



# PROJECT SPECIFICATION

of work to be done and materials to be used in carrying  
out the works shown on the accompanying  
drawings

**Sher Ali Dwelling**  
(project name)

**Lot 146, Trevors Road ASHBURTON**  
(project address)

**Shameer Sher Ali**  
(owners name)

**Job Number**

**860864**

DATE: December 2024

## TABLE OF CONTENTS

1220	PROJECT	2
1232	INTERPRETATION & DEFINITIONS	3
1233	REFERENCED DOCUMENTS	5
1250	TEMPORARY WORKS & SERVICES	6
1270	CONSTRUCTION	9
2210	PREPARATION & GROUNDWORK	13
3820	CARPENTRY	16
3827E	ECOPLY® PLYWOOD BRACING SYSTEM	19
4161	UNDERLAYS, FOIL AND DPC	22
4231HA	JAMES HARDIE AXON™ PANEL CLADDING	26
4261	BRICK VENEER CLADDING	31
4323G	GERARD® STEEL TILE ROOFING	36
4521	ALUMINIUM WINDOWS AND DOORS	40
4610	GLAZING RESIDENTIAL	47
4821	FLASHINGS	51
5113G	GIB® PLASTERBOARD LININGS	54
6700	PAINTING GENERAL	58
6711	PAINTING EXTERIOR	64
6721	PAINTING INTERIOR	65
7120	HOT & COLD WATER SYSTEM	66
7151	SANITARY FIXTURES, TAPWARE & ACCESSORIES	71
7430	DRAINAGE	73
7701	ELECTRICAL BASIC	76



**masterspec**

Verified spec ID: **336810-383999**

This specification has been produced using Masterspec software and completed on 03/12/2024.  
Scan to verify or go to [masterspec.co.nz/verify](https://masterspec.co.nz/verify)



**1220 PROJECT****1 GENERAL**

This general section describes the project including:

- A description of the work
- Design construction safety
- Principal's Health & Safety matters
- Site description, features and restrictions
- Design parameters for design by contractor
- Archaeological discovery

**1.1 READ ALL SECTIONS TOGETHER**

Read all general sections together with all other sections.

**1.2 RESTRICTED BUILDING WORK**

This project includes Restricted Building Work.

**Site****1.3 LEGAL DESCRIPTION**

The site of the works, the street address and the legal description are shown on the drawings.

**Site environment - Wind****1.4 WIND DESIGN PARAMETERS - NON SPECIFIC DESIGN**

The design wind pressures are to [NZS 3604](#), Table 5.4 Determination of wind zone, up to and including Extra High Wind Zone.

Building wind zone      high (refer to [NZS 3604](#), table 5.4)

**Site environment - Durability****1.5 EXPOSURE ZONE**

The exposure zone is to [NZS 3604](#), Section 4 Durability, 4.2 Exposure zones and [NZBC E2/AS1](#).  
The site zone is:      C

**Site environment - Seismic****1.6 EARTHQUAKE ZONE - NON SPECIFIC DESIGN**

The zone is to [NZS 3604](#), Section 5 Bracing design, 5.3 Earthquake bracing demand.  
The earthquake zone    2  
is:

**Archaeological discovery****1.7 ANTIQUITIES AND ITEMS OF VALUE**

Report the finding of any fossils, antiquities and other items of value, to the Contract Administrator.  
All to remain undisturbed until approval is given for removal.

Pre-1900, items or evidence of human activity on the site, come under the Heritage New Zealand Pouhere Taonga Act 2014. If such items or evidence is discovered work must stop immediately and the Contract Administrator must be notified immediately. The site may be classified as an Archaeological Site under the Act, and the Contract Administrator or Owner must contact the Heritage New Zealand for authority to proceed.

## 1232 INTERPRETATION & DEFINITIONS

### 1 GENERAL

This general section relates to definitions and interpretation that are used in this specification.

#### 1.1 DEFINITIONS

Hold point:	A stage of the construction where the contract administrator and any other nominated person requires notice to be given that particular work is to be carried out. Work may not proceed on that particular part until the contract administrator and any other nominated person has advised that work can continue. A notice period of 2 Working Days is required unless stated otherwise.
Notification point:	A stage of the construction where the contract administrator and any other nominated person requires notice to be given that particular work is to be carried out. Work may continue and the contract administrator and any other nominated person may choose whether or not they wish to witness the particular work being carried out. A notice period of 2 Working Days is required unless stated otherwise.
Product:	A thing or substance produced by natural process or manufacture.
Proprietary:	Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
Provide and fix:	"Provide" or "fix" or "supply" or "fix" if used separately mean provide and fix unless explicitly stated otherwise.
Required:	Required by the documents, the <a href="#">New Zealand Building Code</a> or by a statutory authority.
Review:	Review by the contract administrator and other consultants is for general compliance only. Review does not remove the need for the contractor to comply with the stated requirements, details and specifications of the manufacturers and suppliers of individual components, materials and finishes. Neither can the review be construed as authorising departures from the contract documents.
Working day:	Working day means a calendar day other than any Saturday, Sunday, public holiday or any day falling within the period from 24 December to 5 January, both days inclusive, irrespective of the days on which work is actually carried out.
Workplace:	Workplace means the place where work is being carried out, or is customarily carried out, for a business or undertaking including any place where a worker goes, or is likely to be, while at work (under <a href="#">Health and Safety at Work Act 2015</a> ).

#### 1.2 PERSONNEL

Principal:	The person defined as "Principal" in the conditions of contract.
Contractor:	The person contracted by the principal to carry out the contract.
Contract administrator:	The person appointed by the principal to administer the contract on the principal's behalf. Where no person has been appointed by the principal, it means the principal or the principal's representative.

#### 1.3 ABBREVIATIONS

The following abbreviations are used throughout the specification:

AAMA	American Architectural Manufacturers Association
AS	Australian Standard
AS/NZS	Joint Australian/New Zealand Standard
ASTM	American Society for Testing and Materials
AWCINZ	Association of Wall and Ceiling Industries of New Zealand Inc.
BCA	Building Consent Authority
BPIR	Building Product Information Requirements
BRANZ	Building Research Association of New Zealand
BS	British Standard
COP	Code of practice

CSIRO	Commonwealth Scientific and Industrial Research Organisation
HERA	Heavy Engineering Research Association
LBP	Licensed Building Practitioner
MBIE	Ministry of Business, Innovation and Employment
MPNZA	Master Painters New Zealand Association Inc
NZBC	<a href="#">New Zealand Building Code</a>
NZS	New Zealand Standard
NZS/AS	Joint New Zealand/Australian Standard
NZTA	New Zealand Transport Agency
NUO	Network Utility Operator
OSH	Occupational Safety and Health
PCBU	Person Conducting a Business or Undertaking (under <a href="#">Health and Safety at Work Act 2015</a> )
RBW	Restricted Building Work
SARNZ	Scaffolding and Rigging New Zealand Inc
SED	Specific Engineering Design
TA	Territorial Authority
TNZ	Transit New Zealand (Transit New Zealand is now New Zealand Transport Agency NZTA - some specifications are still prefixed TNZ)

#### 1.4 DEFINED WORDS

Words defined in the conditions of contract, New Zealand Standards, or other reference documents, to have the same interpretation and meaning when used in their lower case, title case or upper case form in the specification text.

#### 1.5 WORDS IMPORTING PLURAL AND SINGULAR

Where the context requires, words importing singular only, also include plural and vice versa.

1233    REFERENCED DOCUMENTS

1    GENERAL

1.1    REFERENCED DOCUMENTS

Throughout this specification, reference is made to various [New Zealand Building Code](#) Compliance Documents (NZBC \_\_\_), acceptable solutions (\_\_\_ AS\_) and verification methods (\_\_\_ VM\_) for criteria and/or methods used to establish compliance with the [New Zealand Building Code](#).

Reference is also made to various standards produced by Standards New Zealand (NZS, AS/NZS, NZS/AS), overseas standards and to listed Acts, Regulations and various industry codes of practice and practice guides. The latest edition (including amendments and provisional editions) at the date of this specification applies unless stated otherwise.

It is the responsibility of the contractor to be familiar with the materials and expert in the techniques quoted in these publications.

Documents cited both directly and within other cited publications are deemed to form part of this specification. However, this specification takes precedence in the event of it being at variance with the cited documents.

1.2    DOCUMENTS

Documents referred to in the GENERAL sections are:

<a href="#">NZBC F5/AS1</a>	Construction and demolition hazards
<a href="#">AS/NZS 1170.2:2011</a>	Structural design actions - Wind actions
<a href="#">NZS 1170.5</a>	Structural design actions - Earthquake actions - New Zealand
<a href="#">AS/NZS 3012</a>	Electrical installations - Construction and demolition sites
<a href="#">NZS 3109</a>	Concrete construction
<a href="#">NZS 3114</a>	Specification for concrete surface finishes
<a href="#">NZS 3602</a>	Timber and wood-based products for use in building
<a href="#">NZS 3604</a>	Timber-framed buildings
<a href="#">NZS 4210</a>	Masonry construction: Materials and workmanship
<a href="#">NZS 4781</a>	Code of Practice for Safety in Welding and Cutting
<a href="#">AS/NZS 5131</a>	Structural steelwork - Fabrication and erection
<a href="#">NZS 6803</a>	Acoustics - Construction Noise
<a href="#">Building Act 2004</a>	
<a href="#">Building Regulations 1992</a>	
<a href="#">Health and Safety at Work Act 2015</a>	
<a href="#">Health and Safety at Work (General Risk and Workplace Management) Regulations 2016</a>	
<a href="#">Health and Safety at Work (Hazardous Substances) Regulations 2017</a>	
<a href="#">Health and Safety in Employment Regulations 1995</a>	
<a href="#">New Zealand Building Code</a>	
<a href="#">Heritage New Zealand Pouhere Taonga Act 2014</a>	
<a href="#">Resource Management Act 1991</a>	
<a href="#">Smoke-free Environments Act 1990</a>	
<a href="#">WorkSafe</a>	<a href="#">Guidelines for the provision of facilities and general safety in the construction industry</a>
<a href="#">WorkSafe</a>	<a href="#">Good Practice Guidelines - Excavation Safety</a>
<a href="#">WorkSafe</a>	<a href="#">Scaffolding in New Zealand - Good Practice Guidelines</a>
<a href="#">WorkSafe</a>	<a href="#">Managing Work Site Traffic - Good Practice Guidelines</a>

## 1250 TEMPORARY WORKS & SERVICES

### 1 GENERAL

This general section relates to temporary works and services required for the construction of the contract works. It includes

- Temporary works and services including temporary fencing and hoardings
- Scaffolding
- General care and protection
- Rubbish removal

#### Temporary works

#### 1.1 COSTS RELATING TO TEMPORARY WORKS

Pay all rates/fees in respect of temporary works.

#### 1.2 MAINTENANCE OF TEMPORARY WORKS

Maintain alter, adapt and move temporary works and services as necessary. Clear away when no longer required and make good.

#### 1.3 SAFEGUARD THE SITE, THE WORKS AND MATERIALS

Take reasonable precautions to prevent unauthorised access, including access outside working hours, to the site, the works and adjoining property. Safeguard the site, the works, materials and plant from damage and theft.

#### 1.4 SITE FENCING

Provide and maintain a site fence, 2 metres high from ground level on the side accessible to the public. Construct to comply with [NZBC F5/AS1](#) Construction and demolition hazards. Construct as required for public areas and as shown on the drawings.

Construct the fence with:

- galvanized chain link netting with a 50mm x 50mm maximum grid size
- posts at 2.5 metre centres maximum
- gap at the bottom of the fence no greater than 100mm

#### 1.5 SITE HOARDINGS

Provide and maintain hoardings, 2 metres high from ground level on the side accessible to the public. Construct to comply with [NZBC F5/AS1](#) Construction and demolition hazards. Construct as required for public areas and as shown on the drawings.

Construct hoardings with continuous cladding of:

- close butted timber at least 19mm thick; or
- 6mm exterior grade plywood on studs at 600mm centres maximum; or
- 9mm exterior grade plywood on studs at 1 metre centres maximum; or
- continuous metal cladding suitably supported to provide strength and rigidity

#### 1.6 SITE FENCING - NON-PUBLIC AREAS

Provide and maintain a 1 metre high site fence to non-public areas. Construct using:

- warratah stakes at 1.5 metre centres fitted with safety caps
- plastic safety mesh

#### 1.7 PROVIDE SEDIMENT AND SILT RUN OFF PROTECTION

Provide appropriate measures to prevent or minimise sediment generation and silt run off. Comply with territorial and other authority requirements relating to carrying out earthworks.

Prevent silt run off by:

- exposing only as much ground as required at any time
- providing run off channels, contour drains or earth bunds to divert clean water away from the site on to stable sealed or grassed ground
- capture silt by the use of silt fences, vegetation buffer strips, sediment ponds or earth bunds.

Provide sediment control by:

- earth bunds constructed across the slope to control and detain run off
- silt fences constructed using filter fabric stretched between posts at a maximum of 1 metre spacing.

Pump water from trenches and other areas of the site using methods to prevent sediment entering any drain or watercourse. Filter dirty water before discharging into drainage system.

#### 1.8 PROVIDE CONCRETE WASHWATER RUN OFF PROTECTION

Provide appropriate measures to prevent cement/concrete washwater or slurry run off to; drains or waterways, landscaped areas new or remaining and adjoining public or private properties. Comply with territorial and other authority requirements relating to cement/concrete washwater.

Control run off from:

- Cement/concrete based material production, placing and finishing.
- Hosing down and cleaning of, tools and equipment, fresh material, and spilt or surplus material, pumps and mixers etc.
- Wet cutting or grinding.
- Slab watering etc.
- Water cleaning of new concrete elements, fresh used formwork etc.

Small project with relatively large exposed ground areas - prevent run off by:

- directing small amounts of washwater onto the area of ground closest to the work.
- for larger amounts provide run off channels, and small soak pits
- very small amounts of washwater with no aggregate and only a small amount of sand may be spread over existing lawns.

Large project and those without suitable ground area - prevent run off by:

- plan and implement washwater control measures based on the expected volumes, allow for the timely removal and safe disposal of liquids and solids.
- Limit the volume of water used for washing down to the extent required.
- Control the flow of washwater so that it is directed to proper catchments.
- providing watertight bunds, pits or tanks, filtered washwater is not to be discharged to drains.

Spilt or surplus material:

- if possible allow to set and either use or dispose of as hardfill.
- pre-made concrete items, either use or dispose of as hardfill.

Pump washwater away from drains, waterways and adjoining property.

### Temporary services

#### 1.9 WATER

Provide clean, fresh water for the works and make arrangements for distributing about the site.

#### 1.10 ELECTRICITY

To AS/NZS 3012.

Nominate the person to install and be responsible for the complete temporary electrical installation. The name and designation of the person responsible is to be displayed prominently and close to the main switch or circuit breaker.

Inspect and overhaul the installation at such intervals as are prescribed by the network utility operator but not more than three monthly intervals.

### Scaffolding

#### 1.11 SCAFFOLDING

Provide scaffolding for the efficient execution of the works.

Comply with:

- [Health and Safety at Work Act 2015](#)
- [Health and Safety in Employment Regulations 1995](#)
- Health and Safety at Work (General Risk and Workplace Management) Regulations 2016
- [Worksafe - Scaffolding in New Zealand - Good Practice Guidelines](#)

### Care and protection - existing buildings

#### 1.12 MAKE GOOD - SITE

Make good all damage to existing roads, footpaths, grounds, services, landscape elements and site features caused in carrying out the contract works.

## 1.13

Provide locksets with temporary keying, or install with the cylinders removed.

## 1.14

Provide temporary storage areas and protective covers and screens to meet the requirements of the products to be stored.

## 1.15

Maintain on site appropriate means for the storage and removal of construction waste material. Where required or appropriate provide for the separate storage of recyclable waste and other materials requiring special disposal.



## 1270 CONSTRUCTION

### 1 GENERAL

This GENERAL section relates to common requirements for construction issues including:

- Quality control and assurance
- Noise and nuisance
- Set-out and tolerances
- Common execution requirements
- Qualifications
- Common product requirements
- Common requirements for samples and prototypes
- Common requirements for spare and maintenance products
- Cleaning during the works
- Removal of protection
- Completion requirements
- Commissioning
- Practical completion submission
- Defects period submissions
- Completion submissions

#### Quality control and assurance

##### 1.1 QUALITY ASSURANCE

Carry out and record regular checks of material quality and accuracy, including:

- Concrete quality and finish.
- Dimensional accuracy of structural column locations (following completion of foundations).
- All perimeter columns and frames for plumb.
- Levels of all floors relative to the site datum.
- Framing timber moisture content.

Where any material, quality or dimension falls outside specified or required tolerances, obtain written direction from the contract administrator. Where building consent approval is affected, confirm remedial action with the Building Consent Authority.

Provide all materials, plant, attendances, supervision, inspections and programming to ensure the required quality standards are met by all project personnel.

#### Noise and nuisance

##### 1.2 LIMIT CONSTRUCTION NOISE

Minimise the effects of noise generation by including in the planning of the work such factors as placing of plant, programming the sequence of operations and other management functions. Limit construction noise to comply with the requirements of [NZS 6803](#), the requirements of the Resource Management Act sections 326, 327 and 328 and the [Health and Safety in Employment Regulations 1995](#) clause 11.

##### 1.3 ACCEPTABLE NOISE LEVELS

Refer to [NZS 6803](#) Tables 2 and 3 for the upper limits of construction work noise received in residential zones, dwellings in rural areas, industrial areas and commercial areas, note also the allowed adjustments. Do not exceed these limits or any limits imposed by regional councils or territorial authorities.

##### 1.4 PROVIDE INFORMATION TO NEIGHBOURS

Provide information to neighbours of any noise generation from the site liable to constitute a problem. Explain to them the means being used to minimise excessive noise and establish with them the timings most suitable for the noise generating work to be carried on.

Discuss with any complainant the measures being used to minimise noise. Where possible modify these measures to accommodate particular circumstances. Finally, determine the sound level at the location under discussion using methods and observation reporting as laid down in [NZS 6803](#). If the noise level is above the upper limits of [NZS 6803](#), table 2 and table 3, cease the noise generating operation and remedy the problem.



**1.5 DIRT AND DROPPINGS**

Remove dirt and droppings deposited on public or private thoroughfares from vehicles servicing the site to the satisfaction of the appropriate authorities and the contract administrator.

**1.6 DAMAGE AND NUISANCE**

Take precautions to prevent damage and nuisance from water, fire, smoke, dust, rubbish and all other causes resulting from the construction works.

**Set-out and tolerances****1.7 SURVEY INFORMATION**

Locate and verify survey marks and datum points required to set out the works. Where these do not exist or cannot be located advise the contract administrator who will arrange for the required points to be established.

Record and maintain their position. Re-establish and replace disturbed or obliterated marks.

**1.8 SET-OUT**

Set out the work to conform with the drawings.

**1.9 USE OF SET-OUT INSTRUMENTS**

Permit without charge, the use of instruments already on site for checking, setting out and levels.

**1.10 CHECK DIMENSIONS**

Check all dimensions both on drawings and site, particularly the correlation between components and work in place. Take all dimensions on drawings to be between structural elements before linings or finishes, unless clearly stated otherwise.

**1.11 TOLERANCES**

All work to be level, plumb, and true to line and face. Unless otherwise specified in specific work sections of this specification, tolerances for structural work shall comply with the following:

Concrete construction:	To <a href="#">NZS 3109</a> Concrete construction Clause 3.9 Tolerances for reinforcement Table 5.1 Tolerance for precast components Table 5.2 Tolerance for in situ construction To <a href="#">NZS 3114</a> Concrete surface finishes
Masonry construction:	To <a href="#">NZS 4210</a> Masonry construction: Materials and workmanship Clause 2.6.5 Tolerances Table 2.2 Maximum tolerances
Structural steelwork:	To <a href="#">NZS 3404.1</a> Steel structures standard Section 14.4 Tolerances (after fabrication) Section 15.3 Tolerances (erection)
Timber framing:	To <a href="#">NZS 3604</a> Timber-framed buildings Clause 2.2 Tolerances Table 2.1 Timber framing tolerances

Refer to work sections for tolerance requirements for finishes.

**Execution****1.12 EXAMINE PREVIOUS WORK**

Before commencing any part of the work carefully examine the previous work on which it depends, to ensure it is of the required standard.

**1.13 MINIMISE DELAYS DUE TO WEATHER**

Use appropriate techniques and methods to prevent damage and minimise delays due to weather.

**1.14 NEW PRODUCTS**

Products to be new unless stated otherwise, of the specified standard, and complying with all cited documents.

**1.15 COMPATIBILITY OF PRODUCTS**



Remove any temporary lock cylinders and complete final keying prior to handing over keys to the principal on completion of the works. Leave the works secure with all accesses locked. Account for all keys/cards/codes and hand to the principal along with an itemised schedule, retaining a duplicate schedule signed by the principal as a receipt.

## 2210 PREPARATION & GROUNDWORK

### 1 GENERAL

This section relates to the clearance, excavation and backfilling of the site area in preparation for:

- footings and floor slabs
- backfilling behind basement retaining walls

#### Documents

#### 1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

[NZS 3604](#) Timber-framed buildings  
[WorkSafe](#) [Good Practice Guidelines - Excavation Safety](#)

#### 1.2 SITE SAFETY

Provide adequate support for all excavations. Cover holes and fence off open trenches and banks.

#### 1.3 ARCHAEOLOGICAL DISCOVERY

If fossils, antiquities and other items of value are found refer to the general section 1220 PROJECT for actions to be taken with archaeological discovery.

### 2 PRODUCTS

#### 2.1 EXCAVATED CLEAN FILL

Clean, free of contamination, mineral soil from other formations in the excavation which may be selected and approved as suitable for filling by having grading and moisture content properties that will allow recompaction to 95% of maximum density.

#### 2.2 VOLCANIC TUFF FILL

Scoriaceous tuff of variable grading excluding excessive silt or clay material, capable of being placed and compacted as specified.

#### 2.3 ROCK FILL

Hard material comprising rock, broken stone, hard brick, concrete, run of pit scoria, or other comparable inert material capable of being placed and compacted as specified.

#### 2.4 SAND FILL

Clean sand of such grading in particle size to achieve mechanical compaction to 90% maximum density.

#### 2.5 HARD FILL

Scoria or crushed rock to GAP (General All Passing) 40 grading.

#### 2.6 GRANULAR FILL

Approved screened crushed gravel or scoria, graded in size from 20mm to 7mm, clean. When tested with a standard sieve of 4.75 opening no material is to pass.

#### 2.7 DRESSING COURSE

Scoria to GAP 20 grading, or "dirty footpath scoria", or equivalent "all in" graded crushed metal aggregate.

#### 2.8 FREE-DRAINING AGGREGATE

Scoria or crushed gravel graded 50 to 14 clean.

### 3 EXECUTION

#### 3.1 WASHOUT BAY FOR TRUCK

Provide a designated area for trucks to be washed down to avoid mud and dirt being carried off site.

#### 3.2 EXCAVATION GENERALLY

Carry out excavation, using plant suitable for the purpose, to the guidelines set by the [WorkSafe, Good Practice Guidelines - Excavation Safety](#).

### 3.3 BURNING OF MATERIALS

Burning of materials is not permitted on site.

### 3.4 PROTECT EXISTING WORK

Protect from damage existing buildings, structures, roads, paving and services nominated on the drawings as being retained.

### 3.5 PROTECT EXISTING TREES, PLANTING, OR LANDSCAPE FEATURES

Protect from damage trees, shrubs, natural site features and existing landscaped areas nominated on the drawings as being retained. Ensure existing levels are undisturbed beneath the dripline of retained trees.

### 3.6 EROSION CONTROL

Ensure measures are in place to contain silt dislodged as a result of water infiltration and to prevent it being carried off site with stormwater.

### 3.7 SURFACE PREPARATION

Comply with [NZS 3604](#), section 3.5, **Site preparation**. Remove all turf, vegetation, trees, topsoil, stumps, uncontrolled fill and rubbish from the area to be built on.

### 3.8 UNDERGROUND ELEMENTS AND SERVICES

Break out and remove old foundations, slabs, drainage pipes, manholes, tanks, cables and redundant services. Report for instructions when any unexpected voids, made-up ground or services are encountered. Seal off the ends of drains or remove to territorial authority approval.

### 3.9 STOCKPILE TOPSOIL

Stockpile excavated topsoil on site where directed. Keep separate from other excavated materials. Spread and level where directed before completion of the works.

### 3.10 SHORING AND UNDERPINNING

Carry out shoring and underpinning shown on the drawings and as necessary to prevent subsidence of adjoining public or private property and to ensure the safety of the public and site personnel. Maintain protection throughout the progress of the works, or until foundations and subgrade structures have been completed and the stability of adjoining public and private property secured.

### 3.11 GENERAL EXCAVATION

Trim ground to required profiles, batters, falls and levels. Remove loose material. Protect cut faces from collapse. Keep excavations free from water.

### 3.12 ROCK EXCAVATION

If rock is found at any level above the underside of the structural foundations, or above required base levels for site service trenches, immediately notify the owner. Obtain written instructions from the owner on the proposed approach to rock excavation, or consequent alterations to subgrade construction. Confirm any changes with the territorial authority.

### 3.13 FOUNDATION EXCAVATION

Take foundation excavations to depths shown. Keep trenches plumb and straight, bottoms level and free of soft spots, stepped as detailed and clean and free of water.

### 3.14 INADEQUATE BEARING

If localised bearing is not to [NZS 3604](#), 3.1.2 **Foundations** and 3.1.3 **Determination of good ground**, then excavate further and backfill with material as follows:

- Below slabs on grade: Hardfill compacted in 150mm layers
- Below footings: 10 MPa concrete

If excavation exceeds the required depths, backfill and compact to the correct level with material as listed.

Confirm any changes with the territorial authority.

For inadequate bearing or over excavation of service trenches, use hardfill compacted in 150mm layers.

### 3.15 STANDARD OF COMPACTION

Place fill in layers of not more than 150mm and compact to achieve 95% of maximum dry density.  
For granular fill material, the fill shall be compacted to 80% of saturated dry density.

3.16 GRANULAR BASE FOR SLABS

To conform to [NZS 3604](#), section 7.5.3, **Granular base**. Consolidate with a vibrating roller. Blind the surface with 20mm of coarse sand or sand/cement and roll ready to receive a damp-proof membrane.

3.17 GENERAL BACKFILLING

Obtain written confirmation from the owner before using any excavated material. Compact approved backfilling in 150mm layers with the last 200mm in clean topsoil, lightly compacted and neatly finished off.

3.18 RETAINING WALLS

Backfill behind retaining walls with free draining granular material and compact in 200mm layers. Ensure any tanking membranes, protection sheets, drain coil and damp-proofing are not damaged.

3.19 SURPLUS MATERIAL

Remove surplus and excavated material from the site.

**3820 CARPENTRY****1 GENERAL**

This section relates to the supply and erection of timber framing, as a framed structure, or as partitioning. It includes prefabricated timber and engineered wood.

**1.1 DOCUMENTS**

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC B2/AS1	Durability
AS/NZS 1328.1	Glued laminated structural timber - Performance requirements and minimum production requirements
AS/NZS 1604.1	Preservative-treated wood-based products - Part 1: Products and treatment
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber structures standard
NZS 3604	Timber-framed buildings
NZS 3622	Verification of timber properties
NZS 3640	Chemical preservation of round and sawn timber
AS/NZS 4357.0	Structural laminated veneer lumber - Specification
FTMA CoP	Frame and Truss Manufacturers Association Code of Practice
<b>*A copy of NZS 3604 Timber-framed buildings, must be held on site.</b>	

**1.2 DIMENSIONS**

All timber sizes except for battens are actual minimum dried sizes.

**2 PRODUCTS****2.1 TIMBER FRAMING, TREATED**

Species, grade and in service moisture content to [NZS 3602](#), [NZBC B2/AS1](#) and treatment to [NZS 3640](#), [NZBC B2/AS1](#). Structural grade (SG) to [NZS 3604](#), [NZS 3622](#) with properties to [NZS 3603](#).

**2.2 TIMBER FRAMING, CHEMICAL FREE**

Species, grade and moisture content in service as set out in [NZS 3602](#), [NZBC B2/AS1](#).

**2.3 LAMINATED TIMBER**

Radiata pine laminations to [AS/NZS 1328.1](#); treated as required by [NZS 3602](#), [NZBC B2/AS1](#), to the requirements of [NZBC B2/AS1](#), [AS/NZS 1604.1](#), [NZS 3640](#), with special attention to Appendix B "Specification advisory notes". Supply weather resistant sealed.

**2.4 NAILS**

Type to [NZS 3604](#), section 4, **Durability**, and of the size and number for each particular types of joint as laid down in the nailing schedules of [NZS 3604](#), sections 6-10.

**2.5 BOLTS AND COACH SCREWS**

Bolts and coach screws complete with washers, to the requirements of [NZS 3604](#), clause 2.4.5 Bolts and Coach Screws, and section 4, **Durability**, and of the type, number and form required for each particular junction to [NZS 3604](#), sections 6 - 10.

**2.6 NAIL PLATES**

Comply with the requirements of [NZS 3604](#), section 4, **Durability**, and of the number and form required for each particular junction to [NZS 3604](#), sections 6 - 10. Plates to the plate manufacturer's design for the particular locations as shown on the drawings.

**2.7 CONNECTORS**

Comply with the requirements of [NZS 3604](#), section 4, **Durability**, and of the number and form required for each particular junction to [NZS 3604](#), sections 6-10. Connectors and structural brackets to the connector manufacturer's design for particular locations shown on drawings.

**2.8 CORROSION RISKS**

For interior timber, treated with copper-based timber preservatives (H3.2 or higher), use a minimum of hot-dipped galvanized steel fixings and fasteners.



For exterior timber, timber in damp areas and timber subject to occasional wetting, use only stainless steel (or equivalent) fixings and connectors, when the timber is treated with; Copper Azole (CuAz, Preservative code 58), Alkaline Copper Quaternary (ACQ, Preservative code 90), Micronise Copper Azole (code 88) or Micronised Copper Quaternary (code 89).

- 2.9 DPC  
Refer to 4161 UNDERLAYS, FOIL AND DPC section

### 3 EXECUTION

#### 3.1 EXECUTION GENERALLY

To [NZS 3604](#) except as varied in this specification. Execution to include those methods, practices and processes contained in the unit standards for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

#### 3.2 SEPARATION

Separate all timber framing timbers from concrete, masonry and brick by: -

- a full length bituminous damp-proof membrane overlapping timber by at least 6mm; or
- a 12mm minimum free draining air space

#### 3.3 ATTENDANCE

Provide and fix blocks, nogs, openings and other items as required by other trades.

#### 3.4 MOISTURE CONTENT

Maximum allowable equilibrium moisture content (EMC) for non air-conditioned or centrally heated buildings for framing to which linings are attached.

Framing at erection: 24% maximum

Framing at enclosure: 20% maximum

Framing at lining: 16% maximum

#### 3.5 SET-OUT

Set out framing in accordance with the requirements of [NZS 3604](#) and as required to support sheet linings and claddings. When necessary provide framing to suit any required cladding/lining control joints and sheet joints.

#### 3.6 FRAMING WALLS

Frame to required loading and bracing complete with lintels, sills and nogs, all fabricated and fastened to [NZS 3604](#), section 8, **Walls**.

#### 3.7 FRAMING ROOFS

Frame to required loading and bracing complete with valley boards, ridge boards and purlins.

Design and fit roof trusses complete with anchorage. All fabricated and fastened to [NZS 3604](#), section 9, **Posts** and 10, **Roof framing**.

#### 3.8 FRAMING CEILINGS

Frame to required loading and bracing complete with runners and battens set out to support ceiling lining. All fabricated and fastened to [NZS 3604](#), section 13, **Ceilings**. Trim for openings in ceilings and hatches to [NZS 3604](#) section 13.3, **Openings in ceilings**. Provide blocking for water tanks located in the ceiling space to [NZS 3604](#), section 13.4, **Water tanks in roof space**.

#### 3.9 INSTALLING WALL UNDERLAYS

Refer to 4161 UNDERLAYS, FOIL AND DPC section

#### 3.10 FIT CAVITY BATTENS

Fit and fix 20mm cavity battens over wall underlay or rigid air barrier, fully nail to timber studs to the requirements of the manufacturer or to [NZS 3604](#). Fit and fix related flashings. Make allowance for cladding control joints where required. Fit and fix cavity closers to base of walls, open horizontal (or raking) junctions and over openings (windows, meters etc.).

#### 3.11 DPC TO LOSP TREATED TIMBER

Refer to 4161 UNDERLAYS, FOIL AND DPC section.

#### 3.12 DPC TO TIMBER

Refer to 4161 UNDERLAYS, FOIL AND DPC section.



**4 SELECTIONS****4.1 EXTERIOR WALL FRAMING - RADIATA PINE**

Member	Species	Grade	Treatment
Exterior walls:	Radiata pine	SG8	H1.2
Parapets:	Radiata pine	SG8	H1.2
Enclosed decks and balconies:	Radiata pine	SG8	H1.2
Cantilevered joists enclosed decks and balconies:	Radiata pine	SG8	H3.2
Nogs	Radiata pine	SG8	H1.2
Wall battens (not cavity):	Radiata pine	Merch	H1.2
Jamb battens:	Radiata Pine	Merch	H3.1

**4.2 CAVITY BATTENS**

Cavity battens	Species	Grade	Treatment
Timber - Non Structural:	Radiata pine	Merchantable	H3.1
Proprietary - non structural:	Manufacturer ~	Type ~	Reference ~
Cavity closer:	Manufacturer ~	Type ~	Reference ~

**4.3 ROOF FRAMING - RADIATA PINE**

Member	Species	Grade	Treatment
Rafters:	Radiata pine	SG8	H1.2
Trusses:	Radiata pine	SG8	H1.2
Purlins:	Radiata pine	SG8	H1.2
Ceiling joists and battens:	Radiata pine	SG8	H1.2
Valley boards:	Radiata pine	Merchantable	H1.2
Sarking:	Radiata pine	Merchantable	H1.2
Skillion roof framing:	Radiata pine	SG8	H1.2
Enclosed flat roof framing:	Radiata pine	SG8	H1.2

**4.4 EXTERIOR EXPOSED TIMBERS**

Member	Species	Grade	Treatment
Posts:	Radiata pine	SG8	H3.2 CCA
Joists:	Radiata pine	SG8	H3.2 CCA
Exterior stairs and steps:	Radiata pine	SG8	H3.2 CCA
Pergola:	Radiata pine	SG8	H3.2 CCA
Ground contact members	Radiata pine	SG8	H5 CCA

Note all CCA to be preservative code 01 or 02

**4.5 INTERIOR FRAMING - RADIATA PINE**

Member	Species	Grade	Treatment
Non structural walls:	Radiata pine	SG8	H1.2
Structural and braced walls:	Radiata pine	SG8	H1.2

## 3827E ECOPLY® PLYWOOD BRACING SYSTEM

### 1 GENERAL

This section relates to the use of Ecoply® sheets for structural wall bracing:

#### Documents

#### 1.1 DOCUMENTS

Documents referred to in this section are:

NZBC B1/AS1	Structure
NZBC E2/AS1	External moisture
AS/NZS 1170.2:2011	Structural design actions - Wind actions
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 1604.3:2012	Preservative-treated wood-based products - Part 3: Plywood
AS/NZS 2269.0	Plywood - structural - specifications
NZS 3602	Timber and wood-based products for use in building
NZS 3603	Timber Structures Standard
NZS 3604	Timber-framed buildings
EN 15804+A2	Sustainability of construction works - Environmental product declarations - Core rules for product category of construction products
ISO 14025	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
BRANZ Technical Paper P21	BRANZ Technical Paper P21: A wall bracing test and evaluation procedure (2010)

#### 1.2 MANUFACTURER'S DOCUMENTS

CHH Woodproducts documents relating to work in this section are:

**Ecoply®** Specifications and Installation Guide

**Ecoply®** Technical Notes.

FSC Certificates on request for W8.1 Plywood FSC Mix

Carter Holt Harvey Tokoroa FSC-C012019 SCS-COC-001316 Controlled Wood SCS-CW-001316 (expires 5 Jun 2023)

Copies of the current product literature are available from Carter Holt Harvey Woodproducts Ltd

Web: [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz)

Telephone: 0800 326 759

#### 1.3 NO SUBSTITUTIONS

Substitutions are not permitted to any specified system, or associated components and products.

#### Performance

#### 1.4 STRUCTURAL FIXINGS, WIND

Design and use the fixings appropriate for the wind zone (R) and topographical classification (T) of this site and building height; as required by [NZS 3604](#) and the wind loads on various wall areas as given by [AS/NZS 1170.2](#).

#### 1.5 STRUCTURAL FIXINGS, EARTHQUAKE

Use fixings and methods capable of sustaining the loads appropriate to the area as set out in [NZS 3604](#) and as required by [NZS 1170.5](#).

#### 1.6 BRACING SYSTEM

The Ecoply® bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading to [NZBC B1](#) Structure, and to [NZS 3603](#) Timber Structures Standard. Refer to table for summary of P21 Ratings for 2.4m high **Ecoply®** wall element:

Provide braced wall systems using GIB® Ezybrace Systems to meet the requirements of [NZS 3604](#) when tested to BRANZ Technical Paper P21. Refer to drawings for location and type.

Brace No.	Minimum wall length	Lining Requirements	Bus/m Wind	Bus/m Earthquake
EP1	0.4m	7-12mm Ecoply® one side	80	95
EP1	0.6m	7-12mm Ecoply® one side	95	105
EP1	1.2m	7-12mm Ecoply® one side	120	135
EPG	0.4m	7-12mm Ecoply® one side and 10mm Gib® Standard plasterboard other side	100	115
EPG	1.2m	7-12mm Ecoply® one side and 10mm Gib® Standard plasterboard other side	150	150

Note:

- Plywood must be at least taken up to within 300mm of top plate.
- Hold down connections required each end of bracing element.
- Maximum 120 Bus/m for any bracing element on timber framed floor ([NZS 3604](#))

## 2 PRODUCTS

### Materials

#### 2.1 ECOPLY® STRUCTURAL PLYWOOD

Radiata pine veneer ply to [AS/NZS 2269.0](#), DD face grade or better, 7mm minimum thick, H3.2 CCA treated to [AS/NZS 1604.3](#).

### Components

#### 2.2 NAILS

Nail fixing for **Ecoply®** used as a structural bracing

Fixing type	Minimum nail length
Direct Fixed	50 x 2.8mm flat head hot dipped galvanized or stainless steel annular grooved nails
Cavity Fixed	60 x 2.8mm flat head hot dipped galvanized or stainless steel annular grooved nails

## 3 EXECUTION

### Conditions

#### 3.1 HANDLE

Handle sheets carefully and reject those with damaged faces or edges.

#### 3.2 STORE

Store sheets in stacks clear of the ground, supported without sagging on evenly spaced horizontal bearers. Protect from damage and weather.

#### 3.3 WALL FRAMING

Kiln dried timber framing sizes and set outs to [NZS 3604](#) with stud and nog centres and timber widths to **Ecoply®** Specification and Installation Guide. Treatment to [NZS 3602](#).

### Application

#### 3.4 BOTTOM PLATE FIXING

Use Gib HandiBrac® hold-down connections at each end of bracing element. Refer to the installation instructions supplied with connectors for correct bolt types to be used for either concrete or timber floors. Within the length the bracing element, bottom plates are fixed to the requirements of [NZS 3604](#).

#### 3.5 CAVITY BATTENS

The bracing element may be fixed over cavity battens.

Fix 40 x 20mm minimum cavity battens, staggered nailed at 150mm centres to studs around the perimeter of the bracing element and nailed to the intermediate studs within the bracing element at 300mm centres with 50mm x 2.8mm flat head galvanized or stainless steel annular grooved nails.

### 3.6 SUPPORT EDGES AND JOINTS

Fully support edges and joints. Studs maximum 600mm centres and nogs maximum 800mm centres with the framing width of 45mm at each **Ecoply®** sheet joint.

### 3.7 NAIL FASTENERS TO BRACING ELEMENT

Place nail fasteners at 150mm centres around perimeter, 7mm from edge of the **Ecoply®** sheet and 300mm centres on intermediate supports of each **Ecoply®** sheet.

### 3.8 FIXING ECOPLY® STRUCTURAL PLYWOOD SHEETS

Fit and fix to [NZS 3604](#), [NZBC E2/AS1](#), 9.8 **Plywood sheet** and the manufacturer's bracing requirement with sheets and trim all in plumb, true alignment and face.

Fix **Ecoply®** sheets vertically. Allow 2-3mm expansion gap between sheets. Cut edges of sheet to be placed to the top. For EPGs bracing system the **Ecoply®** may terminate within a maximum of 300mm below the top plate, e.g. at soffit line, where solid nogging must be provided for the full length of the bracing element to provide fixing of the **Ecoply®**.

### 3.9 FIXING GIB® PLASTERBOARD SHEETS

Fix Gib® plasterboard sheets to Gib® Ezybrace system. Refer to the appropriate Gib® Plasterboard section.

## Completion

### 3.10 PROTECTION

Protect work from the weather until it is covered, coated or sealed.

### 3.11 REPLACE

Replace damaged or marked elements.

### 3.12 LEAVE

Leave work to the standard required by following procedures.

### 3.13 REMOVE

Remove all debris, unused materials and elements from the site.

## 4 SELECTIONS

### 4.1 ECOPLY® STRUCTURAL PLYWOOD

Location:	Refer to drawings and bracing calculations
Manufacturer:	CHH Woodproducts
Brand/grade:	Ecoply® DD or better A BOND
Stress grade:	F8
Thickness:	7mm
Treatment:	H3.2 CCA

### 4.2 BRACING SYSTEMS

Refer to Ecoply® Specification and Installation Guide for specific bracing details, and to Gib® Ezybrace system for bracing element fixing details. For location refer to drawn documentation and bracing calculations.

## 4161 UNDERLAYS, FOIL AND DPC

### 1 GENERAL

This section relates to the application of:

- DPC/DPM
- wall underlays includes Kraft based and synthetic wall underlays
- roofing underlays includes kraft based and synthetic roof underlays
- foils
- vapour barriers
- accessories

#### 1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

NZMRM	New Zealand Metal Roofing Manufacturers Inc.
W2	Wall underlay Kraft/bituminous based Heavy grade
W3	Wall underlay Synthetic based non-absorbent
W4	Wall underlay Synthetic based absorbent
R1	Roof underlay Kraft/bituminous based Heavy grade
R2	Roof underlay Kraft/bituminous based Self-supporting
R3	Roof underlay Synthetic based Heavy grade
R4	Roof underlay Synthetic based Self-supporting

The following definitions apply specifically to this section:

Wall underlay the same meaning as defined in [NZBC E2/AS1](#), covering kraft based and synthetic wall underlays, sometimes called, wall wraps, building wraps or building papers.

#### Documents

#### 1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

<a href="#">NZBC E2/AS1</a>	External moisture
<a href="#">NZS/AS 1530.2</a>	Methods for fire tests on building materials, components and structures - Test for flammability of materials
<a href="#">NZS 2295</a>	Pliable, permeable building underlays
<a href="#">AS/NZS 2904</a>	Damp-proof courses and flashings
<a href="#">NZS 3604</a>	Timber-framed buildings
<a href="#">AS/NZS 4200.1</a>	Pliable building membranes and underlays
<a href="#">AS/NZS 4347.0</a>	Damp-proof courses and flashings - Methods of test - General introduction, list of methods and test specimen requirements
<a href="#">AS/NZS 4389</a>	Roof safety mesh
<a href="#">AS/NZS 4534</a>	Zinc and zinc/aluminium-alloy coatings on steel wire
<a href="#">NZMRM CoP</a>	NZ Metal Roof and Wall Cladding Code of Practice

#### Requirements

#### 1.3 INSTALLATION SKILL LEVELS

Installers to be familiar with the manufacturer's technical literature and the [NZMRM CoP](#) NZ Metal Roof and Wall Cladding Code of Practice.

### 2 PRODUCTS

#### Materials

#### DPC

## 2.1 POLYETHYLENE DPC

Polyethylene film to [AS/NZS 2904](#) and to the appropriate test methods set out in [AS/NZS 4347.0](#). Thickness 500 microns minimum, manufactured for use as a damp-proof course and concealed flashings to doors and windows.

## 2.2 BITUMINOUS IMPREGNATED DPC

Heavy Kraft impregnated with high grade bitumen and coated with higher heat resistant bitumen to [AS/NZS 2904](#) and to the appropriate test methods set out in [AS/NZS 4347.0](#).

### DPM

## 2.3 DAMP PROOF MEMBRANE - CONCRETE FLOOR

Polyethylene sheet with minimum thickness of 0.25mm to [NZS 3604](#), 7.5.6, **Polyethelene (polythene) sheet damp-proof membranes.**

### Wall Underlays

## 2.4 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYPROPYLENE - FIRE (W4)

Absorbent, breathable, fire retardant, non-woven, white soft spun-bonded polypropylene membrane. Designed for use as fire retardant membrane, with Flammability Index of 1, when tested to [NZS/AS 1530.2](#).

## 2.5 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYOLEFIN - FIRE (W4)

Absorbent, breathable, fire retardant polyolefin (polyethylene) woven into sheet form with micro sized pores that allow the membrane to breathe with a fire retardant flammability index of 1, tested to [NZS/AS 1530.2](#).

## 2.6 ABSORBENT SYNTHETIC WALL UNDERLAY - POLYPROPYLENE (W4)

Absorbent, breathable spun bonded polypropylene type building membrane, coated with a breathable water resistant film.

### Rigid Wall Underlays

## 2.7 BITUMINOUS HEAVY WEIGHT ROOFING UNDERLAY (R1)

Roofing underlay tested to [NZS 2295](#).

## 2.8 BITUMINOUS SELF-SUPPORTING ROOFING UNDERLAY (R2)

Self supporting roofing underlay tested to [NZS 2295](#).

## 2.9 BITUMINOUS FIRE RETARDANT SELF-SUPPORTING TWO WAY REINFORCED (R2)

Self supporting roofing underlay consisting of two layers of heavy weight Kraft underlay, surfaced coated with water repellence formula which is solvent free, two-way reinforced, and then laminated using a fire retardant adhesive tested to [NZS/AS 1530.2](#).

### Accessories

## 2.10 WINDOW DOOR SEALING SYSTEM

Proprietary window and door flashing tape and accessories to E2/AS1, paragraph 4.3.11, **Flexible flashing tape**, paragraph 9.1.5, **Wall underlays to wall openings.**

## 2.11 STUD STRAPS

19mm wide polyethylene straps, for cavity construction with framing centres greater than 450mm.

## 2.12 GUTTER AND UNDER FLASHINGS

Bituminous breather type underlay cut to width by manufacturer for use under valley, apron flashing and internal gutters. Soffit liner cut to width from bituminous breather type underlay.

## 2.13 ADHESIVE TAPE

Adhesive tapes to compliment the underlay. Pressure sensitive tapes for joining foil insulation and vapour barriers.

# 3 EXECUTION

## Conditions



### 3.1 GENERAL REQUIREMENTS

To [NZBC E2/AS1](#) Table 23 Properties of Roof Underlays and Wall Underlays; and manufacturers technical literature.

Note: Care should be taken not to expose the underlay to continuous wet and windy conditions.

### 3.2 STORAGE

Store wall and roofing underlays and accessory materials, under conditions that ensure no deterioration or damage. Store rolls in an upright position on a smooth floor and protected from sunlight, UV radiation and moisture.

### 3.3 INSPECTION

Before starting work, check that the framing will allow work of the required standard. Carry out remedial work identified before laying underlay.

#### **Application - DPC**

### 3.4 POLYETHYLENE DPC TO TIMBER

Lay polyethylene DPC under treated and untreated timber, including LOSP treated timber, of all timber framed walls on concrete and concrete masonry, in a single layer with 50mm overlaps at joints to provide a waterproof barrier.

### 3.5 BITUMINOUS DPC TO TIMBER

Lay bituminous DPC under timber of all timber framed walls on concrete, in a single layer with 50mm overlaps at joints to provide a waterproof barrier.

NOTE: Do not use bituminous DPC under LOSP treated timber.

### 3.6 DPC TO MASONRY AND BRICK VENEER

Lay DPC along base of cavity and fix top edge to studs with galvanized clouts. Turn DPC out over concrete rebate under bottom course of veneer.

### 3.7 DPC BETWEEN DISSIMILAR MATERIALS

Lay DPC between dissimilar materials where required.

#### **Application - DPM**

### 3.8 DPM TO CONCRETE FLOOR

Lay DPM under concrete floor substrate over sand binding, in a single layer with 150mm overlaps at joints to provide a waterproof barrier.

#### **Application - Wall Underlay**

### 3.9 WALL UNDERLAY

Fix horizontally to outside face of substrate in true alignment, with succeeding sheets overlapping 150mm to [NZBC E2/AS1](#), clause 9.1.7, **Wall underlay** and refer to manufacturer for requirement for fastenings. Fix to manufacturers requirements. Scribe neatly around penetrations and openings to leave no gaps. Tape all penetrations. Keep clean, undamaged and without visible weather deterioration until closed in.

### 3.10 INSTALL STUD STRAPS

Over underlay, install 19mm wide polyethylene straps horizontally at 300mm centres, draw taut and fix to studs with stainless steel staples.

#### **Application - Roofing Underlay**

### 3.11 ROOF UNDERLAY

Lay vertically over purlins on wire netting with a 150mm side lap. Fix securely to purlins with galvanized fixing clips. Lay underlay to avoid excessive dishing between purlins. When used vertically limit individual runs to 10 metres for bituminous based roofing underlays, 7 metres for fire retardant underlays and 20 metres for synthetic roofing underlays. Do not lay vertically on roof pitches under 10°.

Lay horizontally across the rafter/trusses starting at the gutter line with succeeding sheets in true alignment and lapping 150mm. Scribe around and fit neatly to all penetrations. Avoid prolong exposure by installing the roof immediately. UV exposure to manufacturers requirements, maximum 7 days.

