GIB®	197	197
c		1	3.2		2.44	GS2-NOM	GIB®	157	157
d		1	7.9		2.44	GS2-NOM	GIB®	389	389
e	17.9	1	0.6		2.44	BL1-H	GIB®	58	60
		2	0.6		2.44	BL1-H	GIB®	58	60
		3	0.8		2.44	GS1-N	GIB®	48	46
		4	2.1		2.44	GS1-N	GIB®	143	124
		5	1.2		2.44	EP1-1.2	CHH	142	159

Wind Demand: 682, Earthquake Demand: 880
 Wind Resistance: 1499 (220%), Earthquake Resistance: 1492 (170%)

193 OK, 196 OK, 312 OK, 302 OK, 157 OK, 157 OK, 389 OK, 389 OK, 449 OK, 449 OK

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

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

Line	Ext. Len. (m)	Element	Length (m) or No.	Angle (degrees)	Type	Supplier	Wind (BU)	Earthquake (BU)
A		1	1		Braced Piles	NZS3604	160	120
		2	1		Anchor Pile	NZS3604	160	120
		3	1		Braced Piles	NZS3604	160	120
B		1	1		Braced Piles	NZS3604	160	120
		2	1		Cantilever Pile	NZS3604	70	30
		3	1		Cantilever Pile	NZS3604	70	30
C		1	1		Anchor Pile	NZS3604	160	120
		2	1		Anchor Pile	NZS3604	160	120

Wind Demand: 426, Earthquake Demand: 687
 Wind Resistance: 1100 (258%), Earthquake Resistance: 780 (114%)

480 OK, 360 OK, 300 OK, 180 OK, 320 OK, 240 OK

Software functionality

Custom elements can be entered by accessing the 'custom' tab as shown in figure 8.

FIGURE 8: GIB EZYBRACE® 2016 — CUSTOM ELEMENTS SHEET

Supplier	System	Min. Length m	Wind BU/s/m	EQ BU/s/m	Element Height Dependant	Element Foundation Dependant
Custom1	CU1-0.4	0.4	80	95	☒	☒
Custom1	CU1-0.6	0.6	95	105	☒	☒
Custom1	CU1-1.2	1.2	120	135	☒	☒
Custom2	CU2-0.4	0.4	90	90	☒	☒
Custom2	CU2-0.6	0.6	127	136	☒	☒
Custom2	CU2-1.2	1.2	164	135	☒	☒
Engineer	Portal	1	300	300	☐	☐

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

Demand Calculation Sheet	
Job Details	
Name	Example
House and Number	100 Job Street
Lot and DP Number	Lot 123 DP 101
City/Town/District	Sevilla District
Designer	A.R. Architect
Company	John Limited
Date	11/6/15
Building Specification	
Number of Storeys	1
Floor Loading	2 kPa
Foundation Type	Shallow
Cladding Weight	Single
Roof Weight	Light
Roof in Roof Space	No
Roof Pitch	20
Roof Height above Gance (m)	2.5
Building Height to Apex (m)	5
Ground to Lower Floor (m)	0.3
Average Stud Height (m)	2.44
Building Length (m)	17.8
Building Width (m)	11.8
Building Floor Area (m²)	100
Building Location	
Wind Zone	High
Earthquake Zone	1
Soil Type	C (Shallow)
Annual Prob. of Exceedance	1 in 500 (NZS3604 2011 Default)
Bracing Units required for Wind	
Along	Across
Single Level	682 965
Bracing Units required for Earthquake	
Along & Across	
Single Level	177

GIB® plasterboard linings

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

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

LIMITATIONS

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

GIB EzyBrace® Systems in water-splash areas

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

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

Renovation

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

Openings in bracing elements

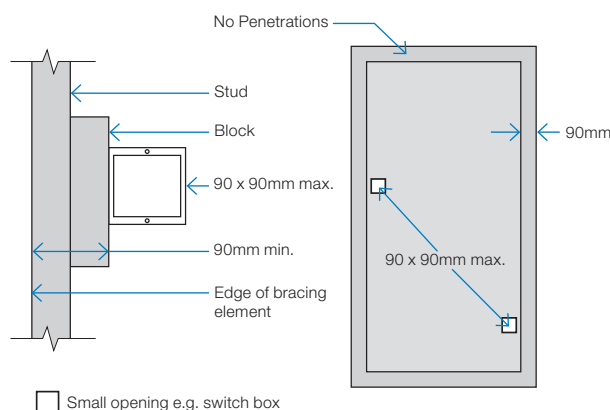
SMALL OPENINGS

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

LARGE OPENINGS

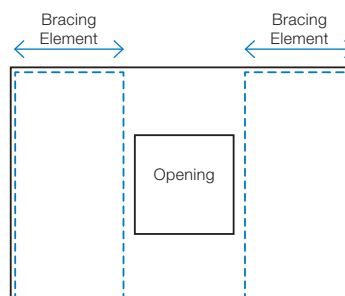
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GFB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS



Timber framing

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

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

GIBFix® Framing System (alternative layout)

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

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

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

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

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

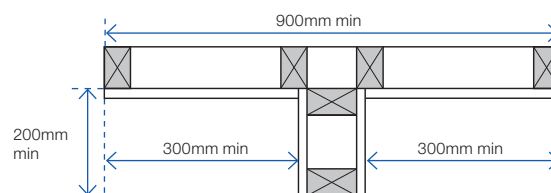
Guidelines for intersection walls

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

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

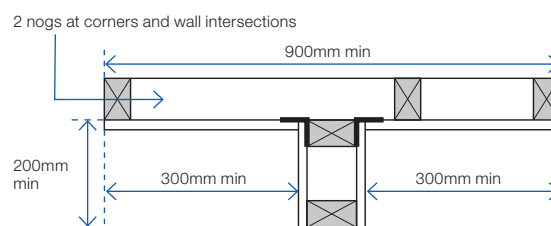
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



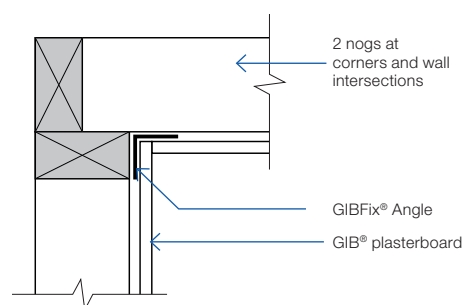
GEB002

FIGURE 13: WALL INTERSECTION (GIBFix® FRAMING SYSTEM)



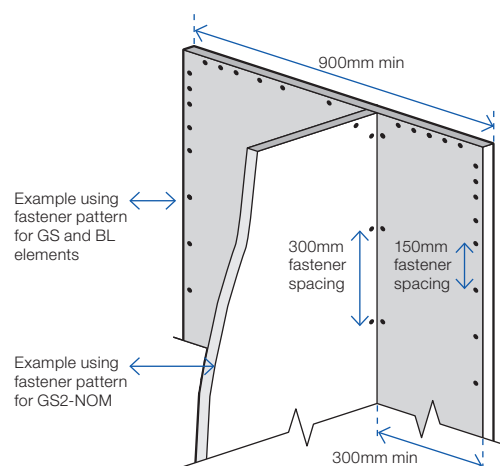
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFix® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

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

Top plate connections

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

Parapets and gable end walls

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

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

or

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

Bottom plate fixing

TIMBER FLOOR

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

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

CONCRETE FLOOR – EXTERNAL WALL BRACING ELEMENTS

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

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

CONCRETE FLOOR – INTERNAL WALL BRACING ELEMENTS

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

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

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

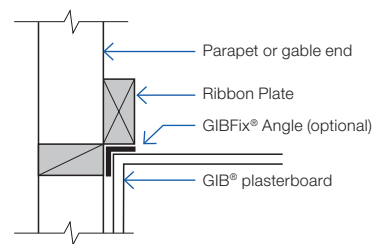
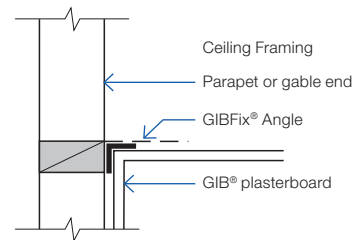


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

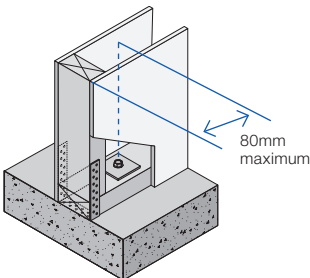
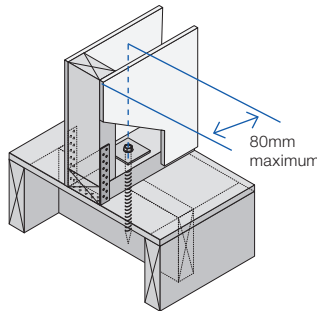
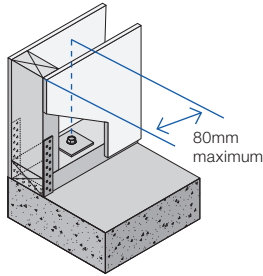
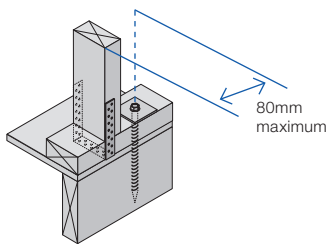
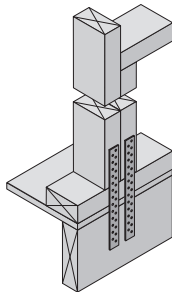
BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

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

Bracing strap installation

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

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

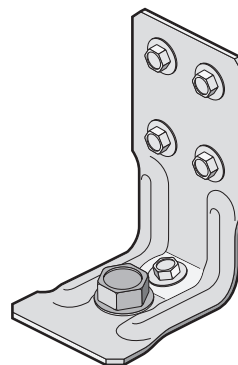
Concrete floor		Timber floor	
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.			
Internal wall			
			
GEB004		GEB005	
External wall			
			
GEB006		GEB007	
Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library.		2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Block to nog fixed with 3/100 x 3.75mm nails to stud.	
			
		GEB008	
Hold-down fastener requirements			
Concrete floor		Timber floor	
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.		12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element	

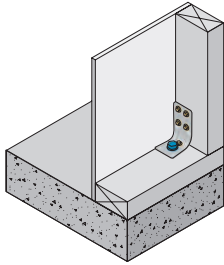
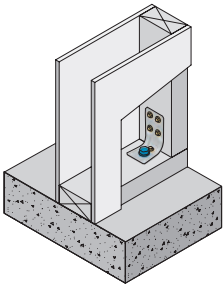
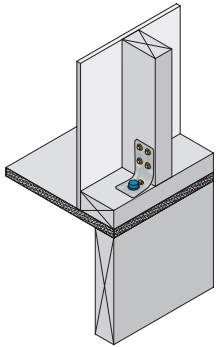
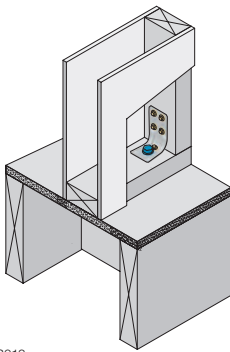
GIB HandiBrac® installation

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

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

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



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

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

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

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

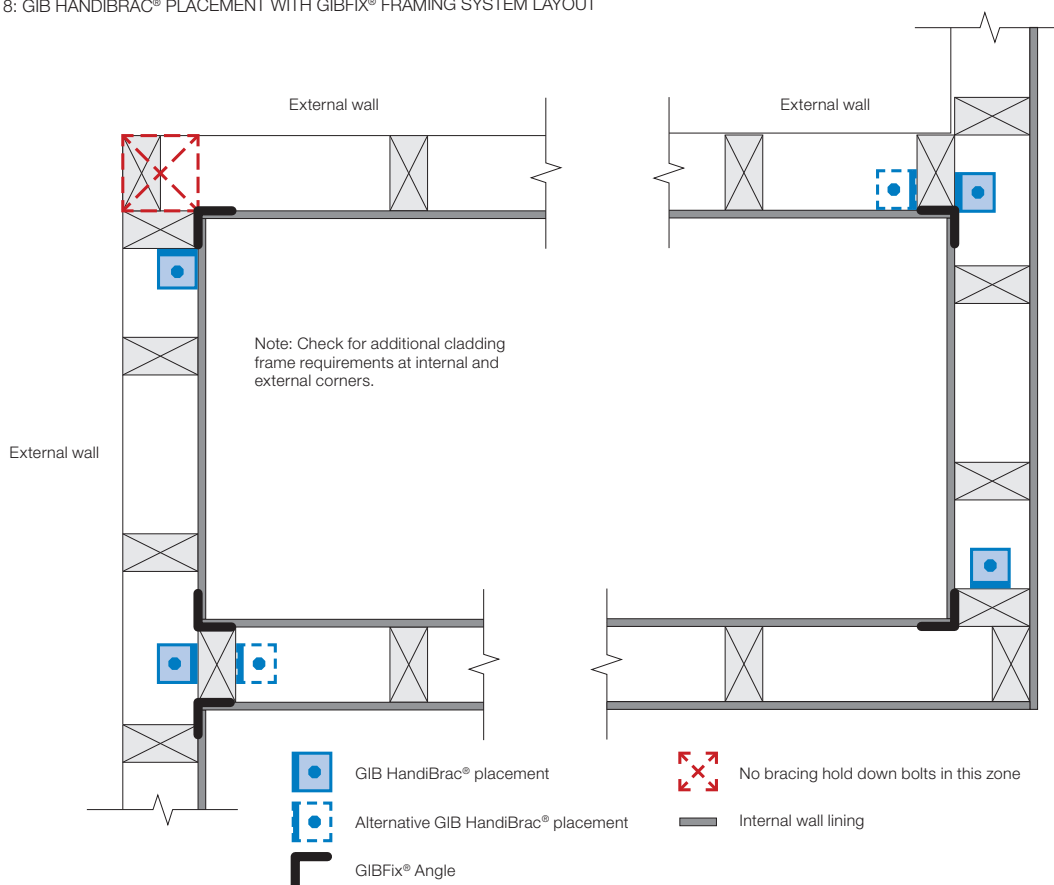
The GIB HandiBrac® is fixed to the stud which has the GIBFix® Angle.

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

TIMBER FLOORS

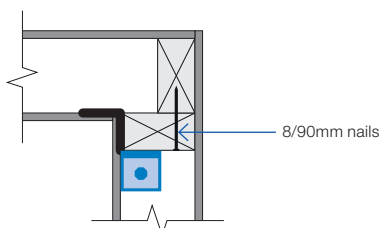
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

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



GEB013

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



GEB014

Ceiling diaphragms

GIB® plasterboard ceiling diaphragms are stiff and strong horizontal elements which effectively transfer loads to bracing walls. They themselves do not have a bracing unit rating but are used when bracing lines exceed 6m separation. The basic shape of a ceiling diaphragm is square or rectangular. Protrusions are permitted but cut-outs are not. The length of a ceiling diaphragm shall not exceed twice its width. Dimensions are measured between supporting bracing lines. Supporting bracing lines shall have a bracing capacity no less than the greater of 100 bracing units or 15 bracing units per metre of diaphragm dimension, measured at right angles to the line being considered, see figure 21.

Limitations for GIB® plasterboard ceiling diaphragms

Ceiling diaphragms may be constructed using any GIB® plasterboard provided perimeter fixing is at;

150mm centres for: Diaphragms up to 7.5m in length, no steeper than 15°.

100mm centres for: Diaphragms up to 7.5m in length, no steeper than 45°. Diaphragms up to 12m in length, no steeper than 25°.

Diaphragms outside these parameters must be specifically designed.

General fixing requirements for GIB® Ceiling Diaphragms:

- Linings must be installed over the entire area of the diaphragm.
- Fastening must be no less than 12mm from sheet edges and not less than 18mm from sheet ends.
- Sheets must be supported by framing members (e.g., ceiling battens) spaced at no more than 500mm centres for 10mm GIB® plasterboard and at no more than 600mm centres for 13mm GIB® plasterboard.
- Sheets within the diaphragm area may be fastened and finished conventionally in accordance with the publication entitled, "GIB® Site Guide". All joints shall be GIB® Joint Tape reinforced and stopped. It is recommended that sheet butt joints are formed off framing and back-blocked (see "GIB® Site Guide").
- Use full width sheets where possible. At least 900mm wide sheets with a length not less than 1800mm shall be used. Sheets less than 900mm wide but no less than 600mm may be used provided all joints with adjacent sheets are back-blocked (see "GIB® Site Guide" and figure 22).
- Fasteners are placed at the specified centres around the ceiling diaphragm with the corners fastened using the GIB EzyBrace® fastener pattern.

FIGURE 20: PROTRUSIONS AND CUTOUTS

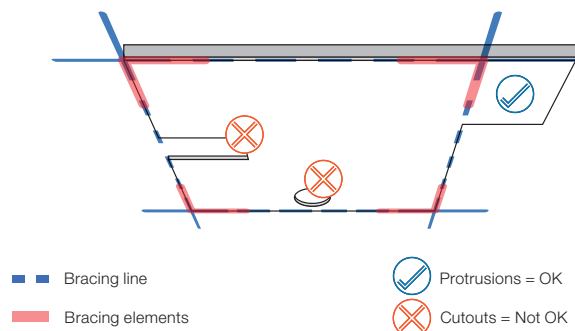


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

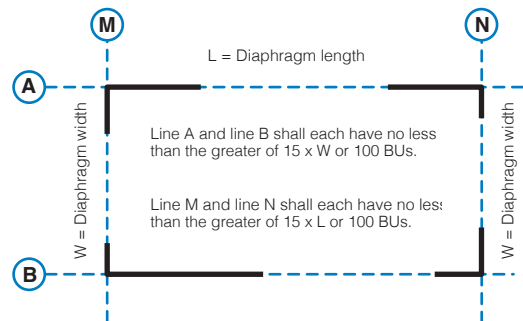


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS

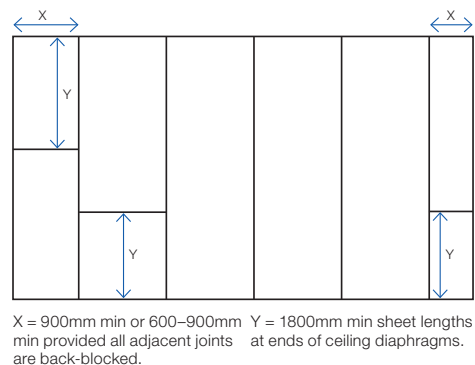
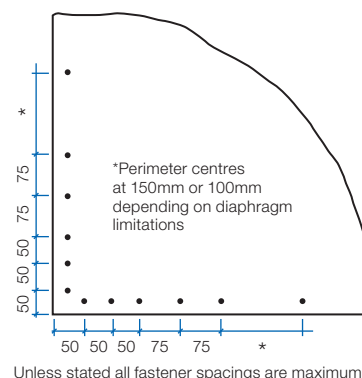


FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



GEB015

Ceiling battens in ceiling diaphragms

Ceiling diaphragms may be constructed using steel or timber ceiling battens.

Battens shall be spaced at a maximum of:

- 500mm for 10mm GIB® plasterboard.
- 600mm for 13mm GIB® plasterboard.

Timber battens shall be fixed in accordance with the requirements of NZS 3604:2011.

Metal battens shall be GIB® Rondo® battens with two external flanges of 8mm to allow direct screw fixing to roof framing.

GIB® Rondo® metal battens shall be fixed with 2/32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws to supporting framing.

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

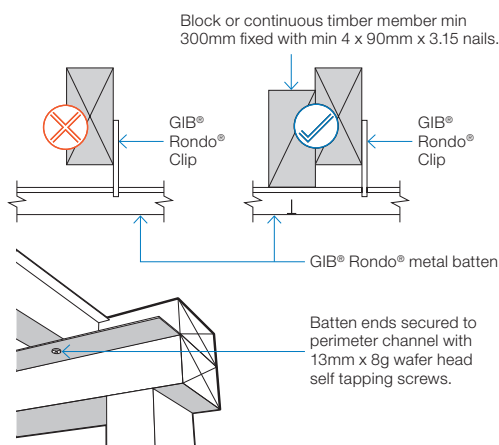
For GIB® Rondo® metal battens, a GIB® Rondo® metal channel or metal angle is required at the perimeter of the diaphragm. The perimeter channel shall be fastened to the top plate with 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screw at 300mm centres maximum.

Linings are fastened to metal using 25mm x 6g GIB® Grabber® Self Tapping screws and to timber framing using 32mm x 6g GIB® Grabber® High Thread screws. Alternatively 32mm x 7g GIB® Grabber® Dual Thread screws can be used in both cases. Fastener centres are specified on p.18.

Coved ceiling diaphragms can be achieved by using nominally 32 x 32 x 0.55mm proprietary galvanised metal angles ("back-flashing") at the changes in direction. These angles shall be:

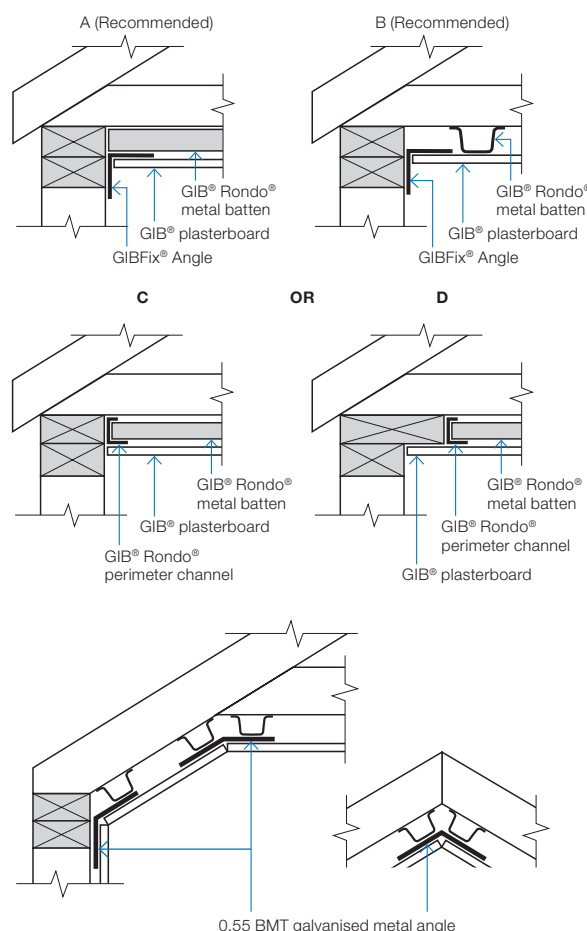
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screws.
- Fastened to timber framing using 32mm x 7g GIB® Grabber® Dual Thread screws when linings are installed.

FIGURE 26: GIB® RONDO® METAL CEILING BATTEN INSTALLATION



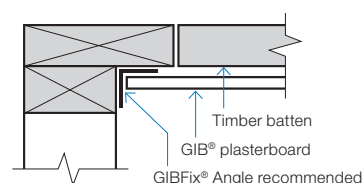
GEB016

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



GEB017

FIGURE 28: TIMBER CEILING BATTENS*



GEB018

Openings in ceiling diaphragms

SMALL OPENINGS

Small opening (e.g. down lights) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the ceiling diaphragm.

LARGE OPENINGS

Openings are allowed within the middle third of the diaphragms length and width. Fixing of sheet material to opening trimmers shall be at 150mm centres. Neither opening dimension shall exceed a third of the diaphragm width. Larger openings or openings in other locations require specific engineering design.

Where fireplace flue or range hood openings are required in a ceiling diaphragm use a galvanised metal backing plate as shown in figure 25, with a maximum hole diameter of 350mm.

Figure 25 can also be used for range hood openings in walls.

For information on openings in ceiling diaphragms contact the GIB® Helpline on 0800 100 442.

FIGURE 24: LARGE OPENINGS IN CEILING DIAPHRAGMS

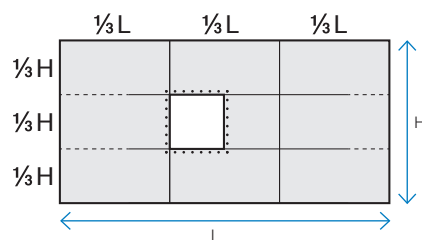
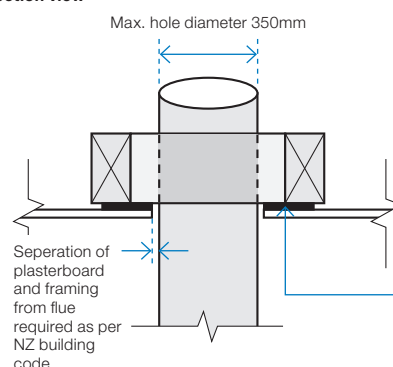


FIGURE 25: FIREPLACE FLUES AND RANGE HOOD OPENINGS

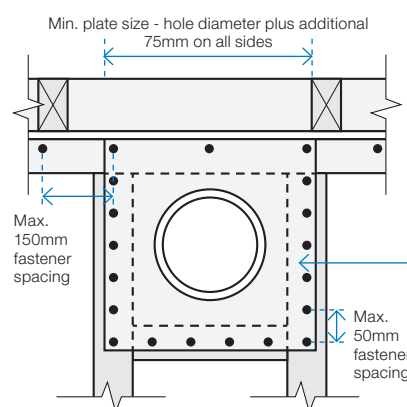
Section view



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.

Plan view



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.

Plasterboard ceiling not shown in plan view

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

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

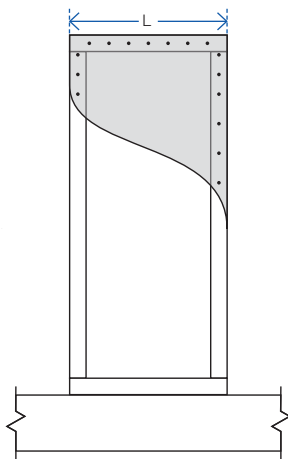
'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

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

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

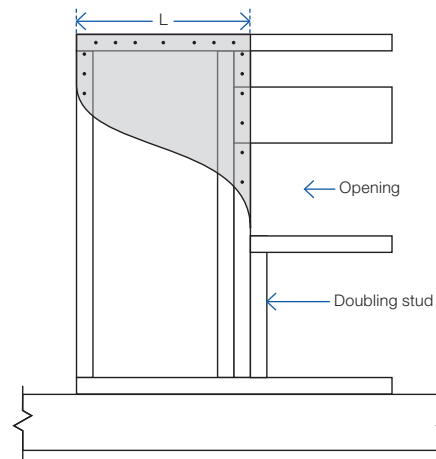
Fastener spacings and diagram scales shown in Figures 29-32 are indicative only. Refer to p.23-30 for construction details.

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



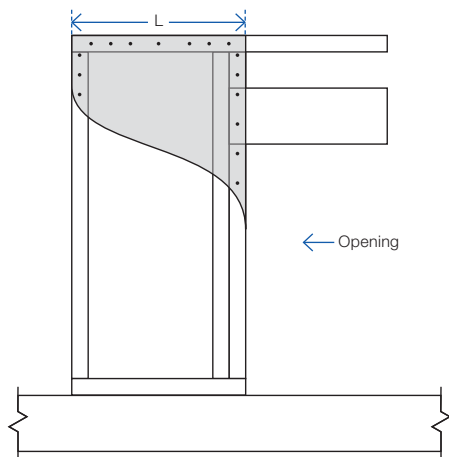
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



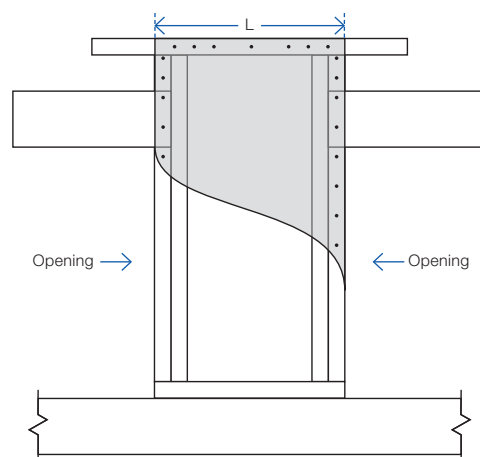
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



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

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



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

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

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

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

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

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

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

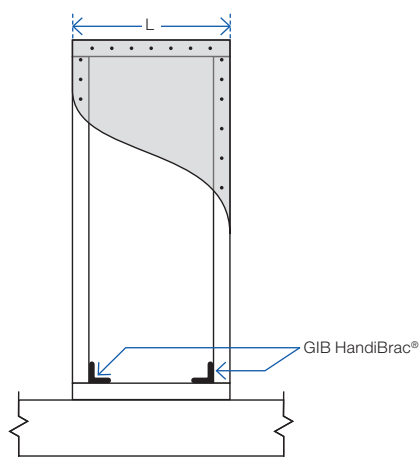
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

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

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

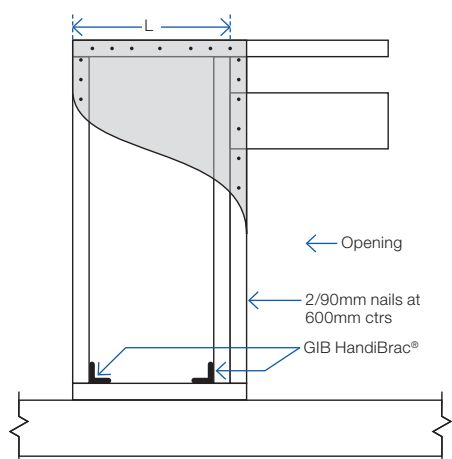
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



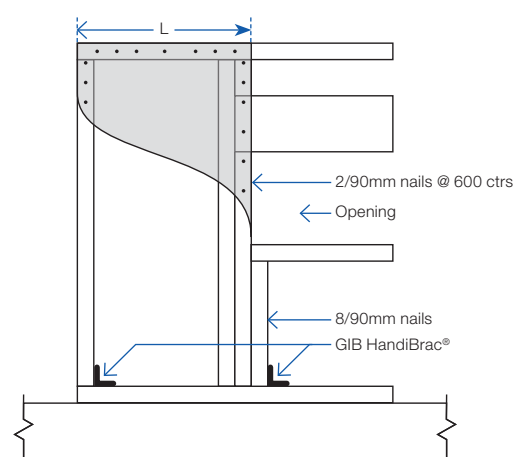
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



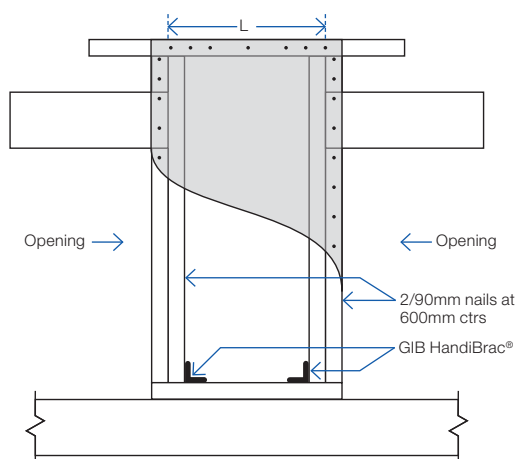
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



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

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



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

GIB EzyBrace® Systems specification GS1-N

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

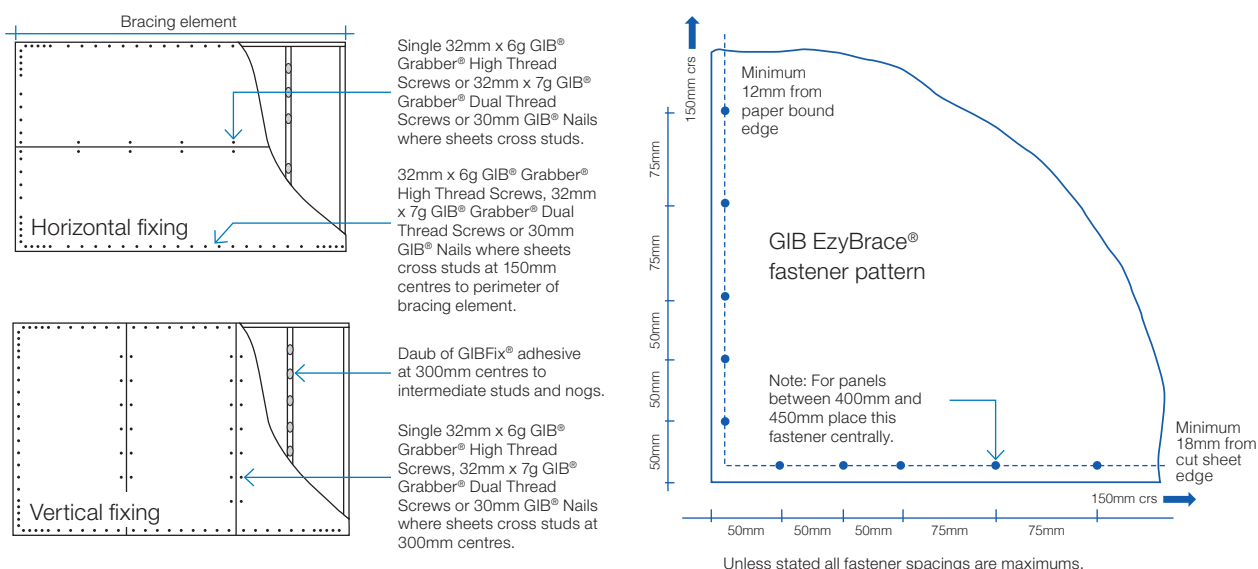
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification GS2-NOM

Specification code	Minimum length (m)	Lining requirement
GS2-NOM	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

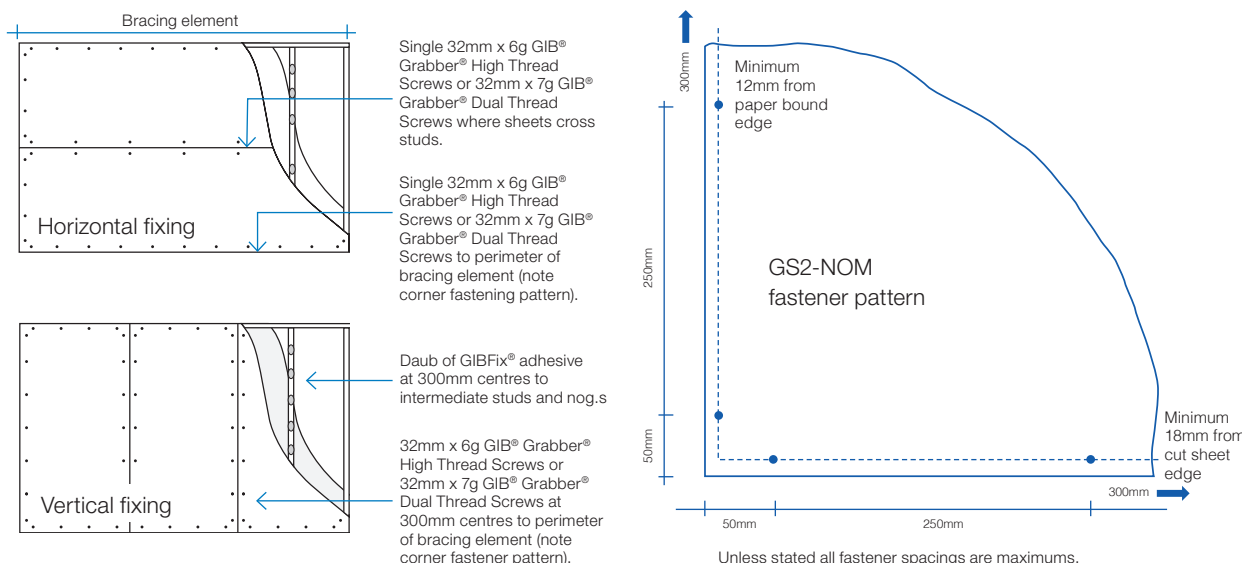
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GS2-NOM ADHESIVE FIXING OPTION AT DOOR JAMBS

As an alternative to using screw fixings, a continuous 6-10mm bead of solvent based GIBFix® All-Bond can be applied along the full height studs immediately adjacent to an internal door opening and at the door lintel or head trimmer. The lining is then bedded into the adhesive and installed into the rebated jamb, as shown in figure 38.

This solvent based adhesive option may only be used with GS2-NOM specification and is designed to reduce popping of fasteners around door openings on internal walls.

FIGURE 37: SCREW FIX FOR OPENINGS

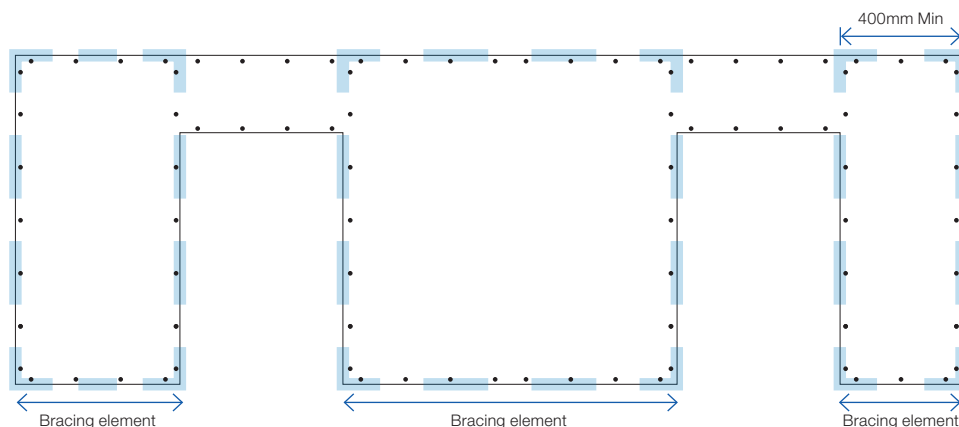
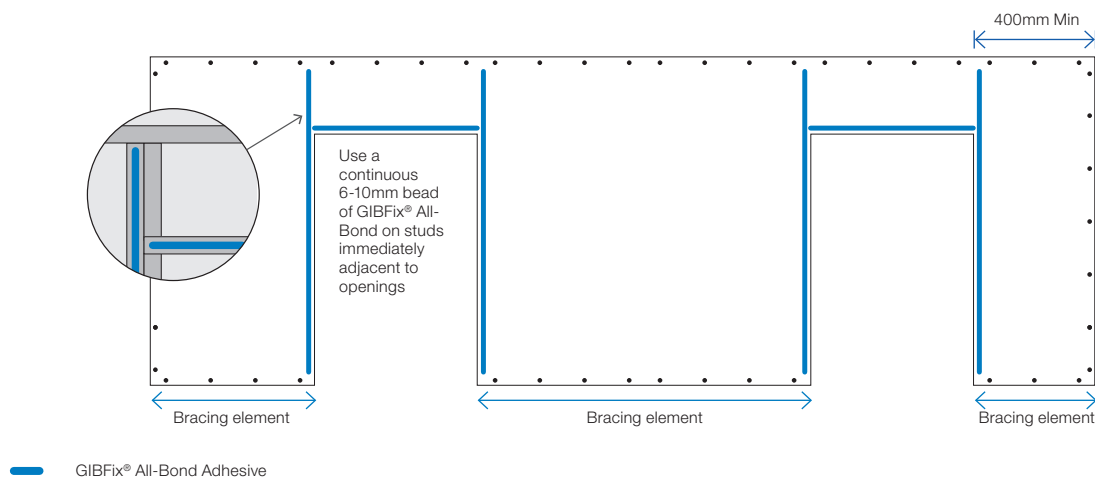
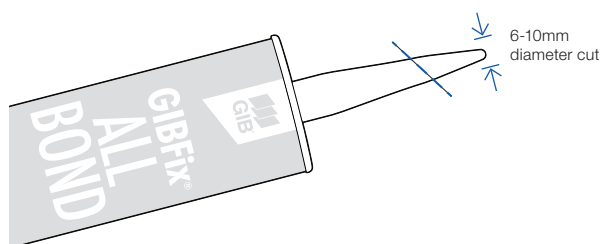


FIGURE 38: SCREW AND ADHESIVE FIX FOR OPENINGS



ADHESIVE NOZZLE APERTURE



GIB EzyBrace® Systems specification GS2-N

Specification code	Minimum length (m)	Lining requirement
GS2-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber Floor

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

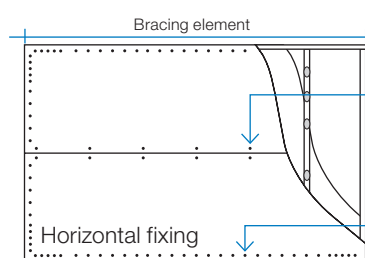
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

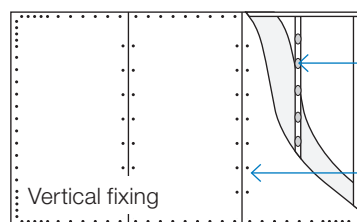
JOINTING

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



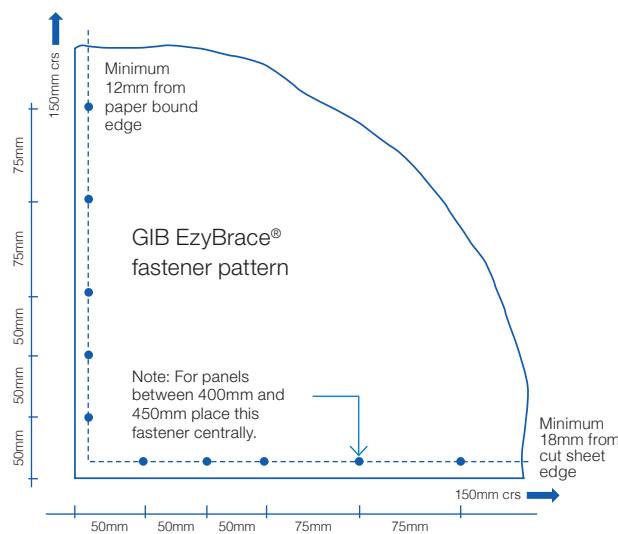
Single 32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails where sheets cross studs.

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails at 150mm centres to perimeter of bracing element.



Daub of GIBFix® adhesive at 300mm centres to intermediate studs and nogs.

Single 32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails at 300mm centres.



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

GIB EzyBrace® Systems specification GSP-H

Specification Code	Minimum length (m)	Lining requirement	Other requirements
GSP-H	0.4	Any 10mm or 13mm GIB® plasterboard lining to one side of framing and minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails.

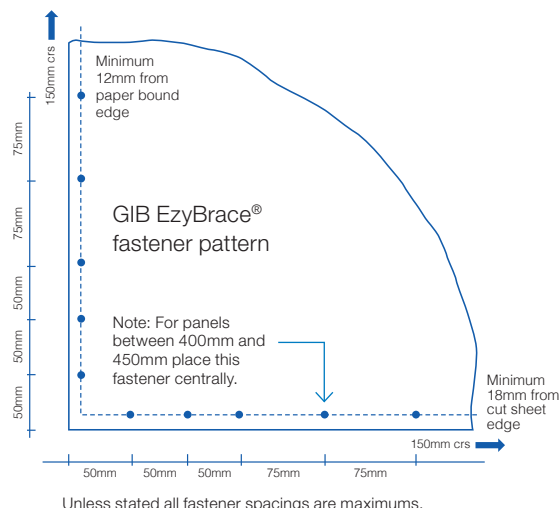
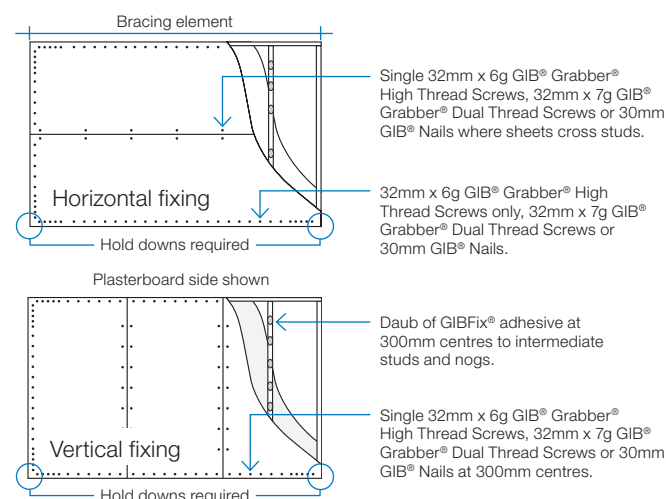
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification BL1-H

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

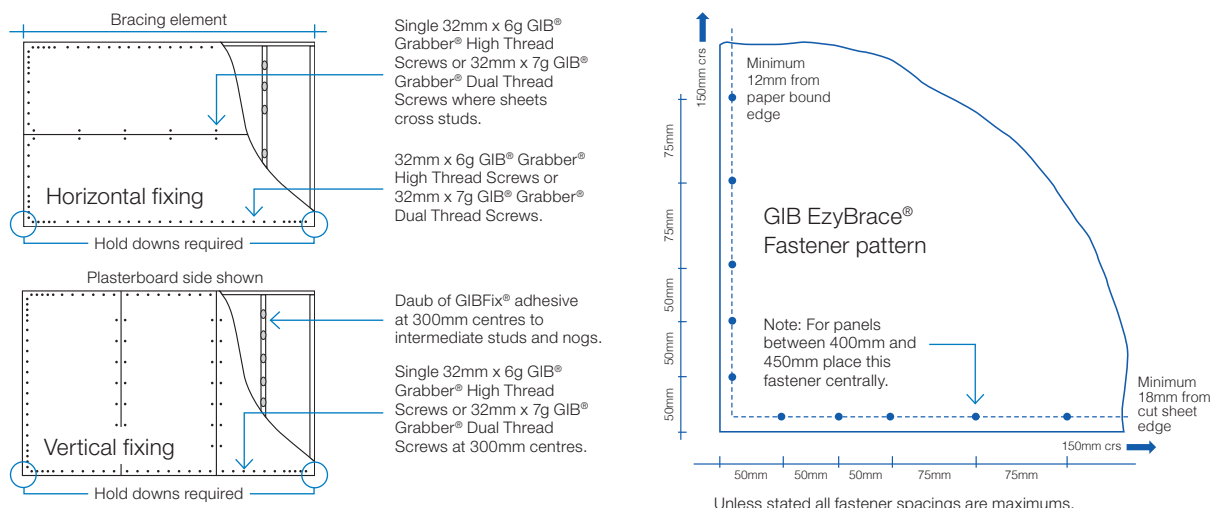
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification BLG-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLG-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus any 10mm or 13mm GIB® plasterboard to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

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

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus any 10mm or 13mm GIB® plasterboard lining to the other side.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Other side: 32mm x 6g GIB® Grabber® High Thread Screws, 30mm GIB Nails or 32mm x 7g GIB® Grabber® Dual Thread Screws.

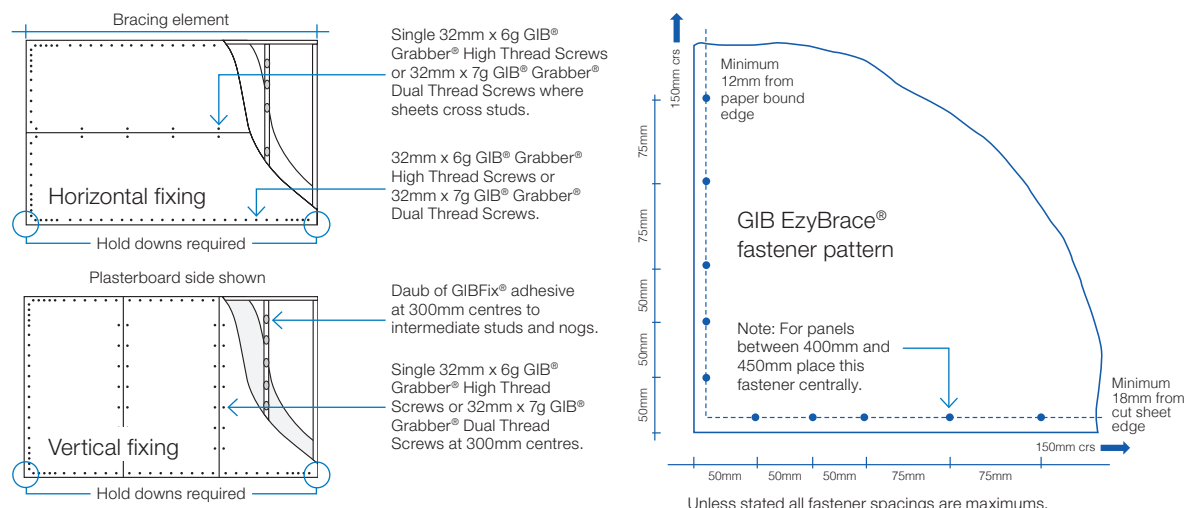
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification BLP-H

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

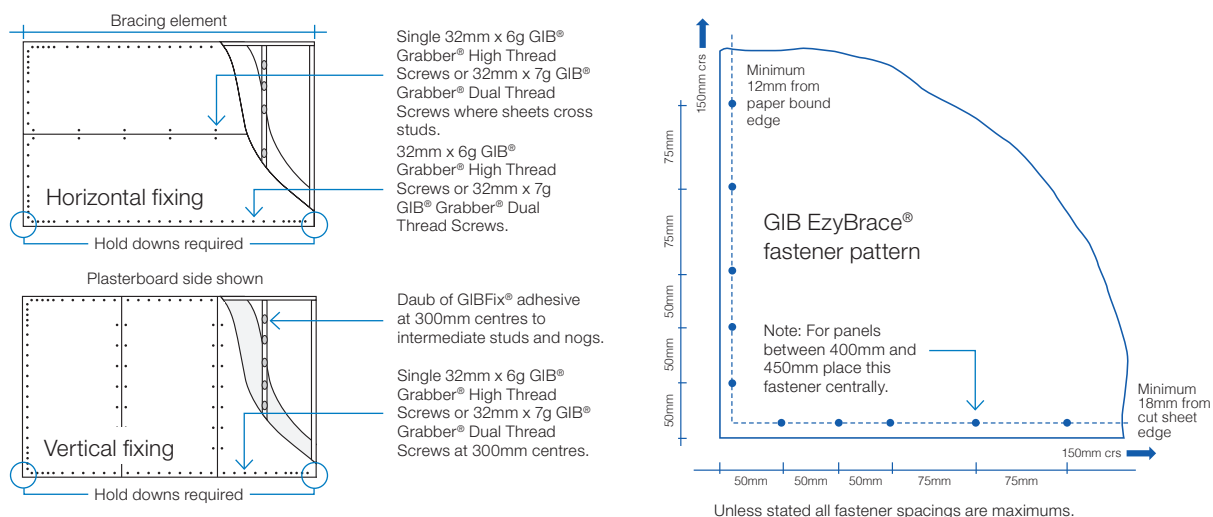
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread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

Fastener centres

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

JOINTING

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



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



Winstone Wallboards is committed to protecting the environment. Environmental matters are integrated into all business activities:

- Our operations strive to exceed all environmental regulatory requirements at all times.
- Protection of the environment is a day to day responsibility that we all must accept.
- We allocate appropriate management time and resources to address relevant environmental issues and continuously improve our activities in that area.
- We will achieve our standards of performance through positive action, employee involvement and constant communication with our neighbours, local authorities and customers.

Minimise on-site waste when designing and/or installing GIB® Systems. For larger projects give consideration to our cut-to-length service to reduce waste. GIB® plasterboard off-cuts, if separated from other waste building materials, can be readily recycled.

For larger projects waste can be diverted to compost manufacturers who grind up the GIB® plasterboard and use it in compost. For smaller projects, the GIB® plasterboard can be ground up and spread around the building site.

GLOBAL GREENTAG^{CERT}™

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

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.

COPYRIGHT

Copyright © Winstone Wallboards Ltd 2016. All of the material contained in this brochure, including all text, tables, charts, graphs, drawings, images, diagrams are protected by copyright. These materials may not be reproduced, adapted or transmitted in any form by any process, without the permission of Winstone Wallboards Ltd.

Winstone Wallboards asserts its moral rights and reserves all other intellectual property rights in the materials contained in this brochure and related to GIBFix® Framing System and GIB EzyBrace® Systems.

TRADEMARKS

The names GIB®, GIB Fyrelite®, GIB Ultralite®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, GIB HandiBrac®, GIB EzyBrace®, the colour blue for GIB Braceline®, the colour pink for GIB Fyrelite®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

PATENTS

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



SDC - Approved Building Consent Document - BC231907 - Pg 169 of 446 - 21/03/2024 - helen.fowler

FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442



Bracing Supplement Document

Issue Date December 2016

GIB® Bracing design notes

SUPPLEMENT

ISSUE DATE

GIB Ezybrace® Systems 2016 BU/m Ratings	Sept-16
Designing and Building with GS2-NOM	Sept-16
Multi Layer Bracing Systems	Aug-16
GIB® News article: Wings, Blocks & Diaphragms	Apr-13
GIB® News article: Low Damage Solutions for Non- Structural Elements	Jul-12
GIB® News article: Canterbury Earthquake Online Guides	Mar-12
Bracing Light Timber Frame Buildings Using Sheet Materials	Nov-11
Distribution of Wall Bracing Elements	Nov-11
Designing Bracing Upgrades	Jun-11



GIB Ezybrace® Systems 2016 BU/m Ratings

Issue Date September 2016

The BU/m ratings for GIB EzyBrace® Systems shown below are responsibly conservative and are provided to allow manual calculation, and for use in alternative proprietary software.

The GIB EzyBrace® 2016 software delivers more accurate demand calculations based on specific building parameters entered, and bracing resistance

(BU/m) is often higher than the values presented below. Do not use this table to assess bracing substitutions.

Table 1: GIB® Standard Bracing Unit Ratings

Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
GS1-N	0.4	GIB® Standard plasterboard one side	N/A	50	55
	1.2			70	60
GS2-N	0.4	GIB® Standard plasterboard both sides	N/A	70	65
	1.2			95	85
GS2-NOM	0.4	GIB® Standard plasterboard both sides (standard GIB® site guide fastener pattern)	N/A	50	50
GSP-H	0.4	GIB® Standard plasterboard one side, structural plywood the other	Panel hold-down fixings	100	115
	1.2			150*	150*

Table 2: GIB Braceline® Bracing Unit Ratings

Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
BL1-H	0.4	GIB Braceline® one side	Panel hold-down fixings	90	100
	1.2			125*	105
BLG-H	0.4	GIB Braceline® one side,	Panel hold-down fixings	110	115
	1.2	GIB® Standard plasterboard the other		150*	145*
BLP-H	0.4	GIB Braceline® one side, structural plywood the other	Panel hold-down fixings	120*	135*
	1.2			150*	150*

* Timber Floors – A limit of 120 BU/m for NZS 3604:2011 timber floors applies unless specific engineering ensures that uplift forces generated by elements rated higher than 120 BU/m can be resisted by floor framing.



Wall Heights other than 2.4m

The published Bracing Unit ratings are based on a 2.4 metre height. For greater heights, the ratings must be multiplied by a factor $f = 2.4$ divided by the actual wall height. The Bracing Unit ratings for walls higher than 2.4 metres will reduce.

For example:

The Bracing Unit rating of a 2.7 metre high wall is obtained by multiplying the values in Tables 1 and 2 by $f = 2.4/2.7 = 0.89$

The Bracing Unit rating of a 3.6 metre high wall is obtained by multiplying the values in Tables 1 and 2 by $f = 2.4/3.6 = 0.67$

The height of walls with a sloping top plate can be taken as the average height.

Walls lower than 2.4 metres shall be rated as if they were 2.4 metres high.

For more information visit gib.co.nz/ezybrace or call the GIB® Helpline on 0800 100 442.

Designing and Building with GS2-NOM

Issue Date September 2016

GIB EzyBrace® Systems 2016 literature and software includes the option of allowing nominally fixed internal walls lined on both sides with GIB® plasterboard to contribute to the building's bracing resistance. The fixing pattern as illustrated below represents the standard fixing pattern as published on page 38-39 of the GIB® Site Guide (December 2014).

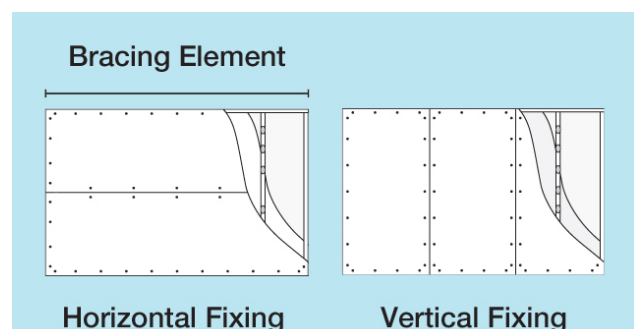
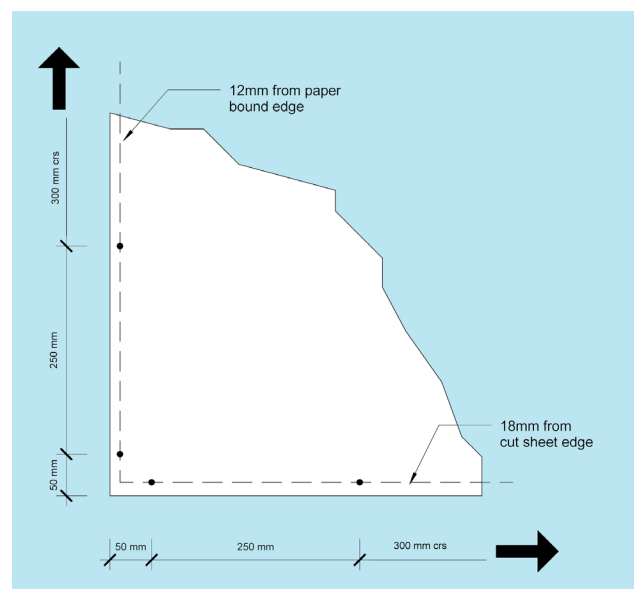
Building investigations following the Canterbury earthquakes have confirmed that not only designated bracing elements (such as GS1-N & GS2-N) resist lateral forces. Nominally fastened internal walls also contribute (often substantially) to the building's total resistance. An earthquake does not distinguish between designated GIB® plasterboard bracing elements and nominally fastened GIB® plasterboard linings. All the walls contribute to providing resistance against wind and earthquake forces.

Permitting nominally fixed internal GIB® plasterboard linings to contribute to bracing resistance means that the total number of nails or screws can be reduced significantly. This results in a simpler and more uniform fastener pattern and a reduction in the risks of fastener 'popping' as a result of timber movement. This improves the chance of achieving a high quality of finish.

When compared with GS1-N and GS2-N, the same Bracing Unit (BU) rating can be achieved with GS2-NOM using 30% to 40% fewer screws.

The design examples on the following pages illustrate how fastener numbers can be reduced.

FIGURE 1: GS2-NOM SCREW FIXING PATTERN



GS2-NOM - DESIGN APPROACH 1

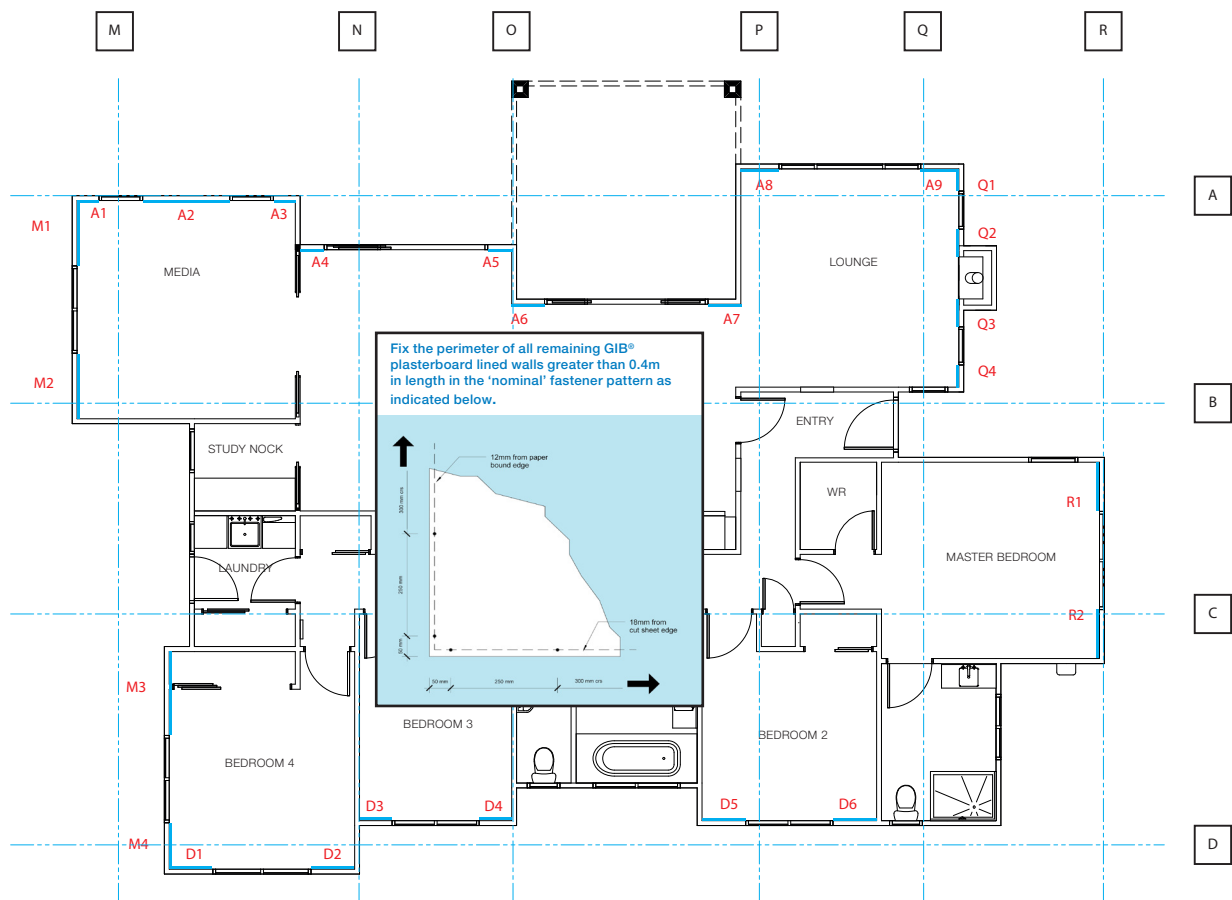
The design example in Figure 2 below shows designated bracing elements GS1-N and BL1-H used around the perimeter of the house. A note is added that all remaining GIB® plasterboard linings are fixed at the nominal GIB® Site Guide pattern.

In this particular case the design calculations in Figure 3 show that bracing resistance exceeds demand by 60% when accounting for nominally fixed GS2-NOM throughout. Had GS1-N or GS2-N designated internal bracing elements been used, in addition to nominally fixed (not counted) remaining walls, the fastener count could have increased by more than 500 screws.

The calculations also show how lengths of GS2-NOM can be accumulated on a bracing line. Lengths of internal wall equal or greater than 0.4 m can be added, provided walls are lined both sides with a minimum of 10 mm GIB® Standard plasterboard fixed in the nominal GIB® Site Guide pattern. The accumulated length is then entered in the bracing resistance calculations. Bathroom walls and walls with significant openings are not added to the accumulated length.

In this case the Building Official should be able to take the design redundancy into account, ensure internal walls lined both sides are generally fixed in accordance with the standard GIB® Site Guide GS2-NOM pattern, and focus more specifically on critical elements around the building perimeter.

FIGURE 2: DESIGN APPROACH 1– BRACING LAYOUT PLAN



This design considers the inherent bracing provided by the structure and tops up with designated bracing elements where required. To avoid any potential for miscommunication and delays onsite during construction and inspection, designers should clearly note the intent to use standard GIB® Site Guide GS2-NOM fixing on bracing plans.



