BC220141

PRODUCT CERTIFICATE

This is to certify that

Firth Ribraft® Floor System

Product description

The Firth RibRaft® Floor System comprises of polystyrene pods, steel reinforcing rods, plastic spacers and Firth RibRaft® concrete. The system consists of the following components:

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

Product purpose or use

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

Certificate holder

Fletcher Concrete and Infrastructure Ltd.
T/A Firth Industries
810 Great South Road
Penrose Auckland NZ 1061
Ph: 0800 800 576
W: www.firth.co.nz

CodeMark Product Certification Body

Bureau Veritas Australia Pty Ltd
3/435 Williamstown Road,
Port Melbourne VIC, 3207
Ph: 1800 855 190
www.bureauveritas.com.au

Sam Guindi
Product Certification Manager

For and on behalf of
Bureau Veritas Australia Pty Ltd

Complies with the New Zealand Building Code (NZBC):

If designed, used, installed and maintained in accordance with the scope of this certificate, the above mentioned product will meet or contribute to meeting the following provisions of the NZBC:

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

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

Subject to the following conditions and limitations:

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

WWW.JAS-ANZ.ORG/REGISTER

19 March 2020
Date of issue

CM70056 Rev 2
Certificate Number

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

These documents must be retained on site. Inspections may not be carried out if they are not.

Firth

JANUARY 2020

+RibRaft®

BC220141

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

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

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

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

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

THIS MANUAL CONSISTS OF 3 SECTIONS:

SECTION 1 DESIGN INFORMATION

Contains information principally useful for the specifier or building designer

SECTION 2 INSTALLATION INFORMATION

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

SECTION 3 VERIFICATION

Describes the required verification checks

SECTION: DESIGN INFORMATION

1

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

2.0 TECHNICAL INFORMATION

2.1 Overview

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

2.2 Pods

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

2.3 Steel

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

2.4 Concrete

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

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

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

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

CODEMARK™
CM70056

3.0 SCOPE

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

3.1 Structure Limitations

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

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

3.2 Live Loading

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

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

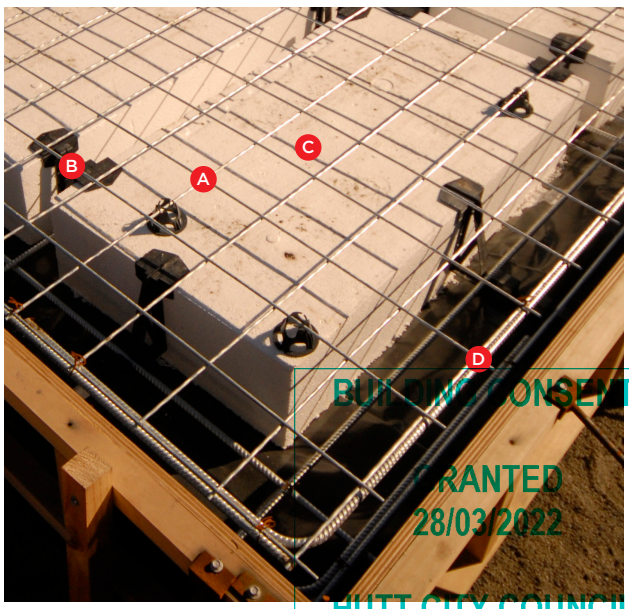
3.3 Snow Loading

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

3.4 Dead Loading for Use with This Manual

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

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



The RibRaft® System

A Steel mesh reinforcing B Firth 100mm spacer

C Firth RibRaft® polystyrene pods D Steel reinforcing

3.5 Foundation Requirement for Different Building Types

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

Table 1 Foundation Type Identifier

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

3.6 Foundation Soils

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

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

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

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

Table 2 Scala Penetrometer Blows Required and Ultimate Bearing Capacity

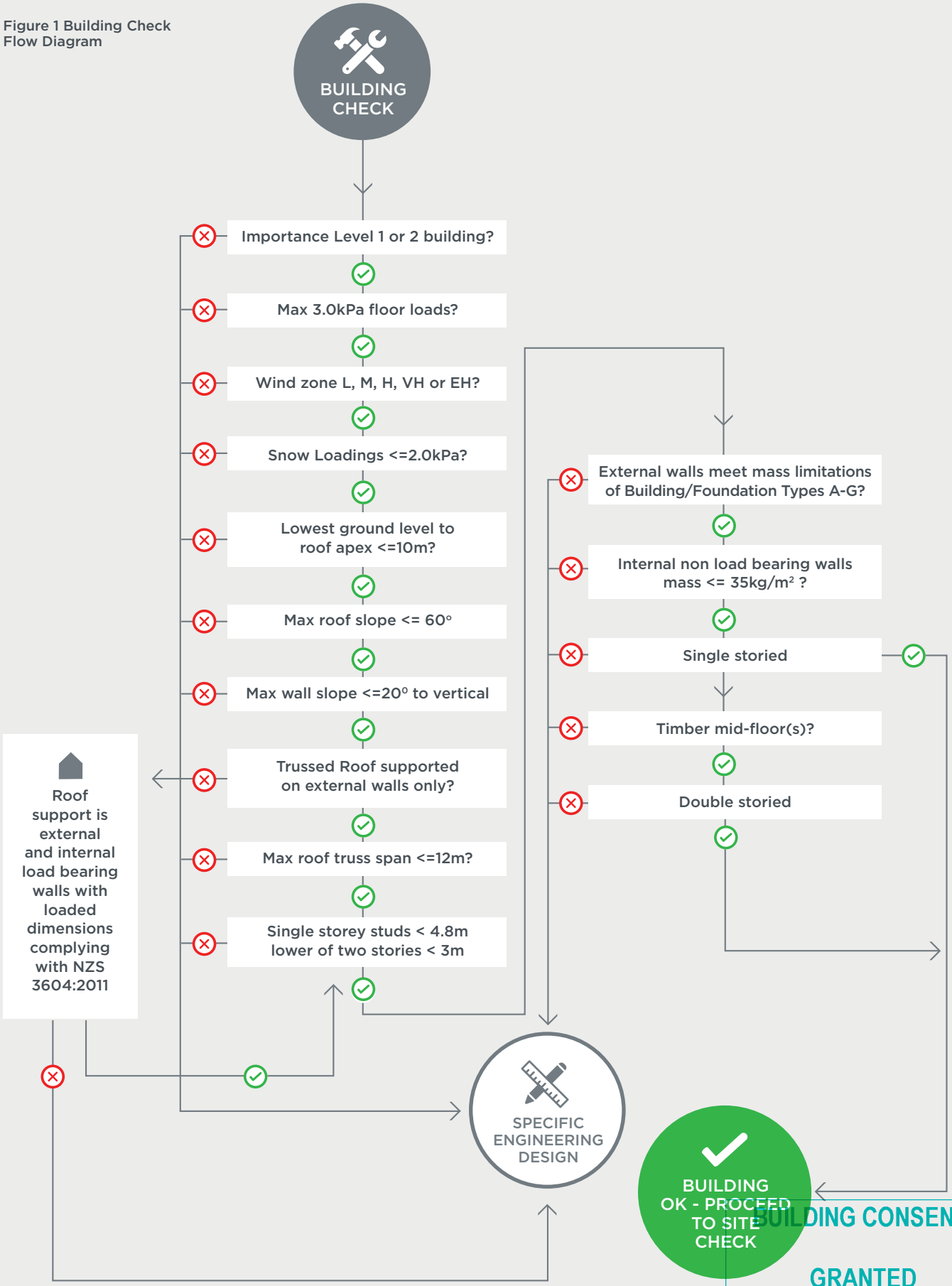
FOUNDATION TYPE	ULTIMATE BEARING CAPACITY (KPA)	MIN. BLOWS PER 300MM DEPTH FOR SCALA TESTING
A	140	4
B	175	5
C	210	6
D	240	7
E	275	8
G	Good ground	9

3.7 Flow Diagrams

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

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

Figure 1 Building Check Flow Diagram

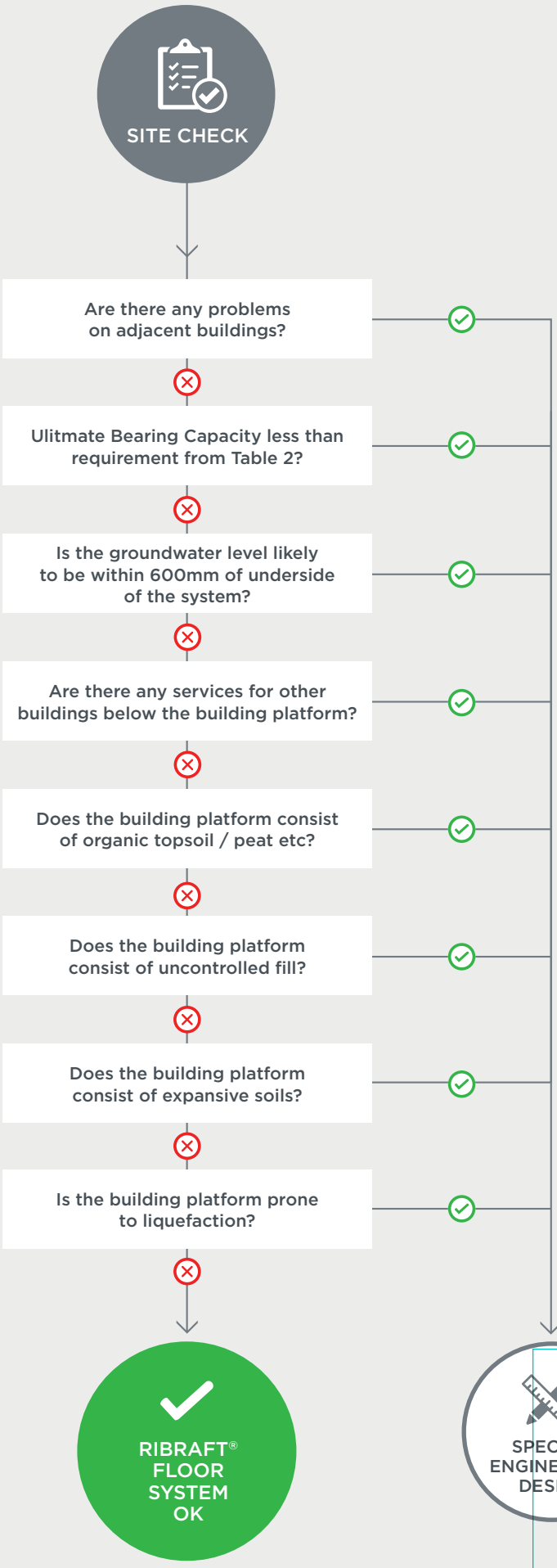


BUILDING CONSENT

GRANTED 28/03/2022

HUTT CITY COUNCIL

Figure 2 Building Check
Flow Diagram



4.0 CONSTRUCTION DETAILS

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

4.1 Pod Layout

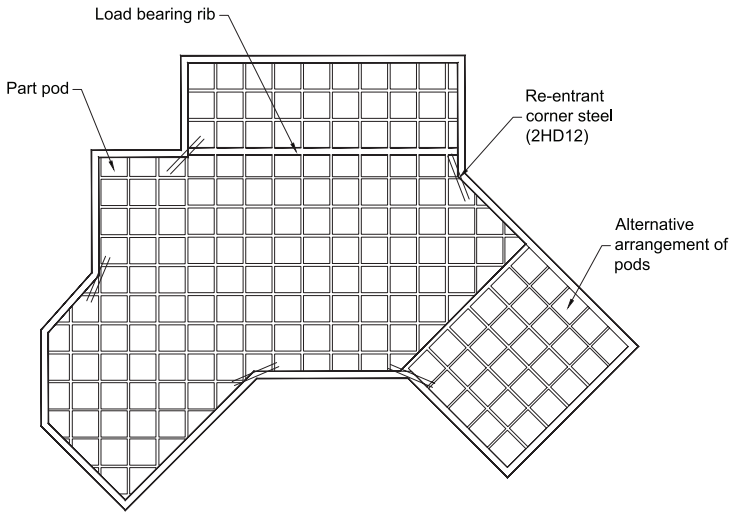
RibRaft® polystyrene pods supplied by Firth (1100 x 1100 x 220mm thick) shall be placed on levelled ground and arranged in a waffle pattern. The pods are used as void formers while the concrete is curing. These pods are an integral component of the system and shall not be substituted.

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

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

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

Figure 3 Typical RibRaft® Plan



4.2 Edge Beam Width and Reinforcement

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

4.3 Internal Ribs (non load bearing) Width and Reinforcement

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

4.4 Internal Ribs (load bearing) Width and Reinforcement

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

4.5 Point Loads

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

Table 3 Foundation Requirements for Individual Point Loads

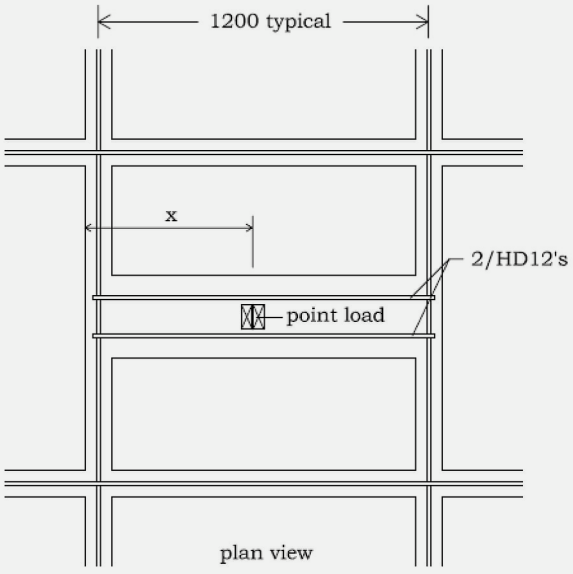
	FOUNDATION OPTIONS BELOW POINT LOAD:	
ULTIMATE LIMIT POINT LOAD REACTION	PAD OPTION, GOOD GROUND	BEAM OPTION, BEARING CAPACITY GREATER THAN 140KPA (3)
Up to 10kN	No thickening required	No thickening required
Up to 20 kN	375x375 pad(1)	300mm wide load under point load as detailed in Figure 5
Up to 30kN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

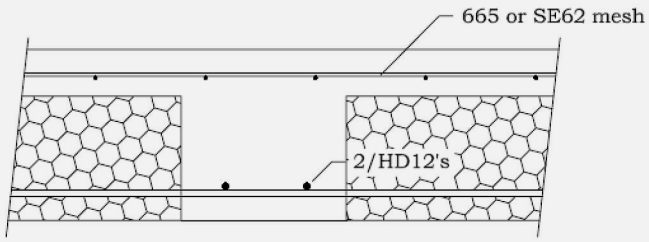
Notes
(1) Pad thickness to match depth of pods plus topping (bears on ground not polystyrene) and reinforced with 2 x D12 Bars both ways
(2) Pad thickness to match depth of pods plus topping (bears on ground not polystyrene) and reinforced with 3 x D12 Bars both ways
(3) Refer section 3.6 for confirmation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

Figure 4 Details for Beam Option Thickening Under Point Loads

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

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





sect A - A
refer detail D
figure 5 of Firth
Ribraft Manual

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

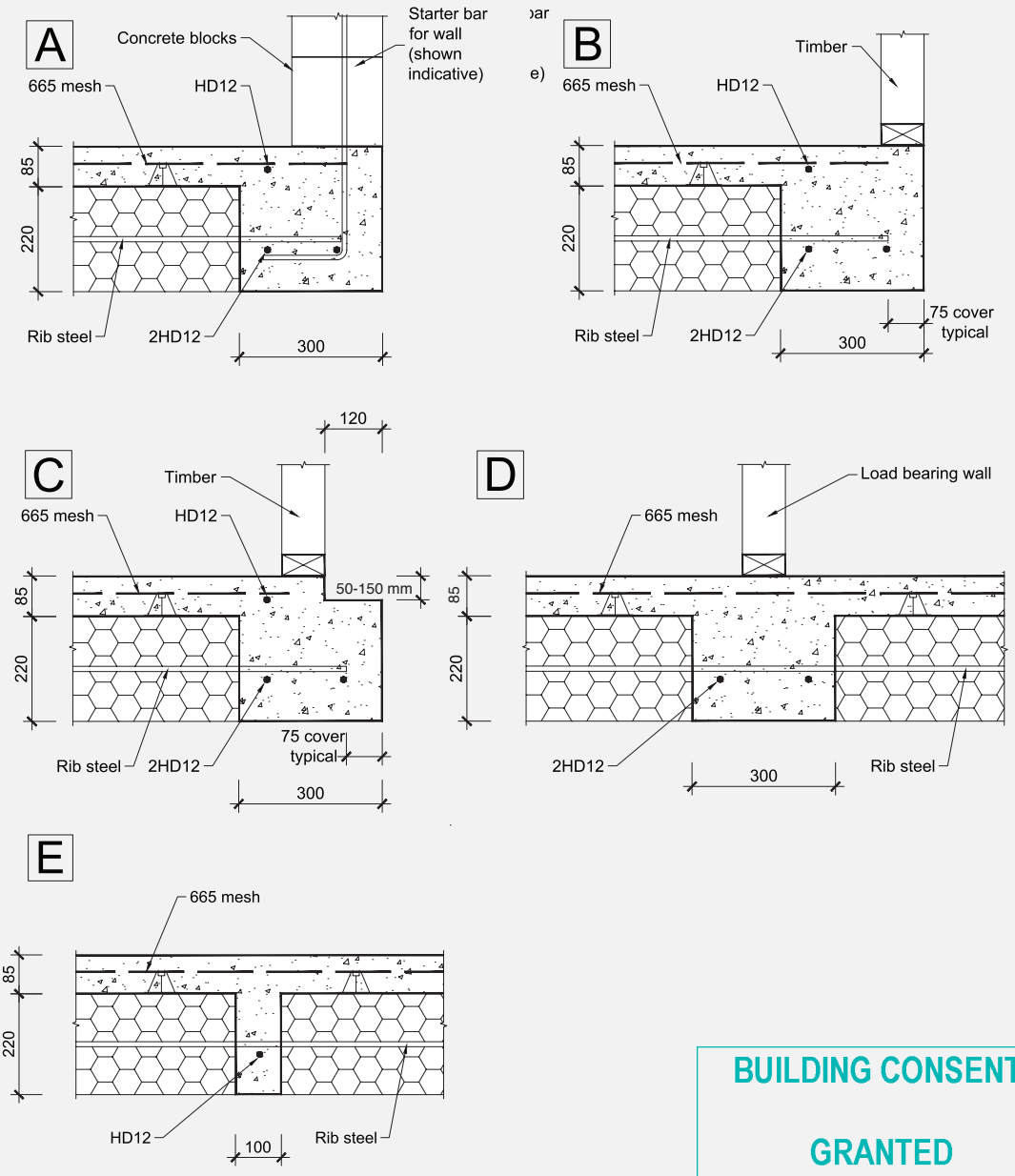
4.6 Mesh Reinforcement

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

4.7 Re-entrant Corners

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

Figure 5
Standard RibRaft®
Construction Details



BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

5.0 LATERAL RESISTANCE

5.1 Earthquake Resistance

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

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

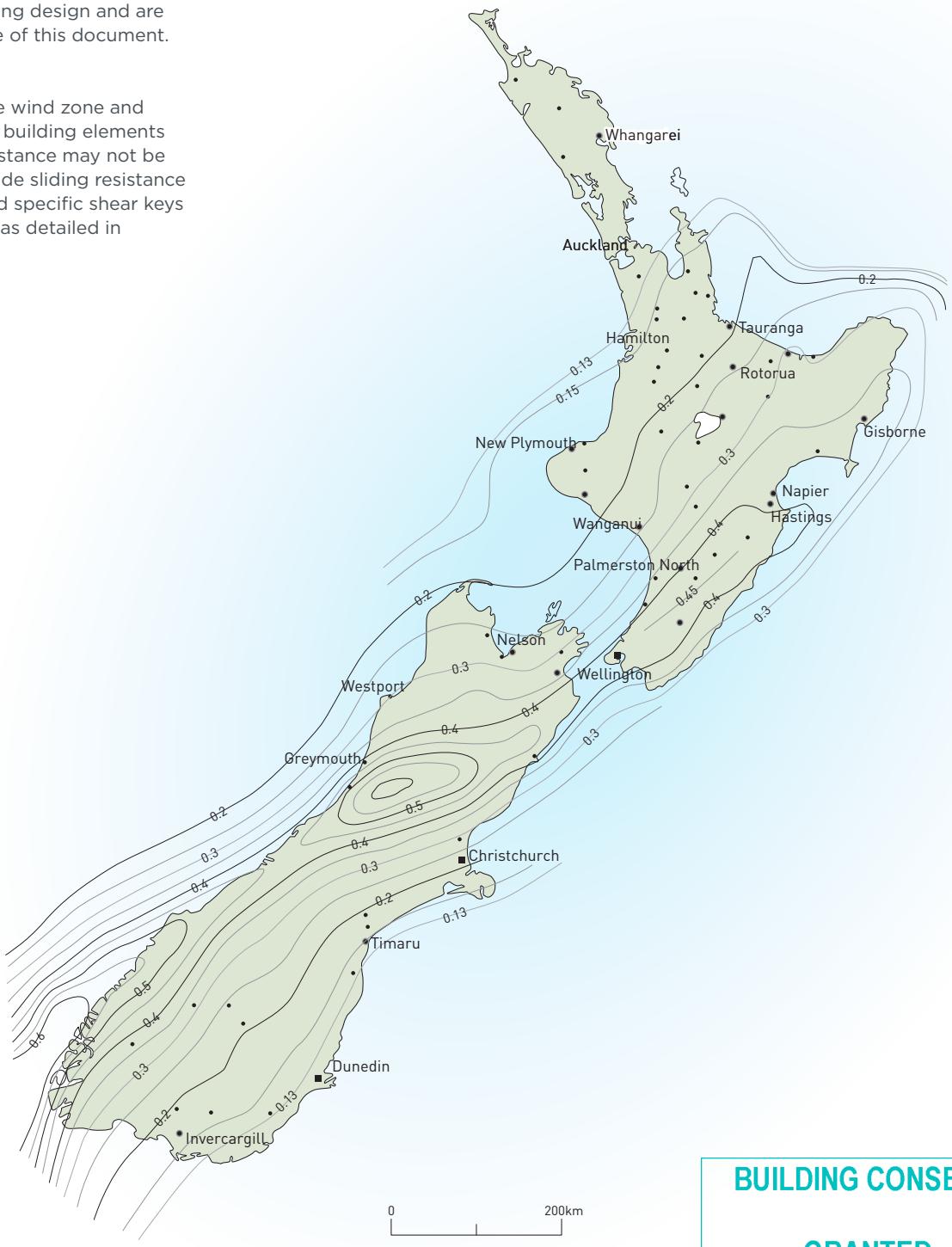


Figure 6
Seismic Hazard Factor Z to NZS 1170.5

5.2 Wind Resistance

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

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

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

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

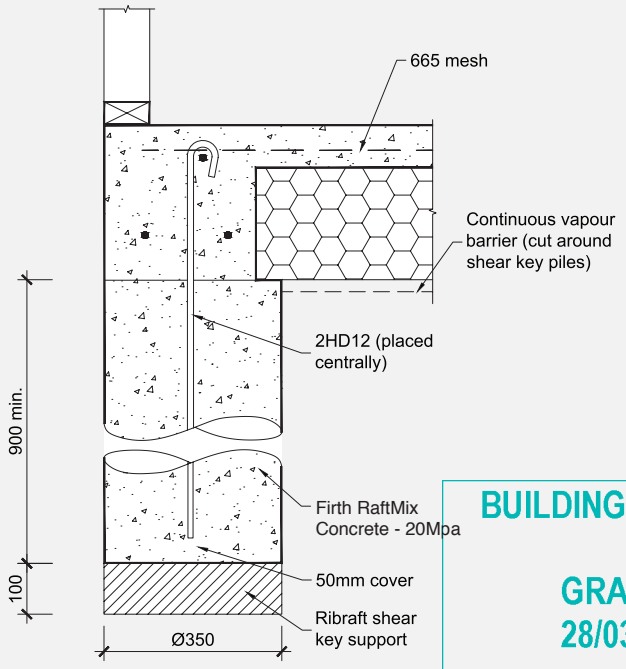
Table 4 Bracing Capacity Provided By Frictional Resistance Per 100m² Of Ground Floor Area

5.3 Shear Keys

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

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

Figure 7 RibRaft® Shear Key



5.4 Design Example For Lateral Resistance Calculation

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

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

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

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

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

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

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

6.0 OTHER DESIGN DETAILS

6.1 R-Values

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

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

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

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

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

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

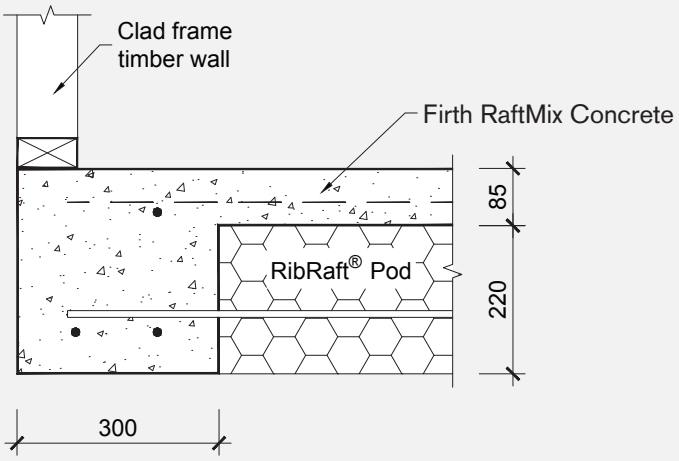


Figure 8
RibRaft® R Values For 90mm Thick Walls On The Floor Edge

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

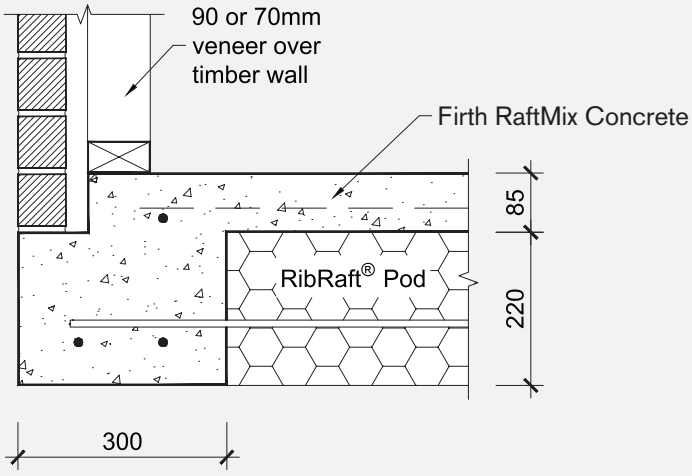


Figure 9
RibRaft® R Values For 70-90mm Thick Veneer, Cavity, and 90mm Walls.

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

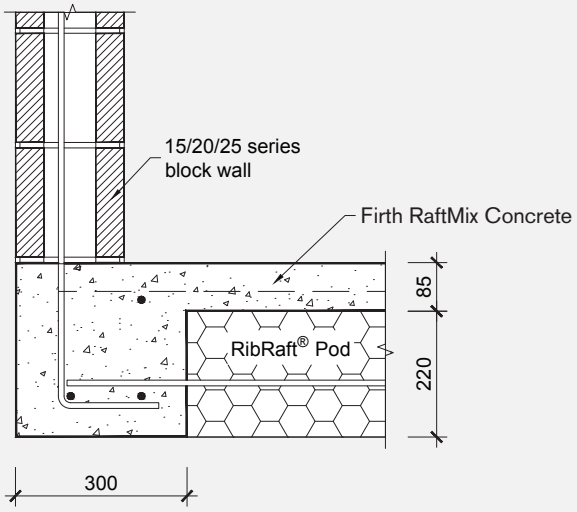


Figure 10
RibRaft® R Values
For Various
Thicknesses
Of Masonry Walls

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

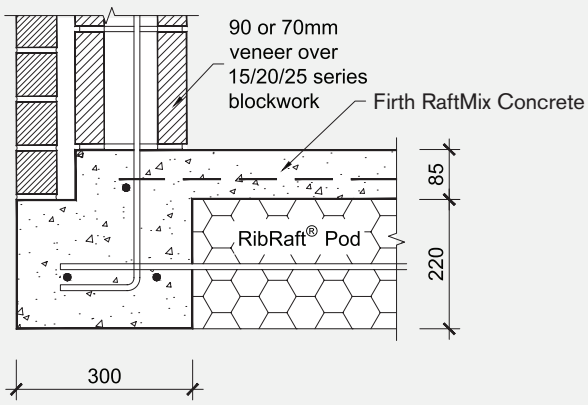


Figure 11
RibRaft® R-Values
For 70-90mm Thick
Veneer, Cavity, And
Various Thickness
Masonry Walls

	BLOCK	FLOOR AREA TO PERIMETER RATIO M²/M									
		1.25	1.50	1.75	2.00	2.25	2.0	2.75	3.0	3.5	4.00
R-Value m² °C/W	15 SERIES	1.59	1.73	1.86	1.99	2.12	2.24	2.37	2.49	2.72	2.95
	20 SERIES	1.64	1.78	1.92	2.06	2.19	2.32	2.44	2.58	2.81	3.04
	25 SERIES	1.69	1.83	1.98	2.11	2.25	2.38	2.51	2.64	2.88	3.12

6.2 Shrinkage Control

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

6.2.1 Saw Cut Joints

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

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

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

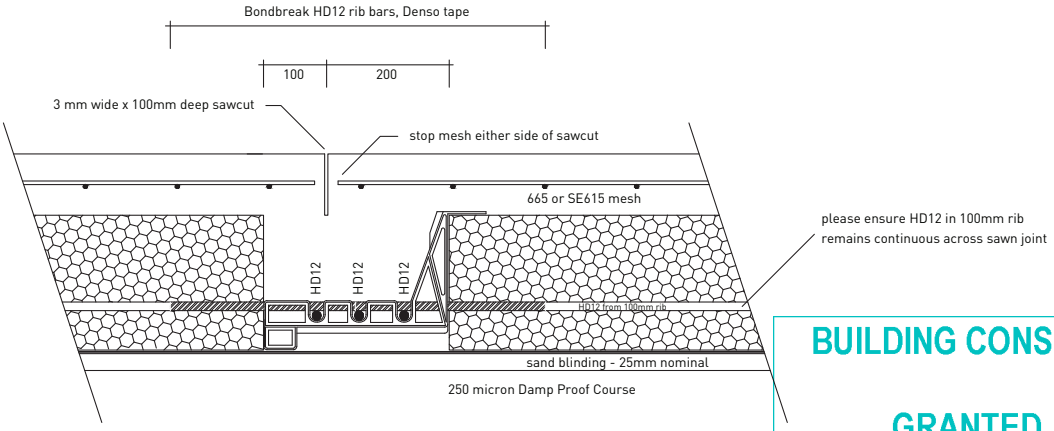
In order to limit the width of cracks at re-entrant, or internal corners, extra steel shall be placed on top of the mesh. These shall be 2-HD12 bars (Grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 3.

6.2.2 Free Joints

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

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

Figure 12 Free Joint Details



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

6.3 Services Detailing

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

6.3.1 Within Slab Running of Services

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

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

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

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

6.3.2 Under Slab Running Of Services

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

> Installed at right angles to the slab surface.

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

> Lagging must be at least 6mm thick.

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

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

Table 6 Maximum Diameter Of Pipe Services

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

Notes:

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

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

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

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

Figure 13 Example of Detailing Requirements For Services

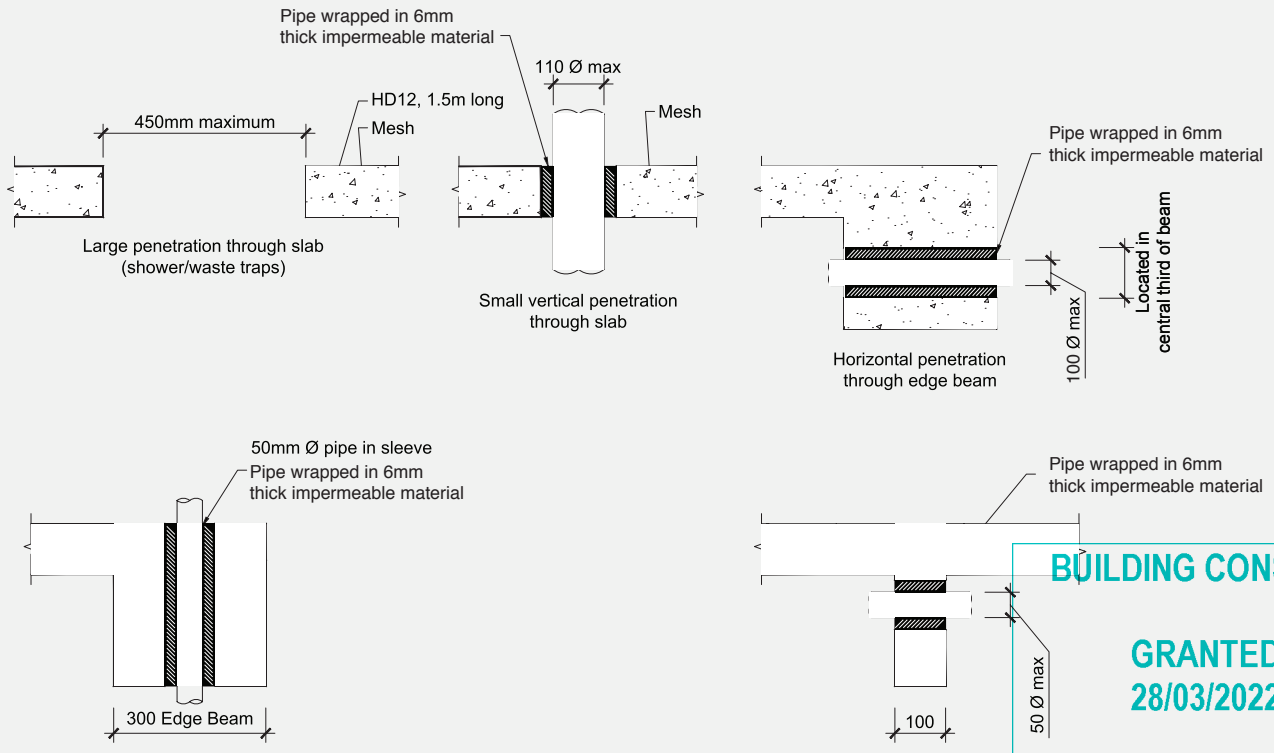
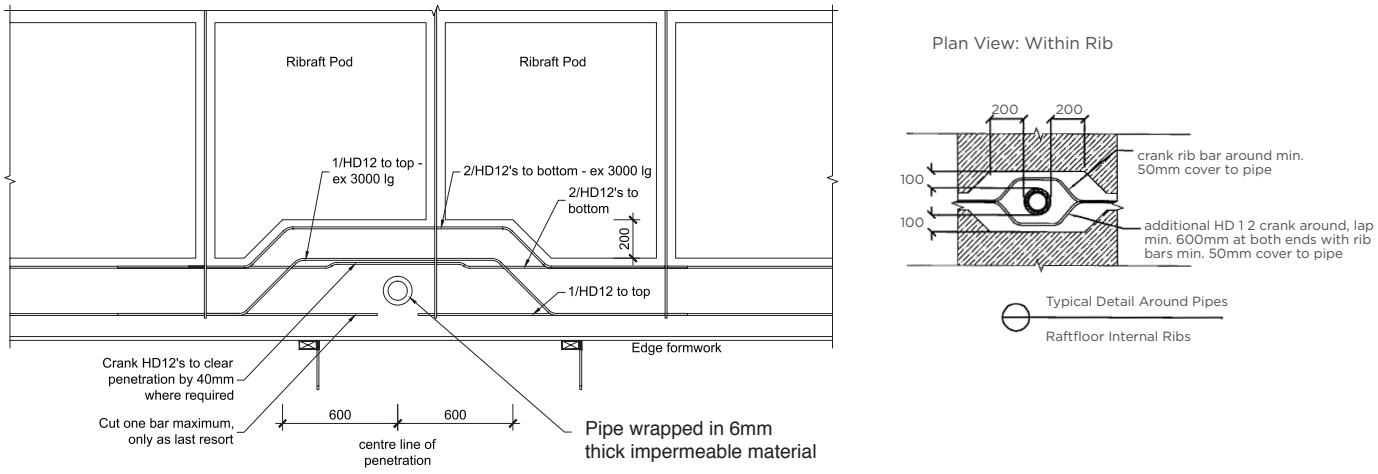


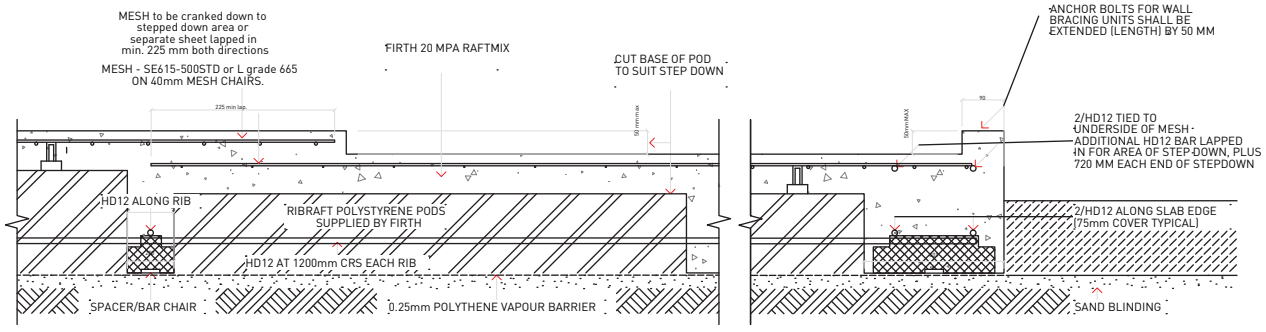
Figure 14
Localised Increase In Width At Edge Beam Where Vertical Service Up To 100mm Diameter Are Required



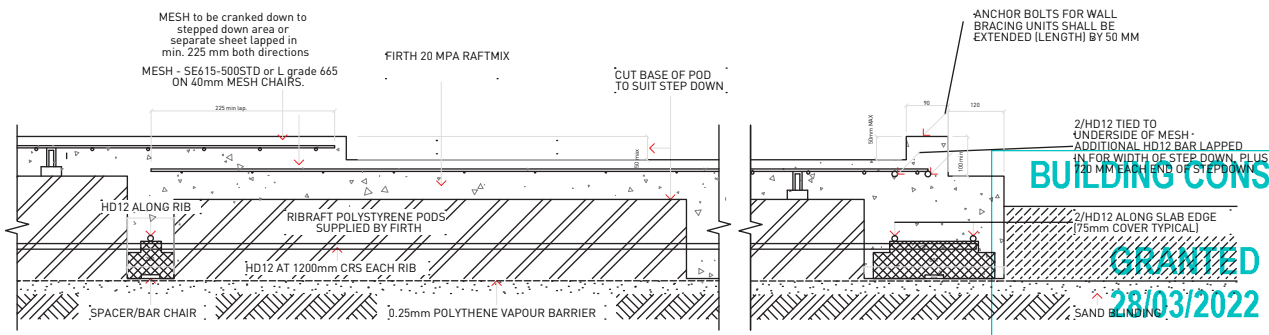
6.3.3 Recesses for Showers

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

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

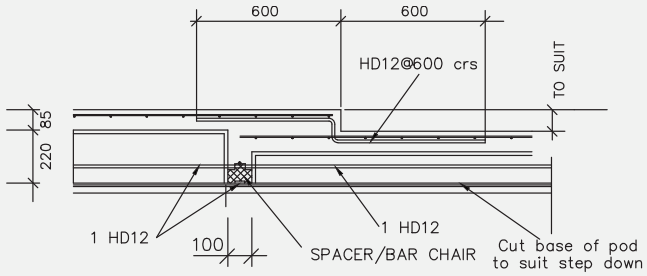


RIB RAFT FLOOR - SET-DOWN DETAIL FOR MAX. 50mm REBATED SHOWER

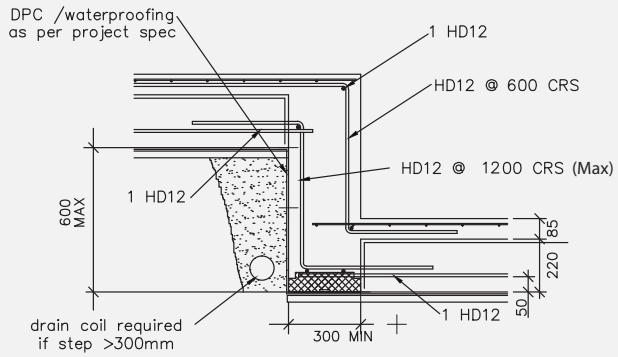


RIB RAFT FLOOR - SET-DOWN DETAIL FOR MAX. 50mm REBATED SHOWER

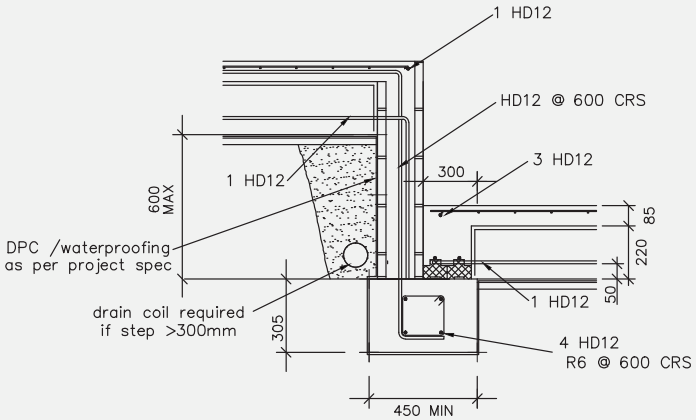
Figure 16 Details where step downs are required in the floor



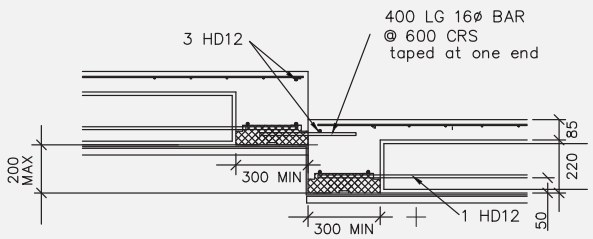
7/S2 SET–DOWN DETAIL FOR STEP UP TO 100mm
1:20



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



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



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

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

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

BUILDING CONSENT

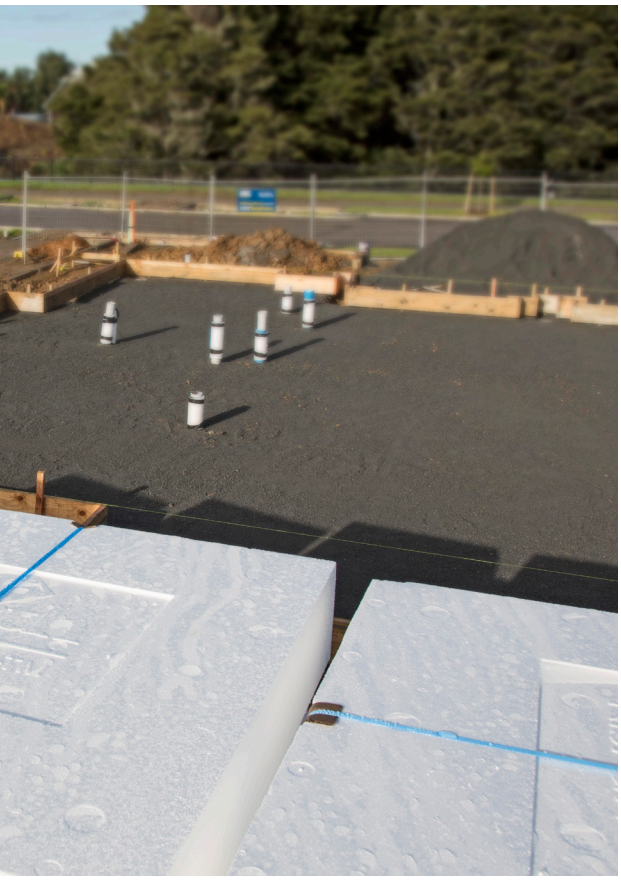
GRANTED
28/03/2022

HUTT CITY COUNCIL

SECTION: INSTALLATION INFORMATION

2

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



2.0 SITE REQUIREMENTS

2.1 General

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

This Section shall only apply for building sites such that:

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

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

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

2.2 Temporary Excavations

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

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

2.3 Surface Water

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

Figure 1
Relationship
Of RibRaft®
To Sloping
Ground Surface

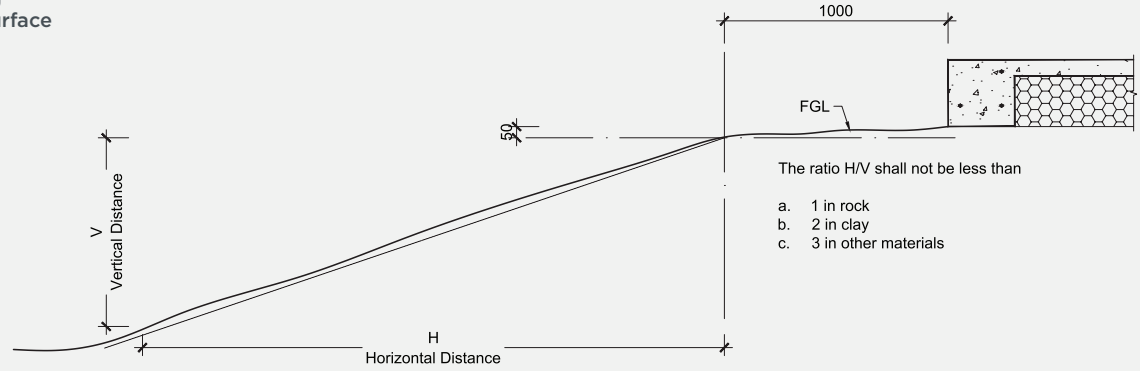


Figure 2
Temporary
Excavation
Limited

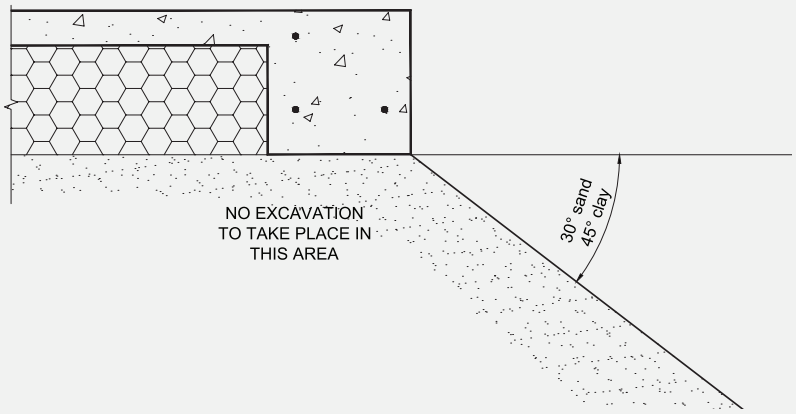
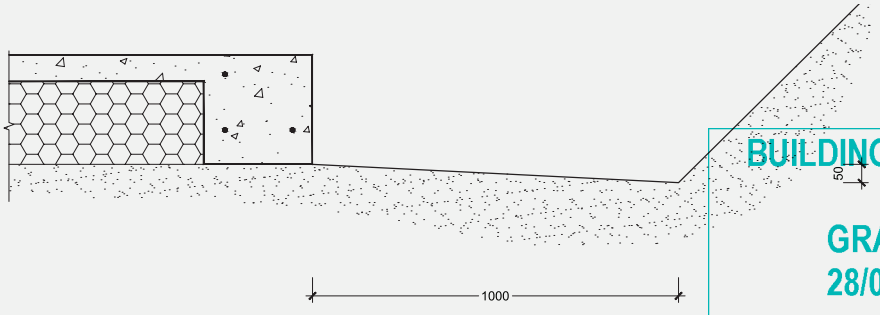


Figure 3
Site Grading



BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

3.0 INSTALLATION PROCEDURE

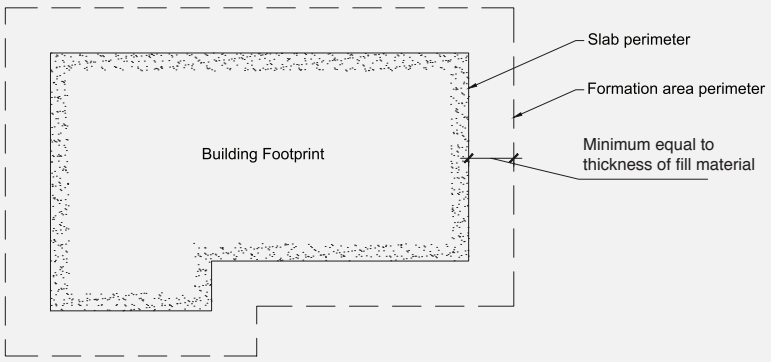
3.1 Site Preparation

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

3.2 Earthworks

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

Figure 4 Plan of Formation Area



3.3 Shear Keys

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

3.4 Plumbing and Services

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

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

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

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

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

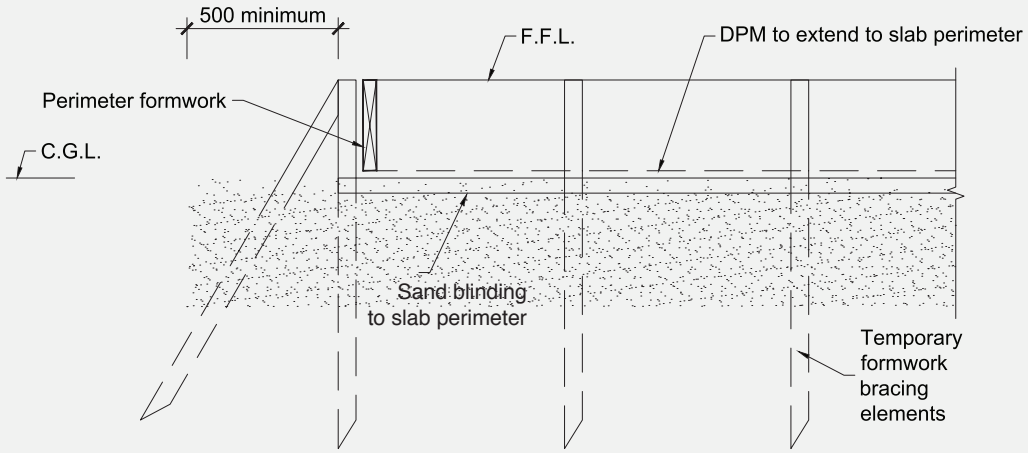
3.5 Sand Blinding

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

3.6 Damp Proof Membrane

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

Figure 5 Sand blinding / DPM / Formwork Details



3.7 Edge Formwork

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

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

3.8 Laying the Pods and Spacers

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

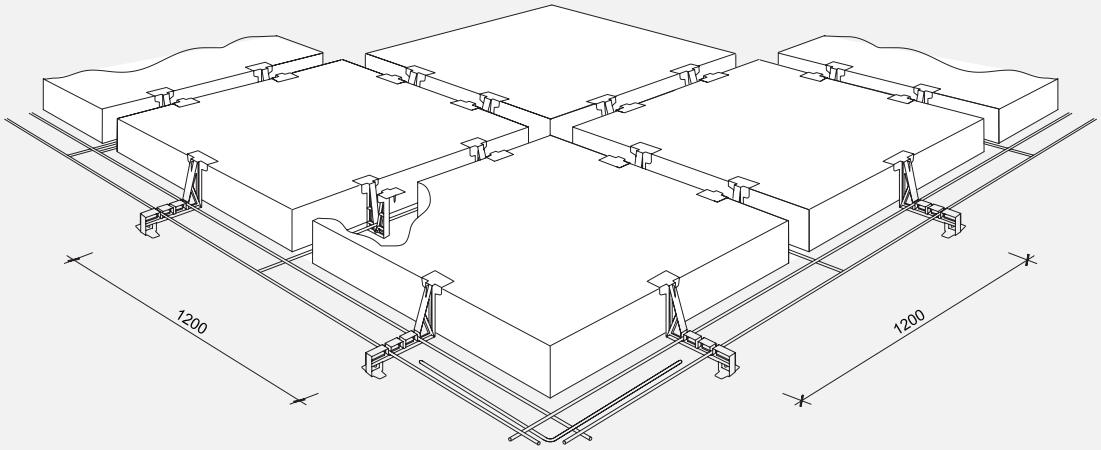
Except where a 300mm wide rib is required, each pod or part pod shall always be separated by 100mm using a minimum of one Firth approved 100mm spacer along each edge of each pod or part pod. The ribs in both directions shall form a waffle pattern throughout the slab. It is essential that the ribs and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

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

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

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

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



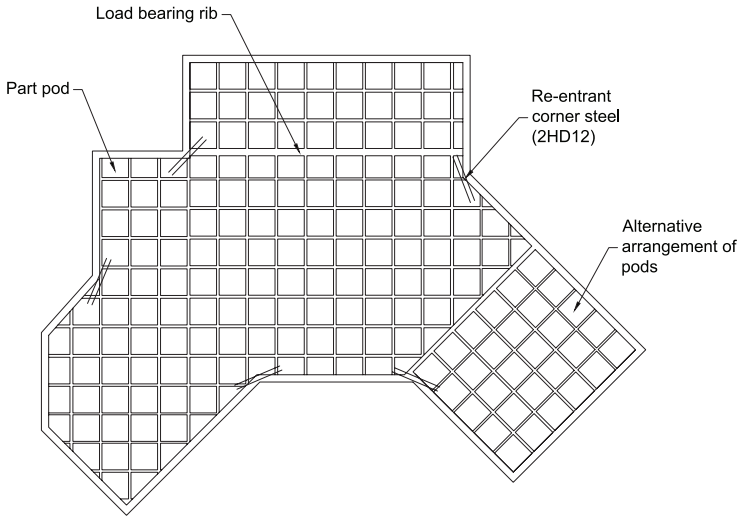


Figure 7 Typical Pod And Rib Layout

3.9 Reinforcing Steel

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

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

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

3.9.1 Edge Beam Steel

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

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

3.9.2 Rib Steel

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

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

3.9.3 Mesh Reinforcing

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

3.9.4 Re-entrant Corner Steel

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

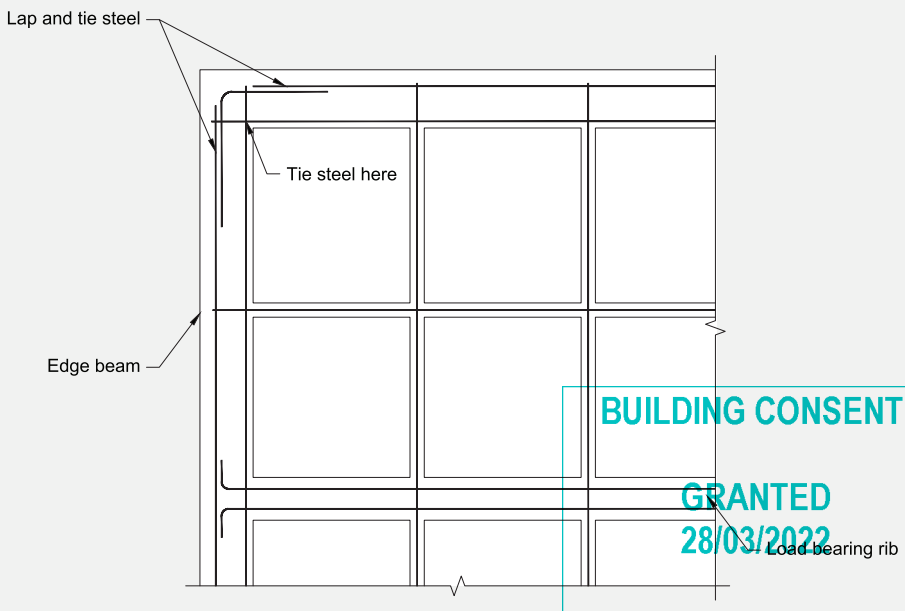


Figure 8 Corner steel layout

3.10 Concrete Installation

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

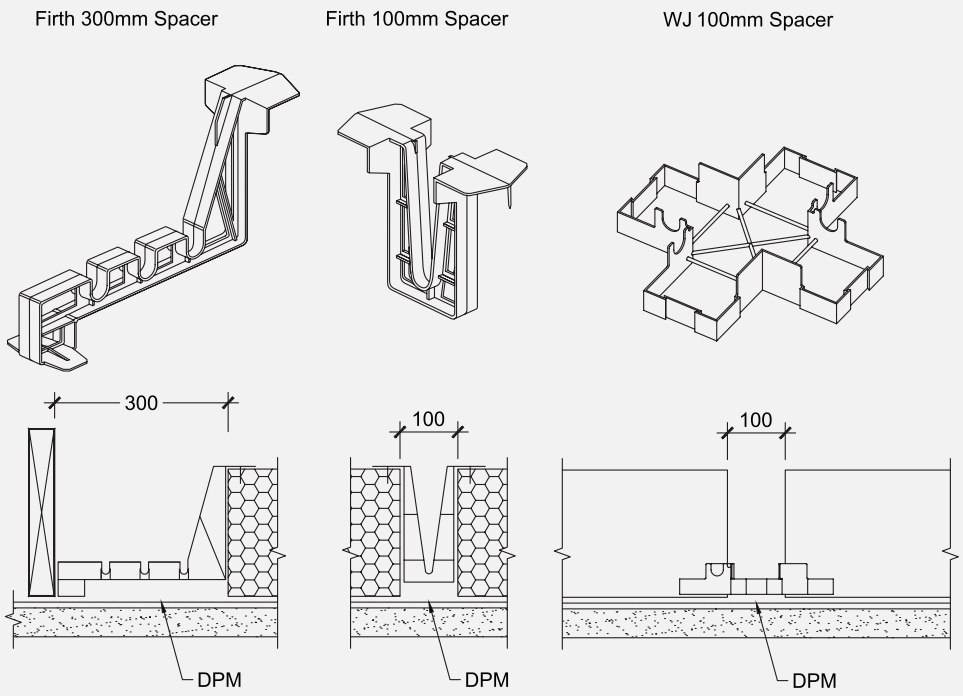
3.10.1 Placing

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

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

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

Figure 9
Spacer
Details



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

3.10.2 Finishing

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

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

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

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

3.10.3 Curing

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

> Ponding or continuous sprinkling of water.

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

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

3.11 Shrinkage Control Joints

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

3.11.1 Saw Cut Joints

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

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

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

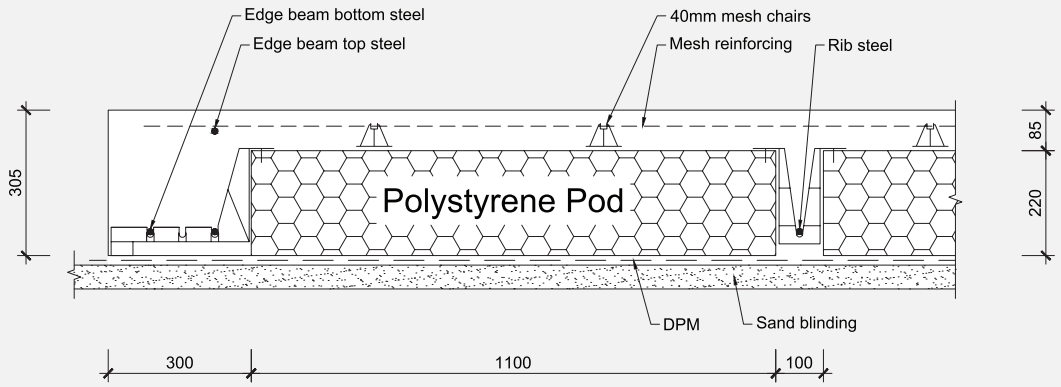
In order to limit the width of cracks at re-entrant, or internal corners, extra steel shall be placed to control the mesh. These shall be 2-HD12 bars (grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Figure 7.

3.11.2 Free Joints

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

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

Figure 10 Detailed Section



3.12 Removal of Formwork

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

3.13 Masonry Veneer

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

3.14 Landscaping/Paving

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

3.15 Ongoing Maintenance

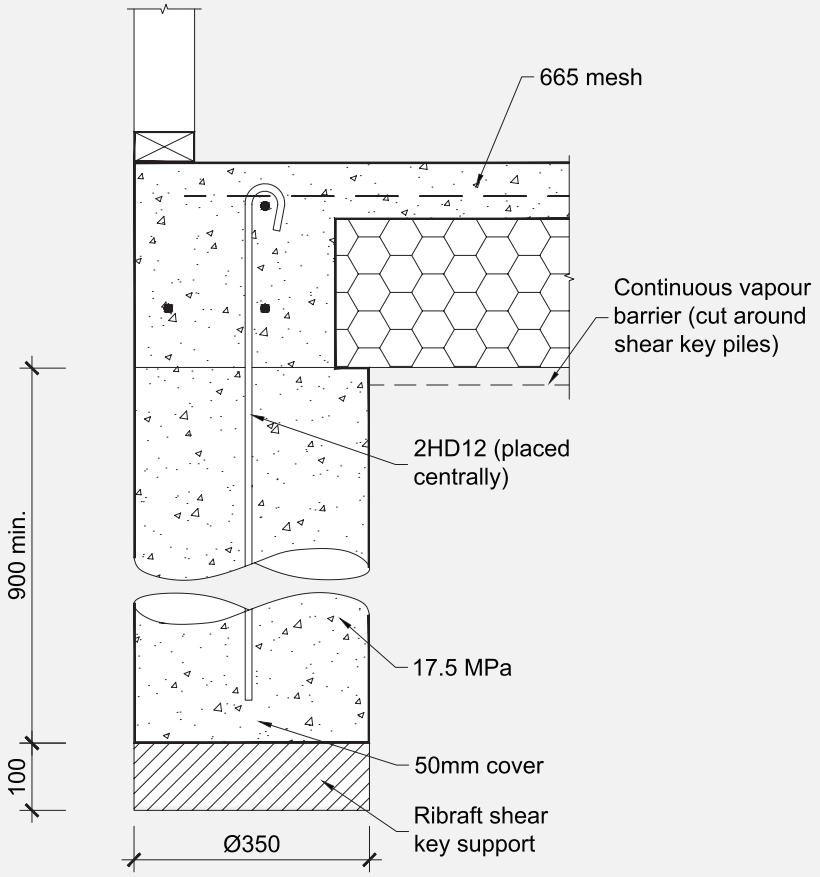
The building owner shall ensure that the ground surrounding the system be maintained so that the integrity of the system is not jeopardised. In other words, at no time shall the ground immediately adjacent to the system be allowed to settle away to expose the underside of the slab.

4.0 SHEAR KEYS

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

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

Figure 11 Shear Pile Construction Detail



SECTION: VERIFICATION

3

1.0 DESIGN

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

2.0 CONSTRUCTION

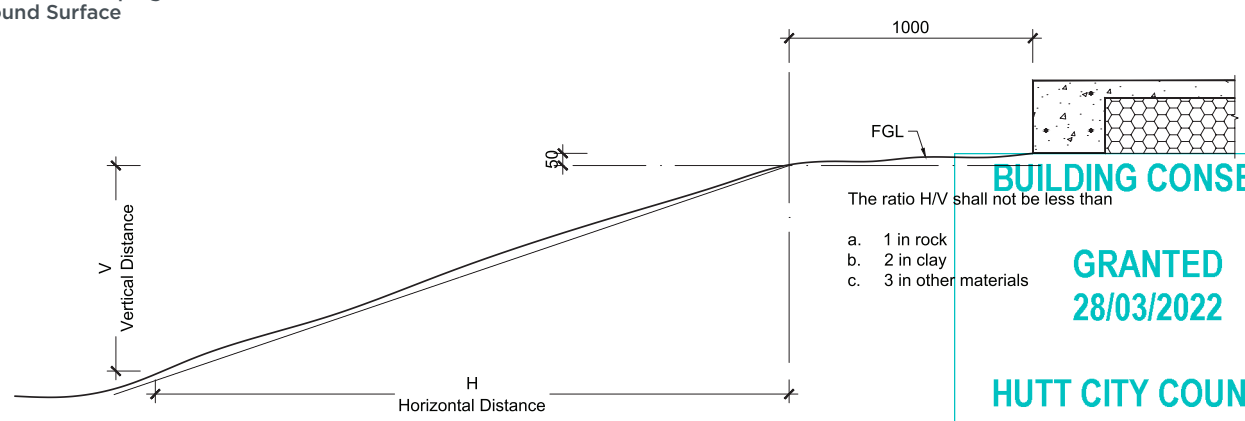
The RibRaft® foundation system has been designed to accommodate structures complying with the non specific design standards NZS3604 or NZS4229. With these types of structures the Building Control Authority specifies the inspections required and often conducts these. A similar construction verification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

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

PRE-POUR INSPECTION CHECK LIST

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

Figure 1
Relationship of RibRaft® To Sloping Ground Surface



BC220141

CODEMARK
CM70056

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

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

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

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

CONCRETE & MASONRY PRODUCTS: A SUSTAINABLE BUILDING OPTION & SOLUTION

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

Firth

0800 FIRTH 1 (347841)
FIRTH.CO.NZ

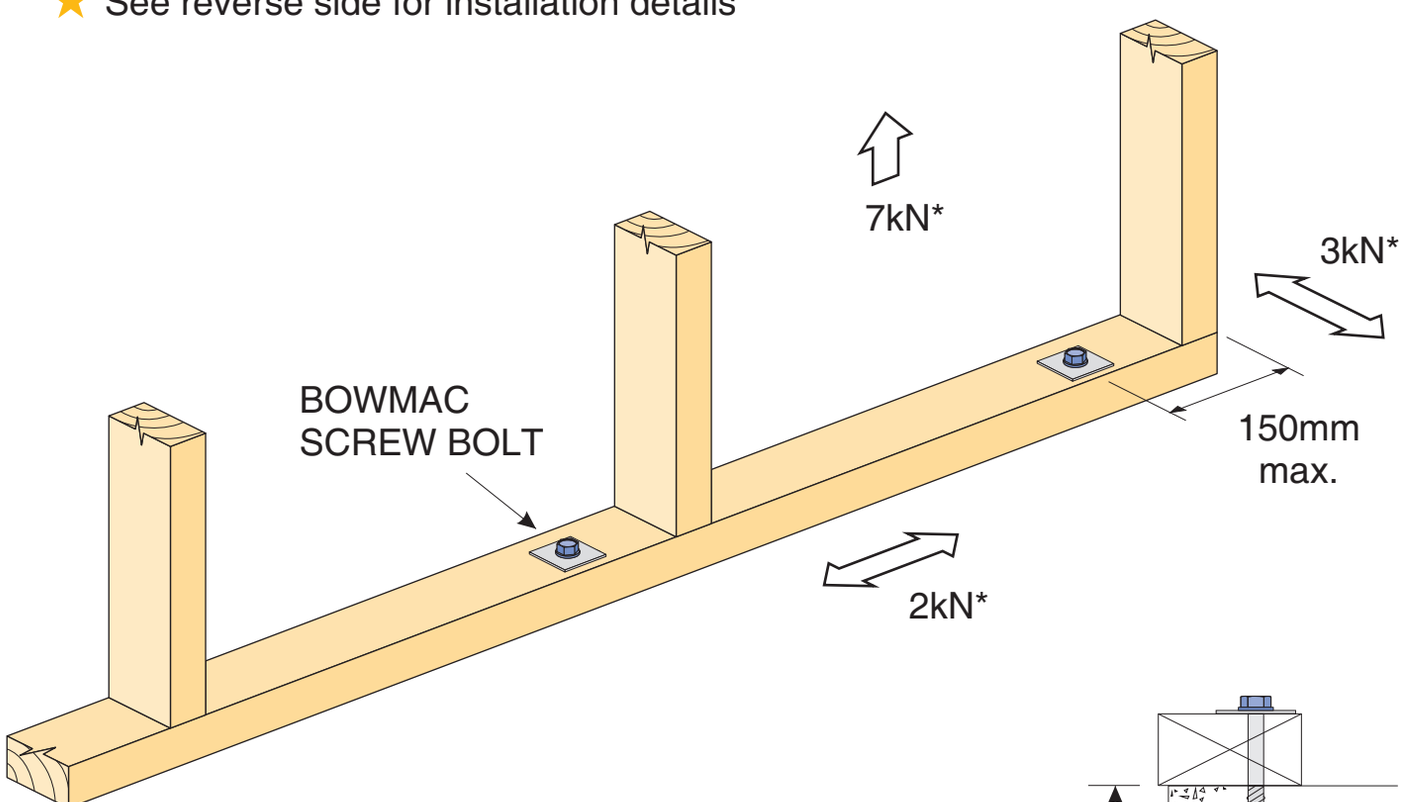
04/2013

BOWMAC®

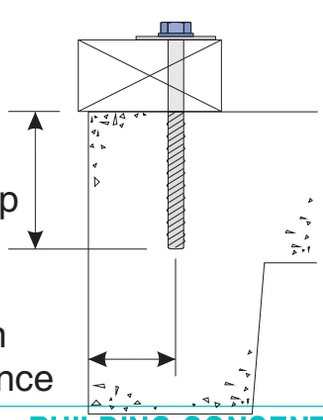
BOTTOM PLATE SCREW BOLT

M10 X 140 BOWMAC BLUE HEAD

- ★ Complies with Clause 7.5.12.2 NZS 3604:2011 Proprietary Post Fixed Anchors
- ★ BRANZ tested. Ref# ST0895 Oct. 2012
- ★ Suitable for both external and internal wall frame anchor to concrete slab or masonry header blocks
- ★ Complies with durability requirements for “All Zones” in a “CLOSED” environment as defined in Table 4.1 NZS 3604:2011
- ★ See reverse side for installation details



* Min. load capacity per anchor
from Clause 7.5.12.3 NZS 3604:2011



Available from leading Builders Supply Merchants throughout New Zealand

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

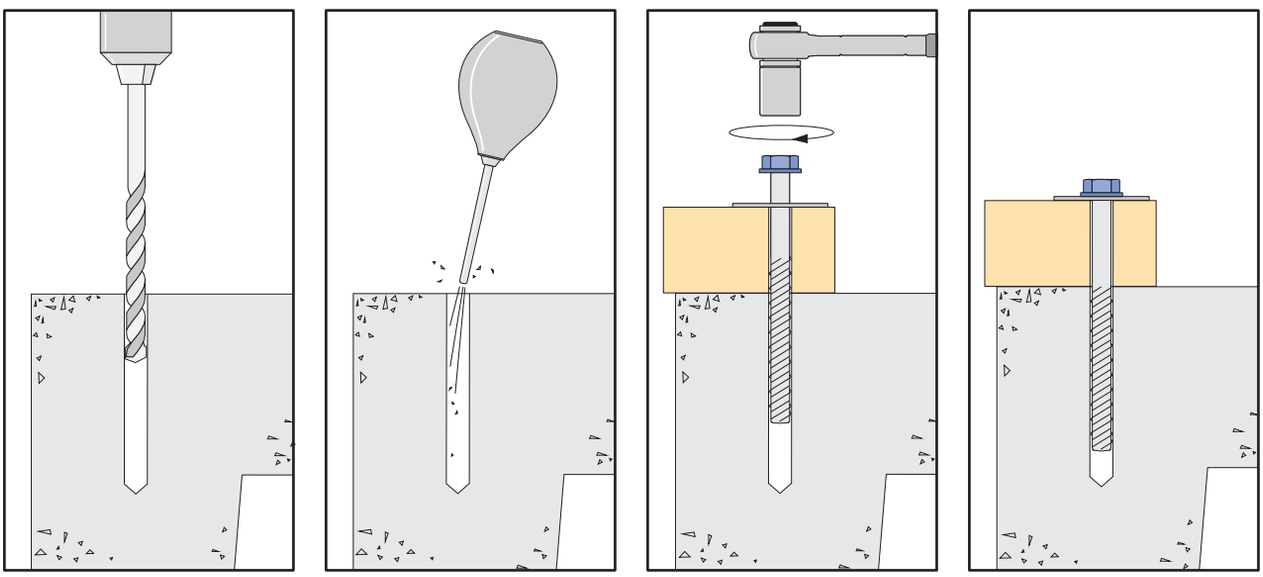
MiTek®

BOWMAC®

Installation Details

★ Install BOWMAC SCREW BOLT and washer supplied to concrete slabs at 900mm max. crs., or 600mm max. crs. when using masonry header blocks.

★ SCREW BOLT must be located within 150mm from end of timber wall frame.



