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PROJECT SPECIFICATION.

Proposed New Dwelling for

Niall & Nicole Huxtable-Jones.

12 Leven Stream Lane.

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2 GENERAL

2.1 DIMENSIONS

The cross section dimensions of components or fixings quoted in this Standard are those deemed to be adequate for the particular application. Identical material of larger dimensions may be used unless specifically excluded.

2.2 TOLERANCES

Tolerances shall be as given in table 2.1.

2.3 TIMBER AND WOOD-BASED BUILDING COMPONENTS

2.3.1 NZS 3602

The timber species, preservative treatment, in-service moisture range and their end use environment shall comply with NZS 3602.

2.3.2 Framing grades

The *framing* grades to be used with this Standard shall be as follows. The properties for these grades, except No. 2 Framing, are as specified in NZS 3603 and as defined in *structural grade (SG)* in 1.3.

(a) Dry Timber
  (i) SG 6;
  (ii) SG 8;
  (iii) SG 10; or
  (iv) No. 2 Framing to NZS 3631 is allowed for *non-loadbearing walls* as given in 8.5.1.1(b).

(b) Wet Timber
  (i) SG 6 (Wet); or
  (ii) SG 8 (Wet).

SG 6 (Wet) Framing can be used as if it was dry SG 6 Framing provided the conditions of 2.3.4 are met. SG 8 (Wet) is for wet-in-service conditions and cannot be used as SG 8 when dry.

Where different member sizes, *spans* or other design properties apply for the different grades, the Standard specifies the different requirements necessary. Where such distinction is not given then the member sizes, *spans* or other design properties given apply equally to all grades.

C2.3.2

All structural grades for house framing are now verified grades in accordance with NZS 3622 and have been renamed SG 6, SG 8, SG 10, SG 6 (Wet) and SG 8 (Wet) with properties meeting those currently specified in NZS 3603. The renaming simplifies structural grading for the market because there will be no distinction between framing timber which is machine graded and verified, MSG, or visually graded and verified, VSG. The renaming replaces No.1 Framing with SG 6.

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Table 2.1 – Timber framing tolerances

Item	Tolerances
Deviation from the position shown on plan for a building	15 mm
Deviation from vertical	15 mm per 2 storey height (5 mm per 2.4 m)
Deviation from vertical for buildings in excess of 2 full storeys	20 mm
Relative displacement between loadbearing walls in adjacent storeys intended to be in vertical alignment	5 mm
Deviation from line in plan: (a) In any length up to 10 m (b) In any length over 10 m	 5 mm 10 mm total
Deviation from horizontal: (a) In any length up to 10 m (b) In any length over 10 m	 5 mm 10 mm total
Straightness of corners (where 2 walls meet at right angles) Other studs (gradual bow)	2 mm in 2.4 m in both studs 6 mm in 2.4 m
Wall framing: (a) At mid-height under 3 m long horizontal straight edge (b) At mid-height under 1.3 m long horizontal straight edge	 6 mm gradual bow 1.5 mm out of line

2.3.3 Separation

As shown in figure 2.1 *framing* timbers shall be separated from direct contact with concrete or masonry by either:

(a) A free-draining air space of not less than 12 mm; or

(b) A bituminous *damp-proof course (DPC)* or other suitable impervious material overlapping the timber by at least 6 mm (see also 4.3.3).

2.3.4 Green and dry timber

This Standard applies to Radiata pine and Douglas fir. The design solutions are for timber which is dry (maximum moisture content 18 %) throughout its design life. Timber may be installed green provided non-vertical members are propped and are not subjected to design loadings until they are dry. This does not include SG 8 (Wet).

The exceptions to the requirement that timber remain dry in service are as follows: *piles* to section 6, *bearers* to table 6.4(b), *stringers* to section 6, *joists* to table 7.1(b), cantilevered *balcony* floor *joists* to table 7.2, *posts* to section 9 and timbers under *roof* overhangs (i.e. the exposed ends of *rafters, purlins, battens* and outriggers) to sections 10 and 15. These members can be installed either dry or green and can be wetted in service.

The cross-section dimensions of timber given in the Standard are the actual minimum dried sizes that shall be used. Where green timber is used its dimensions shall be no less than the green gauged equivalent size given below:

Actual minimum dried size (mm)	35	45	70	90	140	190	240	290
Green gauged equivalent size (mm)	37	47	69	94	144	194	244	294

C2.3.4

The Standard's provisions may be applicable to timbers other than Radiata pine and Douglas fir such as other softwood species. Such use however, needs to be subject to demonstration of adequate structural performance and durability.

Over recent years framing practice has moved from predominantly green gauged framing to dry sizes. Further, those dry sizes are based on the Australian dried softwood sizes rather than the dry dressed sizes specified in NZS 3601. There are significant differences between these two sets of dried sizes in sizes 200 mm and over. To avoid confusion, NZS 3604, including its tables, now gives the actual minimum dried size based on the Australian sizes. This brings the tables into line with Australian practice and is simpler for the consumer.

Continued...

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The only exceptions to these requirements are for *piles* and *battens* which shall be sawn timber to the sizes required in 6.4 and 10.2.1.16 respectively.

2.3.5 Call sizes

Where the Standard specifies members by call size those sizes shall be read as the actual minimum dried sizes as given below:

Call sizes (mm)	25	40	50	75	100	150	200	250	300
Actual minimum dried size (mm)	19	35	45	70	90	140	190	240	290

2.3.6 Processed components

Wood-based components (e.g. particleboard, fibreboard) shall be manufactured to AS/NZS 1860.

2.3.7 Flooring timber

Wood-based components used for flooring shall be in accordance with AS/NZS 1860. These components shall be no closer to the ground than 550 mm and shall be protected from exterior exposure, and interior moisture.

2.3.8 Plywood

Plywood shall be manufactured to AS/NZS 2269 (Parts 0 to 2).

2.3.9 Engineered wood products

2.3.9.1

Engineered wood products shall be either laminated veneer lumber (LVL), or glue laminated timber manufactured using Radiata pine or Douglas fir.

2.3.9.2

LVL shall be manufactured in accordance with AS/NZS 4357 (Parts 0 to 4).

2.3.9.3

Glue laminated timber shall be manufactured in accordance with AS/NZS 1328 (Parts 1 and 2).

2.3.9.4

The preservative treatment for engineered wood products shall comply with NZS 3602 provided however that where engineered wood products are not already specified, the level of treatment shall be the same as that required for kiln-dried Radiata pine *structural grades* to comply with NZS 3602.

2.3.9.5

Engineered wood products may be used as a direct substitute for SG 6, 8 or 10 provided that they are of the same finished size as the member to be substituted and that the strength and stiffness properties have been verified and marked in accordance with NZS 3622 and are no less than the strength and stiffness properties of the grade to be substituted.

NZS 3604 does not provide design solutions for timber loaded in situations where prolonged high moisture contents can be expected, except for the members specifically noted in 2.3.4. However, timber that is graded and installed green, namely SG 6 (Wet) framing, or timber that has been installed dry and become wet during the building process, may still be used with the Standard, provided it is propped and dried in place before being loaded and remains dry in service from that point on.

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C2.3.9.6

The intention of 2.3.9.6 is to allow LVL or glue-laminated product to be used in place of solid timber framing members that are already within the scope of NZS 3604. Such allowance means that smaller or stronger section sizes will be available for use in areas where available space is a limitation.

So long as the resultant load from the member does not exceed the limitations of the clause this should also provide a means of achieving wood-based product lintels for larger span openings such as garage doors.

The expectation is that supporting documentation will include a producer statement (design) from a chartered professional engineer as the supporting documentation for the engineering basis of the selection charts or software used.

2.3.9.6

Proprietary grades and sizes of engineered wood products may be used for *framing* members in this Standard providing that:

(a) The *framing* member is within the scope of this Standard;

(b) The loadbearing reaction of the *framing* member shall not exceed 16 kN in a downwards direction or 16 kN in an upwards direction; and

(c) The selection charts or software used for the selection of the engineered wood product have as a minimum been engineered in accordance with B1/VM1.

Supporting documentation shall be provided by the author of the selection chart or software package to demonstrate compliance with this clause.

2.4 FASTENINGS AND FABRICATION

2.4.1 General

All parts of the building shall be securely fastened in accordance with 2.4.2, in order to resist all forces likely to be encountered during construction, or during the expected life of the building and to ensure that the building as a whole acts as a single structural entity.

2.4.2 Fastenings and connections

Fastenings and connections shall be as specified in the relevant clause of this Standard or have an equivalent *capacity* as specified in the relevant clauses and tables of this Standard.

2.4.3 Tolerances

All timbers shall be set true to the required lines and levels with all mitres, butts, laps, housings, and other functions cut accurately so as to provide full and even contact over all bearing surfaces. Timber *framing* tolerances shall be as given in table 2.1.

2.4.4 Nails (other than those used to attach roofing materials)

C2.4.4.1

The tables and figures of earlier editions of NZS 3604 specified 100 x 3.75 mm hand-driven nails and gave capacities for alternative fixings. The nail fixing capacities in the tables have been updated to reflect the common use of power-driven nails. Recent testing has been based on 90 x 3.15 mm power-driven nails. Where these are specified in the tables, 100 x 3.75 or 100 x 4.0 mm hand-driven nails are an acceptable substitute.

2.4.4.1

Nailing requirements are specified throughout the text, tables and nail schedules by length and diameter, and sometimes by the number and edge clearance. The letters “FH” specify that flathead nails shall be used.

Where 100 mm nails are specified as 100 x 4.0 mm this refers to hot-dipped galvanized (HDG) nails.

Hand-driven nails 100 x 3.75 mm or 100 x 4.0 mm may replace 90 x 3.15 mm power-driven nails unless otherwise specified in the tables or nailing schedules. Other sizes shall be as listed in the tables.

Durability requirements are specified in table 4.3.

See table 2.2 for a guide to fixing types and capacities.

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Table 2.2 – Fixing type and capacity reference guide (see 2.4.4.1)

Fixing type	Description	Alternative fixing capacity (kN)	See table
A	2 / 90 x 3.15 end nails	0.7	8.18
B	2 / 90 x 3.15 end nails + 2 wire dogs	4.7	
C	2 / 90 x 3.15 end nails + strap fixing (see figure 8.12)	8.5	
D	4 / 90 x 3.15 end nails + 2 strap fixing (double stud)	16.0	
E	2 / 90 x 3.15 skew nails + 2 wire dogs	4.7	10.1, A10.1 10.7, A10.7 10.11, A10.11 10.14 10.15 15.6, A15.6 15.10, A15.10
F	2 / 90 x 3.15 skew nails + strap fixing (see figure 10.6)	7.0	
G	10 / 90 x 3.15 nails (5 each side)	4.7	10.2, A10.2 15.7, A15.7
H	1 / M12 bolt	8.5	
I	2 / M12 bolts	16.0	
J	2 / M16 bolts	24.0	
K	6 / 90 x 3.15 nails	3.0	10.5, A10.5
L	2 / M12 bolts	9.8	
M	2 / M16 bolts	13.0	
N	6 / 100 x 4.0 HDG nails (hand driven)	4.7	10.8, A10.8 15.8, A15.8
O	2 / M12 bolts (see figure 9.3 (C))	6.8	
P	2 HDG ‘flat’ straps (see figure 9.3 (B))	13.7	
Q	2 HDG ‘tee’ straps (see figure 9.3 (A))	25.5	
R	1 / 90 x 3.15 nail	0.55	10.10, A10.10 10.12, A10.12 15.9, A15.9
S	2 / 90 x 3.15 nails	0.8	
T	1 / 10g self-drilling screw, 80 mm long	2.4	
U	1 / 14g self-drilling Type 17 screw, 100 mm long	5.5	

NOTE – Capacities are associated with fixing type, not fasteners. See individual selection tables for the appropriate fixing type for the application.

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2.4.4.2
The length of nails passing through sheet material thicker than 10 mm shall be the length specified in the nailing schedules, or three times the sheet thickness, whichever is the greater.

2.4.4.3
The joints listed in the nailing schedule tables shall be made with the number of connectors of the specified type, length, and diameter driven in the specified locations into both pieces of timber at right angles, unless skewed nails are specified.

2.4.4.4
The depth of penetration into the point side piece of timber shall be at least 45 % of the length of the nail.

2.4.4.5
Where the nail size specified would cause splitting, the nail holes shall be pre-drilled to a diameter of 80 % of the nail diameter.

2.4.4.6
Nails in structural joints shall be fully driven.

2.4.4.7
Members in this Standard, except for *jack studs, bottom plates* and *top plates*, may be substituted with built-up members comprising up to six *framing* members nailed together, provided the following conditions are satisfied:

(a) For the individual *framing* members comprising the built-up member:
  (i) All *framing* members match the width and grade of the member being substituted, and
  (ii) The combined thickness of the *framing* members equals or exceeds the thickness of the member being substituted.

(b) For nailing requirements of the built-up member, where the built-up member comprises up to three members:
  (i) *Spacings* of nails along the built-up member shall not exceed six times the thickness of the thinnest *framing* member, and
  (ii) All nails shall penetrate at least three-quarters of the thickness of the last *framing* member and the nails shall be driven alternatively from either face of the built-up member, and
  (iii) For members of width 140 mm or more there shall be at least two rows of nails across the member width at the centres required in (i) above.

(c) For nailing requirements of the built-up member, where the built-up member comprises more than three members (see 8.5.1.2):
  (i) The first three members shall be built up as described in 2.4.4.7. Additional members shall be fixed with nails twice as long, and *spaced* at six times the thickness of the additional member being added.

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2.4.5 Bolts and coach screws

In bolted joints, washers shall be provided at each timber surface under the bolt or coach screw head and the nut. For M12 and M16 bolts the washers shall be not less than 50 mm x 50 mm x 3 mm if square or not less than 55 mm diameter x 3 mm if round. (Bolts shall comply with the requirements of AS 1111 Parts 1 and 2 and coach screws to AS/NZS 1393.)

2.4.6 Timber connectors or fixings

2.4.6.1

Manufacturers of a timber connector or fixing shall provide the following information on each package of fixings, or on a label securely attached thereto:

(a) The name, or registered trade name, or make and address of manufacturer;

(b) The materials used in manufacture including fasteners and corrosion protection;

(c) The *capacity* of the timber connector or fixing in kN determined in accordance with 2.4.7;

(d) Fastener's requirements;

(e) Details of intended use.

2.4.6.2

Timber connectors to be tested for compliance with this Standard shall be sampled at random from a particular package and the test results recorded.

2.4.7 Connector capacity and durability

The *capacity* of a connector or fixing shall be calculated in accordance with the following equation:

$$R = \phi \times Q_k \times n \times k$$

where

R	=	connector *capacity* in kN
ϕ	=	*capacity* reduction factor from NZS 3603
Q_k	=	characteristic value obtained by test in accordance with BRANZ evaluation Method EM1 or AS/NZS 2699: Part 2 as appropriate
n	=	number of tested elements making up the complete joint
k	=	modification factors from NZS 3603 (section 4) as appropriate to the specific application.

In addition to verifying the *load* carrying *capacity* the manufacturer shall also demonstrate that the fixings shall conform with the durability requirements of clause B2 of the NZBC.

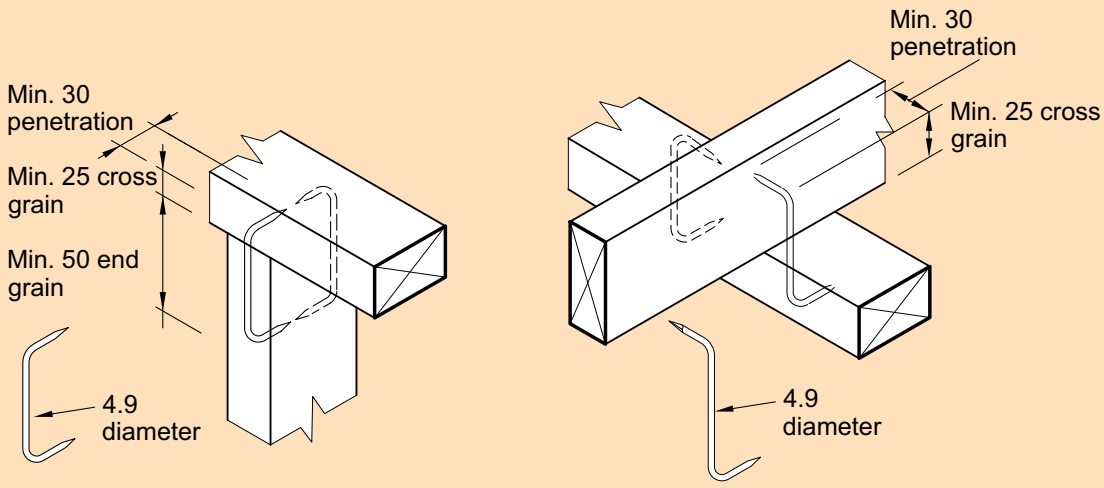
2.4.8 Wire dogs

Wire dogs shall be of steel of at least 4.9 mm diameter and shall penetrate at least 30 mm into each piece of timber. Figure 2.2 shows the minimum dimensions required between the edge of the timber and the spike of the *wire dog*.

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D WIRE DOG

Z WIRE DOG RIGHT HAND
AND LEFT HAND

Unless otherwise stated, all dimensions are in mm.