FIGURE 3: DESIGN APPROACH 1 - BRACING RESISTANCE CALCULATIONS INCLUDING GS2-NOM

Single Level Along Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									624	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	992 159%	976 137%
A	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	1.60		2.4	GS1-N	GIB®	110	96		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.50		2.4	GS1-N	GIB®	28	29		
	5	0.50		2.4	GS1-N	GIB®	28	29		
	6	0.70		2.4	GS1-N	GIB®	41	41		
	7	0.70		2.4	GS1-N	GIB®	41	41		
	8	0.80		2.4	GS1-N	GIB®	49	47		
	9	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									388 OK	377 OK
B	1	1.60		2.4	GS2-NOM	GIB®	80	80		
	2	1.60		2.4	GS2-NOM	GIB®	80	80		
									160 OK	160 OK
C	1	1.80		2.4	GS2-NOM	GIB®	90	90		
	2	1.80		2.4	GS2-NOM	GIB®	90	90		
									180 OK	180 OK
D	1	0.80		2.4	GS1-N	GIB®	49	47		
	2	0.80		2.4	GS1-N	GIB®	49	47		
	3	0.60		2.4	GS1-N	GIB®	34	35		
	4	0.60		2.4	GS1-N	GIB®	34	35		
	5	0.80		2.4	GS1-N	GIB®	49	47		
	6	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									264 OK	259 OK

Single Level Across Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									785	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1155 147%	1103 155%
M	1	1.30		2.4	GS1-N	GIB®	90	78		
	2	1.30		2.4	GS1-N	GIB®	90	78		
	3	1.60		2.4	GS1-N	GIB®	110	96		
	4	0.90		2.4	GS1-N	GIB®	57	53		
External Length = 12									347 OK	305 OK
N	1	3.20		2.4	GS2-NOM	GIB®	160	160	160 OK	160 OK
O	1	3.20		2.4	GS2-NOM	GIB®	160	160	160 OK	160 OK
P	1	2.00		2.4	GS2-NOM	GIB®	100	100	100 OK	100 OK
Q	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	0.40		2.4	GS1-N	GIB®	21	23		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.40		2.4	GS1-N	GIB®	21	23		
	5	2.00		2.4	GS2-NOM	GIB®	100	100		
									185 OK	193 OK
R	1	0.90		2.4	BL1-H	GIB®	102	92		
	2	0.90		2.4	BL1-H	GIB®	102	92		
External Length = 12									204 OK	185 OK

GS2-NOM - DESIGN APPROACH 2

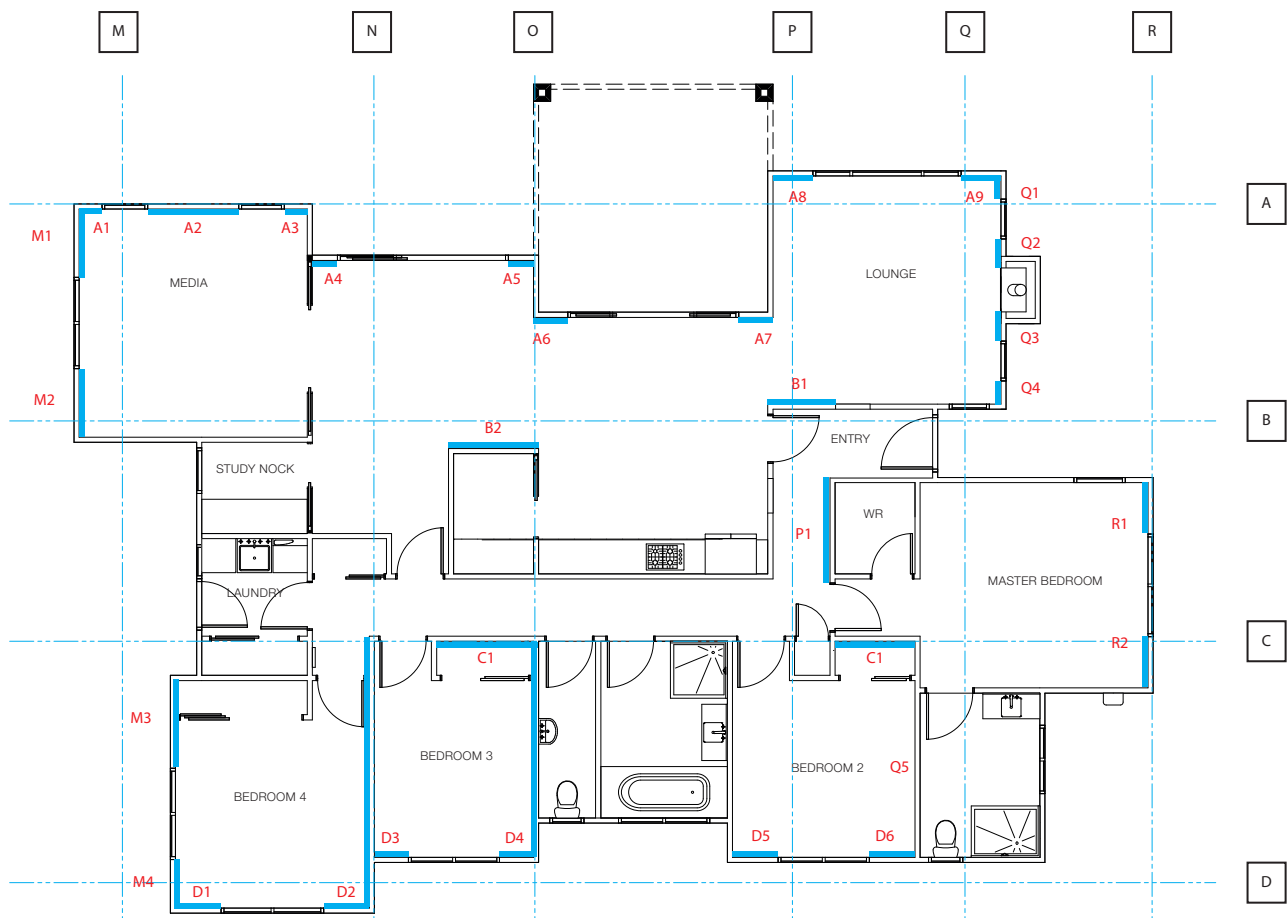
The design approach in Figure 4 below shows designated bracing elements GS1-N and BL1-H used around the perimeter of the house. Standard GIB® Site Guide fixing is used on internal walls lined both sides. Specific sections of these internal walls are nominated as GS2-NOM bracing elements, sufficient to meet or exceed the minimum bracing demand on the particular bracing grid line.

In this case GS2-NOM is used as a conventional bracing element. This method might be preferred by some designers, builders and building officials as it represents a more traditional approach to bracing resistance calculations and construction and permits focus on designated elements.

The outcome in terms of number of fastener is the same as that achieved with DESIGN APPROACH 1 where the fastener count could have increased by 500 screws if GS1-N or GS2-N designated internal bracing elements had been used in place of GS2-NOM.

In this case the calculations show how GS2-NOM is used as an orthodox bracing element and the building consent and inspection processes are also conventional. Given the many internal walls not counted in this case, it is still suggested that inspection focus should be more specifically on critical elements around the building perimeter.

FIGURE 4: DESIGN APPROACH 2 – BRACING LAYOUT PLAN



This design uses GS2-NOM as a conventional bracing element and designers should clearly identify designated elements on the bracing plan. Not counted internal walls fastened in the standard GIB® Site Guide pattern add further redundancy.



FIGURE 4: DESIGN APPROACH 2 – BRACING LAYOUT PLAN

Single Level Along Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									624	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1152 185%	1136 160%
A	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	1.60		2.4	GS1-N	GIB®	110	96		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.50		2.4	GS1-N	GIB®	28	29		
	5	0.50		2.4	GS1-N	GIB®	28	29		
	6	0.70		2.4	GS1-N	GIB®	41	41		
	7	0.70		2.4	GS1-N	GIB®	41	41		
	8	0.80		2.4	GS1-N	GIB®	49	47		
	9	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									388 OK	377 OK
B	1	5.00		2.4	GS2-NOM	GIB®	250	250	250 OK	250 OK
C	1	5.00		2.4	GS2-NOM	GIB®	250	250	250 OK	250 OK
D	1	0.80		2.4	GS1-N	GIB®	49	47		
	2	0.80		2.4	GS1-N	GIB®	49	47		
	3	0.60		2.4	GS1-N	GIB®	34	35		
	4	0.60		2.4	GS1-N	GIB®	34	35		
	5	0.80		2.4	GS1-N	GIB®	49	47		
	6	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									264 OK	259 OK

Single Level Across Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									785	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1645 210%	1593 224%
M	1	1.30		2.4	GS1-N	GIB®	90	78		
	2	1.30		2.4	GS1-N	GIB®	90	78		
	3	1.60		2.4	GS1-N	GIB®	110	96		
	4	0.90		2.4	GS1-N	GIB®	57	53		
External Length = 12									347 OK	305 OK
N	1	5.00		2.4	GS2-NOM	GIB®	250	250	250 OK	250 OK
O	1	5.00		2.4	GS2-NOM	GIB®	250	250	250 OK	250 OK
P	1	5.00		2.4	GS2-NOM	GIB®	250	250	250 OK	250 OK
Q	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	0.40		2.4	GS1-N	GIB®	21	23		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.40		2.4	GS1-N	GIB®	21	23		
	5	5.20		2.4	GS2-NOM	GIB®	260	260		
									345 OK	353 OK
R	1	0.90		2.4	BL1-H	GIB®	102	92		
	2	0.90		2.4	BL1-H	GIB®	102	92		
External Length = 12									204 OK	185 OK

GS2-NOM ADHESIVE FIXING OPTION AT REBATED JAMBS

When rebated jambs are used, GS2-NOM fastener numbers can be further reduced by using a continuous bead of GIBFix® All-Bond solvent-based

adhesive on studs adjacent to the opening, as illustrated below. This method only applies to GS2-NOM fixing and not to other designated bracing elements.

If the adhesive fixing method is preferred, it is strongly recommended that it is discussed with the site building official at an early stage, prior to starting lining installation, so that an inspection and sign-off process can be agreed.

There should be ample opportunity to do this given that lining installation commences at an advanced stage of the project.

CLEAR COMMUNICATION BETWEEN THE DESIGNER, BUILDER AND BUILDING CONSENT AUTHORITY IS KEY!

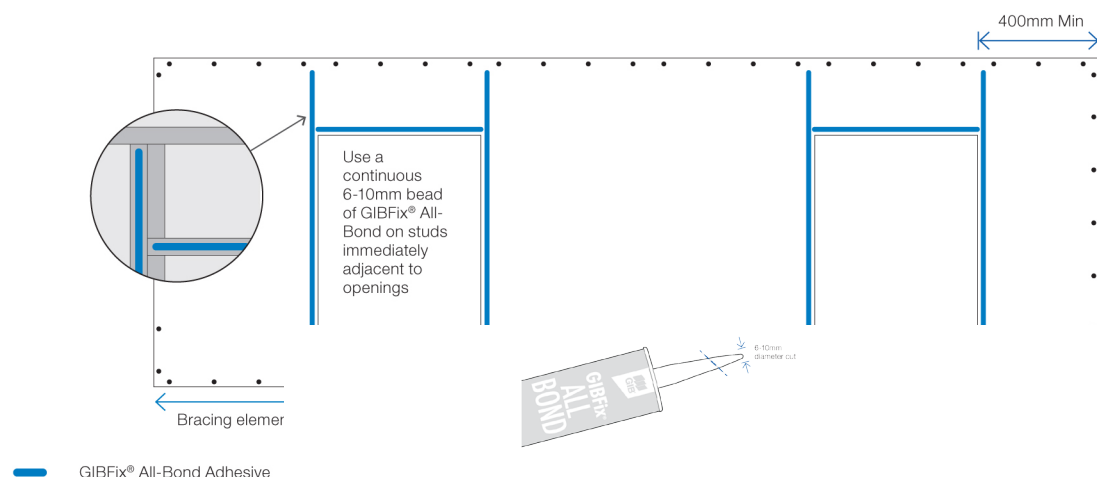
A poor outcome would be when the designer and builder have elected to use the adhesive fixing method but have failed to advise the site building official prior to lining. If the building official has reservations about the application of adhesive, one of the following processes can be agreed;

A number of random core holes can be requested. They can be drilled with a small hole-saw in locations above openings as agreed between the building

official and installer. If presence of GIB® All-Bond adhesive is evident it is at the building official's discretion to accept the installation 'on reasonable grounds'.

If the decision is made to reject the adhesive fixing method post-lining, screws can be installed in accordance with the Figure 1 GS2-NOM fixing pattern. If GIBFix® All-Bond adhesive has been used it is prudent to wait 7 days for the adhesive to fully cure before applying screws.

FIGURE 6: GS2-NOM SCREW AND GIBFIX® ALL-BOND FIXING FOR REBATED JAMBS



SUMMARY GS2-NOM DESIGN, INSTALLATION AND INSPECTION

GS2-NOM

- GS2-NOM permits internal walls lined in accordance with standard GIB® Site Guide fixing to contribute to bracing resistance
- Using GS2-NOM can result in a significant reduction of screw fixings which in turn aids quality of finish
- Using GS2-NOM can result in a more uniform fastener pattern
- The decision to use GS2-NOM requires agreement between the various parties involved in the design and construction process
- Using GS2-NOM in calculations often results in designs with bracing resistance well exceeding bracing demand because most internal walls can be counted. In addition, conservative Bracing Unit ratings have been assigned to GS2-NOM in the GIB EzyBrace® Systems 2016 software.
- When inspecting GS2-NOM installations, the design margin should be taken into account
- When design margins are tight, focus should first be on bracing distribution and the design and construction of critical bracing elements, e.g. narrow panels adjacent to significant openings such as large windows, ranch sliders or garage doors.

- GS2-NOM specifies 300 mm maximum perimeter screw centres. Closer fixing is permitted.

GS2-NOM ADHESIVE FIXING OPTION

- If the GS2-NOM adhesive fixing method is preferred, prior communication between the contractor, installer, and building official is required. Installation of adhesive fixed GS2-NOM without prior consultation with the site building official is discouraged.
- The lining installer may wish to take a photographic record of the installation. However, acceptance depends on the practices adopted by the particular Building Control Authority and prior communication is once again recommended.
- If adhesive fixed GS2-NOM has been installed without prior consultation with the site building official, random core holes can be drilled to determine the presence of adhesive and establish 'reasonable grounds' for sign off. If required, installation of additional screws can be requested.

COMMUNICATION IS KEY WHEN DESIGNING AND INSPECTING BRACING, INCLUDING GS2-NOM FIXING.

PRODUCT SUBSTITUTION

- 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 compromise performance. Follow system specifications.

TECHNICAL MATERIAL & ASSISTANCE

Technical specification materials are available from www.gib.co.nz/ezybrace. Or call the GIB® Helpline 0800 100 442 for more information.





Multi Layer Bracing Systems

Issue Date August 2016

SDC - Approved Building Consent Document - BC231907 - Pg 180 of 446 - 21/03/2024 - helen.fowler

In a two layer wall system such as GIB® Fire or Noise control systems, the plasterboard bracing element sheets can be either:

Applied directly to the framing, with fasteners set out as per the bracing instructions and a fastener length as per the system being installed. The inner layer can be left unstopped. Or,

Applied to the outer sheets with the outer layer fasteners being installed as per the bracing instructions and fastener length as per the system being installed.

The outer layer is to be tapped and stopped as per GIB® Site Guide.

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

Wings, Blocks and Diaphragms

Issue Date April 2013

We are often asked if separate bracing calculation is required for 'wings' or 'blocks'.

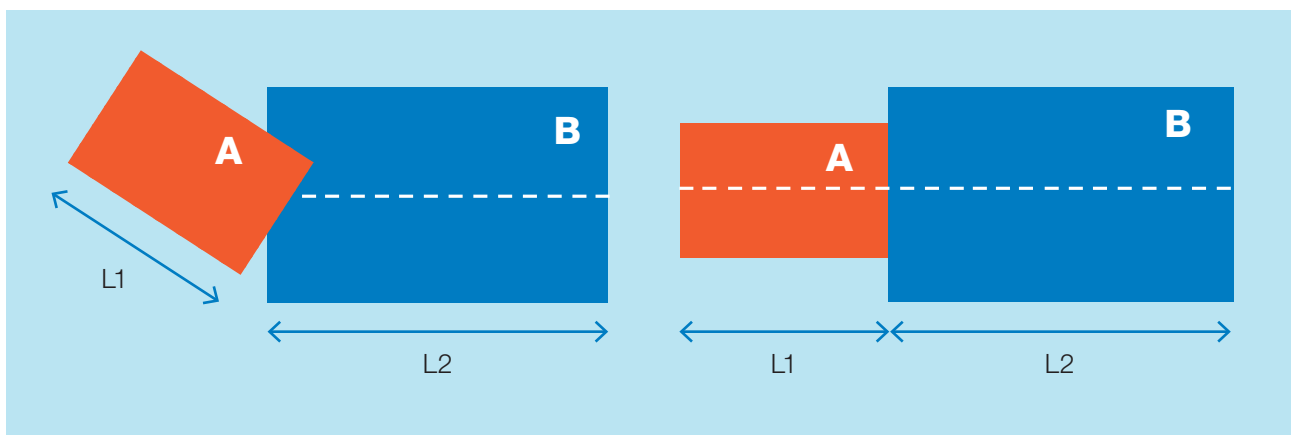
NZS 3604:2011 paragraph 5.1.5 requires wings or blocks to 'provide sufficient bracing individually' if they extend more than 6 metres from main building. Note that this requirement refers to the provision of bracing, and that separate calculation is not mentioned as a requirement.

The intent of the clause is that provision of bracing is relative to floor area. In other words, if a wing represents 20% of the total building floor area, then at least 20% of the bracing demand must be provided in that wing. This can be achieved by separate calculation, but is often more readily achieved by treating the building as a single unit and simply ensuring bracing distribution is balanced and proportional to floor area.

Even when wings or blocks are at an angle to the main building, a single calculation can be carried out. NZS3604:2011 paragraph 5.4.4 gives guidance for walls at angles to the bracing grid and is intended for single or few individual walls. Wings or blocks at an angle are better treated separately or by 'stretching' the building along the ridge line for calculation purposes and treating it as a single rectangular structure. The angle to bracing line function in the GIB EzyBrace® calculation sheet does not need to be applied in this situation.

Using a 'stretched' rectangular design will deliver the same outcome as doing two separate calculations. Again the important issue is to ensure that bracing provision and distribution is proportional to floor area.

Calculating A and B separately give the same bracing demand as treating them as a single 'stretched' building. Ensure that bracing provision is proportional to floor area.



The other frequently encountered bracing question relates to ceiling diaphragms and when they are required.

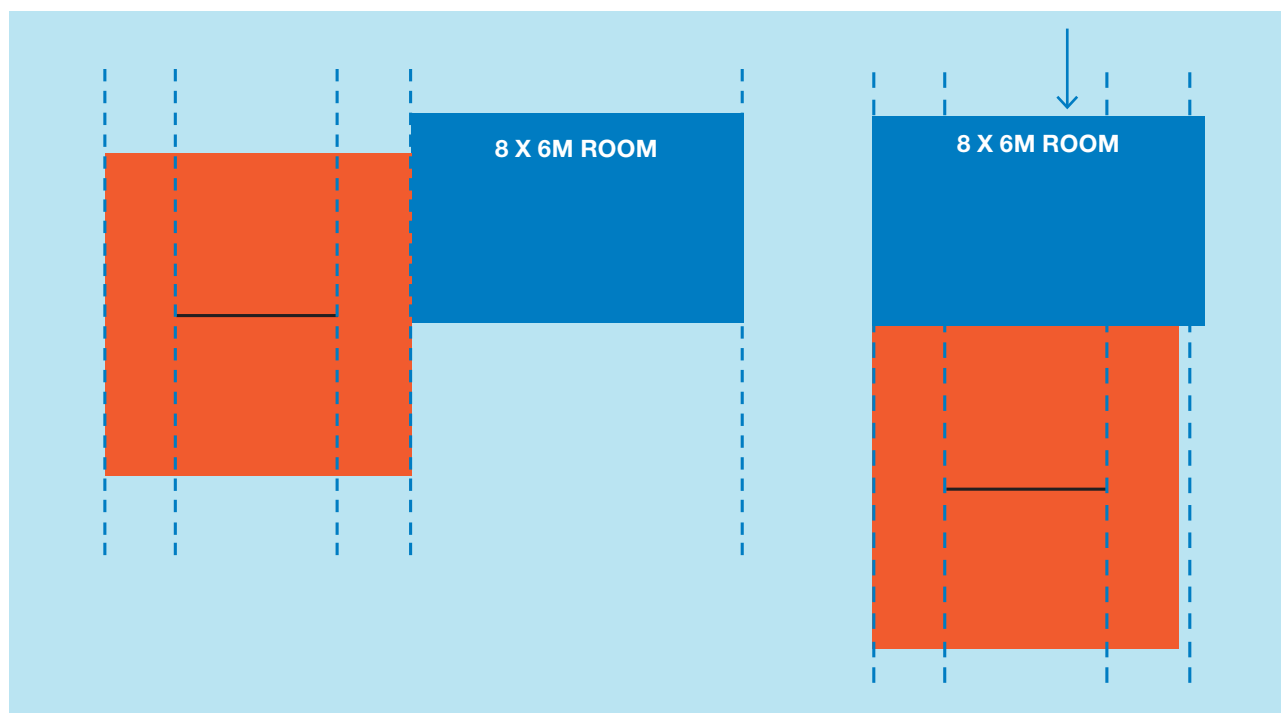
We often see diaphragms specified where they are not needed.

NZS3604:2011 paragraph 5.4.6 states that bracing lines 'shall not be at more than 6 m centres provided that there need be no bracing lines within the area covered by a diaphragm ...'. The need for a diaphragm is thus determined by the spacing of bracing lines and not by the dimensions of a particular room.

The illustration below shows two designs incorporating a 8 x 6 m room. In one case NZS3604:2011 requires a ceiling diaphragm and in the other case it does not because bracing lines dissecting the room are spaced at less than 6 m.

A point to note is that the underlying NZS3604 assumption is that structural framing, such as trusses, rafters and their connections, provide support to the external wall (indicated by an arrow) back to the bracing grid. Use a ceiling diaphragm if there is any doubt whether such structural connections exist.

The 8 x 6m room on the left requires a ceiling diaphragm whilst the same size room on the right does not because bracing lines at less than 6m dissect the space.



Low damage solutions for non-structural elements

Issue Date July 2012

Over the past 12 months Winstone Wallboards has been working closely with the engineering faculty at the University of Canterbury to develop improved systems for interior linings within commercial buildings.

Following the Canterbury earthquakes, many commercial buildings have suffered significant damage. As widely reported most high rise buildings in the Christchurch CBD have been, or are being, deconstructed. The many low-to-medium rise buildings that survived have often suffered significant damage to non-structural elements such as internal partitions and ceilings. Damage to these elements has generally been more costly than damage to the structure itself. Damage to non-structural elements also causes significant business disruption, either directly or during the repair process.

Non-structural ceilings and partitions are commonly lined with gypsum plasterboard and the owner's preference, often guided by the specifier, is more often than not for a flush monolithic finish. Expansive wall and ceiling areas are flush-finished and corners at wall and wall-to-ceiling intersections are typically square stopped. Non-structural elements tend to be tightly fitted into the main structure. Once taped and stopped, gypsum plasterboard lined walls and ceilings are very stiff. When locked into the main structure these elements do not have the ability to follow expected structural movement and 'inter-storey drifts' that occur during serviceability and design level earthquakes.

As a result non-structural elements can suffer significant damage. This has been evident in Christchurch and even after re-fixing, plasterstopping and painting, damage has repeated following further aftershocks.

Testing at Canterbury University has shown that 'low damage' solutions can be achieved by simply incorporating regular control joints. Negative details at wall junctions and intersections with the main structure, and breaking up expansive areas with regular control joints, will provide freedom for the non-structural elements to accommodate movements of the main structure.

Testing rig at University of Canterbury



Comments from the researchers include;

“The details work astonishingly well. Partitions stay flawless till 2.0% drift”

“Even at triple the current serviceability requirements, damage was minimal or in serviceable condition”

“Gaps can be arranged by simple calculation with a very high precision”

“Gaps can easily be made aesthetically pleasing or hidden with trim finishes”

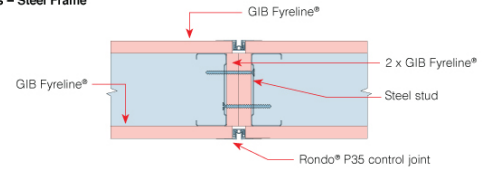
“This cannot be achieved with existing monolithic finish practices”

Recommended details are as simple as they are effective, but a shift in owner and architectural expectation is required to make them work. The challenge to the architectural profession is to incorporate and ‘celebrate’ these expressed details if we are to have ‘low’ or ‘no damage’ solutions for non-structural elements in seismic zones.

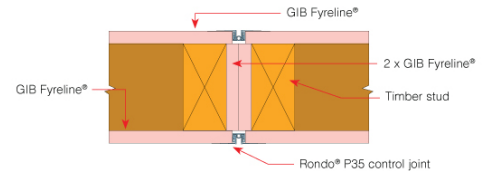
**For further information contact the
GIB® Technical Helpline 0800 100 442.
A detailed information bulletin is being
prepared and will be available shortly.**

Control joint illustrations from GIB® Fire Rated Systems 2006

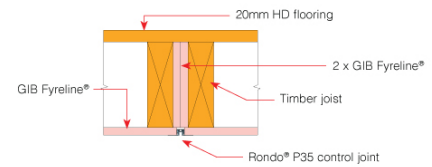
Fire Rated Walls – Steel Frame



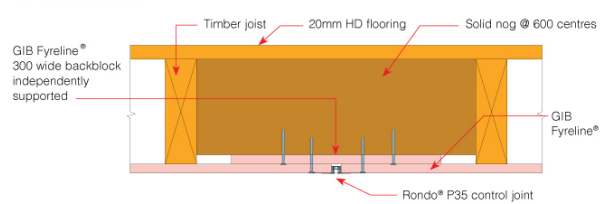
Fire Rated Walls – Timber Frame



Fire Rated Floor/Ceiling



Fire Rated Floor/Ceiling



Canterbury Earthquake Online Guidelines

Issue Date March 2012

A series of possible details to provide freedom of movement & reduce earthquake damage to non-structural linings.

New updated Technical Bulletins can now be viewed at www.gib.co.nz/canterburyearthquake. These include guidelines for the damage assessment and repair of plasterboard linings in earthquake damaged properties. Guidance is also available for the repair of lath and plaster linings, and for the design of supplementary bracing using other sheet materials.

We must remember that the Canterbury earthquakes are structural events that test a building's bracing system in real life. Before committing to repairs it is essential to assess and reinstate where necessary, the structure's resistance to possible future events. Failure to do so can result in repeated damage and the need for ongoing repairs. Keep an eye out for updates on our website. Within the near future we will be launching a simple 'bracing assessment' tool aimed at assisting assessors, designers, and builders with evaluating structural adequacy of houses.

We have also posted a paper by our engineers Hans Gerlich and Richard Hunt summarising their observations relating to the performance of houses in and around Christchurch. In low-rise timber or steel framed buildings plasterboard linings will attract earthquake forces first and must be designed to resist them.

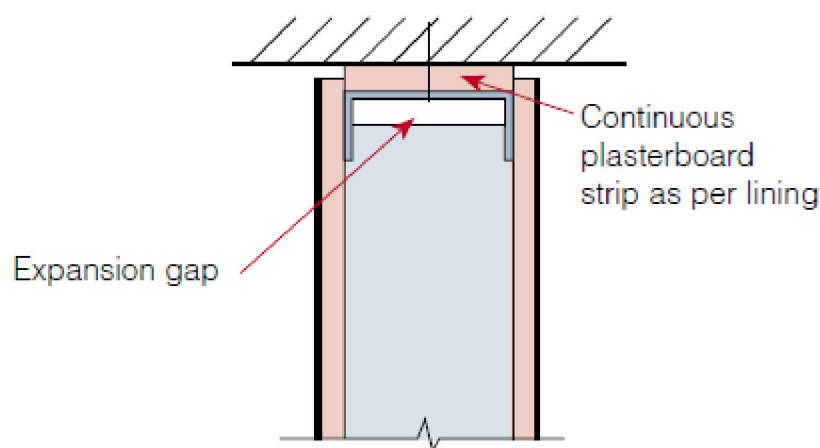
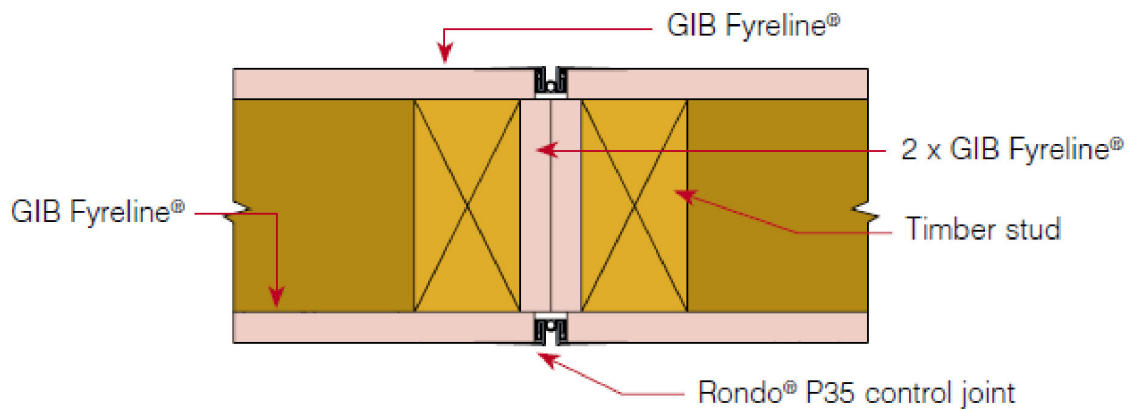
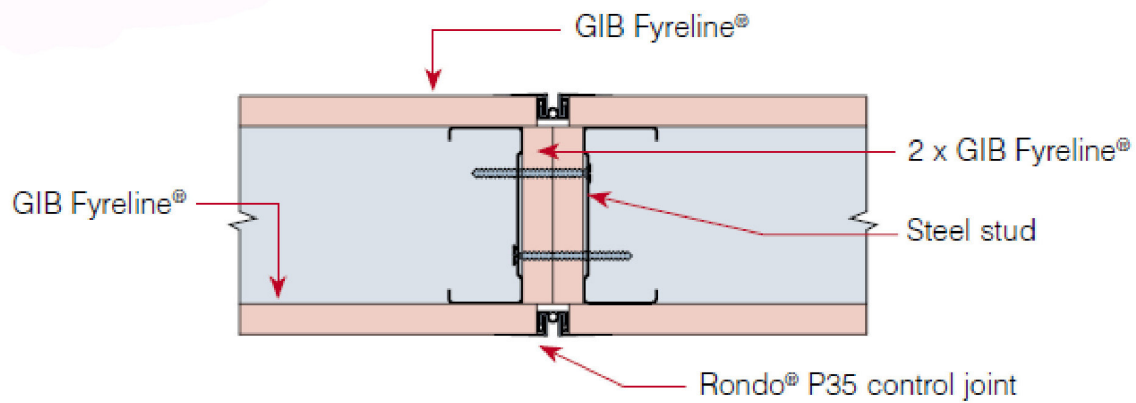
In commercial buildings, gypsum plasterboard linings obviously cannot be designed to resist forces resulting from imposed lateral movements of the main structure during a design level earthquake (see below).

Gypsum plasterboard linings in a commercial building being severely damaged and forced off the wall framing by structural movement



Where gypsum plasterboard cannot be expected to resist such forces, a degree of freedom must be provided. The illustrations below show the principles of control and movements joints which can be easily incorporated in partition designs (whilst maintaining other performance attributes such as fire resistance or noise control).

Unfortunately architectural trends and owner requirements often dictate that walls are finished flush with a minimum of visual interruptions. A change in aesthetic design and acceptability of such details is required if we are to minimise post-earthquake damage in commercial structures.



Bracing light timber framed buildings using sheet materials

Issue Date November 2011

BRACING UNITS

Bracing Units (BUs) were introduced for use with NZS3604 in the late 1970s in recognition of the contribution sheet linings and claddings make to the bracing resistance of light timber framed structures. A 2.4 m high by 2.4 m long wall, with a cut-in metal angle brace and gypsum plasterboard on one face, was tested and achieved a bracing resistance of 5 kN (approximately 500 kg). This was defined as 100 BUs (or 42 BU/m).

Since then the bracing rating (BU/m) for many proprietary systems have been established using the BRANZ P21 Wall Bracing Test and Evaluation Procedure.

The approach adopted by NZS3604 aims to achieve bracing resistance by evenly distributing moderately rated bracing elements throughout the structure. The sum total of these BUs must exceed the design wind and earthquake forces (the demand).

DISTRIBUTION

The NZS3604 rules regarding bracing distribution have been tightened in 2011, but they are still minimum guidelines. It is the responsibility of the building designer to ensure even distribution of bracing and to seek professional engineering input in case of any doubt.

“Lop-sided” distribution can result in irregular response to wind and earthquake forces causing unpredictable damage.

COMBINING DIFFERENT SHEET MATERIALS

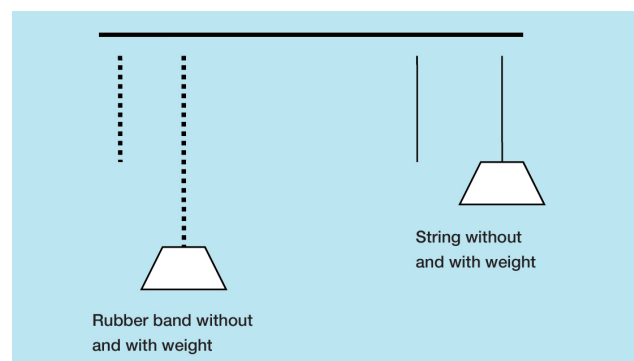
Different sheet materials bring different attributes. The internal gypsum plasterboard lining system is inevitably very stiff once sheets are interconnected,

taped and stopped. However, gypsum plasterboard bracing is less ductile than structural plywood sheet bracing.

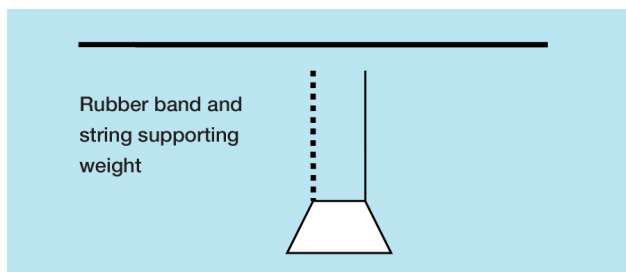
Structural plywood sheet bracing, installed on the outside of external framing, provides excellent ductility but offers less stiffness than plasterboard.

Whether we like it or not, the internal plasterboard linings will attract wind and earthquake forces first before they can be transmitted to other more flexible bracing systems. If we do not design plasterboard linings to accept these forces, then we can expect more damage than might otherwise be the case. The Canterbury earthquakes have shown plasterboard failures to be far more extensive when internal linings were poorly or not designed and installed to withstand earthquake forces.

To help illustrate this principle imagine a length of rubber band (ductile plywood bracing) and a similar length of string (stiff gypsum plasterboard bracing) both capable of supporting a certain weight (the bracing demand). The rubber band stretches considerably when the weight is applied. However, there is minimal stretch when the same weight is supported by the string.



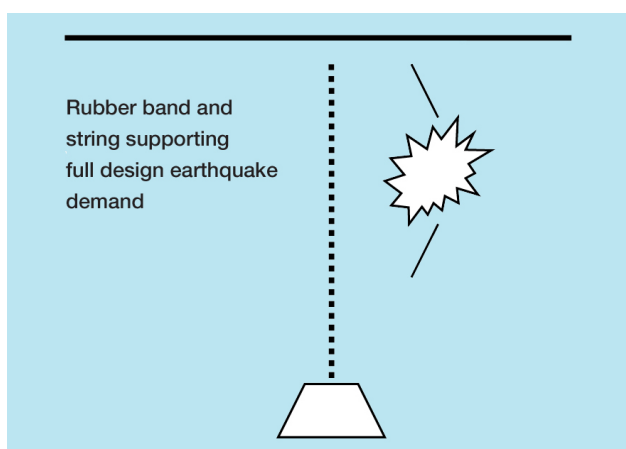
If we use the rubber band and string together to support the weight then the string does most of the work and needs to break before weight is transferred to the rubber band as illustrated below.



Now what happens when we apply these principles to buildings and do not design the stiffer element (gypsum plasterboard) to resist the full design wind and earthquake forces? In other words, what if the rubber band (plywood) has been designed to accept the bracing demand but the string (gypsum plasterboard) has only nominal fixings?

At frequent “serviceability” winds and small earthquake forces the string will perform as illustrated above.

However when forces approach “ultimate” design demand, the string will suffer damage or break before forces are transferred to the rubber band. So, although the plywood is likely to offer structural stability and protection from catastrophic failure well past design loads, the gypsum plasterboard lining system will suffer significant damage.



CONCLUSIONS

Sheet materials provide the most effective means of achieving bracing resistance in light timber framed structures such as houses.

The internal gypsum plasterboard lining system is the stiffest structural element in light timber framed structures and will attract design wind and earthquake forces first. Gypsum plasterboard linings must be designed and fixed to resist these forces regardless of whether supplementary bracing, such as structural plywood, is installed.

Discretionary use of high performance sheet materials such as structural plywood provides added ductility to enhance protection of structures against catastrophic failure.

The combination of gypsum plasterboard and structural plywood provides early strength and stiffness at design level events and added ductility when structures are subjected to even greater wind or earthquake actions.

Using a more flexible bracing system alone, based on multiple individual sheets or discrete length panels, and not fixing internal gypsum plasterboard linings to withstand wind and earthquake forces, is likely to result in significantly greater internal lining damage during a design and even more frequent serviceability events.

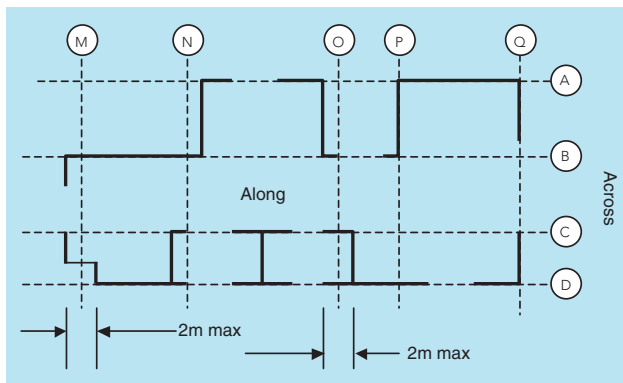
The best bracing system relies on a combination of internal gypsum plasterboard linings and plywood sheet bracing. Plasterboard provides strength and stiffness and plywood adds strength and ductility. To minimise damage during serviceability and ultimate design events, design plasterboard bracing to accept the full design demand and supplement with structural plywood for added strength and ductility as desired. Winstone Wallboards and Carter Holt Harvey publish combined GIB® / Ecoply® bracing systems where both the gypsum plasterboard and structural plywood are installed as a bracing element.

Distribution of Wall Bracing Elements

Issue Date November 2011

Distribute bracing by drawing a grid pattern of bracing lines along and across the building. Bracing lines must coincide as much as possible with wall bracing elements.

Pairs of bracing elements may be counted on a single line provided they are no more than 2m apart as illustrated below. Locate wall bracing elements evenly throughout the building and as close as practical to corners of external walls.



Bracing lines must be spaced no more than;

- 6m for standard construction with any GIB® plasterboard ceiling, or
- 7.5m where dragon ties in accordance with NZS 3604:2011 have been installed to provide lateral strength to walls, or
- 12m with a GIB® plasterboard ceiling diaphragm, constructed in accordance with this publication. (Refer to the GIB® Ceiling Diaphragms technical note).

No bracing line shall have a capacity less than the greater of 100 bracing units or 50% of the total bracing demand

(D) divided by the number of bracing lines (n) in the direction being considered ($0.5 \times D/n$).

For this purpose bracing lines less than 1m apart shall be considered one line.

For example, if the bracing demand for the building shown in the diagram above is 2,500 BUs (Wind) and 2,000 BUs

(Earthquake) in the across direction (M, N, O, P, Q) each line must each have at least the maximum of $0.5 \times 2,500 / 5 = 250$ BUs (Wind) and $0.5 \times 2,000 / 5 = 200$ BUs (Earthquake).

In addition external walls shall have a bracing capacity no less than 15 bracing units per metre of external wall length.

Wall bracing elements on timber floors shall not be rated higher than 120 BU/m.

Wall bracing elements on concrete floors shall not be rated higher than 150 BU/m.



Designing Bracing Upgrades

Issue Date June 2011

SDC - Approved Building Consent Document - BC231907 - Pg 190 of 446 - 21/03/2024 - helen.fowler

Following the earthquake events in Christchurch homeowners may be looking for additional bracing performance.

As the New Zealand Building Code is based on a minimum requirement, customers may decide to specify above this level. This bulletin has been created to assist designers with upgrading bracing resistance using GIB EzyBrace®, for buildings that fall within the design scope of NZS 3604:2011.

PROBABILITY OF EXCEEDANCE AND BRACING RESISTANCE

The New Zealand Building Code requirements for Earthquake Bracing design are based on the probability that a certain design event is exceeded, as illustrated below.

Annual Probability of Exceedance	Return Period Factor for Specific Design ¹
Once in 500 years or 1/500	1.0
Once in 1000 years or 1/1000	1.3
Once in 2500 years or 1/2500	1.8

¹ Equivalent Static Method of NZS1170.5:2004 compared with the GIB EzyBrace® software

An earthquake with a probability of being exceeded once in 2500 years is much more severe than one with a 1/500 year probability of exceedance. Most residential buildings, such as those constructed in accordance with NZS 3604:2011, are required to meet a minimum 1/500 annual probability of exceedance, assuming a 50 year life expectancy. When a residential

home is designed for a 100 year life expectancy, the required earthquake design period is 1/1000.

Multi-tenanted and public buildings such as hotels, apartments, offices, schools, medical centres, etc. can often be built to NZS 3604:2011 but commonly need to be designed for a different annual probability of exceedance ranging from 1/500 to 1/2500, depending on importance level and design working life.

To place some perspective, analysis of the information from the 22nd February Christchurch earthquake indicates that this event was close to the 1/2500 annual probability of exceedance.

UPGRADING BRACING RESISTANCE USING GIB EZYBRACE®

GIB EzyBrace® systems have been tested and appraised to meet the requirements of the New Zealand Building Code using New Zealand Standard NZS 3604:2011 and the default setting for earthquake design is an annual probability of exceedance of 1/500.

The GIB EzyBrace® software now incorporates an easy way to design for increased bracing resistance by selecting an increased annual probability of exceedance level.

Simply select the annual probability of exceedance using the drop down box in the demand sheet. For a 1/1000 probability, the bracing requirement (demand) increases by 30% and for a 1/2500 probability, bracing demand increases by 80% when compared with the default 1/500 minimum annual probability of exceedance.

Wind Zone	High	Earthquake Zone	Soil Type
Select by Building Consent Authority Map		3 ▼	D&E (deep to very soft) ▼
or Preference	High ▼	Annual exceedance probability	
Wind region	Preference selected ▼	1/1000 (NZS3604:2011 x 1.3) ▼ *	
Lee Zone	Preference selected ▼	This design has been upgraded to resist	
Ground Roughness	Preference selected ▼	an annual earthquake exceedance	
Site Exposure	Preference selected ▼	probability of 1/1000	
Topographic Class	Preference selected ▼	* Options include the default setting of 1/500, or increased annual probabilities of exceedance of 1/1000 or 1/2500	

When designing for increased bracing resistance a statement, similar to that below, should be highlighted on all bracing plans and associated information;

“The bracing design of this building has been upgraded at the clients request to exceed the requirements of a 1/[select] annual probability. This design must not be modified or substituted as this will affect the specified bracing performance of this building”

DESIGN ACROSS THE WHOLE BUILDING

As a general rule of thumb it is recommended to exceed the minimum bracing requirements by 10 to 20%. This means a target bracing resistance value of between 110 and 120%.

As is reflected in NZS 3604:2011 bracing should ideally be distributed evenly across the whole building and not just isolated to the external walls or building ends.

External walls generally only account for around 1/3 of the total bracing performance of a house. Therefore if

bracing on the external walls is increased by say 30%, the actual improvement over the whole building is likely to be only 10% or less.

Also modifying plasterboard linings alone will often deliver limited improvement. To achieve a higher overall building performance, full bracing system specifications must be installed which often includes additional hardware such as panel hold-downs.



BRANZ Appraised

Appraisal No. 928 [2021]

GIB EZYBRACE® SYSTEMS

Appraisal No. 928 [2021]

This Appraisal replaces BRANZ
Appraisal No. 928 [2016]

BRANZ Appraisals

Technical Assessments of
products for building and
construction.



Winstone Wallboards Ltd

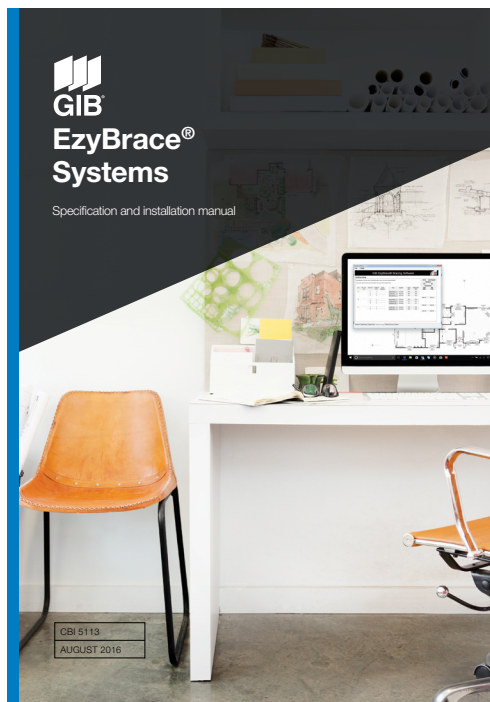
P.O. Box 12 256
Porirua
Auckland 1642
Tel: 09 633 0100
Fax: 09 633 0101
Hotline Tel: 0800 100 442
Hotline Fax: 0800 229 222
Web: www.gib.co.nz
Email: info@gib.co.nz



BRANZ

BRANZ

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



Product

- 1.1 GIB EzyBrace® Systems are a range of wall and ceiling bracing systems based on the use of GIB® Standard, GIB Braceline® and other GIB® plasterboards. GIB EzyBrace® Systems are used to resist earthquake and wind loads on timber-framed buildings designed and constructed in accordance with NZS 3604 and the GIBFix® Framing System. The GIB EzyBrace® Bracing Software provides an electronic means of calculating bracing demand and resistance.

Scope

- 2.1 GIB EzyBrace® Systems and the GIB EzyBrace® Bracing Software have been appraised for the design and use of interior wall and ceiling bracing systems in buildings within the scope limitations of NZS 3604.

Building Regulations

New Zealand Building Code [NZBC]

- 3.1 In the opinion of BRANZ, GIB EzyBrace® Systems, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. GIB EzyBrace® Systems meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 [a], [f], [h] and [j]]. See Paragraphs 8.1-8.10.

Clause B2 DURABILITY: Performance B2.3.1 [a] not less than 50 years. GIB EzyBrace® Systems meet this requirement. See Paragraphs 9.1-9.4.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. GIB EzyBrace® Systems meet this requirement.



Technical Specification

4.1 The GIB® plasterboards and accessories used with the GIB EzyBrace® Systems, and supplied or specified by Winstone Wallboards Ltd are as follows:

GIB® plasterboards

- **GIB® Standard** - GIB® Standard plasterboard is a paper-bound, fibreglass reinforced gypsum-plaster core sheet lining material. GIB® Standard plasterboard is available in 10 mm and 13 mm thicknesses and a sheet width of 1,200 mm and 1,350 mm [GIB® Wideline]. The sheets have a taper on the two long sheet edges. The 10 mm thick sheets are also available with a square edge. Sheets are available in various lengths from 2,400 mm to 6,000 mm. The nominal sheet weight is 6.5 kg/m² for 10 mm thick sheets and 8.5 kg/m² for 13 mm thick sheets. GIB® Standard plasterboard face paper is a light buff colour.
- **GIB Braceline®** - GIB Braceline® is a high-density fibreglass reinforced, paper-bound gypsum-plaster core sheet lining material. GIB Braceline® is available in 10 mm and 13 mm thicknesses. The sheets have a taper on the two long sheet edges. GIB Braceline® has a sheet width of 1,200 mm and 1,350 mm, and is available in lengths of 2,400 mm, 2,700 mm, 3,000 mm, 3,600 mm and 4,800 mm. The nominal sheet weight is 9 kg/m² for 10 mm thick sheets and 12.5 kg/m² for 13 mm thick sheets. GIB Braceline® face paper is light blue in colour.
- **Alternative GIB® plasterboards** - in certain situations, as specified in the Technical Literature, substitution is permitted with GIB Aqualine®, GIB Fyrelene®, GIB Toughline® and GIB Ultraline®.

Components and Accessories

- **GIB® Accessories and GIB® Jointing Compounds** - as specified in the GIB® Site Guide Technical Literature.
- **Fasteners**
 - GIB Grabber® High Thread Screws for fixing directly to timber - 32 mm x 6 g.
 - GIB Nail - 30 x 2.8 mm.
 - GIB Grabber® screws for fixing to light gauge steel battens - 32 mm x 6 g.
- **Adhesive and Sealants**
 - GIBFix® One - an off-white acrylic adhesive supplied in 375 ml cartridges and 600 ml sausages.
 - GIBFix® All-Bond - a green solvent-based adhesive supplied in 375 ml cartridges and 600 ml sausages.
- **GIBFix® Framing Components**
 - GIBFix® Angle - 45 x 45 x 0.55 mm galvanised steel angle with a knurled surface. Supplied in lengths of 2.4 m and 2.7 m.
 - GIB Grabber® Dual Thread Screws for fixing to timber through GIBFix® Angle - 32 mm x 7 g needle-point screw with coarse thread lower section and fine thread upper section.
- **Fasteners, Anchors and Connections**
 - GIB® HandiBrac® - a one-piece, 2 mm thick, galvanised steel angle bracket approximately 95 mm high, 65 mm long and 54 mm wide. The bracket is supplied with five Type 17 screws, 14 g x 35 mm.
 - BOWMAC® screw bolt - M10 x 140 mm screw anchor, with a blue painted hex head.
 - Coach screws - 12 mm x 150 mm and 50 x 50 x 3 mm washer, hot-dip galvanised for fixing to timber floors.
 - Cast-in bolts - M12 x 150 mm minimum and 50 x 50 x 3 mm washers for fixing to concrete floors.
 - Shot-fired fasteners - minimum 75 mm x 3.8 mm with 16 mm discs for fixing GS1-N, GS2-N and GS2-NOM internal line bracing elements to concrete slabs.
 - Galvanised or stainless steel strap - 25 x 0.9 mm top and bottom plate connections.
 - Strap fixings - 30 x 2.5 mm hot-dip galvanised or stainless steel flat head nails. [Note: For corrosion protection requirements, refer to NZS 3604, Section 4.]

- **Ceiling Diaphragms** - ceiling diaphragms are constructed using timber ceiling battens, or GIB® Rondo® or similar metal ceiling batten systems.
- **Plywood**
 - **Plywood** - minimum of 7 mm thick complying with AS/NZS 2269 D-D Structural Grade.
 - **Plywood fixings** - 50 x 2.5 mm hot-dip galvanised or stainless steel annular-grooved, flathead nails.

Handling and Storage

- 5.1 The best results are achieved when GIB® plasterboards are treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the GIB® Site Guide. Sheets must be carried on edge and not dragged.
- 5.2 All accessories must be kept dry.

Technical Literature

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

Design Information

General

- 7.1 NZS 3604 provides methods to distribute the bracing elements in walls to resist forces. The use of ceiling diaphragms is defined in the Technical Literature.
- 7.2 GIB EzyBrace® Systems are for use in dry, internal situations only.
- 7.3 GIB EzyBrace® Systems must not be exposed to temperatures of 52°C or greater for prolonged periods. Refer to appliance and fitting manufacturers for installation details.

GIB EzyBrace® Bracing Software

- 7.4 The GIB EzyBrace® Bracing Software contains design procedures and an electronic calculation method for bracing demand calculated in accordance with NZS 3604, Section 5. Floor loadings can be selected in accordance with either NZS 3604, Bracing Demand Tables 5.5–5.10 for 2 kPa floor loads or less, or Tables 14.1–14.3 for 3 kPa floor loads.
- 7.5 The bracing demand calculations contained in the GIB EzyBrace® Bracing Software are based on first principles engineering and calculate wind and earthquake demand, based on the building parameters entered. Resulting bracing demand calculations are project specific and can differ from values derived using NZS 3604 wind and earthquake demand tables. The GIB EzyBrace® Bracing Software has been assessed as part of this Appraisal.
- 7.6 The bracing ratings for GIB EzyBrace® Systems are embedded in the GIB EzyBrace® Bracing Software.

GIBFix® Framing System

- 7.7 The GIBFix® Framing System utilises GIBFix® Angles fixed at internal corners and at wall/ceiling junctions to reduce the potential for fastener 'popping' and joint cracking due to timber framing movement. The GIBFix® Framing System also offers an alternative arrangement of studs at corners and at intersecting walls to improve insulation and to reduce thermal bridging compared to traditional wall framing layouts. Refer to the Technical Literature for full details.
- 7.8 Where walls intersect, noggings are required at maximum 900 mm centres to enable fixing of the end stud of the intersecting wall to the main wall framing.
- 7.9 The GIBFix® Framing System permits the use of a single panel hold-down [e.g. GIB® HandiBrac®] at wall corners and T-intersections for both the across and along bracing directions.

Framing

- 7.10 GIB EzyBrace® Systems can be installed using conventional timber framing layouts or by using the layouts provided in the GIBFix® Framing System. The bracing ratings embedded in the GIB EzyBrace® Bracing Software are equally applicable to both framing options.
- 7.11 Timber framing grade, spacing and construction must comply with NZS 3604. Timber treatment must comply with NZBC Acceptable Solution B2/AS1.
- 7.12 Winstone Wallboards Ltd recommends the use of kiln-dried stress-graded framing timber. The minimum actual framing dimensions are 90 mm x 45 mm for external walls and 75 mm x 45 mm for internal walls.
- 7.13 Joints in the top plates of bracing panels must be tied together with 3 kN and 6 kN top plate connectors using 25 mm x 0.9 mm hot-dip galvanised mild steel strap, three nails each side of joint for 3 kN and six nails each side of joint for 6 kN.

Bracing System GS2-NOM

- 7.14 Most GIB EzyBrace® Systems require additional fasteners at the corners to achieve the published bracing ratings. The GS2-NOM system only requires fixings at 300 mm centres around the sheet perimeter.
- 7.15 Where internal doors penetrate a GS2-NOM bracing element and recessed door jambs are used, the sheets may be adhesive fixed around the door opening with GIBFix® All-Bond, instead of screw fixing. This is designed to reduce fastener 'popping' around internal doors when using grooved door frames. Screw fixing should be used where door frames are to be finished with architraves and the architrave will cover the screws. The adhesive fix option around door openings must not be used with any other GIB EzyBrace® Systems.

Alternative GIB® plasterboards

- 7.16 GIB Ezybrace® Systems have been designed and tested using only the products specified. Occasionally additional properties may be required to be provided by a different GIB® plasterboard product. Table 1 provides acceptable alternative options.

Table 1: Permitted Alternatives in GIB EzyBrace® Systems

Specified	Permitted alternative GIB® plasterboard products								
GIB® plasterboard	GIB® Standard	GIB Ultraliner®	GIB Braceliner/ Noiseline®	GIB Aqualiner®	GIB Toughliner®	GIB Fyreliner®			
						10 mm	13 mm	16 mm	19 mm
GIB® Standard	N/A	✓	✓	✓	✓	✓ <i>Note 1</i>	✓ <i>Notes 1 and 3</i>		
GIB Braceliner®	X	X	N/A	✓ <i>Note 2</i>	✓	X	✓ <i>Notes 1, 2 and 3</i>		

- Note 1:** The fastener type and length and must be as required for the relevant Fire Resistance Rating (FRR) system but the fixing pattern must be as required for bracing elements.
- Note 2:** The bracing element must be 900 mm or longer. Fasteners must be at maximum 100 mm centres to the perimeter of the bracing element. The bracing corner fastening pattern applies to all four corners of the element.
- Note 3:** Specify traditional wall framing layout where a FRR is required. See Paragraph 11.4.

BOWMAC Screw Bolts

- 7.17 When BOWMAC Screw Bolts are used as fixings for external walls with concrete masonry header block foundations, the minimum grout/concrete strength must be as specified in NZS 3604. BOWMAC Screw Bolts may be used in Corrosion Zones B and C as defined in NZS 3604. BOWMAC Screw Bolts may only be used in NZS 3604 Corrosion Zone D where the minimum concrete cover to the bolt is 60 mm. This cannot be achieved with standard 90 mm wide timber framing. An alternative option in this scenario is to use 140 mm wide framing.

Structure

Bracing

- 8.1 The bracing unit [BU] ratings are embedded in the GIB EzyBrace® Bracing Software and vary with the wall length.
- 8.2 The Technical Literature provides comprehensive construction and panel hold-down details. These include bottom plate fixings using anchor screws and cast-in bolts (concrete), coach screws (timber), GIB® HandiBrac® or nailed stud-to-plate straps.
- 8.3 Bracing units derived from the BRANZ P21 test method are based on a wall height of 2.4 m. The GIB EzyBrace® Bracing Software calculates bracing ratings for higher wall heights by multiplying the appropriate bracing rating by 2.4 m and dividing by the actual wall height in metres. For walls less than 2.4 m in height, the GIB EzyBrace® Bracing Software calculates bracing ratings as if they were 2.4 m high.
- 8.4 NZS 3604 limits wall bracing elements to a maximum of 120 BU/m for timber-framed floors and 150 BU/m for concrete floors.

Ceiling Diaphragms

- 8.5 GIB® ceiling diaphragms are used to space bracing lines further apart than 6 m. The basic shape of a ceiling diaphragm must be square or rectangular and the length must not exceed twice the width.
- 8.6 For ceiling diaphragms not steeper than 15° and not exceeding 7.5 m in length, any GIB® plasterboard may be used provided the perimeter fixing are at 150 mm centres.
- 8.7 For ceiling diaphragms not steeper than 45° and not exceeding 7.5 m in length, and for diaphragms not steeper than 25° and not exceeding 12 m in length, any GIB® plasterboard may be used provided the perimeter fixings are at 100 mm centres.

Openings in Bracing Elements

- 8.8 Small openings of 90 x 90 mm or less may be placed anywhere except within 90 mm of the edge of the bracing element.

Shower Areas

- 8.9 GIB EzyBrace® Systems must not be located in shower cubicles or behind baths and the like. GIB EzyBrace® Systems may be used in water-splash areas provided they are protected as required by NZBC Clause E3 Internal Moisture. Refer to BRANZ Appraisal No. 427 GIB® Wet Area Systems.

Impact Resistance

- 8.10 GIB® plasterboards provide adequate resistance to soft body impact, based upon history of use in domestic and light commercial applications.

Durability

- 9.1 GIB EzyBrace® Systems, including linings and their fixings, have a serviceable life of at least 50 years. The ability of the systems to remain durable is dependent on them remaining dry in service, and being maintained in accordance with this Appraisal.

Maintenance

- 9.2 The building must be maintained weatherproof and GIB® plasterboards must be protected from external and internal moisture in accordance with NZBC Clauses E2 and E3.
- 9.3 Holes resulting from damage to the lining, up to 100 x 100 mm square, will have no significant effect on the performance of the bracing panel. Such holes may be repaired by patching, stopping and finishing as appropriate. Independent expert advice must be sought to assess the effect and repair of larger areas of damage.
- 9.4 Bracing elements require no ongoing maintenance, apart from decoration and the repair of any damage.

Prevention of Fire Occurring

- 10.1 Separation or protection must be provided to the GIB EzyBrace® Systems from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Verification Method C/VM1 and NZBC Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

Fire Affecting Areas Beyond the Fire Source

- 11.1 For internal surface finish properties and fire resistance ratings, refer to BRANZ Appraisal No. 289 GIB® Fire Rated Systems.

Internal Moisture

- 12.1 GIB® plasterboard must be used in dry internal situations, and must not be used where likely to be exposed to liquid water, or where extended exposure to humidity above 90% RH is expected, e.g., such as may be expected in sauna rooms, commercial kitchens and the like.

Installation Information

Installation Skill Level Requirement

- 13.1 Installation of GIB EzyBrace® Systems must be completed by, or under the supervision of a Licensed Building Practitioner with the relevant Licence Class, in accordance with the Technical Literature and this Appraisal.

General

- 14.1 GIB EzyBrace® Systems must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

Framing

- 14.2 To achieve an acceptable decorative finish, the GIB® Site Guide specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. Winstone Wallboards Ltd recommends a moisture content of 12% or less where buildings are to be air conditioned, centrally heated or have heat pumps installed.
- 14.3 Where the GIBFix® Framing System is used, GIBFix® Angles are tacked to the framing with flat head clouts prior to installation of the GIB® plasterboard.

Cutting

- 14.4 GIB® plasterboard is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.

Hold-downs

- 14.5 GIB EzyBrace® Systems which require hold-downs must either have a GIB® HandiBrac® fitted to each end of the bracing element or alternatively a metal stud-to-plate strap and hold-down anchor may be used. Refer to the Technical Literature for full installation details. Where a metal stud-to-plate strap is used, the hold-down anchor must be placed no more than 80 mm from the end of the bracing element.
- 14.6 Where the GIBFix® Framing System is used, a single hold-down located at a wall intersection may be used to provide the hold-down in both the across and along bracing directions.

Plasterboard Sheet Fixing

- 14.7 Corner fixings must be 50 mm away from the sheet corner. Fixings must be no closer than 12 mm from the paper-bound sheet edge, and no closer than 18 mm from a cut edge, and driven at right angles to the sheet until the head is seated in a slight dimple just below the surface of the paper liner. Fixings must not be over-driven.

- 14.8 Wall bracing plasterboards [except for those used with the GS2-NOM system] are fixed at 150 mm centres around the perimeter framing of the bracing element *[Note: There is a variation for GIB Aqualine® and GIB Fyrelime®, see Table 1]*. At the corners of the wall bracing elements, a special fastening pattern is required with fasteners spaced at 50 mm, 100 mm, 150 mm, 225 mm and 300 mm from the corner and thereafter at 150 mm centres. Fixing to other framing is either mechanical or by using GIBFix® adhesives.
- 14.9 When installing GS2-NOM bracing elements, the GIB® plasterboard is fixed to framing around the bracing element perimeter and at sheet joints with fasteners at maximum 300 mm centres. Where recessed door jambs are used on internal door frames, the GIB® plasterboard may be fixed to the framing around the door opening with GIBFix® All-Bond, see Paragraph 7.15.
- 14.10 Where GIB Aqualine® or GIB Fyrelime® substitutes for GIB Braceline®, bracing elements must be longer than 900 mm and the bracing element perimeter fasteners must be spaced at 100 mm centres and the corner pattern described in Paragraph 14.8 used.
- 14.11 Full sheets must be used wherever possible.

Fire Resistance Rated Bracing Elements

- 14.12 Where a bracing element is also used as a fire-rated element, the method of fixing [including the length of the fixing specified] for the fire-rated element must be used, but the perimeter fixings of the bracing element must be at 150 mm centres and fixings at corners of the bracing element must be fixed as described in Paragraph 14.8. In two-layer systems, the inner layer must be used for bracing.

Plywood Fixing

- 14.13 Plywood is nail fixed at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing.

Ceiling Diaphragms

- 14.14 All GIB EzyBrace® System ceiling diaphragms require fixings around the perimeter at 100 mm or 150 mm centres, depending on the ceiling pitch and length. See Paragraphs 8.4-8.6 and refer to the Technical Literature.
- 14.15 The perimeter of the ceiling diaphragm is fixed to GIBFix® Angles, GIB® Rondo® perimeter channels, or alternatively, to an additional ex 150 x 40 mm timber plate fixed to the top plate.

Jointing and Finishing

- 14.16 All bracing element joints must be reinforced with GIB® tape and finished in accordance with the GIB® Site Guide.

Health and Safety

- 15.1 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.