- Use a 10mm diameter masonry bit for drilling into concrete substrate.
- Drill a hole into the concrete base to a minimum depth of 95mm and clean out dust and debris from hole prior to installation of BOWMAC SCREW BOLT.
- Insert SCREW BOLT through washer and timber and into the hole.
- Begin tightening SCREW BOLT by applying downward pressure when engaging the first thread.
- Additional downward pressure may be required for installation in high strength, dense concrete.
- Continue tightening SCREW BOLT until the head is firmly seated against the washer.
- In extremely dense material, use of an impact wrench is recommended.
- Ensure SCREW BOLT is at the required embedment depth.
- Don't exceed the maximum clamping torque of 80Nm.
- The installation is now complete.

Installation Tips

- Use quality hexagonal socket with a ratchet spanner.
- Where substrate allows, a torque controlled wrench can be used.
- During installation debris or dust created by the thread cutting action may cause some resistance to be experienced. This is easily overcome by unscrewing the BOWMAC SCREW BOLT for one turn, or more and then continue to fix to the full embedment.

Code: **BPS**
Packed: **10 SCREW BOLTS & washers per bag**
5 bags per carton outer

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

MiTek New Zealand Limited

AUCKLAND
PO Box 58-014, Botany 2163
Phone: 09-274 7109
Fax: 09-274 7100

CHRISTCHURCH
PO Box 8387, Riccarton 8440
Phone: 03-348 8691
Fax: 03-348 0314

www.miteknz.co.nz

MITEK® LUMBERLOK® BOWMAC®

HUTT CITY
TE AWA KAIRANGI

BRANZ Appraised
Appraisal No. 695 [2017]

WATERGATE PLUS WALL UNDERLAY

Appraisal No. 695 (2017)

Amended 15 September 2021

This Appraisal replaces BRANZ Appraisal No. 695 (2010)

BRANZ Appraisals

Technical Assessments of products for building and construction.

Thermakraft Limited
PO Box 58 112
Greenmount
Auckland
Tel: 09 273 3727
Fax: 09 273 3726
Free phone: 0800 806 595
www.thermakraft.co.nz

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 Watergate Plus is a fire retardant, flexible synthetic wall underlay for use under direct fixed and non-direct fixed wall cladding on timber and steel-framed buildings. The product is manufactured from coated, non-woven polyolefin and is coloured white.

Scope

Flexible Wall Underlay

2.1 Watergate Plus has been appraised for use as a flexible wall underlay for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber-framed buildings; or,
- the scope limitations of NASH Building Envelope Solutions, Paragraph 1.1 for steel-framed buildings; and,
- with direct fixed absorbent and non-absorbent wall claddings; or,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; or,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber-framed buildings or to NASH Building Envelope Solutions for steel-framed buildings; and,
- situated in NZS 3604 Wind Zones up to, and including, Very High.

Use over Rigid Wall Underlay

2.2 Watergate Plus has been appraised for use as a flexible wall underlay over rigid wall underlays on buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 for timber-framed buildings; or,
- the scope limitations of NASH Building Envelope Solutions Paragraph 1.1 for steel-framed buildings; and,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
- with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber-framed buildings or NASH Building Envelope Solutions for steel-framed buildings; and,
- situated in NZS 3604 and NASH Standard Part 2 Wind Zones up to, and including, Extra High.

Specific Design

2.3 Watergate Plus has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Watergate Plus into their design in accordance with the declared properties and the instructions of Thermakraft Limited.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Watergate Plus, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.2. Watergate Plus meets these requirements. See Paragraphs 9.1 and 9.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.4 (c). Watergate Plus meets this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Watergate Plus will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Watergate Plus meets this requirement.

Technical Specification

4.1 Watergate Plus is a white, 105 g/m^2 non-woven, microporous polyolefin fabric underlay.

4.2 The product is supplied in various sizes. Refer to Table 1. The product is printed with the Watergate Plus logo repeated along the length of the roll and can also be co-branded with custom printing. The rolls are wrapped in clear polythene film.

Table 1: Roll Dimensions

Width (mm)	Length (m)	Coverage (m^2)
1,370	18.5	25
1,370	37	50
1,370	73	100
2,740	18.5	50
2,740	36.5	100

Accessories

4.3 Accessories used with Watergate Plus which are supplied by the installer are:

- **Fixings** - 6-8 mm staples, large head clouts minimum 20 mm long, self-drilling screws, proprietary underlay fixings, double sided tape (for steel framing) or other temporary fixings to attach the wall underlay to the framing.
- **Wall underlay restraint (timber frame)** - polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to restrain the wall underlay in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.
- **Wall underlay restraint (steel frame)** - polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to restrain the wall underlay in accordance with NASH Building Envelope Solutions, Paragraph 9.1.9.5. Thermal break sheathing installed in accordance with NASH Building Envelope Solutions Paragraph 11.4.3.2.

Handling and Storage

5.1 Handling and storage of the product, whether on-site or off-site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

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

Design Information

7.1 Watergate Plus is intended for use as an alternative to conventional building papers which are fixed over timber or steel-framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain. Refer to Table 2 for material properties.

7.2 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.

7.3 Watergate Plus must not be exposed to the weather or ultraviolet (UV) light for a total of more than 90 days before being covered by the wall cladding.

7.4 Watergate Plus is suitable for use as an air barrier where walls are not lined, such as attic spaces at gable ends, in accordance with NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, Paragraph 9.1.4 (c).

7.5 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be restrained between the battens to prevent the underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity. Refer to NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5 for timber framing or NASH Building Envelope Solutions, Paragraph 9.1.9.5 for steel framing. Wall underlay restraint options include polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens or thermal break sheathing (steel framing only).

Table 2: Material Properties

NZS 2295 Property	Property Performance Requirement	Actual Property Performance
Absorbency	≥ 100 g/m^2	Pass
Vapour Resistance	≤ 7 MN s/g	Pass
Water Resistance	≥ 20 mm	Pass
pH of Extract	≥ 6 and ≤ 9	Pass
Shrinkage	≤ 0.5%	Pass
Mechanical	Edge tear and tensile strength	**Edge tear (Average):** Machine direction = 77 N Cross direction = 56 N **Tensile strength (Average):** Machine direction = 2.5 kN/m Cross direction = 2.8 kN/m
Air Barrier	Air resistance: ≥ 0.1 MN s/m^3	Pass. Watergate Plus can be used as an air barrier.

Claddings

7.6 Watergate Plus is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23 on timber-framed buildings and NASH Building Envelope Solutions Table 23 on steel-framed buildings, including non-absorbent wall claddings such as vinyl and metal-based weatherboards in direct fixed situations.

Stucco Plaster

7.7 Watergate Plus is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1 for timber framing or NASH Building Envelope Solutions Paragraph 9.3.5.1 for steel framing. The underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm.

7.8 Watergate Plus may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3.1 b) for timber framing or NASH Building Envelope Solutions, Paragraph 9.3.3.1 b) for steel framing.

Structure

8.1 Watergate Plus is suitable for use in all Wind Zones of NZS 3604 and NASH Standard Part 2 up to, and including, Very High when used as a stand-alone flexible wall underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid wall underlays.

Durability

9.1 Watergate Plus meets code compliance with NZBC Clause B2.3.1 (a) not less than 50 years for wall underlays used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, and code compliance with NZBC Clause B2.3.1 (b) 15 years for wall underlays used where the cladding durability requirement is 15 years.

Serviceable Life

9.2 Provided it is not exposed to the weather or UV light for a total of more than 90 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Watergate Plus is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

10.1 Watergate Plus has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solution C/AS2, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces.

Prevention of Fire Occurring

11.1 Separation or protection must be provided to Watergate Plus from heat sources such as fireplaces, heating appliances, flues and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

12.1 Watergate Plus must be used behind claddings that meet the requirements of the NZBC, such as those covered by NZBC Acceptable Solution E2/AS1 or NASH Building Envelope Solutions, or claddings covered by a valid BRANZ Appraisal.

12.2 Watergate Plus, when installed in accordance with the Technical Literature and this Appraisal will assist in the total cladding systems compliance with NZBC Clause E2.

Installation Information

Installation Skill Level Requirements

13.1 All design and building work must be carried out in accordance with the Watergate Plus Wall Underlay Technical Literature and this Appraisal by competent and experienced tradespersons conversant with wall underlays. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

Underlay Installation

14.1 Watergate Plus must be fixed to all framing members at maximum 300 mm centres with clouts, staples, self drilling screws or proprietary underlay fixings. For steel framing, double-sided tape may be used which is applied to each stud in continuous strips. The underlay must be pulled taut over the framing before fixing.

14.2 Watergate Plus must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 150 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.

14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the underlay by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut underlay must be folded inside the opening and stapled to the penetration framing. Excess underlay may be cut off flush with the internal face of the wall frame.

14.4 Watergate Plus can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3 for timber framing or NASH Building Envelope Solutions Paragraph 9.1.11.3 for steel framing.

14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.

14.6 Any damaged areas of Watergate Plus, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

14.7 The Technical Literature must be referred to during the inspection of Watergate Plus installations.

Basis of Appraisal

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

Tests

15.1 The following tests have been carried out on Watergate Plus in accordance with NZBC Acceptable Solution E2/AS1, Table 23: tensile strength, edge-tear resistance and resistance to water vapour transmission in accordance with AS/NZS 4200.1, shrinkage in accordance with AS/NZS 4201.3, resistance to water penetration in accordance with AS/NZS 4201.4, surface water absorbency in accordance with AS/NZS 4201.6, pH of extract in accordance with AS/NZS 1301.421s and air resistance to BS 6538.3. A range of these tests were completed before and after Watergate Plus was exposed to UV light.

15.2 The flammability index of Watergate Plus has been evaluated in accordance with AS/NZS 1530.2.

Other Investigations

16.1 A durability opinion has been given by BRANZ technical experts.

16.2 An evaluation of the expected performance of Watergate Plus in direct contact with metal wall cladding has been completed by BRANZ.

16.3 The practicability of installation of Watergate Plus has been assessed by BRANZ and found to be satisfactory.

16.4 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

17.1 The manufacture of Watergate Plus has not been examined by BRANZ, but details of the methods adopted for quality control and the quality of the materials used, have been obtained and found to be satisfactory.

17.2 The quality of supply to the market is the responsibility of Thermakraft Limited.

17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall underlay into their design in accordance with the instructions of Thermakraft Limited.

17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Thermakraft Limited.

Sources of Information

- AS 1530.2:1993 Test for flammability of materials.
- AS/NZS 1301.421s:1998 Determination of the pH value of aqueous extracts of paper, board and pulp - Cold extraction method.
- AS/NZS 4200.1:1994 Pliable building membranes and underlays - Materials.
- AS/NZS 4201.1:1994 Pliable building membranes and underlays - Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2:1994 Pliable building membranes and underlays - Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3:1994 Pliable building membranes and underlays - Methods of test – Shrinkage.
- AS/NZS 4201.4:1994 Pliable building membranes and underlays - Methods of test – Resistance to water penetration.
- AS/NZS 4201.6:1994 Pliable building membranes and underlays - Methods of test – Surface water absorbency.
- BS 6538.3:1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295:2006 Pliable, permeable building underlays.
- NZS 3604:2011 Timber-framed buildings.
- NASH Building Envelope Solutions: 2019 Light steel-framed buildings.
- NASH Standard Part Two: 2019 Light Steel Framed Buildings.
- Ministry of Business, Innovation and Employment Record of Amendments - Acceptable Solutions, Verification Methods and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 30 November 2018

This Appraisal has been amended to change the Appraisal name to Watergate 295 Synthetic Underlay and to update Table 1.

Amendment No. 2, dated 15 February 2019

This Appraisal has been amended to change the Appraisal name to Watergate Plus Wall Underlay.

Amendment No. 3, dated 26 February 2020

This Appraisal has been amended to change the Appraisal name to Watergate Plus, include roll size of 3.0 m x 30 m, update Table 1 and update NZBC referenced documents.

Amendment No. 4, dated 01 March 2021

This Appraisal has been amended to update the roll sizes available. Refer Table 1.

Amendment No. 5, dated 15 September 2021

This Appraisal has been amended to increase the maximum exposure period to 90 days.

BRANZ

In the opinion of BRANZ, Watergate Plus Wall Underlay is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

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

Conditions of Appraisal

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

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
21 September 2017

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY TE AWA KAIRANGI

BC220141

Thermakraft

Thermakraft
ONE WRAP SYSTEM
10 Products - One system
One warranty

Installation Guide

WATERGATE PLUS

New Zealand's premium all-purpose, fire retardant wall wrap.

Watergate Plus is specifically designed as a wall underlay behind exterior wall cladding. Made from synthetic materials Watergate Plus is fire retardant, water resistant and vapour permeable. The water vapour transfer rate of the product has been optimised to minimise condensation risk in homes without compromising its primary water barrier properties.

Watergate Plus is part of the Thermakraft One Wrap System. Its unique construction allows for easier installation while maintaining best in class performance qualities.

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

Smarter products. Better buildings.
thermakraft.co.nz

CodeMark
BRANZ-CM-1002

BRANZ Appraised
Appraisal No.695 [2017]

HUTT CITY
TE AWA KAIRANGI

Installation Guide

Application Method

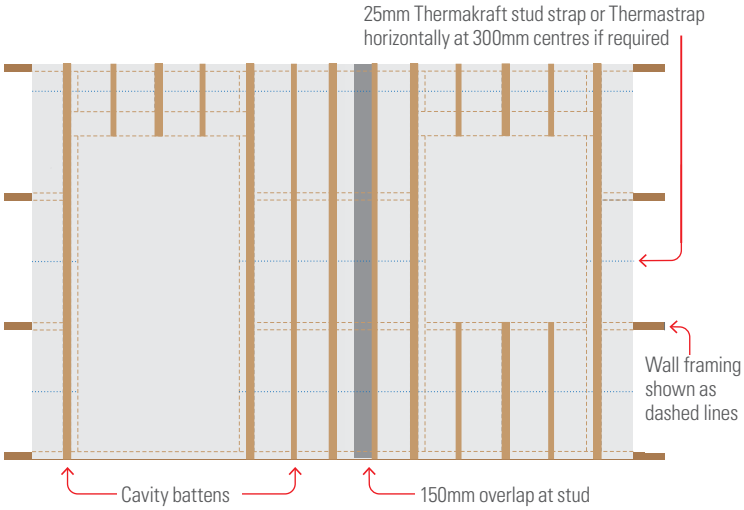
- Fix Watergate Plus underlay with printed side facing the exterior.
- Fix to all exterior walls from below bearers to the top plate. Pull the Watergate Plus underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically. Additional fasteners should be used around each opening to be cut out. Fixing types and requirements for steel framed structure can be found in the MRM Code of Practice.
- Watergate Plus underlays are available in widths of 2740mm and 1370mm. The 2740mm width product is generally wide enough to cover from below the bottom plate to the top plate.
- When fixing Watergate Plus underlay to Steel framing the same procedures applies. Use adhesive spray or tape or flat head screws to fasten to the framing or thermal break, the exterior cladding fastenings will act as the permanent fixings.
- Cover all windows and door openings with Watergate Plus underlay.
- It is recommended that the Watergate Plus underlay is not cut and prepared for window installation until the arrival of the windows. Minimum of 150mm lap is required at joins. All vertical laps must be made over studs. Horizontal laps to be laid ship lap style allowing water to be shed to the outer face of the membrane.
- When windows and doors are ready for installation, the Watergate Plus underlay covering the openings should cut at 45° and folded into the opening and securely fastened. Thermakraft window flashing tapes are recommended as the window flashing system. **Note:** In accordance with NZBC Acceptable Solution E2/AS1, wall underlay must be prevented from bulging into the drained cavity. Where stud spacing is greater than 450mm, Thermakraft stud strap run horizontally at 300 centres is an acceptable means of prevention.
- Once installed, Watergate Plus must not be left exposed to the weather or UV for a maximum of 60 days. Watergate Plus underlays will provide temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZBC B2 Durability.
- Make good repairs in damaged areas with Thermakraft window flashing tapes. Any large areas which require repair may be covered with a second layer of underlay with a lap of 150mm required.
- Watergate Plus underlay must be installed by a licensed building practitioner.

Fix securely to the frame with fasteners such as 6-8mm staples

On arrival of doors and windows, cut Watergate at each opening on a 45° angle away from each corner. Pull the Watergate flaps inside and fasten to the inside of frame.

Application Tips

Watergate Plus is unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent to flash off in a well ventilated area. Recommended minimum 7 days.



Handling and Storage

Watergate Plus underlay must be handled with care to prevent damage such as tearing and roll deformation. Due to the width of the product, care should be taken when installing in windy conditions.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

Thermakraft Limited / 0800 806 595

Issue 2, January 2020

BRANZ Appraised

Appraisal No. 648 [2016]

KNAUF GLASSWOOL INSULATION

Appraisal No. 648 (2016)

Amended 12 May 2021

BRANZ Appraisals

Technical Assessments of products for building and construction.

Knauf Insulation Pty Limited

Unit 1/44 Borthwick Avenue
Murarrie
Queensland 4172
Australia

Tel: + 61 7 3343 1989

Web: www.knaufinsulation.com.au

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 Knauf Glasswool Insulation is a range of thermal insulating material manufactured from ECOSE® Technology resin-bonded, glass wool fibres. The insulation is pre-cut to suit a wide range of thermal insulation requirements and framing set-outs in walls, ceilings and roofs of buildings.

1.2 The Knauf Glasswool Insulation product range includes Earthwool® Glasswool Insulation and Earthwool® Glasswool Insulation with DriTherm® Technology products, as detailed in Table 1. Earthwool® Glasswool Insulation with DriTherm® Technology is silicon treated.

Scope

2.1 Knauf Glasswool Insulation has been appraised as a thermal insulating material for framed or part-framed walls, ceilings and roofs of domestic and commercial buildings.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Knauf Glasswool Insulation, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years and B2.3.1 (b) 15 years and B2.3.2. Knauf Glasswool Insulation meets these requirements. See Paragraph 8.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.1. Knauf Glasswool Insulation contributes to meeting this requirement. See Paragraphs 13.1 and 13.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Knauf Glasswool Insulation meets this requirement.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.1 (a) and H1.3.2 E. Knauf Glasswool Insulation contributes to meeting these requirements. See Paragraphs 14.1 and 14.2.

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY TE AWA KAIRANGI

Technical Specification

4.1 Knauf Glasswool Insulation is an ECOSE® Technology resin-bonded, fibrous glass wool insulation manufactured from recycled and/or virgin glass and ECOSE® Technology resin. Earthwool® Glasswool Insulation with DriTherm® Technology is silicon treated. Knauf Glasswool Insulation are formed into segments, blankets and rolls and are available as set out in Table 1.

Table 1: Knauf Glasswool Insulation product ranges

R-value	Nominal Thickness (mm)	Width (mm)	Length (mm)	Density (kg/m³)
Earthwool® Glasswool Insulation - Acoustic Range				
1.3	50	600	2,700	11.0
1.4	50	430, 450, 580 or 600	1,160	14.0
1.9	75	600	2,700	11.0
2.0	75	430, 450, 580 or 600	1160	14.0
Earthwool® Glasswool Insulation - Wall Segments				
2.2	90	580	1,160	10.8
2.4	90	580	1,160	14.5
2.6	90	430 or 580	1,160	20.3
2.8	90	430 or 580	1,160	29.1
3.2	140	580	1,160	9.3
3.6	140	580	1,160	13.4
4.1	140	580	1,160	21.0
Earthwool® Glasswool Insulation with DriTherm® Technology - Wall Segments				
2.2	90	580	1,160	10.7
2.4	90	580	1,160	14.6
Earthwool® Glasswool Insulation - Ceiling Segments				
2.7	125	430	1,160	8.8
3.2	150	430	1,160	8.7
3.2*	105	430	1,160	23.3
3.6	175	430 or 600	1,160	7.3
4.1	195	430	1,160	7.7
5.2	210	430	1,160	11.2
6.3	275	430	1,160	9.0
Earthwool® Glasswool Insulation with DriTherm® Technology - Ceiling Segments				
R3.6	175	430 or 600	1200	7.4
R5.2	210	430	1160	11.4
R6.3	275	430	1160	9.0
Earthwool® Glasswool Insulation - Ceiling Rolls				
1.8	70	1,200	13,500	12.1
2.9	115	1,200	8,500	12.2
3.2	135	1,200	8,000	11.0
3.6	150	1,200	7,000	11.0

Earthwool® Glasswool Insulation - Handy Rolls				
2.2	90	430 or 580	18,000	10.7
Earthwool® Glasswool Insulation with DriTherm® Technology - Handy Rolls				
2.2	90	430 or 580	18,000	10.8
Earthwool® Glasswool Insulation - Masonry Wall Insulation				
1.5	50	600	1,100	29.5
Earthwool® Glasswool Insulation - Commercial Rolls				
1.4	55	1,200	37,000	11.1
1.6	60	1,200	28,000	13.4
1.9	75	1,200	26,000	11.6
2.4	100	1,200	22,000	10.2
2.6	105	1,200	18,500	11.5
3.1	120	1,200	14,500	13.1
3.3	130	1,200	13,500	12.7
Earthwool Glasswool with Dritherm® Technology – SoundShield				
R2.6	90	430 or 580	1,160	20.07
Knauf Insulation with Dritherm Technology - Smart Facade				
R1.6	50	600	1,200	38.0
R2.2	75	600	1,200	38.0
R3.2	100	600	1,200	38.0

Note: * Skillion Roof

4.2 Knauf Glasswool Insulation is brown in colour and is packaged in pre-printed plastic compression bags with labelling in compliance with AS/NZS 4859.1.

4.3 Accessories used with Knauf Glasswool Insulation, which are supplied by the insulation installer, are plastic strapping and fixings.

Handling and Storage

5.1 Knauf Glasswool Insulation must be stored under cover and in dry conditions. Heavy objects must not be stacked on the packs. The packs must be stored in an orientation that avoids excessive compression of the product.

5.2 In general, insulation products are sensitive to the length of time they are stored under compression packaging. Product that does not recover to its nominal thickness may not achieve the stated thermal resistance (R-value).

Technical Literature

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

Design Information

General

7.1 Knauf Glasswool Insulation is intended for use as thermal insulation to meet the requirements of the NZBC. Knauf Glasswool Insulation can be used to meet the minimum schedule method R-values of NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Greater construction R-values can be achieved where specific design is used. For construction R-values, refer to the BRANZ House Insulation Guide. Product R-values and dimensions are given in Table 1.

7.2 Knauf Glasswool Insulation's R-values have been determined by testing to AS/NZS 4859.1, which is an acceptable method in NZBC Acceptable Solution H1/AS1.

7.3 Knauf Glasswool Insulation segment, blanket and roll products are designed to be friction-fitted between wall, ceiling or roof framing. They can also be laid directly on a ceiling lining, or over ceiling battens or joist/truss chords. In other horizontal situations, the insulation must be adequately supported by a suitable durable material. Earthwool® glasswool skillion roof insulation is designed to be friction-fitted between rafters.

7.4 Where the insulation is installed in exterior walls, the insulation material nominal thickness must be selected to provide a snug close fit which touches all sides of the insulation cavity between the wall underlay and the interior wall lining.

7.5 Where the insulation is retrofitted in external timber-framed walls without a wall underlay, and with direct-fixed claddings, the insulation must be at least 20 mm thinner than the framing to allow a gap of at least 20 mm between the insulation and the wall cladding. Horizontal straps must be stapled into the sides of the wall studs at 300 mm centres maximum as support before the insulation is installed. Refer also to NZS 4246, Section 5.4.2.

7.6 When the insulation is installed in a wall with a drained cavity, it is recommended that specific wall products with a controlled nominal thickness be used. Where the stud spacings are greater than 450 mm, an intermediate means of restraining the insulation from bulging into the cavity must be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

7.7 To prevent moisture transfer and to provide roof ventilation, a separation of 25 mm minimum is required between the insulation and any rigid substrate or flexible roof underlay. Selecting the specifically designed skillion roof insulation product with a controlled thickness can assist with this requirement.

7.8 The building envelope must be constructed to ensure the insulation remains dry during installation and throughout the life of the building.

7.9 The clearance requirements for heating appliances and downlights must be met and reference made to the manufacturers instructions and NZS 4246. See Paragraphs 10.1-10.3.

Durability

8.1 The durability assessment of Knauf Glasswool Insulation to meet the requirements of the NZBC is based on the difficulty of access and replacement, and the ability to detect failure of the insulation, both during normal use and maintenance of the building.

Serviceable Life

8.2 Where the building is maintained so that the provisions of the NZBC E2 and E3 Clauses are met, and where the insulation is not crushed or exposed to conditions that will diminish its thermal performance, Knauf Glasswool Insulation can expect to have a serviceable life of at least 50 years.

Maintenance

9.1 Knauf Glasswool Insulation that has become damp must be removed and the cause of dampness repaired. Cavities must be clean and dry before fitting new insulation of an equivalent thermal rating. NZS 4246 gives guidance on thermal insulation maintenance due to water damage.

9.2 Earthwool® Glasswool Insulation with DriTherm® Technology may be dried and reinstated into the dried cavity if the cause of dampness was a potable water leak. NZS 4246 gives guidance on thermal insulation maintenance due to water damage.

Prevention of Fire Occurring

10.1 Knauf Glasswool Insulation is considered a non-combustible material and need not be separated from heat sources such as fireplaces, flues and chimneys. However, when used in conjunction with or attached to heat sensitive materials, the heat sensitive material must be separated or protected from heat sources. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

Downlights

10.2 Recessed luminaires shall be of the specified luminaire types and installed in accordance with NZBC Verification Method C/VM1 and NZBC Acceptable Solution C/AS1, Section 7.4.

10.3 Insulation materials must maintain a clearance of 100 mm to undefined recessed luminaires in existing buildings.

Fire Affecting Areas Beyond the Fire Source

11.1 Knauf Glasswool Insulation has a Group Number of 1-S. When used in an occupied space, Knauf Glasswool Insulation may or may not need to be enclosed by an internal lining depending on the Risk Group. Refer to the relevant NZBC Acceptable Solutions C/AS1 and C/AS2 for specific internal surface finish requirements.

External Moisture

12.1 The total building envelope must be weathertight and comply with the requirements of NZBC Clause E2 to ensure that the insulation remains dry in use.

12.2 The moisture content of the construction materials at the time of installing and enclosing the insulation must meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 10.2 a) or lower moisture content if required by the lining manufacturer.

Internal Moisture

13.1 Buildings must provide an adequate combination of thermal resistance, ventilation and space temperature to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate. This does not apply to communal non-residential, commercial, industrial outbuildings or ancillary buildings.

13.2 Roofs and walls of housing complying with the Schedule Method for Compliance with Clause H1.3.2 E will have adequate thermal resistance. Other buildings may require more thermal insulation to satisfy the requirements of NZBC Acceptable Solution E3/AS1 than that to satisfy the energy efficiency provisions alone.

Energy Efficiency

14.1 Knauf Glasswool Insulation will contribute to meeting the requirements of NZBC Clause H1 Performance H1.3.1 (a) and H1.3.2 E by compliance with NZBC Verification Method H1/VM1 or NZBC Acceptable Solution H1/AS1. Refer to Paragraphs 7.1-7.7.

14.2 Knauf Glasswool Insulation R-values have been determined by BRANZ testing to AS/NZS 4859.1 and are given in Table 1.

Installation Information

Installation Skill Level Requirements

15.1 All design and building work must be carried out in accordance with the Knauf Glasswool Insulation Technical Literature and this Appraisal. All building work must be undertaken by competent and experienced tradespersons conversant with Knauf Glasswool Insulation.

General

16.1 Installation of Knauf Glasswool Insulation must be in accordance with the Technical Literature and this Appraisal. NZS 4246 should be used as a guide for installing insulation in residential buildings.

16.2 The product must be installed only when the building is enclosed and when the construction materials have achieved the required maximum moisture content or less.

16.3 Knauf Glasswool Insulation must be released from the packaging and allowed to re-loft prior to installation. The time to loft will depend upon the length of time the product has been packaged and stored.

16.4 Knauf Glasswool Insulation is supplied in segments, blanket and roll form (Table 1) to suit framing layouts. The segment products are sized to fit between standard framing centres. The products are able to be cut to suit wall cavities and when fitted between roof or ceiling framing. The insulation must be neatly friction-fitted between framing members so that the potential for gaps and convective heat loss is reduced. In wall cavities the insulation must be neatly friction-fitted between framing members to prevent sagging. In ceilings or roofs, the insulation may be fitted between framing members or fitted over framing members and butted tightly. The insulation must extend to the external wall plate. The insulation must not be folded, tucked or compressed. A close, even fit provides the most efficient thermal performance. Whenever possible, the insulation should be fitted beneath wiring or plumbing.

16.5 The clearance requirements for heating appliances, light fittings and downlights must be followed. Refer also to NZS 4246.

Inspections

16.6 The Technical Literature, this Appraisal and NZS 4246 must be referred to during the inspection of Knauf Glasswool Insulation installations.

Health and Safety

17.1 Refer to the Technical Literature and NZS 4246 for guidance on health and safety requirements such as personal protective clothing and installation hazard assessment.

Basis of Appraisal

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

Tests

18.1 BRANZ has carried out thermal resistance testing of Knauf Glasswool Insulation in accordance with AS/NZS 4859.1.

18.2 Tests have been carried out in accordance with AS 1530.1. Knauf Glasswool Insulation is not deemed combustible according to the test criteria. The results have been reviewed by BRANZ technical experts.

Other Investigations

19.1 An assessment of the durability of Knauf Glasswool Insulation has been made by BRANZ technical experts.

19.2 The manufacturer's Technical Literature have been reviewed by BRANZ and found to be satisfactory.

19.3 The fibre used to manufacture Knauf Glasswool Insulation is certified to the European Certification Board for Mineral Wool Products (EUCEB).

Quality

20.1 The manufacture of Knauf Glasswool Insulation has been examined by BRANZ, including methods adopted for quality control. Details of the manufacturing processes, and quality and composition of the raw materials used were obtained and found to be satisfactory.

20.2 Knauf Insulation Pty Limited is responsible for the quality of the product supplied.

20.3 Quality of installation of the product on-site is the responsibility of the installer.

20.4 Quality of maintenance of the building to ensure the insulation remains dry is the responsibility of the building owner.

Sources of Information

- AS 1530.1: 1994 Combustibility test for materials.
- AS/NZS 4859.1: 2002 Materials for the thermal insulation of buildings.
- AS/NZS 4859.1: 2018 Thermal insulation materials for buildings - Part 1: General criteria and technical provisions.
- BRANZ House Insulation Guide, Fifth Edition 2014.
- BRANZ Bulletin Number 525 Preventing moisture problems in timber-framed skillion roofs.
- NZS 4214: 2006 Method of determining the total thermal resistance of parts of buildings.
- NZS 4246: 2016 Energy efficiency – Installing bulk thermal insulation in residential buildings.
- Ministry of Business, Innovation and Employment Records of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 12 May 2021.

This Appraisal has been amended to update the Appraisal name, and to include Earthwool® Glasswool Insulation with DriTherm® Technology products. The Appraisal text and product range in Table 1 have also been updated.

BRANZ

In the opinion of BRANZ, Knauf Glasswool Insulation is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Knauf Insulation Pty 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. Knauf Insulation Pty 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 Knauf Insulation Pty 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 Knauf Insulation Pty Ltd or any third party.

For BRANZ

Chelydra Percy
Chief Executive
Date of Issue:
01 December 2016

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY TE AWA KAIRANGI

EARTHWOOL® the feel good glasswool insulation
GLASSWOOL

INSTALLATION INSTRUCTIONS

EARTHWOOL® GLASSWOOL INSULATION WALL SEGMENTS

These instructions should be read in conjunction with local standards AS 3999 or NZS 4246 and all applicable local, state and federal building regulations.
Before you start installing, please make sure you are familiar with our Health and Safety Information contained in this document.
Ensure that you use tools and equipment that are suitable for the intended application. This will include suitable safety equipment.

Do not start work until the site is safe!
Assess the wall condition and structure together with the method of installation you are to use based on the appropriate requirements established in the building code, site assessment and or plans provided. Installation must be completed to the requirements of relevant standard: AS 3999:1992 or NZS 4246:2006.

Tools required:
- Sharp knife for trimming insulation
- Ladder
- Suitable clothing (see our Health and Safety Information)
- Tape measure

STEP 1
- Determine the most suitable product for your project. Walls can be insulated using rolls or segments.
- Insulation is available in varying widths and thicknesses to suit most framing spaces. Please check Knauf Insulation's product guide for the most suitable product for your application.
- To calculate the number of packs needed, determine the area (m^2) to be insulated by multiplying the length by the width or wall height. The number of m^2 of insulation material is clearly marked on each pack. Divide the total area to be insulated by the m^2 in a pack to determine the number of packs required (don't forget to round up to the nearest whole pack). Allowances should be made for areas that are unable to be insulated.

STEP 2
- Don't take the insulation out of the packaging until you're in position and ready to install.
- Before installation check that the product selected matches the specification.
- Ensure that the insulation has lofted to the nominal thickness, if required, gently agitate the insulation by gently shaking or bouncing it on its side until it recovers to thickness stated on the label.
- Where installing around wall lights or heat sources consult the appliance manufacturer's instructions for appropriate clearances. Additional guidance is provided in AS 3999 and NZS 4246.

STEP 3
- When installing insulation between framing members, ensure that you achieve a snug fit avoiding any gaps, tucks and folds.
- It is recommended that you select products that have the same thickness as the cavity. In circumstances where the cavity is deeper than the product selected, adequate support must be provided.
- Make sure insulation fits snugly against top and bottom wall plates. The front face of the segment should be flush with the inside face of the framing.
- For metal frame walls, install insulation according to the relevant building code. Friction fit one side of the segment into the metal C-channel and butt the other edge against the metal stud. Install insulation to cover the full height of the wall.

- Use off cuts to insulate small and hard to fit areas.

STEP 4

- Attention to detail is very important. Make sure all areas are insulated, behind electrical outlets, plumbing and services.
- Seal all penetrations in exterior walls with insulation or foam sealants.

STEP 5

- Complete a final check of the installation ensuring all areas have been insulated and that you have an even and consistent layer of insulation.
- Finish your project by removing all packaging and disposing of all rubbish and excess insulation responsibly.

We recommend that once completed another person checks the work to ensure it has been installed according to required standards.

EARTHWOOL the feel good glasswool insulation
GLASSWOOL

HEALTH AND SAFETY INFORMATION

SAFETY WARNINGS AND HAZARDS

- You must turn the mains power 'Off'' before entering the work space, and, if in any doubt about how to turn the power 'Off'', you must consult a licensed electrician.
- Working in areas that contain live electrical wiring is extremely hazardous. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.
- Defective electrical cables, exposed terminals and conductors of electrical equipment such as light fittings and fans can cause burns and electric shocks please exercise caution when working near such hazards – check with an electrician if you are unsure if the cabling is safe.
- Working in hot and poorly ventilated areas when installing insulation can be dangerous.
- Working at heights, when installing insulation can be dangerous.

BEFORE INSTALLATION

- You must turn the mains power 'Off'' and, if in any doubt about how to turn the power 'Off'', consult a licensed electrician.
- Do not enter the workspace for the purposes of the pre-work inspection or the installation until you are satisfied that the power has been isolated. Even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live.
- Complete a pre-work assessment before installation to identify safety hazards which may include but are not limited to the following:
    - access to the roof area,
    - working at heights,
    - electrical safety hazards,
    - adequate ventilation of the work area and
    - nails and sharp objects on the ground

- Before commencing work you must have systems in place to reduce risks identified in the pre-work assessment such as but which are not limited to:
    - systems to prevent falling when working at heights.
    - ventilate the working area if possible.
    - cover exposed skin. When working in an unventilated area, wear a disposable face mask.
    - rinse hands in cold water before washing.
    - wear goggles when working overhead.
    - clean using vacuum equipment.

DURING INSTALLATION

- Work with another person and maintain contact throughout both the assessment and installation process.
- Only open bags as required.
- Wear appropriate clothing for the job such as long sleeved top, flat rubber sole shoes, gloves conforming to Australian Standard AS2161 and ventilated non-fogging dust resistant goggles conforming to AS/NZ 1336, and a P2 dust mask.
- Avoid eye contact with dust or fibres to minimise eye or skin contact and inhalation during handling.
- Avoid installing insulation in hot weather and at the hottest part of the day.
- Under no circumstances must fixing devices in ceiling spaces or under floors, or in proximity to electrical wiring, be of metal or other conductive material.

ELECTRICAL SAFETY CONSIDERATIONS BEFORE ISOLATING POWER

- Locate and review the incoming power supply, main switchboard and meter box.
- Ensure you understand if there is a main isolator and how power can be safely isolated.
- Ensure you understand the direction of the 'On' and 'Off' position of the main switch (NOTE: the 'Off' position is not always as it seems - check with an electrician if you are unsure).
- Before installation, switch 'Off'' the electricity supply at the main switchboard (check with an electrician if you are unsure if power can be turned 'Off'' at the switchboard).

- Be aware that even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.

PROCEDURE FOR ISOLATION - CERAMIC FUSES (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Ceramic fuses are typically found in older style homes.
- Identify if any fuse is deactivated.
- Check if there are any fuses currently in the 'Off' position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned 'Off'.
- Apply additional strips of electrical tape over the deactivated fuse and any individual isolator in the 'Off' position as a reminder to leaving it in the 'Off' position once the re-activation procedure has been completed.
- If you find a fuse plug out of its socket, whilst the main isolator is in the 'Off' position, place electrical tape over its respective switch and one over the fuse socket opening.
- DO NOT touch the internal metal fittings.
- Place a written note on the main isolator switch or meter box enclosure to advise the power is 'Off'' and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances, within the home, previously left on are no longer operating to confirm the mains power is now isolated.
- The original person who placed the isolation tag is the only one who can re-activate the power. Advise occupants of this requirement.

PROCEDURE FOR ISOLATION CIRCUIT BOARD (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Circuit boards are typically found in modern homes.
- Check if there are any switches currently in the 'Off' position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned 'Off'.
- Apply additional strips of electrical tape over any deactivated fuses or individual switches in the 'Off' position after isolating the mains power as a reminder to leave it in the 'Off' position once the re-activation procedure has been completed.
- Turn 'Off' all individual switches on the circuit board.
- Place a written note on the switches or meter box enclosure to advise the power is 'Off'' and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances within the home previously left on are no longer operating to confirm the mains power is now isolated.
- The originator that placed the isolation tag is the only one who can re-activate the power. Advise occupants of the requirement.

REACTIVATING THE POWER

- After the completion of the installation, switch the mains power to the 'On' position (for ceramic fuse board), but for a circuit board, switch the main power 'On' and then each individual power isolator on one at a time. The taped switches in the 'Off' position should stay switched 'Off'.
- WARNING: If you cannot reconnect power please ensure you seek assistance from a qualified electrician.

SUITABLE CLOTHING

- When handling any insulation material, especially in enclosed poorly ventilated areas and/or overhead, the use of suitable eye protection conforming to AS1336 will greatly reduce contact with dust or fibres.
- Wear suitable loose fitting clothes, including long sleeved shirts, long pants, cap and gloves.
- A suitable dust mask is recommended when working in confined, poorly ventilated and dusty areas.
- Wash work clothes separately and rinse the washing machine after use.

EARTHWOOL the feel good glasswool insulation
GLASSWOOL

INSTALLATION INSTRUCTIONS

EARTHWOOL® GLASSWOOL INSULATION CEILING SEGMENTS

These instructions should be read in conjunction with local standards AS 3999 or NZS 4246 and all applicable local, state and federal building regulations.
Before you start installing, please make sure you are familiar with our Health and Safety Information contained in this document.
Ensure that you use tools and equipment that are suitable for the intended application. This will include suitable safety equipment.

Do not start work until the site is safe!
Assess the ceiling condition and structure together with the method of installation you are to use based on the appropriate requirements established in the building code, site assessment and or plans provided. Installation must be completed to the requirements of relevant standard: AS 3999:1992 or NZS 4246:2006.

Tools required:
- Sharp knife for trimming insulation
- Ladder
- Suitable clothing (see our Health and Safety Information)
- Tape measure
- Non-conductive insulation stick for positioning insulation in hard to reach areas
- Kneeling board to span ceiling framing

STEP 1
- Determine the most suitable product for your project. Ceilings can be insulated using rolls or segments.
- Where you have existing insulation that is level with the ceiling joists, you can install additional insulation over the top. It is recommended that this is installed at right angles to the existing insulation.
- Insulation is available in varying widths and thicknesses to suit most framing spaces. Please check Knauf Insulation's product guide for the most suitable product for your application.
- To calculate the number of packs needed, determine the area (m^2) to be insulated by multiplying the length by the width or wall height. The number of m^2 of insulation material is clearly marked on each pack. Divide the total area to be insulated by the m^2 in a pack to determine the number of packs required (don't forget to round up to the nearest whole pack). Allowances should be made for areas that are unable to be insulated.

STEP 2
- Don't take the insulation out of the packaging until you're in a position and ready to install.
- Before installation, gently agitate the insulation by gently shaking or bouncing it on its side until it recovers to the thickness stated on the label.
- Do not block ceiling vents and take care around downlights and other sources of heat. Consult the manufacturer's instructions for appropriate clearances. Additional guidance is provided in AS 3999 and NZS 4246.

STEP 3
- Start installing the insulation at the far corners of the ceiling and work your way back towards the ceiling access.
- When installing insulation between ceiling joists, ensure that you achieve a snug fit avoiding any gaps.
- When installing insulation in truss roofs, ensure that insulation is firmly butted together to achieve a consistent layer of insulation without any gaps.
- Where required, use a sharp knife to cut the insulation to fit. It is important that when you cut the insulation that you avoid coming into contact with any electrical services.

- When installing insulation in a roof eave (i.e. where the roof joins the ceiling), make sure the insulation covers the top plate but is not in contact with the roof. It is important to maintain a 20mm gap between the roofing substrates and the insulation.

STEP 4

- Complete the final check of the insulation ensuring all areas have been insulated and that you have an even and consistent layer of insulation.
- Finish your project by removing all packaging from the ceiling and disposing of all rubbish and excess insulation responsibly.

STEP 5

- Once you have worked your way back to the ceiling access, make sure you insulate the ceiling access panel before exiting the roof space.

We recommend that once completed another person checks the work to ensure it has been installed according to required standards.

BC220141

EARTHWOOL the feel good glasswool insulation
GLASSWOOL

HEALTH AND SAFETY INFORMATION

SAFETY WARNINGS AND HAZARDS

- You must turn the mains power 'Off'' before entering the work space, and, if in any doubt about how to turn the power 'Off'', you must consult a licensed electrician.
- Working in areas that contain live electrical wiring is extremely hazardous. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.
- Defective electrical cables, exposed terminals and conductors of electrical equipment such as light fittings and fans can cause burns and electric shocks please exercise caution when working near such hazards – check with an electrician if you are unsure if the cabling is safe.
- Working in hot and poorly ventilated areas when installing insulation can be dangerous.
- Working at heights, when installing insulation can be dangerous.

BEFORE INSTALLATION

- You must turn the mains power 'Off'' and, if in any doubt about how to turn the power 'Off'', consult a licensed electrician.
- Do not enter the workspace for the purposes of the pre-work inspection or the installation until you are satisfied that the power has been isolated. Even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live.
- Complete a pre-work assessment before installation to identify safety hazards which may include but are not limited to the following:
    - access to the roof area,
    - working at heights,
    - electrical safety hazards,
    - adequate ventilation of the work area and
    - nails and sharp objects on the ground

- Before commencing work you must have systems in place to reduce risks identified in the pre-work assessment such as but which are not limited to:
    - systems to prevent falling when working at heights.
    - ventilate the working area if possible.
    - cover exposed skin. When working in an unventilated area, wear a disposable face mask.
    - rinse hands in cold water before washing.
    - wear goggles when working overhead.
    - clean using vacuum equipment.

DURING INSTALLATION

- Work with another person and maintain contact throughout both the assessment and installation process.
- Only open bags as required.
- Wear appropriate clothing for the job such as long sleeved top, flat rubber sole shoes, gloves conforming to Australian Standard AS2161 and ventilated non-fogging dust resistant goggles conforming to AS/NZ 1336, and a P2 dust mask.
- Avoid eye contact with dust or fibres to minimise eye or skin contact and inhalation during handling.
- Avoid installing insulation in hot weather and at the hottest part of the day.
- Under no circumstances must fixing devices in ceiling spaces or under floors, or in proximity to electrical wiring, be of metal or other conductive material.

ELECTRICAL SAFETY CONSIDERATIONS BEFORE ISOLATING POWER

- Locate and review the incoming power supply, main switchboard and meter box.
- Ensure you understand if there is a main isolator and how power can be safely isolated.
- Ensure you understand the direction of the ‘On’ and ‘Off’ position of the main switch (NOTE: the ‘Off’ position is not always as it seems - check with an electrician if you are unsure).
- Before installation, switch 'Off'' the electricity supply at the main switchboard (check with an electrician if you are unsure if power can be turned 'Off'' at the switchboard).

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

KNAUF INSULATION
it's time to save energy

- Be aware that even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.

PROCEDURE FOR ISOLATION - CERAMIC FUSES (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Ceramic fuses are typically found in older style homes.
- Identify if any fuse is deactivated.
- Check if there are any fuses currently in the 'Off' position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned 'Off'.
- Apply additional strips of electrical tape over the deactivated fuse and any individual isolator in the 'Off' position as a reminder to leaving it in the 'Off' position once the re-activation procedure has been completed.
- If you find a fuse plug out of its socket, whilst the main isolator is in the 'Off' position, place electrical tape over its respective switch and one over the fuse socket opening.
- DO NOT touch the internal metal fittings.
- Place a written note on the main isolator switch or meter box enclosure to advise the power is 'Off'' and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances, within the home, previously left on are no longer operating to confirm the mains power is now isolated.
- The original person who placed the isolation tag is the only one who can re-activate the power. Advise occupants of this requirement.

PROCEDURE FOR ISOLATION CIRCUIT BOARD (IF IN DOUBT YOU MUST CONSULT A LICENSED ELECTRICIAN)

- Circuit boards are typically found in modern homes.
- Check if there are any switches currently in the 'Off' position, take note of them.
- Place a strip of electrical tape over main switch isolator after it is turned 'Off'.
- Apply additional strips of electrical tape over any deactivated fuses or individual switches in the 'Off' position after isolating the mains power as a reminder to leave it in the 'Off' position once the re-activation procedure has been completed.
- Turn 'Off' all individual switches on the circuit board.
- Place a written note on the switches or meter box enclosure to advise the power is 'Off'' and WORK IN PROGRESS is occurring.
- Check to ensure the lights and appliances within the home previously left on are no longer operating to confirm the mains power is now isolated.
- The originator that placed the isolation tag is the only one who can re-activate the power. Advise occupants of the requirement.

REACTIVATING THE POWER

- After the completion of the installation, switch the mains power to the 'On' position (for ceramic fuse board), but for a circuit board, switch the main power 'On' and then each individual power isolator on one at a time. The taped switches in the 'Off' position should stay switched 'Off'.
- WARNING: If you cannot reconnect power please ensure you seek assistance from a qualified electrician.

SUITABLE CLOTHING

- When handling any insulation material, especially in enclosed poorly ventilated areas and/or overhead, the use of suitable eye protection conforming to AS1336 will greatly reduce contact with dust or fibres.
- Wear suitable loose fitting clothes, including long sleeved shirts, long pants, cap and gloves.
- A suitable dust mask is recommended when working in confined, poorly ventilated and dusty areas.
- Wash work clothes separately and rinse the washing machine after use.

BRANZ Appraised
Appraisal No. 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
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 aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *[Note: The Appraisal of Linea™ Weatherboard Cavity Cladding relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone.]*

[Note: Linea™ Weatherboard Cavity Cladding can be used to provide fire resistance rated construction, but these aspects have not been assessed by this Appraisal and are outside its scope.]

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 scribers** - timber treated to Hazard Class H3.1, pre-primed before installation.
- **Window and door trim cavity air seal** - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
- **Flexible sealant** - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- **Cavity batten fixings** - 40 x 2.8 mm flathead hot-dip galvanised nails.
- **Linea™ Weatherboard fixings** - 60 x 3.15 mm flathead hot-dip galvanised HardieFlex nails or stainless steel ring shank HardieFlex nails (for concealed nailing in NZS 3604 Wind Zones up to, and including, Very High), 75 x 3.15 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in NZS 3604 Wind Zones up to, and including, Very High), and 90 x 3.55 mm jolthead hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa).

(Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).

- **Axent™ Trim fixings** - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolthead nails and stainless steel ring shank jolthead nails.
- **Aluminium joinery head flashing** - as supplied by the joinery manufacturer or the contractor.
- **Flashings** - balustrade and parapet cap flashings, and inter-storey joint flashings. Refer to NZS 3604 Section 4, and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.

Paint System Specification

4.3 Paint systems are not supplied by James Hardie New Zealand Limited and have not been assessed, therefore they are outside the scope of this Appraisal.

4.4 All exposed faces, including top edges at sills and all bottom edges of Linea™ Weatherboard, Axent™ Trim and accessories must be finished with at least 2 coats of an exterior grade latex acrylic paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.

Handling and Storage

5.1 Handling and storage of all materials supplied by James Hardie New Zealand Limited or the building contractor, whether on-site or off-site, is under the control of the building contractor. Linea™ Weatherboards must be stacked flat, off the ground and supported on a level platform. They must be kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Weatherboards must always be carried on edge.

5.2 Accessories must be stored so they are kept clean, dry and undamaged. All accessories must be used within the maximum storage period recommended by the manufacturer.

Technical Literature

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

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 mm^2 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/m^2 at equilibrium moisture content (EMC). The mass of the 150 mm wide board is 24.93 kg/m^2 at EMC and the mass of the 180 mm wide board is 23.92 kg/m^2 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/m^2 and a total heat released of less than 25 MJ/m^2. Testing was carried out as per Paragraph 5.4 of NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of NZBC Acceptable Solution C/AS2, achieving a Type A performance. Linea™ Weatherboards can therefore be used within 1 m of the relevant boundary.

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

Prevention of Fire Occurring

13.1 Separation or protection must be provided to the Linea™ Weatherboards from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Acceptable Solution C/AS1 and C/AS2, and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

14.1 Linea™ Weatherboard Cavity Cladding, when installed in accordance with this Appraisal and the Technical Literature will prevent the penetration of moisture that could cause undue dampness or damage to building elements.

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

14.3 Linea™ Weatherboard Cavity Cladding allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet code compliance with NZBC Clause E2.3.6.

14.4 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Appraisal and are the responsibility of the designer for compliance with the NZBC.

14.5 The use of Linea™ Weatherboard Cavity Cladding where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations, etc to remain weather resistant.

Internal Moisture

15.1 Buildings must be constructed with an adequate combination of thermal resistance and ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

Water Vapour

15.2 Linea™ Weatherboard Cavity Cladding is not a barrier to the passage of water vapour, and when installed in accordance with the Technical Literature and this Appraisal will not create or increase the risk of moisture damage resulting from condensation.

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 jolthead nails in NZS 3604 Wind Zones up to, and including, Very High, or 90 x 4.0 mm hot-dip galvanised or stainless steel jolthead nails in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa, depending on the location, see Paragraph 10.2. Nails must be fixed 15 mm up from the bottom of the board and punched a maximum of 2 mm below the surface of the board. The top board must be pre-drilled for fixing.

17.13 Linea™ Weatherboards can be hand or gun nailed. Nails must not be closer than 25 mm to the end of the board when hand nailing, or closer than 50 mm when gun nailing. *[Note: Gun nailing must only be used for concealed nailing.]*

Aluminium Joinery Installation

17.14 Aluminium joinery and associated head and sill (for direct fixed) flashings must be installed by the building contractor in accordance with the Technical Literature. An 8 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.

17.15 After installing the window and door joinery, Axent™ Trim, planted sills and scribers may be installed in accordance with the Technical Literature to provide additional weatherproofing for the joinery/weatherboard junction.

Inspections

17.16 The Technical Literature must be referred to during the inspection of Linea™ Weatherboard Cavity Cladding installations.

Finishing

17.17 The paint coating manufacturer's instructions must be followed at all times for application of the paint finish. Linea™ Weatherboards and trim must be clean and dry before commencing painting.

Health and Safety

18.1 Cutting of Linea™ Weatherboards must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

18.2 When power tools are used for cutting, grinding or forming holes, health and safety measures as set out in the Technical Literature must be observed because of the amount of dust generated.

18.3 Safe use and handling procedures for Linea™ Weatherboards and the components that make up the cladding system are provided in the relevant manufacturer's Technical Literature.

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.

BRANZ

In the opinion of BRANZ, Linea™ Weatherboard Cavity Cladding is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to James Hardie New Zealand Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
02 September 2020

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY TE AWA KAIRANGI

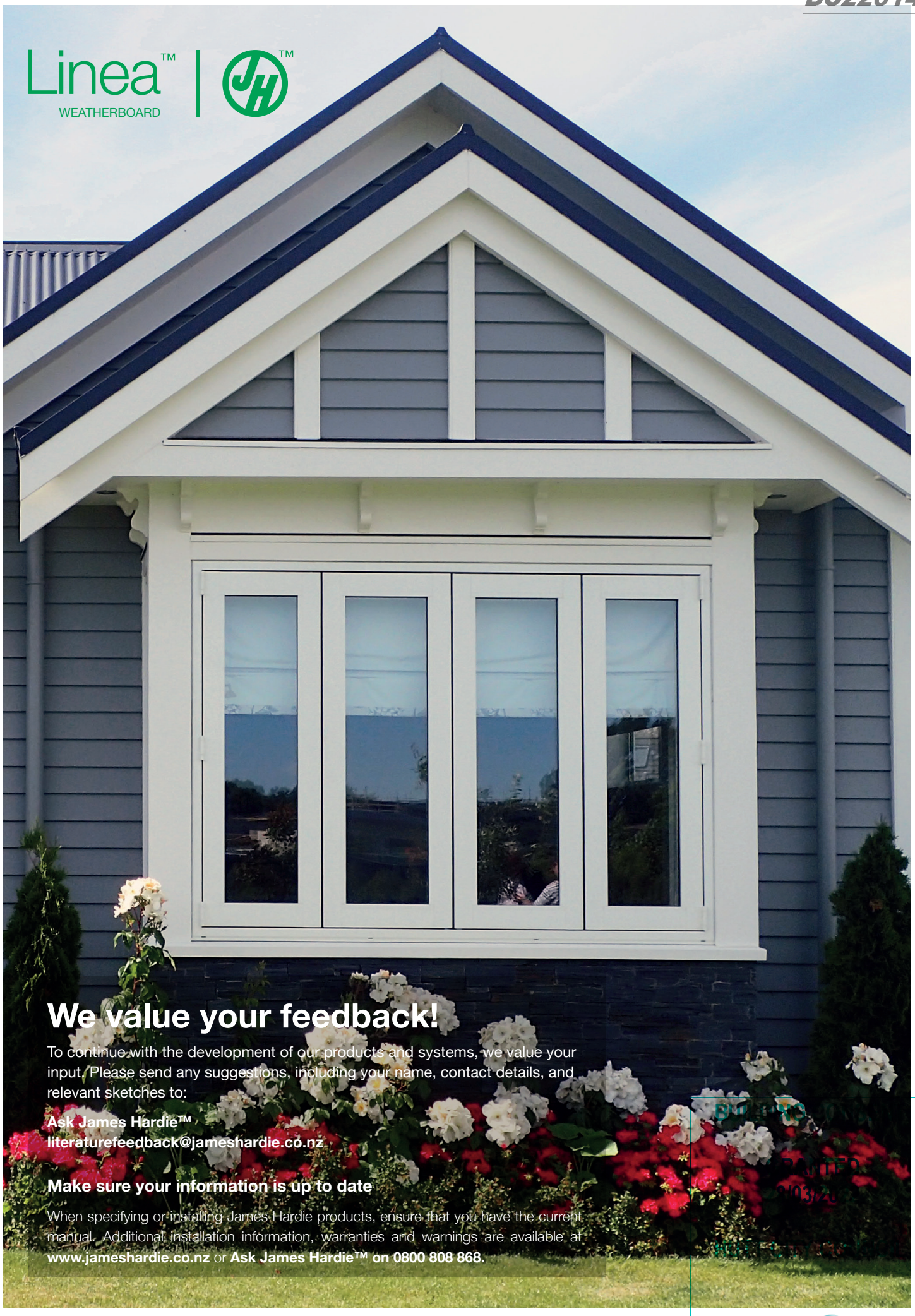
Linea™ WEATHERBOARD

jameshardie.co.nz

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

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

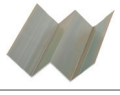
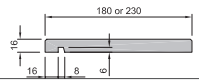
Accessories/tools supplied by James Hardie			
Accessories	**Description**	**Size (mm)**	**Code**
	**External corner soaker 90º for Linea Weatherboards 180mm** • Aluminium • Copper • Stainless Steel	200 long	 **301186** **301188** **301197**
	**External corner soaker 135º for Linea Weatherboards 180mm** • Aluminium	200 long	 **301178**
	**External corner soaker 90º for Linea Weatherboards 150mm** • Aluminium • Stainless Steel	170 long	 **302820** **302821**
	**External corner soaker 90º 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 90º** Etched primed aluminium extrustion used to create 900 internal corner	2700 long 4000 long	**301184** **305807**
	**Internal 'W' Mould 135º** Etched primed aluminium extrustion used to create 135º 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	**302782**
	**HardieFlex™ Stainless steel nail - 5kg**	60 x 3.15mm	**302784**
	**HardieBlade™ Saw Blade** Diamond tip fibre cement circular saw blade. Spacers not included	4 tooth - 184mm	**300660**
	**HardieBlade™ Saw Blade** Diamond tip fibre cement circular saw blade. Spacers not included	6 tooth - 254mm	**303375**
	**Gecko Gauge** This easy to use tool gauges and supports the weatherboard for a one person install.		**305941**

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

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.

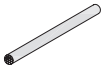
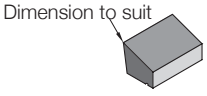
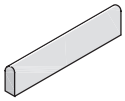
Accessories	Description	Size (mm)	Material/ appearance
	**Flexible Underlay** To comply with Table 23 of E2/AS1		
	**D head or RounDrive Nail** Gun nail for concealed fixing Linea Weatherboard.	60 x 2.87	Hot Dip Galvanised/ Stainless Steel
	**HardieFlex™ Hot Dip Galv. Nails** For concealed fixing by 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 Scriber** To scribe beside window, site cut to suit.	As required	H3.1 minimum Treated Timber Timber Merchant or cut on site
	**Fibre Cement Cutting Blade** Diamond tip 305mm diameter circular saw blade to fit drop saw.	305mm	Diamond Tipped
	**Cavity Closer - aluminium** Used in walls taller than 10m for inter-tenancy fire separation.		
	Primers. Dulux 1-Step Prep, Resene Quick Dry etc.		

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.

CODEMARK™
30018

Please refer to www.building.govt.nz for a copy of the certificate.

Linea Weatherboard cavity fixed cladding also has a BRANZ Appraisal number 447 (2010) available at www.branz.co.nz or www.jameshardie.co.nz.

BRANZ Appraised
Appraisal No.447 [2010]

4 Design

4.1 Responsibility

The specifier or other party responsible for the project must ensure that the information and details in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this technical specification.

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

Specifier

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

Installer

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

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets their aesthetic expectations before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation. James Hardie will only offer a replacement product if Linea Weatherboard or Axent Trim supplied are found to be out of its manufacturing specification.

4.2 Clearances

The clearance between the bottom edge of cladding and the paved/unpaved ground must comply with section 9.1.3 of E2/AS1. On the roofs and decks the minimum clearance must be 50mm. These clearances must be maintained throughout the life of the building.

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

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

Do not install cladding such that it may remain in contact with water or ground, refer to figures in section 9 of this manual.

4.3 Structure

4.3.1 Timber Framing

Timber framing must be in accordance with NZS 3604 (Timber-framed buildings) or designed as for specific engineering design (SED) in accordance with NZS 3603 and AS/NZS 1170 where specific engineering design is required, the framing stiffness must be equivalent to or more than the framing provisions of NZS 3604.

The stud spacing must not exceed 600mm centres maximum for buildings within the scope of NZS 3604 and 400mm centres maximum for wind pressures more than 1.5kPa (ULS).

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

4.3.2 Durability

Timber framing must be treated to a minimum H1.2 treatment requirements and comply with Acceptable Solution B2/AS1 'Durability' of the NZBC. For further timber treatment information refer to the NZS 3602 (Timber and Wood-Based Products for use in Buildings) for minimum timber treatment selection and treatment requirements. Framing must be protected from moisture at sites in accordance with the recommendations of framing manufacturers. Refer to the NZS 3602 for information about the allowable moisture content in timber framing.

4.4 Structural Bracing

Bracing can be achieved by using HomeRAB Pre-Cladding or RAB Board installed direct to framing instead of a flexible underlay or by using Villaboard™ Lining bracing system on the internal face.

4.5 Energy Efficiency

External walls constructed as per this technical specification, using Linea Weatherboard cladding must use suitable bulk insulation to meet the minimum thermal insulation requirements as per Clause H1/AS1 'Energy Efficiency' of the NZBC.

4.6 Fire Rated Walls

External walls with Linea Weatherboard cavity fix construction method can achieve fire ratings up to 60/60/60 when constructed in accordance with the James Hardie Fire and Acoustic Design Manual. Linea Weatherboard must be face fixed for fire rated applications.

Refer to the Fire and Acoustic Design Manual for further information about fire rated systems.

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.

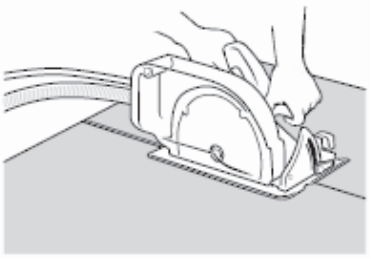
When cutting

- ✓ 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.

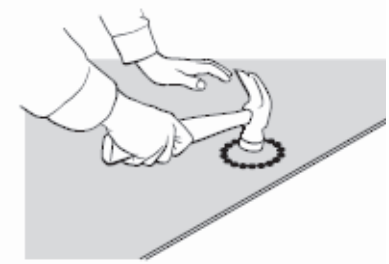
Working Instructions

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 1000mm^2/m length. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. Alternate cavity closer can be used ensuring compliance of E2 and may need to be used with a cant strip.

6.7 Cavity Battens

The cavity battens provide airspace between the frame and cladding and are considered a "packer" only in this specification.

The timber battens must be minimum H3.1 treated to comply with the durability requirements of B2/AS1.

Cavity battens must comply with E2/AS1 and:

- Be minimum 18mm thick
- Be minimum 45mm wide
- Until claddings are fixed the battens need only to be tacked to framing with 40 x 2.8mm nails at 800mm centres maximum (batten fixing is required temporarily to keep them straight on the wall during construction)

6.8 Joints

6.8.1 Jointing

The ends of Linea Weatherboard are jointed off-stud by means of a tongue and groove joint. Tongue and groove joints may be located centrally between studs but no closer than 100mm from the edge of a stud. The joints must be staggered by 600mm minimum. Flexible sealant must be applied to the front of tongue before pushing into the groove at the time of installation. From a visual perspective, the joint line will be visible and must not be hard filled.

6.8.2 Drainage Joint

After every two floors a horizontal drainage joint flashing is required, refer to figures Figure 29 in section 9 of this manual.

6.8.3 External Corner Joint

There are a number of options to select from when detailing external corners:

- 90º corner soaker in aluminium, copper or stainless steel
- 135º corner soaker 180mm aluminium
- Aluminium boxed corners
- Box corners using Axent Trim
- Mitred corners to weatherboards

Refer to figures in section 9 of this manual.

6.8.4 Internal Corner Joint

There are a number of options to select from when detailing internal corners:

- 90º or 135º Aluminium W-mould
- Scribed corner

Refer to figures in section 9 of this manual.

6.9 Junctions and Penetrations

All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Linea Weatherboard which meet the performance requirements of E2 ‘External Moisture’, an approved document of the NZBC, refer to figures in section 9 of this manual.

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:

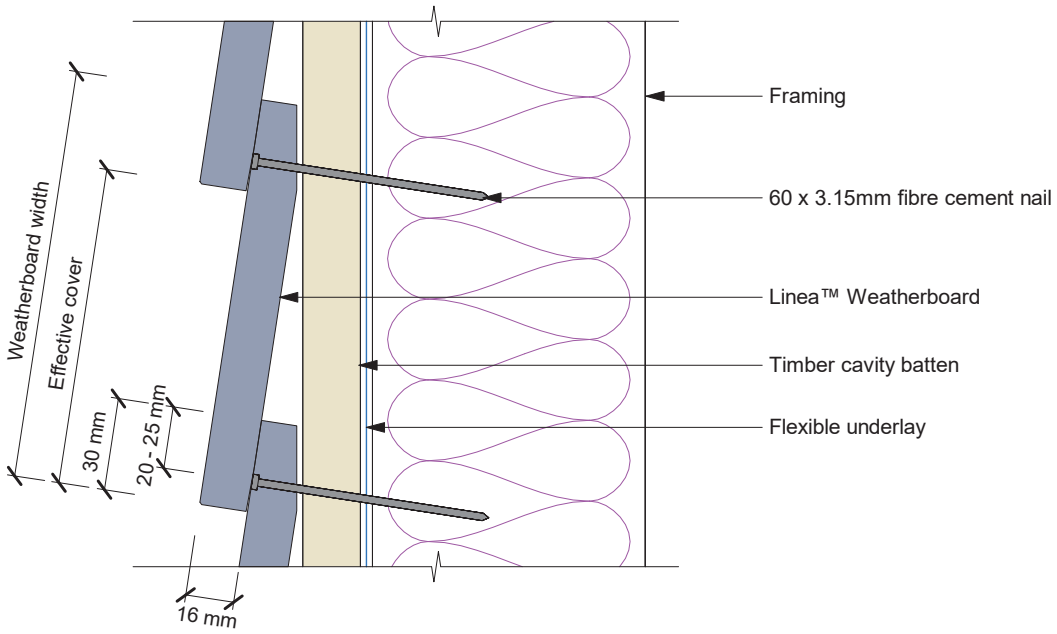
- Washing down exterior surfaces every 6-12 months* using low pressure water and a brush, and every 3-4 months in extreme coastal conditions or sea spray zones
- Re-coating exterior protective finishes. Always refer to your paint manufacturer for re-coating requirements
- Maintaining the exterior envelope 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

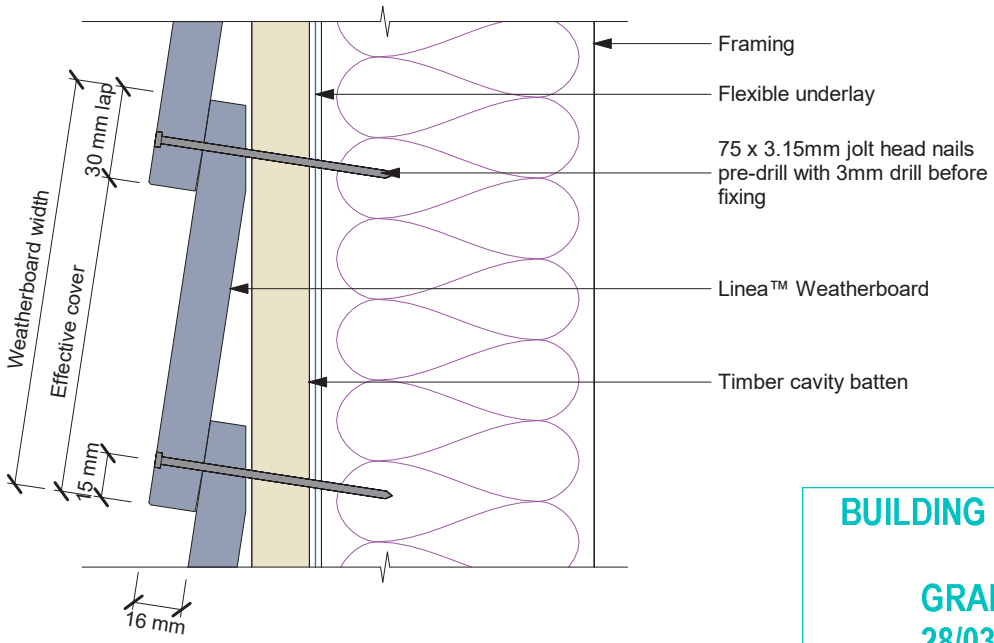
For all meter box details please visit our website at **www.jameshardie.co.nz** or Ask James Hardie on **0800 808 868**.

Figure 1: Weatherboard fixing



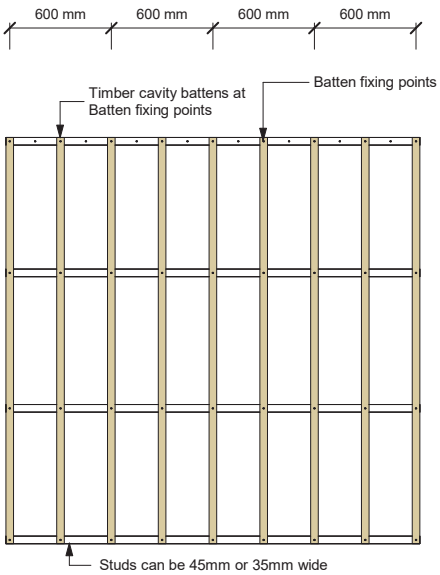
Concealed Nailing

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



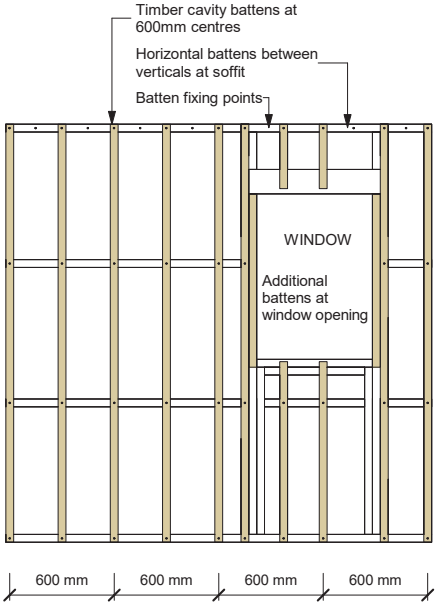
Exposed Nailing

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.