3.12 GUTTER AND UNDER FLASHINGS

Lay bituminous breather type underlay cut to width by manufacturer for use as an underlay to valley, apron flashings, internal gutters and soffit liner. Lap under flashings with adjoining underlays. Fix soffit liner from top plate down 150mm past ribbon plate.

Completion

3.13 CLEAN UP

Clean up as the work proceeds.

3.14 LEAVE

Leave work to the standard required by following procedures.

3.15 REMOVE

Remove debris, unused materials and elements from the site.

4 SELECTIONS

4.1 WALL UNDERLAY

Location:	Throughout
Brand / type:	Masons Uni flexible air barrier /Fire retardant absorbent breathable composite non woven wall underlay
Jointing tape:	Masons tape

4.2 ROOFING UNDERLAYS

Location:	Throughout
Brand / type:	SISALATION Bitumac 750 / Bitumenous Heavy Weight Wall and Roof Underlay

Accessories

4.3 WINDOW/DOOR SEALING SYSTEM

Brand / type:	Masons flashing tape
---------------	----------------------

4.4 STUD STRAPS

Location:	Throughout (where studs > 450mm centers)
Brand / type:	Themastrap 201 / 19mm wide polyethylene strap



## 4231HA JAMES HARDIE AXON™ PANEL CLADDING

### 1 GENERAL

This section relates to the supply and fixing of James Hardie Axon™ Panel cladding.

#### 1.1 RELATED WORK

Refer to ~ for ~.

Refer to painting section/s for the protective coating required to meet the NZBC durability requirements.

#### 1.2 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

LRV: Light Reflectance Value

CLD: Ceramic Low Density

#### Documents

#### 1.3 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

[NZBC](#) Protection from fire

[C/AS1-AS2](#)

[NZBC](#) External Moisture

[E2/AS1](#)

[AS/NZS](#) Structural design actions - Wind actions

[1170.2:2011](#)

[AS/NZS](#) Cellulose-cement products-Flat sheet

[2908.2](#)

[NZS 3602](#) Timber and wood-based products for use in building

[NZS 3604](#) Timber-framed buildings

[AS/NZS](#) Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter

[3837](#) Standard fire test method for evaluation of fire propagation characteristics of exterior wall assemblies containing combustible components

[NFPA](#) Standard fire test method for evaluation of fire propagation characteristics of exterior wall assemblies containing combustible components

[285:2019](#)

CodeMark Certificate [CMNZ30165](#) - Axon™ Panel Cladding by James Hardie

#### 1.4 MANUFACTURER/SUPPLIER DOCUMENTS

James Hardie® documents relating to this part of the work:

Axon™ Panel Timber Cavity Batten Technical Specification March 2024

Axon™ Panel Fixed to Hardie™ CLD™ Structural Cavity Batten Technical Specification March 2024

Axon™ Panel Direct Fixed Technical Specification March 2024

Hardie™ Flex Sheet technical specification

Fire and Acoustic Design Manual by James Hardie®

[BRANZ Appraisal 1211](#) [2022] - Axon™ Panel Cladding

Manufacturer/supplier contact details

Company: James Hardie New Zealand Limited

Web: [www.jameshardie.co.nz](http://www.jameshardie.co.nz)

Email: [info@jameshardie.co.nz](mailto:info@jameshardie.co.nz)

Telephone: Ask James Hardie™ on 0800 808 868.

#### Warranties

#### 1.5 WARRANTY - MANUFACTURER/SUPPLIER

Provide a material manufacturer/supplier warranty:

15 years: For James Hardie Axon™ Panels  
(refer to James Hardie product warranty)

15 year:For accessories supplied by James Hardie (refer to James Hardie product warranty)

From:Date of purchase

- Provide this warranty on the manufacturer's standard form.

Refer to the general section 1237 WARRANTIES for additional requirements.

Requirements

- 1.6NO SUBSTITUTIONS
- Substitutions are not permitted to any specified system, or associated components and products.
- 1.7SAFE WORKING
- To James Hardie requirements for safe working practices with James Hardie products, particularly with regards to cutting and drilling.
- 1.8INFORMATION FOR OPERATION AND MAINTENANCE
- Provide relevant James Hardie maintenance requirements at completion of the work.

Performance - Wind

- 1.9PERFORMANCE - WIND
- James Hardie Axon™ Panel is suitable for use in all wind zones up to design wind pressure of 3.2kPa ULS and building height 25m maximum.

Performance - Fire

2PRODUCTS

Materials

- 2.1AXON™ PANEL
- James Hardie Axon™ Panel, face primed shiplap jointed panels, 9.0mm and 8.5mm thick, manufactured from cellulose fibre reinforced cement to [AS/NZS 2908.2](#). Refer to SELECTIONS.
- 2.2AXENT™ TRIM
- Hardie™ Axent™ Trim, 45mm, 70mm and 89mm wide x 19mm thick, manufactured from cellulose fibre reinforced cement to [AS/NZS 2908.2](#). Refer to SELECTIONS.

Components

- 2.3FASTENER TYPE
- Fasteners to minimum durability requirements of the NZBC. Refer to [NZS 3604](#), section 4, **Durability**, for requirements for fixing's material to be used in relation to the exposure conditions.
- Refer to [NZBC E2/AS1](#), Table 20, **Material selection** for fixing material, and [NZBC E2/AS1](#), Table 21, **Compatibility of materials in contact**, for selection of suitable fixing materials and their compatibility with other materials.

Zone	Fixings Material
Zone D, Zone E / Microclimates (incl. Geothermal)	Grade 316 Stainless
Zone B, Zone C	Hot-dipped galvanized
Bracing - All zones	Grade 316 Stainless

Check against SED (specific engineering design) requirements for microclimate conditions.

Refer to SELECTIONS.

- 2.4NAIL - AXON™ PANEL FIXING TO TIMBER CAVITY BATTEN
- Over flexible wall65mm x 2.8mm Hardie™Flex nails underlay:
- Over RAB™ Board: 75mm x 3.15mm Hardie™Flex nails
- Refer to SELECTIONS.

2.5 NAIL - AXON™ PANEL DIRECT FIX  
40mm x 2.8mm Hardie™Flex nails.

2.6 NAIL - AXENT™ TRIM  
40mm brad nails.

#### **Accessories**

2.7 FLASHING TAPES - TIMBER CAVITY BATTEN  
Inseal® 3259 black compressible medium density closed cell foam tape, 1.5mm thick x 48mm wide for vertical joints, and 1.5mm thick x 80mm wide for internal corners.

2.8 FLASHING TAPES - HARDIE™ CLD™ STRUCTURAL CAVITY BATTEN  
Polypropylene DPC under Hardie™ CLD™ Structural Cavity Batten internal corners. Refer to James Hardie® Axon™ Panel technical specification for selection of required width.

2.9 ALUMINIUM ACCESSORIES  
Extruded aluminium etch primed. External box corners and horizontal 'h' flashing suitable for dark paints.

2.10 SEALANT  
Flexible sealant. Refer to the sealant manufacturer's technical literature to confirm suitability for the application.

### **3 EXECUTION**

#### **Conditions**

3.1 STORAGE  
Take delivery of products dry and undamaged on pallets, and keep on pallet. Protect edges and corners from damage and covered to keep dry until fixed.

3.2 HANDLING  
Avoid distortion and contact with potentially damaging shiplap edges and surfaces. Do not drag panels across each other, or across other materials. Protect edges, corner and surface finish from damage.

3.3 SUBSTRATE  
Do not commence work until the substrate is of the standard required for the specified finish; plumb, level and in true alignment. Moisture content of timber framing must not exceed the requirements specified by [NZS 3602](#) to minimise shrinkage and movement after panels are fixed.

Confirm that 70mm minimum framing for vertical joints for timber cavity construction has been correctly installed.

3.4 SEAL EDGES  
Seal site cut sheet edges prior to installation. Seal panel edges around window and door openings, meter boxes and at other penetrations.

#### **Application - generally**

#### **3.5 PENETRATIONS AND FLASHINGS**

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the cladding. Required preparatory work includes the following:

- Wall underlay appropriately incorporated with penetration and junction flashings.
- Materials lapped in a way that water tracks down to the exterior face of the wall underlay.
- Wall underlay to openings finished and dressed off ready for the installation of window and door frames and other penetrations
- Required holes in cladding accurately formed and cut to James Hardie requirements, ensure (if required) services penetration grommets/sleeves/seals/tapes are in place prior to cladding installation.
- Claddings neatly finished off to all sides of openings
- Installation of flashings (those required to be installed prior to installation of penetrating

elements).

### **Install Axon™ Panel cladding**

#### **3.6 PANEL LAYOUT**

All panel edges must be supported by the framing. Fix Axon™ Panels vertically.

#### **3.7 FASTENER - SIZE AND LAYOUT**

Fix Axon™ Panels to framing using the fixings specified in James Hardie® Axon™ Panel technical specifications and in accordance with the following requirements:

- Nails must have a minimum clearance of 18mm from sheet edges and a minimum of 75mm vertically and 150mm horizontally from sheet corners.
- Nails must finish flush with sheet surface.

#### **3.8 FIXING - DIRECT FIXED TO FRAME**

Fix with 40mm x 2.8mm Hardie™ Flex nails. Fix sheet at 200mm centres at all sheet edges as well as all intermediate framing. Alternatively fix with ND50 brad nails at 150mm centres.

#### **3.9 GUN NAILING**

Axon™ Panels can be fixed using nail guns. The gun nails used must have a full round head to provide the required holding power. The length and gauge of nails must at a minimum be as specified in the James Hardie Axon™ Panel technical specifications.

#### **3.10 VERTICAL JOINT**

Joint Axon™ Panels in accordance with James Hardie Axon™ Panel technical specifications

#### **3.11 HORIZONTAL JOINT**

Provide a horizontal joint at floor joist levels to accommodate the movement resulting from timber joist shrinkage and settlement. Install a 'z' flashing where drainage is required at floor level. For Axon™ Panels use a Hardie™ 9mm Panel aluminium 'h' mould complete with 'h' mould jointer external corner jointer or a Hardie™ 9mm aluminium angled 't' mould complete with angled 't' mould jointer, external corner jointer or a purpose made 'z' flashing to form a horizontal joint.

#### **3.12 EXTERNAL CORNER JOINT WITH H MOULD**

Fit Hardie™ 9mm Panel aluminium horizontal 'h' mould over lower Axon™ Panel and lap the upstand under upper Axon™ Panel. Leave 15mm gap maximum between upper and lower Axon™ Panels at the solid timber floor joist levels.

Fit Hardie™ 9mm Panel aluminium external box corner under the aluminium 'h' mould with flanges removed locally. Mitre the 'h' mould over box corner flashing to cover it. Install "h" mould external corner jointer over. The upper box corner flashings are to be finished flush with the bottom edge of upper Axon™ Panel.

An aluminium corner flashing is required over the Hardie™ 9mm Panel aluminium horizontal flashing where the box corner is terminated under the 'h' mould. Hardie™ 9mm Panel aluminium external box corner flanges to be removed locally over the aluminium 'h' mould and corner underflashing to be lapped under the upper box corner flashing. Lap wall underlay over aluminium 'h' mould or seal to flashing with a flashing tape. Refer to Axon™ Panel technical specifications.

#### **3.13 FIX AXENT™ TRIM**

Fix Hardie™ Axent™ Trim to internal corners, external corners, vertical joints and intermediate vertical locations in accordance with James Hardie Axon™ Panel Technical Specification details.

#### **3.14 FINISHING**

Refer to painting section/s for protective coating system.

### **Completion**

#### **3.15 REPLACE**

Replace all damaged or marked elements.

#### **3.16 LEAVE**

Leave work to the standard required for following procedures.

#### **3.17 REMOVE**

Remove debris, unused materials and elements from the site.

#### 4 SELECTIONS

For further details on selections go to [www.jameshardie.co.nz](http://www.jameshardie.co.nz).

Substitutions are not permitted to the following, unless stated otherwise.

##### 4.1 TIMBER CAVITY BATTENS

Timber species: Radiata pine  
Treatment: H3.1  
Size: 45mm wide x 18mm thick minimum, height to match framing studs  
Batten spacing: ~  
Fastener type: 40mm x 2.8mm Hardie™ Flex nails  
Fastener finish: ~  
Fixing centres: 800mm

##### 4.2 JAMES HARDIE AXON™ PANELS - SHEET CLADDING PANELS

Brand/type: axon  
Thickness: 9mm  
Fastener type: hot dipped galv

##### 4.3 JAMES HARDIE AXENT™ TRIM

Brand/type: Hardie™ Axent™ Trin  
Thickness: 19mm  
Width: as per client selection

#### Finishing

##### 4.4 PAINTING

Refer to painting section/s for details.

## 4261 BRICK VENEER CLADDING

### 1 GENERAL

This section relates to clay brickwork as a veneer cladding.  
It includes:

- Standard brick veneer cladding
- Proprietary two storey brick veneer system
- Proprietary stack bonded brick veneer system

#### 1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

CB&PMA	New Zealand Clay Brick & Paver Manufacturer's Association
NZMTA	New Zealand Masonry Trades Association
BBFNZ	Brick and Blocklayers Federation of New Zealand

The following definitions apply specifically to this section:

Proprietary Two Storey Brick Veneer System	Proprietary system for two storey clay brick veneer construction as contained in <a href="#">BRANZ Appraisal 690</a> - Two Storey Brick Veneer System.
Proprietary Stack Bonded Brick Veneer System	Proprietary system for stack bonded clay brick veneer construction as contained in <a href="#">BRANZ Appraisal 1045</a> - Stack Bonded Brick Veneer System.

#### Documents

#### 1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

<a href="#">NZBC E2/AS1</a>	External moisture
<a href="#">NZBC B1/AS3</a>	Structure
<a href="#">NZS 1170.5</a>	Structural design actions - Earthquake actions - New Zealand
<a href="#">AS/NZS 2699.1</a>	Built-in components for masonry construction - Wall ties
<a href="#">AS/NZS 2699.3</a>	Built-in components for masonry construction - Lintels and shelf angles (durability requirements)
<a href="#">AS/NZS 2918:2001</a>	Domestic solid fuel burning appliances - Installation
<a href="#">NZS 3103</a>	Sands for mortars and plasters
<a href="#">NZS 3604</a>	Timber-framed buildings
<a href="#">NZS 4210</a>	Masonry construction: materials and workmanship
<a href="#">SNZ HB 4236</a>	Masonry veneer wall cladding
<a href="#">AS/NZS 4455.1</a>	Masonry units, pavers, flags and segmental retaining wall units - Masonry units
<a href="#">BRANZ Appraisal 690</a>	Two Storey Brick Veneer System
<a href="#">BRANZ Appraisal 1045</a>	Stack Bonded Brick Veneer System
<a href="#">BRANZ</a>	Good practice guide: Masonry veneer
<a href="#">CB&amp;PMA TB1</a>	Design Note TB1 Two Storey Clay Brick Veneer Construction - Made Easy
<a href="#">CB&amp;PMA TB2</a>	Design Note TB2 Specification For The Stack Bond Brick Veneer System
<a href="#">ASTM D6134</a>	<a href="#">ASTM D6134</a> / D6134M-07(2019)e1, Standard Specification for Vulcanized Rubber Sheets Used in Waterproofing Systems

#### Requirements

#### 1.3 QUALIFICATIONS

Bricklayers to be experienced, competent and familiar with the materials and the techniques specified.



All work to be installed or supervised by a Registered Master Mason or Licensed Building Practitioner (LBP): Licensed for Bricklaying and Blocklaying 1: Brick/masonry Veneer. RBW must be supervised by an LBP.

#### 1.4 NO SUBSTITUTIONS

Substitutions are not permitted to any of the specified systems, components and associated products listed in this section.

### Compliance information

#### 1.5 INFORMATION REQUIRED FOR CODE COMPLIANCE

Provide the following compliance documentation:

- Producer Statement - Construction from the installer of proprietary brick veneer systems.
- Other information required by the BCA in the Building Consent Approval documents.

### Performance

#### 1.6 DESIGN PARAMETERS - NON SPECIFIC DESIGN - EARTHQUAKE

Design the installation to the seismic parameters of [NZS 4210](#) Masonry construction: materials and workmanship.  
Refer to SELECTIONS for details.

#### 1.7 COMPLIANCE - STANDARD BRICK VENEER SYSTEM

Brickwork to comply with [SNZ HB 4236](#) Masonry veneer wall cladding.

## 2 PRODUCTS

### Materials

#### 2.1 CLAY BRICKS

To [AS/NZS 4455.1](#).

#### 2.2 SILLS

Refer to SELECTIONS for type.

#### 2.3 LINTELS

Steel lintel angles over openings to [AS/NZS 2699.3](#).

#### 2.4 VERMIN PROOFING

Either:

- Proprietary plastic weephole vents built into open perpend.
- Galvanized hexagon 10 mm mesh of 1 mm diameter steel wire 100 mm wide, complete with galvanized steel staples. Fix across base of cavity if gaps in veneer exceed 13 mm.

#### 2.5 DAMP-PROOF COURSE (DPC)

To [NZBC E2/AS1](#) either:

- 2 coats bitumen-based paint to [AS/NZS 2904](#).
- 1.0 mm min. bituminous sheet or heavy kraft strip laminate (saturated and coated with bitumen) to [AS/NZS 2904](#).
- 1.0 mm min. butyl rubber to [ASTM D6134](#).

### Components - standard brick veneer

#### 2.6 WALL TIES

To [AS/NZS 2699.1](#). Metal ties screw fixed to framing.

#### 2.7 REINFORCEMENT

Galvanized wire joint reinforcement. Refer to SELECTIONS for type.

### Accessories

#### 2.8 SAND FOR MORTAR

To [NZS 3103](#). Chloride levels not to exceed 0.04% by dry weight of sand.

- 2.9 MORTAR  
Composed of Portland cement, sand and water with an admixture to the provisions of [NZS 4210](#): 2.2 Mortar. Obtain written approval of admixture being used. Obtain written approval if intending to use hydrated lime in the mortar.
- 2.10 MORTAR COLOUR  
Add mineral oxide pigment conforming to requirements of [NZS 4210](#), clause 2.2.2.2(f).
- 2.11 ADMIXTURES  
To [NZS 4210](#).
- 2.12 WATER  
Clean, fresh and free from excess alkali, salt, silt and organic materials.

### 3 EXECUTION

#### Conditions

- 3.1 DELIVERY, STORAGE AND HANDLING  
To [NZS 4210](#) for aggregates, cement, bricks and reinforcement.  
Take delivery of materials and goods and store on site and protect from weather or damage.  
Protect finished surfaces, edges and corners from damage.  
Move/handle goods in accordance with manufacturer's requirements.  
Reject and replace goods that are damaged or will not provide the required finish.
- 3.2 PRE-INSTALLATION / APPLICATION REQUIREMENTS - CONCRETE BASE  
Check vertical and horizontal alignment. Any discrepancies exceeding the permitted tolerances shall be corrected before units are laid.
- 3.3 TIMBER FRAMING - STANDARD BRICK VENEER  
Check timber framing stud spacing is in accordance with [NZS 3604](#).
- 3.4 PENETRATIONS  
Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames and other penetrations through the brick veneer. Required preparatory work includes the following:
  - brick veneer wall underlay to openings finished and dressed off ready for the installation of window and door frames and other penetrations
  - brick veneer neatly finished off to all sides of openings
  - installation of flashings (those required to be installed prior to installation of penetrating elements).
- 3.5 MEASURE MATERIALS  
Measure materials for mortar accurately by weight or volume using suitably calibrated equipment.
- 3.6 WET WEATHER  
Keep bricks dry at all times prior to laying. Protect the top row of uncompleted brick walls. Protect freshly laid brickwork during interruption through rain and at completion of each day's work. Protect brickwork for a minimum of 6 hours.
- 3.7 COLD WEATHER CONSTRUCTION  
When air temperature is below 5°C take the precautions required by [NZS 4210](#): 2.18 Cold weather construction.
- 3.8 HOT WEATHER CONSTRUCTION  
When air temperature is above 25°C or there is a drying wind, or lower temperatures, take the precautions required by [NZS 4210](#): 2.19 Hot weather construction.
- 3.9 KEEP FACE WORK CLEAN  
Keep clean during erection and until completion of the contract works. Turn back scaffold boards at night and during heavy rain. Do not rub face work to remove stains.

#### Installation - general



### 3.10 COLOUR MIXING

Check all bricks delivered to site for colour variation, prior to commencing work. Ensure bricks are thoroughly blended from several pallets to ensure an even colour spread throughout the work.

### 3.11 UNIFORMITY

Carry up work with no portion more than 1500 mm above another at any time, raking back between levels.

### 3.12 BONDING

Lay bricks to the required bonding in the various locations. Refer to SELECTIONS/drawings.

### 3.13 PROVIDE WEEPHOLES

Provide weepholes at the bottom of cavities and cells to [SNZ HB 4236](#) and [NZBC E2/AS1](#), 9.2.6, **Cavities**, and as necessary to drain moisture to the outside air. Provide vent gap at the top of the veneer.

### 3.14 INSTALL VERMIN PROOFING

Either:

- Proprietary plastic weephole vents built into open perpend.
- Fold and staple one edge of the mesh to the substrate, with the mesh sloping down towards the veneer. Set the other edge into the mortar joint by half the thickness of the veneer or 50 mm, whichever is less.

### 3.15 CAVITY VENTILATION

Ventilate to outside air with top and bottom openings to the requirements of [SNZ HB 4236](#) and [NZBC E2/AS1](#), 9.2.6, **Cavities**. Seal cavity off from roof space.

### 3.16 CAVITY BRICKWORK BELOW GROUND

Fill all cavities below finished grade with concrete. Place a continuous damp-proof course within the first three mortar joints above ground. Seal the face of all brickwork below ground.

### 3.17 FORM OPENINGS

Unless detailed otherwise form openings to typical details from BRANZ Masonry veneer - Good practice guide.

### 3.18 SEPARATION JOINTS

Provide for wall movements of veneer with control joints to [NZS 4210](#): 2.10 Methods of controlling wall movements. Weatherproof as necessary.

### 3.19 FORM REVEALS

Form lintels, jambs and sills as detailed complete with flashings and all ready for following work.

### 3.20 HEAD FLASHINGS

Provide a flexible flashing extending 200 mm beyond ends of the opening and sloping to weepholes over all openings in cavity walls, in accordance with E2/AS1, 9.2.4, **Flashings**.

### 3.21 JAMB FLASHINGS

Provide a flexible flashing to jambs of openings in cavity walls, fully lapped with horizontal damp-proof courses at head and sill, in accordance with E2/AS1, 9.2.4, **Flashings**.

### 3.22 SILL FLASHINGS

Provide a flexible flashing under jointed sills, turned up at back and ends, in accordance with E2/AS1, 9.2.4, **Flashings**.

### 3.23 REBATE DAMP PROOFING

Provide damp-proof course to stepped rebates supporting brick veneer in accordance with E2/AS1, 9.2.5, **Foundation support and damp-proofing**.

#### Installation - standard brick veneer

### 3.24 INSTALL LINTELS

Fit lintel angles to openings, sized to [NZBC E2/AS1](#), 9.2.9, **Openings in masonry veneer** Table 18E and placed to [NZBC E2/AS1](#), 9.2.9, **Openings in masonry veneer**.

### 3.25 CAVITY WIDTH

No cavity width less than 40 mm or more than 75 mm.

### 3.26 PLACE WALL TIES

Place wall ties to: -

- [NZS 4210](#): 2.9.5 Tie anchorage, cover and fixing; and
- [NZS 4210](#): 2.9.6 Placing of ties
- [NZS 4210](#): 2.9.7 Tie classification and spacing
- [NZBC E2/AS1](#), 9.2.7, **Wall ties**, for requirements, spacing, embedment, placement and materials

At unsupported edges and at all openings through veneered walls or non-grouted cavity walls, wall ties to be provided:

At the top and bottom of the opening:

- Not more than 300 mm or 2 courses, whichever is the smaller

At the sides of the opening or at an unsupported edge:

- Not more than 300 mm
- Where the veneer wall continues above or is interrupted by a damp-proof course or waterproof membrane, wall ties shall be provided in each of the first two courses above the membrane.

### Installation - ancillary work

### 3.27 BUILD IN FIXINGS

Build in necessary fixing bricks or blocks for trims.

### 3.28 BUILD IN ELEMENTS

Build in sills, copings, lintels, steps and other elements using mortar similar to that in adjacent walls.

### 3.29 BUILD IN DOORS AND WINDOWS

Build in door and window frames as the work proceeds and bed in mortar similar to that in adjacent work.

### Completion

### 3.30 ROUTINE CLEANING

Carry out routine trade cleaning of this part of the work including periodic removal all debris, unused and temporary materials and elements from the site.

### 3.31 EFFLORESCENCE, WATER CLEANING

To remove deposits, brush with a stiff-bristle broom and take away brushings from the locality. Remove remaining deposit with a damp sponge. Wash wall thoroughly with a plentiful supply of clean water. Repeat this process every 4 weeks from appearance through to the completion of the contract works.

### 3.32 DEFECTIVE OR DAMAGED WORK

Repair damaged or marked elements. Replace damaged or marked elements where repair is not possible or will not be acceptable. Leave work to the standard required for following procedures.

## 4 SELECTIONS

Substitutions are not permitted to the following, unless stated otherwise.

### Performance - seismic

### 4.1 DESIGN PARAMETERS - NON SPECIFIC DESIGN - EARTHQUAKE

Building seismic zone: ~ (refer to [NZS 4210](#))

## 4323G GERARD® STEEL TILE ROOFING

### 1 GENERAL

This section relates to Gerard® interlocking pressed Steel roofing tiles complete with underlay, battens and accessories.

It includes:

- Steel roofing tiles
- Concealed Fastening (CF) steel roofing tiles
- Associated flashings and accessories

#### 1.1 RELATED WORK

Refer to 4161 UNDERLAYS, FOIL AND DPC for underlays, foils and DPC  
Refer to relevant timber framing section for timber battens

#### 1.2 ABBREVIATIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations used throughout the specification.

NZMRM New Zealand Metal Roofing Manufacturers Inc

#### Documents

#### 1.3 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC E2/AS1	External moisture
NZBC G12/AS1	Water Supplies
AS/NZS 1170.2:2011	Structural design actions - Wind actions
AS 1397	Continuous hot-dip metallic coated steel sheet and strip – coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS ISO9001	Quality management systems - requirements
NZS 2295	Pliable, permeable building underlays
NZS 3602	Timber and wood based products for use in building
NZS 3604	Timber-framed buildings
NZS 4217	Pressed metal tile roofs
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

#### 1.4 MANUFACTURER'S DOCUMENTS

Manufacturer's and supplier's documents relating to work in this section are:

Gerard® Product Brochures  
Gerard® New Zealand installation manual  
Gerard® Roof care and maintenance  
Gerard® Product Technical Statements  
Gerard® Technical Notes  
Gerard® Technical data Sheets  
Acoustic Research Group acoustic test reports No.70, 71, 72 and 73  
Cyclonic Testing Station - Summary of test results sheet - TS943 Revision A  
AHI Roofing Ltd ISO 14001 Certificate No. 188  
[BRANZ Appraisal No.1089 \[2020\]](#) - Gerard Concealed Fastening Roofing Systems - Amended 30.01.2024  
BRANZ Appraisal No. 1096 [2024] - Gerard Roofing Systems

Manufacturer/supplier contact details:

Company: RoofTG Pacific Limited  
Web: [www.gerardroofs.co.nz](http://www.gerardroofs.co.nz)  
Email: [info@gerardroofs.co.nz](mailto:info@gerardroofs.co.nz)  
Telephone: 0800 100 244

#### Warranties

#### 1.5 WARRANTY - MANUFACTURER/SUPPLIER - STANDARD WARRANTY

Provide a material manufacturer/supplier warranty:

Textured Finish Roof

30 years	For weather performance
20 years	For surface coating

Satin Finish Roof

30 years	For weather performance
15 years	For surface coating

- Provide this warranty on the manufacturer/supplier standard form (if not available then use the standard form in the general section 1237WA WARRANTY AGREEMENT)
- Commence the warranty from the date of practical completion of the contract works.

Refer to the general section 1237 WARRANTIES for additional requirements.

## Requirements

### 1.6 NO SUBSTITUTIONS

Substitutions are not permitted to any specified Gerard® system, or associated components and products.

### 1.7 QUALIFICATIONS

Installers to be experienced in installation of Gerard® roofing tiles. If requested provide evidence of qualification / experience prior to commencing work.

## Performance - Wind

### 1.8 FIXINGS, WIND - NON SPECIFIC DESIGN

Design and use the fixings appropriate to Gerard® New Zealand installation manual requirements and as appropriate for the project wind design stated above. To [NZS 3604](#), table 10.12 Tile Battens for all Wind Zones. Refer to Gerard® New Zealand instruction manual & Technical Note - "Installation of Gerard Roofs in all wind zones including extra high wind zones" and BRANZ Appraisal No.1089 [2020, Amended 30.01.2024] - Ross Roof Group Concealed Fastening Roofing Systems for the selected profile, fixing requirements.

### 1.9 CO-ORDINATE

Co-ordinate to ensure substrate and preparatory work is complete and other work programmed in the order required for access and completion of the roof. Complete Gerard® Technical Note - "Builders check-list."

### 1.10 PERFORMANCE

Accept responsibility for the weather-tight performance of the completed roofing system, including all penetrations through the roof and junctions with walls and parapets. Comply with [NZMRM CoP](#), for performance, loadings, design, flashings, penetrations and installation recommendations, and section 15.3, **Pressed Steel Tiles**.

## 2 PRODUCTS

### Materials

#### 2.1 UNDERLAY

Self supporting, synthetic roofing underlay or self supporting, synthetic roofing underlay to comply with [NZS 2295](#). Refer to 4161 UNDERLAYS, FOILS AND DPC for details.

#### 2.2 BATTENS

To [NZS 3604](#), 10.2.1.16 **Purlins and tile battens**. Radiata Pine or Douglas Fir, SG6, treated H1.2. Moisture content to [NZS 3602](#).

#### 2.3 PRESSED STEEL TILES

To [NZS 4217](#), and [NZBC E2/AS1](#), 8.3 Pressed Steel tiles. Aluminium/Zinc coated steel AZ 150, 0.39mm BMT to AS 1397. Tiles available in a range of profiles & may be finished either in a stone coated surface (textured) or Satin acrylic finish. Refer to SELECTIONS for type.

## Components

### 2.4 TILE FIXINGS - NAILS

Hot-dipped galvanized steel flat head 50mm x 2.8mm painted tile nails.

### 2.5 FLASHINGS, CAPPINGS AND COVERS

To NZS E2/AS1, 4.0 **Flashings**. Gerard® proprietary ridge, hip, gable, valley & wall flashings, cappings and trims manufactured from aluminium-zinc coated steel AZ 150, to AS 1397, coated to match adjacent roofing where required, as part of the selected Gerard® profile's roofing system.

## 3 EXECUTION

### Conditions

#### 3.1 INSPECTION

Inspect the roof framing and supporting structure and do not start work until it is complete and fully braced ready for tiling, all to the requirements of [NZS 3604](#) or specific design where required. Ensure Gerard® – "Builders check-list" has been completed

#### 3.2 COMPLY

Comply with the preparation, laying and fixing requirements of [NZS 4217](#), [NZBC E2/AS1 8.0 Roof claddings](#), and the Gerard® requirements where these are of a higher standard.

### Application

#### 3.3 SET-OUT

Carefully set out the roof with a measuring rod to position the battens accurately taking account of rafter lengths, overhangs into gutters and spoutings and verge overhangs, all to minimise tile cutting. Batten setout in accordance with requirements for selected Gerard® profile.

#### 3.4 LAY UNDERLAY

Roof underlay to be installed horizontally with a minimum 75mm overlap, all vertical laps to be taken past rafters and lap by a minimum of 150mm to [NZBC E2/AS1: 8.1.5 Underlays](#), and Gerard® requirements. Roofing underlay is installed under the roofing battens but over the bottom batten over fascia into gutters, drawn tight over rafters from ridges and hips and into valleys. If damaged, make good with full lap inserts as the work proceeds.

#### 3.5 FIX BATTENS

To [NZS 3604](#), table 10.12 and/or to Gerard® requirements for specific design wind loads. Fix battens over the underlays in straight courses, spanning at least 3 rafters, between fascia and ridge and elsewhere to Gerard® required details. Nail or screw as required at every crossing. Square cut ends to form butt joint over rafters with joints staggered.

#### 3.6 LAYING

Do not take heavy equipment onto the roof. Plan work to minimise foot traffic. Work on the roof only using appropriate footwear. Interlock, lap and lay tiles to [NZBC E2/AS1: 8.3 Pressed Steel tiles](#), and Gerard® requirements. Finish ridge, hip, valley, barge and eaves to Gerard® required details if not detailed elsewhere.

#### 3.7 NAIL FIX TILES

Nail tiles to battens generally through the upstand and downturn of the tile lap as well as all elements to Gerard® details and to [NZBC E2/AS1](#). Bottom course of tiles are fixed driving vertical nails into face of tile, and into eaves batten. Eaves nails to Satin finish tiles are sealed with a synthetic washer, textured tiles to be sealed with the touch-up kit base coat and stone chip. Successive rows of tiles are fixed driving 50mm Gerard® approved nails into the face of battens.

#### 3.8 CUTTING AND BENDING

Cut, bend and straighten tiles neatly to finish true to line and plane when in place, using installation equipment maintained in the proper condition, all to [NZS 4217](#) and to Gerard® details.

#### 3.9 FIT FLASHINGS, COVERS AND CAPPINGS

Cut, fit and fix all elements true to line and plane, to [NZBC E2/AS1: 4.0 Flashings](#), [NZBC E2/AS1: 5.0 Roof/wall junctions](#) in accordance with Gerard® requirements and the [NZMRM CoP](#), section 15.3 **Pressed Steel Tiles**, if not detailed elsewhere.

Tiles must be turned up a minimum of 40mm and covered to prescribed cover by Gerard® factory produced flashings.

### 3.10 EPDM FLASHINGS TO PENETRATIONS

Form to [NZBC E2/AS1: 8.1.7](#) and [8.3.10 Roof penetrations](#), in accordance with Gerard® requirements and to the [NZMRM CoP](#).  
Install EPDM proprietary flexible sleeve/boot flashing in accordance with manufacturer's requirements, ensuring installed 45° to horizontal.

### 3.11 PENETRATIONS AND JUNCTIONS

Form to [NZBC E2/AS1: 8.1.7](#) and [8.3.10 Roof penetrations](#), in accordance with Gerard® requirements and to the [NZMRM CoP](#).

Check that adjoining walls and parapets are prepared ready for the installation of the roofing.  
Confirm that openings have been prepared ready for the installation of skylight, chimneys and other penetrations through the roof. Required work includes the following:

- underlay turned up at wall and parapet lines
- underlay finished and dressed off to all openings, ready for the installation of skylights and other penetrations
- roofing installation neatly finished to all sides of openings and to all wall and parapet junctions including proprietary Gerard® PVC stop ends.
- installation of flashings, either custom-made flashings made from Gerard® supplied sheet or a supported membrane flashing.
- install selected sealant between flashing and roofing tile to Gerard® requirements.
- where applicable, touch up membrane flashings where they overlap roofing tiles with Gerard® touch-up kit base coat and/or stone chip.

### 3.12 INTERNAL GUTTERS

Fit internal gutters to project design and to [NZMRM CoP](#), section 5.5 **Gutters** for internal gutters.

## Completion

### 3.13 MAKE GOOD

Touch up all damaged coatings with Gerard® touch-up kit base coat and/or stone chip.

### 3.14 LEAVE

Leave this work complete with all necessary flashings, valleys, ridges and hips all properly installed as the work proceeds so the finished roof is completely weathertight.

### 3.15 REMOVE

Remove trade rubbish and unused materials from the roof and surrounds regularly during the work.  
Sweep down the completed roof and clean out spoutings, gutters and rainwater pipes. Remove debris, unused materials and elements from the site.

## 4 SELECTIONS

For further details on selections go to [www.gerardroofs.co.nz](http://www.gerardroofs.co.nz).  
Substitutions are not permitted to the following, unless stated otherwise.



4521    ALUMINIUM WINDOWS AND DOORS

1    GENERAL

This section relates to the manufacture, supply, and installation of:

- aluminium windows
- aluminium doors and frames
- hardware and furniture
- overhead glazing
- flashings

1.1    RELATED WORK

Refer to glazing sections for glass types

1.2    ABBREVIATIONS AND TERMS

SLS	Serviceability limit state
ULS	Ultimate limit state
WGANZ	Window & Glass Association NZ
PQAS	Powder Coating Quality Assurance System

Documents

1.3    DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC E2/AS1	External moisture
NZBC F4/AS1	Safety from falling
NZBC H1/AS1-AS2	Energy efficiency
NZBC H1/VM1-VM2	Energy efficiency
AS/NZS 1170.2:2011	Structural design actions - Wind actions
NZS 1170.5	Structural design actions - Earthquake actions - New Zealand
AS/NZS 1580.108.1	Methods of test for paints and related materials - Determination of dry film thickness on metallic substrates - Non destructive methods
AS/NZS 1734	Aluminium and aluminium alloys - flat sheets, coiled sheet and plate
AS/NZS 1866	Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
NZS 3604	Timber-framed buildings
AS 3715	Metal finishing - Thermoset powder coatings for architectural applications
NZS 4211	Specification for performance of windows
NZS 4223.3	Glazing in buildings - Human impact safety requirements
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
BS EN 673	Glass in building - Determination of thermal transmittance (U-value) - Calculation method
AAMA 2603	Voluntary specification, performance requirements, and test procedures for pigmented organic coatings on aluminium extrusions and panels (with coil coating appendix)
AAMA 2604	Voluntary specification, performance requirements and test procedures for high performance organic coatings on aluminium extrusions and panels.
AAMA 2605	Voluntary specification, performance requirements and test procedures for superior performing organic coatings on aluminium extrusions and panels.
BS 3900	Methods of tests for paints, Part C5: Determination of film thickness
ISO 10077-1	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - General
ISO 10077-2	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Numerical method for frames
BRANZ BU 636	Protecting Glass From Damage



Window & Glass Association NZ ([WGANZ](#)) documents:

[Window Installation Guide](#) Guide to Window Installation as described in E2/AS1

[PQAS](#) Powder Coating Quality Assurance System

[SFA 3503-03](#) Anodic Oxide coatings on wrought aluminium for external architectural application (2005)

US Federal Specification:

[TT-S-001543A](#) Sealing compound, silicone rubber base (for caulking, sealing and glazing in buildings and other structures)

[TT-S-00230C](#) Sealing compound, elastomeric type, single component (for caulking, sealing and glazing in buildings and other structures)

## Warranties

### 1.4 WARRANTY - MANUFACTURER / SUPPLIER

Provide a material manufacturer/supplier warranty:

5 years: For fabrication

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

### 1.5 WARRANTY - INSTALLER / APPLICATOR

Provide an installer/applicator warranty:

2 years: For installation

- Provide this warranty in the installer/applicator standard form.

Refer to the general section 1237 WARRANTIES for additional requirements.

### 1.6 QUALIFICATIONS

Work to be carried out by trades people experienced, competent and familiar with the materials and techniques specified.

### 1.7 COMPLIANCE

Windows and doors to be manufactured and installed to [NZBC E2/AS1](#).

### 1.8 SHOP DRAWINGS

Shop drawings to show the general arrangement of the aluminium joining including, but not be limited to:

Construction details (minimum scale 1:5) showing the interface between joinery elements and the building structure including: -

- Jointing details and method of fixing between individual elements and between this installation and adjacent work
- Interaction between claddings and linings
- Flashing details
- Sealants and air seals
- Non standard fixing details including bracketing

And where required the following:

- Design calculations
- Producer Statement in the form PS1 Producer Statement Design
- Rebate sizes
- Dimensions of all typical elements and of any special sizes and shapes
- Provision for the exclusion and/or drainage of moisture
- Provision for adjustment of fixings to ensure true alignment of windows and doors
- Sealant types and full size sections of all sealants and backing rods
- Provision for thermal movement
- Provision for seismic movement and movement under wind loads
- Sequence of installation
- Glazing specification and details

Where requested provide the following additional information

- Information of Professional Indemnity Insurance held by the person providing the shop drawings

Refer to the general section 1235 SHOP DRAWINGS for the requirements for submission and review and the provision of final shop drawings.

Complete shop drawing review before commencing fabrication.

## 1.9 CERTIFICATION

Provide evidence of a certificate by a laboratory accredited by International Accreditation of New Zealand that the windows and doors offered comply with the requirements of [NZS 4211](#).

### Performance

## 1.10 PERFORMANCE - WINDOWS AND DOORS

To [NZS 4211](#), including:

- deflection, opening sashes, air infiltration, water penetration, ultimate strength, torsional strength of sashes, marking.

Refer to SELECTIONS.

## 1.11 PERFORMANCE - STRUCTURAL/WEATHER-TIGHTNESS

The structural and weather-tight performance of the completed joinery, the glazing and infill panels is the responsibility of the window manufacturer.

### Performance - Wind (design by contractor)

## 1.12 WIND - NON SPECIFIC DESIGN

Design the installation to the wind zone parameters of [NZS 3604](#), table 5.4.  
Refer to SELECTIONS for wind zone.

### Finishes

## 1.13 CERTIFY COATINGS - POWDER COATING

Certify on request, compliance with this specification and support with control and sampling records.  
Test for film thickness to BS 3900, part C5, method No. 4, using method (b) or to [AS/NZS 1580.108.1](#) for certifying thickness and method (a) where any dispute arises as to the thickness provided.

The coating should be applied by an applicator who can certify that the coating has been applied in accordance with the specification.

# 2 PRODUCTS

### Materials

## 2.1 WINDOWS

Refer to SELECTIONS for type and finish.

## 2.2 DOORS

Refer to SELECTIONS for type and finish.

## 2.3 ALUMINIUM EXTRUSIONS

Alloy designation to comply with [AS/NZS 1866](#). Branded and extruded for anodising or powder coating.

## 2.4 ALUMINIUM SHEET AND STRIP

Complying with [AS/NZS 1734](#) of suitable thickness. Rolled for anodising or powder coating.  
Alloy designation: 5251 - H16 or 5005 - H16

## 2.5 STAINLESS STEEL SHEET AND STRIP

Type: 316 austenitic steel  
Finish grade: 2B (satin lustre)

## 2.6 GLASS

Refer to the glazing section for glass types and installation.

## 2.7 REVEALS - TIMBER PAINTED

Timber reveals for paint finish with all sides primed grooved for wall linings or flush finished for architraves.

## 2.8 FLASHINGS GENERALLY

To [NZBC E2/AS1](#), 9.1.10 **Windows and Doors**. Material, grade and colour of head flashings to match the window frames. Ensure that materials used for head, jamb and sill flashings are compatible with the window frame materials and fixings and cladding materials.

### Components - for cavity systems

## 2.9 STANDARD CAVITY CLOSER

A perforated device constructed from either aluminium or PVC to close the cavity above the window or door unit, between the cladding and head flashing, to provide ventilation in accordance with [NZBC E2/AS1](#) to the spaces above the window or door.

## 2.10 SUPPORT BAR

[WGANZ](#) extruded aluminium support bar with built in drainage and ventilation to [NZBC E2/AS1](#), to provide continuous support to the window unit. Size to suit cladding type.

### Components

## 2.11 GLAZING GASKETS

Thermoplastic rubber. Do not stretch glazing gaskets during installation. Measure and cut gaskets 5-10% over length before installation.

## 2.12 HARDWARE AND FURNITURE

Hinges, stays, catches, fasteners, latches, locks and furniture as offered by the window and door manufacturer. Refer to SELECTIONS for type and finish. Key alike all lockable window hardware able to be keyed alike.

## 2.13 SAFETY STAYS

Stainless steel non releasable restrictors to limit window opening to [NZBC F4/AS1](#), Section 2.0, **Opening windows**.

### Sealants

## 2.14 STRUCTURAL SEALANT

Silicone chemically curing sealant specifically formulated and tested or approved equivalent with not less than a  $\pm 40\%$  movement factor complying with US Federal Specification TT-S-001543A.

## 2.15 WEATHERING / INSTALLATION SEALANT

Building sealant used in accordance with manufacturer's instructions for weather sealing aluminium frames to the cladding, complying with US Federal Specification TT-S-001543A, or a one-part polyurethane moisture curing, elastic joint sealant of medium modulus ( $\pm 25\%$  movement) to US Federal Specification [TT-S-00230C](#).

## 2.16 FOAM TAPE

Foam tape to [NZBC E2/AS1](#), 9.1.10.7 **Closed cell foam tape**.

### Finishes

## 2.17 POWDER COATED ALUMINIUM - EXTRA-DURABLE POLYESTER

Polyester powder organic coating in accordance with [WGANZ PQAS](#), AS 3715, and AAMA 2603

## 2.18 POWDER COATED ALUMINIUM - HIGH-DURABILITY POLYESTER

High-performance polyester powder coating in accordance with [WGANZ PQAS](#), and AAMA 2604.

# 3 EXECUTION

### Conditions - generally

## 3.1 DO NOT DELIVER

Do not deliver to site any elements which cannot be unloaded immediately into suitable conditions of storage.

### 3.2 UNLOAD WINDOW JOINERY

Unload, handle and store elements in accordance with the window manufacturer's requirements.

### 3.3 AVOID DISTORTION

Avoid distortion of elements during transit, storage and handling.

### 3.4 PREVENT DAMAGE

Prevent prefinished surfaces rubbing together, and contact with mud, plaster and cement. Keep paper and cardboard wrappings dry.

### 3.5 PROPRIETARY ELEMENTS

Fix in accordance with the window manufacturer's requirements.

### 3.6 PROTECTIVE COVERINGS

Retain protective coverings and coatings to BRANZ BU 636 and keep in place during the fixing process. Provide protective coverings and coatings where required to prevent marking of surfaces visible in the completed work and to protect aluminium joinery from following trades. Remove protection on completion.

### 3.7 ADDITIONAL PROTECTION

Supply and fix additional protection as necessary to prevent marking of surfaces which will be visible on completed work.

## Conditions - fixings and fastenings

### 3.8 SUPPLY OF FIXINGS

Use only fixings and fastenings recommended by the manufacturer of the component being fixed and to comply with the ULS wind pressure stated in SELECTIONS. Ensure fixings and fastenings exposed to the weather are of aluminium, or Type 316 stainless steel or if not exposed to the weather may they be hot-dip galvanized steel with a coating weight of 610 g/m<sup>2</sup> complying with [AS/NZS 4680](#).

### 3.9 INSTALLATION FIXING

To [NZBC E2/AS1](#), 9.1.10.8, **Attachments for windows and doors**. Fix windows/doors through reveal to frame with a pair of 75 x 3.15mm minimum galvanised jolt head nails or a pair of 8 gauge x 65mm minimum stainless steel screws. Fix at a maximum of 450 centres along all reveals and a maximum of 150mm from reveal ends. Ensure fixings do not penetrate metal flashings. Install packers between reveals and framing at fixing points, except at the head.

## Assembly

### 3.10 FABRICATION

Fabricate frames as detailed on shop drawings. Install glazing, hinges, stays and running gear as scheduled. Provide temporary bracing and protection. Temporarily secure all opening elements for transportation.

### 3.11 TIMBER / PVC REVEALS

Before fixing to aluminium frames, ensure that timber reveals which are being painted have been primed on all surfaces.

### 3.12 HARDWARE GENERALLY

Factory fit all required and scheduled hardware. Account for all keys and deliver separately to the site manager.

### 3.13 SAFETY STAYS

Factory fit safety stays to all windows scheduled for safety stays and to all windows where safety stays are required to comply with [NZBC F4/AS1](#) 4.0, Opening windows.

## Installation - windows and doors

### 3.14 CORROSION PROTECTION

Before fixing, apply suitable barriers of bituminous coatings, stops or underlays between dissimilar metals in contact, or between aluminium in contact with concrete.

### 3.15 CONFIRM PREPARATION OF EXTERIOR WALL OPENINGS

Confirm that exterior wall openings have been prepared ready for the installation of all window and door frames. Do not proceed with the window and door installation until required preparatory work has been completed.

Required preparatory work includes the following:

- wall underlay/building wrap to openings finished and dressed off ready for the installation of window and door frames to [NZBC E2/AS1:9.1.5](#) **Wall underlays to wall openings**.
- Full height 20mm jamb battens to [NZBC E2/AS1](#) figure 72A (direct fix only)
- claddings neatly finished off to all sides of openings
- installation of flashings (those which are required to be installed prior to frames).

### 3.16 INSTALLATION

Fix to comply with the reviewed shop drawings and installation details including flashings and bedding compounds, pointing sealants and weathering sealants.

### 3.17 INSTALLATION CAVITY CONSTRUCTION

Install to [WGANZ Window Installation Guide](#) details and drawings including [WGANZ](#) sill support bars.

For thresholds with support bars fixed through membranes, pre-fill support bar screw holes with silicone sealant to [NZBC E2/AS1](#), figure 62(d).

### 3.18 INSTALL FLASHINGS

Install flashings to heads, jambs and sills of frames as supplied and required by the window manufacturer and as detailed on the drawings. Finish head flashings to match window finish.

Place all flashings so that the head flashing weathers the jamb flashings, which in turn weathers over the upstand of the sill flashing. Ensure that sill flashings drain to the outside air.

Except where window/door frames are recessed, ensure that head flashings over-sail unit by 20mm minimum plus any jamb scribe width at each end.

### 3.19 COMPLETE AIR SEAL

To [NZBC E2/AS1:9.1.6](#) Air seals. Form an air-tight seal by means of a proprietary expanding foam or sealants used with backing rods, applied between the window / door reveal and structural framing to a depth of 10 - 20mm, to provide a continuous air tight seal to the perimeter of the window or door.

### 3.20 FIX HARDWARE

Fix all sash and door hardware and furniture as scheduled.