Basis of Appraisal

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

Tests

- 16.1 Bracing tests were carried out by Winstone Wallboards Ltd in accordance with BRANZ Technical Paper P21 to determine the performance of GIB EzyBrace® Systems when the building is subjected to lateral wind or earthquake loading. Nail and screw slip tests were carried out by BRANZ and Winstone Wallboards Ltd. Winstone Wallboards Ltd's test facilities, procedures and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 17.1 The GIB EzyBrace® Bracing Software has been assessed by BRANZ and found to be satisfactory.
- 17.2 The GIB EzyBrace® Systems and GIB® Site Guide Technical Literature have been examined by BRANZ and found to be satisfactory.
- 17.3 Site inspections were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.
- 17.4 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.
- 17.5 The properties of Winstone Wallboards Ltd GIB® plasterboards have been assessed for the following properties: MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, inspection for fungal spores, and hard and soft body impact tests.

Quality

- 18.1 Winstone Wallboards Ltd's manufacturing process and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory.
- 18.2 The quality management systems of Winstone Wallboards Ltd have been assessed and registered by TELARC as meeting the requirements of ISO 9001, Registration No. 581.
- 18.3 Winstone Wallboards Ltd is responsible for the quality of the product supplied.
- 18.4 The quality of the application and finish on-site is the responsibility of the installation and stopping contractors.
- 18.5 Designers are responsible for the design of buildings.
- 18.6 Building owners are responsible for the maintenance in accordance with the instructions of Winstone Wallboards Ltd.

Sources of Information

- AS/NZS 2269.0:2012 Plywood - Structural - Specifications.
- AS/NZS 2588:2018 Gypsum plasterboard.
- BRANZ Technical Paper P21:2010 A wall bracing test and evaluation procedure.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

In the opinion of BRANZ, **GIB EzyBrace® Systems** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Winstone Wallboards Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

01 December 2021

**BRANZ Appraised**

Appraisal No. 827 [2019]

**ECOPLY® BARRIER
RIGID AIR BARRIER**

Appraisal No. 827 [2019]

This Appraisal replaces BRANZ

Appraisal No. 827 [2014]

Amended 03 September 2021

BRANZ AppraisalsTechnical Assessments of
products for building and
construction.**CHH Plywood****Carter Holt Harvey****Plywood Ltd**

Private Bag 92 106

Auckland

Tel: 0800 326 759

Fax: 09 633 1582

Web: www.chhply.co.nz

**BRANZ**

122 Moonshine Rd,

Rimutaka, Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

branz.co.nz

**Product**

- 1.1 The Ecoply® Barrier Rigid Air Barrier is sealed plywood sheets and tapes designed for use as a rigid wall underlay and air barrier (sheathing) behind cavity wall cladding systems. Ecoply® Barrier is also for use as a wall bracing system to resist wind and earthquake loads on timber-framed buildings.

Scope

- 2.1 Ecoply® Barrier has been appraised for use as a rigid wall underlay, air barrier and temporary weather-protecting sheathing on timber-framed buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained and vented cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1; and,
 - situated in NZS 3604 Wind Zones up to, and including, Extra High.
- 2.2 Ecoply® Barrier has also been appraised for use as wall bracing systems for timber-framed buildings within the scope of NZS 3604.

Building Regulations**New Zealand Building Code (NZBC)**

- 3.1 In the opinion of BRANZ, Ecoply® Barrier, 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 B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Ecoply® Barrier meets the requirements for loads arising from earthquake and wind [i.e. B1.3.3 (f) and (h)]. See Paragraphs 8.1-8.4.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.2. Ecoply® Barrier meets these requirements. See Paragraphs 9.1-9.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the wall cladding system, Ecoply® Barrier contributes to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Ecoply® Barrier meets this requirement.

- 3.2 Ecoply® Barrier can be used to satisfy the bracing demand requirements of Section 5 of NZS 3604 which is an Acceptable Solution for compliance with NZBC Clause B1.

Technical Specification

- 4.1 The components and accessories for Ecoply® Barrier, which are supplied by Carter Holt Harvey Plywood Ltd are:
- **Ecoply® Barrier sheets** are 7 mm thick, 1,197 mm wide and 2,440 and 2,745 mm long structural plywood, manufactured from radiata pine in accordance with AS/NZS 2269, and H3.2 CCA treated in accordance with AS/NZS 1604.3. The sheets are coated on the front face and four edges with a beige polyester powder coating. Plywood sheets are marked Ecoply® Barrier for identification.
 - **Ecoply® Sealing Tape** - 60 mm x 30 m tape for sheet joints.
 - **Ecoply® Frame Flashing Tape** - 150 mm x 30 m and 200 mm x 30 m.
 - **Ecoply® Sill Tape** - 150 mm x 20 m and 200 m x 20 m.
- Tapes are marked Ecoply® and type for identification.
- 4.2 The components and accessories for the Ecoply® Barrier, which are supplied by the building contractor are:
- **Ecoply® Horizontal Jointer** - PVC horizontal 'Z' flashing supplied by E2 Flashing Solutions.
 - **Fasteners** - 50 x 2.8 mm flathead hand-driven nails, hot-dip galvanised or stainless steel. Paslode Impulse 50 x 2.8 mm round head gun-nails. Hot-dip galvanised or stainless steel. Stainless steel nails must be ring shanked.
- [Note: Hot-dip galvanising must comply with AS/NZS 4680 and stainless steel must be Grade 304 or 316.]*
- **Bracing panel end stud connection** - GIB® HandiBrac® one-piece, 2 mm thick, galvanised steel angle bracket approximately 95 mm high, 65 mm long and 54 mm wide. The bracket is supplied with 5 Type 17 screws 14 g x 35 mm.
 - **Timber floor end stud hold down** - 12 mm x 150 mm hot-dip galvanised coach screws.
 - **Concrete floor end stud hold down** - cast-in bolts M12 x 150 mm minimum, or proprietary fixings with a minimum characteristic strength of 15 kN.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by Carter Holt Harvey Plywood Ltd or the building contractor, whether on-site or off-site, is under the control of the building contractor. Ecoply® Barrier plywood sheets 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. The Ecoply® Tapes must be protected from damage and weather and stored in clean, dry conditions away from direct exposure to sunlight. uPVC jointers must be protected from physical damage and should be stored flat and under cover.
- 5.2 Other accessories must be stored so they are kept clean, dry and undamaged.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Ecoply® Barrier Specification & Installation Guide, which must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Ecoply® Barrier Specification & Installation Guide and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 Ecoply® Barrier is intended for use as a rigid wall underlay and an air barrier fixed over timber-framed walls in order to support wind pressures and to act as a secondary barrier to wind-driven rain. With all joints sealed with Ecoply® Tapes, no flexible wall underlay is required over the Ecoply® Barrier plywood.
- 7.2 Commencing from installation, the Ecoply® Barrier, including the Ecoply® Tapes, must not be exposed to the weather for more than 180 days.
- 7.3 Ecoply® Barrier may be used as a temporary weather protecting sheathing to allow the insulation and internal lining of the building to proceed before the wall cladding is installed. To achieve temporary weathertightness, all joints, internal and external corners of the Ecoply® Barrier must be sealed, the roof cladding and soffit linings must be installed, the flexible sill and jamb flashing tape system must be installed around the window and door openings, and the window and door joinery must be installed complete with head flashings and air seals. The timber wall framing must have a maximum moisture content as specified by the internal lining system supplier at the time of the insulation installation and internal lining application.
- 7.4 Ecoply® Barrier is suitable for use under wall claddings as a rigid wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Table 23 on timber-framed buildings. Refer to Table 1.

Table 1: NZBC E2/AS1, Table 23 Requirements

NZBC E2/AS1 Table 23 Rigid Wall Underlay Properties	Property Performance Requirement	Ecoply® Barrier Actual Property Performance
Vapour Resistance	≤ 7 MN s/g	2.2 MN s/g
Absorbency	≥ 100 g/m ²	1,451 g/m ²
Water Resistance	≥ 20 mm	Pass

Timber Treatment

- 7.5 Timber wall framing behind the Ecoply® Barrier must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

- 7.6 Timber framing must be minimum 90 x 45 mm structural grade SG8 and must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170, considering local factors. In all cases, studs must be at maximum 600 mm centres. Dwargs must be fitted flush between the studs at maximum 1,200 mm centres. *[Note: The timber framing must also be suitable for the selected wall cladding. Refer to the selected cladding system's Technical Literature for specific framing requirements.]*
- 7.7 Timber wall framing where the Ecoply® Barrier plywood sheets are joined must be nominal 50 mm width [i.e. 45 mm minimum finished width].
- 7.8 Timber framing must be kiln dried and as dry as practically possible at the time of the Ecoply® Barrier installation.

Ecoply® Barrier Set Out

- 7.9 All Ecoply® Barrier plywood sheet edges must be fully supported by framing.
- 7.10 Ecoply® Barrier must be installed vertically. At the base of the wall the plywood sheets must hang below the bottom plate a minimum of 25 mm, up to a maximum of 40 mm.

Ecoply® Barrier Plywood and Cladding Fixing

- 7.11 Ecoply® Barrier plywood sheets must be fixed at maximum 150 mm centres around the perimeter of each sheet and at maximum 300 mm centres to intermediate studs. In Extra High Wind Zones, the fixing centres on the intermediate studs must be closed up to maximum 150 mm centres. The fixings are at the same centres regardless of whether the Ecoply® Barrier plywood is being used for bracing or not.
- 7.12 The length of the selected wall cladding fasteners must be increased by a minimum of 7 mm to maintain the face load strength of the wall cladding system.

Structure

Mass

- 8.1 The mass of Ecoply® Barrier is approximately 4 kg/m². This mass must be added to the selected wall cladding system mass when determining the overall wall cladding mass in terms of NZS 3604.

Wind Zones

- 8.2 Ecoply® Barrier is suitable for use in all Wind Zones of NZS 3604 up to, and including, Extra High.

Bracing

- 8.3 The bracing units achieved [wind and earthquake] for the Ecoply® Barrier are given in Table 2. The Technical Literature gives details of edge and end fixing distances and provides comprehensive construction and panel hold-down details.
- 8.4 The bracing units are derived from the BRANZ P21 test method based on a wall height of 2.4 m. For greater wall heights the bracing rating is calculated by multiplying the appropriate value shown in Table 2 by 2.4 divided by the wall height in metres. Walls lower than 2.4 m shall be rated as if they were 2.4 m in high.

Table 2: Bracing Ratings for Ecoply® Barrier Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	Bottom Plate Hold-down and Fixing	BUs/m Wind	BUs/m Earthquake
EPBI	0.4 m	Ecoply® Barrier one side	GIB HandiBrac®*	80	95
	0.6 m			95	105
	1.2 m			120	135**
EP2	0.6 m	Ecoply® Barrier or Ecoply® each side	GIB Handibrac®	105	115
EPBS	0.4 m	Ecoply® Barrier one side	No additional fastening*	60	60
	0.6 m			60	65
	1.2 m			65	70
	2.4 m			80	90
EPBG	0.4 m	Ecoply® Barrier one side and 10 mm GIB® Standard plasterboard other side	GIB HandiBrac®	100	115
	1.2 m			150**	150**

Notes:

* Bottom plate fixed in accordance with the requirements of NZS 3604.

** Timber Floors - A limit of 120 BU/m applies to NZS 3604 timber floors.

Penetrations for Services

- 8.5 Small openings for services of up to 90 x 90 mm may be placed no closer than 90 mm to the edge of the bracing element and service penetrations up to a maximum of 150 mm diameter may be placed no closer than 150 mm from the sheet edge, without affecting the bracing rating of the panel.

Connections

- 8.6 The Ecoply® Barrier Technical Literature contains a top plate hold down detail and a lintel tie down connection detail that are alternatives to the details given in NZS 3604.

Durability

- 9.1 Ecoply® Barrier meets code compliance with NZBC Clause B2.3.1 [a] not less than 50 years when used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, or where it is used as a bracing element, and code compliance with NZBC Clause B2.3.1 [b], 15 years where the cladding durability requirement is 15 years and the Ecoply® Barrier is not used as a bracing element.

Serviceable Life

- 9.2 Provided Ecoply® Barrier is not exposed to the weather or ultraviolet [UV] light for a total of more than 180 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, the Ecoply® Barrier is expected to have a serviceable life of at least 50 years.
- 9.3 Areas of geothermal activity and coastal locations can be very corrosive to fasteners, especially coastal locations within distances of up to 500 metres of the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets in some instances. These coastal locations are defined in NZS 3604 as Zone D and stainless steel fasteners must be used. For installation in NZS 3604 Corrosion Zones C and B, hot-dip galvanised steel fasteners complying with the requirements of NZS 3604 may be used.

Maintenance

- 10.1 Ecoply® Barrier will not normally require maintenance. However, if damage occurs to the cladding or lining protecting the sheathing or to the sheathing itself, then repairs or replacement must be carried out to ensure the integrity of the rigid air barrier.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to the Ecoply® Barrier from heat sources such as fireplaces, heating appliances 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 Ecoply® Barrier must be used behind claddings that meet the performance requirements of NZBC Clause E2.
- 12.2 Ecoply® Barrier, when installed in accordance with the Ecoply® Barrier Specification & Installation Guide and this Appraisal, will assist in the total cladding system's compliance with NZBC Clause E2.

Installation Information

Installation Skill Level Requirements

- 13.1 All design and building work must be carried out in accordance with the Ecoply® Barrier Technical Literature and this Appraisal by competent and experienced tradespersons conversant with the Ecoply® Barrier. 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.

System Installation

Ecoply® Barrier Installation

- 14.1 Ecoply® Barrier plywood sheets may be cut using any circular saw or hand saw tool. Holes and cut-outs may be formed by using a hole saw.
- 14.2 Sheets must be dry prior to installation. Cut edges that are left exposed must be sealed in accordance with the Ecoply® Barrier Specification & Installation Guide prior to installation.
- 14.3 Prior to fixing Ecoply® Barrier plywood sheets, a check must be made to ensure all sheet edges will be supported by framing. At the base of the wall, the sheet must hang below the bottom plate by a minimum of 25 mm.
- 14.4 Ecoply® Barrier plywood sheets must be fixed to the timber framing with 50 x 2.8 mm hot-dip galvanised flathead clouts, or 50 x 2.8 mm ring shanked stainless steel nails. Nails may be either hand-driven or power-driven. Refer to Paragraph 7.11 for fixing centres and Paragraph 9.3 for material selection.
- 14.5 At vertical joints, Ecoply® Barrier must be installed with a 1.5-3 mm gap between the sheet edges. Sheets at horizontal joints between floor levels must be installed with a minimum 15 mm gap between the edges and must be supported over horizontal framing. All horizontal joints must be flashed with the Ecoply® Horizontal Jointer.
- 14.6 Any damaged areas of Ecoply® Barrier, or gaps around service penetrations, must be repaired by covering with joint sealing tape.

Joint Sealing Tape Installation

- 14.7 Ecoply® Barrier plywood sheets must be cleaned of dust and other surface contaminants prior the application of the joint sealing tape to ensure adequate adhesion is achieved.
- 14.8 All vertical sheet joints, internal and external corners, penetrations or damaged areas and over driven nails must be covered with Ecoply® Sealing Tape. The manufacturer's instructions regarding the application temperatures for the joint sealing tapes must be followed.

Flexible Sill and Jamb Tape Installation

- 14.9 The Ecoply® Sill Tape and Ecoply® Frame Flashing Tape must be installed in accordance with the Ecoply® Barrier Specification & Installation Guide. Particular attention must be paid to the installation of the sill and jamb tapes around window and door joinery openings to ensure all exposed timber wall framing in the opening is protected.

Inspections

- 14.10 The Ecoply® Barrier Specification & Installation Guide must be referred to during the inspection of the Ecoply® Barrier installations.

Health and Safety

- 15.1 Ecoply® Barrier must be handled in accordance with the Material Safety Data Sheet for H3.2 CCA treated Ecoply®.
- 15.2 When power tools are used for cutting or forming holes, health and safety measures as set out in the Ecoply® Barrier Specification & Installation Guide must be undertaken because of the amount of dust generated.
- 15.3 Safe use and handling procedures for the Ecoply® Barrier and the components that make up the cladding system are provided in the relevant manufacturers' Installation Guides.

Basis of Appraisal

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

Tests

- 16.1 Racking tests were carried out in accordance with BRANZ Technical Paper P21. The earthquake and wind bracing ratings were determined using the evaluation procedures outlined in BRANZ Technical Recommendation No. 10. The test results and laboratory methods have been reviewed by BRANZ and found to be satisfactory.
- 16.2 Testing has been carried out by BRANZ to determine the face load pressure resistance of Ecoply® Barrier.
- 16.3 Testing to determine the resistance of Ecoply® Barrier plywood to water vapour transmission in accordance with AS/NZS 4200.1 and resistance to water penetration in accordance with AS/NZS 4201.4 has been completed. The results have been reviewed by BRANZ and found to be satisfactory.
- 16.4 The Ecoply® Sealing Tape, Frame Flashing Tape and Sill Tape have been tested to BRANZ criteria to assess the tensile strength of control and UV aged material, nail sealability, water resistance of control and UV accelerated aged material and pliability. BRANZ has determined that the tapes are fit for purpose for the intended use. The adhesion to the Ecoply® Barrier plywood sheet has also been tested and found to be satisfactory.

Other Investigations

- 17.1 Structural and durability opinions were given by BRANZ technical experts.
- 17.2 An assessment was made of the durability of the Ecoply® Barrier Tapes by BRANZ technical experts.
- 17.3 BRANZ expert opinion on NZBC E2 code compliance for Ecoply® Barrier was based on evaluation of all details within the scope and as stated within this Appraisal. The details contained within the Ecoply® Barrier Specification & Installation Guide have been reviewed and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of Acceptable Solution E2/AS1 for a rigid wall underlay.
- 17.4 Site inspections were carried out by BRANZ to assess the practicability of installation.
- 17.5 The Ecoply® Barrier Specification & Installation Guide has been examined by BRANZ and found to be satisfactory.

Quality

- 18.1 The manufacture of the Ecoply® Barrier plywood has been examined by BRANZ, including methods adopted for quality control. Details regarding the composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 18.2 The quality of materials, components and accessories supplied by Carter Holt Harvey Plywood Ltd is the responsibility of Carter Holt Harvey Plywood Ltd. The quality control system for the manufacture of the plywood used for the Ecoply® Barrier has been assessed and registered as meeting the requirements of AS/NZS 2269 by the Engineered Wood Products Association of Australasia, Certificate No. 911.
- 18.3 The manufacture of Ecoply® Tapes has been examined on behalf of BRANZ, including methods adopted for quality control. Details of the quality and composition of the materials used were obtained and found to be satisfactory.
- 18.4 Quality of installation on-site of components and accessories supplied by Carter Holt Harvey Plywood Ltd and the building contractor is the responsibility of the installer.
- 18.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation in accordance with the instructions of Carter Holt Harvey Plywood Ltd.

Sources of Information

- AS/NZS 1170:2002 Structural design action - General principles.
- AS/NZS 2269:2012 Plywood - Structural.
- AS/NZS 4200.1:2017 Pliable building membranes and underlays - materials.
- AS/NZS 4201.4:1994 Pliable building membranes and underlays - Methods of test - Resistance to water penetration.
- NZS 3602:2003 Timber and wood-based products for use in building.
- NZS 3603:1993 Timber Structures Standard.
- 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.

Amendments

Amendment No. 1, dated 03 September 2021.

This Appraisal has been amended to reflect building code updates relating to fire.

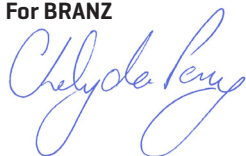
In the opinion of BRANZ, **Ecoply® Barrier Rigid Air Barrier** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Carter Holt Harvey Plywood Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

21 June 2019

ECOPLY[®] SPECIFICATION & INSTALLATION GUIDE

OCTOBER 2021

INCLUDING OCTOBER 2021 TECHNICAL NOTE '19mm ECOPLY JUST GOT AN UPGRADE'
AND MINOR AMENDMENTS



19mm ECOPLY JUST GOT AN UPGRADE

INTRODUCTION

As part of process improvement and product development, Carter Holt Harvey Plywood Ltd (CHH Ply) is proud to introduce an improved veneer layup/construction for the 19mm Ecoply Structural Plywood range (including FI I/F8 Longspan flooring, F8 flooring, Carpet grade flooring and Ecoply square edge).

This Technical Note details the changes and application of 19mm Ecoply with 19-38-5 construction in lieu of the previous 19-30-7 construction, including Section Properties, Product Identification and Specification & Installation requirements.

SECTION PROPERTIES

Table 1. Section Properties of 19mm Ecoply Structural Plywood, denotes the section properties for the new 19-38-5 construction, together with the section properties of the previous 19-30-7 construction. 19-38-5 demonstrates improved structural properties in the parallel to the grain direction, whilst exhibiting reduced structural properties in the perpendicular direction. For Specific Engineering Design (SED) projects, engineers will need to confirm the suitability of the 19-38-5 plywood as appropriate for their design.

Table 1: Section Properties of 19mm Ecoply® Structural Plywood

Nominal plywood thickness ¹	ID code ²	Mass	Section properties per mm width					
			Parallel to the face grain			Perpendicular to the face grain		
			Parallel Moment of Inertia	Section Modulus	Shear Constant	Perpendicular Moment of Inertia	Section Modulus	Shear Constant
(mm)		(kg/m ²)	(mm ⁴)	Z (mm ³)	I/Q (mm ²)	I (mm ⁴)	Z (mm ³)	I/Q (mm ²)
19	19-30-7	10.6	451.0	46.9	13.7	157.0	23.8	10.7
19	19-38-5	10.6	456.3	47.7	14.8	132.5	20.9	9.2

¹ Actual thickness of Ecoply sheets manufactured to thickness tolerances stated in AS/NZS 2269

² Identification code: panel thickness – outermost veneer thickness x 10 – number of plies

³ I/Q values for rolling shear are for stress at the neutral axis calculated as in NZS 3603

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
- Glue bond: e.g. A BOND
- Formaldehyde emission class: E0 for A Bond Ecoply
- Australasian Standard: e.g. AS/NZS 2269
- Treatment Standard (if applicable): e.g. AS/NZS 1604.3:2012
- Stress grade: e.g. F11/F8
- Nominal Thickness: e.g. 19-
- The values of second moment of area (moment of inertia) (I) and section modulus (Z) in the grain orientations to which the properties are declared: e.g. 456.3,47.7/132.5,20.9
- Date and time of manufacture: e.g. 01/12/15 12:23:45
- The Engineered Wood Products Association of Australasia (EWPPAA) brand and mill number: e.g. 911 (Tokoroa mill)

Example

ECOPLY CD STRUCTURAL A BOND EO
AS/NZS 2269.0:2012
19-(456.3,47.7/132.5,20.9)
OPERATOR/DATE/TIME F11/F8



SPECIFICATION & INSTALLATION

19-38-5 Ecoply Structural Plywood shall be specified and installed in accordance with the product specific usage requirements for nominal 19mm plywood as detailed in the Ecoply® Specification and Installation Guide and/or NZS 3604, Timber framed buildings, as appropriate. Where the 19mm plywood solution is part of SED, refer to structural engineer's details.ils.

CONCLUSION

19mm Ecoply Structural Plywood products manufactured by CHH Ply from October 2021 will have a veneer layout corresponding with an ID Code of 19-38-5. The span tables and installation requirements detailed in the Ecoply® Specification and Installation Guide remain applicable for this alternate veneer layout.

For SED projects, engineers will need to confirm the suitability of the 19-38-5 plywood as appropriate for their design.

REFERENCES

- Ecoply® Specification & Installation Guide
- NZS 3604:2011, Timber framed buildings

LIMITATIONS

The information contained in this document is current as at October 2021 and is based on data available to CHH Ply at the time of going to print. CHH Ply reserves the right to change the information contained in this document without prior notice. It is important that you visit www.chhply.co.nz or call 0800 326 759 to confirm that you have the most up to date information available.

CHH Ply has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document. However, to the extent permitted by law CHH Ply will not be liable for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.



ECOPLY® SPECIFICATION & INSTALLATION GUIDE

Contents

1.0 Ecoply® Product Range	3
1.1 Technical Information and CAD Details	3
1.2 Product Description and Range	4
1.3 Surface Grades	5
1.4 Preservative Treatment	6
1.5 Section Properties	7
1.6 Product Identification	8
1.7 Code Compliance	9
1.8 General Design Considerations	9
1.9 Sustainability	11
1.10 Health & Safety	11
1.11 Storage & Handling	11
2.0 General Installation Guide	12
2.1 Framing	12
2.2 Sheet Fasteners and Fixing	12
2.3 Adhesives	14
3.0 Structural Bracing & Ceiling Diaphragms	15
3.1 Design to Comply with the New Zealand Building Code	15
3.2 Ecoply Bracing Specifications Summary	17
3.3 Ecoply Bracing Specification - EPI	18
3.4 Ecoply Bracing Specification - EPG	20
3.5 GIB Handibrac® – Recommended Installation Method	22
3.6 Structural Ceiling Diaphragms	22
4.0 Roofs and Decks	23
4.1 Flexible Membrane Systems	23
4.2 Roof Tile Systems	24
4.3 Roofing & Decking – Product Selection Guide	24
4.4 Frame Spacings for Ecoply Roofs and Decks	25
4.5 Roofing – Design Considerations	26
4.6 Roofing – Installation	28
5.0 Flooring	30
5.1 Flooring – Range	30
5.2 Flooring – Installation	30
5.3 Flooring – Finishing	31
6.0 Frequently Asked Questions	32
7.0 References and Sources of Information	34
8.0 Limitations	34



1.0 ECOPLY® PRODUCT RANGE

Manufactured in New Zealand by Carter Holt Harvey Plywood, 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 (EWPA) 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.chhply.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 Plywood 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.chhply.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 October 2021. 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 Plywood 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 F11¹ stress grade (See Tables 1, 4 and 5). Other Ecoply products are also available in F11¹ 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.chhply.co.nz or contact Carter Holt Harvey Plywood 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 grade¹
- Other Ecoply products are also available in F11¹ upon request

¹ Where the stress grade F11 is referred to in all CHH 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: • Furniture/Joinery/Signs • Interior Linings • Sheathing • Engineering components where a superior visual finish is required	Possible Uses: • Structural gussets • Stressed skin panels • Bins, boxes, crates • Hoardings • Membrane substrate	Possible Uses: • 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: • Substrate for flooring overlays such as linoleum, tiles and rigid coverings • Substrate for membrane roofing and decking where visible appearance is critical	Possible Uses: • 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.

I.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 I.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

Nominal plywood thickness ²	ID code ³	Mass	Section properties per mm width					
			Parallel to the face grain			Perpendicular to the face grain		
			Parallel Moment of Inertia	Section Modulus	Shear Constant	Perpendicular Moment of Inertia	Section Modulus	Shear Constant
(mm)		(kg/m ²)	(mm ⁴)	Z (mm ³)	I/Q (mm ²)	I (mm ⁴)	Z (mm ³)	I/Q (mm ²)
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
19 ⁵	19-38-5	10.6	456.3	47.7	14.8	132.5	20.9	9.2
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 plywood thickness ²	ID code ³	Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F8)			Perpendicular to the face grain (F8)		
		Bending Stiffness EI	Bending Moment f _{pb} Z	Rolling Shear f _{pr} I/Q	Bending Stiffness EI	Bending Moment f _{pb} Z	Rolling Shear f _{pr} I/Q
(mm)		(1000 Nmm ²)	(Nmm)	(N)	(1000 Nmm ²)	(Nmm)	(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
19 ⁵	19-38-7	4161.4	1192.5	26.8	1205.8	522.5	15.6
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 Grade (Including Longspan Flooring)

Nominal plywood thickness ²	ID code ³	Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F11)			Perpendicular to the face grain (F8)		
		Bending Stiffness EI	Bending Moment f _{pb} Z	Rolling Shear f _{pr} I/Q	Bending Stiffness EI	Bending Moment f _{pb} Z	Rolling Shear f _{pr} I/Q
(mm)		(1000 Nmm ²)	(Nmm)	(N)	(1000 Nmm ²)	(Nmm)	(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
19 ⁵	19-38-5	4801.7	1478.7	36.8	1205.8	522.5	15.6
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 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

5 From October 2021 CHH Plywood will shift to manufacturing 19mm plywood in a 19-38-5 construction instead of 19-30-7

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 Plywood 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

Stress Grade	Characteristic Strength MPa	
	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 ϕ 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 ϕ 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 m ² ; 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 m ²	Primary structural members in structures intended to fulfil essential services or post disaster function
	Value of Strength Reduction Factor ϕ		
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: e.g. A BOND
- Formaldehyde emission class: E0 for A Bond Ecoply
- Australasian Standard: e.g. AS/NZS 2269
- Treatment Standard (if applicable): e.g. 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 (EWPPAA) 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



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



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 (EWPA) which is itself audited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

CHH Plywood is licensed by the EWPA to stamp plywood with the EWPA/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 PSI-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 E₀).

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 E₀ 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 4.5×10^{-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 Plywood 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 Plywood 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.chhply.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 Plywood

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.chhply.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

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.

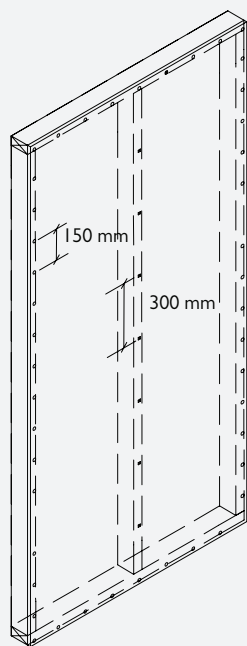
For plywood used as exterior cladding refer to the current Shadowclad® Specification & Installation Guide for Cavity Construction which can be downloaded from www.chhply.co.nz

For plywood used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide which can be downloaded from www.chhply.co.nz

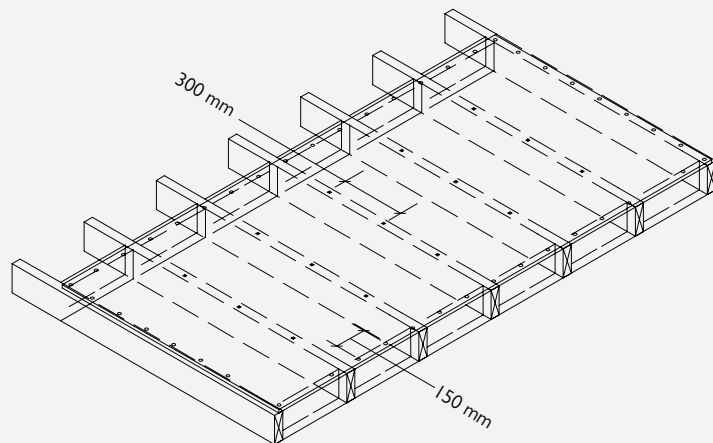
2.2 SHEET FASTENERS AND FIXING

- 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

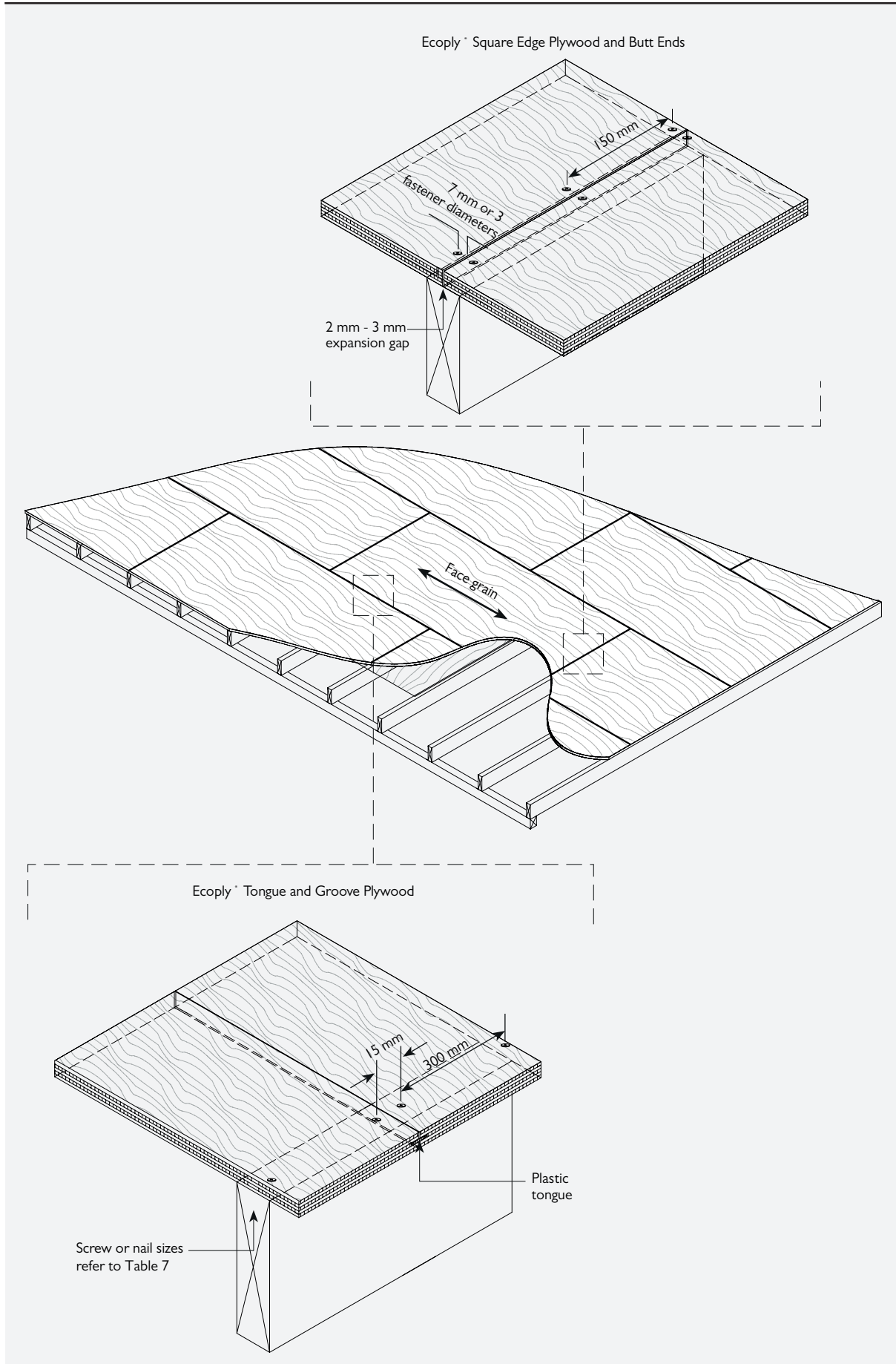


Table 7: Fasteners and Characteristic Shear Loads for Ecoply®

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 ²	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 ²	10-24-35 ⁴	1200	10-16-40 ⁴	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 advice 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 glue line 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 Plywood 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 - BI 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.

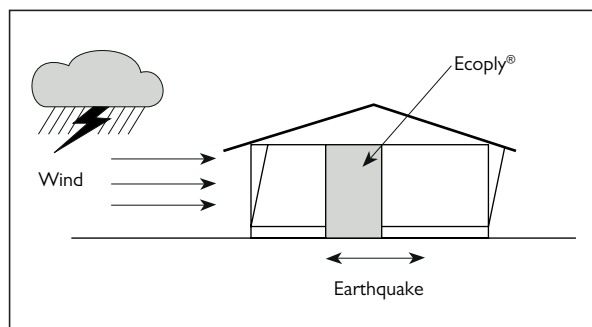
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

Structure

Timber framed buildings to NZS 3604 *Timber Framed Buildings* is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution BI/ASI Structure.

CHH Plywood 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 BI/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.chhply.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 Plywood 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.

Table 8: Ecoply® Suitability for Bracing Applications 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' 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:

- 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 $2.4 \div \text{element height in metres}$, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
- Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height."
- 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 Plywood 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 Plywood 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.chhply.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 Plywood 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
EPI	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.chhply.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.chhply.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.

SEPTEMBER 2015

3.3 ECOPLY® BRACING SPECIFICATION - EPI

Table 10: Singled Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPI_0.4	0.4 m	Ecoply one side	80	95
EPI_0.6	0.6 m	Ecoply one side	95	105
EPI_1.2	1.2 m	Ecoply one side	120	135

Framing

Wall framing must comply with:

- NZBC B1 - Structure: ASI Clause 3 Timber (NZS 3604)
- NZBC B2 - Durability: ASI 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.

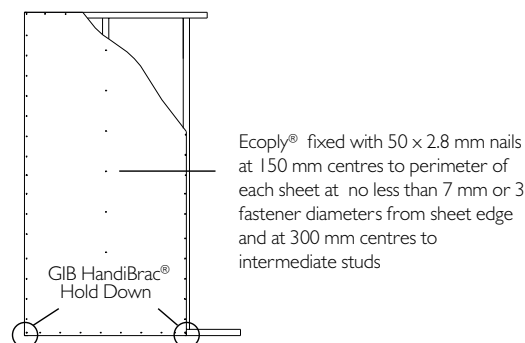
Fasteners for H3.2 CCA treated Ecoply® panels

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® 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/ASI 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.

SEPTEMBER 2015

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.

SEPTEMBER 2015

3.4 ECOPLY® BRACING SPECIFICATION – EPG

Table 12: Structural Plywood Brace with Plasterboard Other Side

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPG_0.4	0.4 m	Ecoply one side and 10 mm	100	115
EPG_1.2	1.2 m	GIB® Standard plasterboard other side	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

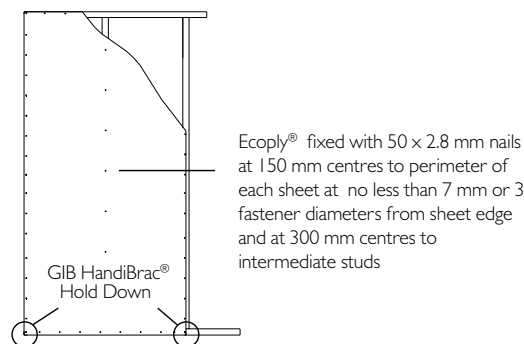
Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

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® 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.

SEPTEMBER 2015

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.

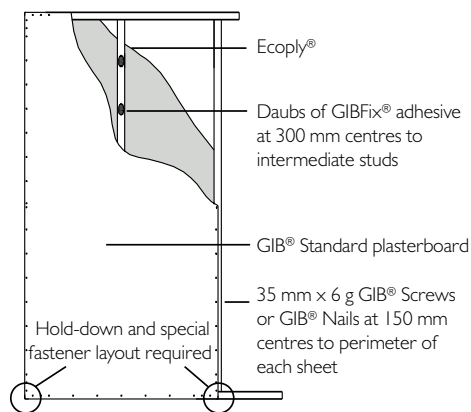


Table 13: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

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 zones I 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 I 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 exposure 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.

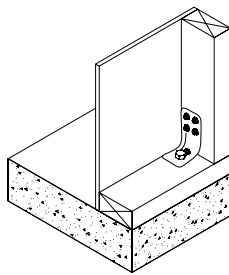
- The GIB HandiBrac® registered design provides for quick and easy installation
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to

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

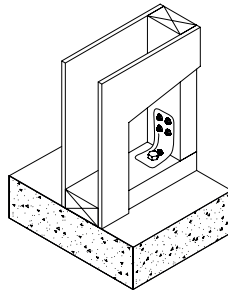
Concrete Floor

External Walls



Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate

Internal Walls



Position GIB HandiBrac® at the stud/plate junction

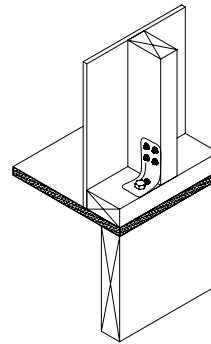
Hold-down fastener requirements

A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket

Reproduced with the permission of Winstone Wallboards Ltd

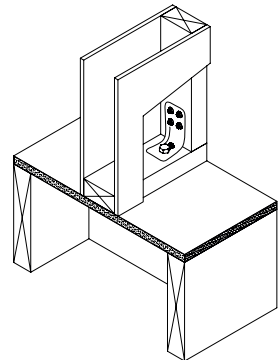
Timber Floor

External Walls



Position GIB HandiBrac® in the centre of the perimeter joist or bearer

Internal Walls



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

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:

- Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
- 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:

- The length of diaphragm shall not exceed twice its width measured between supporting walls
- The ceiling lining must consist of plywood over the entire area of the diaphragm
- Complete sheets with a minimum size of 1800 x 900 must be used
- Framing size and spacing must comply with NZS 3604
- 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 Ecopyly
- Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
- Fixings are no closer than 10 mm from sheet edges
- 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
- Sheets must be laid in a staggered pattern
- 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 EWPA 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 Plywood. 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 Plywood' 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.

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 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' available upon request)	F8 (F11' available upon request) 19 mm Longspan supplied F11' as standard	F11'
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 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 Plywood 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 Ecopy® with face grain across framing				
				Ecopy 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 Ecopy weight or 40 kg/m² including Ecopy)	>2°	F8	Extra High	600	600	800	800	900
			High	900	900			
		F11	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 Ecopy® with face grain across framing					
	Ecopy 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 Ecopy® with face grain across framing			
	Ecopy 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 Plywood 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 Ecopy® 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 Plywood 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.

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 Plywood recommends a vent area of 1/300th of the ceiling plan area (approx 3350 mm² 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.

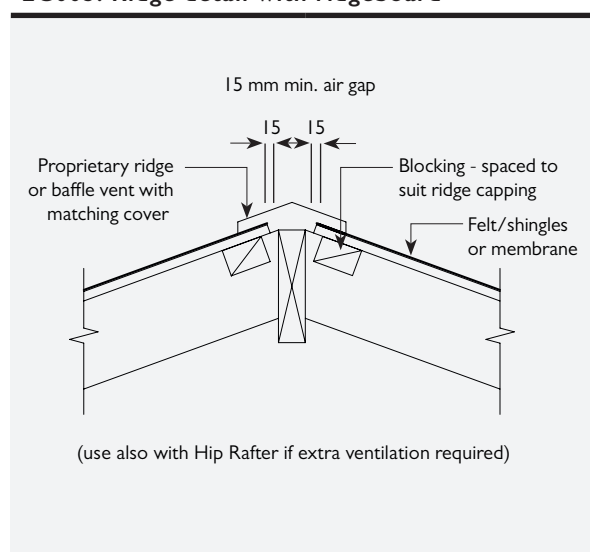
Bubbling

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.

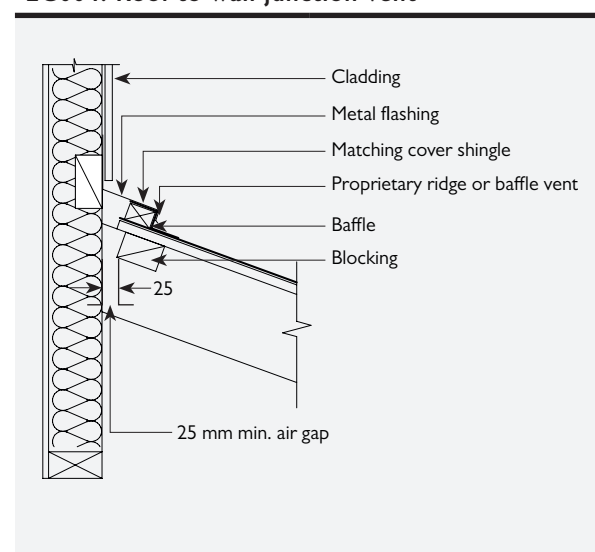
Soil

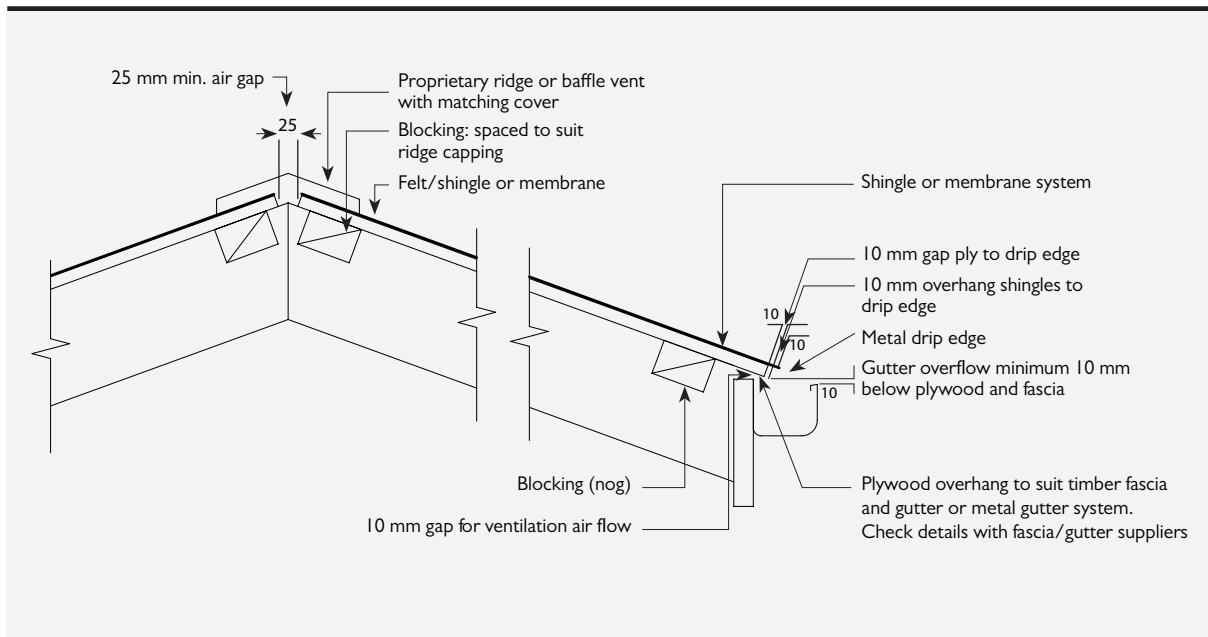
Ecoply plywood (untreated or H3.1 LOSP/H3.2 CCA treated) must not be allowed to come in contact with soil. Surfaces, flashings and gutters should be detailed to avoid trapping detritus and moisture.

EC003: Ridge detail with ridgeboard



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.

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:

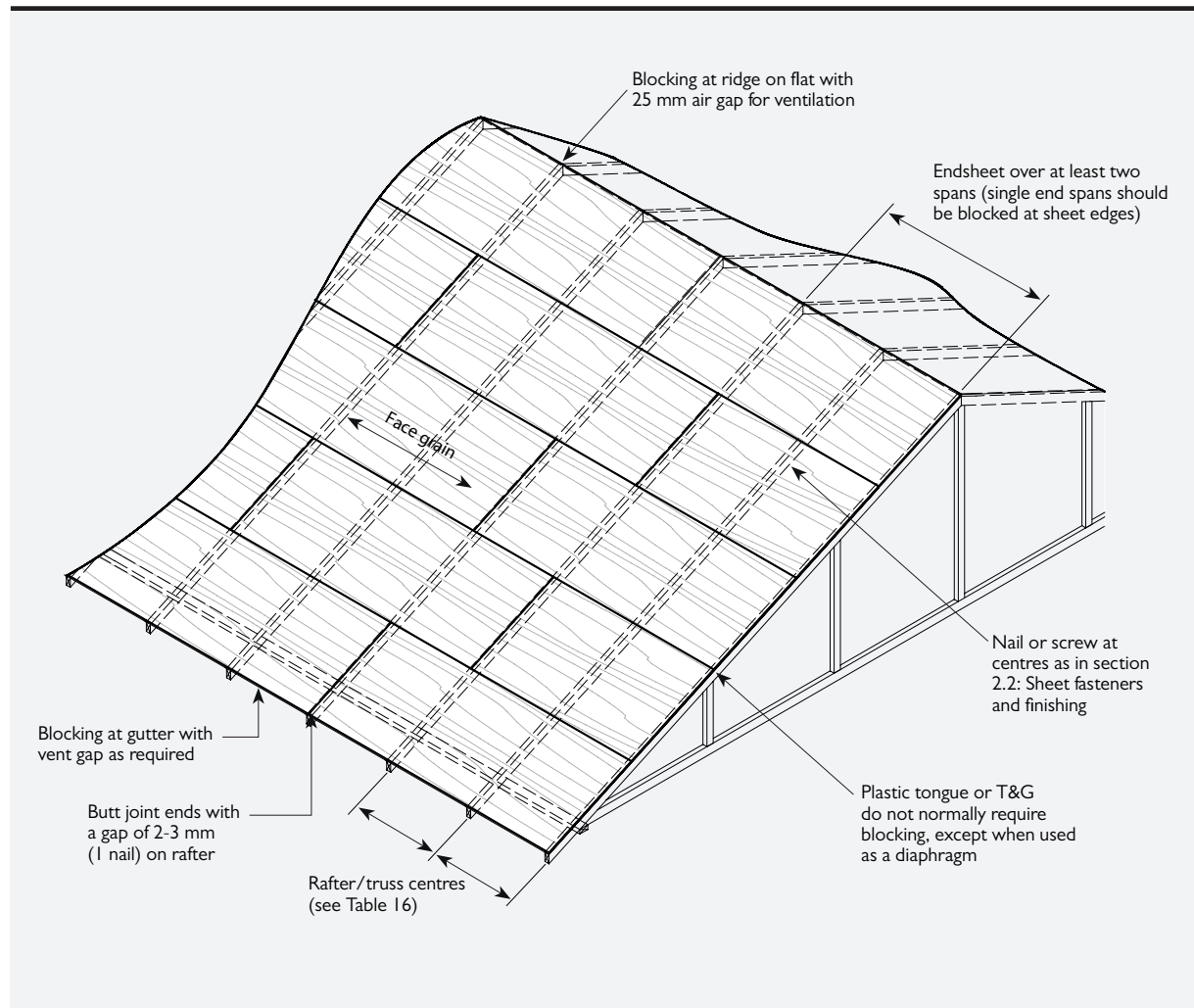
- Ensure top edges of framing are properly aligned
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to lower moisture level in roof spaces, second floor spaces, and reduce differential truss, rafter or joist deflections

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

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 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 Plywood 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 m²) 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

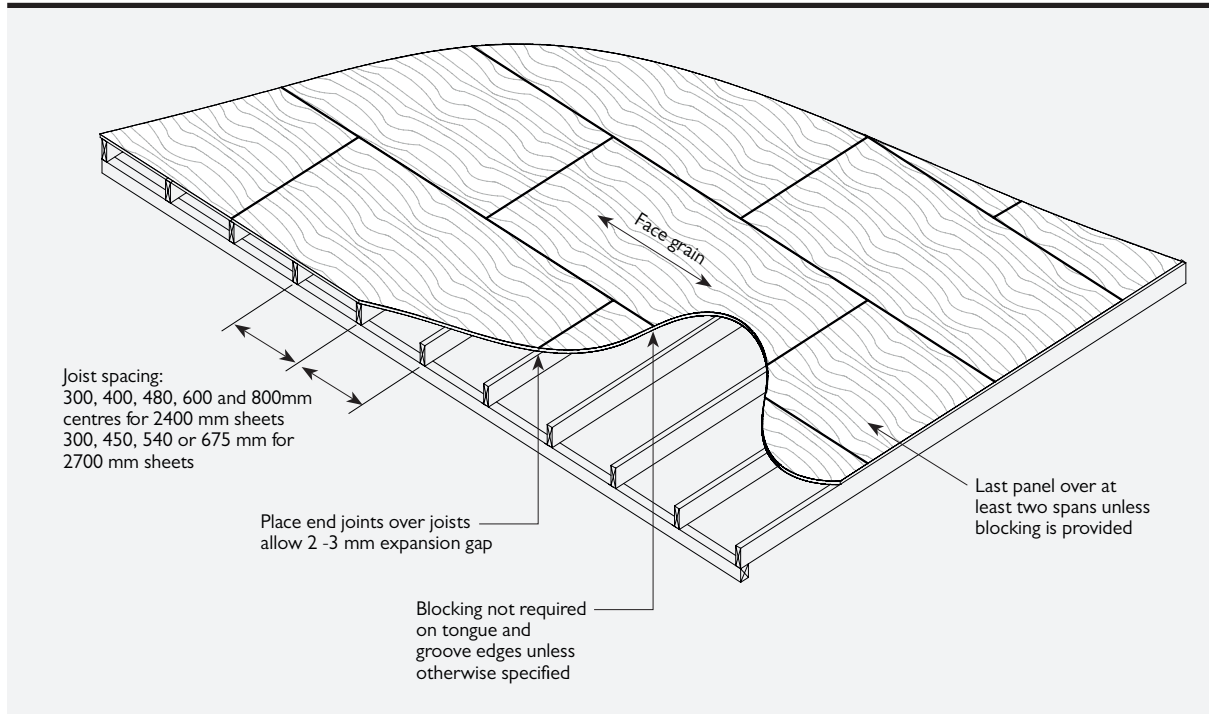
Blocking

- 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

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/m²) 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 (E₀ - 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.

7.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code (NZBC)
 - CHH Plywood technical notes - downloadable from www.chhply.co.nz
 - 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)
 - EWPA (www.ewp.asn.au)
 - Product Technical Statement for Ecoply available online (www.chhply.co.nz/product-technical-statements)
 - EWPA 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

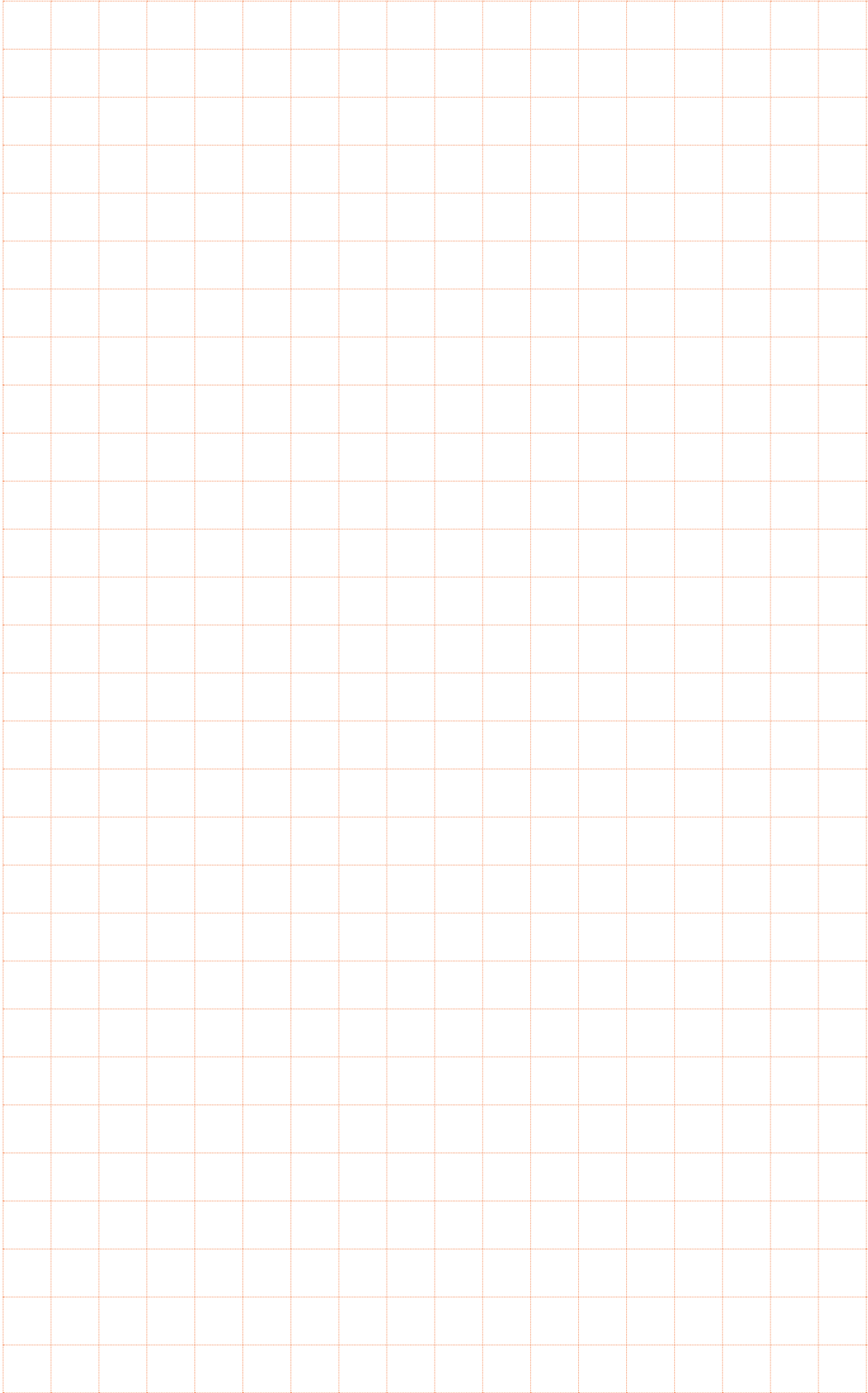
The information contained in this document is current as at October 2021 and is based on data available to CHH Plywood at the time of going to print.

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 Plywood design information and literature relating to Ecoply structural plywood products. CHH Plywood 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.chhply.co.nz to obtain current information.

CHH Plywood 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 Plywood assumes no responsibility or liability for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.



CHH PLY

Private Bag 92-106
Victoria Street West
Auckland 1142
New Zealand

Freephone: 0800 326 759

www.chhply.co.nz

October 2021
Ecoply.V3.02.1021



MASONS UNI® FLEXIBLE AIR BARRIER (UNI® FAB) SPECIFICATION GUIDE



MASONS
Designed Smart, Built Tough.

V1.0 October 2021

1. GENERAL

1.1 GENERAL

This specification relates to the installation of Masons UNI® Flexible Air Barrier (UNI® FAB).

1.2 RELATED WORK

The installation of UNI® FAB relies on the installation of a timber or steel primary structure that:

- › complies with the NZ Building Code and is designed in accordance with NZS 3604:2011 or NASH Standard Parts 1 and 2: 2019, or
- › is specifically designed to NZS 3603:1993 or AS/NZS 1170:2002, or
- › where existing is suitable for the intended building work.

1.3 DOCUMENTS

Refer to the following manufacturer's documents:

- › Masons UNI® FAB pass™
- › Masons UNI® FAB Design and Installation guide
- › Masons UNI® FAB warranty.

Refer to the following related documents:

- › NZS 3604:2011 Timber-framed buildings
- › NASH Standard Parts 1 and 2: 2019
- › NZS 3603:1993
- › NZS 1170:2002 (set).

1.4 GENERAL DESIGN CONSIDERATIONS

The system must be specified in accordance with the Mason's UNI® FAB Design and Installation guide.

2. PRODUCTS

2.1 PRODUCT DESCRIPTION

UNI® FAB is a nonwoven, absorbent, water-resistant 180 GSM, synthetic wall underlay. It comprises three polypropylene layers: two outer layers of nonwoven polypropylene with a middle layer of a functional-technical film. It is manufactured to meet the European standard EN 13859-2:2014 as well as the absorbency performance requirement as per NZS 2295:2006. It is supplied coloured blue with a black underside unless an alternative colour is requested.



2.2 ASSEMBLY COMPONENTS

The following assembly components are supplied by Masons:

UNI® FAB

- Masons UNI® FAB 2.74 x 50 m
- Masons UNI® Soffit FAB 0.6 x 18.5 m

Fixings

- Masons UNI® Fasteners 32 mm
- Masons UNI® Cap Nails

Ancillary components

- Masons 40 Below™ (Platinum or Flex) flashing tape 150 mm x 20 mm
- Masons 40 Below™ (Platinum or Flex) flashing tape 75 mm x 20 mm
- Masons Penetration Seal 1-75 mm
- Masons Penetration Seal 80-170 mm
- Masons UNI® FAB Seam and Repair Tape
- Masons Corner Guards
- Masons PEF Backing Rod
- Masons Brick Ties.

2.3 SUBSTITUTIONS

Substitutions are not permitted to any of the specified components listed in this section.

3. EXECUTION

3.1 QUALIFICATIONS

The installation of the UNI® FAB must be carried out by a competent and experienced builder.

3.2 RESTRICTED BUILDING WORK

Where Restricted Building Work applies, the installer shall be a Licensed Building Practitioner (LBP) or be supervised by an LBP with the relevant license class.

3.3 CHECK RELATED WORK

Confirm the primary structure:

- complies with the NZ Building Code and is designed in accordance with NZS 3604:2011 or NASH Standard Parts 1 and 2: 2019, or
- is specifically designed to NZS 3603:1993 or AS/NZS 1170:2002, or
- where existing is suitable for the intended building work, and
- meets the fixing requirements as per Table 1 in the UNI® FAB Design and Installation Guide.



4. APPLICATION

4.1 GENERAL

The installation of the UNI® FAB must be completed in accordance with the instructions in the Masons UNI® FAB Design and Installation guide and the building consent documentation. All conditions contained in the building consent documentation must be met.

4.2 RECEIPT OF PRODUCT

Ensure that all product supplied by Masons is:

- free of defects at the time of delivery and
- handled and stored in accordance with all Masons' requirements.

5. COMPLETION

5.1 QUALITY CHECK

Check the installation to ensure all components have been installed in accordance with all Masons' requirements.

5.2 WARRANTIES

A manufacturer's warranty is available for the UNI® FAB. Refer to www.mpb.co.nz.

5.3 INFORMATION FOR CARE AND MAINTENANCE

The UNI® FAB requires minimal care and maintenance to maintain the performance of the underlay. Refer to www.mpb.co.nz.



6. PROJECT-SPECIFIC SELECTIONS

PROJECT DETAILS

Project address

Lot/DP number

Date of plans

Purpose of plans

Description of building work and reference to drawing numbers

DOCUMENTS SUPPLIED (CHECK WHICH APPLIES)

☐

Masons UNI® FAB pass™

☐

Masons UNI® FAB Design and
Installation Guide

☐

Masons UNI® FAB Warranty

DESIGNER CONFIRMATION (CHECK WHICH APPLIES)

Location

Wind zone or design pressure (ULS)

☐

Low

☐

Medium

☐

High

☐

Very high

☐

Extra high

☐

Design pressure (ULS) up to 4.6 kPa

Exposure zone as per NZS 3604:2011

☐

A

☐

B

☐

C

☐

D

Distance to boundary

☐

Less than 1 m

☐

Greater than 1 m

Building

Framing

☐

Timber

☐

Lightweight steel

☐

Existing building assessed at equivalent stiffness to NZS 3604:2011



ASSEMBLY COMPONENT SELECTIONS

UNI® FAB

- ☐ Masons UNI® FAB 2.74 x 50 m
- ☐ Masons UNI® Soffit FAB 0.6 x 18.5 m

Fixings

- ☐ Masons UNI® Cap Nails for use with timber framing
- ☐ Masons UNI® Self Drilling Screws with washers for use with lightweight steel frames

Ancillary components

- ☐ Masons 40 Below™ flashing tape (Flex) 150 mm x 20 mm
- ☐ Masons 40 Below™ flashing tape (Flex) 75 mm x 20 mm
- ☐ Masons 40 Below™ flashing tape (Platinum) 150 mm x 20 mm
- ☐ Masons 40 Below™ flashing tape (Platinum) 75 mm x 20 mm
- ☐ Masons Penetration Seal 1-75 mm
- ☐ Masons Penetration Seal 80-170 mm
- ☐ Masons UNI® FAB Seam and Repair Tape
- ☐ Masons Corner Guards
- ☐ Masons PEF Backing Rod
- ☐ Masons Brick Ties
- ☐ Masons Wrap Strap.

**MASONS UNI FLEXIBLE
AIR BARRIER (UNI)
TECH DATA SHEET**



MASONS
Designed Smart, Built Tough.

V1.0 September 2021

DESCRIPTION

UNI is a three-layer flexible wall underlay. It is manufactured by thermally bonding outer spunbonded layers to an inner layer of microporous polypropylene film.