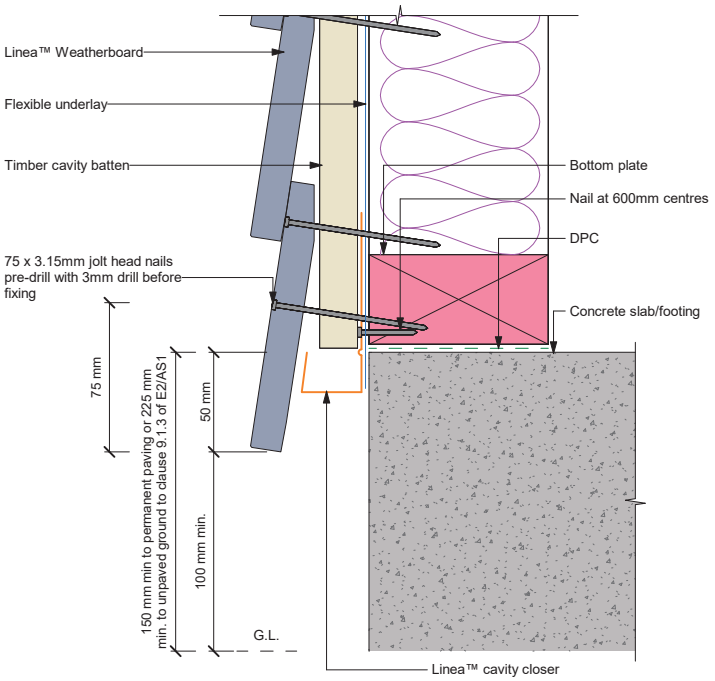
Figure 3: Batten layout at window opening



- 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



Note:
Drain holes in James Hardie uPVC vent strip are sufficient to achieve ventilation openings of 1000mm² per lineal metre

Figure 5: Enclosed Deck

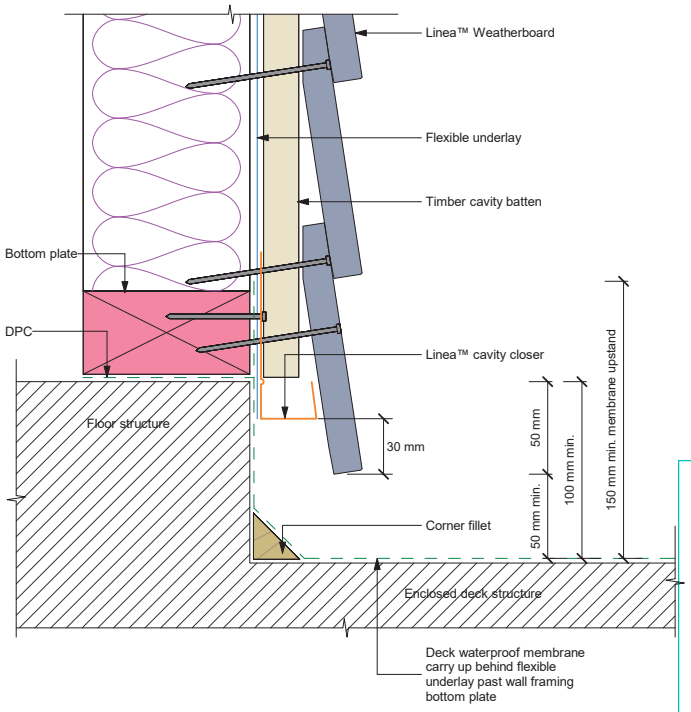


Figure 6: Jointing off stud

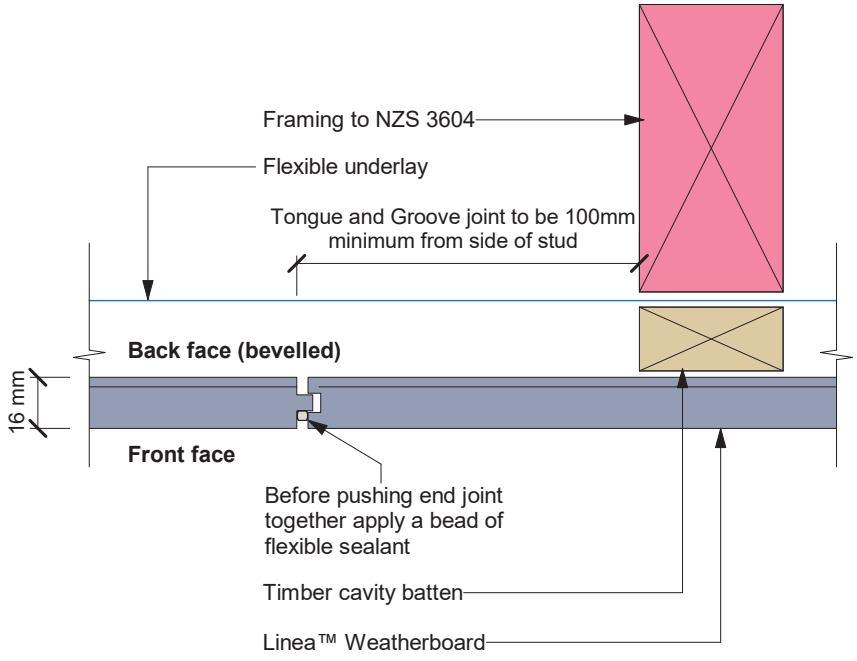
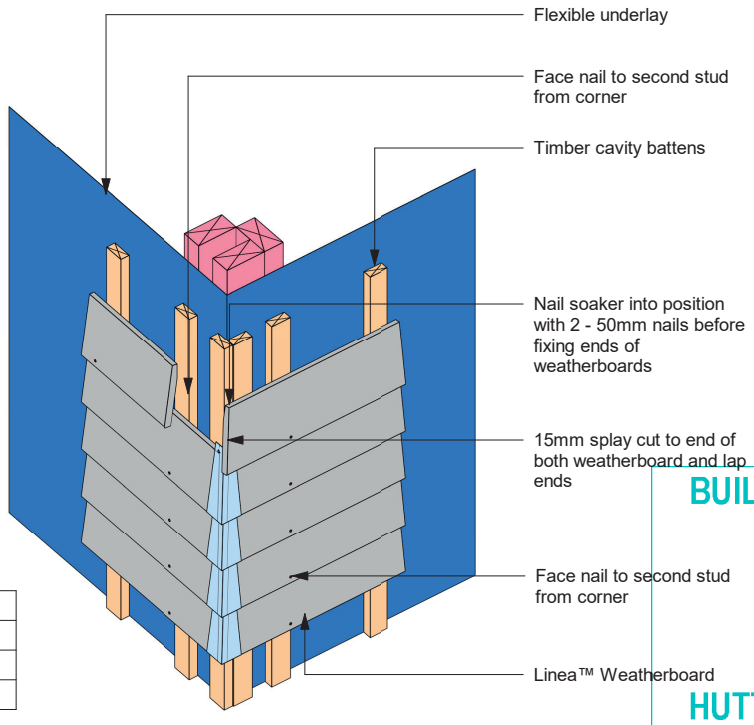
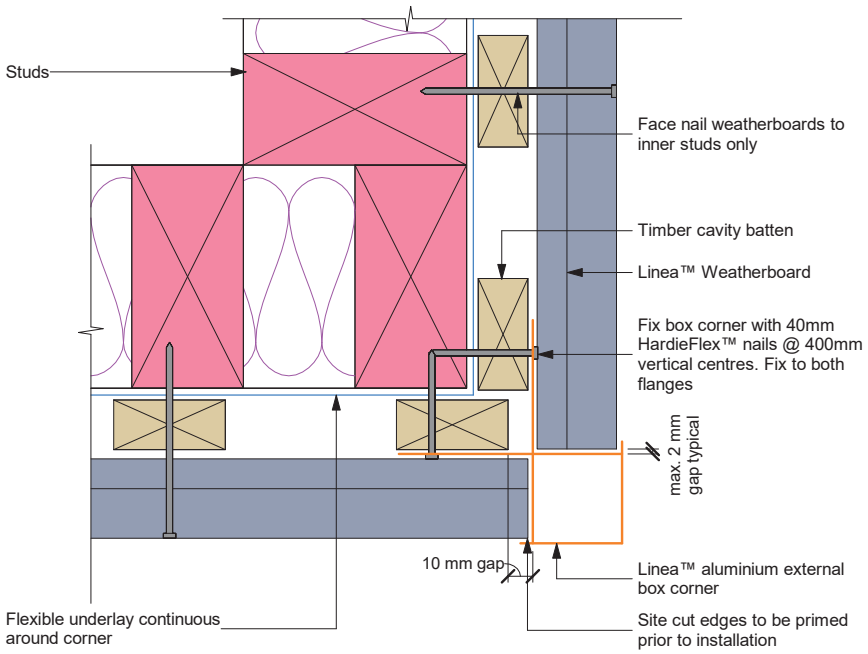


Figure 7: External corner soaker



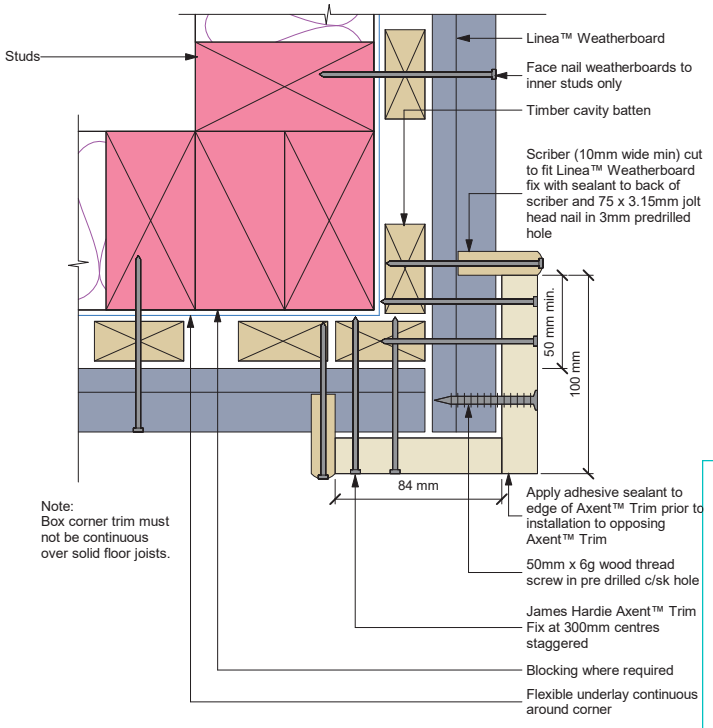
Soaker material	Nail material
Copper	Copper or phosphor bronze
Aluminium	Hot dip galvanised
Stainless steel	Stainless steel

Figure 8: Aluminium box corner



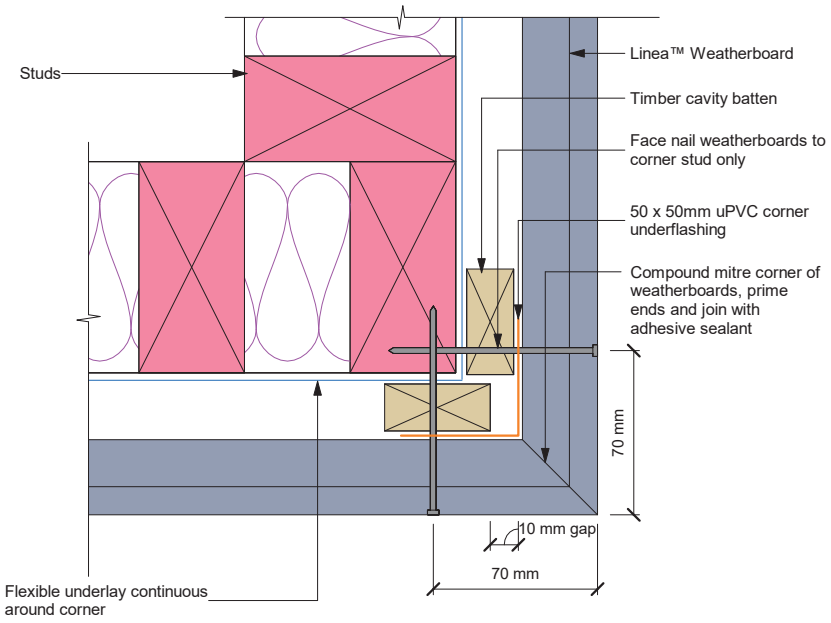
Note: Site cut edges to be primed

Figure 9: Boxed corner



Note:
Box corner trim must not be continuous over solid floor joists.

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

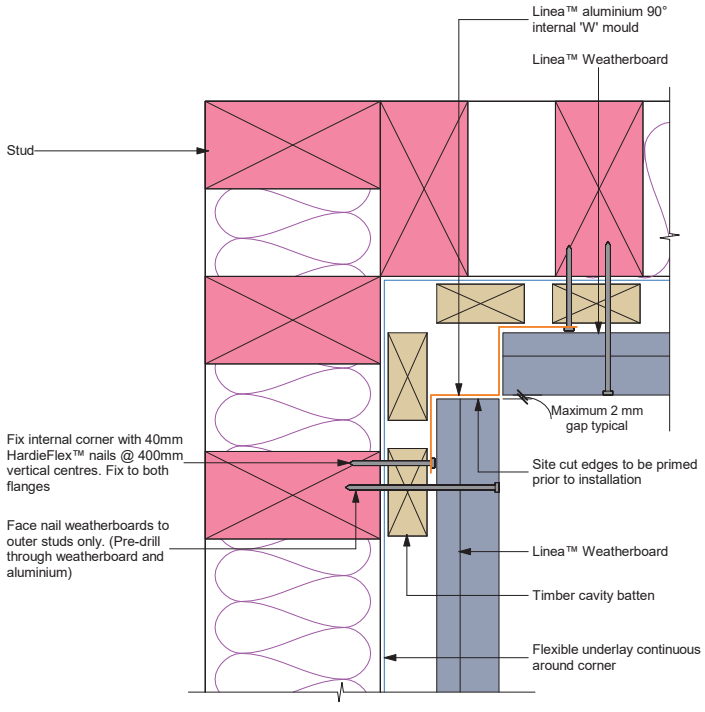
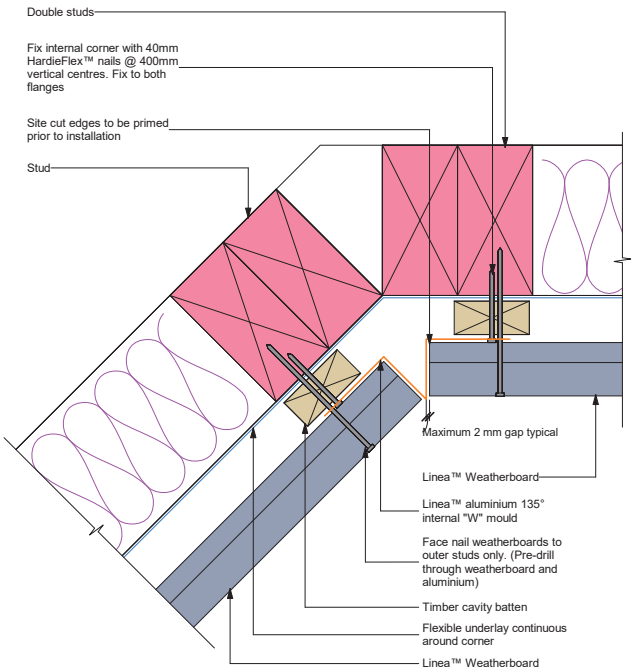


Figure 12: Internal 135 º aluminium 'W' mould corner



Note:
Aluminium extrusion must not be continuous over solid floor joists

Figure 13: Internal corner joint flashing

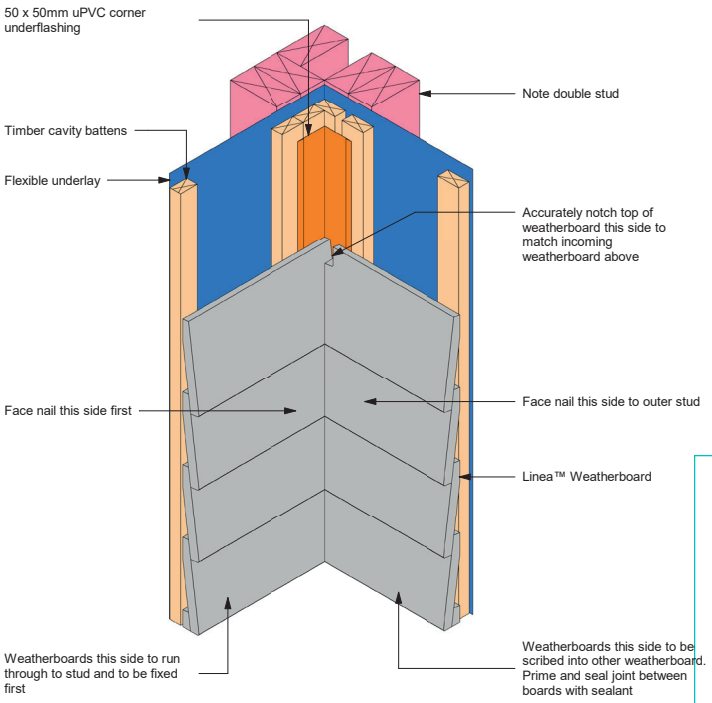
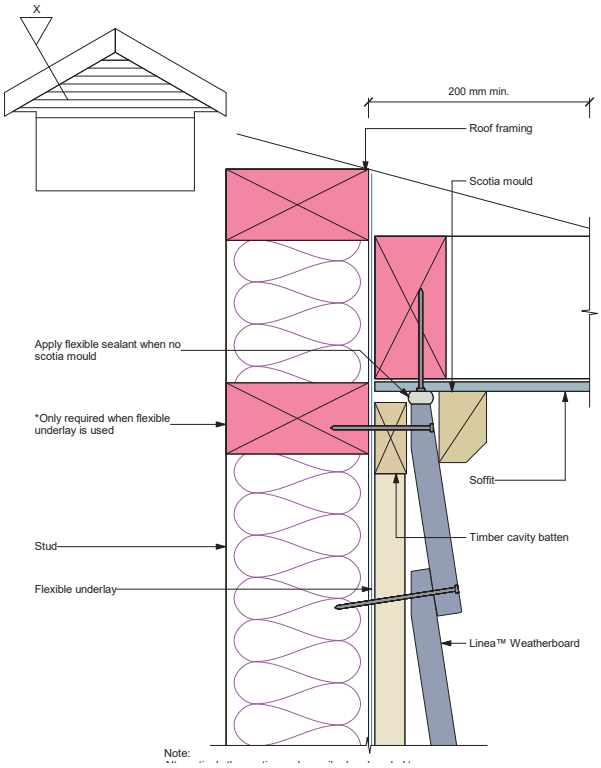


Figure 14: Wall to soffit junction 'X'



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

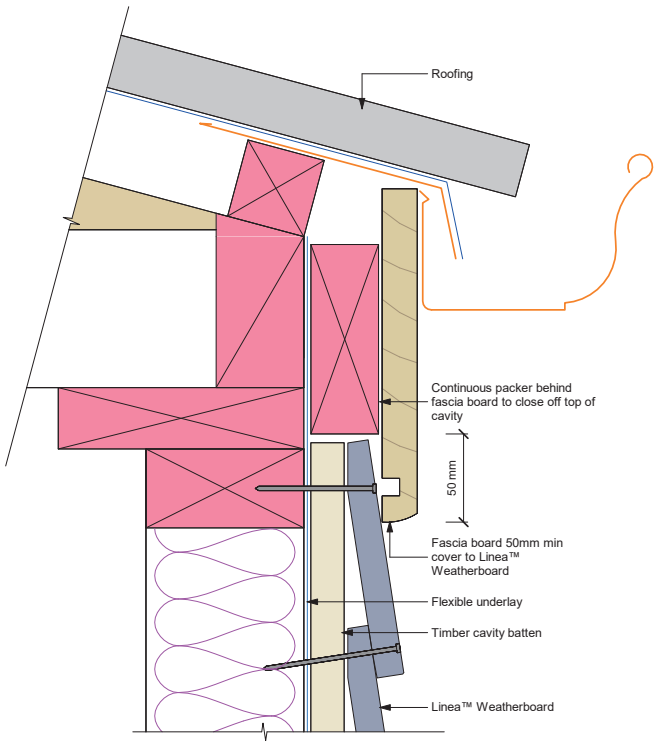
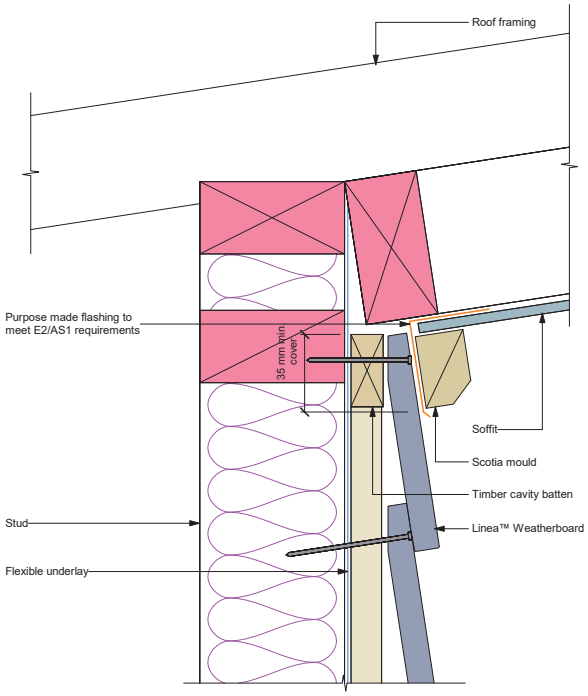
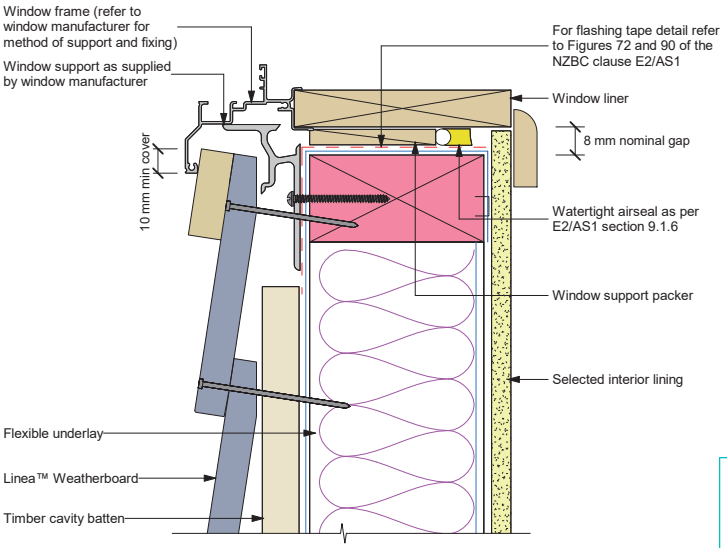


Figure 16: Sloping soffit and wall junction



Note: Site cut edges to be primed

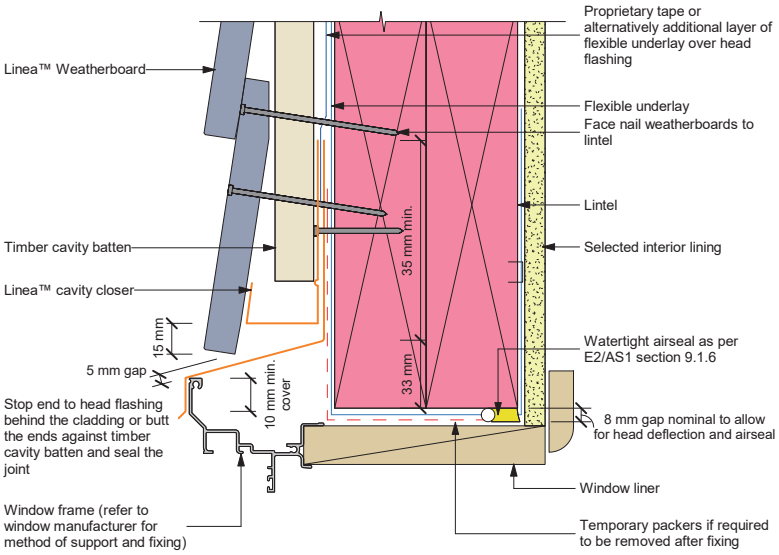
Figure 17: Window and door sill



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

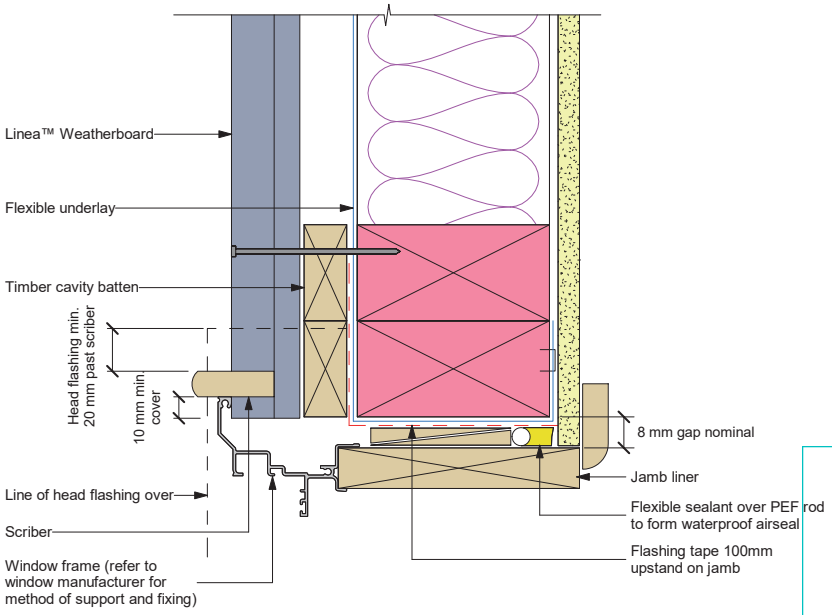
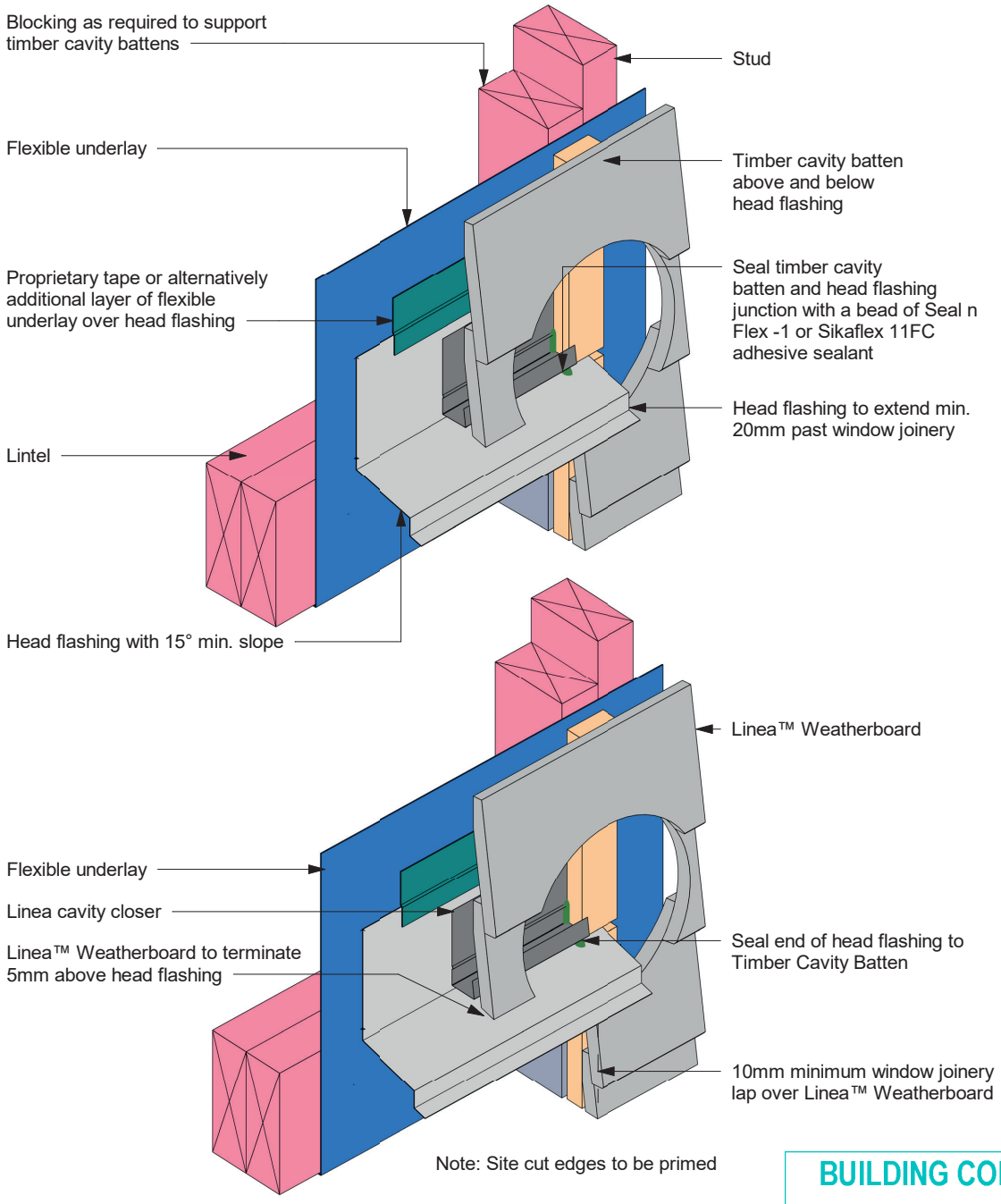
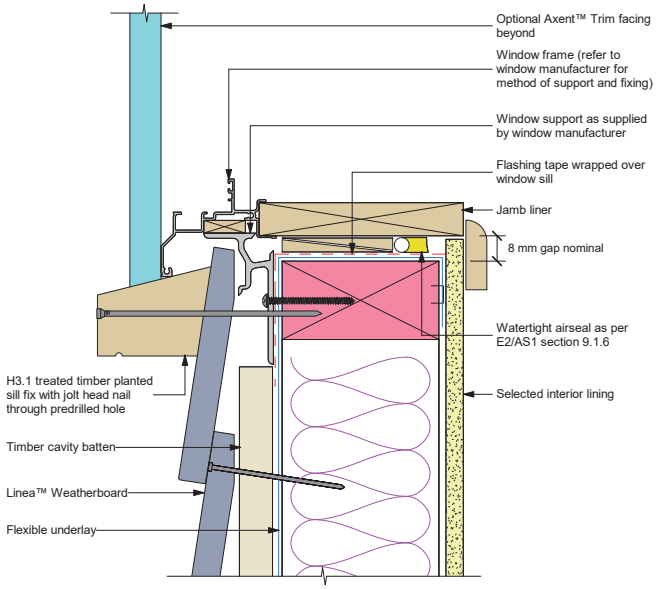


Figure 20: Window head stop end



Note: Site cut edges to be primed

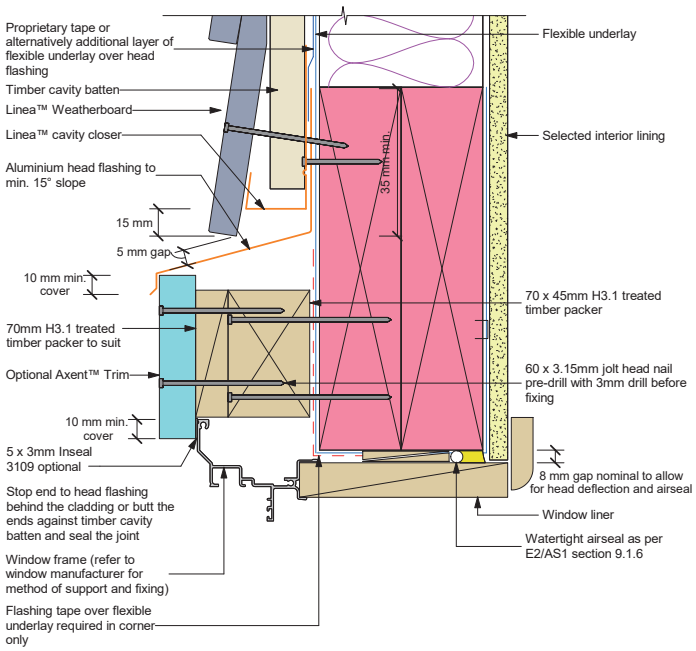
Figure 21: Window sill with facing



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

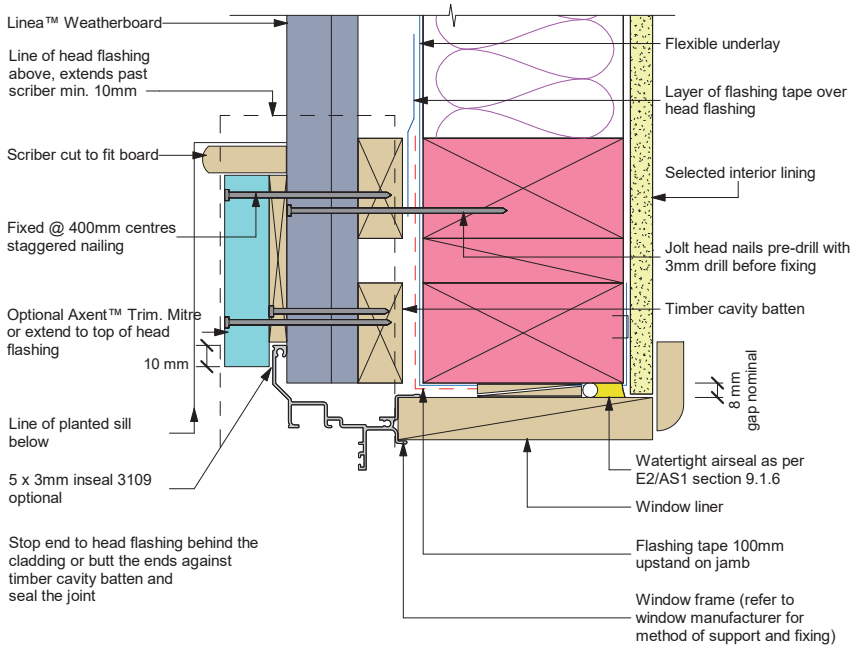
Refer to the manufacturer or supplier for technical information for these materials

Figure 22: Window head with facings



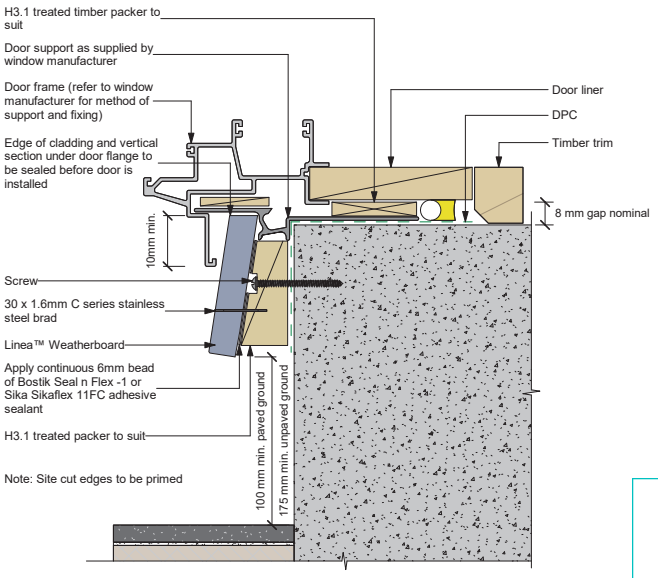
Note:
- Sealant must be installed between head flashing and window flange in VH and EH wind zones and SED pressures
- Alternatively, the head flashings can be formed with stop ends as per E2/AS1
- Refer to Figure 22 for sealing end battens to head flashing

Figure 23: Window jamb with facings



Note:
- Site cut edges to be primed

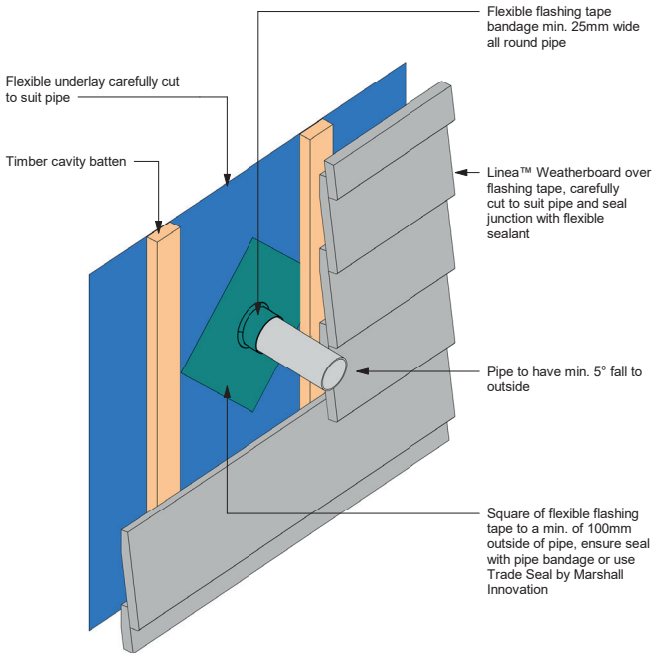
Figure 24: Door sill support detail



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

General notes for materials selection
1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of the NZBC E2/AS1
2. Flexible underlay must comply with acceptable solution E2/AS1
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact
4. Linea™ Weatherboard to have sealed butt joint over batten at each corner of opening

Figure 25: Pipe penetration



Note: Site cut edges to be primed

Figure 26: Continous cladding over joist

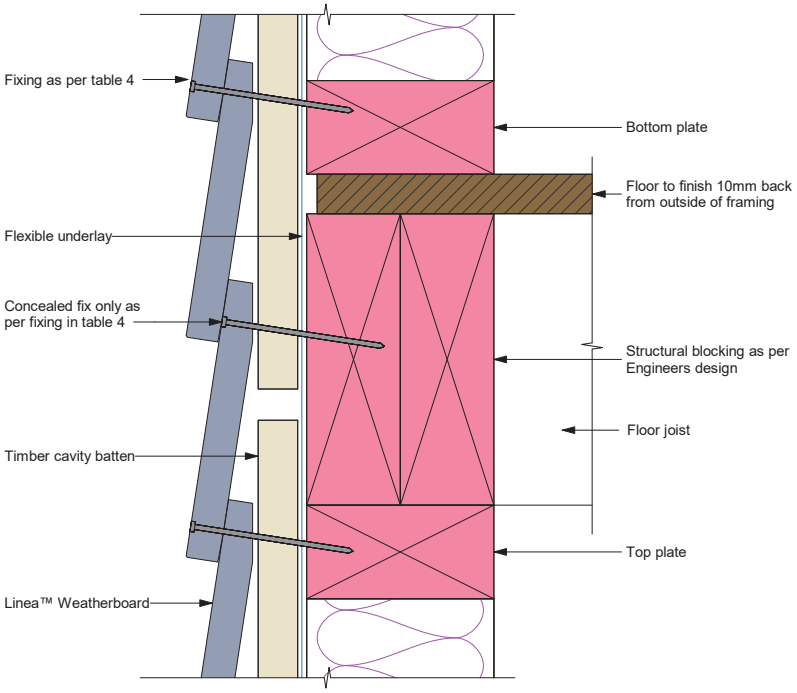
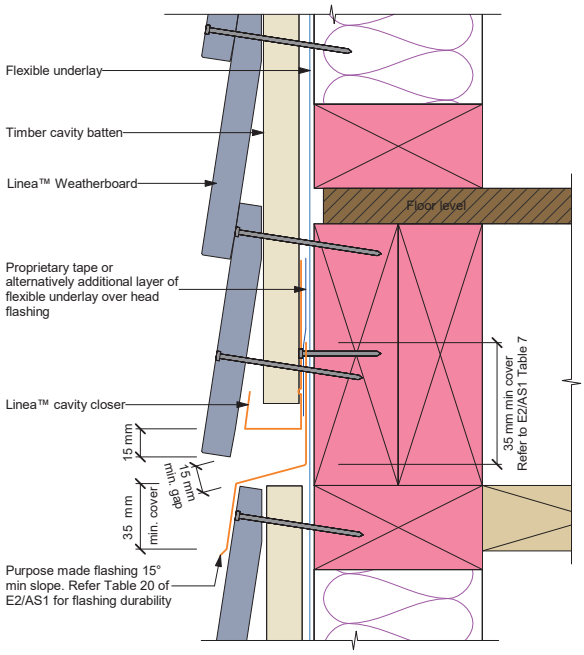


Figure 27: Drained flashing joint at floor level



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

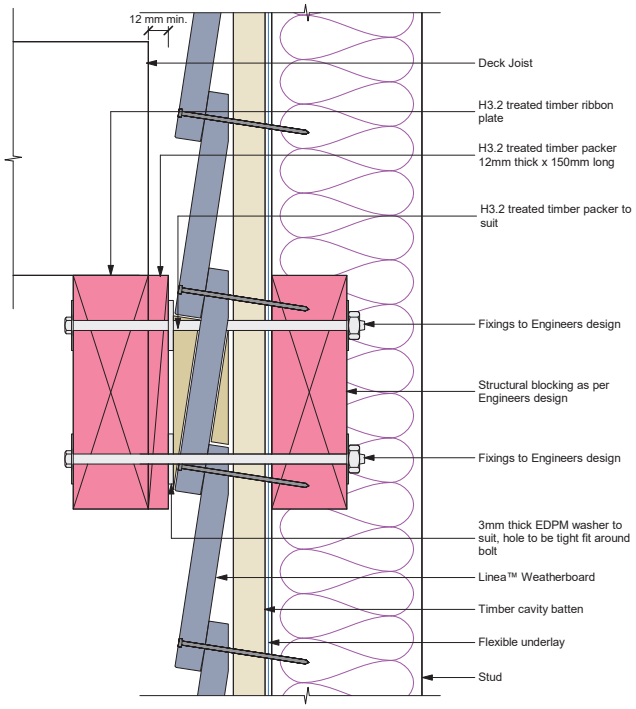


Figure 29: One piece apron flashing joint

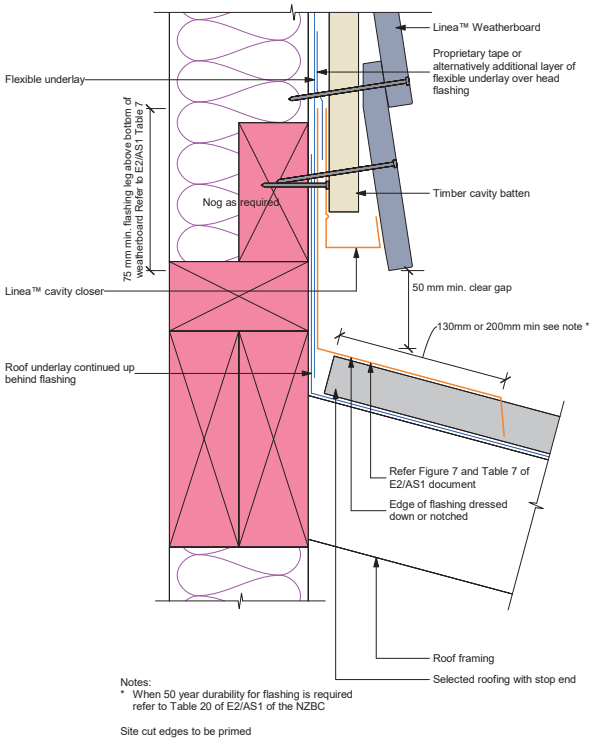


Figure 30: Roof to wall junction detail

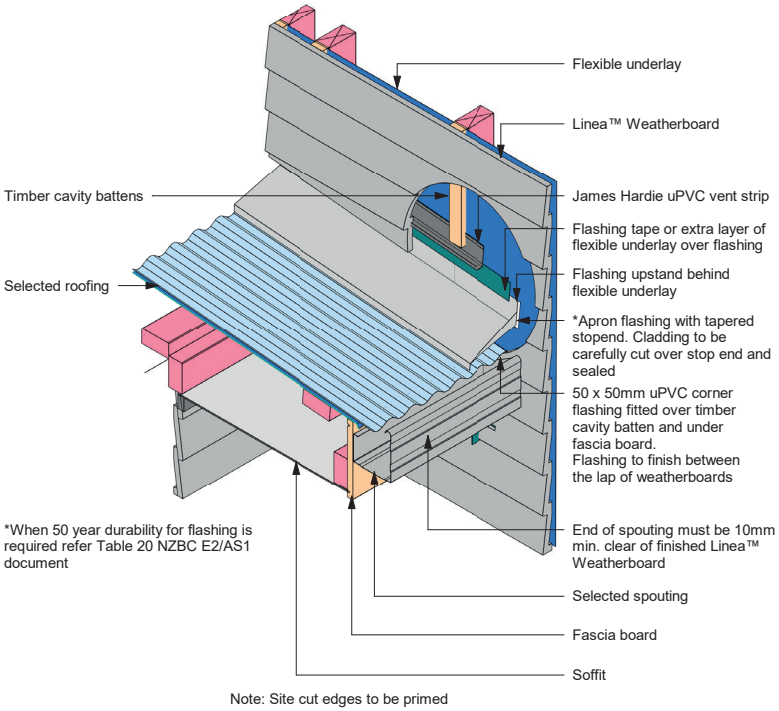


Figure 31: Parapet flashing

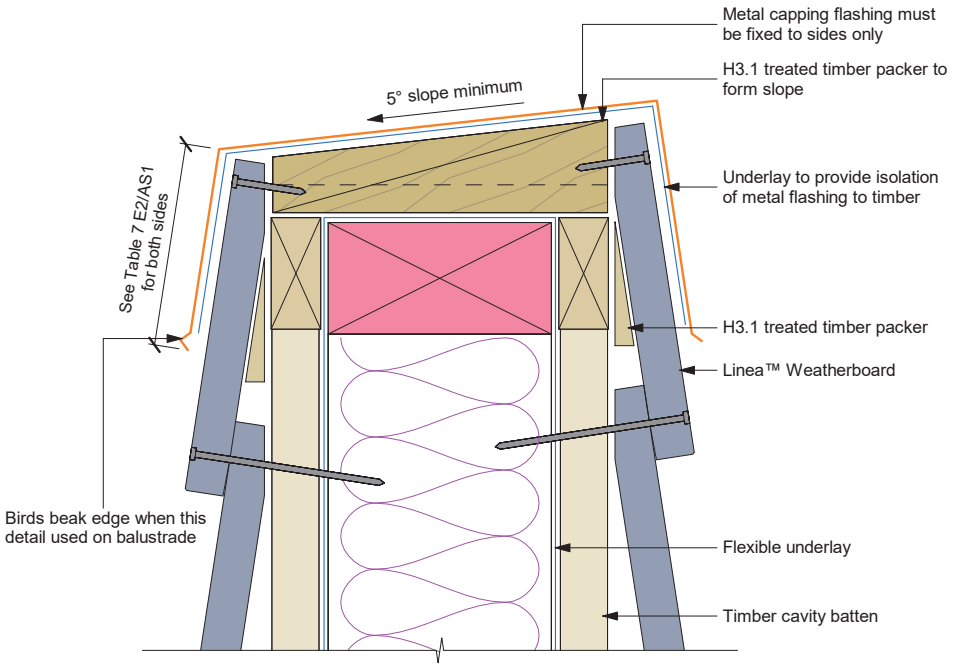


Figure 32: Enclosed deck balustrade to wall

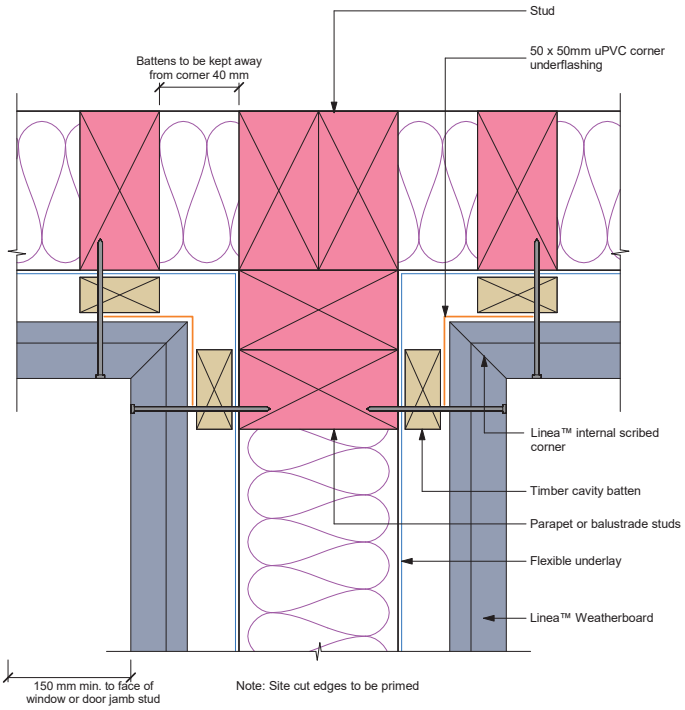
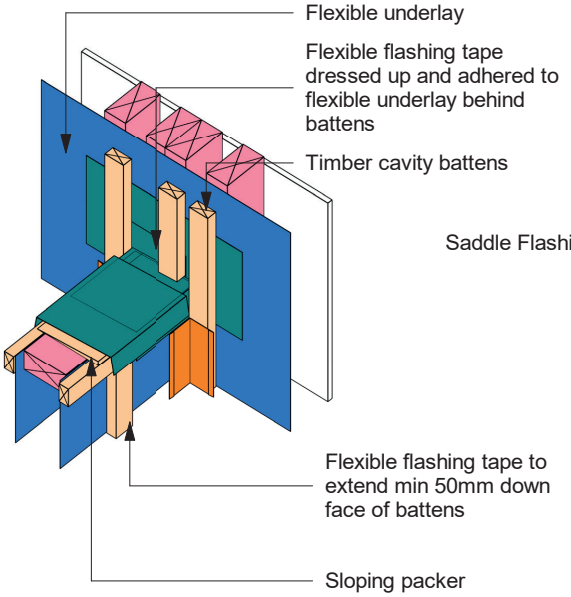
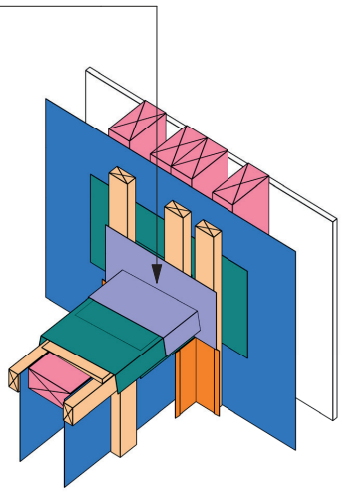


Figure 33: Enclosed balustrade to wall



Batten and Flashing Tape Application Prior to Metal Flashing Fixing



Saddle Flashing Application Prior to Cladding and Cap Flashing Fixing

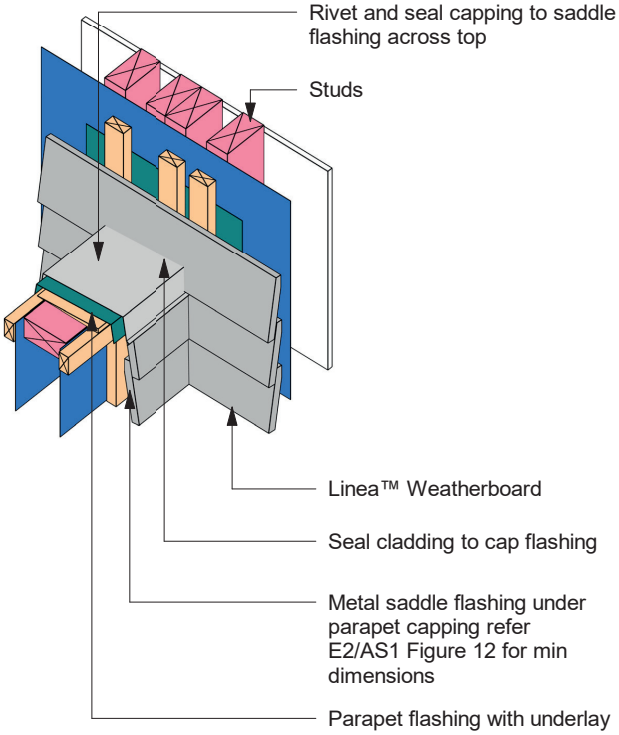
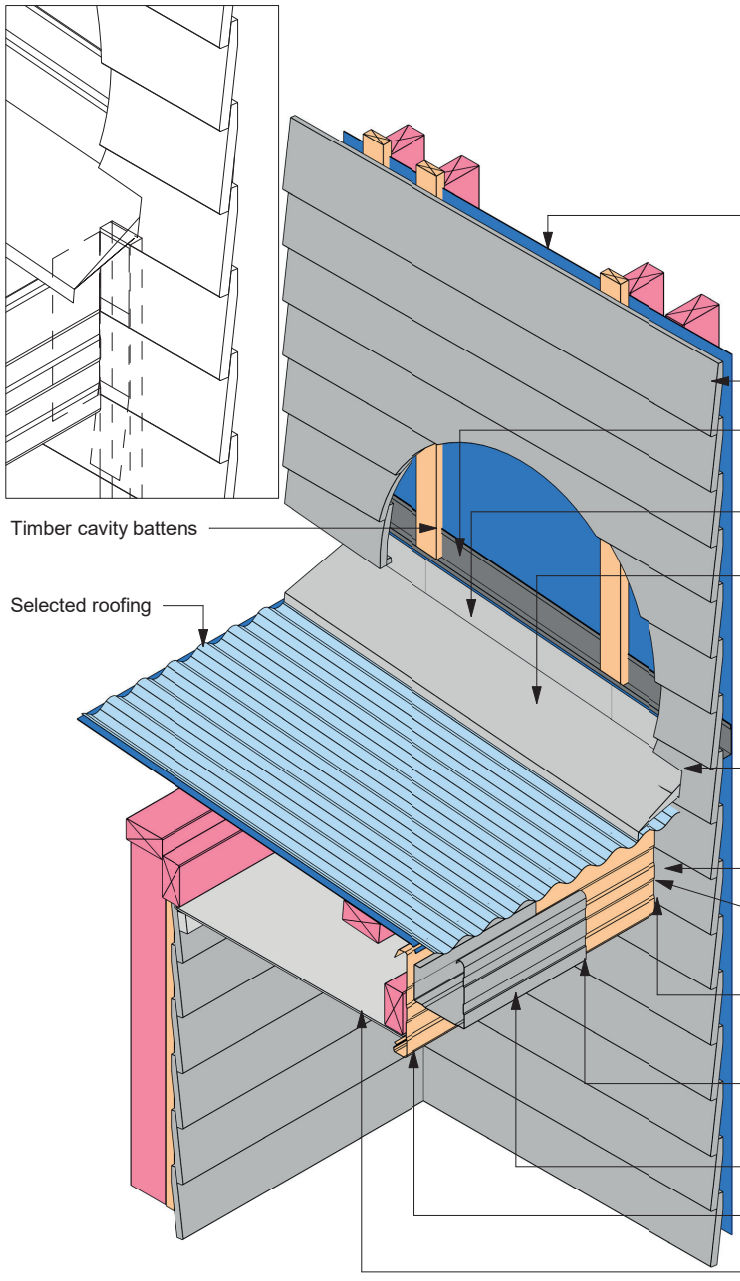


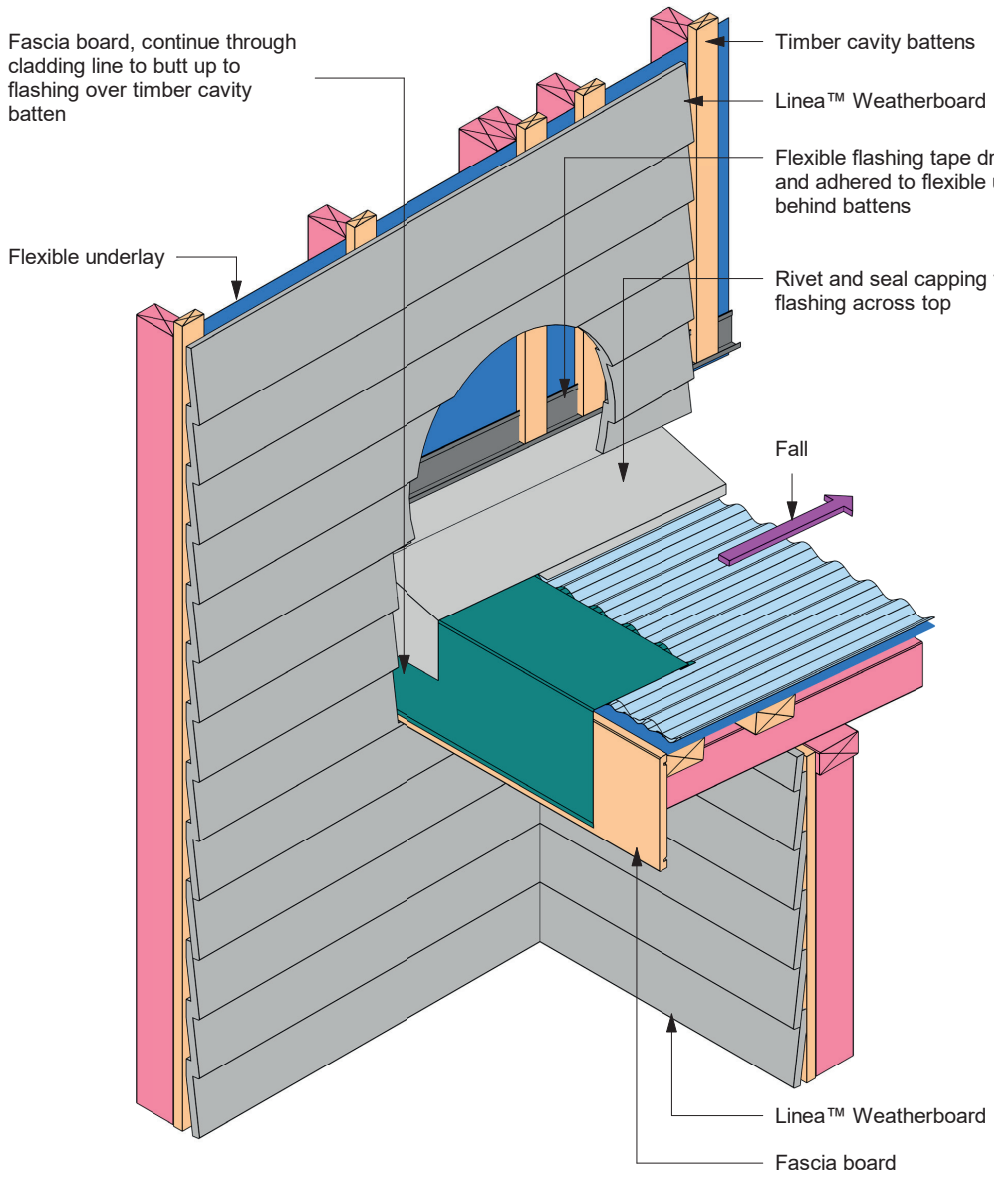
Figure 34: Junction Linea™ Weatherboard and fascia board



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

Note: Site cut edges to be primed

Figure 35: Enclosed roof to wall intersection



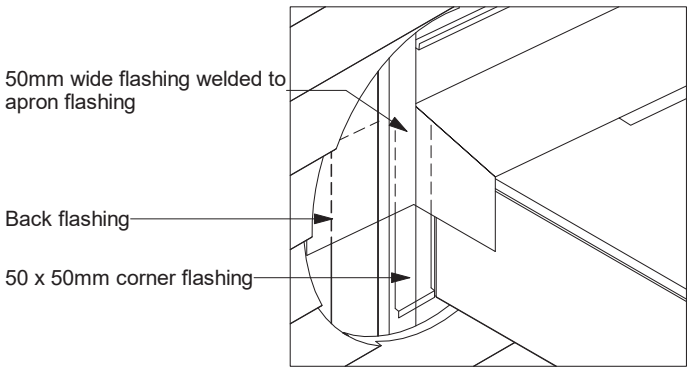
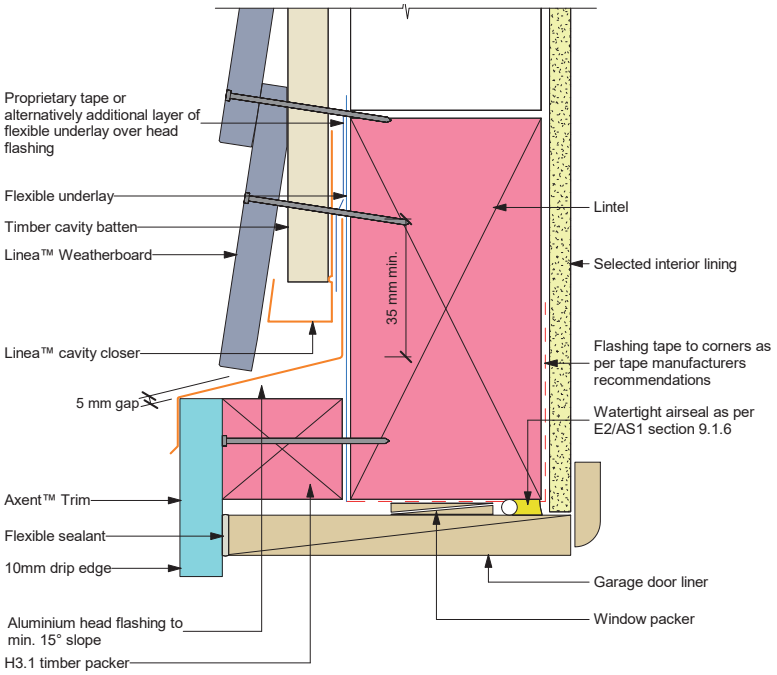
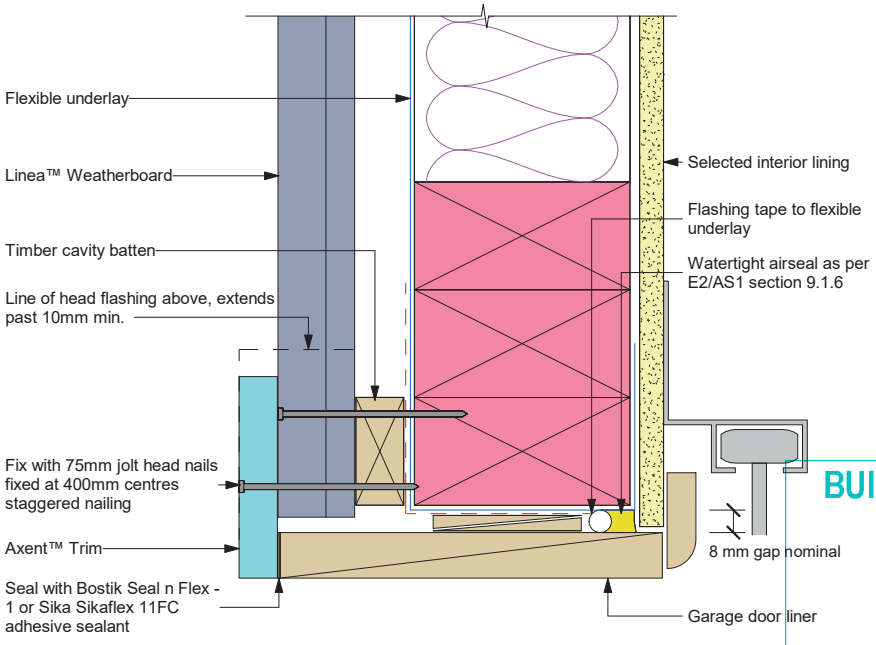


Figure 36: Garage door head



Note:
- Sealant must be applied between head flashing and liner in VH and EH wind zones and SED wind pressures
- Site cut edges to be primed

Figure 37: Garage door jamb



Note: Site cut edges to be primed

Figure 38: Framing setout building height over 10m

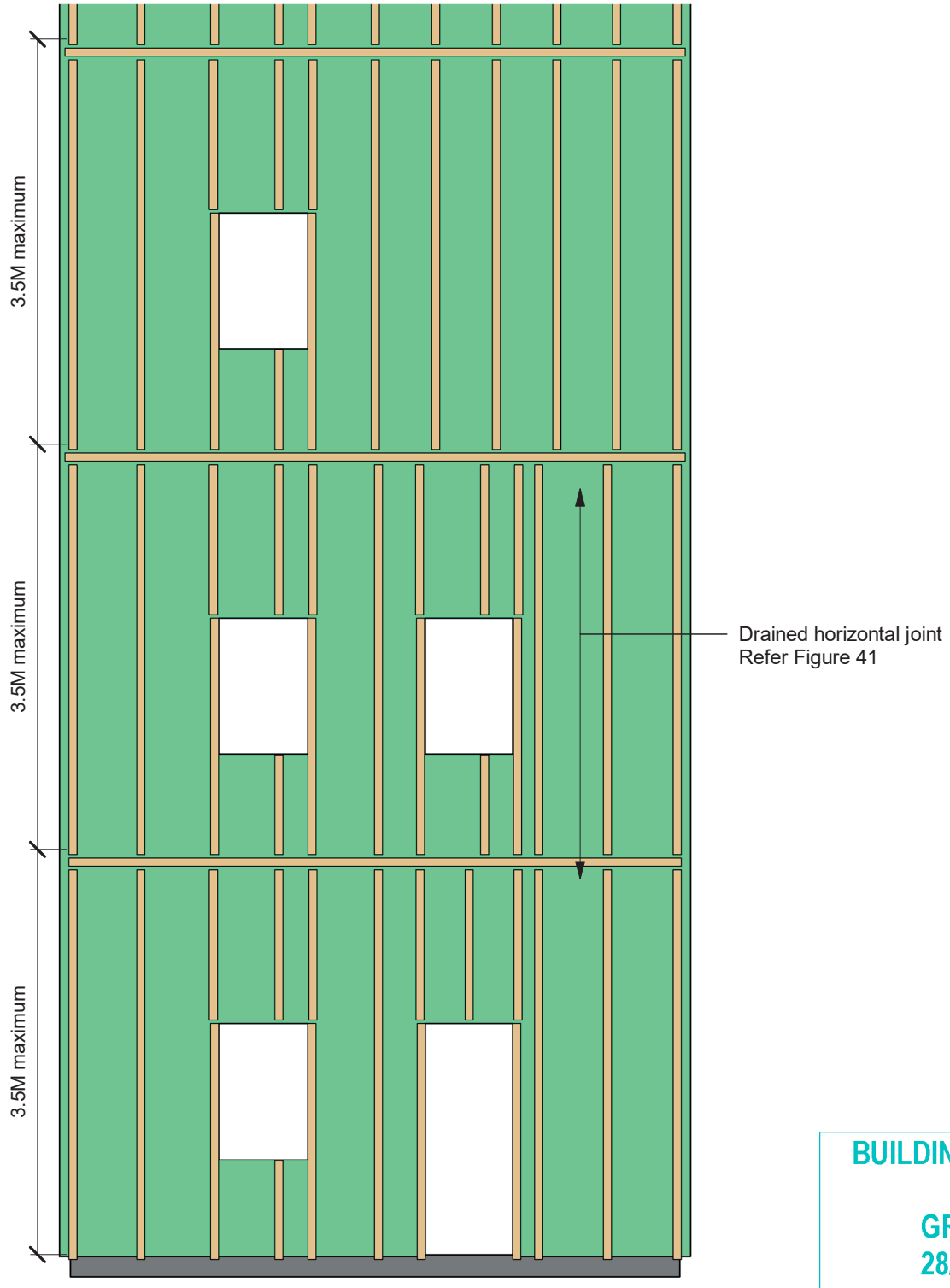
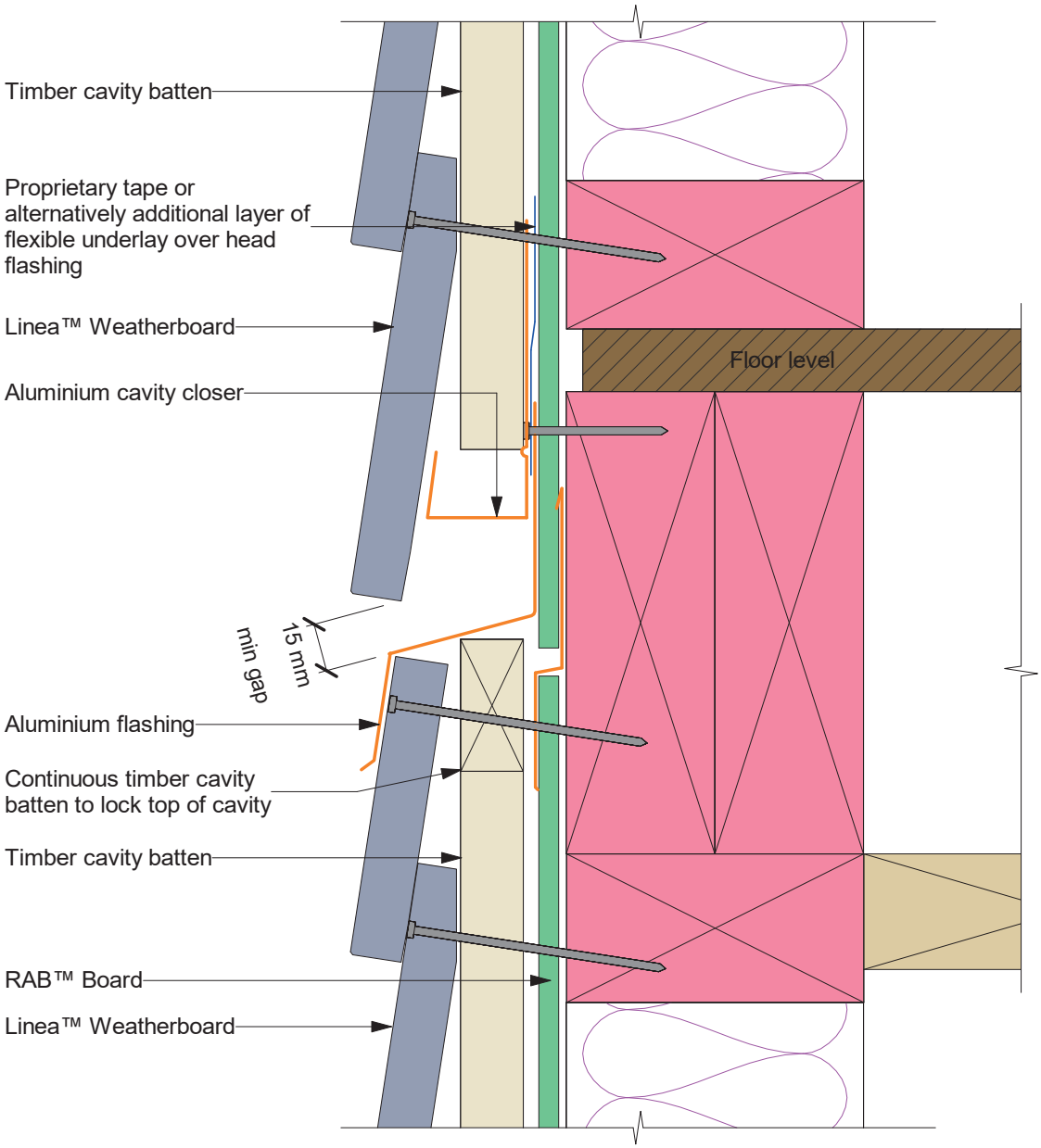


Figure 39: Intertenancy vertical fire separation



Notes

Notes

Notes

Linea™ WEATHERBOARD

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.

BC220141

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

JamesHardie™

Ask James Hardie™ | Call 0800 808 868 | jameshardie.co.nz

HUTT CITY
TE AWA KAIRANGI

BRANZ Appraised
Appraisal No. 789 [2020]

ELDORADO STONE™ VENEER AND HARD AS ROCKS APPLICATION SYSTEM

Appraisal No. 789 (2020)

This Appraisal replaces BRANZ Appraisal No. 789 (2012)

BRANZ Appraisals

Technical Assessments of products for building and construction.

Hard as Rocks Ltd
PO Box 1706
Taupo 1351
Freephone: 0800 353 672
Phone: 07 378 3929
Web: www.hardasrocks.co.nz

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 The Eldorado Stone™ Veneer and Hard as Rocks Application System is a cavity-based external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 The system consists of a cast stone veneer cladding designed to imitate the look of natural stone. The stone veneer elements are manufactured from lightweight aggregates, portland cement and iron oxide pigments, and are cast to mimic different types of stone. Fibre cement backing sheets are fixed over timber battens to form a 20 mm cavity. The stone veneer and mortar are mechanically anchored through to the structural wall framing by stainless steel anchor ties and screws.

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

Scope

2.1 The Eldorado Stone™ Veneer and Hard as Rocks Application System has been appraised as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- 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 The Eldorado Stone™ Veneer and Hard as Rocks Application System must only be installed on vertical surfaces (except for sills, which must have a minimum 10° slope and be waterproofed in accordance with the Technical Literature).

2.3 The system is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(Note: The Appraisal of Eldorado Stone™ Veneer and Hard as Rocks Application System relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone or design wind pressure.)*

2.4 Installation of components and accessories supplied by Hard as Rocks Ltd and licensed applicators must be carried out only by Hard as Rocks Ltd licensed applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the Eldorado Stone™ Veneer and Hard as Rocks Application System, 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. The Eldorado Stone™ Veneer and Hard as Rocks Application System 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 10.1–10.5.

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2. The Eldorado Stone™ Veneer and Hard as Rocks Application System meets these requirements. See Paragraphs 11.1 and 11.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The Eldorado Stone™ Veneer and Hard as Rocks Application System meets this requirement. See Paragraphs 15.1–15.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Eldorado Stone™ Veneer and Hard as Rocks Application System meets this requirement.

Technical Specification

4.1 System components and accessories supplied by Hard as Rocks Ltd are as follows:

Stone

- **Eldorado Stone™ Veneer** elements are cast from moulds originating from natural stone and are made from portland cement, lightweight aggregates and oxide pigments forming a variety of stone styles. Styles of cast stone available are listed in the Technical Literature.

Anchor Ties and Screws

- **Anchor Ties** are approximately 60 mm long by 20 mm wide formed from Grade 304 stainless steel strip. They are pre-punched with a 5 mm diameter hole for the screw. Screws are square drive 12 g x 65 mm long Grade 304 stainless steel.