### Application - jointing and sealing

### 3.21 SEAL FRAMES ON SITE

Seal frames to each other and to adjoining structure and finishes, all as required by the window manufacturer and to make the installation weathertight. In very high and extra high or greater wind zones, seal between the window head and the head flashing. Do not seal the junction between the sill member and the cladding or sill flashing which must remain open.

### 3.22 PREPARE JOINTS

Ensure joints are dry. Remove loose material, dust and grease. Prepare joints in accordance with the sealant manufacturer's requirements, using required solvents and primers where necessary.

Mask adjoining surfaces which would be difficult to clean if smeared with sealant.

### 3.23 BACK UP

When using back-up materials do not reduce depth of joint for sealant to less than the minimum required by the manufacturer of the sealant. Insert polyethylene rod or tape back-up behind joints being pointed with sealant.

### 3.24 SEALANT FINISH

Tool sealant to form a smooth fillet with a profile and dimensions required by the sealant manufacturer. Remove excess sealant from adjoining surfaces, using the cleaning materials nominated by the sealant manufacturer and leave clean.

### Completion - cleaning

### 3.25 REMOVE TRADE DEBRIS

Remove trade debris by appropriate means on a floor by floor basis as each floor is completed and again before any work is covered up by others. Arrange for general removal.

3.26 TRADE CLEAN

Trade clean window frames, operable windows and doors, glass and other related surfaces inside and out at the time of installation to remove marks, dust and dirt, to enable a visual inspection of all surfaces.

Completion

3.27 PROTECTIVE COVERINGS

Retain protective coverings and coatings and keep in place during the fixing process. Provide protective coverings and coatings where required to prevent marking of surfaces visible in the completed work and to protect aluminium joinery from following trades.

3.28 SAFETY

Indicate the presence of transparent glasses for the remainder of the contract period, with whiting, tape or signs compatible with the glass type. Indicators other than whiting must not be applied to the glass surface. Masking tape must not be used for this purpose.

3.29 IN SITU TOUCH-UP TO POWDER COATED ALUMINIUM

In situ touch-up of polyester or fluoropolymer coated aluminium is only permitted only to minor surface scratching. Otherwise replace all damaged material.

3.30 REMOVE

At the appropriate stage of the project, remove safety indicators and protective coverings and wipe down all joinery thoroughly.

3.31 REPLACE

Replace damaged, cracked or marked elements.

3.32 MANIFESTATIONS

To [NZS 4223.3](#), 2.2 Manifestation (making glass visible).

4 SELECTIONS

Performance

4.1 THERMAL PERFORMANCE - VERTICAL WINDOWS & DOORS

Window /Door Number:	Consuction R-value:
R0.50	R0.40
~	

Performance - Wind (design by contractor)

4.2 WIND - NON SPECIFIC DESIGN

Building wind zone     high (refer to [NZS 3604](#), table 5.4)



**4610 GLAZING RESIDENTIAL****1 GENERAL**

This section relates to the supply and fixing of glass products for external and internal joinery in residential type buildings and includes:

- windows and doors
- frameless shower and bath screens
- splashbacks, wall linings
- balustrade systems, pool fences
- mirrors and mirror frames

**1.1 ABBREVIATIONS AND DEFINITIONS**

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

PVB Polyvinyl Butyral

CIP Cast in place

**Documents****1.2 DOCUMENTS**

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC B2/AS1	Durability
NZBC F4/AS1	Safety from falling
NZBC F9/AS1	Means of restricting access to residential pools
NZBC H1/AS1-AS2	Energy Efficiency
NZBC H1/VM1-VM2	Energy Efficiency
AS/NZS 1170.2: 2011	Structural design actions - Wind actions
NZS 3604	Timber-framed buildings
NZS 4211	Specification for performance of windows
NZS 4223.1	Glazing in buildings - Glass selection and glazing
NZS 4223.Supp1	Glazing in buildings - Supplement 1 to NZS 4223.1:2008 and NZS 4223.4:2008
NZS 4223.2	Glazing in buildings - Insulating glass units
NZS 4223.3	Glazing in buildings - Human impact safety requirements
NZS 4223.4	Glazing in buildings - Wind, dead, snow and live action
AS/NZS 2208	Safety glazing materials in buildings
AS/NZS 4666	Insulating glass units
BRANZ BU 636	Protecting Glass From Damage

**Warranties****1.3 WARRANTY - MANUFACTURER/SUPPLIER**

Warrant glass under normal environmental and use conditions against failure of materials.

10 years:	for insulating glass units
10 years:	for laminated glass
10 years:	for toughened glass

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

**Performance****1.4 ENERGY EFFICIENCY**

Provide glazing to comply with H1 Energy efficiency requirements of NZBC H1/AS1-AS2 and NZBC H1/VM1-VM2.



## 2 PRODUCTS

### Materials

#### 2.1 CLEAR FLOAT GLASS

Clear ordinary annealed transparent float glass for general window glazing. Thickness to [NZS 4223.1](#) and [NZS 4223](#). Supp 1.

#### 2.2 TEXTURED, PATTERNED OR OBSCURE GLASS

Translucent, annealed, rolled glass with a decorative pattern on one surface.

#### 2.3 TOUGHENED GLASS

Grade A Safety Glass to [AS/NZS 2208](#).

Heat soaked toughened glass to [NZS 4223.1](#), Appendix E required for critical areas. Refer to SELECTIONS.

#### 2.4 INSULATING GLASS UNITS (IGU'S)

To [AS/NZS 4666](#), [NZS 4223.2](#) and the IGU Manufacturers Association (IGUMA) requirements. Marking to [NZS 4223.2](#) as modified by [NZBC B2/AS1](#), 3.5.

Refer to SELECTIONS for specified surfaces of the IGU.

Surface numbering order for glass panes in an IGU are #1, #2, #3, and #4 as follows:

- Surface #1 - outer face of exterior pane
- Surface #2 - cavity face of the exterior pane
- Surface #3 - cavity face of the interior pane
- Surface #4 - outer face of the interior pane

### Components, aluminium and uPVC glazing

#### 2.5 GLAZING TAPE AND GASKETS

Single/double sided pressure sensitive self-adhesive low/medium/high density foam tapes/butyl tapes selected to suit the glazing detail to window manufacturers' requirements.

#### 2.6 SETTING BLOCKS

Santoprene/Neoprene, 80-90 Shore A hardness, set at quarter points or to detail, to support the weight of glass panes.

## 3 EXECUTION

### Conditions

#### 3.1 GENERAL REQUIREMENTS

To [NZS 4223.1](#), [NZS 4223.3](#), [NZS 4223.4](#). All external glazing to be wind and watertight on completion.

#### 3.2 DELIVERY

Keep glass dry and clean during delivery and bring on to site when ready to glaze directly into place. Comply also with the storage requirements set out in BRANZ BU 636.

#### 3.3 GLASS CONDITION

All glass to have undamaged edges and surfaces.

#### 3.4 GLASS THICKNESS

If not specifically stated in the glazing schedule determine the minimum thickness of glass for each sheet as required by [NZS 4223.1](#), [NZS 4223.3](#), [NZS 4223.4](#) and [NZS 4223](#). Supp 1. For windows tested to [NZS 4211](#), ensure glass meets the requirements of the window testing.

Determine the final glass thickness based on whether wind loading or human impact considerations govern.

#### 3.5 REBATE DIMENSIONS

Provide rebates for glazing to the widths and depths necessary for each situation including minimum glass edge cover to [NZS 4223.1](#), Section 4 Glazing.

#### 3.6 JOINTING, PUTTY AND SEALING MATERIAL COMPATIBILITY

Ensure jointing, putty and sealing materials are compatible with glass substrates. Confirm compatibility with laminated glass, IGUs and coatings.

### **Conditions - human impact safety requirements**

#### **3.7 SAFETY GLAZING, GENERAL REQUIREMENTS**

Glazing of doors, side panels, low level and window seat glazing, bathrooms, stairwell landings and similar locations, to [NZS 4223.3](#) for thickness and maximum areas of safety glass.

#### **3.8 SAFETY GLAZING MATERIAL**

Use only safety glazing materials defined in [NZS 4223.3](#), that also comply with the relevant requirements of [AS/NZS 2208](#). Ensure material is permanently marked and if cut by the distributor or installer mark each piece to [NZS 4223.3](#), 2.8 Identification.

#### **3.9 CONTAINMENT**

Edge cover to comply with [NZS 4223.1](#), Section 4 Glazing, table 5. Otherwise to [NZS 4223.3](#), 2.3 Edge cover.

### **Assembly**

#### **3.10 WORKING OF GLASS**

All working of glass as required in [NZS 4223.1](#).

#### **3.11 EDGE WORK AND BEVELLING**

Edgework other than a clean cut. Refer to SELECTIONS/drawings for type.

#### **3.12 SURFACE TREATMENT**

Refer to SELECTIONS/drawings for finish.

#### **3.13 SURFACE CUTTING**

Refer to SELECTIONS/drawings for finish.

#### **3.14 INSTALL SAFETY GLASS**

To [NZS 4223.3](#).

### **Application aluminium**

#### **3.15 INSTALL GLASS TO ALUMINIUM FRAMES**

Install glass to NZS4223.1.

- Bead glaze to Section 4 Glazing.
- Channel glaze to Section 4 Glazing, and Section 5 for Framed, Unframed, Partly Framed Glass Assemblies.

### **Finishing**

#### **3.16 SAFETY**

Indicate the presence of transparent glass for the remainder of the construction period, with whiting, tape or signs compatible with the glass type.

### **Completion**

#### **3.17 TRADE CLEAN**

Clean off or remove safety indicators at completion of the building.

#### **3.18 REPLACE**

Replace damaged, cracked or marked glass.

#### **3.19 LEAVE**

Leave work to the standard required by following procedures.

#### **3.20 REMOVE**

Remove debris, unused materials and elements from the site.

## **4 SELECTIONS**



## 4821 FLASHINGS

### 1 GENERAL

This section relates to the fabrication and installation of flashing systems not forming part of a proprietary system.

#### Documents

#### 1.1 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC B2/AS1	Durability
NZBC E2/AS1	External moisture
AS/NZS 2728	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements
AS 3566	Self-drilling screws for the building and construction industries - General requirements and mechanical properties
NZS 3604	Timber-framed buildings
NZMRM CoP	NZ Metal Roof and Wall Cladding Code of Practice

#### Requirements

#### 1.2 QUALIFICATIONS

Work to be carried out by trades people experienced, competent and familiar with the materials and techniques specified.

#### 1.3 VERIFY DIMENSIONS

Verify dimensions against site measurements prior to fabrication.

#### Standards of performance

#### 1.4 DURABILITY REQUIREMENTS

Design and install the flashings appropriate for the durability applications in accordance with NZBC B2/AS1. The Building Code B2, 3.2 requires that all hidden elements have at least the same durability as that of the element that covers it. Refer to NZBC B2/AS1 Table 1: Durability Requirements of Nominated Building Elements and NZBC E2/AS1 Table 20 Material selection.

#### 1.5 COMPATIBILITY REQUIREMENTS

Each flashing material shall be selected in accordance with NZBC E2/AS1 Table 20 to minimise corrosion. Refer to either NZS 3604 Clause 4.2 or AS/NZS 2728 for the relevant exposure conditions. For compatibility of materials in contact and subject to run-off, refer to NZBC E2/AS1 table 21 and NZBC E2/AS1 table 22.

#### 1.6 PROTOTYPES - REVIEW

Refer to the general section 1270 CONSTRUCTION for details of how prototypes will be reviewed and how instructions to proceed will be given. For flashings where there are no specific details or drawings, provide full size prototypes of the flashings to integrate components into the weathertight system. Co-ordinate with the trades affected by the installation. Provide the prototype flashings to the contract administrator for review.

### 2 PRODUCTS

#### 2.1 FLASHING MATERIALS

Acceptable materials for flashings are described in NZBC E2/AS1, 4.0. Material, grade and colour as detailed and scheduled. Ensure that materials used for flashings are compatible with the building and cladding materials and their fixings.

#### 2.2 FLASHING FABRICATION

Fabricate flashings generally to NZBC E2/AS1, 4.0, from a ductile grade of metal designed for lateral strength by folding, stiffening or ribbing on external edges, having a maximum un-stiffened width of 300mm. Provide all hooks, hems, kick outs, bird's beaks, stop ends, soft edges and turn downs etc. to NZBC E2/AS1, 4.0, or as shown on the drawings.

## 2.3 FIXINGS

Rivets, screws, nails and cleats to be compatible with the materials being fastened. Fasteners complying with the corrosion requirements of AS 3566 are suitable for use with ZINCALUME® steel products. Use only low carbon non-conductive sealing washers.

## 2.4 JOINTS - SEALANTS

Neutral Curing silicone or MS polymer sealant as required, with low resistance to compression and be-able to withstand large temperature variations. MS polymer sealant to be used where the sealant is exposed and the surrounding surfaces are to be subsequently painted or coated.

# 3 EXECUTION

## Conditions

## 3.1 DELIVERY

Keep flashings dry in transit. Take delivery of flashings in an undamaged condition. Reject all damaged materials.

## 3.2 STORAGE

Store materials and accessories on a level, firm base, in dry conditions, well ventilated, out of direct sunlight and completely protected from weather and damage. Ensure storage areas are away from current work areas. Cover to keep dry until fixed.

## 3.3 HANDLING

Avoid distortion and contact with potentially damaging surfaces/substances. Do not drag flashings across each other, or across other surfaces. Protect edges, corners and surfaces from damage.

## 3.4 SUBSTRATE

Do not commence work until the substrate is of the standard required by the installer for the specified flashings, level and in true alignment.

## 3.5 PROTECT

Protect surfaces, window and door joinery, and finishes already in place, from the possibility of damage during the installation process.

## 3.6 CONFIRM LAYOUT

Before commencing work confirm the proposed installation of the flashings and expansion joints and other visual considerations of the finished work.

## 3.7 CO-ORDINATE INSTALLATION

Co-ordinate installation of flashings with associated trades.

## Application

## 3.8 INSTALLATION

Install flashings in accordance with [NZMRM CoP](#) and in compliance with [NZBC E2/AS1, 4.0](#) Flashings. For very high wind zones and where the pitch of the roof is below 15° the flashing joint laps shall be sealed with sealant at each end of the lap to prevent the ingress of water.

Refer to [NZBC E2/AS1](#) Table 7 for general dimensions of flashings.

## 3.9 FIXINGS

Fix flashings with fasteners appropriate to the situation. For fixing flashings with proprietary brackets or clips ensure they are aligned to allow for movement and are compatible with the flashing material.

Fix screws with the shank perpendicular to the surface of the flashing with the washer fitted firmly against the flashing. Screws to be compatible with the flashing material.

Rivets 'blind' or 'pop' are to be sealed when used. Aluminium rivets are compatible with zinc or AZ coated steel. Monel and stainless steel rivets can be used to fix galvanized steel flashings. Minimum diameter of rivet to be used is 4.0mm. Drill hole 1mm larger than the rivet size. Seal head of rivet with neutral cured silicone.

## 3.10 JOINTING - SEALANTS



## 5113G GIB® PLASTERBOARD LININGS

### 1 GENERAL

This section relates to the supply, fixing and jointing of GIB® plasterboard linings and accessories to timber and steel framed walls and ceilings to form:

- standard systems
- superior finish quality systems
- bracing systems
- fire rated garage boundary wall systems
- wet area systems
- GIBFix® Framing systems

#### 1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

AWCINZ Association of Wall and Ceiling Industries New Zealand

#### Documents

#### 1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC C/AS2	Protection from fire
NZBC E2/AS1	External moisture
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS 2588	Gypsum plasterboard
AS/NZS 2589	Gypsum linings - Application and finishing
NZS 3604	Timber-framed buildings
AS/NZS 4600:2005	Cold-formed steel structures
ISO 5660.1	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method)
ISO 5660.2	Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 2: Smoke production rate (dynamic measurement)
BRANZ Technical Paper P21	BRANZ Technical Paper P21: A wall bracing test and evaluation procedure (2010)
NASH	Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria

#### Requirements

#### 1.3 NO SUBSTITUTIONS

Substitutions are not permitted to any specified GIB® systems, GIB® system components, GIB® plasterboard, associated GIB® products or GIB® accessories.

#### 1.4 INSTALLER WORK SKILLS AND QUALIFICATIONS

GIB® plasterboard fixers and plasterers to be experienced competent workers, familiar with GIB® plasterboard lining systems installation and finishing techniques. Submit evidence of experience on request. For example:

- National Certificate of Interior Systems; or
- Certified Business member of AWCINZ.

#### Performance

#### 1.5 INSPECTIONS AND ACCEPTANCE

Allow for inspection of the finished plasterboard surface:

- before applying sealer and
- before applying finish coatings or decorative papers,



so that after assessment of the type and/or angle of illumination and its effect on the completed decorative treatment, group approval and acceptance of the surface can be given.

1.6 BRACING REQUIREMENTS

Braced wall systems to [NZS 3604](#) when tested to BRANZ Technical Paper P21, using:

- GIB Ezybrace® Systems (2016) and/or GIB Ezybrace® Bracing Design Software
- GIB Ezybrace® Bracing Supplement Document (December 2016)
- GIB Ezybrace® for Steel Frame Housing (NASH) Software 2011 (to NASH Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria)

Refer to drawings for location and type.

2 PRODUCTS

Materials

2.1 GIB® PLASTERBOARD

Gypsum plaster core encased in a face and backing paper formed for standard and water resistance use to [AS/NZS 2588](#). Refer to SELECTIONS for location, type, thickness and finish.

GIB® Standard plasterboard

GIB Wideline® plasterboard

GIB Ultraline® high quality surface plasterboard

GIB Fyrelime® fire resistant plasterboard

GIB Braceline® & GIB® Noiseline® dual purpose wall bracing & noise control plasterboard

GIB Aqualine® wet area plasterboard

GIB Toughline®

GIB Toughline® Aqua

2.2 GIB® COVING

GIB-Cove® plasterboard coving. Refer to SELECTIONS for profile and size.

Components

2.3 CEILING BATTENS

GIB® Rondo® metal ceiling battens, batten joiners and perimeter channel.

2.4 SCREWS

GIB® Grabber® drywall type screws as follows:

Grabber® type	Used for fixing:
High Thread	GIB Ezybrace® or Standard systems to timber
Self Tapping	Standard systems to light gauge steel or timber
Dual Thread Screws	GIBFix®, GIB Ezybrace®, or Standard systems, to light gauge steel or timber
Wafer Head Needle Tip	Light gauge metal to timber not directly under plasterboard
Pancake Head Drill Tip	Light gauge metal to light gauge metal directly under plasterboard

Refer to GIB® requirements for appropriate details.

2.5 TAPE ON TRIMS AND EDGES

GIB® Goldline™ tape-on trims

GIB® UltraFlex® high impact corner mould

GIB® Levelline® Tape on Trim

2.6 METAL ANGLE TRIMS

GIB® galvanized steel slim angle trims.

2.7 CONTROL JOINTS

GIB® Rondo® P35 control joints.

GIB® Goldline™ tape-on trims

GIB® plastic W-profile control joints.

Accessories

2.8 ADHESIVE

Timber frame and/or steel frame:  
GIBFix® One ultra low VOC water based wallboard adhesive  
GIBFix® All-Bond solvent based wallboard adhesive

## 2.9 JOINTING COMPOUND

Bedding compound:	GIB Tradeset®, GIB Lite Blue®, GIB MaxSet®, GIB ProMix® All Purpose, GIB Plus 4®
Finishing compound:	GIB ProMix® All Purpose, GIB® Trade Finish®, GIB® Trade Finish® Lite, GIB ProMix® Lite, GIB® U-Mix, GIB Plus 4®, GIB Trade Finish® Multi
Cove:	GIB-Cove® Bond

## 2.10 JOINTING TAPE

GIB® jointing tape.

## 2.11 GAP FILLER

GIB® Gap Filler ultra low VOC multi-purpose acrylic flexible filler

# 3 EXECUTION

## Conditions

### 3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

### 3.2 LEVELS OF PLASTERBOARD FINISH

Provide the selected plasterboard surfaces to the pre decorative levels of finish specified in [AS/NZS 2589](#).

### 3.3 CONFIRM LEVELS OF PLASTERBOARD FINISH ACCEPTANCE

Before commencing work, agree in writing upon the surface finish assessment procedure towards ensuring that the quality of finish expectations are reasonable and are subsequently obtained and acceptable.

**Do not apply decorative treatment until it is agreed in writing by the contractor, subcontractors and decorator that the specified plasterboard Level of Finish has been achieved.**

"Levels of plasterboard finish" is a tool for specifying the required quality of finish when installing and flush stopping GIB® plasterboard **prior** to the application of a range of decorative finishes under various lighting conditions. Refer to **AS/NZS 2589**.

### 3.4 SUBSTRATE

Do not commence work until the substrate is plumb, level and to the standard required by the sheet manufacturer's requirements. Refer to GIB® Site Guide (September 2018).

### 3.5 TIMBER FRAME MOISTURE CONTENT

Maximum allowable moisture content to [AS/NZS 2589](#) for timber framing at lining: 18% or less for plasterboard linings. Refer to [NZBC E2/AS1](#) and GIB® Site Guide (Sept 2018).

### 3.6 METAL FRAMING

Metal framing, to which gypsum lining is fixed, shall comply with AS 1397, [AS/NZS 4600](#), or NASH Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria as applicable. Where adhesion of gypsum linings is required, surfaces shall be free of oil, grease, dust and other foreign materials. Refer to the metal framing manufacturers specifications where high density gypsum linings (>800 kg/m<sup>3</sup>) such as GIB Braceline® and GIB Noiseline® are specified for fixing to light gauge steel framing.

### 3.7 PROTECTION

Protect surfaces; cabinetwork, fittings, equipment and finishes already in place from the possibility of water staining and stopping damage. Refer to GIB® Site Guide (Sept 2018).

## Application

- 3.8 INSTALL CEILING BATTENS  
Install to GIB® Rondo® Ceiling Batten Systems requirements.
- 3.9 LINING WALLS AND CEILINGS GENERALLY  
Form to GIB® Site Guide (September 2018). Ensure bulk insulation thickness shall not exceed that of the wall framing.
- 3.10 BOARD ORIENTATION  
Minimise joints by careful sheet layout using the largest sheet sizes possible, and generally fixing horizontally. Where part sheets are required for various stud heights they should be positioned so the cut sheet is as low as possible to keep joints below eye level.
- 3.11 FORM WET AREA SYSTEMS  
Form to GIB Aqualine® Wet Area Systems requirements.
- 3.12 FORM BRACING SYSTEMS  
Form bracing systems to:  
• GIB Ezybrace® Systems (2016)
- 3.13 FORM CONTROL JOINTS  
Form control joints to GIB® Site Guide (September 2018) requirements.
- 3.14 INSTALL COVES  
Install to GIB-Cove® literature using GIB-Cove® Bond.
- 3.15 INSTALL TAPE-ON TRIMS  
Install to GIB® Goldline™ Tape-on trims literature and/or GIB® Ultraflex high impact corner mould literature.

### Finishing

- 3.16 FINISHING GENERALLY  
To GIB® Site Guide (September 2018) and [AS/NZS 2589](#).

### Completion & Commissioning

- 3.17 REPLACE  
Replace damaged sheets or elements.

## 4 SELECTIONS

- 4.1 GIB® BRACING SYSTEMS  
Refer to:  
• GIB Ezybrace® Systems (2016)  
• GIB Ezybrace® Systems (2011)  
For bracing element location refer to drawn documentation.

**6700 PAINTING GENERAL****1 GENERAL**

This section relates to the general matters related to painting work

**1.1 RELATED WORK**

Refer to 6711 PAINTING EXTERIOR for exterior paint systems.  
Refer to 6721 PAINTING INTERIOR for interior paint systems.

**1.2 ABBREVIATIONS**

The following abbreviations are used throughout this part of the specification:

APAS	Australian Paint Approval Scheme
MPNZA	Master Painters New Zealand Association Inc.
VOC	Volatile organic compound

**Documents****1.3 DOCUMENTS**

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC C/AS2	Protection from fire
AS/NZS 2311	Guide to the painting of buildings
AS/NZS 2312.1	Guide to the protection of structural steel against exterior atmospheric corrosion by the use of protective coatings - Paint Coatings
AS/NZS 5131	Structural steelwork - Fabrication and erection
AS/NZS ISO 9001	Quality management systems - requirements
SNZ TS 3404	Durability requirements for steel structures and components
WorkSafe	<a href="#">Guidelines for the provision of facilities and general safety in the construction industry</a>
WorkSafe	<a href="#">Guidelines for the management of lead-based paint</a>
MPNZA	Specification manual
MPNZA	Health and Safety Programme
Health and Safety at Work Act 2015	

**Requirements****1.4 NO SUBSTITUTIONS**

Substitutions are not permitted to any specified manufacturer's system, or associated components and products.

**1.5 QUALIFICATIONS**

Painters to be a member of MPNZA and experienced competent workers, familiar with the materials and the techniques specified.

**1.6 HEALTH AND SAFETY**

Refer to the requirements of the [Health and Safety at Work Act 2015](#) and [WorkSafe: Guidelines for the provision of facilities and general safety in the construction industry](#). If the elimination or isolation of potential hazards is not possible then minimise hazards in this work on site by using the proper equipment and techniques as required in the MPNZA Health and Safety Programme. Supply protective clothing and equipment. Inform employees and others on site of the hazards and put in place procedures for dealing with emergencies.

Refer to [WorkSafe: Guidelines for the management of lead-based paint](#) for the required procedures and precautions when:

- treating/removing lead-based paint
- burning off paint
- sanding off paint
- using solvent based paint removers.

**1.7 MATERIAL SAFETY DATA SHEET**

Obtain from each paint manufacturer the material safety sheet for each product used. Keep sheets on site and comply with the required safety procedures.

### Warranties

#### 1.8 WARRANTY

Warrant this work under normal environmental and use conditions against failure.

2 years: Warranty period

Refer to the general section 1237WA WARRANTY AGREEMENT for the required format and details of when completed warranty must be submitted.

### Performance

#### 1.9 MANUFACTURER'S INSPECTION

Allow the paint manufacturers to inspect the work in progress and to take samples of their products from site if requested.

#### 1.10 INSPECTION OF WORK

Inspection of the whole of the work at each of the stages scheduled may be made. Agree a programme that will facilitate such inspection, including notification when each part and stage of the work is ready for inspection.

## 2 PRODUCTS

### Materials

#### 2.1 PAINT TYPES

Use the manufacturer's complete system and only the products specified.

#### 2.2 MATERIALS GENERALLY

Use only the Manufacturer's products which are guaranteed for their consistency and performance under [AS/NZS ISO 9001](#) and APAS approval, prepared, mixed and applied as directed in the Manufacturer's specification sheets, specification manuals and product data sheets.

#### 2.3 THINNERS AND ADDITIVES

Only use thinners or additives within the stated limits for the particular situations specified.

### Accessories

#### 2.4 FILLERS

For recommendations on; fillers, stopping, paint strippers, cleaning agents, etching solutions, mould inhibitors, rust inhibitors, knotting and other commodities used for the surface preparation, refer to the manufacturer of the specified coating.

## 3 EXECUTION

### Conditions

#### 3.1 EXECUTION

To conform to manufacturer's requirements and those methods, practices and techniques contained in [AS/NZS 2311](#), the MPNZA Specification manual, and [WorkSafe: Guidelines for the provision of facilities and general safety in the construction industry](#).

#### 3.2 PREPARE

Prepare surfaces to the coating manufacturer's requirements.

#### 3.3 COATED SURFACES

Ensure that substrate surfaces are able to achieve the specified finish.

#### 3.4 PRE-PRIMED SURFACES

Sand down any breakdown or damage of the primer to a sound surface and immediately re-prime.

#### 3.5 BRUSH DOWN

Brush down surfaces immediately before application, to remove dust, dirt and loose material.

### 3.6 COMPATIBILITY

Check that materials are as required by the paint manufacturers for the particular surface and conditions of exposure, and that they are compatible with each other. Use paint from the same manufacturer for each paint system. If not compatible, obtain instructions before proceeding.

### 3.7 TREATED SURFACES

Where surfaces have been treated with preservatives or fire retardants, check with the treatment manufacturer that coating materials are compatible with the treatment and do not inhibit its performance. If they are not compatible, obtain instructions before proceeding.

### 3.8 ANCILLARY SURFACES

The coatings listed in schedules and elsewhere are of necessity simplified. Coat ancillary exposed surfaces to match similar or adjacent materials or areas, except where a fair-faced natural finish is required or items are completely prefinished. In cases of doubt obtain instructions before proceeding.

### 3.9 HARDWARE

Do not paint hinges or hardware that cannot be removed. If items can be removed, carefully remove hardware, fixtures and fittings before commencing work. Set aside where they cannot be damaged or misplaced and replace on completion.

### 3.10 PROTECTION

Use dropsheets, coverings and masking necessary to protect adjoining fixtures, fittings and spaces from paint drops, spots, spray and damage.

## **Preparation - unpainted and pre-primed timber and wood based products**

### 3.11 MOISTURE CONTENT

Ensure moisture content at the time of application is near to the equilibrium moisture content pertaining to the particular locality in which the timber is used, without any excessive moisture content gradient between core and surface.

### 3.12 PREPARING DRESSED TIMBER

Ensure dressed timber is smooth, free from raised or woolly grain, planing burrs or other machining defects. Slightly round or ease sharp edges to ensure they can be properly coated. Sand timber to bring up to a smooth finish along the direction of the grain. Sand timber back to new condition timber that has been weathered.

### 3.13 PREPARING ROUGH SAWN TIMBER

Thoroughly brush along the direction of the grain to remove dust and dirt.

### 3.14 PREPARING PRE-PRIMED TIMBER

Check pre-prime coat for damage, powdering, weathering or loss of adhesion. Where primer is sound, thoroughly brush along the direction of the grain to remove dust and dirt. If there is doubt, sand back and re-prime.

### 3.15 TIMBER SPECIES

Check that the preparation and paint system is suitable for the timber species.

### 3.16 PREPARING DAMAGE AND DEFECTS

Scrape clean loose or soft material holes, depressions, resin or gum pockets, knot holes, surface splits, checks, or any localised decay. Apply primer and/or sealer specified and fill these areas with linseed oil putty or other appropriate filler.

### 3.17 FIXINGS

Take timber fixings below the painted or clear finished surface. Leave corrosion resistant timber fixings flush with clear finished surfaces.

### 3.18 CLEANING

Remove grease and oil by wiping down with solvent or water-based degreasing agent. Remove resin by wiping down with solvent or water-based degreasing agent or heating and scraping.

Remove sanding dust. Bad staining may be untreatable and require replacement of timber, discuss with paint manufacturer and main contractor.



**Preparation - unpainted masonry**

3.19 PREPARING BRICKS

Remove loose dirt, sand, aggregate and mortar by brushing down or blocking-off surface with a flat stone, hose with clean water. Fill holes with mortar/acrylic based filler. Remove efflorescence by dry brushing with a stiff bristle brush. Brickwork that has been acid cleaned shall have the pH tested to ensure it is neutralized before painting.

3.20 PREPARING CONCRETE

Remove grease and formwork oil with solvent or water and household detergent. Wash with clean water and allow to dry. Fill unwanted holes with cement grouting and allow to cure. Remove loose surface material and surface projections with a flat stone. Roughen slightly dense or glazed surfaces with light (30 mesh) sandblasting, rubbing with coarse abrasive stones, or by wetting the surface and treating with 10% commercial hydrochloric acid solution. Allow to react for 5 minutes, scour surface with a stiff bristle brush, wash off with clean water and allow to dry. Remove efflorescence by dry brushing or by wetting the surface and treating with 10% commercial hydrochloric acid solution as above.

Remove dust and dirt by brushing, air blast, hosing, or scrubbing as may be necessary.

3.21 PREPARING CEMENT PLASTER

Ensure surface is adequately cured and dry. Treat mould with one part sodium hypochlorite household bleach to three parts clean water solution or a proprietary anti-mould solution, and allow to dry. Remove efflorescence by brushing only.

3.22 PREPARING CONCRETE MASONRY

Remove loose dirt, sand, aggregate and mortar by brushing down or blocking-off the surface with a flat stone or hardwood block. Fill holes with mortar or acrylic based filler. Treat mould with one part sodium hypochlorite household bleach to three parts clean water solution, or a proprietary anti-mould solution, and allow to dry.

Remove efflorescence by dry brushing or by wetting the surface and treating with 10% commercial hydrochloric acid solution. Allow to react for 5 minutes, scour the surface with a stiff bristle brush, wash off with clean water and allow to dry.

Remove dust and dirt by brushing, air blast, hosing or scrubbing.

**Preparation - gypsum plaster**

3.23 PREPARING GYPSUM PLASTER

Fill and sand small crevices and cracks. Surface moisture content not to exceed 12% at time of coating.

**Preparation - unpainted linings**

3.24 PREPARING FIBROUS PLASTER

Check for and remove release agents and other contaminants by washing with clean water or solvent and allow to dry. Fill cracks and surface imperfections with patching plaster and lightly sand smooth. Remove dust.

3.25 PREPARING PLASTERBOARD

Check that joints are prepared to a smooth level surface finish. Fill cracks and surface imperfections with the sheet manufacturer's required stopping compound and lightly sand smooth. Remove dust.

**Preparation - painted surfaces generally**

3.26 SURFACE PREPARATION

Refer to the Manufacturer's specification sheets and product data sheets. Carry out the preparatory work required by them for each of the substrates.

For interior surfaces such as paper faced plasterboard use the Manufacturer's recommended finishing compound as an aid to achieving a Level 5 finish.

3.27 MOULD



Sterilise surface mould by washing or sponging the whole surface with a one part sodium hypochlorite household bleach to three parts clean water solution. Allow bleach to act for 30 minutes and wash off with clean water. Wash cloths and sponges regularly in clean water. Reapplication may be necessary. Treat with anti-mould solution to the treatment manufacturer's requirements.

### 3.28 GAP FILLING

Fill cracks, holes, indented and damaged surfaces with putty, plaster filler, wood filler, or plastic wood, as appropriate and in accordance with the paint manufacturer's requirements. Allow to dry or set before sanding back level with the surface. Prime coat or seal the timber before using putty. Wet cement or gypsum base plasters before applying filler. Use only Portland cement base types, or water-insoluble organic-based gap fillers in exterior or wet areas.

#### **Application - before applying final coatings**

### 3.29 OFF-SITE WORK

Carry out off-site preparation and coating under cover, in a suitable environment and with adequate lighting. Store items both before and after coating in a clean, dry area, protected from the weather and mechanical damage, properly stacked and spaced to permit air circulation and to prevent sticking of surfaces.

### 3.30 PRIMING JOINERY

Before priming preservative treated timber ensure that any cut surfaces have been retreated. Liberally coat end grain, allow to soak in and then recoat. Ensure LOSP treated joinery has dried sufficiently to lose odour.

### 3.31 CONCEALED JOINERY SURFACES

Apply off-site coatings to all surfaces including those which will be concealed when incorporated into the building.

### 3.32 CONCEALED METAL SURFACES

Apply primer to suit the coating system to all metal surfaces which will be concealed when incorporated into the building.

### 3.33 DOORS

Prime or seal and paint all six faces of doors before hanging.

### 3.34 BEAD GLAZING

Before glazing apply the first two coats, or the primer and one undercoat, to rebates of stained, varnished or painted joinery and beads.

### 3.35 PUTTY GLAZING

Follow putty manufacturers recommendations for application, drying, and painting. Ensure that the putty is fully protected by the coating system as soon as it is sufficiently hard.

#### **Application - generally**

### 3.36 PAINTING GENERALLY

Comply with the paint manufacturer's requirements and any additional requirements in this specification.

### 3.37 MIXING

Thoroughly mix paints. Lift any settled pigment and ensure the paint is homogenous.

### 3.38 ENVIRONMENT

Paint exterior surfaces only in favourable weather conditions:

- warm dry days without frost or heavy dews
- avoid painting in direct sunlight any surfaces that absorb heat excessively
- as far as possible apply paint in the temperature range 15°C to 25°C
- do not paint if temperatures fall outside the range of 10°C and 35°C unless paints with the necessary temperature tolerance have been specified
- do not apply solvent borne paint if moisture is present on the surface

### 3.39 SEQUENCE OF OPERATIONS

Painting work to generally follow the following sequences:

- back painting and pre-installation painting, then post-installation exposed-face painting
- complete surface preparation before commencing painting
- apply paint in the specified sequence using the specified paint
- allow full drying time between coats to the paint manufacturer's requirements
- do not expose primers, undercoats and intermediate coats beyond manufacturers stated instructions before applying the next coat
- finish broad areas before painting trim
- ensure batch numbers of tins are matched for whole areas
- internally, paint ceilings before walls and walls before joinery, trim and other items

### 3.40 PAINT APPLICATIONS

Select brush, roller, or pad and apply paint to the requirements of the paint manufacturer and to obtain a smooth even coating of correct thickness, uniform gloss and colour.

### 3.41 DRYING TIME

Before handling or applying the next coat of paint, give each coat the full drying time as required by the paint manufacturer. Ensure that surfaces are dry and that condensation does not occur before the paint reaches surface-dry condition.

### 3.42 LIGHTLY SAND

Lightly sand primers, sealers, undercoats and intermediate coats to remove dust pick-up, protruding fibres and coarse particles. Remove dust immediately before applying the next coat.

### 3.43 DEFECTIVE WORK

Correct defective work immediately and re-coat as required, following precisely the paint system specified.

### 3.44 EACH COAT

Each coat of paint and the completed paint system to have the following qualities and properties:

- uniform finish, colour, texture, sheen and hiding power
- the specified number of coats applied
- no blemishes such as runs, sags, crinkling, fat edges, entrained paint skins, hairs, dust, bare or starved patches, cracks, brush marks, ladder marks and blistering
- proper covering of corners, crannies, thin edges, cracks, end grain and other difficult places of application

## **Completion**

### 3.45 CLEAN

Clean adjoining surfaces, glass and fittings of any paint contamination. Clean off glass indicators at completion of the building works. Clean glass inside and out to a shining finish.

### 3.46 CLEAN EQUIPMENT

Use the Manufacturer's environmental wash system for the cleaning of water-based paint and plasters from brushes, rollers, plastering or spray equipment to separate the solids from the water component for safe disposal.

### 3.47 LEAVE

Leave the whole of this work uniform in gloss and colour, of correct thickness, free from painting defects, clean and unmarked and to the standard required by following procedures.

### 3.48 REMOVE

Remove dropsheets, coverings and masking to leave surrounding surfaces and areas clean, tidy and undamaged. Remove debris, unused materials and elements from the site.

### 3.49 REPLACE HARDWARE

Replace hardware without damage to it or the adjoining surface. Leave properly fitted and in working order.

## **4 SELECTIONS**

### 4.1 SELECTIONS

Refer to 6711 PAINTING EXTERIOR and 6721 PAINTING INTERIOR for selections.

## 6711 PAINTING EXTERIOR

### 1 GENERAL

This section relates to the preparation of exterior unpainted and pre-painted surfaces, and the application of exterior:

- decorative paint coatings
- protective paint coatings
- sealers
- stains
- clear finishes

#### Related work

#### 1.1 RELATED SECTIONS

Refer to 6700 PAINTING GENERAL for general painting matters.  
Refer to 6721 PAINTING INTERIOR for interior paint systems.

#### Warranties

#### 1.2 WARRANTY

Warrant this work under normal environmental and use conditions against failure.  
2 years: Warranty period

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

### 2 PRODUCTS

#### 2.1 PRODUCTS

Refer to 6700 PAINTING GENERAL for product clauses.

### 3 EXECUTION

#### 3.1 EXECUTION

Refer to 6700 PAINTING GENERAL for execution clauses.

### 4 SELECTIONS

## 6721 PAINTING INTERIOR

### 1 GENERAL

This section relates to the preparation of interior unpainted and pre-painted surfaces, and the application of interior:

- decorative paint coatings
- protective paint coatings
- sealers
- stains
- clear finishes

#### Related work

#### 1.1 RELATED SECTIONS

Refer to 6700 PAINTING GENERAL for general painting matters.  
Refer to 6711 PAINTING EXTERIOR for exterior paint systems.

#### Warranties

#### 1.2 WARRANTY

Warrant this work under normal environmental and use conditions against failure.  
2 years: Warranty period

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

### 2 PRODUCTS

#### 2.1 PRODUCTS

Refer to 6700 PAINTING GENERAL for product clauses.

### 3 EXECUTION

#### 3.1 EXECUTION

Refer to 6700 PAINTING GENERAL for execution clauses.

### 4 SELECTIONS

**7120 HOT & COLD WATER SYSTEM****1 GENERAL**

This section relates to piped potable water supply systems from the network utility supply authority water main to designated points and appliances, the installation of hot water heating appliances, distributing piped hot water to other appliances, and the installation of valves.

**1.1 RELATED WORK**

Refer to 7150 SANITARY FIXTURES, TAPWARE & ACCESSORIES for sanitary fixtures and tapware selections.

**Documents****1.2 DOCUMENTS**

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC G4/AS1	Ventilation
NZBC G11/AS1	Gas as an energy source
NZBC G12/AS1	Water supplies
NZBC G12/AS3	Water supplies
NZBC H1/AS1-AS2	Energy Efficiency
AS 1432	Copper tubes for plumbing, gas fittings and drainage applications
AS/NZS 1477	PVC pipes and fittings for pressure applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2033	Installation of polyethylene pipe systems
AS 2345	Dezincification resistance of copper alloys
AS/NZS 2492	Cross Linked Polyethylene (PE-X) pipe for pressure applications
AS/NZS 2537.1	Mechanical jointing fittings for use with cross-linked polyethylene (PE-X) for pressure applications. Plastic piping systems for hot and cold water installations - Cross linked polyethylene (PE-X) General
AS/NZS 2537.2	Mechanical joining fittings for use with crosslinked Polyethylene (PE-X) for pressure applications - Plastics piping systems for hot and cold water installations - Crosslinked Polyethylene (PE-X) - Fittings
AS/NZS 2537.3	Mechanical jointing fittings for use with cross-linked polyethylene (PE-X) for pressure applications. Plastic piping systems for hot and cold water installations - Cross linked polyethylene (PE-X) fitness for purpose of system
AS/NZS 2537.4	Mechanical jointing fittings for use with cross-linked polyethylene (PE-X) for pressure applications. Plastic piping systems for hot and cold water installations - Cross linked polyethylene (PE-X) Guidance for the assessment of conformity.
AS/NZS 2642.1	Polybutylene pipe systems - Polybutylene (PB) pipe extrusion compounds
AS/NZS 2642.2	Polybutylene pipe systems - Polybutylene (PB) pipe for hot and cold water applications
AS/NZS 2642.3	Polybutylene pipe systems - Mechanical jointing fittings for use with polybutylene (PB) pipes for hot and cold water applications
AS/NZS 2845.1	Water supply - Backflow prevention devices - Materials, design and performance requirements
AS 2845.3	Water supply - Backflow prevention devices - Field testing and maintenance
AS/NZS 3500.1	Plumbing and drainage - Water services
AS/NZS 3500.4	Plumbing and drainage - Heated water services
NZS 3501	Specification for copper tubes for water, gas and sanitation
AS 3688	Water supply and gas systems - metallic fittings and end connectors
AS/NZS 3879	Solvent cements and priming fluids for PVC (PVC-U and PVC-M and ABS and ASA pipes and fittings

AS 4032.2	Water supply - Valves for the control of heated water supply temperatures - Tempering valves and end-of-line temperature actuated devices
AS/NZS 4129	Fittings for polyethylene (PE) pipes for pressure applications.
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
NZS 4305	Energy efficiency domestic type hot water systems
NZS 4602	Low pressure copper thermal storage electric water heaters
NZS 4606.1	Storage water heaters. General requirements
NZS 4606.2	Storage water heaters. Specific requirements for water heaters with single shells
NZS 4606.3	Storage water heaters. Specific requirements for water heaters with composite shells.
NZS 4607	Installation of thermal storage electric water heaters: valve-vented systems
NZS 4617	Tempering (3-port mixing) valves
AS 4809	Copper pipe and fittings. Installation and commissioning
AS 5200 part 053	Plumbing and drainage products, Stainless steel pipes and tubes for pressure applications.
AS/NZS 5601.1	Gas installations - general installations
AS/NZS 60335.2.35	Household and similar electrical appliances. Safety - Pat 2.35 Particular requirements for instantaneous water heaters
Gas (Safety and Measurement) Regulations 2010	
Plumbers, Gasfitters and Drainlayers Act 2006	
NZ Backflow Testing Standard: NZ Backflow Testing Standard 2019, Field testing of backflow prevention devices and verification of air gaps	

## Requirements

### 1.3 QUALIFICATIONS

Plumbers to be experienced competent workers, familiar with the materials and the techniques specified. Carry out all work under the direct supervision of a certifying plumber under the Plumbers, Gasfitters and Drainlayers Act 2006.

## Performance

### 1.4 TESTING - TO NZBC G12/AS1

Test to NZBC G12/AS1, 7.6, Watertightness, for hot and cold water.

- Test to a pressure of 1500 kpa for period not less than 15 minutes.

Confirm the timing before carrying out any tests. Supply potable water and the apparatus needed. Slowly fill service pipes with water to exclude air. Test and ensure there is no measurable loss of pressure for the minimum period. Slowly fill distribution pipes with water to exclude air. Ensure that with draw-off taps closed the system must remain water-tight.

## 2 PRODUCTS

### 2.1 COPPER PIPE

To NZBC G12/AS1, 2 Materials. Copper pipe to NZS 3501, AS 1432 (type A, B & C) and AS 3688 for fittings.

### 2.2 POLYBUTYLENE PIPE

To NZBC G12/AS1, 2 Materials. Polybutylene tubing to AS/NZS 2642.1, AS/NZS 2642.2 and AS/NZS 2642.3 complete with fittings and accessories brand-matched. Protect from sunlight.

### 2.3 POLYETHYLENE PIPE

To NZBC G12/AS1, 2 Materials. Polyethylene pipes to AS/NZS 4130 and fittings to AS/NZS 4129. Except for solid black PE, protect from sunlight. For cold water applications only.

### 2.4 WATER METER

To the requirements of the network utility operator.

### 2.5 VALVES

Pressure reducing or limiting valve, filter, non-return valve, cold water expansion valve, pressure relief or temperature valve, pressure relief valve and isolating valves to NZBC G12/AS1.



## 2.6 BACKFLOW PREVENTION DEVICES

Provide backflow prevention devices to [AS/NZS 2845.1](#) where it is possible for water or contaminants to backflow into the potable water supply. Refer to [NZBC G12/AS1](#), 3.4 Backflow protection & 3.5 Containment Backflow protection and [NZBC G12/AS1](#), table 2, Selection of Backflow Protection and table 2A Containment Backflow Protection

## 2.7 TEMPERING VALVE

Tempering valve to [NZS 4617](#) or AS 4032.2 to [NZBC G12/AS1](#).

### Materials - Hot water heating appliances

## 2.8 ELECTRIC HOT WATER CYLINDER, MAINS PRESSURE

To [NZS 4305](#) [NZS 4606.1](#), [NZS 4606.2](#) and [NZS 4606.3](#), electric water storage cylinder, insulated and complete with required fittings.

### Components

## 2.9 INSULATION

Pre-formed pipe sections complete with bends and fittings, with fixing tape to the manufacturer's requirements and to [NZBC H1/AS1-AS2](#) and [AS/NZS 3500.4](#).

## 2.10 PROTECTIVE TAPE

Plasticised PVC tape system with primer, mastic fixing and outer coating.

# 3 EXECUTION

## 3.1 EXECUTION GENERALLY

Generally carry out the whole of this work and tests to [NZBC G12/AS1](#) or [AS/NZS 3500.1](#) and [AS/NZS 3500.4](#) as modified by [NZBC G12/AS3](#).

## 3.2 HANDLE AND STORE

Handle and store pipes, fittings and accessories to avoid damage. Store on site, under cover on a clean level area, stacked to eliminate movement and away from work in progress.

Store tapware in a shelved, dry and securely locked area. Retain tapware in the manufacturer's original packaging, complete with all fixings and installation instructions. Label each unit separately with its space/fixture number to match.

## 3.3 CORE HOLES AND SLEEVES

Review location and fit core holes and sleeves as needed throughout the structure in conjunction with the boxing, reinforcing and placing of concrete. Strip core holes and make good after installation of pipework.

## 3.4 CONCEAL

Conceal pipework within the fabric of the building unless detailed otherwise. Satin finish chrome plate exposed work, complete with matching ferrule at the surface penetration.

## 3.5 CORROSION

Separate all metals subject to electrolytic action from each other and from treated timber, concrete and other lime substances by space, painting of surfaces, taping, or separator strips.

## 3.6 THERMAL MOVEMENT

Accommodate movement in pipes resulting from temperature change by the layout of the pipe runs, by expansion joints and by sleeving through penetrations.

## 3.7 PIPE SIZE

Flow rates to each outlet to be no less than those given in [AS/NZS 3500.1](#) and [AS/NZS 3500.4](#) as modified by [NZBC G12/AS3](#) or [NZBC G12/AS1](#), table 3, Acceptable flow rates to sanitary fixtures. Pipe size as determined in [NZBC G12/AS1](#), table 4, Tempering valve and nominal pipe diameters.

## 3.8 ELECTROLYTIC ACTION

Avoid electrolytic action by eliminating contact or continuity of water between dissimilar metals.

## 3.9 EXCAVATE

Excavate for the water main to a firm, even trench base in straight runs. Allow to backfill.

#### Application - Jointing

##### 3.10 JOINTING COPPER PIPE

Braze pipe, fit alloy compression fittings, crox type joints and seal ring compression joints to [NZBC G12/AS1](#) and AS 4809.

##### 3.11 JOINTING POLYBUTYLENE PIPE

Aluminium clamped, seal ring compression or push fit "O" ring seal jointing to pipe system manufacturer's requirements.