Figure 2.2 – Wire dogs (see 2.4.8)

2.5 REINFORCING STEEL

Reinforcing bars and steel mesh shall comply with AS/NZS 4671. Reinforcing bars shall be grade 300E. Mesh shall be grade 500N or 500E.

2.6 CONCRETE

Concrete shall comply with NZS 3104 for manufacture and with NZS 3109 for construction.

2.7 CONCRETE MASONRY

Concrete masonry shall comply with AS/NZS 4455 Part 1 for manufacture and with NZS 4210 for construction.

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4.3 TIMBER AND WOOD-BASED BUILDING COMPONENTS

4.3.1

For wood-based building components, preservative treatment, in-service moisture range and their end use environment shall comply with NZS 3602.

4.3.2

All timber and wood-based building components shall be protected against damage from moisture, and against significant variations of moisture content, both before and after installation or enclosure.

4.3.3 Timber

Framing timber shall be separated from concrete or concrete masonry in accordance with 2.3.3.

4.3.4 Wood-based building components

Wood-based building components used for flooring in areas such as in bathrooms, kitchens, laundries, and toilets shall be protected by an impervious finish or *lining* with sealed joints.

4.3.4.1 Water splash areas

See 2.3.6 to 2.3.8.

4.3.4.2 Medium density components

Medium density wood-based building components shall not be exposed to ground atmosphere or be used externally. They shall not be used for flooring. See 2.3.6 to 2.3.8.

4.3.5 Timber decks

Preservative treatment of members of timber *decks* shall comply with NZS 3602. Metal fixings and fastenings shall be as detailed in 4.4.

C4.3.4

E3/AS1 has a list of acceptable finishes and linings.

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C4.4

Corrosion of ferrous fasteners will cause rapid deterioration of adjacent timber.

Manufacturers should clearly label their components to indicate the weight of the galvanizing.

4.4 STEEL FIXINGS AND FASTENINGS

4.4.1

Table 4.1 sets out the protection required for steel fixings and fastenings to meet durability requirements. See figure 4.3(a) and figure 4.3(b). The following conditions apply:

(a) For subfloor fixings and fastenings, provide a well drained subfloor area free of ponding;

(b) Components of fixings and fastenings shall be of compatible metals and of durability at least equal to that required.

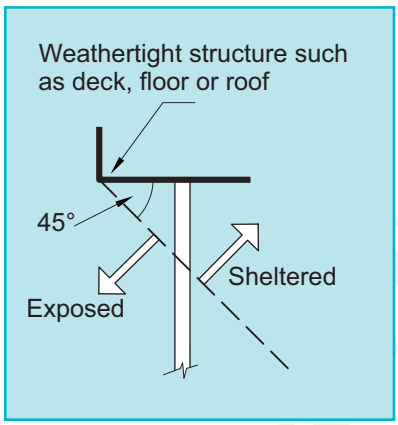


Figure 4.3(a) – Environment definitions “Sheltered” and “Exposed”

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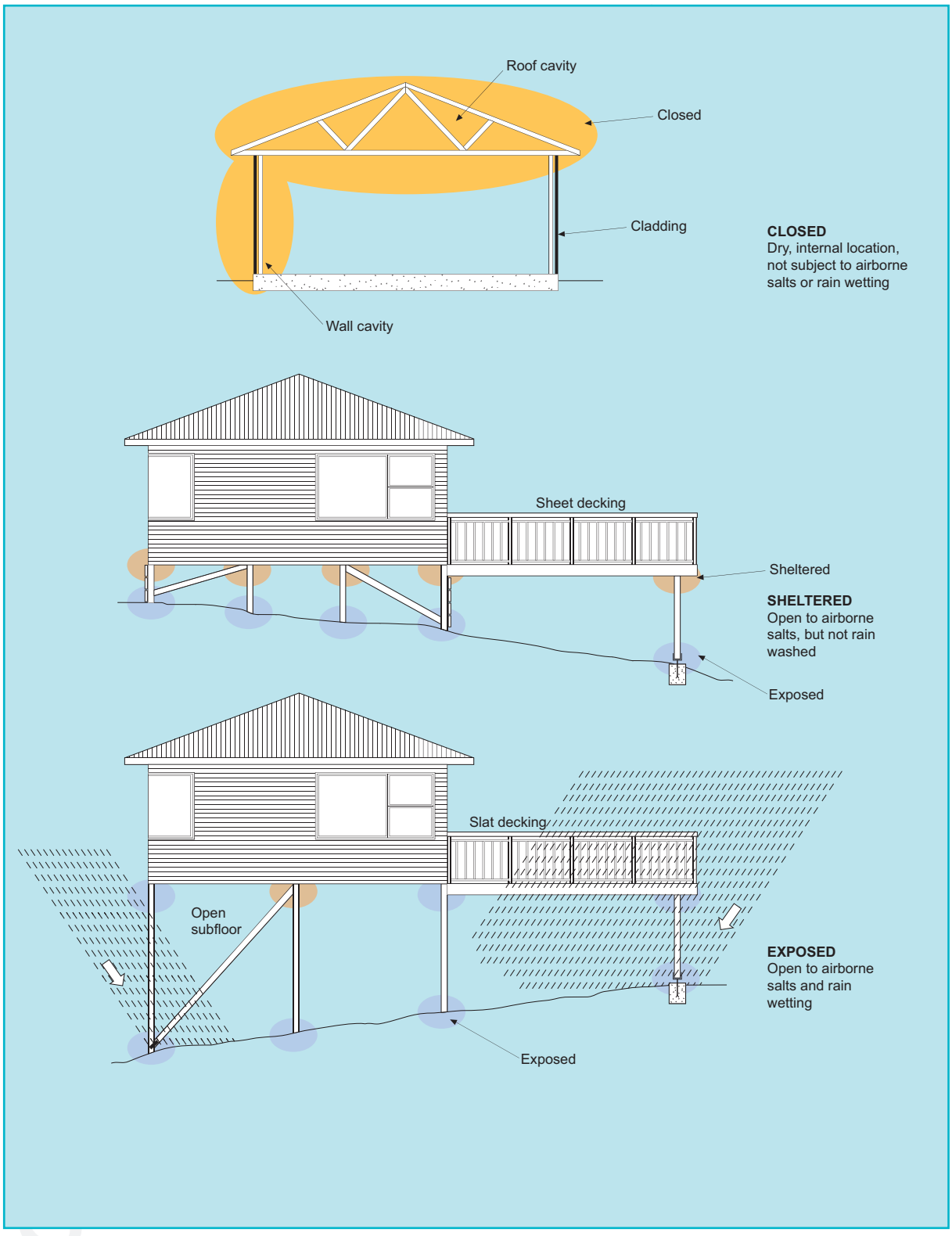


Figure 4.3(b) – Exposure definitions (see table 4.1 and figure 4.3(a))

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Table 4.1 – Protection required for steel fixings and fastenings excluding nails and screws(1) (see 4.4.1)

ZONES	FIXING FASTENING	ENVIRONMENT		MATERIAL
ALL ZONES	Nail plates	CLOSED AND ROOF SPACES		Continuously coated galvanized steel(2)
	Wire dogs & bolts			Hot-dipped galvanized steel(2)
	All other structural fixings	CLOSED		Mild steel (uncoated, non-galvanized)(3)
ZONE D	All structural fixings	SHELTERED(4) AND EXPOSED		Type 304 stainless steel(5)
ZONES B AND C	Treated timber pile connections more than 600 mm from the ground and all subfloor connections	Subfloors vented 7000 mm² or less	SHELTERED(4)	Hot-dipped galvanized steel(2)
		Subfloors vented more than 7000 mm²	EXPOSED	Type 304 stainless steel(5)
	Treated timber pile connections within 600 mm of the ground	SHELTERED(4) AND EXPOSED		Type 304 stainless steel(5)
	All other structural fixings, except fabricated brackets(6)	SHELTERED(4)		Hot-dipped galvanized steel(2)
		EXPOSED		Type 304 stainless steel(5)

(1) Items described in this table are steel fasteners required to last not less than 50 years, used for joining timber, such as nail plates, bolts, brackets, wire dogs and similar, but not including nails or screws (which are described in table 4.3).
(2) All galvanizing weights to steel shall be as given in table 4.2.
(3) Steel fixings in timber treated with copper-based timber preservatives shall be as per 4.4.4.
(4) "Sheltered" shall be that above a 45° line drawn from the lower edge of a projecting weathertight structure such as a floor, roof or deck. "Exposed" shall be below that 45° line. See figure 4.3(a) and (b).
(5) Type 304 stainless steel is sufficient to comply with NZBC requirements, but may have surface rust. Type 316 may be used where appearance is a consideration but exceeds the requirements of the NZBC.
(6) "Fabricated brackets" shall be made from 5 mm (minimum thickness) mild steel and shall be hot-dipped galvanized.

4.4.2

Galvanized steel components shall have galvanized coating masses in accordance with table 4.2.

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Table 4.2 – Galvanizing of steel components other than nails and screws (see 4.4.2)

Component	Standard	Protection required
Bolts in any location that require galvanizing (see table 4.1)	AS/NZS 4680 and AS 1214	600 g/m^2 average
Nail plates used in sheltered locations Nail plates used in exposed locations	AS 1397 AS/NZS 4680	Z275 pre-galvanized sheet 390 g/m^2
Brackets used in sheltered locations Brackets used in exposed locations	AS/NZS 4680 AS/NZS 4680	390 g/m^2 600 g/m^2
Nail plates used in roof spaces	AS 1397	Z275 pre-galvanized sheet
Wire dogs in any location that require galvanizing (see table 4.1)	AS/NZS 4534	150 g/m^2 (Zn + 5 % Al)

4.4.3 Nails

The materials for nails and screws shall be as given in table 4.3.

Table 4.3 – Steel items such as nails and screws used for framing and cladding (see 4.4.3)

Building location	Nail or screw use				
	Cladding that acts as bracing (50-year durability)	Non-structural cladding (15-year durability)	Framing in "Closed" areas(1) including roof spaces	Framing in "Sheltered" areas(1)	Framing in "Exposed" areas(1)
Zone D	Stainless steel(2) or silicon bronze or protected galvanized steel(3)	Galvanized steel(4)	Mild steel(5)	Galvanized steel(5)	Stainless steel(2)
Zones B & C	Galvanized steel(4)	Galvanized steel(4)	Mild steel(5)	Galvanized steel(5)	Galvanized steel(5)

(1) For definitions of "closed", "sheltered", and "exposed" see table 4.1 and figure 4.3(a) and (b).
(2) Stainless steel nails shall be minimum Type 304 and shall have annular grooves to provide similar withdrawal resistance to hot-dipped galvanized nails.
(3) Protection of galvanized steel nails shall consist of putty and an exterior painting system consisting of a primer undercoat and 2 top coats of oil-based or acrylic paint.
(4) Where the cladding is a corrosive timber, such as western red cedar or redwood, or is treated with copper-based ACQ or CuAz preservatives, use stainless steel (2) or silicon bronze.
(5) Steel fixings in timber treated with copper-based preservatives shall be as per 4.4.4.
(6) Irrespective of the above, nails and screws shall be compatible with any fixing plate that is used with them.
(7) Nails and screws and other fixings into piles within 600 mm of the ground shall be stainless steel.
(8) Galvanized nails shall be hot-dipped galvanized to a minimum of 320 g/m^2; galvanized screws shall be mechanically zinc plated in accordance with AS 3566: Part 2, Class 4.
(9) Type 304 stainless steel is sufficient to comply with NZBC requirements, but may have surface rust. Type 316 may be used where appearance is a consideration but exceeds the requirements of the NZBC.

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4.4.4 Copper-based timber preservatives

Steel fixings and fastenings in contact with timber treated with copper-based timber preservatives (H3.2 or higher) shall be as per table 4.1 and table 4.3 but shall also be a minimum of:

(a) Type 304 stainless steel for fixings in contact with timber treated with Copper Azole, or Alkaline Copper Quaternary (ACQ) preservatives, where used in exposed or sheltered locations;

(b) Hot-dipped galvanized for all other locations.

4.5 CONCRETE AND CONCRETE MASONRY

C4.5

The provisions of this clause provide for a life of not less than 50 years. More economic designs could result in some cases if the more detailed provisions of NZS 3101 are followed, but such designs are not within the scope of this Standard.

4.5.1

Minimum concrete cover to steel *reinforcement* shall be:

(a) 75 mm when concrete is placed directly on or against the ground;

(b) 50 mm in all other situations where the concrete is placed in formwork provided the concrete specifications follow the provisions of 4.5.2;

(c) 30 mm from the top of a *wall* or floor slab which is in a closed area or 50 mm from the top of any exposed *wall* or floor slab.

4.5.2

The minimum specified 28-day concrete strength, complying with NZS 3104 and NZS 3109 shall be:

(a) 10 MPa for unreinforced concrete used in mass *foundations*;

(b) 17.5 MPa for unreinforced concrete applications, or reinforced concrete either not exposed to weather or exposed to the weather in Zone B as shown in figure 4.2;

(c) 20 MPa for reinforced concrete exposed to weather in Zone C as shown in figure 4.2;

(d) 25 MPa for reinforced concrete exposed to weather in Zone D as shown in figure 4.2;

(e) Specially selected from NZS 3101 table 5.3 where a direct wearing concrete floor is required;

(f) Geothermal hot spots shall be to SED.

4.5.3

Concrete masonry shall:

(a) Comply with the provisions of NZS 4210;

(b) Have minimum cover to steel *reinforcement* from an uncoated masonry external face and minimum grout strength of:

45 mm and 17.5 MPa for interior conditions and Zone B;
50 mm and 20 MPa for Zone C;
60 mm and 25 MPa for Zone D.

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10.0 Construction Moisture

Amend 5 Aug 2011

10.1 Moisture in materials

Moisture contained in the *building* structure at completion of *construction* shall not be permitted to damage the *building elements*.

Construction moisture includes the moisture contained in:

a) Timber products as a result of a treatment or manufacturing process,

Amend 5 Aug 2011

b) Green timber, and timber or other materials that have been exposed to the weather, and

c) Concrete, mortar or plaster that is not completely cured.

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10.2 Maximum acceptable moisture contents

The maximum moisture contents shall be:

a) For timber *framing* at the time of installing interior *linings*, the maximum acceptable moisture content shall be the lesser of:

i) 20% for insulated buildings, 24% for non-insulated buildings, or

ii) as specified in NZS 3602,

b) For timber weatherboards and exterior joinery, 20% at the time of painting,

c) For reconstituted wood products, 18% at all times, and

d) For concrete floors, sufficiently dry to give a relative humidity reading of less than 75% at the time of laying fixed floor coverings.

COMMENT:

Some manufacturers of timber or other wall or floor components may recommend lower moisture contents for their products.

It is advisable to use the manufacturer's moisture content requirements, if these are lower than those required by this paragraph.

10.3 Measuring moisture content

Amend 5 Aug 2011

10.3.1 Timber

Measurement shall be by the recommended procedure in the Scion (New Zealand Forest Research Institute) publication "Measurement of moisture content of Wood" using electrical resistance type moisture meters with insulated probes. Representative samplings of measurements shall be taken:

a) With meters calibrated to AS/NZS 1080.1 Appendix E

b) By inserting probes to at least 1/3 the depth of timber being measured, at a distance exceeding 200 mm from board ends

c) Using correction factors for timber species, temperature, and treatment type (outlined in Scion publication above).

COMMENT:

For convenience of site measurement, readings of moisture content can be compared against a 'control' *framing* sample of known acceptable moisture content. The comparative readings must be taken during the same test period, be of the same framing type, and using the same resistance moisture meter. This method of moisture testing may be appropriate for non-boron treated *framing*, or processed timber *framing*.

10.3.2 Concrete floors

Measurement shall be made in accordance with BRANZ Bulletin 330 Thin Flooring Materials using hygrometers calibrated to ASTM E 104 – 2002 Standard practice for maintaining constant relative humidity by means of aqueous solutions.

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MASONS UNI® PLUS FLEXIBLE AIR BARRIER

DESIGN AND INSTALLATION GUIDE

MASONS
Designed Smart, Built Tough.

V2.0 March 2022 - CM

General and product information

PURPOSE

This design and installation guide relates to Masons UNI® PLUS Flexible Air Barrier.

IMPORTANT DOCUMENTS

This guide should be read in conjunction with the relevant:

- Masons UNI® PLUS Warranty
- Masons UNI® PLUS Installation Video. SEE VIDEO

SKILLS REQUIRED

This guide is suitable for use by a competent designer and person with basic carpentry skills. Where applicable the person specifying, supervising or installing the Masons UNI® PLUS must be able to meet all RBW provisions.

FOR MORE HELP

Technical assistance is available at www.mpb.co.nz.

While all reasonable efforts have been made to ensure the accuracy of information provided, this guide is a guide only. It may be subject to change.

FOR OUR WARRANTY

Refer to www.mpb.co.nz.

PRODUCT DESCRIPTION

UNI® PLUS is a nonwoven, absorbent, water-resistant, 180 GSM, synthetic wall underlay. It comprises three polypropylene layers: two outer layers of nonwoven polypropylene with a middle layer of a functional-technical film. It is supplied coloured blue with a white underside unless an alternative colour is requested.

SCOPE AND LIMITATIONS

For scope of use, limitations, conditions and statement of building code compliance, refer to www.mpb.co.nz.

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Design

STEP 1:

CONFIRM SCOPE

Confirm the proposed use is within the scope and limitations as stated on www.mpb.co.nz.