Sealer and Mortar

- **StoneTite™ Sealer** is a styrene/butadiene co-polymer latex adhesive used as a slurry mix with portland cement for sealing the fibre cement substrate. It is also used as a mortar additive in StoneTite™ Mortar.
- **StoneTite™ Mortar** is a pre-bagged mix of fine washed sand and portland cement. It is supplied in 25 kg bags and one bag is mixed on site with 3 L of clean drinking water mixed with 600 ml of StoneTite™ additive. It is trowel-applied to the fibre cement as the mortar coat in an 8-10 mm thick layer, followed by the embedment of the stone.

4.2 System accessories used with the system which are supplied by the building contractor are:

- **Flexible wall underlay** – building paper complying with NZBC Acceptable Solution E2/AS1, Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
- **Rigid wall underlay** – plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.
- **Flexible sill and jamb tapes** – flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- **Cavity battens** – nominal 50 mm wide by 20 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber, treated to Hazard Class H3.1.
- **Cavity batten fixings** – 30 x 2.5 mm hot-dip galvanised flathead nails.
- **Cavity vent strip** – PVC, aluminium or stainless steel, punched with 3-5 mm holes or slots complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3.

- **Fibre cement sheet** – 7.5 mm or 9 mm thick fibre cement sheet complying with AS/NZS 2908.2 in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.7.2.
- **Joinery head flashings** – as supplied by the joinery manufacturer or contractor.
- **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 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.

Handling and Storage

5.1 Handling and storage of all materials supplied by Hard as Rocks Ltd or its licensed applicators, whether on-site or off-site, are under the control of Hard as Rocks Ltd licensed applicators. Dry storage must be provided on-site for the Eldorado Stone™ Veneer elements. Bags of StoneTite™ mortar mix and StoneTite™ sealer must be stored under cover. Liquid components must be stored in frost-free conditions.

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

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Eldorado Stone™ Veneer and Hard as Rocks Application System. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

Framing

Timber Treatment

7.1 Timber wall framing behind the Eldorado Stone™ Veneer and Hard as Rocks Application System must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

7.2 Timber framing must comply with NZS 3604 or be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. In all cases, studs must be at maximum 400 mm centres. Dwangs must be fitted flush between the studs at maximum 800 mm centres.

7.3 For specifically designed timber-framed buildings situated in Wind Zones above NZS 3604 defined Extra High, there must be a minimum timber framing size of 90 x 45 mm, and a minimum timber grade of MSG8.

7.4 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *[Note: If the Eldorado™ Stone and Hard as Rocks Application System is fixed to framing with a moisture content of greater than 24%, problems may occur at a later date due to excessive timber shrinkage.]*

General

8.1 Punchings in the cavity vent strip must provide a minimum ventilation opening area of 1,000 mm^2 per lineal metre of wall in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3 b).

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

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

8.4 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for Wind Zones up to, and including, Very High, and rigid underlays for buildings in the Extra High Wind Zone. Unlined gables and walls must incorporate a rigid sheathing or an air barrier which meet 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 screw fixing lengths must be increased by a minimum of the thickness of the underlay.

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

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

Control Joints

9.1 Control joints where Eldorado Stone™ Veneer and Hard as Rocks Application System is used must be constructed in accordance with the Technical Literature and be provided as follows:

- **Horizontal control joints** – at maximum 5.4 m centres and at inter-storey floor levels.
- **Vertical control joints** – at maximum 5.4 m centres; aligned with any control joint in the structural framing, or where the system abuts different cladding types.

[Note: Horizontal and vertical control joints must be located over structural supports. The Technical Literature provides some guidance for the design of vertical control joints where the system abuts different cladding types. Details not included within the Technical Literature are outside the scope of this Appraisal and are the responsibility of the designer – see Paragraph 8.6.]

Inter-storey Junctions

9.2 Inter-storey drained joints must be constructed in accordance with the Technical Literature. Inter-storey joints must be provided to limit continuous cavities to the lesser of 2-storeys or 7 m in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4 b).

Structure

Mass

10.1 The mass of Eldorado Stone™ Veneer and Hard as Rocks Application System (including the weight of the fibre cement sheet and mortar) is, in the case of the heaviest stone veneer profile, less than 80 kg/m^2, therefore it is considered a medium weight wall cladding in terms of NZS 3604.

Impact Resistance

10.2 The system has adequate resistance to impact loads likely to be encountered in normal residential use. The likelihood of impact damage to the system when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers should be considered for vulnerable areas.

Wind Zones

10.3 The Eldorado Stone™ Veneer and Hard as Rocks Application System is suitable for use in all Wind Zones of NZS 3604 up to, and including, Extra High where buildings are within the scope as detailed in Paragraph 2.1. See Paragraph 10.5 for anchor tie spacings.

Earthquake Zones

10.4 The Eldorado Stone™ Veneer and Hard as Rocks Application System is suitable for use in all Earthquake Zones of NZS 3604.

Anchor Tie Spacing

10.5 Determine the anchor tie spacing for the relevant Wind Zone from Table 1. Determine the anchor tie spacing for the relevant Earthquake Zone from Table 2. The lowest anchor tie spacing must be used for the building design.

Table 1.

Wind Zone Vertical Anchor Tie Spacing (mm)		
Wind Zone	Within 1,200 mm of building corner	More than 1,200 mm from building corner
Low	400	400
Medium	400	400
High	300	400
Very High	200	300
Extra High	180	200

Note: The maximum horizontal anchor tie spacing to studs is 400 mm.

Table 2.

Earthquake Zone Vertical Anchor Tie Spacing (mm)		
Earthquake Zone	Single Storey 3 m maximum	Building Height 10 m maximum
Zone 1	400	300
Zone 2	400	225
Zone 3	250	150
Zone 4	200	120

Note: The maximum horizontal anchor tie spacing to studs is 400 mm.

Durability

11.1 The Eldorado Stone™ Veneer and Hard as Rocks Application System meets the performance requirements of NZBC Clause B2.3.1 (b) 15 years for the stone veneer cladding system.

Serviceable Life

11.2 Eldorado Stone™ Veneer and Hard as Rocks Application System is expected to have a serviceable life in excess of 35 years provided the system is maintained in accordance with this Appraisal.

Maintenance

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

12.2 Regular cleaning (at least annually) is required to remove grime, dirt and organic growth and to maximise the life and appearance of the stone veneer finish. Grime may be removed by brushing with a soft bristle brush, warm water and detergent.

12.3 Annual inspections must be made to ensure that all aspects of the Eldorado Stone™ Veneer and Hard as Rocks Application System, including flashings and any sealed joints remain in a weatherproof condition. Any cracks, damaged areas or areas showing signs of deterioration, must be repaired immediately. Eldorado Stone™ Veneer and Hard as Rocks Application System must be repaired in accordance with the instructions of Hard as Rocks Ltd.

12.4 Minimum ground clearances as set out in this Appraisal and the Technical Literature must be maintained at all times during the life of the system. *(Note: Failure to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of the Eldorado Stone™ Veneer and Hard as Rocks Application System.)*

Control of External Fire Spread

Vertical Fire Spread

13.1 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

13.2 The Eldorado Stone™ Veneer and Hard as Rocks Application System is composed entirely of stone on fibre cement cladding and is therefore defined as non-combustible, as per NZBC Acceptable Solution C/AS2 Definitions. When Eldorado Stone™ Veneer and Hard as Rocks Application System is uncoated or has a directly applied surface finish of no more than 1 mm in thickness, it can be used within 1 m of the relevant boundary. This meets the requirements of Paragraph 5.4 of NZBC Acceptable Solution C/AS1 and Paragraph 5.8.2 a) of NZBC Acceptable Solution C/AS2.

13.3 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

14.1 Separation or protection must be provided to Eldorado Stone™ Veneer and Hard as Rocks Application System from heat sources such as fireplaces, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions 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

15.1 Eldorado Stone™ Veneer and Hard as Rocks Application System when installed in accordance with this Appraisal and the Technical Literature prevents the penetration of moisture that could cause undue dampness or damage to building elements.

15.2 The cavity must be sealed off from the roof and sub-floor space to meet the performance requirements of NZBC Clause E2.3.5.

15.3 Eldorado Stone™ Veneer and Hard as Rocks Application System allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet the performance requirements of NZBC Clause E2.3.6.

15.4 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.

15.5 The use of Eldorado Stone™ Veneer and Hard as Rocks Application System where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations etc. to remain weather resistant.

Internal Moisture

16.1 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

16.2 Eldorado Stone™ Veneer and Hard as Rocks Application System is not a barrier to the passage of water vapour, and when correctly installed will not create or increase the risk of moisture damage resulting from condensation.

Installation Information

Installation Skill Level Requirements

17.1 All design and building work must be carried out in accordance with the Eldorado Stone™ Veneer and Hard as Rocks Application System Technical Literature and this Appraisal. All building work must be undertaken by Hard as Rocks Ltd licensed applicators. Where the work involves Restricted Building Work, this must also be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License class.

System Installation

Building Underlay and Flexible Sill and Jamb Tape Installation

18.1 The selected wall underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of Eldorado Stone™ Veneer and Hard as Rocks Application System. Flexible wall 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.

Aluminium Joinery Installation

18.2 Aluminium joinery must be installed by the building contractor in accordance with the Technical Literature. A 7.5–10 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.

18.3 The system must be installed in accordance with the Technical Literature by Hard as Rocks licensed applicators.

18.4 Eldorado Stone™ Veneer and Hard as Rocks Application System must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Finishing

18.5 Hard as Rocks Ltd Technical Literature must be followed at all times for finishing of mortar work. Excess mortar must be removed carefully with a soft brush when the mortar is partially dry (after approximately 1 hour). The quality of final pointing and mortar work are pivotal to the final aesthetic look of the stone veneer.

Inspections

18.6 The Technical Literature must be referred to during the inspection of Eldorado Stone™ Veneer and Hard as Rocks Application System installations.

Health and Safety

19.1 Cutting of Eldorado™ Stone elements must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

19.2 When power tools are used for cutting, grinding or forming holes, health and safety measures must be observed because of the amount of dust generated.

19.3 Safe use and handling procedures for the components that make up Eldorado Stone™ Veneer and Hard as Rocks Application 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

20.1 The following testing has been undertaken by BRANZ:

- BRANZ expert opinion on NZBC Clause E2 code compliance for Eldorado Stone™ Veneer and Hard as Rocks Application System was based on evaluation of all details within the scope and as stated within this Appraisal and testing of the Eldorado Stone™ Veneer and Hard as Rocks Application System to E2/VM1 (as contained within NZBC Clause E2, Amendment 4). The testing assessed the performance of the window head, jamb and sill details, meter box head, jamb and sill details, vertical and horizontal control joints, internal and external corners, and pipe penetration. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of Acceptable Solution E2/AS1 for drained cavity claddings.
- Wind face load and fastener pull-out testing for Eldorado Stone™ Veneer and Hard as Rocks Application System. BRANZ determined design wind suction pressures, and by comparing these pressures with the NZS 3604 design wind speeds and AS/NZS 1170 pressure coefficients, the fixing requirements were determined for timber walls.
- In-plane shear testing of Eldorado Stone™ Veneer and Hard as Rocks Application System was carried out to determine the system's ability to resist self-weight.
- A racking test was completed to examine the performance of Eldorado Stone™ Veneer and Hard as Rocks Application System where the system was subjected to both serviceability level and ultimate level seismic racking deflections, taken to be ±8 mm and ±36 mm respectively. The stone veneer system did not crack or show signs of damage.

Other Investigations

21.1 Structural and durability opinions have been provided by BRANZ technical experts.

21.2 Site inspections of Eldorado Stone™ Veneer and Hard as Rocks Application System installations have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

21.3 The Technical Literature for Eldorado Stone™ Veneer and Hard as Rocks Application System has been examined by BRANZ and found to be satisfactory.

Quality

22.1 The manufacture of the cast veneer stone elements has not been examined by BRANZ, however methods adopted for quality control, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

22.2 The quality of materials, components and accessories supplied by Hard as Rocks Ltd is the responsibility of Hard as Rocks Ltd.

22.3 Quality on-site is the responsibility of Hard as Rocks Ltd licensed applicators.

22.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, wall underlays, flashing tapes, air seals, cavity battens and fibre cement sheets in accordance with the instructions of Hard as Rocks Ltd.

22.5 Building owners are responsible for the maintenance of Eldorado Stone™ Veneer and Hard as Rocks Application System installations in accordance with the instructions of Hard as Rocks Ltd.

Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber structures standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4211: 2008 Specification for performance of windows.
- Ministry of Business, Innovation and Employment Record of amendments – Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

BRANZ

In the opinion of BRANZ, Eldorado Stone™ Veneer and Hard as Rocks Application System is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Hard as Rocks 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. Hard as Rocks 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 Hard as Rocks 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 Hard as Rocks Ltd or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
04 December 2020

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY TE AWA KAIRANGI

BC220141

Hard as Rocks

BRANZ Appraised
Appraisal No.789 [2012]
Application System

ELDORADO STONE®

CONSTRUCTION GUIDE

ELDORADO STONE™ VENEER AND HARD AS ROCKS APPLICATION SYSTEM

VERSION 1.1 February 2016

FOR YOUR LOCAL LICENSED APPLICATOR AND HARD AS ROCKS DISTRIBUTOR PLEASE PHONE

0800 353 672

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

PRODUCT DESCRIPTION

Eldorado Stone™ veneer and Hard as Rocks Application System is a simulated stone veneer cladding system designed to imitate the look of natural stone. The materials used in the manufacture of Eldorado Stone™ veneer are lightweight aggregates, Portland cement and iron oxide pigments that are cast to mimic different styles of stone. The weight of the cladding system in total does not exceed 80kg/m^2.

Hard as Rocks New Zealand's installation procedure of this stone veneer cladding is generally over conventional timber framing with studs at not more than 400 mm centres, a nominal 20mm drained and ventilated cavity and a fibre-cement backing sheet sealed with a proprietary moisture resistant coating. Proprietary stainless steel ties are used as a mechanical fixing between the timber framing and the mortar/stone veneer. This cast stone veneer and its New Zealand installation system can be used on domestic and light commercial buildings where domestic construction techniques are used as well as solid construction buildings as detailed below.

SCOPE OF USE

No substitutions are permitted for Eldorado Stone Veneer & Hard as Rocks Application System.

The Eldorado Stone™ veneer and Hard as Rocks Application System has been appraised as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- 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.

  The Eldorado Stone™ veneer and Hard as Rocks Application System must only be installed on vertical surfaces (except for sills which must have a minimum 10º slope and be waterproofed in accordance with the Technical Literature)

RESPONSIBILITIES

a. **Hard as Rocks** is responsible for the quality of Eldorado Stone™ veneer and its installation system.
b. Quality of installation on site is the responsibility of **Hard as Rocks** licensed applicators.
c. **Building designers** are responsible for all components of the building and substrate design, to comply with NZBC, and for the incorporation of the *Hard as Rocks Application System* into their design in accordance with the instructions of Hard as Rocks technical literature.
d. **Builders** are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and the NZBC.
e. **Installation of the stone veneer** and the stone veneer accessories supplied by Hard as Rocks and **approved installers** must be carried out only by Hard as Rocks licensed applicators.
f. **Building owners** are responsible for the maintenance of *Eldorado Stone™ veneer and Hard as Rocks Application System* in accordance with the instructions of Hard as Rocks literature.

- **BUILDERS**
- *Weathertightness and flashings are the sole responsibility of the builder and Hard as Rocks Ltd accepts no liability for incorrect or inadequate installation.*

BUILDING CONSENT
GRANTED
28/03/2022
HUTT CITY COUNCIL

SUBSTRATES

Concrete Masonry/Brickwork or Concrete Panels

Eldorado Stone™ veneer can be direct fixed to many masonry surfaces. Each application should consider many aspects including weather tightness (where applicable), footing loading (particularly over brick applications where brick tie loadings need to also be factored and calculated) and returns into window and door rebates. The BRANZ appraised *Eldorado Stone™ veneer and Hard as Rocks Application System* does not cover these applications so it is up to designers and engineers to incorporate the system to meet the NZ building code.
In general applications, the surface must be totally free of oil, grease, paint, curing compounds, sealers, mould release agents, dust or other loose contaminating materials. If any of these materials are present the surface must be cleaned back to the original surface by sandblasting, water blasting, acid etching or wire brushing.
Prior to stone application the surface must be waterproofed using a water proofing slurry which is brushed or rolled on to a depth of not more than 2mm.

FIBRE CEMENT BOARD

The most common and cost-effective form of application is over an approved fibre cement board substrate. We use and recommend BGC Stonesheet 7.5mm and 9mm sheets.
Installation of the fibre cement board and relevant flashings is the responsibility of the builder and must be carried out in accordance with the manufacturer's technical instructions to ensure compliance with the requirements set out in E2 *External Moisture* of the New Zealand Building Code.
All flashings must be installed in accordance with building code requirements. To maintain the weather-resistance of the exterior wall on which the stone products are installed, rigid, corrosion-resistant flashings and a means of drainage shall be installed at all penetrations and terminations of the stone cladding. Flashing type and locations shall be in accordance with the requirements of the applicable code.
The cavity vent strip must be in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3. The vent strip must be manufactured from PVC, aluminium or stainless steel, and be punched with 3 - 5 mm holes or slots which provide a minimum ventilation opening area of 1000 mm2 per lineal meter of wall. The selected cavity vent strip must be installed with the bottom of the vent strip flush with the underside of the cavity battens. Note: A minimum 15 mm drip edge to the bottom of the fibre cement sheet must be maintained at all times.
Minimum 45 mm wide x 18 mm thick H3.1 treated timber cavity battens, or proprietary cavity battens covered by a valid BRANZ Appraisal must be installed over the building underlay to the studs at maximum 400 mm centres. The battens must be fixed in place with 30 x 2.5 mm hot-dipped galvanised flat head nails at maximum 800 mm centres.
7.5 mm and 9mm thick fibre cement sheets complying with AS/NZS 2908 Part 2 may be installed vertically or horizontally. All vertical sheet edges must be supported and fixed through the cavity battens to the wall framing. At the base of the wall, the sheets must hang 50 mm below the supporting framing.

Where to purchase BGC Fibre cement Board

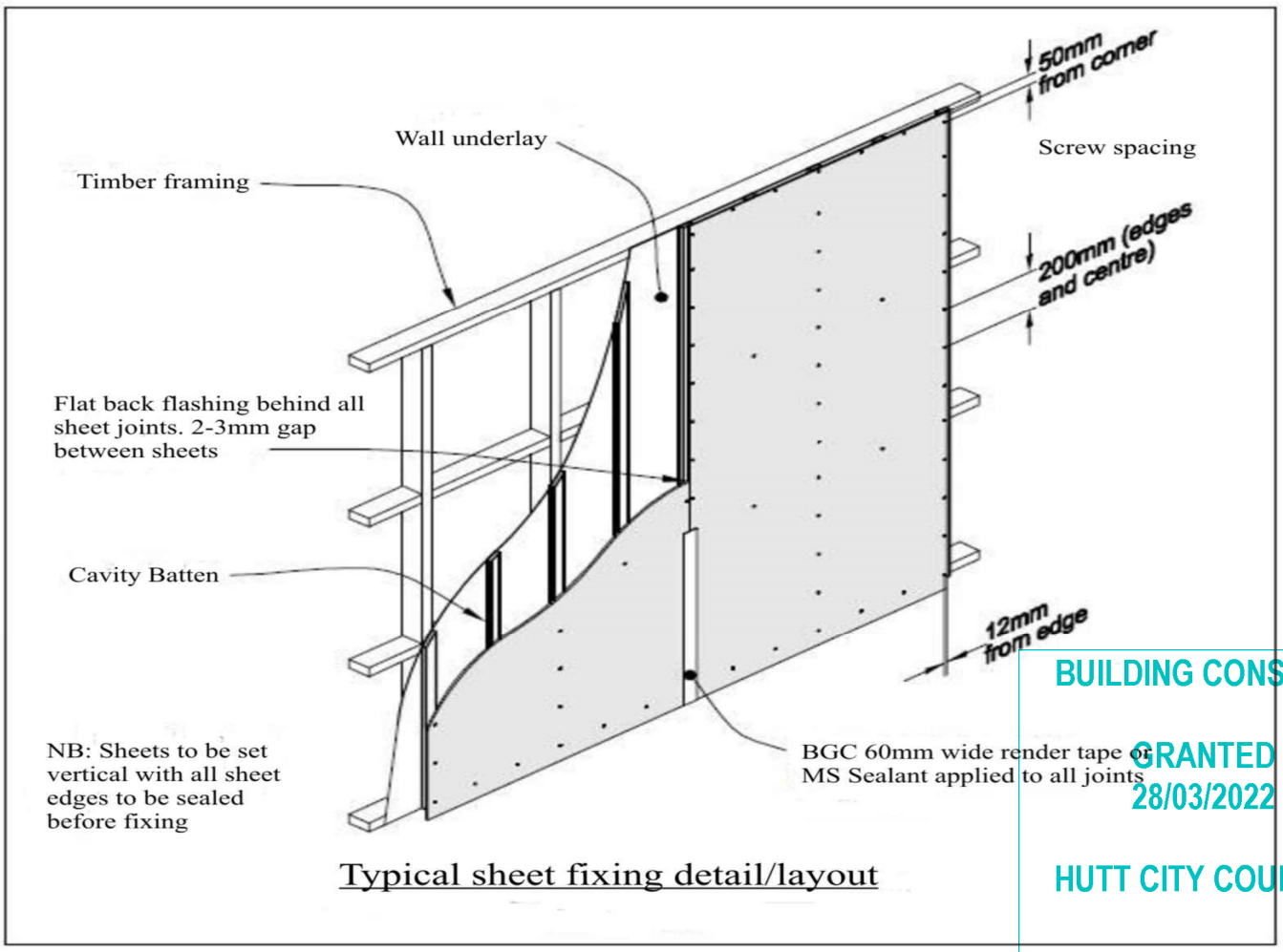
BGC	Placemakers		Bunnings		Carters
	Code	SKU #	Code	SKU #	Product Code
7.5mm Stonesheet	DSS73012	3100354	DSS73012	163617	PPSS 753012
9mm Stonesheet	DSS93012	3100355	DSS93012	163631	
Joint tape	780	3100356	780	163637	
Edge sealer	846	3100351	846	163644	

INSTALLATION OF FIBRE CEMENT BOARD

Diagram: ***Batten and Fibre Cement board set-out***

BUILDERS

- *All exterior applications are to be installed over a 20mm drained cavity system*
- *Use 90 degree moulded flashings for all internal and external corners (PVC, galvanised or Stainless steel as required)*
- *Use Flat back flashings behind all fibre cement sheet joints (horizontal and vertical)*
- *Back flashings are to be installed over the top of the cavity batten and behind the fibre cement board*
- *Use suitably shaped back flashings to all junctions with other claddings*
- *Cavity vent strip to be used at bottom of battens*
- *<u>Builder</u> to install BRANZ appraised MS Silicon to all window jambs and sills.*
- *<u>Builder</u> to install MS Silicon or 65mm wide flashing tape to all fibre cement board sheet joints, corners and cladding junctions*



Typical sheet fixing detail/layout

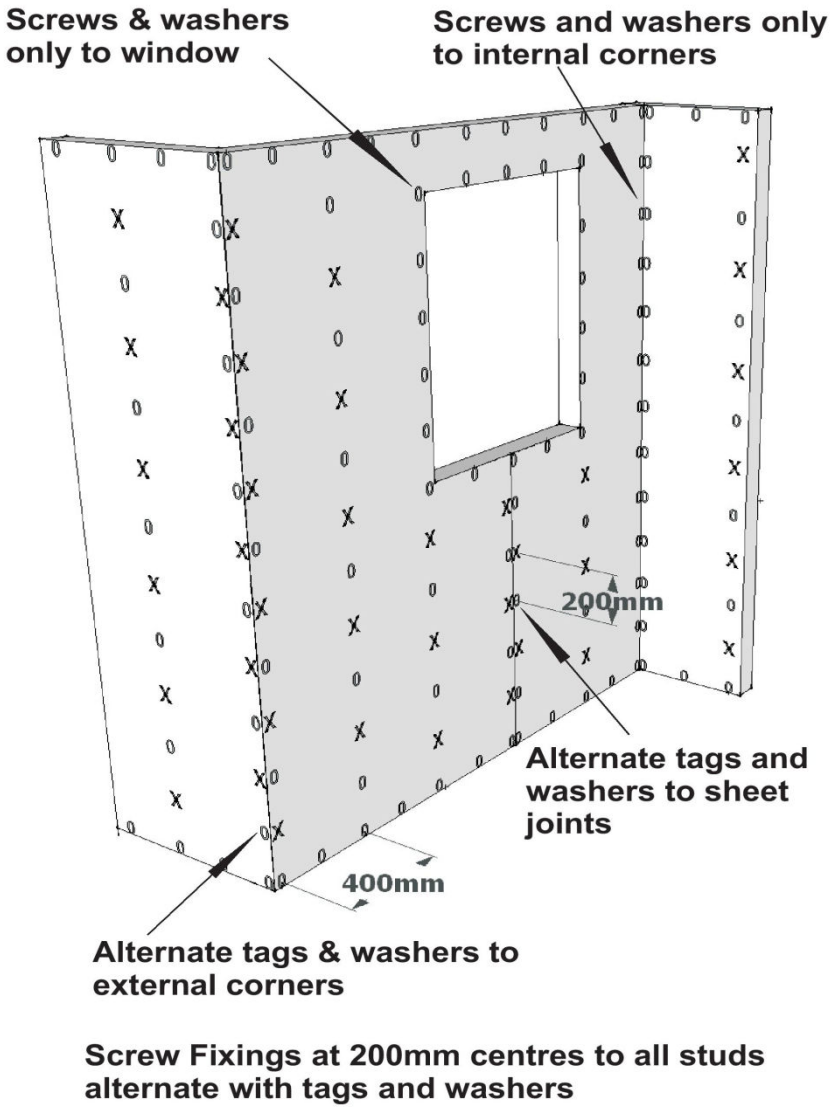
HARD AS ROCKS SCREW & TAG FIXING

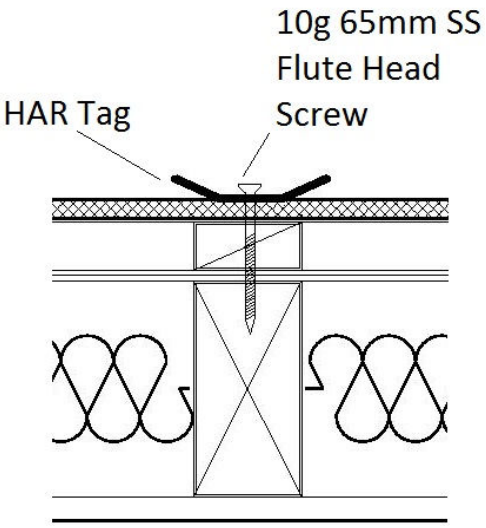
All exterior fibre cement board fixing must use 10g x 65mm Stainless Steel Screws with either M6x19mm x1.6mm Stainless steel Washers or 60mm Stainless Steel Hard as Rocks Tags where applicable.

Interior work can be fixed with the same 65mm screws and washers @ 200mm centres or min 50mm galvanised flat head clouts @ 150mm centres

Fixing requirements table	**Up to 3m High Vertical spacings**	**Above 3m High Vertical spacings**
Wind zones Low, medium and High and Earthquake Zone 1 and 2 Use 7.5mm BGC Stone sheet	**Max. 200mm Tags & Washers to alternate**	**Max. 200mm Tags only**
Wind zones Very high, and Earthquake zones 3 and 4 9mm stonesheet required	**Max. 200mm Tags only**	**Max. 150mm Tags only**
Extra High and Specific Design 2.5 kPa Wind zones, 9mm stonesheet required	**Max. 180mm Tags only**	**Max. 120mm Tags only**

Note: For standard application, the maximum vertical fixing spacing is 200mm. The maximum horizontal fixing spacing to studs is 400mm.





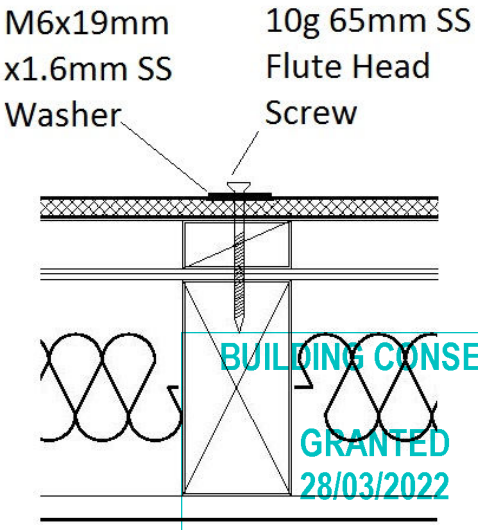
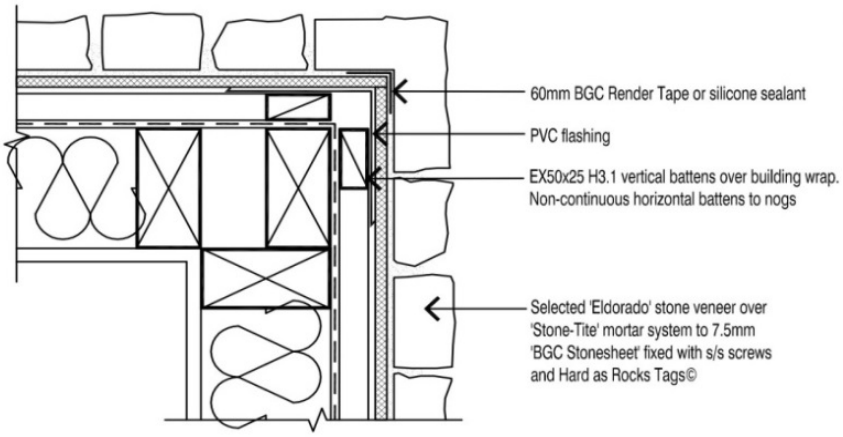
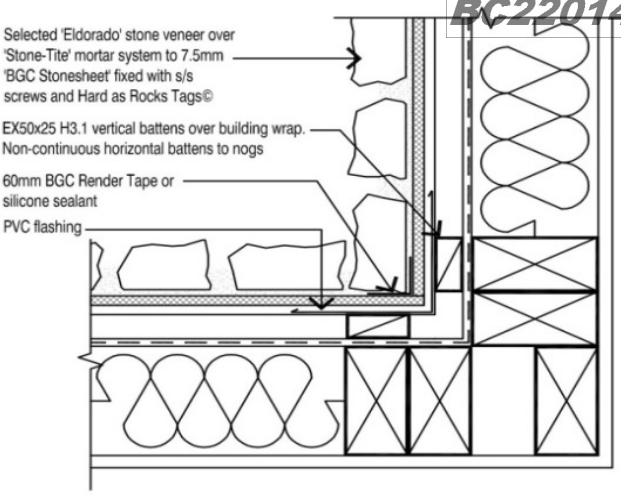


Diagram: *Alternating positions of screws and washers with Hard as Rocks Tags both fixed using 10g x 65mm Stainless steel screws*

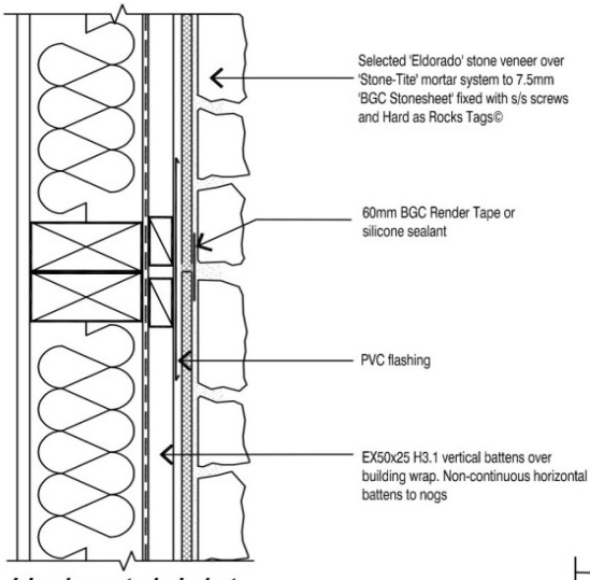
FIBRE CEMENT BOARD JOINTS – Corners



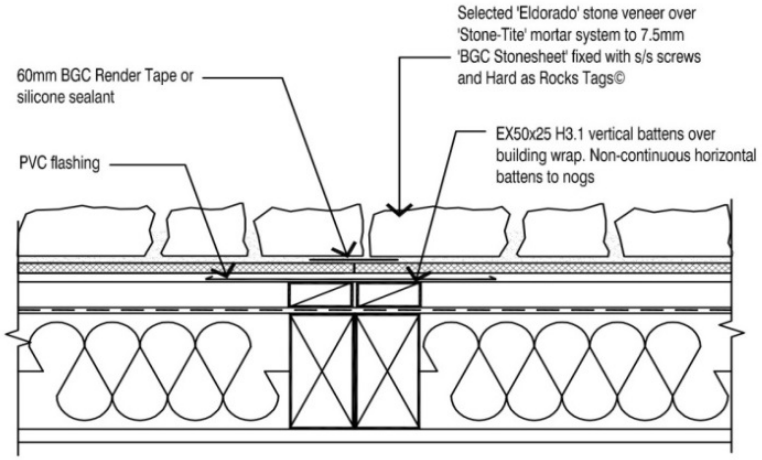
External Corner



Internal Corner



Horizontal Joint



Vertical Joint

BUILDERS

- *All corners to have a 90 degree flashing behind the fibre cement board and over the cavity batten.*
- *All corners to have 60mm flashing tape or MS Silicone sealant applied to sheet joint.*
- *All vertical and horizontal sheet joints to have flat back flashing and 60mm flashing tape or MS silicone sealant to exterior sheet joint.*
- *Control joints to be fixed over double stud and double cavity batten.*
- *Builders are to make sure substrate has no gaps and is watertight with flashings and sealant*

Vertical and Horizontal Control Joints

Vertical control joints to be formed at maximum 5.4m centres, aligned with any control joint in the structural framing, or where the Eldorado Stone Veneer System abuts to different cladding types. Confirm the location of all control joints prior to installation.

Horizontal control joints to be formed on cavity batten framing at maximum 5.4m or at inter-storey floor levels in accordance with Hard as Stone requirements and as shown on plans.

New Zealand Building Code Compliance (NZBC)

BGC fibre cement sheets must be used, installed and maintained in accordance with this Technical Literature to meet the following provisions of the New Zealand Building Code (NZBC).

Clause B1 Structure

BGC fibre cement sheets will meet performance B1.3.1, B1.3.2 and B1.3.4. Relevant information on the physical conditions pertaining to B1.3.3 is included in this literature.

Bracing

BGC fibre cement sheets can be used to provide racking resistance to timber framed walls against wind and earthquake loads in accordance with NZBC, when applied directly to studs. Cavity battens and an additional fibre cement outer cladding is required.

Clause B2 Durability

When used as an external substrate for an applied coating system BGC fibre cement will meet the following provisions of the NZBC.

- B2.3.1(a) - 50 years for structural (bracing) applications. Stainless steel fxings must be used for all bracing sheets.
- B2.3.2(b) - 15 years for general applications. Stainless steel fxings must be used in corrosive conditions such as geothermal hot spots or coastal zones (within 500m of the sea).

Coating systems, seals and flashings must be maintained to ensure moisture does not penetrate the cladding system and sheets and that fxings remain dry at all times.

The homeowner should follow the BRANZ Homeowner's Manual to maintain their dwelling. this manual provides a recommended maintenance check list.

BGC fibre cement is expected to have the service life of at least 50 years.

Clause E2 External Moisture

BGC fibre cement when used in conjunction with an external applied finishing system (jointing and coating) that meets NZBC B2, E2 and F2, will meet performance E2.3.2.

Head flashings and sill trays must be used at all joinery penetrations, and jambs must be sealed as per the relevant instructions in Acceptable Solution E2/AS1 third edition.

Clause F2 Hazardous Building Materials

BGC fibre cement is not considered a health hazard to people and therefore meet the performance F2.3.1.

Sheet Cutting and Preparation

BGC fibre cement sheets may be cut to size on site. If using power tools for cutting, drilling or sanding they must be fitted with appropriate dust collection devices or alternatively an approved (P1 or P2) dust mask shall be worn.

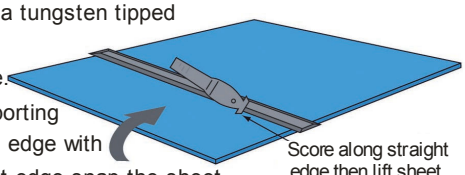
It is recommended that work always be carried out in a well-ventilated location. If a cut edge is to be flush-joined it must be prepared with a recessed edge.

Cutting

The most suitable cutting methods are:

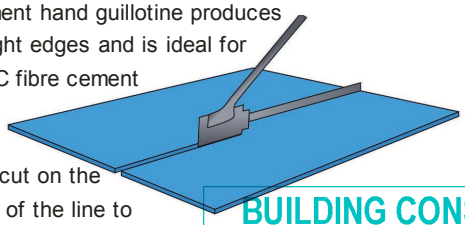
- Score and snap

  Using a straight edge, score the sheet face 4 or 5 times with a tungsten tipped 'score and snap' knife. While supporting the scored edge with the straight edge snap the sheet upward for a clean break.



- Hand Guillotine

  A fibre cement hand guillotine produces clean straight edges and is ideal for cutting BGC fibre cement sheets. Make the guillotining cut on the off-cut side of the line to allow for the blade thickness.



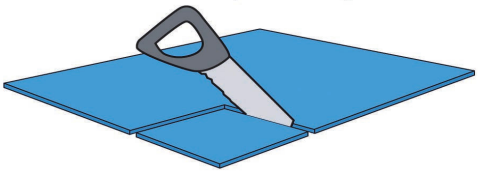
- Notching

  Notches can be made by cutting two sides of the notch with a hand saw or guillotine. Score along the third side with a 'score and snap' knife, then snap upwards while supporting the scored edge to remove the notch.

- Hand Sawing

Hand sawing is suitable for general cutting operations, small cuts, notches and small penetrations.

For accuracy and neatness, mark out the cut lines on the face side of the sheet prior to sawing.

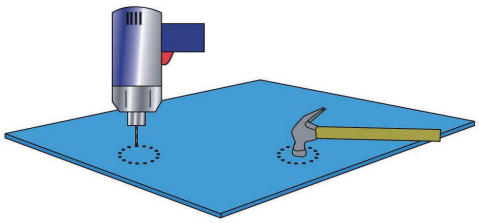


When sawing, the back of the sheet should be supported close to the cut. A fne toothed saw can be used. A quick jabbing action gives best results.

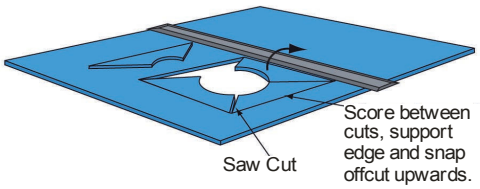
Holes and Penetrations

- Drilling

BGC fibre cement sheets can be drilled using normal high-speed drill bits, do not use the drill's hammer function.



Small rectangular or circular penetrations can be made by drilling a series of small holes around the perimeter of the cut out, then tapping out the waste piece from the sheet face. Tap carefully with a hammer while supporting the underside of the opening to avoid damage. Clean up any rough edges with a rasp if necessary.



Large rectangular openings such as for air conditioners, are formed by deeply scoring the perimeter of the opening with a 'score and snap' knife. Next form a hole in the centre of the opening (see method above) then saw cut from the hole to the corners of the opening.

Finally snap out the four triangular segments to form the opening. Clean rough edges with a rasp if necessary.

Fixing Instructions

BGC fibre cement sheets must be dry before fixing to the framing structure. Sheet edges must be joined over a stud or continuous line of nogging. Sheet cuts, which are to be flush jointed, must be recessed on site. The Hitachi 'Easy Bevel' (Model EBCOMBO) is specifically designed for this purpose.

Framing

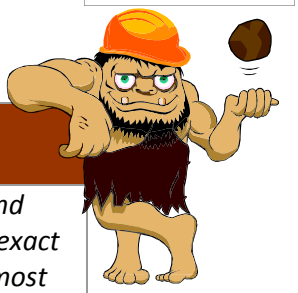
- Framing must be constructed to comply with the New Zealand Building Code (NZBC). Compliance with the NZBC can be met by timber framing designed and constructed in accordance with NZS 3604 for non-specific design, or in accordance with NZS 3603 and NZS 4203/4251 for specific design.
- The framing must be set to a true plane to ensure a straight finish to the wall.
- The moisture content of timber framing must be less than 16% when the cladding sheets are fixed. If sheets are fixed to 'wet' framing problems may occur at a later date due to excessive timber shrinkage. It is strongly recommended that kiln dried framing is used.
- Timber framing, for sheet joints, must have a minimum face width of 45 mm (nominal 50 mm).
- Intermediate studs with a minimum face width of 35 mm (nominal 40 mm) may be used.
- Studs must be spaced at maximum 400 mm centres. Noggings need to align with sheet joints when used for horizontal fixing. BGC fibre cement sheets must not be joined off the framing.

Impact Resistance

BGC Fibre Cement has good resistance to hard and soft body impacts likely to occur in residential and light commercial use. When used in commercial or industrial situations, or other high impact situations, the designer should consider protection measures such as the installation of barriers or bollards to vulnerable areas.

Wind Face Loads

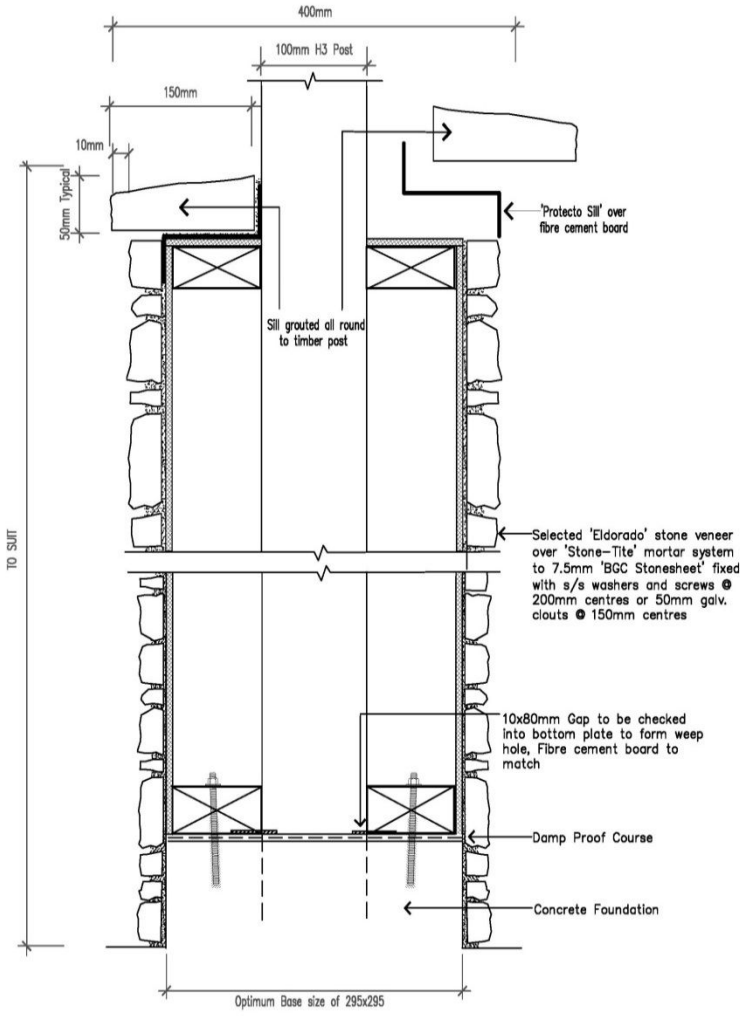
BGC Fibre Cement sheets may be used in all Building Wind Zones of NZS 3604, including Very High.



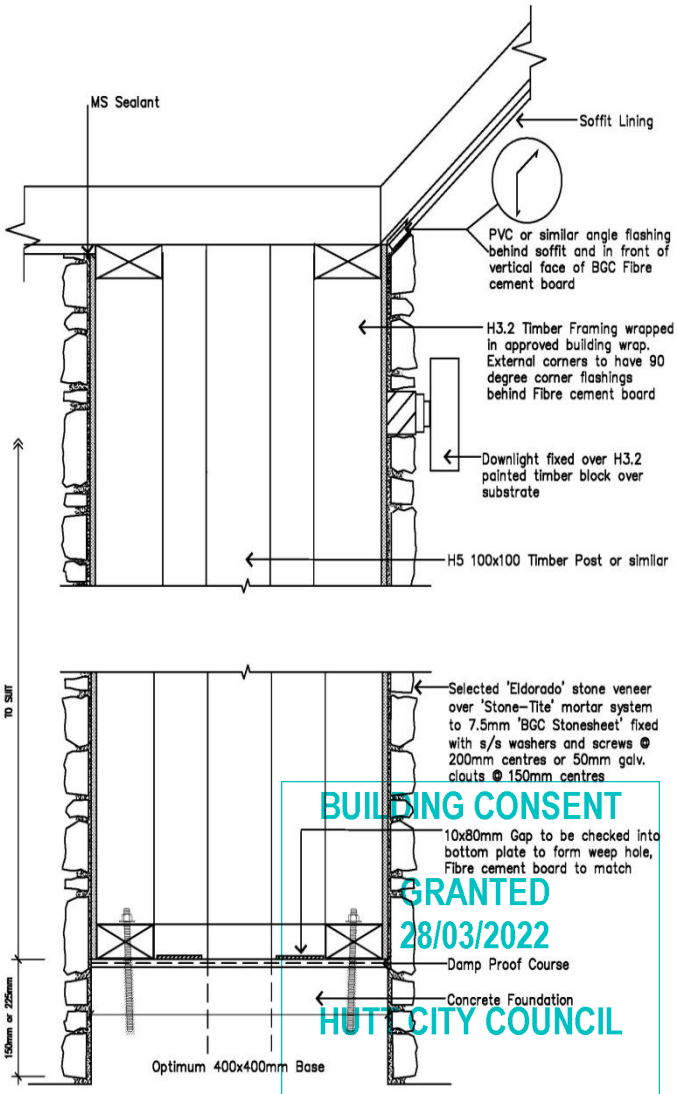
PILLARS

- *The optimum framing size for stone pillars is 400mm square. This is the timber framing and fibre cement board. As most stone profiles are individual pieces this does not have to be exact (except Stacked stone profile) however making the pillar wider may increase the cost as most quoting/costings are based on 400x400 unless otherwise stated.*
- *Remember that the stone will add approximately 100mm to the finished size (50mm thick)*
- *When framing a pillar for our Stacked Stone profile please frame the pillar to 300mm square exact or 400mm square exact including fibre cement board. This gives the best visual finish and is economical price wise.*
- *Always use H3.2 timber for all pillar framing. Framing structure is to be rigid and strong as any movement in structure may cause cracking to corners. There is no warranty for cracked corners as a result of substrate movement.*
- *Use building wrap or builder's paper behind the fibre cement board.*
- *All corners must be back flashed and have either 60mm flashing tape or MS silicone sealant applied to exterior sheet joint*
- *50mm flat head galvanised clouts at 150mm centres can be used on pillars where the fibre cement board is direct fixed to framing. Hard as Rocks 65mm SS screws and washers must be used where a 20mm cavity batten has been specified.*

Half high pillars with central post with cap framed at 300x300mm



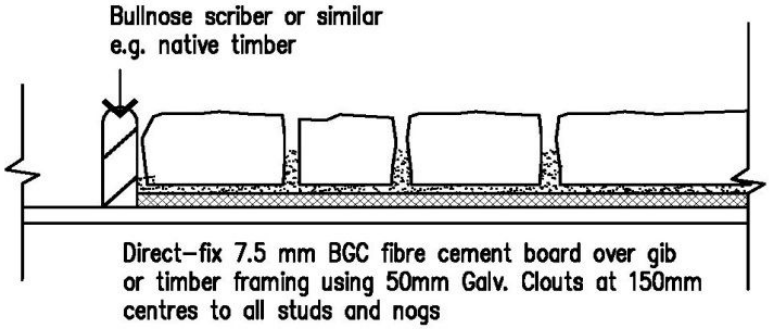
Full height pillars under a flat or raking soffit (note flashing to raked soffit)



Internal stonework to fireplaces and feature walls

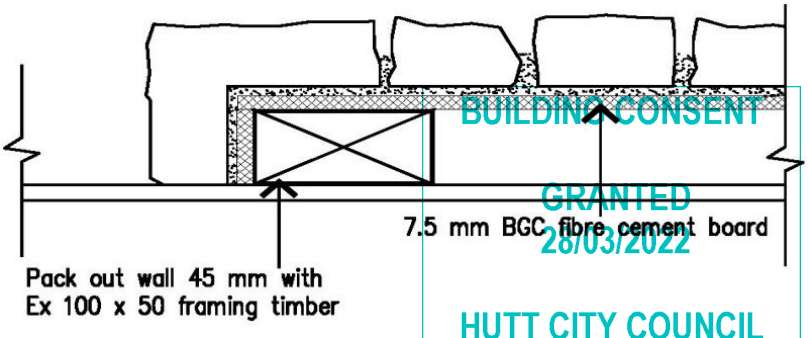
When installing stone to an interior feature wall or fireplace you have a couple of options to consider depending on the space you have available and the look you are wanting to achieve. If you are restricted by space or other complications and just want a flat feature say behind a fireplace you can direct fix the fibre cement board to the wall or over the gib. This is an economical option as it saves on the cost of corner stones however consideration should be given to hiding the edge of the fibre cement board and stone by using a number of trim options including timber facing or scriber, or a tile trim or similar.

Diagram: *Substrate direct-fixed*



The second option is to pack out the area off the wall using 45mm thick timber framing and install the fibre cement board over the top. When the stone is applied your installer will add a corner stone up each side which will make the whole wall look like it is approx. 100mm thick giving a sense of depth and dimension.

Diagram: *Substrate packed off the wall for a sense of depth*

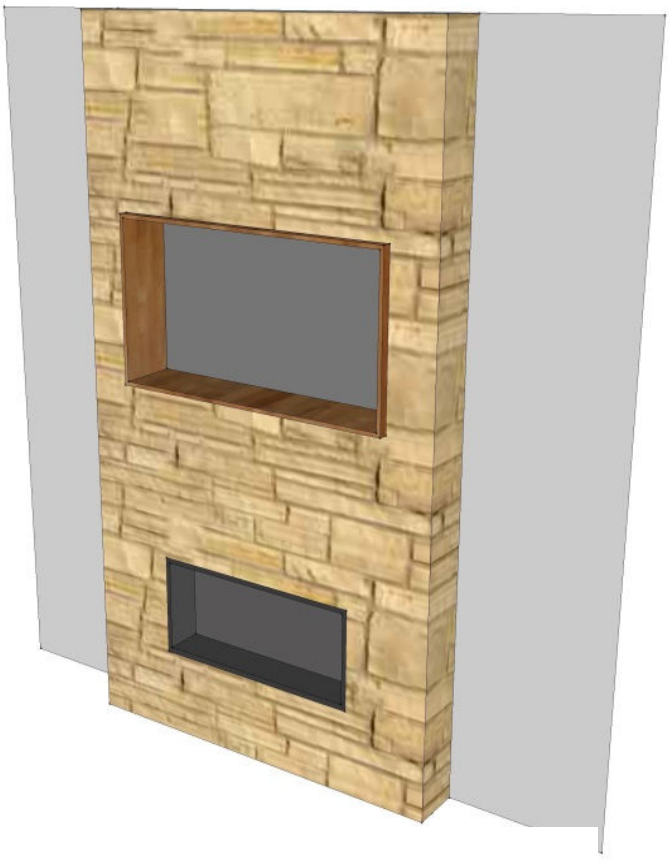


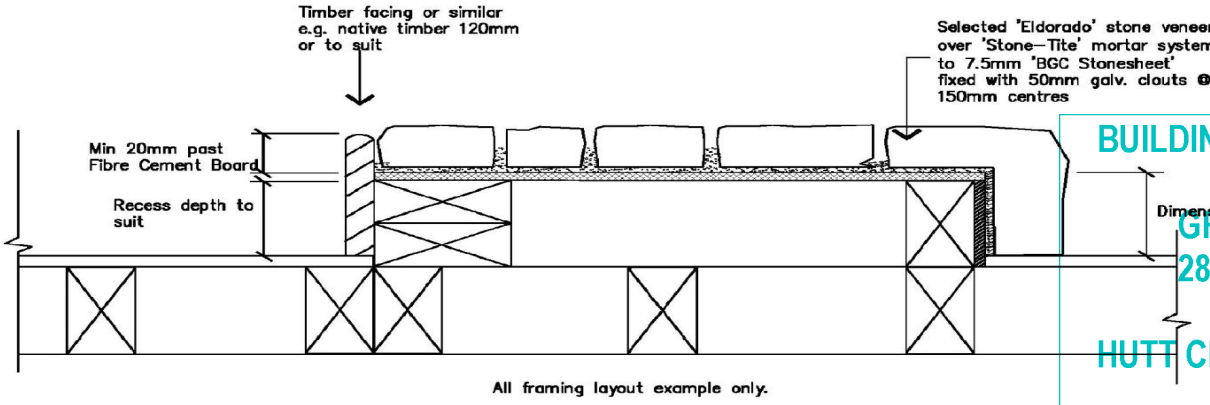
FIREPLACES AND FEATURE WALLS

- *50mm flat head galvanised clouts at 150mm centres can be used on interior applications where the fibre cement board is direct fixed to framing.*
- *For inbuilt fires, the fire box should be flush mounted to the fibre cement board with the fire fascia or surround pushed back against the fibre cement board as if it were a window. Your installer will lay the stone up to the edge of the fascia.*
- *If the fire surround or fascia is designed to be removed for servicing, thought should be given as to how to lay the stone to accommodate this. Some fires require a gap needing to be left immediately above the fascia in order to lift the fascia up and then off. You can disguise this gap with a negative detail or suitable flashing.*
- *If you are mounting a TV bracket remember to install extra timber nogs or blocks into the framing to accommodate the bracket before you install the fibre cement board.*
- *Remember that the stone is approximately 50mm thick so if you are returning corners into a TV recess make allowances for the thickness of the stone for sizing.*

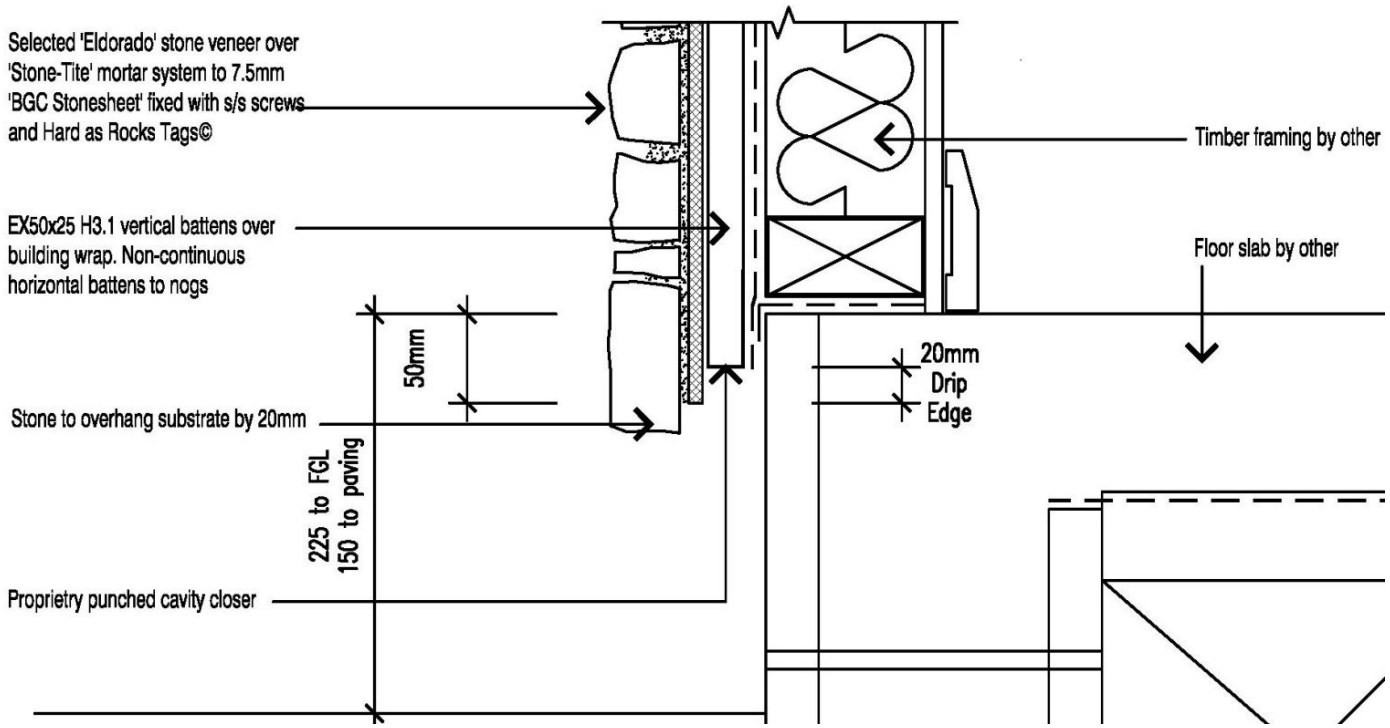
Shelving units and 'Display' box installations

Picture framed TV Recess

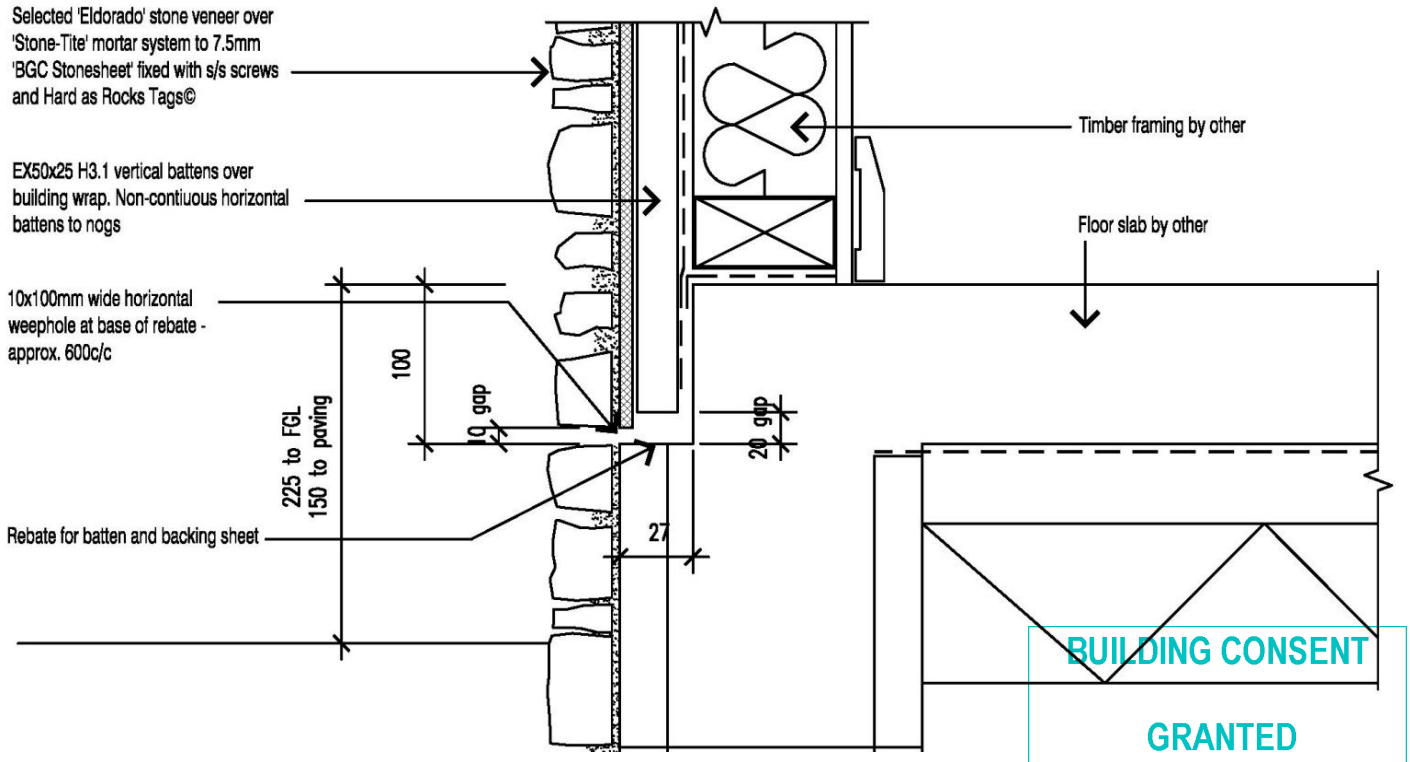




(1a) Standard Slab Edge

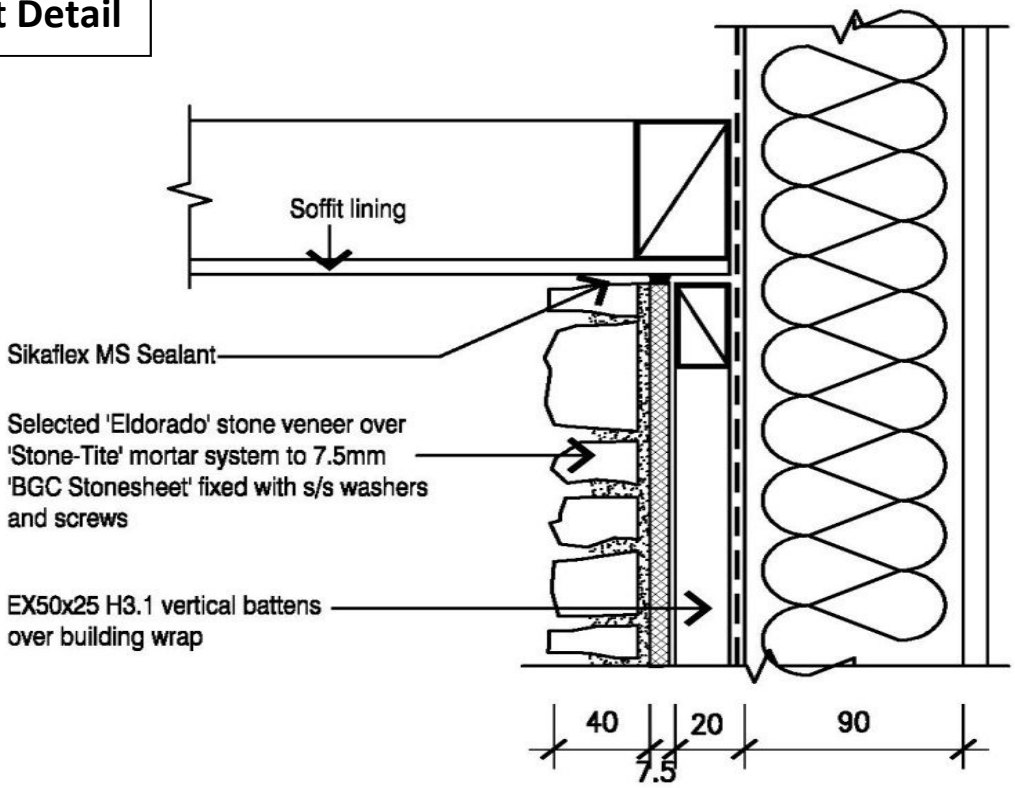


(1b) Rebated Slab Edge

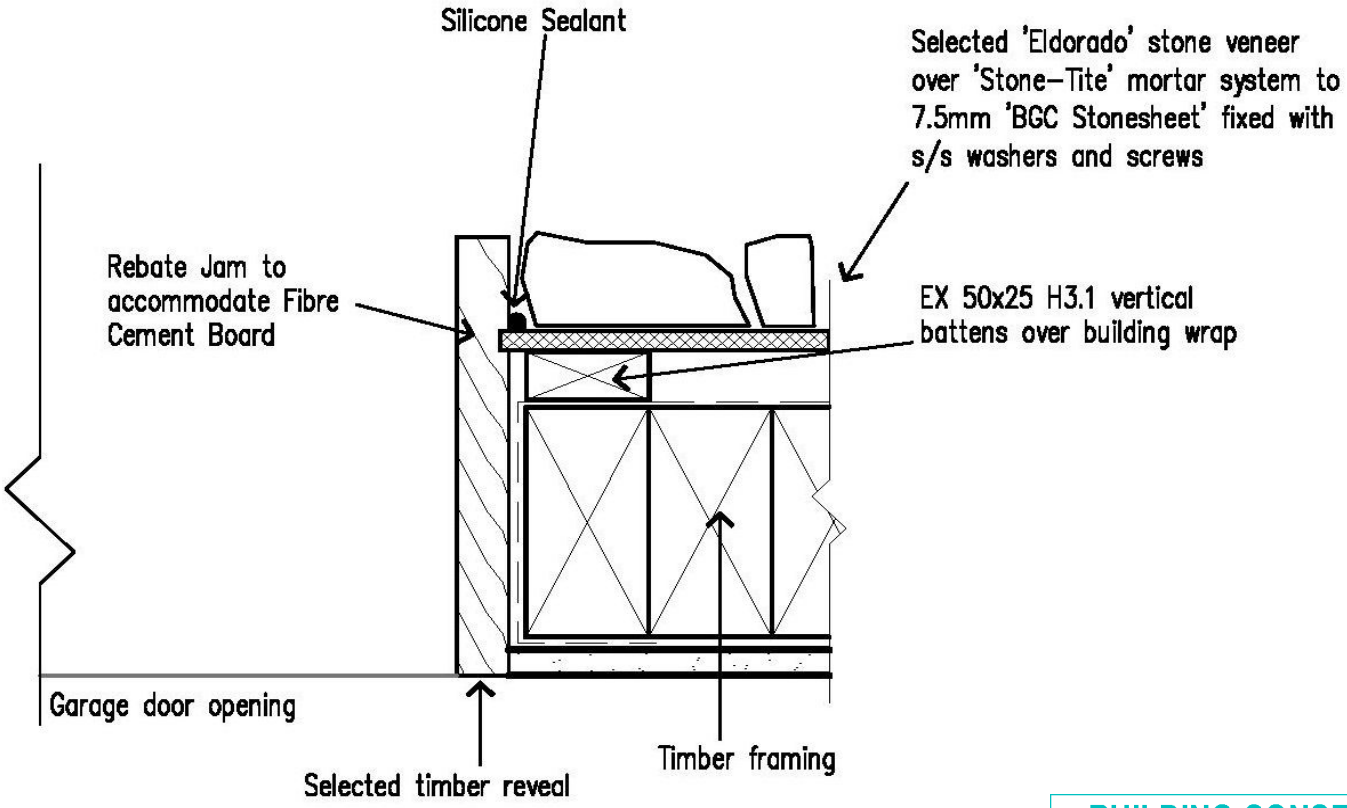


HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(1g) Soffit Detail



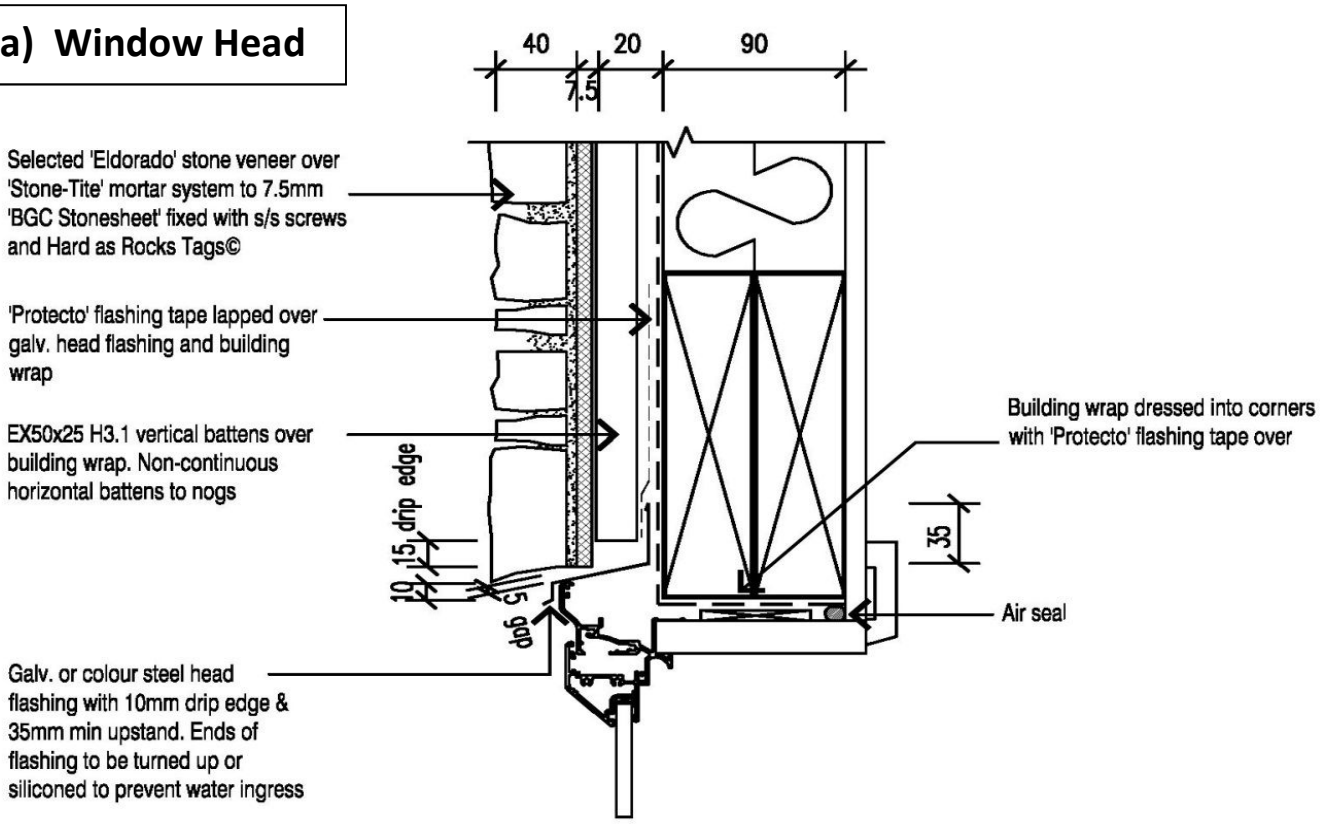
(1j) Garage Jamb Detail



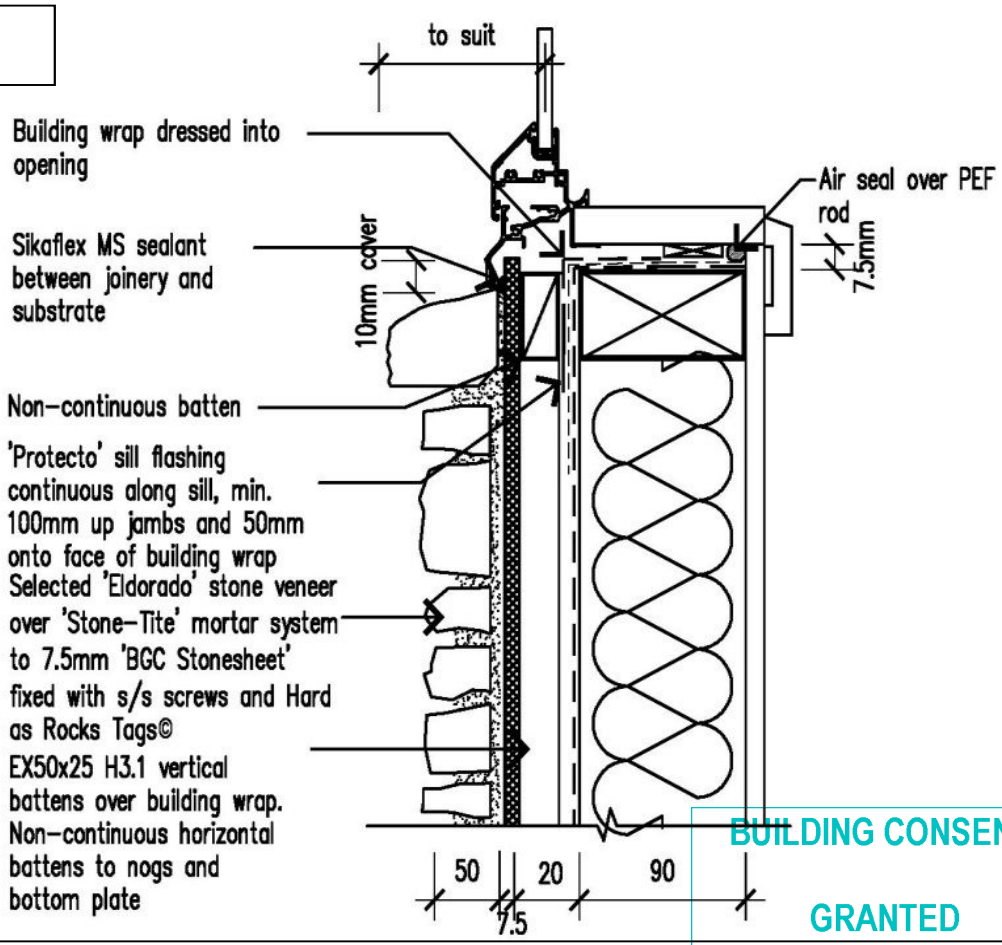
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(5a) Window Head