##### 3.12 JOINTING POLYETHYLENE PIPE

Seal ring compression joints and electrofusion to [NZBC G12/AS1](#) and [AS/NZS 2033](#).

#### Application - Pipework installation

##### 3.13 WATER SUPPLY CONNECTION

Arrange with the network utility operator for a connection to the water main and from there through a water meter and gate valve. Provide back flow prevention to [NZBC G12/AS1](#).

##### 3.14 POTABLE WATER SUPPLY PIPEWORK INSTALLATION

From connection point, run pipes complete with all fittings, support and fixing, joins and install to manufacturers specifications. Size the pipes and branches in straight runs to deliver the acceptable flow rate to [AS/NZS 3500.1](#) and [AS/NZS 3500.4](#) as modified by [NZBC G12/AS3](#) or [NZBC G12/AS1](#), table 3, Acceptable flow rates to sanitary fixtures at each outlet. Allow for the expected concurrent use of adjoining fixtures and size the piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Pipework support spacing to be firmly fixed and buffered to eliminate noise and hammer, with preformed tee-connection take-offs and branches, with machine made 3 diameter bends, complete with necessary valves and fittings. Conceal pipework and pressure test before the wall linings are fixed.

##### 3.15 HOT WATER PIPEWORK

Use a take-off spigot to give separate branches to each fitting, lay out pipes with support spacing to [AS/NZS 3500.4](#) as modified by [NZBC G12/AS3](#) or [NZBC G12/AS1](#), table 9 Water supply pipework support spacing. Fix firmly and buffer to eliminate noise and hammer, with preformed tee-connection take-offs and branches, and preformed 3 diameter bends, complete with all necessary valves and fittings

Lag all pipes with rigid insulation to the manufacturer's requirements and [AS/NZS 3500.4](#) as modified by [NZBC G12/AS3](#) or [G12/AS1](#).

##### 3.16 EQUIPOTENTIAL BONDING METALLIC WATER SUPPLY PIPES

If it is an electrical requirement, before enclosing, ensure metallic water supply pipes and metallic sanitary fixtures are equipotential bonded (or at least conductor cable attached) to [NZBC G12/AS1](#), 9.0.

##### 3.17 IN-LINE FILTER

Install an in-line filter immediately adjacent to the main isolating valve at the point of entry to the building, in an accessible position to allow for easy cleaning.

#### Application - Hot water systems

##### 3.18 HOT WATER CYLINDER INSTALLATION GENERALLY

Install hot water cylinders complete to the manufacturer's requirements and to [NZBC G12/AS1](#), 6.11, Water heater installation or [NZS 4607](#) for Valve-vented systems.

##### 3.19 SEISMIC RESTRAINTS - NON-GAS WATER HEATING APPLIANCES

Non-gas (electric, wet-back, solar etc) water heating appliances (storage water heaters) to be restrained to manufacturer's requirements and [NZBC G12/AS1](#), 6.11, Water Heater Installation or [AS/NZS 3500.4](#), 5.5.4 Seismic restraints.

##### 3.20 INSTALLING HOT WATER PIPE INSULATION

Insulate all hot water pipes to [NZBC H1](#)/AS1-AS2 Energy Efficiency, [AS/NZS 3500.4](#), section 8.2 Thermal insulation, and to the insulation manufacturer's instructions. Cut insulation sections tight between timber framing and tight between the webs of steel studs.

### 3.21 INSTALL ELECTRIC HOT WATER CYLINDERS AND BOILING CYLINDERS

Install where shown complete with all the necessary fittings to the cylinder manufacturer's requirements and in accordance with [NZBC G12](#)/AS1: 6.11 or [NZS 4607](#) for Valve-vented systems.

### 3.22 INSTALL STORAGE HOT WATER CYLINDER OVERFLOW TRAY

Install drained overflow tray to storage hot water cylinder to [NZBC G12](#)/AS1.

### 3.23 INSTALL TEMPERING VALVE

Install 1 metre minimum from outlet of hot water cylinder and to manufacturer's instructions. Install copper pipework for 1 metre minimum downstream of tempering valve prior to connection of non-metallic pipework.

### 3.24 PENETRATIONS

Provide and fit collars and escutcheon plates to match the pipework at all penetrations through constructions.

#### Installation - Valves

### 3.25 INSTALLING BELOW GROUND ISOLATING VALVE

Install all below ground items such as main isolating valves and water meters in preformed concrete pits or approved equivalent.

### 3.26 INSTALLING APPLIANCE ISOLATING VALVES - CONCEALED

Install isolating valves for appliances in accessible positions. Locate in adjacent cupboards and position to allow for easy connection and operation.

### 3.27 INSTALLING BACKFLOW PREVENTION DEVICE

Provide and install backflow prevention device as near as practicable to the potential source of contamination, and in an accessible position for maintenance and testing to AS 2845.3 or [NZ Backflow Testing Standard](#).

#### Completion

### 3.28 LABEL

Label all pipework with permanent adhesive markers at 3 metre minimum intervals.

### 3.29 CLEAN IN-LINE FILTER

Clean all in-line filters on completion of works.

### 3.30 REPLACE

Replace damaged or marked elements.

### 3.31 LEAVE

Leave work to the standard required by following procedures.

### 3.32 REMOVE

Remove debris, unused materials and elements from the site.

## 4 SELECTIONS

#### Water main

### 4.1 POLYETHYLENE WATER MAIN

Size: 25mm outside diameter (i.e. DN 25 in [AS/NZS 4130](#))

#### Pipework

### 4.2 POLYBUTYLENE PIPE

Manufacturer: dux

Brand: segura

## 7151 SANITARY FIXTURES, TAPWARE & ACCESSORIES

## 1 GENERAL

This section relates to the supply and installation of sanitary fixtures, tapware and sanitary accessories.

## 1.1 RELATED WORK

Refer to 7120 or 7123 HOT AND COLD WATER SYSTEM for hot water cylinders.  
Refer to 7420 or 7421 SANITARY SYSTEMS for the supply and fitting of waste disposal pipework  
Refer to the electrical section/s for electrical connection of accessories.

## Documents

## 1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC E3/AS1	Internal moisture
NZBC G1/AS1	Personal hygiene
NZBC G12/AS1	Water supplies
NZBC G12/AS3	Water supplies
NZBC G13/AS1	Foul water
NZBC G13/AS3	Plumbing and drainage
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3500.1	Plumbing and drainage - water services
AS/NZS 3500.2	Plumbing and drainage - sanitary plumbing and drainage
AS/NZS 3500.4	Plumbing and drainage - Heated water services
NZS 4223.3	Glazing in buildings - Human impact safety requirements
Plumbers, Gasfitters and Drainlayers Act 2006	

## Requirements

### 1.3 QUALIFICATIONS GENERALLY

Refer to 1270 CONSTRUCTION for requirements relating to qualifications.

## 2 PRODUCTS

## 2.1 SANITARY FIXTURES

Refer to SELECTIONS for product selection.

## 2.2 TAPWARE

Refer to SELECTIONS for product selection.

## 2.3 SANITARY APPLIANCES

Refer to SELECTIONS for product selection.

## 2.4 SANITARY ACCESSORIES

Refer to SELECTIONS for product selection.

## 2.5 ELECTRICAL SANITARY ACCESSORIES

Refer to SELECTIONS for product selection.

### 3 EXECUTION

## Conditions

### 3.1 DELIVERY, STORAGE & HANDLING OF PRODUCTS

Refer to 1270 CONSTRUCTION for requirements relating to delivery, storage and handling of products.

### 3.2 INSTALLATION REQUIREMENTS INCLUDING NZBC G13/AS1

Install to NZBC G1/AS1, AS/NZS 3500.1 and AS/NZS 3500.4 as modified by NZBC G12/AS3, NZBC G12/AS1, NZBC G13/AS1, NZBC E3/AS1 and to the fixture manufacturer's installation requirements for each component.

### 3.3 INSTALLING SHOWER OR BATH DOOR AND SCREEN

To NZS 4223.3 and to the product manufacturer's requirements. Set units level, plumb and true to line and required location, with moving parts and actions freely and easily operating.

### 3.4 INSTALLATION TAPWARE

In accordance with the manufacturer's requirements. Maintain safe water temperatures to comply with NZBC G12/AS1 6.14 Safe water temperatures.

#### **Application - sanitary accessories**

### 3.5 INSTALLING ACCESSORIES

Fit specified fittings firmly in place, all plumb and level.

Locate at heights and/or locations shown on the drawings, or as required to comply with NZBC G1/AS1. For any dimension not shown or known, request direction before proceeding

### 3.6 CUTTING AND FITTING

Where cutting and fitting of the substrate is necessary for installing any unit, carry out this work before the painting or finishing of that surface. Remove any hardware when required for painting, placing it in the packaging or carton originally supplied and returning it to the secure store until ready for re-installation.

### 3.7 INSTALLING UNITS

Install each unit in accordance with the proprietary fixture manufacturer's requirements, using the templates and tools supplied or recommended by them. Set units level, plumb and true to line and required location, with moving parts and actions freely and easily operating. Do not make any modifications to supplied units.

#### **Completion & Commissioning**

## 4 SELECTIONS

Substitutions are not permitted to the following, unless stated otherwise.

**7430 DRAINAGE****1 GENERAL**

This section relates to the supply and laying of gravity foul water (sewage), stormwater and groundwater drainage.

**1.1 DOCUMENTS REFERRED TO**

Documents referred to in this section are:

NZBC B1/AS1	Structure
NZBC E1/AS1	Surface water
NZBC E1/VM1	Surface water
NZBC G13/AS2	Foul Water
NZBC G13/AS3	Plumbing and Drainage
AS/NZS 1254	PVC-U pipes and fittings for Stormwater and Surface Water applications
AS/NZS 1260	PVC-U pipes and fittings for drain, waste and vent applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2033	Installation of Polyethylene pipe systems
AS 2439.1	Perforated Plastics Drainage and Effluent Pipes and Fittings - Perforated drainage pipe and associated fittings
AS/NZS 2566.1	Buried Flexible Pipelines - Structural Design
AS/NZS 2566.2	Buried Flexible Pipelines - Installation
NZS 3104	Specification for concrete production
AS/NZS 3500.2	Plumbing and drainage - Sanitary plumbing and drainage
NZS 3604	Timber-framed buildings
NZS 4229	Concrete masonry buildings not requiring specific engineering design
AS/NZS 4671	Steel reinforcing materials
AS/NZS 5065	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Plumbers, Gasfitters and Drainlayers Act 2006	

**1.2 AS BUILT DOCUMENTS**

Supply a 1:100 scale as-built drawing of drains and fittings to the territorial authority and to the owner on completion.

**1.3 QUALIFICATIONS**

Drainlayers to be experienced, competent and familiar with the materials and techniques specified. Carry out all work under the direct supervision of a certifying drainlayer under the [Plumbers, Gasfitters and Drainlayers Act 2006](#).

**2 PRODUCTS****2.1 CONCRETE**

17.5 MPa prescribed mix to [NZS 3104](#).

**2.2 REINFORCEMENT**

Plain round and/or deformed steel bars, Grade 300 to [AS/NZS 4671](#).

**2.3 PVC-U PIPES**

PVC-U pipes bends, junctions, fittings and joints to [AS/NZS 1254](#) and [AS/NZS 1260](#).  
Underground PVC-U pipe to be classified as follows:

Classification:	Use:
SN4 - SN6	Domestic & light load areas
SN8 - SN10	Commercial & Industrial medium load areas
SN16	Public roads & high load areas

**2.4 POLYETHYLENE PIPES**

Polyethylene pipes and fittings to [AS/NZS 5065](#).

**2.5 PERFORATED PIPE - SUBSOIL DRAINAGE**



Perforated corrugated coil high density polyethylene subsoil drainage pipe to AS 2439.1 with polypropylene filter sock over, for groundwater drainage.

#### 2.6 GULLY TRAPS - NZBC G13/AS2

To [NZBC G13/AS2](#): 3.3 Gully traps, complete with grating.

#### 2.7 SURFACE WATER SUMP GRATINGS

Cast iron frame with lift-up grating.

#### 2.8 STRIP DRAIN CHANNEL

Proprietary, modular, variable invert, plastic, steel (various types), or polymer concrete drainage channel sections and drainage sump, embedded in site concrete and fitted with selected metal gratings.

#### 2.9 INSPECTION COVERS

Cast iron frame with screw-down cover.

#### 2.10 TRENCH BACKFILLING MATERIAL, FOUL WATER - NZBC G13/AS2

Bedding and backfilling material to [NZBC G13/AS2](#), 2.0 Materials, for methods shown in [NZBC G13/AS2](#), figure 7, Bedding and backfilling.

### 3 EXECUTION

#### 3.1 EXCAVATE

Excavate for drains to a firm even base with correct gradients set in straight runs. Trenches running parallel, below and close to foundations of buildings to [NZS 3604](#) or [NZS 4229](#) to be separated to:

- [NZBC E1/AS1](#), 3.9.7, Proximity of Trench to Building, for stormwater and subsoil drains.
- [AS/NZS 3500.3](#), 6.2.8, Installation near and under buildings, as modified by [NZBC E1/AS2](#).
- [NZBC G13/AS2](#), 5.6, Proximity of Trench to Building, for foul water drains.

#### 3.2 MANUFACTURER'S REQUIREMENTS

All drainage installations to the pipe and fitting manufacturer's requirements.

#### 3.3 FOUL WATER DRAINAGE GENERALLY - NZBC G13/AS2

Carry out foul water drainage work to [NZBC G13/AS2](#) and [NZBC G1/AS1](#) and complete all tests to [NZBC G13/AS1](#), 7.1 Test Methods.

Lay uPVC pipe systems to relevant sections of [AS/NZS 2032](#). Lay polyethylene pipes and fittings to relevant sections of [AS/NZS 2033](#).

#### 3.4 LAY FOUL WATER DRAINS

Lay drains in straight runs to correct gradients, to discharge into the network utility operator's sewer. Set inspection fittings on a concrete base.

#### 3.5 CONSTRUCT GULLY TRAPS - NZBC G13/AS2

Set in a minimum 75mm thick concrete with top surround 25mm above paving and 100mm above other surfaces, to [NZBC G13/AS2](#), 3.3 Gully traps.

#### 3.6 LAY STORMWATER DRAINS

Confirm the required location of downpipes and finished ground levels before commencing pipework. Set downpipe bends in concrete with the concrete brought up to protect the top of the bend from damage. Lay drains in straight runs to correct gradients to discharge into the network utility operator's stormwater system.

#### 3.7 LAY PERFORATED PIPING - SUBSOIL DRAINAGE

Lay perforated groundwater drainage piping with filter sock, firmly on a bed of drainage material screeded to the required gradient. Lay in straight runs to discharge into surface water drainage system. The pipe must not excessively elongate during installation. Carry drainage material up and over the pipes without disturbing them. Extend the high end of all lines up to the surface in capped, solid pipe to provide for flushing out.

#### 3.8 LAY PERFORATED PIPING TO BASEMENT WALLS - SUBSOIL DRAINAGE

Ensure any required waterproofing and protection sheets are in place before starting work.

Lay perforated groundwater drainage piping with filter sock, firmly on a bed of drainage material screeded to the required gradient. The pipe must not excessively elongate during installation. Lay in straight runs to 1:150 gradients with invert of the highest horizontal point 50 mm minimum below floor slab level, discharging into surface water drainage system. Carry drainage material up and over the pipes without disturbing them. Fill with drainage material to full height of wall. Carry the high end of all lines up to the surface in capped, solid pipe to provide for flushing out.

### 3.9 INSTALL STRIP DRAIN CHANNEL

Excavate trench and form site concrete base to fall. Set interlocking channel sections, sumps and accessories in place, all in accordance with the channel manufacturer's requirements. Check falls and install gratings and covers.

### 3.10 INSTALL SURFACE WATER SUMP

To [NZBC E1/AS1](#) or to [AS/NZS 3500.3](#) section 7 as modified by [NZBC E1/AS2](#), complete with ceramic half-siphon pipe and cast iron frame with a lift out grating.

### 3.11 INSTALL STORMWATER INSPECTION CHAMBERS

Construct as detailed on a poured concrete footing to [NZBC E1/AS1](#), 3.7, Access for maintenance, or to [AS/NZS 3500.3](#), section 7 as modified by [NZBC E1/AS2](#). Provide all necessary haunching to channels. Fit a cast iron cover and frame.

### 3.12 INSTALL FOUL WATER INSPECTION CHAMBERS - NZBC G13/AS2

Construct as detailed on a poured concrete footing to [NZBC G13/AS2](#), 5.7 Access points. Provide all necessary haunching to channels. Fit a cast iron cover and frame.

### 3.13 SOAKHOLES OR TRENCHES

Dispose of stormwater on site as shown on the drawings, by soakage, to suit local geology and soil structure; all as directed by the territorial authority.

### 3.14 CONCRETE ENCASEMENT

Concrete encase shallow drains and drains under driveways, on a 100mm deep 17.5 MPa concrete bed reinforced with three 10mm mild steel bars. Surround pipes with a polythene membrane to allow movement and encase in 100mm 17.5 MPa concrete.

### 3.15 TESTING - FOUL WATER

Confirm timing before carrying out any tests. Supply potable water and apparatus needed. Test to [NZBC G13/AS1](#), 7.1 Test Methods or [AS/NZS 3500.2](#), section 15 Testing of Sanitary Plumbing and Sanitary Drainage Installations, as required. Carry out and record a visual inspection that each joint showed no evidence of leaks.

### 3.16 TRENCH BACKFILLING GENERALLY - FOUL WATER

Granular bedding and selected fill shall be placed in layers no greater than 100 mm loose thickness and compacted. Base bedding (beneath the pipe) shall be placed and compacted before pipes are laid. Up to 300mm above the pipe, compaction shall be by tamping by hand tool over the entire surface of each layer to produce a compact layer without obvious voids, without disturbing or distorting the drain. Run marker tape along line of the pipe on top of the bedding.

Up to 300mm above the pipe, compaction shall be by tamping by hand using a rod with a pad foot (having an area of  $75 \pm 25$  mm by  $75 \pm 25$  mm) over the entire surface of each layer to produce a compact layer without obvious voids, without disturbing the drains.

More than 300 mm above the pipe, compaction shall be by at least four passes of a mechanical tamping foot compactor (whacker type) with a minimum weight of 75 kg. For plastic based pipes, ensure care taken to avoid impact loading of the pipe.

## 4 SELECTIONS

## 7701 ELECTRICAL BASIC

### 1 GENERAL

This section relates to the wiring for domestic and small scale commercial installations, including:

- power
- lighting
- electrical automation
- security system
- complete with componentry
- electrically-powered fittings
- fire rated sealers, liners and accessories

#### 1.1 ABBREVIATIONS AND DEFINITIONS

Refer to the general section 1232 INTERPRETATION & DEFINITIONS for abbreviations and definitions used throughout the specification.

The following abbreviations apply specifically to this section:

AFDD	Arc Fault Detection Device
ELV	Extra Low Voltage
GLS	general lighting service
IP	international (ingress) protection classification
NUO	Network Utility Operator
PCB	printed circuit board
PIR	passive infrared
SIA	security integration architecture
TPS	tough plastic sheathed
TCF	Telecommunications Carriers' Forum

#### Documents

#### 1.2 DOCUMENTS

Refer to the general section 1233 REFERENCED DOCUMENTS. The following documents are specifically referred to in this section:

NZBC E2/AS1	External moisture
NZBC F6/AS1	Visibility in escape routes
NZBC G4/AS1	Ventilation
NZBC G9/AS1	Electricity
AS/NZS 1125	Conductors in insulated electric cables and flexible cord
AS/NZS 1768	Lightning protection
AS/NZS 2201.1	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
AS 2293.1:2005	Emergency escape lighting and exit signs for buildings - System design, installation and operation
AS 2293.3:2005	Emergency escape lighting and exit signs for buildings - Emergency escape luminaires and exit signs
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3008.1.2	Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical New Zealand installation conditions
AS/NZS 3100	Approval and test specification-general requirements for electrical equipment
AS/NZS 3112	Approval and test specification - Plugs and socket-outlets
AS/NZS 3113	Approval and test specification - Ceiling roses
AS/NZS 3190	Approval and test specification - Residual current devices (current-operated earth-leakage devices)
AS/NZS 3439.3	Low-voltage switchgear and controlgear assemblies - Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards
NZS 4514	Interconnected smoke alarms for houses

NZS 4246	Energy Efficiency - Installing bulking thermal insulation in residential buildings
AS/NZS 5000.2	Electric cables - Polymeric insulated - for working voltages up to and including 450/750v
AS/NZS 60335.1	Household and similar electrical appliances - Safety - General requirements
AS/NZS 60695.11.5	Fire hazard testing - Test flames - Needle-flame test method - Apparatus, conformity test arrangement and guidance.
AS/NZS 61439.3	Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO).
IEC 61643	Components for low voltage surge protection devices
Electricity (Safety) Regulations 2010 (Reprint as at 21 January 2019).	
TCF Premises Wiring Cable Installers Guidelines for Telecommunication Services	

Documents listed above and cited in the clauses that follow are part of this specification. However, this specification takes precedence in the event of it being at variance with the cited document.

## Warranties

### 1.3 WARRANTY

Warrant the complete electrical installation under normal environmental and use conditions against failure of materials and execution.

1 year: Warranty period

Refer to the general section for the required form of 1237WA WARRANTY AGREEMENT and details of when completed warranty must be submitted.

## Requirements

### 1.4 COMPLY

Comply with the Electricity (Safety) Regulations 2010, [AS/NZS 3000](#), [AS/NZS 3008.1.2](#), and [TCF Premises Wiring Cable Installers Guidelines for Telecommunication Services](#) for listed and prescribed work and with the utility network operator's requirements. Apply for the service connection. Arrange for the required inspections of listed work. Pay all fees.

### 1.5 QUALIFICATIONS WORKERS – LICENSED UNDER STATUTE

Workers and supervisors to be appropriately qualified to applicable legislative requirements. Refer to 1270 CONSTRUCTION for additional requirements relating to qualifications.

### 1.6 QUALIFICATIONS - SECURITY SYSTEM

Installation by an installer licensed under the Private Investigators and Security Guards Act. Installation of all security equipment to comply with [AS/NZS 2201.1](#) Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance.

### 1.7 SAFETY OF INSTALLATION - DESIGN BY ELECTRICAL ENGINEER

Before installation work commences obtain from the electrical engineer a Certified Design. The Certified Design is to comply with the Electricity (Safety) Regulations (2010), regulation 58.

### 1.8 SAFETY OF INSTALLATION - DESIGN BY ELECTRICIAN

Before installation work commences provide a Certified Design. The Certified Design is to comply with the Electricity (Safety) Regulations (2010), regulations 58. It must be signed by the designer of the installation.

### 1.9 ELECTRICAL CERTIFICATE OF COMPLIANCE

Supply a certificate of compliance (CoC) to the owner, and if required the NUO, as required by the Electricity (Safety) Regulations 2010, prior to connection.

- Arrange for the NUO to inspect before the meter installation, listed work inspection, polarity check and supply becoming live.
- Arrange for an inspector to inspect high risk electrical work as required by regulation 70.

### 1.10 ELECTRICAL SAFETY CERTIFICATE

Provide an Electrical Safety Certificate (ESC), as required by the Electricity (Safety) Regulations 2010, Reg 74A, to the owner and when required the BCA. To be provided no later than 20 working days after connection and prior to Practical Completion.

## 2 PRODUCTS

### 2.1 MAINS SUPPLY

Tough plastic sheathed neutral screened cable to [AS/NZS 5000.2](#) and [AS/NZS 3008.1.2](#), with a minimum rating of 60 amps per phase. Include pilot cable where required by network utility company.

### 2.2 CABLES

Tough plastic sheathed copper conductors to [AS/NZS 5000.2](#), stranded above 1.0mm<sup>2</sup>, and to [AS/NZS 3008.1.2](#). Minimum sizes as below. Increase sizes if the method of installation, thermal insulation, cable length or load will reduce the cable rating below that of the MCB rating, or produce an excessive voltage drop.

Lighting circuits:	Domestic: 1.5mm <sup>2</sup> on 10 amp MCBs
Lighting circuits:	Commercial: 1.5mm <sup>2</sup> on 16 amp MCBs
Power circuits:	2.5mm <sup>2</sup> on 16 amp MCBs for domestic and unenclosed or unfilled cavity construction
	2.5mm <sup>2</sup> on 16 amp MCBs for domestic insulated construction, or filled cavity
	2.5mm <sup>2</sup> on 20 amp MCBs for unenclosed or unfilled cavity construction
	2.5mm <sup>2</sup> on 16 amp MCBs for insulated construction, or filled cavity, or lengths over 30 metres
Hot water cylinder circuits:	Single phase: 2.5mm <sup>2</sup> on 20 amp MCBs
Range/oven/hob circuits:	Single phase: 6mm <sup>2</sup> high temperature cable on 32 amp MCBs

Heat resistant cable for final connections to all heated appliances, and high temperature cable in ambient conditions that may be above 35°C (roof spaces above insulation etc).

### 2.3 METER BOX

Proprietary manufactured, zinc plated powder coated metal case, or ABS plastic, with glazed panel door, weatherproof where mounted outdoors, and complete with meter mounting, main switch and fuse.

### 2.4 DISTRIBUTION BOARD

Flush surface mount boards manufactured to [AS/NZS 3439.3](#), or AS/NZS 61439.3, and installed in accordance with [AS/NZS 3000](#). Manufactured from engineering grade resin with a glow wire rating of 850°C, complete with neutral and earth busbars, and insulated comb phase bar. Distribution boards to have 20% spare capacity for future additions and alterations.

### 2.5 CIRCUIT PROTECTION

General requirements including main switch 63A or 100A. Residual current protection 30mA, ensure RCCBs' meet Type A and comply with [AS/NZS 3190](#). MCBs to 4.5kA or 6kA rated.

### 2.6 WALL BOXES

Standard grid size or equivalent to be manufactured from plastic or metal, with 2 or more gang size to be metal with steel inserts for accessory securing screws. Screw fixed.

### 2.7 SWITCH UNITS

Single pole switches to be 16 amp minimum rated, double pole or intermediate to be 16 amp minimum rated. All switches to be 230 volt a.c. polycarbonate flushplate units. Label all switch units that control electrical equipment or special lighting circuits by proprietary engraved switch mechanisms where applicable. Refer to drawings/schedules for number of switches per unit, dimmer units, neon (indicator or toggle) units and 2 way units. Refer to SELECTIONS.

### 2.8 HOT WATER SYSTEM SWITCH

One way 20 amp switch complete with cable clamp for flexible PVC conduit to element enclosure.

### 2.9 SWITCHED SOCKET UNITS

10 amp, 230 volt flat 3 pin socket outlets fitted with safety shutters and manufactured to [AS/NZS 3100](#), [AS/NZS 3112](#) and [AS/NZS 3113](#), single or multi gang as detailed.

### 2.10 FIRE & SMOKE ALARM SYSYEM



Refer to SELECTIONS.

#### 2.11 SURGE PROTECTION

Protection for the homes appliances with IEC 61643 Class II surge protection devices fitted to the switchboard. For variable electronic equipment fit IEC 61643 Class III surge protection to switched socket outlets.

#### 2.12 LIGHT FITTINGS

Fluorescent and High Intensity Discharge fittings with low loss control gear and power factor corrected to 0.95 minimum. Control gear suitable for dimming if this is required. All fittings complete with lamps; Incandescent GLS lamps pearl, coiled-coil 230v rated, bayonet cap; Fluorescent triphosphor 2700K; CFL; halogen ELV 12v dichroic reflector with cover glass unless detailed otherwise; integral/non-integral LEDs, reflectors, lenses, heatsinks and drivers - 3,000K to 4,000K, CRI >80, L70.

#### 2.13 EXHAUST FANS

Ceiling, wall or duct mounted exhaust fans for ventilation to [NZBC G4/AS1](#), and compliant with [AS/NZS 60335.1](#).

#### 2.14 HEATED TOWEL RAILS

Fixed wired heated towel warmers, double insulated, IPX4 splash-proof, compliant with [AS/NZS 60335.1](#), scratch resistant powdercoated or chrome finish.

### **Security system**

#### 2.15 CONTROL PANEL

Control panel system with a minimum of one installer code, one master code, 6 zones minimum and 6 user codes. The installer to select codes to suit installation.

#### 2.16 DETECTORS

There are two main types of detectors:

- Standard passive infrared sensors: Install in stable environments with no wind flow and no direct bright sunlight.
- Passive infrared/ microwave sensors: Install in area where environmental stability is an issue.

#### 2.17 AUDIBLE DEVICES

Internal sirens can be either a 12V Piezo Siren or a Horn speaker with a sound pressure level of no less than 95dB.

External siren can be either a stainless steel design or have hardened plastic casing. Both designs to be fully weatherproof but not limited to IP66 Rating. The siren box to contain a strobe diffuser in either blue or red. The siren shall contain a horn speaker, 12v speaker or an electronic siren. The external siren box to have both a cover and rear wall tamper mechanism.

#### 2.18 CABLING

Security alarm wiring to NZS/AS 1125 for cables.

Security alarm wiring to be multi stranded and not single stranded, minimum 0.5mm<sup>2</sup>.

#### 2.19 PERIPHERALS

Fit anti-tamper devices to detectors, control panels and equipment housings, programmed to give a tamper indication when the system is unset and a tamper alarm when the system is set.

Standard keypad manufactured of moulded hardened plastic with either a LED or LCD screen, to match the style of the wiring accessories in diameter, colour and aesthetics.

#### 2.20 COMMUNICATIONS

Digital dialler to be built into the PCB of all control panels, with the options for both monitoring and remote dial in windows based software. Digital dialler to comply with all the industry standard communication formats including contact I.D and SIA, and NZ Telepermit certification.

Remote software able to upload / download programming changes and or history events and change status of the security alarm with the ability to be turned off if required.

### **3 EXECUTION**

#### 3.1 MAIN SUPPLY

Lay underground mains to the NUO requirements. Excavate trench, install cable and marker tape and backfill.



### 3.2 METER BOX

Fit to meter box manufacturer and Electricity Retailer requirements. Recess into external wall in sheltered area and flash to weatherproof to [NZBC E2/AS1](#) fig 69. Arrange for meter installation and connection.

### 3.3 DISTRIBUTION BOARD

Fit to [AS/NZS 3000](#) and board manufacturer requirements. Recess into wall or surface mount and ensure fire containment properties of the enclosure are maintained.

### 3.4 CIRCUIT PROTECTION

Install MCBs at distribution board to [AS/NZS 3000](#) to protect each final sub circuit.

### 3.5 MAIN EARTH

Provide a plastic toby box to contain and protect the earth electrode. Fix the connecting earth wiring closely and securely against wall surfaces.

### 3.6 EARTH LEAKAGE PROTECTION

Install RCD protection to [AS/NZS 3000](#).

### 3.7 RCD - RESIDENTIAL INSTALLATIONS

Install 30mA RCD protection at the switchboard for all final sub circuits to control outlets and lighting except for fixed or stationary cooking equipment, to [AS/NZS 3000](#).

### 3.8 RCD - SPECIFIC INSTALLATIONS

Install fixed wired RCD protected outlets (SRCD) in the following higher risk areas:

- Wet areas: bathrooms, laundries, kitchens.
- Near pools and water features.
- Where intended for use with cleaning equipment.
- Hand-held tools subject to movement in use, i.e. work-shops, garages.

### 3.9 SET-OUT

The position of outlets and equipment shown on drawings is indicative of requirements. Confirm documents and site conditions are not in conflict with other services or features. Resolve conflicts and discrepancies before proceeding with work affected. Confirm on site the exact location, disposition and mounting heights of all outlets, fittings, equipment, penetrations, and use of exposed wiring. Fix outlet items level, plumb and in line.

### 3.10 CABLING

Install wiring systems to [AS/NZS 3000](#). All cabling run concealed. No TPS cable laid directly in concrete. Locate holes in timber framing for the passage of cables at the centre line of the timber member. Install cable in conduits where required to pass through concrete or underground. In walls run cabling horizontally and vertically in straight lines. In ceilings either run cabling along ceiling framing or attached to catenary wires. Clip cabling to ceiling framing/catenary wires.

### 3.11 CABLING CIRCUITS

Install all circuits with the appropriately rated cable and circuit protection. Install with a maximum of 8 light switch units or 4 double or single switched socket units on any circuit. Minimum 2 lighting circuits per floor. Separate circuits for all electric heating appliances. Kitchen sockets to be on at least two different circuits.

### 3.12 LIGHT FITTINGS

Install light fittings in locations and at heights specified and confirmed by the owner, in accordance with the fitting manufacturer requirements.

### 3.13 EXTRA LOW VOLTAGE LIGHTING

Use electronic, transformers (halogen) or drivers (LED) for ELV lamps, one transformer/driver per lamp. Locate to manufacturer requirements and as close as practicable to the lamp. Ensure transformers/drivers and rear of light fittings are adequately ventilated and appropriately clear of any building elements, to [AS/NZS 3000](#).

### 3.14 ELECTRIC HOT WATER SYSTEM

For storage heaters, wire as a separate circuit through a wall-mounted isolating switch, with the cable from switch to element encased in flexible PVC conduit, clamp fixed at each end. Hot water cylinders, thermostats and 3000 watt element supplied and fitted under the hot and cold water system section.

**3.15 SURGE PROTECTION**

Install surge protection devices to manufacturer requirements and in accordance with [AS/NZS 3000](#) and AS/NZS 1768. When fitting IEC 61643 Class II protection at the switchboard, protect the device by a dedicated MCB.

**3.16 ELECTRIC POWERED FITTINGS AND EQUIPMENT**

Install and wire fittings and equipment to individual fittings and equipment manufacturer requirements. Refer to the drawings for required layouts and locations for equipment. Refer to SELECTIONS for schedules of fittings.

**3.17 BATHROOM ELECTRICAL FIXTURES**

Install all electrical fixtures. Connect the following bathroom and toilet electrical items:

- Heated towel rails: Install to manufacturers requirements and installed in accordance with [AS/NZS 3000](#)
- Mirror demisters: Locate centrally above the wash hand basin(s). Connect wiring to room lighting unless specified otherwise.
- Exhaust fans: Install exhaust fans to manufacturer requirements. Installed in accordance with [AS/NZS 3000](#) and [NZBC G4/AS1](#).

**3.18 OUTDOOR/EXTERIOR SERVICES**

Install all wiring systems in accordance with [AS/NZS 3000](#) and in accordance with the manufacturer recommendations:

Provide circuits and connections for exterior installations, including ELV 12/24 Volt path lighting and electronic irrigation systems. Refer to drawings for connection points. Where underground, ensure appropriate protection, such as thickness of sheathing, conduit, depth of cabling, and proximity to other services.

Use the appropriate rated fittings for power control and power supply. Weather protected switches and sockets to IP56. Install to manufacturer specifications using recommended fittings and sealants to maintain the products integrity.

Earth leakage protection to be provided for in areas where there is increased risk to human safety in the form of either RCDs at the distribution board, or socket outlet. RCDs are recommended for visible awareness of protection.

**3.19 LABELLING**

Include label under each controller, switch and circuit breaker on distribution boards. Include a warning notice if light dimmers are used in the installation. List the rating of each circuit.

**Security system****3.20 SECURITY SYSTEM**

Install to the system manufacturer requirements, control panel, detectors and associated equipment fitted neatly and without damage to surrounding finishes. Installation of security equipment to [AS/NZS 2201.1](#) Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance. All 230v mains power connections to the security panel are to be in accordance with [AS/NZS 3000](#). The 230V power is to be switched using a dedicated single gang Isolator switch or similar.

**Completion & Commissioning****3.21 COMPLETION MATTERS**

Refer to 1270 CONSTRUCTION for completion requirements and if required commissioning requirements.

**4 SELECTIONS**

GJ Gardner Homes  
Lot 146 Strowan Fields,  
Ashburton  
-  
29 November 2024  
#15839

Constructure

Dear Sirs,

LOT 146 STROWAN FIELDS, ASHBURTON.  
SOIL BEARING INVESTIGATION

Introduction

Constructure Christchurch Ltd has been engaged to complete a shallow soil bearing investigation & provide foundation recommendations at the above address, this was completed on 28 November 2024.

The purpose of this report is to determine the soil bearing capacity in accordance with section 3.1 of NZS3604:2011. This report does not cover liquefaction potential, expansive soil potential, slope stability or erosion.

Site

The site is on the South side of Trevors Road, flat and grass covered, and within the Strowan Fields subdivision.

There are no nearby slopes, streams or other features which do not meet the requirements of section 3.1.2 of NZS3604:2011.

Testing and Results

Four Scala Penetrometer tests and two Hand Augers were carried out, the locations and results of the tests are recorded on the attached soil investigation record sheets.

The results of the testing are summarised below:

Soil Profile	
Soil Type	Depth from surface (mm)
Topsoil	0-300
Clay with Gravels	300-400+ (Hand Auger refusal)

Soil Bearing Capacity		
Ultimate Capacity	Allowable Capacity (ø = 0.5)	Depth from surface (mm)
200kPa	100kPa	300
300kPa	150kPa	300

03 365 3243  
chch@constructure.co.nz  
  
Christchurch Office  
332 Durham St  
Christchurch 8013  
  
constructure.co.nz

The groundwater table was not encountered during testing.

#### Other Information Reviewed

The geotechnical report by Davis Oglivie dated 23 September 2021 has considered the site to be equivalent to 'low liquefaction vulnerability' with reference to the *MBIE guidance document*<sup>1</sup> & *NZGS Modules*<sup>2</sup>.

#### Compliance with NZS3604

Based on the information above, 'Good Ground' as defined in NZS3604:2011 has been achieved onsite at a depth of 300mm below existing ground level.

#### Recommendations

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

All rubbish, noxious and organic matter as outlined in NZS3604:2011 Clause 3.5.1 should be removed from the building area, to a minimum depth of 300mm and the ground brought back up to formation using compacted hardfill if required prior to installing the foundations.

#### Limitations

We have prepared this report in accordance with the brief provided. The contents of this report are for the sole use of the client and no responsibility of liability will be accepted to any third party. Data or opinions contained within the report may not be used in other contexts or for any other purposes without prior review and agreement.

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

Subsurface conditions, such as groundwater levels can change over time and between seasons. This should be borne in mind, particularly if the report is used after a protracted delay.

Should conditions encountered differ to those outlined in this report Constructure Christchurch Ltd should be given the opportunity to review the continued applicability of our recommendations.

Please contact me should any further information be required.

Yours faithfully,



**Rob Dickie**

BE(Hons) CPEng CMEngNZ

03 365 3243  
chch@constructure.co.nz

Christchurch Office  
332 Durham St  
Christchurch 8013

constructure.co.nz

---

<sup>1</sup> <https://www.building.govt.nz/building-code-compliance/canterbury-rebuild/repairing-and-rebuilding-houses-affected-by-the-canterbury-earthquakes/>

<sup>2</sup> <https://www.building.govt.nz/building-code-compliance/b-stability/b1-structure/module-1-overview-guidelines/>

Project L0 + 146 Struan P.E.M.

Job # 15879

Page #

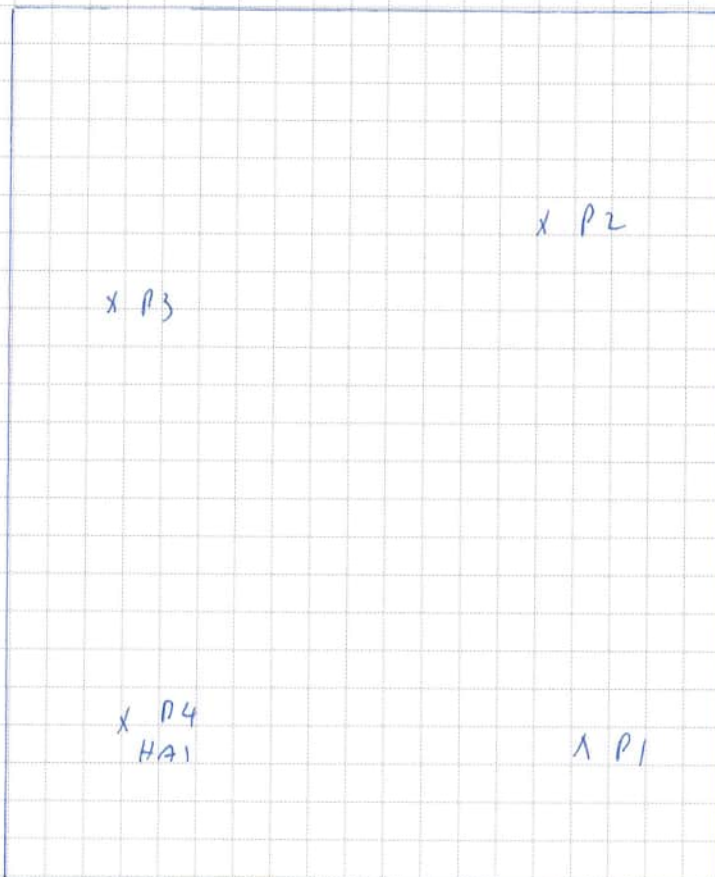
Section

Designed 11

Date 20/11/2021

Checked

## Constructure

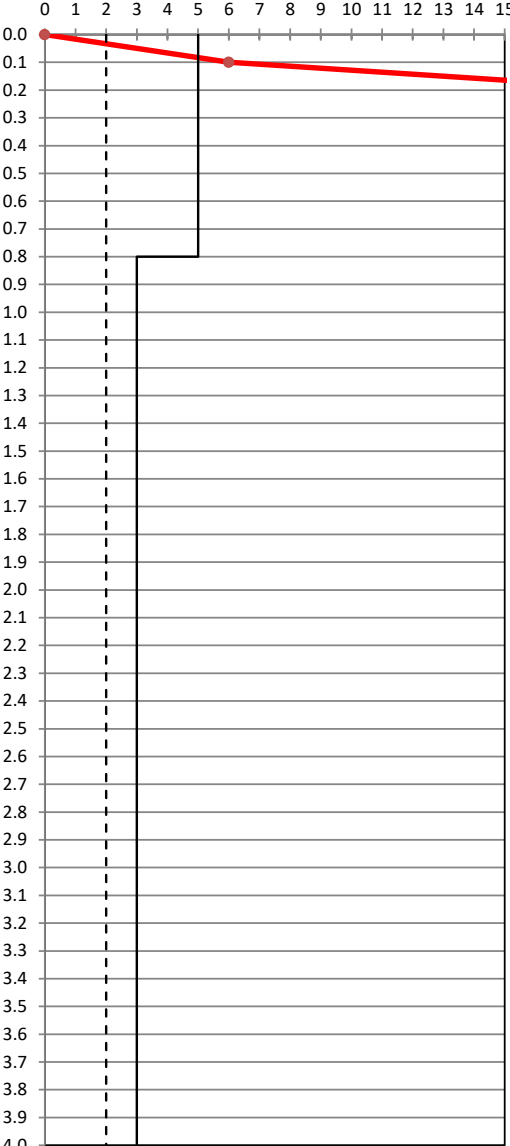


TREVORS ROAD

soil investigation record

Project:	Lot 146 Strowan Fields		No.:	1 OF 5
Ref:	15839		Date:	28/11/2024
By:	RD		Checked	RD

Test Location 1

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

Notes:

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

—●— Blows/100mm

—— 100 kPa Allowable Bearing Capacity

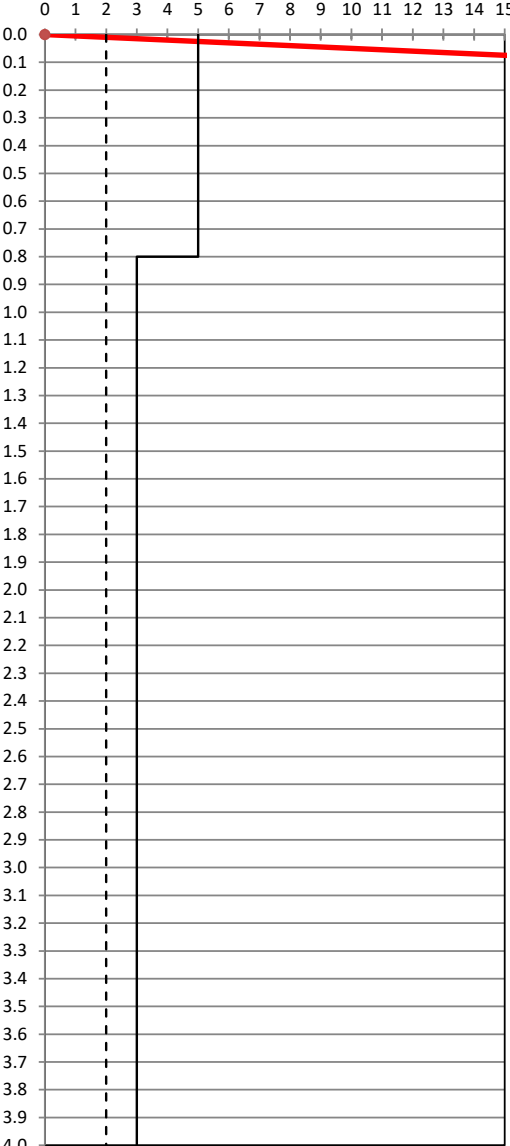
- - - - 65 kPa Allowable Bearing Capacity



soil investigation record

Project:	Lot 146 Strowan Fields		No.:	2 OF 5
Ref:	15839		Date:	28/11/2024
By:	RD		Checked	RD

Test Location 2

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

Notes:

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

Blows/100mm

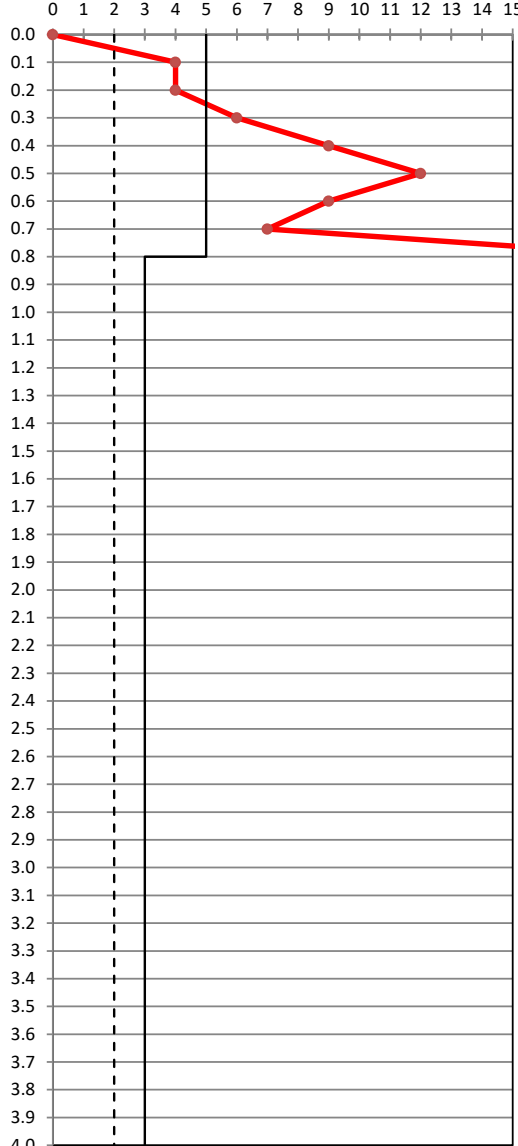
100 kPa Allowable Bearing Capacity

65 kPa Allowable Bearing Capacity

soil investigation record

Project:	Lot 146 Strowan Fields		No.:	3 OF 5
Ref:	15839		Date:	28/11/2024
By:	RD		Checked	RD

Test Location 3

Depth (m)	Bore Log (Hand Auger)		Scala Penetrometer
	Symbol	Description	(Blows/100mm)
GL			 <div><div>● Blows/100mm</div><div>— 100 kPa Allowable Bearing Capacity</div><div>- - - 65 kPa Allowable Bearing Capacity</div></div>
0.2			
0.4			
0.6			
0.8			
1.0			
1.2			
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			
2.8			
3.0			
3.2			
3.4			
3.6			
3.8			
4.0			


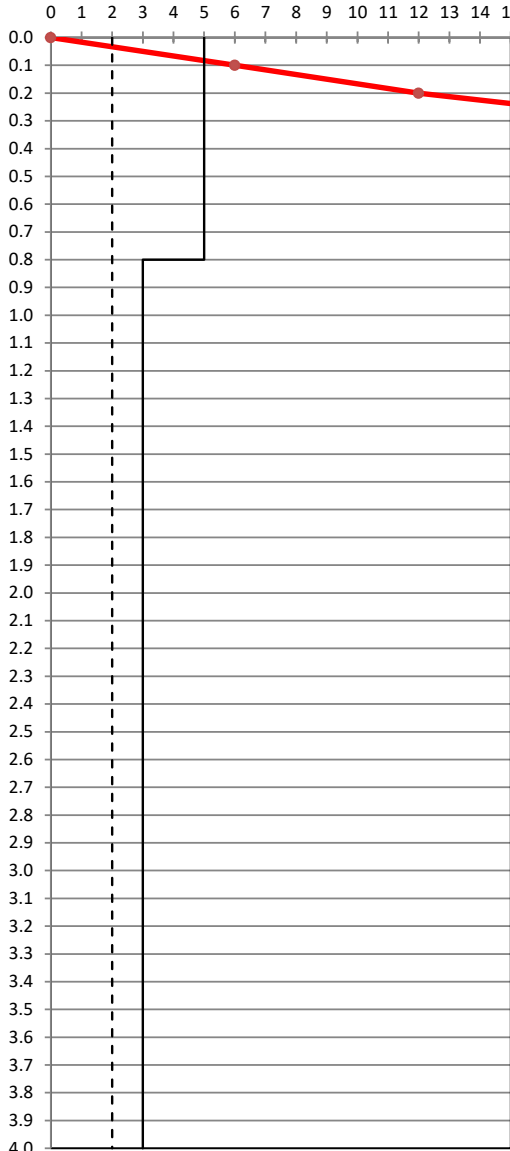

Notes:

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

soil investigation record

Project:	Lot 146 Strowan Fields		No.:	4 OF 5
Ref:	15839		Date:	28/11/2024
By:	RD		Checked	RD

Test Location 4

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

Notes:

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

Blows/100mm

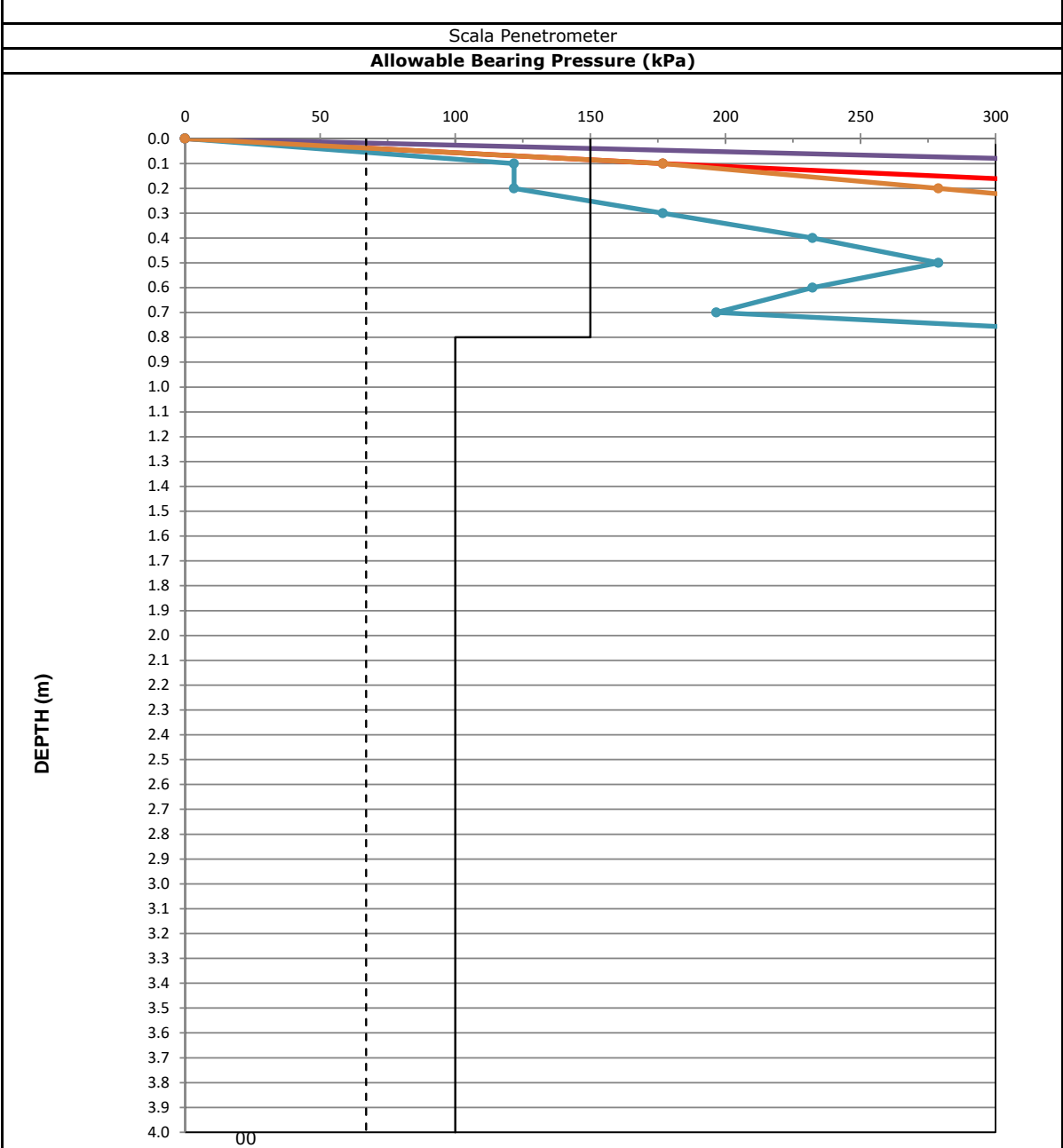
100 kPa Allowable Bearing Capacity

65 kPa Allowable Bearing Capacity



soil investigation record

Project:	Lot 146 Strowan Fields	no.	5 OF 5
Ref:	15839	date	28/11/2024
By:	RD	checked	RD



Notes:

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

Legend:

- Test Location 1
- Test Location 2
- Test Location 3
- Test Location 4
- 100 kPa Allowable Bearing Capacity
- 65 kPa Allowable Bearing Capacity

# SuperSlab | SuperSlab<sup>+</sup>

## TECHNICAL MANUAL

REVISION | J



## CONTENTS

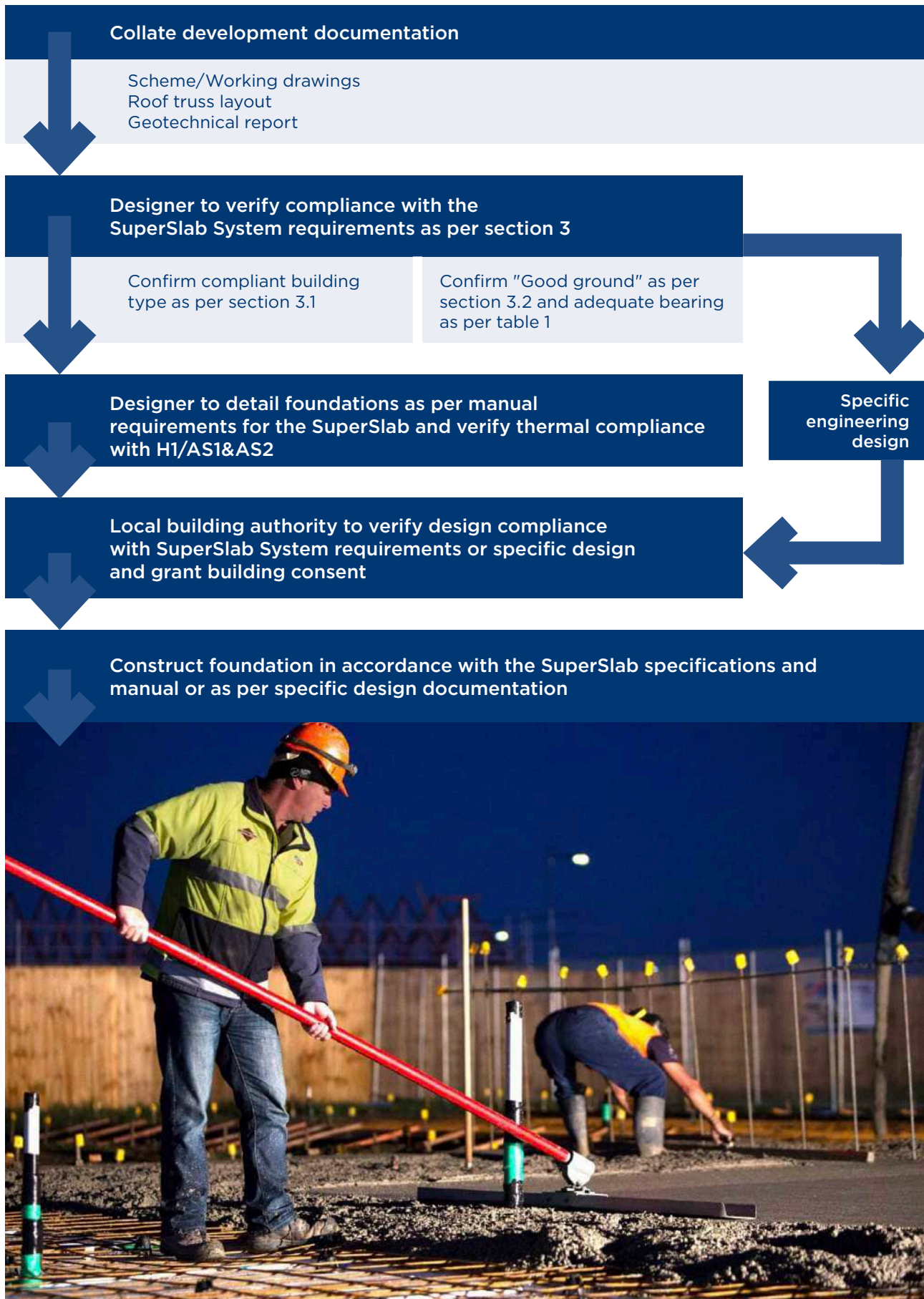
<b>1.0 GENERAL</b>	<b>3</b>
<b>2.0 SUPERSLAB COMPONENTS</b>	<b>3</b>
2.1 Pod void formers	3
2.2 Topping slab and rib reinforcement	3
2.3 Typical Superslab layout and details	4
2.4 Concrete	4
<b>3.0 SCOPE OF USE</b>	<b>5</b>
3.1 Building types and loading suitable for the SuperSlab system	5
3.2 Ground conditions	8
3.3 Lateral resistance under wind and earthquake	10
3.4 Weights and loadings	15
<b>4.0 INSTALLATION INFORMATION</b>	<b>16</b>
4.1 Site preparation and Earthworks	16
4.2 Damp proof membrane (DPM)	16
4.3 Set out & boxing	16
4.4 Pod set out	17
4.5 Perimeter foundations	17
4.6 Internal ribs, Load bearing thickenings and Pads	17
4.7 Mesh and Topping thickness	18
4.8 Reentrant corners	18
4.9 Concrete placing, finishing and curing	18
4.10 Saw cutting (control joints) and free joints	19
4.11 Plumbing and pipe penetrations	19
4.12 Shower Rebates	20
4.13 Wing walls	20
4.14 Polished Concrete floors	20
<b>5.0 LANDSCAPING AND ONGOING MAINTENANCE</b>	<b>20</b>
5.1 Paving and landscaping heights	21
5.2 Excavation and retaining walls	21
5.3 Drainage of the site	21
5.4 Gardens, trees and shrubs	21
<b>6.0 STANDARD DETAILING</b>	<b>22</b>
6.1 Qpod substitutions detailing	26
<b>7.0 INSULATED SLABS</b>	<b>32</b>
7.1 SuperSlab+	32
7.2 QuickSet and QuickEdge	34

## DISCLAIMER

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



## CHECK LIST



## 1.0 - GENERAL

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

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

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

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

## 2.0 - SUPERSLAB COMPONENTS

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

### 2.1 Pod Void Formers

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

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

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

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

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

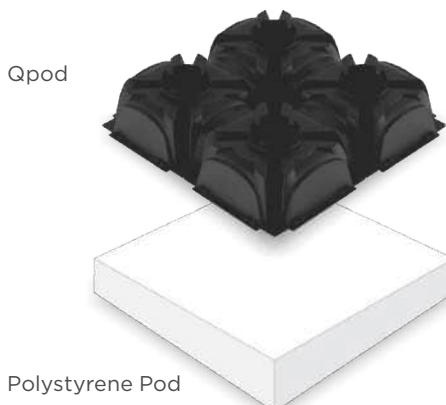
### 2.2 Topping Slab and Rib Reinforcement

SuperSlab requires 85mm (minimum) and 100mm (maximum) thick topping slab as outlined in section 4.7. The topping slab shall be reinforced with ductile steel mesh (SE62 - minimum weight of 2.29kg/m<sup>2</sup>). The mesh must comply with the minimum requirements of the New Zealand Building Code. The mesh is to have a tensile strength of 500 MPa and needs to be ductile, achieving 10% elongation when tested to NZS4671 and the building code testing requirements. As an alternative topping reinforcement, SE62 mesh can be substituted with 10mm diameter, grade 300, class E reinforcing bars placed at 300 centers each way. Loose bars shall be chaired and tied as per NZS3109, cover shall be as outlined per section 4.7.

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

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

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



## 2.3 Typical SuperSlab layout and details

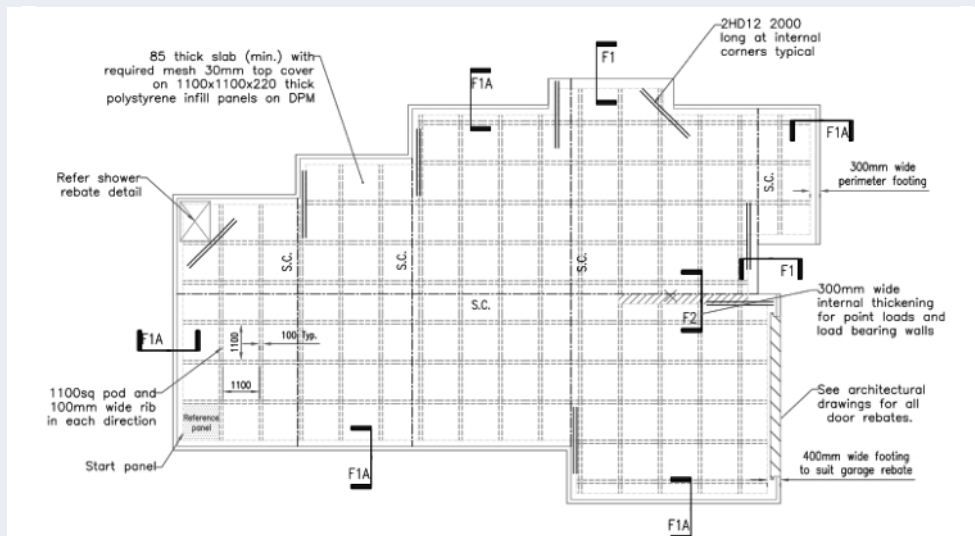


FIGURE 1 – SuperSlab layout (slab area: = 197 m²)

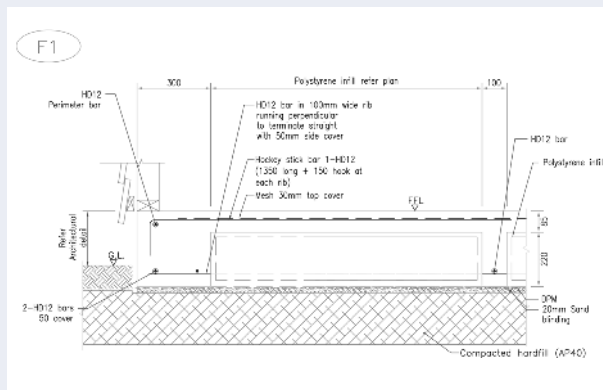


FIGURE 2 – Light clad perimeter footing detail

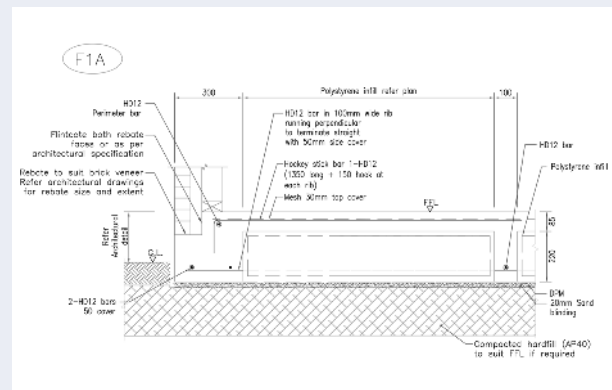


FIGURE 3 – Brick clad perimeter footing detail

## 2.4 Concrete

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

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

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

the sea or 100m to fresh water.

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

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

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

### 3.0 - SCOPE OF USE

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

#### 3.1 Building types and loading suitable for SuperSlab Systems

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

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

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

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

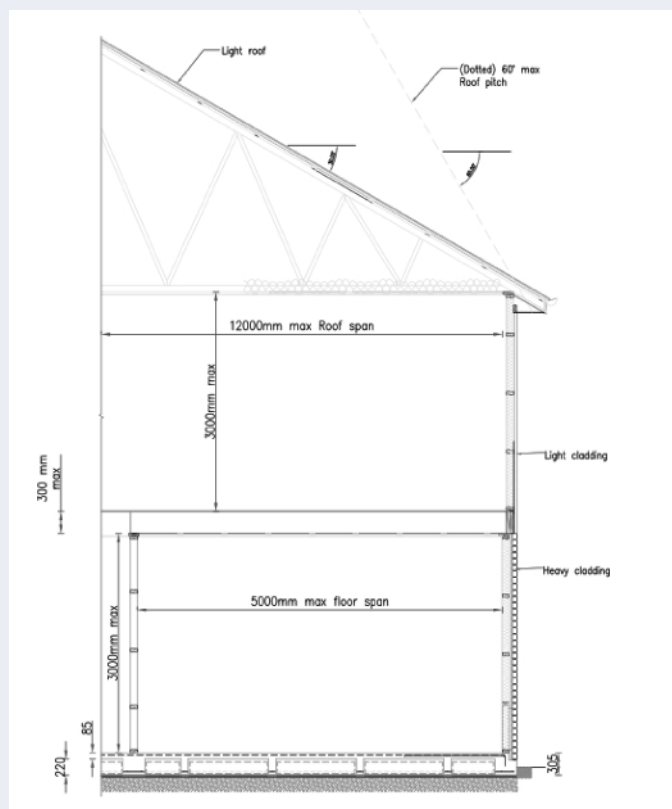


FIGURE 4 – Typical house layout



**Table 1**

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

**Notes as referenced in table 1 above**

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

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

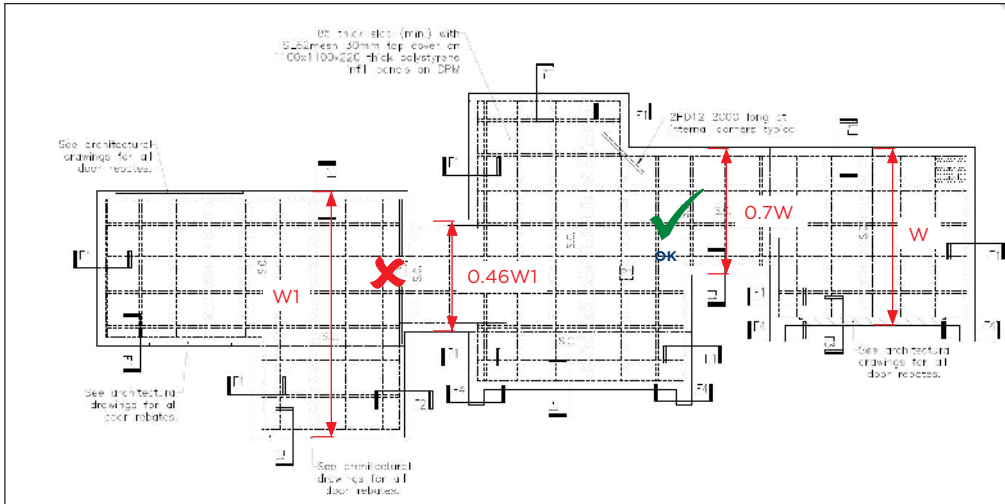
Buildings deviating from the limitations listed are outside the scope of this document. However, an economical SuperSlab solution can still be adopted with specific engineering design. Contact Allied Concrete for further information and advice.

**Table 2**

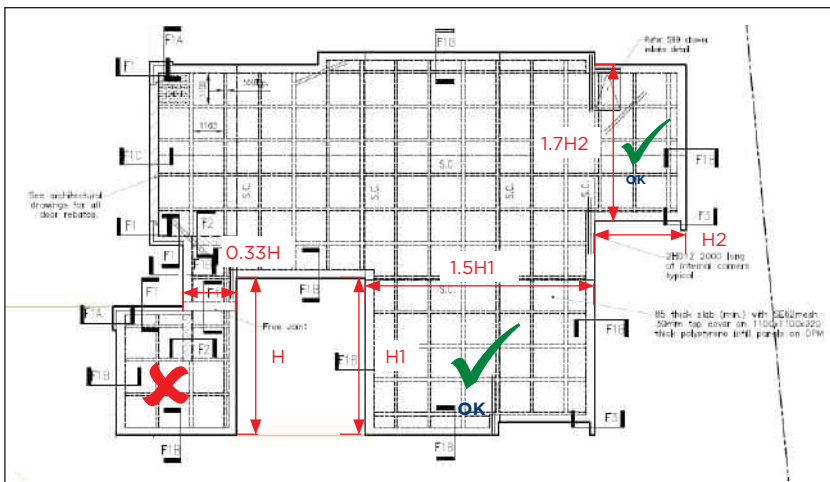
NZS3604/B1 penetrometer testing criteria for Geotechnical ultimate bearing	Number of blows per 100mm – upper 600mm subgrade	Number of blows per 100mm – below 600mm subgrade
300 kPa (good ground)	5	3
200 kPa	3.33	2
150 kPa	2.5	1.5
MBIE/Stockwell penetrometer Criteria testing criteria for Geotechnical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

## Foundations shape requirements

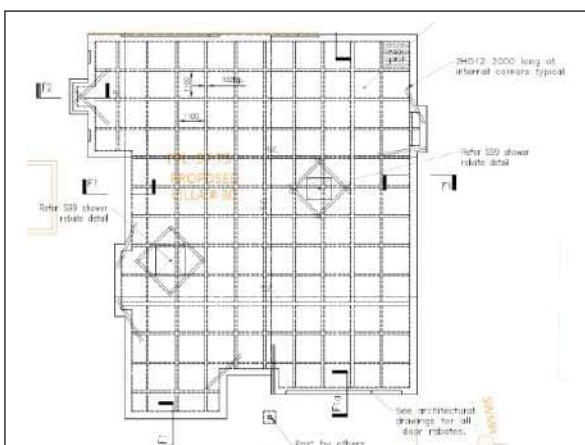
Two foundations connected by a narrow corridor will require specific engineering design (SED) and appropriate free joint detailing. Narrow corridors can be defined as a width less than 50% of the width of the smaller of the adjacent slab (W) areas as per example below. Foundations of this layout are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



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



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





### 3.2 Ground conditions

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

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

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

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

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

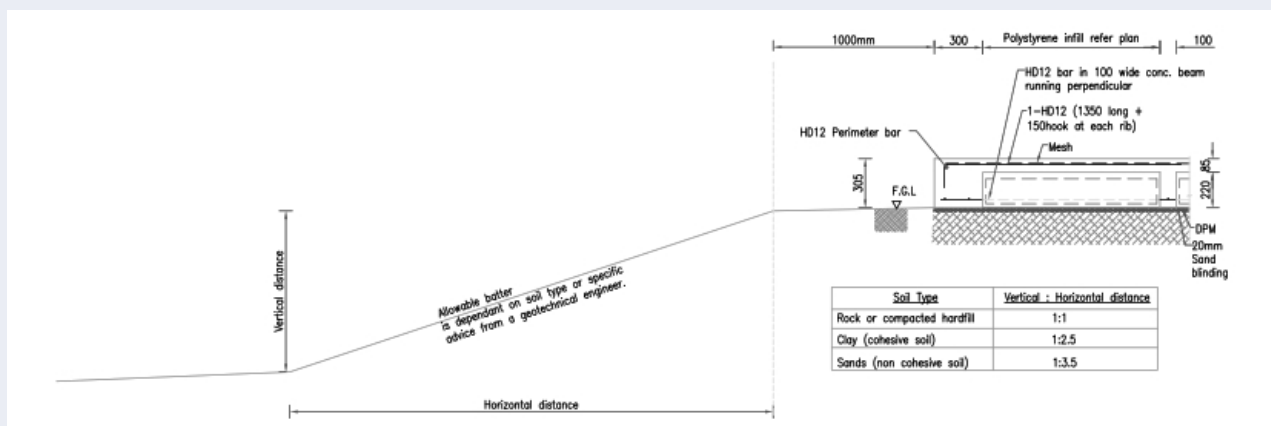


FIGURE 5 – Safe batters for raised building platform

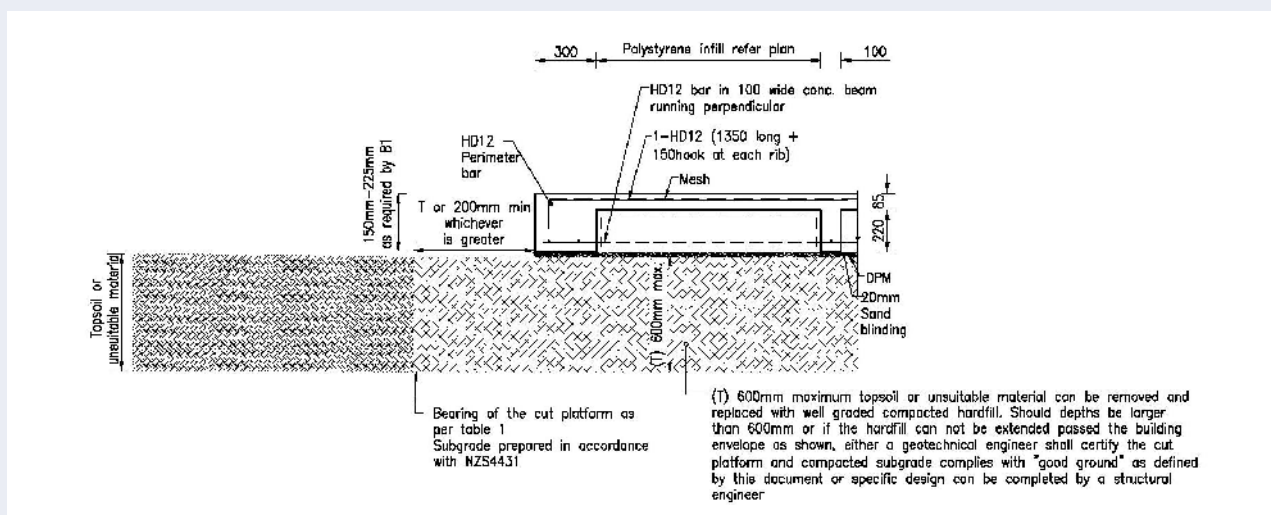


FIGURE 6 – Deep top soil subgrade limitations (Updated)

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

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

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

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

**8. SITE INSTABILITY** - whether global or local.

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

## 9. UNCERTIFIED FILL AND BRIDGING.

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

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

## NOTE:

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

### 3.3 Lateral resistance under wind and earthquake

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

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

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

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

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

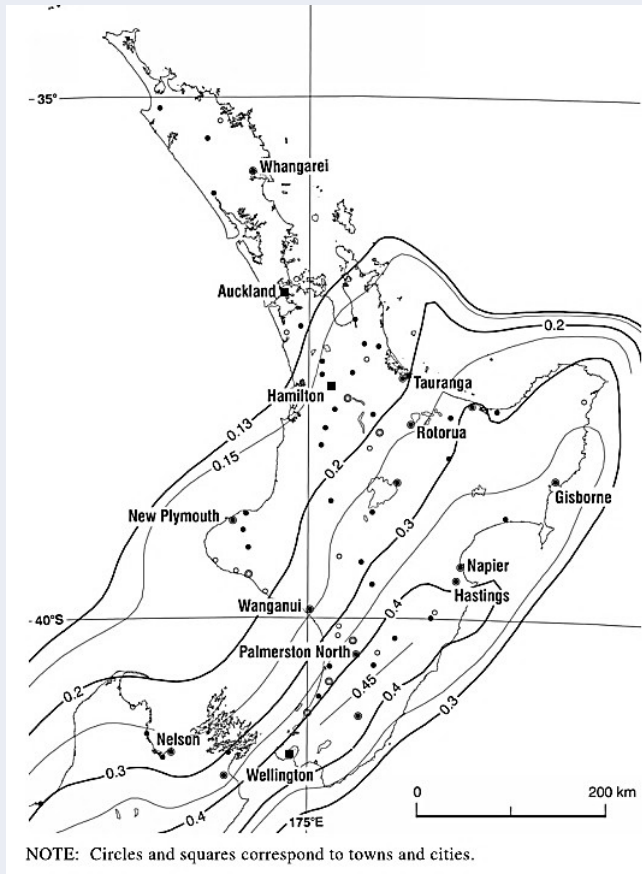
#### Protection of services (refer figures 9, 10,11 &12)

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

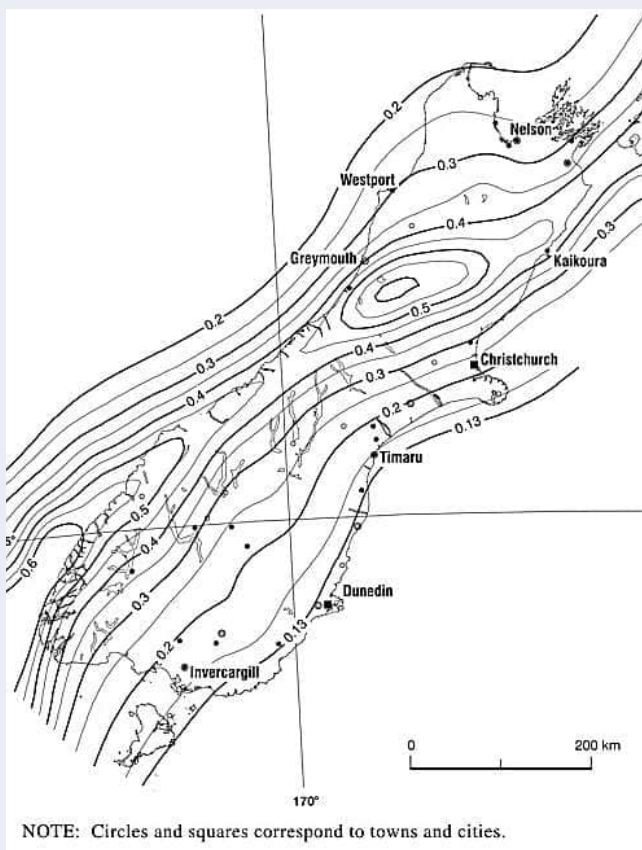
SuperSlab systems require all plumbing pipes to be installed as per Figure 9 for any sites with Z factors larger than 0.15. It is also recommended that the pipe penetration details are adopted on all other foundations.

#### Shear Keys (refer Figures 13 &14)

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



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



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



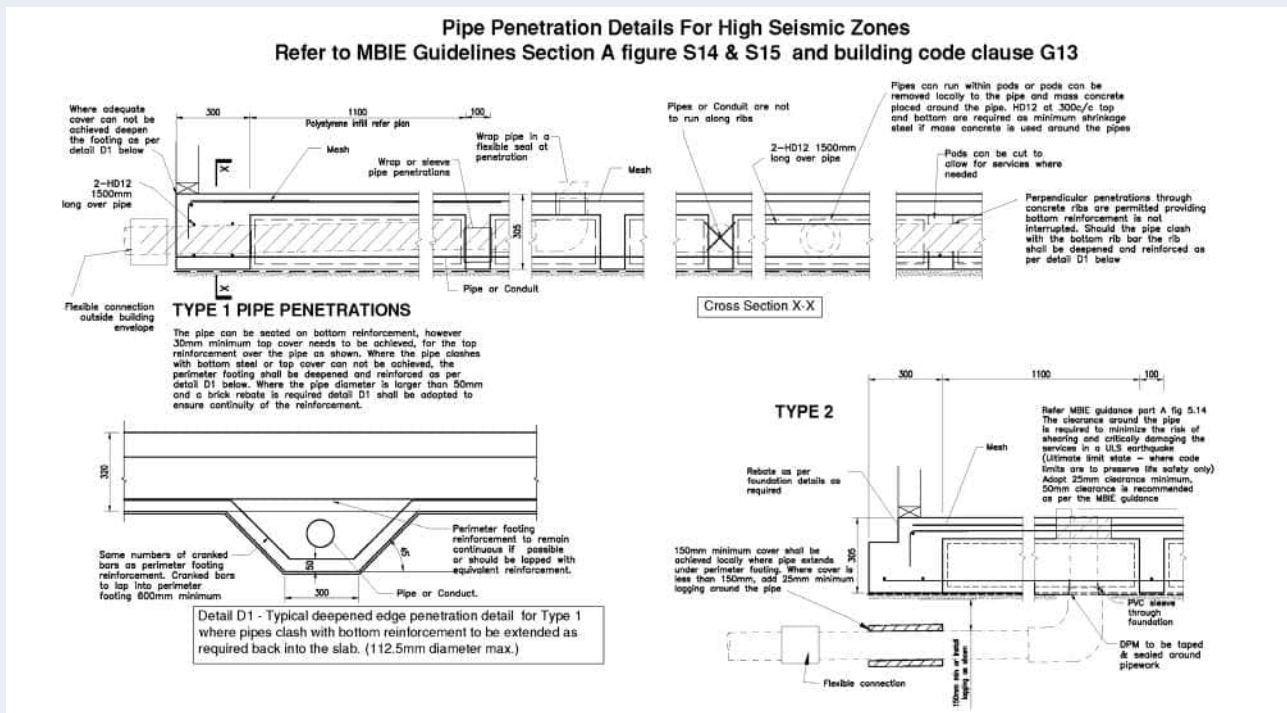


FIGURE 9 – Pipe penetration details

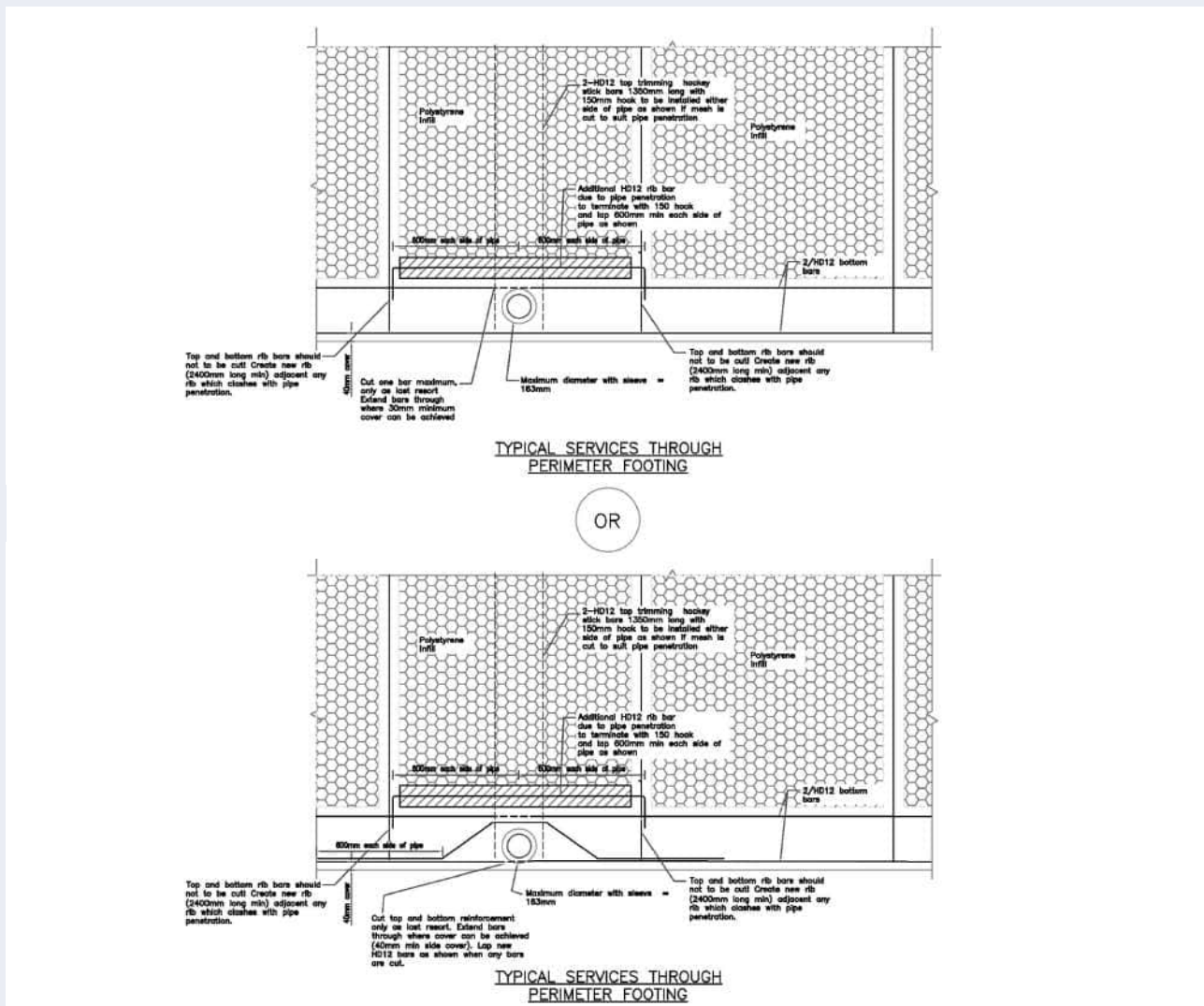


FIGURE 10 – Pipe penetration in perimeter footing

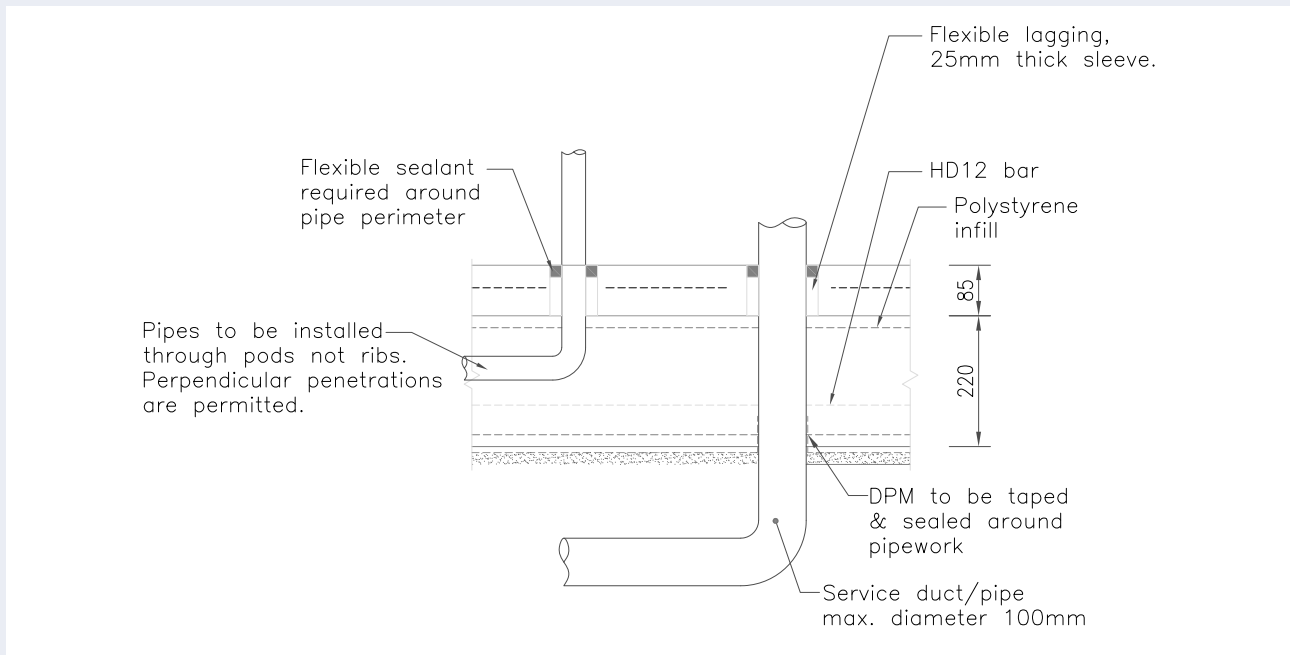


FIGURE 11 - vertical penetrations

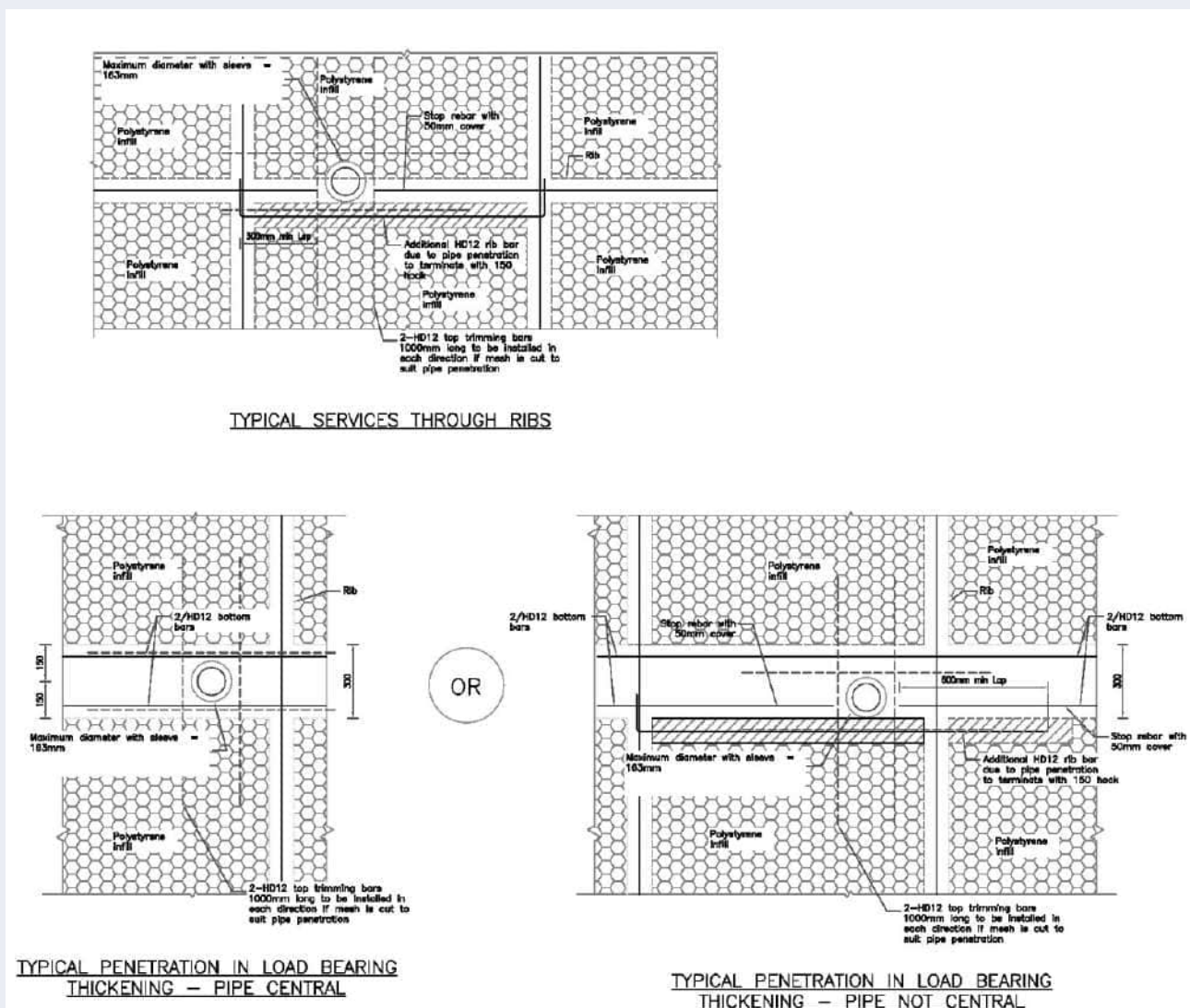
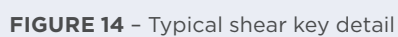
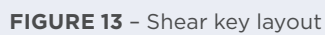


FIGURE 12 - vertical penetration through external footing or rib





### 3.4 Weights and loadings

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

#### Dead or permanent loads

- Heavy roof loading 1.0 kPa - including cladding, roof framing, insulation and ceiling
- Light roof loading 0.5 kPa - including cladding, roof framing, insulation and ceiling
- First floor (timber) – 0.6 kPa - Including joists, nogs and services, flooring and lower level ceiling
- Lower level heavy cladding - 2.2 kPa (220 kg/m<sup>2</sup>)
- Upper/lower level light cladding - 0.6 kPa (60 kg/m<sup>2</sup>)

#### Live or imposed loading

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

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

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

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

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

## 4.0 - INSTALLATION INFORMATION

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

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

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

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

All bar laps shall be 50 x db or greater.

### 4.1 Site preparation and Earthworks

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

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

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

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

#### Minimum Shear Strength and Maximum Air Voids Method

##### AIR VOIDS PERCENTAGE

(As defined in NZS 4402)

Average value less than	8%
Maximum single value	10%

##### UNDRAINED SHEAR STRENGTH

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

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

The average value shall be determined over any ten consecutive tests

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

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

### 4.2 Damp proof membrane (DPM)

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

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

### 4.3 Set out & boxing

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

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

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

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

#### 4.4 Pod set out

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

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

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

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

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

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

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

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

#### 4.5 Perimeter foundations

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

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

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

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

#### 4.6 Internal ribs, Load bearing thickenings & Pads

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

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

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

figure 18 for the internal slab thickening detail.

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

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

#### 4.7 Mesh and Topping thickness

The mesh used in the 85mm topping is SE62 (or 2.29kg/m<sup>2</sup> minimum) grade 500 E as per NZS4671 and NZBC clause B1.

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

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

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

cracking and as such shall be avoided.

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

#### 4.8 Reentrant corners

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

#### 4.9 Concrete placing, finishing and curing.

##### PLACING

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

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

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

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

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

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

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

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



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

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

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

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

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

#### FINISHING

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

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

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

#### CURING

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

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

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

mitigate thermal shock and cracking in the slab.

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

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

#### 4.10 Saw cutting (control joints) and free joints.

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

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

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

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

#### 4.11 Plumbing and pipe penetrations

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

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



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

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

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

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

#### 4.12 Shower Rebates

SuperSlab systems have been designed to accommodate a 50mm deep shower rebate. Refer standard details as per figure 15. All pods in contact with the shower rebate are cut down by 50mm and mesh is lowered and chaired appropriately with the correct cover and lap. Trimming bars are required around the shower as per Figure 15. It is important the reinforcement of any perimeter footings, ribs or internal slab thickenings extending across or adjacent to a shower rebate are kept continuous. The maximum area of any shower rebate for SuperSlab systems is 4m<sup>2</sup>. Larger or deeper rebates can be accommodated with specific engineering design and are beyond the scope of this document.