STEP 2:

CONFIRM RELATED BUILDING WORK

Masons UNI® PLUS is suitable for use with a timber or steel framed structure. For new and existing buildings confirm that the primary structure:

- complies with the NZ Building Code and is designed in accordance with NZS 3604:2011 or NASH Design Standard 2019 Parts 1 and 2; or
- is specifically designed to NZS 3603:1993 or AS/NZS 1170:2002; or
- where existing, is suitable for the intended building work.

Masons UNI® PLUS can be used with a cladding fixed over a cavity or direct fixed. Confirm whether the design includes a cavity system or not and determine the type and orientation of the battens. Ensure cavity battens specified are timber battens. Ensure that the framining meets, as a minimum the requirements in Table 1.

SEE TABLE

STEP 3:

SPECIFY FIXINGS

Specify Masons UNI® fastener fixings in accordance with Table 1. Masons UNI® Fasteners are 25 mm galvanised or stainless steel nails with a plastic washer.

SEE TABLE

STEP 4:

SPECIFY ANCILLARY PRODUCTS

Ensure all required ancillary products are specified in the completed Masons UNI® PLUS specification.

STEP 5:

QUALITY CHECK

Confirm all relevant design requirements are met.

Collate the following documents and include in the building consent application:

- Masons UNI® PLUS Specification,
- Masons UNI® PLUS Warranty and
- this document.

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Pre-installation

HEALTH AND SAFETY

Take all necessary steps to ensure your safety and the safety of others:

- ensure adequate ventilation or mechanical dust extraction when cutting or drilling
- take care when fixing the wrap in windy conditions
- wear appropriate safety equipment, clothing and footwear
- use all tools in accordance with relevant instruction manuals
- plan and monitor a safe approach for working at height; select and use the right equipment
- clear the work area of any obstruction before work starts.

For further information refer to:

- WorkSafe. [July 2018] Small Construction Sites, the Absolutely Essential Health and Safety Toolkit.
- WorkSafe. [December 2016] Health and Safety at Work, Quick Reference Guide.

These documents are available at www.worksafe.govt.nz.

HANDLING AND STORAGE

Handling

Care must be taken during loading, unloading, and transporting the materials to prevent pre-installation damage.

Unload the rolls carefully by hand. Do not crush the rolls and ensure they are protected from damage.

Storage

Store the rolls on end under a cover, in a clean and dry area and out of direct sunlight.

TOOLS AND EQUIPMENT REQUIRED

Install Masons UNI® PLUS using standard carpentry tools and equipment. Use tools in accordance with good trade practice and supplier's instructions.

CN100 UNI Cap Nailer Gun



UNI Fasteners



UNI PLUS Seam Tape



40 Below Platinum or Flex Flashing Tape



BrickTies



Penetration Seals



Corner Guards



PEF Rod



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Installation

STEP 1:

BUILDING CONSENT DOCUMENTATION

Where applicable, access and view building consent documentation.

STEP 2:

CHECK RELATED BUILDING WORK

For new and existing buildings ensure the primary structure is straight and true and within framing tolerances as described in Table 2.1, section 2 of NZS 3604:2011.

Masons UNI® PLUS can be used where cladding is installed over a cavity system or direct fixed cladding.

STEP 3:

INSTALL WRAP

For assistance in installing UNI® PLUS refer to video.

DIAGRAM 0.1

SEE VIDEO

Fit Wrap

SEE VIDEO

Ensure all necessary equipment and ancillary components are available.

Masons UNI® PLUS must be installed with the printed side out, typically run horizontally on vertical framing. However, it is non directional and may be run in line with raking soffit lines or gables.

Fixing

DIAGRAM 0.9

SEE VIDEO

Masons supply Masons UNI® Fasteners for both timber and lightweight steel framing.

Ensure battens are fixed to Table 1 (as a minimum) or to the building consent.

Where cavity battens are to be installed, fix Masons UNI® PLUS to frames at the plates and nogs/dwangs using the applicable Masons UNI® Fasteners. Do not fix to the studs.

When fixing vertical or horizontal cavity battens ensure batten nails are a minimum of 100 mm away from the UNI® Fastener.

Fasten battens promptly to prevent wind blow out whilst 'UNI® PLUS is tacked up' with reduced numbers of cap nails.

Where bulging has or is likely to occur secure with Masons Wrap Strap.

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DIAGRAM 0.1

Fit UNI® PLUS Soffit Strip/Drop

SEE VIDEO

The use of a soffit roll or drop is optional.

If required cut a suitable width from the roll of UNI PLUS and install along the top plate. Ensure that it is taut. Secure in accordance with Table 1.

SEE TABLE

Do not fasten the bottom of the soffit strip as this needs to overlap the next layer of UNI® PLUS.

DIAGRAM 0.1

Fit UNI® PLUS

SEE VIDEO

Where a soffit strip/drop has been installed:

- Hold the soffit strip up to beneath the horizontal installation of the UNI® PLUS. Ensure that the soffit strip layer overlaps the lower layer by 150 mm.
- Fold the soffit layer down. Secure and tape with 40 Below Platinum or Flex.

Where a Soffit strip/drop has not been installed:

- Run UNI® PLUS along the top face, level with the top plate. Ensure that it is taut. Ensure the wrap extends a minimum of 50 mm below the bottom plate or bearer.

Ensure the wrap is taut and does not belly into the cavity or openings. Fix in accordance with the building consent or Table 1.

SEE TABLE

Run the wrap over all openings and leave openings covered until windows and doors are ready to be installed.

DIAGRAM 0.1

Where UNI® Soffit has not been installed:

Run UNI® PLUS along the top face, level with the top plate. Ensure that it is taut. Ensure the wrap extends a minimum of 50 mm below the bottom plate or bearer. Secure in accordance with Table 1.

- Ensure the wrap is level and is pulled taut so that the wrap does not belly into the cavity.
- Run the wrap over all openings and leave openings covered until windows and doors are ready to be installed

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Laps

DIAGRAM 0.1

SEE VIDEO

Masons UNI® PLUS must lap a minimum of 150 mm at horizontal joints and over framing wherever possible. Vertical joints must always be over framing and a minimum of 150 mm lap.

Upper wrap sheets must lap over lower wrap sheets to ensure water is shed outside the wrap.

All laps must be taped off with 60 mm Masons UNI® PLUS Seam and Repair Tape or Masons 40 Below Flashing Tape (Flex or Platinum). Ensure adhesion by applying pressure using a plastic scraper.

If UNI® PLUS is to be used as temporary weather protection, ensure all joins have been sealed using Masons UNI® PLUS Seam and Repair Tape, or Masons 40 Below (Flex or Platinum) Flashing Tape. The roof cladding and soffit linings must also have been installed.

Penetrations

DIAGRAM 0.8

SEE VIDEO

Pipe penetrations must be sealed using Masons Penetration seals or similar, ensuring good adhesion by applying pressure with a plastic scraper.

Intersections – Apron Flashings, Interstorey Flashings, Change of pitch

DIAGRAM 0.7

Drape UNI® PLUS over the upstand of apron, change of pitch or inter storey flashings. The UNI® PLUS length should extend beyond the flashing by 100 – 150 mm at each end. Secure with UNI® Fastenings. Tape all laps with UNI® 40 Below (Flex or Platinum) Flashing Tape.

Tears

SEE VIDEO

Regularly check Masons UNI® PLUS for damage, tears, holes and gaps. Any damaged areas must be repaired immediately.

Repair by covering with new wrap lapping the damaged area by at least 150 mm and tape the wrap using Masons UNI® Seam and Repair Tape.

Small tears can be repaired by taping with Masons UNI® Seam and Repair Tape.

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STEP 5

PREPARE OPENINGS

Openings

DIAGRAM 0.2

SEE VIDEO

Remove the wrap by cutting the wrap diagonally from each corner of the opening. Fold the flaps of the cut membrane inside the opening. Staples may be used to fix the wrap to the inside of the window frame. Cut excess wrap flush with the internal face of the framing.

Flashing tape must be installed to all openings. Masons 40 Below (Flex or Platinum) Flashing Tape must be used.

All exposed wall framing in the openings must be protected by the Masons UNI® PLUS, and Masons 40 Below Flashing Tape.

To ensure the best possible adhesion make sure the substrate is clean, dry, free from dust or any other contaminants.

Window & Door sills

DIAGRAM 0.3

SEE VIDEO

Place Masons Corner Guard over the Masons UNI® PLUS and into the bottom corners of the window or door sill and staple to the jamb for timber framing or attach with double sided tape for steel framing.

Install Masons 40 Below (Flex or Platinum) Flashing Tape flush with the interior face of the opening along the entire length of the sill and up each jamb to a minimum of 200 mm. Press tape firmly into the corner over the guard first then slit at each corner and fold around onto the frame face. Fold remainder of the tape against the outer face of the frame and press firmly using the plastic scraper.

Window and door heads

DIAGRAM 0.3

SEE VIDEO

Install lintel pieces at top corners of opening, 200 mm along the lintel and 200 mm down the jamb. Slit Masons UNI® PLUS at each corner and fold at least 50 mm onto outer face of building wrap. To create a seal at corner junctions, install butterflies at 45° across the corner of the head/jamb.

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STEP 6: **DIAGRAM 0.2**	**INSTALL JOINERY** **SEE VIDEO** Install window and door joinery with head flashings and air seals.
	Masons recommends Running Masons Dry Fix Plastic DPC up the side of the window jambs and under the head flashing. Where plastic DPC is installed around joinery as secondary water proofing such as for brick veneer work, fasten the DPC to the frame over the wrap using Masons UNI® Fasteners. To seal above the head flashing, Masons recommends installing UNI® PLUS so that it drapes over the head flashing extending the length of the flashing by 100 – 150 mm at each end. Secure with UNI® Fastenings. Tape all laps with UNI® 40 Below (Flex or Platinum) Flashing Tape. This method of sealing is mandatory at wind zones very high and above. For wind zones less than very high, the head flashing may be sealed to the UNI® PLUS using UNI® Seam and Repair Tape or UNI® 40 Below (Flex or Platinum) Flashing Tape.
STEP 7:	**QUALITY CHECK** Ensure that all joins are taped, and all tears have been repaired. Ensure full adhesion around penetrations and openings. Ensure Mason's warranty is inserted into the client document package.

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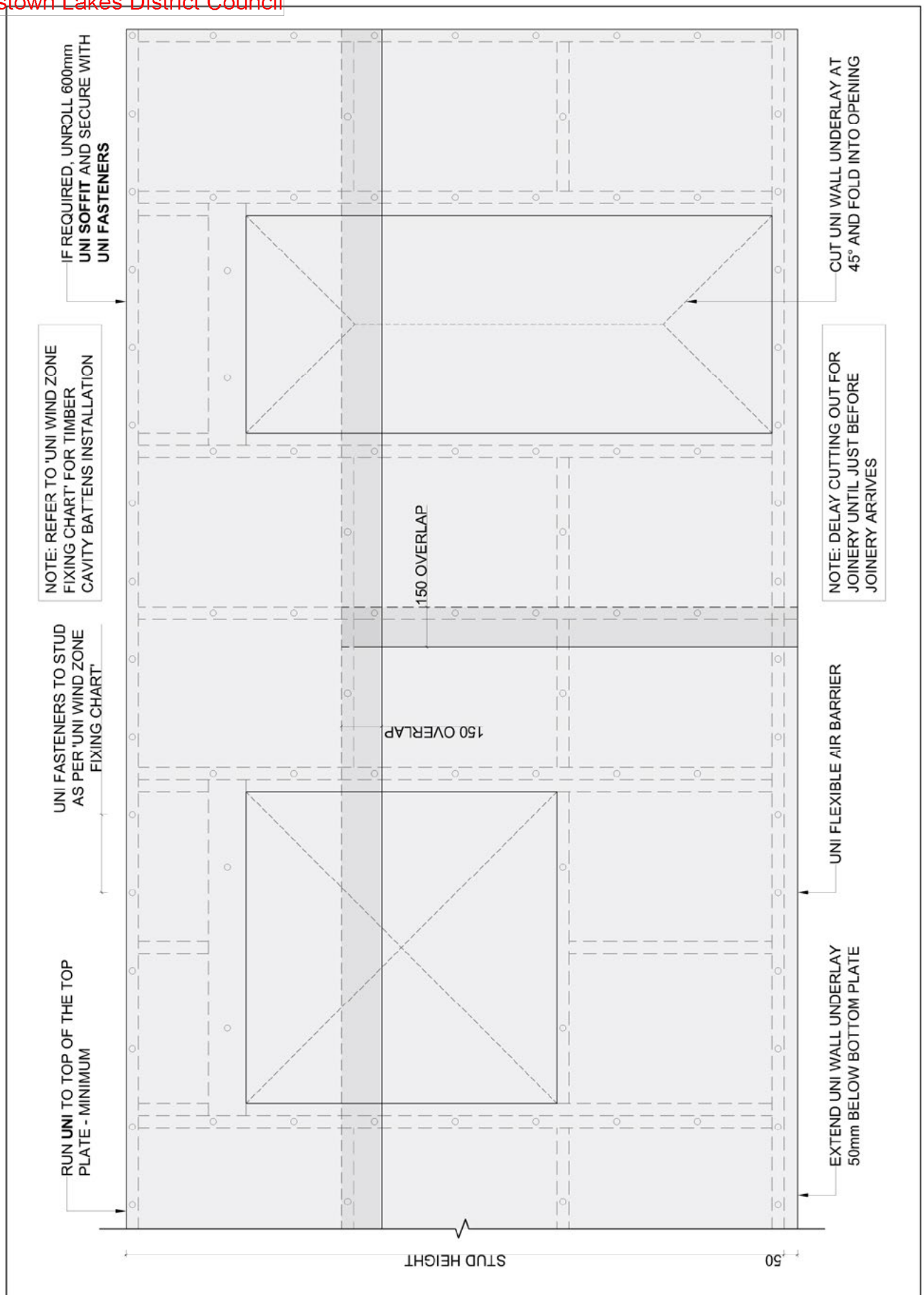
Appendix 1

TABLE 1: FIXING TABLE

Stud centres (mm)	Fixings on studs (mm)	Minimum nogs centre (mm)	Perimeter fixing all around	Wind Zone	Fixing on nogs	Fixings
600	Nail at 450 mm centres	800	Nail at 300 mm centres	Low/ Medium	Nail at centre	25 mm nails with plastic washer
450	Nail at 500 mm centres	800	Nail at 300 mm centres	Low/ Medium	Nail at centre	25 mm nails with plastic washer
400	Nail at 450 mm centres	800	Nail at 300 mm centres	Low/ Medium	Nail at centre	25 mm nails with plastic washer
600	Nail at 300 mm centres	800	Nail at 300 mm centres	High	Nail at centre	25 mm nails with plastic washer
450	Nail at 350 mm centres	800	Nail at 300 mm centres	High	Nail at centre	25 mm nails with plastic washer
400	Nail at 300 mm centres	800	Nail at 300 mm centres	High	Nail at centre	25 mm nails with plastic washer
400	Nail at 250 mm centres	800	Nail at 300 mm centres	Low/ Medium/ High/ Very High	Nail at centre	25 mm nails with plastic washer
300	Nail at 300 mm centres	800	Nail at 300 mm centres	Low/ Medium/ High/ Very High/ Extra High	Nail at centre	25 mm nails with plastic washer
300	Nail at 250 mm centres	800	Nail at 300 mm centres	Low/ Medium/ High/ Very High/ Extra High	Nail at centre	25 mm nails with plastic washer
300, 400, 450, 600	Battens with nails at 400 mm centres	800	Batten with nails at 300 mm centres	Low/ Medium/ High/ Very High/ Extra High	Battens with nails at 400 mm centres (2 nails min)	Batten – 20 x 45 SG8 Nails – 60 2.8 ring shank galvanised