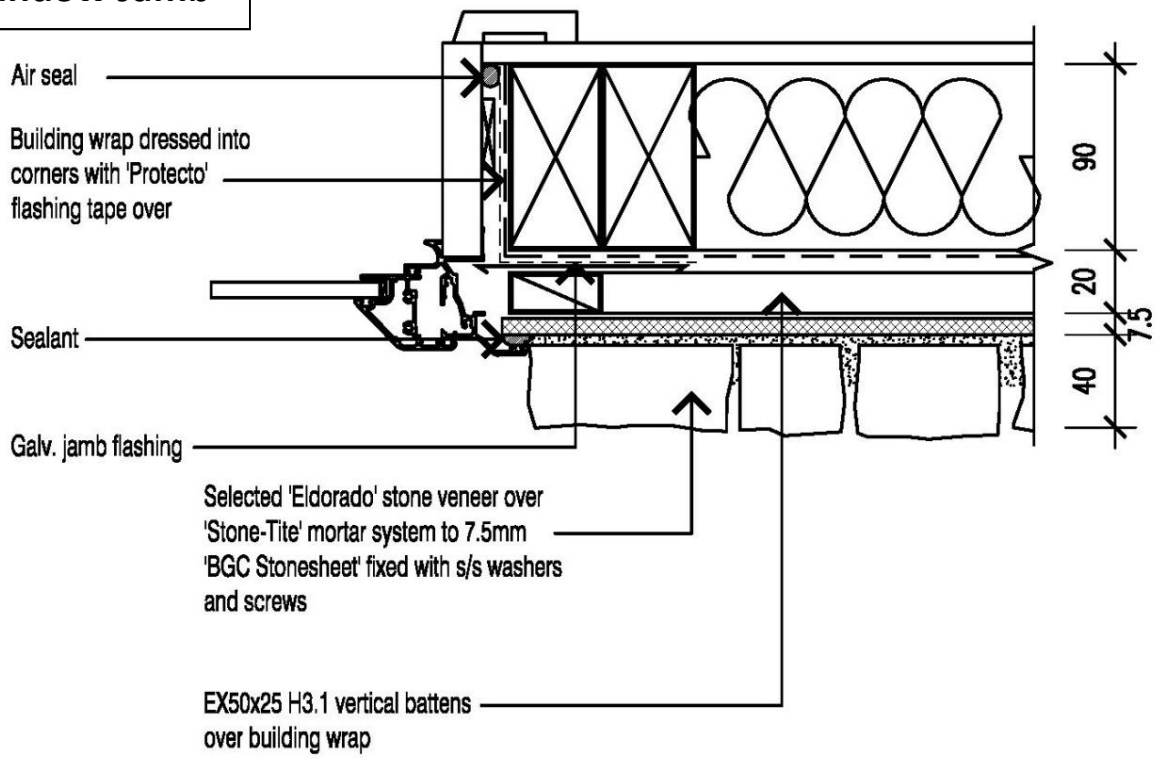
(5d) Window Sill



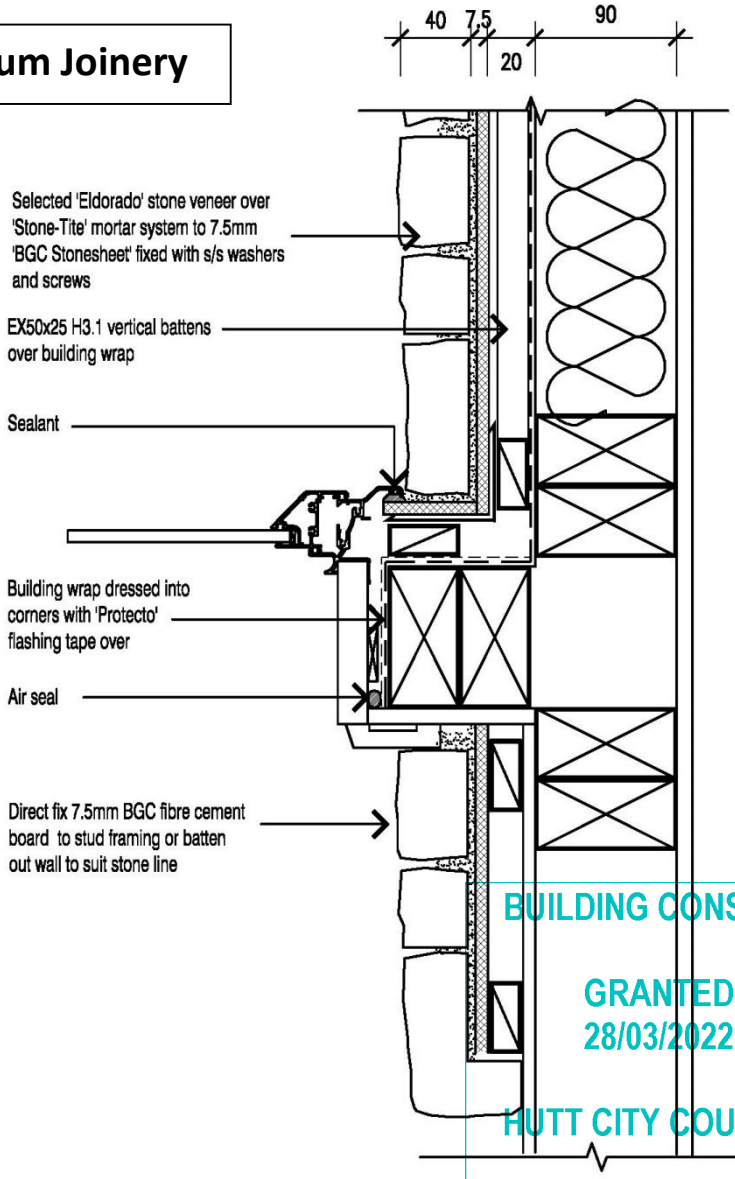
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(5c) Window Jamb



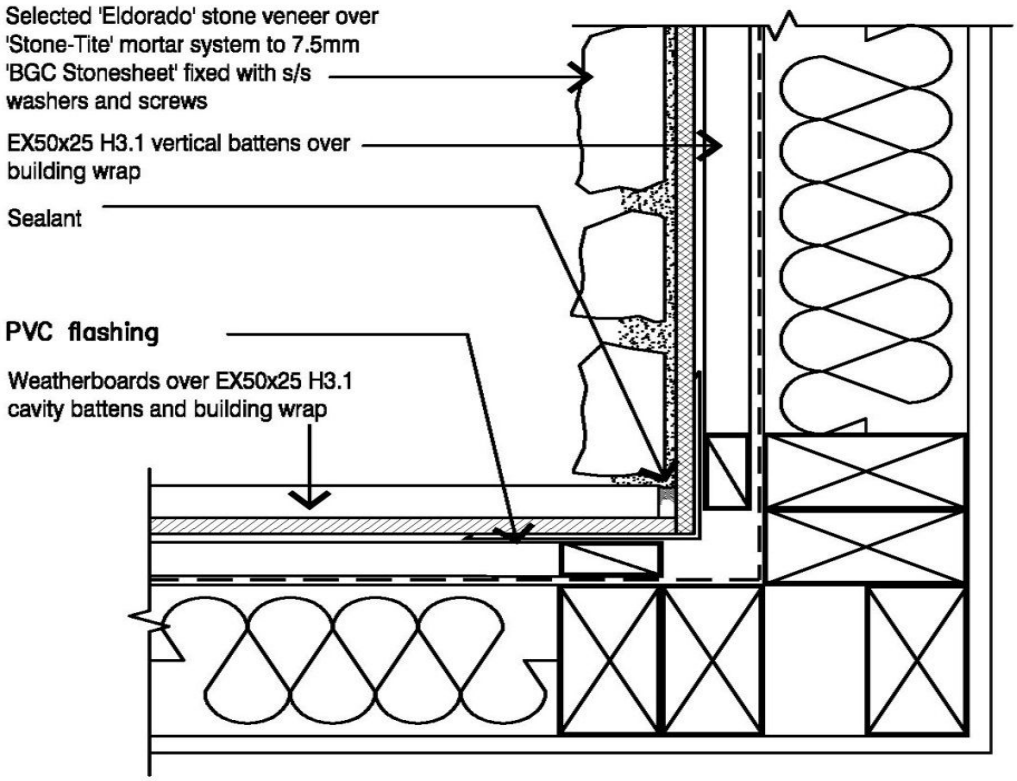
(5h) Internal Corner with Aluminium Joinery



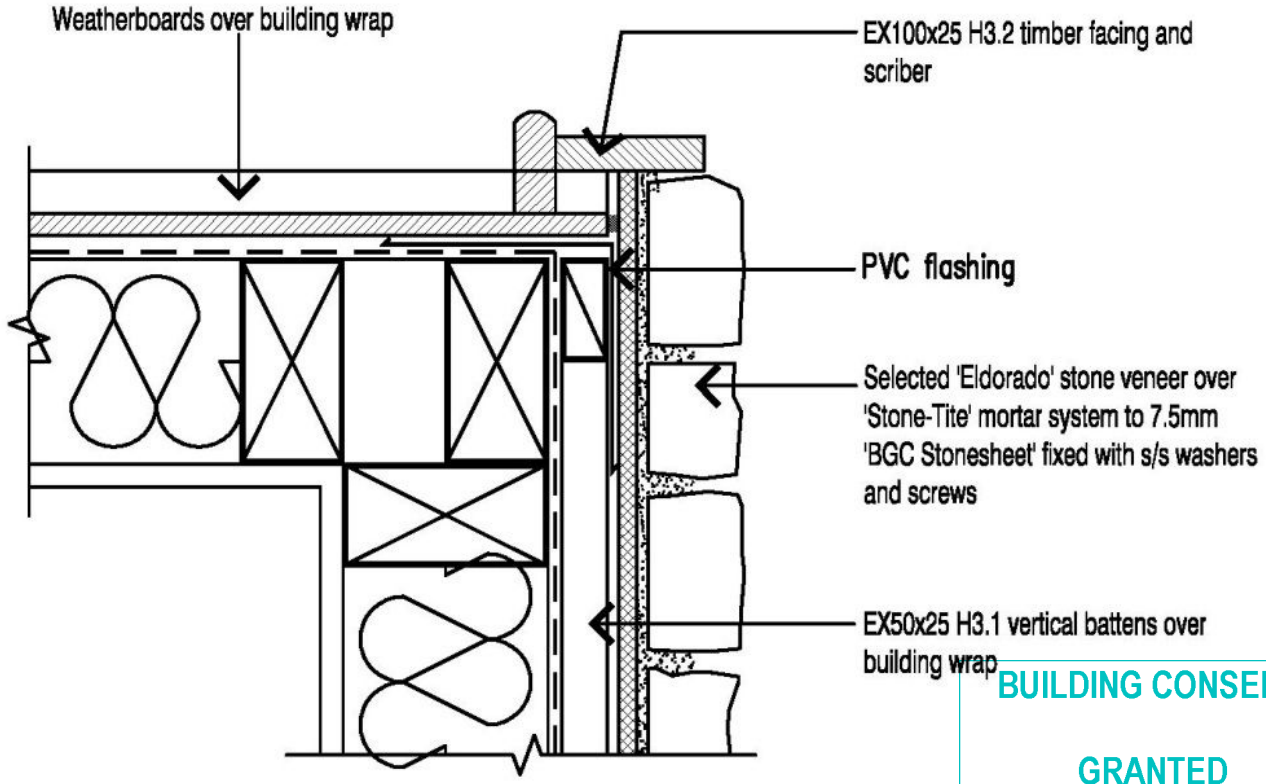
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(2d) Internal Corner with W/B's



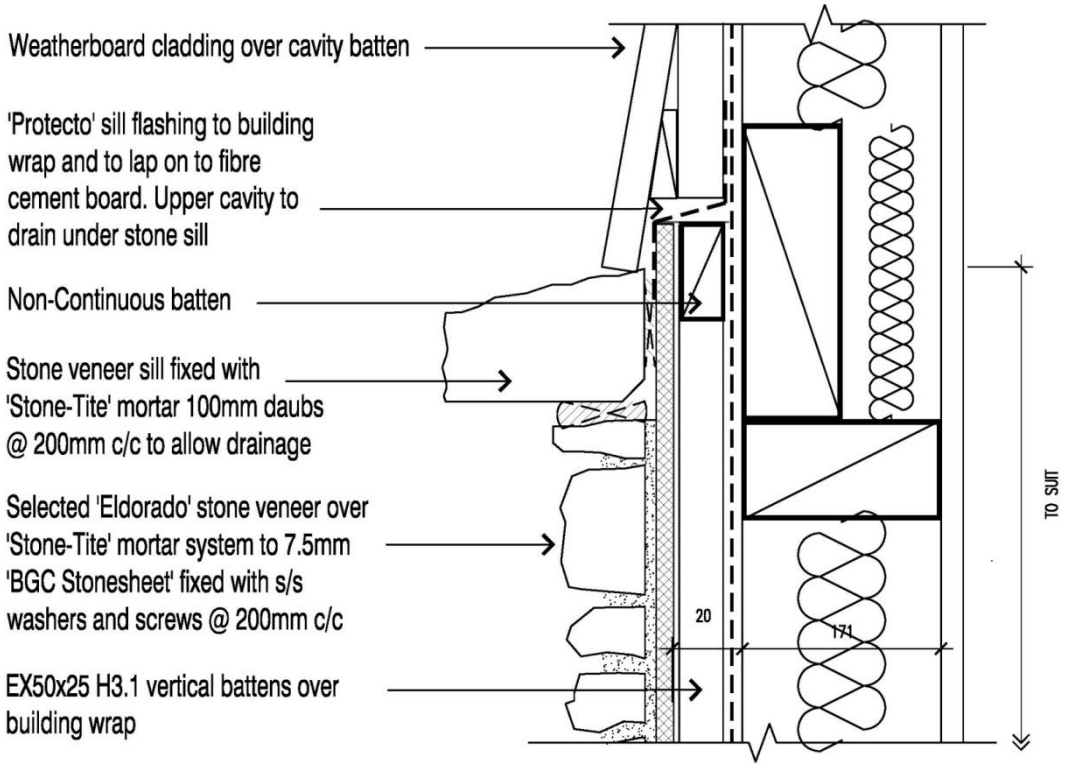
(2g) External Corner with W/B's



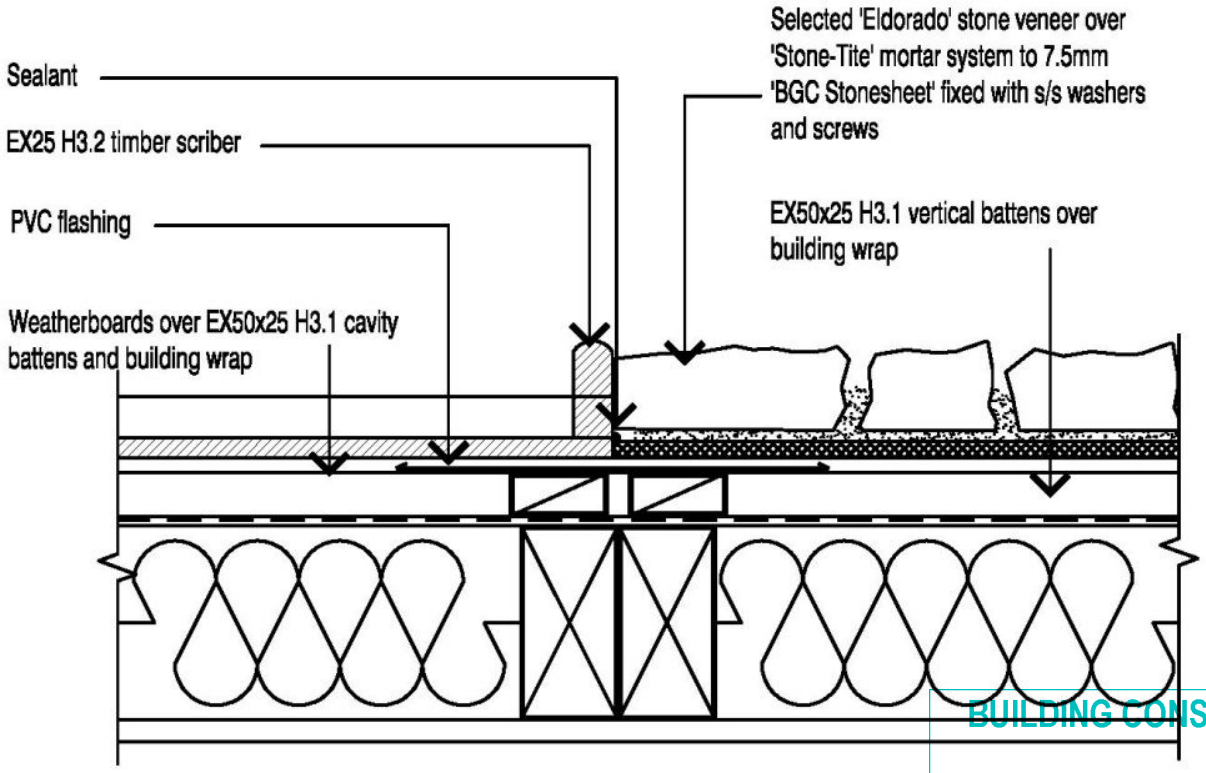
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(3f) Horizontal transition with W/B's



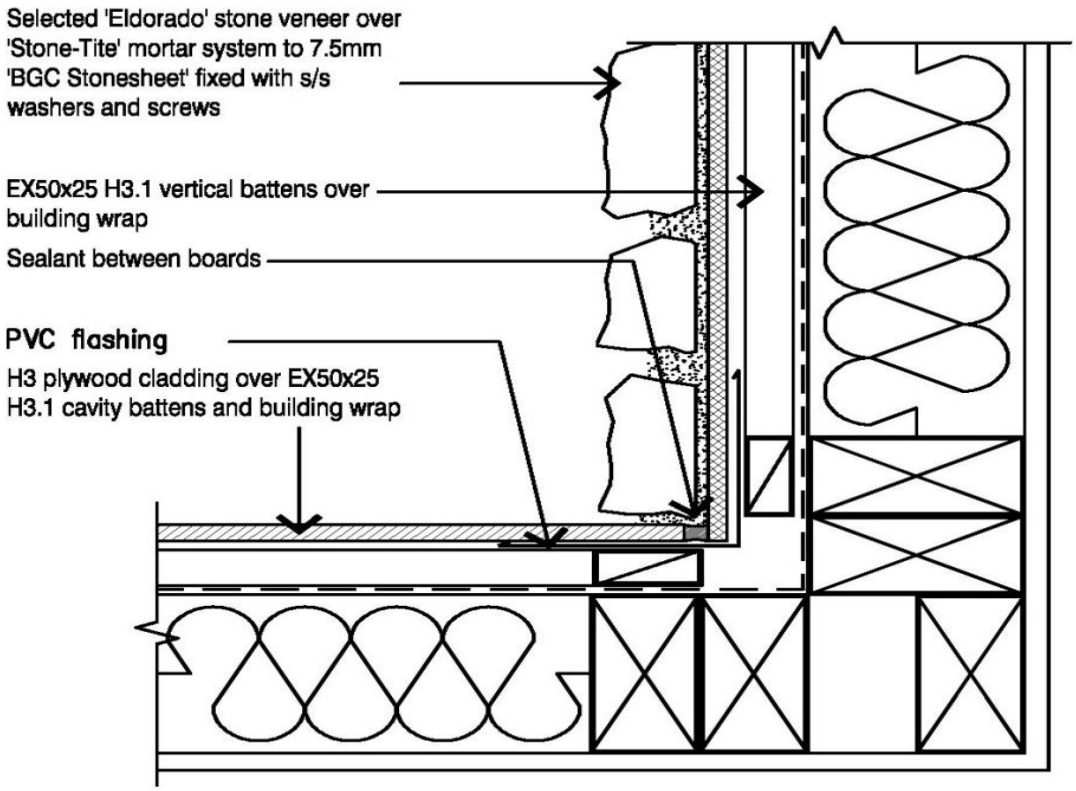
(3b) Vertical transition with W/B's



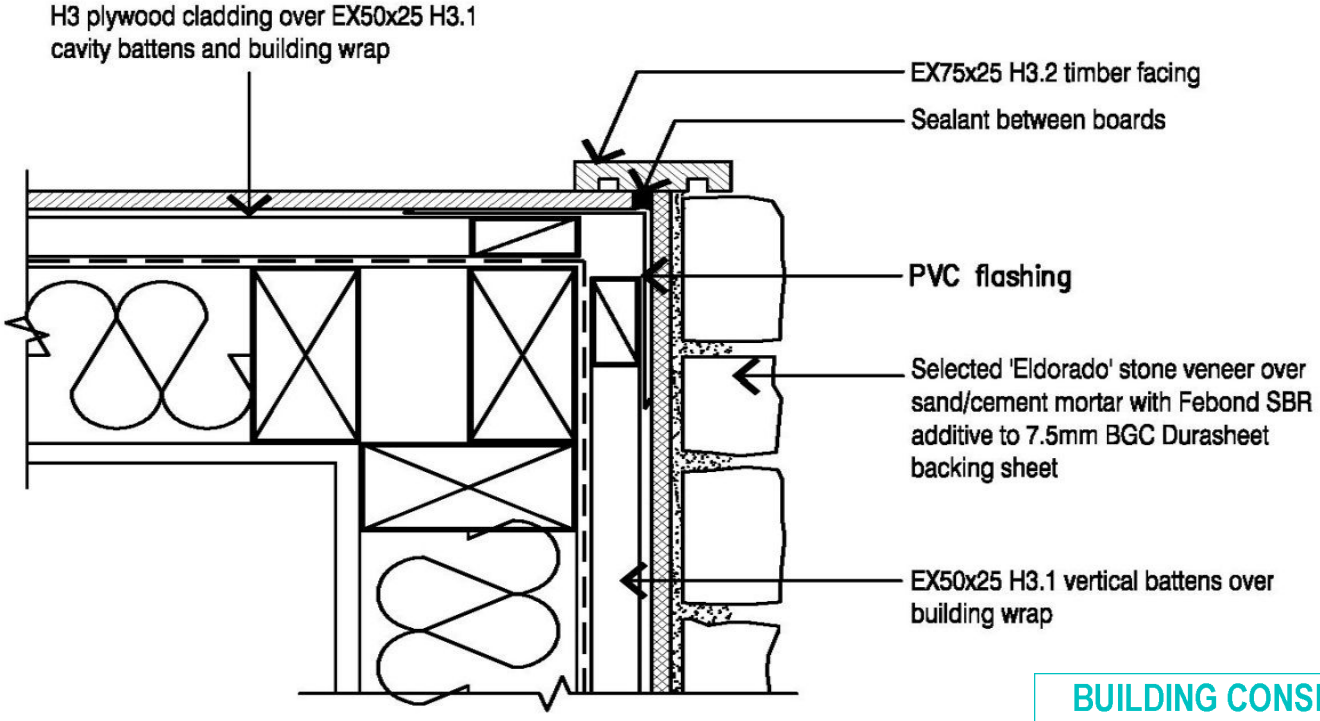
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(2f) Internal Corner with Ply



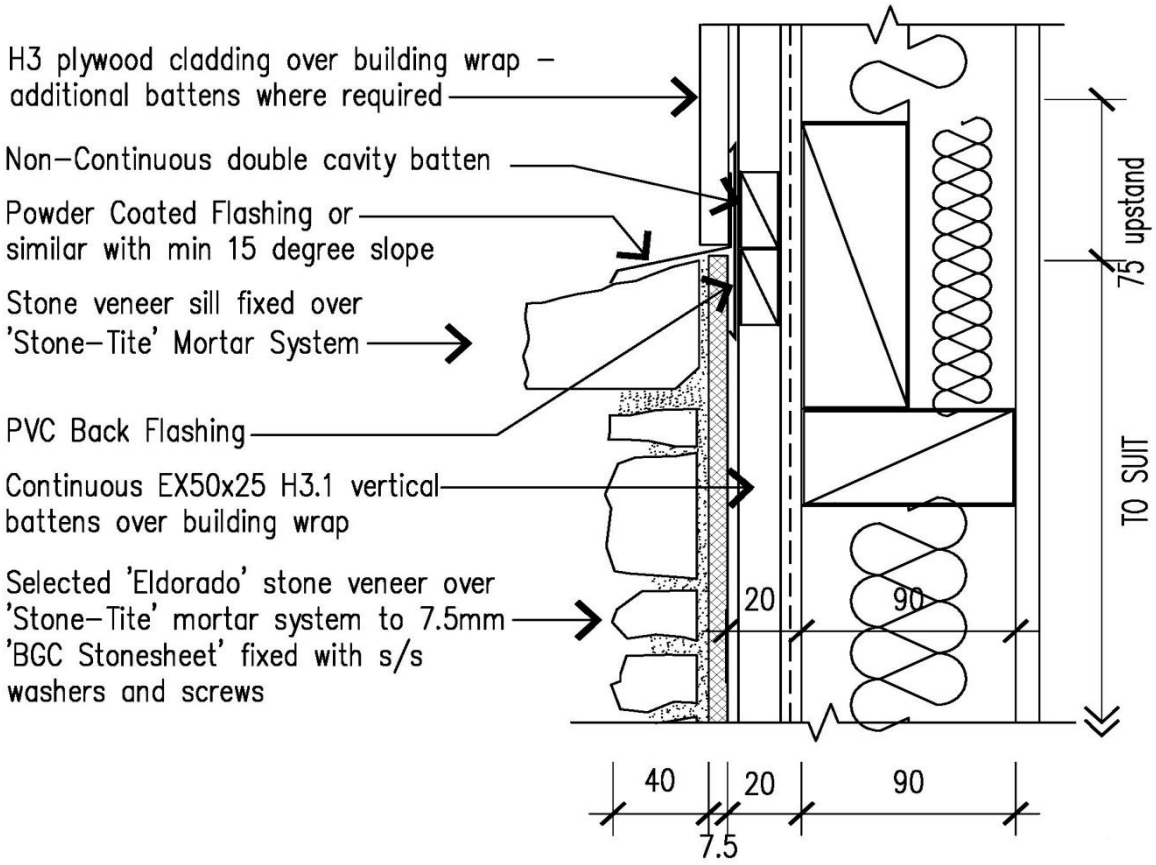
(2i) External Corner with Ply - Facing



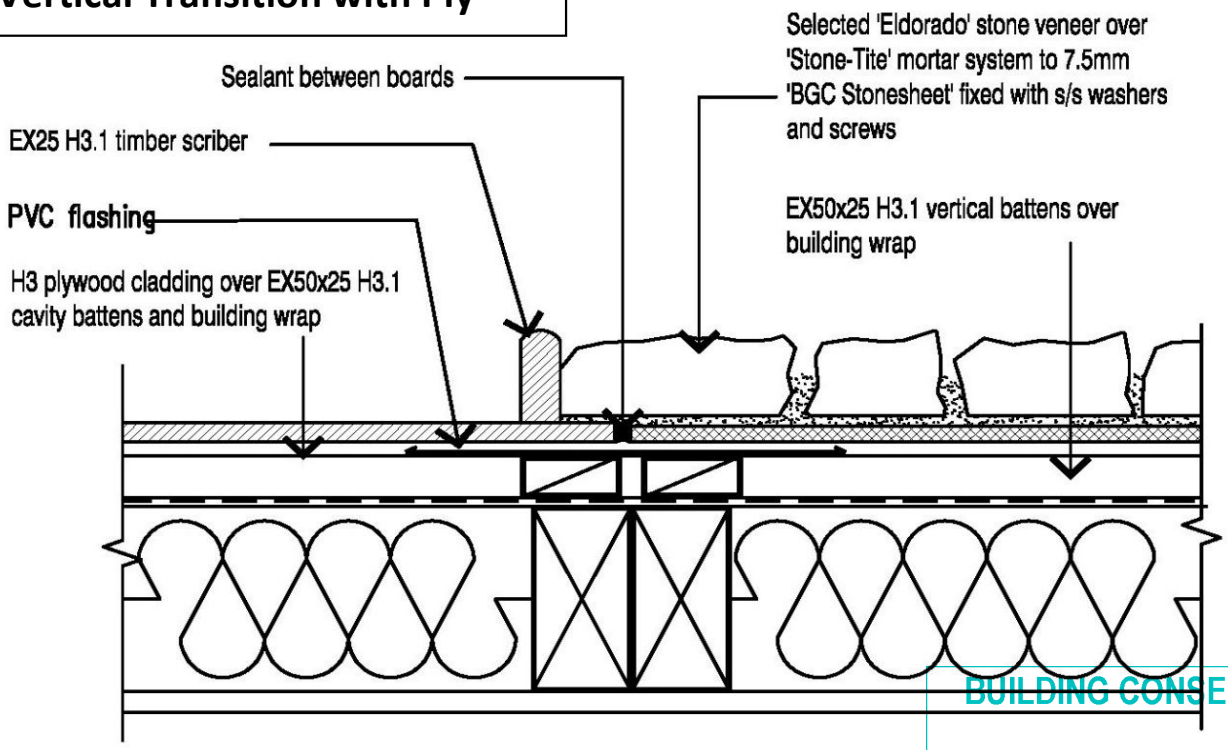
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(3p) Horizontal Transition with Ply



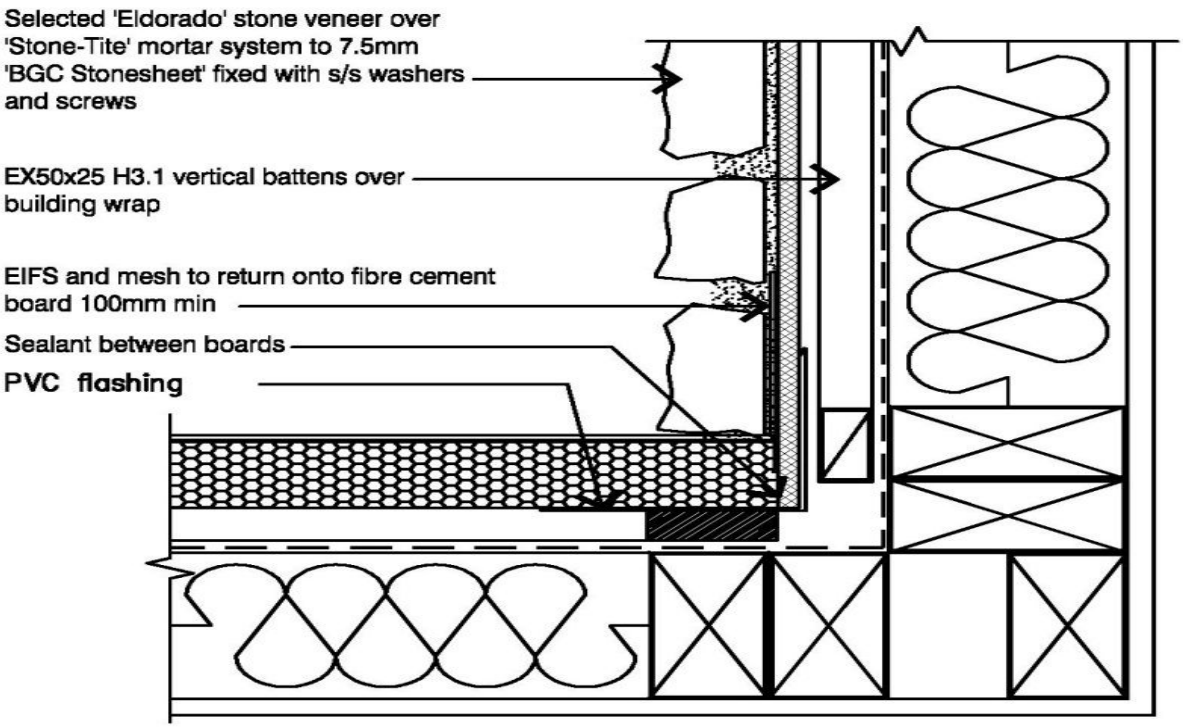
(3d) Vertical Transition with Ply



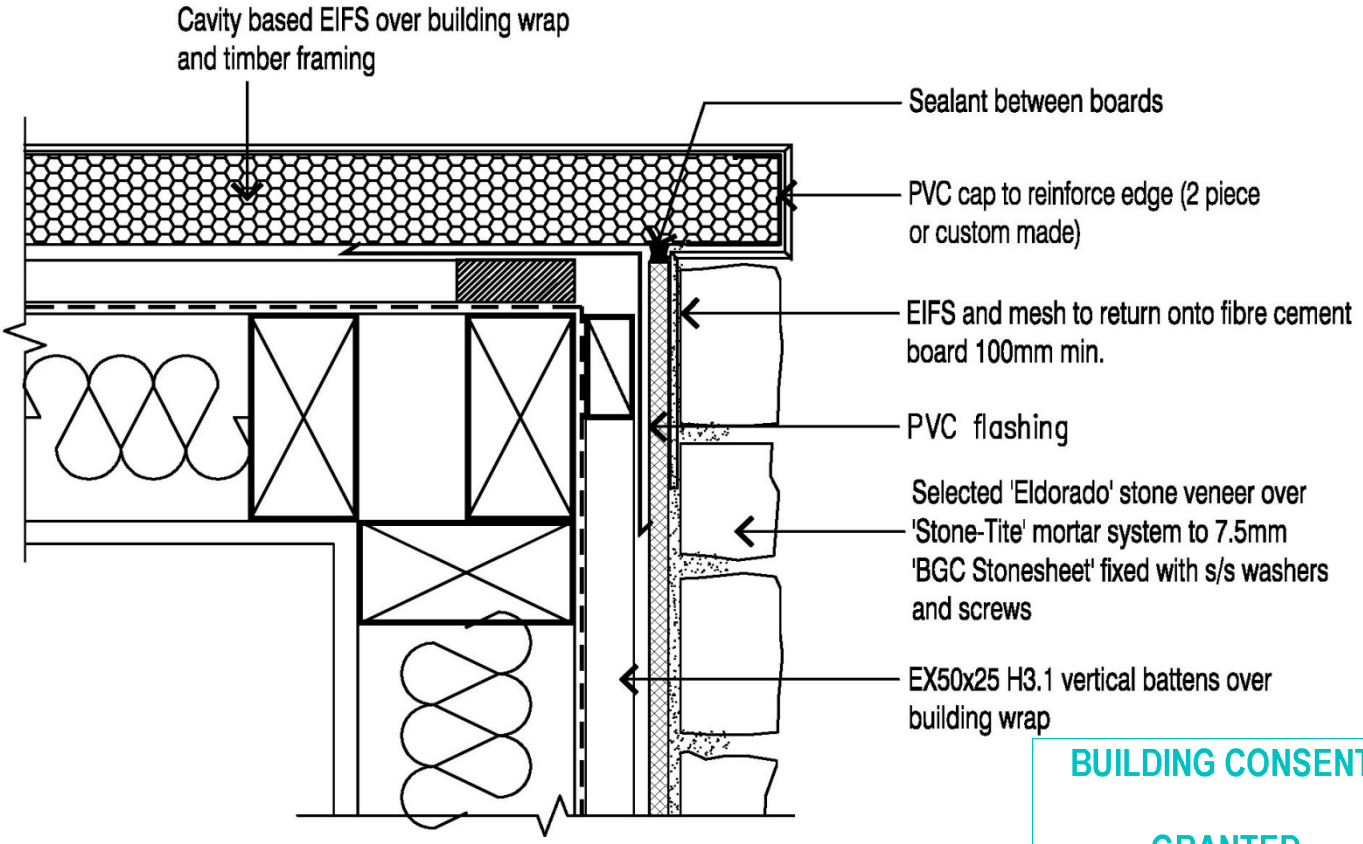
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(2l) Internal Corner with EIFS or AAC Panel



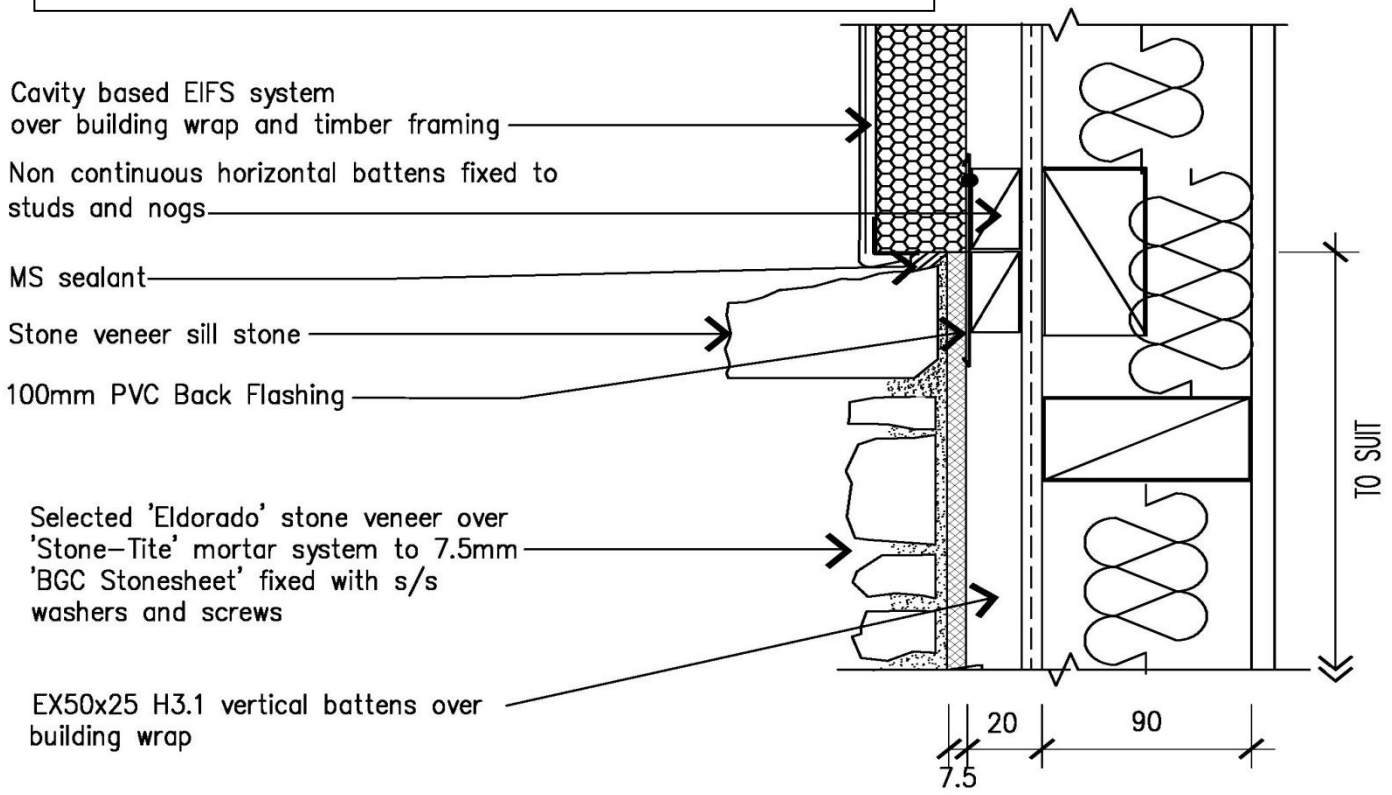
(2k) External Corner with EIFS or AAC Panel



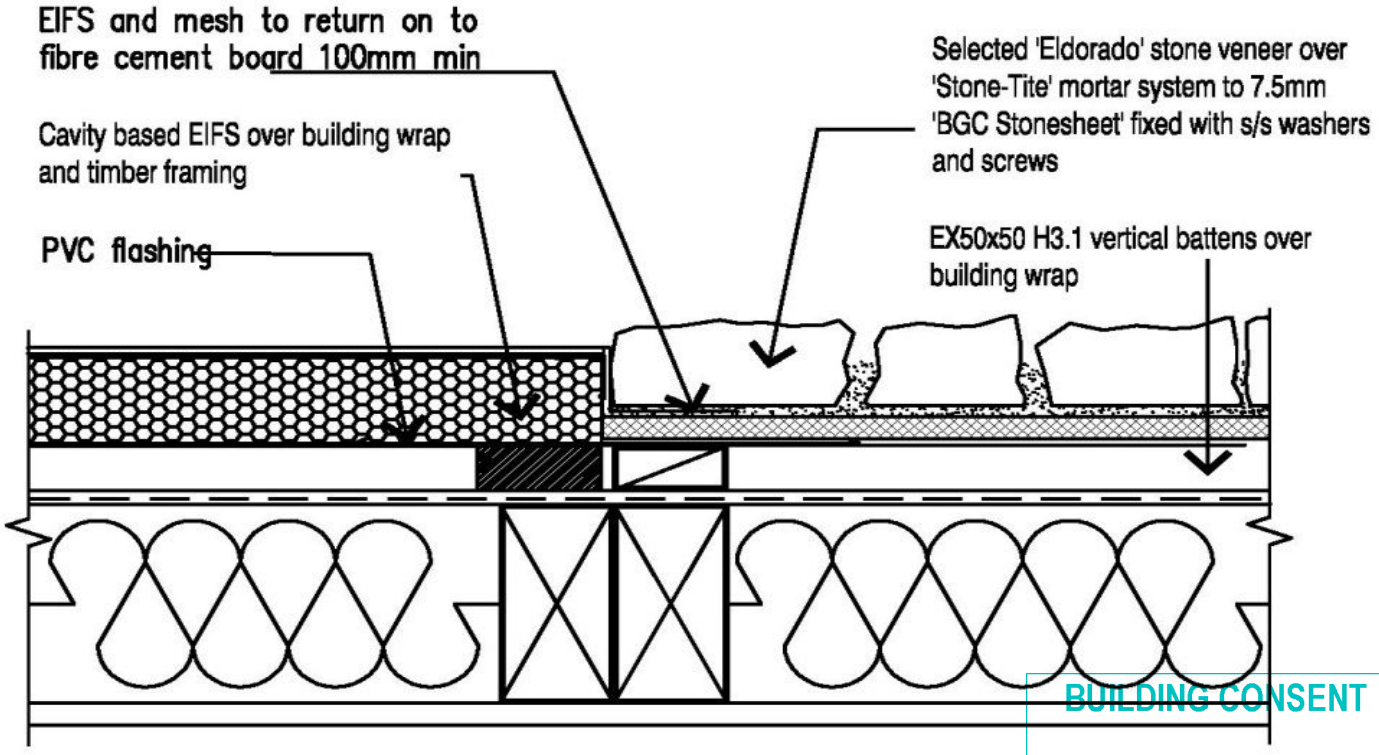
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(3i) Horizontal transition with EIFS or AAC Panel



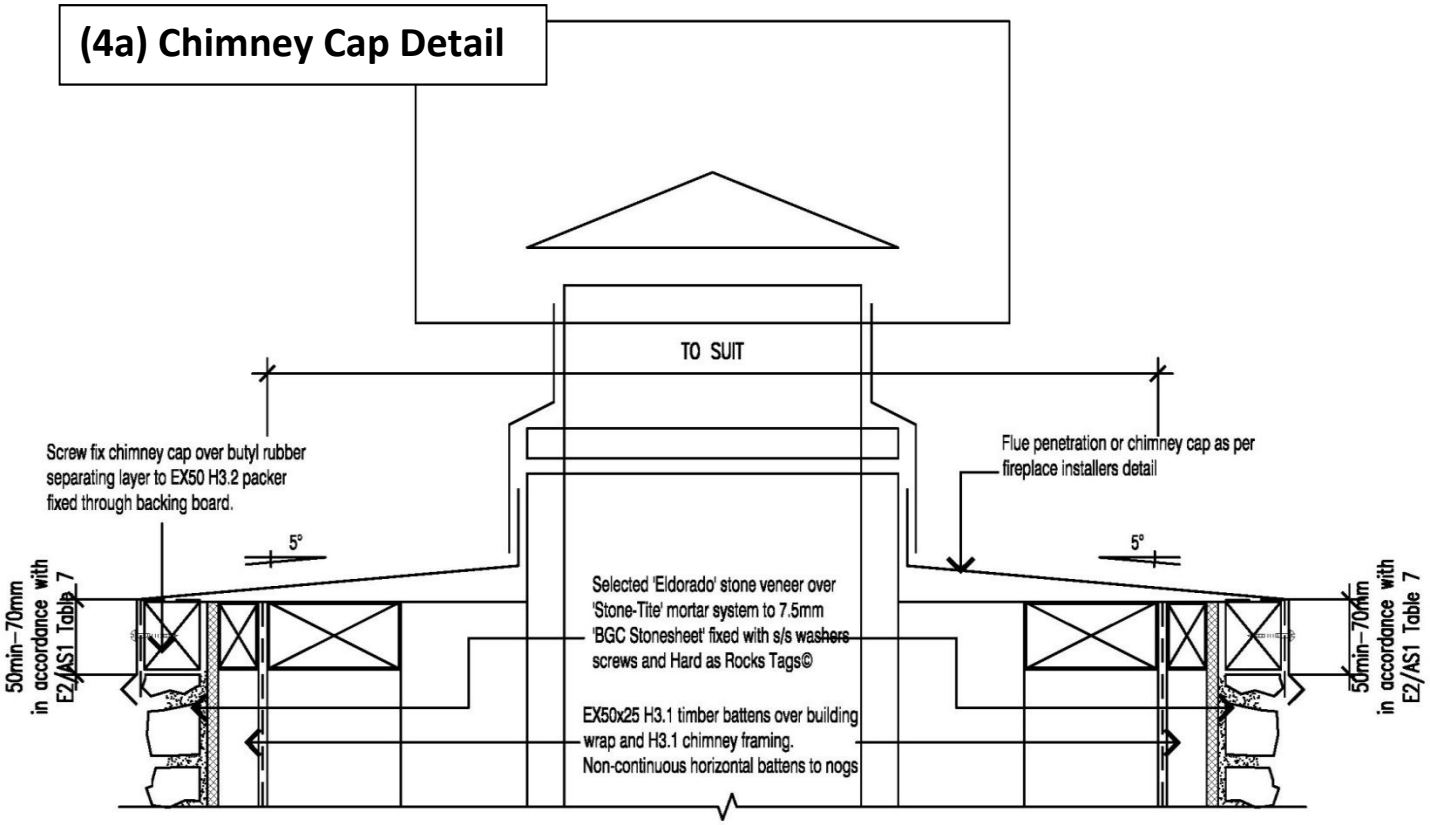
(3e) Vertical Transition with EIFS or AAC Panel



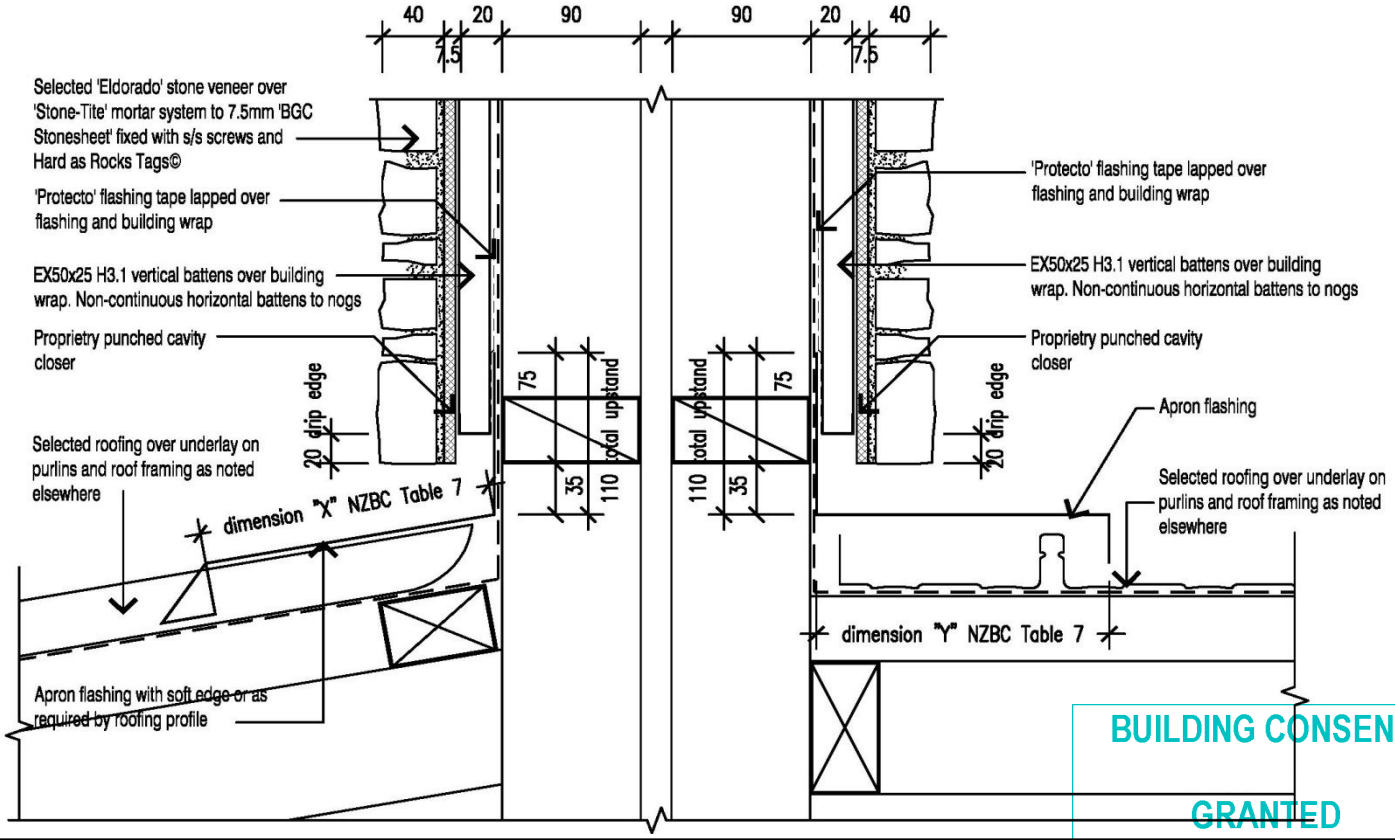
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(4a) Chimney Cap Detail



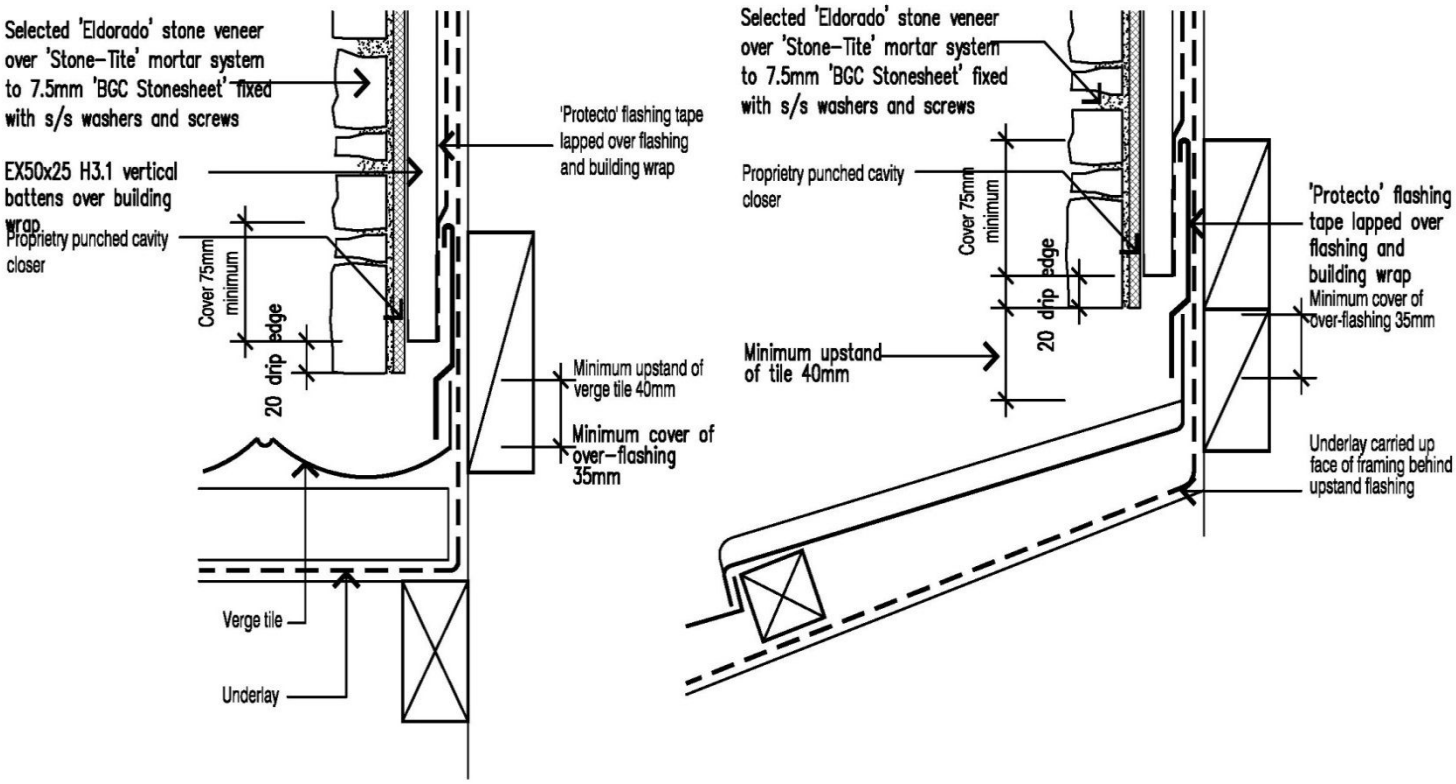
(4c) Roof Abutment - Longrun



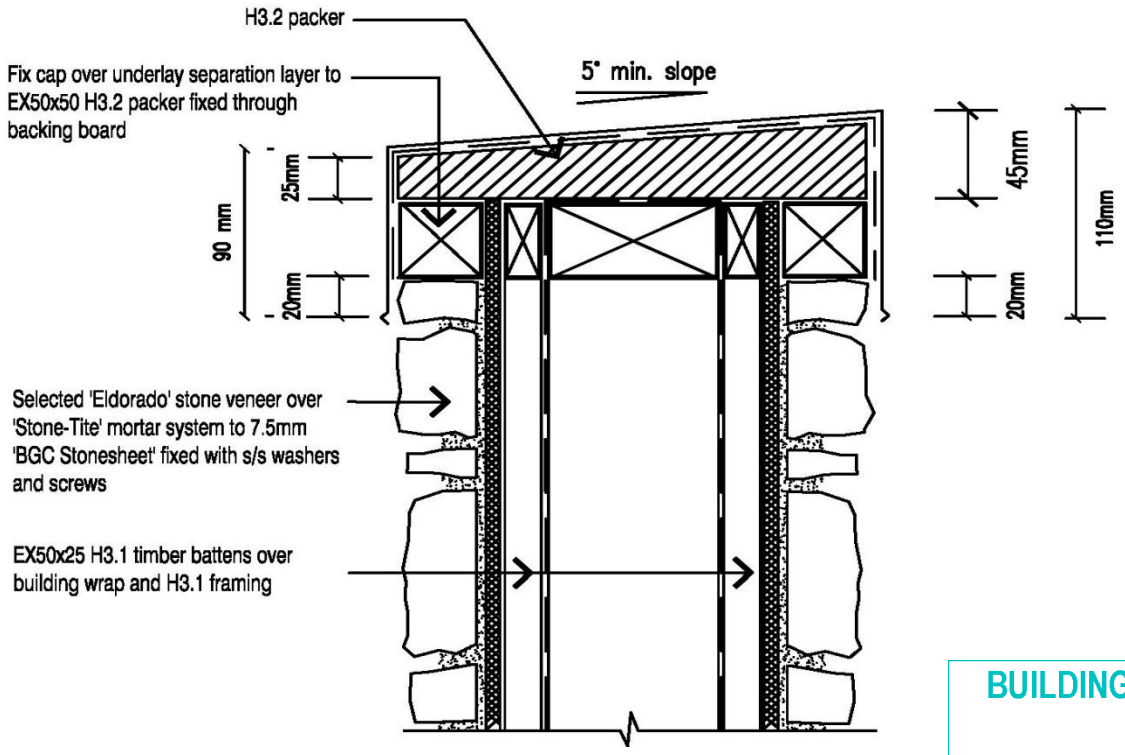
HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

(4f) Roof Abutment Metal Tile



(4h) Parapet detail



HARD AS ROCKS SUGGESTED DETAILS ONLY – DETAILS TO BE APPROVED BY LOCAL AUTHORITY & COMPLY WITH NZBC

Builders are responsible for the supply and installation of the fibre cement board with Hard as Rocks Tags, all relevant watertight flashings behind all fibre cement board sheet joints, sealant over the top of the sheet joints and sealing around joinery and all workmanship and installation of the substrate to meet Hard as Rocks Technical Literature and NZBC.

For product selection and colour choices please refer to the website or call 0800 353 672 to contact your local Hard as Rocks Ltd distributor and arrange to see samples or displays.

Do you have a technical question?? Please contact us

Hard as Rocks Ltd, PO Box 1706, Taupo

P: 07 3789926 F: 0800 353 672

W: www.hardasrocks.co.nz E: info@hardasrocks.co.nz

RUSTIC LEDGE ALEXANDRA

RUSTIC LEDGE WEST COAST

RUSTIC LEDGE CAMBRIDGE

WHITE OVER-GROUT

WEST COAST AND ALEXANDRA MIX

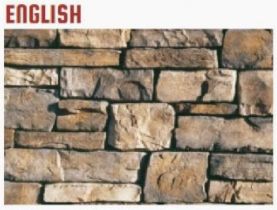
STACKED STONE OLD ENGLISH

STACKED STONE SLATE GREY

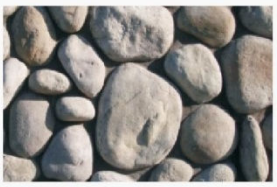
STACKED STONE BLUESTONE

SHADOW ROCK TETON

HILLSTONE MOLANO



CLIFF STONE MONTECITO



RIVER ROCK ALPINE

COUNTRY RUBBLE SERRANO

PACIFIC LAVA NU'U

PAHOEHOE KONA

Manawatu - manawatu@hardasrocks.co.nz
Wellington/Wairarapa - wellington@hardasrocks.co.nz
Nelson - marlborough@hardasrocks.co.nz
West Coast - westcoast@hardasrocks.co.nz
Canterbury - canterbury@hardasrocks.co.nz
Otago/Queenstown-Lakes - otago@hardasrocks.co.nz
Southland - southland@hardasrocks.co.nz

Northland - northland@hardasrocks.co.nz
Auckland - auckland@hardasrocks.co.nz
Waikato/Coromandel - waikato@hardasrocks.co.nz
Hawkes Bay - hawkesbay@hardasrocks.co.nz
Gisborne - gisborne@hardasrocks.co.nz
Bay of Plenty - bayofplenty@hardasrocks.co.nz
Taupo/Rotorua/Ohakune - taupo@hardasrocks.co.nz

For updates and a full set of suggested detail drawings please refer to the Technical Information section on the website.

COLORSTEEL®

Installers Guide

July 2019

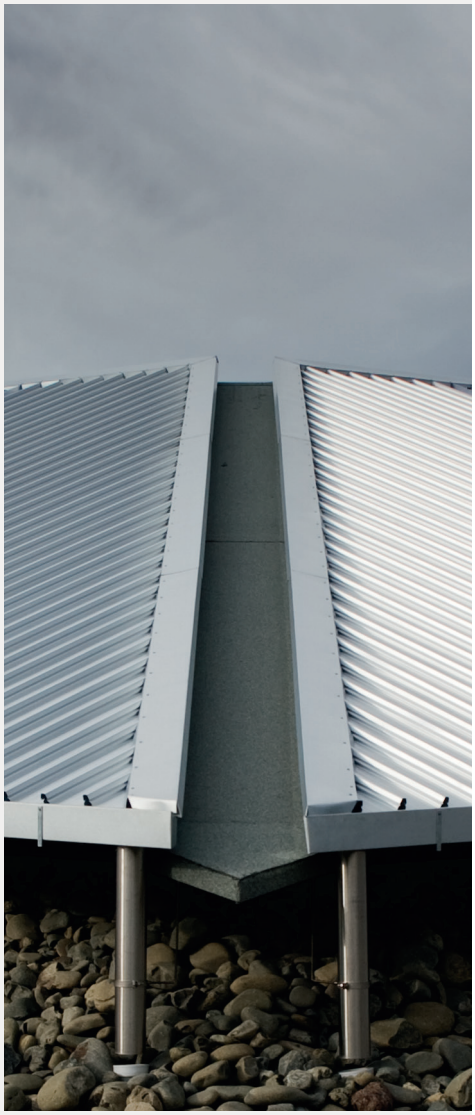

BC220141
BUILDING CONSENT
GRANTED
28/03/2
HUTT CITY COUNCIL
HUTT CITY

INTRODUCTION

New Zealand Steel takes a great deal of pride in manufacturing top quality products and knows that the final appearance is influenced by the skills and care taken with the material. This guide provides recommendations on the correct installation of COLORSTEEL®, Zincalume® steel and Galvsteel® material. To obtain optimum durability of these products, handling and fixing procedures appropriate to the material, application and environment must be used.

MATERIALS

A variety of steel coating systems are offered:

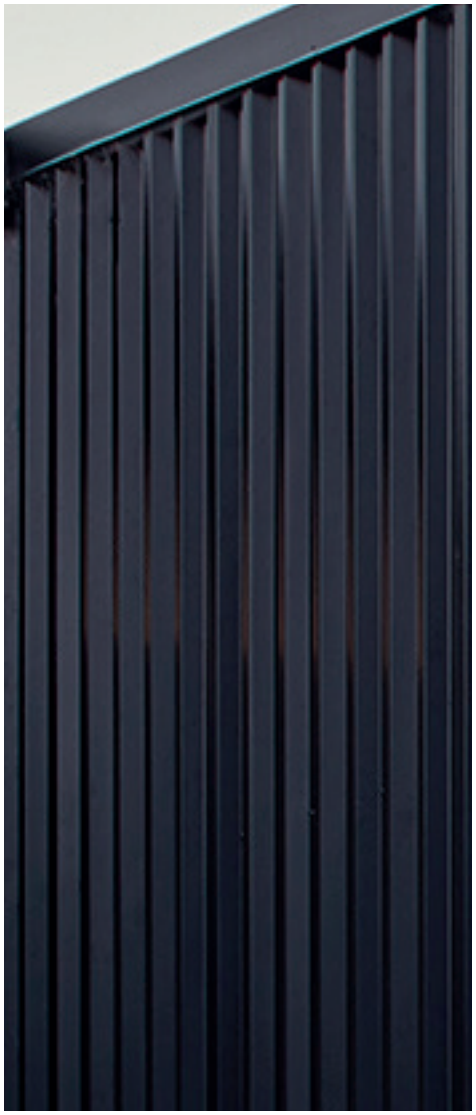


ZINCALUME®

Steel with an alloy coating consisting of 55% aluminium, 45% zinc by weight which offers superior corrosion resistance compared to galvanised steel in most environments (particularly coastal environments).

GALVSTEEL®

Traditional galvanised steel is offered under the trade name of Galvsteel®. This material is coated in 99% pure zinc.



COLORSTEEL®

COLORSTEEL® describes those steel building materials which have an oven-cured paint system applied to a flat galvanised or Zincalume® base on a continuous 'coil to coil' operation at the New Zealand Steel Glenbrook works. The pre-painting process improves both the looks and the durability of the finished product.

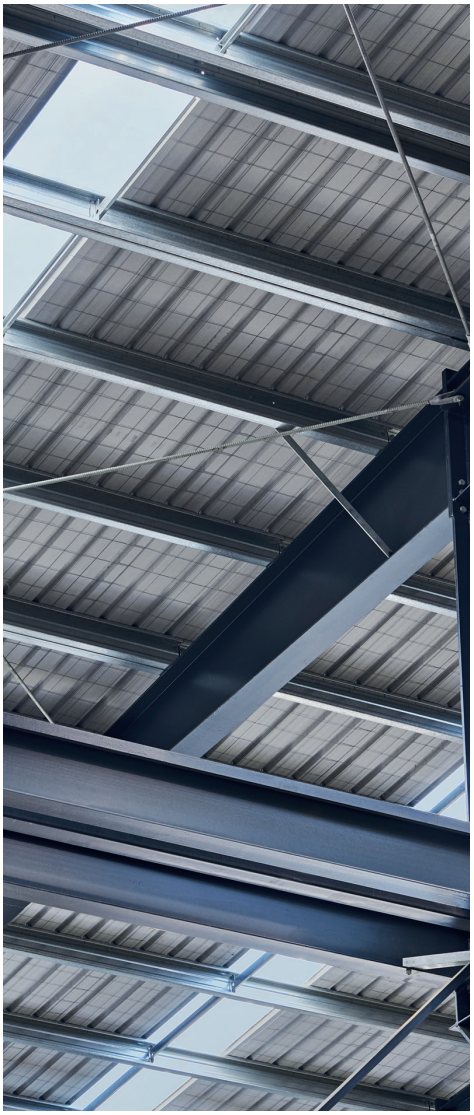
The brand name COLORSTEEL® is unique to materials manufactured by New Zealand Steel and must not be applied generically to other pre-painted products.

COLORSTEEL® ENDURA®

Has a Zincalume® substrate with an AZ150 coating class, (i.e. 150 g/m² of aluminium/ zinc alloy). It is suitable for most moderate to severe marine applications.

COLORSTEEL® MAXX®

Has a Zincalume® substrate with an AZ200 coating class, (i.e. 200 g/ m² of aluminium/ zinc alloy), to give enhanced performance in very severe marine environments.



COLORSTEEL® DRIDEX® and DRIDEX+®

Have an absorptive layer of fleece on the underside, negating the need for separate roofing underlay. These products must be installed by an accredited COLORSTEEL® Dridex® installer.
(Contact New Zealand Steel for details on how to become accredited).

PRODUCT SELECTION

Appearance

Colour

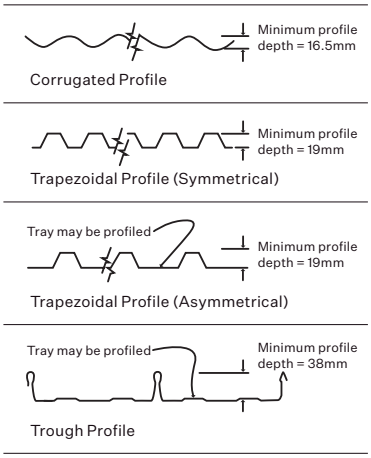
COLORSTEEL® comes in an extensive palette of colours. Refer to your supplier or the New Zealand Steel brochure Choosing COLORSTEEL® for details. New microwrinkle technology has led to the development of COLORSTEEL® Matte colours, in a limited colour range. COLORSTEEL® Matte requires special care during installation, refer to the COLORSTEEL® Matte installation guide bulletin.

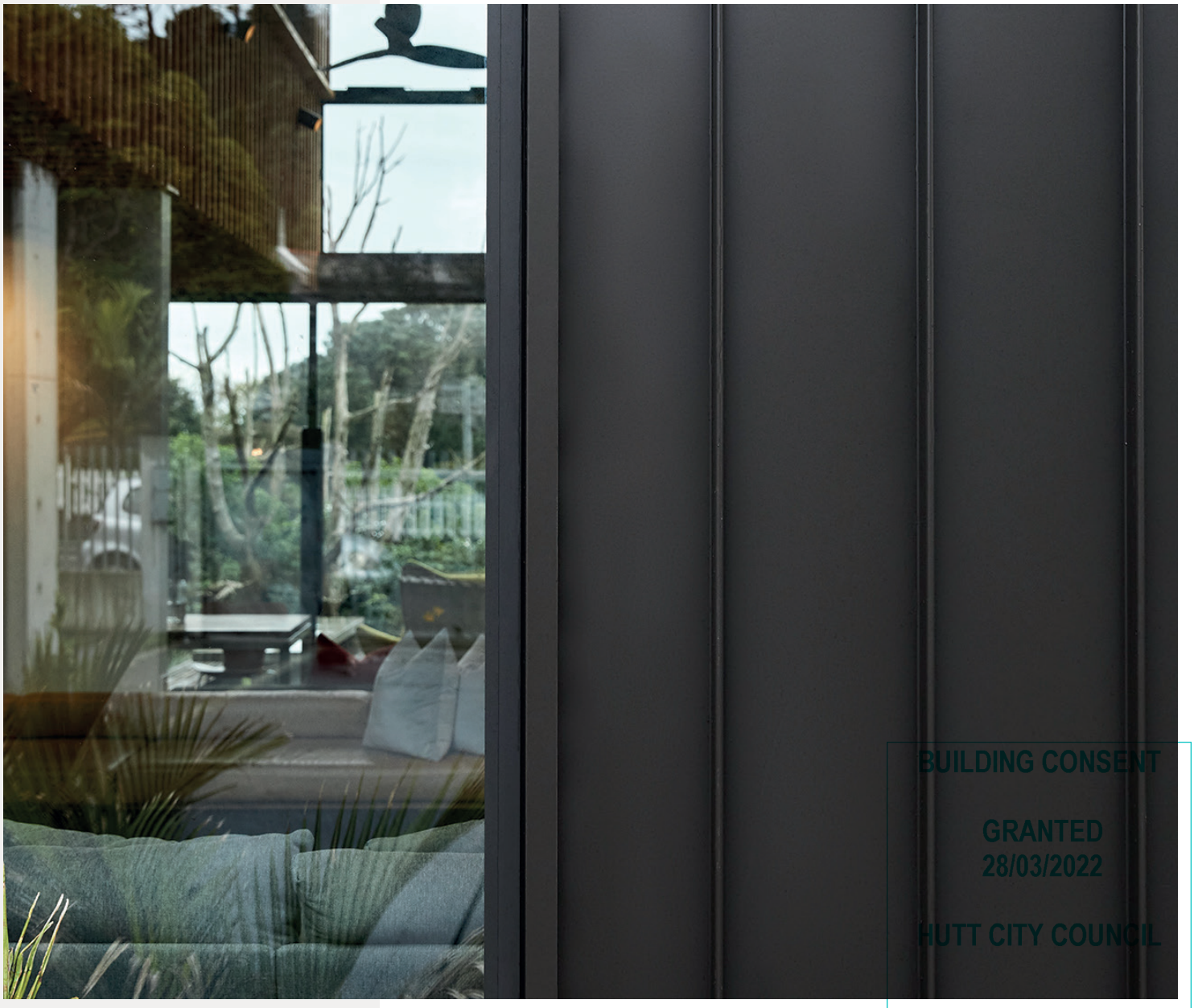
Glare

In some areas, colour choice may be limited by Council regulations, and this should be checked where applicable. Glare off light coloured roofs can sometimes be an annoyance to neighbours and if this is to be considered, refer to the COLORSTEEL® Glare Bulletin.

Profile

Profiles may be described as Corrugated, Trapezoidal (rib) or Secret Fix (Trough, Tray, Standing Seam, Decking).





Performance

Strength
Different profiles and profile heights will have different strength characteristics. Generally, the higher the profile height the stronger it will be. Refer to roof manufacturer for specific information.

Environment
The boundaries of different corrosion zones are difficult to define because many factors determine the corrosivity of a particular location. Issues such as difficulty of replacement, and access for maintenance should also be considered when making material choices. The designer should choose the appropriate materials for the location, which meet the minimum durability requirements of the NZBC and satisfy customer expectations.

For information on environments, warranties and maintenance see Environmental Categories, Warranty and Product Maintenance Recommendations brochure.

Compatibility
When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. This is known as galvanic or bi-metallic corrosion. A similar problem commonly occurs with water flowing over dissimilar metals.

Copper
Copper is not compatible with Galvsteel®, Zincalume® or COLORSTEEL® products, especially where the two materials are in contact in the presence of water or where water can flow from copper to the coated product. Every effort must be made to prevent the overflow of water from copper pipes on to the roofing and guttering material.

Lead
Lead is not compatible with Zincalume® products. Corrosion will result from contact between the two products, or from water run-off from lead to Zincalume® or COLORSTEEL®.