Property	Method	Units	Value
Informative			
Mass/unit area	EN 1849-2:2010	g/m ²	180
Thickness	EN 1849-2:2010	mm	0.7
Width	EN 1849-2:2003	m	2.74 0.6 m
Length	EN 1849-2:2003	m	18.2
Straightness	EN 1849-2:2003	mm/10 m	30
Visible defects	EN 1850-2:2004		No defects
Normative			
Reaction to fire	EN ISO 11925-2 AC-2011	class	E
Resistance to water penetration	EN 1928:2002	class	W1
Water vapour transmission (sd)	EN ISO 12572:2004 EN 1931:2002	m	0.2
Water absorbance	NZS 2295	AS/NZS 4201:part 6	
Air resistance (Air permeability)	EN 12114	m ³ /(m ² x h x 50 Pa)	≤ 0.01
Dimensional stability	EN 1107-2:2002	%	≤2
Flexibility at low temps	EN 495-5:2014	°	-40
Resistance to tearing MD	EN 12310-1:2010	N	210N

SDC - Approved Building Consent Document - BC231907 - Pg 253 of 446 - 21/03/2024 - helen.fowler



Property	Method	Units	Value
Resistance to tearing CD	EN 12310-1:2010	N	290N
Tensile strength MD	EN 12311-2:2013	N/50 mm	330
Tensile strength CD	EN 12311-2:2013	N/50 mm	230
Tensile strength - elongation MD	EN 12311-2:2013	%	40
Tensile strength - elongation CD	EN 12311-2:2013	%	80
Performance after artificial aging			
Method of aging	EN 1296 & EN 1297		
Water resistance, Resistance to water penetration	EN 1928:2002	class	W1
Tensile strength MD/ CD	EN 12311-2:2013	n/50 mm	280/195
Tensile strength elongation	EN 12311-2:2013	%	34/68

Bitumac® 750 (860)

Heavy Duty Non Fire Retardant Kraft Roof Underlay

Application

Bitumac® 750 is a heavy duty kraft recommended for use as a self-supporting roof underlay where fire retardant properties are not important.

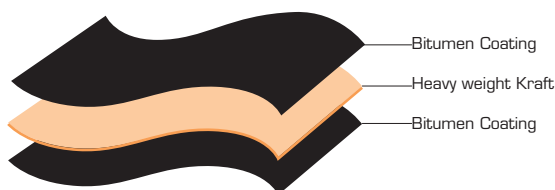
Suitable for:

- All roof cladding types including concrete and clay tiles, profiled metal and pressed metal tiles
- Direct fixing under absorbent and non absorbent roof claddings such as profiled metal

Features and Benefits

- Self-supporting heavy duty product that can be installed without support for spans up to 1200mm
- Absorbent allowing it to be used with all cladding types
- Vapour permeable - allowing vapour to pass through preventing the build-up of condensation

Technical Data



NZS 2295 – Pliable, Permeable Building Underlays

Properties	Requirement	Performance
Absorbency	$\geq 150 \text{ g/m}^2$	Pass
Water Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Resistance to Water Penetration	$\geq 100 \text{ mm}$	Pass
pH of Extract	> 5.5 and < 8.0	Pass
Moisture Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Tensile Strength	MD $\geq 11 \text{ kN/m}$, CD $\geq 6 \text{ kN/m}$
	Edge Tear Resistance	MD $\geq 70 \text{ N}$, CD $\geq 55 \text{ N}$
Air Resistance	$\geq 0.1 \text{ MN s/m}^3$	Pass
Additional Information		
Flammability Index	> 5	Non Fire Retardant
NZS 2295:2006 Classification	R2	Self-supporting
Wind load zone	R2	Up to Very High

New Zealand Building Code (NZBC) and Limitations

When used, installed and maintained in accordance with the requirements outlined in this datasheet, will meet or contribute to meeting the following provisions of the NZBC:

NZBC Clause E2: External Moisture

Bitumac® 750 meets the requirements of NZBC E2/AS1 Table 23 for use as a:

- Roof underlay
- Wall wrap
- Air barrier

NZBC Clause B2: Durability

Meets the requirement NZBC B2.3.1 a) 50 years and NZBC B2.3.1 b) 15 years

Limitations

To meet the above Bitumac® 750 *must* be

- Installed as specified on this data sheet
- Kept dry at all times and not allowed to remain wet during construction or in service
- Maintained in a cavity where it is subject to intermittent wetting only and not exposed to sustained humidities in excess of 90% RH i.e:
 - where timber moisture content $> 18\%$
 - or where other building elements are releasing moisture (e.g: drying concrete)

Installation

General

- If roof pitch is less than 10 degrees, Bitumac® 750 should be run horizontally on support.
- If roof pitch is equal or greater than 10 degrees, Bitumac® 750 may be run horizontally or vertically.

Support is also required where Bitumac® 750 is installed on spans greater than 1200mm.

For all wall types, Bitumac® 750 must be:

- Fixed across its width and secured adequately in place with 8mm staples or 20mm clouts at no greater than 600mm centres across the width of the paper capturing all edges by the fastenings
- Lapped by 150mm and face away from the prevailing wind
- Run at lengths no greater than 10m
- Run over any ridges by no less than 150mm
- Sufficiently tensioned to ensure ponding does not occur
- Clad on the same day as installation (7 days maximum if Bitumac® 750 can be kept dry and undamaged).

Penetrations

- Bitumac® 750 must fit tightly and be lap taped around penetrations, allowing for free drainage of condensation

Repairs

- Any damage must be repaired with a new piece of underlay

Installation with LOSP treated timber

- Suitable for use with LOSP treated timber, conditional upon the solvent in LOSP treated timber having had sufficient time to evaporate (usually 4 days after treatment under appropriate environmental conditions)

Specification Notes

State the following: Product required: Bitumac® 750 Non Fire Retardant Roof Underlay

Product Specification

Description	Product Code	Roll Size	Area	GSM
Bitumac® 750	7886024	1250mm x 24m	30m²	330gsm
Bitumac® 750	7886040	1250mm x 40m	50m²	330gsm

Storage

Bitumac® 750 must be protected against damage and weather. Rolls must be stored on end, under cover in a clean, dry environment. Do not crush product

Accreditations/Appraisals/Certification

Tasman Insulation New Zealand Ltd

Certified OMS



Distributed by:
Tasman Insulation New Zealand Limited
9-15 Holloway Place, Penrose,
Auckland 1061, New Zealand

(1) This data sheet may have been superseded. Please refer to pinkbatts.co.nz for the most current information. This datasheet supersedes all previous versions. (2) Tasman Insulation New Zealand Ltd retains the right to change specifications without prior notification. (3) Do not use this product for any application not detailed in this data sheet. (4) Recommendations and advice regarding the use of this product are to be taken as a guide only. The purchaser should ascertain the suitability of this product for the particular end-use situation intended and when used in conjunction with other products. (5) Consult Tasman Insulation New Zealand Ltd for further information. (6) All claims about this product are subject to any variation caused by normal manufacturing process and tolerances. (7) The liability of Tasman Insulation New Zealand Ltd and its employees and agents for any errors or omissions in this data sheet or otherwise in relation to the product is limited to the fullest extent permitted by law. Except where the consumer acquires the goods for the purposes of a business, any rights a consumer may have under the Consumer Guarantees Act are not affected. (8) This information is provided without prejudice to Tasman Insulation New Zealand Ltd standard terms and conditions of sale.

Please consider the environment before printing this.

For further information visit pinkbatts.co.nz or call 0800 746 522

ROOF

PRODUCT DATA SHEET



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

26/05/2020

VERSION DATE

06/10/2022

RECERTIFICATION

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 advice 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



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



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 advice 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



PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie

Direct Fixed and Cavity Cladding systems



JHETGL30 and JHETGL60. These details have only been assessed and certified with respect to external fire spread via Linea™ Weatherboard. For walls located within 1.0m of a relevant boundary, Linea™ Weatherboard may be used as an external façade/cladding attached to the exterior of fire rated wall systems as depicted within the Fire and Acoustic Design Manual (November 2020). Fire Resistance rating performance of the wall assembly falls outside the scope of this certificate

iii. BRANZ Appraisal No 447 (2020) Linea™ Weatherboard Cavity Cladding

(Note: Provisions within the documents above related to the use of the systems with steel-frame construction are outside the scope of this certification).

3. In wind zones greater than Very High a rigid air barrier which complies with Table 23 of E2/AS1 shall be used. In Buildings exceeding 10 m in height RAB™ Board must be used including horizontal control joints in accordance with the requirements of the CodeMark certificate for RAB™ Board. (Refer to GM-CM30130)
4. The system is certified for use:
 - a. with the ancillary components as described in this certificate,
 - b. with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. Only joinery compliant with the requirements of NZS 4211:2008 including amendment 1 for the relevant Wind Zone or wind pressure shall be used or have a current CodeMark
5. The weatherboards must only be installed horizontally on vertical surfaces.
6. All exposed faces, including top edges at sills and all bottom edges of Linea™ Weatherboard and fibre cement ancillary components must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730
7. E2.3.5 and E2.3.6 compliance is limited to cavities created between the internal surface of the panels and the underlay or RAB™ Board's.

7 HEALTH AND SAFETY INFORMATION

Standard industry safety practices and manufacturer safety requirement as detailed in the technical literature including the applicable SDS must be observed at all time. Please refer to James Hardie SDS Fibre Cement Products June 2022

9 BASIS FOR CERTIFICATION

The certification decision is based on independent technical review(s) of test report(s), engineering opinion(s) and other documented evidence(s), factory audit(s) and site review(s)

Code Clause	Compliance pathway	Evidence
B1 STRUCTURE	Alternative solution -Expert judgement	001, 002, 003, 021 and 022
B2 DURABILITY	Alternative solution -Expert judgement	001, 002, 003, 021 and 022
C3 FIRE AFFECTING AREAS BEYOND THE SOURCE	Alternative solution -Expert judgement	001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 021, 022 and 023
E2 EXTERNAL MOISTURE	Alternative solution -Expert judgement	001, 002, 003, 013, 014, 015, 016, 017, 018, 019, 020, 021 and 022
F2 HAZARDOUS BUILDING MATERIALS	Alternative solution -Expert judgement	001, 002, 003, 021, 022 and 024

10 SUPPORTING DOCUMENTATION FOR CERTIFICATION



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 advice 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



PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie

Direct Fixed and Cavity Cladding systems



Ref	Author	Title	Date and/or revision
001	BRANZ	LINEA™ - WEATHERBOARD CAVITY CLADDING - Appraisal No. 447 [2020]	02 September 2020
002	BRANZ	LINEA™ - WEATHERBOARD DIRECT FIXED CLADDING - Appraisal No. 446 [2020]	02 September 2020
003*	BRANZ	BRANZ Appraisals Means of Compliance - Basis of Appraisal - LINEA™ WEATHERBOARD DIRECT FIXED AND CAVITY CLADDING - Appraisal No 446 and 447 (2020)	TV10686-001 21/08/2020
004*	BRANZ	Fire Assessment Report based Cone calorimeter test.	FH3182 21 November 2002
005*	BRANZ	Fire Assessment Report based Cone calorimeter test.	FH 2976 15 May 2001
006*	BRANZ	Fire Assessment Report based Cone calorimeter test (BRANZ Project No. FC10254-001).	FSR 4206 Issue2 7 November 2018
007*	BRANZ	Fire technical Opinion: Technical opinion based on NFPA 285 Compliance with NZBC C/AS2, clause 5.8.2 (b) and C/VM2 Part A (a).	FC12172-001 1 November 2019
008*	BRANZ	Fire Assessment Report Review of James Hardie Fire and Acoustic Manual	FAR 4620 – 04 November 2016
009*	BRANZ	Fire technical Opinion: Fire resistance of James Hardie Wall Systems with Service Penetrations	FC12040-004 -03 december2019
010*	BRANZ	Technical Assessment "Fire Resistance of External Wall and Soffit" Various JH Products	FAR 2597- 5th October 2005
011*	Intertek B&C	JH cavity fix wall assembly fire test as per NFPA 285	J6706.01-121-24 - 20th August 2019
012*	Intertek B&C	JH cavity fix wall assembly fire test as per NFPA 285	J6707.01-121-24 - 21st August 2019
013*	Clarkson Consulting Services	JH NZ_RAB_Weathertightness Assessment_200626_R1.5	26 June 2020
014*	James Hardie Building Product	Weathertightness Testing of Residential Façade Fibre Cement Cladding System On Cavity Battens to the requirement of Verification Method E2/VM1	TS061-05, dated 15 February 2006
015*	James Hardie Building Product	TESTING OF A TITAN RESIDENTIAL FIBRE CEMENT CLAD FAÇADE FOR COMPLIANCE WITH THE REQUIREMENTS OF AS/NZS 4284:1985 "TESTING OF BUILDING FACADES"	TS010-06, dated 14 November 2006
016*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS003-13, dated 4 December 2013
017*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS022-13, dated 12 November 2013
018*	James Hardie Technical Support group	Weathertightness (E2/VM1)	TS033-13, dated 8 January 2014
019*	James Hardie Technical Support group	Weathertightness & Façade System (E2/VM1)	TS009-15, dated 14 October 2015
020*	James Hardie Technical Support group	Testing of James Hardie NZ ExoTec Façade panel top hat rainscreen façade system in accordance with AS/NZS 4284:2008	FT-R1005, dated May 2017
021	James Hardie New Zealand Limited	James Hardie Linea™ Weatherboard Direct Fix Technical Specification (May 2020)	May 2020
022	James Hardie New Zealand Limited	James Hardie Linea™ Weatherboard Cavity Fix Technical Specification (May 2020)	May 2020



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



PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie Direct Fixed and Cavity Cladding systems



023	James Hardie New Zealand Limited	James Hardie Fire & Acoustic Design Manual. Section 4:16 Control of External Fire Spread, figures No's. 1 to 8 and 12 to 20, specifically details JHETGL30 and JHETGL60	November 2020
024	James Hardie New Zealand Limited	LQA8N - SAFETY DATA SHEET- JAMES HARDIE FIBRE CEMENT SHEETS PRODUCTS	Version No.: 2.0 ISSUED Date : 22/06/2022
* These documents were provided commercial in confidence and are not publicly available			



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



PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie Direct Fixed and Cavity Cladding systems



11 SUPPORTING INFORMATION ABOUT DESCRIPTION (OPTIONAL)

Linea™ Weatherboard cladding is finished with a latex paint system

Linea™ Weatherboards are bevel-back profile weatherboards with tongue and groove 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 relevel profile is machined on the back face of the weatherboard, the bottom of the board is chamfered and the tongue and groove 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 scribes - timber treated to Hazard Class H3.1, pre-primed before installation.



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 advice 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



PRODUCT CERTIFICATE

Linea™ Weatherboard by James Hardie

Direct Fixed and Cavity Cladding systems



- Window and door trim cavity air seal - air seals complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Paragraph 9.1.6, or self-expanding, moisture-cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
- Flexible sealant - sealant complying with NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- Linea™ Weatherboard fixings
 - Direct fix cladding method:- 40 x 2.8 mm flathead hot-dip galvanised Hardie™ Flex nails or stainless steel ring shank Hardie™ Flex nails (for concealed nailing), and 60 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing).
 - Cavity cladding method - 60 x 3.15 mm flathead hot-dip galvanised Hardie™ Flex nails or stainless steel ring shank Hardie™ Flex nails (for concealed nailing in NZS 3604 Wind Zones up to, and including, Very High), 75 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in NZS 3604 Wind Zones up to, and including, Very High), and 90 x 3.55 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 3.2 kPa).
- Hardie™ Axent™ Trim fixings - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolthead nails and stainless steel ring shank jolthead nails.
(Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).
- Flashings - balustrade and parapet cap flashings and inter-storey joint flashings. Refer to NZS 3604 Section 4, and NZBC Acceptable Solution E2/AS1, 3rd Edition, amendment 10, 5 November 2020, Table 20 for durability requirements.

Aluminium joinery head flashing - as supplied by the joinery manufacturer or the contractor

12 SUPPORTING INFORMATION ABOUT INTENDED USE (OPTIONAL)

Nil

13 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE (OPTIONAL)

Linea™ Weatherboard Cavity Cladding can be used to provide fire resistance rated construction, but this aspect has not been assessed and is outside the scope of this certificate

End of document



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 advice 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



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.



**James Hardie New Zealand
Limited**

PO Box 12 070

Penrose

Auckland

Tel: 0800 808 868

Fax: 0800 808 988

Web: www.jameshardie.co.nz



BRANZ

BRANZ

1222 Moonshine Rd,

RD1, Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

branz.co.nz



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 aluminum 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.]

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.)

- **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 scribes** - timber treated to Hazard Class H3.1, pre-primed before installation.
 - **Window and door trim cavity air seal** - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
 - **Flexible sealant** - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
 - **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.

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).

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.]*

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/m² and a total heat released of less than 25 MJ/m². Testing was carried out as per Paragraph 5.4 of NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of NZBC Acceptable Solution C/AS2, achieving a Type A performance. 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.

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.

- 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 joisthead nails in NZS 3604 Wind Zones up to, and including, Very High, or 90 x 4.0 mm hot-dip galvanised or stainless steel joisthead 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 scribes 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.

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.

Sources of Information

- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2908.2: 2000 Cellulose-cement products - Flat sheet.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- AS/NZS 4534: 1998 Zinc and zinc/aluminium-alloy coatings on steel wire.
- AS/NZS 4680: 2006 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard.
- NZS 3604: 1999 Timber framed buildings.
- NZS 4211: 2008 Specification for performance of windows.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



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

Cavity Fix

Technical Specification

May 2020 New Zealand



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.

Contents

1	Product Overview	4
1.1	Product Information	4
1.2	Manufacturing and Classification	5
1.3	Components and Accessories	5
2	Application and Scope	9
2.1	Application	9
2.2	Scope	9
2.3	Limitations	9
2.4	Details	9
3	Compliance	10
3.1	NZBC Compliance	10
4	Design	10
4.1	Responsibility	10
4.2	Clearances	11
4.3	Structure	11
4.3.1	Timber Framing	11
4.3.2	Durability	11
4.4	Structural Bracing	11
4.5	Energy Efficiency	11
4.6	Fire Rated Walls	11
4.7	Control of External Fire Spread	12
4.8	Alpine regions	12
5	Safe Working Practices	13
5.1	Storage and delivery	15
5.2	Tips for safe and easy handling of weatherboard products	16
6	Installation	16
6.1	Fastener	16
6.1.1	Fastener – Size and Method	16
6.1.2	Gun Nailing	17
6.1.3	Fastener Durability	17
6.2	Framing	18
6.2.1	Specific Engineering Design (SED)	18
6.2.2	Gable Ends	18
6.2.3	Tolerances	19
6.3	Flexible Underlay or HomeRAB Pre-Cladding	19
6.4	Intermediate Support	19
6.5	Rigid Air Barrier	19
6.6	Vent Strip	19
6.7	Cavity Battens	19
6.8	Joints	20
6.8.1	Jointing	20
6.8.2	Drainage Joint	20
6.8.3	External Corner Joint	20
6.8.4	Internal Corner Joint	20
6.9	Junctions and Penetrations	20
7	Finishes	21
7.1	Preparation and Priming	21
7.2	Sealants	21
7.3	Painting	21
8	Care and Maintenance	22
9	Details Section Index	23
	Product Warranty	51

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

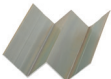
Accessories/tools supplied by James Hardie			
Accessories	Description	Size (mm)	Code
	External corner soaker 90° for Linea Weatherboards 180mm - Aluminium - Copper - Stainless Steel	200 long	301186 301188 301197
	External corner soaker 135° for Linea Weatherboards 180mm Aluminium	200 long	301178
	External 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 extrusion used to create 90° internal corner	2700 long 4000 long	301184 305807
	Internal 'W' Mould 135° Etched primed aluminium extrusion used to create 135° internal corner	2700 long	301183

Table 2 contd.

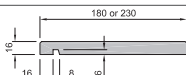
Accessories/tools supplied by James Hardie			
Accessories	Description	Size (mm)	Code
	JH Corner Under Flashing 50 x 50mm PVC moulding used as under fashing for internal and external corners	3000 long	303745
	Axent Trim 84mm	84 x 2600 long	401943
	Axent Trim 100mm	100 x 2600 long	401930
	Axent Fascia - 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

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.

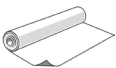
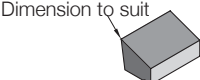
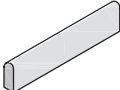
Accessories	Description	Size (mm)	Material/appearance
	Flexible Underlay To comply with Table 23 of E2/AS1		
	D head or RounDrive Nail Gun nail for concealed fixing Linea Weatherboard.	60 x 2.87	Hot Dip Galvanised/ Stainless Steel
	HardieFlex™ Hot Dip Galv. Nails For concealed fixing by hand nail	60 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
	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 Scribe 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.		

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.

3 Compliance

3.1 NZBC Compliance

When installed in accordance with the conditions of CodeMark number GM-CM30018 Linea Weatherboard complies with all relevant requirements of the NZBC.



Please refer to www.building.govt.nz 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.



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.

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

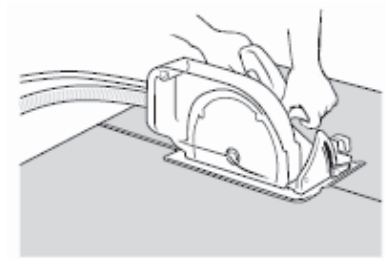
- ✓ Work outdoors only
- ✓ Make sure you work in a well ventilated area
- ✓ Position cutting station so wind will blow dust away from yourself and others in the working area
- ✓ Rotate employees across cutting task over duration of shift
- ✓ Cut products with a HardieBlade Saw Blade (or equivalent) and 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.

Working Instructions

HardieBlade™ Saw Blade

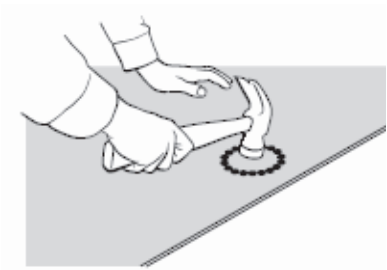
The HardieBlade Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust collector connected to a M Class or higher vacuum. When sawing, clamp a straight edge to the sheet as a guide and run the saw base plate along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

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

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.

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 James Hardie Rigid Air Barriers 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 James Hardie rigid air barriers, windows/doors need to be installed with required flashing tapes and seals etc. Refer to James Hardie Rigid Air Barriers 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 1000mm²/m length. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. Alternate cavity closer can be used ensuring compliance of E2 and may need to be used with a cant strip.

6.7 Cavity Battens

The cavity battens provide airspace between the frame and cladding and are considered a "packer" only in this specification.

The timber battens must be minimum H3.1 treated to comply with the durability requirements of B2/AS1.

Cavity battens must comply with E2/AS1 and:

- Be minimum 18mm thick
- Be minimum 45mm wide
- Until claddings are fixed the battens need only to be tacked to framing with 40 x 2.8mm nails at 800mm centres maximum (batten fixing is required temporarily to keep them straight on the wall during construction)

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:

- 90° corner soaker in aluminium, copper or stainless steel
- 135° 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:

- 90° or 135° 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.

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.

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.

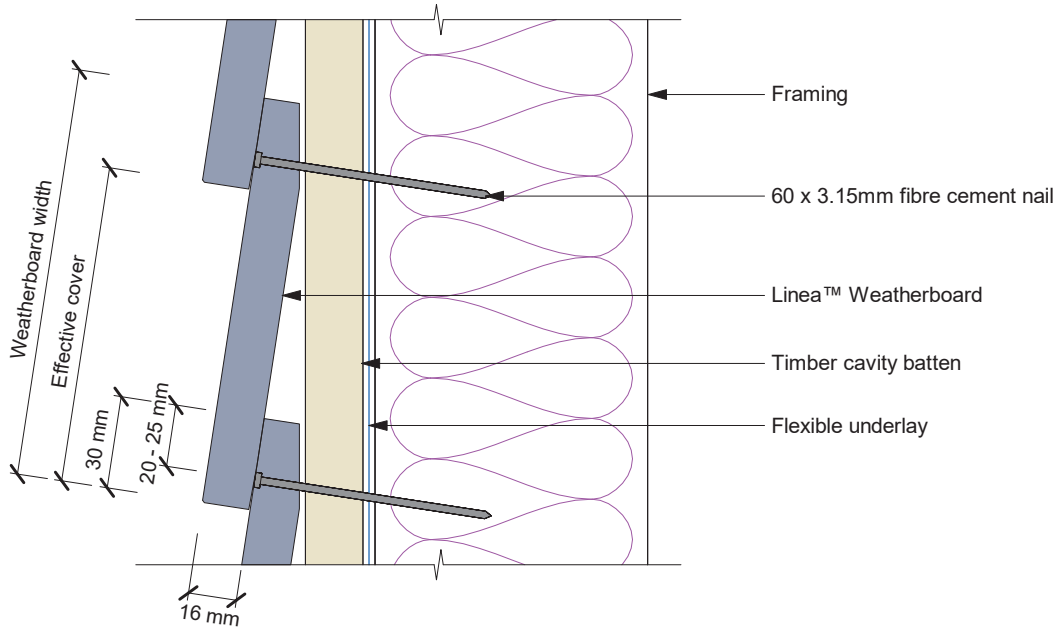
9 Details Section Index

Description	Page
Figure 1: Weatherboard fixing	25
Figure 2: Batten fixing	26
Figure 3: Batten layout at window opening	26
Figure 4: Foundation detail	27
Figure 5: Enclosed Deck	27
Figure 6: Jointing off stud	28
Figure 7: External corner soaker	28
Figure 8: Aluminium box corner	29
Figure 9: Boxed corner	29
Figure 10: Mitre corner	30
Figure 11: Internal 90 ° aluminium 'W' mould corner	30
Figure 12: Internal 135 ° aluminium 'W' mould corner	31
Figure 13: Internal corner joint flashing	31
Figure 14: Wall to soffit junction 'X'	32
Figure 15: Nil soffit detail	32
Figure 16: Sloping soffit and wall junction	33
Figure 17: Window and door sill	33
Figure 18: Window head	34
Figure 19: Window jamb	34
Figure 20: Window head stop end	35
Figure 21: Window sill with facing	36
Figure 22: Window head with facings	36
Figure 23: Window jamb with facings	37
Figure 24: Door sill support detail	37
Figure 25: Pipe penetration	38
Figure 26: Continuous cladding over joist	38
Figure 27: Drained flashing joint at floor level	39
Figure 28: Timber deck junction	39
Figure 29: One piece apron flashing joint	40
Figure 30: Roof to wall junction detail	40
Figure 31: Parapet flashing	41
Figure 32: Enclosed deck balustrade to wall	41
Figure 33: Enclosed balustrade to wall	42
Figure 34: Junction Linea™ Weatherboard and fascia board	43

Description	Page
Figure 35: Enclosed roof to wall intersection	44
Figure 36: Garage door head	45
Figure 37: Garage door jamb	45
Figure 38: Framing setout building height over 10m	46
Figure 39: Intertenancy vertical fire separation	47

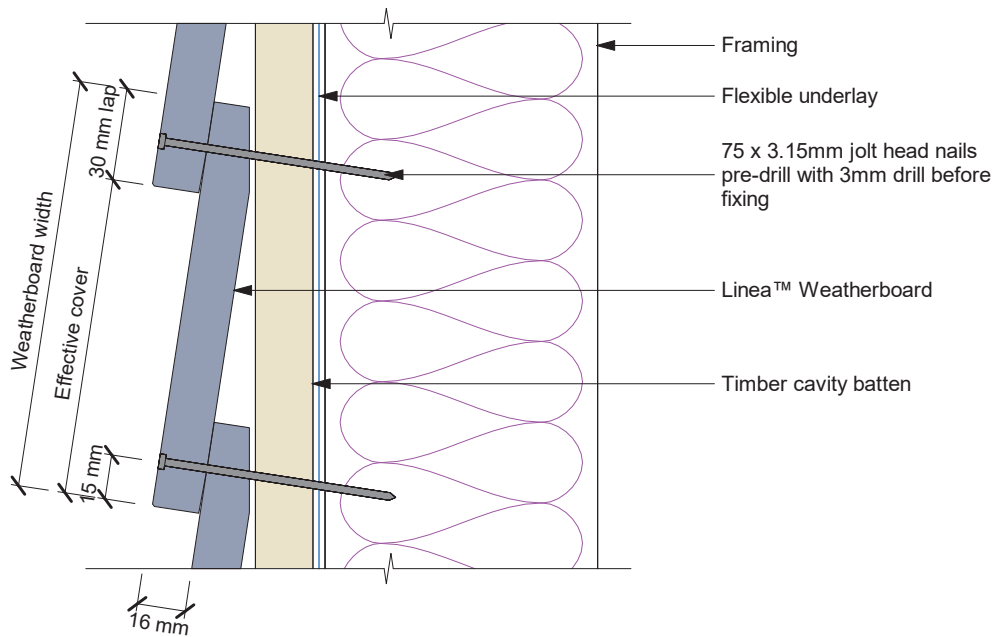
For all meter box details please visit our website at www.jameshardie.co.nz or Ask James Hardie on **0800 808 868**.

Figure 1: Weatherboard fixing

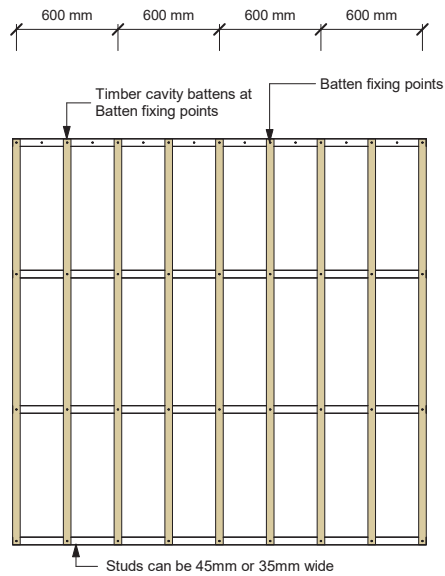


Concealed Nailing

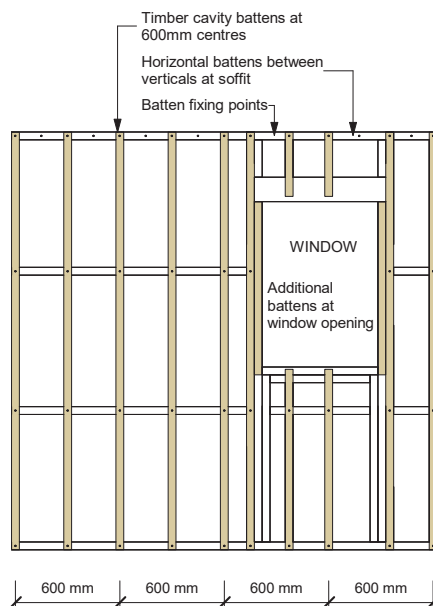
Linea™ Weatherboards to be face fixed at corners and down window and door openings using jolt head nails at 90° to face, punch 2mm below surface and fill. Refer to fixing table 4



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

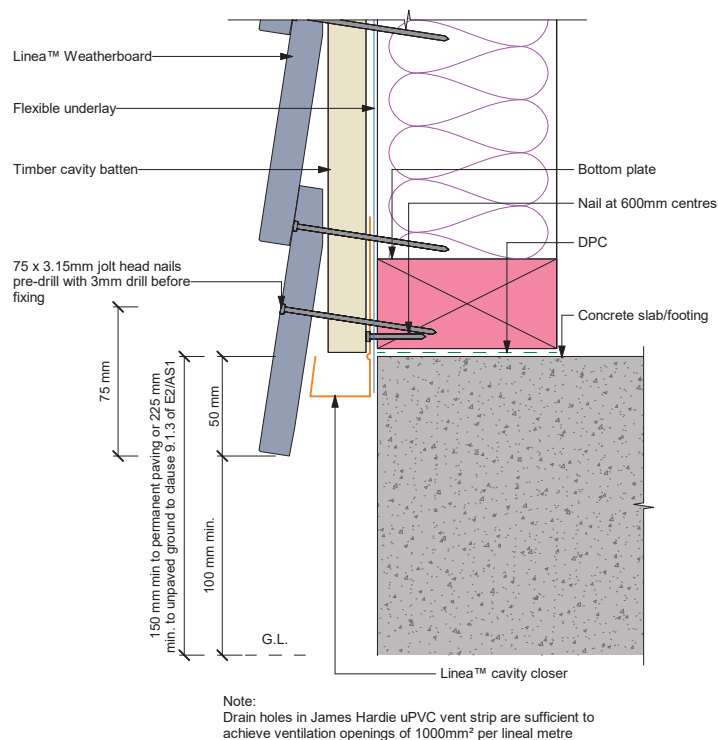


Figure 5: Enclosed Deck

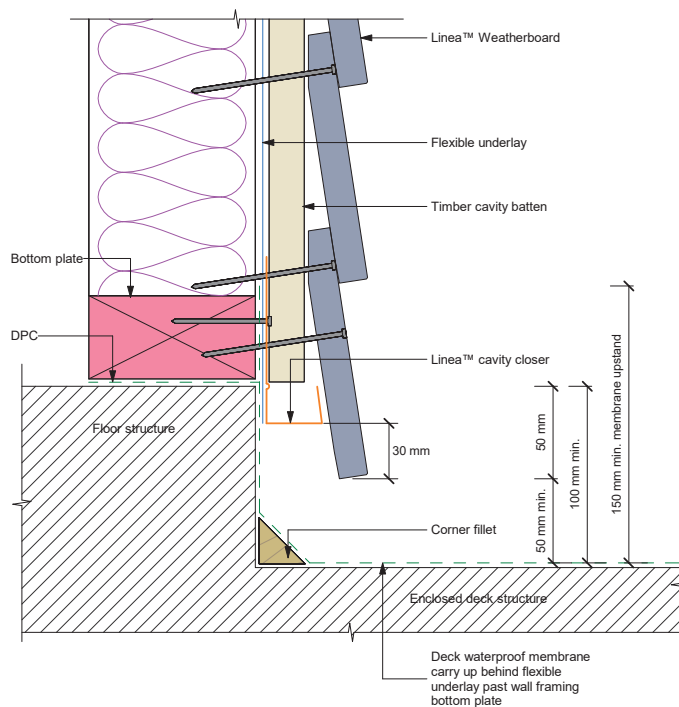


Figure 6: Jointing off stud

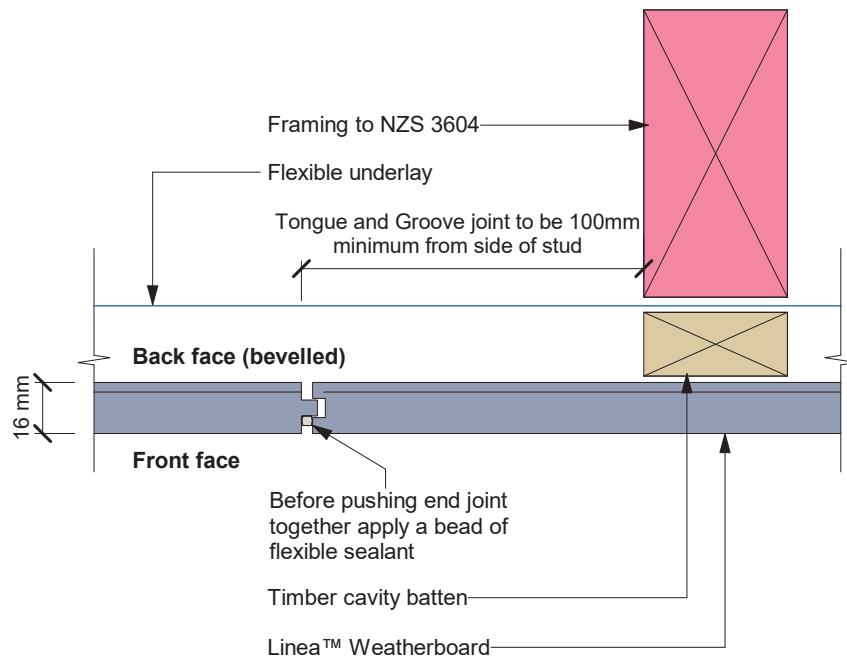
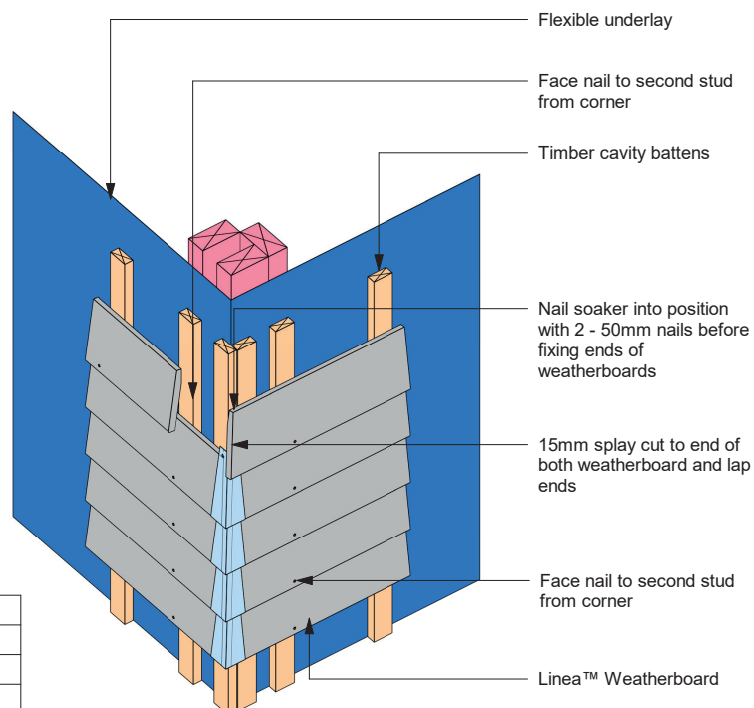


Figure 7: External corner soaker



Soaker material	Nail material
Copper	Copper or phosphor bronze
Aluminium	Hot dip galvanised
Stainless steel	Stainless steel

Figure 8: Aluminium box corner

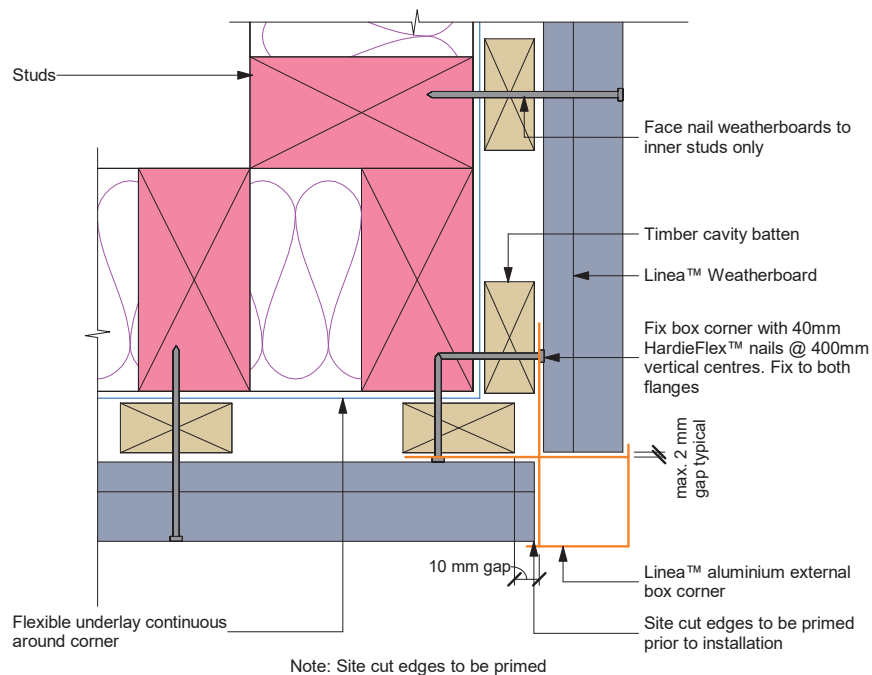


Figure 9: Boxed corner

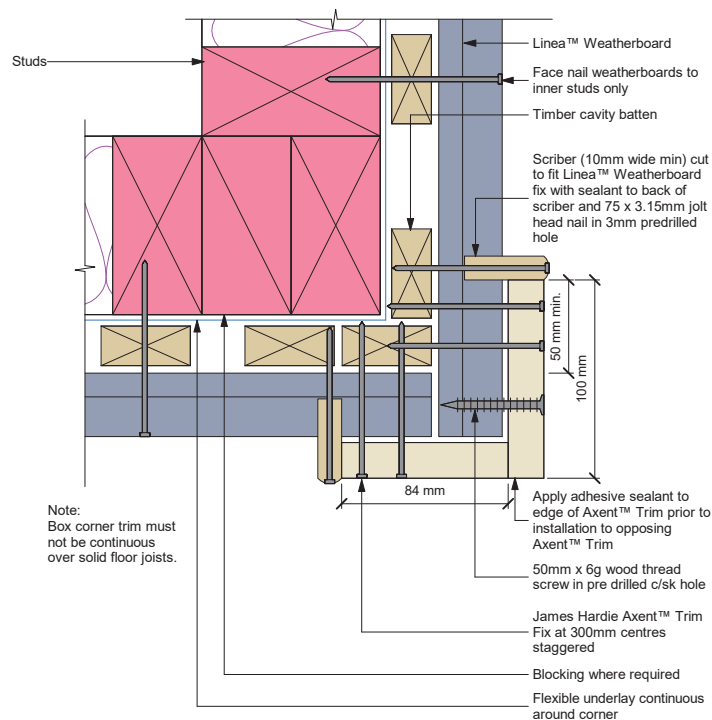
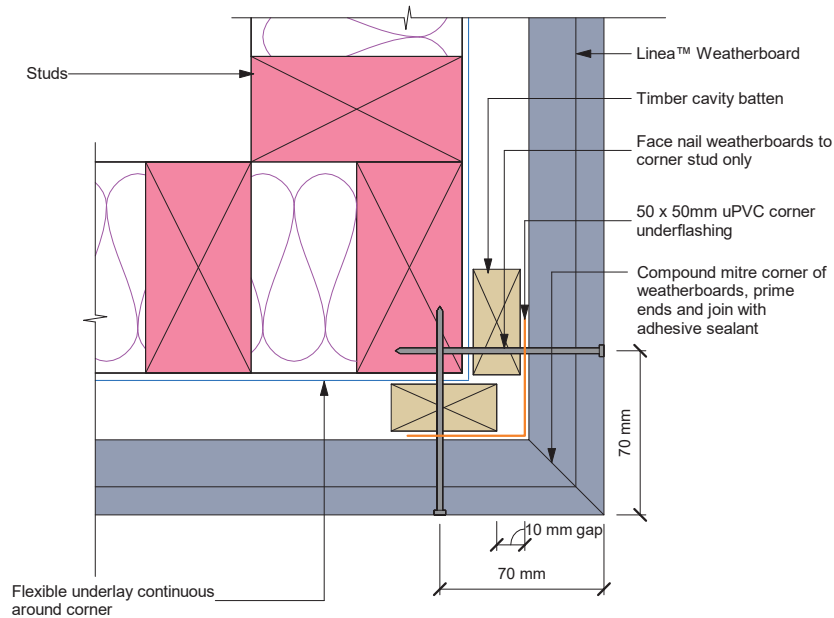


Figure 10: Mitre corner



Note: Adhesive sealant must be used on the full end face of both weatherboards. Push lightly together

Figure 11: Internal 90 ° aluminium 'W' mould corner

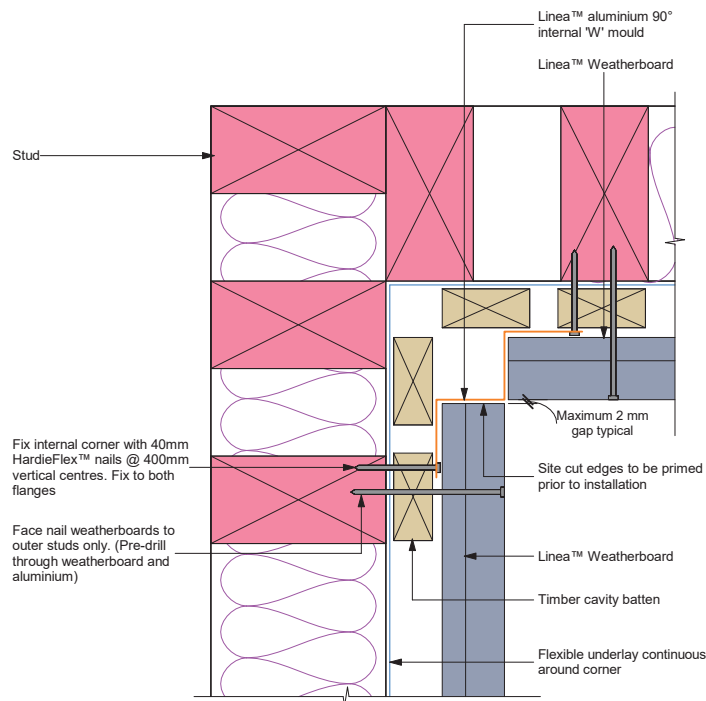


Figure 12: Internal 135 ° aluminium 'W' mould corner

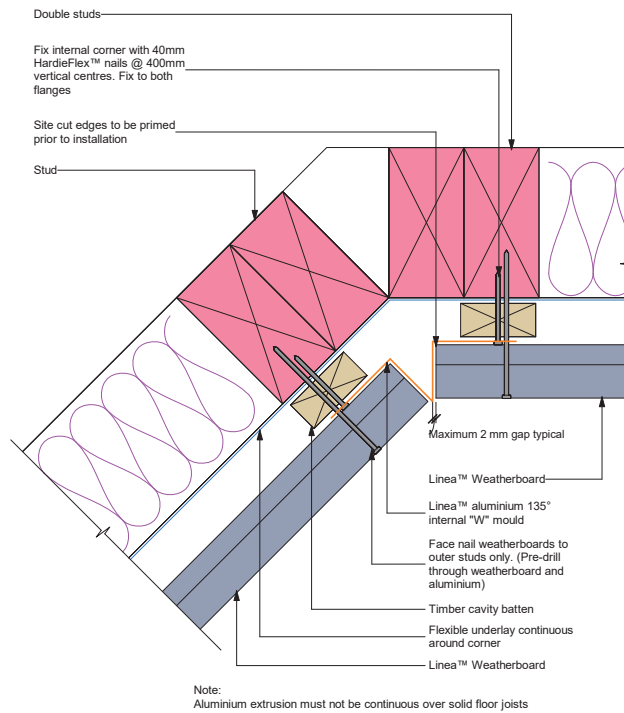


Figure 13: Internal corner joint flashing

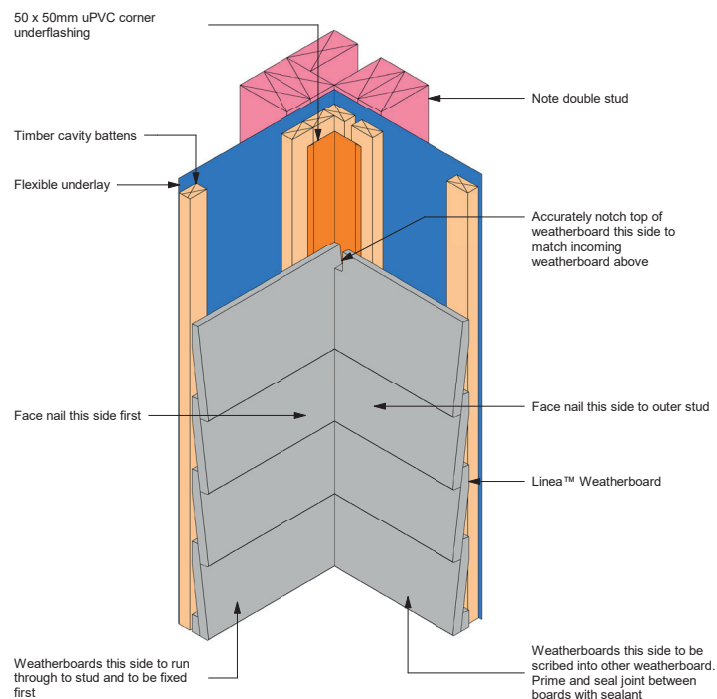
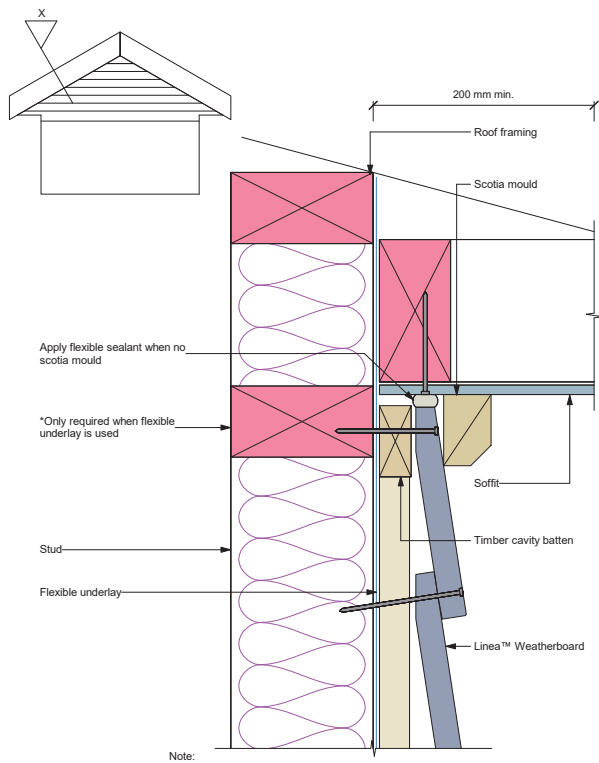


Figure 14: Wall to soffit junction 'X'



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

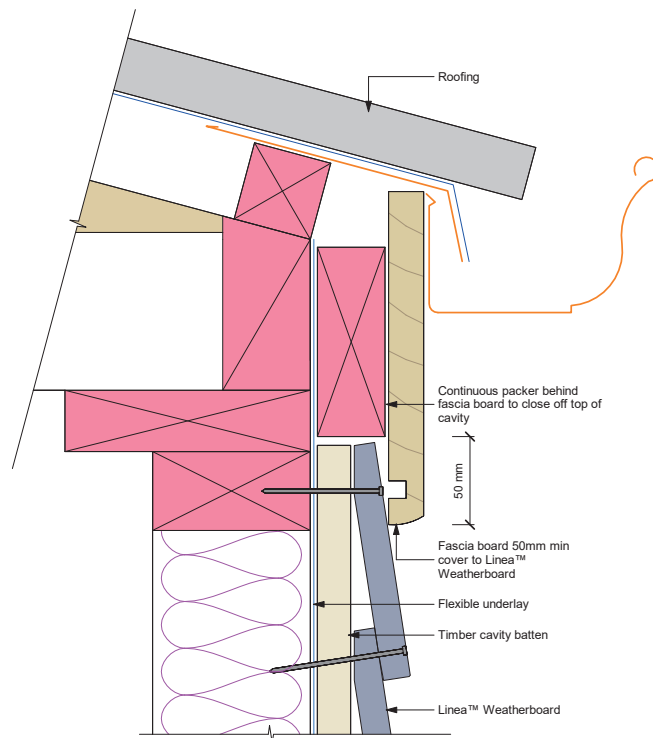


Figure 16: Sloping soffit and wall junction

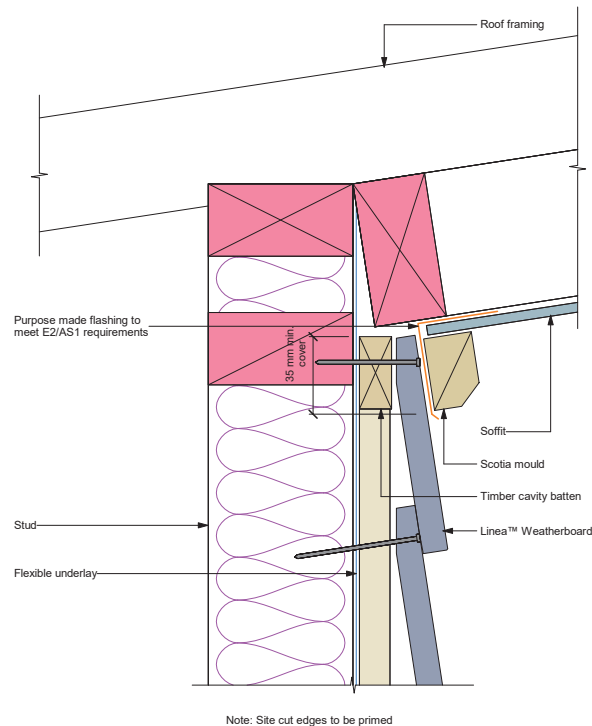
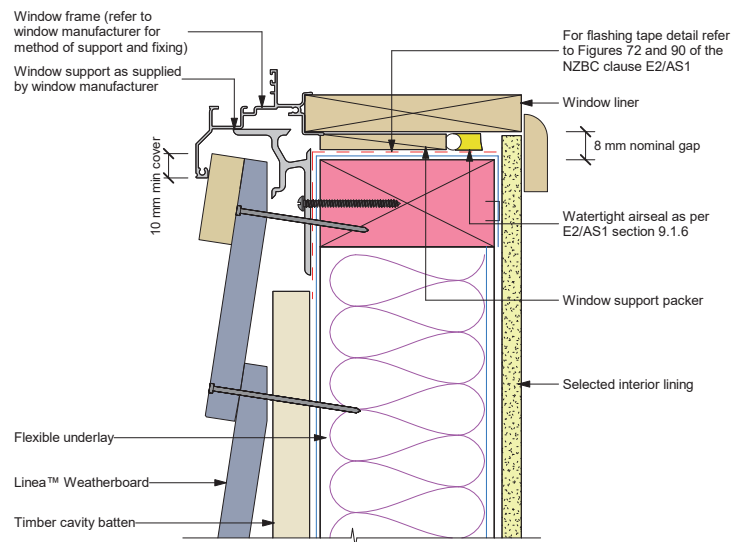


Figure 17: Window and door sill

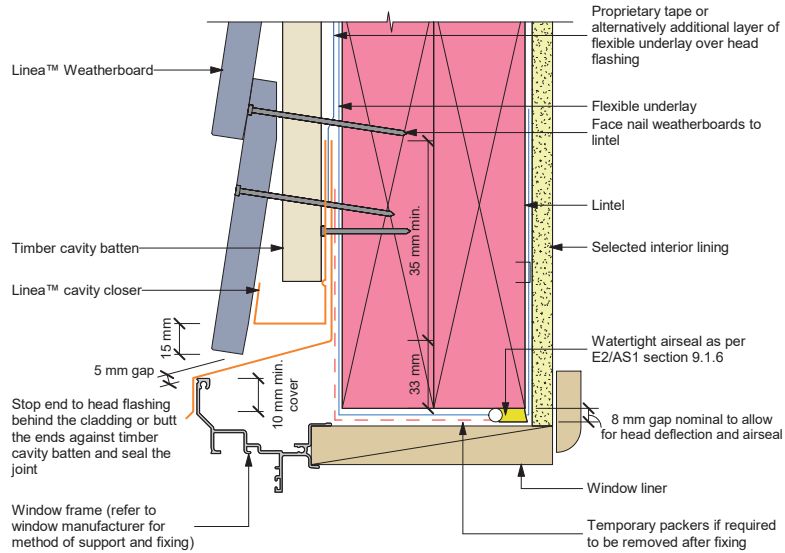


General notes for materials selection

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

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

Figure 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

Figure 19: Window jamb

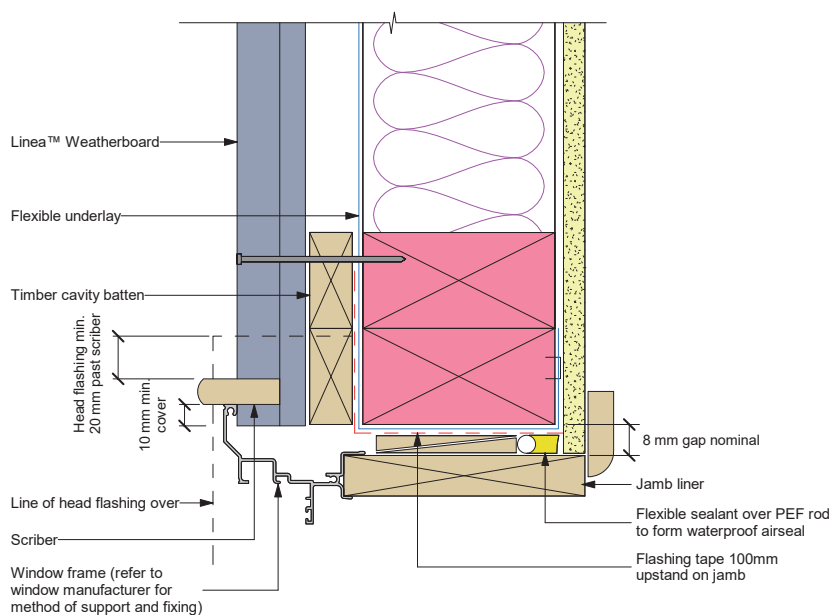


Figure 20: Window head stop end

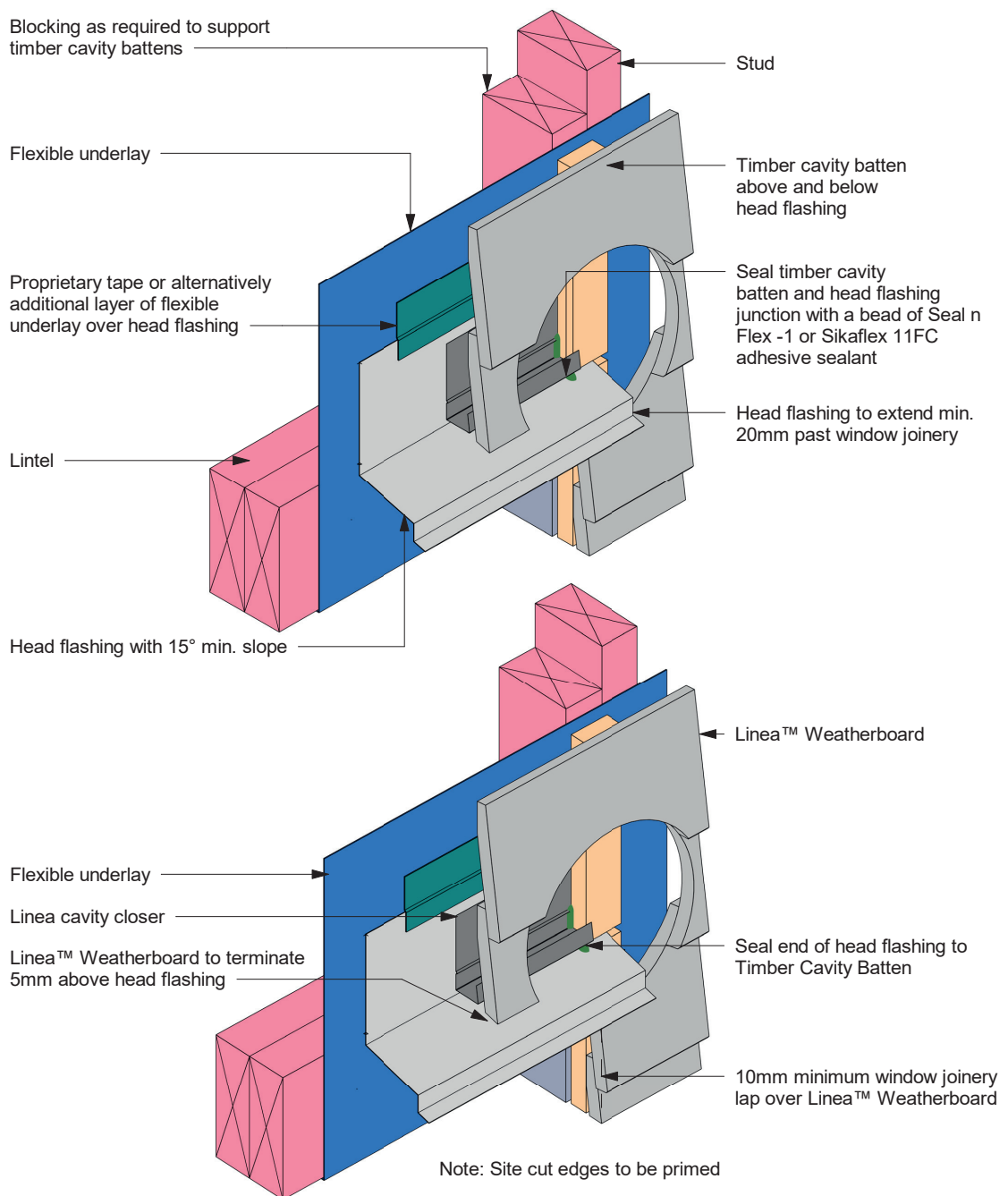
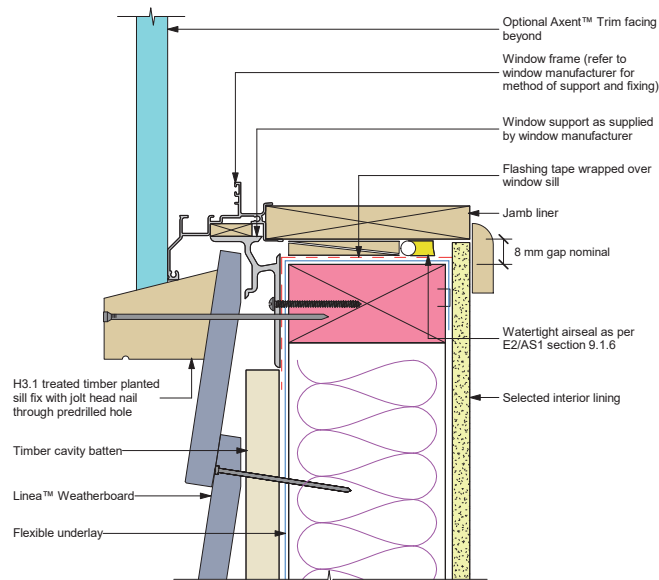
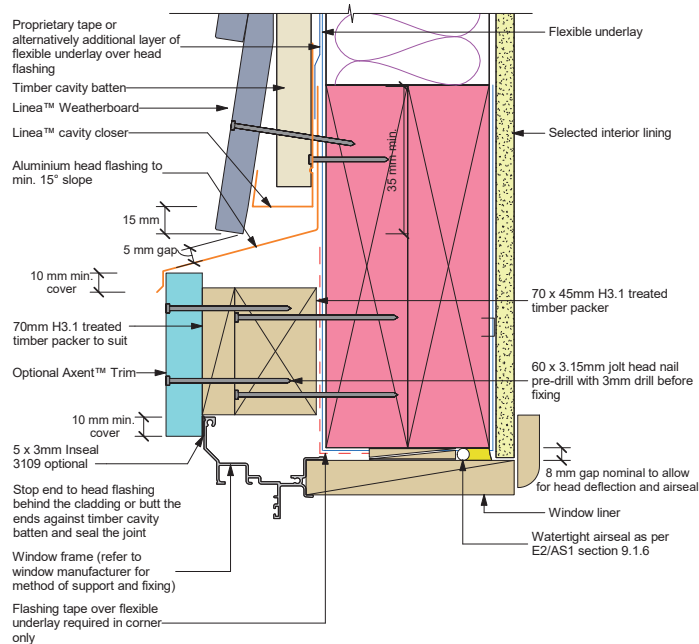


Figure 21: Window sill with facing**General notes for materials selection**

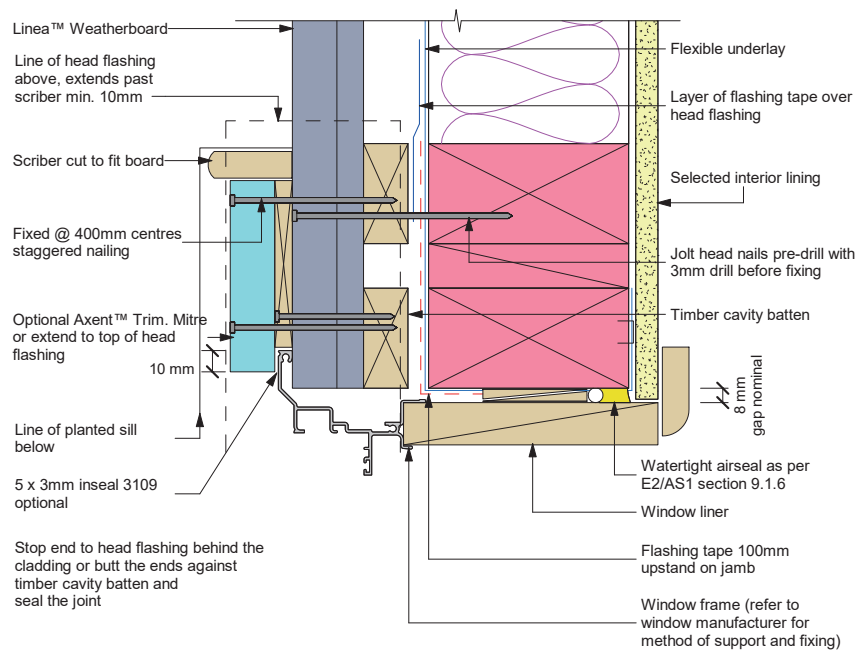
1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1
2. Flexible underlay must comply with acceptable solution E2/AS1
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it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