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UNI FAB, UNI Plus & UNI Pro

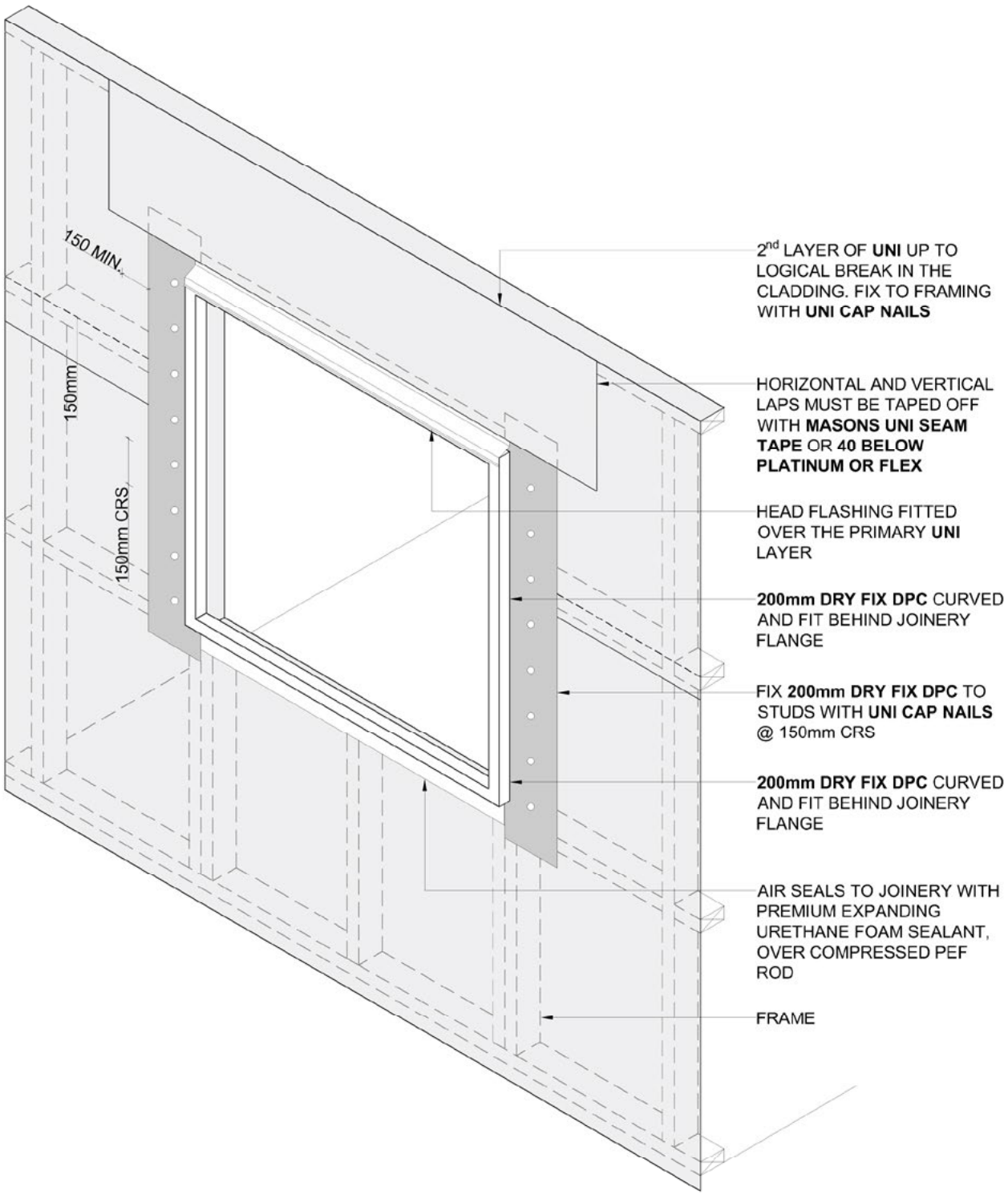
The Primary UNI Setout on Studs
with UNI Fasteners

*UNI fasteners & UNI cap nails are used interchangeably

Scale	Date
1:20	

Drawing Ref No.
UNI.01

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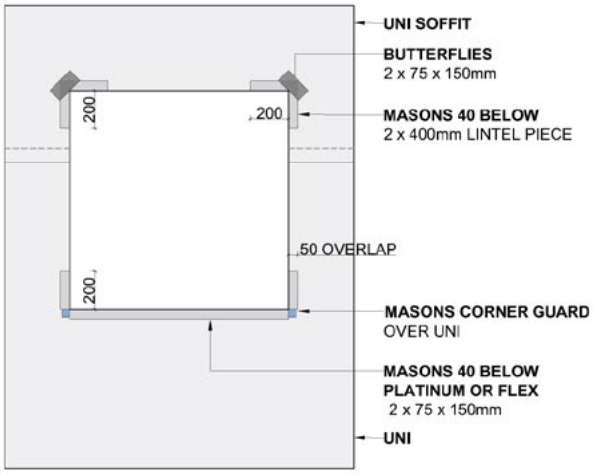
UNI FAB, UNI Plus & UNI Pro
Setout on Timber Frame

Additional Layer of UNI over Head Flashing

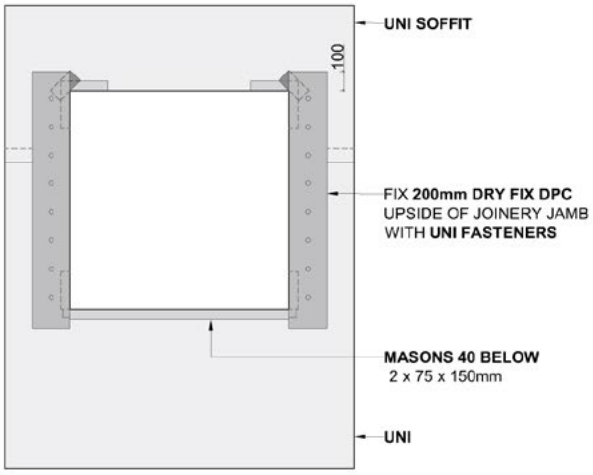
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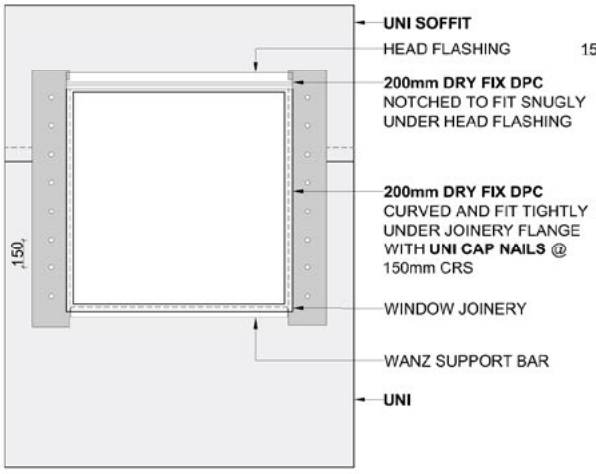
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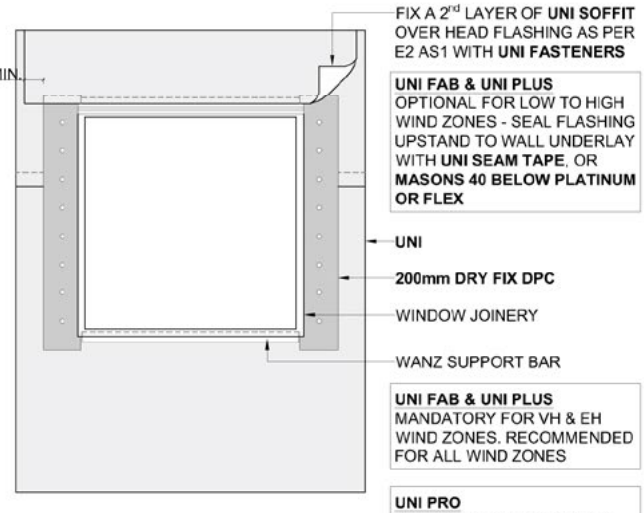
STEP ONE



STEP TWO



STEP THREE



STEP FOUR

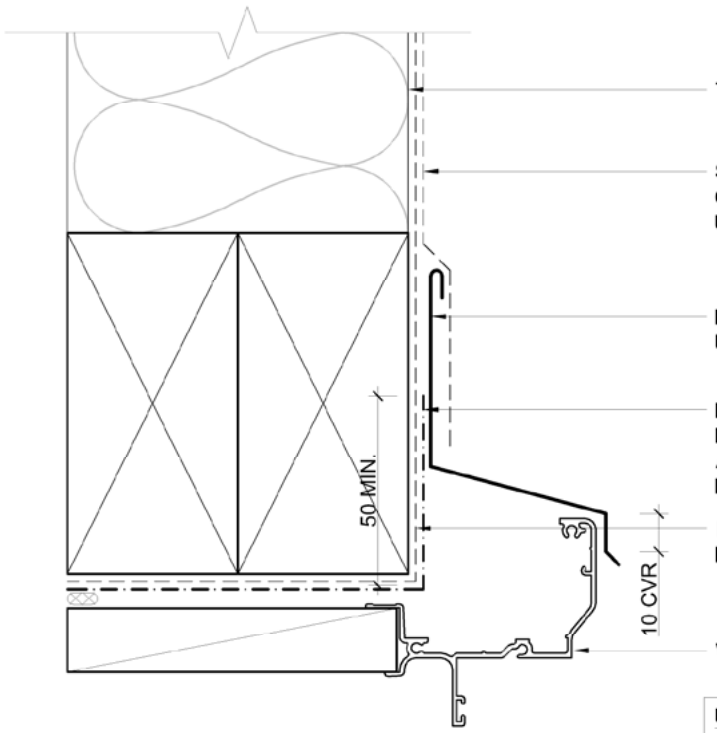
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Window Installation
UNI FAB, UNI Plus & UNI Pro

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UNI.03

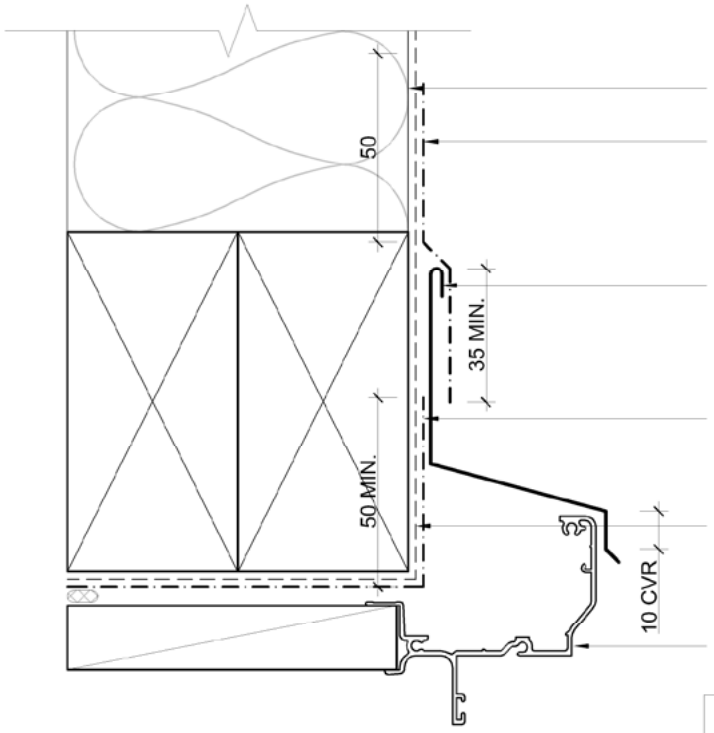
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ADDITIONAL UNI OVER HEAD FLASHING

UNI FAB & UNI PLUS
MANDATORY FOR VERY HIGH AND EXTRA HIGH WIND ZONE. RECOMMENDED FOR ALL WIND ZONES

UNI PRO
MANDATORY FOR ALL WIND ZONES



FLASHING TAPE OVER HEAD FLASHING

NOTE: DO NOT TAPE HEAD FLASHING ON UNI PRO. USE ADDITIONAL LAYER OF UNI TO ALL WIND ZONES

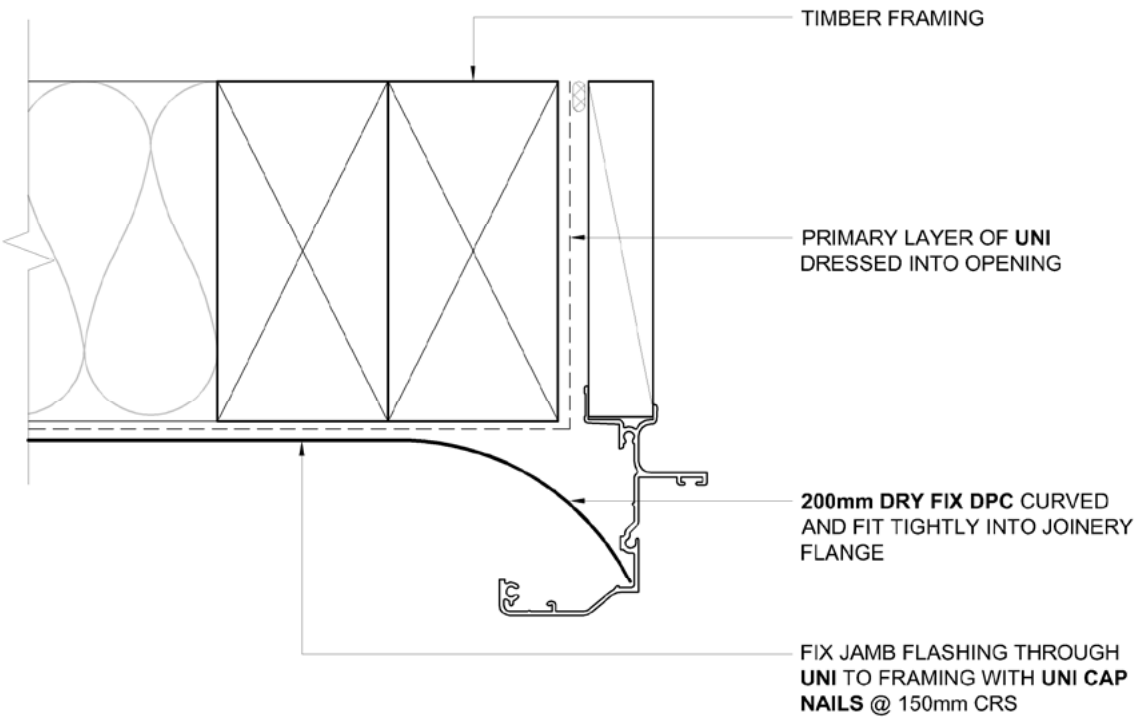
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Window Head
Head Flashing to UNI FAB, UNI Plus & UNI Pro

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1:2	

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UNI.04

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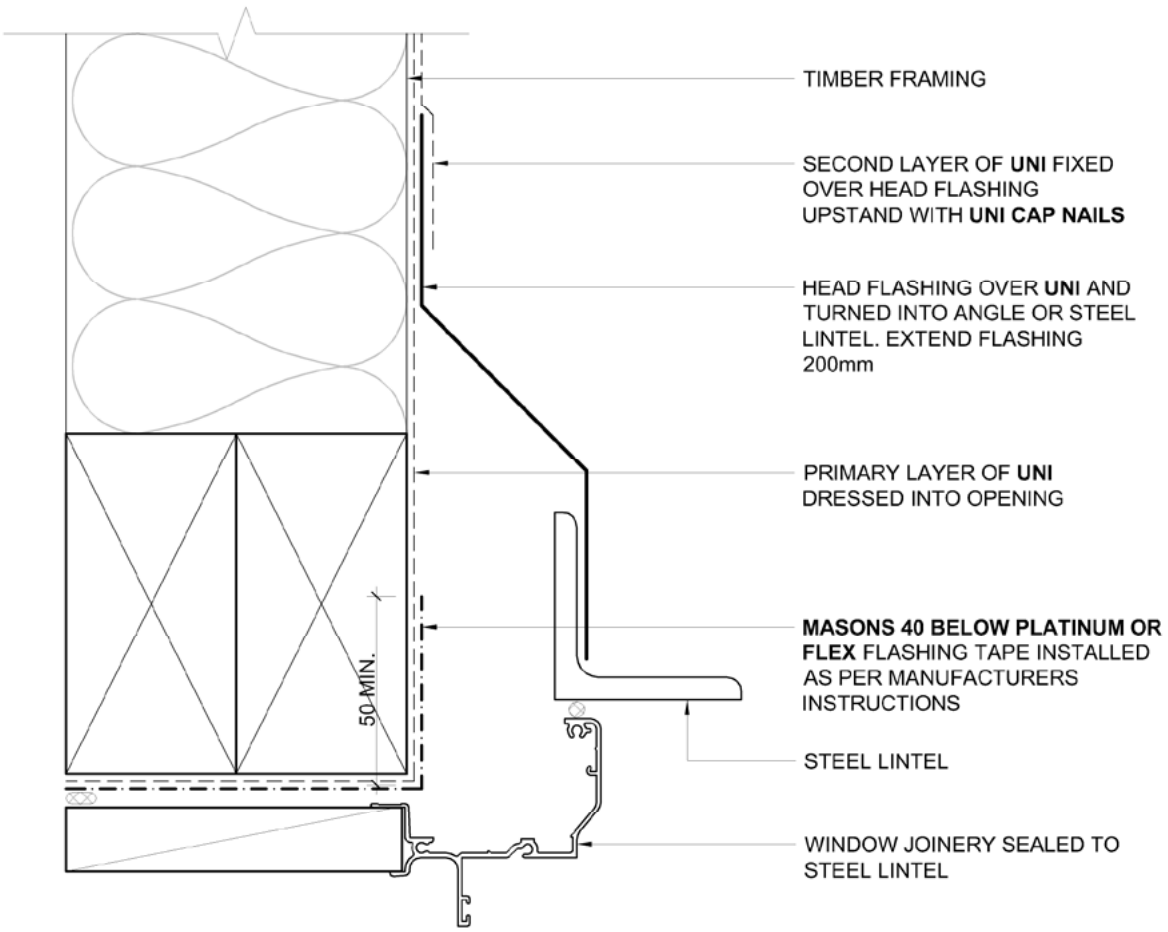
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Typical Jamb with 200mm Plastic DPC
UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