Stainless Steel
Stainless steel must not be in contact with Zincalume® or COLORSTEEL® products, but run off from stainless steel onto these products is acceptable.

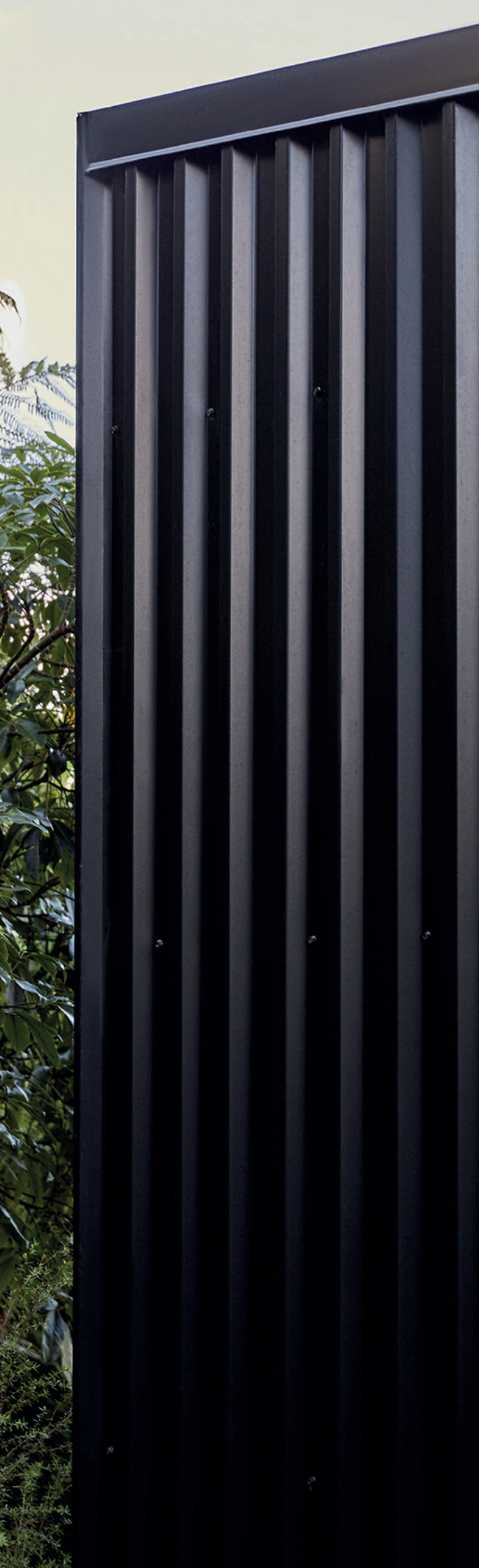
Galvanised Steel
Galvanised steel is compatible in contact with Zincalume®, COLORSTEEL®, aluminium or zinc but these materials must not discharge onto unpainted galvanised steel, as they are inert. Other inert surfaces include any painted surface, glass, PVC and glazed clay tiles.

Minimum Pitch
Different profiles have different minimum pitch limitations.

Profile	Rib Height	Minimum Pitch
Trapezoidal asymmetrical	20 – 25 mm	4°
Trapezoidal asymmetrical	25 – 35 mm	3°
Trapezoidal asymmetrical and symmetrical	36 – 60 mm	3°
Trapezoidal symmetrical	20 – 35 mm	4°
Secret-Fix	>30 mm	3°
Secret-Fix	<30 mm	8°
Standing seam fully supported flat sheet metal	>30 mm	3°
All other types of fully supported flat sheet metal		5°
Corrugated and other profiled sheeting	16.5 – 20 mm	8°
Corrugated and other profiled sheeting	21 – 35 mm	4°

Zinc / Zincalume® / Aluminium	**MORE ACTIVE MATERIALS**
Steel	
Lead	
Copper and Brass	
Stainless Steel	**MORE NOBLE METALS**

This chart lists commonly used metals in a 'Galvanic series'. If any two of these metals are in damp contact or a run-off situation, the metal higher on the table will sacrifice itself to protect the metal lower on the scale. Therefore the simple rule is to remember that you can run water down but not uphill. For example zinc to copper is alright but copper to zinc is not.

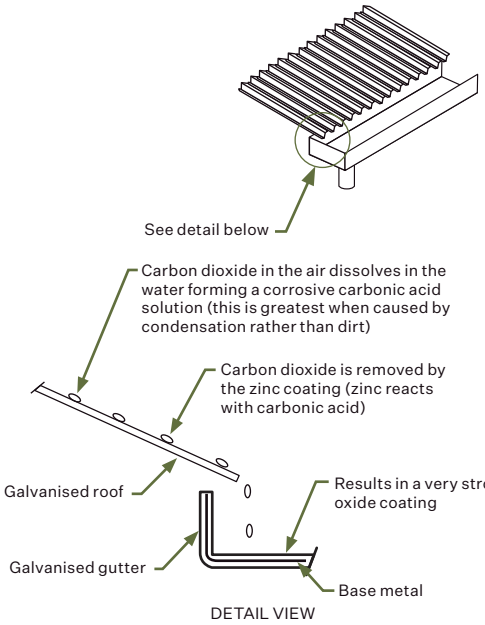


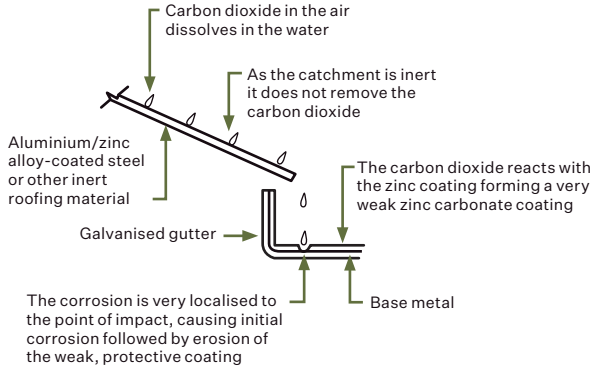
Inert Catchment

Run-off from inert surfaces such as glazed tiles, aluminium and aluminium-dominant metallic coatings, fibreglass, pre-coated metals, glass or any painted surface can cause corrosion of unpainted galvanised steel and other zinc-dominant metallic coatings. This is known as 'drip-spot corrosion' or inert catchment corrosion.

Water sitting on a surface absorbs carbon dioxide forming carbonic acid, which is reactive with zinc. On a galvanised surface, the carbonic acid reacts with the zinc and becomes neutral. On an inert surface discharging into an unprotected zinc surface, the carbonic acid is not neutralised, and reaction will be concentrated on the drip points of the inert surface onto the zinc surface.

As the formation of carbonic acid takes time to occur, inert catchment corrosion is normally seen at specific drip points of dew off a roof rather than below rain washed painted walls and windows.





Flashings

Flashings and ridge capping should be manufactured from the same coating system as used for the main roof area, i.e. all COLORSTEEL® products. Higher performance flashings can be used with the main roof i.e. COLORSTEEL® Maxx® flashings with a COLORSTEEL® Endura® main roof, but not the other way around, i.e. COLORSTEEL® Endura® flashings with a COLORSTEEL® Maxx® main roof. Where greater durability is required for flashings behind cladding or other building elements, colour matched alternative metals may be used. It is likely that these flashings will weather at a different rate than the COLORSTEEL®, and differential appearance may occur.

TAKING DELIVERY

Checking

Check the delivery to make sure you have the right product, delivered in prime condition. Verify that it is genuine COLORSTEEL®, Zincalume® or Galvsteel® material. Where different brands of pre-painted material are used on the same building, differences in colour, gloss and weathering performance may appear obvious within a short period of time. This will be due to the different paint formulations used by different manufacturers. New Zealand Steel Limited will not accept liability for problems caused by the mixing of brands.

Ensure that the order is complete including all fasteners, accessories etc required to commence installation.

Unloading

Set out flat area and supporting dunnage to ensure sheets will not be damaged by site debris. When unloading by crane, ensure lifting boom has a spreader bar and that tightening strops do not damage sheet laps. If unloading by hand lift each sheet off the stack without sliding over under sheets, as that may cause damage to the paint.

Storage

Close stacked sheets may deteriorate rapidly if water enters the pack. Sheets that are delivered wet or become wet in storage must be used immediately or dried. Drying can be done by filleting sheets or cross stacking them on a slope to allow water to drain and air to circulate between the sheets.

Long term storage may only be done in a dry, well ventilated environment.

Protect from contamination from corrosive and damaging substances such as acid, cement, swarf etc.

Wet Storage Damage

Failure to follow these handling and storage precautions could result in spoiling the surface appearance of the products and severely reducing their service life. On Galvsteel® material this will appear as a white corrosion product (white rust), whereas on Zincalume® the corrosion product is black. This should not be confused with fretting. On COLORSTEEL®, the result of wet storage damage could be a bubbling of the paint surface. Damage resulting from such failure invalidates the warranty and is not recoverable from New Zealand Steel Limited.

INSTALLATION

Safety
Installing roofs involves many hazards including laceration, electrocution, puncture and falling from height. Prudent PPE and installation practices must be employed, and the guidelines of MBIE “Best Practices for Safe Working at Height” must be strictly adhered to.

Handling
New Zealand Steel products are of high quality and perform best when handled correctly.

- Don’t handle them roughly or carelessly.
- Don’t drag or slide new sheets over other sheets or rough surfaces.
- All equipment and materials taken on to the roof should be clean and care taken to prevent damaging the surface.

Footware
- Anyone walking on the roof should wear clean flat rubber-soled footwear to prevent marking.
- Put an old mat or piece of carpet at the base of the ladder so that shoes can be cleaned before going up on the roof, or dirty shoes should be removed and replaced at base of ladder
- Care should be taken walking on roofs as they may be slippery at times.

Strippable protective film
Strippable film is a clear pressure sensitive polyethylene plastic film that is applied to some COLORSTEEL® products in the New Zealand Steel paint line to assist in protecting the COLORSTEEL® surface from damage and scratching during forming, transportation, handling, storage and erection.

Strippable film is designed to provide some protection to the COLORSTEEL® product prior to and during installation on the building. It is not designed to protect against corrosion, humidity or chemicals.

Storage
COLORSTEEL® product with film applied must be stored at temperatures less than 50°C and out of direct sunlight to avoid prolonged UV exposure. The product needs to be kept dry to prevent moisture ingress between the film and the painted surface. In the longer term this may cause issues to the COLORSTEEL® and in the shorter term cause the film adhesive to whiten and breakdown leaving residue on the painted surface when the film is removed.

Usage
Storage requirements for formed products on building sites are as above. The film is intended to protect the painted product up to and during installation, it must be removed directly before or immediately after installation. Failure to do so may result in the film adhesive leaving a residue on the painted surface.

On removal of the film the painted surface must be inspected and any adhesive residue cleaned off. Mild household cleaners be may be used, check that the cleaning product manufacturer recommends the product as being suitable for use with painted surfaces and all of the recommended safety precautions are followed. Ensure the cleaning product is washed off the COLORSTEEL® surface with fresh water after use.

Marking

Black lead pencils must never be used for marking COLORSTEEL®, Zincalume® or Galvsteel® products. The carbon in the pencil promotes corrosion which will etch the surface of the material, leaving a permanent mark. Use a pencil of any colour other than black, a marker pen, chalk or crayon.

Cutting

Cut COLORSTEEL® with care to avoid marring the high-quality finish. Cut by shear only, using nibblers or hand shears. Friction blades and high-speed saw blades must not be used. These blades will damage both the metallic coating and the COLORSTEEL® surface by creating excessive heat, and generate large amounts of hot swarf which may embed into the coating surface.

All debris must be swept off the job at the end of each day. Prevention of swarf damage is far easier than its cure. See Swarf Staining Bulletin for more information.

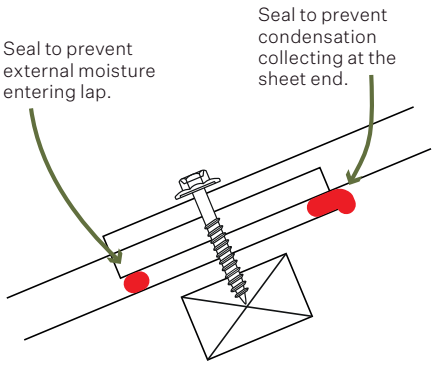
Sealing and joining

Sealing

Soldering should not be used on COLORSTEEL® or Zincalume®, use only neutral cure silicone rubber or MS polymer sealants. Pre-align the pieces to be joined and pre-drill if possible. Thoroughly clean off surplus sealant and swarf using a dry, lint-free cloth or plastic scraper. Apply two beads of sealant close to each edge of the joint. Align pieces together and fasten with sealed rivets at 50mm centres.

End Laps

End laps in profiled metal roofing should be avoided where possible. When unavoidable, the end laps should be sealed with a double bead of sealant as in the illustration below.



Fastening

The selection of the appropriate form of fastener is important. Fastener durability should equal or exceed that of the material being fastened. Fasteners used on COLORSTEEL® products should be factory colour matched prior to installation.

Screw fasteners

Screw fasteners of a length sufficient to give adequate penetration into supporting structure are to be used. Refer to manufacturer for specific recommendations. Fasteners should be a minimum of Class 4 for severe environments, and Class 5 for very severe. They should be manufactured and coated in materials compatible with the material being fastened, and be fitted with a low carbon, non-conducting sealing washer.

Rivets

Rivets should be minimum 4mm diameter aluminium. Sealed rivets are preferred over unsealed as they do not require the addition of a dab of sealant on the face to achieve weatherproofing.

Spacing

Fasteners should be of grade and type suitable for the application, installed at spacings required by design loads and manufacturer's recommendations. On buildings constructed to NZS 3604 a consistent fixing pattern should be used on all fastener rows, for other buildings, greater fastener density may be required around the periphery. All purlins must be fastened so that they each contribute to resisting uplift forces.

Rivets on flashings should be placed at 50mm centres.

Setting

Fasteners should be seated snugly to give a good seal, without distorting the roofing profile. Overdriving, over-tightening or using too many fasteners can cause purlin marking and other damage, and can contribute to roof noise.

Driving

Impact screw guns can cause damage to the heads of screws and cause damage to protective coatings, as can worn driving sockets. Use only drivers recommended by the fastener supplier, and snug fitting drive sockets.

Allowance for expansion

All roofing and cladding is subject to expansion and contraction due to temperature extremes. This is particularly evident with darker colours and long spans where the expansion may be as much as 8.0mm for a 10.0 metre sheet. Screws fitted with profiled washers for the purposes of allowing thermal expansion must be installed centrally through a 9mm diameter pre-drilled hole in the roof sheeting.

Flashings

For transverse flashings, aluminium soft edging may be used, or flashings may be notched into rib and secret fixed profiles. Where penetration flashings are required, proprietary EPDM boot flashings may be used, or bespoke flashings may be fabricated in accordance with the Profiled Metal Roofing Code of Practice.

Flashings should not have edges that impinge on adjacent coated surfaces, and longitudinal edges such as barge downturns must have a small gap between downturn edge and neighbouring pan.

Sheet ends

The pans at the top end of sheets must be turned up to form a stop end. On roof pitches below 8°, ensure that the gutter end of profiled sheets is turned down.

PREVENTING PROBLEMS

Water ponding

Roofs

Ponding will create prolonged time of wetness, and increase the build-up of debris. Ponding will detract from coated steel product life and will invalidate the product warranty.

Where the roof pitch is low, changes in structure alignment or damage to the roof sheets may result in a negative pitch and consequently lead to water ponding. The following conditions commonly cause water ponding:

- Over-spaced purlins
- Deformation of timber purlins
- Placement of external loads such as air conditioning units
- Careless roof foot traffic
- Excessive canning of the profile pans
- Incorrectly installed penetrations

Gutters

Gutters must be installed with adequate fall to ensure all water is transported to appropriately located downpipes. The installation and downpipe construction should allow the gutter to drain completely. Regular gutter cleaning and maintenance is required to remove leaves and other debris that may restrict water flow to downpipes. Particular care should be taken at the entrance to downpipes and corners, to avoid blockages leading to water ponding.

A gutter protection system (or any other product) that entraps debris and/or water between itself and any steel product surfaces, restricting the coated steel's ability to dry, is not recommended and is an exclusion in the product warranty.

Foot traffic

1. Use purlin spacing guidelines for Heavy Traffic if roofs are to be accessed by maintenance personnel.
2. Consider the use of walkways to prevent damage where the roof may be subject to heavy foot traffic.
3. Do not use the roof surface as staging for work on adjacent building facets.

Colour match paint

Colour match paint is designed for matching accessories to the COLORSTEEL® material. Colour match paint is not designed for repairing marks or blemishes. Fasteners and accessories requiring colour matching should be painted prior to installation.

Minor scratches

Air-dried paints used to disguise marks will weather at a rate different from that of COLORSTEEL®, sometimes dramatically so, and will often become more apparent than the mark they are intended to disguise. Minor scratches are best left alone, they will not affect the performance of the COLORSTEEL® product due to the self-healing qualities of the primer and metallic coating, and become less evident as the coating weathers.

Minor scratches may be described as scratches that do not extend to the metallic coating, are less than 3mm in width, and are not visually noticeable from a distance of 3 metres. This definition will however vary with the concentration of the scratches, and the visibility of the area affected.

Widespread coating damage to any COLORSTEEL® product can only be rectified by replacement of the affected sheets.

Lichen

Temperature, dust and rainfall can create a good environment for lichens to establish and flourish, and this can occur on almost any surface. For more information on Lichen treatment refer to Removal of Lichen bulletin.

Sunscreen

Sunscreen containing titanium dioxide or zinc oxide can accelerate the degradation of organic materials including auto finishes and COLORSTEEL® surfaces. This damage is irreparable so prevention of its occurrence is the only defence. See Sunscreen bulletin for more information.

FIELD PAINTING

Zincalume® and Galvsteel® are readily paintable using good quality primers and topcoats. Metallic coated roofs can be painted immediately after installation. Dirt, grease and any loose materials must be cleaned off so the surface is clean and dry prior to the first coat being applied. A popular solution is to apply a good quality galvanised iron primer and two topcoats, following the manufacturer's recommendations.

COLORSTEEL® can be painted after exposure to weather. Normally 12-18 months exposure is required to achieve surface modification of the surface to allow the new coating to adhere.

Side laps of unpainted Zincalume® steel do not require lap priming.

MAINTENANCE

Regular maintenance will increase the life of your COLORSTEEL®, Zincalume® or Galvsteel® roof. Rain washing will keep most exposed roofs clean and free of contaminants, but regular inspections should be conducted and any localised build-up of debris removed. Unwashed roof areas and wall cladding may require regular manual washing in accordance with New Zealand Steel guide: *Maintenance Recommendations.*

WARRANTIES

Warranties specific to each contract are issued through the Rollformer by New Zealand Steel Limited. In order to ensure the appropriate product is specified for the intended service life in any given environment, New Zealand Steel Limited recommends that they be consulted as early as possible in the design stage to ensure correct material selection and backing by an appropriate warranty. For information on environments, warranties and maintenance see Environmental Categories, Warranty and Product Maintenance Recommendations brochure.

BC220141

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

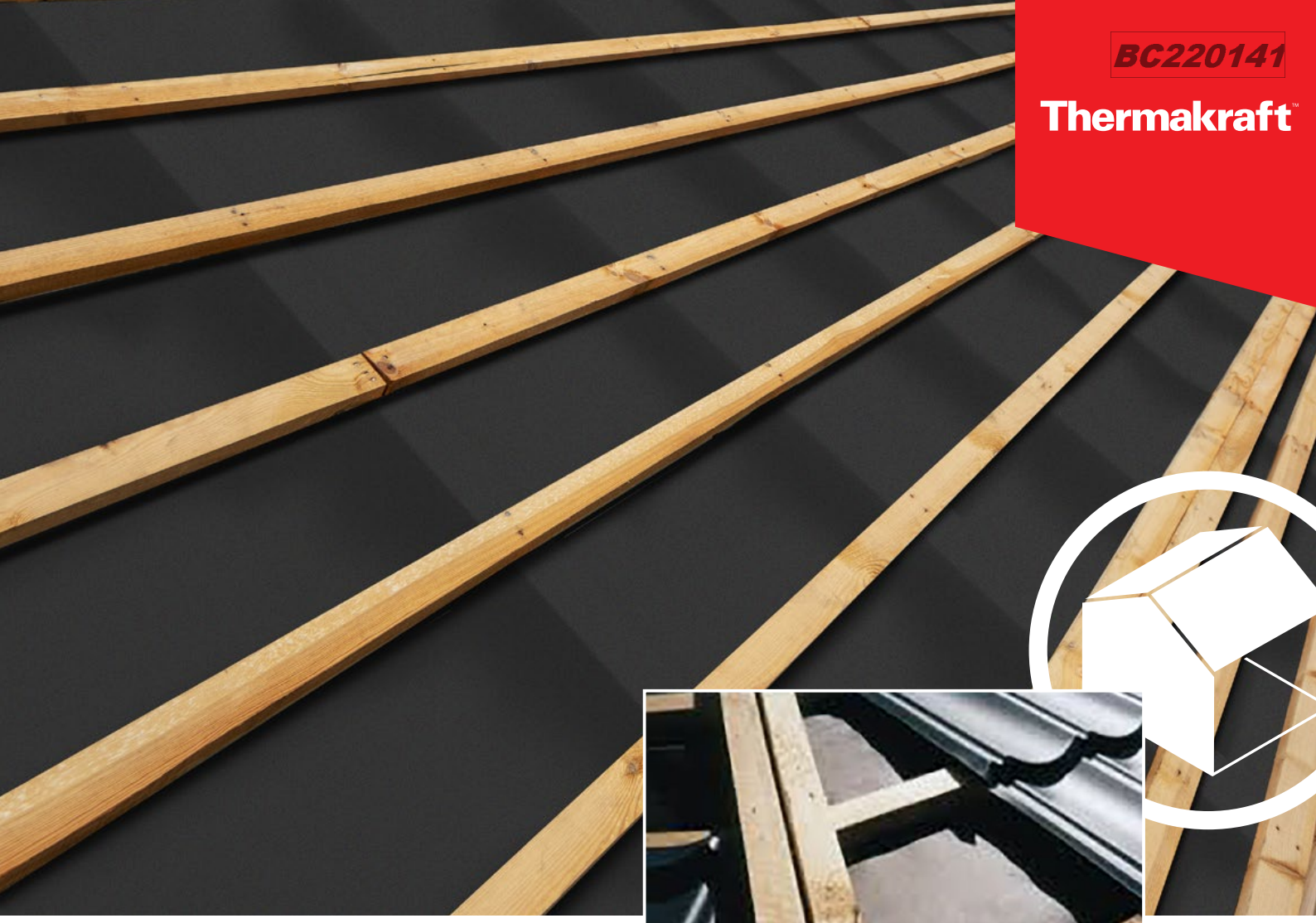
For additional information,
literature or technical
assistance, please contact:
New Zealand Steel Limited
Private Bag 92 121, Auckland 1142
Free Phone: **0800 697 833**
Email Address: **info@colorsteel.co.nz**
www.colorsteel.co.nz
www.nzsteel.co.nz

This Installers Guide is intended as a general guideline only and does not constitute professional advice. All buildings and roofs are unique and extra specific professional advice on installation may be required. New Zealand Steel accepts no liability in relation to the installation of steel roofing.

NEW ZEALAND MADE

BC220141

Thermakraft™



Installation Guide

THERMAKRAFT 215

Self-supporting bituminous wall and roof underlay

Commonly referred to as “Building Paper” Thermakraft 215 is a self-supporting, kraft paper based, bituminous building underlay that is suitable for use on roofs and walls in residential buildings. It is vapour permeable, meaning that liquid water from the outside is prevented from penetrating but water vapour from the inside can pass through and escape the building envelope. Thermakraft 215 is easy to install.

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

Smarter products. Better buildings.
thermakraft.co.nz

Installation Guide

Application Method (Roofing)

Thermakraft 215 is a bituminous building underlay used on roofs in residential buildings.

- Thermakraft 215 can be used in direct fix or cavity fix for roof construction.
- Run NO longer than 10m.

Long-run metal roofing/vertical or horizontal installation method

- Fix using stainless steel 8-12mm staples or 20mm flat head clouts, or appropriate proprietary fastenings on timber framed structure. Fixing at 300mm centres. Fixing types and requirements for steel framed structure can be found in the MRM Code of Practice.
- Refer to table below to determine underlay support requirements.

Roof Pitch	Span	Underlay Support Required	
		Horizontally Installed	Vertically Installed
≥ 10°	> 1200mm	Yes	Yes
	≤ 1200mm	No	No
< 10° (Min 3°)	> 1200mm	Yes	Yes
	≤ 1200mm	No	Yes

- Thermakraft 215 upper sheet lapped over lower sheets (shiplap) to ensure water is shed to the outer face.
  Note: Thermakraft 215 can move downwards. To prevent this, it must be "Captured" by the fastenings at each purlin. Horizontal fix must not be used on purlin distance greater than 1100mm to allow for 150mm laps.
- Must be laid firmly (tight/taut) without creases. All laps either vertical or horizontal must be a minimum of 150mm lap.
- When underlay support is required, Thermakraft recommend using AUSMESH Safety Mesh, AUSNET hexagonal netting or Thermastrap 201.
- Thermakraft 215 can be installed above the battens or purlins for profiled metal roof claddings and otherwise in accordance with NZBC E2/AS1.
- If required to achieve a lap seal (refer to NZ Metal Roofing Code of Practice), use Thermakraft Aluband window sealing tape or Thermakraft White General Purpose Tape.
- Thermakraft 215 will provide temporary weather protection during construction, same day coverage recommended. DO NOT over expose the product to the weather or UV for more than 7 days in any roof applications.
- Thermakraft 215 may be unwound to the full length from the gutter to the ridge. However, when ridge ventilation is required Thermakraft 215 may be terminated or slit at the ridge purlin to allow a free passage of air.
- Thermakraft 215 must NOT overhang the gutter line by more than 20 mm, or if eaves flashings are used, terminate on the upper side of the flashing. More details can be found in the MRM Code of Practice.
- Flue penetrations must have a minimum distance of 50mm from Thermakraft 215 (refer to NZ Metal Roof and Wall Cladding Code of Practice 10.11.5).
- Thermakraft 215 must be free of tears and punctures, fit tightly and be lap taped around all penetrations (except flue penetrations), to provide drainage for any condensation, or surface water from leaks.

Note: Do not use Aluband on penetrations where Polybutene water pipes have been installed. Refer Pipe Manufacturers for instructions on sealing penetrations.

Concrete/Metal tile roofing

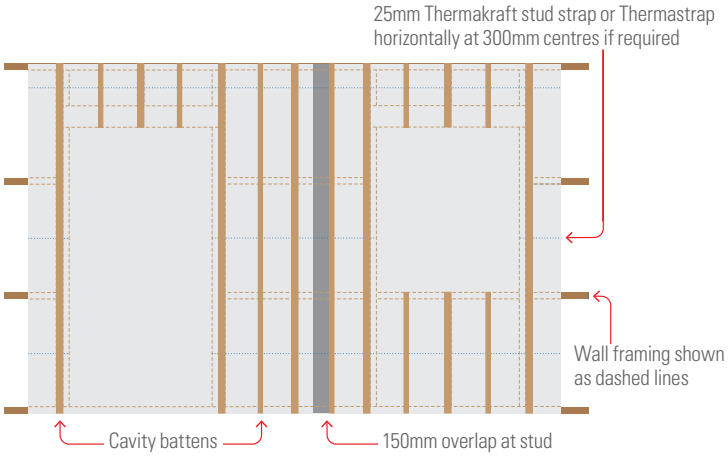
- Thermakraft 215 must be laid over rafters prior to fixing the tile battens. The maximum span between rafters for Thermakraft 215 is 1200mm. Masonry tile roofs must have antiponding boards in accordance with NZBC E2/AS1 Paragraph 8.2.5.
- Installed Thermakraft may be laid over the top of the antiponding boards and draped into the gutter by no more than 20mm. Antiponding boards must be treated in accordance with NZS 3604.
- Do NOT Run Thermakraft 215 longer than 10m in length.

Application Method (Wall)

- Fix Thermakraft 215 underlay with printed side facing the exterior.
- Fix to all exterior walls from below bearers to the top plate. Pull the Thermakraft 215 underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically. Additional fasteners should be used around each opening to be cut out. Fixing types and requirements for steel framed structure can be found in the MRM Code of Practice.

Installation Guide

- When fixing Thermakraft 215 underlay to Steel framing the same procedures applies, use adhesive spray or tape or flat head screws to fasten to the framing or thermal break, the exterior cladding fastenings will act as the permanent fixings.
- Cover all windows and door openings with Thermakraft 215 underlay.
- It is recommended that the Thermakraft 215 underlay is not cut and prepared for window installation until the arrival of the windows. minimum of 150mm lap is required at joins, all vertical laps must be made over studs. Horizontal laps to be laid ship lap style allowing water to be shed to the outer face of the membrane.
- When windows and doors are ready for installation, the Thermakraft 215 underlay covering the openings should cut at 45° and folded into the opening and securely fastened. Thermakraft window flashing tapes are recommended as the window flashing system.
  Note: In accordance with NZBC Acceptable Solution E2/AS1, wall underlay must be prevented from bulging into the drained cavity. Where stud spacing is greater than 450mm Thermakraft stud strap run horizontal at 300 centres is an acceptable means of prevention.
- Once installed, Thermakraft 215 must not be left exposed to the weather or UV for a maximum of 28 days. Thermakraft 215 underlays will provide temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZS 3604.
- Make good any forced tears with Thermakraft window flashing tapes. Any large areas which require repair may be covered with a second layer of underlay, a lap of 150mm is required.
- For wall cavity systems where stud spacings are greater than 450mm centres, another means of restraint is required on the flexible underlay to prevent insulation bulge (refer to E2/AS1).
- Thermakraft 215 underlay must be installed by a licensed building practitioner.



Application Tips

- Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.

Handling and Storage

Thermakraft 215 underlay must be handled with care to prevent damage such as tearing and roll deformation. Due to the width of the product, care should be taken when installing in windy conditions.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

Thermakraft Limited / 0800 806 595

Issue 1, November 2019

CBI 5113

AUG 2012

GIB® RONDO® METAL BATTEN SYSTEMS

SYSTEM AND INSTALLATION MANUAL

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

GIB®

BC220141

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

GIB® Rondo® Metal Batten Systems

Specification and installation guide

- Suitable for Residential and some commercial applications
- GIB® Rondo® metal battens are the recommended system for use in ceilings in conjunction with 13mm GIB® plasterboard
- Easy to install; achieve a flat and true ceiling
- A stable substrate that reduces the risk of costly call backs

GIB® Rondo® Metal batten systems

Winstone Wallboards accepts no liability if the system is not installed in strict accordance with the instructions contained in this publication.

Use only the current specification

This publication may be superseded by a new publication. Winstone Wallboards accepts no responsibility for reliance on superseded publications. Call 0800 100 442 or visit www.gib.co.nz to confirm the currency of the publication.

Beware of substitution

The performance of GIB® Rondo® Metal batten systems is very sensitive to design detailing and specification. It is important that only GIB® Rondo® branded products are used in the systems contained in this publication. No responsibility will be accepted for alternative manufacturers product.

Customised design solutions

The systems detailed in this publication should cover most commonly encountered situation. For projects where specific performance is required please contact our technical support team on 0800 100 442.

CONTENTS

AUGUST 2012

INTRODUCTION

AUGUST 2012

WHY METAL?

A large proportion of ceiling defects such as peaking or cracked joints and popped fasteners can be attributed to movement in the substrate. Timber ceiling substrates are more prone to temperature or moisture induced movement and shrinkage. These issues tend to impact on the surface of the plasterboard and can result in call-backs. Metal ceiling batten systems provide a stable substrate for plasterboard ceiling linings. Regular users of metal batten systems consistently have fewer call-backs for movement related ceiling defects such as peaking or cracked joints and popped fasteners.
Once builders change to GIB® Rondo® metal battens they appreciate the simple installation methodology and enjoy reduced callbacks. Very few, if any, revert back to using timber.

Benefits of steel battens include;

- Consistent performance
  - Less influence from moisture or environmental factors than timber. Unlike timber battens which can vary in grade, species with temperature and humidity, the performance of GIB® Rondo® metal battens is consistent throughout New Zealand
- Lighter weight
  - Lower transport costs and easier to handle on site
- Require less storage space
  - Storage space is often at a premium on building sites and a house-lot of GIB® Rondo® componentry will occupy substantially less space on site than timber battens
- Easy to achieve a flat, stable substrate
  - This results in a trouble free ceiling and reduces the risk of costly call-backs

Benefits of GIB® Rondo® metal batten systems

- Versatility
  - The extensive componentry range provides solutions to a multitude of situations
- Technical back up
  - Our well established and highly rated technical team are available to quickly and efficiently handle any enquiries, call us on 0800 100 442
- Flexibility
  - GIB® Rondo® metal batten systems can be used on residential and some commercial ceilings. Components are also available for use in wall strapping situations and have been tested and approved for use in GIB® noise control systems

There are two systems to select from;

GIB® Rondo® 310 metal batten system – (35mm battens)
The GIB® Rondo® 310 metal batten system comprises a 35mm deep batten. The recommended method of fixing is to use clips as illustrated below.
This provides a flat substrate for the plasterboard ceiling as it is able to compensate for any deviations in the framing.
If the substrate is consistently flat the battens can be attached directly to the underside of the framing.

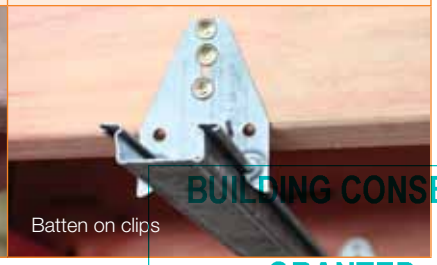
GIB® Rondo® 308 metal batten system – (16mm battens)
The GIB® Rondo® 308 ceiling batten is a light weight system based on a 16mm deep batten fixed to a clip attached to the ceiling framing as shown.

310 METAL BATTEN


Batten on clips


Direct fix

308 METAL BATTEN


Batten on clips

IMPORTANT NOTE:
Manufactured from 0.55BMT steel with a Z275 coating exceeding the NZBC durability requirements for interior use.

GIB® RONDO® 310 METAL BATTEN SYSTEM

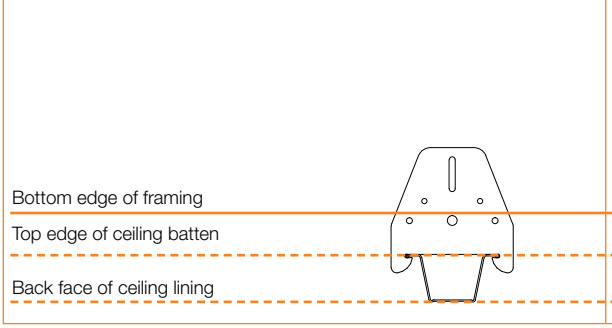
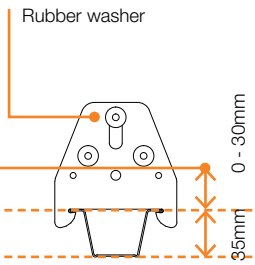
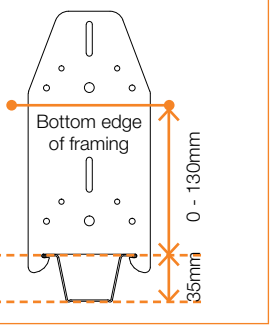
AUGUST 2012

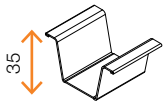
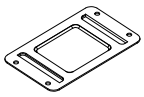
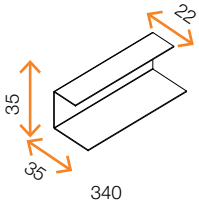
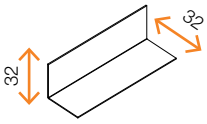
GIB® RONDO® 310 CEILING BATTEN SYSTEM

The GIB® Rondo® 310 system forms a strong, stable and flat substrate for ceilings in residential and commercial applications. The 35mm dimension allows it to be directly substituted into ceilings where 35mm timber battens would traditionally have been used. Consult an electrical contractor for any earthing requirements that may need to be incorporated.
There are two methods of fixing GIB® Rondo® 310 metal battens.

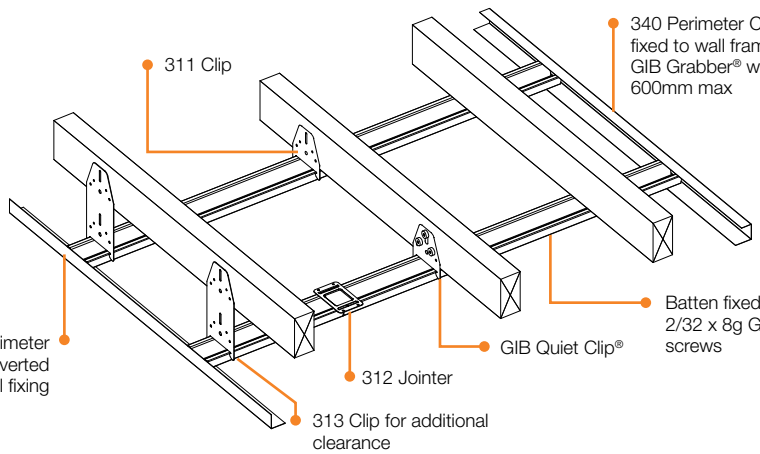
Recommended method
Clipped using either;
- 311 clip for a drop of 0-30mm
- 313 clip where a larger drop is required between the bottom of the truss chord, joist or rafter and the back of the ceiling batten a drop of up to 130 mm can be achieved in order to accommodate services or variations in framing heights
- GIB Quiet Clip® for use in GIB® Noise control systems

Alternative method
- Directly by fastening with pairs of min GIB Grabber® 32mm x 8g wafer head screws through the flange (consult span tables pg 5)
- Alternatively pairs of min 45mm x 2.8mm FH nails can be used
- For fixing to steel framing a drill tip screw is recommended

311 CLIP	GIB QUIET CLIP®	313 CLIP
		

GIB® RONDO® 310 BATTEN	312 JOINTER CLIP	340 PERIMETER CHANNEL	NZ18 PERIMETER ANGLE
			
35	312	340	NZ18

For ceiling diaphragm details see page 8

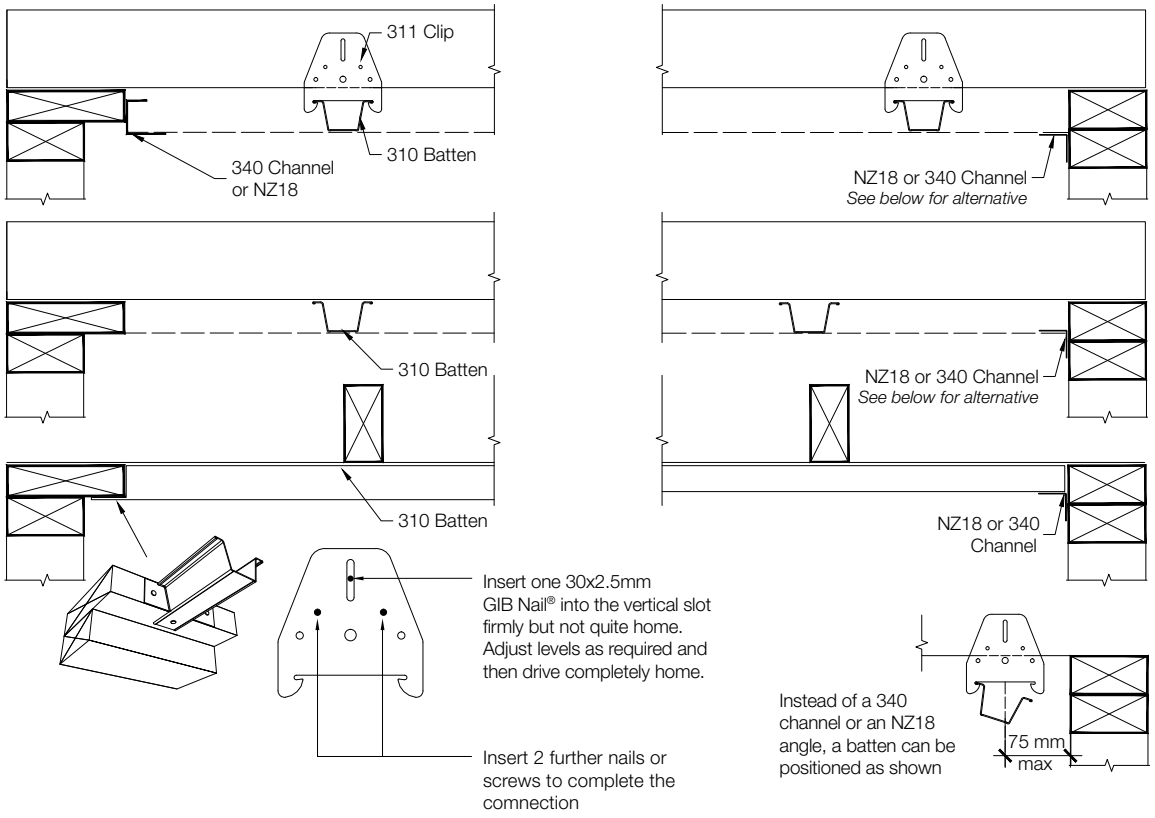


GIB® RONDO® 310 METAL BATTEN SYSTEM

AUGUST 2012

GIB® RONDO® METAL BATTEN SYSTEM INSTALLATION INSTRUCTIONS

Consult an electrical contractor for any earthing requirement that may need to be incorporated

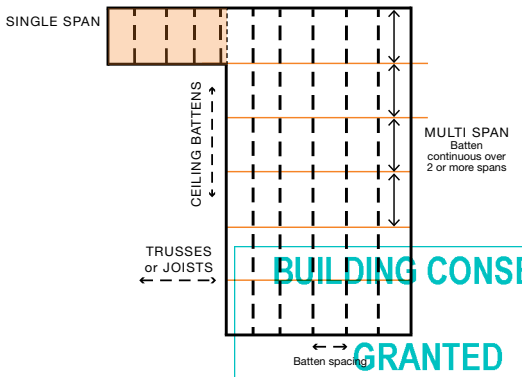


- Establish a datum line for the ceiling
- Place a string line on the datum line at right angles to the battens, under the truss or joist closest to the centre of the room
- Install GIB® Rondo® clips at 600mm centres (450mm for 10mm plasterboard) using the string line to establish the correct position
- Cut the batten to the required length using snips or a hacksaw
- Insert the batten into the channel at each end and fit into the clip
- Install remainder of clips ensuring that the batten is straight and flat

GIB® Rondo® 310 Batten Span Table for Residential Internal Applications

GIB® Plasterboard thickness Single layer	Maximum batten spacing (mm)	Multi Span (mm)	Single Span and Garages (mm)
10mm	450	1200	900
13mm	600		

For situations not covered by this chart please contact the GIB®Helpline on 0800 100 442



GIB® RONDO® 308 METAL BATTEN SYSTEM

AUGUST 2012

GIB® RONDO® 308 METAL BATTEN SYSTEM

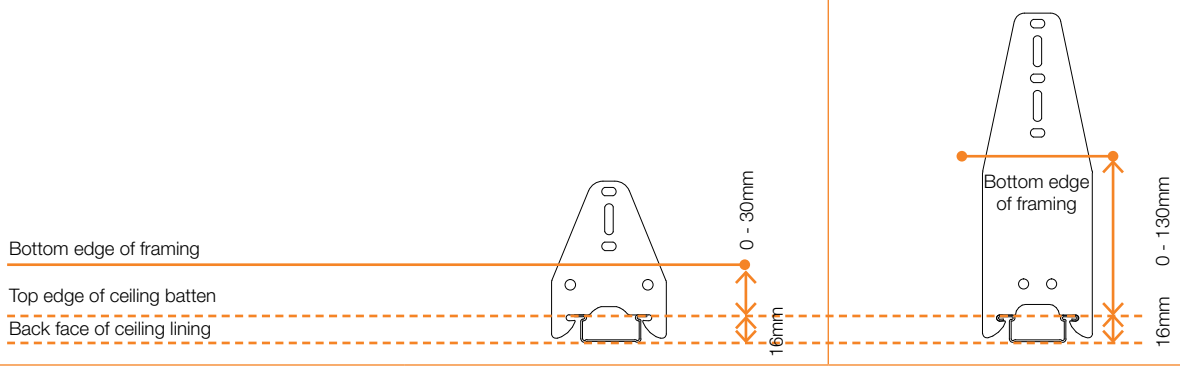
The GIB® Rondo® 308 system is a light weight yet very strong ceiling batten. In addition to its function as a ceiling batten it can also be used as a wall furring channel and is an integral part of GIB® Noise control systems. *See page 9 for details.* Consult an electrical contractor for any earthing requirements that may need to be incorporated.

The GIB® Rondo® 308 system is installed using either;

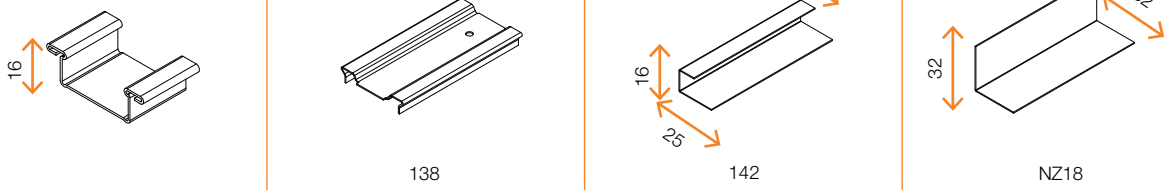
- 226 clip for a drop of 0-30mm
- 394 clip where a larger drop is required between the bottom of the truss chord, joist or rafter and the back of the ceiling batten. Up to 130 mm clearance between the bottom of the framing and the back of the batten of can be achieved in order to accommodate services or variations in framing heights

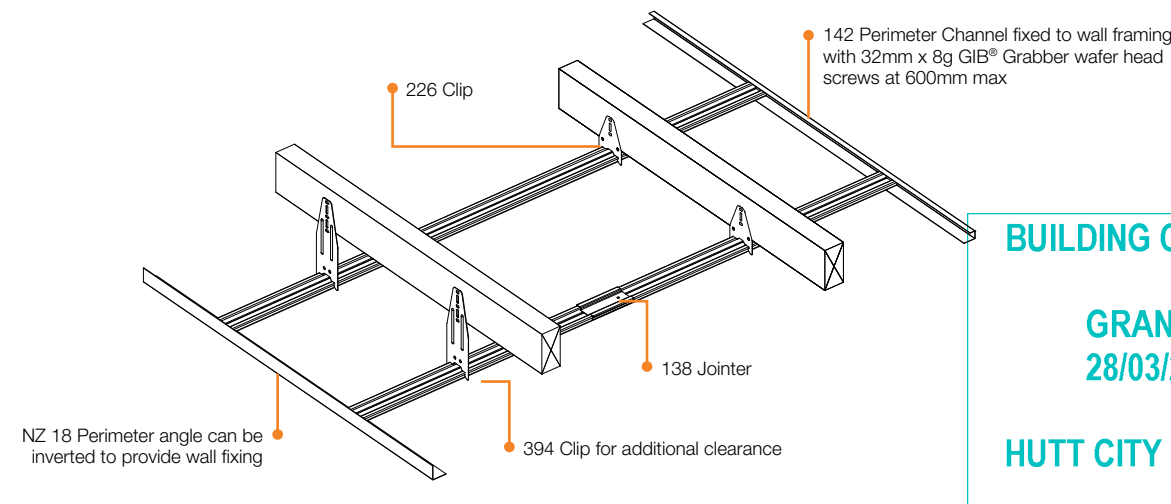
Note: If the 308 system is to be used in a ceiling diaphragm, the batten needs to secured directly to the framing. See page 8 for details.

226 CLIP	394 CLIP



GIB® RONDO® 308 BATTEN	138 JOINTER	142 PERIMETER CHANNEL	NZ 18 PERIMETER ANGLE





BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

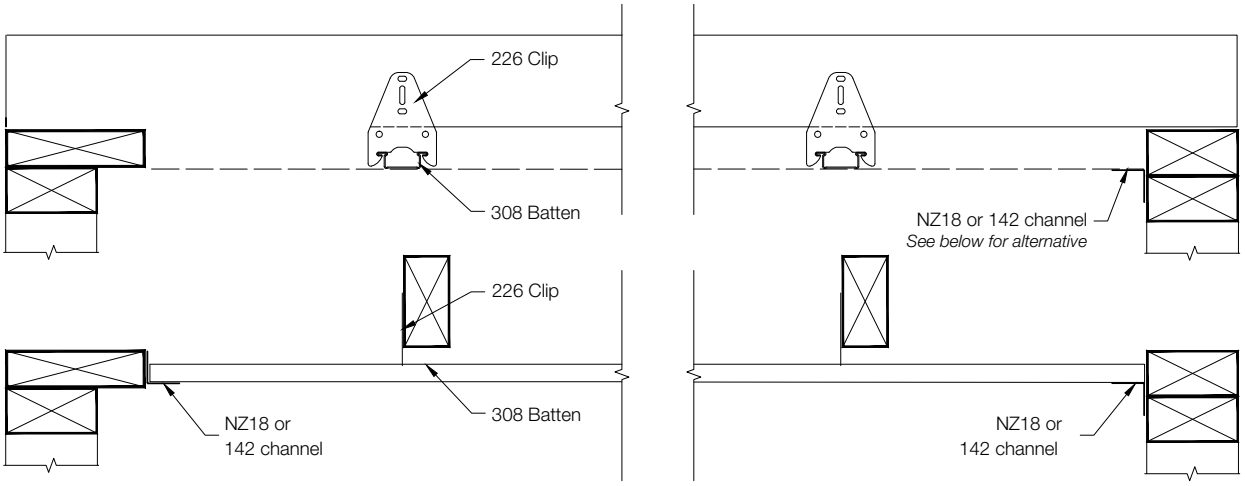
HUTT CITY TE AWA KAIRANGI

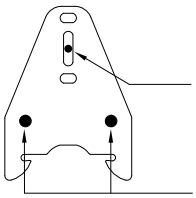
GIB® RONDO® 308 METAL BATTEN SYSTEM

AUGUST 2012

GIB® RONDO® METAL BATTEN SYSTEM INSTALLATION INSTRUCTIONS

Consult an electrical contractor for any earthing requirement that may need to be incorporated.

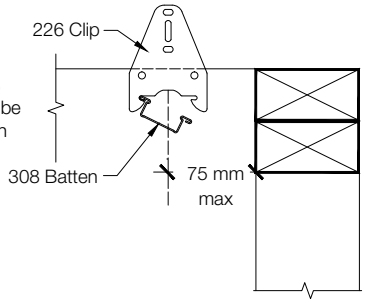




Insert one 30x2.5mm GIB Nail® into the vertical slot firmly but not quite home. Adjust levels as required and then drive completely home.

Insert 2 further nails or screws to complete the connection

Instead of a 142 channel or an NZ18 angle, a batten can be positioned as shown

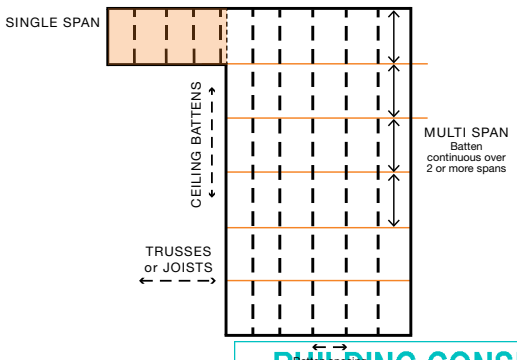


- Establish a datum line for the ceiling
- Place a string line on the datum line at right angles to the battens, under the truss or joist closest to the centre of the room
- Install GIB® Rondo® clips at 600mm centres (450mm for 10mm plasterboard) using the string line to establish the correct position
- Cut the batten to the required length using snips or a hacksaw
- Insert the batten into the channel at each end and fit into the clip
- Install remainder of clips ensuring that the batten is straight and flat

GIB® Rondo® 308 Batten Span Table for Residential Internal Applications

GIB® Plasterboard thickness Single layer	Maximum batten spacing (mm)	Multi Span (mm)	Single Span and Garages (mm)
10mm	450	1200	900
13mm	600		

For situations not covered by this chart please contact the GIB®Helpline on 0800 100 442



GIB® RONDO® COMPONENTS

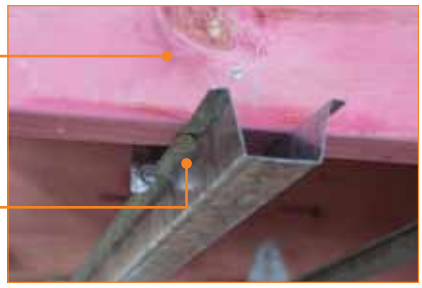
AUGUST 2012

Ceiling Diaphragms using GIB® Rondo® Metal Battens

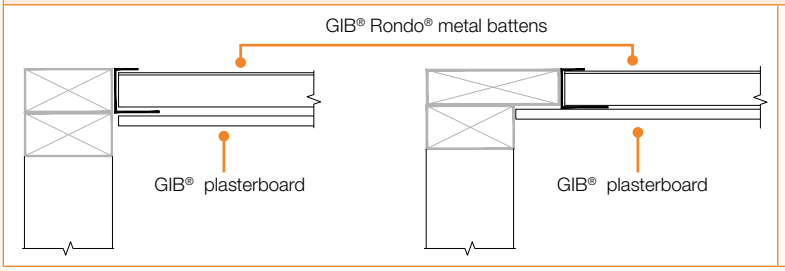
GIB® Rondo® metal batten systems may be used in ceiling diaphragms as required for GIB Ezybrace® systems provided that;

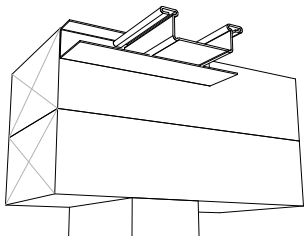
- The batten is either fixed directly to the underside of the ceiling framing OR
- The batten is fixed to a block or continuous member that has been securely attached to the ceiling framing with 4x90mm nails (minimum)

NOTE: It is not acceptable to install a ceiling diaphragm on clips without additional support as shown below:



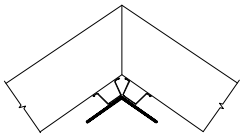
CEILING DIAPHRAGM PERIMETER

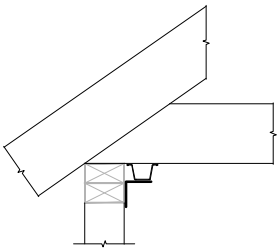


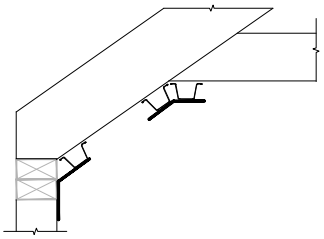


Perimeter channel, (340, 142 or 140) to be fixed with 32mm x 8g GIB® Grabber® wafer head screws at 300mm centres

CHANGE IN PLANE







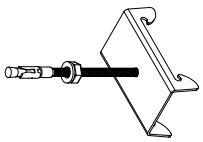
Changes in plane can be achieved by attaching a folded metal angle to the junction.

- Minimum 0.55mm BMT
- Fastened on each edge using 2.8mm x 30mm GIB® Nails or 32mm x 8g GIB® Grabber® wafer head screws at 300mm centres
- Plasterboard linings to be fastened to each edge of the folded angle at 150mm centres

GIB® Rondo® wall strapping systems

In addition to the ceiling batten function the GIB® Rondo® 308 batten system can be used as a wall strapping channel for masonry or concrete wall construction. The adjustable length masonry anchor allows insulation to be installed if required.

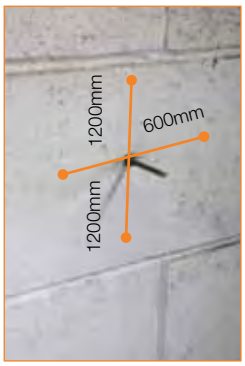
A239 CLIP	237 CLIP
Threaded hole, Masonry anchor included (100mm or 180mm)	Unthreaded hole, No masonry anchor included Suitable for timber or masonry application



GIB® RONDO® COMPONENTS

AUGUST 2012

The A239 clip can be used in conjunction with the 308 batten to provide an effective wall strapping solution. If required polystyrene insulation can be fitted over the anchor bolts. A239 clips should be spaced at 1200mm centres vertically (max) and 600mm centres horizontally (max).



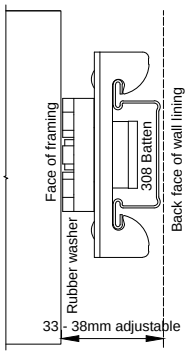
GIB® Rondo® and Noise Control

GIB® Rondo® metal batten systems play an important part in GIB® Noise control systems.

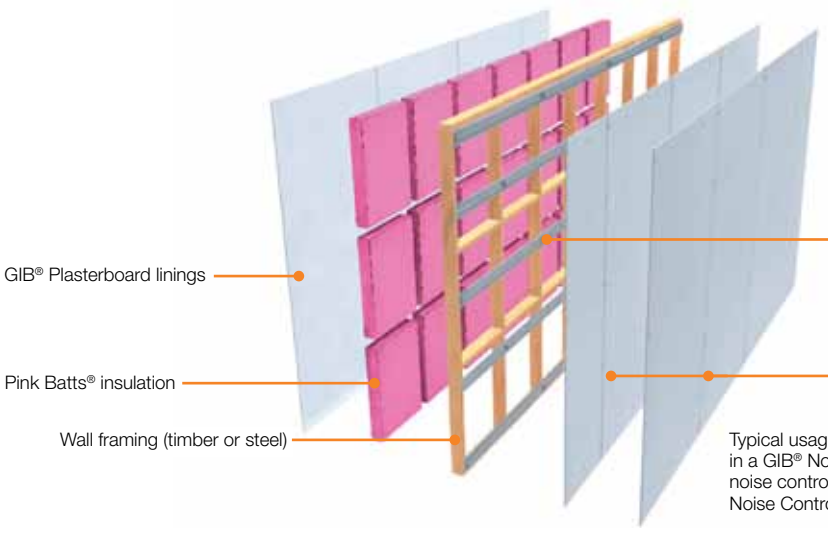
GIB QUIET CLIP®

The GIB Quiet Clip® has rubber grommets that provide isolation between the ceiling and the ceiling framing. Installation is the same as for the 311 clip.

ST001 ACOUSTIC MOUNT



The ST001 clip has a threaded rubber washer to provide isolation from the wall framing. The thread allows the clip to be adjusted to compensate for framing deviations. The clip accepts the GIB® Rondo® 308 batten. This is a high performing noise control system and can deliver STC ratings up to 62.



Typical usage of ST001 clip with GIB® Rondo® 308 batten in a GIB® Noise control system. For full installation details for noise control systems please refer to the publication GIB® Noise Control Systems (www.gib.co.nz)

SUSPENDED CEILING SYSTEMS

AUGUST 2012

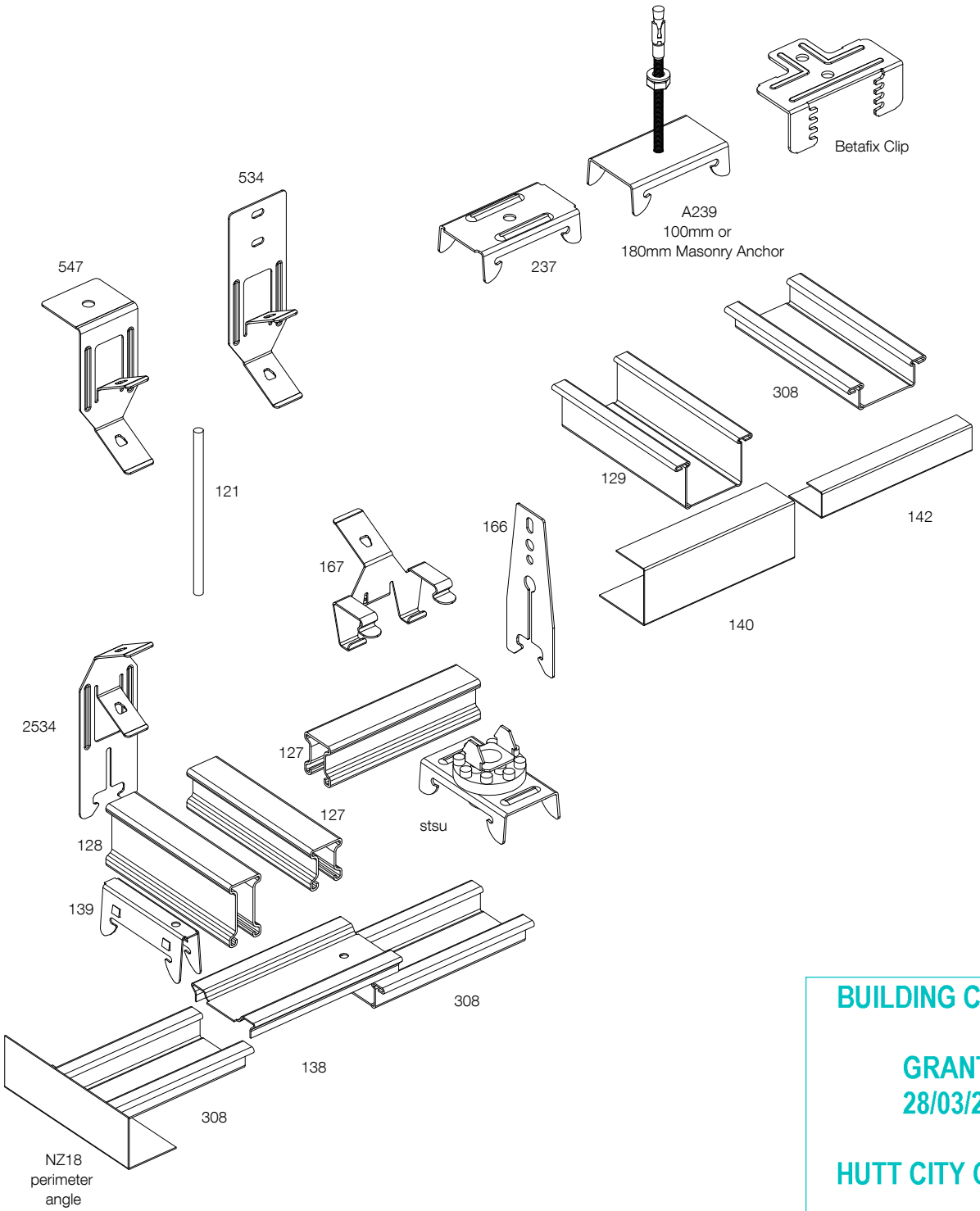
Suspended ceiling layout and spans are subject to specific design. For further information please contact the GIB® Help line on 0800 100 442

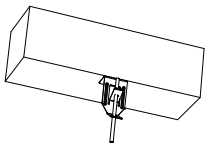
The range of GIB® Rondo® suspended ceiling componentry provides additional clearance above the ceiling level. This could be to run electrical, plumbing or ventilation equipment. The system allows for the ceiling lining material to be directly attached to the lower face of the battens. This is not to be confused with a two way grid system which accommodates proprietary ceiling tiles.

The components can be assembled in a wide range of combinations to suit a variety of applications.

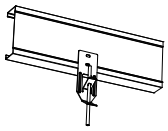
Curved ceilings can also be created by curving the Top Cross Rail (TCR) and attaching the batten to the TCR.

For details on curving componentry contact the GIB® Helpline on 0800 100 442.

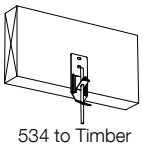




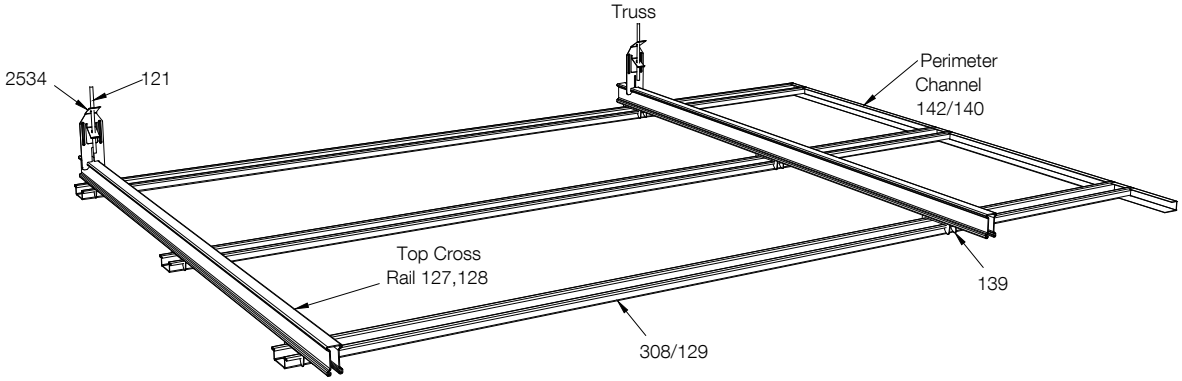
547 to Concrete

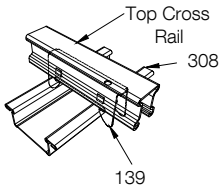


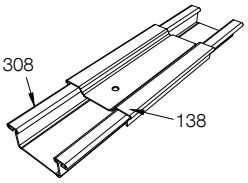
534 to Purlin

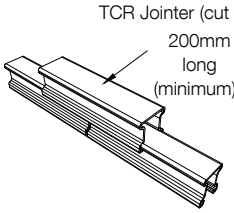


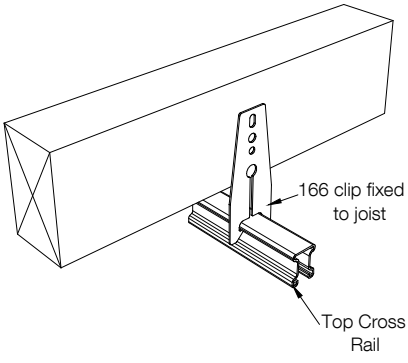
534 to Timber Truss

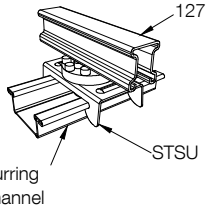


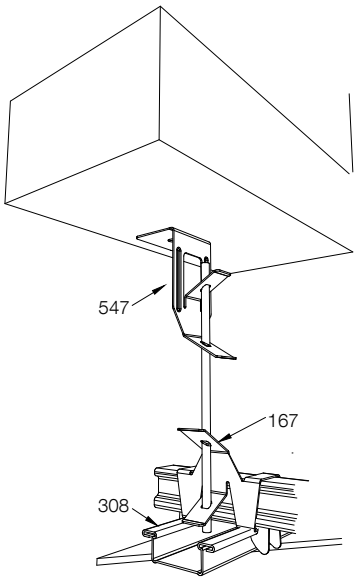


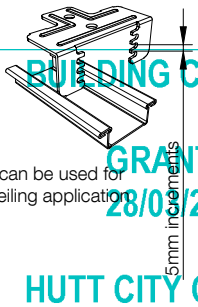












NOTES

AUGUST 2012

GIB Products

Manufactured by Winstone Wallboards Ltd. Distributed nationwide by authorised distributors.

Trademarks

GIB Helpline - Call Free

0800 100 442

Free Facsimile

0800 229 222

Website

www.gib.co.nz

Auckland

P.O Box 12 256 Penrose. Telephone 09 - 633 0100

Facsimile 09 - 633 0101

Printed in New Zealand using mineral-oil-free inks on environmentally responsible Media Satin using PEFC pulp from a mill that is EMAS accredited and ISO 14001 certified.

BC220141

Winstone Wallboards Limited

37 Felix Street, PO Box 12256
Penrose, Auckland, New Zealand
Phone 64-9-633 0100, Facsimile 64-9-633 0101
Website: www.gib.co.nz
Email: info@gib.co.nz

GIB® Helpline: 0800 100 442
Facsimile: 0800 229 222

Rinnai

Mains pressure stainless steel
indoor hot water storage cylinders

PTS
02:18

A Product Technical Statement (PTS) is a way to show how a product or system is fit for purpose for use in New Zealand and to demonstrate compliance with the New Zealand Building Code (Building Code Amendment Act 2013).

Product description
Designed and assembled in New Zealand, with the inner cylinder made in the UK, Rinnai mains pressure stainless steel hot water cylinders are available in four sizes; 135 L, 180 L, 250 L, and 300 L. Model and configuration* selection will be dependent on the hot water demand of the property.

The 180, 250, and 300 L cylinders, due to having an extra port (the eco inlet), can be connected to an open loop solar or hot water heat pump system.

135 L 180 L

* Refer to the Rinnai website or cylinder specification guide for the cylinder configurations available.

Scope of use
Suitable for indoor mains and low pressure residential and commercial applications. The system should be located and arranged so as to achieve the closest proximity to water draw off points.

They are not suitable as a spa or swimming pool heater.

Not suitable for bore or tank water, or for mains supply where the water is hard and/or aggressive. For more information refer to the cylinder water quality and impurity limits table in the owner and installer guide, available online.

To meet the New Zealand Building Code requirement[1] to disinfect water for legionella bacteria, the cylinder thermostat has been set to 65 °C.

250 L 300 L

1 Clause G12.3.9, Acceptable Solution G12/AS1 6.14.3

Design guidelines
Specification and installation must be in accordance with Rinnai installation requirements and with the Building Code.

Rinnai specify that installation must be in compliance with AS/NZS 3000:2007, and AS/NZS 3500.

As per AS/NZS 3500.4:2015 5.4 and G12/AS1 6.11.3, the cylinder MUST BE installed with a suitably drained drip tray/catch pan.

Quality assurance
- ISO 9001 Certified System
- ISO 14001 Certified System

Rinnai

Mains pressure stainless steel
indoor hot water storage cylinders

PTS
02:18

Compliance with the NZ Building Code
If specified, installed and maintained in accordance with all Rinnai requirements the Rinnai mains pressure stainless steel cylinders will comply with the below provisions of the NZ Building Code.

Code clause	Evidence of compliance
G9.2, G9.3.3	Cylinder approval to AS/NZS 60335.2.27
G12.3.8	Cylinder approval to AS/NZS 60335.2.27
G12.3.9	Acceptable solution G12/AS1 6.14.3, the cylinder thermostat has been set to 65 °C.
H1.3.4	Cylinders meet the requirements of the minimum energy performance standards (MEPs) by cylinder approval to NZS 4606 (Storage water heaters - General requirements), and AS/NZS 4692.1:2005 (Electric water heaters - Energy consumption, performance and general requirements).

Additional evidence to support the above statements
Supplier Declaration of Compliance:
- SDoC identification number - 2017 001 SS

Electrical safety approval:
- Certificate of approval number - ESV170017

Seismic restraint
Cylinders should be installed on a flat level base of sufficient strength to support the weight of the water heater when full. The water heater must also be suitably restrained against seismic activity, 'G12/AS1 Figure 14' details an acceptable method of restraint.

Special conditions - installation requirements
Full appliance information can be found at www.rinnai.co.nz.

Limitations: To be installed in accordance with all Rinnai installation requirements and by a licensed gasfitter/plumber, and electrician. Upon completion of the installation, a final inspection and test to demonstrate that the cylinder has been installed in accordance with Rinnai's instructions is to be done by the installer. The installer is to issue an electrical safety certificate upon completion.

Special conditions - maintenance requirements
For reliable operation Rinnai cylinders should be maintained and serviced as detailed in the owner and installer guide. Installation, servicing and repair shall be carried out only by authorised personnel.

BC220141

Mains pressure indoor stainless steel cylinders

Owner and installer guide

BUILDING CONSENT

GRANTED

28/03/2022

Rinnai

HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

Important

Cylinders shall be installed in accordance with:
- Manufacturer's installation instructions
- Current AS/NZS 3000, AS/NZS 3500, and G12/AS1

Installation, servicing and repair shall be carried out only by authorised personnel.

Not suitable as a spa or swimming pool heater.

- Owner, please retain this guide for future reference
- Installer, please leave this guide with the owner

Warning
Improper installation, adjustment, alteration, service and maintenance can cause property damage, personal injury or loss of life.

This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.

For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624).

Rinnai New Zealand Limited
105 Pavilion Drive, Mangere, Auckland
PO Box 53177, Auckland Airport, Auckland 2150

Phone: (09) 257-3800
Fax: (09) 257-3899
Email: info@rinnai.co.nz
Web: rinnai.co.nz
youtube.com/rinnainz
facebook.com/rinnainz

Contents

About your cylinder

Water is heated by an electric element, or elements located in the cylinder. The temperature of the water is controlled by an automatic thermostat that is set by your installer, usually to 65 °C.