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

Figure 22: Window head with facings**Note:**

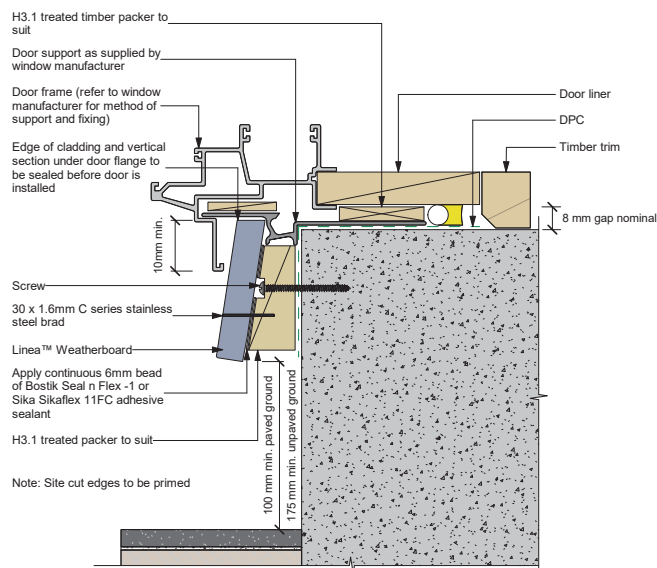
- Sealant must be installed between head flashing and window flange in VH and EH wind zones and SED pressures
- Alternatively, the head flashings can be formed with stop ends as per E2/AS1
- Refer to Figure 22 for sealing end battens to head flashing

Figure 23: Window jamb with facings



Note:
• Site cut edges to be primed

Figure 24: Door sill support detail

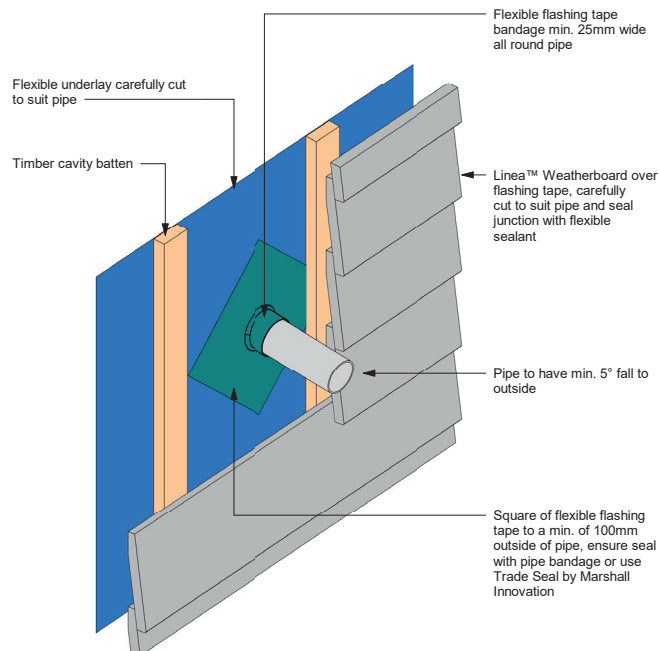


Note: Site cut edges to be primed

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

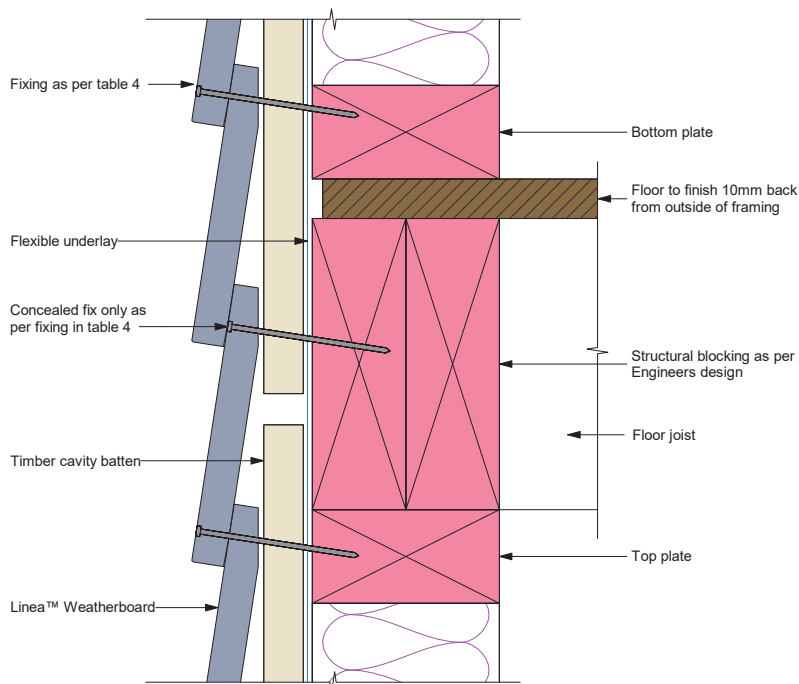
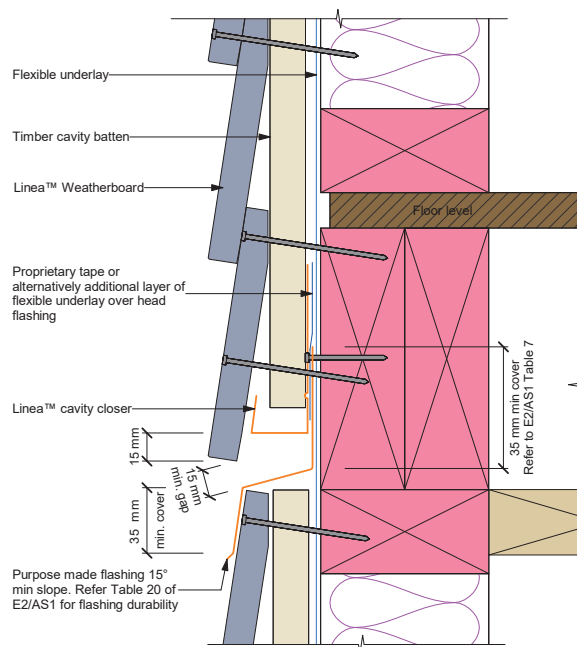


Figure 27: Drained flashing joint at floor level



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

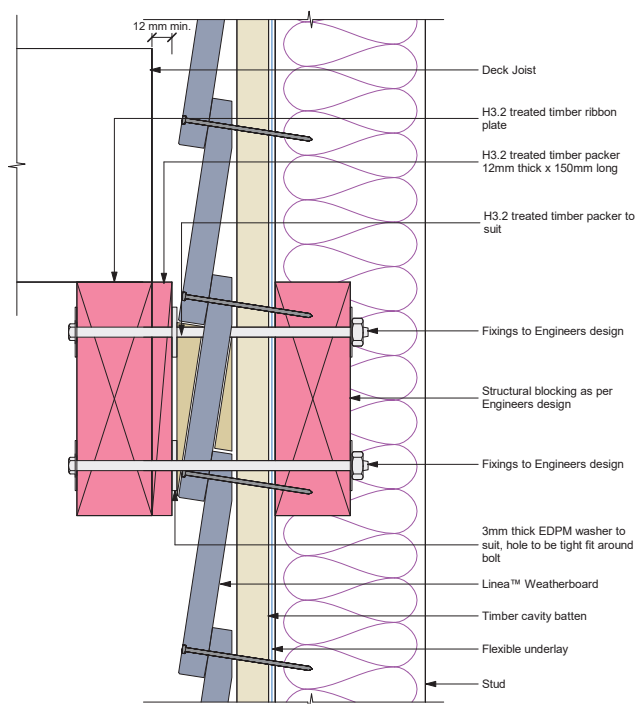


Figure 29: One piece apron flashing joint

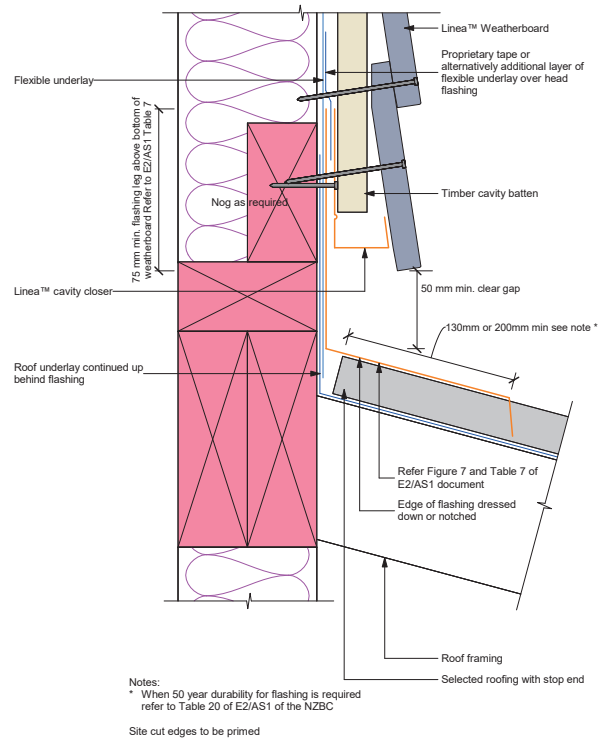


Figure 30: Roof to wall junction detail

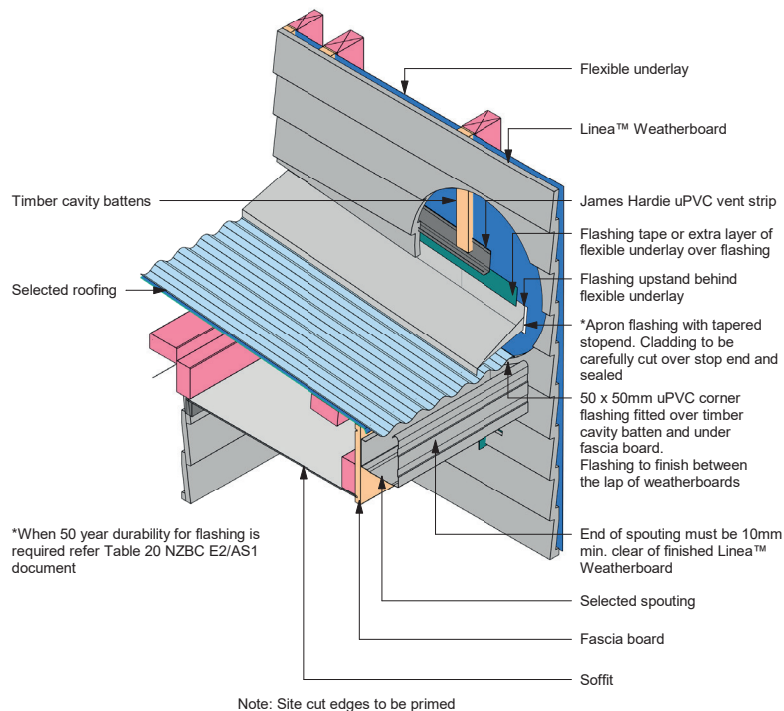


Figure 31: Parapet flashing

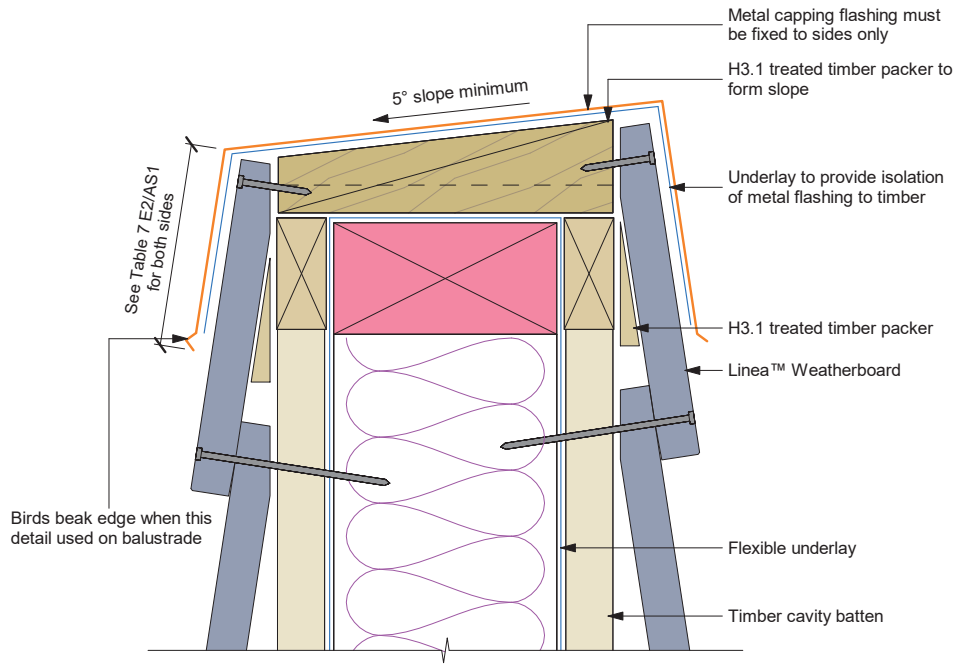


Figure 32: Enclosed deck balustrade to wall

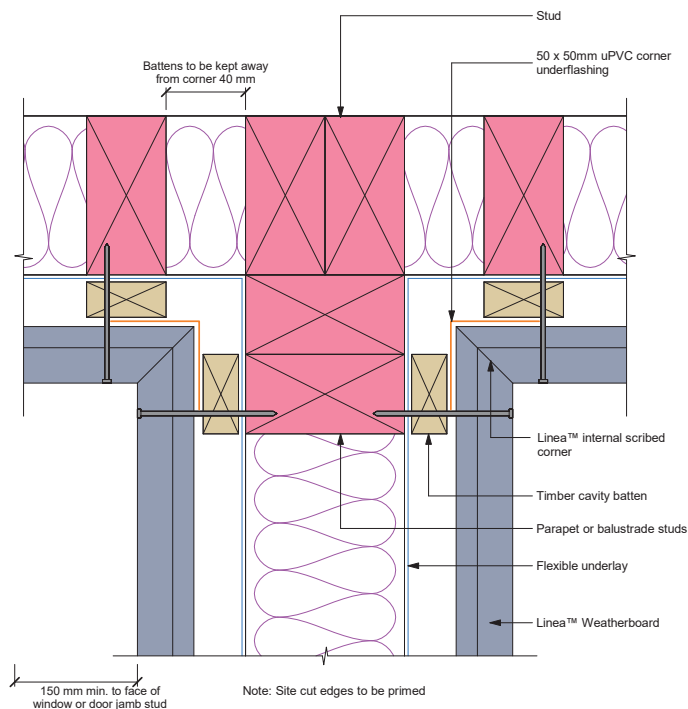


Figure 33: Enclosed balustrade to wall

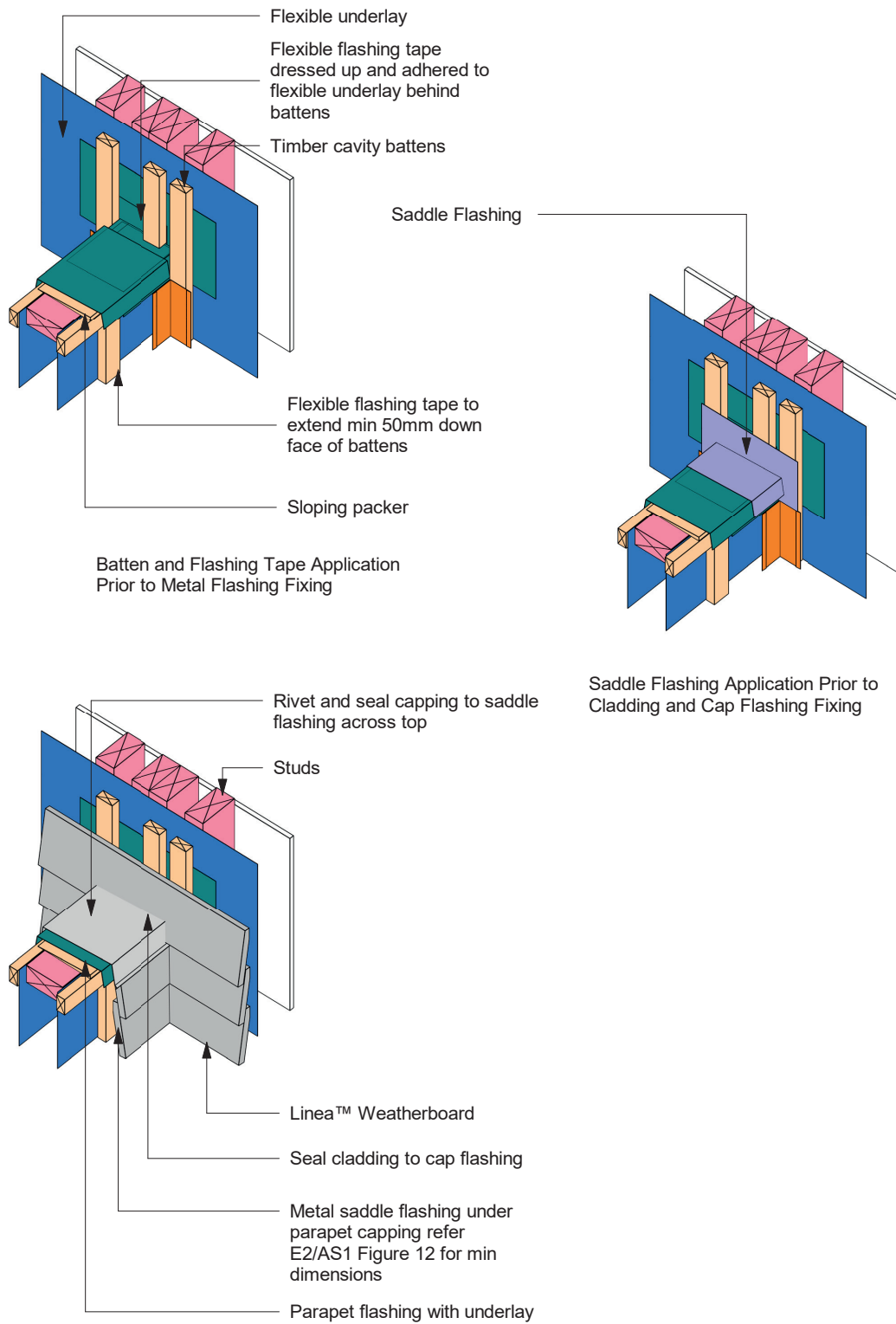
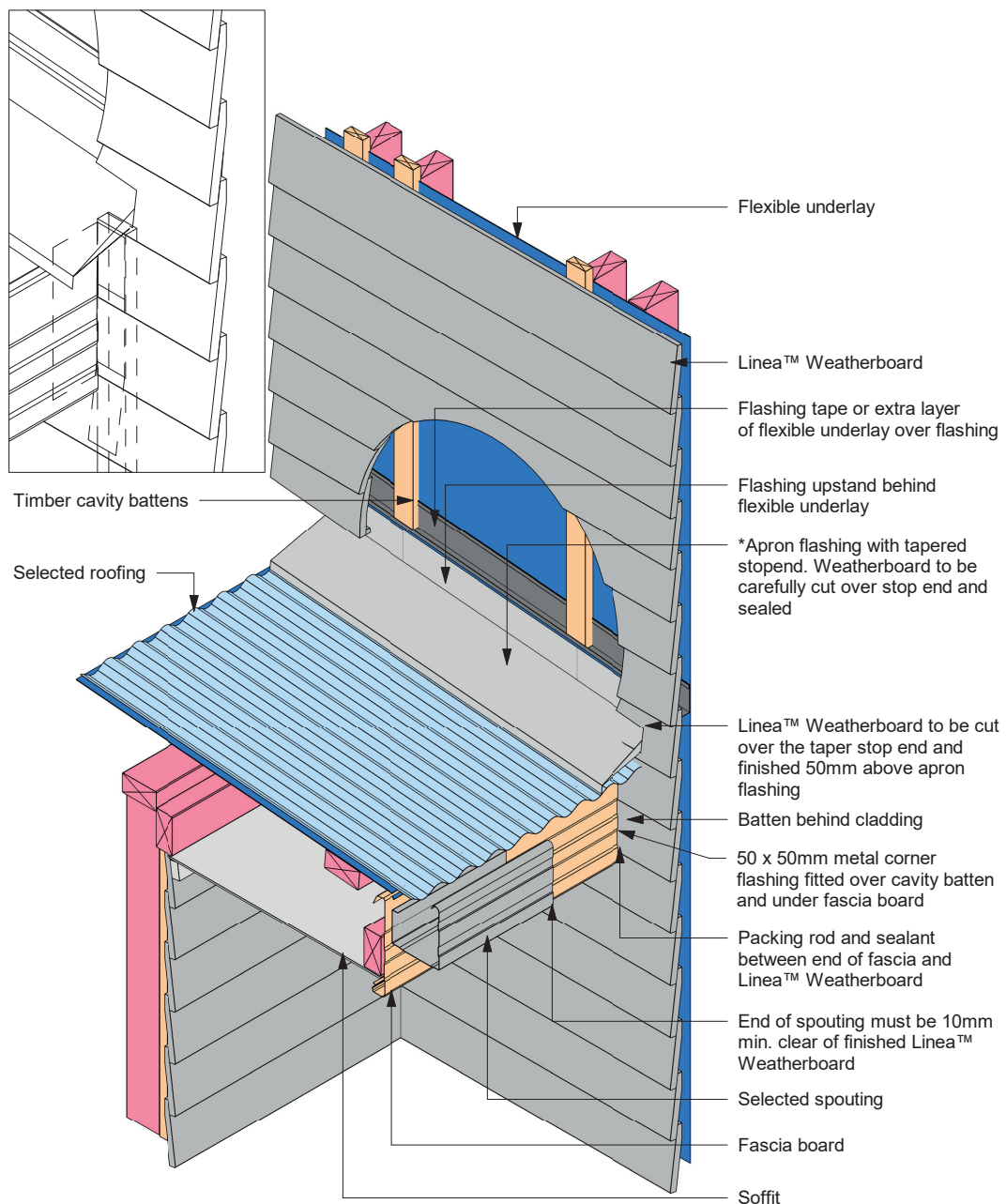


Figure 34: Junction Linea™ Weatherboard and fascia board



*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

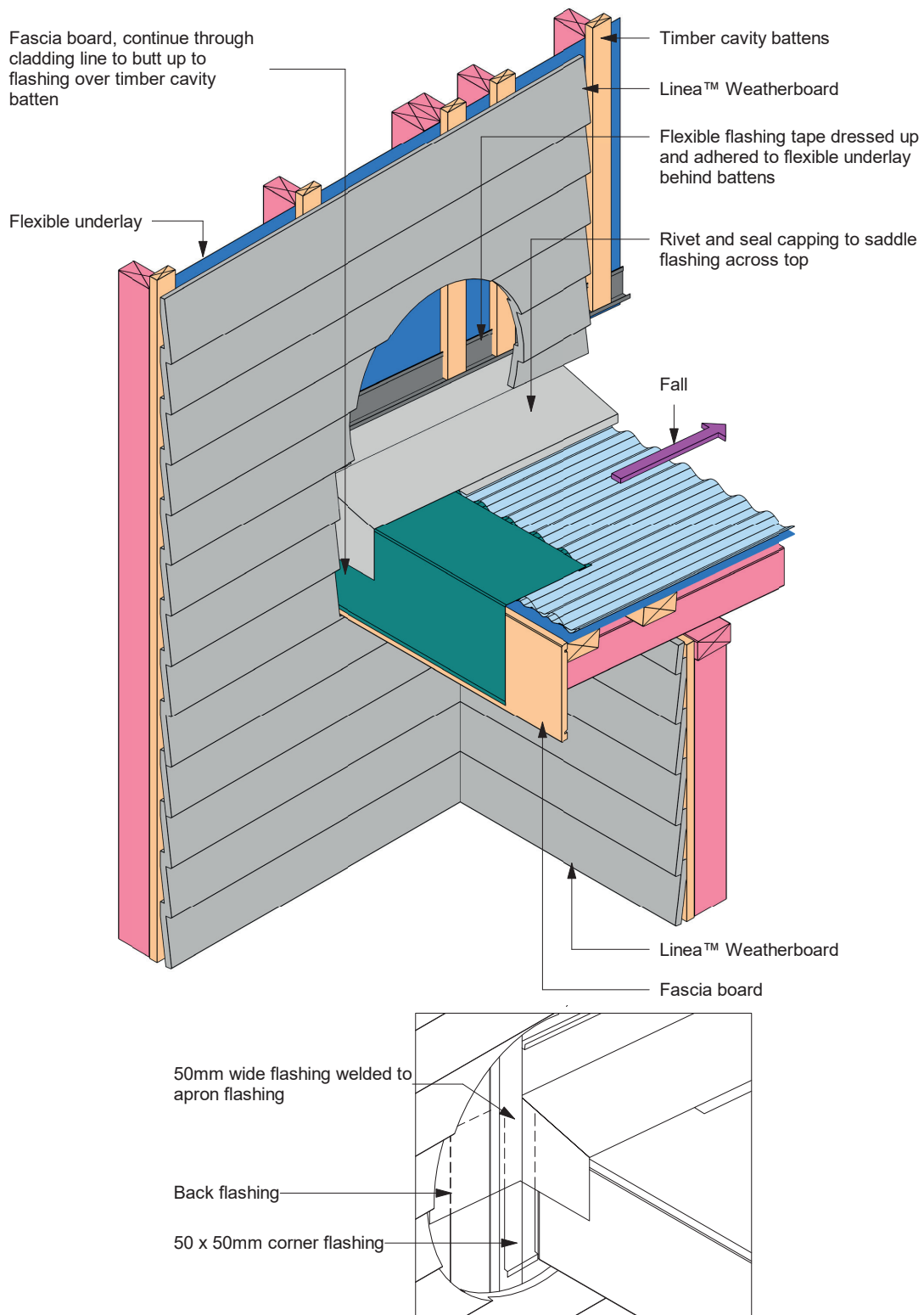
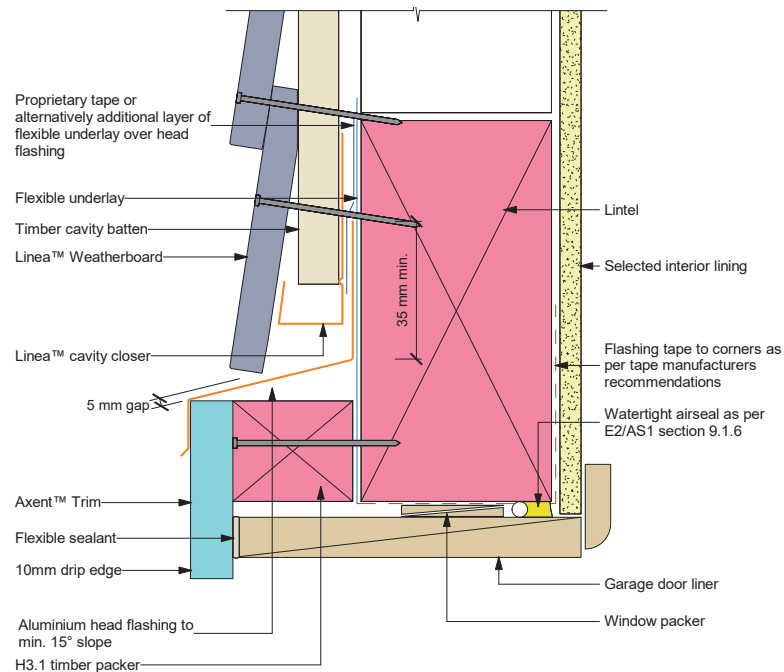


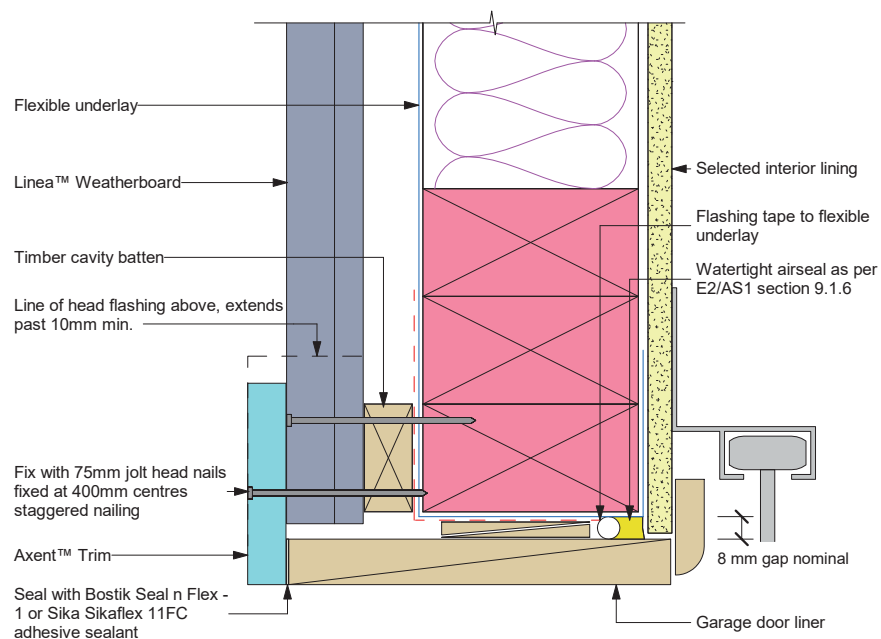
Figure 36: Garage door head



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

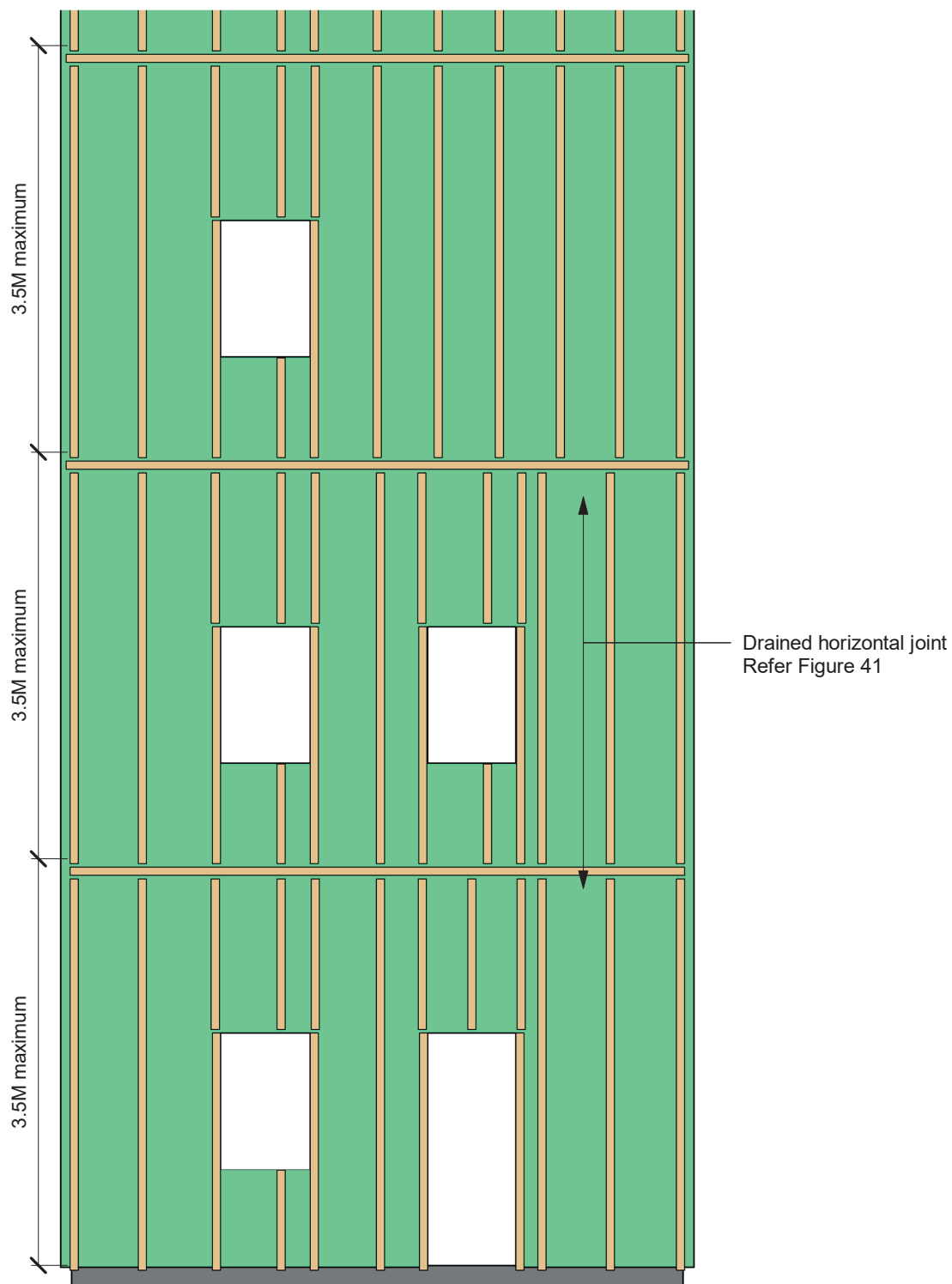
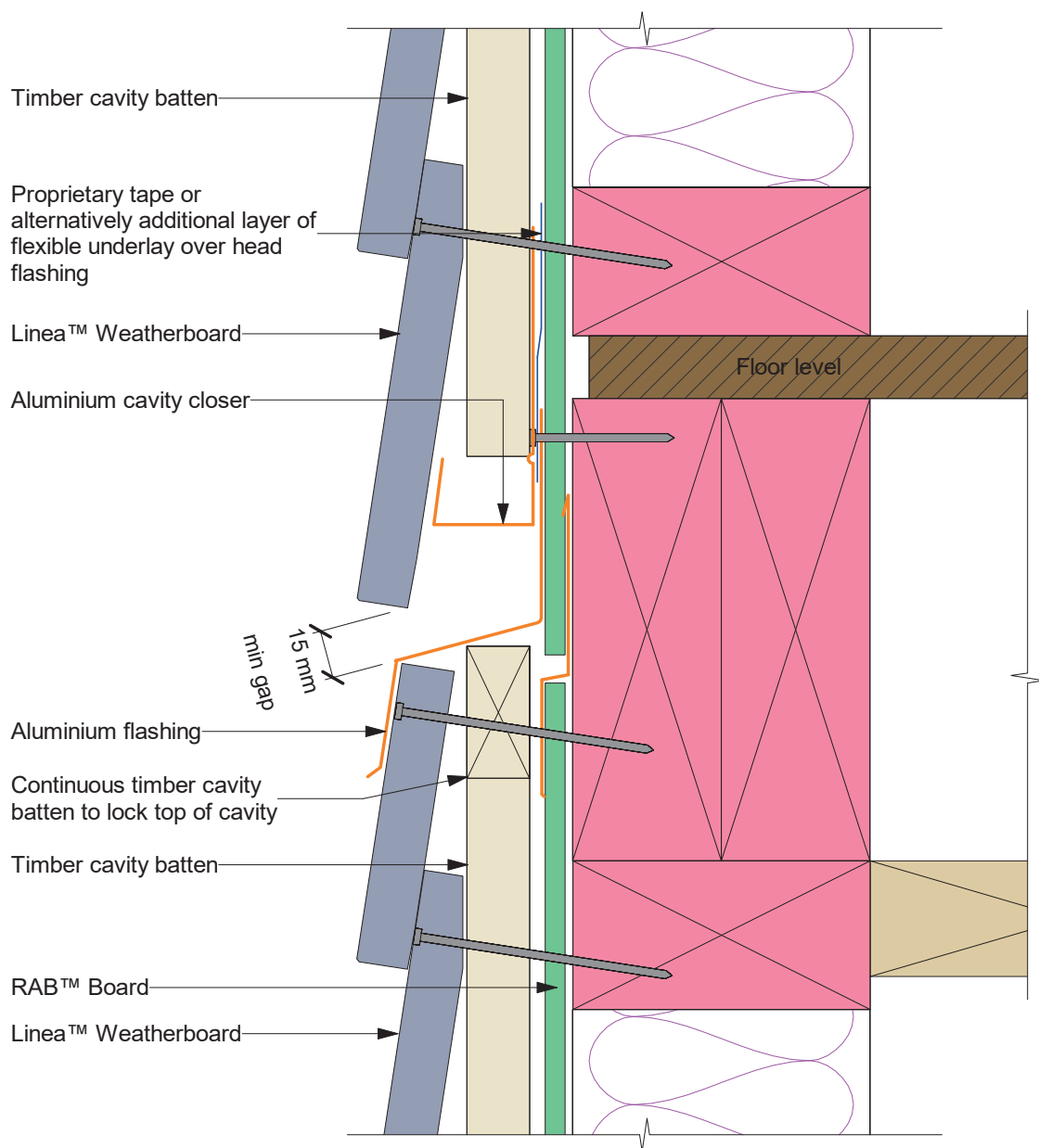


Figure 39: Intertenancy vertical fire separation



SDC - Approved Building Consent Document - BC231907 - Pg 322 of 446 - 21/03/2024 - helen.fowler

Handwritten notes area with horizontal lines.

Notes

SDC - Approved Building Consent Document - BC231907 - Pg 323 of 446 - 21/03/2024 - helen.fowler

Handwritten notes area with horizontal lines.

SDC - Approved Building Consent Document - BC231907 - Pg 324 of 446 - 21/03/2024 - helen.fowler

Handwritten notes area with horizontal lines.

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.

Copyright 2020. © James Hardie New Zealand Limited. TM and ® denotes a Trademark or Registered Mark owned by James Hardie Technology Limited.

Linea™
WEATHERBOARD



Product Technical Statement

Gerard Roofs Pressed Steel Tiles

Statement of Building Code Compliance

This system if designed, used, installed and maintained in accordance with the supporting technical information and additional conditions and limitations will meet the following provisions of the New Zealand Building Code:

- B1 Structure
- B2 Durability
- E1 Surface Water
- E2 External Moisture

Evidence Base to Support Compliance

This system has the following evidence to support the above solution type declaration:

- Independent technical opinion
- In-house technical opinion
- Independent testing
- In-house testing
- Industry-based scheme
- Historical proof of performance

B1, B2, E1 & E2 reference NZ Metal Roofing & Wall Cladding Manufacturers Code of Practice. Section 10 relates to Pressed Metal Roofing Tiles.

Compliance with NZS4217 Pressed Metal Tile Roofs

Aluminium-zinc coated steel complies with AS1397, not NZS3441 as prescribed in NZS4217. We are also comfortable that we meet the requirements of B2 based on the In-service History Evaluation allowed under B2/VM1. At two severe marine testing sites we have roofs which are in good condition after 23 and 25 years respectively. Evaluations continue on other roofs which are in excess of 30 years.

Scope of Use

Buildings that comply with NZS3604 with a minimum roof pitch which is profile dependent of between 12 and 20 degrees.

Environmental Conditions

This system is code-compliant for the following environmental conditions:

- Wind Zone - Specific Design
- Corrosion Zone - Sea Spray Extreme
- Seismic Zone - High

Specific design can allow higher wind speeds - batten rafter connections are the limitation.

Installation Conditions

This system is code-compliant on the condition that it has been installed by:

- Licensed Applicator / Installer

Additional Conditions & Limitations

A warranty for the system is supplied with 50 year pro-rated duration.

Material Compatibility with Modern Roofing Materials

If alterations are made to the home after the installation of the roof, such as fitting of chimneys, extensions, installation of skylights, etc., it is important to ensure that the materials that are used are compatible with the roofing material. Gerard Roofs' steel tiles are manufactured from 55% aluminium- zinc coated steel and then post coated with a protective and decorative coating system.

Dissimilar Metal Corrosion

When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. A similar effect commonly occurs with water flowing over dissimilar metals. This form of corrosion is commonly found where:

- Water is discharged from copper or brass systems over a galvanised or 55% aluminium-zinc coated steel roof
- Unpainted lead flashings are applied directly to 55% aluminium-zinc coated steel products, or
- Where fasteners are incompatible with the roofing material

Any electrical contact between dissimilar metals should be avoided.

Consenting Instructions

Where Gerard Metal Roofing Tiles are specified on plans these must be installed by a trained installer. Substitution is not allowed.

Critical Maintenance

As detailed in our warranty: "It is best to chemically clean the roof before growths are seen as a preventative maintenance measure. Spores may be present on the roof for up to two years before any visible organic growths are noticed. Treating the roof will not only kill the organic growths, but also the spores that lead to them. We suggest treating the roof every three to five years, however if you see growth occurring treat the roof more frequently."

Gerard Roofs Pressed Steel Tiles

Statement of Building Code Compliance

This system if designed, used, installed and maintained in accordance with the supporting technical information and additional conditions and limitations will meet the following provisions of the New Zealand Building Code:

- B1 Structure
- B2 Durability
- E1 Surface Water
- E2 External Moisture

Evidence Base to Support Compliance

This system has the following evidence to support the above solution type declaration:

- Independent technical opinion
- In-house technical opinion
- Independent testing
- In-house testing
- Industry-based scheme
- Historical proof of performance

B1, B2, E1 & E2 reference NZ Metal Roofing & Wall Cladding Manufacturers Code of Practice. Section 10 relates to Pressed Metal Roofing Tiles.

Compliance with NZS4217 Pressed Metal Tile Roofs

Aluminium-zinc coated steel complies with AS1397, not NZS3441 as prescribed in NZS4217. We are also comfortable that we meet the requirements of B2 based on the In-service History Evaluation allowed under B2/VM1. At two severe marine testing sites we have roofs which are in good condition after 23 and 36 years respectively. Evaluations continue on other roofs which are in excess of 30 years.

Scope of Use

Buildings that comply with NZS3604 with a minimum roof pitch which is profile dependent of between 12 and 20 degrees.

Environmental Conditions

This system is code-compliant for the following environmental conditions:

- Wind Zone - Specific Design
- Corrosion Zone - Sea Spray Extreme
- Seismic Zone - High

Specific design can allow higher wind speeds - batten rafter connections are the limitation.

Installation Conditions

This system is code-compliant on the condition that it has been installed by:

- Licensed Applicator / Installer

Additional Conditions & Limitations

A warranty for the system is supplied with 50 year pro-rated duration.

Material Compatibility with Modern Roofing Materials

If alterations are made to the home after the installation of the roof, such as fitting of chimneys, extensions, installation of skylights, etc., it is important to ensure that the materials that are used are compatible with the roofing material. Gerard Roofs' steel tiles are manufactured from 55% aluminium-zinc coated steel and then post coated with a protective and decorative coating system.

Dissimilar Metal Corrosion

When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. A similar effect commonly occurs with water flowing over dissimilar metals. This form of corrosion is commonly found where:

- Water is discharged from copper or brass systems over a galvanised or 55% aluminium-zinc coated steel roof
- Unpainted lead flashings are applied directly to 55% aluminium-zinc coated steel products, or
- Where fasteners are incompatible with the roofing material

Any electrical contact between dissimilar metals should be avoided.

Consenting Instructions

Where Gerard Roof Tiles are specified on plans these must be installed by a trained installer. Substitution is not allowed.

Critical Maintenance

As detailed in our warranty: “It is best to chemically clean the roof before growths are seen as a preventative maintenance measure. Spores may be present on the roof for up to two years before any visible organic growths are noticed. Treating the roof will not only kill the organic growths, but also the spores that lead to them. We suggest treating the roof every three to five years, however if you see growth occurring treat the roof more frequently.”

External Moisture

To Whom It May Concern

Re: Gerard Roof Tiles External Moisture. NZBC and Specific Engineering Design.

NZBC E2 requires that a roof provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

Gerard Roofs have been in service for more than 50 years and we offer a 50 year warranty on our metal roofing tiles even in extreme environments.

E2/AS1 Section 8.3 Pressed Metal Tile, The Metal Roofing and Wall Cladding Code of Practice and Gerard Roofs Installation manual provide details which outline the installation of the roofing system so that the roofing system meets the NZBC E2 requirements.

Wall Flashing Details

E2/AS1 requires the use of wall flashings specific to the wind zone in which the roofs will be fastened - these relate to the minimum cover that the wall must cover the flashing up-stand. In situations where the wind zone is higher than Extra High the flashings specified in the Extra High Wind Zone should be used. This requires coverage of 90 mm.

Gerard roofs install roofs in cyclonic regions of Australia where wind speeds of 240 km/hr have occurred without issues with standard flashings.

Roofing Underlays

Pressed metal tiles have to have an underlay that meets the requirements of NZS 2295:2006. The Bitumen based underlays are not suitable for Extra High or above Wind Zones however there are some Synthetic roofing underlays that have been approved by BRANZ which are suitable for the Extreme Wind Zones.

A Synthetic roofing underlay should be used under roofs that are located in Extra High or Specific Engineering Designed situation.

In summary, we have confidence that roofs installed as per Gerard Roofs installation manual and maintained in accordance with our warranty will last in excess of 50 years, we have installed roofs in New Zealand for more than 50 years and have significant numbers of installations in cyclonic regions where the wind and rainfall levels exceed those of the New Zealand Environment.

Should this not address your concerns, please feel free to contact me in person so I can better understand your reservations.

Regards

Dean Vincent

Peter Richards

Sales and Marketing Manager

Product Innovation Manager

New Zealand and Pacific Regions

Dektite

Design features

SDC - Approved Building Consent Document - BC231907 - Pg 334 of 446 - 21/03/2024 - helen.fowler



Flexible Cone Sleeve

Dektite cone shape eliminates seal breakdown due to vibration or expansion and contraction, while isolation of pipe from sheeting dampens noise levels.

Stress Isolation Points

Unique to Dektite, two flexible shoulders absorb distortion and stop transfer of stresses from base to cone, as unit is formed over roofing profile.

Bonded Aluminium Flange

Corrosion-resistant, malleable flange, evenly distributes fastening pressure and allows ease of hand-shaping on most sheet profiles.

Integrity of Flashing Shape

Minimal distortion after installation, maintains natural flashing shape and seal around pipe, while water run-off is improved.

UV Protection

Dektite products are resistant to ultraviolet light damage and will remain fully flexible under all conditions.

Easily Identified Sizing

Pipe diameter rings are clearly marked on the cone sleeve (metric and imperial) for cutting to match the appropriate pipe diameter.

Low Profile Design

Sleek, unobtrusive shape is designed to minimise silhouette on roofline, while managing to provide generous internal clearance for steep, angular installations.

Improved Waterproofing

Designed to strengthen sealant bond and improve waterproofing, the ribbed base also has a tapered edge to improve runoff and contribute to a superior waterproof seal.

Perfect for approved flues!

Dektite EPDM polymer flashings have been officially tested and conform to all Australian and New Zealand Standards on approved flue systems. EPDM withstands temperatures from -50°C – 115°C and up to 150°C intermittently. withstands temperatures from -60°C – 200°C and up to 250°C intermittently.

Dektite Premium

The versatile solution

SDC - Approved Building Consent Document - BC231907 - Pg 335 of 446 - 21/03/2024 - helen.fowler

Most extensive range of Dektites 0 - 510mm penetrations, available in black and grey EPDM and silicone red for high temperatures.

Designed to enable practically any pipe flashing operation to be carried out within minutes, simple to install and very effective.

The low profile cone not only looks good but provides a generous internal clearance, so even the steepest roofs are handled with ease.

Around the base of the cone a flexible bead reduces stress on the flashing membrane.

Suitable for flashing pipes that penetrate wall claddings.

For a maintenance free seal on pipes from 0 - 510mm diameter, it's much more than a flexible solution to pipe flashing, it's a means of saving time and money.

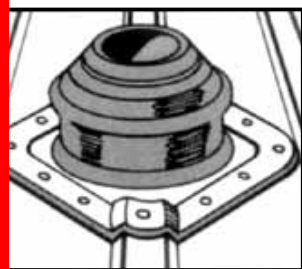
✓ Can also be used to flash square penetrations. Just add 30% to the pipe diameter and trim the cone to suit.

✓ EPDM withstands temperatures from -50°C - 115°C and up to 150°C intermittently.

✓ Silicone withstands temperatures from -60°C - 200°C and up to 250°C intermittently.



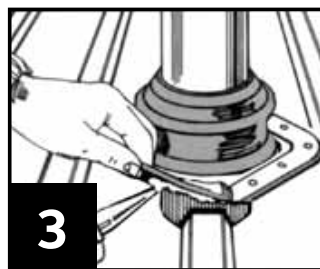
Installation Instructions:



1

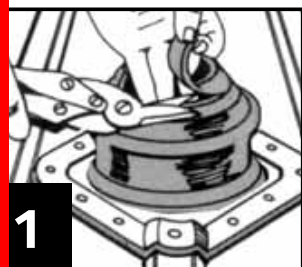
NOTE:

For more effective drainage, always fit the Dektite on the diamond or bias.
Dektites are suitable for flashing pipes that penetrate wall claddings.



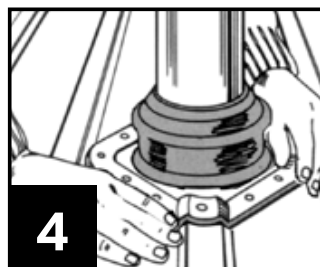
3

Apply a neutral-cure silicone sealant by turning back the flexible flange (refer to page 13 for silicone types).



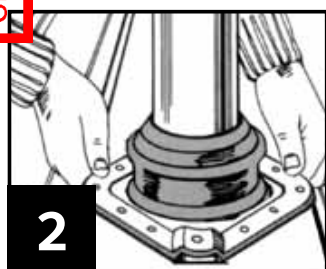
2

Cut a neat hole in roofing sheet with minimum clearance for pipe and insert pipe through hole. Trim the cone to suit pipe size using sharp tin snips. Where required, support cut sections of sheet with additional framing.



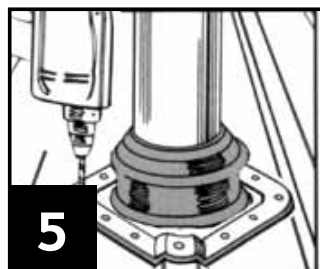
4

Press base to the roof profile by hand, smooth out any awkward creases. Don't fully extend to allow for vibration.



5

Slide Dektite flashing down over pipe. Lubricating the pipe with water allows the pipe to slide snugly into position.



Fasten using self drilling washered screws. Fit fasteners progressively outward in opposing pairs to avoid gaps.

Dektite Aluminium

The best solution for stone chip and pressed metal tiles

The base is 99.9% pure grade aluminium making it strong, malleable and easy to install.

Environmentally friendly, ideal where potable water is collected.

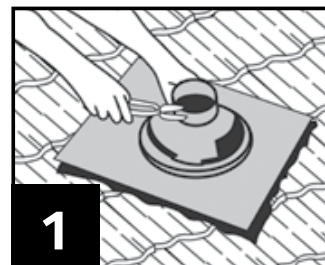
The best solution for stone chip and pressed metal tiles.

EPDM withstands temperatures from -50°C to 115°C and up to 150°C intermittently.

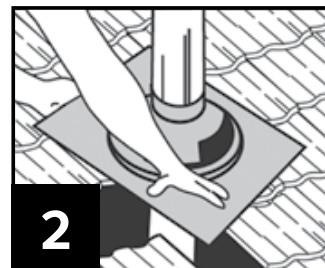
Code	Base (mm)	Pipe (mm)	Pitch	Colour
TFA 12-70	500 x 600	12-70	0-45°	BLACK (EPDM)
TFA 50-170	600 x 600	50-170	0-45°	
TFA 110-220	764 x 764	110-200	0-45°	
TFA 160-300	600 X 900	160-300	0-45°	
TFA 300-450	965 x 965	300-450	0-45°	



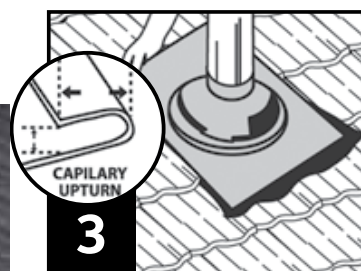
Installation Instructions:



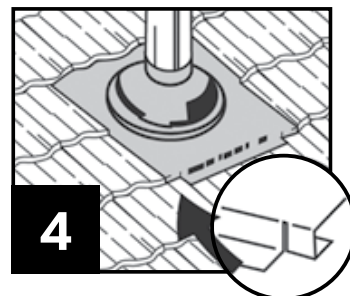
Trim Dektite cone to suit pipe size using sharp tin snips.



After lubricating the flue with water, slide Dektite down to the tile level.



Form an anti-capillary fold then place upper edge of base under up-stream tiles.



Dress base to profile, cut tabs on the bottom corners and fold under to stop wind lift.

Technical Data Sheet

FV130

Shower Fan Unit

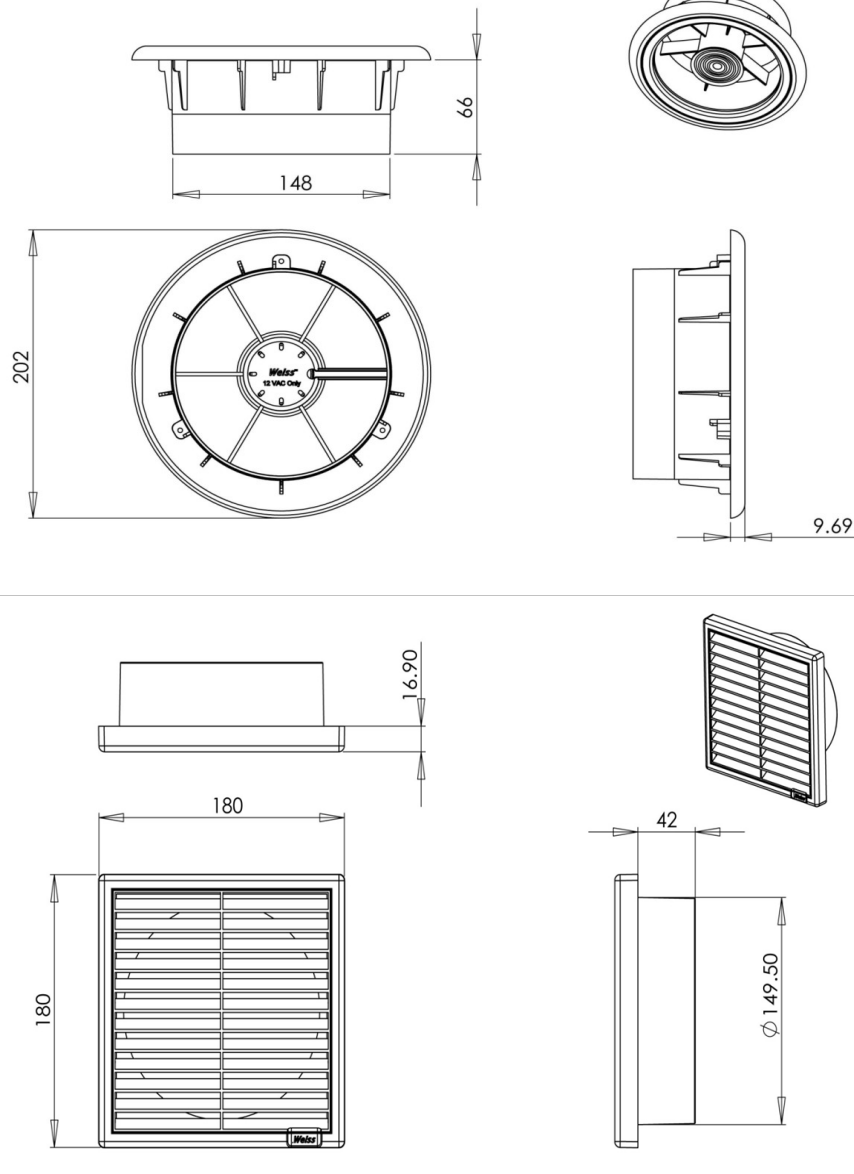
150mm ducting

WEISS™

Dimensions

Cut-out size for inlet fascia 170mm

Cut out size for outlet vent 155mm



Specifications

Weight	2kg
Colour of front fascia	White
Housing material	ABS

Approval

AS/NZS 3350.2.80:1998 Amdts 1-3 "Electrical Fan"

Features

- Easy to install
- 6 metres of 150mm ducting supplied
- Unique 'no fuss' all in one unit
- Allows moisture to be removed to the outside of your home
- All parts are included
- 3 year extended warranty

Technical Data Sheet

Product Use

The FV130 is used for the extraction of mist and steam

Typical applications:

- Bathrooms
- Toilets
- Laundries

Environmental Conditions

Operation	to IEC 721-3-3
Climatic conditions	class 3K5
Temperature	0...+50°C
Humidity	<95% r.h.

Standards

Test standards	AS/NZS 3350.2.80: 1998 Amdts 1-3 "Electrical Fan"
Test Report no	SD3190
EMC Compliance	This is a Level One product with an C frame motor that has a very low risk of causing EMC Interference

General

Free Air Fan Performance	362m³/ hr 100.6L/sec
Installed decibel rating	45DB

Ordering

When ordering please give name and type,	
Reference	FV130
Barcode	942000490093-8

Technical Data

Power Supply	230 VAC
Power consumption	max. 0.4 Amps
Supply Line fusing	max. 10A
For solid wires	2 x 1.5mm²
Motor	230-240VAC 50Hz 0.4 Amp
Motor insulation class	B1
Total motor wattage	40 Watts
Motor protection	Thermally protected
Total product wattage	40 watts



ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

Fast-drying acrylic undertile liquid waterproofing membrane

Class III Membrane - Conforms to AS4858:2004

BRANZ Appraised (No. 472 and No. 473)

Suitable for internal use

Low VOC content – meets Green Building Council of Australia
Green Star IEQ-13 requirements



BRANZ Appraised
Appraisal No.472 [2017]



BRANZ Appraised
Appraisal No.473 [2017]

ARDEX Australia Pty Ltd

20 Powers Road
Seven Hills NSW 2147
Phone: 1300 788 780
Fax: 1300 780 102
Email: technicalservices@ardexaustralia.com
www.ardexaustralia.com

ARDEX New Zealand Ltd

15 Alfred Street
Onehunga, Auckland 1061
Phone: 0800 227 339
Fax: (03) 384 9779
Email: info@ardexnz.com
www.ardex.co.nz

ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

PRODUCT DESCRIPTION

ARDEX WPM 001 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.

ARDEX 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*
- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat
- Flexible: Accommodates normal building movement class 3 membrane as per AS/NZ 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 & easy cleaning
- CSIRO Appraisal #91 for undertile waterproofing in shower recesses
- Conforms to the requirements of AS/NZ 4858: 2004 Wet Area Membranes.
(Ref: CSIRO Report 3779)

*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. Only recommended on concrete, screed and render substrates externally.

Surfaces

Walls & floors

Substrates

Concrete

Cured for min. 28 days or sealed when set with one coat of ARDEX WPM 300 (HydrEpoxy 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 WPM 300 as above.

Renderers and screeds

Cured for min. 7 days or sealed when set with one coat of ARDEX 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 WPM 300 as above.

Fibre cement

Suitable for wet area grade fibre cement.

Plasterboard

Wet area grade only.

Plywood

Structural plywood (PAA branded), marine grade or other wet area grade only. Not recommended for external use (Refer ARDEX). Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing. The maximum recommended span in E2/AS1 is 400mm. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. External edges shall be chamfered with a minimum radius of 5mm. Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets. All joints in the plywood and junctions of plywood with other materials shall have 25mm ARDEX Release tape applied before application of the membrane.

Particleboard

Wet area grade, internal use only (special preparation is required – contact ARDEX).

Permanent

In conditions of permanent immersion,

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.

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	15m ²	7.5m ²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m ²	15m ²	20kg(15L) unit

PACKAGING

Single component: 20kg (approx. 15 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.

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 polyester 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 WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX 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. It may produce discomfort of the eyes, respiratory tract and skin. Do not breathe gas/fumes/vapour/spray. Avoid contact with skin. Wear eye/face protection. In case of contact with eyes, rinse with plenty of water and seek medical advice.

ADDITIONAL INFORMATION IS LISTED IN THE 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

One-Part 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.

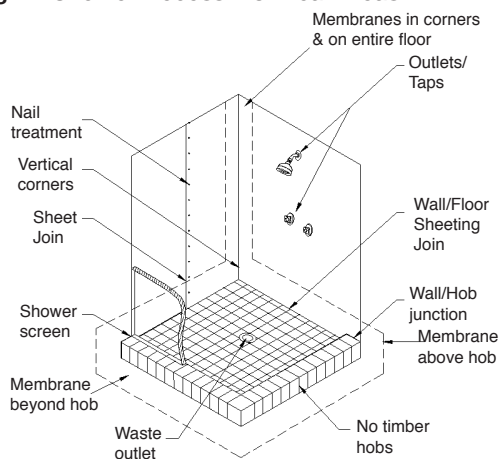
To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25-40 micrometers wet film thickness while ARDEX WPM 001 needs to be applied at between 0.5 and 1.0 mm per coat depending on product and application (Refer Table 1).

CRITICAL AREAS:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian 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 & floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber).

Fig.1 – Shower Recess – Critical Areas

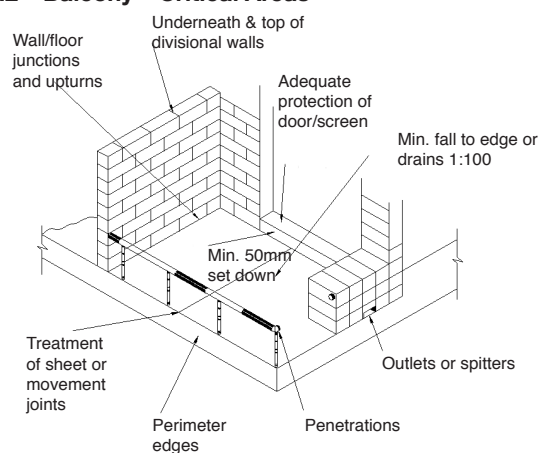


5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr)) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at 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. Spreading the sealant to 6mm on either side of the joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 & 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 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

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

Fig.2 – Balcony – Critical Areas



achieve the fall with a sand/cement screed.

2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).
3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/ sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls, or other items such as planter boxes.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. 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 2mtr (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 (Sheltercoat/ Superflex 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 and allow to dry before applying two coats of ARDEX WPM 001 membrane in a band at least 200mm wide equidistantly across the crack, 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" polyester 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:

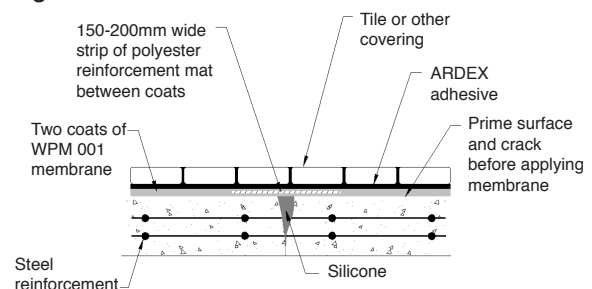
Contact your local ARDEX representative.

Movement/construction joints

Movement joints (<6mm)

Use same procedure as in crack preparation.

Fig.3 Crack Treatments



ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

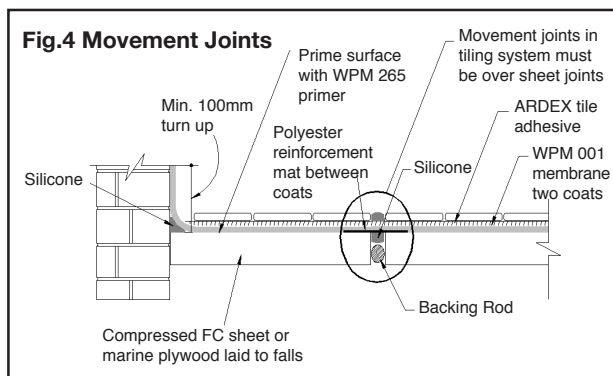
Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement 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)

Corners & coving areas

After priming with ARDEX WPM 265 and allowing 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 polyester 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 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" polyester

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 100 mm 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 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 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 treatment. 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.