Drawing Ref No.
UNI.05

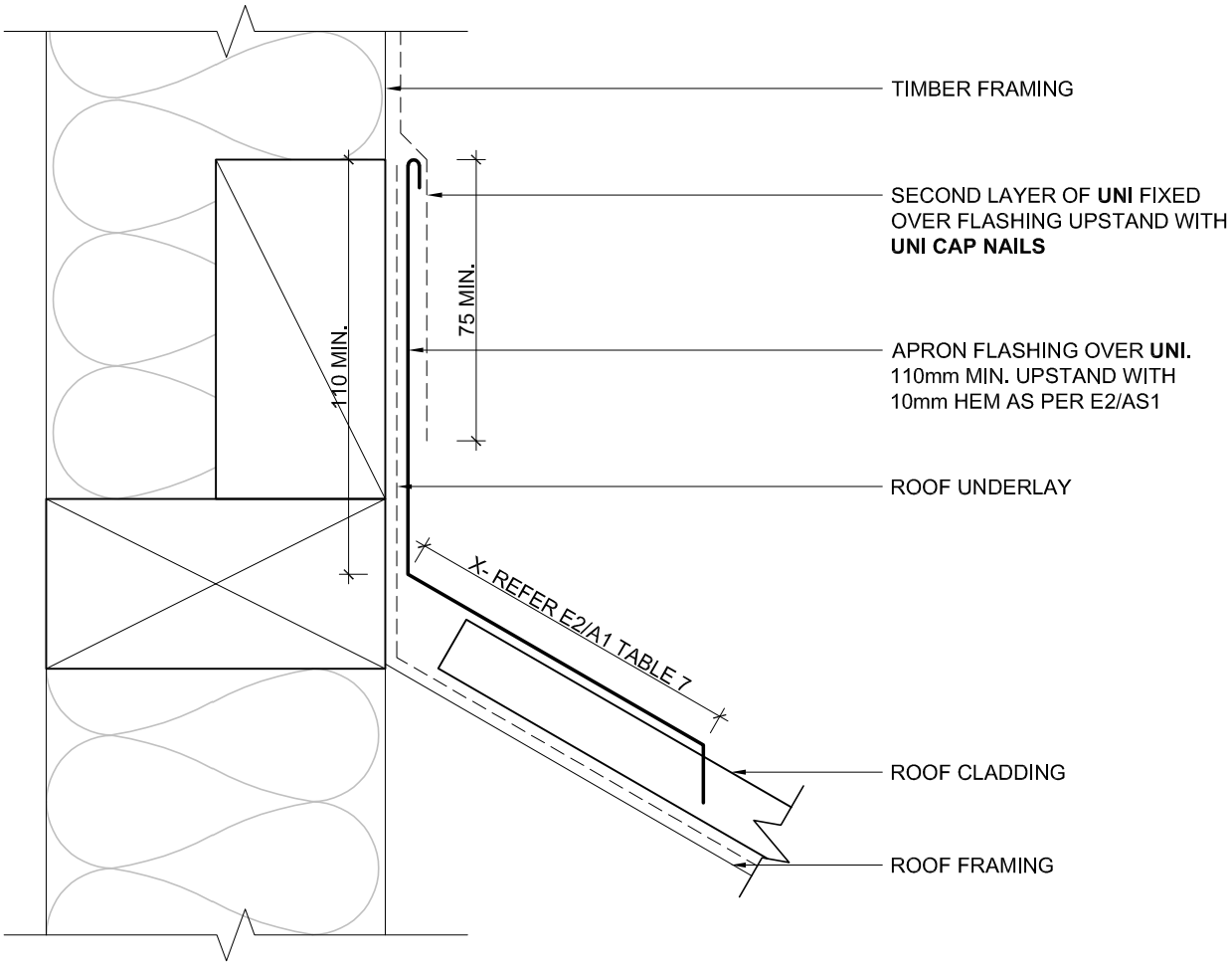
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ADDITIONAL UNI OVER HEAD FLASHING - BRICK VENEER

MASONS Designed Smart, Built Tough.	**Brick Lintel Veneer Window Head** UNI FAB, UNI Plus & UNI Pro	Scale 1:2	Date
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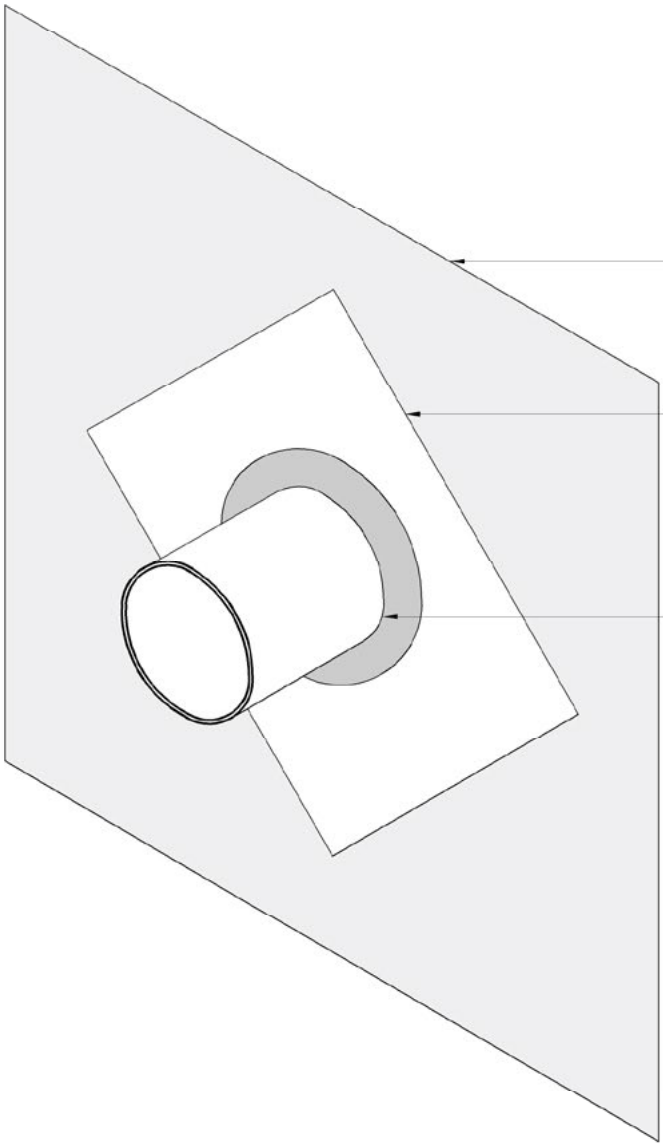
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Apron Flashing Installation
UNI FAB, UNI Plus & UNI Pro

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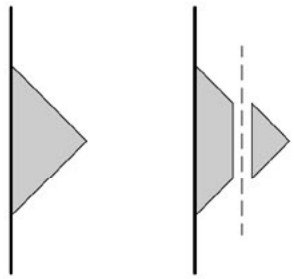


NOTE: MEASURE PIPE OR CONDUIT TO CHOOSE THE CORRECT SIZE MASONS PENETRATION SEAL

UNI FAB

MASONS 1-75mm PENETRATION SEAL OR **80-170mm MASONS PENETRATION SEAL**, ORIENTATED AT 45°. PRESS FIRMLY ONTO **UNI FAB** WITH TAPE SCRAPER

CUT EDPM TO SNUG FIT ON PIPE OR CONDUIT



EDPM NOZZLE CUT TO SUIT PIPE

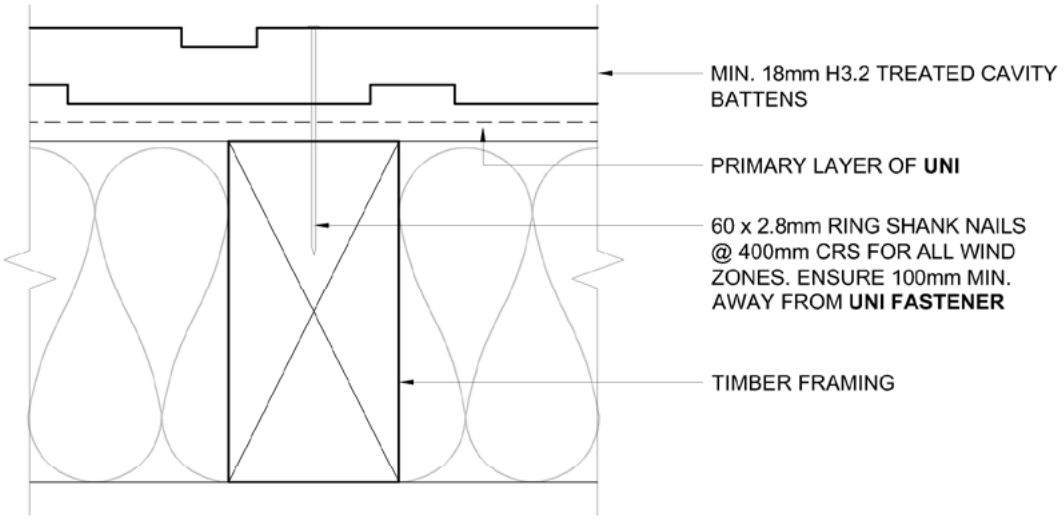
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Penetration Seals
UNI FAB, UNI Plus & UNI Pro

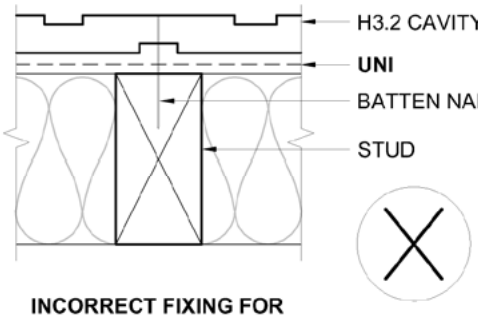
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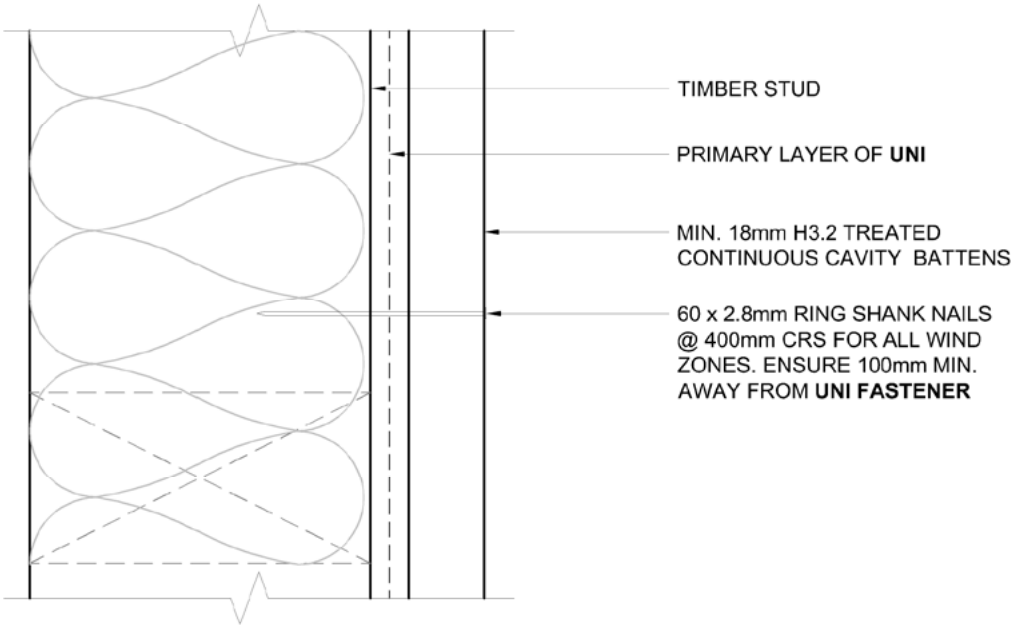


HORIZONTAL CAVITY BATTEN



INCORRECT FIXING FOR VENTILATED BATTENS

NOTE:
- BATTEN FIXINGS REFER TO 'UNI WIND ZONE FIXING CHART'
- USE APPROPRIATE FIXING FOR CORROSION ZONE
- DO NOT FIX AT BATTEN NOTCHES
- MASONS WRAP STRAP IS RECOMMENDED BEFORE INSTALLING BATTENS TO PREVENT BUILDING WRAP FROM BULGING



VERTICAL CAVITY BATTEN

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CAVITY BATTEN FIXING
UNI FAB, UNI Plus & UNI Pro

Scale	Date
1:2	

Drawing Ref No. UNI.09

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INSTALLATION GUIDE

Thermakraft™
COVERTEK
407

Thermakraft™ COVERTEK 407

Heavy duty self-supporting roof and wall underlay

Kingspan Thermakraft Covertek 407 is our strongest synthetic underlay, designed as a means of managing condensation, water vapour transfer and water ingress in the most trying conditions including applications where the roof pitch is 3° and above. Covertek 407 is fire retardant.

Product usage

Covertek 407 is a synthetic self-supporting roof and wall underlay designed as a means of managing condensation and water ingress in roof applications. Constructed using a microporous water-resistant film sandwiched between two layers of spun-bonded polyolefin Covertek 407 is fire retardant, absorbent and breathable.

CodeMark GM-CM30028

BRANZ Appraised
Appraisal No.651 [2019]

Kingspan®

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Queenstown Lakes District Council

Covertek 407

Heavy duty self-supporting roof and wall underlay

Roof Application Method

Long-run metal roofing/vertical or horizontal installation method

- Fix Covertek 407 underlay with printed side facing the exterior.
- Fix using stainless steel 8-12mm staples or 20mm flat head clouts, or appropriate proprietary fastenings on timber framed structure. Fixing at 300mm centres. Fixing types and requirements for steel framed structure can be found in the NZ Metal Roof and Wall Cladding Code of Practice (COP).
- 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

- Covertek 407 upper sheet lapped over lower sheets (shiplap) to ensure water is shed to the outer face. Note: Covertek 407 can move downwards. To prevent this, it must be "Captured" by the fastenings at each purlin. Horizontal fix must not be used on purlin distance greater than 1100mm to allow for 150mm laps.
- Must be laid firmly (tight/taut) without creases. All laps either vertical or horizontal must be a minimum of 150mm lap.
- When underlay support is required, Kingspan recommend using AUSMESH Safety Mesh, AUSNET hexagonal netting or Thermastrap 201. Note: Commercial Buildings may require the use of Roof Safety Mesh under Covertek 407. Covertek 407 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 Roof and Wall Cladding COP), use Thermakraft Premium Joining Tape or any Thermakraft Window Flashing Tape.
- Covertek 407 will provide some temporary weather protection during construction (maximum 7 days), same day coverage recommended. DO NOT over expose the product for more than 7 days.
- Covertek 407 may be unwound to the full length from the gutter to the ridge. However, when ridge ventilation is required Covertek 407 may be terminated or slit at the ridge purlin to allow a free passage of air.
- Covertek 407 must NOT overhang the gutter line by more than 20 mm, or if eaves flashings are used, terminate on the upper side of the flashing. More details can be found in the NZ Metal Roof and Wall Cladding COP.
- Flue penetrations must have a minimum clearance of 50mm from Covertek 407 (refer to NZ Metal Roof and Wall Cladding Code of Practice 10.11.5 and the flue suppliers instructions).
- Covertek 407 must be free of tears and punctures, fit taut and be lap taped around all penetrations (except flue penetrations), to provide drainage for any condensation, or surface water from leaks.
- Lap taping can be done with Thermakraft Premium Joining Tape or any Thermakraft Window Flashing Tape.

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

- Covertek 407 must be laid over rafters prior to fixing the tile battens. The maximum span between rafters for Covertek 407 is 1200mm. Masonry tile roofs must have antiponding boards in accordance with NZBC E2/AS1 Paragraph 8.2.5.
- Installed Covertek 407 may be laid over the top of the antiponding boards and draped into the gutter by no more than 20mm.
- Covertek 407 must be installed by, or under the guidance of a licensed building practitioner.

Application Tips

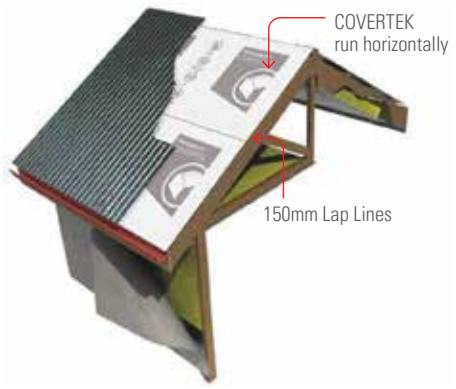
Unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent chemical to flash off in a well ventilated area. Recommended minimum 7 days.