#### 4.13 Wing walls

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

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

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

#### 4.14 Polished Concrete floors

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

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

## 5.0 - LANDSCAPING AND ONGOING MAINTENANCE

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

### 5.1 Paving and landscaping heights

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

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

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

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

### 5.2 Excavation and retaining walls

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

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

### 5.3 Drainage of the site

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

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

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

### 5.4 Gardens, trees and shrubs

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

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

## 6.0 - STANDARD DETAILING

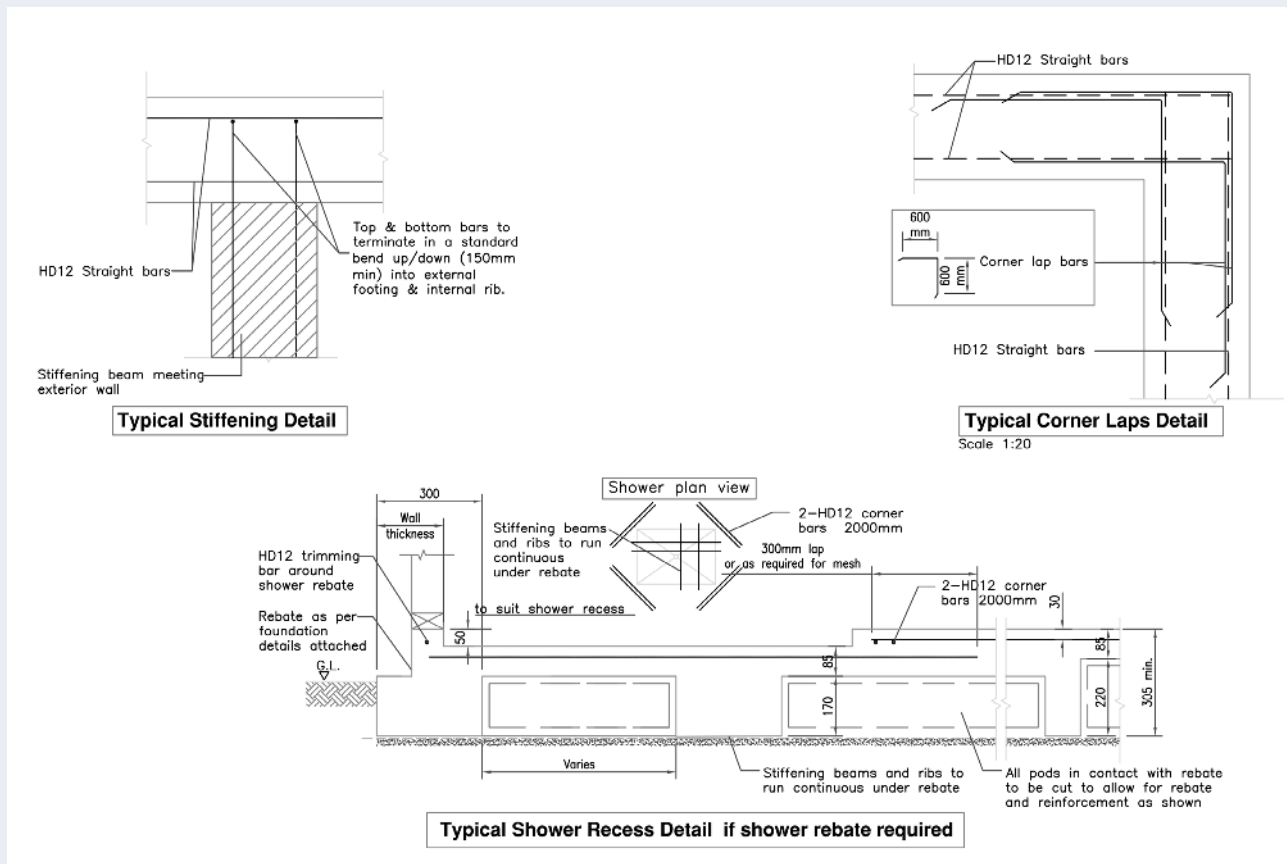


FIGURE 15 - Typical shower rebate details and corner bar lap detail

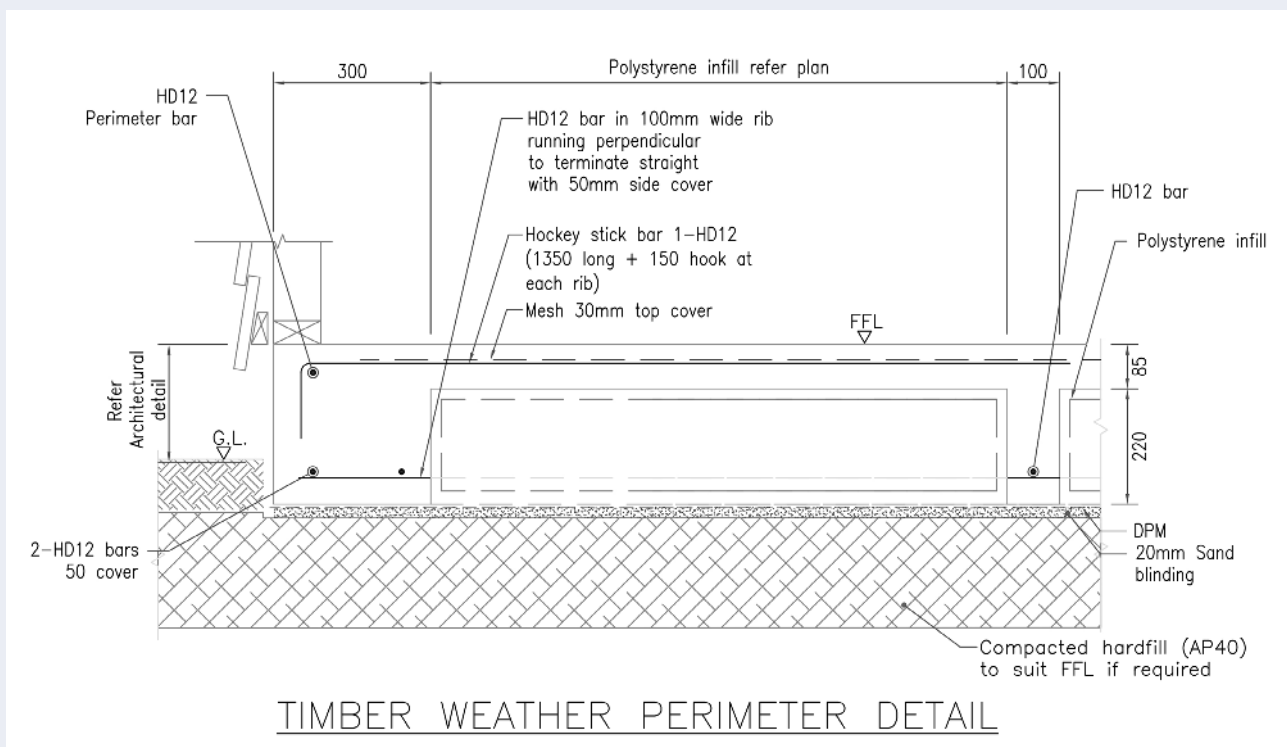
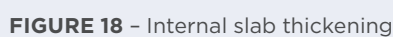
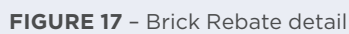
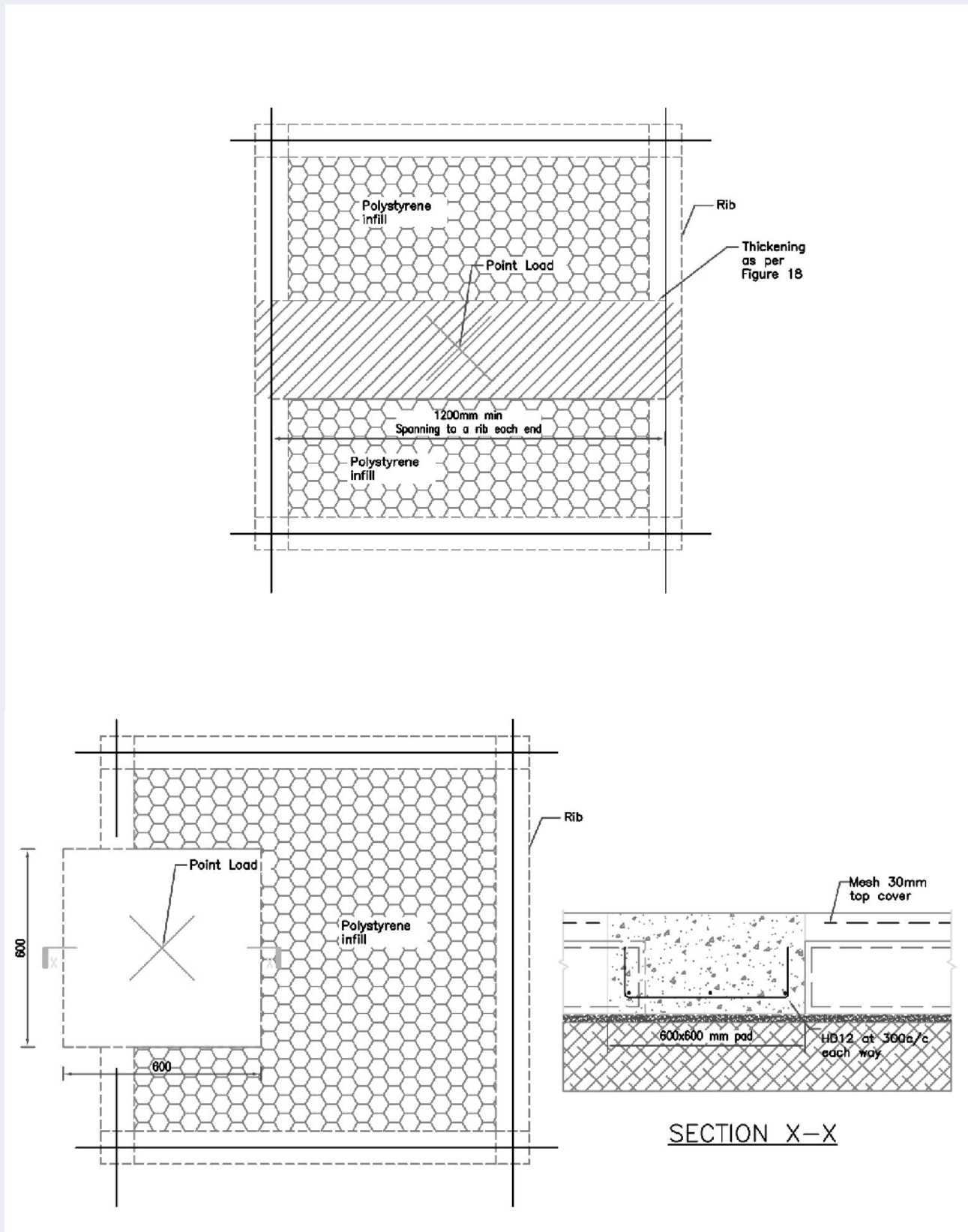


FIGURE 16 - Typical details - Lightweight cladding





**FIGURE 19** – Internal point loads larger than 13kN

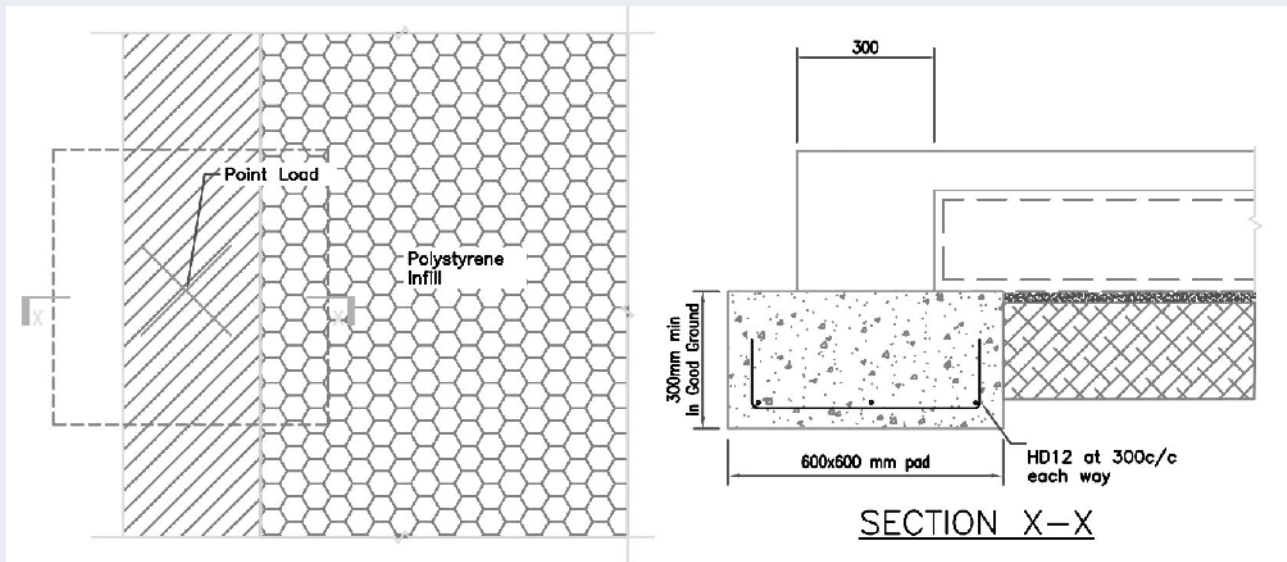


FIGURE 20 – Perimeter point loads larger 20kN

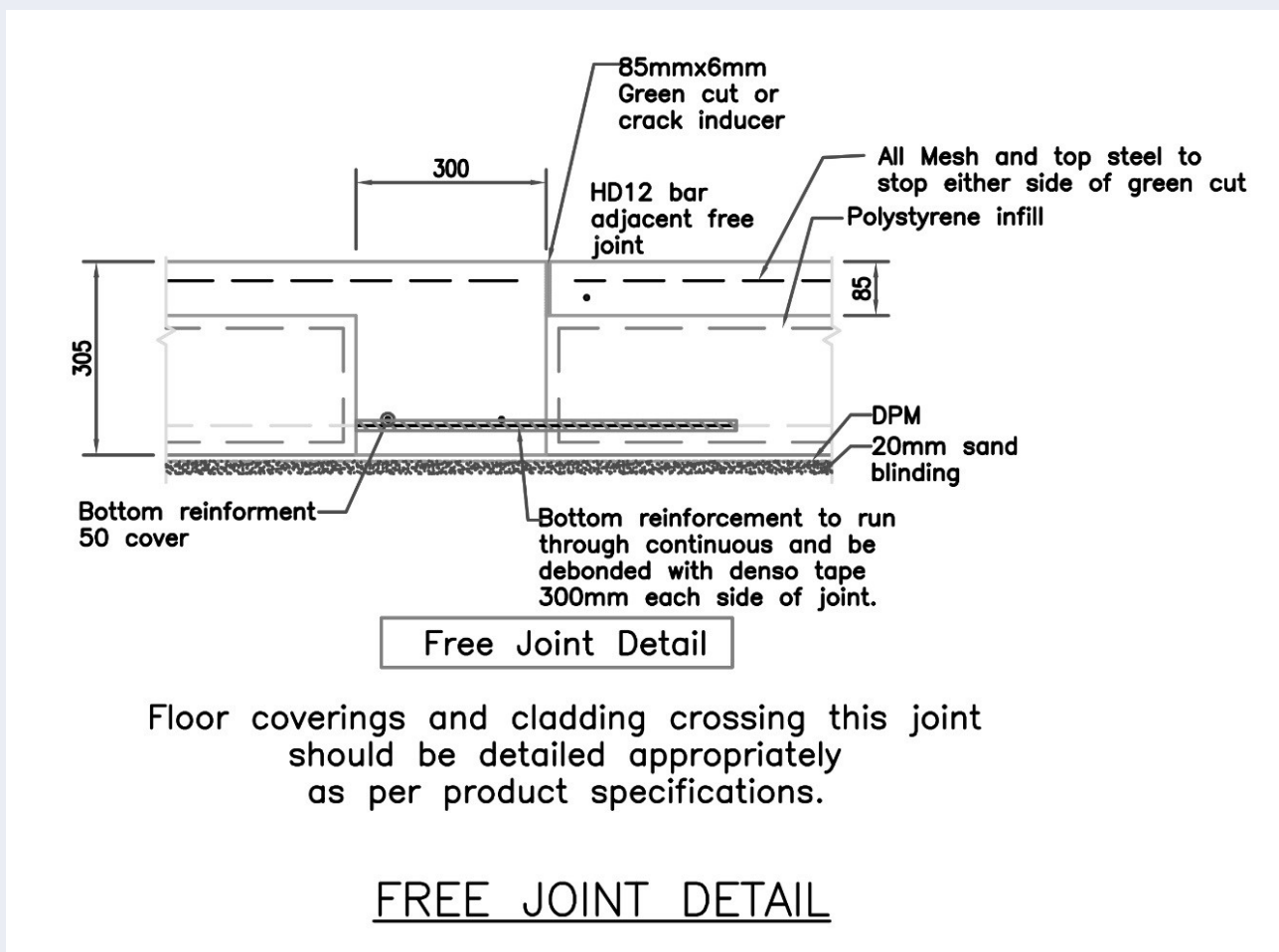
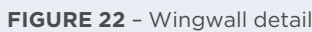


FIGURE 21 – Free Joint





**Typical Stiffening Detail**

HD12 Straight bars

Stiffening beam meeting exterior wall

Top & bottom bars to terminate in a standard bend up/down (150mm min) into external footing & internal rib.

**Typical Corner Laps Detail**

HD12 Straight bars

Corner lap bars

Scale 1:20

**Typical Shower Recess Detail if shower rebate required**

Shower plan view

2-HD12 corner bars 2000mm

300mm lap or as required for mesh

2-HD12 corner bars 2000mm

300

Wall thickness

Stiffening beams and ribs to run continuous under rebate

to suit shower recess

HD12 trimming bar around shower rebate

Rebate as per architectural drawings

G.L.

Varies

Thickening beams and ribs to run continuous under rebate

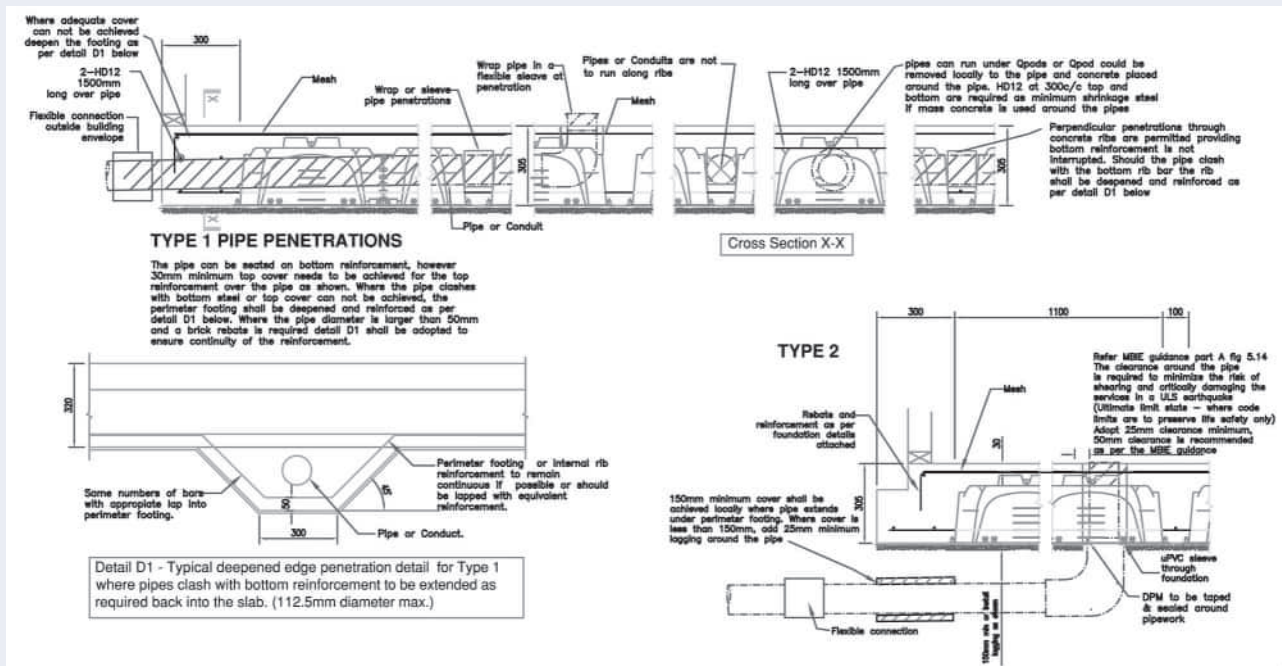
85

220

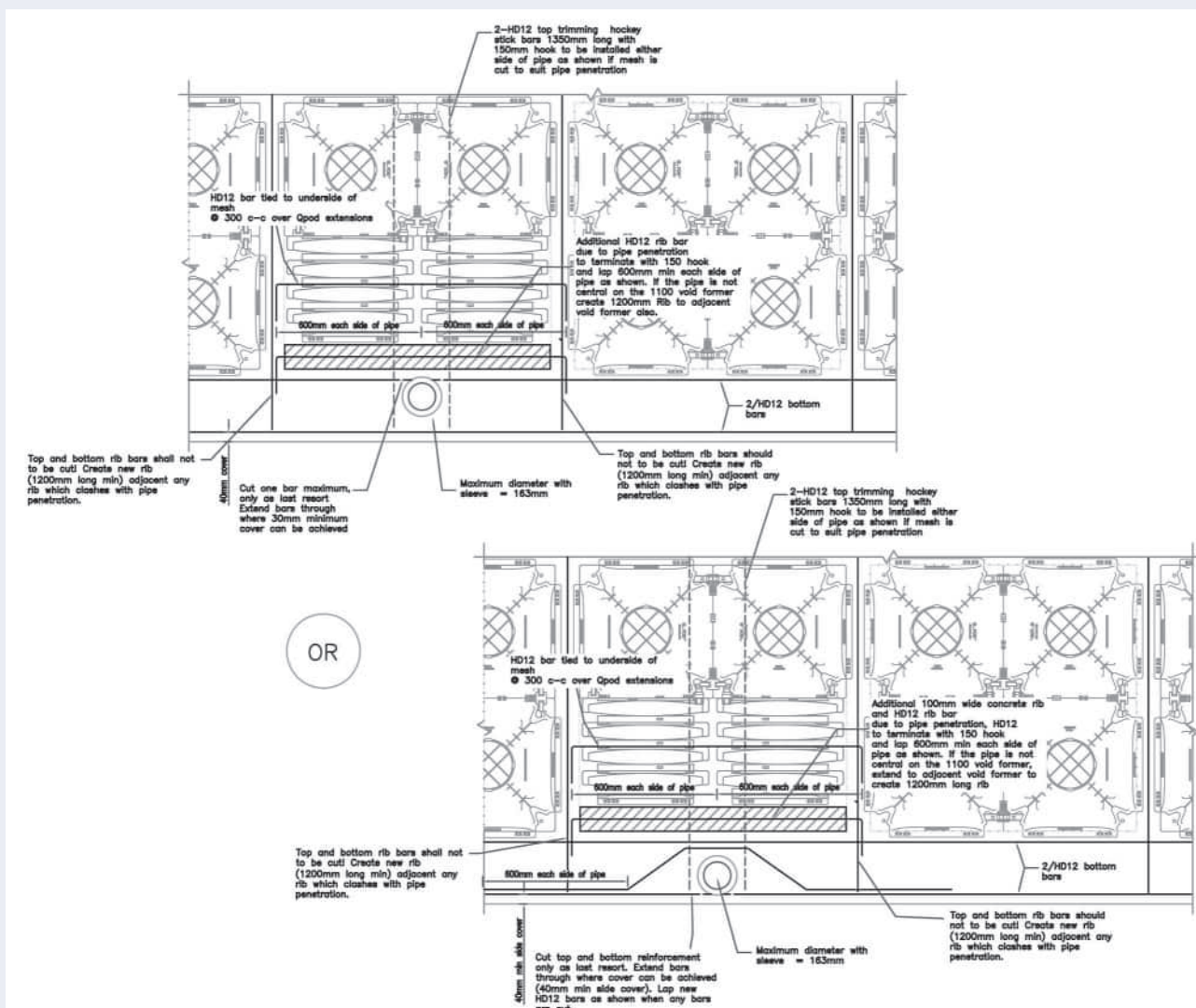
305 min.

All Opods in contact with rebate to be cut 50mm (max) to allow for rebate and reinforcement as shown.

**FIGURE 23** – Qpod rebate and corner details



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



**FIGURE 25** – Qpod perimeter footing pipe penetrations

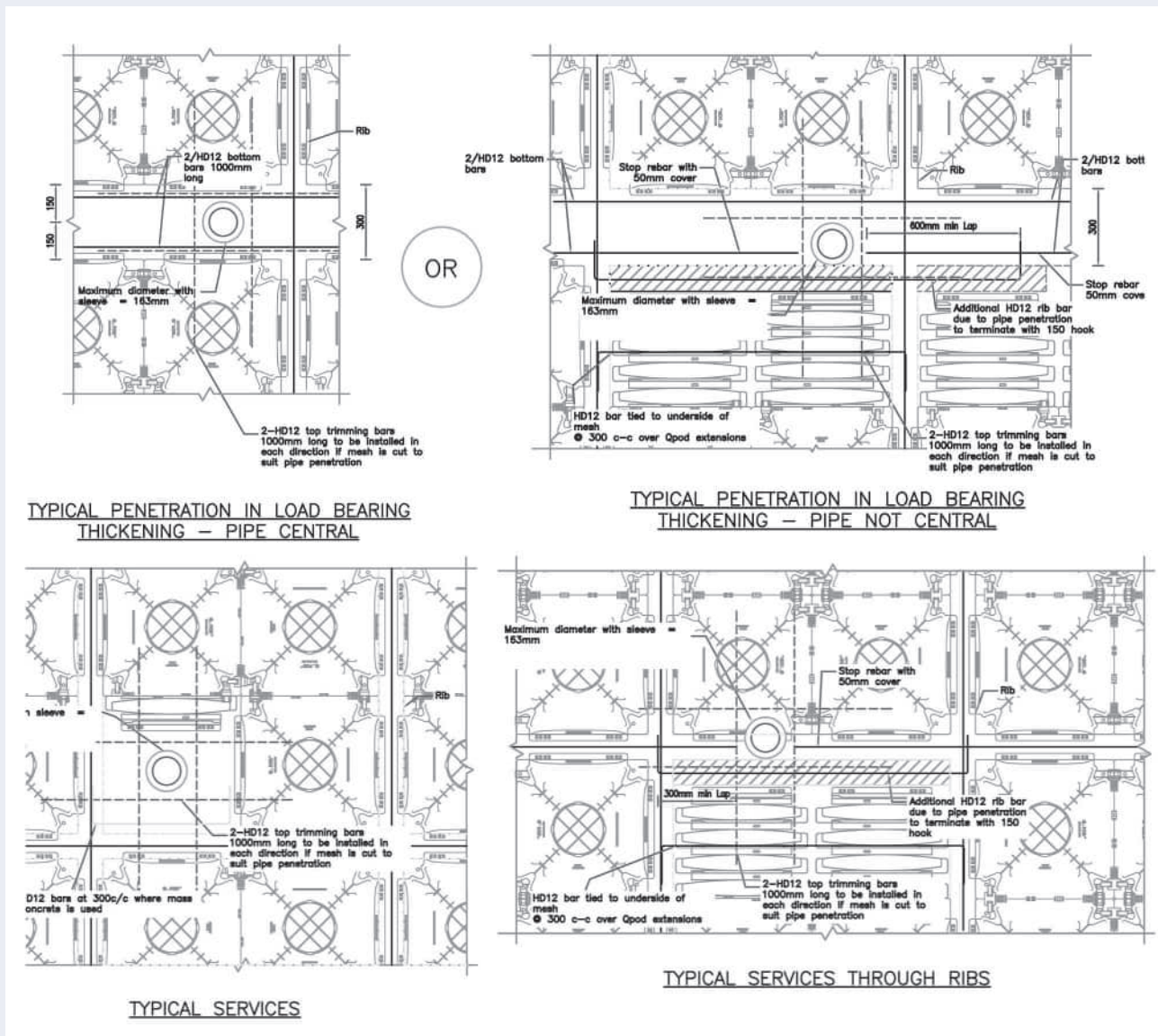


FIGURE 26 – Qpod internal pipe penetrations

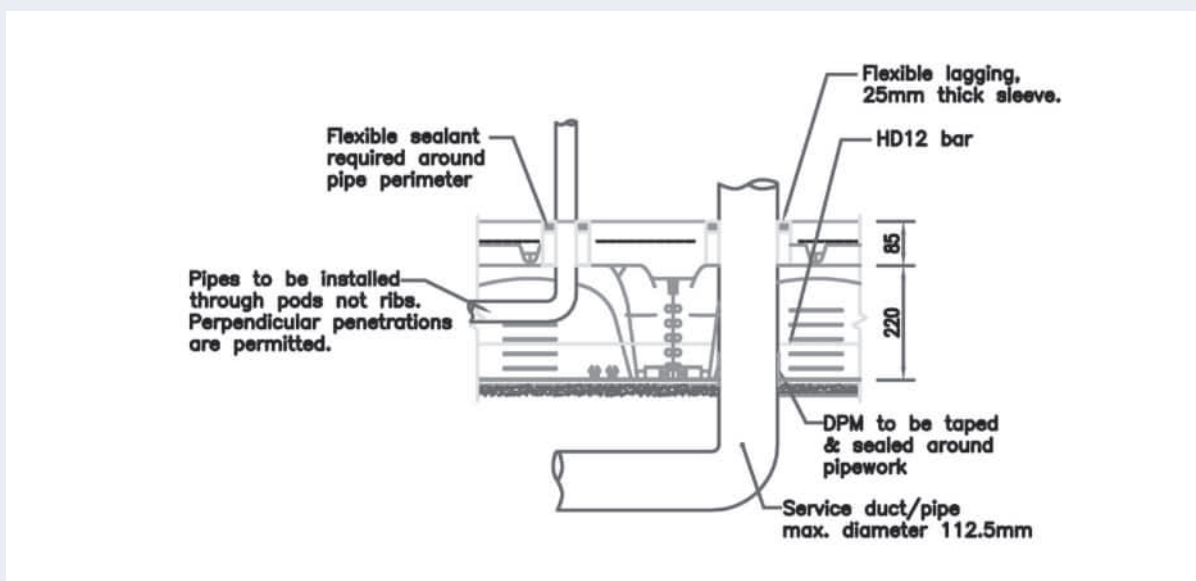


FIGURE 27 – Qpod vertical pipe penetrations



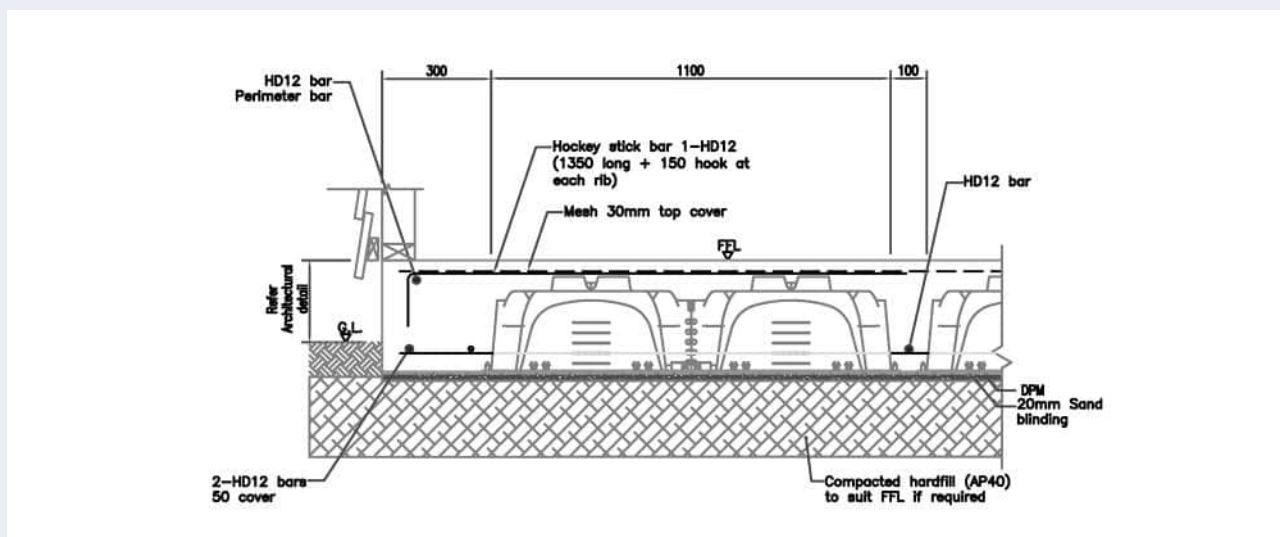


FIGURE 28 - Qpod light cladding perimeter detail

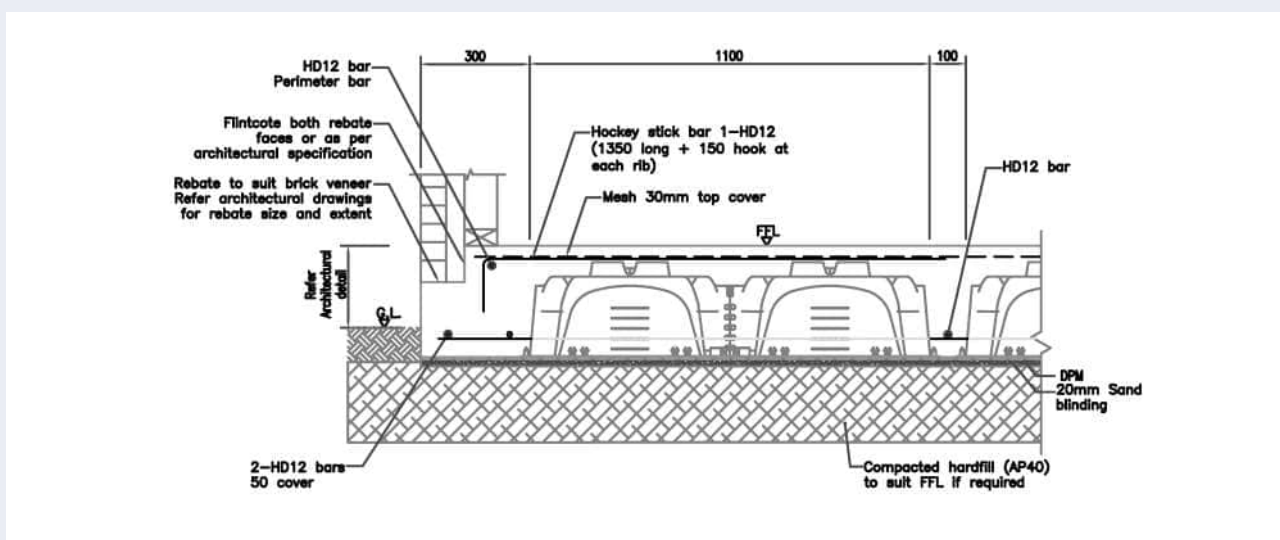


FIGURE 29 - Qpod brick cladding perimeter detail

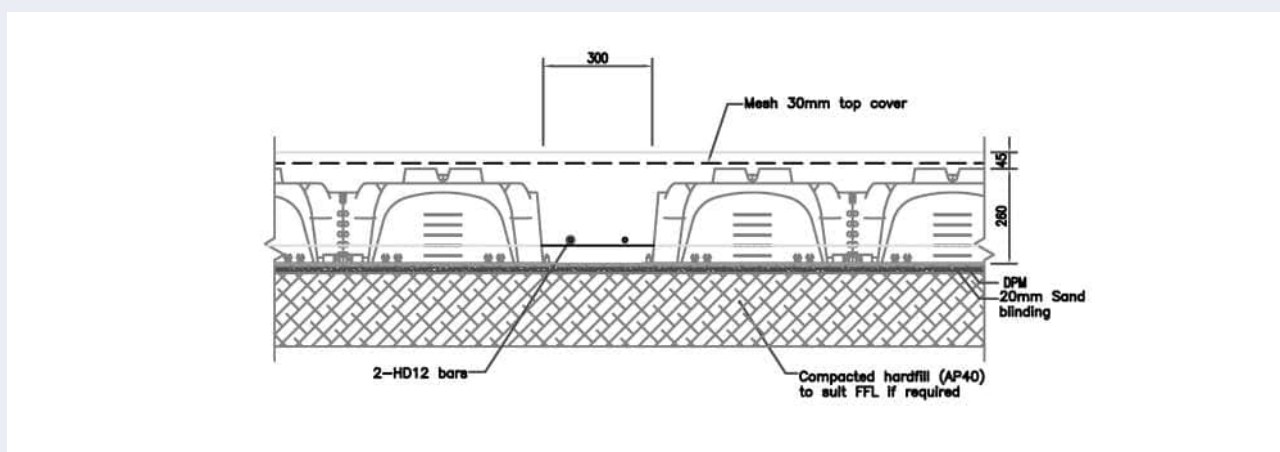


FIGURE 30 - Qpod internal loadbearing wall or slab thickening

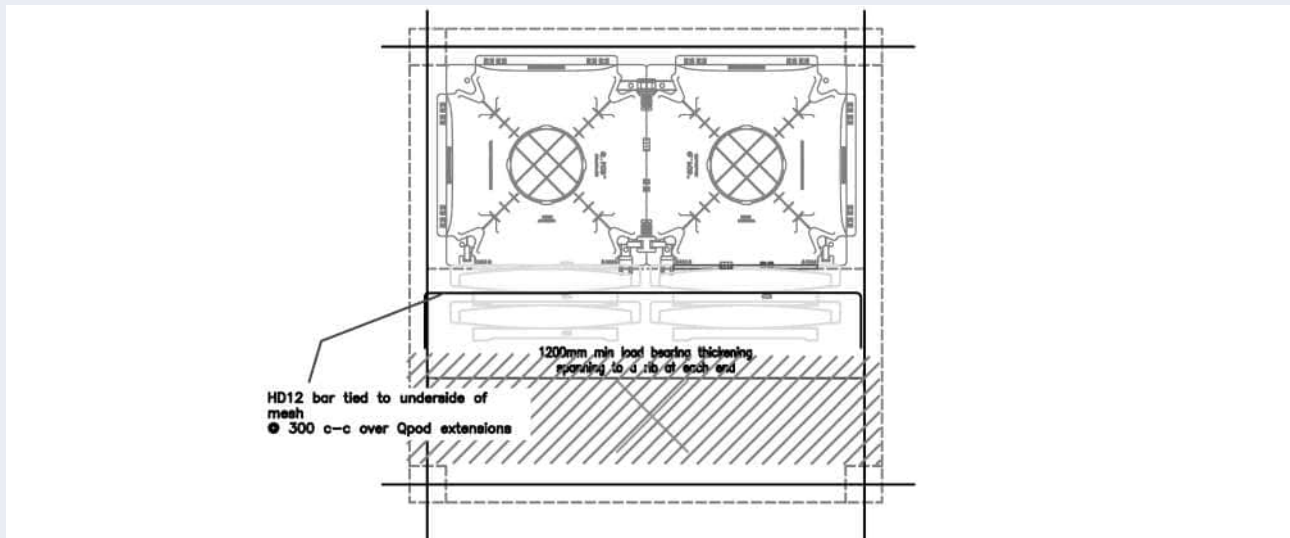


FIGURE 31 – Qpod internal point load – slab thickening

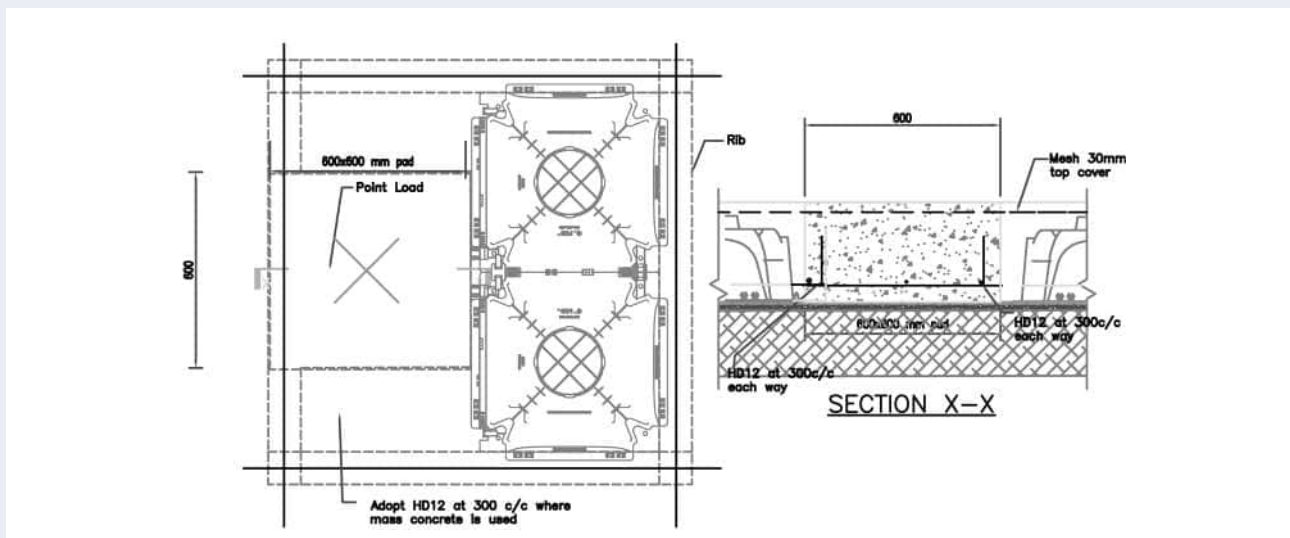


FIGURE 31b – Qpod internal point load – pad footing

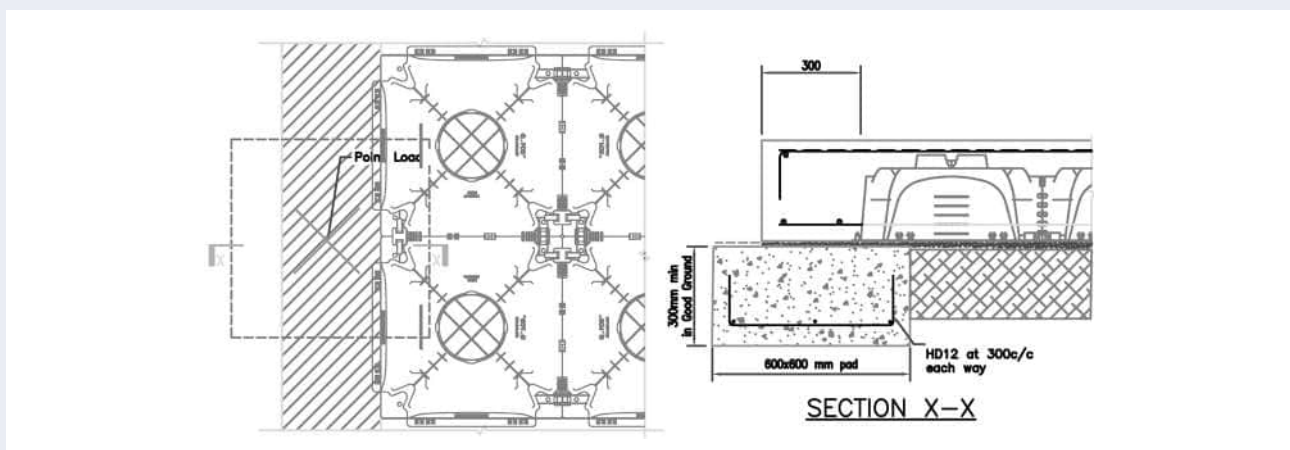
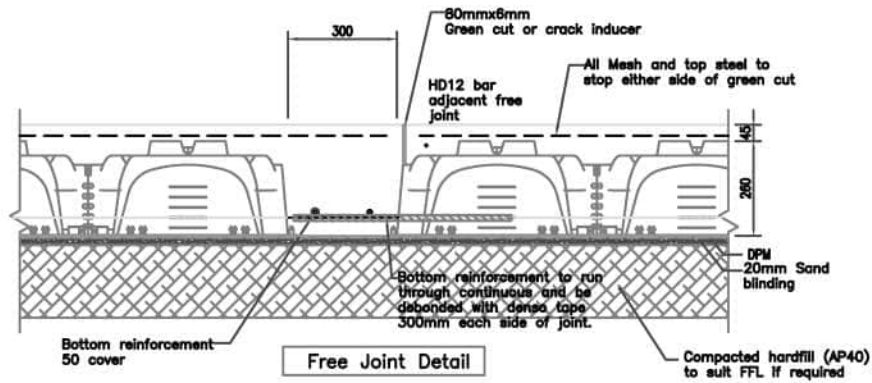
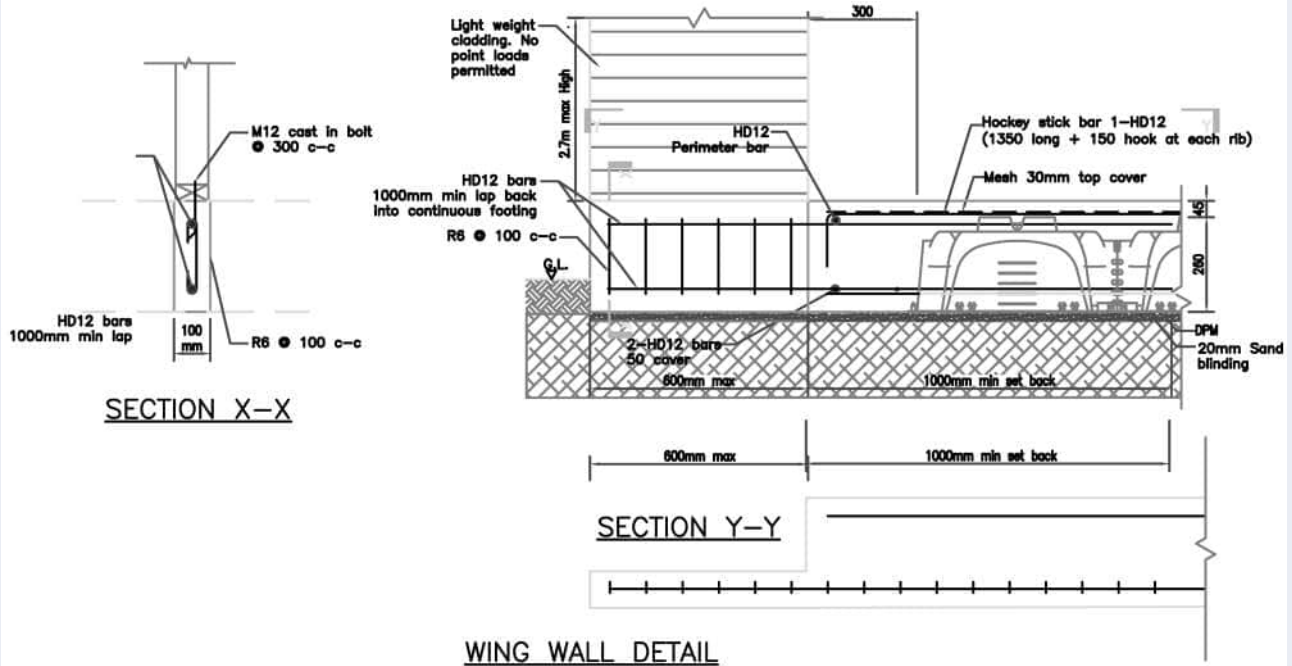


FIGURE 32 – Qpod perimeter point load – pad footing



### FREE JOINT DETAIL

FIGURE 33 – Qpod free joint detail



### WING WALL DETAIL

FIGURE 34 – Qpod wingwall detail



## 7.0 - INSULATED SLABS

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

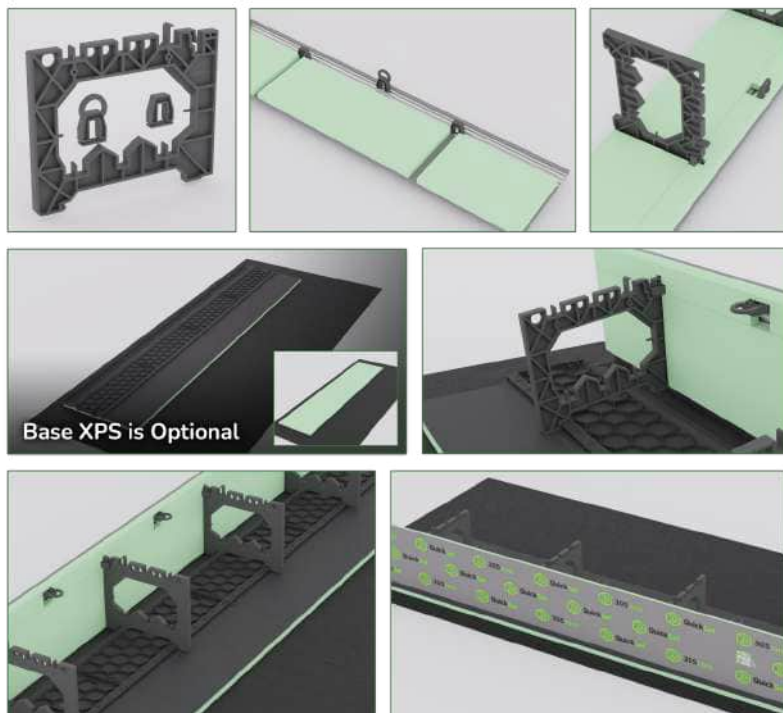
The R-value is mainly dependent on the area to perimeter ratio of the foundation the edge of the foundation around the perimeter of the building is where most of the heat is lost. Insulating the exposed perimeter edge will achieve the best results relative to cost in comparison to underslab insulation. Underslab insulation (with and without edge insulation) can be used for SuperSlab providing the insulation is VH grade (or better) and a maximum thickness of 150mm (max). In colder climates edge and underslab insulation is likely to be required to achieve compliance with H1/AS1&AS2.

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

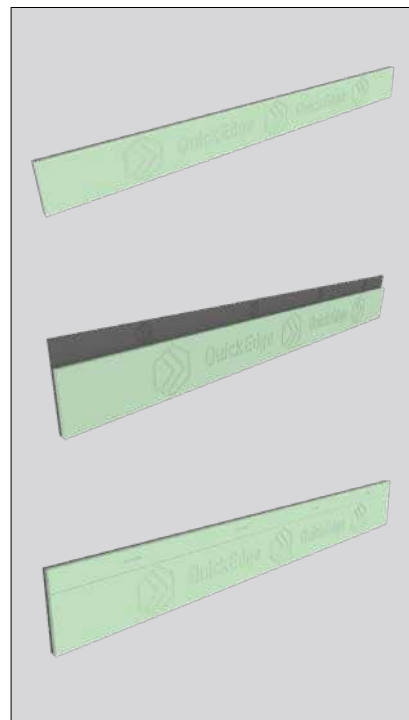
### 7.1 SuperSlab+

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

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



**QuickSet**



**QuickEdge**

**90mm Wall Framing:**

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

**Table 3**

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

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

**140mm Wall Framing:**

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

**Table 4**

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

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

## Hold down fixings

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

### 7.5.12.3

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

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

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

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

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

Alternatively to the above, proprietary hold downs can be used, where the product accounts for the edge insulation and minimum edge distances required. These proprietary products shall demonstrate compliance with NZS 3604 and building code requirements (as outlined above).

## 7.2 QuickSet and QuickEdge Standard detailing

SuperSlab+ can be specified with QuickSet and QuickEdge as edge insulation alone or combined with base insulation for a fully insulated foundation. Refer to the QuickSet and QuickEdge detailing library for system detailing requirements.





Certificate no: CMNZ30086

Version: J

Original issue date: 03 September 2020

Version date: 27 May 2024

Renewal date: 03 September 2026

#### 1. Certificate Holder Details



**Allied Concrete Ltd**

35 Inglewood Road, Invercargill 9810.

info@alliedconcrete.co.nz

Tel: .03 2171600 or 0800 4 255433

[www.alliedconcrete.co.nz](http://www.alliedconcrete.co.nz)

#### 2. Product Certification Body

**Global-Mark Pty Ltd**

Trading as Global-Mark

57 Willis Street, Wellington, 6011

customer.service@global-mark.co.nz

+64 4 280 6672

[www.global-mark.co.nz](http://www.global-mark.co.nz)

**Complaints:** The complaints process for this certificate can be found here:  
[www.global-mark.co.nz/complaints](http://www.global-mark.co.nz/complaints)

#### Global-Mark Managing Director.

Herve Michoux



# Product Certificate

## Allied SuperSlab Concrete Floors System

### 3. Description of Building Method or Product

Allied SuperSlab Concrete Floors System is a building method for reinforced concrete slab-on-ground floors. The method uses polystyrene void formers or QPOD moulded plastic pod void formers.

### 4. Intended use of Building Method or Product

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

### 5. New Zealand Building Code Provisions

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

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

### 6. Conditions and Limitations of Use

- Allied SuperSlab Concrete Floors Systems has been certified for use in buildings within the following scope limitations:
  - buildings, up to two storeys high, either:
    - timber framed within the scope of NZS 3604:2011 (paragraph 1.1.2), or
    - steel framed within the scope of NASH Standard Part Two: 2019 Light Steel Framed Buildings, and
  - with a maximum height of 10 m measured from the ground to the apex, and
  - with Building Types and Minimum ground bearing capacity limits as detailed in Table 1 of Allied Concrete SuperSlab Technical Manual Rev J, February 2024, as follows:



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.