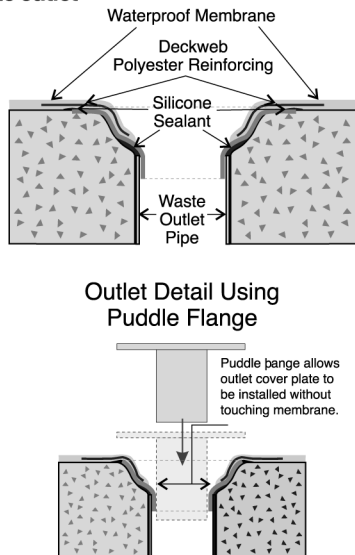
Waste Outlet

Prime the surface with ARDEX WPM 265 and allow to dry. Surfaces of the outlet flange must be primed with an appropriate 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 30mm. Place ARDEX "Deckweb" polyester 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)

Balcony penetrations (Refer Fig.6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Fig.5 – Waste outlet

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm 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.

Tiling systems

It is advisable to conduct a flood test of the shower 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.

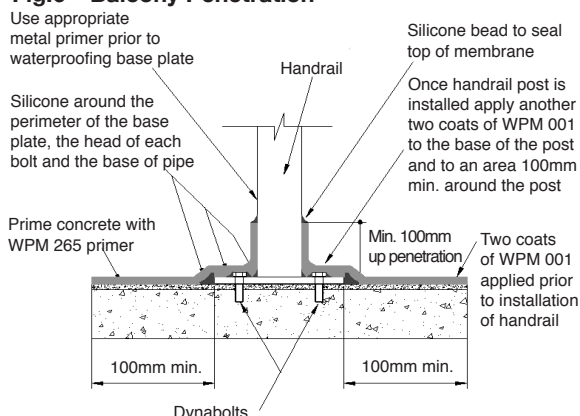
TECHNICAL DATA

ARDEX WPM 001 Characteristics of liquid

Form & Colour	Blue viscous paste
Type	Single part
Specific Gravity	Approx. 1.34kg/litre
pH of Liquid	8.5
Viscosity of Liquid (RVT Brookfield, spindle 7 speed 10)	52,000cps
Non Volatile Matter (volume) AS1321.10	50.3%±1
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.

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% R.H)

Fig.6 – Balcony Penetration

ARDEX WPM 001

One-Part Undertile Waterproofing Membrane

Toll Free Technical Services:

1800 224 070 (Australia)

0800 227 339 (New Zealand)

ARDEX Australia Pty Ltd

20 Powers Road

Seven Hills NSW 2147

Phone: 1300 788 780

Fax: 1300 780 120

Email: technicalservices@ardexaustralia.com

www.ardexaustralia.com

ARDEX New Zealand Ltd

32 Lane Street, Woolston

Christchurch, New Zealand 8023

Phone: 0800 227 339

Fax: (03) 384 9779

Email: info@ardexnz.com

www.ardex.co.nz

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 New Zealand 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. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them. © ARDEX New Zealand Ltd. All aforementioned products are the trade marks of ARDEX New Zealand Ltd.



ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

Two-Part Undertile Waterproofing Membrane

BRANZ Appraised (No. 472 & No. 473)

Suitable for internal and external use

Advanced acrylic – will not re-emulsify

Fibre-reinforced – eliminates the need for reinforcing mat

Water based – safe to use, low odour and easy cleaning

Flexible – meets class III category for AS/NZ 4858 Wet Area Membranes

Low VOC content – meets Green Building Council of Australia Green Star IEQ-13 requirements



BRANZ Appraised
Appraisal No.472 [2017]



BRANZ Appraised
Appraisal No.473 [2017]

ARDEX Australia Pty Ltd

20 Powers Road

Seven Hills NSW 2147

Phone: 1300 788 780

Fax: 1300 780 102

Email: technicalservices@ardexaustralia.com

www.ardexaustralia.com

ARDEX New Zealand Ltd

15 Alfred Street

Onehunga, Auckland 1061

Phone: 0800 227 339

Fax: (03) 384 9779

Email: info@ardexnz.com

www.ardex.co.nz

ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

PRODUCT DESCRIPTION

ARDEX WPM 002 is a tough, fast drying two component waterproofing membrane specifically designed for use under tiles. The product has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 002 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification.

ARDEX WPM 002 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 002 is one of the fastest drying acrylic membranes on the market – normally ready to tile in 16-24 hours @ 23°C.

ARDEX WPM 002 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 002 can be tiled over in 16-24 hours, or 4 hours @ 23°C/50% RH in non critical areas*.

Features benefits

- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat.
- Flexible: Accommodates normal building movement.
- Advanced acrylic: Will not re-emulsify.
- Designed for tiling: Fully compatible with ARDEX tile adhesives.
- Water based, safe to use, low odour and easy cleaning for undertile waterproofing in shower recesses by independent testing authority.
- Excellent exterior.
- Conforms to the requirements of AS/NZS 4858:2004 Wet Area Membranes (Ref: CSIRO Report 3879)

*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 and external wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic. Only recommended on concrete, screed and render substrates externally.

Surfaces

Walls and floors.

Substrates

Concrete

Cured for min. 28 days or sealed when set with one coat ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet concrete should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.

Render and screeds

Cured for min. 7 days or sealed when set with one coat ARDEX 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 WPM 300 as above.

Fibre cement

Wet area grade only.

Plasterboard

Wet area grade only.

Plywood

Structural plywood (PAA branded) or marine grade or other wet area grade only. Not recommended for external use (refer ARDEX). Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing. The maximum recommended span in E2/AS1 is 400mm. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. External edges shall be chamfered with a minimum radius of 5mm. Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets. All joints in the plywood and junctions of plywood with other materials shall have 25mm ARDEX Release tape applied before application of the membrane.

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 WPM 002 must be covered with tiles for full immersion applications.

Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

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	0.6mm	0.9mm	1.2mm	32m ²	16m ²	40kg kit
WALLS	0.4mm	0.6mm	0.8mm	48m ²	24m ²	40kg kit

PACKAGING

Two component: 20kg (approx. 20 litres) liquid pail/ 20kg bags powder.

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.

COVERAGE

Two coats are recommended for an effective waterproof membrane. Coverage will vary depending on the porosity of the surface.

One 40kg kit will cover approximately 16-24m (based on two coats) depending on area requirements between wall and floor surfaces to be treated.

DRYING TIMES

Curing time will vary depending on temperature and humidity.

Recoat time

1-2 hours (23°C/50% RH) between first and second coats. Alternatively, if a polyester 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 002 membrane is totally dry in 16 hours at 23°C/50% RH but can take up to 24 hours at 10°C / 50% RH in corners or for thick films.

In areas where bond breakers or additional reinforcement are not used, ARDEX WPM 002 can be tiled over after 4 hours at 23°C / 50% RH.

Fully cured

The shower should not be used until the membrane has reached its full strength. Normally ARDEX WPM 002 membranes are 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 WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX 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 002.

For substrates or situations other than those listed contact ARDEX.

SAFETY DATA

ARDEX WPM 002 Part A is non-hazardous. It may produce discomfort of the eyes, respiratory tract and skin. It should not be swallowed or inhaled. Avoid contact with skin and wear eye/face protection. In case of contact with eyes, rinse with plenty of water and contact a doctor or Poisons Information Centre.

ARDEX WPM 002 Part B contains cement and is therefore hazardous. It may cause burns and serious damage to eyes. Do not breathe dust and avoid contact with eyes. Wear dust masks, goggles and gloves

ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

when handling. Keep container locked up and in a well ventilated place.

ADDITIONAL INFORMATION IS LISTED IN THE MATERIAL SAFETY DATA SHEET.

APPLICATION

Apply ARDEX WPM 002 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 light 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 002 needs to be applied at between 0.6 and 0.9 mm per coat depending on product and application (Refer Table 1).

CRITICAL AREAS: INTERNAL WET AREAS

1. Construction should be in accordance with Australian 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 2m) 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 cured 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, and spread to 6mm on either side of joint.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls, and spread to 6mm on either side of joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 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 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

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 a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).

Fig.1 – Shower recess – critical areas

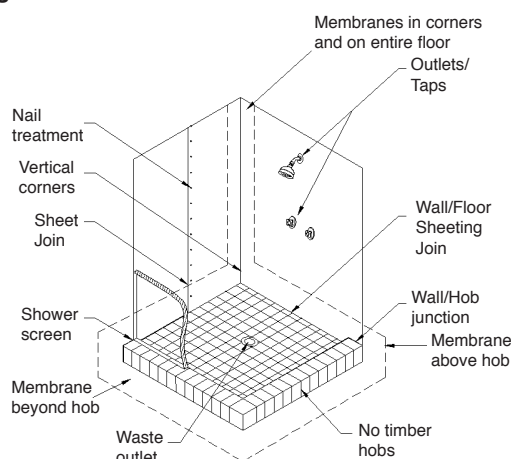
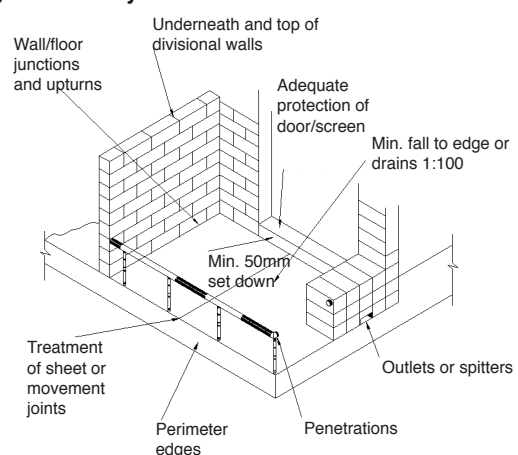


Fig.2 – Balcony – critical areas



3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. 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 2m (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 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to be completely dry prior to the application of the ARDEX WPM 002 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 and allow to dry before applying two coats of ARDEX WPM 002 membrane, in a band at least 200mm wide equidistantly across the crack, 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 002 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth 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.

Cracks >6mm:

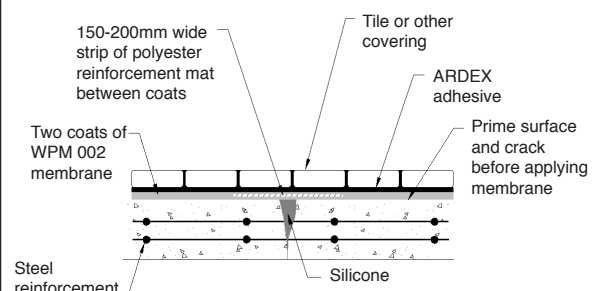
Contact your local ARDEX representative.

Movement/construction joints

Movement joints (<6mm)

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 002 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX

Fig.3 Crack Treatments



ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

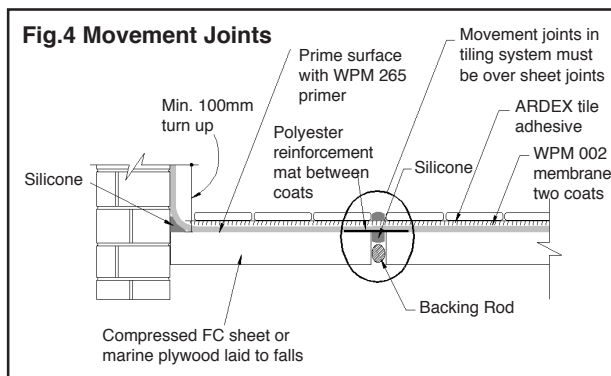
"Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

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)

Corners and coving areas

After priming with ARDEX WPM 265 and allowing to dry, apply a generous bead (16mm) of neutral cure silicone sealant in coving areas and corners. (Refer Fig.5) Smooth over the silicone so that it extends 8mm up the wall and 8mm over the floor and allow to touch dry.



Apply a first coat of ARDEX WPM 002 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 around 1.2mm). Alternatively, if a polyester 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 Superflex WPM 265 and allowing to dry, apply a generous bead (16mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 8mm up the wall and 8mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth 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 002 should be applied to at least 150mm up the wall surfaces as per the recommendations for the application of ARDEX WPM

002 to floors.

Walls

Two coats of ARDEX WPM 002 are required to achieve a minimum total dry film thickness of 0.8mm.

After priming with ARDEX Superflex WPM 265 and allowing to dry, apply two coats of ARDEX WPM 002 (to achieve a minimum dry film thickness of 0.8mm) in two opposite directions. Wall sheets 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 002 are required to achieve a minimum total dry film thickness of 1.2mm. The flooring recommendations should be extended at least 150mm up all perimeter walls.

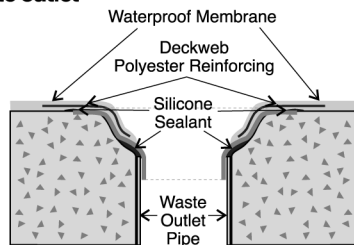
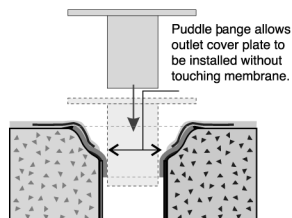
Prime the surface with ARDEX WPM 265 water based primer and allow to dry.

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 treatment. 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 and allow to dry. Surfaces of outlet flange must be primed with an appropriate primer.

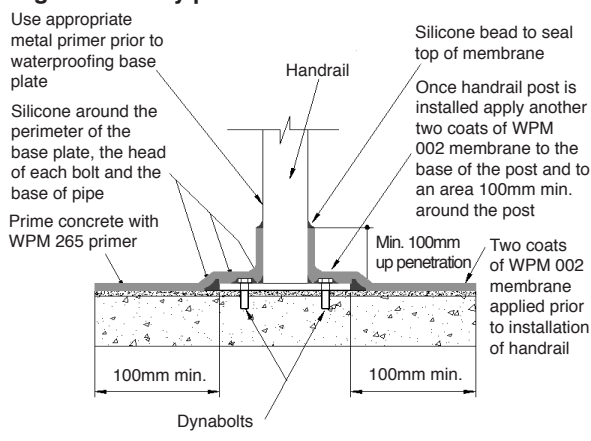
Apply ARDEX WPM 002 over the adjacent floor surface extending down into the waste outlet pipe overlapping the pipe surfaces by at least 30mm. Place ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig. 5).

Fig.5 – Waste outlet**Outlet Detail Using Puddle Flange****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 10mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of ARDEX WPM 002 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 1.2mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

Fig.6 – Balcony penetration**Tiling systems**

It is advisable to conduct a flood test of the shower once the membrane has cured (normally after 48 hours), and before the tiling commences. A broad range of ARDEX tile adhesives can be used over ARDEX Superflex membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

QUALITY PRODUCT

ARDEX WPM 002 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

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.

TECHNICAL DATA**ARDEX WPM 002****Characteristics of components**

Form & Colour	Liquid: white, medium viscosity Powder: off white
---------------	--

Characteristics of mixed product

Mixing Ratio	1:1 by weight
SG of mixed product	1.44kg/litre
Non Volatile Matter	77±1%
Colour	light grey/green

Characteristics of cured membrane

Shore A hardness ASTM D2240	
– dry film	85 – 90
– wet film	75 – 80

Tensile Strength	
7 days dry AS1145	1.7 MPa

Full Cure 28 days:	2.9 MPa
--------------------	---------

Elongation at Break	
7 days dry AS1145	332%

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% RH)

ARDEX WPM 002

Two-Part Undertile Waterproofing Membrane

Toll Free Technical Services:

1800 224 070 (Australia)

0800 227 339 (New Zealand)

ARDEX Australia Pty Ltd

20 Powers Road

Seven Hills NSW 2147

Phone: 1300 788 780

Fax: 1300 780 120

Email: technicalservices@ardexaustralia.com

www.ardexaustralia.com

ARDEX New Zealand Ltd

32 Lane Street, Woolston

Christchurch, New Zealand 8023

Phone: 0800 227 339

Fax: (03) 384 9779

Email: info@ardexnz.com

www.ardex.co.nz

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 New Zealand 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. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them.



BRANZ Appraised

Appraisal No. 484 [2018]

MAPEGUM WPS, MAPELASTIC,
MAPELASTIC SMART AND
MAPELASTIC AQUADEFENSE
- WET AREA MEMBRANES

Appraisal No. 484 [2018]

This Appraisal replaces BRANZ

Appraisal No. 484 [2012]

Amended 06 October 2022

BRANZ Appraisals

Technical Assessments of
products for building and
construction.



MBP [NZ] Ltd

Exclusive distributor of Mapei
products in New Zealand

P.O. Box 12 326

Penrose

Auckland

Tel: 09 921 1994

Fax: 09 921 1993

Web: www.MBPLtd.co.nz



BRANZ

BRANZ

11-22 Moonshine Rd,

Rimutaka, Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

branz.co.nz



Product

- 1.1 Mapegum WPS and Mapelastic AquaDefense are one-component, liquid-applied waterproofing membranes for internal applications under trafficable floor finishes.
- 1.2 Mapelastic and Mapelastic Smart are two-component liquid-applied waterproofing membranes suitable for internal applications on substrates under trafficable floor finishes.

Scope

- 2.1 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes have been appraised for use as waterproofing membranes for the internal wet areas of buildings, within the following scope:
 - on floor substrates of concrete, flooring grade particle board, plywood, fibre cement compressed sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
 - when protected from physical damage by trafficable floor finishes; and,
 - where floors are designed and constructed such that deflections do not exceed $1/360^{\text{th}}$ of the span.
- 2.2 The use of Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Movement and control joints in the substrate must be carried through the membrane and trafficable floor finish. The design and construction of the substrate and movement and control joints is specific to each building, and is therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.4 The trafficable floor finishes are outside the scope of this Appraisal.
- 2.5 The membranes must be installed by trained applicators, approved by MBP [NZ] Ltd, to the conditions of the Technical Data Sheet [TDS] of the products.



Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 [b] 15 years and B2.3.2. Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes meet these requirements. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes will meet this requirement. See Paragraphs 11.1-11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes meet this requirement.

Technical Specification

4.1 Materials supplied by MBP [NZ] Ltd are as follows:

- **Mapegum WPS** - a one-part, fast drying, polymer-based, ready-to-use, liquid-applied membrane. It is supplied as a light grey-coloured paste in 5, 10 and 25 kg buckets.
- **Mapelastic** - a two-part, flexible, cementitious, liquid-applied membrane. It is supplied as a Part A powder in 24 kg multi-wall bags and a Part B liquid in 8 kg plastic containers. When dry, the membrane is grey in colour.
- **Mapelastic Smart** - a two-part, flexible, cementitious, liquid-applied membrane. It is supplied as a Part A powder in 20 kg multi-wall bags and a Part B liquid in 10 kg plastic containers. When dry, the membrane is light grey in colour.
- **Mapelastic AquaDefense** - a one-part, solvent-free, ultra-quick drying synthetic resin-based paste in water dispersion liquid-applied membrane. It is supplied as a light blue coloured paste in 15 kg drums.
- **Mapeband and Mapeband Gaskets** - a rubber-coated polyester tape for waterproofing expansion joints and sealing around drains and pipes. Available as a tape 120 mm wide in rolls 50 m long, and also in ready-made internal and external corners [90 and 270 degrees] and pipe gaskets 118 x 118 mm and 300 x 300 mm, "T" profiles 515 mm x 315 mm and cross profiles 515 x 515 mm.
- **Mapeband PE120** - a PVC fabric tape used to reinforce wall/wall and floor/wall joints. It is only used with Mapegum WPS and Mapelastic AquaDefense. Available as a tape 120 mm wide, in rolls 10 m and 50 m long, and also as preformed angles 90° and 270°.
- **Mapetex Sel** - a macro-holed non-woven fabric, used to reinforce the first and second layer of the waterproofing membranes. It is supplied as a polypropylene white fabric, in rolls 100 mm, 200 mm and 1 m wide x 25 m long.
- **Mapenet 150** - a glass fibre mesh used to reinforce the membranes. It is supplied as a blue mesh in rolls 1 m wide and 50 m long.
- **Mapeband SA** - a self-adhesive butyl rubber tape used to reinforce all joints. It is supplied as a 2 mm thick, 100 mm wide tape in rolls 25 m long.
- **Mapei Primer 3296** - an acrylic primer for absorbent surfaces. It is an opaque colour and supplied in 5 and 10 kg drums.

Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and out of freezing conditions. The membrane products have a shelf life of 24 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

- 6.1 This Appraisal must be read in conjunction with:
- Mapelastic Smart, Version 2013-4-2022-gb, 2022.
 - Mapegum WPS, Version 2014-10-2020-en (IT), 2020.
 - Mapelastic, Version 331-5-2018-gb, 2018.
 - Mapelastic AquaDefense, Version 2013-11-2016-gb, 2016.
- 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 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes are for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 Mapegum WPS and Mapelastic AquaDefense are designed to be used where a one-component product is preferred.
- 7.3 The membranes must be protected from physical damage by the application of trafficable floor finishes.
- 7.4 Movement and control joints may be required depending on the shape and size of the building or room, and the floor finish specified. Design guidelines can be found in the BRANZ Good Practice Guide: Tiling.
- 7.5 Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases, framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed 1/360th of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

Substrates

Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used.
- 8.2 The plywood must be laid with the face grain at right angles to the floor joists. The plywood must be supported with dwangs or framing with a maximum span of 400 mm in each direction, fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres along the sheet edges and 200 mm through the body of the sheets.

Fibre Cement Compressed Sheet/Fibre Cement Sheet Tile Underlay

- 8.3 Fibre cement compressed sheet and tile underlay must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Installation must be in accordance with the instructions of the manufacturer.

Particleboard

- 8.4 Particleboard must be specified for the end use in accordance with NZS 3602.

Concrete and Concrete Masonry

- 8.5 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229 and concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

- 8.6 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be suitable for use in internal wet areas.
- 8.7 Fibre cement sheet must be suitable for use in wet areas and comply with AS/NZS 2908.2.
- 8.8 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

Durability

Serviceable Life

- 9.1 The Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes, when subjected to normal conditions of environment and use, are expected to have a serviceable life of at least 15 years and be compatible with trafficable floor finishes with a design service life of 15-25 years.

Maintenance

- 10.1 No maintenance of the membranes will be required provided significant substrate movement does not occur and the trafficable floor finish remains intact. Regular checks must be made of the floor finish to ensure it is sound and will not allow moisture to penetrate. Any issues must be repaired immediately by repairing the floor finish.
- 10.2 In the event of damage to a membrane, the trafficable floor finish must be removed and the membrane repaired by removing the damaged portion and applying a patch with sufficient overlap over the damaged section.
- 10.3 Drainage outlets must be maintained to operate effectively, and floor finishes must be kept clean.

Internal Moisture

- 11.1 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes are impervious to water, and when appropriately designed and installed, will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Surfaces must be finished with a trafficable floor finish. A means of compliance with NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 b), 3.1.2 b) and 3.3.1 b).
- 11.3 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1,500 mm out from the shower rose. Floor wastes and drainage flanges must be provided and the floor must fall to the outlet.
- 11.4 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes are suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of compliance for overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1,500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, the BRANZ Good Practice Guide: Tiling, and flooring and wall lining manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must be installed as per the NZBC requirements. They must flash over the membrane a minimum of 30 mm.
- 11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms where timber and plywood floors are used.

Installation Information

Installation Skill Level Requirement

- 12.1 Installation of the membranes must be completed by trained applicators approved by MBP [NZ] Ltd
- 12.2 Installation of substrates must always be carried out in accordance with the Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.

Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of concrete substrates must be 75% or less before membrane application. The concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.
- 13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have a reinforcement installed as set out in the Technical Literature.
- 13.4 Refer to the product manufacturer for correct priming requirements.

Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 8°C or above 35°C.
- 14.2 Mapelastic and Mapelastic Smart require the liquid and powder to be mixed and left to stand for 5 minutes before re-mixing, then applying. Mapegum WPS and Mapelastic AquaDefense must be thoroughly stirred before application.
- 14.3 The membranes must be applied in a minimum of two coats, at the rates set out in the Technical Literature. Subsequent coats must be applied in an opposite direction to the previous coat. The total finished system thickness of the Mapegum WPS and Mapelastic AquaDefense membranes must be a minimum of 1 mm and the Mapelastic and Mapelastic Smart Membranes must be a minimum of 2 mm.
- 14.4 Application can be made by roller (medium/long nap), brush (long bristle), or a notched steel trowel (finished with a flat steel trowel).
- 14.5 Reinforcement fabric or Mapeband is bedded into the wet layer between coats to provide movement protection at wall/wall and wall/floor junctions, or any other areas such as joints in the flooring substrate, floor cracks, or around penetrations in the membrane. In all other situations, reinforcement provisions as set out in this Appraisal and the Technical Literature apply.
- 14.6 Clean up may be undertaken with water.
- 14.7 For further information, refer to the Technical Literature.

Floor Finishes

- 15.1 The membranes must be fully cured before installing the trafficable floor finish. The cured membranes must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide: Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer or MBP [NZ] Ltd.



Impregnating Drain Vertical fabric with Mapelast AquaDefense



Application of Mapeband to a wall-floor joint with Mapelast AquaDefense



Application of the first coat of Mapelast AquaDefense



Application of the second coat of Mapelast AquaDefense

Inspections

- 16.1 The Technical Literature must be referred to during the inspection of membrane installations.
- 16.2 Critical areas of inspection are:
- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
 - Moisture content of the substrate prior to the application of the membrane.
 - Acceptance of the substrate by the membrane installer prior to application of the membrane.
 - Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness and use of reinforcement.
 - Membrane curing and integrity prior to the installation of floor finish including protection from mechanical damage during curing and prior to installation.

Health and Safety

- 17.1 Safe use and handling procedures for the membranes are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

Basis of Appraisal

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

Tests

- 18.1 The following testing has been undertaken by various organisations:
- Mapegum WPS and Mapelastic Wet Area Membranes in accordance with; EN 14891 for initial tensile adhesion strength, tensile strength after water contact, tensile adhesion strength after heat ageing, tensile adhesion strength after contact with lime water, tensile adhesion strength after contact with chlorine water, tensile adhesion strength after freeze-thaw cycles, waterproofing and crack bridging ability; DIN 53504 for tensile strength and maximum elongation after exposure to air and water immersion [Mapegum WPS only] and; Mapei internal method for water absorption after exposure and water immersion.
 - Mapelastic Smart in accordance with EN 1502-4 for bond strength to concrete, freeze thaw, flexibility, static and dynamic crack bridging, water vapour permeability, impermeability to water and bond strength after water immersion, heat ageing, freeze-thaw and alkali ageing.
 - Mapelastic in accordance with; EN 14891 for crack bridging after 28 days exposure to air, crack bridging after 7 days exposure to air and 21 days immersion in water, adhesion to concrete surface after 28 days exposure to air, adhesion to concrete surface after 28 days exposure to air and 21 days immersion in water; DIN 52615 for resistance to water vapour transmission and; Mapei internal method for deformability under low temperatures.
 - Mapegum WPS in accordance with; EN 1384 for tensile adhesion strength after exposure and water immersion; UNI 8202/22 for water absorption after exposure and water immersion and; DIN 53505 for shore A hardness.
 - Mapelastic AquaDefense in accordance with AS/NZS 4858 Appendix A including effect of heat ageing, bleach, detergent and water on tensile and elongation, water vapour transmission to ASTM E96-92 and cyclic movement resistance requirements of AS/NZS 4858 Appendix B. Testing to ANSI 118.10-1999 including seam strength, breaking strength, dimensional stability, resistance to fungi, static head and shear strength to ceramic tile and cement mortar. Also tensile adhesion on a plywood substrate and low temperature flexibility of the membrane.
- 18.2 The above test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 18.3 Testing of Mapegum WPS and Mapelastic has been undertaken by BRANZ for durability in accordance with AS/NZS 4858, Appendix A covering tensile strength and elongation after immersion in water, bleach, detergent, and after heat ageing.
- 18.4 Testing for suitability of Mapelastic over particleboard in accordance with AS/NZS 4858, Appendix C has been undertaken by BRANZ and found to be satisfactory.

Other Investigations

- 19.1 An assessment was made of the durability of the Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes by BRANZ technical experts.
- 19.2 Site inspections have been carried out by BRANZ to examine the practicability of installation and to examine completed installations.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 20.1 The manufacture of the membranes has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 20.2 The quality management system of the membranes manufacturer has been assessed and found to be satisfactory.
- 20.3 The quality of supply of the membrane system materials to the market is the responsibility of MBP [NZ] Ltd.
- 20.4 Quality on-site is the responsibility of the MBP [NZ] Ltd trained applicators.
- 20.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the framing systems and substrates.
- 20.6 Building owners are responsible for the maintenance of the trafficable floor finish in accordance with the instructions of MBP [NZ] Ltd.

Sources of Information

- AS 3958.1:2007 Guide to the installation of ceramic tiles.
- AS/NZS 1170:2002 Structural design actions.
- AS/NZS 2908.2:2000 Cellulose-cement products – Flat sheet.
- AS/NZS 2269:2012 Plywood-Structural.
- AS/NZS 4858:2004 Wet area membranes.
- BRANZ Good Practice Guide: Tiling, April 2015.
- DIN 53504 May 1994 Determination of tensile stress/strain properties of rubber.
- EN 1348: 1997/A1 Adhesives for tiles – Determination of tensile adhesion strength for cementitious adhesives.
- EN 14891 March 2003 Liquid applied waterproofing membranes for use beneath ceramic tiling – Definitions, specifications and test methods.
- NZS 3101:2006 The design of concrete structures.
- NZS 3602:2003 Timber and wood-based products for use in buildings.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4229:2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230:2004 Code of Practice for the design of masonry structures.
- UNI 8202 – 22: 1987 Building. Water proof sheets. Determination of behaviour in water.
- Ministry of Business, Innovation and Employment Record of amendments – Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 25 February 2021

This Appraisal has been amended to update the Appraisal holder.

Amendment No. 2, dated 06 October 2022

This Appraisal has been amended to include trafficable floors and to remove Mapelastic Turbo.

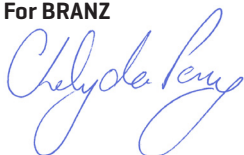
In the opinion of BRANZ, **Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic Aquadefense Wet Area Membranes** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **MBP [NZ] Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

09 February 2018



Wet Area Systems

Specification and installation manual

SDC - Approved Building Consent Document - BC231907 - Pg 364 of 446 - 21/03/2024 - helen.fowler

CBI 5113

FEBRUARY 2021

NATIONAL SUPPORT

VISIT: Winstone Wallboards Limited
37 Felix Street, Penrose,
Auckland 1061, New Zealand

POST: PO Box 12 256, Penrose,
Auckland 1642, New Zealand

PHONE: +64 9 633 0100

EMAIL: info@gib.co.nz

WEB: gib.co.nz

GIB® HELPLINE

0800 100 442

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.

CONTENTS

Introduction	5	Construction Details	18-30
Design considerations	6-11	Limitations	31
Where to use GIB® Wet Area linings	6	Use only the current specification	31
Benefits	6	Substitution	31
Handling and storage	6	Trademarks	31
Limitations	6	Copyright	31
Board substitution options	7		
Penetrations and sealants	8		
Renovations	8		
Maintenance	8		
Compliance with the NZ Building Code	9-11		
Installation	12-17		
Non-tiled walls – Timber Framing	12		
Non-tiled walls – Steel Framing	13		
Tiled walls – Timber Framing	14		
Tiled walls – Steel Framing	15		
Metal angles and maximum tile weights	16		
Ceilings	17		

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®

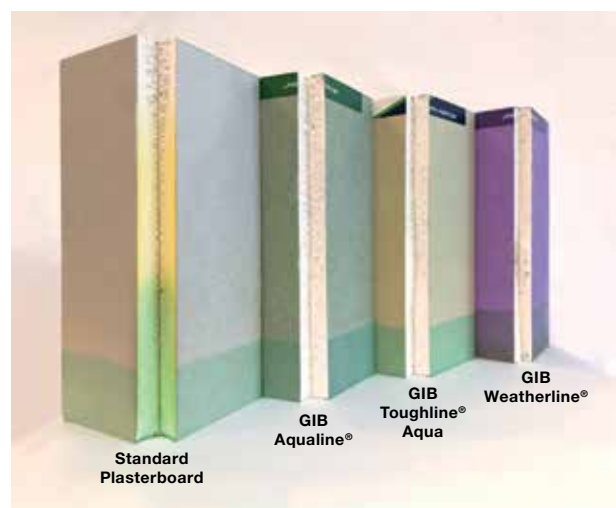
Although able to cope with infrequent short-term exposure, standard gypsum plasterboard will have a shortened life expectancy when frequently exposed to water or a high moisture environment.

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.



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 pre-seal 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.

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

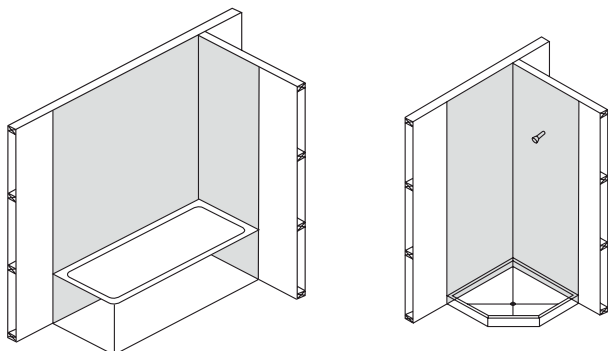
STRUCTURE – CLAUSE B1

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

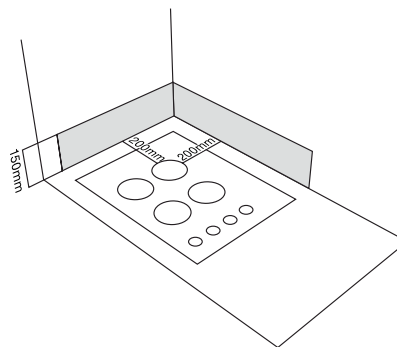
When installed and maintained in accordance with this literature, GIB® Wet Area systems tiled or vinyl covered have a serviceable life of at least 15 years. They comply with the requirements of NZ Building Code Clause B2 (Durability) for use in wet areas directly exposed to liquid water, e.g. showers, 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 Fyrelite®, 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.

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.

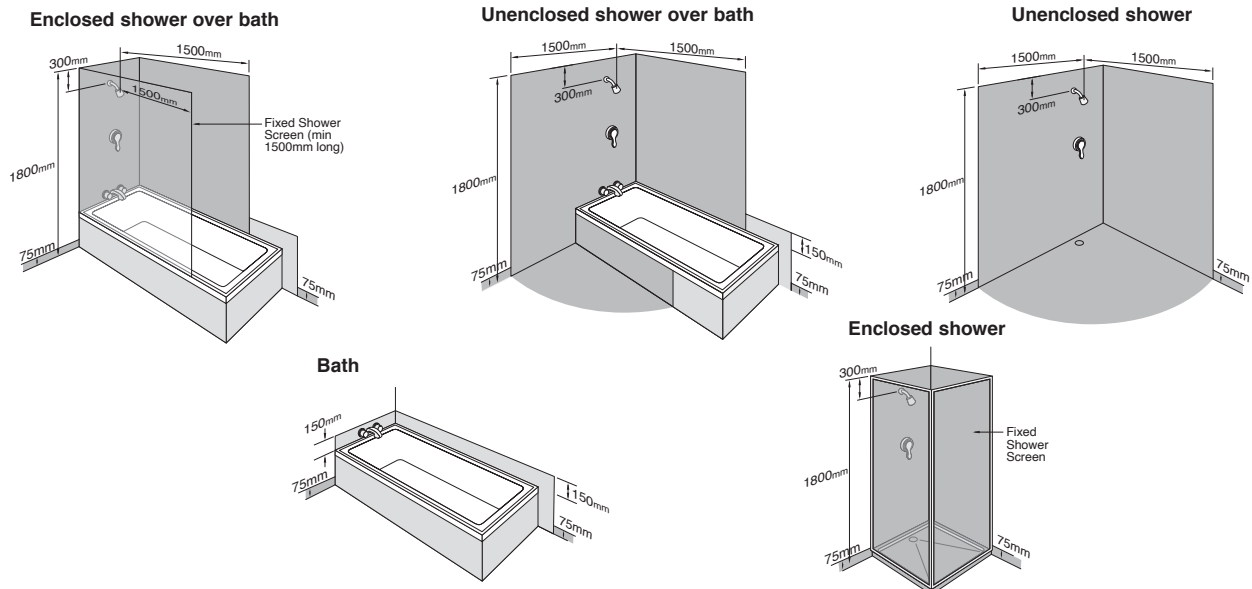
E3.3.5 - Surfaces of the building elements likely to be splashed or become contaminated in the course of the intended use of the building, must be impervious and easily cleaned.

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.



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 Fyrelite®, 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.

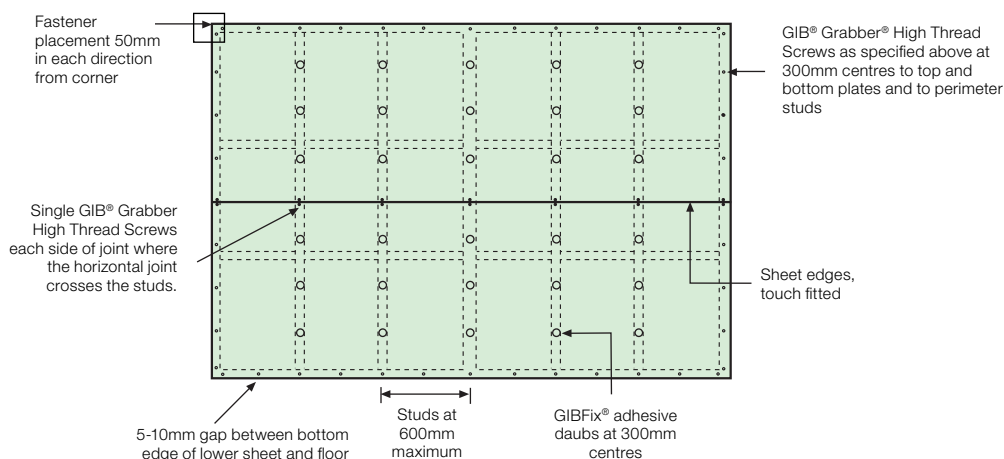
LINING

- 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.

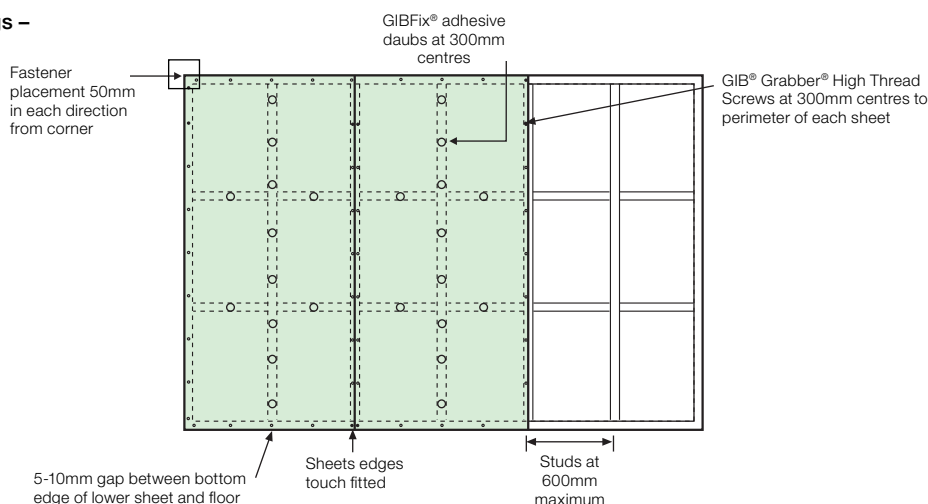
JOINTING

- 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.

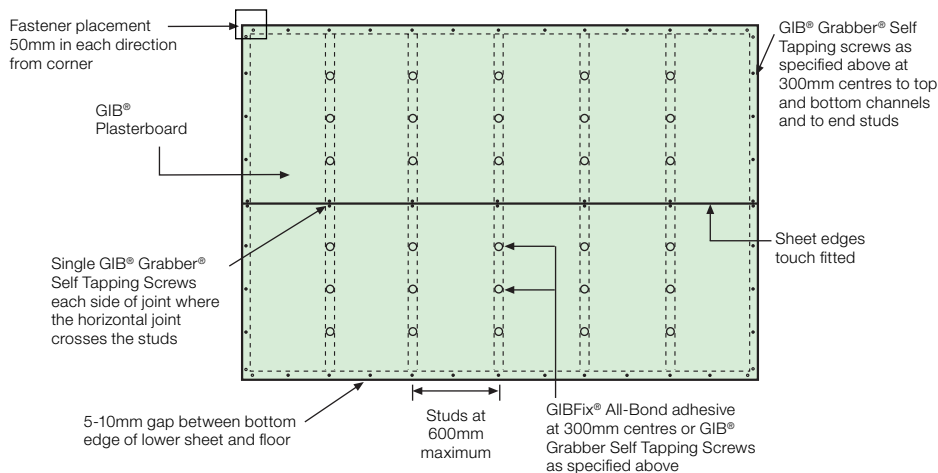
LINING

- 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.

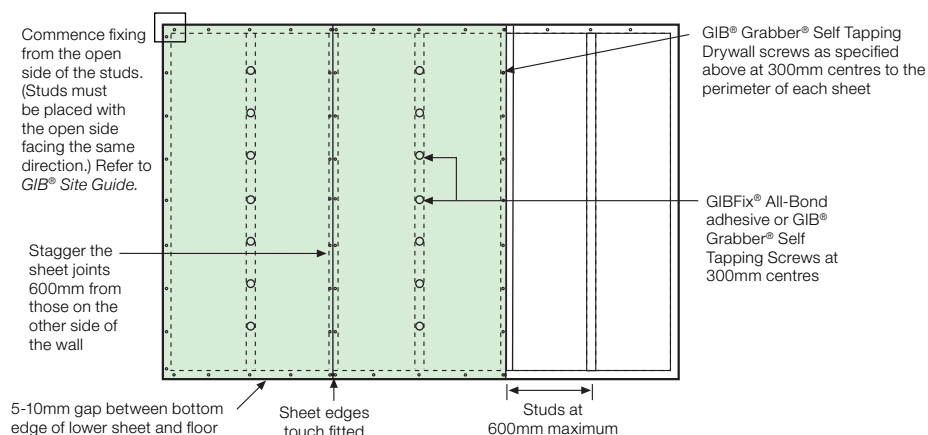
JOINTING

- 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



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.

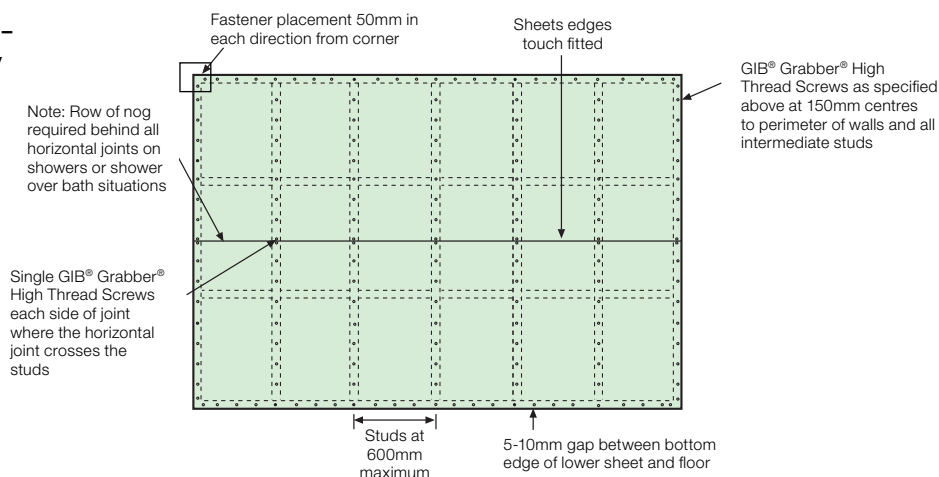
LINING AND TILE WEIGHTS

- 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

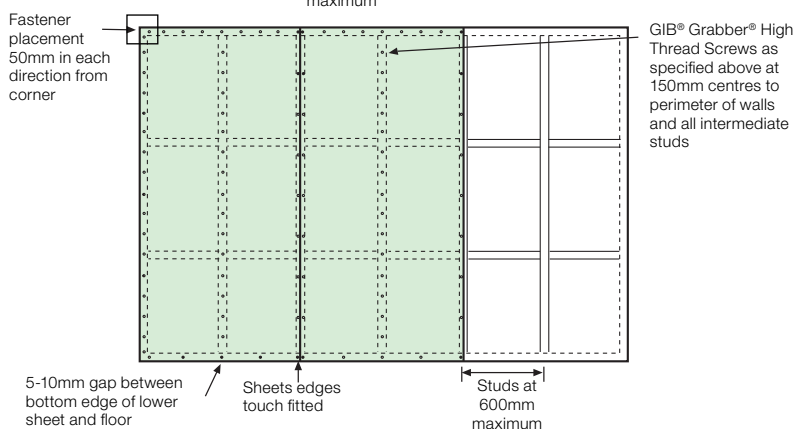
JOINTING

- 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.

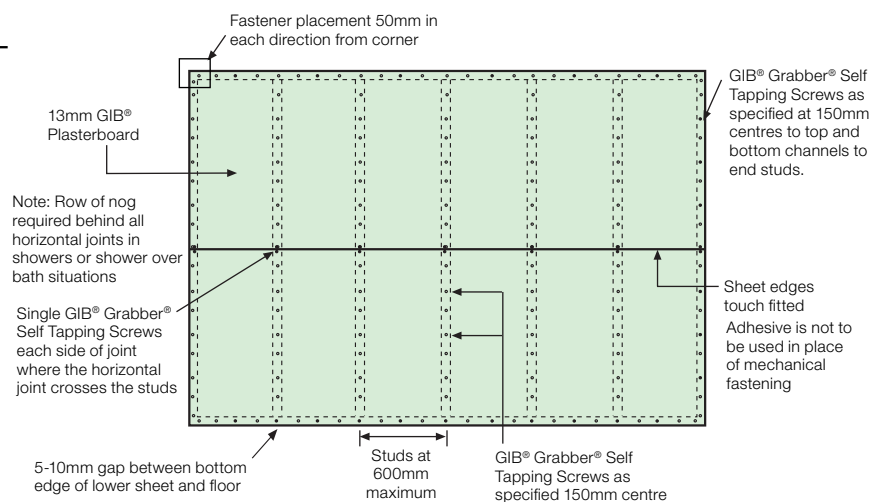
LINING AND TILE WEIGHTS

- 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

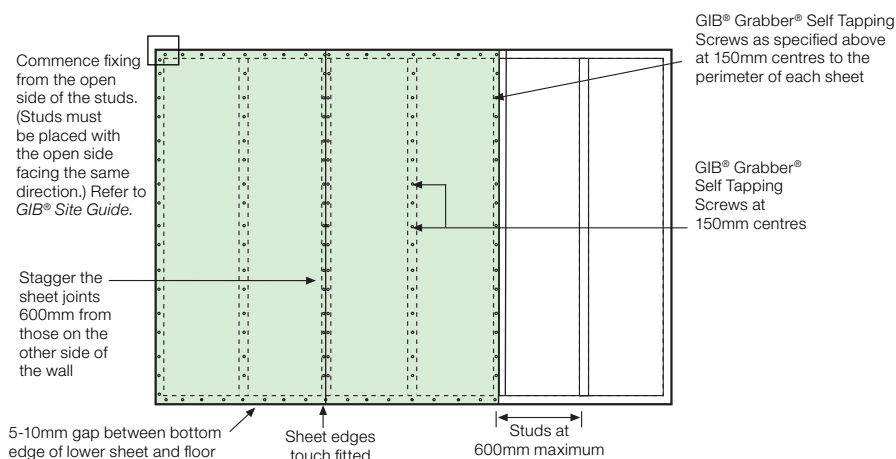
JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

Fastening the Linings – Horizontal Fixing Only

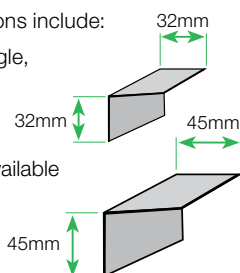


Fastening the Linings – Vertical Fixing Only

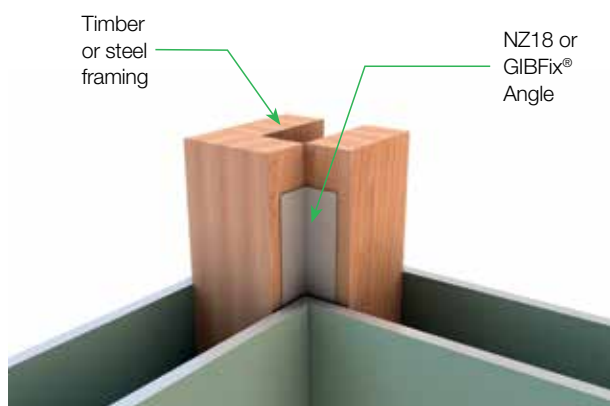


METAL ANGLES FOR TILED INTERNAL CORNERS

- 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/m² 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.

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

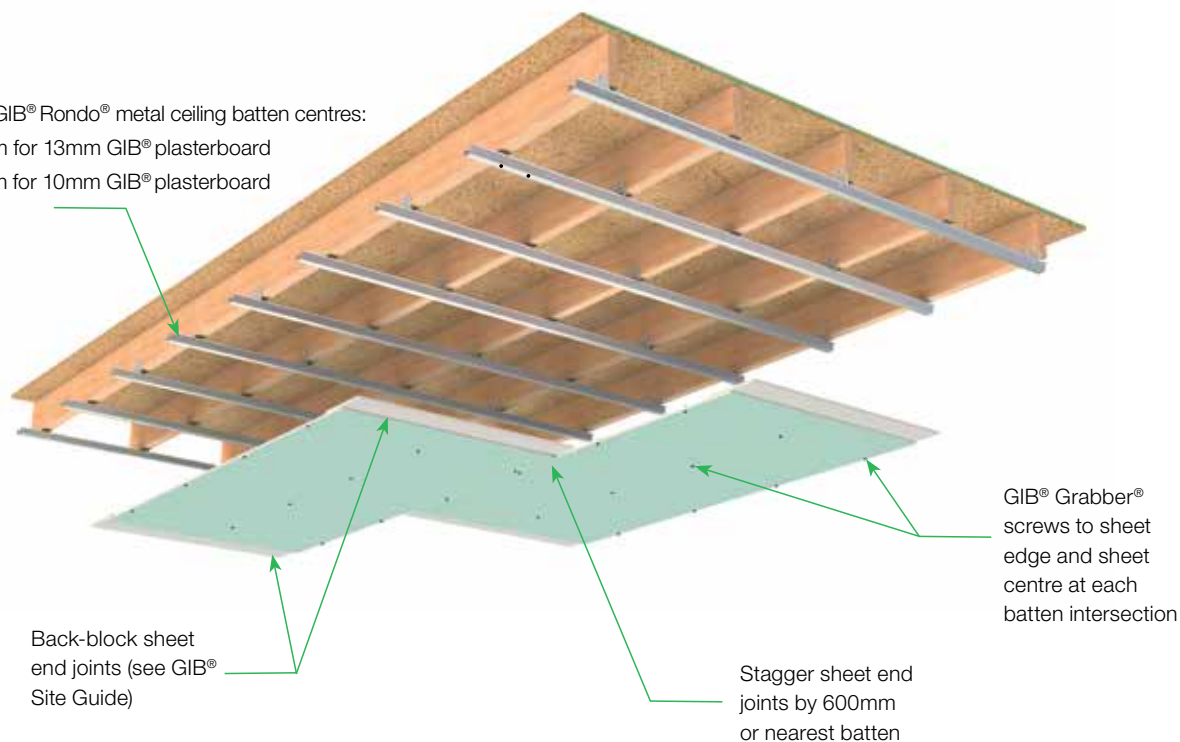
- 13mm GIB® plasterboard – 600mm centres maximum
- 10mm GIB® plasterboard – 450mm centres maximum

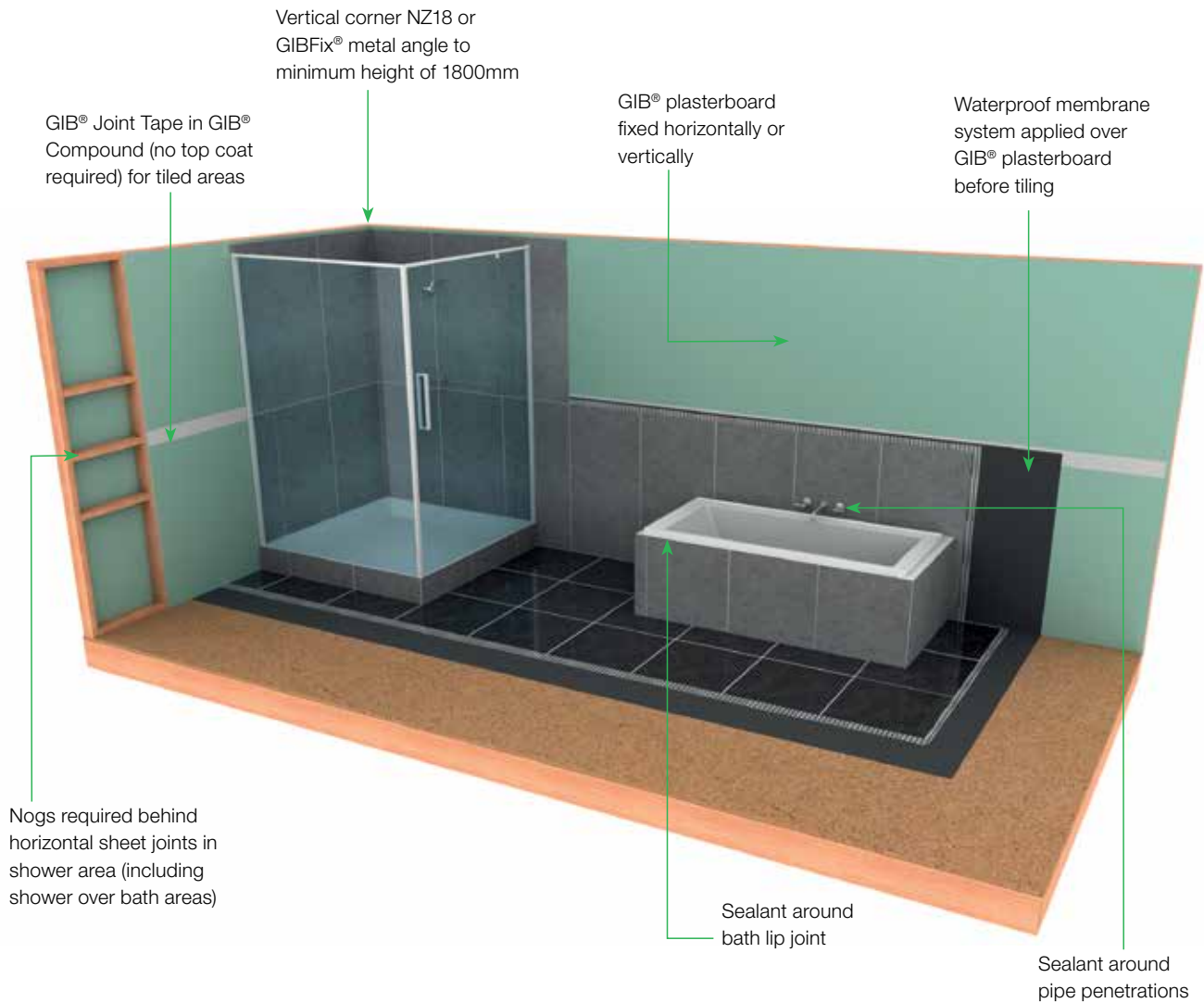
JOINTING

- 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

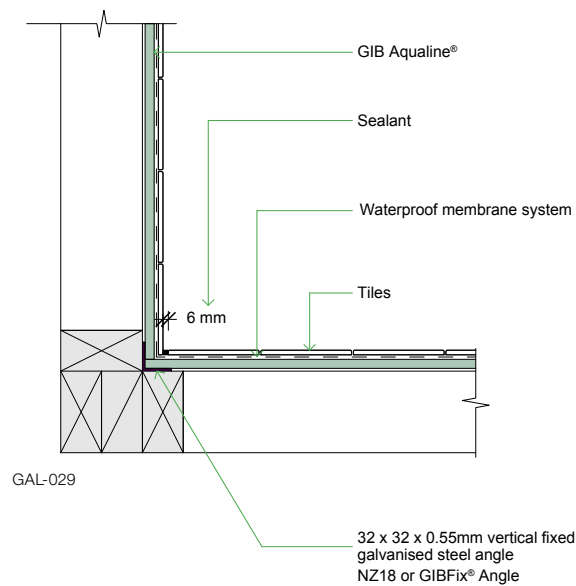
Maximum GIB® Rondo® metal ceiling batten centres:

- 600mm for 13mm GIB® plasterboard
- 450mm for 10mm GIB® plasterboard

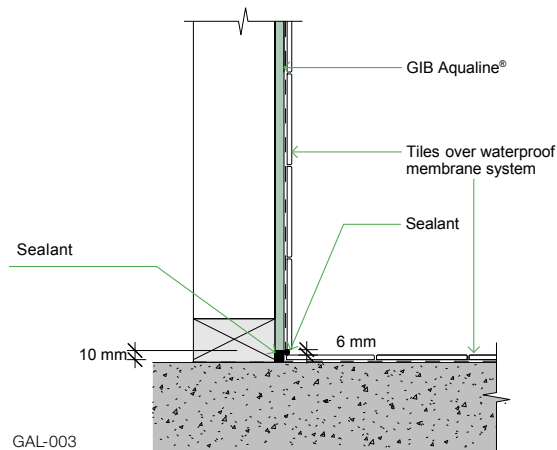




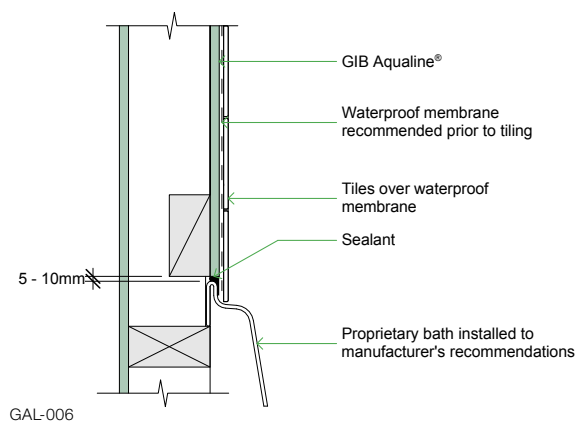
A: TILED INTERNAL CORNER



B: CERAMIC FLOOR LINING JUNCTION



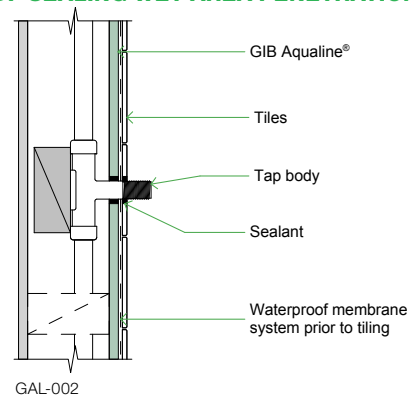
C: BATH LINING JUNCTION



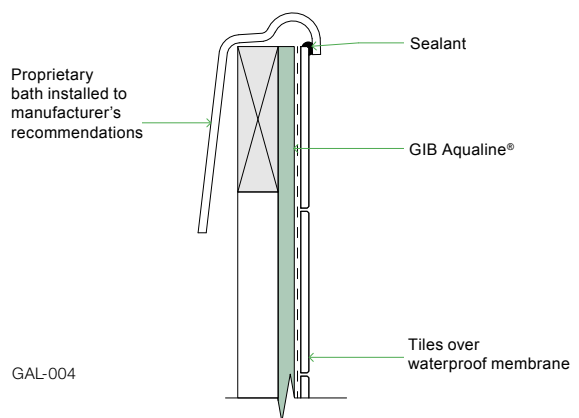
G: SHOWER MIXER PENETRATION IN WET WALL LININGS

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.