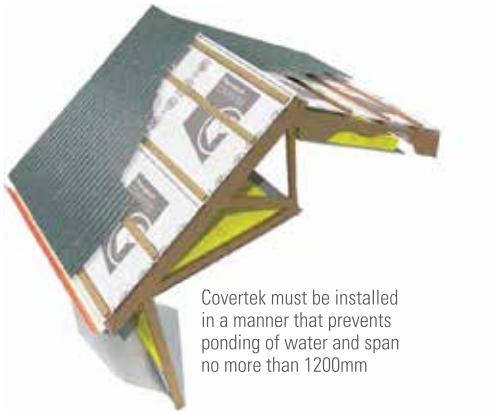
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Covertek 407

Heavy duty self-supporting roof and wall underlay

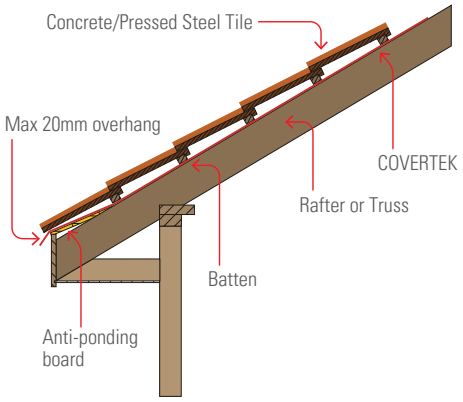
Corrugated roofing:

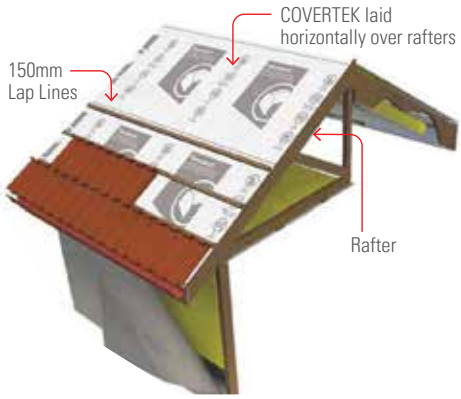




Concrete/metal tile roofing:

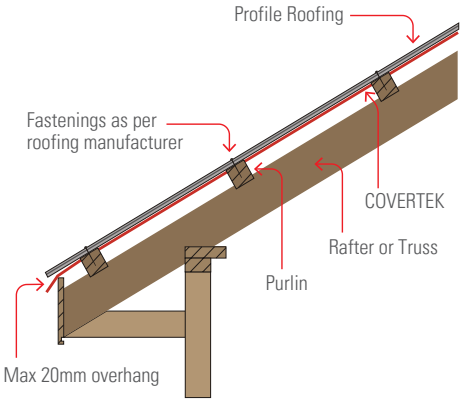
Tile roofing



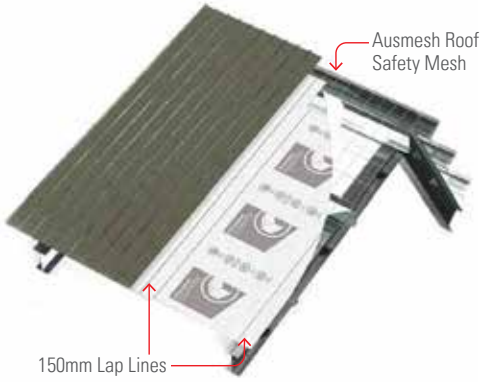


Long run metal roofing:

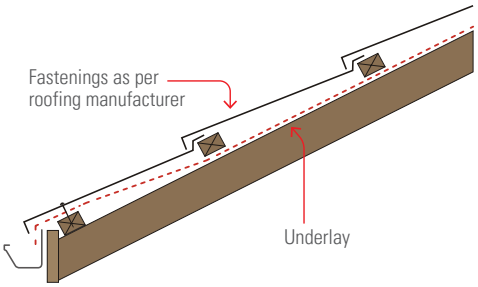
Wooden construction



Steel construction



Metal tile installation



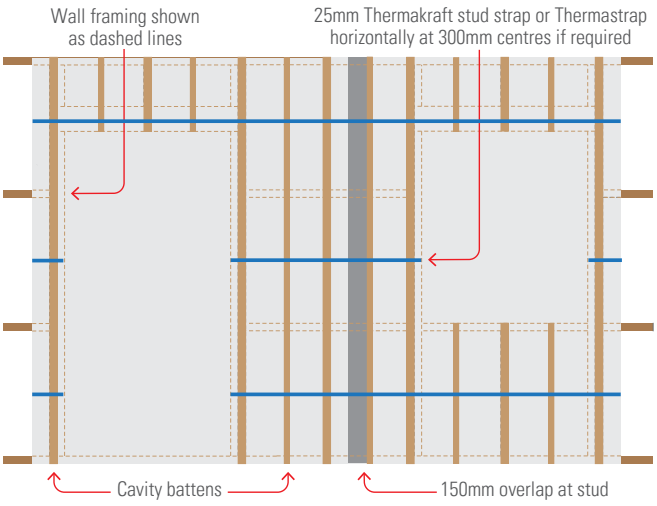
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Heavy duty self-supporting roof and wall underlay

Wall Application Method

- Fix Covertek 407 underlay with printed side facing the exterior.
- Fix to all exterior walls from below bearers to the top plate. Pull the Covertek 407 underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically. Additional fasteners should be used around each opening to be cut out. Fixing types and requirements for steel framed structure can be found in the NZ Metal Roof and Wall Cladding COP.
- When fixing Covertek 407 underlay to Steel framing the same procedure 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.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZBC Clause B2.3.2.
- Covertek 407 underlays are available in widths of 2550mm and 1250mm.
- Cover all windows and door openings with Covertek 407 underlay.
- It is recommended that the Covertek 407 underlay is not cut and prepared for window installation until the arrival of the windows. Minimum of 150mm 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 Covertek 407 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 or Thermastrap run horizontal at 300mm centres is an acceptable means of prevention.

- Once installed, Covertek 407 must not be left exposed to the weather or UV for a maximum of 60 days. Covertek 407 underlays will provide some degree of temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- 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.
- Lap taping can be done with Thermakraft Premium Joining Tape or any Thermakraft Window Flashing Tape.
- Covertek 407 underlay must be installed by, or under the guidance of 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

- Covertek 407 must be handled with care to prevent damage such as tearing and roll deformation.
- The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

CodeMark GM-CM30028

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Appraisal No.651 (2019)

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www.thermakraft.co.nz

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The recommendations contained in Kingspan's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Kingspan (for example quality of workmanship and design), Kingspan shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards. Literature subject to change without notification. Latest documentation can be found online. E&OE.

Issue 3.0, September 2022

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Demand Calculation Sheet

Job Details

Name:	New Dwelling
Street and Number:	12 Leven Stream Lane
Lot and DP Number	Lot 45 DP 611245
City/Town/District	
Designer	Justin
Company	J B H Draughting Ltd
Date	Saturday, 24 January 2026

Building Specification

Number of Storeys	1
Floor Loading	2 kPa
Foundation Type	Slab
	Single
Cladding Weight	Light
Roof Weight	Light
Room in Roof Space	No
Roof Pitch (degrees)	25
Roof Height above Eaves (m)	2.8
Building Height to Apex (m)	5.4
Ground to Lower Floor (m)	0.2
Average Stud Height (m)	2.4
Building Length (m)	19.5
Building Width (m)	10.6
Building Plan Area (m²)	185

Building Location

Wind Zone = High

Earthquake Zone 3

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

Bracing Units required for Wind

	Along	Across
Single Level	**615**	**1205**

Bracing Units required for Earthquake

	Along & Across
Single Level	**987**

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WALL BRACING LEGEND ALONG

Brace Line	Element Length	Code	Description	BU/m Wind Rating	BU/m Eq Rating	Bracing Element Height	BU's Wind Acheived	BU's Eq Acheived
a1	0.830	GS1-N	Gib Std One Side Only	50	55	2.400	42	46
a2	2.150	GS1-N	Gib Std One Side Only	70	60	2.400	151	129
a3	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
a4	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
b1	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
b2	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
b3	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
b4	1.650	GS1-N	Gib Std One Side Only	70	60	2.400	116	99
b5	0.450	GS1-N	Gib Std One Side Only	50	55	2.400	23	25
c1	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
c2	0.950	GS1-N	Gib Std One Side Only	50	55	2.400	48	52
c3	0.550	BL1-H	Gib Braceline One Side	90	100	2.400	50	55
c4	0.550	GS1-N	Gib Std One Side Only	50	55	2.400	28	30
c5	0.550	GS1-N	Gib Std One Side Only	50	55	2.400	28	30
c6	0.550	BL1-H	Gib Braceline One Side	90	100	2.400	50	55
c7	1.710	GS1-N	Gib Std One Side Only	70	60	2.400	120	103
c8	1.200	GS1-N	Gib Std One Side Only	70	60	2.400	84	72
Grand total: 17							1491	1344

WALL BRACING LEGEND ACROSS

Brace Line	Element Length	Code	Description	BU/m Wind Rating	BU/m Eq Rating	Bracing Element Height	BU's Wind Acheived	BU's Eq Acheived
m1	0.440	HP	Home RAB one Side	85	91	2.400	37	40
m2	0.440	HP	Home RAB one Side	85	91	2.400	37	40
m3	0.900	GS1-N	Gib Std One Side Only	50	55	2.400	45	50
m4	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
n1	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
o1	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
o2	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
p1	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
q1	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
r1	1.800	GS1-N	Gib Std One Side Only	70	60	2.400	126	108
r2	1.000	BL1-H	Gib Braceline One Side	90	100	3.200	68	75
r3	1.000	BL1-H	Gib Braceline One Side	90	100	2.500	86	96
s1	0.850	BL1-H	Gib Braceline One Side	90	100	2.400	77	85
s2	0.850	BL1-H	Gib Braceline One Side	90	100	2.400	77	85
Grand total: 14							1309	1227

Code	Description	Bracket
BL1-H	Gib Braceline One Side	Yes
GS1-N	Gib Std One Side Only	No
HP	Home RAB one Side	Yes

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GIB EzyBrace® Systems specification GS1-N

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

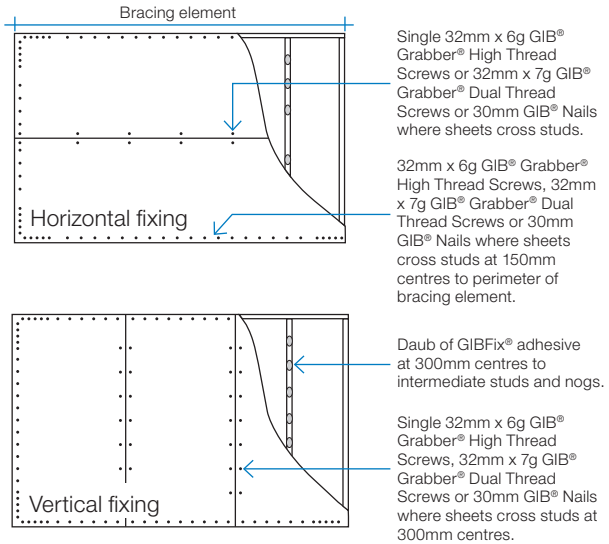
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

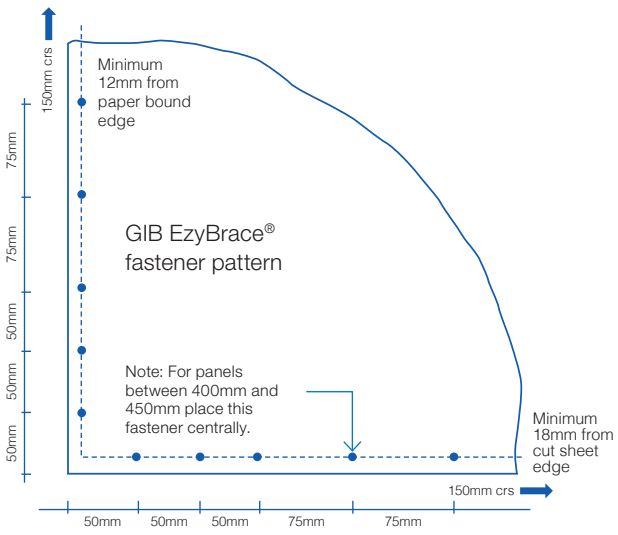
Fastener centres

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

JOINTING

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





Unless stated all fastener spacings are maximums.

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

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GIB EzyBrace® Systems specification BL1-H

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

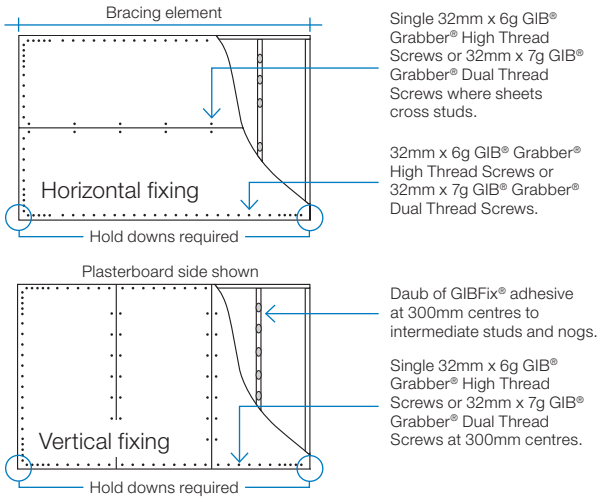
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

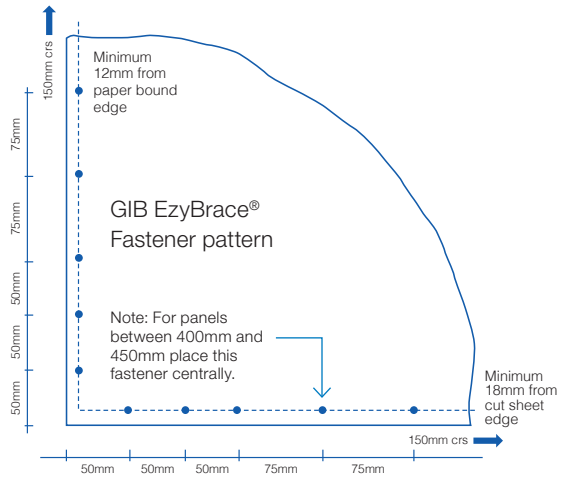
Fastener centres

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

JOINTING

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





Unless stated all fastener spacings are maximums.

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

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6 Bracing

HomeRAB Pre-Cladding and RAB Board are suitable for bracing applications. Given below are various bracing systems that have been tested and the bracing values published. Refer to bracing system details for bracing installation or refer to James Hardie Bracing Design Manual for further information.

6.1 Bottom Plate Fixing/Hold Down Restraints

The timber framing must be fixed in accordance to table 8.19 of the NZS 3604. Additional hold down restraints must be provided as per each bracing system's requirements. Refer to bracing systems details.

6.1.1 Concrete foundation

Pydra brace anchor kits or GIB Handibrac® with a 15kN minimum uplift capacity holding down bolt can be used as end restraints.

6.1.2 Timber foundation

Pydra brace anchor kits or GIB Handibrac® with a M12 x 150mm holding down bolt can be used as end restraints. Alternatively, holding down straps as per the NZS 3604 can also be used.

6.2 Fastener Durability and Size

Coach screws and holding down (HD) bolts, where used, must be M12 hot-dipped galvanised steel fitted with 50 x 50 x 3mm galvanised washers. The holding down bolts and washers must have a protective coating as per Table 4.2 of the NZS 3604.

Pre-Claddings:

All nails for fixing the pre-cladding bracing panels in Zone D must be Grade 304/316 stainless steel in accordance with the NZS 3604.

All nails for fixing the pre-cladding bracing panels for Zone B and Zone C can be Grade 304/316 stainless steel or hot dipped galvanised steel nail.

Note: Fastener sizes are given in the respective details section for each product or system.

6.3 Sheet Nailing

Nails can be hand driven or gun nailed at a minimum edge distance as shown in the bracing details within this specification. This also applies to dimensions from corners, vertically and horizontally. The sheets must be held hard against the framing during nailing to minimise sheet break-out at the back of sheet. Always drive all nails flush with the sheet surface. For sheet/panel systems do not punch the nail below the surface as it reduces the nail's holding power.

Fix all sheets from the centre working towards outer edges to avoid drumminess. Fixings at 150mm maximum centres when hand nailing.

Gun nails can be used on some bracing systems with fixings at 100mm maximum centres. Must use a 6.85mm Ø round head coil nail with a pneumatic nail gun. **Refer to bracing tables for hand or gun nail options available.**

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6.4 Sheet Orientation

For the bracing systems specified in this manual, all flat sheets must be fixed vertically with the exception of Villaboard™ Lining, which can either be fixed vertically or horizontally as per the bracing systems details.

Full-height sheets must be used for walls up to 3000mm in height. When bracing walls height exceed 3000mm, sheet jointing is acceptable. Only one horizontal sheet joint is permitted within the element height. The maximum height of bracing wall is limited to 4800mm.

A site cut bracing sheet must be minimum 300mm wide when used in a bracing element. Refer to Figure 16.

Always ensure that the sheet joint is on the centre line of the stud or nog to achieve sufficient cover of fixings.

In internal walls the lining sheet used for bracing must stop 6mm above the finished floor.

6.5 Service Penetrations

Holes/penetrations up to 100 x 100mm positioned no closer than 200mm of the edge or another penetration, are allowed for services. Maximum of two service penetrations are recommended per sheet.

No window/door penetrations are allowed within the bracing elements.

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Table 7

HomeRAB™ Pre-Cladding vertically fixed

System number	Length	Hold down	Refer figures	BU/M		kN/m		Fixing method	
				Wind	Earthquake	Wind	Earthquake	Hand nail	Gun nail
Hpn	1200	N	27	67	71	3.3	3.5	√	✕
HP	400	Y	28,32,33,34	85	91	4.2	4.5	√	E
	600	Y	28,32,33,34	99	103	4.9	5.1	√	E
	1200 to 2400	Y	29,32,33,34	133*	104	6.6	5.2	√	E
	2400 to 4800	Y	29,32,33,34	141*	67	7.0	3.3	√	E

*A limit of 120BUs/m maximum applies to timber floors and 150BUs/m maximum to concrete floors built as per the NZS 3604: 2011 unless a specific engineering design is carried out to ensure the uplift force generated by bracing elements does not exceed the maximum limit for each floor type.

Table 8

HomeRAB™ Pre-Cladding vertically fixed with 10mm GIB® Standard plasterboard

System number	Length	Hold down	Refer figures	BU/M		kN/m		Fixing method	
				Wind	Earthquake	Wind	Earthquake	Hand nail	Gun nail
HPg	400	Y	28,30,32,33,34	90	98	4.5	4.9	√	E
	600	Y	28,30,32,33,34	127*	136*	6.3	6.8	√	E
	1200 to 2400	Y	29,31,32,33,34	164*	138*	8.2	6.9	√	E

*A limit of 120BUs/m maximum applies to timber floors and 150BUs/m maximum to concrete floors built as per the NZS 3604: 2011 unless a specific engineering design is carried out to ensure the uplift force generated by bracing elements does not exceed the maximum limit for each floor type.