Important
All cylinders have the potential to leak water. To minimise damage to other areas of your home, ensure that your cylinder has been installed with a drip tray—the person doing the installation is responsible for this.

* Refer to the warranty terms and conditions in this guide for more information.

Safety messages

- **Element cover**
  Do not remove the element cover as this will expose 230 V wiring and must only be removed by an authorised person.

- **Thermostat setting**
  Must only be adjusted by an electrician or other suitably qualified tradesperson.

- **Damaged components**
  If any component is damaged, it must be replaced by an authorised person using Rinnai replacement parts.

- **Child supervision**
  Children should be supervised to ensure they do not play with any part of the hot water system.

- **Hot pipe work**
  Care should be taken not to touch the pipe work from the cylinder as this could be very hot.

Safety devices

Your cylinder is fitted with a:

- Temperature & Pressure and Relief (TPR) valve, designed to automatically release water in the event that temperature or pressure exceeds safe levels.

- Automatic thermostat to maintain water temperature.

- Temperature override cutout for heating element.

  In the case of a standard cylinder (not installed in a solar application), the operation of the thermal cutout can indicate a dangerous situation. Do not reset the thermal cutout until the water heater has been serviced by a qualified person.

Do not operate the system unless all the safety devices are fitted and are in working order. It is also important that you do not tamper or remove any of these devices.

Cylinder thermostat setting

To meet the New Zealand Building Code requirement[1] to disinfect water for legionella bacteria[2], the thermostat has been set to 65 °C.

Turning the cylinder on/off

If you plan to be away for a few nights we suggest you leave the system switched on. If it is necessary to switch it off, when switching back on, remember that the cylinder will take time to heat back up again.

Draining and filling the system

This normally occurs during installation or servicing and must be carried out by an authorised person.

Installation by a licensed tradesperson

Only a licensed tradesperson can install, adjust, maintain, and service this water heater. Any work carried out by a non-licensed tradesperson is illegal and will void any warranty.

[1] Clause G12.3.9, Acceptable Solution G12/AS1 6.14.3
[2] Legionella is a bacterium that can cause Legionnaires' disease—a severe form of pneumonia

Maintenance and servicing

Hot water systems, like cars, require regular maintenance and servicing. To ensure longevity of your cylinder we recommend the following.

Period	What needs to be done
Every six months	TPR (temperature & pressure relief) operate the easing gear
Year five	Inspection and service the entire hot water system, including element*
Every 24 months after year five	Inspection and service the entire hot water system, including element*

* In hard water areas the element(s) must be periodically descaled. To do this the cylinder must be drained and the element(s) removed

TPR valve
This valve is located near the top of the cylinder and is essential for safe operation. The TPR valve works by automatically venting hot water if the temperature or pressure of the water in the cylinder gets too high.

Every six months operate the easing gear to remove lime deposits and to check that it is not blocked. As this will discharge hot water, ensure no one is near the drain line.

WARNING

Failure to operate the relief valve easing gear at least once every six months may result in the water heater exploding. Continuous leakage of water from the valve may indicate a problem.

It is important that you raise and lower the easing gear gently. During the operation, if the valve does not discharge water when the easing gear is lifted, or does not seal again when closed, arrange for an authorised person to come and inspect the system immediately.

IMPORTANT

During servicing of your cylinder the TPR valve needs to be checked and/or replaced. This needs to be done by an authorised person at intervals not exceeding five years, or more frequently in areas where the water is classified as hard.

A TPR valve must not be replaced with one that has a higher pressure rating than that specified for the cylinder.

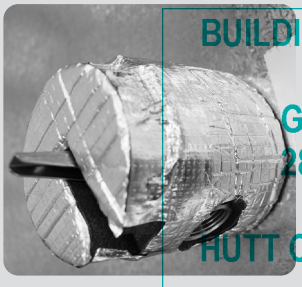
Maintenance and servicing
Rinnai has a maintenance, service, and spare parts network with personnel who are fully trained and equipped to give the best advice on your Rinnai product. Regular maintenance and servicing is not covered by the Rinnai warranty.

For help locating a service person in your area call 0800 RINNAI (0800 746 624).

TPR position - top of cylinder

How to operate the easing gear

Insulated TPR valve for the 250 and 300 L cylinders



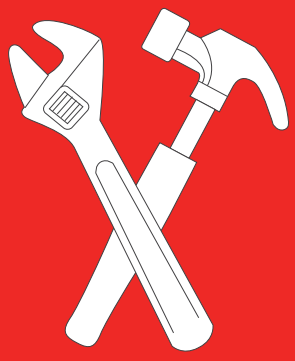
Troubleshooting

Do not attempt to carry out any work other than that mentioned in this troubleshooting section. If you have any other faults or problems, please contact your installer, or contact Rinnai.

Problem	Possible solution
Lack of hot water or no hot water	Is there electricity supply to the cylinder? Check that the isolating switch marked 'hot water' or 'water heater', at the meter box, is switched on. Also check any isolating switches near the water heater are switched on. Check the fuse or circuit breaker marked 'hot water' or 'water heater' at the meter box. Repeated failure of the fuse or tripping of the circuit breaker indicates a fault, which must be investigated by an authorised tradesperson. Most hot water cylinders are controlled at peak times by your electricity supplier via a ripple relay. Contact your electricity supplier to determine if there have been any issues with the power supply.
Lack of hot water or no hot water	Are you using more hot water than you think? Often you don't realise how much water is actually being used. This applies especially when showering. Typical flow rates for showers is approximately 8-10 litres per minute. Conduct a simple experiment by placing a measured bucket under your shower for ten seconds and multiply by six to determine the amount of water produced over a minute. If your result is significantly more than the rates mentioned you may want to consider installing a low flow shower rose—available at all good plumbing stores.
Lack of hot water or no hot water	Cold water relief valve discharging continuously? It is normal for the cold water relief valve to discharge a small quantity of water through the drain line. If water is discharging continuously there may be a fault with one of the valves, contact the installer to discuss.
Water is too hot	If possible check the temperature of the water coming out of a hot water tap with a thermometer. If it is higher than 55 °C then this indicates a problem with your system—contact an electrician for advice.
High electricity bills	If you think your electricity bill is too high, investigate the following: • Has your electricity tariff changed? • Is your cold water relief valve discharging continuously? • Are you using more hot water than normal? • Has there been any leaking hot water pipes, or taps?

BC220141

Installation



Installation, servicing and repair shall be carried out only by authorised personnel.

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

Specification summary

Suitability
- Indoor mains and low pressure systems
- Residential and commercial applications
- Left or right hand cold inlet connections

Not suitable as a pool or spa heater.

The 180 L, 250 L, and 300 L cylinders can be connected to an open loop solar or hot water heat pump system via the eco connection.

System should be located and arranged so as to achieve the closest proximity to water draw off points.

Not suitable for bore or tank water, or for mains supply where the water is hard and/or aggressive. Refer p.12 and p.17 for cylinder water quality and impurity limits.

Operating pressures
Maximum working pressure = 850 kPa

Element
Incoloy 825 alloy sheath curved element positioned at the bottom of the cylinder, and midway if a dual element is purchased.

Thermostat
The thermostat setting is between 60-80 °C.

Standard cylinder
Robert Shaw 30 A contact thermostat, manually resettable at 85 °C (yellow dial).

Cylinder in a solar installation
Robert Shaw 30 A contact auto-reset thermostat (red dial).

Weights	empty	full
• 135 L:	27 kg	162 kg
• 180 L:	32 kg	212 kg
• 250 L:	41 kg	291 kg
• 300 L:	47 kg	347 kg

Pressure limiting (reducing) valve
This water heater MUST be installed with a 500 kPa or less pressure limiting valve and appropriate cold water expansion valve.

TPR valve
A temperature and pressure relief valve is supplied with the water heater and MUST be fitted. A TPR insulation kit, to reduce heat loss, is also supplied with the larger 250 and 300 L cylinders—this also needs to be fitted.

The TPR valve thread should be sealed with teflon tape, do not use paste and hemp. Use the spanner flats on the valve body to tighten, DO NOT use a wrench on the valve body.

The TPR valve must be fitted with a drain pipe to direct any water discharged to a visible point outside the property. The drain pipe must have a continuous fall and be at least the same size as the TPR valve outlet (½ ″BSP). Where the drain pipe exceeds three metres in length it is recommended an air break be provided within 300 mm of the TPR valve outlet. Where an air break is used it is recommended that the pipe size after the air break be increased to one size larger than the TPR valve. It must also be protected from freezing conditions.

Protection against water
IPX1

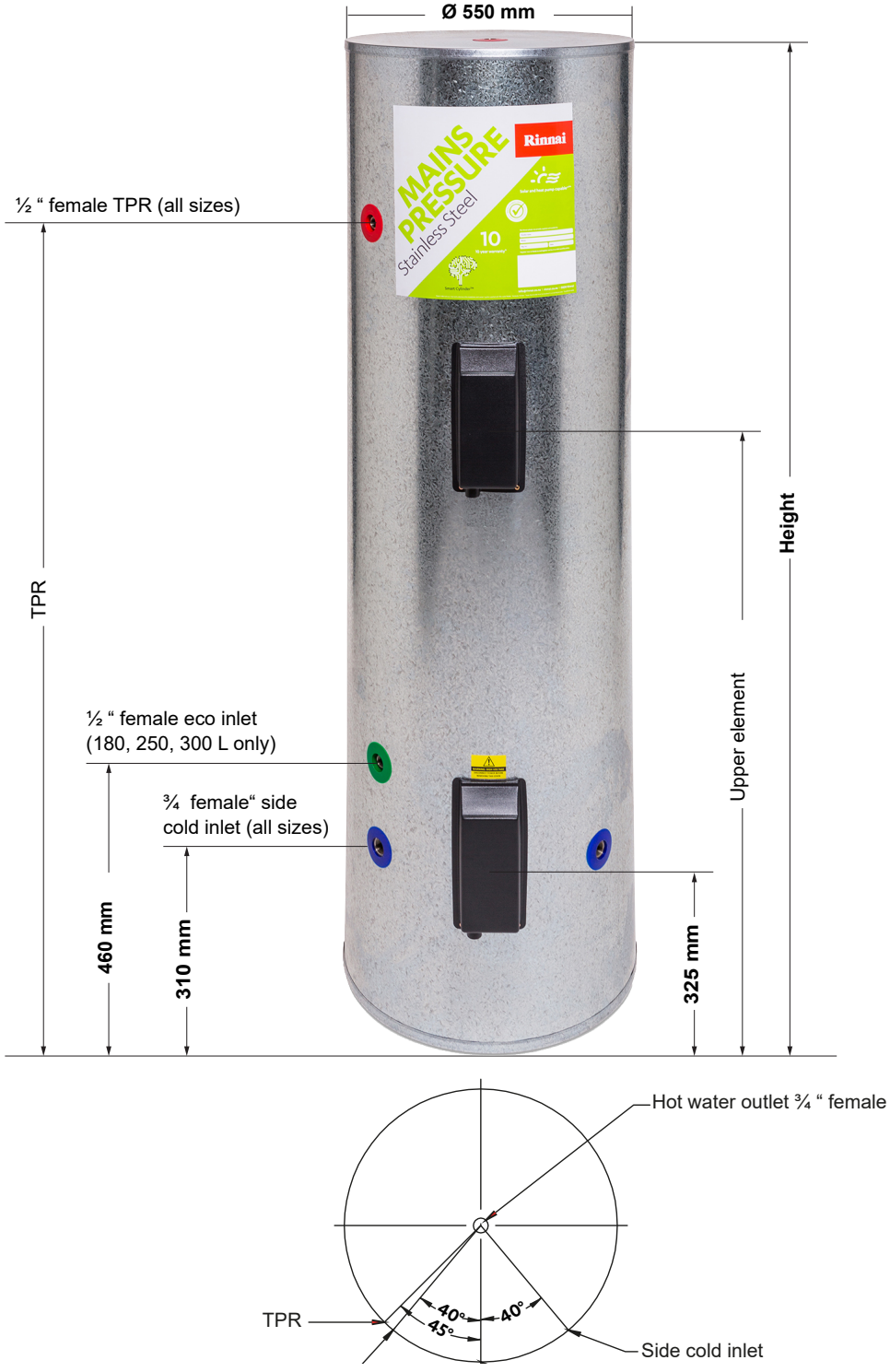
BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

Dimensions



Tank size	Upper element	TPR	Height
135 L	N/A	690 mm	1015 mm
180 L	N/A	970 mm	1295 mm
250 L	1080 mm	1410 mm	1730 mm
300 L	1380 mm	1725 mm	2045 mm

Plumbing setup

Cylinders should be installed in accordance with G12/AS1, and AS/NZS 3500.4:2018. For servicing and maintenance, please allow sufficient room for access to covers and valves.

For ease of reference, the below diagrams have been reproduced from AS/NZS 3500.4:2018 and were accurate at the time of print, always refer to the latest standard.

Fitting a dedicated cylinder drain, separate from any other valve, is highly recommended to enable servicing of the water heater to be undertaken.

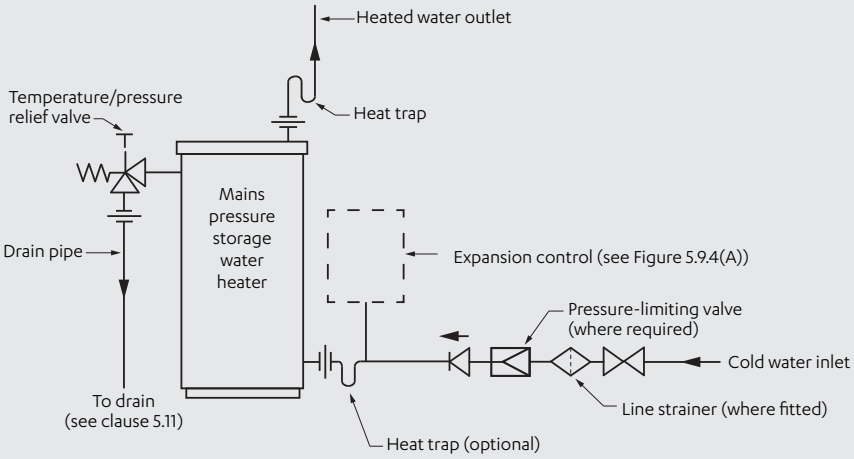
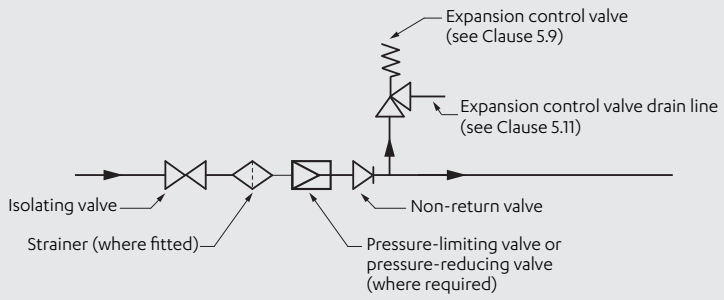
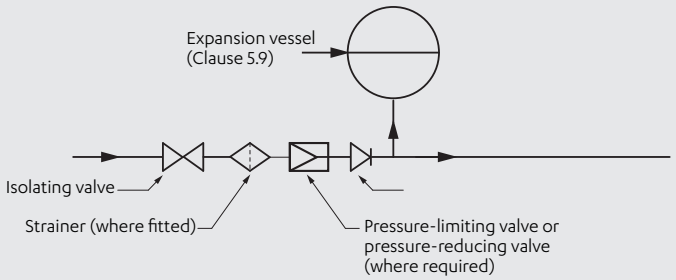


Figure 5.9.4(C) TYPICAL INSTALLATION OF A MAINS PRESSURE STORAGE WATER HEATER



(a) Typical assembly incorporating a pressure-limiting or pressure-reducing valve using an expansion control valve



(b) Typical assembly with no pressure-limiting or pressure-reducing valve using an expansion vessel
Note: Expansion control valve may be combined with the pressure-limiting valve.

Figure 5.9.4(A) TYPICAL INSTALLATION OF VALVES

Base requirements
Cylinders should be installed on a flat level base of sufficient strength to support the weight of the water heater when full.

The water heater must also be suitably restrained against seismic activity, ‘G12/AS1 Figure 14’ details an acceptable method of restraint.

Drip tray/catch pan (MUST be fitted)
The Rinnai warranty does not cover any consequential loss from leaks to the cylinder, so it’s important a suitably drained drip tray/catch pan is fitted as per AS/NZS 3500.4:2015 5.4 and G12/AS1 6.11.3.

Pipe work
It is the installer’s responsibility to adequately size the distribution pipe work in a property to ensure sufficient performance from all outlet fittings. Water pipe sizing should be performed in accordance with AS/NZS 3500.4 and/or G12 AS1. Pipe sizing and valve selection must be performed to allow for the water supply pressure.

A drain off tap or line must be fitted to the inlet of the water heater.

All hot water pipe work should be insulated with polythene foam or equivalent insulation to optimise performance and energy efficiency.

To prevent damage to the water heater when attaching pipe clips or saddles to the jacket, it is recommended that self drilling screws with a maximum length of 12 mm are used. If drilling is required take extreme care not to penetrate the inner cylinder.

Storage and delivery temperatures

Storage temperature
To meet the New Zealand Building Code requirement[1] to disinfect water for legionella bacteria, the cylinder thermostat has been set to 65 °C.

WARNING Thermostat settings must only be adjusted by an electrician or other suitably qualified tradesperson. The access cover to the element and thermostat must only be removed by an electrician or other suitably qualified tradesperson.

Sanitary fixtures delivery temperature
Water temperatures over 55 °C can cause severe scalds. Local regulations must be considered regarding temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature is limited to 45 °C for early childhood centres, schools, nursing homes or similar facilities and 55 °C for all other buildings. To comply with these requirements, a temperature limiting device, such as a tempering or thermostatic mixing valve will be required on all installations.

[1] Clause G12.3.9, Acceptable Solution G12/AS1 6.14.3

Water quality

Rinnai cylinders are manufactured to suit most NZ council water supplies. However some water supplies can have a detrimental effect on the water heater, its operation, and life expectancy.

Pitting corrosion

Rinnai stainless steel cylinders are made from 2101 grade duplex stainless steel and are highly resistant to pitting corrosion, but not completely immune from it. Pitting corrosion may occur in the form of deposit attack if the water supply has a high percentage of dissolved solids present.

Hard water

Hard water (containing calcium carbonate) can cause scaling on hot surfaces. We recommend a water temperature of no more than 65 °C to minimise scale build-up. Scale reducing or water softening devices should be considered in hard water areas. The unit is not guaranteed against damage due to scaling.

Water quality outside the limits (as set down below) will void this warranty.

Water Quality and Impurity Limits

TDS (Total Dissolved Solids)	Total Hardness $CaCO_3$	Dissolved (free) CO_2	pH	Langelier Index
Up to 600 mg/L or ppm	Up to 200 mg/L or ppm	Up to 25 mg/L or ppm	6.5-8.5	Between -1.0-0.8

Most metropolitan water supplies fall within these limits. If you are unsure about water quality, please test your water for compliance to Rinnai standards. If sludge or foreign matter is present in the water supply, a suitable filter should be incorporated in the water supply.

Some examples of water quality issues where water may need to be treated:

- Hard water (areas including Wanganui)
- Aggressive water (areas including Christchurch)

Stainless steel cylinders are not suitable for tank or bore water.

Electrical supply and connections

The electrical connection must be carried out by a qualified person in accordance with NZ Electrical Regulations. The water heater must have the heating element connected to an independent, fused, AC 230 V 50 Hz power supply with an isolating switch installed at the switch board. Disconnect all power prior to installation and commissioning.

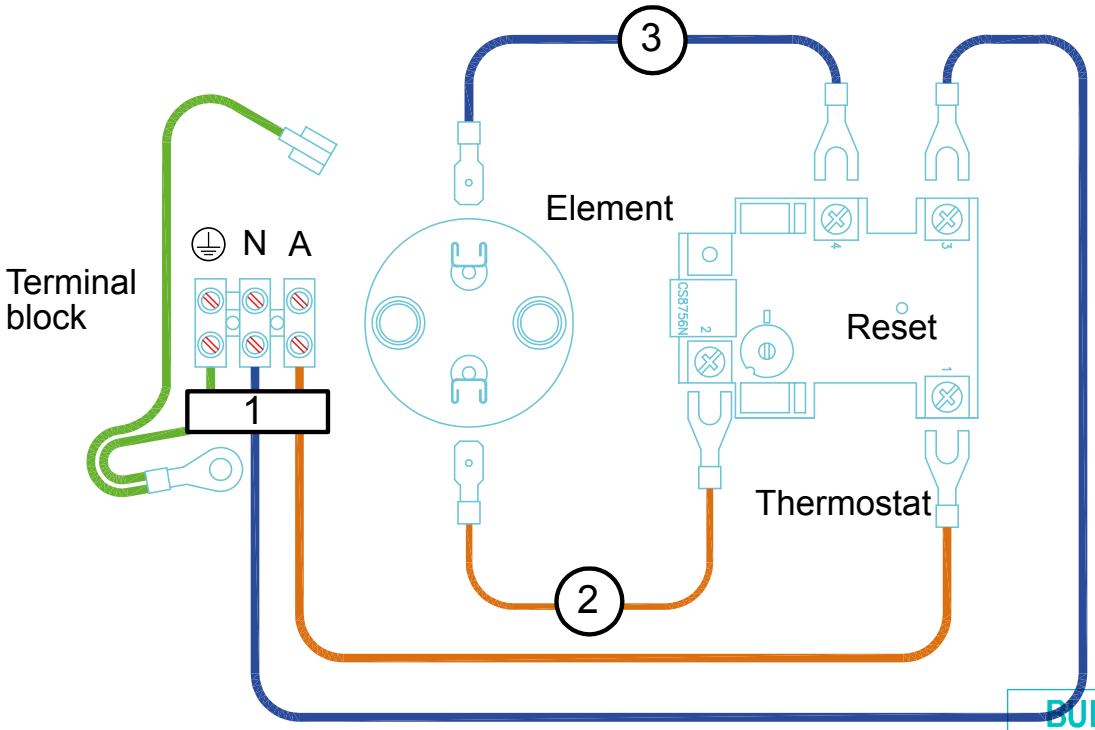
- The water heater must be filled with water prior to connection to the power supply
- Household wiring to the heater must be capable of withstanding the appliance load
- Fixed wiring must be protected from contact with the internal hot surface of the water heater

Electrical access is via a hole in the element cover for mounting with an approved electrical conduit gland. For entry to the element cover remove the two fixing screws.

Connect all LIVE, NEUTRAL and EARTH wires in accordance with the wiring diagram. Inspect and ensure all wiring links are secure prior to fixing the access cover and turning the power on.

To ensure the over-temperature and energy cutout is set press the ‘reset’ button on the thermostat.

The appliance is intended to be connected to cables of fixed wiring which has a cross-sectional area of 1.5 mm^2 - 2.5 mm^2.



Wire No.	Description	Colour	Code
1	Wiring main loom R/Shaw assy.	Green/brown/blue	20197
2	Wire link brown R/Shaw assy.	Brown	20198
3	Wire link blue R/Shaw assy.	Blue	20199

Valves and fittings

Valves with pressure ratings other than those listed in this manual must not be used.

Fittings supplied with the cylinder

TPR valve, brass plugs, to plug unused connections, a key spanner, and the owner and installer guide are packaged inside the element cover.

The TPR valve insulation kit, for the 250 and 300 L cylinders, and instructions are supplied in a clear plastic bag fixed to the element cover as shown. The valve insulation kit is provided to reduce heat loss from the TPR and must be fitted.

250 and 300 L TPR valve insulation kit

Commissioning

Commissioning and draining activities must be carried out by an authorised person.

To fill and turn on the water heater

1. Open all hot water taps in the house including the shower.
2. Open the cold water isolation valve to the water heater. Air will now be forced out of the taps.
3. Close each tap when the water runs freely without air bubbles.
4. Check all plumbing connections and pipe work for water leaks.
5. Switch on the electric power supply.

To turn off the water heater

It may be necessary to turn off a water heater after installation and commissioning, for example during building activities or if the premises are vacant.

1. Switch off the electricity supply at the isolating switch to the water heater.
2. Close the cold water isolation valve at the inlet to the water heater.

To drain the water heater

1. Turn off the water heater as above.
2. Close all the hot water taps.
3. Gently operate the TPR valve release, this will relieve the pressure in the water heater.
4. Open the drain valve—make sure no damage will occur from discharged water.
5. Operate the TPR valve again. This allows air into the water heater and will result in the water draining.

Limited Warranty

Rinnai brings you peace of mind with a:

10-year warranty

This warranty is applicable to all **Rinnai Stainless Steel Indoor cylinders**.

All terms of the warranty, subject to the conditions below, are effective from the date of first installation. Proof of purchase and installation date will be required at the time of any warranty claim. Where the date of installation is not known or cannot be proven the warranty will commence one month after the date of manufacture—refer to the data label on the cylinder. This warranty is only valid within the country of purchase.

		Residential application	Commercial application
Cylinder only		10 years	3 years
	Labour	5 years	1 year
All other parts supplied by Rinnai (thermostats, elements, seals etc.)	Parts	1 year	1 year
	Labour	1 year	1 year

Single residential application warranty

A residential application is defined as an installation where the water heater, with the thermostat set below 70 °C, delivers hot water to a single family residential dwelling, not used for commercial purposes.

Examples where a residential dwelling is used for commercial purposes; hair salon, catering kitchen, communal care facility etc. These installations would be considered commercial applications. An exception would be an accommodation business such as a motel, where the water heater serves the equivalent of a single family dwelling, this would be a residential application.

Commercial application warranty

For constant use applications such as, but not limited to these, underfloor heating and circulating ring mains. The cylinder must be sized and installed according to written guidelines from Rinnai.

General warranty terms

Rinnai reserves the right to make modifications and change specifications and its parts without notice.

For the purposes of the Consumer Guarantees Act 1993, Rinnai only guarantees the availability of repair facilities and spare parts for the express warranty periods recorded in the Rinnai warranty summary table.

If the cylinder is being acquired for personal, domestic or household use, this warranty does not limit any consumer rights or guarantees that may apply under the Consumer Guarantees Act 1993. If the product is being acquired for the purposes of a business, the provisions of the Consumer Guarantees Act 1993 do not apply and no other warranties (either express or implied by law) apart from those stated in this warranty apply.

Warranty terms and conditions

1. All terms of this warranty are effective from the date of first installation. The attending service person reserves the right to verify this date.

2. All Rinnai cylinders must be installed, commissioned, serviced, repaired and removed in accordance with the manufacturer's installation instructions, local regulations, and municipal building codes by persons authorised to do so.

3. All Rinnai cylinders must be operated and maintained in accordance with manufacturer's instructions.

4. The warranty applies only to the components supplied by Rinnai. It does not apply to components supplied by others, such as, but not limited to these, isolating valves, electrical switches, pipe work, electrical cables, and fuses.

5. Where the cylinder has not been sited in accordance with the installation instructions or installed such that normal service access is difficult, a service charge will apply. If at the discretion of the attending service person the installation is deemed illegal or access is dangerous, service will be refused. Any work required to gain reasonable access to the cylinder will be chargeable by the attending service person (for example, removal of cupboards, doors, walls, or the use of special equipment to move components, but not limited to these).

6. The cylinder warranty is for the period indicated in the summary table. Where the cylinder and/or part is replaced under warranty the balance of the original warranty will remain effective.

7. Rinnai reserve the right to transfer functional components from defective water heaters if they are suitable.

8. Rinnai reserve the right to have the installed product returned to the factory for inspection.

9. Where the cylinder is installed outside the metropolitan area or further than 40 km from a Rinnai authorised service centre, travel costs shall be the owner's responsibility.

10. Rinnai reserves the right to replace the cylinder for another type if upon inspection it is deemed another cylinder of a different construction is more suitable.

Warranty exclusions

The following exclusions may cause the warranty to become void and will result in a service charge and costs of parts (if required).

1. Accidental damage and acts of God.

2. Failure due to abuse or misuse, improper maintenance or improper storage.

3. Failure due to incorrect or unauthorised installations.

4. Failure or damage caused by alterations, service or repair work carried out by persons other than those authorised by Rinnai.

5. Where the cylinder has failed directly or indirectly as a result of poor water quality outside the limits specified and/or used with bore or tank water.

TDS (Total Dissolved Solids)	Total Hardness $CaCO_3$	Dissolved (free) CO_2	pH	Langelier Index
Up to 600 mg/L or ppm	Up to 200 mg/L or ppm	Up to 25 mg/L or ppm	6.5-8.5	Between -1.0-0.8

6. Where it is found that there is no fault with the cylinder and the issue is related to the installation or is due to power failure.

7. Subject to any statutory provisions to the contrary, Rinnai does not accept:
   a. liability for consequential damage or any incidental expenses resulting from any breach of the warranty.

   b. claims for damage to building or any other consequential loss either directly or indirectly due to leaks or any other faults.

Warranty examples in the real-world

We understand warranty information can be confusing. To help clarify what this means in the real-world we have developed some residential application scenarios to clarify what would fall within warranty and what wouldn't.

Scenario	Age of part/ cylinder	Within warranty	
Faulty thermostat	10 months	Yes	All costs covered by Rinnai.
Faulty element	3 years	No	All costs covered by the owner.
Cylinder leaks as a result of a faulty inner cylinder and causes damage to carpets and flooring	11 months	Yes/No	Cost of cylinder replacement covered by Rinnai. Consequential loss, damage to carpets and flooring, is not[1].

[1] Consequential losses

All cylinders are required to be installed with a drip tray, this is a mandatory requirement of the installation. If damage is caused by a leaking cylinder that has not been installed with a drip tray the owner can seek compensation through the installer or consider claiming on insurance.

Purchase details

Record your purchase details below

ATTACH YOUR PROOF OF PURCHASE HERE:

Retailer:

Retailer address:

Date of purchase:

Product details:

Please keep these details in a safe place for future reference.

Register your Rinnai cylinder online at www.rinnai.co.nz/register/ for service reminders, product updates and special offers—you can unsubscribe at any time.

Installer details

Company name:

Installer name:

Address:

Phone:

Mobile:

Signed:

Date:

BC220141

Rinnai.co.nz

Tel: 0800 746 624
http://www.youtube.com/rinnainz
http://facebook.com.rinnainz

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL
20132-I: 09-20

HUTT CITY
TE AWA KAIRANGI

BC220141

pryda

FIXING & INSTALLATION OF PRYDA CONNECTORS & ENGINEERED SYSTEMS

BUILDER'S GUIDE

2020

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

HUTT CITY
TE AWA KAIRANGI

CONTENTS

PRYDA BUILDING GUIDE OVERVIEW

Pryda has developed this guide to accommodate New Zealand building practices. It is important that designers, engineers, builders, inspectors and building authorities are familiar with the benefits and critical requirements of the system. Pryda timber connectors, trusses and beams comply with the New Zealand Building Code, Section B1 Structure and B2 Durability, having been designed in accordance with sound and widely accepted engineering principles to comply with NZS3604:2011.

The capacities reported in this publication are limit state design capacities and not characteristic strengths thereby allowing direct comparison with design reactions reported in Pryda design software and Pryda design reports. This document supersedes and replaces all the previous publications of Builder's Guide.

For further design advice or engineering support regarding the Pryda products discussed in this publication please phone us at **0800 88 22 44** or visit our website - **www.pryda.co.nz.**

The Pryda Builders Guide features a Building Consent Documentation Reference for many connection details. This is aimed to encourage designers to align details in the building consent documentation with useful information in the Pryda Builders Guide for easy reference for builders and building officials at the time of inspection. The process is illustrated on the following page. It should be recognised that this is not a requirement and fabricators may choose to present information in various formats.

The **Building Consent Documentation Reference** should not be confused with the Pryda product code.

The Company

Pryda New Zealand is an autonomous division of USA-based Illinois Tool Works Inc. a Fortune 200 diversified manufacturing company with almost 100 years of history. Other successful ITW brands include Paslode, ITW Proline, Ramset and Reid Construction Systems. Pryda also gains valuable benefits in product, fabrication machinery and software development from its association with other ITW software and truss connector suppliers from around the world.

Who is Pryda?

Pryda was born in Napier, New Zealand in 1964. Pryda has remained an integral part of the building industry in New Zealand for over 50 years, particularly in timber truss and frame solutions with the development of a diverse range of timber connectors and structural brackets. Today Pryda remains a trusted New Zealand brand on building sites, in trade stores and in offices of architects, engineers and designers.

Pryda utilises world-class technology to provide a total system package to its licensed truss and frame plants, including fully integrated software and production systems, access to world leading manufacturing equipment and the highest levels of technical support.

Our Philosophy

Pryda develops solutions to common construction challenges on the philosophy, **"safer, faster, smarter, easier".**

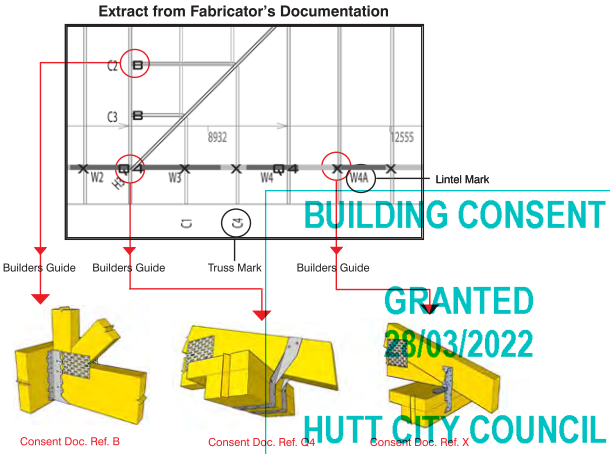
Pryda's philosophy is a unique method of looking at the total business needs of its licensed truss and frame fabricators, and providing cost effective solutions that not only meet current requirements but also identify and satisfy long term goals.

BUILDING CONSENT DOCUMENTATION REFERENCE INDEX

ROOF FRAMING	Roof Component Tie Down Connection	NC8	1 / NPPC8 Concealed Purlin Cleat	47
		Q4	1 / MPQHS4 Cyclone Strap	47
		Q6	1 / MPQHS6 Cyclone Strap	47
		Q9	1 / QHS9 Cyclone Strap	47
		Q6*	1 / MPQHS6 Cyclone Strap, wrap legs under support member	47
		Q9*	1 / QHS9 Cyclone Strap, wrap legs under support member	47
	Roof Component to Roof Component Connection	VS	Variable Skew Hanger	48
		MG	Multigrip	48
		MGL	Multigrip Long	48
		A	MPFB4590 Joist Hanger	48
		B	MPFB45120 Joist Hanger	48
		C	MPFB45180 Joist Hanger	48
		D	FB94/152 Joist Hanger	49
		NC8	2 / NPPC8	49
		NPA	2 / Nail-on Angle	49

BUILDING CONSENT DOCUMENTATION REFERENCE

The Pryda Builders Guide features **building consent documentation references** for many connection details. This is aimed to encourage designers to align details in the building consent documentation with useful information in the Pryda Builders Guide for easy reference for builders and building officials at the time of inspection. The process is illustrated below.



FRAME & TRUSS MANUFACTURERS ASSOCIATION CODE OF PRACTICE

1 The Code of Practice

1.1 Purpose

The FTMA Code of Practice is intended to provide a means of assurance to consumers, specifiers and Building Consent Authorities (BCAs) by way of publishing the standards and procedures that members agree to. In this way there is a basis for comparison with non-members as well as an industry based benchmark from which expectations can be managed.

1.2 Intention

It is intended that:

- Adherence to the Code of Practice will enable a qualifying fabricator to certify and mark their product as compliant to the Code of Practice;
- After a period of implementation and review adherence to the Code of Practice will be audited by a third party auditor;
- That adherence to the Code of Practice will be required for membership of FTMA.

1.3 Content

The Code of Practice includes:

- Section 2 - Truss Documentation

2 Truss documentation

2.1 Introduction

The intention of this section is to describe the documentation required to be produced by a fabricator of nail-plated timber trusses for use by its customer. The information contained in the document may be used by a Building Consent Authority (BCA) to satisfy the provisions of the Building Act 2004 and reasonable BCA processes in the issuing of a Building Consent or Code Compliance Certificate (CCC).

For practical purposes the production of the documentation is a two stage process. The first stage is to provide documentation to support the issuing of a building consent.

This can be achieved by providing:

- a 'Buildable' truss layout;
- a Fabricator Design Statement and;
- a Producer Statement – Design.

These documents show that trusses have been designed by an accredited fabricator[1], licensed to use specific design software, applying the appropriate loads and using the appropriate materials to ensure compliance with the NZ Building Code (NZBC) as well as giving notification of any resultant loads that may affect the supporting structure.

This documentation is intended to be provided to the “design lead”[2] to then consider when completing the structural design before providing it to the BCA as part of a building consent application. The BCA may then issue a building consent that is subject to receiving further documentation.

The second stage is to support the issuing of the CCC and is required prior to on-site inspection by the BCA.

This can be achieved by providing:

- an 'As Built' truss layout;
- a Fabricator Design Statement;
- a Producer Statement – Design and;
- a Manufacturing Statement.

This is similar documentation to that provided for the first stage but ensures that the final construction details of the manufactured trusses accurately reflect what was built, which can then be recorded by the BCA as part of the project documentation. Such further documentation then satisfies the conditions on which the consent had been issued. The documentation is intended to be provided to the builder on-site and to the customer who should make it available to the BCA prior to on-site inspection.

When producing an 'As Built' truss layout and final truss detailing for supply, it is expected that a fabricator shall give consideration to any 'Buildable' truss layout that has been consented by a BCA. The fabricator shall consider any structural implications that may result from a different layout to that consented and if any changes are to be made then these shall be communicated to the customer to pass on to their design team for consideration and approval before proceeding with supply. It is not expected that fabricators should have to follow exactly a consented layout, particularly when it may have been provided by a competitive party. However a fabricator will have to produce an 'As Built' truss layout as per 2.3.1.

This two stage process is reflected in section 7.5 of the guidance document "Guide to applying for a building consent" published by the Department of Building and Housing. Acknowledgement and support for the COP Section 2 – Truss Documentation is also outlined in the publication from DBH Codewords issue 044. Both publications are available online at www.dbh.govt.nz

While it is expected that the documentation is going to be provided to assist a BCA in the consent or CCC process it should be noted that the contractual relationship is between a fabricator and its customer and that the responsibility to provide this information to a BCA rests with the applicant for a building consent.

[1] An accredited fabricator is a company that has a formal agreement with a nail-plate manufacturer to use their products in the manufacture of trusses. The nail-plate manufacturer in turn licenses the fabricator to use specific design software supplied and underwritten by the nail-plate manufacturer.

[2] A design lead refers to the architect or draftsperson responsible for the overall design of the building

PRODUCER STATEMENT
PRYDA TIMBER CONNECTORS

December 2020

This Producer Statement is issued by Pryda NZ to cover the use, installation and durability of Pryda Timber Connectors for both structural application and durability as required by the New Zealand Building Code clauses B1 & B2 respectively.

Description

The Pryda timber connectors are manufactured from either Z275 or Z600 galvanised coil. Some brackets are also available in hot dipped galvanised or stainless steel for use in certain exposed and covered situations.

Application

Pryda timber connectors are designed for specific connections of timber to timber, primarily, as well as masonry, concrete and steel. Please contact Pryda should you require assistance relating to these connectors.

Installation

Pryda timber connectors should be installed without damage to the finished surfaces. Storage prior to use to be in dry moisture free conditions that would not affect the future durability of the product.

Design Capacity

As timber grades vary the design capacity is derived using the methods in NZS3603:1993 and is mostly dependant on the shear values of the nails, screws and bolts in timber. Most commonly used Timber Connectors have published characteristic strengths published in our literature.

Durability

The durability of Pryda timber connectors is in accordance with the acceptable solutions contained in Table 4.1 and Table 4.2 of NZS3604:2011 in order to achieve a 50 year life expectancy for the connectors where applicable. Alternative solutions and direct applications are to be found elsewhere in this publication.

Andre' van Blerk
BSc (Eng) CPEng CMEngNZ IntPE
Senior Structural Engineer
Pryda NZ (A division of ITW)

8 Orbit Drive, Rosedale, Auckland
PO Box 100303, North Shore 0757, Auckland.
T: 0800 88 22 44
E: info@prydaanz.com

TIMBER CONNECTORS GUIDE

Knuckle Nail plates

Codes: As per table below

Material: 1.0mm G300 Z275 galv steel

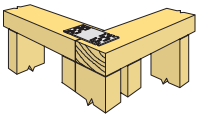
Pryda Knuckle Nail plates are designed for onsite use for a range of structural and non-structural timber jointing and timber protection uses such as butt joints, mitre joints, timber repairs, plank protectors and fence construction. A natural arc or dove-tail effect is created as the nails penetrate into the timber providing a very positive resistance to nail withdrawal.

Knuckle Nail plates are also available in coil form making it ideal for the on-site user to cut the required length by using metal cutters.

Knuckle Nail plates code MP8R10 = Merchant pack 8 rows of nails long x 10 teeth wide

CODE	WIDTH	LENGTH	CODE	WIDTH	LENGTH	CODE	WIDTH	LENGTH
MP2R4	33mm	63mm	MP4R10	76mm	127mm	MP4R16	134mm	127mm
MP2R5	38mm	63mm	MP6R10	76mm	190mm	MP6R16	134mm	190mm
MP4R5	38mm	127mm	MP8R10	76mm	254mm	NCR16	134mm	8.45m
MP6R5	38mm	190mm	MP10R10	76mm	317mm			
MP8R5	38mm	254mm	NCR10	76mm	12.7m			

Strap Nails



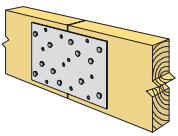
Codes: As per table below

Material: 1.0mm G300 Z275 galv steel

Pryda Strap Nails are pre-punched nail plates offering a quick, simple, economical and easy to use method of jointing timber. Strap Nails use the sharper tooth profile featuring the exclusive pre-punched twisted nail resulting in increased holding power due to better penetration of all timber types. Install simply by placing Strap Nail over joint and hammer into place.

CODE	WIDTH	LENGTH
MPSN2 or SN25	25mm	100mm
MPSN50 or SN50	50mm	100mm
SN50L	50mm	150mm

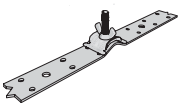
Nail-on Plates



Material: 1.0mm or 2.0mm G300 Z275 galv steel or stainless steel

Pryda Nail-on Plates are flat, galvanised or stainless steel plates which are nail-fixed to timber to form various types of joints. Use only 3.5 x 3.15 mm galvanised Pryda Timber Connector Nails or equivalent nails with these connectors. Nail-on plates provide a quick and economical means of providing a strong joint for many different on-site applications. They are available in 3 widths - 75, 100 & 150mm and 2 thicknesses NPA = 1.0mm and NPB = 2.0mm.

Strapbrace



Codes: SB10 - 10m coil, SB30 - 30m coil, SB30T - 30m with 5 tensioners
SBT - Bag of 5 tensioners.

Stainless: SBU15/S - 15m coil, SBT/SS316 - Tensioner

Material: 0.8mm x 25mm G550 Z275 galv steel or stainless steel

Pryda Strapbrace is a high tensile strap ideally suited for bracing walls or roof planes in residential buildings. Strapbrace acts in tension only so must be applied in pairs. It is pre-punched to accept both 3.15mm nails and the 6mm tensioner bolt. The tensioner is available individually or within SB30T kits. Pryda Strapbrace is not designed for use as a hold down strap on braced wall panels - use Pryda Sheet Brace Straps for this application.

Maxi Strap

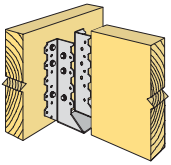
Codes: SBI/15 - 15m coil, SBI - 30m coil, SBI/T - tensioner.

Stainless: SBI/S - 30m coil. SBI/TS - Tensioner

Material: 0.8mm x 50mm G550 Z275 galv steel coil or stainless steel

Pryda Maxi Strap is a high tensile strap ideally suited for larger spans in walls or roof planes usually found on commercial or industrial buildings. Like the Strapbrace, Maxi Strap acts in tension only so braces must be applied in pairs. Holes have been pre-punched to accept both 3.15mm nails as well as the Maxi Strap tensioner. Tensioners are available individually.

Framing Brackets



Codes: Codes as per table below

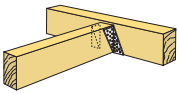
Material: 1.0mm G300 Z275 galv steel or stainless steel

The Pryda Framing Brackets are suitable for fixing joist to joist to beam, truss to truss, rafter to purlin and hangers to joists where a strong, rigid joint is required between members meeting at 90 deg. and floor joist. All these framing brackets use 35 x 3.15mm Pryda Product Nails or 12g x 35mm Type 17 Hex Head screws. The Framing Brackets must be fully nailed or screwed to achieve full design load capacities.

PRODUCT CODE	SUITABLE FOR TIMBER	PRODUCT CODE	SUITABLE FOR TIMBER
MPFB4590*	45 X 90 - 150mm	MPFB5274	50 x 90 - 150mm
MPFB45120*	45 X 120 - 200mm	MPFB52124*	50 x 120 - 200mm
MPFB45180*	45 x 190 - 300mm	MPFB52174	50 x 190 - 300mm
		FB94/152*	2/45 x 190 - 290mm
		FB65/170	65 x 190 - 290mm
		FB90200	90 x 195 - 300mm

*Available in Stainless steel

Nail-on Diagonal Cleats

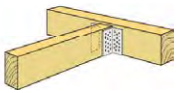


Codes: NPD

Material: 1.0mm G300 Z275 galv steel

The Pryda Nail-on diagonal Cleat is manufactured from 190 x 100 x 1.0mm Nail-on Plate diagonally folded to either LH or RH cleats. If this cleat is used as a butt joint connection for larger timber then use 35mm x 3.15mm Pryda Product Nails however when nailing into poles as a girt to pole connection then 75 x 3.15mm flat head nails should be used.

Nail-on Angles

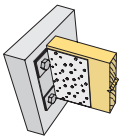


Codes: NPA - 190 x 100mm folded in half along its length

Material: 1.0mm G300 Z275 galv steel

The Pryda Nail-on Angle is manufactured from Nail-on Plate and shares similar characteristics and uses. It is ideal for butt joint situations as well as beam to bearer situations and gives a strong, economic alternative to framing brackets where the width of the beam is non-standard. This Nail-on Angle is pre-punched to accept 35 x 3.15mm Pryda Product Nails however if used as a connection to poles then 75 x 3.15mm flat head nails should be used.

Tim-Con Brackets

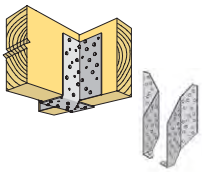


Codes: TCF130 - 130x 40/110mm, TCF190 - 190 x 40/110mm

Material: 2.0mm G300 Z275 galv steel

The Pryda Tim-Con Bracket is a high strength bracket for fixing timber beams or trusses to concrete or concrete block walls. Use 35mm x 3.15mm Pryda Product Nails into the timber beam. The bolt load capacity into the concrete or concrete blocks is critical and as bolt strength varies with different concrete grades, it is the responsibility of the specifier to check adequacy of bolts in each application. Either used singly or in pairs dependent upon design loading.

Nail-on Joist Hangers and Split Joist Hangers

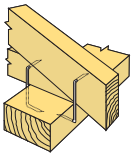


Codes: JHH100 - Suitable for 100mm timber, JHHS - Suitable for variable width timber

Material: 1.2mm G300 Z275 galv steel for JHH100, 1.8mm G300 Z275 galv steel for JHHS

The Pryda Nail-on Joist Hangers and Split Joist hangers are the heavy duty hangers in the Pryda hanger range and are pre-punched to accept the 35mm x 3.15mm Pryda Product Nails. The JHHS is a split hanger and will accept timber beam width as narrow as 32mm with beam depths commencing at 280mm.

Z & U Nails

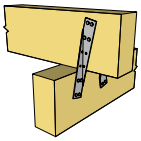


Codes: MPZU, MPZR, MPZL Stainless: MPZU/S MPZR/S, MPZL/S

Material: 5mm diameter mild steel wire galvanised or stainless steel

Z or U nails are manufactured in left handed, right handed or U (staple). It provides an effective and quick means of holding down purlins to rafters and joists to plates and joists to beams in high wind zones making a strong, low cost tie against wind uplift. Each nail is 100mm shank with 40mm spikes. The spike at 85deg to the shank and the unique “humpty backed” formation in the shank combine to draw the timbers to each other.

Ceiling & Purlin Hangers

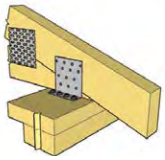


Codes: CPH190-LH, CPH-190RH, Stainless CPH190-LH/S, CPH-190RH/S

Material: 1.0mm G300 Z275 galv steel or stainless steel

Pryda Ceiling and Purlin Hangers are a simple cost effective fastening method providing a variety or uses in a building. They are simply nailed onto two pieces of timber crossing each other at right angles using 35mm x 3.15mm Pryda Product Nails. The Ceiling and Purlin Hangers are available in 190mm long and are normally used in pairs.

Concealed Purlin Cleats

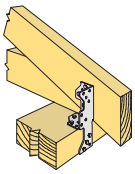


Codes: NPPC4, NPPC6, NPPC8, TTP9KN and TTP16KN.

Material: 2mm G300 Z275 galv steel or stainless steel

The Pryda Concealed Purlin Cleats provide a strong rigid connection for rafters, trusses and beams to wall top plates. Ideally suited as truss tie downs with ceiling plates if 14g x 75mm Type 17 hex head screws are used instead of the normal 12g x 35mm screws used in other applications. This is a versatile fastening and is also suitable for purlin fixing with or without ceiling to resist wind uplift. Available in 40, 60 or 80mm wide cleats to meet most applications.

Multigrips

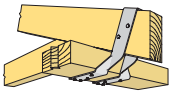


Codes: MPMG - 100 x 36 x 36mm, MGL - 132 x 36 x 36mm, Stainless: MG/S - 100 x 36 x 36mm stainless steel

Material: 1.0mm G300 Z275 galv steel or stainless steel

Pryda Multigrips are as the name suggests a multi-purpose one product fastening with no left hand or right hand requirements whilst using the 35mm x 3.15mm Pryda Product nail. The in-built bending slot ensures accurate bending on site. The long Multigrip has been designed to provide increased truss to top plate connection length allowing the truss to be tied directly to both top plate and ceiling plate.

Cyclone Straps



Codes: MPQHS4 - 400mm, MPQHS6 - 600mm, QHS9 - 900mm

Material: 0.95mm G300 Z275 galv steel

The Pryda Cyclone Strap has been designed as a simple, efficient tie down with the greatest design capacity for wind uplift prior to using a special design capacity. Tests have proven that bending the Cyclone Strap legs under the support member increases the design load that the strap is capable of carrying.

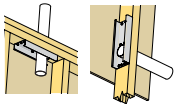
Ezi Stud

Codes: SST

Material: 1mm G300 Z275 galv steel

The Pryda Ezi Stud Tie - SST has been designed to exceed the requirement of table 8.18 in NZ3604:2011 - "Fixing of top plate of wall to supporting members such as studs and lintels at 600mm centres". The Pryda Ezi Stud Tie is not reliant on the position of the top plate fixing nails to achieve desired strength.

Pryda Frame Fix

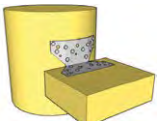


Codes: PFF

Material: 1.6mm G300 Z275 galv steel

The Pryda Frame Fix has a unique design which satisfies both downward and uplift capacities where a 60mm hole has been cut into a top plate with ceiling plate for service requirements. In these situations 14g x 75mm hex head type 17 screws shall be used. The PFF is designed to sit inside the wall space and will not interfere with either internal or external wall claddings. This product can also be used to reinstate the integrity of studs where 60mm holes have been drilled to allow service pipes/ducting to pass. In these cases 12g x 35mm hex head type 17 screws shall be used.

Pole to Girt Brackets

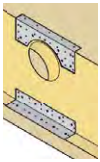


Codes: NPP2G. Stainless NPP2G/S

Material: 0.95mm G300 Z275 galv steel or stainless steel

The Pryda Pole to Girt bracket provides a robust means of fixing timber girts to poles in Pole & Rafter buildings. The bracket is designed in a butterfly shape to easily wrap around the poles. The nPP2G is a variation of the multigrip but with greater extension into the connected member and with the addition of screw holes provides greater fixing capacity.

Pryda Stren-joist

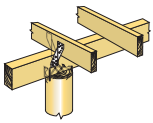


Codes: NPSJ, NPSJD

Material: 1.6mm G300 Z275 galv steel

The Pryda Stren-joist has been designed to allow service holes to be cut in floor joists. The fitting of a Pryda Stren-joist re-instates the integrity of the penetrated joist. They are quick and easy to install, come in a kit and shall be used on joists 140mm - 290mm high. Each kit contains the 3 part Stren-joist bracket, 1 x 500gr 35 x 3.15mm Pryda Product Nails and 10 x 8g x 20mm screws. If the hex head screwing installation is used then 30 x 12g x 35mm hex head type 17 galv screws will be required.

6kN & 12kN Pile-Bearer Kits

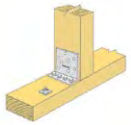


Codes: PBK6S & PBK12S for severe conditions

Materials: Standard Kit. Severe Corrosion Kit - Stainless Steel

The 6kN kit is suitable for the fixing of cantilever timber piles to bearers and joists and the 12kN kit for the fixing of anchor or braced timber piles to bearers and joists. Each kit includes the fixing requirements of nails and “U” nails.

Sheet Brace Anchor Kit

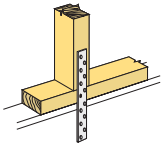


Codes: SBA - contains 2 x NPPC8, 16 x 35 x 3.15mm Pryda product nails and 8 x 12g x 35mm Hex Head Type17 screws.

Material: 2.0mm G300 Z275 galv steel

Provides 6kn and 12kN capacity wall stud to bottom plate connection. Can be retrofitted if external wall lining and cladding installed. Use 2 connectors where 12kN fixing required.

Sheet Brace Straps

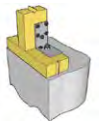


Codes: SBS300 - 300mm long, SBS400 - 400mm long, SBS600 - 600mm long, SBS30M - 30m coil. Stainless SBS300/S, SBS400/S, SBS600/S

Material: 1.0mm G300 Z275 galv steel or stainless steel

Pryda Sheet Brace Straps are mild steel straps providing 6kN or 12kN capacity fixing for sheet-braced wall panels. They comply with the requirements of NZS3604:2011 for a 6kN capacity strap. Use 2 straps and wrap around bottom plate where 12kN capacity fixing is required. The SBS is also very popular as a method of lintel tie down.

Pryda Brace Anchor

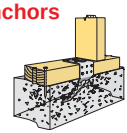


Codes: PBA

Material: 5mm G250 Steel

The PBA is designed to be used in conjunction with all gypsum wallboard manufacturers, bracing systems, references and literature. The PBA can satisfy the hold down requirements and is a substitute for the pre-fitted double strap.

Bottom Plate Anchors

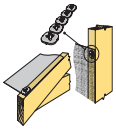


Codes: BPA - 235 x 1.2 x 50mm

Material: 1.2mm G300 Z600 galv steel

The Pryda Bottom Plate Anchor is a pressed steel bracket for fixing timber wall plates to concrete floors. Removes the need to pre-drill bottom plates. Cost saving over anchor bolts.

Pryda Fix & Foil Fix

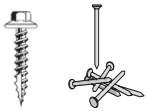


Codes: SFI - Pryda Fix

Material: 0.8mm galv steel

Pryda Fix (for shade cloth) is designed as a non-tear economical fixing for sheet insulation and shade netting. It eliminates tearing on sharp surfaces, the rounded coined edge holding the material firmly against the timber when the sharp pre-punched fastenings are driven home.

Fasteners



Product Nails

OSNGB Galv	35mm nails x 3.15mm 500g (approx 220 nails)
OSNBCI/SS Stainless	35mm nails x 3.15mm 500g (approx 203 nails)

Product Screws

HH1235G Galv	12g x 35mm hex head type 17 (100 pack)
HH1235SS Stainless	12g x 35mm hex head type 17 (100 pack)
HH1475S Galv	14g x 75mm hex head type 17 (100 pack)

PRODUCER STATEMENT STRUCTURAL BRACKETS

Pryda Structural Brackets

December 2020

This Producer Statement is issued by Pryda NZ to cover the use, installation and durability of Pryda Structural Brackets for both structural application and durability as required by the New Zealand Building Code clauses B1 & B2 respectively.

Description

Pryda Structural Brackets are fabricated from flat bar steel. They are mostly available in hot dipped galvanised finish with a selection also available in stainless steel for use as an architectural feature or in certain exposed and covered situations as covered in NZS3604:2011. The zinc coating is applied in accordance with AS/NZS 4690:1999 and the thickness exceeds 600g/m2. The remaining Pryda Structural Brackets are finished in electro galvanised.

Application

Pryda Structural Brackets are designed to connect timber to masonry, concrete and steel. The brackets are designed for specific connections of timber to other materials. Please contact Pryda technical service should you require assistance for your intended application.

Installation

The Pryda Structural Brackets should be installed without damage to the finished surfaces. Storage prior to use to be in dry moisture free conditions that would not affect the durability of the product.

Characteristic Strength

When used with timber, the characteristic strength is derived by the verification method in accordance with the NZBC standard NZS3603:1993. The withdrawal strength of the bracket varies with the type of substrate it is installed in, hence the limit state design capacities shall be determined by the design engineer taking into consideration the above point.

Durability

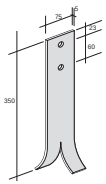
The durability of the Pryda Structural Brackets is in excess of the acceptable solutions contained in Table 4.1 of NZS3604:2011 in order to achieve a 50 year life expectancy for the brackets. Pryda Structural Brackets are hot-dipped galvanised to a level exceeding 600g/m2. Depending on the environmental conditions and exposure to marine conditions, the surface of the stainless steel brackets can be affected by tea staining. However, tea staining does not affect the structural integrity of the fitting.

Andre' van Blerk
BSc (Eng) CPEng CMEngNZ IntPE
Senior Structural Engineer
Pryda NZ (A division of ITW)

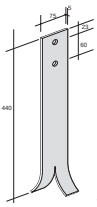
Pryda New Zealand
A division of ITW New Zealand Ltd
8 Orbit Drive, Rosedale, Auckland
PO Box 100303, North Shore 0757 Auckland

Tel: 0800 88 22 44
Email: info@prydaanz.com

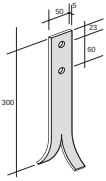
STRUCTURAL BRACKETS GUIDE



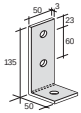
SBK3
(B78)



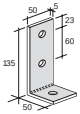
SBK3H
(B79)



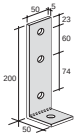
SBK4 ■
(B75)



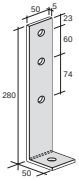
SBK10
(B351)



SBK10A ■
(B51)



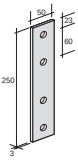
SBK11A
(B52)



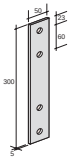
SBK12A
(B53)

SBK14
(B350)

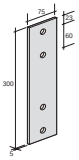
SBK14A ■
(B55)
(B50)



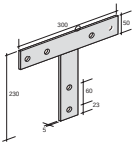
SBK22 ■



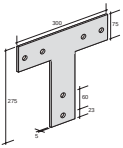
SBK23 ■
(B85)



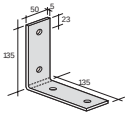
SBK25 ■
(B88)



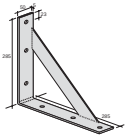
SBK27 ■
(B35)



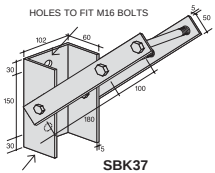
SBK28
(B38)



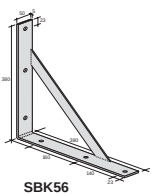
SBK34



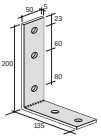
SBK36
(B163)



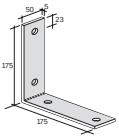
SBK37
INCLUDES 2 M16X140 BOLTS
(B155)



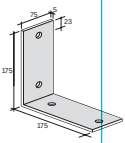
SBK56
(B165)



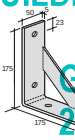
SBK52A
(B54)



SBK53
(B55)

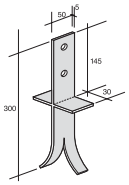


SBK53A
(B58)

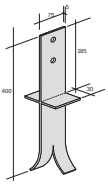


SBK55
(B65)

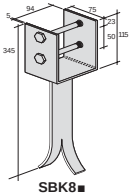
ALL BOLT HOLES TO ACCOMMODATE M12 BOLTS UNLESS NOTED
* BRACKETS WITH HOLES FOR 6MM COUNTERSUNK SCREWS. ELECTRO GALVANISED FINISH
■ ALSO AVAILABLE IN STAINLESS STEEL GALVANISED AND STAINLESS STEEL PLATES AND BRACKETS FOR CONCRETE, TIMBER AND STEEL CONNECTIONS



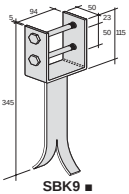
SBK5 ■
(B195)



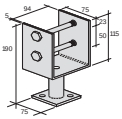
SBK6 ■
(B197)



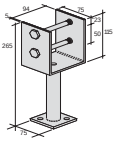
SBK8 ■
INCLUDES 2 M12X120HD G BOLTS
(B138)



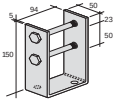
SBK9 ■
INCLUDES 2 M12X120 HDG BOLTS
(B135)



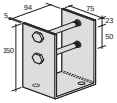
SBK15
INCLUDES2 M12X120 HDG BOLTS
(B12)



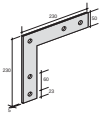
SBK16 ■
INCLUDES2M12X120 HD G BOLTS
(B14)



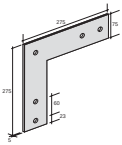
SBK17 ■
12MM BOLTS INCLUDED MASONRY ANCHOR NOT SUPPLIED
(B25)



SBK18 ■
12MM BOLTS INCLUDED MASONRY ANCHOR NOT SUPPLIED
(B 28)



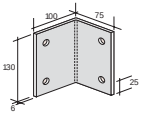
SBK29 ■
(B45)



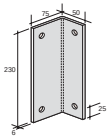
SBK30
(B48)

SBK31 ■
(B175)

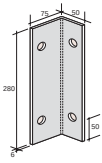
SBK31A ■
(B176)



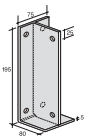
SBK32 ■



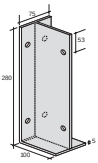
SBK33 ■
(B177)



SBK33A ■
(B178)



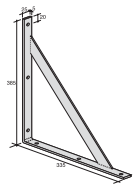
SBK38 ■
(B108)



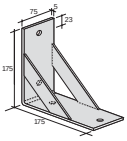
SBK38A ■
(B109)

SBK41 *
(B553)

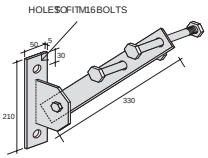
SBK42 *
(B554)



SBK50 *
(B567)

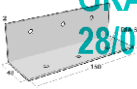


SBK55A
(B68)



SBK57 ■
INCLUDES2M 16X120 BOLTS
(B145)

SBKFS
(BSB1)



P2BB ■

Whilst reference is made to competitor product it is intended as a best fit only and may not be an identical match - if in doubt please check.

A new timber treatment system for Acceptable Solution B2/AS1:

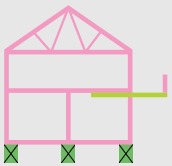
- **tough** against fungal decay and insect attack
- simpler and easier to use
- protects framing from decay
- time and cost effective

Timber treatment in Acceptable Solution B2/AS1 has changed to a new, simpler system:

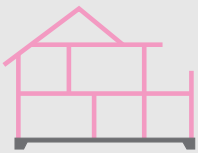
If you are using the Acceptable Solution to demonstrate compliance with the Building Code, H1.2 is now required for nearly all radiata pine and Douglas fir enclosed timber framing.

FOR TIMBER FRAMING WITH:

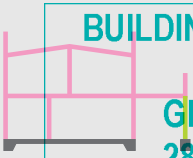
Cantilevered enclosed balcony and balustrade



Enclosed balcony and balustrade with living space below



Enclosed balcony and balustrade open below



H1.2 H3.2 H5

H5 post if in contact with the ground.

What's new with timber treatment?

The Acceptable Solution B2/AS1 has changed. The timber treatment hazard class H1.2 is now required for radiata pine and Douglas fir timber in buildings, where it is protected from the weather (ie, enclosed timber framing). Consult the tables in a **Quick Guide to Timber Treatment** for Enclosed Framing for the few exceptions to H1.2 treatment.

Why H1.2?

Research shows that H1.2 gives framing timber good protection from decay. H1.2 boron treatment is colour-coded pink.

How can I be sure my timber framing complies with the Building Code?

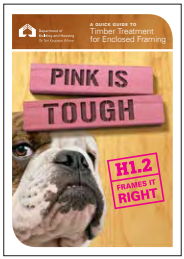
The changes shown here outline one way to comply with the New Zealand Building Code durability clause B2. However, this is only a very brief introduction, so consult Acceptable Solution B2/AS1 for full details.

Why continue to treat timber?

Timber must be adequately protected against damage from fungal and insect attack so that buildings are durable and comply with the Building Code. The new system improves the overall level of protection against decay.

What about other species of wood for framing?

For other species of wood and engineered wood products (such as LVL and Glulam), the Acceptable Solution does not change. For information on other species which can be used under the Acceptable Solution, consult NZS 3602:2003 Tables 1 and 2.



This is only a very brief introduction to the changes made to the timber treatment requirements effective July 2011.

For further information see **"A Quick Guide to Timber Treatment for Enclosed Framing"** which is available from the Department of Building and Housing, or consult Acceptable Solutions B2/AS1 for full details.

Pryda New Zealand acknowledges the Department of Building and Housing as the source of this information.

ENVIRONMENT DEFINITIONS & PRODUCT SELECTION

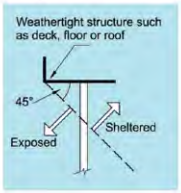
Alternative solution to Table 4.1 NZS3604:2011

Under the building code, Clauses B2 Durability, requirements for steel fasteners are:

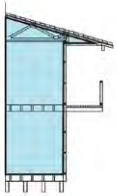
- For structural steel fasteners with difficult access and replacement - 50 years or nominated period
- For structural steel fasteners with moderate ease of access and replacement - 15 years or nominated period

Environment Definitions

Exposed/Sheltered



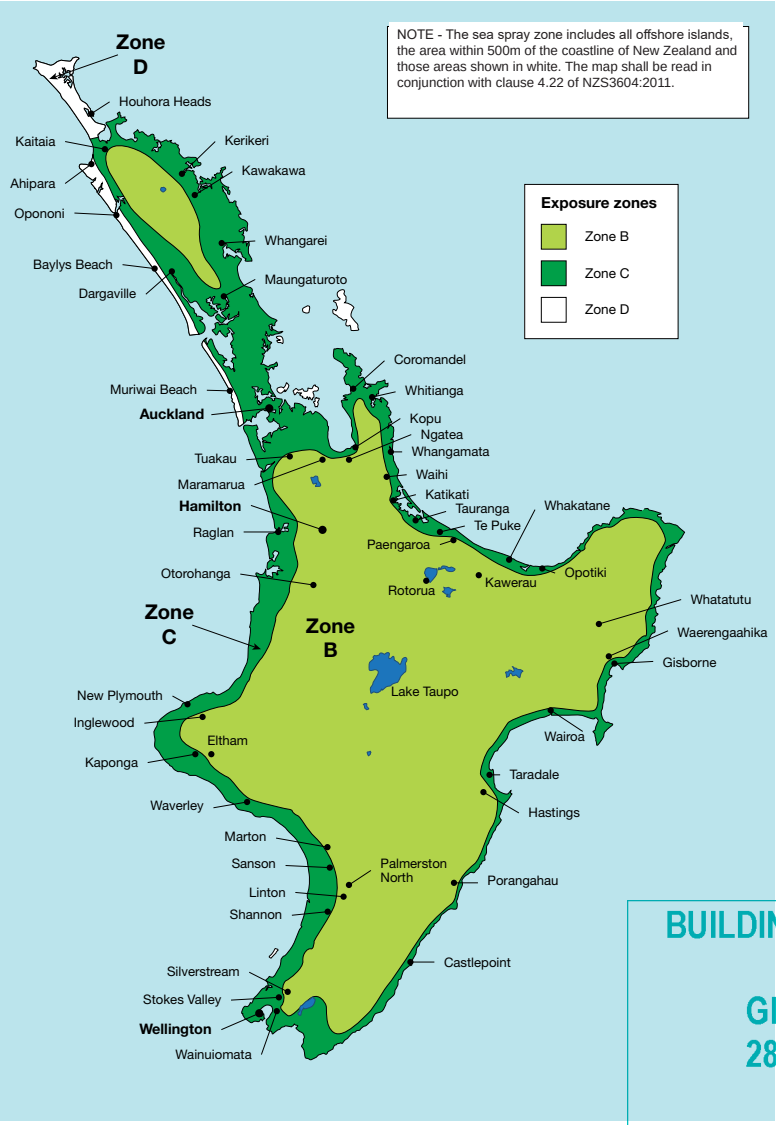
Closed



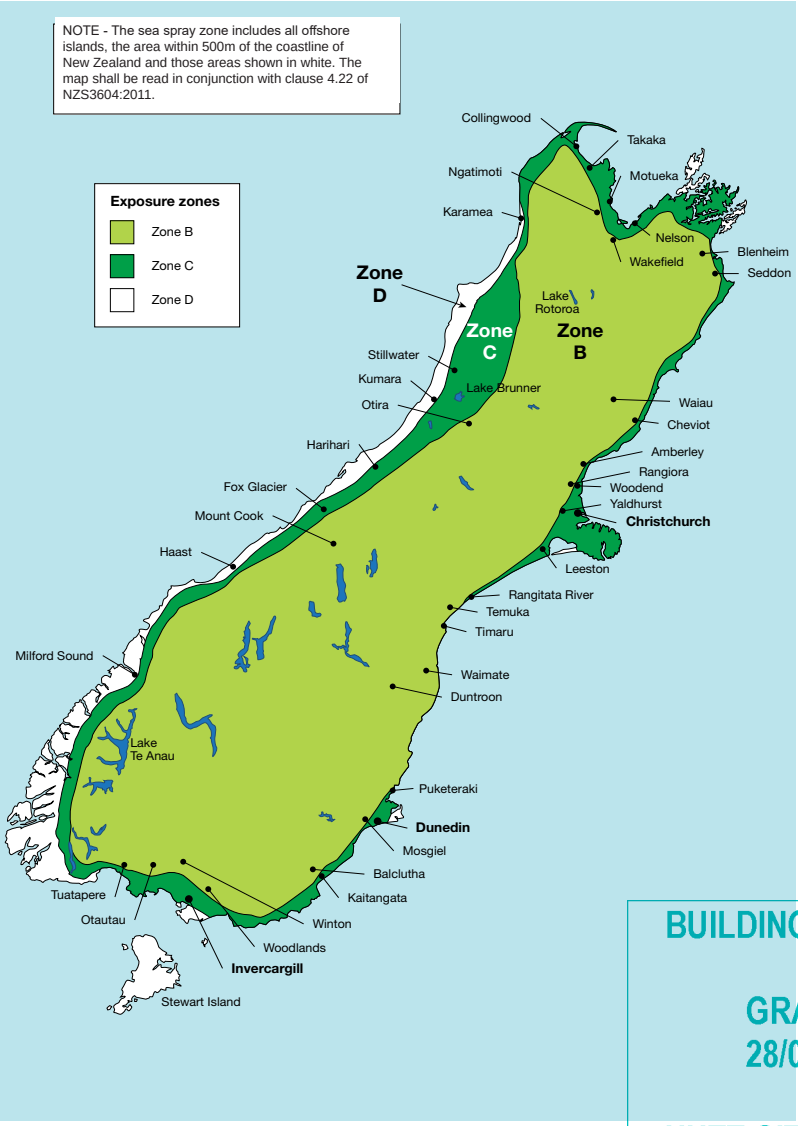
Zone	Location		Environment	Product
All Zones	Fully enclosed walls, floors & roof spaces		Closed	Pryda Zinc Coated Products
Zones B & C	All subfloor fastenings more than 600mm above the ground	Vented 7000mm²/m² or LESS	Sheltered	Pryda Stainless Steel Products
		Vented MORE than 7000mm2/m²	Exposed	Pryda Stainless Steel Products
	All subfloor fastenings within 600mm of the ground	Sheltered and exposed		Pryda Stainless Steel Products
	All other structural fixings	Sheltered		Pryda Stainless Steel Products
		Exposed		Pryda Stainless Steel Products Pryda SBK HDG Brackets
Zones D	All structural fittings	Sheltered and exposed		Pryda Stainless Steel Products

Notes: All Pryda galvanised products comply with NZS3604:2011 Table 4.2

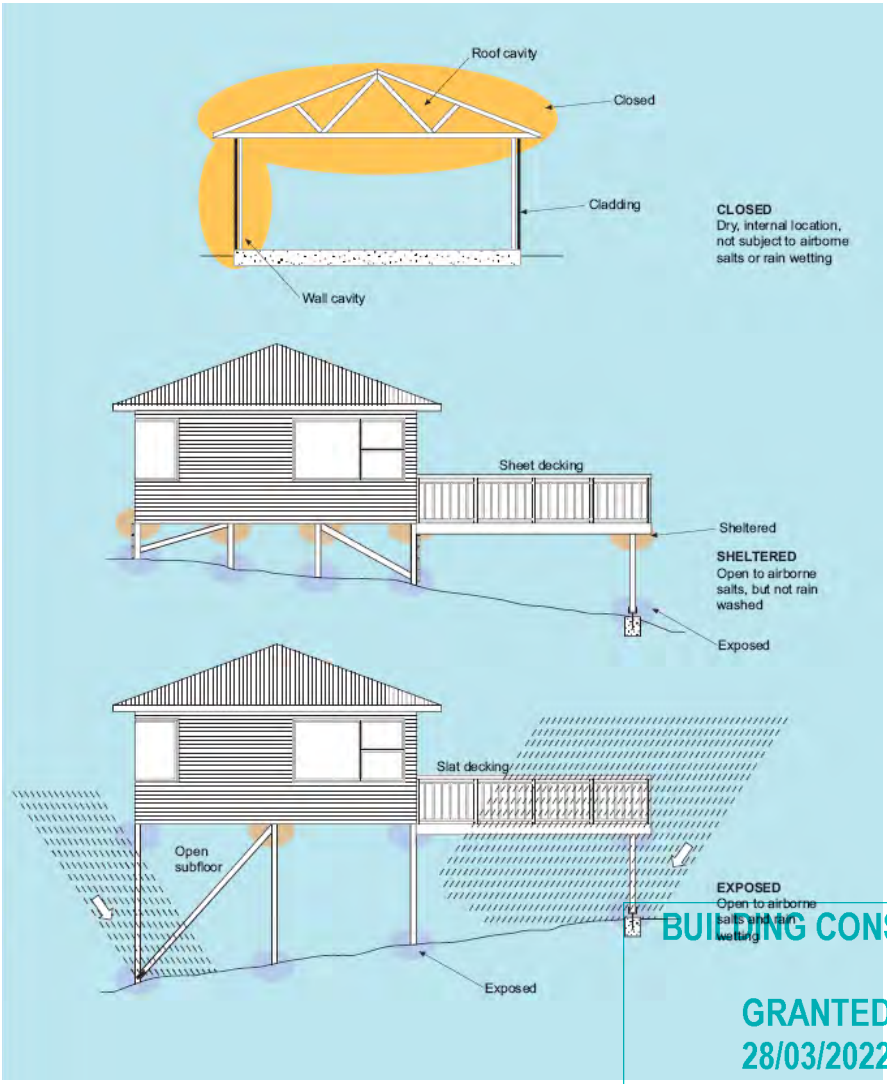
EXPOSURE ZONES



DURABILITY - EXPOSURE ZONES



EXPOSURE DEFINITIONS



6KN PILE-BEARER KIT

Consent Doc. Ref.
P6

6kN Capacity Fixing of Cantilever Pile to Bearer and Joists

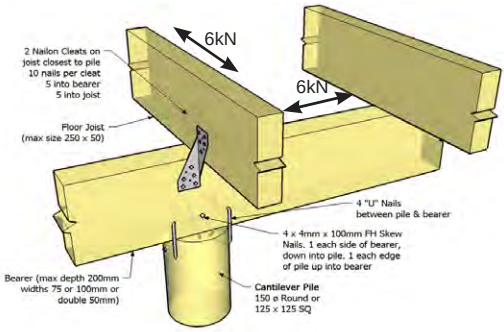
Features

- Connection detail covers bearer sizes up to 200mm deep, joists up to 250mm deep.
- All components supplied as one complete package.
- Available in all stainless steel components for use in environments with severe corrosion risk.