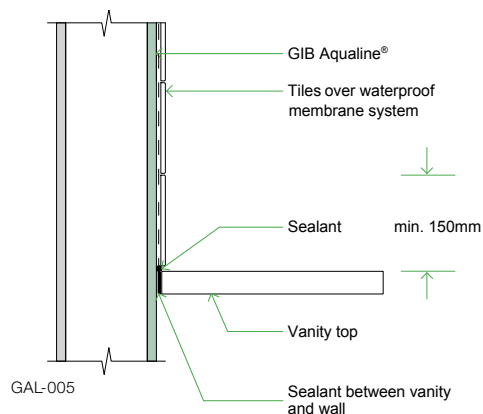
D: SEALING WET AREA PENETRATION



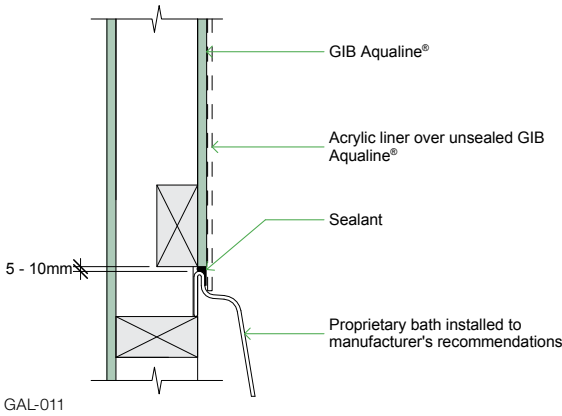
E: BATH CRADLE LINING DETAIL



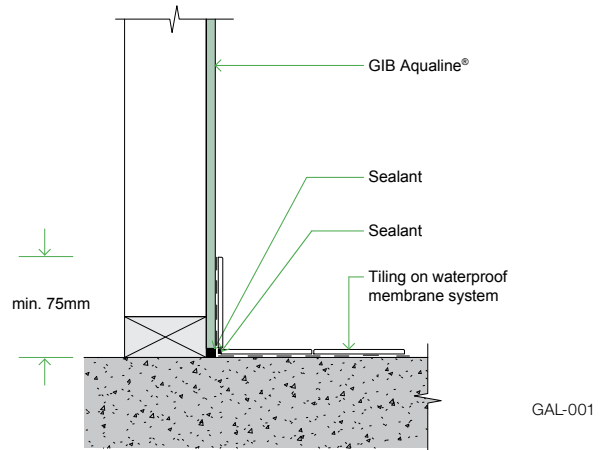
F: VANITY TOP LINING JUNCTION



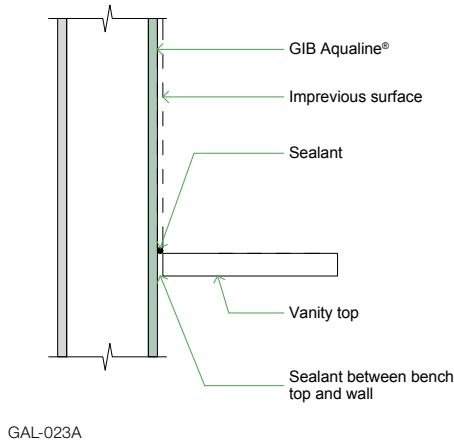
A: BATH LINING JUNCTION



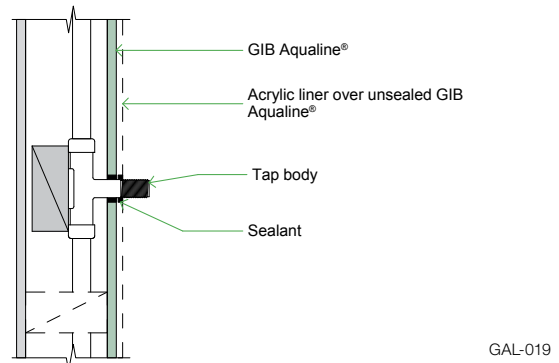
D: CERAMIC FLOOR SKIRTING LINING JUNCTION



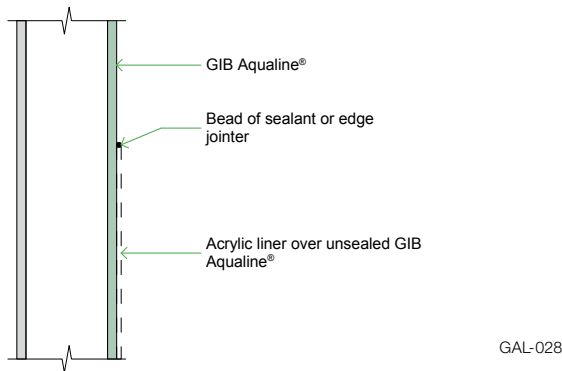
B: VANITY TOP LINING JUNCTION



E: SEALING SEMI WET AREA PENETRATION



C: UNSEALED PLASTERBOARD LINING

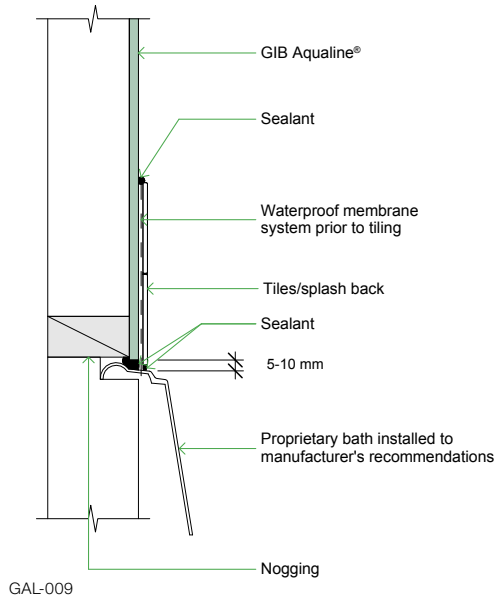


F: SHOWER MIXER PENETRATION IN WET WALL LININGS

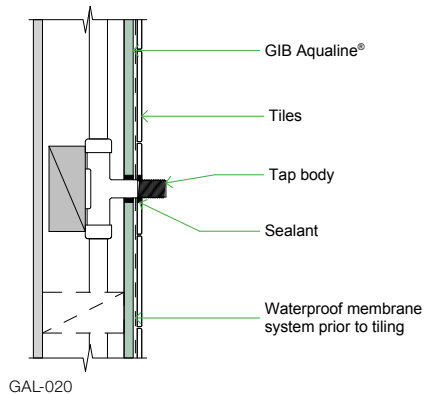
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



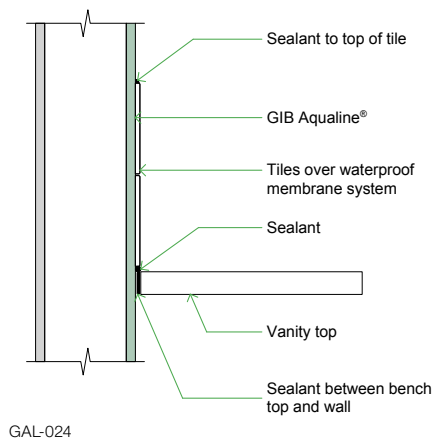
A: BATH LINING JUNCTION



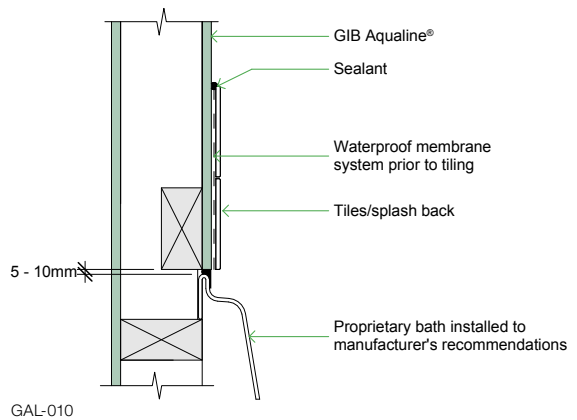
B: SEALING SEMI WET AREA PENETRATION



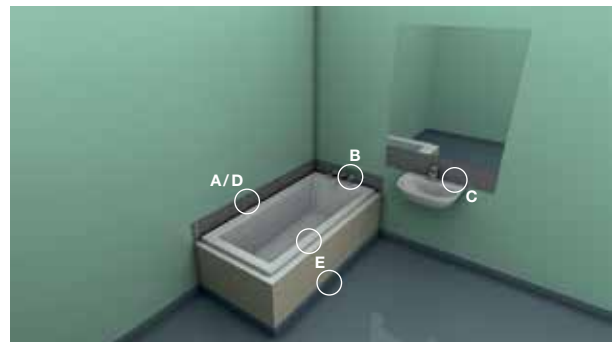
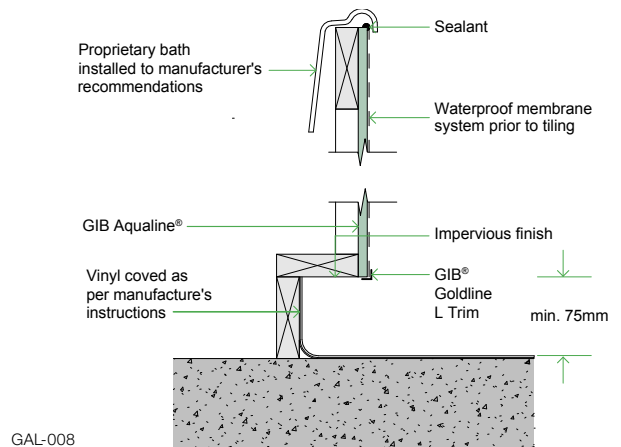
C: VANITY TOP LINING JUNCTION



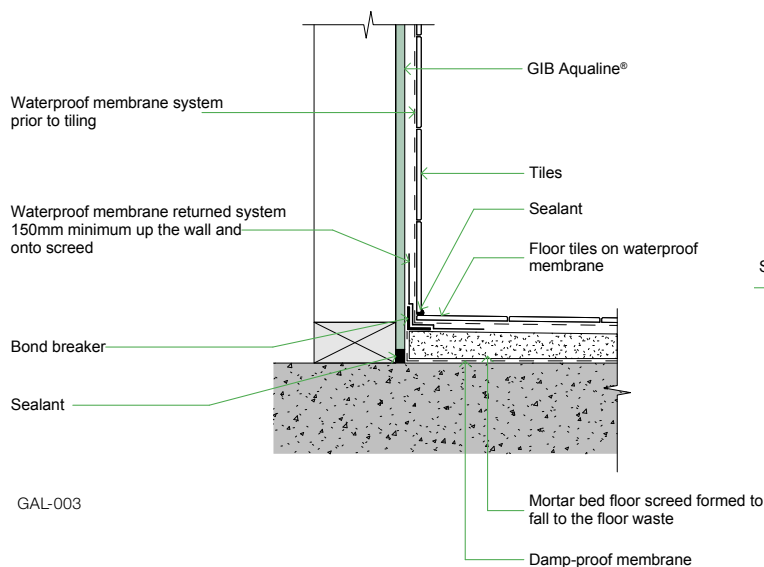
D: BATH LINING JUNCTION



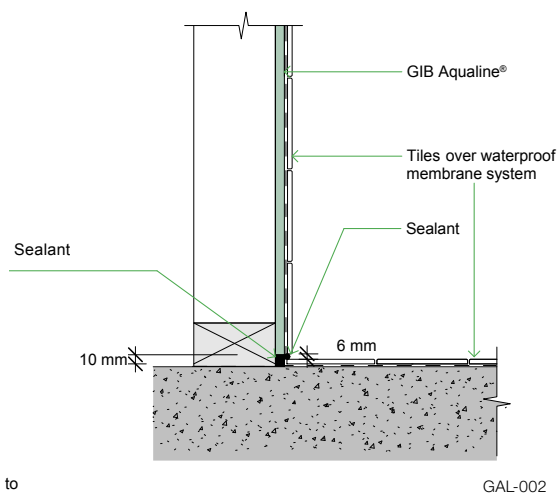
E: CRADLE VINYL LINING JUNCTION



A: MORTAR UNDER CERAMIC FLOOR LINING JUNCTION



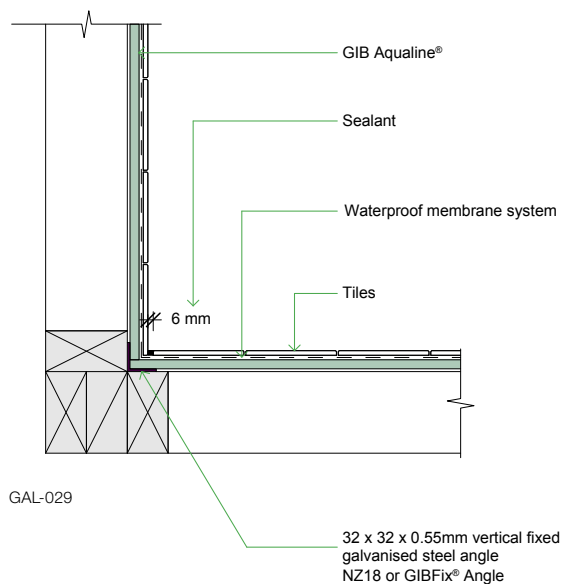
C: CERAMIC FLOOR LINING JUNCTION



PREFORMED SHOWER BASE JUNCTIONS

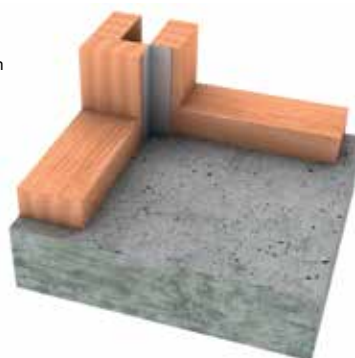
Refer to the shower base manufacturer for proprietary shower tray installation detailing including wet wall lining junction detailing.

B: TILED INTERNAL CORNER



D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.

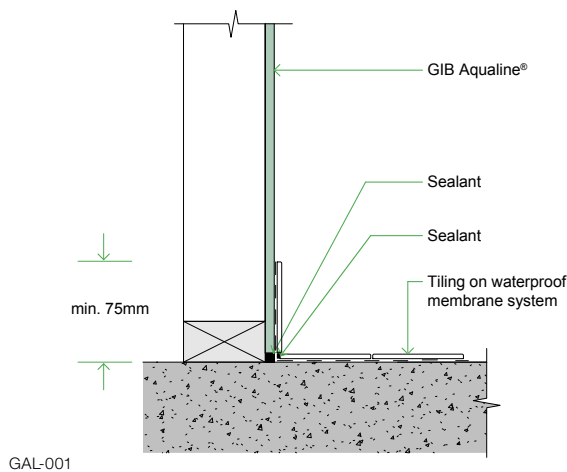


E: SHOWER MIXER PENETRATION IN WET WALL LININGS

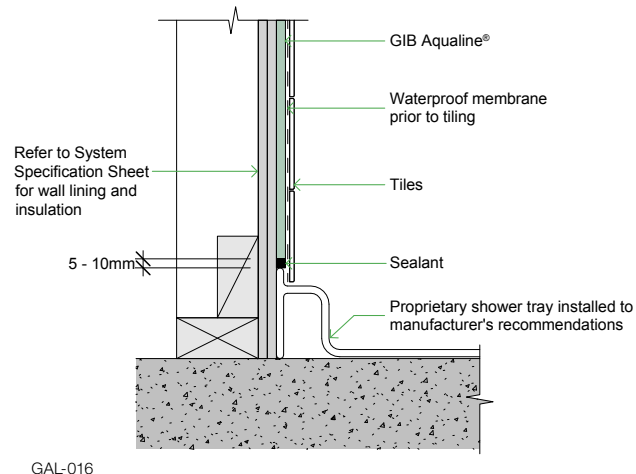
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



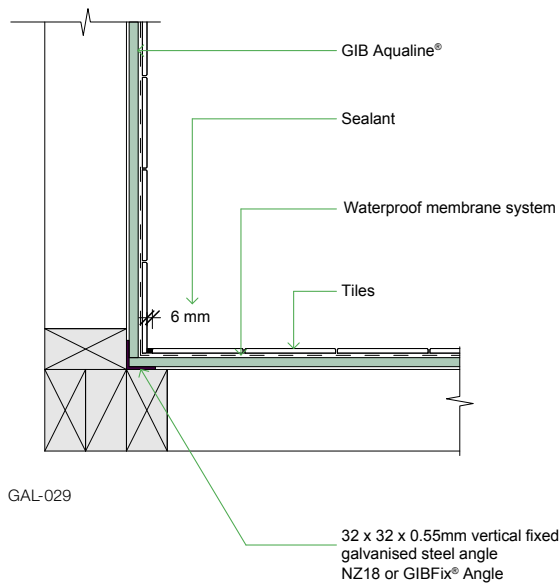
A: CERAMIC FLOOR SKIRTING LINING JUNCTION



B: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION

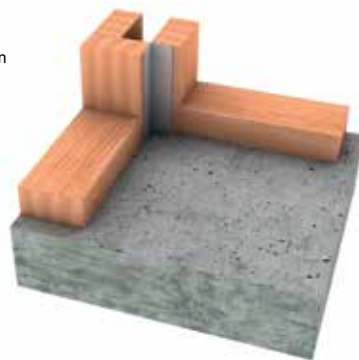


C: TILED INTERNAL CORNER



D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.

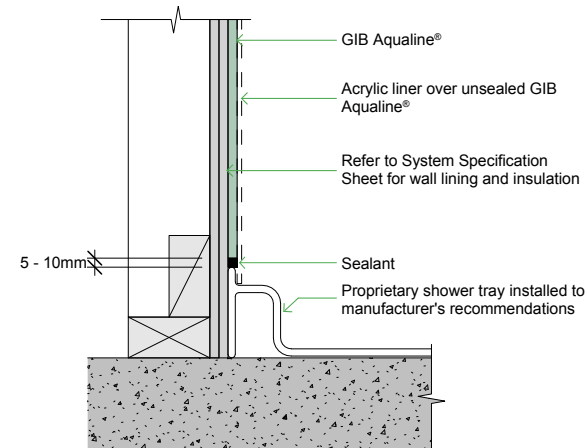


E: SHOWER MIXER PENETRATION IN WET WALL LININGS

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.

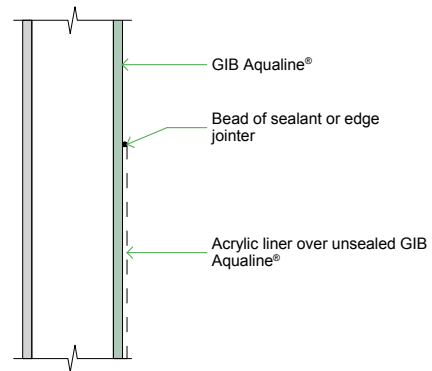


A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



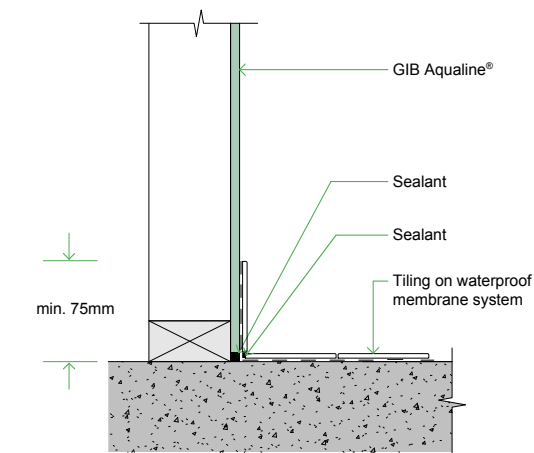
GAL-015

C: UNSEALED PLASTERBOARD LINING



GAL-028

B: CERAMIC FLOOR SKIRTING LINING JUNCTION



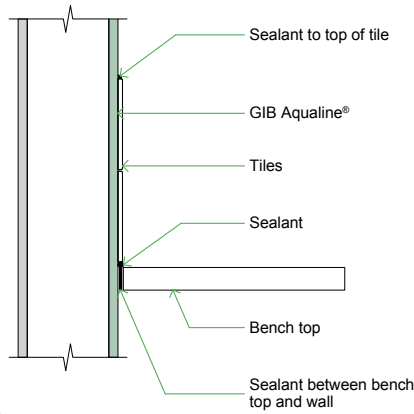
GAL-001

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.

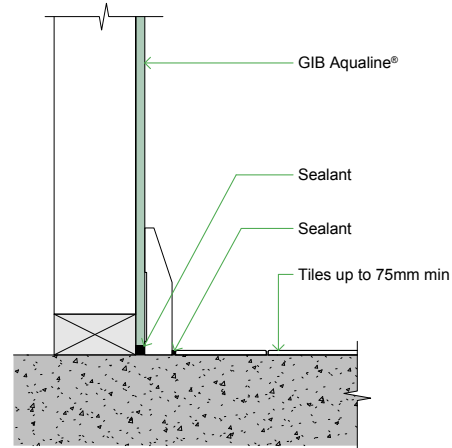


A: BENCH TOP LINING JUNCTION



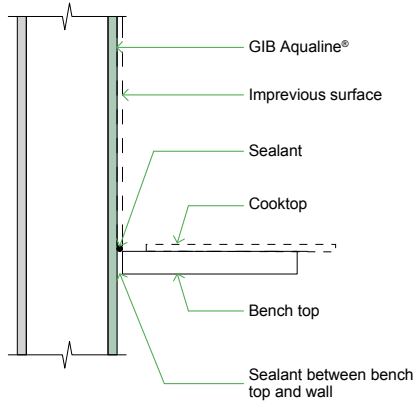
GAL-024

CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

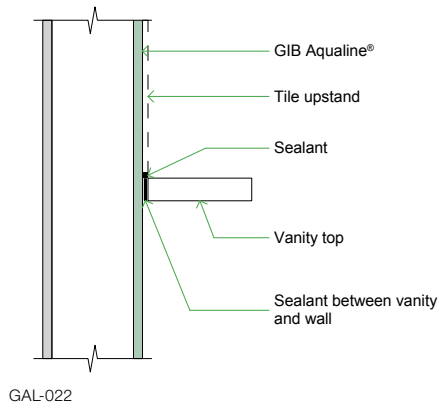
B: COOKTOP LINING JUNCTION



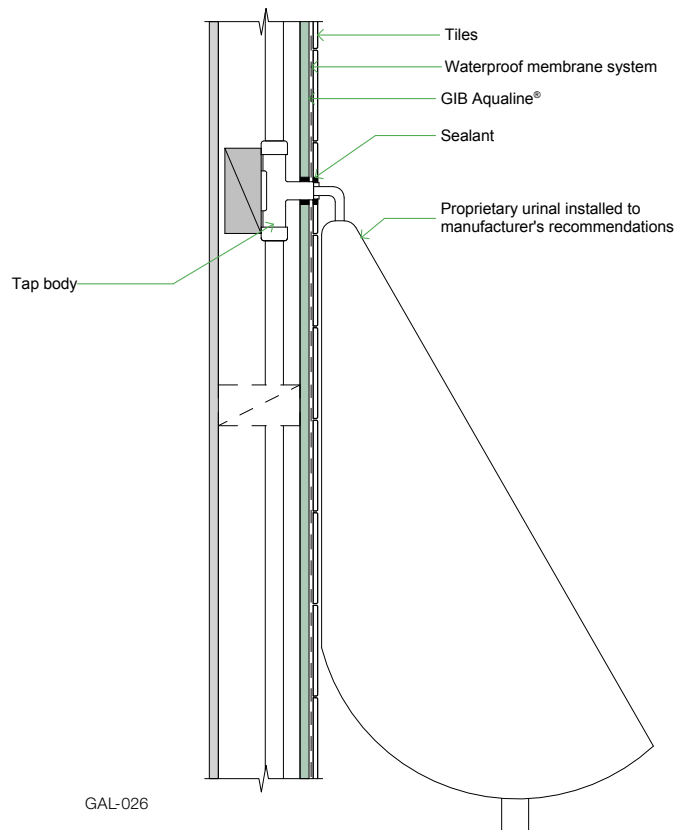
GAL-023B



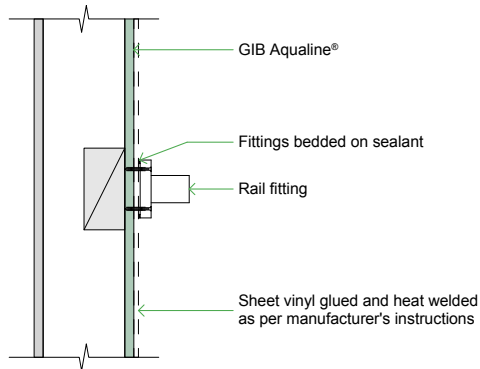
A: VANITY TOP LINING JUNCTION



B: SEALING WET AREA PENETRATION LINING JUNCTION

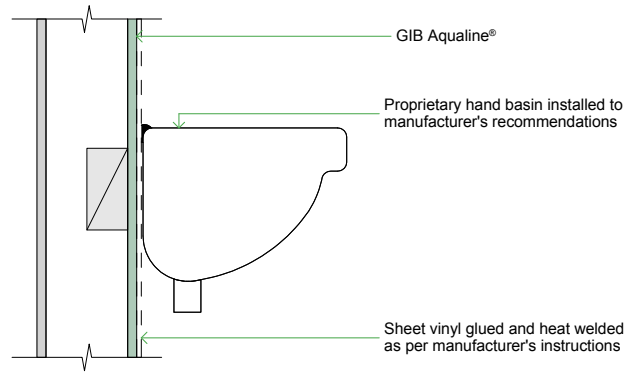


A: SURFACE MOUNTED WITH NOG



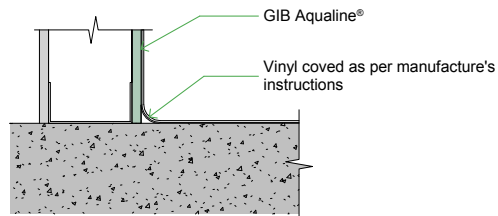
GAL-027

C: BASIN LINING JUNCTION



GAL-025

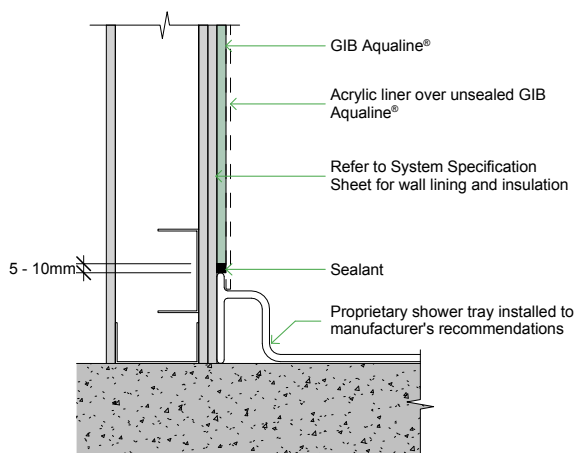
B: VINYL FLOOR LINING JUNCTION



GAL-006

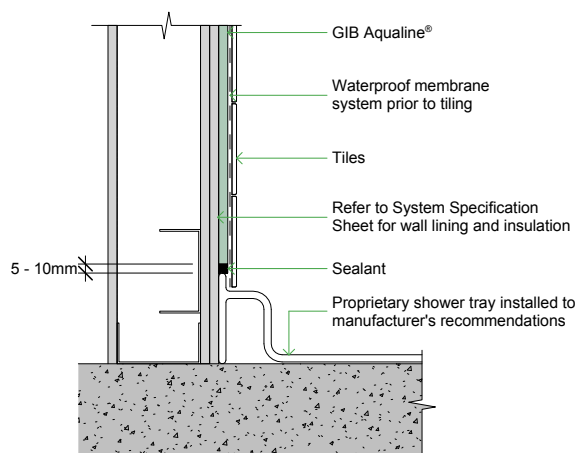


A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



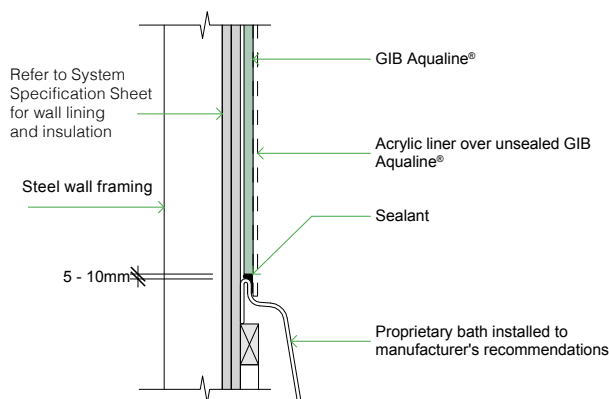
GAL-017

C: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



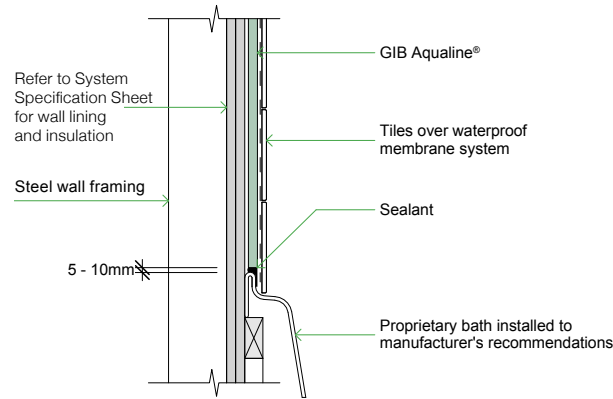
GAL-018

B: BATH DOUBLE LINING JUNCTION



GAL-013

D: BATH DOUBLE LINING JUNCTION



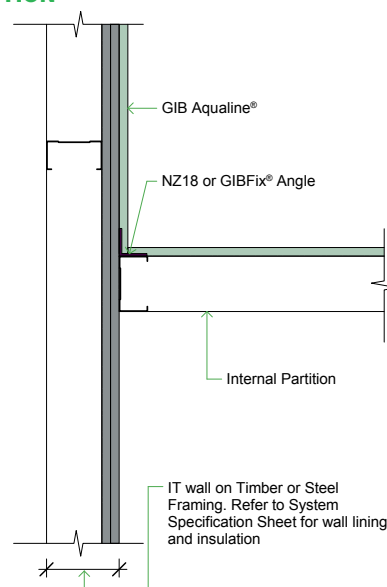
GAL-014

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.

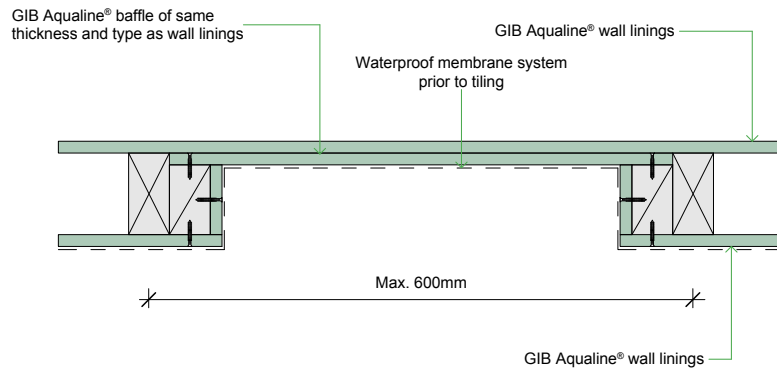
Do not tile on the resilient side of a GIB Rail® or Acoustic Resilient Mount (ST-001) and channel noise control system.

E: INTERTENANCY WALL AND WET AREA WALL JUNCTION

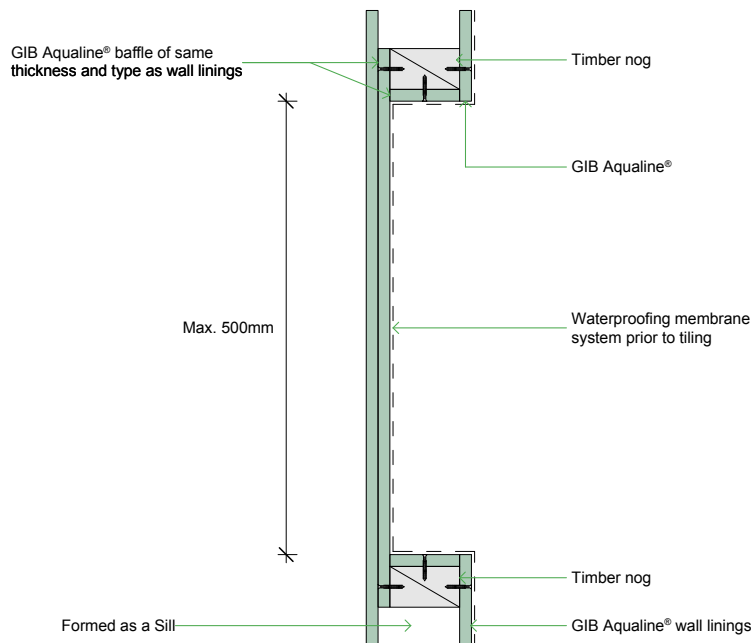


GAL-031C

TIMBER FRAME TILE RECESS

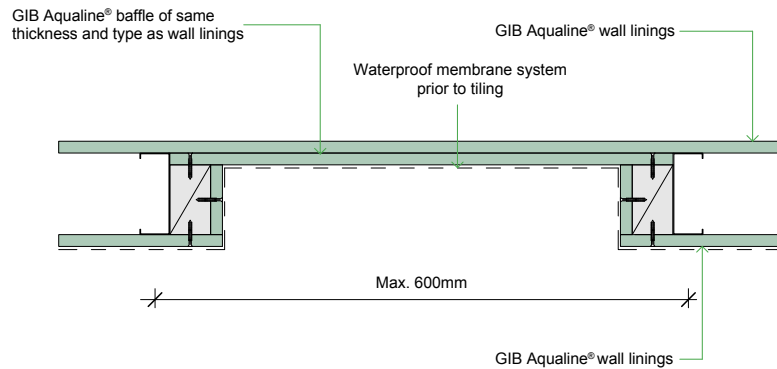


Larger recesses can be accommodated depending on specific framing layout provided 500mm is not exceeded in at least one direction.

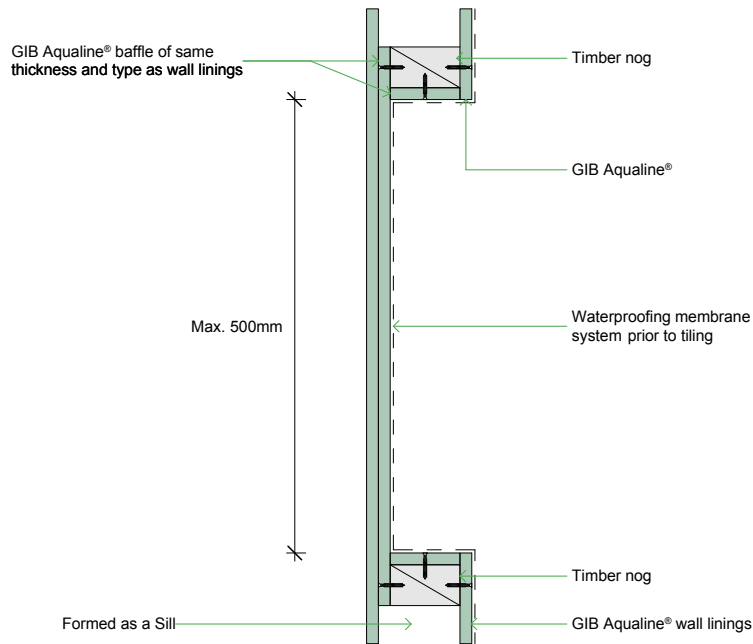


GAL-029

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.

COPYRIGHT

All of the material contained in this brochure, including all text, tables, charts, graphs, drawings, images and diagrams, are protected by copyright. These materials may not be reproduced, adapted or transmitted in any form by any process, without the permission of Winstone Wallboards Ltd.

Copyright© Winstone Wallboards Ltd, 2021.



SDC - Approved Building Consent Document - BC231907 - Pg 395 of 446 - 21/03/2024 - helen.fowler

FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442



HardieBacker®

Cement Board

Installation Guide



**MADE BETTER.
INSTALLS BETTER.
PERFORMS BETTER.**™

ESPAÑOL AL OTRO LADO

CUTTING CEMENT HARDIEBACKER® BOARD



- Use a straight edge as a guide to score the board's face and snap upward along the score line. We recommend using a carbide-tipped scoring knife, but a utility knife may also be used. The use of shears (manual, electric or pneumatic) is also acceptable.
- For cutouts and small holes, score around perimeter and break out from the face side with hammer.
- NEVER use high-speed power tools (e.g. saws, grinders, etc.) to cut James Hardie® products indoors as they may generate excessive silica dust.
- NEVER dry sweep – Use wet dust suppression methods or HEPA vacuum for clean-up.
- To further limit respirable silica dust exposures, wear a properly-fitted, NIOSH-approved dust mask or respirator (e.g. N-95 dust mask) in accordance with applicable government regulations and manufacturer instructions.

COUNTERTOP INSTALLATION

1 | Ensure cabinets are level and secure

- Use minimum 1/2 in exterior grade plywood or equivalent, positioned across the wood cabinet. Space between plywood supports is not to exceed 16 in on center.

2 | Determine layout of HardieBacker cement board

- Do not align HardieBacker cement board joints with plywood joints.
- Score and snap boards to required sizes and make necessary cutouts.
- We recommend an 1/8 in gap from board edges.

3 | Attach HardieBacker cement board to countertop

- Apply a supporting bed of dry-set mortar or modified thinset to plywood with a 1/4 in square-notched trowel. Mastic can also be used with a 5/32 in V-notched trowel.
- Use the fastener pattern as a guide. Fasten HardieBacker cement board with specified nails or screws (as listed in "Materials Required") every 8 in over the entire surface. Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in from board corners.

4 | Tape joints prior to tiling

- Prior to setting the tile, fill all joints with the same mortar used to set the tiles.
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.

5 | Exterior application (Limited to HardieBacker 500 in HZ10 climate zones) [‡] Additional details on page 4

- Follow Countertop installation steps 1 thru 4
- Mastic (organic adhesives) shall not be used in exterior applications

FLOOR INSTALLATION

(Interior Application Only)

We recommend 1/4 in HardieBacker® board for floor applications, unless 1/2 in thickness is needed for transition.

1 | Ensure subfloor is structurally sound

On existing structures:

- Ensure subfloor is not damaged. Replace any loose, warped, uneven or damaged sections of floor.
- Make certain subfloor is a clean and flat surface.

For all floors:

- Use minimum 5/8 exterior grade plywood or 23/32 OSB with Exposure 1 classification or better, complying with local building codes and ANSI A108.11.
- Joist spacing not to exceed 24 in on center.
- The floor must be engineered not to exceed the L/360 deflection criteria (L/720 for natural stone), including live and dead design loads, for the specific joist spacing used.

2 | Determine layout of HardieBacker cement board

- Stagger all HardieBacker cement board joints. Do not align with subfloor joints.
- Never allow all four corners of boards to meet at one point.
- We recommend an 1/8 in gap between board edges.
- Keep sheet edges 1/8 in back from walls and cabinet bases.
- Score and snap boards to required sizes and make necessary cutouts.

3 | Attach HardieBacker cement board to subfloor

- Apply a supporting bed of mortar or modified thinset to subfloor using a 1/4 in square-notched trowel.
- Embed HardieBacker cement board firmly and evenly in the wet mortar.
- Use the fastener pattern as a guide. Fasten HardieBacker cement board with specified nails or screws (as listed in "Materials Required") every 8 in over the entire surface. Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in from board corners.
- Set fastener heads flush with the surface without overdriving.

4 | Tape joints prior to tiling

- Prior to setting the tile, fill all joints with the same mortar used to set the tiles.
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.





WALL INSTALLATION

1 | Ensure framing is structurally sound

- Must comply with local building codes and ANSI A108.11.
- Use a minimum of 2 in x 4 in wood studs or 20-gauge metal studs, which must be straight, properly aligned and spaced a maximum of 16 in on center.
- In tub and shower enclosures, ensure that the framing is adequately reinforced at the corners.

2 | Determine layout of HardieBacker cement board

- Boards may be installed vertically or horizontally.
- Edges of the board parallel to framing must be supported by a structural framing member.
- Score and snap boards to required sizes and make necessary cutouts.

3 | Attach HardieBacker cement board to framing

- For interior installations, the use of a waterproof membrane, vapor barrier or vapor retarding membrane is optional unless the local building code requires it.
- If required by the local building code, install a code compliant waterproof membrane, vapor barrier or vapor retarder membrane, check with the membrane manufacturer for suitability for applicable conditions and follow the manufacturer's installation instructions for these materials.
- Install boards 1/4 in above floor, tub or shower pan and caulk accordingly.
- Fasten cement board with specified nails or screws (as listed in "Materials Required") a maximum of 8 in on center at all supports.
- Keep fasteners 3/8 in from board edges and 2 in in from sheet corners.
- Set fastener heads flush with the surface, without overdriving.

4 | Tape joints prior to tiling

- Fill all joints with mortar (see "Materials Required").
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.

5 | Exterior application (Limited to HardieBacker 500 in HZ10 climate zones)[†] *Additional details on page 4*

- Install HardieBacker 500 over sub-sheathing with a code approved water-resistive barrier, or in accordance with applicable code.
- May be used up to a height not exceeding the lesser of: through the second-story above grade or 30 feet above grade.
- Follow wall installation steps 1 thru 4



FINISHING WITH TILE

1. Refer to ANSI A108 and the mortar and tile manufacturers' published application guidelines for complete tiling instructions.
2. Wipe the surface of HardieBacker® cement board clean with a damp sponge just prior to adding mastic or mortar.
3. Spread the mastic or mortar with a notched trowel (Note: Please see "Materials Required" to see which setting material is required for your application).
4. Twist or press and beat in tiles complying with ANSI A137.1.
5. Allow a minimum of 24 hours curing set time before grouting.



FINISHING WITH NATURAL STONE

Natural stone often has hidden weaknesses which can result in surface cracks in finished floors. To reduce the risk of job failures, always consult The Marble Institute of America Handbook.

In addition to the steps outlined under "Floor Installation," the following is required:

- Always follow the recommendations of the flooring material manufacturer.
- Marble and natural stones must have sufficient flexural strength for use in flooring systems.* Where the quality and strength of the stone is unknown, the floor must be engineered not to exceed the L/720 deflection criteria, including live and dead design loads, for the specific joist spacing used. The strength of your natural stone will have an impact on the ultimate performance of your flooring system.

**Testing has shown that a minimum 2900 psi is preferable for flooring application.*

FINISHING WITH PAINT, WALLPAPER OR TEXTURE

(Interior Application Only)

1 | Painting or Wallpapering

Apply a drywall primer suitable for high-moisture areas, as recommended by the paint manufacturer. Paint HardieBacker board as you would drywall. If wallpapering, prime surface of HardieBacker board with a primer suitable for high-moisture areas as recommended by the wallpaper manufacturer.

2 | Texturing

Texture can be applied to HardieBacker board in the same way as drywall.

STEAM ROOM APPLICATION

HardieBacker® board is recognized for use in residential steam rooms when installed over conventional framing and in accordance with HardieBacker board printed installation instructions, TCNA guidelines (Tile Council of North America Handbook, www.tileusa.com), and local building codes. Questions and concerns regarding design and construction should be directed to a knowledgeable professional.

‡ EXTERIOR APPLICATION

(This application has limited warranty coverage. Refer to Exterior Warranty for coverage information on page 8)

HardieBacker 500 may be used up to a height not exceeding the lesser of: through the second-story above grade or 30 feet above grade. The HardieBacker 500 must be installed over sub-sheathing with a code approved water-resistive barrier, or in accordance with the applicable code. Install flashings, clearances, and other building practices per local code. James Hardie will assume no responsibility for water infiltration. Use a minimum No. 11 ga. 1¾ in long roofing nails or No. 8-1¾ in long



(0.375 in HD) or ribbed wafer head corrosion resistant screws spaced a maximum of 8 in OC. The maximum weight of the overlayment (tiles, stones and veneers) is not to exceed the code limit of 15 lbs/sq ft. Exterior application is limited to HZ10® product zone only.

Follow installation procedure in accordance with the stone and mortar manufacturer's recommendations.¹ Stones must be free of any substance that may impede proper adhesion. Skim coat is recommended to be 1/8 in - 1/4 in thick and the tile/stone is to be installed while the skim coat is wet.

CAUTIONS: This product shall not be used in the following applications:

- As a backer board in balcony railings and balcony parapet walls.
- HardieBacker 500 may not be used to a height exceeding through the second-story above grade or greater than 30 feet above grade.

VINYL AND RESILIENT FLOORING *(Interior Application Only)*

Materials Required

1 | Fasteners

- Minimum 7/8 in long galvanized or polymer-coated 18-gauge chisel point staples with 1/4 in crown.
- Minimum 7/8 in long galvanized ring shanked underlayment flooring nails.
- Fasteners should be long enough to reach the bottom of the subfloor, but not penetrate it.
- Avoid using resin, rosin or cement-coated fasteners that can discolor vinyl flooring.

2 | Patch

- Use the cement-based, rapid-setting patching compound recommended by the floor covering manufacturer.
- Do not use a gypsum-based patch. Follow the patch manufacturer's instructions.

Preparation for Underlayment

1 | Ensure subfloor is structurally sound and properly installed

On existing floors:

- HardieBacker® cement board may be installed under or over Vinyl Composition Tile (VCT) and other resilient flooring. For best results, remove existing floor covering, especially if it is in poor condition.
- If installing HardieBacker cement board over existing floor, ensure the floor is flat and floor covering is thoroughly adhered to the subfloor.

On all floors:

- Ensure subfloor is not damaged. Replace any loose, warped, uneven or damaged sections of floor.
- Make sure subfloor is dry, level and fastened correctly. All fasteners must be countersunk or flush with the subfloor. All seams or other areas that are not level must be sanded flat.
- Subfloor must be free of all debris, oil, grease, paint or other foreign substances.

¹ See IRC Table R703.4, IBC §2101.2 and §1405.10

2 | Basements and crawl spaces

- Crawl spaces must be well ventilated with a minimum of 18 in between the ground and joists. A vapor barrier over the ground is required.



Underlayment Installation

1 | Determine layout of HardieBacker® cement board

- Install smooth side up.
- Install HardieBacker boards perpendicular to subfloor panels.
- Stagger all HardieBacker board joints. Do not align HardieBacker board joints with subfloor joints
- Never allow all four corners of boards to meet at one point.
- Lightly butt the board joints. Do not leave a gap or force edges together.
- Join factory-cut edges together in the body of the floor.
- Keep board edges 1/8 in back from walls and cabinet bases.

2 | Attach HardieBacker boards to subfloor

- Fasten one board at a time. HardieBacker boards must be flush with subfloor during installation.
- Begin the fastening pattern in a corner of the board, then fasten the two adjacent edges. Return to the corner and fasten in a diagonal pattern from that corner until the board is completely fastened.
- Place fasteners in a random, staggered pattern across HardieBacker board. Avoid fastening in a straight line.
- Fasten HardieBacker boards with proper fasteners (as listed in “Materials Required”) a maximum of 3 in on center around the perimeter and 6 in on center in the field.
- Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in in from board corners.
- Fastener heads/crowns must be flush with or slightly countersunk a maximum of 1/16 in below the surface.

3 | Finishing surface and joints *(not necessary for carpet or wood flooring)*

- If necessary, lightly hand-sandseams to achieve a smooth transition between boards. Avoid over-sanding. Sanding will generate significant respirable silica dust and those in the immediate area must wear NIOSH-approved respiratory protection (e.g. N95) in accordance with applicable government regulations.
- Thoroughly clean HardieBacker board surface to remove all debris prior to patching.
- Using a wide flat trowel, apply a skim coat of patch (as listed in “Materials Required”) to all seams, sanded areas, hammer indentations, holes, gaps, gouges, chips and voids to achieve a smooth surface. Avoid building a ridge over the seams by feathering the patch out several inches on both sides of the seams.
- Obtaining a perfectly smooth surface may require more than one coat of patch.
- After the patch has thoroughly dried, lightly sand or scrape off any surface imperfections caused by the patch to achieve a smooth surface.
- Wait until patch is thoroughly dry before installing the floor covering.

4 | Flooring installation

- Prepared HardieBacker cement board surface must be free of all debris, oil, paint, caulk, joint compound and other foreign substances.
- Do not install floor covering seams directly over the HardieBacker board seams.
- Install floor covering according to the adhesive and floor covering manufacturers’ instructions.

BASIC COMPOSITION

90% Portland cement and sand with selected additives. Contains no asbestos, formaldehyde, gypsum, paper facing, or abrasive aggregate.

1/4 in HardieBacker cement board:

Sheet size: 3 ft x 5 ft (EZ Grid® board) and 4 ft x 8 ft

Thickness: 1/4 in

Weight: 1.9 lbs. psf (9.3 kg/m²)

Complies with ASTM C1288 & ANSI A118.9

HardieBacker® 500 cement board:

Sheet sizes: 3 ft x 5 ft and 4 ft x 8 ft

Thickness: 0.42 in

Weight: 2.6 lbs. psf (12.7 kg/m²)

Complies with ASTM C1288 & ANSI A118.9

MATERIALS REQUIRED

1 | Mortar

For floors:

- Latex or acrylic modified thinset (complying with ANSI A118.4).
- Dry-set mortar for use between subfloor and cement board only (complying with ANSI A118.1).

For walls and countertops:

- Latex or acrylic modified thinset (complying with ANSI A118.4).
- Type 1 mastic (complying with ANSI A136.1) (Not to be used in exterior applications).
- For Exterior applications, follow stone and mortar manufacturers recommendations.

2 | Tape

- 2 in wide high-strength alkali-resistant glass fiber tape.

3 | Fasteners

For floors and walls:

- Minimum 1-1/4 in (for interior) & 1-3/4 in (exterior walls) long corrosion-resistant roofing nails.
- Minimum 1-1/4 in (for Interior) & 1-3/4 in (exterior walls) long No. 8 x 0.375 in HD self-drilling corrosion-resistant ribbed waferhead screws.
- If compliance with ANSI A108.11 is not required, minimum 1 in long No. 8 x 0.323 in HD self-drilling corrosion-resistant ribbed buglehead screws may be used for floors.

- If applying HardieBacker 500 cement board over gypsum, use minimum 1-3/4 in long corrosion-resistant roofing nails.

For countertops:

- Minimum 3/4 in long corrosion-resistant roofing nails.
- Minimum 3/4 in long ribbed countersinking corrosion-resistant screws.
- 18-gauge corrosion-resistant polymer coated 3/4 in staples with a 1/4 in crown.
- For HardieBacker 500 cement board, use minimum 1-1/4 in long corrosion-resistant roofing nails or ribbed countersinking screws.

For vinyl and resilient flooring: (Interior Only)

- Minimum 7/8 in long galvanized or polymer-coated 18-gauge chisel point staples with 1/4 in crown.
- Minimum 7/8 in long galvanized ring shanked nails.
- Fasteners should be long enough to reach the bottom of the subfloor, but not penetrate it.
- Avoid using resin, rosin or cement-coated fasteners that can discolor vinyl flooring.

HardieBacker board delivers more compressive and flexural strength than any board on the market.

SILICA WARNING: Refer to the product Safety Data Sheet before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust from the product Do not eat, drink or smoke when using this product.

The hazard associated with fiber cement arises from crystalline silica present in the dust generated by activities such as cutting, rebating, drilling, routing, sawing, crushing, or otherwise abrading fiber cement, and when cleaning up, disposing of or moving the dust. When doing any of these activities in a manner that generates dust: (1) comply with the OSHA PEL for silica dust and/or other applicable law, (2) follow James Hardie instructions and best practices to reduce or limit the release of dust; (3) warn others in the area to avoid the dust; (4) when using mechanical saw or high speed cutting tools, work outdoors and use dust collection equipment; and (5) if no other dust controls are available, wear a dust mask or respirator that meets NIOSH requirements (e.g. N-95 dust mask). During clean-up, use a well maintained vacuum and filter appropriate for capturing fine (respirable) dust or use wet clean-up methods - never dry sweep.

BK050905

ENVIRONMENTAL CONSIDERATIONS

HardieBacker® board's proprietary cement formulation provides a moisture resistant wallboard and tile backer substrate that stands tough over time, reducing the need for product replacement. James Hardie has demonstrated a commitment to reducing energy consumption, while improving process efficiencies and waste management. It avoids the use of environmentally damaging materials and uses renewable resources that are abundant in the manufacture of HardieBacker cement board. HardieBacker cement board does not contain any glass fibers, gypsum, asbestos or formaldehyde. The company also focuses on water conservation and attempts to recycle water and waste product as much as possible during the manufacturing process.

RECOGNITIONS

HardieBacker cement board is recognized as an interior substrate by the following:

- International Code Council Evaluation Service ESR-2280
- City of Los Angeles Research Report No. 24862
- HUD Materials Release Nos. 1263 and 1268
- City of New York MEA No. 223-93M
- IBC 2509.2
- IRC R702.4.2

Consult these documents for additional information concerning conditions for use in applicable jurisdictions.

**Cementitious Backer Unit/Fiber-Cement Underlayment*

Compressive Strength Compressive Strength at Equilibrium Moisture Content (ASTM D2394)

1/4 in HardieBacker EZ Grid® cement board: 7000 psi (48 MPa)

HardieBacker 500 cement board: 6500 psi (45 MPa)

Non-Combustibility HardieBacker cement board is recognized as non-combustible in accordance with ASTM E136.

Surface Burning Characteristics When tested in accordance with ASTM method E-84: Flame Spread – 0, Fuel Contributed – 0, Smoke Developed – 5.

Fire Rated Assemblies HardieBacker cement board may be used as a component in one-hour fire-resistive wall construction; consult ESR-2280 website listings for recognized assemblies, or contact James Hardie's Technical Services at 1-800-9HARDIE (1-800-942-7343).

HARDIEBACKER WARRANTIES

INTERIOR APPLICATIONS

The HardieBacker cement board limited lifetime warranty covers both the product and replacement labor for the life of the product. Download a copy of the HardieBacker limited lifetime warranty from hardiebacker.com or obtain one from wherever James Hardie product are sold.

EXTERIOR APPLICATIONS

James Hardie offers a limited 10 year warranty for Hardiebacker 500 cement backerboard installed in exterior applications in HardieZone HZ10 regions only. To find out the HardieZone designation for your ZIP code, go to HardieZone.com

CHOSEN BY PROS. UNRIVALED IN PERFORMANCE.

HardieBacker® Cement Board's **unique cement formulation** and structure provide the ideal combination of **strength, uniform composition and performance** that no other backer board can provide. That's why it was named **The Most Preferred Brand of Backer Board** by tile installers and contractors in the Tile and Stone Report*.



MADE BETTER

Compared to other cement boards, HardieBacker Cement Board offers the **highest flexural strength** and up to **3x the compressive strength** to enable a solid foundation for your tile job.



INSTALLS BETTER

HardieBacker Cement Board is easier to work with, regardless of how you cut it.

- **Less debris**, whether you're cutting manually or with power tools.
- **Cleaner cuts** and sharper edges for tighter seam lines.
- **Less dust**, which means minimal mess and cleanup.

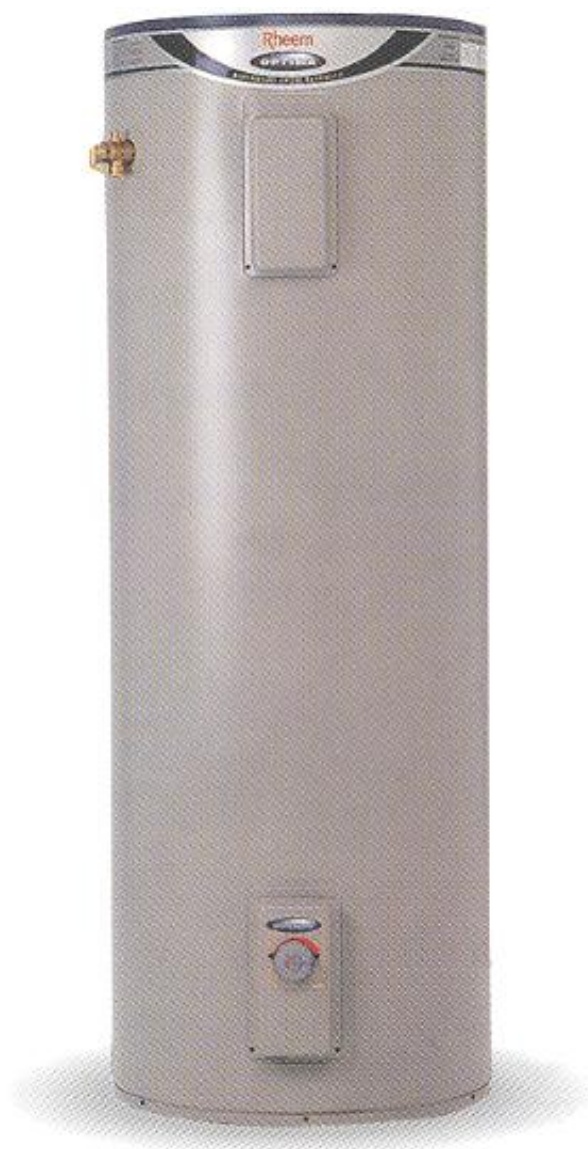


PERFORMS BETTER

Our unique cement formulation resists moisture. Additionally, it provides excellent tile adhesion to help protect your work—and your reputation.

*According to the 2019 Tile and Stone Installation Contractor Market Study conducted by Clear Seas Research in partnership with the NTCA and TILE Magazine.

Owner's Guide and Installation Instructions



Electric Domestic Water Heater



Install a Rheem

*This water heater must be installed and serviced by an authorised person.
Please leave this guide with the householder.*

PATENTS

This water heater may be protected by one or more patents or registered designs in the name of Rheem Australia Pty Ltd.

TRADEMARKS

® Registered trademark of Rheem Australia Pty Ltd.
™ Trademark of Rheem Australia Pty Ltd.

Note: Every care has been taken to ensure the accuracy in preparation of this publication. No liability can be accepted for any consequences, which may arise as a result of its application.

CONTENTS

HOUSEHOLDER - We recommend you read pages 4 to 17.
The other pages are intended for the installer but may be of interest

About Your Water Heater	4
Regular Care	9
Water Supplies	11
Save A Service Call	15
Installation	18
Connections – Plumbing	25
Connections – Electrical	28
Commissioning	31
Draining The Water Heater	34
Warranty	36

ABOUT YOUR WATER HEATER

MODEL TYPE

The Rheem® water heater you have chosen is an Optima™ model. The Optima model has a temperature adjusting knob on the lower front of the water heater. Optima models are available with either a single heating unit or with twin heating units. (refer to “Single Element Model” on page 7 and “Twin Element Model” on page 7). The water heater can be installed indoor or outdoor. Optima models have an extended warranty (refer to the warranty on page 36).

Water is stored in a vitreous enamel lined steel cylinder and heated by the electric immersion heating unit. The thermostat controls the temperature. Automatic safety controls are fitted to the water heater to provide safe and efficient operation.

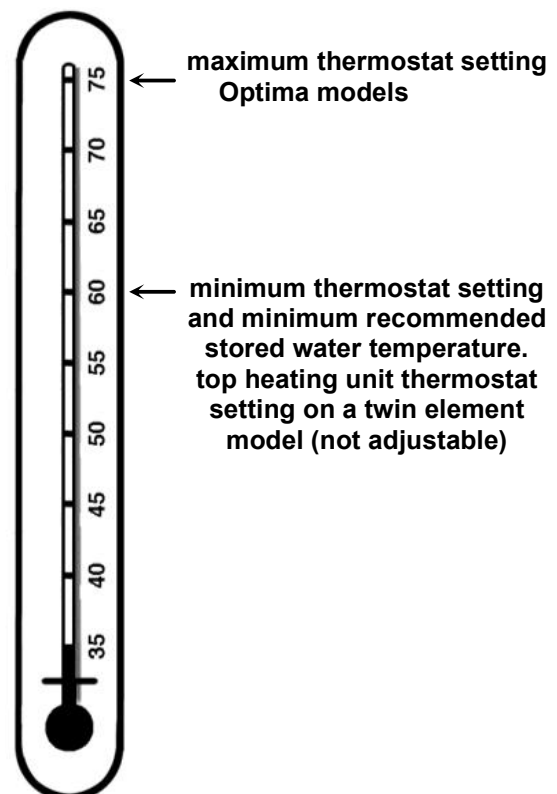
MAINS PRESSURE

The water heater is designed to operate at mains pressure by connecting directly to the mains water supply. If the mains supply pressure in your area exceeds that shown on page 19, a pressure limiting valve must be fitted. The supply pressure should be greater than 350 kPa for true mains pressure operation to be achieved.

HOW HOT SHOULD THE WATER BE?

The water heater features an adjustable thermostat, which allows you to choose the most suitable temperature for your hot water needs. Refer to “Temperature Adjustment” on page 5.

To meet the requirements of the G12 Building Code the temperature of the stored water must not be below 60°C.



HOTTER WATER INCREASES THE RISK OF SCALD INJURY

This water heater can deliver water at temperatures which can cause scalding. Check the water temperature before use, such as when entering a shower or filling a bath or basin, to ensure it is suitable for the application and will not cause scald injury.

We recommend and it may also be required by regulations that an approved temperature limiting device be fitted into the hot water pipe work to the bathroom and ensuite when an Optima water heater is installed.

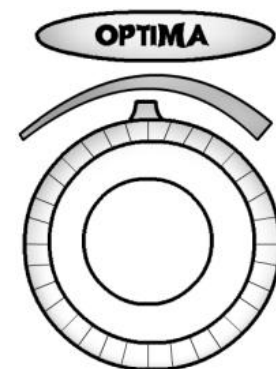
This will keep the water temperature below 55°C at the bathroom and ensuite. The risk of scald injury will be reduced and still allow hotter water to the kitchen and laundry.

THERMOSTAT

The thermostat automatically controls the electricity supply to the heating unit so a constant temperature is maintained. The thermostat and its protective over temperature cut out is mounted inside the front cover of the water heater. There is no need to switch the water heater off when it is not in use, except when you are on an extended holiday. The thermostat is fully automatic and power is only used when heating is required.

TEMPERATURE ADJUSTMENT

An Optima water heater features a user adjustable thermostat, which allows you to choose the most suitable temperature for your hot water needs. To adjust the temperature, push in the child resistant knob and turn anticlockwise to decrease or clockwise to increase the temperature setting. The Optima has a minimum temperature setting of 60°C and a maximum temperature setting of 75°C.



⚠ WARNING

This water heater is only intended to be operated by persons who have the experience or the knowledge and the capabilities to do so. This water heater is not intended to be operated by persons with reduced physical, sensory or mental capabilities i.e. the infirm, or by children. Children should be supervised to ensure they do not interfere with the water heater.

This water heater uses 240 V AC power for the electrically operated components. The removal of the front cover(s) will expose 240 V wiring. It must only be removed by an authorised or qualified person.

Take care not to touch the power plug on a water heater fitted with a power supply cord and plug with wet hands.

SAFETY

This water heater is supplied with a thermostat, an over-temperature cut-out, and a combination temperature pressure relief valve.

These devices must not be tampered with or removed.

The water heater must not be operated unless each of these devices is fitted and is in working order.

The operation of the over-temperature cut-out on the thermostat indicates a possibly dangerous situation. If the over-temperature cut-out operates, it must not be reset and the water heater must be serviced by an authorised or qualified person.

⚠ Warning: For continued safety of this water heater it must be installed, operated and maintained in accordance with the Owner's Guide and Installation Instructions.

The warranty can become void if relief valves or other safety devices are tampered with or if the installation is not in accordance with these instructions.

SINGLE ELEMENT MODEL

This type of water heater has one heating unit with its own thermostat. The heating unit is at the base of the water heater.

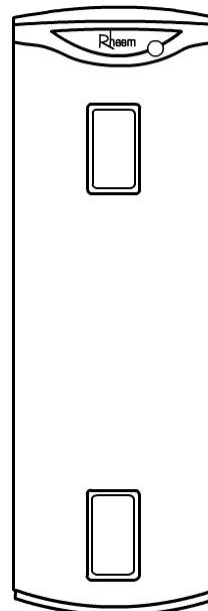
- **Continuous electricity supply**
This type of connection is suited to where the storage capacity is less than the normal daily usage.
- **Off-Peak electricity supply**
This type of connection will only allow heating to occur during set hours. A volume of water sufficient for the day's total use is heated and stored. This type of heating will be more economical due to reduced tariffs by the electricity authority.



TWIN ELEMENT MODEL

This type of water heater has two heating units, each with its own thermostat. One heating unit is at the base of the water heater and the other near the top.

- **Bottom heating unit**
During normal operation this heating unit supplies all the hot water.
- **Top heating unit (Booster)**
This heating unit only operates during periods of high demand to provide an additional supply of heated water.
- **Electrical connection**
The two heating units are wired for non-simultaneous operation, so that only one heating unit can operate at a time. The bottom heating unit is usually connected to an Off-Peak (overnight) or time controlled electricity supply and the top heating unit to a continuous supply. Some electricity suppliers allow both heating units to be metered at the Off-Peak or controlled tariff.



NOTE: Power must be available to the top heating unit circuit at all times for this water heater to operate as designed.

TO TURN OFF THE WATER HEATER

If you plan to be away from home for only a few nights, we suggest you leave the water heater switched on.

If it is necessary to turn off the water heater:

- Switch off the electrical supply at the isolating switch to the water heater.
- Unplug the power supply cord from the power outlet (power supply cord model only).
- Close the cold water isolation valve at the inlet to the water heater.

TO TURN ON THE WATER HEATER

- Open the cold water isolation valve fully on the cold water line to the water heater.
- Plug in the power supply cord at the power outlet (power supply cord model only).
- Switch on the electrical supply at the isolating switch to the water heater.

GOING ON HOLIDAY?

If you plan to be away from home for one or two nights, we suggest you leave the water heater switched on. However, if you plan to stay away more than a few nights, conserve energy by switching the water heater off at either the switchboard or isolating switch.

HOW DO I KNOW IF THE WATER HEATER IS INSTALLED CORRECTLY?

Installation requirements are shown on pages 18 to 26. The water heater must be installed by an authorised person and the installation must comply with National Standards AS/NZS 3500.4, AS/NZS 3000 and all local codes and regulatory authority requirements. The installation must conform with the New Zealand Building Code.

DOES THE WATER CHEMISTRY AFFECT THE WATER HEATER?

The water heater is suitable for most public water supplies, however some water chemistries may have detrimental effects on the cylinder and fittings. **If you are in a known harsh water area you must read page 11.** If you are not sure, have your water chemistry checked against the conditions **described on page 11.**

HOW LONG WILL THE WATER HEATER LAST?

There are a number of factors that will affect the length of service the water heater will provide. These include the water chemistry, the water pressure, the water temperature (inlet and outlet) and the water usage pattern. However, your water heater is supported by a comprehensive warranty (**refer to page 36**).

REGULAR CARE

TEMPERATURE PRESSURE RELIEF VALVE

This valve is near the top of the water heater and is essential for its safe operation. It is possible for the valve to release a little water through the drain line during each heating period. This occurs as the water is heated and expands by approximately 1/50 of its volume.

Continuous leakage of water from the valve and its drain line may indicate a problem with the water heater (refer to “Temperature Pressure Relief Valve Running” on page 16).

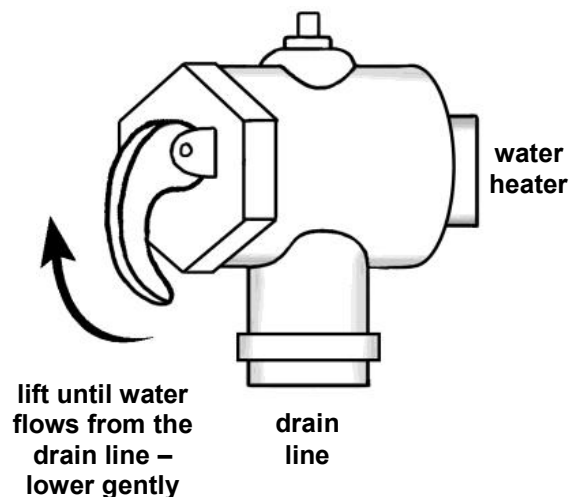
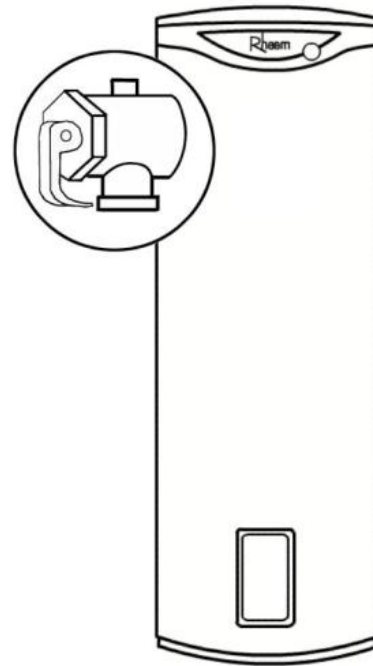
⚠ Warning: Never block the outlet of this valve or its drain line for any reason.