Certificate no: CMNZ30086

Version: J

Original issue date: 03 September 2020

Version date: 27 May 2024

Renewal date: 03 September 2026



# Product Certificate

Allied SuperSlab Concrete Floors System

- i. for building type E supported on “good ground” as defined by the Acceptable Solutions and Verification Methods for New Zealand Building Code Clause B1 Structure1, First edition, amendment 21 (2 November 2023) or,
- ii. for building types B, C & D supported on ground with a reduced ultimate bearing capacity of minimum 200kPa with all other requirements of ‘Good ground’ or,
- iii. for building type A supported on ground with a reduced ultimate bearing capacity of minimum 150kPa with all other requirements of ‘Good ground’.

Note: The liquefaction characteristic of “Good Ground” may be satisfied by TC1 classification as defined in “Repairing and rebuilding houses affected by the Canterbury earthquakes”, Ministry of Business, Innovation and Employment, Version 3, December 2012.

- d. with a floor maximum length of 30 m unless detailed with free joints in accordance with Allied Concrete SuperSlab Technical Manual Rev J, February 2024; and
  - e. with weights and loads as set out in section 3.4 of Allied Concrete SuperSlab Technical Manual Rev J, February 2024, and
  - f. situated in Wind Zones up to and including Extra High, and
  - g. In seismic areas, Seismic Hazard Factor Z is equal to or less than 0.45 (Zone 3).
2. Allied SuperSlab Concrete Floors System shall be specified, designed, installed and maintained in accordance with the following Technical Documentation:
    - a. BRANZ Appraisal No. 964 [2023] A1 Issued 17 April 2024 – Allied SuperSlab Concrete Floors
    - b. Allied Concrete SuperSlab Technical Manual Rev J, February 2024
  3. Reinforcing Steel, Polystyrene Pods or QPOD, Bar Chairs, Pod Spacers and Damp Proof Membrane must be selected, used, handled and stored in compliance with the requirement of the Technical Documentation
  4. The installation must be either done or supervised by an LPB who holds either a carpentry or a foundation license and have access to the Technical Documentation
  5. A minimum of 20 MPa Allied CSS or RSS mixes must be used except in Exposure Zone D where the minimum requirement is 25 MPa concrete. The specified concrete mixes must be manufactured in accordance with NZS 3104:2010 and in Allied Concrete plants.
  6. Compliance with H1.3.1(a) and H1.3.2E for buildings incorporating the Allied SuperSlab Concrete Floors System shall be established by specific design using:
    - a. the Schedule Method in H1/AS1 Fifth Edition Amendment 1, (4 August 2022) and H1/AS2 First Edition Amendment 1, (4 August 2022), or
    - b. the Calculation Method in H1/AS1 Fifth Edition Amendment 1, (4 August 2022) and H1/AS2 First Edition Amendment 1, (4 August 2022), using construction R-values:
      - i. from the performance tables described in Acceptable Solution H1/AS1 Fifth Edition Amendment 1, (4 August 2022) Section F.1.2 or H1/AS2 First Edition Amendment 1, (4 August 2022) Section F.1.2 or



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



Certificate no: CMNZ30086

Version: J

Original issue date: 03 September 2020

Version date: 27 May 2024

Renewal date: 03 September 2026



# Product Certificate

Allied SuperSlab Concrete Floors System

- ii. calculated by the method in Verification Method H1/VM1 Fifth Edition Amendment 1, (4 August 2022) Appendix F Section F.1.2 or Verification Method H1/VM2 First Edition Amendment 1, (4 August 2022) Appendix F Section F.1.2.

## 7. Health and Safety Information

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

## 8. Basis for Certification

The certification decision is based on independent technical review(s) of test report(s), engineering opinion(s) and other documented evidence(s), factory audit(s) and site review(s)

Code Clause	Compliance pathway	Evidence
B1 STRUCTURE:	Acceptable Solution – Testing and assessment	Items 1, 2, 3, 4 & 5
B2 DURABILITY:	Acceptable Solution – Reference to use of acceptable materials	Items 1 & 3
E2 EXTERNAL MOISTURE	Acceptable Solution – Reference to New Zealand Standard	Items 1, 2 & 3
F2 HAZARDOUS BUILDING MATERIALS	Alternative solution – Expert judgement	Item 6
H1 ENERGY EFFICIENCY	Acceptable solution based on H1/AS1 and H1/AS2	Items 1, 2 & 3

## 9. Supporting Documentation for Certification

Rev	Author	Description	Date and/or Revision
1.	Allied Concrete Ltd	Allied Concrete SuperSlab Technical Manual	Rev J, February 2024
2.	Allied Concrete Ltd	QuickSet & QuickEdge System Detail Drawings	Rev J, February 2024
3.	BRANZ	BRANZ Appraisal No. 964 (2023) A1 – Allied SuperSlab Concrete Floors	17 April 2024
4. *	Allied Concrete Ltd	Quick Set Structural Review	December 2019
5. *	Allied Concrete Ltd	Quick Set Engineering Calculations	December 2019



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.

Certificate no: CMNZ30086

Version: J

Original issue date: 03 September 2020

Version date: 27 May 2024

Renewal date: 03 September 2026



# Product Certificate

Allied SuperSlab Concrete Floors System

6.	Allied Concrete	Material Safety Data Sheet for Ready Mixed Concrete (plastic concrete, concrete slurry, concrete bleed water, wet concrete)	20 January 2020
----	-----------------	---	-----------------

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

## 10. Supporting Information About Description (Optional)

Nil

## 11. Supporting Information About Intended Use (Optional)

Nil

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

Nil

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

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



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.

# Ramset™

## CONCRETE NAILS

### | Quick Installation | Tamper Resistant |

#### Product Description

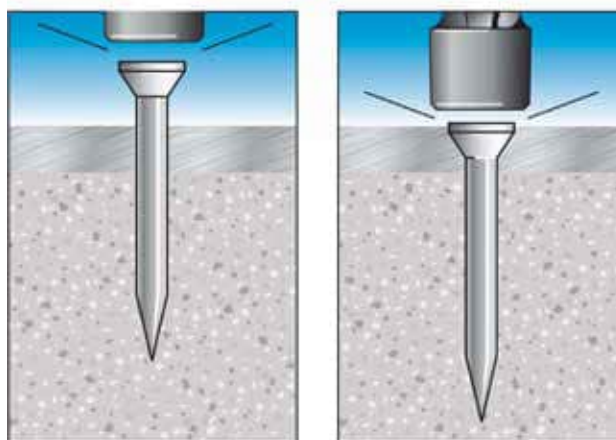
For fixing to concrete, brick and concrete blockwork.



#### Principal Applications

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



#### Installation



#### Features and Benefits

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

#### Concrete Nails

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



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

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

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

## Instructions

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

## Mandatory requirements

For Prolam products that will be exposed to moisture:

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

For paint:

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

For stain:

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

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

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

## Optional requirements

For Prolam products where maintenance of the appearance applies:

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

## For further information

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

[www.prolamnz.com/technical](http://www.prolamnz.com/technical)

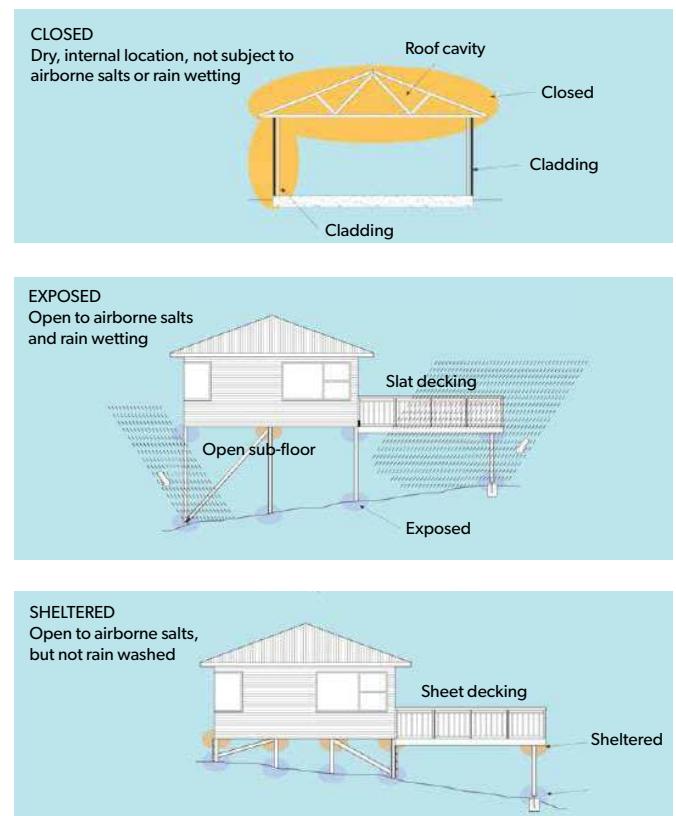


Fig 4.3(a & b) NZS 3604:2011

# BOTTOM PLATE FIXING ANCHOR

COMPLIES WITH CLAUSE 7.5.12.2 NZS 3604:2011

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

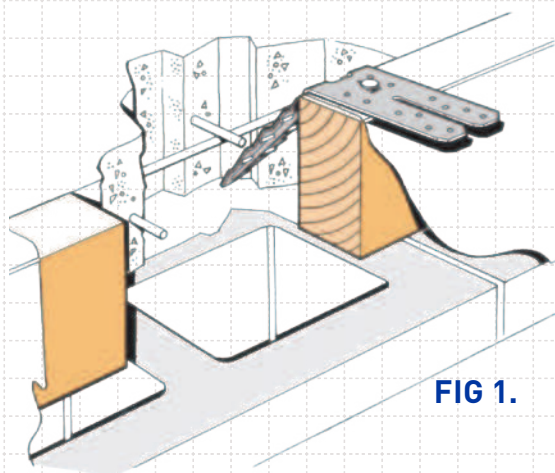
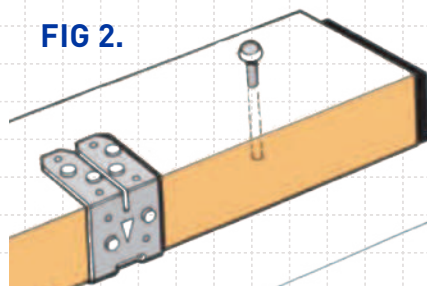


FIG 1.

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

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

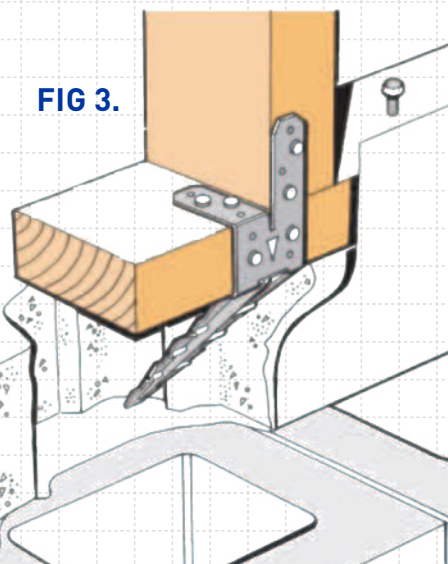
FIG 2.



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

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

FIG 3.

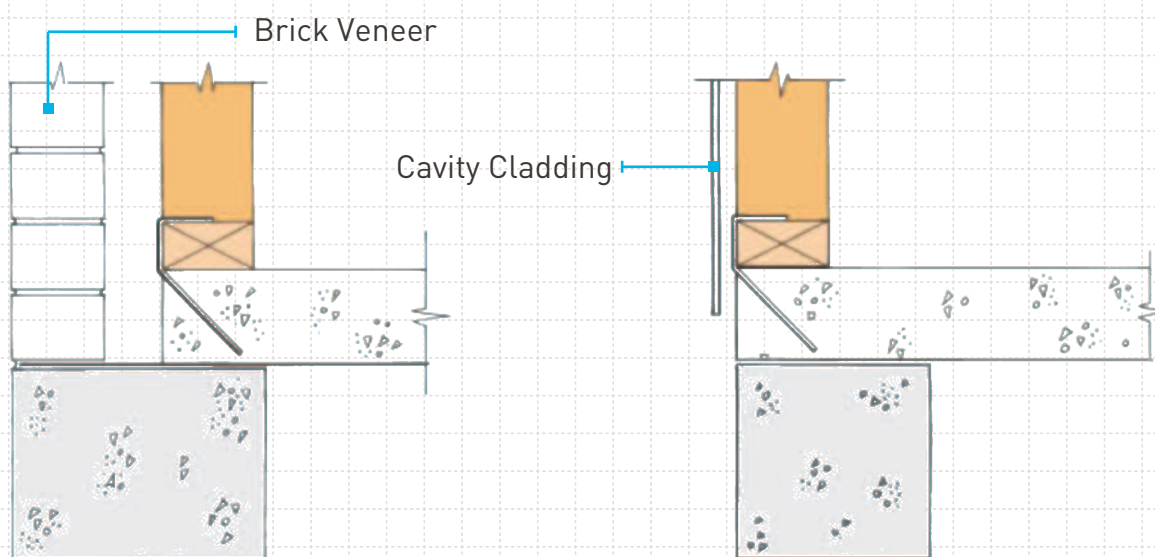
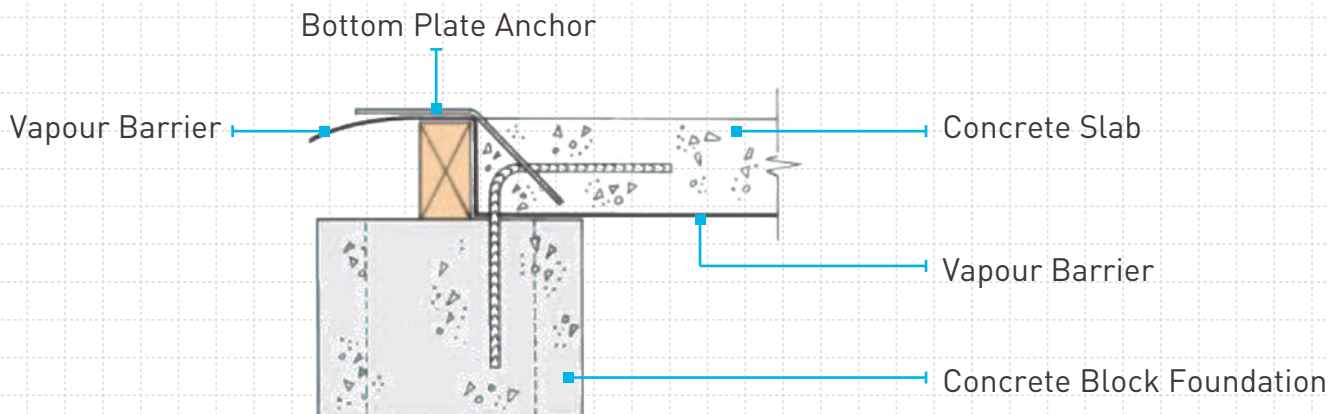


AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



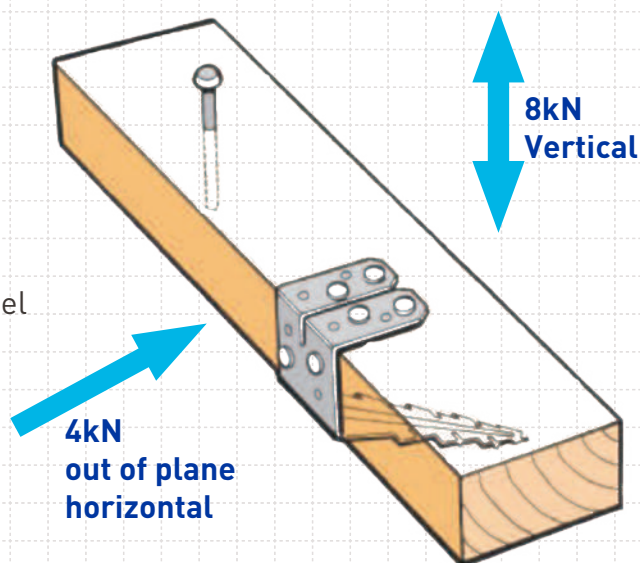


## BOTTOM PLATE FIXING ANCHOR



**DESIGN LOADS**  
Concrete compressive strength 20MPa min.

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

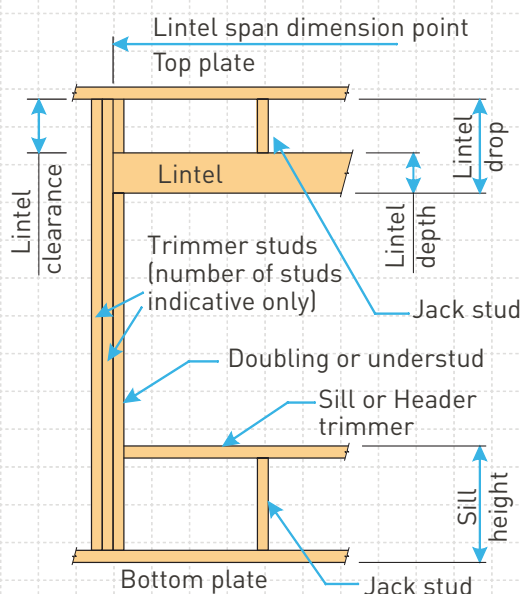




# LUMBERLOK® LINTEL FIXING SCHEDULE

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

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



### LINTEL SUPPORTING GIRDER TRUSSES

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

#### NOTES:

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



**LUMBERLOK® LINTEL FIXING SCHEDULE**

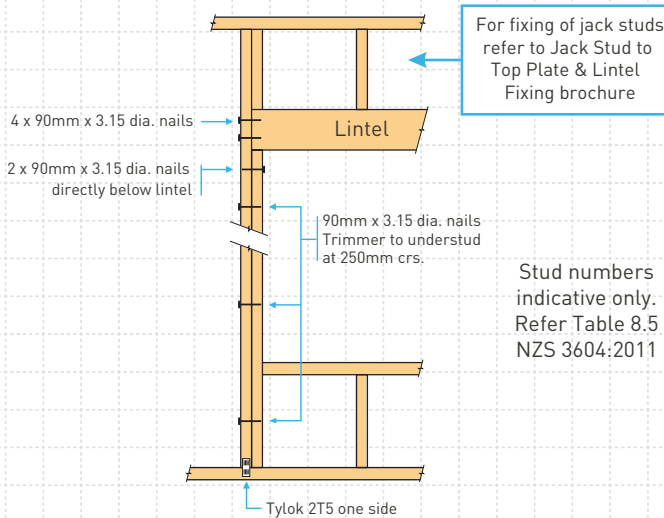
ALTERNATIVE TO TABLE 8.14 &amp; FIGURE 8.12 NZS 3604:2011

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

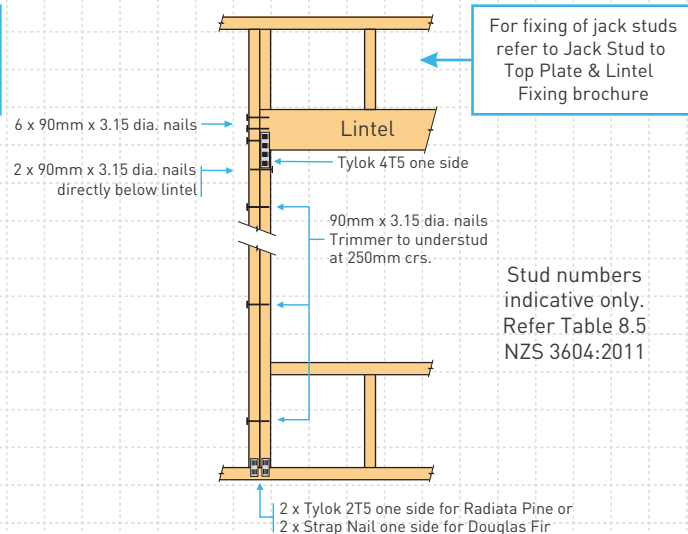
# LUMBERLOK® LINTEL FIXING OPTIONS

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

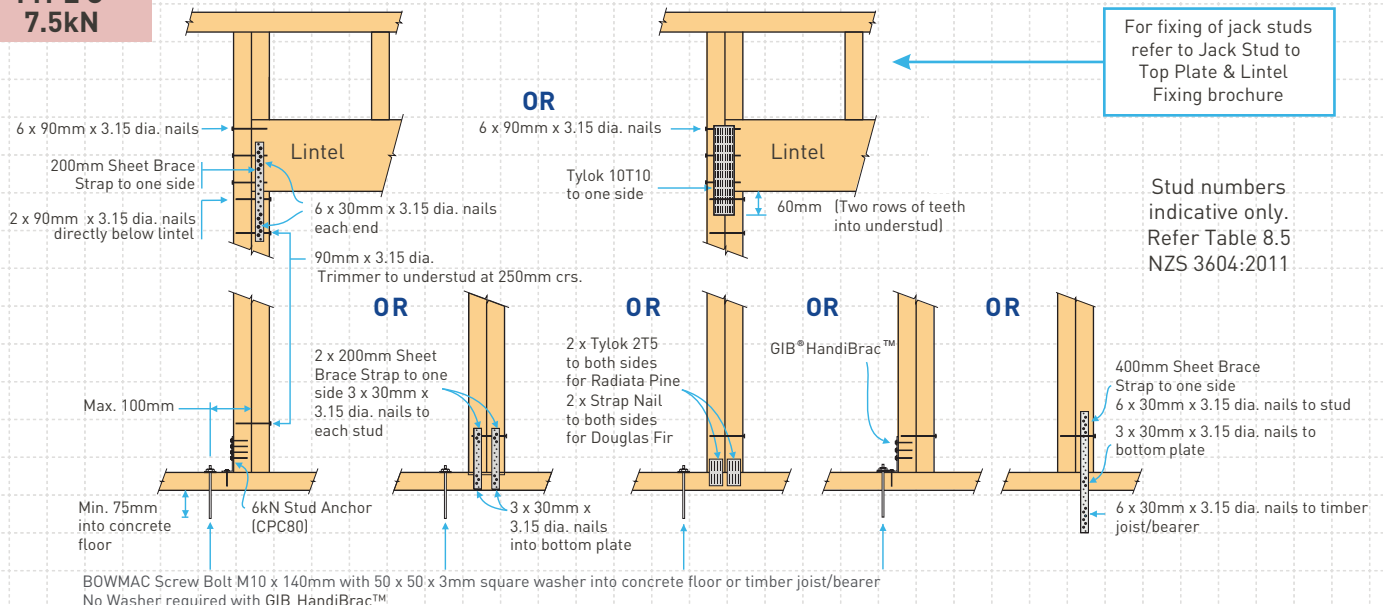
## TYPE E 1.4kN



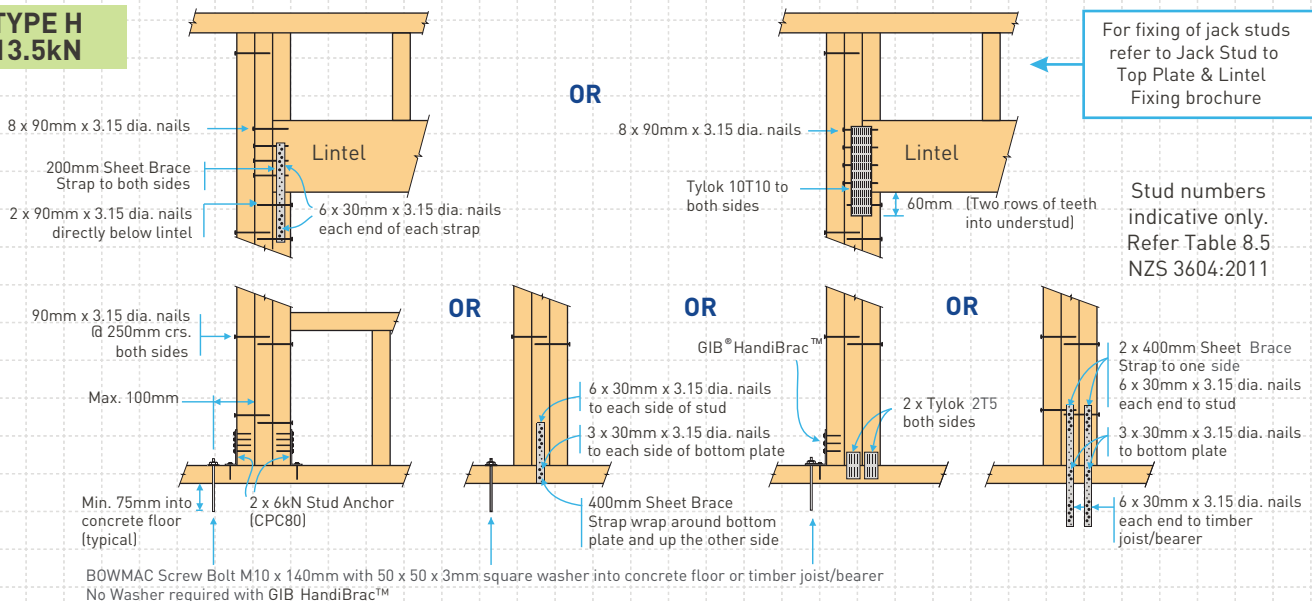
## TYPE F 4.0kN



## TYPE G 7.5kN



## TYPE H 13.5kN

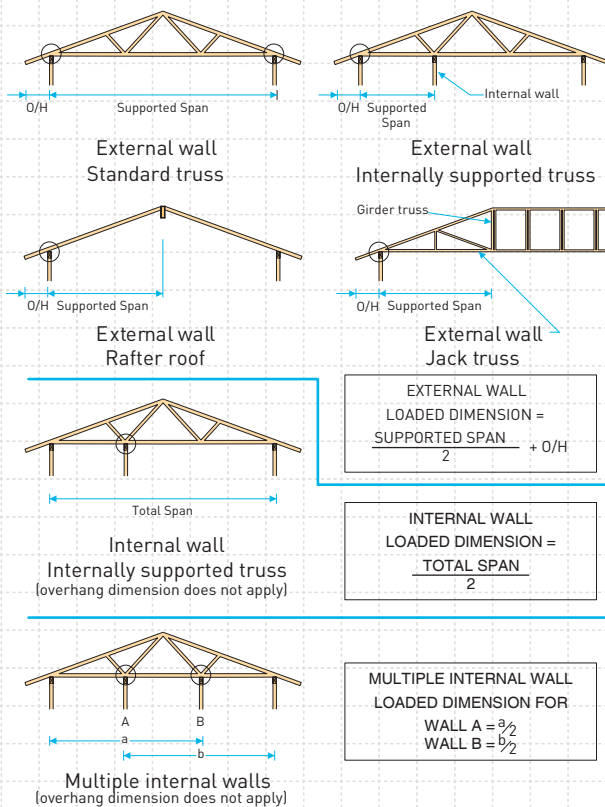


# STUD TO TOP PLATE FIXING SCHEDULE

## ALTERNATIVE TO TABLE 8.18 NZS 3604:2011

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

### LOADED DIMENSION DEFINITION

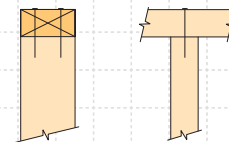


For Fixing Selection Chart refer chart on reverse page

### FIXING OPTIONS

#### FIXING TYPE A 0.7kN

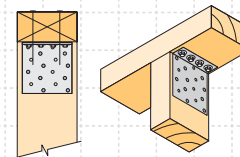
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



#### FIXING TYPE B 4.7kN

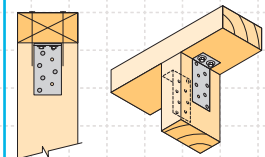
#### CHOOSE ANY OF THE 3 OPTIONS BELOW

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



Plus  
LUMBERLOK  
6kN Stud Anchor  
(CPC80)

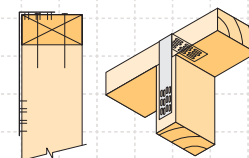
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus  
2 x LUMBERLOK  
CPC40

Recommended for internal wall options to avoid lining issues

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



Plus  
LUMBERLOK  
Stud Strap  
(one face only)

#### Note:

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



**STUD TO TOP PLATE FIXING SCHEDULE****FIXING SELECTION CHART**

(Suitable for walls supporting roof members at 600, 900 or 1200mm crs.)

**Wind Zones L, M, H, VH, EH, as per NZS 3604:2011**

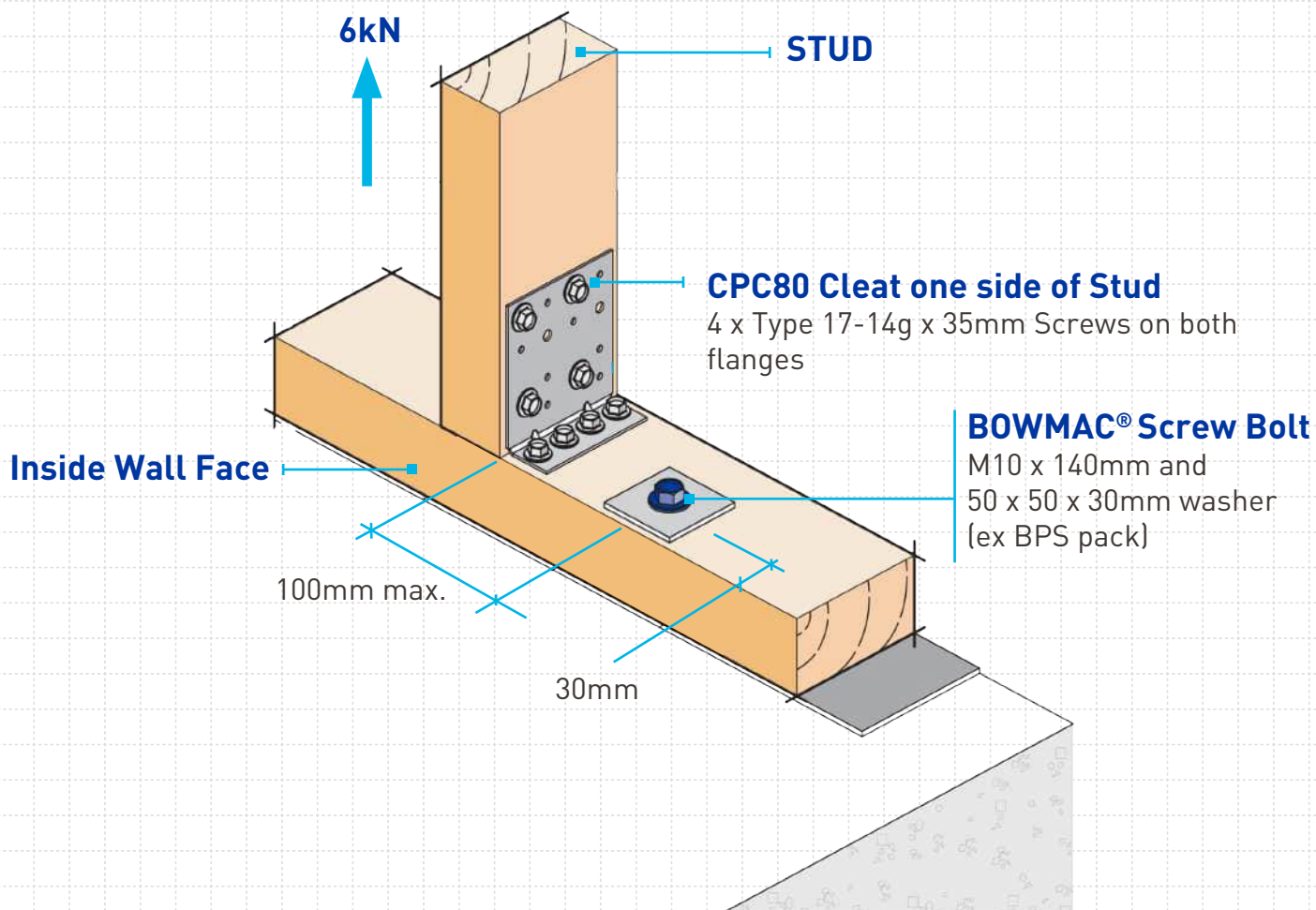
LOADED DIMENSIONS (M) STUD CENTRES			LIGHT ROOF WIND ZONE					HEAVY ROOF WIND ZONE				
300MM	400MM	600MM	L	M	H	VH	EH	L	M	H	VH	EH
3.0	2.3	1.5	A	A	B	B	B	A	A	B	B	B
4.0	3.0	2.0	A	A	B	B	B	A	A	B	B	B
5.0	3.8	2.5	A	B	B	B	B	A	A	B	B	B
6.0	4.5	3.0	A	B	B	B	B	A	A	B	B	B
7.0	5.3	3.5	A	B	B	B	B	A	A	B	B	B
8.0	6.0	4.0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



# 6kN STUD TO BOTTOM PLATE FIXING

IDEAL AS RETRO FIT FIXING AFTER LINING/CLADDING INSTALLED

FOR CONCRETE  
FLOOR SLABS



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

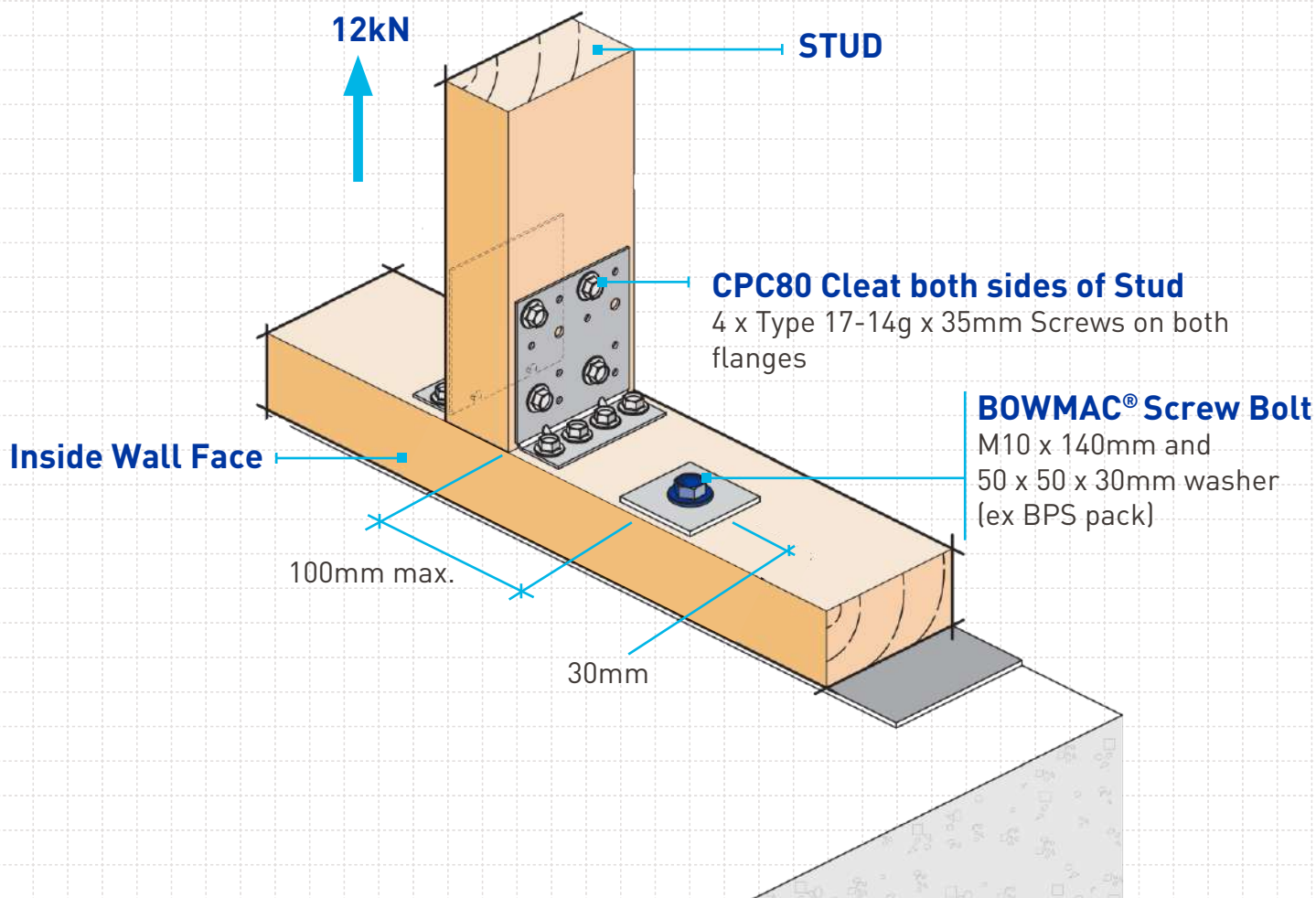
AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



# 12kN STUD TO BOTTOM PLATE FIXING

IDEAL AS RETRO FIT FIXING AFTER LINING/CLADDING INSTALLED

FOR CONCRETE  
FLOOR SLABS



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

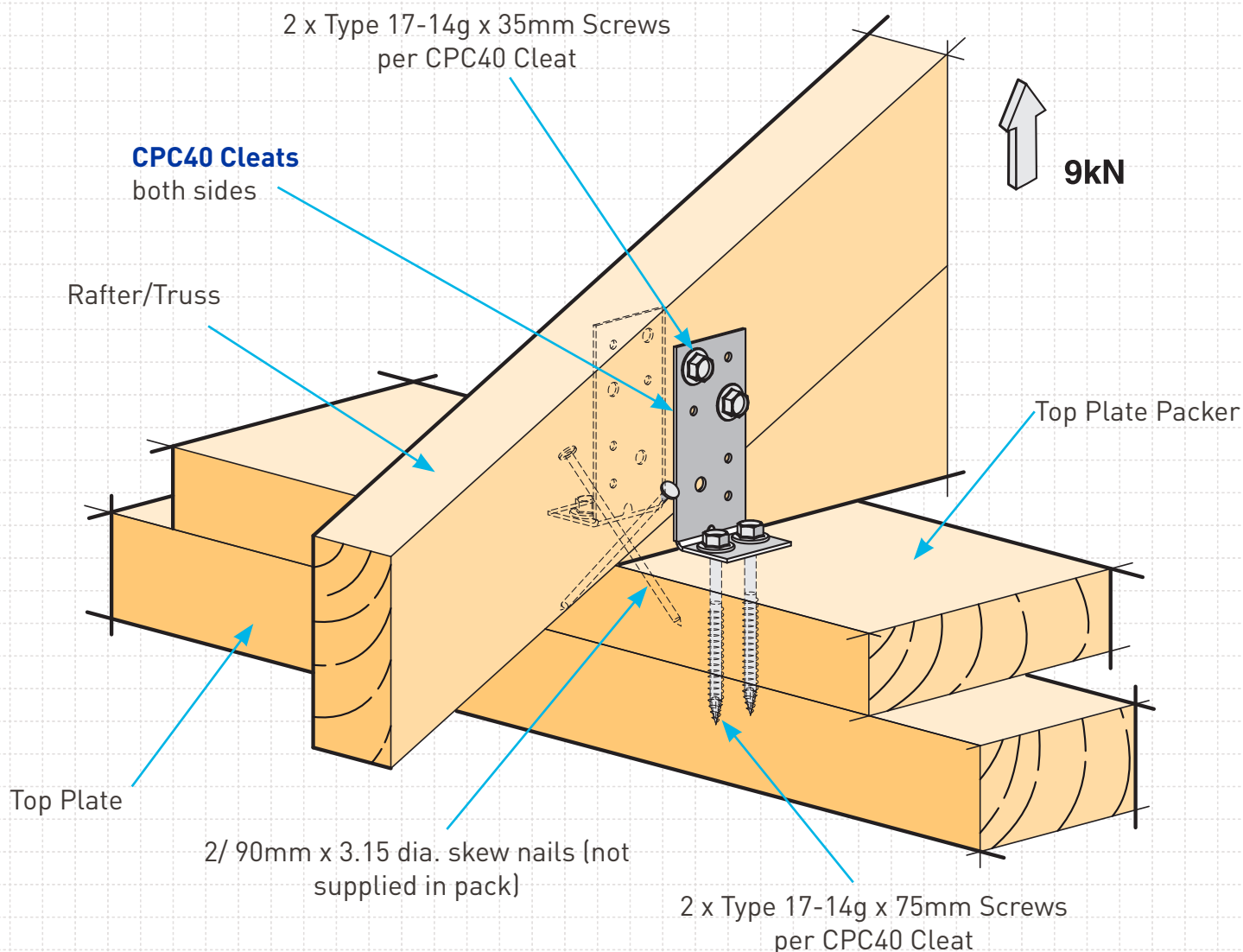
AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



# 9kN TRUSS TO TOP PLATE FIXING

COMPLIES WITH TABLE 10.15 NZS 3604:2011

→ Top mounted fixing allows additional face fixing if required.



**Code:** 9KNTTP  
**Material:** CPC40 1.55mm G300 Z275 Galvanised Steel  
**Packed:** 2 x CPC40 Cleats  
4 x Type 17-14g x 35mm Hex Head Galvanised Screws  
4 x Type 17-14g x 75mm Hex Head Galvanised Screws

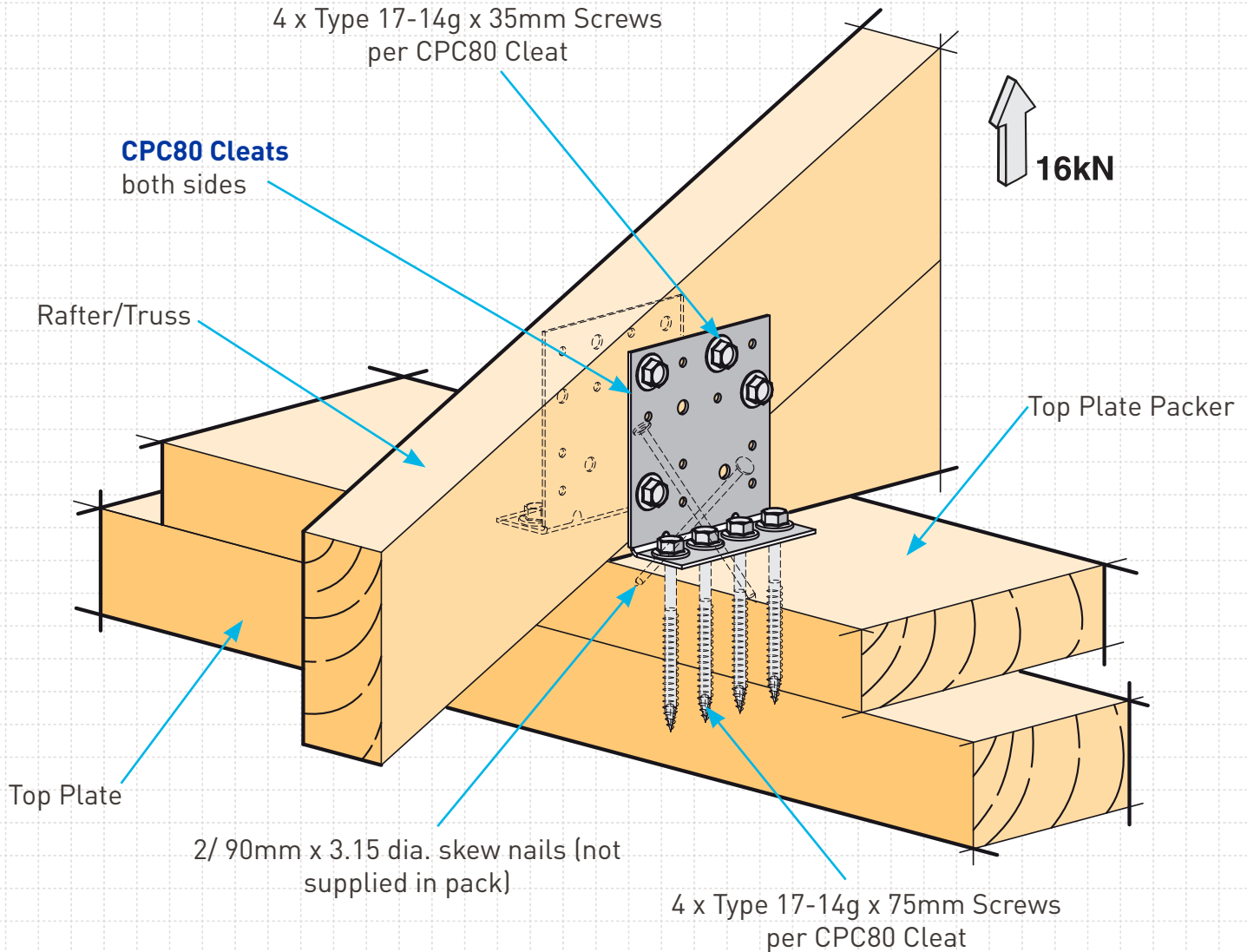
AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



# 16kN TRUSS TO TOP PLATE FIXING

COMPLIES WITH TABLE 10.15 NZS 3604:2011

➔ Top mounted fixing allows additional face fixing if required.