Table 9

RAB™ Board 6mm or 9mm

System number	Length	Hold down	Refer figures	BU/M		kN/m		Fixing method	
				Wind	Earthquake	Wind	Earthquake	Hand nail	Gun nail
JHDn	1200	N	27	118	102	5.9	5.1	√	✕
JHD	400	Y	28,32,33,34	83	107	4.1	5.3	√	E & P
	600	Y	28,32,33,34	99	107	4.9	5.3	√	E & P
	1200 to 2400	Y	29,32,33,34	154*	140*	7.7	7.0	√	E & P
	2400 to 4800	Y	29,32,33,34	133*	150*	6.6	7.4	√	E & P
JHDg	600	Y	6,8,13,14,15	106	121	5.3	6.0	√	E & P

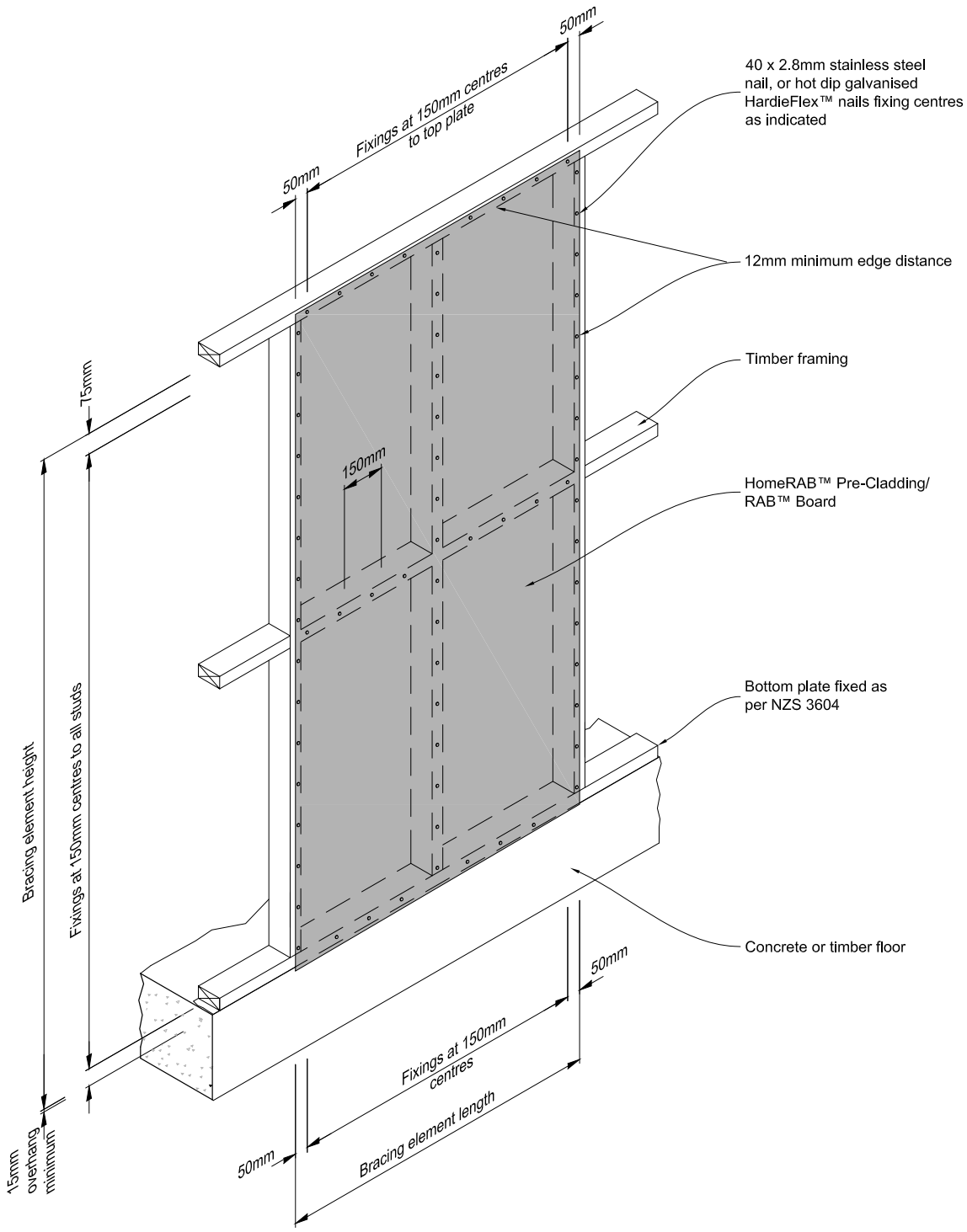
*A limit of 120BUs/m maximum applies to timber floors and 150BUs/m maximum to concrete floors built as per the NZS 3604: 2011 unless a specific engineering design is carried out to ensure the uplift force generated by bracing elements does not exceed the maximum limit for each floor type.

E = Ecko Pneumatic wireless coil nail

P = Paslode RounDrive ring shank nail

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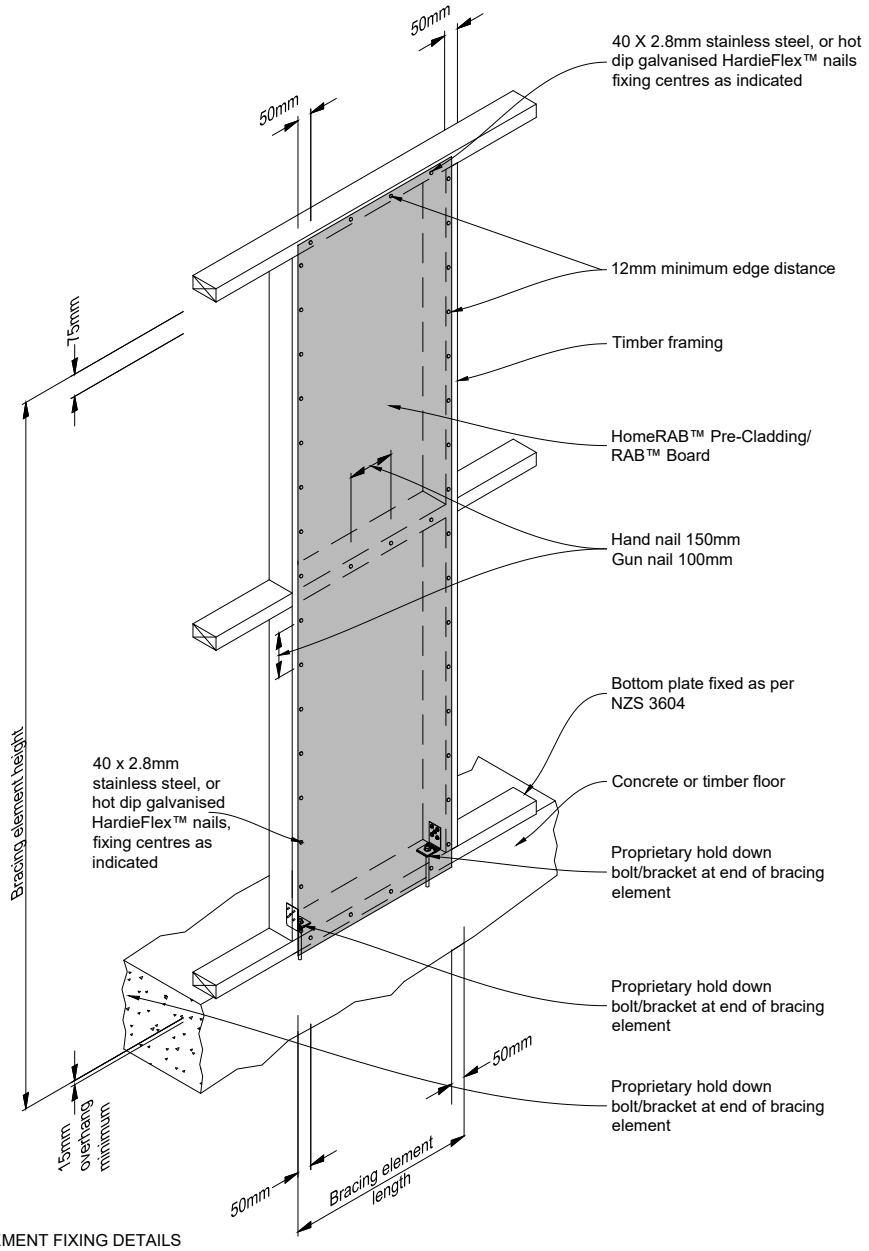
Figure 27: 1200mm HomeRAB™ Pre-Cladding or RAB™ Board to concrete or timber floor - no hold down brackets



Product	System	Minimum length
HomeRAB™ Pre-Cladding	HPn	1200mm
RAB™ Board	JHDn	1200mm

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Figure 28: 400/600mm HomeRAB™ Pre-Cladding or RAB™ Board to concrete or timber floor



FIBRE CEMENT FIXING DETAILS

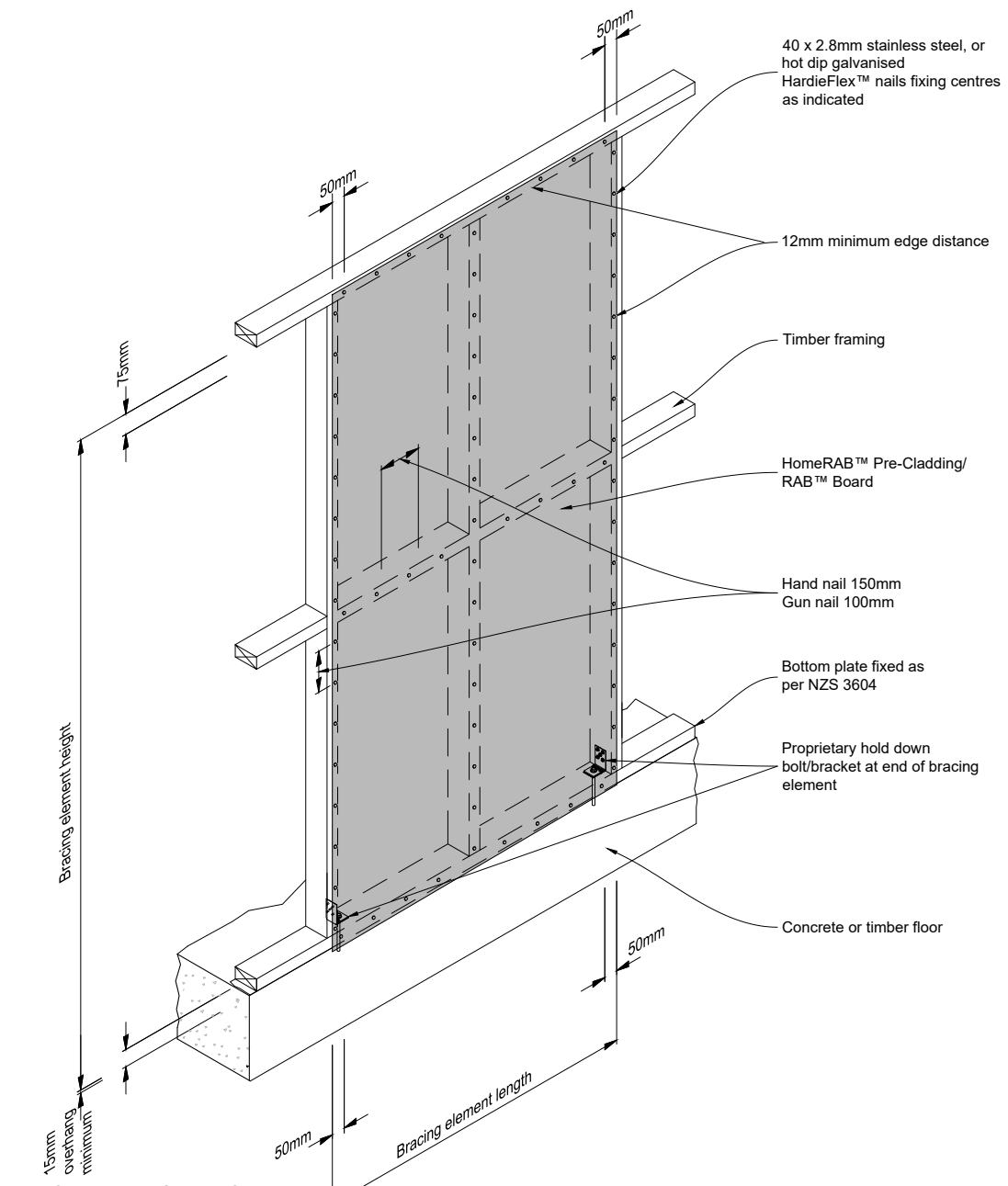
Notes for Figure 28:

- **Concrete floor** bottom plate fixing:- Ramset bracing anchor kit Concrete or GIB Handibrac® with 15kN anchor at each end of bracing element
- **Timber floor** bottom plate fixing:- Ramset bracing anchor kit Wood or GIB Handibrac® with a 12x150mm galvanised coach screw at each end of bracing element

Product	System	Minimum length
HomeRAB™ Pre-Cladding	HP	400 or 600mm
HomeRAB™ Pre-Cladding with 10mm GIB® Standard plasterboard	HPg	400 or 600mm
RAB™ Board	JHD	400 or 600mm
RAB™ Board	JHDg	600mm

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Figure 29: 1200mm HomeRAB™ Pre-Cladding or RAB™ Board to concrete or timber floor



FIBRE CEMENT FIXING DETAILS

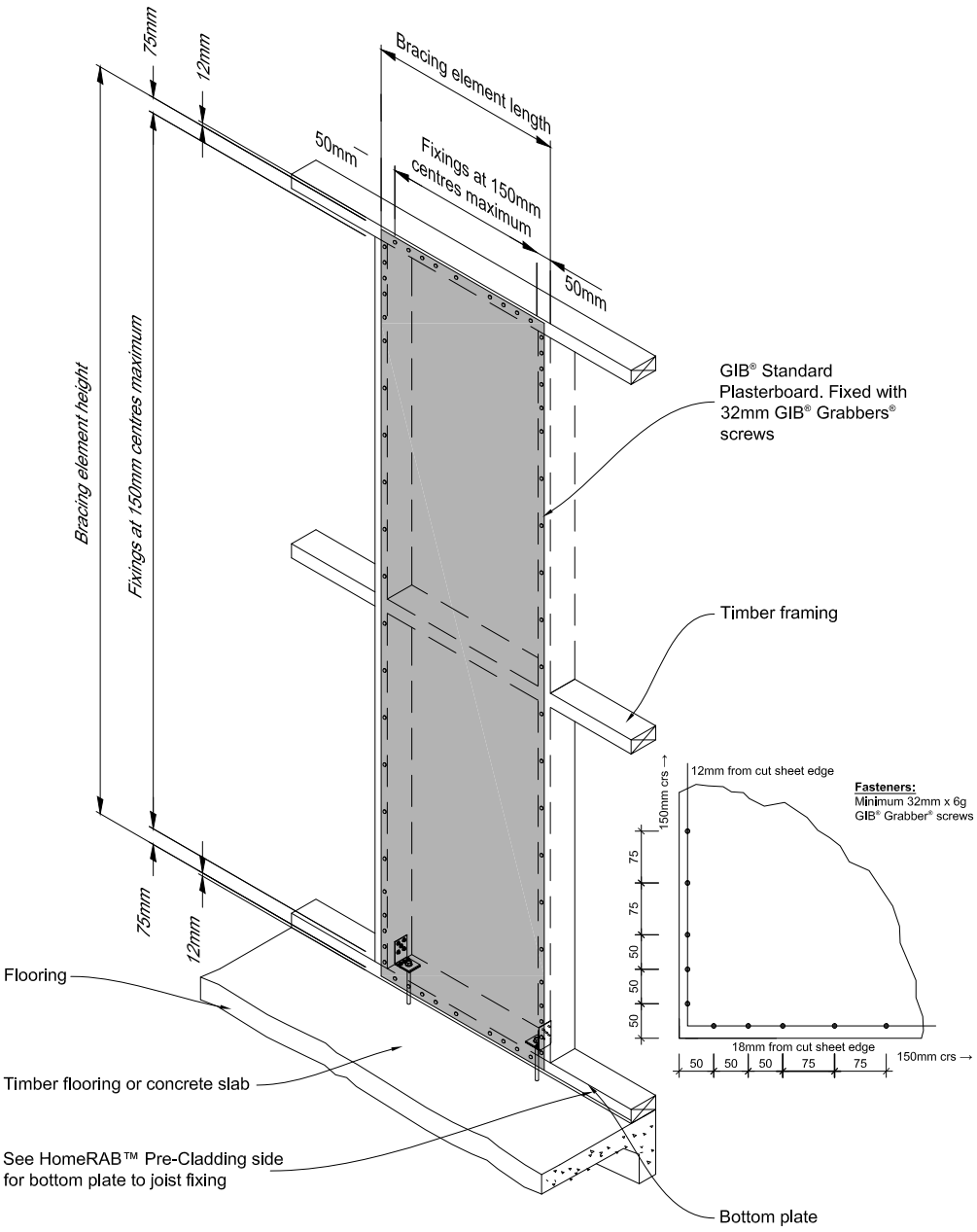
Notes for Figure 29:

- **Concrete floor** bottom plate fixing:- Ramset bracing anchor kit Concrete or GIB Handibrac® with 15kN anchor at each end of bracing element
- **Timber floor** bottom plate fixing:- Ramset bracing anchor kit Wood or GIB Handibrac® with a 12x150mm galvanised coach screw at each end of bracing element

Product	System	Minimum length
HomeRAB™ Pre-Cladding	HP	1200mm
HomeRAB™ Pre-Cladding with 10mm GIB® Standard plasterboard	HPg	1200mm
RAB™ Board	JHD	1200mm

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Figure 30: 400mm/600mm HomeRAB™ Pre-Cladding with 10mm GIB® Standard Plasterboard



STANDARD GIB® FIXING DETAILS

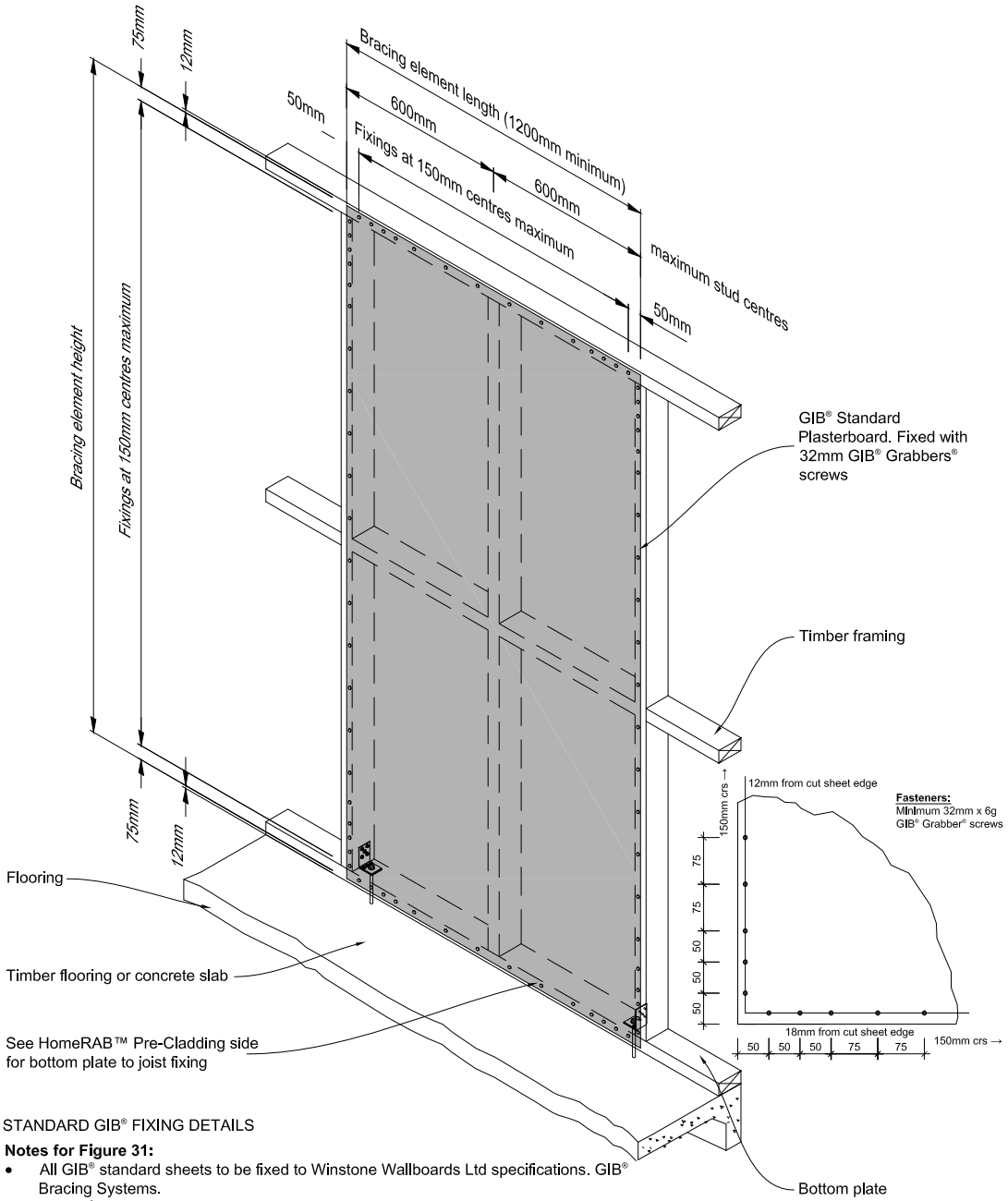
Notes for Figure 30:

- All GIB® standard sheets to be fixed to Winstone Wallboards Ltd specifications. GIB® Bracing Systems.
- All GIB® bracing sheets to be stopped to Winstone Wallboards Ltd specifications. GIB® Site Guide.
- Refer Winstone Wallboards Ltd specifications for edge distance.

Product	System	Minimum length
HomeRAB™ Pre-Cladding	HPg	400 or 600mm
RAB™ Board	JHDg	600mm

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Figure 31: 1200mm HomeRAB™ Pre-Cladding with 10mm GIB® Standard Plasterboard



STANDARD GIB® FIXING DETAILS

Notes for Figure 31:

- All GIB® standard sheets to be fixed to Winstone Wallboards Ltd specifications. GIB® Bracing Systems.
- All GIB® bracing sheets to be stopped to Winstone Wallboards Ltd specifications. GIB® Site Guide.
- Refer Winstone Wallboards Ltd specifications for edge distance.

Product	System	Minimum length
HomeRAB™ Pre-Cladding/GIB® Standard Plasterboard	HPg	1200mm

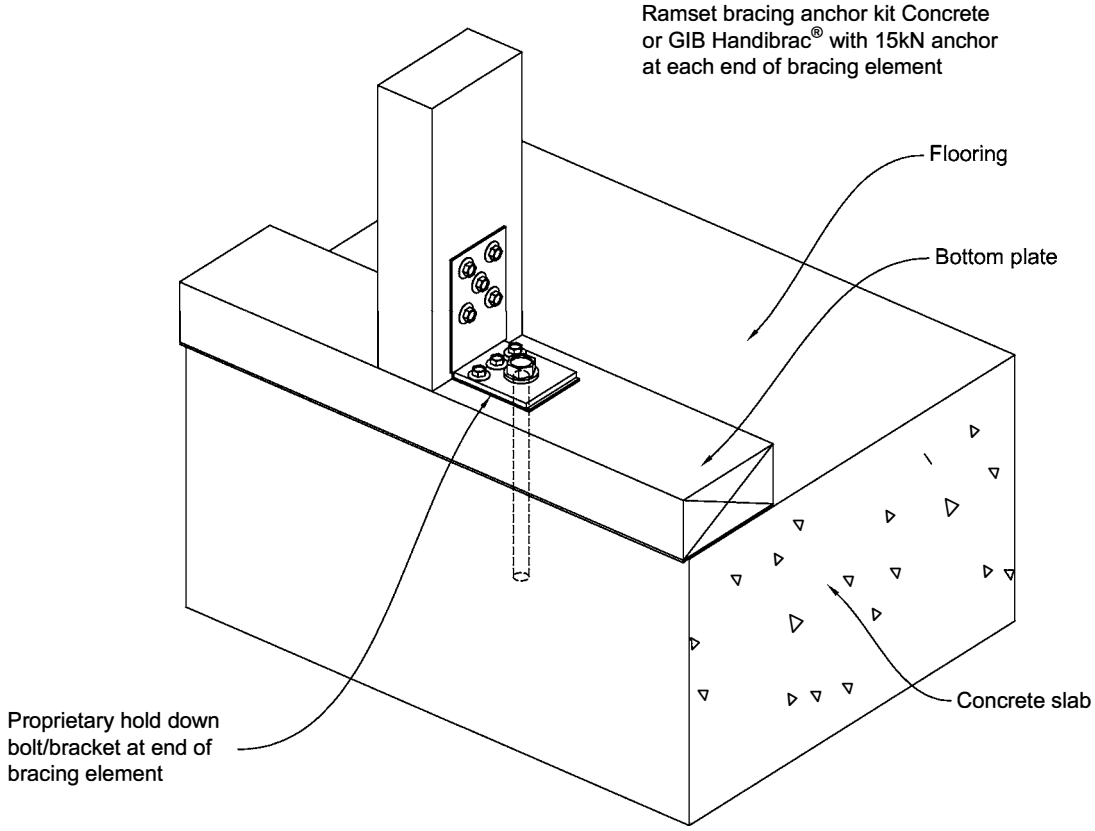
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Bracing Construction Figures

Figure 32: End bracket to concrete slab

Notes for Figure 32:

- **Concrete floor** bottom plate fixing:- Ramset bracing anchor kit Concrete or GIB Handibrac® with 15kN anchor at each end of bracing element

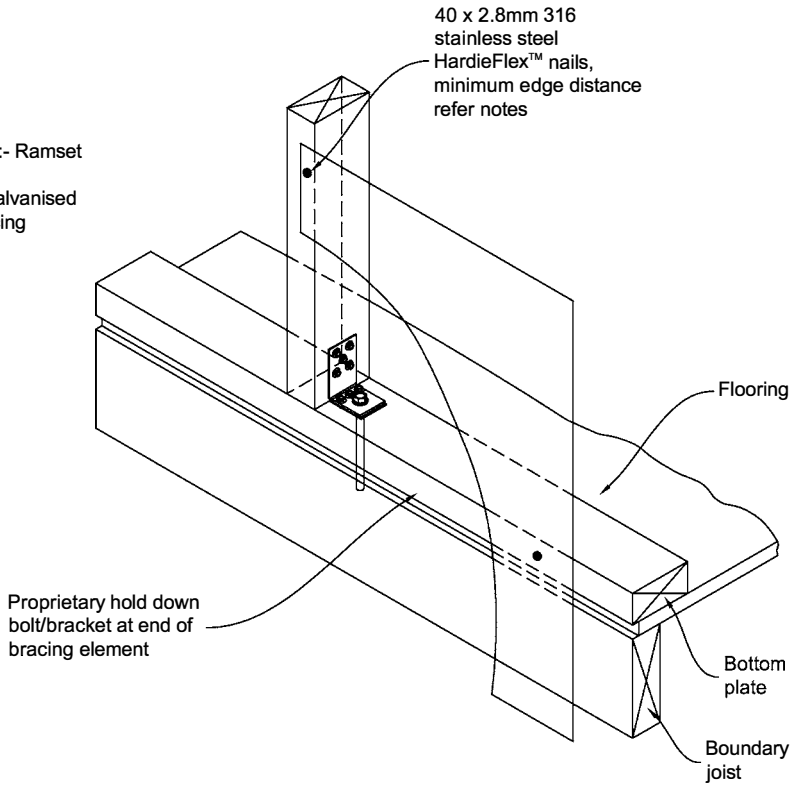


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Figure 33: End bracket to timber joist

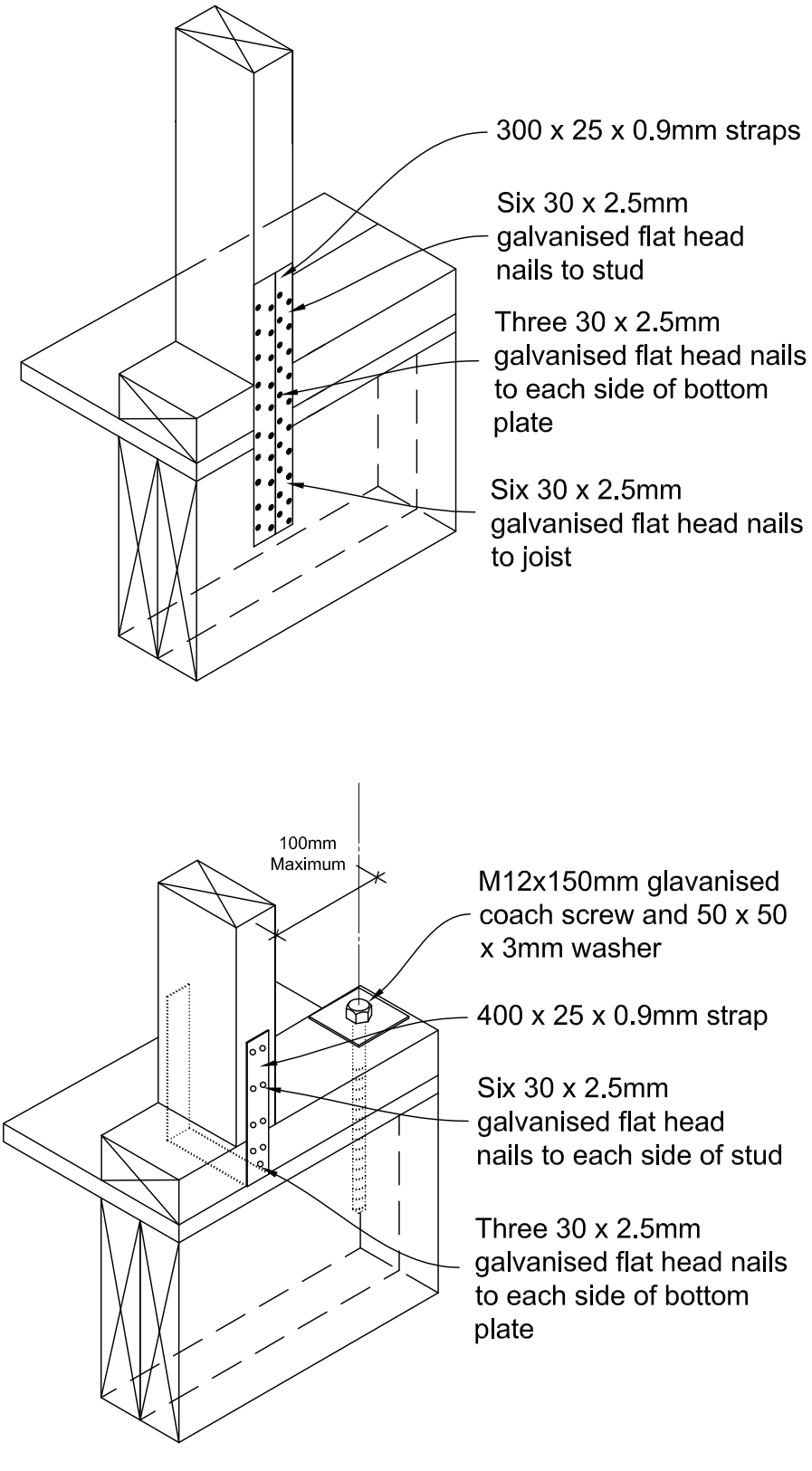
Notes for Figure 33:

- **Timber floor** bottom plate fixing:- Ramset bracing anchor kit Wood or GIB Handibrac® with a 12x150mm galvanised coach screw at each end of bracing element



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Figure 34: Hold down straps to timber joists



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Installation of GIB HandiBrac® – Panel Hold-Down Bracket

Developed in conjunction with MiTek®, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs.

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

The use of the GIB HandiBrac® provides quick and easy installation. As the bracket is fitted inside the framing this allows a flush surface for the wall linings. There is no need to check in the framing as is recommended when fitting conventional straps.

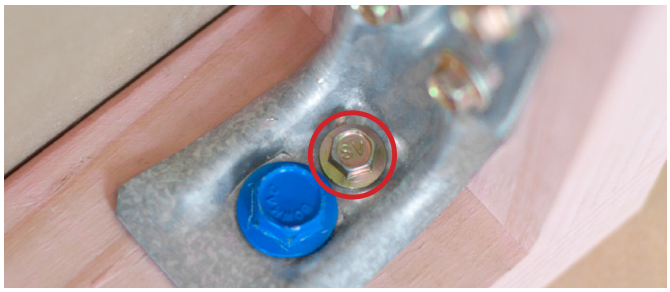
The use of the GIB HandiBrac® allows for installation and inspection at any stage prior to fitting internal linings. It is suitable for both new and retrofit construction.

PREPARATION AND INSTALLATION TIPS

- Use a 10mm diameter masonry drill bit for a solid concrete substrate and an 8mm diameter drill bit for fixing to a timber sub-floor.
- Drill a hole into the base material to depth 8 mm deeper than the required embedment and clean out the hole of dust and debris prior to installation of BOWMAC® screw bolt.
- Use a quality hexagonal socket with a ratchet spanner.
- During installation debris or dust created by the thread cutting action may cause some resistance to be experienced. This is easily overcome by unscrewing the BOWMAC® screw bolt for one turn or more and then continuing to fix to the full embedment.

INSTALLATION

01. Correctly position the GIB HandiBrac® to suit the sub floor (refer GIB® Site Guide (2018) pp 63)



02. Install the hex screw (see red circle above) located in the bracket base when it is in the required position.
03. Insert the blue bolt through the GIB HandiBrac® into the hole and begin tightening the bolt by applying forward pressure when engaging the first thread.
04. Additional forward pressure may be required for installation in high strength, dense base materials.
05. Continue tightening the anchor until the head is firmly seated against the GIB HandiBrac® base. In extremely dense material, use of an impact wrench is recommended.
06. Be sure the bolt is at the required embedment depth.
07. Install remaining four screws into the face of the timber stud.
08. The installation is now complete.

For further information refer to the GIB® Site Guide or call the GIB® Helpline 0800 100 442.