Installation

As detailed above but subject to the following:

1. On round pile bearer must be central. Bearer may be offset on square pile but must not overhang edge.
2. Nailon cleats fix to joist closest to pile. At building corner where fixing to boundary joist is precluded fix cleats to next closest joist along bearer.
3. At external wall where joists do not overhang bearer enough for cleats to be fixed on outside face, they may be fixed to inside face only of that bearer provided a similar detail is used on the other side of the floor system.
4. Joist must have lateral support (blocking or perimeter joist) within 300mm of bearer in accordance with NZS3604:2011 cl 7.1.2.1.
5. All components must be protected after installation against wind-blown sea salt deposition by coating with 2mm thick grease, Selleys roof and gutter (silicone) sealant, or other approved coating.



6 kN Horizontal Capacity Fixing of Bearer/Joists to Cantilever Pile in accordance with NZS 3604:2011 Clauses 6.7.3.1,and 6.7.3.3.

Durability

Complies with NZ Building Code - Clause B2 for a structural component with 50 year durability.

PBK6S: Severe Corrosion Kit (All Grade 304 Stainless Steel Components) - suitable for all sea spray zone conditions.

Specifications

"U" Nails:

5mm diameter, 100mm shank and 40mm spikes (4 of)

Cleats:

150 x 50 x 1mm diagonally folded (2 of same side)

Nails:

45 x 3.15 Flat Head Square Twist (22 of)

100 x 4.0 Flat Head (4 of)

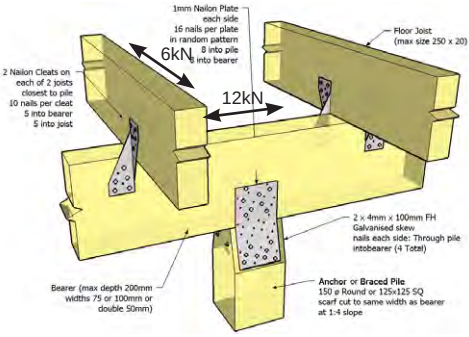
12KN PILE-BEARER KIT

Consent Doc. Ref.
P12

12kN Capacity Fixing of Cantilever Pile to Bearer and Joists

Features

- Allows Anchor/Braced Pile to be in line with and same height as other piles.
- Connection detail covers both Anchor and Braced Piles, with bearer sizes up to 200mm deep, joists up to 250mm deep.
- All components supplied as one complete package.



12 kN HORIZONTAL CAPACITY Fixing of Bearer/ Joists to ANCHOR PILE or BRACED PILE, in accordance with NZS 3604:2011 Clauses 6.8.5, 6.8.6 and 6.9.3.

Installation

As detailed above but subject to the following:

1. On round pile bearer must be central. Bearer may be offset on square pile but must not overhang edge.
2. Nail on cleats fix to two joists closest to pile. At building corner where fixing to boundary joist is precluded fix cleats to next two closest joists along bearer.
3. At external wall where joists do not overhang bearer enough for cleats to be fixed on outside face, they may be fixed to inside face only of that bearer provided a similar detail is used on the other side of the floor system.
4. Joists must have lateral support (blocking or perimeter joist) within 300mm of bearer in accordance with NZS3604:2011 cl 7.1.2.1.
5. Braced Piles - connection is required at top of both piles to which each brace attaches.
6. All components must be protected after installation against wind-blown sea salt deposition by coating with 2mm thick grease, Selleys roof and gutter (silicone) sealant, or other approved coating.

Durability

Complies with NZ Building Code - Clause B2 for a structural component with 50 year durability.

PBK12S: Severe Corrosion Kit (All Grade 304 Stainless Steel Components) - suitable for all sea spray zone conditions.

Specifications

Nailon Plates:
100 x 190 x 1 mm (2 of)

Cleats:
150 x 50 x 1mm diagonally folded
(2 LH and 2 RH)

Nails:
45 x 3.15 Flat Head Square Twist (72 of)
100 x 4.0 Flat Head (4 of)

CONCENTRATED LOADS ON CONCRETE FLOORS

Scope:

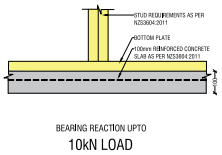
To determine the correct adjustments requirement in addition to the requirements of NZS3604:2011 to foundations in the event of concentrated gravity loads by the roof layout.

To determine the additional studs required for the above wind uplift and gravity situations.

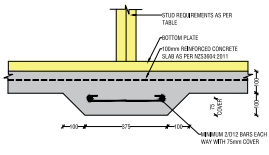
Design Assumptions

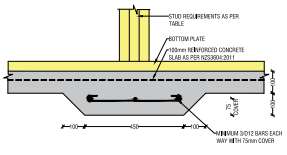
1. Buildings within NZS3604:2011 limits - truss spans within 12m.
2. Standard truss spacing applies ie. minimum 600mm crs and max. 1200mmcrs. Timber shown in studs SG8 or better.
3. Soil conditions - ultimate bearing strength required - 300kpa or betteras per NZS3604:2011 ch.
4. Where 2 or more studs are required, the concentrated load truss facewill be within 50mm of the centre of support.
5. The number of top plates to be determined from NZS3604:2011
6. For the design, minimum one face of the wall has been considered fully lined.
7. These details are for pad footings and can be applied in conjunction with continuous slab thickenings as well.

SLAB THICKENING DETAILS
(FOR CONCENTRATED LOADS FROM TRUSS)

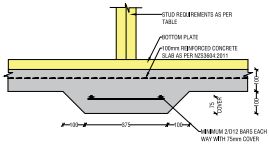


BEARING REACTION UPTO
10kN LOAD

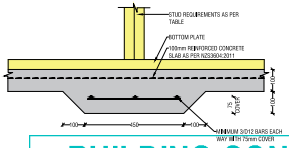




10kN LOAD		
HEIGHT OF STUD (m)	STUD SIZE	NO. OF STUDS UNDER LOAD
2.4	90 x 45	AS PER NZS3604 : 2011
2.7	90 x 45	
3.0	90 x 45	



BEARING REACTION UPTO
20kN LOAD



BEARING REACTION UPTO
30kN LOAD

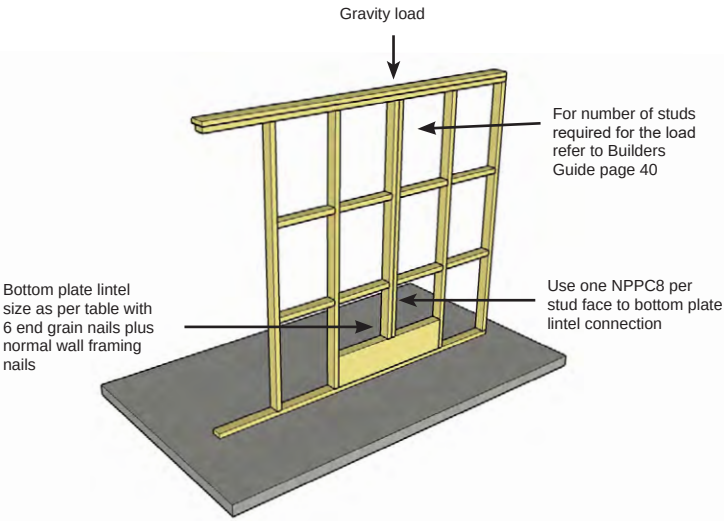
20kN LOAD		
HEIGHT OF STUD (m)	STUD SIZE	NO. OF STUDS UNDER LOAD
2.4	90 x 45	2
2.7	90 x 45	2
3.0	90 x 45	3

30kN LOAD		
HEIGHT OF STUD (m)	STUD SIZE	NO. OF STUDS UNDER LOAD
2.4	90 x 45	3
2.7	90 x 45	3
3.0	90 x 45	4

All capacities are limit state design values and not characteristic strength therefore these may be compared directly to Pryda design software output. Capacities assume a minimum timber grade of SG8.

CONCENTRATED LOADS ON CONCRETE FLOORS

This retrofit can be used when an internal support has no concrete floor thickening and loads are greater than 12kN provided that:



	Gravity Load		
	12kN - 23kN	**24kN - 36kN**	**36kN**
Bottom Plate Lintel Size SG8	1/250 x 100 or 2/250 x 50	1/300 x 100 or 2/300 x 50	SED*

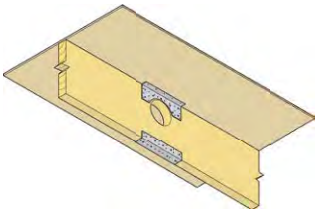
- Minimum length of lintel required is 2m under concentrated load. Use bottom plate lintel size as per table.
- The building to be built within NZS3604:2011 limits with roof spans less than 12m.
- Soil conditions shall be 300kPa ult. bearing or better as per NZS3604:2011 Ch3.
- Where 2 or more studs are required, the concentrated load truss face shall be within 50mm from the centre of the support.
- For number of studs to match load, refer to Pryda Builders Guide page 40.
- If multiple studs are loaded by more than 12kN, the bottom plate lintel shall be extended continuously by one stud spacing past the last loaded stud.
- Concrete is assumed to be 17.5MPa grade or better, 100mm thick with mesh.
- SED required for gravity loads exceeding 36kN.

***SED = Special Engineering Design**

STREN-JOIST

Alternative Solution to NZS3604:2011 Cl 8.51.6 and 8.7.5

Alternative solution where strengthening of joists are required after a hole or notch has been made in a joist, refer to NZS3604:2011 cl 8.5.1.6 and cl 8.7.5.



Specification

Product Code: NPSJ, NPSJD

Material: 1.65mm G300 Z275 galvanised steel

Durability: Suitable for use in closed environment as per NZS3604:2011 Table 4.1

Application: Designed to reinstate the structural integrity of a joist after a service hole has been drilled through the member using the verification methods in accordance with the New Zealand Building Code B1 & B2.

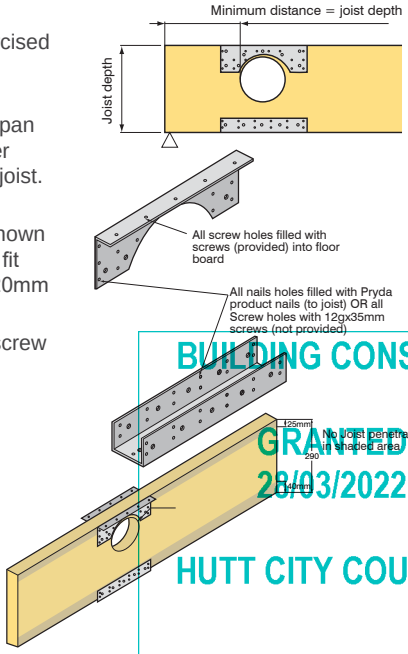
Advantages:

- Quick and easy to install
- Fixing option of either nails or screws
- Can be retro-fitted
- One size designed for use on 140—290mm joists

NPSJ Joist Size (mm)	Max Hole Size (mm)	NPSJD Joist Size (mm)	Max Hole Size (mm)
140 x 45	72	140x90	60
190 x 45	122	190x90	100
240 x 45	125	240x90	110
290 x 45	125	290x90	110

Installation:

1. Use NPSJ/NPSJD to locate and correct vertical location of hole along the joist. Care shall be exercised when installing NPSJ in 140x45mm or NPSJD in 140x90mm joist where hole location is critical.
2. The hole can be made in any position along the span of the joist provided that the hole edge is no closer than one joist depth from the end supports of the joist. Refer to table for maximum hole size in joist.
3. Present the two angles to either side of hole as shown and nail or screw into place ensuring a tight snug fit onto joist and underside of flooring (use 10 / 8gx20mm screws for top flange).
4. Present channel to underside of joist and nail or screw into place ensuring a tight and snug fit.

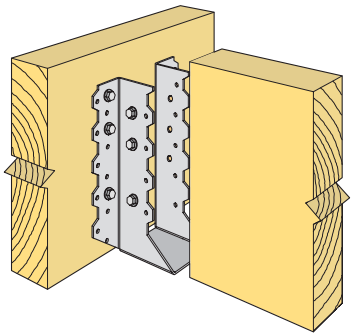


Notes:

- If hex screw fixing option is used then 30 / 12g x 35mm T17 hex head screws are required (not supplied with the NPSJ kit).
- All nail or screws holes shall be filled.
- Intended for use in internal 'closed space' as per Table 4.1 of NZS3604:2011.
- Maximum of 3 holes per one joist, spacings at two times the joist depth.

FRAMING BRACKETS

Features: Pryda Framing Brackets are suitable for truss to truss, rafter to purlin, and hangers to joists. They are either nailed into place with 35 x 3.15mm Pryda Product nails, or type 17 12g x 35mm hex head galvanised screws.



Fixings Requirements for Joists

Loading as per AS/NZS 1170:2002 (Table 3.1)

Domestic/Balcony live loads:
1.5/2.0kPa and 1.8kN point load

Commercial/Industrial live loads:
3.0kPa max and 2.7kN point load

Select joist span using NZS 3604:2011 tables or similar.
Hanger size in table corresponds to joist size.

			Domestic and Balcony Loads			Commercial and Industrial Loads		
			Nails per flange		Screws per flange	Nails per flange		Screws & Nails per flange
Joist Size (mm)	Hanger Size	Consent Doc. Ref.	Joist	Bearer	Joist	Bearer	Joist	Bearer
90 x 45	MPFB4590	A	2	3	1	1	2	4	1 Screw + 1 Nail
140 x 45	MPFB4590	A	2	3	1	1	2	4	1 Screw + 1 Nail
190 x 45	MPFB45120	B	3	5	2	2	3	6	2 Screws + 2 Nails
240 x 45	MPFB45120	B	3	5	2	2	3	6	2 Screws + 2 Nails
290 x 45	MPFB45180	C	4	7	3	3	4	8	3 Screws + 3 Nails

Notes:

- Use 35 x 3.15 mm Pryda product nails and/or Type 17 12g x 35mm Hex Head Screws
- The above values apply to SG 8 or better
- Framing brackets to suit rough sawn timber also available: MPFB5274, MPFB52124, MPFB52174
- All 45mm and 52mm framing brackets are available in stainless steel

FLOOR AND RAFTER TRUSSES

Pryda Longreach Trusses

Pryda Longreach is a premium performance floor and rafter truss system using all timber webs and chords for maximum stiffness, and can be manufactured to any depth required from 235 to 450 mm.
A major feature of all-timber Longreach is that low-cost increases in depth will significantly increase span capacity or stiffness.

Pryda Span Trusses

Pryda Span floor and rafter trusses have galvanised high strength steel diagonal webs for lightweight and economy, and are available in nominal 250, 300 and 400 mm depths. The steel web design has a patented deep V profile incorporating stiffeners for improved performance and resistance to damage during handling on site.

Floor Truss Spans and Depth

This table illustrates the significant increase in span capacity by increasing floor truss depth and/or higher timber grade.

Example: Spans for residential floor loads (1.5kPa/1.8kN) at 450mm centres

Top & bottom chord timber		Truss depth (mm)			
Size (mm)	**Grade**	**250**	**300**	**350**	**400**
90x45	SG 8	4300	4900	5200	5700
90x45	SG 12	5800	6500	7100	7700

Guide to Specification

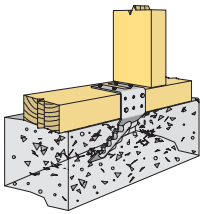
This guide contains information for designers on the design principles for Pryda floor and rafter truss systems to incorporate relevant details within their specifications.

For more information
More information on Pryda floor and rafter truss systems is available from the Pryda website www.pryda.co.nz or contact Pryda New Zealand on 0800 88 22 44.

BOTTOM PLATE ANCHOR

Consent Doc. Ref.
BP6

A pressed steel bracket for fixing timber wall framing to concrete floors



Features

- Replaces NZS 3604:2011 Bolt/Dowel fixing of timber wall plate to concrete slab.
- Speedier concrete finishing - allows floating to slab edge and avoids messy hand trowelling around cast-in bolts.
- Easier wall frame placement - no drilling of plates and no lifting/locating over preplaced bolts.
- Cost savings over cast-in anchor bolts.
- Capacities comply with cl 7.5.12.3 NZS3604:2011

Specification

Product Code: BPA

Material: 1.2mm G300 Z600 galvanised steel coil

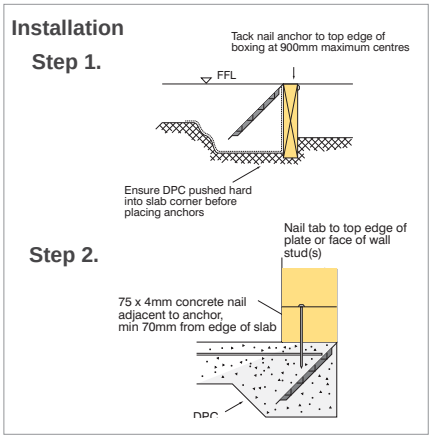
Nails: 35 x 3.15mm Pryda Product Nails

Installation

1. Tack nail anchors to top edge of boxing at maximum 900 ctrs (if wall contains sheet brace element, refer to sheet brace manufacture literature. Position anchors with tabs horizontal and crimped end downwards at 45° angle.
2. After initial concrete cure position wall frame. Bend anchor up and over plate and nail with 35 x 3.15mm Pryda Product Nails-2 into edge of plate and 2 per tab. If tabs coincide with stud position, nail to stud with 2 per tab. Fix one 75 x 4mm concrete nail adjacent to anchor, minimum 70mm from edge of slab.

NOTE: Bottom plate fixings are designed to be used in DRY service conditions ie. with concrete protected from moisture by continuous damp proof membrane.

Capacities assume minimum timber grade of SG8.



PRYDA SHEET BRACE STRAPS

Consent Doc. Ref.
6kN application **BP1** / 12kN application **BP2**

6KN OR 12KN CAPACITY FIXING FOR SHEET-BRACED WALL PANELS

Features

Pryda Sheet Brace Straps are mild steel straps providing 6kN or 12kN capacity fixing for sheet braced wall panels. They comply with the requirements of section 8 NZS3604:2011 and are also popular as a method of lintel tie down. Where straps longer than 600m are required 30m coils are available. The coils can easily be cut to the required length.

Specification

Code:
SBS30M (25mm x 1.0m x 30m)

SBS300 (25mm x 1.0mm x 300mm)

SBS400 (25mm x 1.0mm x 400mm)

SBS600 (25mm x 1.0mm x 600mm)

Material: 1.0mm G300 Z275 galvanised steel coil or stainless steel

Nails: 35 x 3.15mm Pryda Product nails

Installation

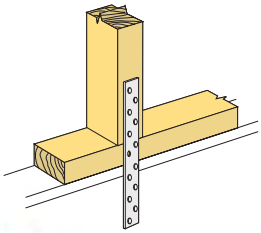
Timber Floor external wall - Install Pryda SBS300 for the connection. Use 6 nails into stud, 3 into bottom plate and 6 into boundary joist/solid blocking. Use 2 straps for connections requiring 12kN capacity.

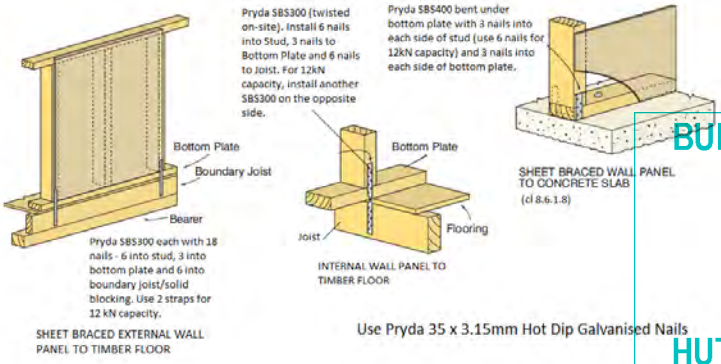
Timber Floor internal wall - Prior to installation twist Pryda SBS300 and fix using 6 nails into Stud, 3 nails to Bottom Plate and 6 nails to Joist. Install a second strap on the opposite side to achieve 12kN capacity.

Concrete Slab - Form U-shaped strap wrapped under the bottom plate and nail with 3 nails into each side of the Stud (use 6 nails for 12kN capacity) and 3 nails into each side of bottom plate.

Rafter to rafter connection - Nail Pryda SBS300 with 6 nails into each rafter.

Lintel fixing - Refer to "Lintel Fixing Schedule" on Pg 36 for installation procedure and further information.





All capacities are limit state design values and not characteristic strength therefore these may be compared directly to Pryda design software output.Capacities assume a minimum timber grade of SG8.

PRYDA STUD ANCHOR

Consent Doc. Ref.
6kN application **BP3** / 12kN application **BP4**

6KN OR 12KN CAPACITY FIXING

Features

6kN: One connector provides 6kN capacity fixing of wall stud to bottom plate.

12kN: Use 2 connectors, one each face of stud (eg. Boundary fire wall – single storey garage).

Able to be retrofitted if external wall lining / cladding already installed.

Specification

Code: SBA

Material: 1.5mm G300 Z275 Galvanised Steel

Nails: 35 x 3.15mm Pryda Product Nails

Screws: Type 17 12g x 35mm hex head galvanised screws

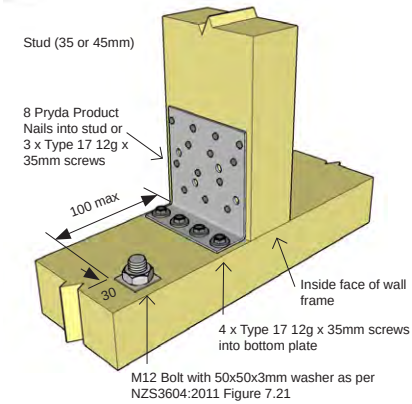
Installation

Locate fixing hard against face of stud and roughly central about stud width. Fix 4 screws down into bottom plate through the four holes in the narrow flange.

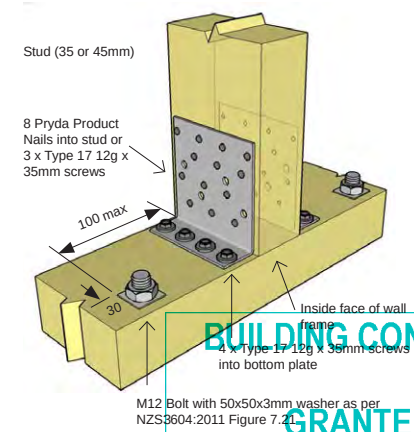
Nail with 8 nails supplied into stud (spread nails evenly over nailing area – not all nail holes will be filled).

Alternately 3x Type 17 12g x 35mm screws can be used. Note: A 6kN fixing of bottom plate to concrete (eg. One M12 bolt) is required within 100mm of the 6kN stud to plate fixing.

6kN - 1 x SBA



12kN - 2 x SBA



All capacities are limit state design values and not characteristic strength therefore these may be compared directly to Pryda design software output.Capacities assume a minimum timber grade of SG8.

LINTEL FIXING SCHEDULE

ACCEPTABLE SOLUTIONS IN CONJUNCTION WITH TABLES 8:14 & FIG 8:12 OF NZS3604:2011

Span Meters	Wind Zone	**LIGHT ROOF** Loaded Dimensions Meters					**HEAVY ROOF** Loaded Dimensions Meters				
		2	3	4	5	6	2	3	4	5	6
0.6	L	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1
	M	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1
	H	L1	L1	L1	L2	L2	L1	L1	L1	L1	L1
	VH	L1	L1	L2	L2	L2	L1	L1	L1	L2	L2
	EH	L1	L2	L2	L2	L3	L1	L1	L2	L2	L2
0.9	L	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1
	M	L1	L1	L1	L1	L2	L1	L1	L1	L1	L1
	H	L1	L1	L2	L2	L2	L1	L1	L1	L2	L2
	VH	L1	L2	L2	L3	L3	L1	L2	L2	L2	L2
	EH	L2	L2	L3	L3	L3	L2	L2	L2	L3	L3
1.2	L	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1
	M	L1	L1	L2	L2	L2	L1	L1	L1	L1	L1
	H	L1	L2	L2	L3	L3	L1	L1	L2	L2	L2
	VH	L2	L2	L3	L3	L3	L1	L2	L2	L3	L3
	EH	L2	L3	L3	L3	L3	L2	L2	L3	L3	L3
1.8	L	L1	L1	L1	L2	L2	L1	L1	L1	L1	L1
	M	L1	L2	L2	L2	L3	L1	L1	L1	L1	L2
	H	L2	L3	L3	L3	L3	L1	L2	L2	L3	L3
	VH	L3	L3	L3	L3	L4	L2	L3	L3	L3	L3
	EH	L3	L3	L3	L4	L4	L3	L3	L3	L3	L4
2.1	L	L1	L1	L2	L2	L2	L1	L1	L1	L1	L1
	M	L2	L2	L2	L3	L3	L1	L1	L1	L2	L2
	H	L2	L3	L3	L3	L3	L2	L2	L3	L3	L3
	VH	L3	L3	L3	L4	L4	L2	L3	L3	L3	L3
	EH	L3	L3	L4	L4	L4	L3	L3	L3	L4	L4
2.4	L	L1	L1	L2	L2	L2	L1	L1	L1	L1	L1
	M	L2	L2	L3	L3	L3	L1	L1	L1	L2	L2
	H	L2	L3	L3	L3	L4	L2	L2	L3	L3	L3
	VH	L3	L3	L4	L4	L4	L3	L3	L3	L3	L4
	EH	L3	L4	L4	L4	SED	L3	L3	L4	L4	L4
3	L	L1	L2	L2	L3	L3	L1	L1	L1	L1	L1
	M	L2	L3	L3	L3	L3	L1	L1	L2	L2	L2
	H	L3	L3	L3	L4	L4	L2	L3	L3	L3	L3
	VH	L3	L4	L4	L4	SED	L3	L3	L3	L4	L4
	EH	L3	L4	L4	SED	SED	L3	L4	L4	L4	SED
3.6	L	L2	L2	L2	L3	L3	L1	L1	L1	L1	L1
	M	L2	L3	L3	L3	L3	L1	L2	L2	L2	L3
	H	L3	L3	L4	L4	L4	L2	L3	L3	L3	L4
	VH	L3	L4	L4	SED	SED	L3	L3	L4	L4	L4
	EH	L4	L4	SED	SED	SED	L3	L4	L4	SED	SED
4.2	L	L2	L2	L3	L3	L3	L1	L1	L1	L1	L1
	M	L3	L3	L3	L3	L4	L1	L2	L2	L3	L3
	H	L3	L4	L4	L4	SED	L3	L3	L3	L4	L4
	VH	L4	L4	L4	SED	SED	L3	L4	L4	L4	SED
	EH	L4	L4	SED	SED	SED	L4	L4	L4	SED	SED
4.8	L	L2	L3	L3	L3	L3	L1	L1	L1	L1	L1
	M	L3	L3	L3	L4	L4	L1	L2	L2	L3	L3
	H	L3	L4	L4	L4	SED	L3	L3	L3	L4	L4
	VH	L4	L4	SED	SED	SED	L3	L4	L4	SED	SED
	EH	L4	SED	SED	SED	SED	L4	L4	SED	SED	SED

Notes:

Lintel spans and loaded dimensions measured in metres.

All frame nailing not indicated, refer to table 8.19 of NZS 3604:2011.

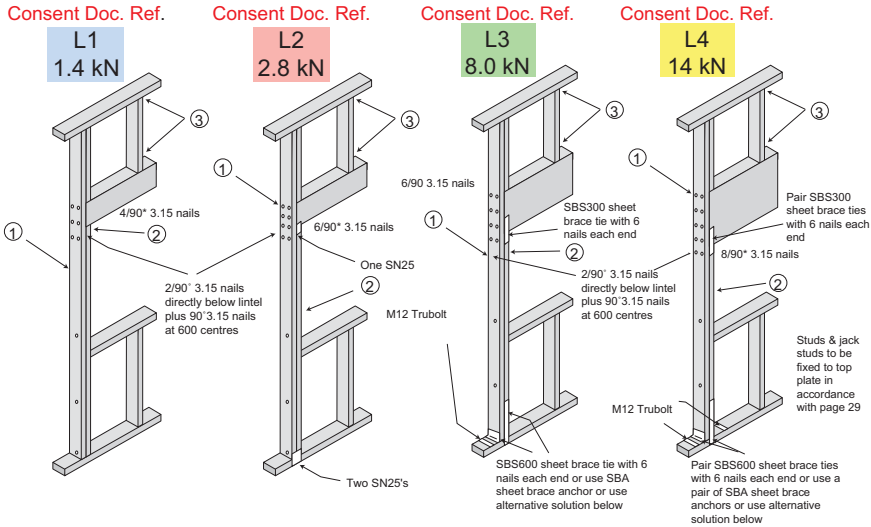
In all cases a 90mm thick external wall is assumed.

For girder truss loads use a minimum of: L3 where girder carries more than 10sq.m. of roof and L4 where girder carries more than 18sq.m. of roof.

600mm overhangs allowed for in the tables.

SED designates that a Specific Design is required.

ACCEPTABLE SOLUTIONS IN CONJUNCTION WITH TABLES 8:14 & FIG 8:12 OF NZS3604:2011



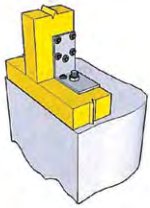
1. For trimming stud thickness refer to Table 8.5 NZS 3604:2011. Additional studs to that shown to have a minimum stud to stud fixing of 11/90*3.15 nails.
2. Where a double stud which provides support for a lintel is shorter by 400mm or more than the full stud height, its thickness shall not be included as contributing to the thickness of trimming studs.
3. Studs & jacks to be fixed to top plate in accordance with the Top Plate to Stud Fixing Guide on pg. 39. Same fixing is required for jack stud to lintel.

Alternative solution for L3 & L4 SBS use

400 strap taker 400 straps
3/ 30 x 3.15 na with 3/ 30 x 3.
6 / 30 x 2.5 mn with 6 / 30 x 2.
stud of each stud

All capacities are limit state design values and not characteristic strength therefore these may be compared directly to Pryda design software output.Capacities assume a minimum timber grade of SG8.

PRYDA BRACING ANCHOR



The Pryda Bracing Anchor (PBA) has been designed to be used in conjunction with gypsum wallboard manufacturers bracing systems, references or literature. The PBA can satisfy the hold down requirements and is a substitute for the pre-fitted double strap or other bracing anchors / brackets.

Product Code: PBA

Material: 5mm electro galv steel

Size: 85/85 x 5 x 50mm

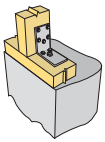
Packing: 10 sets per ctn (Set includes 2 x PBA plus 14 / 12g x 35mm T17 screws)

Features:

- Installation is quick and simple.
- No checking of timber frame to achieve a flush fitting of gypsum wallboard.
- PBA is a one piece anchor for either side of stud.
- Slotted bolt hole provides flexibility in bolt and bracket position ensuring a tight snug fit into stud and bottom plate.
- Can be retrofitted or installed at any stage prior to the fixing of interior gypsum wallboard.
- Allows easy and visible inspection.

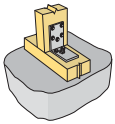
Installation:

- Identify where PBA is to be located from details below. Ensure PBA fits within the wall frame plane.
- Present PBA to junction of bottom plate and stud ensuring a snug fit to both surfaces referring to relevant floor installation detail below to ensure correct placement across face of bottom plate.
- Mark position of 15kN bolt or M12 screw using the PBA as a guide and remove PBA.
- Drill appropriate size hole for bolt or screw with reference to supplier's data sheet for correct hole size and use of the fastening.
- Place the PBA into position and fasten home the screw or bolt to a snug fit, ensuring face of PBA is tight against face of stud.
- Screw 5 / 12g x 35mm hex head tek screws in to the stud flange.
- Re-check the tightness of the M12 screw or 15kN bolt.
- Finally screw 2 / 12g x 35mm hex head tek screws into the bottom plate flange.



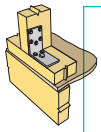
External Brace Wall

Minimum concrete edge distance shall be maintained in accordance with the 15kN proprietary fixing manufacturer's requirements.



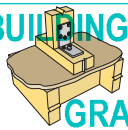
Internal Brace Wall

PBA shall be fixed centrally to the wall frame.



External Brace Wall

PBA shall be fixed centrally over a solid joist using an M12 x 150mm galvanised coach screw.



Internal Brace Wall

PBA shall be fixed centrally on the bottom plate using an M12 x150mm galv coach screw ensuring that screw is fixed centrally into a solid joist. Extra solid nog may be required to achieve solid fixing.

TOP PLATE TO STUD FIXING GUIDE

ALTERNATIVE SOLUTION TO NZS3604:2011 TABLE 8.18

It is proposed that Pryda Strapnails and Pryda Concealed Cleats be preferred as opposed to Pryda Z and U nails for ease of fixing and to lessen interference with the cladding.

TPO

0.7kN

TP1

1.7kN

TP2

2.5kN

TP3

6.0kN

TP3

4.7kN

TP3

6.0kN

Minimum Top Plate to Stud Joint Fixing Table for roof member 600, 900 & 1200 Centres										
Loaded Dimension (m)	Light Weight Roof Wind Zone					Heavy Weight Roof Wind Zones				
	L	M	H	VH	EH	L	M	H	VH	EH
2.0	TPO	TPO	TP1	TP2	TP3	TPO	TPO	TPO	TP1	TP2
3.0	TPO	TP1	TP2	TP3	TP3	TPO	TPO	TP1	TP2	TP3
4.0	TPO	TP2	TP3	TP3	TP3	TPO	TPO	TP2	TP3	TP3
5.0	TP1	TP2	TP3	TP3	TP3	TPO	TPO	TP2	TP3	TP3
6.0	TP2	TP3	TP3	TP3	TP3	TPO	TPO	TP3	TP3	TP3

Consent Doc Ref.	Fixing Capacity	Fixing Detail
TPO	0.7kN	2/End Nails
TP1	1.7kN	2/End Nails + MP2R4 Knuckle Plate
TP2	2.5kN	2/End Nails + MPSN2 Strapnail
TP3	4.7kN	2/End Nails + SN50L Strapnail
TP3	6.0kN	2/End Nails + NPPC8 with 3/T17 14g x 75mm hex head screws
TP3	6.0kN	2/End Nails + SST

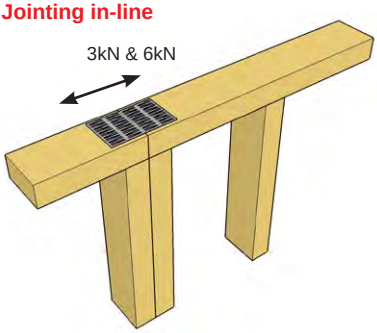
Notes:

- Refer to NZS3604:2011 Table 8.19 and 8.18.
- All truss to top plates to be fixed as per truss manufacturer's fixing schedule and details.
- SG8 min dry wall framing with moisture content <18%.
- Studs at 600mm centres. For 400mm stud centres divide loaded dimension by 1.5.
- Nails specified are 90 x 3.15mm power driven or 100 x 3.75mm hand driven.
- Assumed that the top plate is 45mm.
- Ceiling Plate must be fixed to the top plate with a connection meeting and exceeding the capacity of the stud and top plate connection

TOP PLATE JOINTING GUIDE

As per Cl.8.7.3 of NZS3604:2011

Jointing in-line

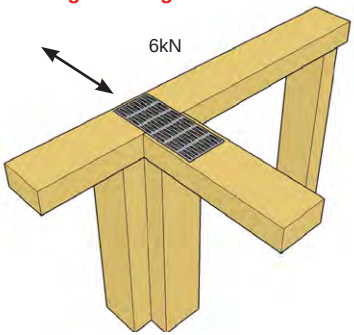


Pryda Connectors to achieve capacities

3kN: SN50 or MP6R5

6kN: SN50L or MP6R10

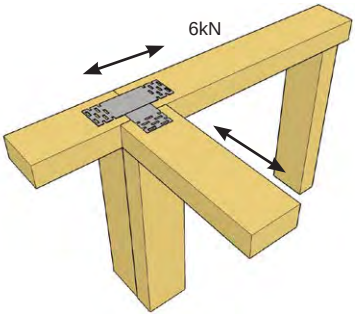
Jointing at 90deg



Pryda Connectors to achieve capacities

6kN: SN50L or MP6R10

Jointing in-line and 90deg



Pryda Connectors to achieve capacities

6kN: 2 x SN50L

FRAME FIX

Alternative Solution to NZS3604:2011 C8.5.1.6 and C8.7.5

Alternative solution where strengthening of top plate or stud is required after a notch or hole has been made, refer to NZS3604:2011 C8.5.1.6 and C8.7.5.

Product Code: PFF

Material: 1.65mm G300 Z275 galvanised steel

Durability: Suitable for use in closed environment as per table 4.1 NZS3604:2011

Usage: Designed to reinstate top plate or stud to FULL STRENGTH after a hole size up to 60mm has been drilled through the member.

- For internal vacuum and air conditioning systems
- Unique design provides greater top plate uplift resistance capacity
- Quick and easy to install to either top plate or stud
- Leaves clean faces to outside edges of the timber frames
- Fixing is by Type17 hex head screws
- Can be used with 90x45mm and 140x45mm

Installation:

Use Type17 14g x 75mm hex head screws when fixing to top plate with a top plate packer. Use Type17 12g x 35mm hex head screws when fixing to stud.

Service hole shall be centred across the timber member and the hole to be a maximum of 60mm diameter.

Maximum stud height shall be 2400mm.

Service hole can be made in any position along the top plate or stud provided that the hole edge is no closer than 45mm from a stud or nog/dwang.

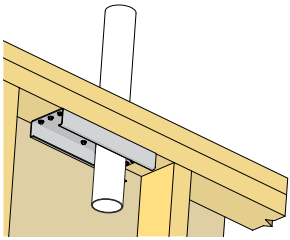
PFF shall be fitted to the inside of the frame to ensure clean outside faces of the timber.

All screws holes shall be filled.

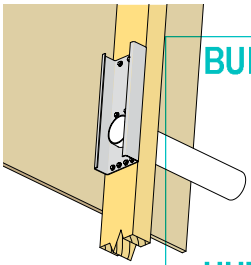
Not intended for use with 70 x 45mm timber.

Intended for use in internal ‘closed space’ as per Table 4.1 of NZS3604:2011.

Top Plate Application



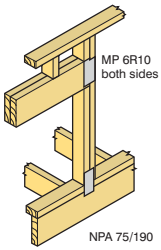
Stud Application



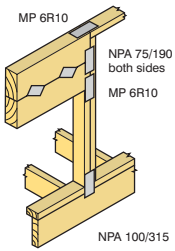
CLAW BEAM LINTELS

Claw Beams are engineered timber beams made of commonly available timber sizes which are mechanically joined together to make up large sections for long spans. The individual members are held together by Pryda Claw nail plates. Clawbeams are manufactured by licensed Pryda Fabricators.

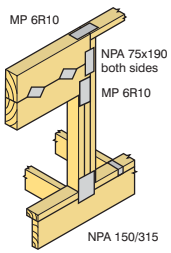
Consent Doc. Ref. **L9**



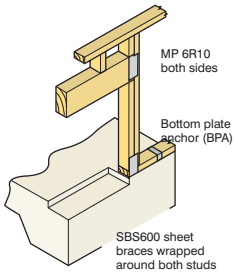
Consent Doc. Ref. **L10**



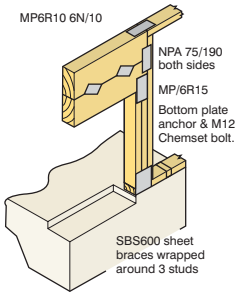
Consent Doc. Ref. **L11**



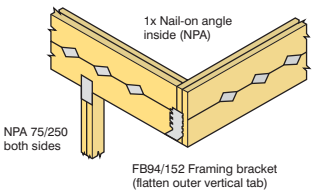
Consent Doc. Ref. **L12**



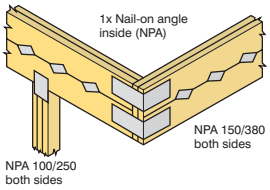
Consent Doc. Ref. **L13**



Consent Doc. Ref. **L14**



Consent Doc. Ref. **L15**

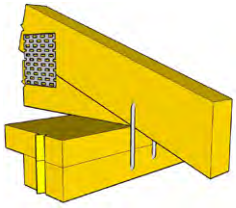


Roof Type	Beam Depths For Fixing Details Shown Above						
	L9	L10	L11	L12	L13	L14	L15
Light Roof standard trusses	150-200	250-300	350-600	150-200	250-300	-	-
Light Roof supported by Girder	-	150-250	350-600	-	150-300	-	-
Heavy Roof standard trusses	150-200	250-450	500-600	150-200	250-600	-	-
Heavy Roof supported by Girder	150-200	250-450	500-600	150-200	350-600	-	-
Light Roof cantilever	-	-	-	-	-	150-200	250-350
Heavy Roof cantilever	-	-	-	-	-	150-200	250-350

Details as specified are suitable for all wind conditions up to and including Very High wind, Extra High wind requires special engineering design.

ROOF COMPONENT TIE DOWN CONNECTIONS

Z-Nail

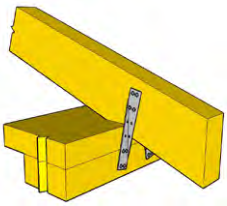


Product Code: MPZR, MPZL & MPZU
Durability: Suitable for all roof spaces that are closed. Stainless required in open soffits. Compliant with Table 4.1 of NZS3604:2011.
Application: Used in pairs when employed as a truss tie down.

Consent Doc. Ref	Product Code	Capacity Up Pair
Z	MPZR & MPZL	2.6kN
U	MPZU	2.4kN

Note: The Z-nails should extend to the lower wall plate and may not terminate in the ceiling plate.

Ceiling & Purlin Hanger

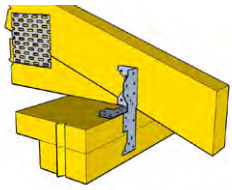


Product Code: CPH190 -LH & -RH
Durability: Suitable for all closed roof spaces. Stainless required in open soffits. Compliant with Table 4.1 of NZS3604:2011.
Application: Usually used in pairs when employed as a truss tie down. All holes filled with 35mm x 3.15mm Pryda product nails.

Consent Doc. Ref	Product Code	Capacity Up Pair
CP9	CPH190	5.0kN

Note: The fixing is only used as a left and right handed pair.

Multigrip (long)



Product Code: MGL
Durability: Suitable for all roof spaces that are closed. Stainless required in open soffits with MG/S with single top plate. Compliant with Table 4.1 of NZS3604:2011.
Application: All holes filled with 30mm x 3.15mm Pryda product nails.

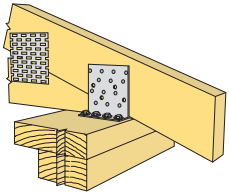
Consent Doc. Ref	Product Code	Capacity
X	MGL	2.6kN
2X	MGL (pair)	5.2kN

Note: MG (short) shall not be used in a double top plate scenario.

All capacities are limit state design values and not characteristic strength therefore these may be compared directly to Pryda design software output. Capacities assume a minimum timber grade of SG8.

ROOF COMPONENT
TIE DOWN CONNECTIONS

Concealed Purlin Cleat

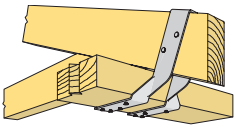


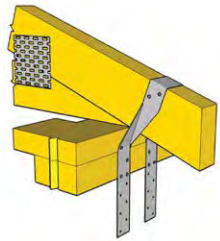
Product Code: NPPC4, NPPC6, NPPC8 or SBA
Durability: Suitable for all closed roof spaces. Compliant with Table 4.1 of NZS3604:2011.
Application: All holes in large flange filled with 35 x 3.15mm Pryda product nails or 12g x 35mm hex head screw. In small flange either Type 17 12g x 35mm or 14g 75mm hex head galv. screws.

Consent Doc. Ref	Product Code	Capacity Up Single	Capacity Up Double
NC4	NPPC4	3.2kN	6.4kN
NC6	NPPC6	4.6kN	9.2kN
NC8	NPPC8	6.0kN	12kN

Note: 12g x 35mm screws can be used in single top plate.
14g x 75mm screws required in top plates more than 45mm thick.

Cyclone Strap





Product Code: MPQHS4, MPQHS6, QHS9
Durability: Suitable for all closed roof spaces. Stainless not available. Compliant with Table 4.1 of NZS3604:2011.
Application:

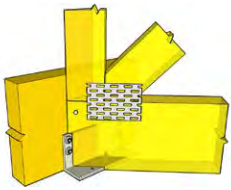
Consent Doc. Ref	Product Code	Capacity Up Single	Capacity Up Double
Q4	MPQHS4	5.0kN	10kN
Q6	MPQHS6	6.3kN	12.6kN
Q9	QHS9	6.3kN	12.6kN
Q6*	MPQHS6	11.2kN	22.4kN
Q9*	QHS9	11.2kN	22.4kN

Note: Values based on 6 nails per leg, except for MPQHS4 which can only hold 4 nails per leg
*With strap wrapped under support member.
Single windstrap to be placed on the outside face of wall. The ceiling plate requires notching on the inside when used in double strap scenario.

All capacities are limit state design values and not characteristic strength therefore these may be compared directly to Pryda design software output. Capacities assume a minimum timber grade of SG8.

ROOF COMPONENT TO ROOF COMPONENT CONNECTIONS

Variable Skew Hanger

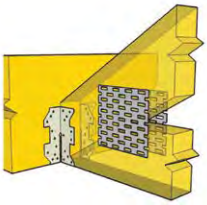


Product Code: LVSIA
Durability: Suitable for all closed roof spaces. Stainless steel not available. Compliant with Table 4.1 of NZS3604:2011.

Application: Suitable for short span trusses only to accommodate angles. Notch truss to achieve flush finish. Top flange - fill all screw holes with Type 12g 17 x 35mm hex head screws. Bottom flange - fix with one 6g 30mm type 17 bugle head screw. Skew nail fix top of bottom chord to bearer.

Consent Doc. Ref	Product Code	J5 Capacity Up	J5 Capacity Down
VS	LVSIA	1.3kN	2.8kN

Multigrip



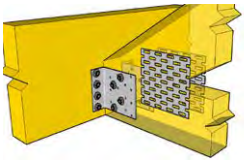
Product Code: MG*/MGL
Durability: Suitable for all closed roof spaces. Stainless steel required in open roofs in Sea spray zone and zone 1 in order to be compliant with Table 4.1 of NZS3604:2011.

Application: Variable width 90 degree connection option. Used in pairs when employed as a truss to truss fixing. All holes filled with 35mm x 3.15mm Pryda product nails.

Consent Doc. Ref	Product Code	J5 Capacity Pair Up	J5 Capacity Pair Down
MG	MG	5.1kN	4.1kN

Note: Long multigrip (MGL - 125mm long) to be used when top chord of supported truss is deeper than 90mm.

Concealed Purlin Cleat

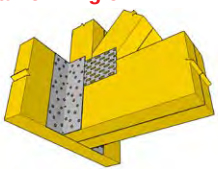


Product Code: NPPC8
Durability: Suitable for all closed roof spaces. Compliant with Table 4.1 of NZS3604:2011.

Application: Variable width connection utilising screws. All screw holes filled.

Consent Doc. Ref	Product Code	J5 Capacity Pair Up	J5 Capacity Pair Down
NC8	NPPC8	8.6kN	6.8kN

Nail-on Angle



Product Code: NPA
Durability: Suitable for all closed roof spaces. Compliant with Table 4.1 of NZS3604:2011.

Application: Variable width connection utilising nails. Suitable for a high truss uplift and gravity loads. All nail holes to be filled

Consent Doc. Ref	Product Code	J5 Capacity Pair Up	J5 Capacity Pair Down
NPA	NPA	20.5kN	16.4kN

The down capacities provided above are for 1.2G+1.5Qr (Dead+Roof Live Load). All capacities are limit state design values and not characteristic strength therefore these may be compared directly to Pryda design software output. Capacities assume a minimum timber grade of SG8.

ROOF PLANE DIAGONAL BRACING

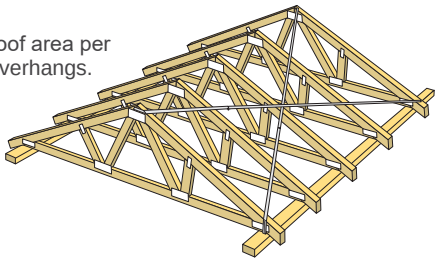
AS PER NZS3604:2011 SECTION 10

ROOF BRACE Definition

A “roof brace” comprises a diagonal pair of Pryda Strap Braces intersecting at 45°, connecting the ridge of the roof to the top plate of the wall with both ends fixed as shown in the diagrams below. A “roof brace” can also be a valley or hip connected continuously.

Light Weight Roofs

Require ONE “roof brace” in each plane of the roof area per 50m² of plan roof area which also includes any overhangs.

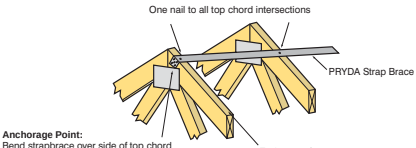


Heavy Weight Roofs

Require ONE “roof brace” in each plane of the roof area per 25m² of plan roof area which also includes the overhangs.

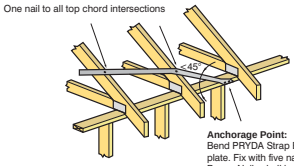
Note: Porches, dormers and small roof planes of less than 6m² do not require bracing.

END FIXING DETAIL AT APEX



Anchorage Point:
Bend strapbrace over side of top chord and fix PRYDA Strap Brace end with five nails. Nails shall be no closer than 10mm to the edge of the timber

END FIXING DETAIL TO TOP PLATE



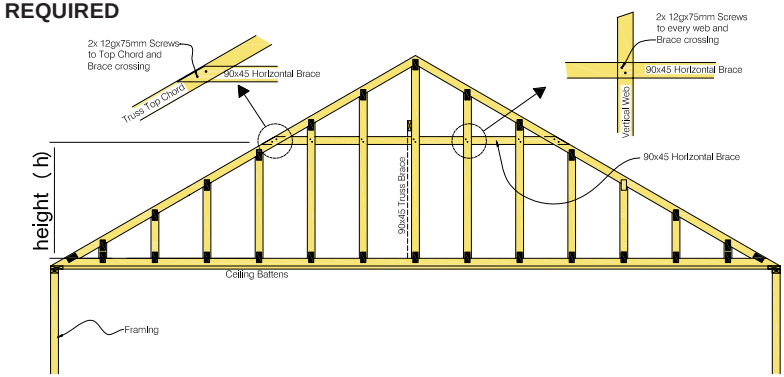
Anchorage Point:
Bend PRYDA Strap Brace over side and under top plate. Fix with five nails to each end of PRYDA Strap Brace. Nails shall be no closer than 10mm to the edge of the timber

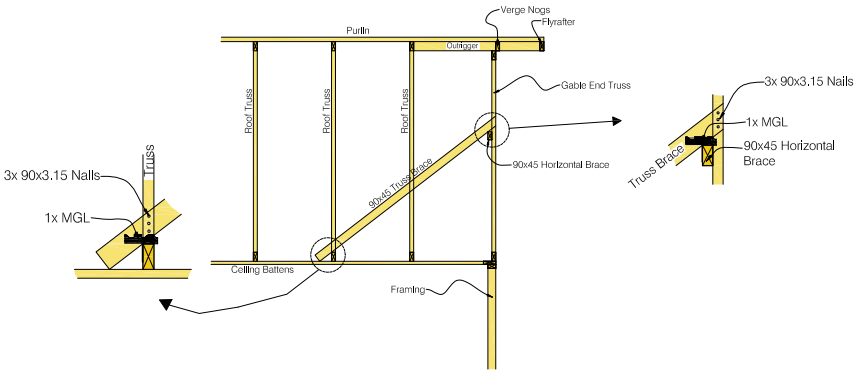
Installation Notes

1. The distribution of roof braces should be performed in an even and balanced fashion
2. For purlins / battens 50mm or deeper, the roof brace shall occupy the plane directly on top of the top chords or rafters
3. Pryda Strap Brace shall be used for spans up to 12m. For spans over 12m Pryda Mexibrace shall be used
4. Nail off Pryda Strap Brace at apex end with 5 nails. Layout Pryda Strap Brace at 45° and nail off at heel end with 5 nails
5. Tension Pryda Strap Brace using Pryda Tensioner before final nailing of one nail per top chord crossing

GABLE TRUSS WEB LATERAL BRACING GUIDE

MAXIMUM HEIGHT (H) FOR VERTICAL TRUSS WEB BEFORE A LATERAL BRACE IS REQUIRED





	Web size (mm) SG8 or better	Wind Zone				
		Low	Medium	High	Very High	Extra High
Single Truss	70x45 SG8 at 400crs	2200	2000	1750	1600	1500
	90x45 SG8 at 400crs	2400	2150	1900	1850	1650
	70x45 SG8 at 600crs	1900	1700	1500	1400	1250
	90x45 SG8 at 600crs	2100	1900	1650	1500	1400
Double Trusses	2/70x45 SG8 at 400crs	2800	2550	2250	2050	1900
	2/90x45 SG8 at 400crs	3050	2750	2450	2250	2100
	2/70x45 SG8 at 600crs	2450	2200	1950	1750	1650
	2/90x45 SG8 at 600crs	2650	2400	2100	1950	1800

PRODUCT SUBSTITUTION

The Building Act was amended in July 2009 to provide for minor variations to building consents. Subsequently the "Building (Minor Variations) Regulations 2009 came into effect on 1 February 2010.

The reasons for amending the Act to allow for minor variations were to:

- Formalise a number of pragmatic and efficient practices already being operated by some BCAs to deal with minor changes during construction.
- Improve national consistency in BCA practices.
- Enable BCAs to lawfully distinguish between minor and other more significant changes to building consents and treat them differently.
- Provide time and cost savings for building owners, builders, BCAs and others when dealing with minor changes to building work for which a consent has already been granted.

Examples of variations that are minor to building consents include:

- Substitute one internal lining for another.
- Minor wall bracing changes.
- A change to a component (for example fixing bracket).
- A construction change (for example the framing method around a window when the window is changed to a door).

Where a minor variation is proposed all parties, eg designers, builders, BCA's, are responsible for managing the process and early communication is paramount. In most cases the applicant will need to supply specific product information to show compliance with the building.

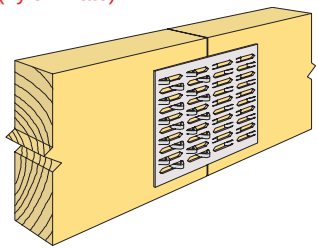
All such information for Pryda products is included within this builders guide.

For any additional product information please contact Pryda on 0800 88 22 44.

Andre' van Blerk
BSc (Eng) CPEng CMEngNZ IntPE
Senior Structural Engineer
Pryda NZ (A division of ITW)

PRYDA SUBSTITUTION GUIDE

Knuckle Nail plates
(Tylok Plate)

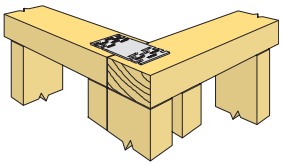


Competitor Code	Pryda Code	Dimensions
2T4	MP2R4	33 x 63mm
2T5	MP2R5	38 x 63mm
4T5	MP4R5	38 x 127mm
6T5	MP6R5	38 x 190mm
8T5	MP8R5	38 x 254mm
4T10	MP4R10	76 x 127mm
6T10	MP6R10	76 x 190mm
8T10	MP8R10	76 x 254mm
10T10	MP10R10	76 x 317mm
-	MP4R16	134 x 127mm
6T20	MP6R16	134 x 190mm

Knuckle Nail plates Coil
(Tylok Coil)

Competitor Code	Pryda Code	Dimensions
Coil T10	NCR10	76mm x 12.7m
Coil T20	NCR16	134mm x 8.45m

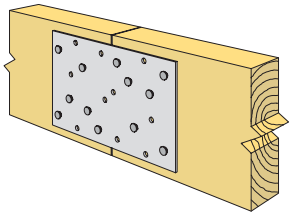
Strap Nail
(Strap Nail)



Competitor Code	Pryda Code	Dimensions
SNS	SN25 or MPSN2	25x100mm
—	SN50 or MPSN50	50x100mm
—	SN50L	50x150mm

** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

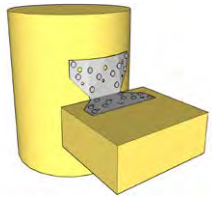
Nail-on Plate
(Nail On Plate)



Competitor Code	Pryda Code	Dimensions
—	NPA75 BAR^	1 x 75 x 1260mm
—	NPA75/190	1 x 75 x 190mm
—	NPA75/250	1 x 75 x 250mm
—	NPA75/315	1 x 75 x 315mm
—	NPA75/380	1 x 75 x 380mm
NP1	NPA100BAR^	1 x 100 x 1260mm
NP120	NPA100/190*	1 x 100 x 190mm
NP132	NPA100/315	1 x 100 x 315mm
—	NPA150/315	1 x 150 x 315mm
RAFTERSPLICE	NPB75/380	2 x 75 x 380mm
—	NPB75 BAR	2 x 75 x 1260mm
NP2	NPB100BAR	2 x 100 x 1260mm
—	NPB150BAR	2 x 150 x 1260mm

^ Only available in stainless steel

Pole to Girt Bracket
(Girt Plate)

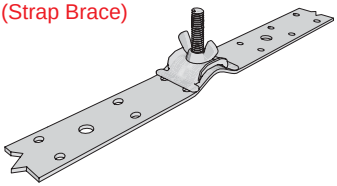


Competitor Code	Pryda Code	Dimensions
GIRTPLATE	NPP2G*	—

** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

Strap Brace

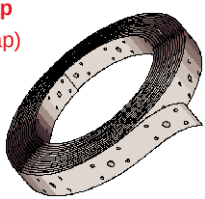
(Strap Brace)



Competitor Code	Pryda Code	Dimensions
SB10	SB10	25 x 0.8mm x 10m
SB30	SB30	25 x 0.8mm x 30m
SB30T	SB30T	25 x 0.8mm x 30m 5x Tensioners
SBTENS	SBT*	Tensioners
SB15/S		25x0.8mm x15m stainless

Maxi Strap

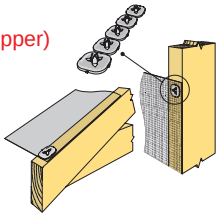
(Maxi Strap)



Competitor Code	Pryda Code	Dimensions
MB15	SBI/15	50 x 0.8mm x 15m
MB30	SBI*	50 x 0.8mm x 30m
MBTENS	SBI/T	Tensioners

Fixes

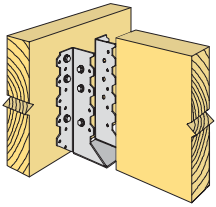
(Little Gripper)



Competitor Code	Pryda Code	Dimensions
LG	SFI	Pryda Fix 30 x 30mm

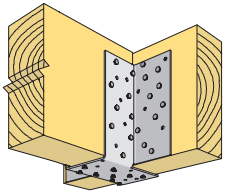
** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

Framing Brackets
(Joist Hangers)



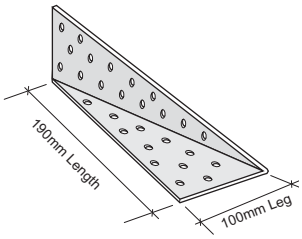
Competitor Code	Pryda Code	Dimensions
JH4790	MPFB4590*	47mm x 77mm
JH47120	MPFB45120*	47mm x 111mm
JH47190	MPFB45180*	47mm x 177mm
JH5290	MPFB5274	52mm x 74mm
JH52120	MPFB52124*	52mm x 124mm
JH52190	MPFB52174	52mm x 177mm
—	FB65/170	65mm x 170mm
JH95	FB94/152*	94mm x 152mm
—	FB90200	90x195mm

Heavy Duty Joist Hangers
(Split Hangers)



Competitor Code	Pryda Code	Dimensions
SPH180	JHH100	For 95mm timber
SPH220	JHHS	Adj. width
	JHSS212	212mm
	JHSS275	275mm

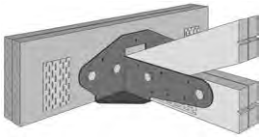
Nail-on Angle & Diagonal Cleat
(Diagonal Cleat)



Competitor Code	Pryda Code	Dimensions
NP160F	NPA	50x50x1x190mm
N21	NPD	Ex 190 x 100 x 1mm plate

** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

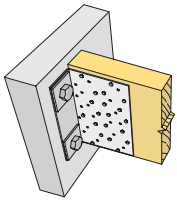
Truss Boots



Competitor Code	Pryda Code	Dimensions
—	TB45/16	Truss Boot
—	TBHD75	Heavy Duty Truss Boot

Tim-Con Brackets

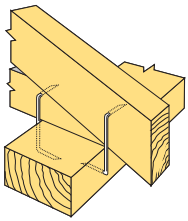
(Concrete Fixing Cleat)



Competitor Code	Pryda Code	Dimensions
CF1	TCF130	130 x 2.0mm
CF2	TCF190	190 x 2.0mm

Z & U Nails

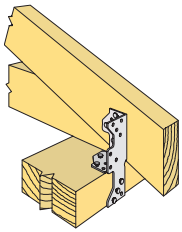
(Wire Dogs)



Competitor Code	Pryda Code	Dimensions
—	MPZL*	—
—	MPZR*	—
—	MPZU*	—

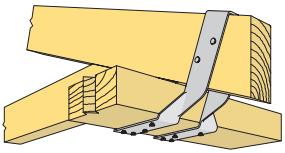
** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

Multigrip
(Multigrip)



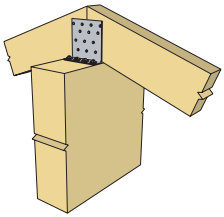
Competitor Code	Pryda Code	Dimensions
—	MG* or MPMG*	36x36x100mm
MGS	MGL	36x36x132mm

Cyclone Straps
(Cyclone Ties)



Competitor Code	Pryda Code	Dimensions
CT400	MPQHS4	32 x 1.2 x 400mm
CT600	MPQHS6	32 x 1.2 x 600mm
—	QHS9	32 x 1.2 x 900mm

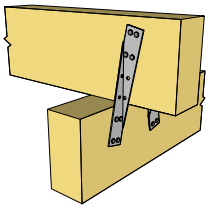
Concealed Purlin Cleats
(Concealed Purlin Cleats)



Competitor Code	Pryda Code	Dimensions/Rating
CPC40	NPPC4*	40 x 2.0mm
—	NPPC6	60 x 2.0mm
CPC80	NPPC8*	80 x 2.0mm
SBP	SBA	6kN / 12kN
9KNTTP	TTP9KN	9kN
16KNTTP	TTP16KN	16kN

** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

Ceiling & Purlin Hanger
(Ceiling Tie)

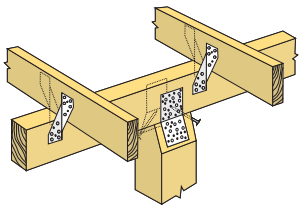


Competitor Code	Pryda Code	Dimensions
CT200LH	CPH190-LH*	190 x 25mm LH
CT200RH	CPH190-RH*	190 x 25mm RH

Easy Stud Tie

Competitor Code	Pryda Code	Dimensions
STUDSTRAP	SST	185/65x30mm

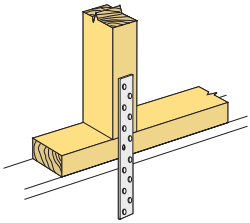
6kN & 12kN Pile Bearer Kit
(Subfloor Fixings)



Competitor Code	Pryda Code	Dimensions
6KNH	PBK6/S	6 kN Severe Corrosion
12KNH	PBK12/S	12 kN Severe Corrosion
CT160HD	NPD150/63/S	150 x 50mm

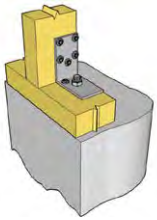
** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

Sheet Brace Strap



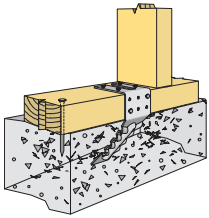
Competitor Code	Pryda Code	Dimensions
SBS3100	SBS300*	25x1x300mm
SBS4100	SBS400*	25x1x400mm
SBS6100	SBS600*	25x1x600mm
	SBS30M	25x1x30m
SBP	SBA	6kN Anchor

Pryda Brace Anchor
(Gib Handibrac®)



Competitor Code	Pryda Code	Dimensions
Gib HandiBrac	PBA	50x5x85/85mm

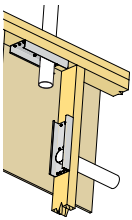
Bottom Plate Tie Down
(Bottom Plate Fixing Anchor)



Competitor Code	Pryda Code	Dimensions
BPA	BPA	50x1.2x235mm

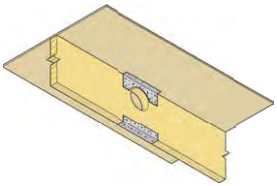
** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

Frame Fix
(Top Plate / Framing Stud Stiffener)



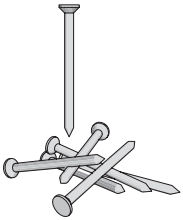
Competitor Code	Pryda Code	Dimensions
TPS & FSS	PFF	85x1.6x240mm

Stren-joist



Competitor Code	Pryda Code	Dimensions
—	NPSJ	3 pce kit for 45mm
	NPSJD	3 pce kit for 90mm

Product Nails



Competitor Code	Pryda Code	Dimensions
PN300500	OSNGB	500gm Clam

Screws

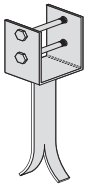
Competitor Code	Pryda Code	Dimensions
SC3512DG	HH1235G*	12g x 35mm type 17
SC7514EG	HH1475S	14g x 75mm type 17

** All available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

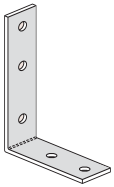
Structural Brackets

Rag Strap

Post Support



Angle Brackets



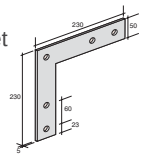
Strap

Competitor Code	Pryda Code
B78	SBK3■
B79	SBK3H■
B75	SBK4■
B195	SBK5■
B197	SBK6■
B138	SBK8■
B135	SBK9■
B12	SBK15
B14	SBK16■
B25	SBK17■
B28	SBK18■
B351	SBK10
B51	SBK10A■
B52	SBK11A
B53	SBK12A
B350	SBK14
B50	SBK14A■
—	SBK34
B54	SBK52A
B55	SBK53
B58	SBK53A
—	SBK22■
B85	SBK23■
B88	SBK25■
B35	SBK27■
B38	SBK28

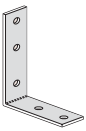
** Electroplated. ■ Also available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

Structural Brackets

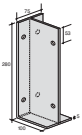
L Bracket



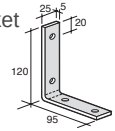
Angles



Beam Support

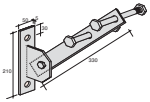


Shelf Bracket

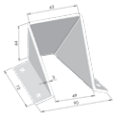


Angles Gusseted

Pole Brace



Fence Stay



Competitor Code	Pryda Code
B45	SBK29■
B48	SBK30
B175	SBK31■
B176	SBK31A■
—	SBK32■
B177	SBK33■
B178	SBK33A■
B109	SBK38■
B98	SBK38A■
—	
B553	SBK41
B554	SBK42
B567	SBK50
B163	SBK36
B65	SBK55
B68	SBK55A
B165	SBK56
B145	SBK57■
B155	SBK37
BSB1	SBKFS

** Electroplated. ■ Also available in stainless steel. Please Note: Whilst reference is made to competitor products it is intended as best fit only and may not be an identical match - if in doubt check.*

BC220141

BUILDING CONSENT

GRANTED
28/03/2022

HUTT CITY COUNCIL

www.pryda.co.nz

FOR MORE INFORMATION CALL 0800 88 22 44 OR EMAIL INFO@PRYDA.CO.NZ

VER DEC 2020

HUTT CITY
TE AWA KAIRANGI