Operate the easing lever on the temperature pressure relief valve once every six months. **It is very important you raise and lower the lever gently.**

⚠ DANGER: Failure to do this may result in the water heater cylinder failing, or under certain circumstances, exploding.

If water does not flow freely from the drain line when the lever is lifted, then the water heater should be checked by a Rheem Service Centre.

The temperature pressure relief valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to “Water Supplies” on page 11).



TEMPERATURE LIMITING VALVE

The valve should be checked for performance every twelve months. This can be performed by measuring the water temperature from a hot tap with a thermometer. If the water is being delivered at a temperature exceeding 55°C, phone a Rheem Service Centre.

The valve should be replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to “Water Supplies” on page 11). Failure to do this may result in water at a temperature up to 70°C being delivered at the hot tap, increasing the risk of scald injury.

EXPANSION CONTROL VALVE

An expansion control valve must be fitted to the cold water line to the water heater. The expansion control valve may discharge a small quantity of water from its drain line during the heating period instead of the temperature pressure relief valve on the water heater.

Operate the easing lever on the expansion control valve once every six months. **It is very important you raise and lower the lever gently.** The expansion control valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits.

GENERAL MAINTENANCE

The jacket of the water heater can be cleaned with a soft cloth and warm mild soapy water on a 3 monthly interval in coastal areas. Under no circumstances should abrasive materials or powders be used.

WATER SUPPLIES

This water heater must be installed in accordance with this advice to be covered by the warranty.

This water heater is manufactured to suit the water conditions of most public reticulated water supplies. However, there are some known water chemistries which can have detrimental effects on the water heater and its operation and / or life expectancy. If you are unsure of your water chemistry, you may be able to obtain information from your local water supply authority. This water heater should only be connected to a water supply which complies with these guidelines for the water heater warranty to apply.

ANODE

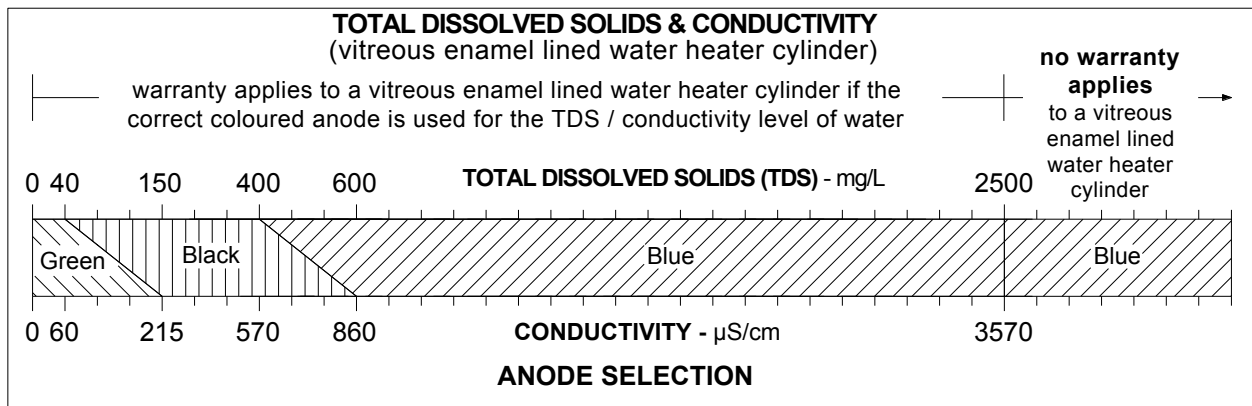
The vitreous enamel lined cylinder of the water heater is only covered by warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is installed. The use of an incorrect colour coded anode will void the cylinder warranty and may shorten the life of the water heater cylinder.

The correct colour coded anode must be selected and fitted to the water heater in accordance with the following advice and the **Anode Selection chart** on page 11 for warranty to apply to the water heater cylinder.

Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

The changing of anodes must be carried out by a plumber or authorised service person.

Note: Some water analysis reports may state the conductivity of the water rather than the level of total dissolved solids. Conductivity, measured in microsiemens per centimetre ($\mu\text{S} / \text{cm}$), is directly proportional to the TDS content of the water. TDS, in mg / L, is approximately 70% of the conductivity in $\mu\text{S} / \text{cm}$.



ANODE INSPECTION

The anode installed in your water heater will slowly dissipate whilst protecting the cylinder. The life of the water heater cylinder may be extended by arranging for an authorised person to inspect the anode and replace if required.

The suggested time after installation when the anode should be inspected is:

Optima 10 years

For water supplies which are either softened, desalinated or where the water supply may alternate between a water tank and a reticulated public supply or another supply, it is recommended the anode be inspected 3 years earlier than shown (refer to "Anode" on page 11).

CAUTION

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use.

If, under these conditions, the water heater has not been used for two or more weeks the following procedure should be carried out before using any electrical appliances (automatic washing machines and dishwashers) which are connected to the hot water supply.

The hydrogen, which is highly flammable, should be vented safely by opening a hot tap and allowing the water to flow. There should be no smoking or naked flame near the tap whilst it is turned on. Any hydrogen gas will be dissipated. This is indicated by an unusual spurting of the water from the tap. Once the water runs freely, any hydrogen in the system will have been released.

SATURATION INDEX

The saturation index is used as a measure of the water's corrosive or scaling properties.

In a corrosive water supply, the water can attack copper parts and cause them to fail. Where the saturation index is less than -1.0 , the water is very corrosive and warranty does not apply to a copper sheathed heating unit. A corrosion resistant heating unit must be used for warranty to apply to the heating unit.

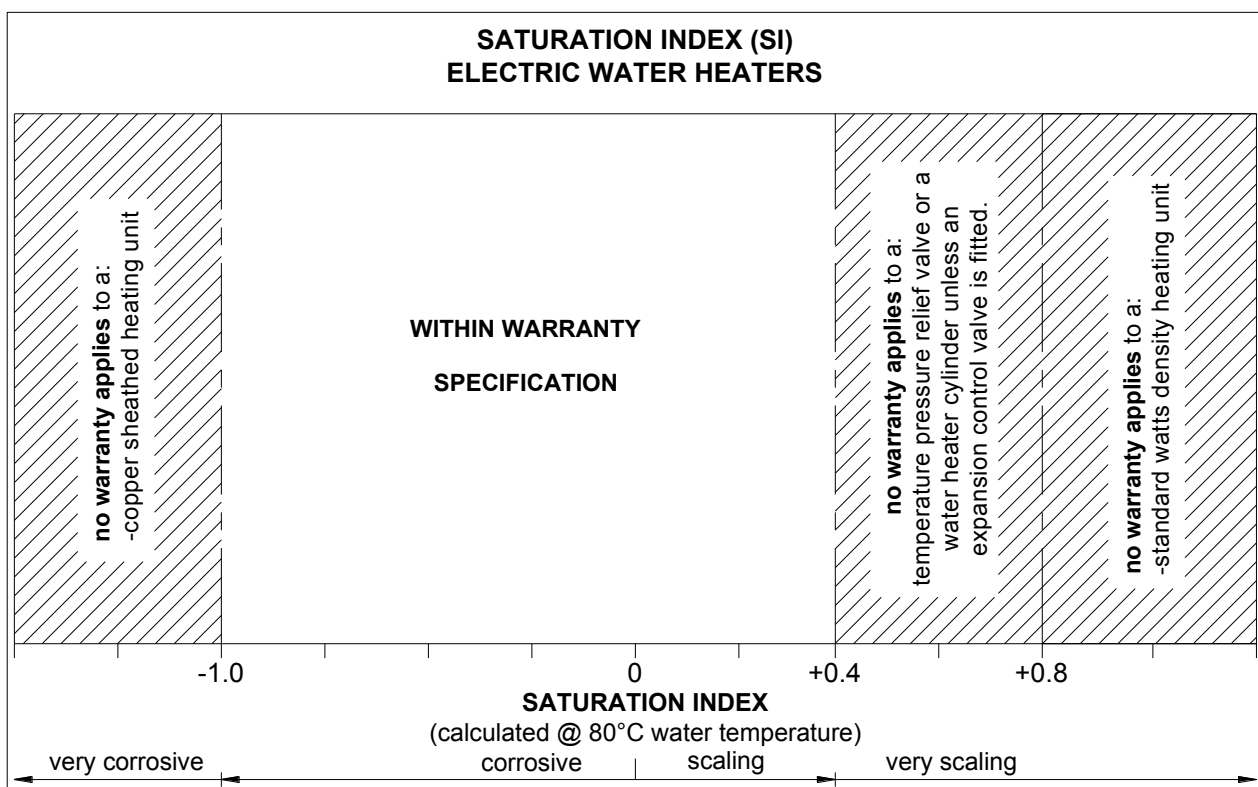
In a scaling water supply calcium carbonate is deposited out of the water onto any hot metallic surface. Where the saturation index exceeds $+0.40$, the water is very scaling. An expansion control valve must be fitted on the cold water line after the non-return valve to protect and for warranty to apply to the temperature pressure relief valve and water heater cylinder.

Where the saturation index exceeds $+0.80$, warranty does not apply to a standard watts density heating unit. A low watts density heating unit must be used for warranty to apply to the heating unit.

Water which is scaling may be treated with a water softening device to reduce the saturation index of the water.

Refer to the **Saturation Index chart** on page 13. Refer to the **cold water connection detail on page 27** for the position of the expansion control valve.

Contact Rheem Service Centre if a replacement heating unit is required.



CHANGE OF WATER SUPPLY

The changing or alternating from one water supply to another can have a detrimental effect on the operation and / or life expectation of a water heater cylinder, a temperature pressure relief valve and a heating unit.

Where there is a changeover from one water supply to another, e.g. a rainwater tank supply, bore water supply, desalinated water supply, public reticulated water supply or water brought in from another supply, then water chemistry information should be sought from the supplier or it should be tested to ensure the water supply meets the requirements given in these guidelines for warranty to apply.

SUMMARY OF WATER CHEMISTRY ADVICE AFFECTING WARRANTY

The warranty of this water heater does not apply on the components listed below if the water heater is connected at any time to a water supply with water chemistry of:

Water Chemistry	Component
Total Dissolved Solids (TDS) > 2500 mg/L	water heater cylinder
Total Dissolved Solids (TDS) not suitable for anode type	water heater cylinder
Saturation Index (SI) < -1.0	copper sheathed heating unit
Saturation Index (SI) > +0.4 (if expansion control valve is not fitted)	water heater cylinder temperature pressure relief valve
Saturation Index (SI) > +0.8	standard watts density heating unit

SAVE A SERVICE CALL

Check the items below before making a service call. You will be charged for attending to any condition or fault that is not related to the manufacture or failure of a part.

NOT ENOUGH HOT WATER (OR NO HOT WATER)

- **Is the electricity switched on?**

Inspect the isolating switch marked “HOT WATER” or “WATER HEATER” at the switchboard and the isolating switch (if one is installed) near the water heater and ensure they are turned on.

Note: Check the electricity supply to which the water heater is connected. If on an Off-Peak or time controlled electricity supply, remember heating hours are restricted (refer to “Off-Peak Electricity Supply” on page 7).



Check the fuse marked “HOT WATER” or “WATER HEATER” at the switchboard.

- **Twin element water heaters**

A twin element non-simultaneous model must have power available to the top heating unit circuit at all times for the water heater to operate as designed.

- **Are you using more hot water than you think?**

Is one outlet (especially the shower) using more hot water than you think? Very often it is not realised the amount of hot water used, particularly when showering. Carefully review the family’s hot water usage. Have your plumber fit a flow control valve to each shower outlet to reduce water usage.

- **Temperature pressure relief valve running**

Is the relief valve discharging too much water? (Refer to “Temperature Pressure Relief Valve Running” on page 16).

- **Thermostat setting**

Ensure the thermostat setting is appropriate. You may choose to adjust the thermostat upwards to gain additional hot water capacity.

Refer to “temperature Adjustment” on page 5

⚠ Warning: Hotter water increases the risk of scald injury.

- **Water heater size**

Do you have the correct size water heater for your requirements? The sizing guide in the Rheem sales literature and on the Rheem website (www.rheem.co.nz) suggests average sizes that may be needed.

TEMPERATURE PRESSURE RELIEF VALVE RUNNING

- **Normal Operation**

It is normal and desirable that this valve allows a small quantity of water to escape during the heating cycle. However, if it discharges more than a bucket full of water in 24 hours, there may be another problem.

- **Continuous dribble**

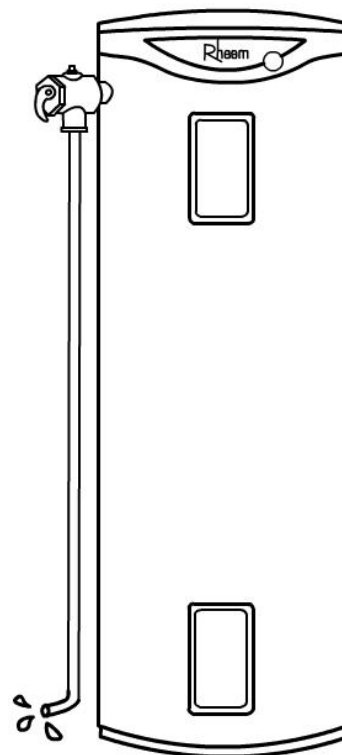
Try gently raising the easing lever on the relief valve for a few seconds (refer to “Temperature Pressure Relief Valve” on page 9). This may dislodge a small particle of foreign matter and clear the fault. Release the lever gently.

- **Steady flows for long period (often at night)**

This may indicate the mains water pressure sometimes rises above the designed pressure of the water heater. Ask your installing plumber to fit a pressure limiting valve.

- **Heavy flows of hot water until water heater is cold - then stops until water reheats**

The water heater **must** be switched off at the switchboard. Phone a Rheem Service Centre



⚠ Warning: Never replace the relief valve with one of a higher pressure rating.

EXPANSION CONTROL VALVE RUNNING

If an expansion control valve is fitted in the cold water line to the water heater (refer to page 27) it may discharge a small quantity of water instead of the temperature pressure relief valve on the water heater. The benefit is that energy is conserved as the discharged water is cooler.

HIGHER THAN EXPECTED ELECTRICITY BILLS

Should you at any time, feel your electricity account is higher than expected, we suggest you check the following points:

- Is the relief valve running excessively?

Refer to “Temperature Pressure Relief Valve Running” on page 16.

- Is one outlet (especially the shower) using more hot water than you think?

Refer to “Not Enough Hot Water” on page 15.

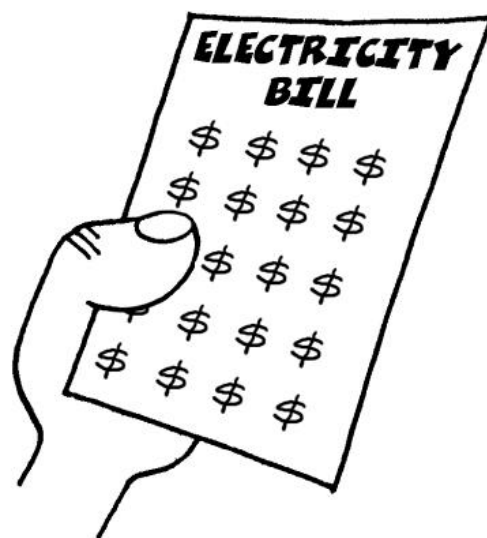
- Is there a leaking hot water pipe, dripping hot water tap, etc?

Even a small leak will waste a surprising quantity of hot water and electricity. Replace faulty tap washers, and have your plumber rectify any leaking pipe work.

- Has there been an increase in hot water usage?

An increase in hot water usage will result in an increase in water heater operation.

- Has your water heating tariff rate been increased by your electricity retailer since your previous account?



ELECTRICITY TARIFFS

The electricity tariff to which your water heater is connected will determine the overall operating cost of the system. It is important you are aware of this tariff, i.e. Off-Peak (overnight) or time controlled supply, Extended Off-Peak (overnight and day) or Extended time controlled supply, Domestic / Continuous. For types of tariffs, refer to “Single Element Model” on page 7 and “Twin Element Model” on page 7.

IF YOU HAVE CHECKED ALL THE FOREGOING AND STILL BELIEVE YOU NEED ASSISTANCE, PHONE A RHEEM SERVICE CENTRE.

INSTALLATION

THIS WATER HEATER IS NOT SUITABLE FOR POOL HEATING

The installation must comply with the requirements of AS/NZS 3500.4, AS/NZS 3000 and all local codes and regulatory authority requirements. In New Zealand, the installation must conform with the New Zealand Building Code.

All packaging materials must be removed from the water heater prior to its installation. This includes the removal of the cardboard base of the carton from the underside of the water heater.

WATER HEATER LOCATION

This water heater is suitable for either outdoor or indoor installation (a model with a supply cord and plug is suitable for indoor installation only). Whether located outdoor or indoor, the water heater should be installed close to the most frequently used outlet and its position chosen with safety and service in mind.

Clearance must be allowed for servicing of the water heater. The water heater must be accessible without the use of a ladder or scaffold.

Make sure the temperature pressure relief valve lever is accessible and the front cover, thermostat, heating unit and if fitted, the side cover and temperature limiting valve can be removed for service.



You must be able to read the information on the rating plate. If possible leave headroom of one water heater height so the anode can be inspected or replaced. Remember you may have to take the entire water heater out later for servicing.

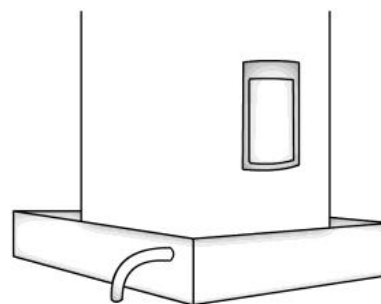
It is recommended the water heater be installed at ground or floor level and must stand vertically upright. The base of the water heater is made of corrosion resistant material, and it may be placed directly in contact with the supporting surface. It is not necessary to allow for free air circulation under the base of the water heater.

Note: The water heater should not be placed in direct contact with a concrete surface that is less than two months old and not fully cured as this may attack the metal coating of the water heater base. A moisture barrier should be used between the two surfaces in this instance.

Remember all local authorities have regulations about putting water heaters into roof spaces.

SAFE TRAY

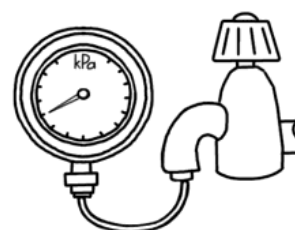
It is a requirement of AS/NZS 3500.4 that for a new installation, a water heater be installed in a safe tray where in the event of a leak, property may otherwise be damaged. Construction, installation and draining of a safe tray must comply with the abovementioned Standard.



MAINS WATER SUPPLY

Where the mains water supply pressure exceeds that shown in the table below, an approved pressure limiting valve is required and should be fitted as shown in the installation diagram (refer to diagram on page 27).

Model	025 to 160	250 to 400
Relief valve setting	1400 kPa	1000 kPa
Expansion control valve setting*	1200 kPa	850 kPa
Max. mains supply pressure		
With expansion control valve	950 kPa	650 kPa
Without expansion control valve	1120 kPa	800 kPa



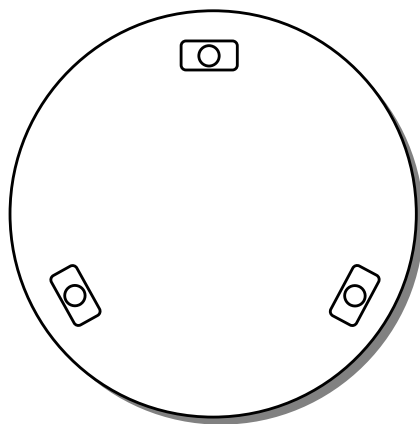
* Expansion control valve not supplied with water heater

TANK WATER SUPPLY

If the water heater is supplied with water from a tank supply and a pressure pump system is not installed, then the bottom of the supply tank must be at least 1 m above the highest point of the hot water plumbing system, including the water heater. Care must be taken to avoid air locks. The cold water line to the water heater should be adequately sized and fitted with a full flow gate valve or ball valve.

Feet for Rheem Externally Mounted Cylinders

Optima 180, 300 and 400L Mains Pressure Water Heaters (3 pieces)



Outside diameters
180 model–488mm
300 model–580mm
400 model–690mm

Feet are 50mm in from edge of cylinder

Installation options:

1. Push tags into soft concrete at correct points according to cylinder diameter
2. Cut off tags and use a blob of construction adhesive to hold feet in place at correct points according to cylinder diameter
3. Cut off tags and screw feet into place on wooden platform at correct points according to cylinder diameter

Note: It is important that only three feet are used to avoid “rocking” and that the feet are positioned at 50mm from outside edge of cylinder to outside edge of feet.

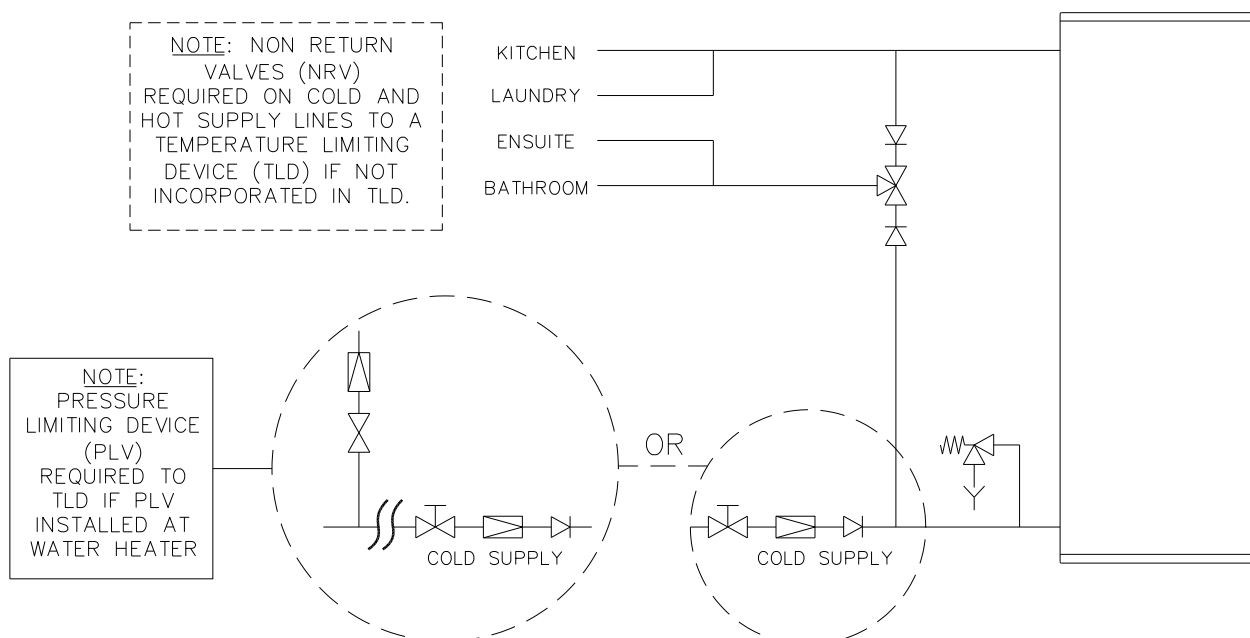
HOT WATER DELIVERY

This water heater can deliver water at temperatures which can cause scalding.

It is necessary and we recommend that a temperature limiting device be fitted between a Rheemglas or Optima water heater and the hot water outlets in any ablution area such as a bathroom or ensuite, to reduce the risk of scalding. The installing plumber may have a legal obligation to ensure the installation of this water heater meets the delivery water temperature requirements of AS/NZS 3500.4 so that scalding water temperatures are not delivered to a bathroom, ensuite or other ablution area.

Where a temperature limiting device is installed adjacent to the water heater, the cold water line to the temperature limiting device can be branched off the cold water line either before or after the isolation valve, pressure limiting valve and non return valve to the water heater. If an expansion control valve is required, it must always be installed after the non return valve and be the last valve prior to the water heater.

If a pressure limiting valve is installed on the cold water line to the water heater and the cold water line to a temperature limiting device branches off before this valve or from another cold water line in the premises, then a pressure limiting valve of an equal pressure setting may be required prior to the temperature limiting device.



Two Temperature Zones Using a Temperature Limiting Device

CIRCULATED HOT WATER FLOW AND RETURN SYSTEM

If a Rheem water heater is to be installed as part of a circulated hot water flow and return system, a storage water heater able to provide a hot water outlet temperature of at least 60°C must be used. **Note:** The thermostat must always be above 60°C. Refer to the [diagram on page 23](#)

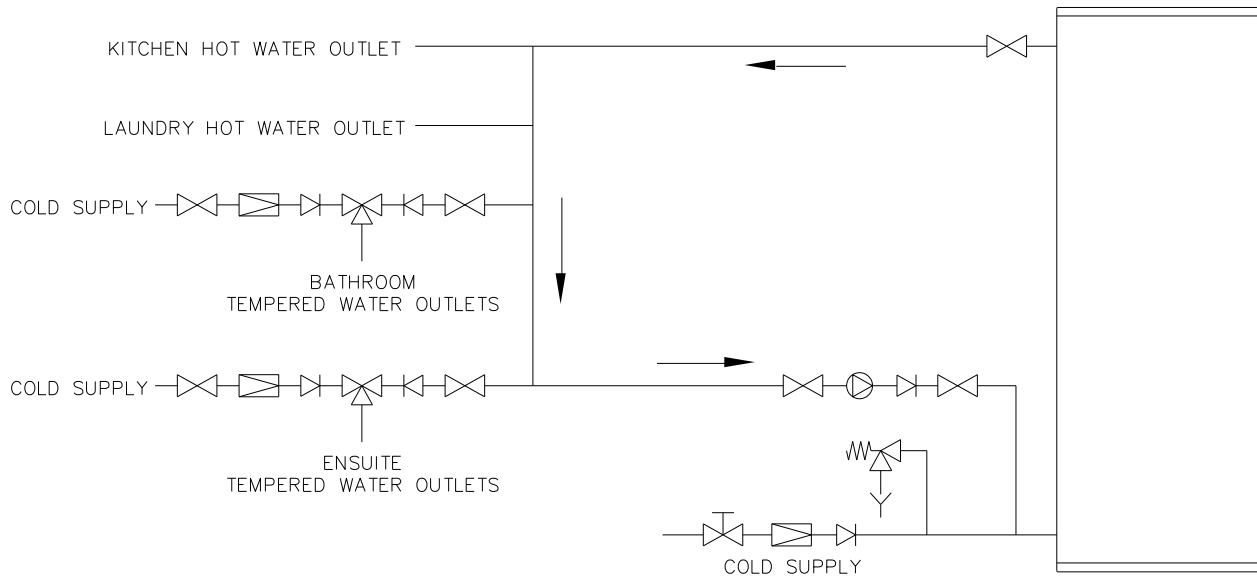
Temperature Limiting Device

A temperature limiting device cannot be installed in circulated hot water flow and return pipe work. The tempered water from a temperature limiting device cannot be circulated. Where a circulated hot water flow and return system is required in a building, a temperature limiting device can only be installed on a dead leg, branching off the circulated hot water flow and return pipe.

If circulated tempered water were to be returned back to the water heater, depending on the location of the return line connection on the water supply line to the water heater, then either:

- water will be supplied to the cold water inlet of the temperature limiting device at a temperature exceeding the maximum recommended water supply temperature, or
- when the hot taps are closed no water will be supplied to the cold water inlet of the temperature limiting device whilst hot water will continue to be supplied to the hot water inlet of the temperature limiting device.

These conditions may result in either water at a temperature exceeding the requirements of AS/NZS 3500.4 being delivered to the hot water outlets in the ablution areas, or the device closing completely and not delivering water at all, or the device failing. Under either condition, the operation and performance of the device cannot be guaranteed.



Circulated Hot Water Flow and Return Continuous Electric Water Heater

Off-Peak or Time Controlled Electricity Supply

A single or twin element electric water heater connected to an Off-Peak electricity supply should not be installed as part of a circulated hot water flow and return system in a building. The benefits of the Off-Peak electricity supply will be significantly reduced.

REDUCING HEAT LOSSES

The cold water line to and the hot water line from the water heater must be insulated in accordance with the requirements of AS/NZS 3500.4. The insulation must be weatherproof and UV resistant if exposed. When using a hot water recirculation system, an increase in running costs can be expected due to the heat loss that occurs through the pipework.

The cold water line to and the hot water line from the water heater must be insulated in accordance with the requirements of AS/NZS 3500.4. The insulation must be weatherproof and UV resistant if exposed.

ANODE

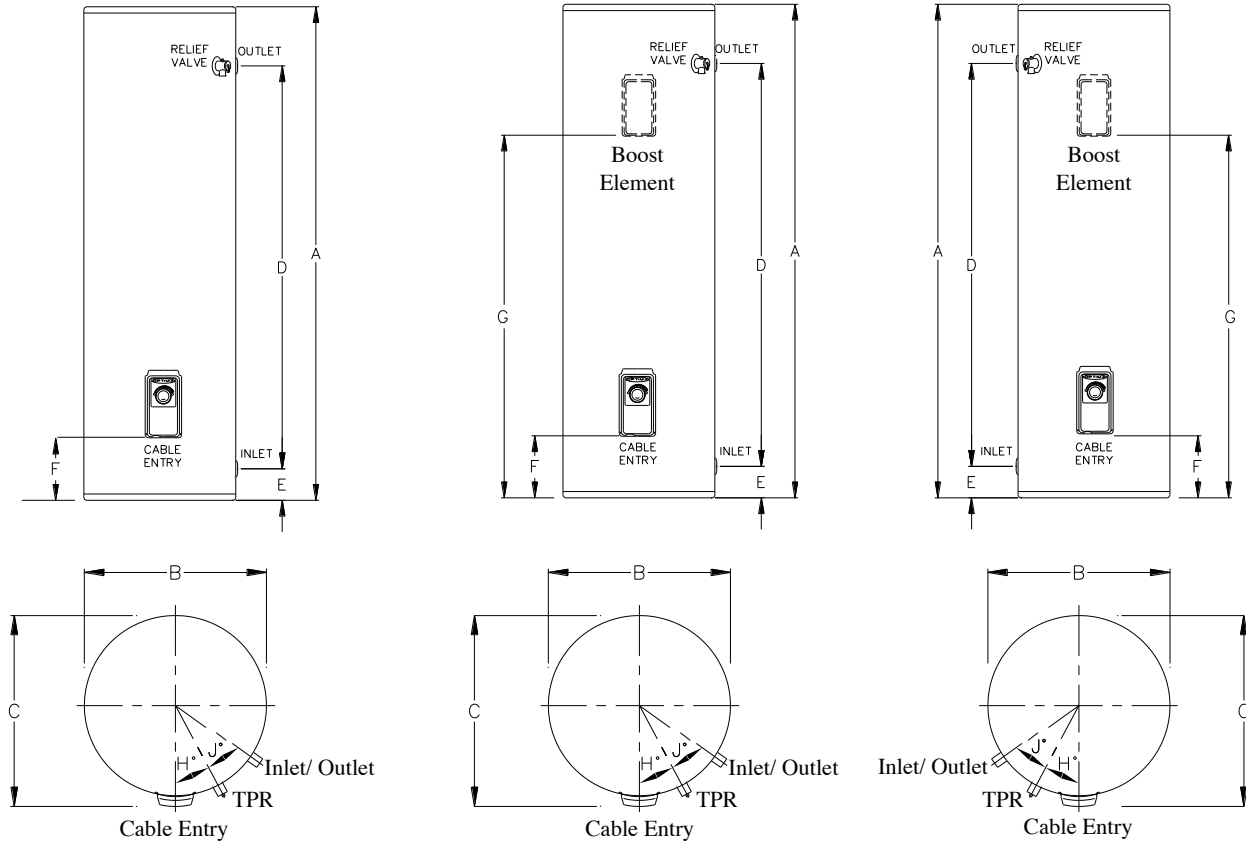
The vitreous enamel lined cylinder of the water heater is only covered by warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is installed. The use of an incorrect colour coded anode will void the cylinder warranty and may shorten the life of the water heater cylinder.

The correct colour coded anode for the water supply being used must be selected and fitted to the water heater for warranty to apply to the water heater cylinder (refer to “Water Supplies” on page 11 and the **Anode Selection chart** on page 12). The black anode is typically fitted as standard.

Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use. In areas where this is likely to occur, the installer should instruct the householder on how to dissipate the gas safely (refer to “Caution” on page 12).

DIMENSIONS AND TECHNICAL DATA



Optima 180 Litre

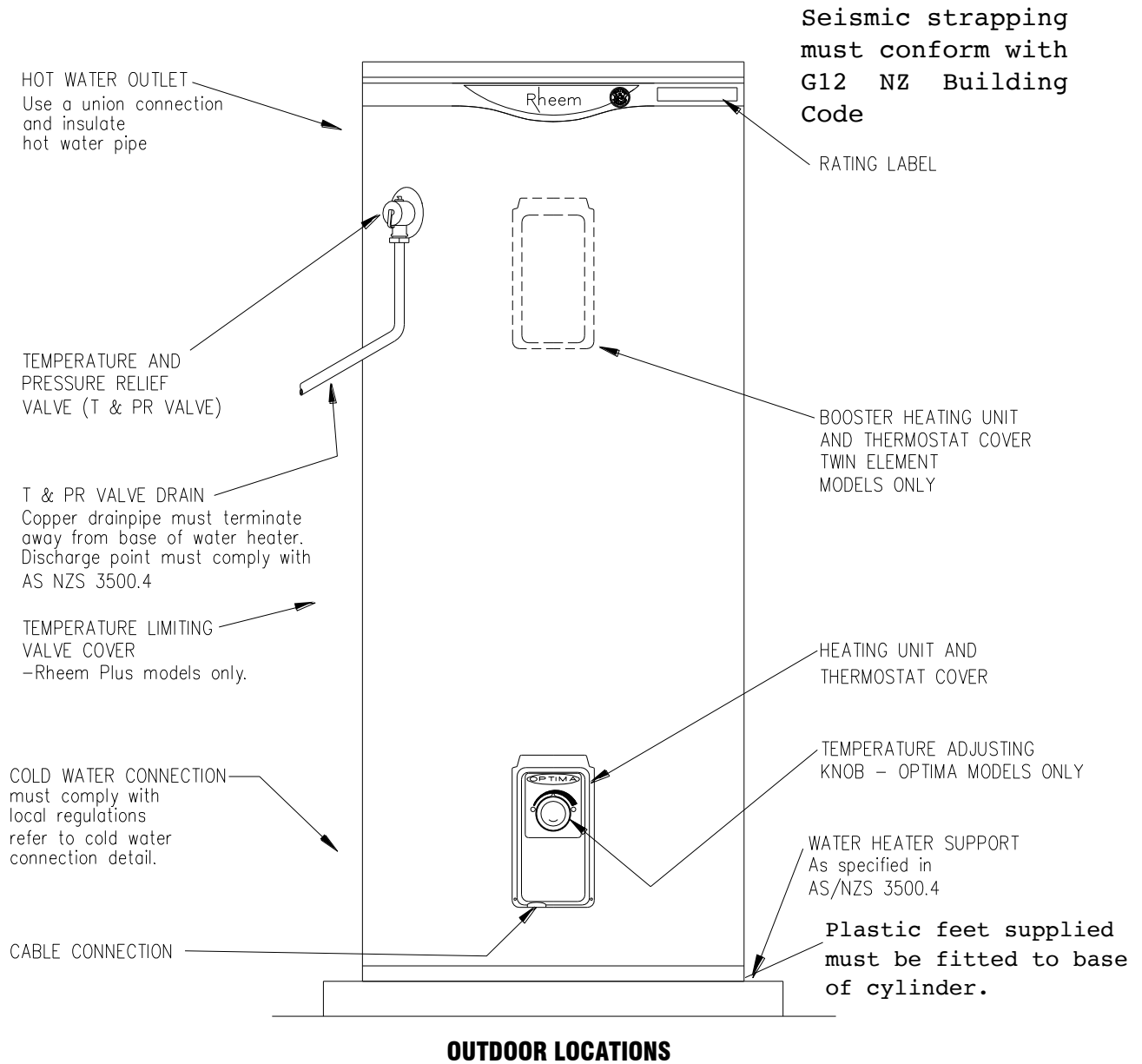
Optima 300 Litre

Optima 400 Litre

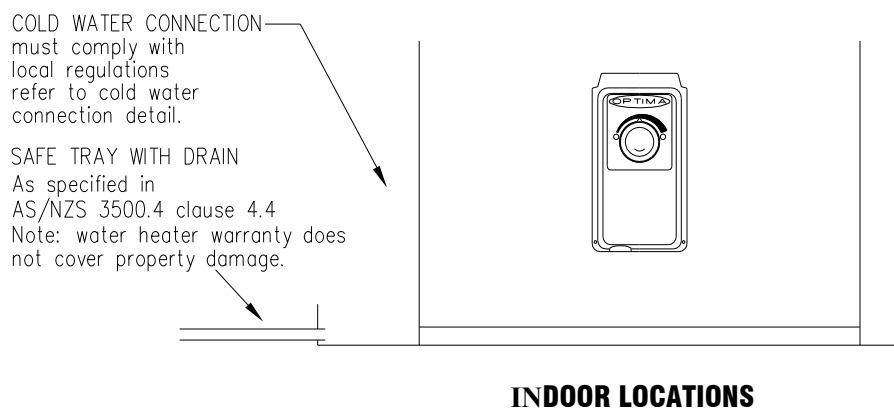
Optima Single Element			913 180	-	-
Optima Twin Element			-	913 300	913 400
Hot Water Delivery	Litres		180	300	400
Boost Capacity	Litres		-	50	90
Dimensions	A	mm	1720	1825	1840
	B	mm	488	580	690
	C	mm	554	646	755
	D	mm	1482	1569	1479
	E	mm	74	74	121
	F	mm	90	90	120
	G	mm	-	1295	1346
	H	deg	23	18	53
	J	deg	22	18	30
Approx. Weight empty		kg	64	97	118

400 Litre models have left hand connections.
Technical data is subject to change.

TYPICAL INSTALLATION – OUTDOOR LOCATION



TYPICAL INSTALLATION – INDOOR LOCATION



CONNECTIONS – PLUMBING

CONNECTION SIZES

- | | Optima |
|----------------------------|---------|
| • Hot water connection: | RP ¾/20 |
| • Cold water connection: | RP ¾/20 |
| • Relief valve connection: | RP ½/15 |

All plumbing work must be carried out by a qualified person and in accordance with the Plumbing Standard AS/NZS 3500.4 and local authority requirements.

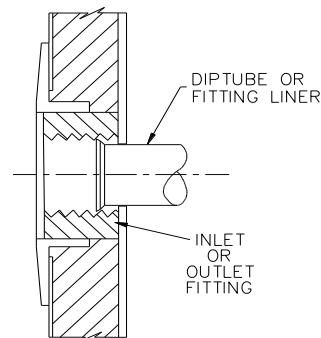
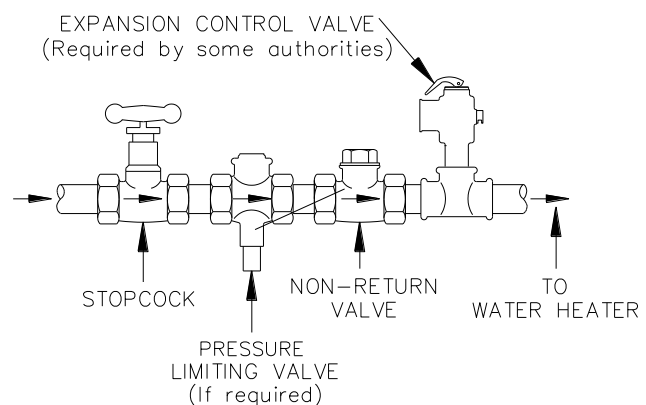
WATER INLET AND OUTLET

All pipe work must be cleared of foreign matter before connection and purged before attempting to operate the water heater. All olive compression fittings must use brass or copper olives. Use thread sealing tape or approved thread sealant on all fittings.

An isolation valve and non-return valve must be installed on the cold water line to the water heater. An acceptable arrangement is shown in the diagram. Refer also to “Hot Water Delivery” on page 21 and to “Mains Water Supply” on page 19.

A disconnection union must always be provided at the cold water inlet and hot water outlet on the water heater to allow for disconnection of the water heater.

This water heater has either a plastic dip tube or fitting liner in the inlet and outlet fittings (see diagram). These must be in place for the water heater to function properly. Do not remove or damage them by using heat nearby. They will be pushed into the correct position as the fitting is screwed in.



PIPE SIZES

To achieve true mains pressure operation, the cold water line to the water heater should be the same size or bigger than the hot water line from the water heater.

The pipe sizing for hot water supply systems should be carried out by persons competent to do so, choosing the most suitable pipe size for each individual application. Reference to the technical specifications of the water heater and local regulatory authority requirements must be made.

TEMPERATURE PRESSURE RELIEF VALVE

The temperature pressure relief valve is shipped either under the top flap of the water heater carton or behind the front cover or in a plastic bag attached to the water heater. The temperature pressure relief valve must be fitted before the water heater is operated. Before fitting the relief valve, make sure the probe has not been bent. Seal the thread with Teflon tape - never hemp. Make sure the tape does not hang over the end of the thread.

Screw the valve into the correct opening (refer to the installation diagram on page 25) leaving the valve outlet pointing downwards. Do not use a wrench on the valve body - use the spanner flats provided. A copper drain line must be fitted to the temperature pressure relief valve (refer to "Relief Valve Drain" on page 27).

EXPANSION CONTROL VALVE

Local regulations may make it mandatory to install an expansion control valve (ECV) in the cold water line to the water heater. In other areas, an ECV is required if the saturation index is greater than +0.4 (refer to "Water Supplies" on page 11).

The expansion control valve must always be installed after the non return valve and be the last valve installed prior to the water heater (refer to diagram on page 27). A copper drain line must be fitted to the expansion control valve (refer to "Relief Valve Drain" on page 27).

The valve must be insulated with closed cell polymer insulation or similar (minimum thickness 9 mm) and the insulation installed so as not to impede the operation of the valve. The insulation must be weatherproof and UV resistant if exposed.

RELIEF VALVE DRAIN

DN15 copper drain lines must be fitted to the temperature pressure relief valve and expansion control valve (if one is installed) to carry the discharge clear of the water heater. Connect the drain lines to the valves using disconnection unions. The drain line from the valve to the point of discharge should be as short as possible, have a continuous fall all the way from the water heater to the discharge outlet and have no tap, valves or other restrictions in the pipe work. A drain line from a relief valve must comply with the requirements of AS/NZS 3500.4. or G12 NZ Building Code

A drain line must be comply with AS/NZS 3500 or G12 NZ Building code.

Subject to local regulatory authority approval, the drain lines from the temperature pressure relief valve and expansion control valve from an individual water heater may be interconnected. Refer to local regulations.

The outlet of a drain line must be in such a position that flow out of the pipe can be easily seen, but arranged so discharge will not cause injury, damage or nuisance. The termination point of a drain line must comply with the requirements of AS/NZS 3500.4. Drain lines must not discharge into a safe tray.

In locations where water pipes are prone to freezing, drain lines must be insulated, must not exceed 300 mm in length and are to discharge into a tundish through an air gap of between 75 mm and 150 mm.

If a drain line discharges into a tundish, the drain line from the tundish must be not less than DN20. The drain line from a tundish must meet the same requirements as for a drain line from a relief valve.

Warning: As the function of the temperature pressure relief valve on this water heater is to discharge high temperature water under certain conditions, it is strongly recommended the pipe work downstream of the relief valve be capable of carrying water exceeding 93°C. Failure to observe this precaution may result in damage to pipe work and property.

CONNECTIONS – ELECTRICAL

The power supply to the water heater must not be switched on until the water heater is filled with water and a satisfactory megger reading is obtained.

All electrical work and permanent wiring must be carried out by a qualified person and in accordance with the Wiring Rules AS/NZS 3000 and local authority requirements.

WATER HEATER

A water heater not fitted with a supply cord and plug must be directly connected to a 240 V AC, 50 Hz mains power supply with an isolating switch installed at the switchboard.

The power supply to a **twin element model** should be Off-Peak (overnight) to the **bottom heating unit** and continuous to the **top heating unit**. The power supply to a **single element model** can be either an **Off-Peak (overnight)**, **Extended Off-Peak (overnight and day)** or **continuous** electricity supply. Check with the local electricity supply authority as to their requirements.

An Off-Peak (overnight) power supply will provide the maximum financial savings. Discuss the power supply requirements with the householder.

A flexible 20 mm conduit is required for the electrical cable to the water heater. The conduit is to be connected to the unit with a 20 mm terminator. Connect the power supply wires directly to the terminal block and earth tab connection, ensuring there are no excess wire loops inside the front cover. The temperature rating of the power supply wires insulation must suit this application.

THERMOSTAT SETTING

The thermostat on an Optima model is user adjustable from 60°C to 75°C.

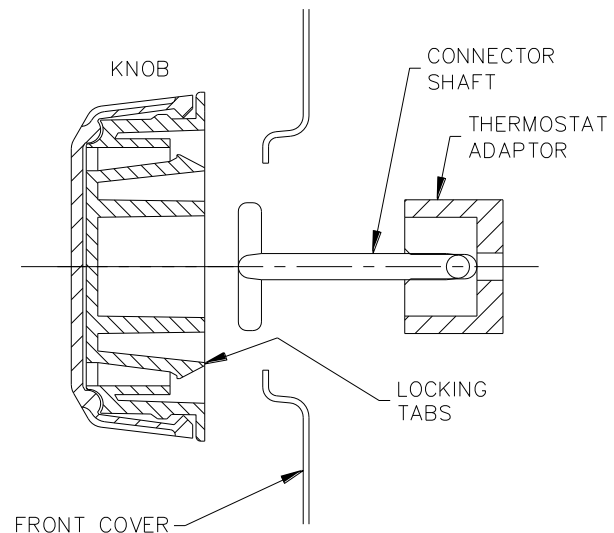
The thermostat is adjusted by turning the knob anticlockwise to decrease the temperature setting and clockwise to increase the temperature setting. The top thermostat on a twin element model is fixed at 60°C.

For reasons of safety and economy, we advise the thermostat be set at the lowest temperature that will provide sufficient hot water. Dishwasher running costs can be adversely affected if the thermostat is set below 65°C. Discuss the thermostat setting requirements with the householder.

ASSEMBLY OF ADJUSTER MECHANISM ON OPTIMA MODEL

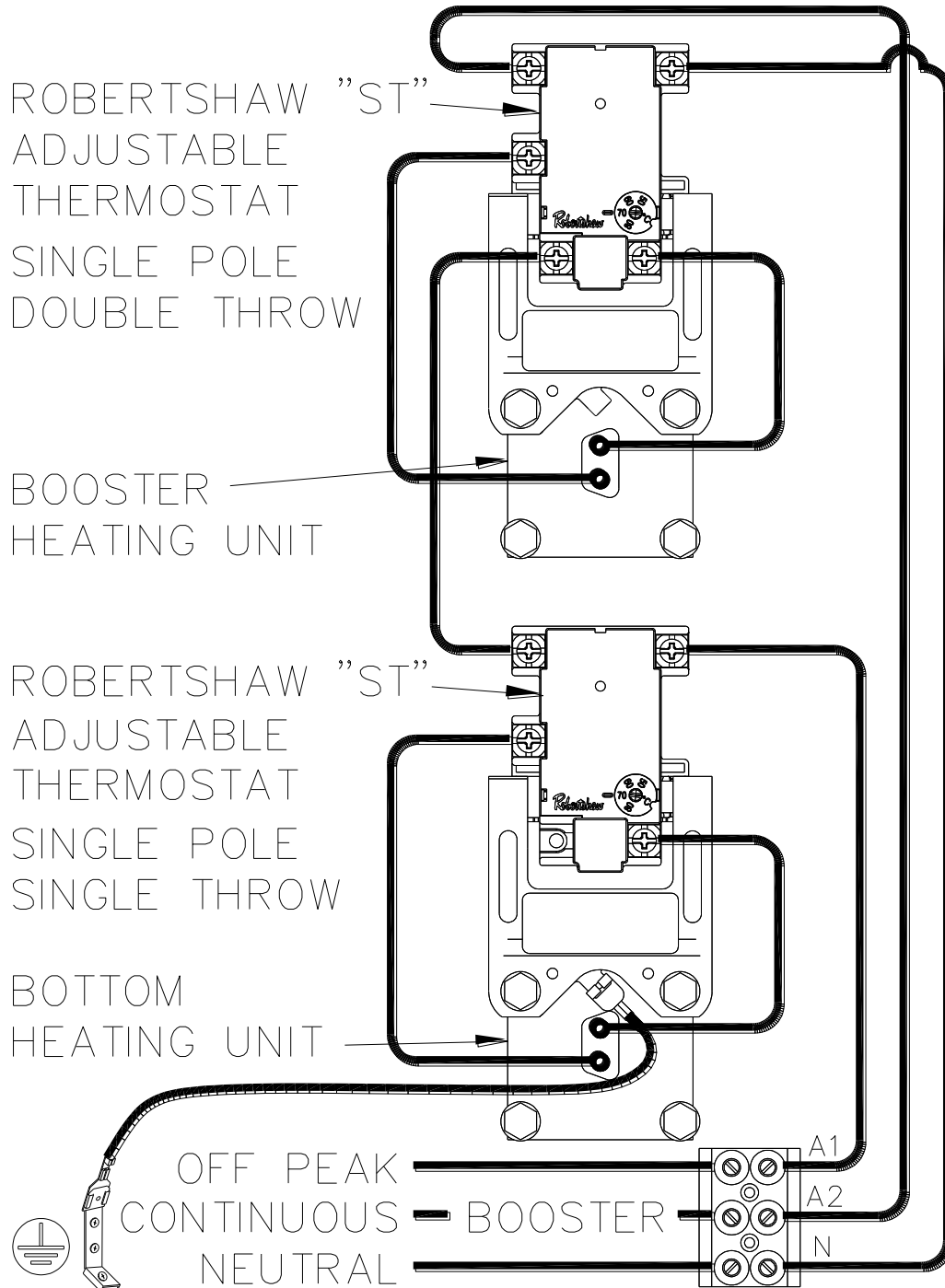
When the front cover has been removed, reassemble as follows:

- Remove the knob from the front cover by depressing the locking tabs on the inside of the front cover.
- Turn the thermostat to the lowest temperature (refer to “Temperature Adjustment” on page 5).
- Fit the front cover.
- Insert the connector shaft through the hole into the thermostat adaptor slots.
- Align the knob slots over the 'T' drive on the connector shaft, with the dial at the lowest setting – a firm push with the hand on the knob front face will engage the locking tabs.



WIRING DIAGRAM TWIN ELEMENT ELECTRIC WATER HEATERS NON-SIMULTANEOUS OPERATION OFF-PEAK CONNECTION

THIS DIAGRAM IS FOR ROBERTSHAW
"ST" THERMOSTATS



Electrical Circuit for Twin Element Models – Robertshaw "ST" Thermostats

The active from the continuous supply must be connected to the top heating unit circuit and the active from the Off-Peak or time controlled supply must be connected to the bottom heating unit circuit.

COMMISSIONING

TO FILL AND TURN ON THE WATER HEATER

The power supply to the water heater must not be switched on until the water heater is filled with water and a satisfactory megger reading is obtained.

- Open all of the hot water taps in the house (don't forget the shower).
- Open the cold water isolation valve fully on the cold water line to the water heater.
Air will be forced out of the taps.
- Close each tap as water flows freely from it.
- Check the pipe work for leaks.
- Switch on the electrical supply at the isolating switch to the water heater.

Explain to the householder or a responsible officer the functions and operation of the water heater. Upon completion of the installation and commissioning of the water heater, leave this guide with the householder or a responsible officer.

TO TURN OFF THE WATER HEATER

If it is necessary to turn off the water heater on completion of the installation, such as on a building site or where the premises is vacant, then;

- Switch off the electrical supply at the isolating switch to the water heater.
- Close the cold water isolation valve at the inlet to the water heater.

DRAINING THE WATER HEATER

To drain the water heater:

- Turn off the water heater (refer to “To Turn Off The Water Heater” on page 33).
- Close all hot water taps.
- Operate the relief valve release lever - do not let the lever snap back or you will damage the valve seat.

Operating the lever will release the pressure in the water heater.

- Undo the union at the cold water inlet to the water heater and attach a hose to the water heater side of the union.

Let the other end of the hose go to a drain.

- Operate the relief valve again.

This will let air into the water heater and allow the water to drain through the hose.

RHEEM ELECTRIC DOMESTIC MAINS PRESSURE WATER HEATER WARRANTY

WARRANTY CONDITIONS

1. This warranty is applicable only to water heaters manufactured from 1st Oct 2010.
2. The water heater must be installed in accordance with the water heater installation instructions, supplied with the water heater, and in accordance with all relevant statutory and local requirements of the State in which the water heater is installed.
3. Where a failed component or water heater is replaced under warranty, the balance of the original warranty period will remain effective. The replaced component or water heater does not carry a new warranty.
4. Where the water heater is installed outside the boundaries of a metropolitan area as defined by Rheem or further than 25 km from a regional Rheem branch office, or a Rheem Service Centre the cost of transport, insurance and traveling costs between the nearest Rheem Service Centre's premises and the installed site shall be the owner's responsibility.
5. Where the water heater is installed in a position that does not allow safe, ready access, the cost of accessing the site safely, including the cost of additional materials handling and /or safety equipment, shall be the owner's responsibility.
6. The warranty only applies to the water heater and original or genuine (company) component replacement parts and therefore does not cover any plumbing or electrical parts supplied by the installer and not an integral part of the water heater, e.g. pressure limiting valve; isolation valves; non-return valves; electrical switches; pumps or fuse.
7. The water heater must be sized to supply the hot water demand in accordance with the guidelines in the water heater literature.

WARRANTY EXCLUSIONS

1. REPAIR AND REPLACEMENT WORK WILL BE CARRIED OUT AS SET OUT IN THE WATER HEATER WARRANTY, HOWEVER THE FOLLOWING EXCLUSIONS MAY CAUSE THE WATER HEATER WARRANTY TO BECOME VOID AND MAY INCUR A SERVICE CHARGE AND / OR COST OF PARTS.
 - a) Accidental damage to the water heater or any component, including: Acts of God; failure due to misuse; incorrect installation; attempts to repair the water heater other than by a Rheem Service Centre or the Rheem Service Department.
 - b) Where it is found there is nothing wrong with the water heater; where the complaint is related to excessive discharge from the temperature and / or pressure relief valve due to high water pressure; where there is no flow of hot water due to faulty plumbing; where water leaks are related to plumbing and not the water heater or water heater components; where there is a failure of electricity or water supplies; where the supply of electricity or water does not comply with relevant codes or acts.
 - c) Where the water heater or water heater component has failed directly or indirectly as a result of: excessive water pressure; excessive temperature and / or thermal input; blocked overflow / vent drain; corrosive atmosphere; ice formation in the pipe work to or from the water heater.
 - d) Where the water heater is located in a position that does not comply with the water heater installation instructions or relevant statutory requirements, causing the need for major dismantling or removal of cupboards, doors or walls, or use of special equipment to bring the water heater to floor or ground level or to a serviceable position.
 - e) Where the water heater has been connected at any time to a water supply that does not comply with the water supply guidelines as outlined in the Owner's Guide and Installation Instructions.
2. SUBJECT TO ANY STATUTORY PROVISIONS TO THE CONTRARY, THIS WARRANTY EXCLUDES ANY AND ALL CLAIMS FOR DAMAGE TO FURNITURE, CARPETS, WALLS, FOUNDATIONS OR ANY OTHER CONSEQUENTIAL LOSS EITHER DIRECTLY OR INDIRECTLY DUE TO LEAKAGE FROM THE WATER HEATER, OR DUE TO LEAKAGE FROM FITTINGS AND / OR PIPE WORK OF METAL, PLASTIC OR OTHER MATERIALS CAUSED BY WATER TEMPERATURE, WORKMANSHIP OR OTHER MODES OF FAILURE.

RHEEM ELECTRIC DOMESTIC MAINS PRESSURE WATER HEATER WARRANTY

WARRANTY

In addition to your legal rights, Rheem New Zealand makes the following promise to the customer. We will repair, or if necessary, replace a defective domestic water heater, or part, which has failed due to faulty manufacture on the following terms and conditions.

Component	Installation	Model	Warranty Period	Warranty
All components (from date of installation)	All installations	Optima	Up to 3 Years	New component or water heater, free of charge, including labour.
Inner Cylinder (from date of installation)	Water heater installed in a "single-family domestic dwelling" With a thermostat set below 76°C	Optima	First 5 years	New water heater, free of charge, including labour.
			Years 6-10	New water heater, free of charge, with installation and labour costs being the responsibility of the owner.
	Water heater installed in other than a "single-family domestic dwelling" With a thermostat set below 76°C	Optima	First 12 months	New component or water heater, free of charge, including labour.
			Years 2-5	New water heater, free of charge, with installation and labour costs being the responsibility of the owner.

DURABILITY

Your Rheem water heater meets the durability standards of the New Zealand Building Code provided the water heater is:

1. Installed in accordance with the New Zealand Building Code and the Rheem installation instructions
2. Maintained in accordance with these instructions
3. Not damaged in any way
4. Stored correctly prior to use,
5. Your water quality remains within the requirements stated in the installation instructions

Warranty Conditions: see Page 35

Note: The water heater must be installed and maintained in accordance with the Rheem Installation Guides supplied with the water heater, and comply fully with all the requirements of the New Zealand Building Code.

Avvio

SDC - Approved Building Consent Document - BC231907 - Pg 442 of 446 - 21/03/2024 - helen.fowler



100
Voile



120
Batik



150
Lantana



160
Cerville



180
Viyella



300
Linen



350
Camile



500
Moire



550
Camlet



700
Octavius



720
Batiste



750
Barathea

Avvio

Avvio vinyl plank flooring combines excellent durability with great style and performance. Perfect for every area of your home Avvio is 100% Waterproof, easy to maintain and stain resistant.

Technical Data

Type:	Vinyl Plank Flooring	Colours:	12
Dimensions:	1320mm x 196mm	Finish:	Matte
Thickness:	2mm	Surface:	Embossed
Wear Layer:	0.3mm	Profile:	Micro Bevel
Units Per Box:	18 boards	Coating System:	Superguard®
m² per box:	4.66	Installation Method:	Direct Stick
m² per pallet:	260.79		

Performance

E3 Internal Moisture:	All wet areas - E3/AS1 – 3.0 Watersplash – (Alternative Solution)^
-----------------------	--

Sustainability

Product Transparency:	Global Green Tag, GreenRate Level A certified.
Accreditation:	Manufactured under a quality and environmental system certified and complying with ISO 9001 and ISO 14001 by an accredited certification body.



Waterproof Surface^



Embossed



Matte Finish



Micro Bevel Edge



ISO 9001



ISO 14001



Easy To Clean



Quiet Underfoot



Affordable



All Godfrey Hirst Vinyl Plank floors must be installed in accordance with relevant New Zealand Standards and in conjunction with the Godfrey Hirst Vinyl Plank Flooring Installation Instructions.
Warranty: All Godfrey Hirst floors carry a warranty supported by New Zealand after sales service. The Godfrey Hirst warranty is applicable to all Godfrey Hirst floors, sold in New Zealand. *As a New Zealand manufacturer, we endorse and recognise all rights of the consumer under the Consumer Guarantees Act 1993 (the "CGA") and further agree to match any performance guarantee or warranty offered in the market place, at the time of purchase, on any product which is equivalent to ours, where that performance guarantee or warranty offers rights to the consumer in addition to those under the CGA". For further information as to the warranty, installation, care and characteristic of this hard flooring please visit www.godfreyhirst.com or call 0800 500 210.
~Test results and certificates are available on request.
^Subject to proper installation, maintenance and local building code/regulatory approval.

E3/AS1 – Alternative Solution Lining Materials - 3.0 Water Splash

Please find below Godfrey Hirst requirements for Vinyl plank flooring when submitted as an alternative solution to meet E3/AS1 Amendment 7 – effective from 5th November 2021.

Please find the following methodology and technical statements to meet wet area requirements for kitchen, bathroom, toilet, laundry and powder room where there are sanitary fixtures and sanitary appliances.

Please ensure that this is submitted alongside adherence to Godfrey Hirst Vinyl technical specifications, installation instructions and care and maintenance guidelines.

Product Schematic



Vinyl Plank Flooring

New Zealand

Godfrey Hirst

Product Range Identification

All wet area applications:

- Aaria DS/DS Plus
- Regent 1200 / 1500
- Vega DS
- Olympus
- Avvio

In Service History

Godfrey Hirst are a part of the Mohawk Industries Group which manufactures and distributes a wide range of Vinyl products designed for domestic and commercial spaces. There is a long successful history both globally and here in New Zealand.

Plank Composition and Finish

Godfrey Hirst vinyl planks are a multi layered PVC based product providing 100% waterproof and non porous product. Further surface protection is provided with applied wear layer and coating technology providing hygienic, durable and impervious surface.

Fully Bonded Installation system provides waterproof surface

Use of adhesives tested and approved by Godfrey Hirst - Wet area application provide protection of the floor surface and plank edges. Once installed the surface is fully bonded, providing long term protection from prolonged water on the top surface.

Protection of Perimeter

Hydro kit. (Or similar low modulus) High-quality waterproof, transparent and elastic one-component joint sealant. Designed for watertight sealing of connection joints between skirting boards, walls and trim profiles. Sealant to be used for the protection of floor and floor perimeter from the risk of splash providing sealed edges 1.5 meters from all sanitary fixtures and sanitary appliances.

Bathroom, toilet and Laundry, apply sealant to the entire perimeter of the floor and around sanitary fixtures, fittings.

Easily Cleaned

Godfrey Hirst floors are easily cleaned using a vacuum or soft broom. Weekly mop the floor using a well rung out damp mop and a non-abrasive soap-free cleaner suitable for Vinyl floors to remove any footprints, dirt and other stains or marks. Refer to our online care and maintenance guides.



Installation Method

Fully Bonded Glue Down System

Sub floor must comply with NZS AS 1884 and be solid, level, dry, smooth, clean and free from all contaminants and substances which could be harmful to vinyl or adhesive. The installer must inspect and approve the sub floor as satisfying these requirements prior to installation. If required, remove any contaminants. Do not install over existing floor coverings as any such installation may void warranty.

Only use Godfrey Hirst recommended Hard-Set Adhesive (in accordance with the relevant Godfrey Hirst Adhesive Recommendation guides online). Please note requirements for high temperature areas, Areas exposed to direct/strong sunlight, and all wet area installations.

Silicone to be used in wet area applications. Please refer to detailed installation guide and use of Hydro kit sealant as noted.



Wet Area Installation Requirement

Godfrey Hirst vinyl plank flooring is suitable for all area use. Please note the system application and adhesive requirements pertaining to your area of use. Refer to Godfrey Hirst technical specifications and Care and Maintenance guides on our website for product specific detail.

Kitchens, integrated laundry and powder rooms. Apply sealant to skirting, toe kicks, and perimeter within 1.5 meters of a sanitary fixture or sanitary appliance.

Bathroom, toilet and laundry. Apply sealant to the entire perimeter of the floor and around sanitary fixtures and sanitary appliances.

See Hydrokit technical data sheet for further detailed drawings.

Godfrey Hirst Supporting Literature Available Online and on Request

- Technical Data Sheets specific to each Vinyl range.
- Installation instructions for fully bonded flooring systems.
- Care and Maintenance guidelines for end consumer.
- Godfrey Hirst adhesive guidelines and recommendations specific to the area of use.
- Testing Certification – VOC – Slip – Fire – Acoustic - Sustainability.

Please also refer to E3 Internal Moisture Building Code for further information and pathways for compliance specific to your building requirements. Please note alternative pathways for compliance can be achieved with building design elements depending on the building type and area of use. ie: Flow restrictors and floor wastes.