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

AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND

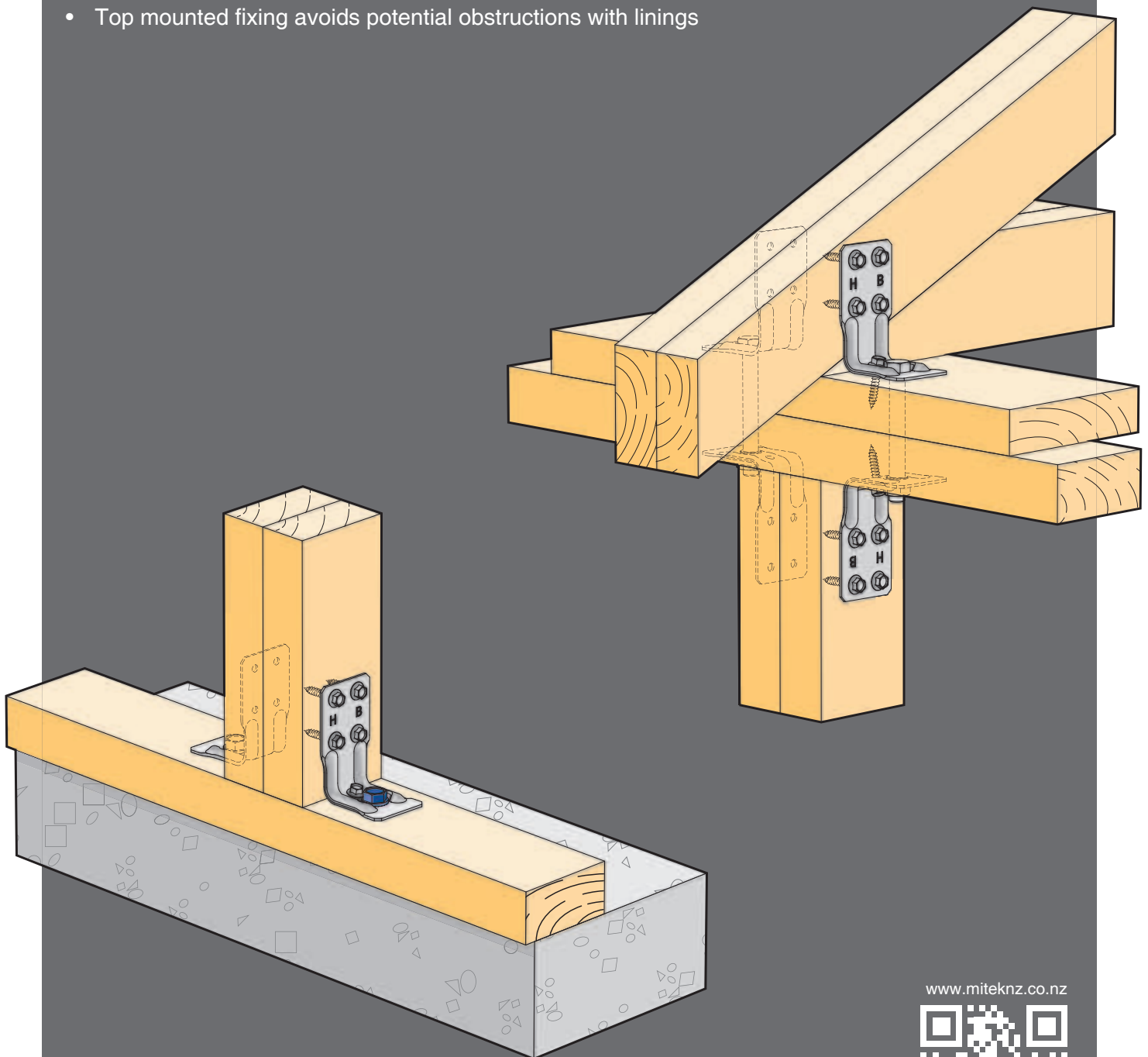




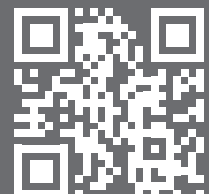
# 24kN Uplift Fixing

INCLUDES BOTH TRUSS FIXING AND BOTTOM PLATE FIXING

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

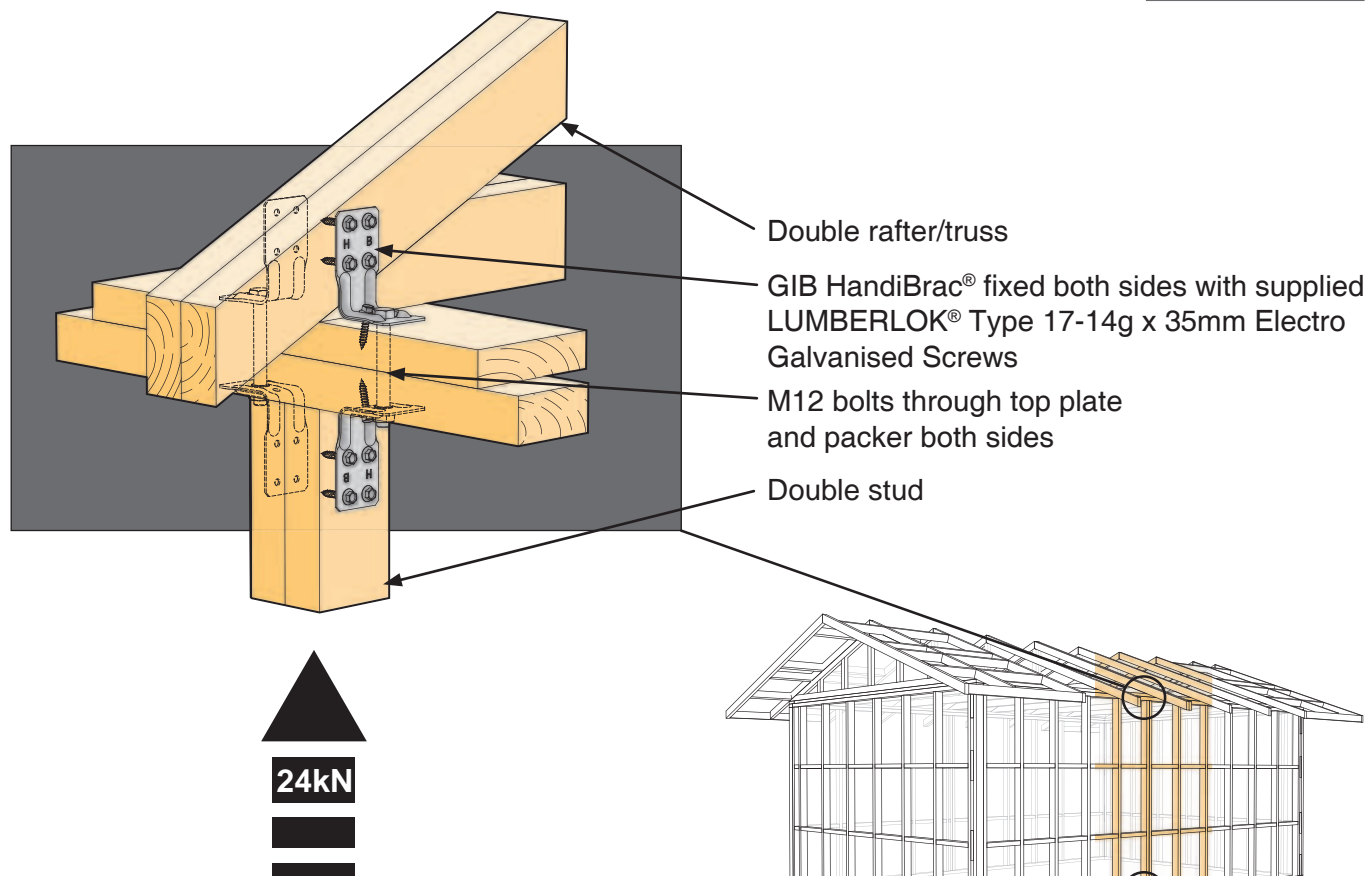


[www.mitek.nz.co.nz](http://www.mitek.nz.co.nz)

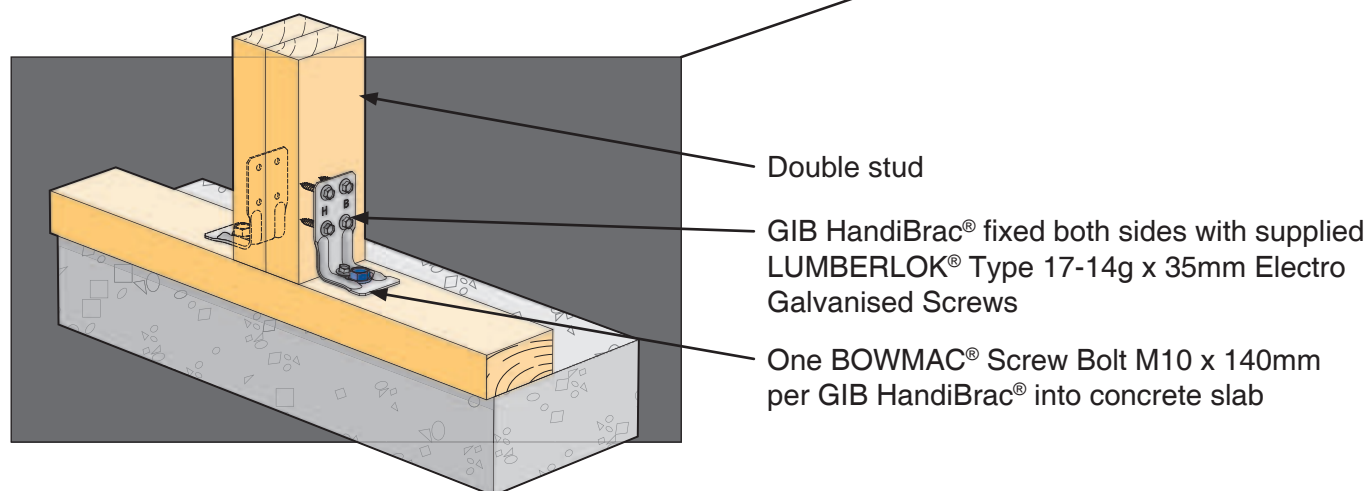




## Truss To Top Plate Fixing



## Stud To Bottom Plate Fixing



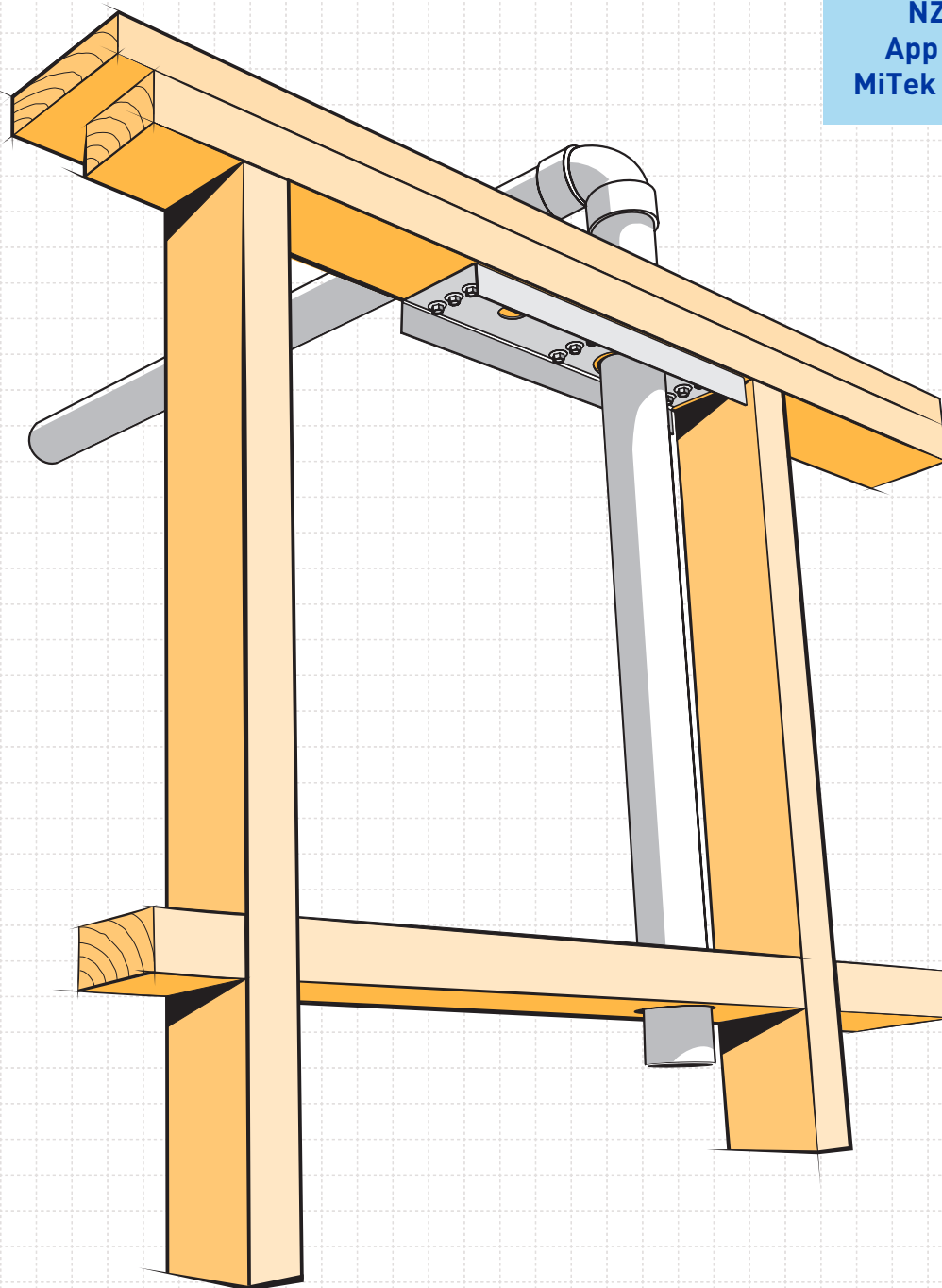
CODE	B24KNUF
MATERIAL	GIB HandiBrac® - 2.0mm G250 Z275 Galvanised Steel
PACKED	6 x GIB HandiBrac®
	2 x M12 120mm bolt and nut set
	2 x BOWMAC® Screw Bolt M10 x 140mm
	30 x LUMBERLOK® Type 17-14g x 35mm Electro Galvanised Screws

# TOP PLATE STIFFENER

## FOR PLUMBING OR VACUUM SYSTEM DUCTING THROUGH TOP PLATES

→ Reinforces the top plate back to FULL STRENGTH

→ Alternative solution to figure 8.20 NZS 3604:2011

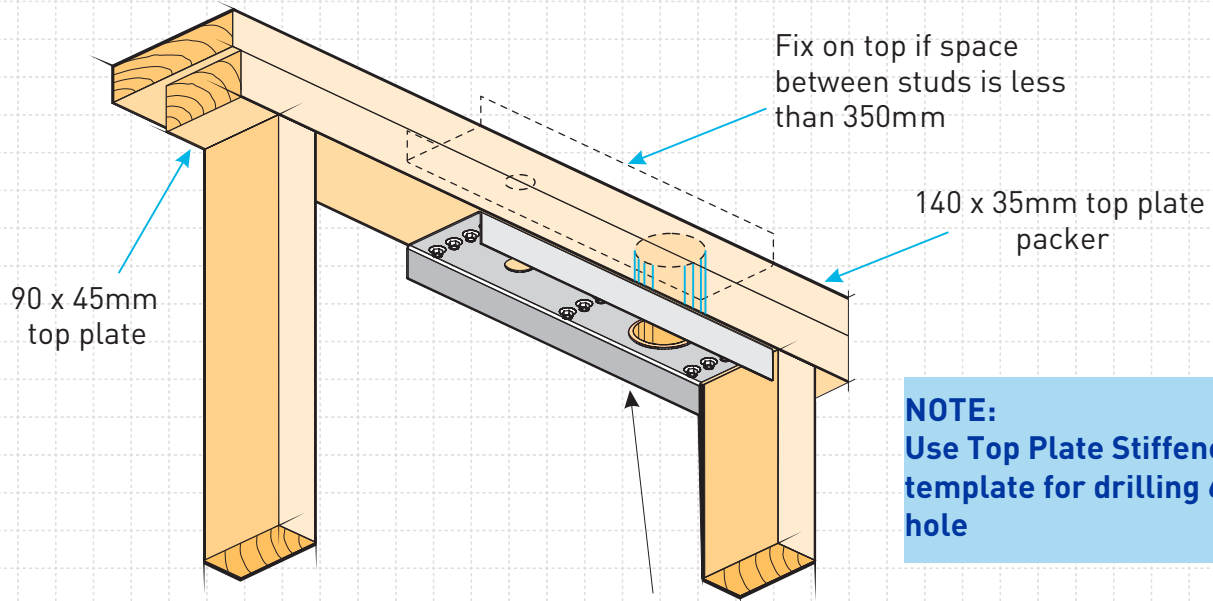


NZ REG DESIGN  
App 408133 © 2006  
MiTek New Zealand Ltd.

AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND

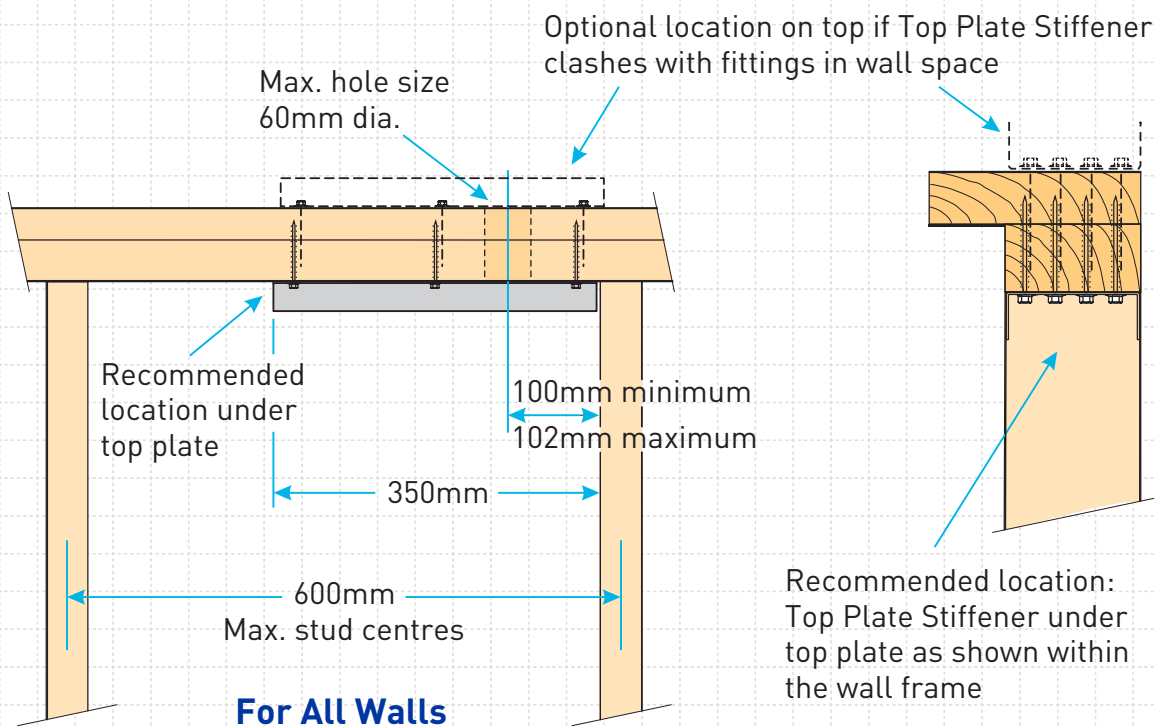


## TOP PLATE STIFFENER



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

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

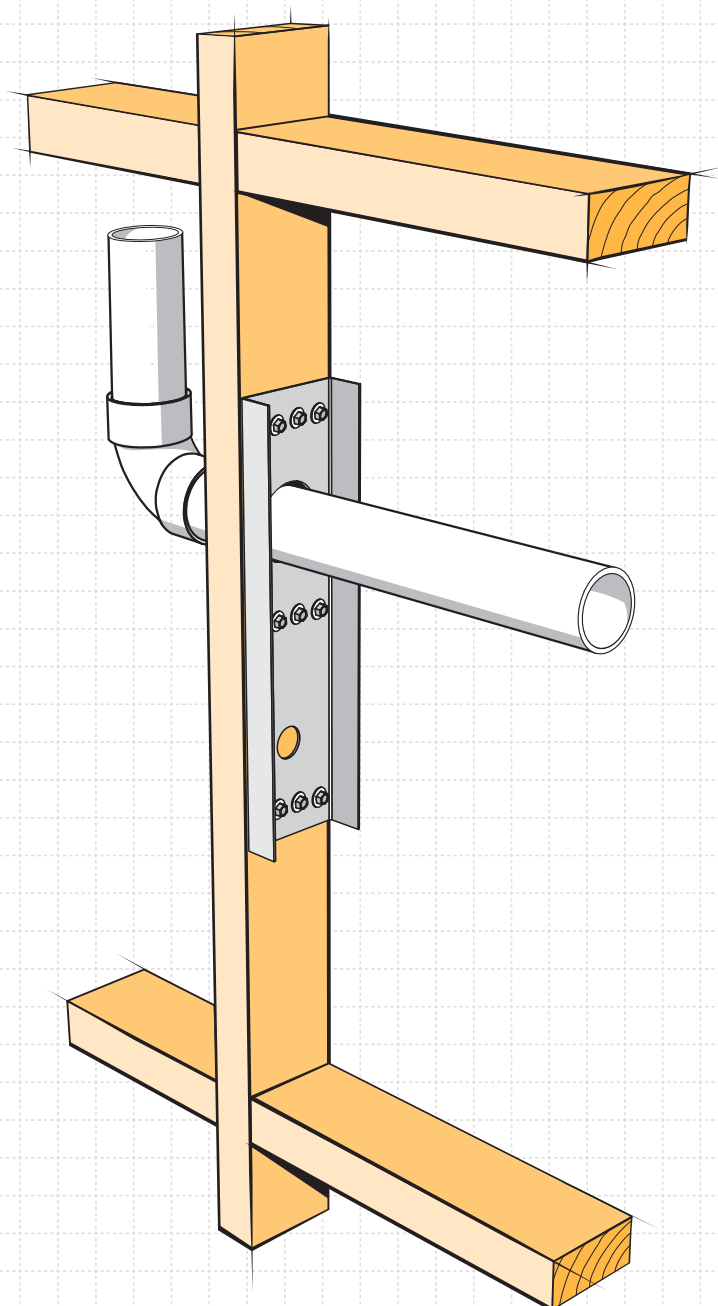


**Code:** TPS  
**Material:** 1.55mm G300 Z275 Galvanised Steel  
**Packed:** 8 x Framing Stud Stiffeners per carton  
100 x Type 17-14g x 75mm Hex Head Galvanised Screws

# FRAMING STUD STIFFENER

## FOR DUCTING THROUGH TIMBER STUDS

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



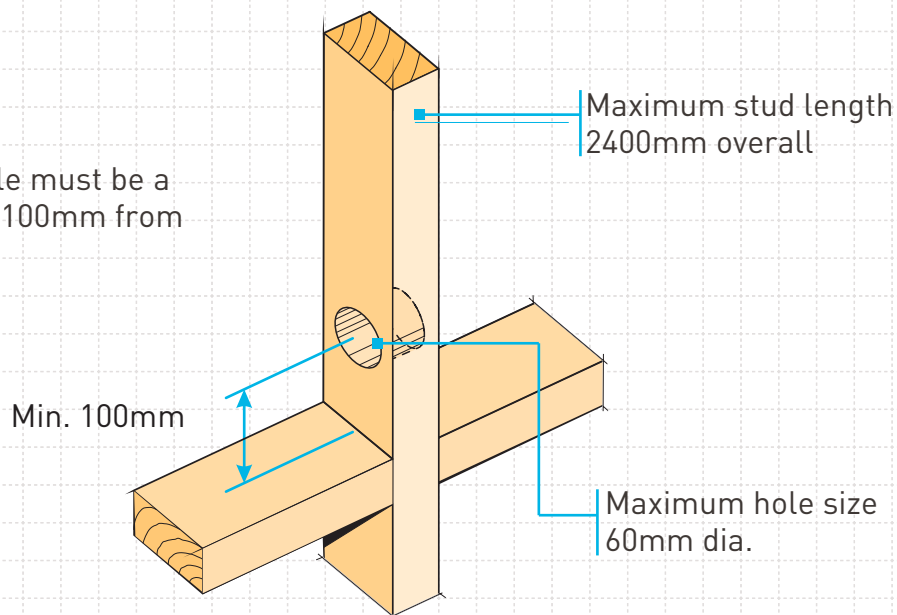
NZ reg. Design  
App. 408133 © 2006  
MiTek New Zealand

AVAILABLE FROM LEADING BUILDERS SUPPLY MERCHANTS THROUGHOUT NEW ZEALAND



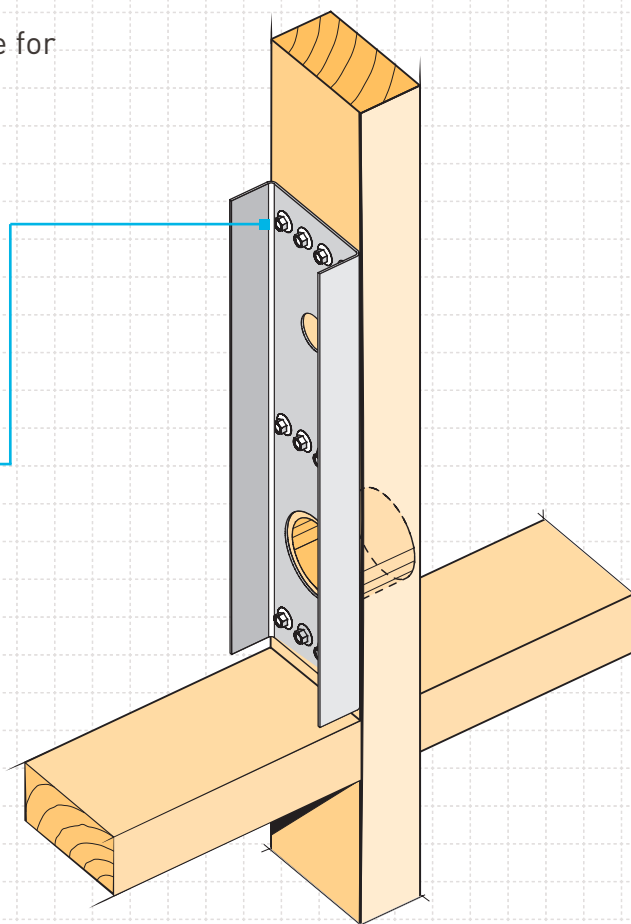
## FRAMING STUD STIFFENER

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



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

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



**Code:** FSS  
**Material:** 1.55mm G300 Z275 Galvanised Steel  
**Packed:** 8 x Framing Stud Stiffeners per carton  
100 x Type 17-14g x 35mm hex head Galvanised Screws



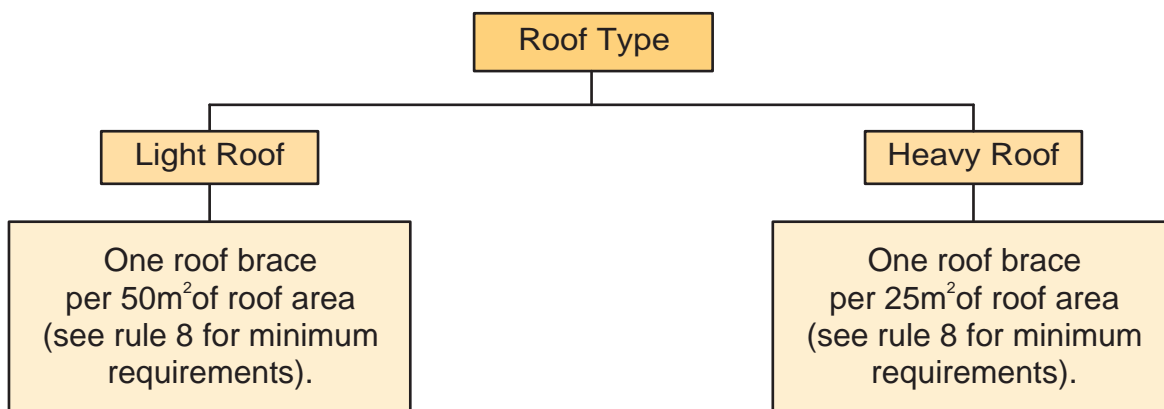


**LUMBERLOK®**

## ROOF BRACING SPECIFICATION AS PER NZS 3604:2011

- ★ Covers roof bracing requirements to resist horizontal loads as set out in NZS 3604:2011 Section 10.
- ★ A definitive guide to the description and installation of Roof Plane Braces and Roof Space Braces.

### Roof Bracing Requirements



### Roof Bracing - Rules & Definitions

1. The bracing described in this brochure covers both framed roofs and fully trussed roofs.
2. Roof planes less than 6m<sup>2</sup> (e.g. dormers & porches) do not require bracing.
3. Roof braces can consist of either i) Roof Plane Brace or ii) Roof Space Brace or combination of the two.
4. Roof braces are not required on roofs where sarking is installed as per NZS 3604:2011 Clause 10.4.4 or where a ceiling diaphragm is installed and is attached to the rafters.
5. Roof area is the actual plan area of the roof and includes overhangs.
6. A hip or valley rafter running continuously from ridge to top plate can be classed as one roof plane brace.
7. A pair of crossed LUMBERLOK Strip Brace (preferred for ease of installation) can be classed as one roof plane brace and shall be installed as detailed in this brochure.
8. There must be at least one roof plane brace in each roof plane. Each ridge line shall have a minimum of two roof braces.
9. Every design effort should be made to distribute the roof braces as evenly as possible over the entire roof area and run alternately in opposite directions.

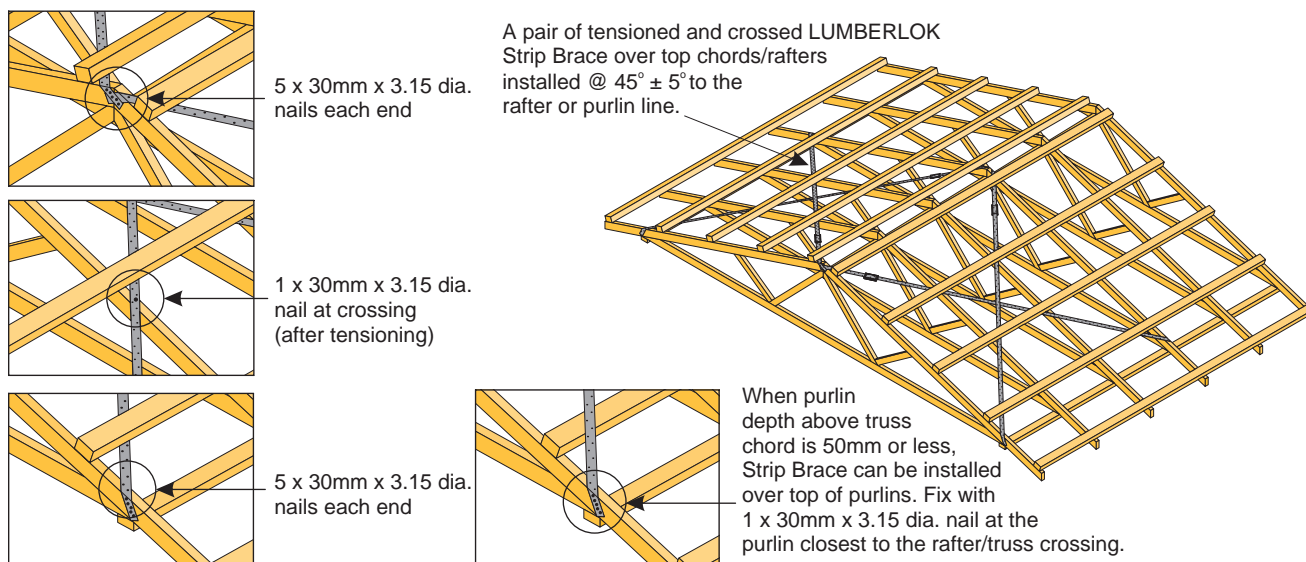
## i) ROOF PLANE BRACE

Each roof plane brace can be:

- A hip or valley rafter running continuously from ridge to the top plate in accordance with NZS 3604:2011 Clauses 10.2.1.3.2 or 10.2.1.3.3

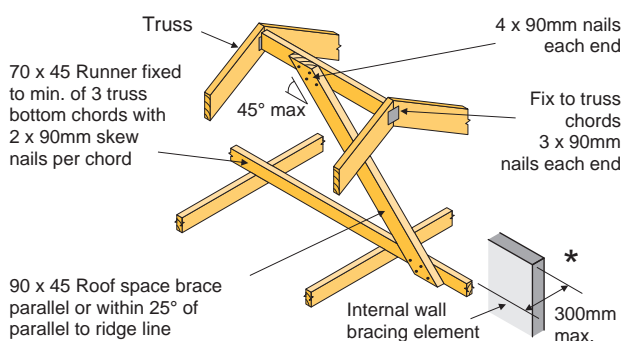
OR

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

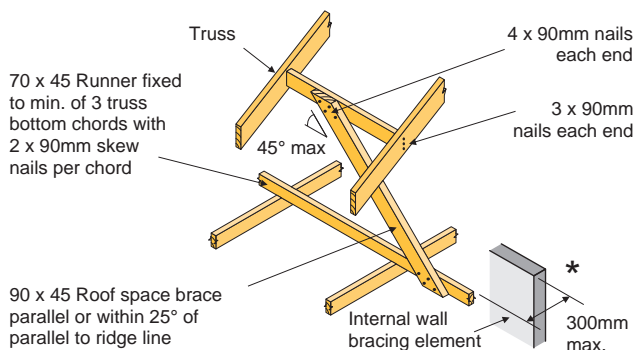


## ii) ROOF SPACE BRACE

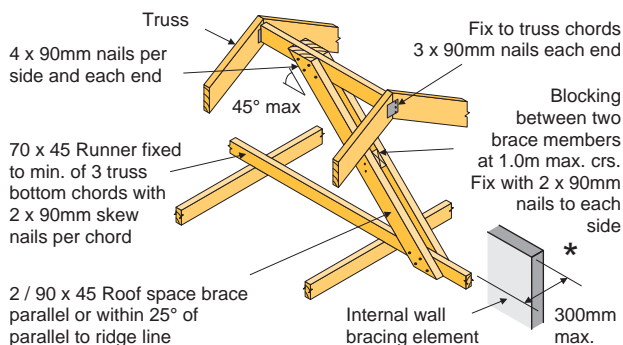
### (A) Less than 2m long.



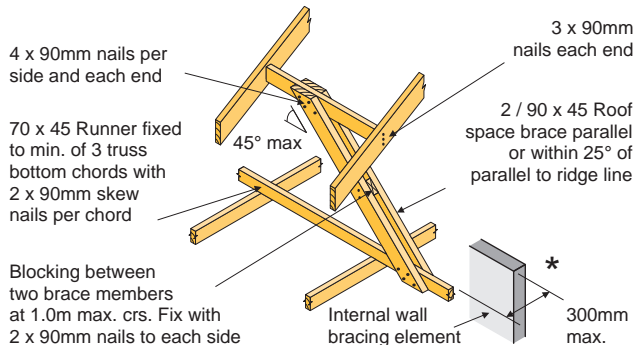
### (C) Not directly under the ridge - less than 2m long.



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



### (D) Not directly under the ridge - more than 2m long.



\* Not required when a ceiling diaphragm complying with Clause 13.5 of NZS 3604:2011 is used.

## Producer Statement PS1 – BOWMAC® Screw Bolt M10 x 140mm

ISSUED BY: MiTek New Zealand Limited

IN RESPECT OF: BOWMAC® Screw Bolt M10 x 140mm

**DESCRIPTION:** BOWMAC® screw bolts M10 x 140mm are identified with blue hexagonal heads and a marking “BOWMAC” stamped on the head. They are manufactured from heat treated carbon steel with a nominal tensile strength  $f_u = 1000$  MPa and yield strength  $f_y = 900$  MPa. They have a nominal shank diameter of 10mm. The shank length is 140mm of which 95mm is threaded. They are protected with nominal zinc plating of 5 micron.

**USES:** Can be used as proprietary post fixed bottom plate anchor and in conjunction with GIB HandiBrac® for fixing proprietary bracing systems to concrete and timber floors.

### CHARACTERISTIC WITHDRAWAL STRENGTH:

- 1) In Header Block Concrete = **20.4 kN**
- 2) In Timber 140x45 SG8 on edge = **12 kN**
- 3) Internal Rib Raft Slab 85mm thick = **19.8 kN** (adjusted for 20 MPa concrete)
- 4) Edge of Rib Raft Slab 35mm edge distance = **17.9 kN** (adjusted for 20 MPa concrete)

### REFERENCE TESTS:

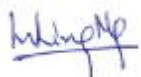
- 1) BRANZ Test Report ST0895 Proprietary Bottom Plate Anchor for MiTek New Zealand Limited 12-10-2012
- 2) MiTek NZ Test Report for BOWMAC® Screw Bolt in Timber Joist, December 2012
- 3) MiTek tests on Firth Rib Raft slab CH31755-1; 13/07/2022
- 4) MiTek tests on Firth Rib Raft slab CH31755-2; 13/07/2022

On behalf of MiTek New Zealand Limited and subject to:

- 1) **Fixing to concrete floor or concrete masonry header block**
  - 1.1. Minimum concrete strength shall be 17.5 MPa
  - 1.2. Minimum edge distance to centre of screw bolt shall be 55mm
  - 1.3. Minimum embedment depth in concrete shall be 88mm
  - 1.4. Drill 10mm diameter hole x 95mm minimum depth and clean out dust and debris
  - 1.5. For 100mm slab apply silicone sealant to bottom of hole to prevent water ingress, or increase slab to 120mm minimum under bracing walls
  - 1.6. In sea-spray zones, masonry header block shall be waterproofed/weather-proofed to the requirements of NZS4210:2001
- 2) **Fixing to timber floor**
  - 2.1. Minimum timber grade shall be MSG8, VSG8 or SG8
  - 2.2. Moisture content of timber joist shall be less than 18%
  - 2.3. Minimum joist size shall be 140x45 mm on edge
  - 2.4. Minimum embedment depth in joist shall be 66mm
  - 2.5. Drill 8mm diameter hole x 74mm minimum depth near centreline of joist
- 3) **Fixing to Rib Raft Slab**
  - 3.1. Minimum concrete strength shall be 20 MPa
  - 3.2. Minimum edge distance to centre of screw bolt shall be 35mm
  - 3.3. Minimum embedment depth in concrete edge shall be 88mm
  - 3.4. Drill 10mm diameter hole x 95mm minimum depth into edge beams or ribs
  - 3.5. For internal slab drill 10mm hole through slab
  - 3.6. In sea-spray zones, external face of edge beams shall be waterproofed/weather-proofed
- 4) **General Requirements**
  - 4.1. BOWMAC® screw bolts can be used in **ALL ZONES** in a “Closed” environment in accordance with Table 4.1 of NZS3604:2011
  - 4.2. Installation shall be in accordance with the manufacturer’s technical literature “BOWMAC Bottom Plate Screw Bolt” and “GIB HandiBrac® Panel Hold-Down Bracket” brochure packed with product
  - 4.3. All proprietary products meeting their performance specification requirements

I BELIEVE ON REASONABLE GROUNDS that the use of BOWMAC® screw bolts in buildings if constructed in accordance with the drawings, specifications, and other documents provided, will comply with Clause B1 and B2 of the NZ Building Code.

For and on behalf of MiTek New Zealand Limited



In Ling Ng  
Engineering Manager New Zealand  
BE (Hons), CMEngNZ, IntPE, CPEng (146585)

Date: 8 November 2022





# EzyBrace® Systems

Specification and installation manual



CBI 5113

AUGUST 2016

**NATIONAL SUPPORT**

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

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

**PHONE:** +64 9 633 0100

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

**EMAIL:** [info@gib.co.nz](mailto:info@gib.co.nz)

**WEB:** [gib.co.nz](http://gib.co.nz)

**GIB® HELPLINE**

0800 100 442



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

**NEW GIB EZYBRACE® 2016 DESIGN SOFTWARE**

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

**NEW GIB® BRACING ELEMENT GS2-NOM**

- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute to bracing resistance.
- Potentially reduces the amount of fasteners<sup>1</sup>
- Encourages more even bracing distribution throughout the building.

<sup>1</sup> Actual savings dependent on building and bracing design

**UPDATE TO OPENINGS IN BRACING ELEMENTS AND CEILING DIAPHRAGMS**

- Large hole specification updated to use a more conservative methodology.
- Guidance included for fireplace flues and range hoods.

**NEW — GIBFIX® FRAMING SYSTEM**

- Reduced potential for fastener pop and joint cracking as a result of timber frame movement.
- Reduced potential for on-site call backs.
- Improved thermal performance.
- Reinforced plasterboard junctions.



**BRANZ Appraised**  
Appraisal No.928 [2016]

## CONTENTS

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



## GIB EzyBrace® Systems — August 2016

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

### USE ONLY THE CURRENT SPECIFICATION

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

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

### PATENTS

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

## Beware of substitution

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

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

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

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

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

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

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



## Scope of use

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

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

## Finish quality — framing and substrates

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

## New GIBFix® Framing System

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

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

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

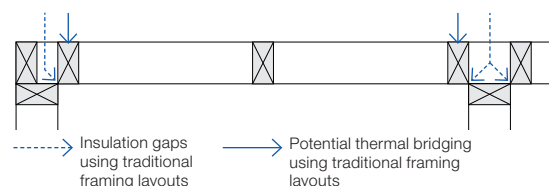
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

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

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

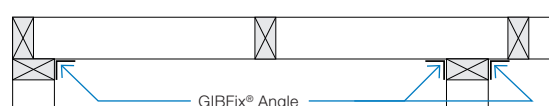
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

FIGURE 1: TRADITIONAL WALL FRAMING LAYOUT



GFS004

FIGURE 2: GIBFix® FRAMING SYSTEM (ALTERNATIVE LAYOUT)



GFS005

## NEW GS2-NOM Bracing Element

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

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

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

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

1. Actual savings dependent on building and bracing design.



## Compliance with the NZ Building Code

### NZBC CLAUSE B1 — STRUCTURE

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

### NZBC CLAUSE B2 — DURABILITY

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

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

### NZBC CLAUSE F2 — HAZARDOUS BUILDING MATERIALS

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

### NZBC CLAUSE H1 — ENERGY EFFICIENCY

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

## CAD design details

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

## Appraisal

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

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



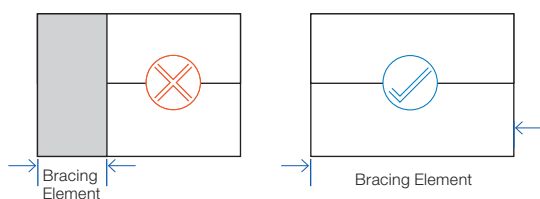


## Bracing resistance

### WALL BRACING LAYOUT

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

FIGURE 3: WALL BRACING LAYOUT



### BRACING DISTRIBUTION

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

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

Space bracing lines no more than:

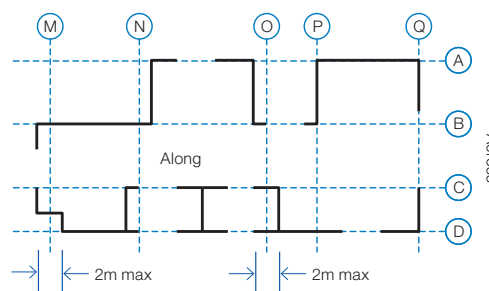
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

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

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

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

FIGURE 4: BRACING GRID LAYOUT



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

### GIB EZYBRACE® SYSTEMS

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

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

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

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

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

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

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

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



## Bracing demand

### GIB EZYBRACE® CALCULATOR

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

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

### DEMAND

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

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

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

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

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

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

**GIB EzyBrace® Bracing Software**

**JOB DETAILS**

Name: Ashburton  
Owner and Number: 100 Ashburton  
Lot and DP Number: Lot 101 DP 101  
City/Town/Region: Ashburton  
Designer: GIB Limited  
Company: GIB Limited  
Date: 1/10/16

**Building Specification**

Number of Storeys: Single  
Floor Loading: 2.0 kPa  
Foundation Type: Sub

**Bracing Location**

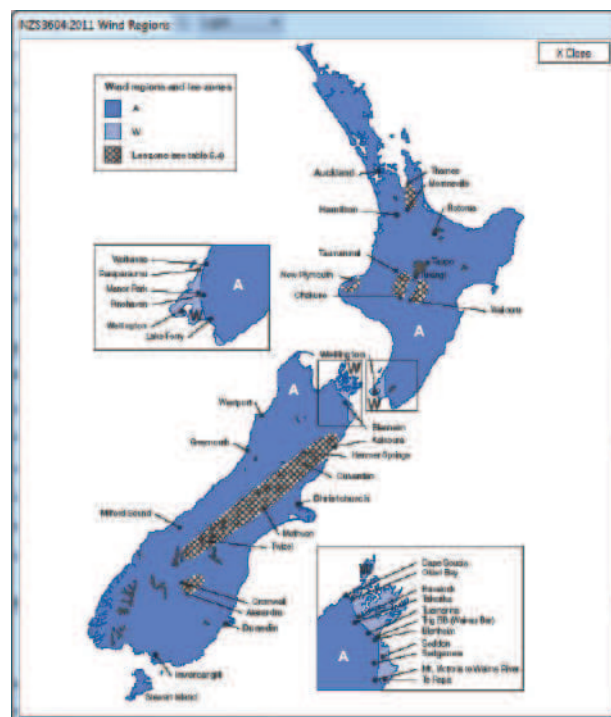
Wind Zone: Low  
Wind Speed at Ground Level: Not Available  
Wind Region: A  
Use Data: No  
Ground Roughness: 1  
Site Exposure: Standard  
Topography Class: 1

**Bracing Units required for Wind**

Storey Level	Strong	Active
Single Level	258	202

**Bracing Units required for Earthquake**

Storey Level	Strong and Active
Single Level	204



Download GIB EzyBrace® 2016 design software from [gib.co.nz/ezybrace](http://gib.co.nz/ezybrace)



## Software functionality

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

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

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

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

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

Line	Ext. Len. (m)	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BU)	Earthquake (BU)	Wind Demand	Earthquake Demand
a	11.25	1	0.5		2.44	GSP-H	GIB	57	58	1499 229%	1492 170%
		2	1.1		2.44	GSP-H	GIB	72	65		
		3	0.5		2.44	GSP-H	GIB	57	73		
b	6.41	1	1.2		2.44	GSP-H	GIB	81	71	153 OK	196 OK
		2	0.6		2.44	GSP-H	GIB	34	35		
		3	4		2.44	GSP-H	GIB	197	197		
c		1	3.2		2.44	GSP-H	GIB	157	157	312 OK	302 OK
d		1	7.5		2.44	GSP-H	GIB	385	385	157 OK	157 OK
e	17.5	1	0.5		2.44	BL-H	GIB	58	60	389 OK	389 OK
		2	0.5		2.44	BL-H	GIB	58	60		
		3	0.8		2.44	GSP-H	GIB	46	46		
		4	2.1		2.44	GSP-H	GIB	143	124		
		5	1.2		2.44	GSP-H	GIB	142	153		

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

Download GIB EzyBrace® 2016 design software from [gib.co.nz/ezybrace](http://gib.co.nz/ezybrace)

Line	Ext. Len. (m)	Element	Length (m)	Angle (degrees)	Type	Supplier	Wind (BU)	Earthquake (BU)	Wind Demand	Earthquake Demand
A		1	1		Braced Pile	1/25/3604	160	129	1100 258%	780 114%
		2	1		Anchor Pile	1/25/3604	160	129		
		3	1		Braced Pile	1/25/3604	160	129		
B		1	1		Braced Pile	1/25/3604	160	129	480 OK	360 OK
		2	1		Anchor Pile	1/25/3604	70	36		
		3	1		Braced Pile	1/25/3604	70	36		
C		1	1		Anchor Pile	1/25/3604	160	129	320 OK	240 OK
		2	1		Anchor Pile	1/25/3604	160	129		



## Software functionality

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

FIGURE 8: GIB EZYBRACE® 2016 — CUSTOM ELEMENTS SHEET

Supplier	System	Min. Length (m)	Wind Bluffing	EQ Bluffing	Element Height (m)	Element Foundation (m)	Import/Export
Custom1	CUR 6.4	6.4	85	95	10	10	Import/Export Custom Elements
Custom1	CUR 6.6	6.6	85	95	10	10	
Custom1	CUR 1.2	1.2	125	135	10	10	
Custom2	CUR 6.4	6.4	95	105	10	10	
Custom2	CUR 6.6	6.6	127	137	10	10	
Custom2	CUR 1.2	1.2	164	174	10	10	
Engineer	Portal	1	200	200	10	10	

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

Help can be accessed by pressing the ? symbol which displays a window with further information.

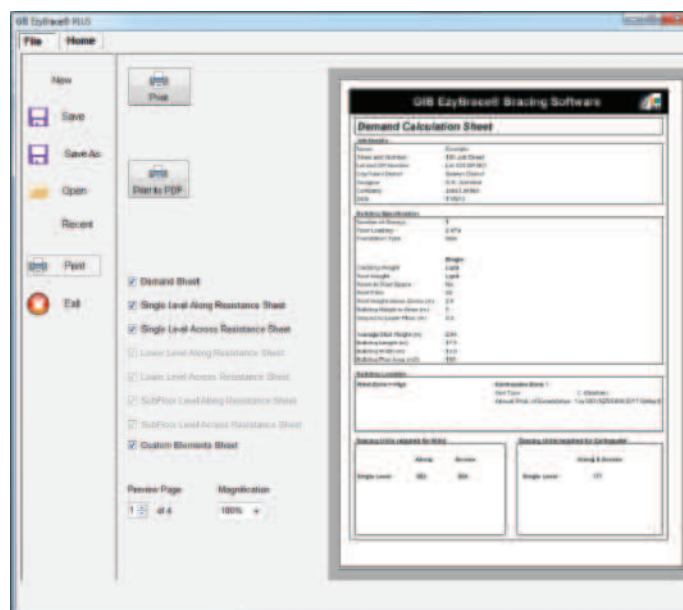
The GIB EzyBrace® 2016 software has a number of options that can be accessed via the File tab at the top left hand corner of the window. The options include: New, Save, Save As, Open, Recent and Print.

- The New option closes any opened job ready for the input of a new job.
- The Save option saves the currently opened job to the same filename and the Save As option saves the job to a new filename.

- The Open option prompts for the name of an existing job.
- The Recent option displays a list of the ten latest jobs and allows for the selection of one of these jobs to be opened.
- The Print option displays the print screen. In this screen, a print preview is displayed. The print preview can be copied to the clipboard by clicking the right-hand mouse button. Also on the print screen is the option to choose which pages are to be printed and the option to print the output to a portable data format, PDF, file.
- The Print Screen View is shown in figure 9.

FIGURE 9: GIB EZYBRACE® 2016 — PRINT SCREEN VIEW

Download GIB EzyBrace® 2016 design software from [gib.co.nz/ezybrace](http://gib.co.nz/ezybrace)





## GIB® plasterboard linings

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

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

### LIMITATIONS

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

## GIB EzyBrace® Systems in water-splash areas

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

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

## Renovation

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

## Openings in bracing elements

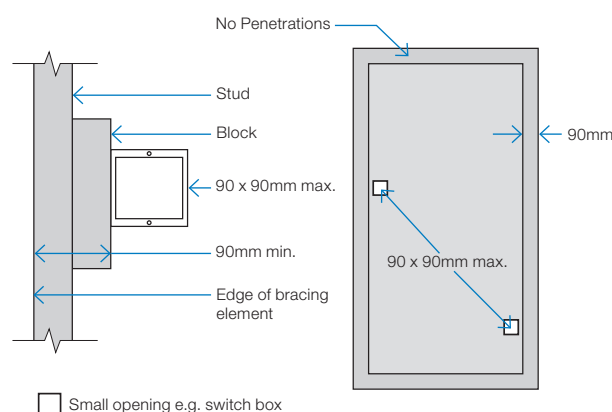
### SMALL OPENINGS

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

### LARGE OPENINGS

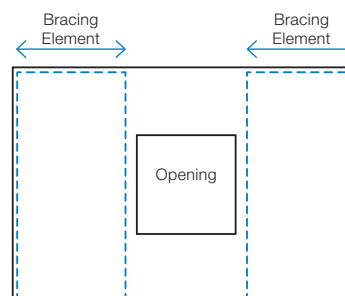
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GEB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS







## Timber framing

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

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

## GIBFix® Framing System (alternative layout)

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

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

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

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

For full specification details refer to GIBFix® Framing System literature available at [gib.co.nz/gibfix](http://gib.co.nz/gibfix).

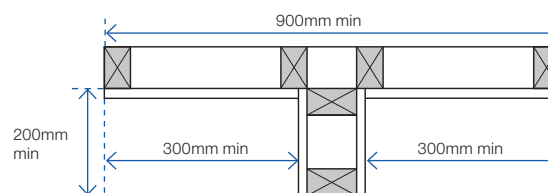
## Guidelines for intersection walls

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

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

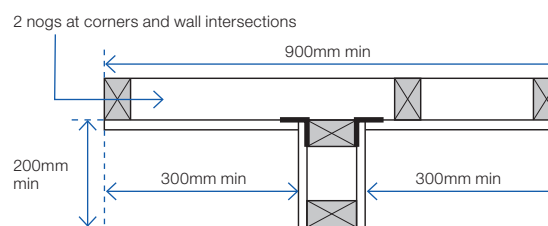
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



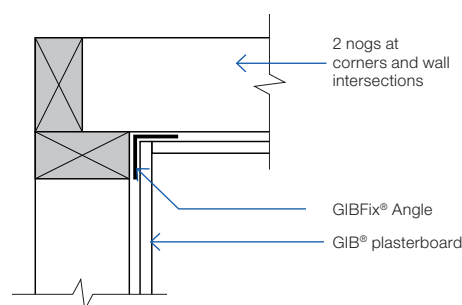
GEB002

FIGURE 13: WALL INTERSECTION (GIBFix® FRAMING SYSTEM)



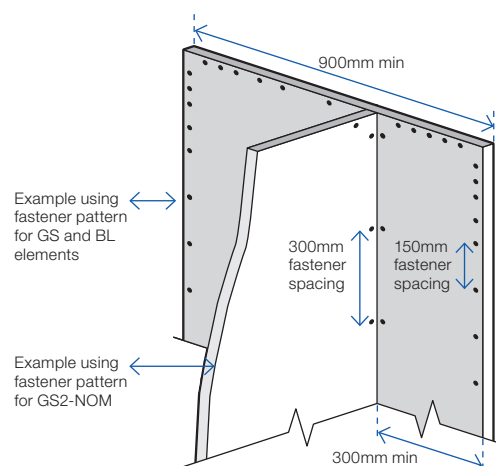
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFix® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

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



## Top plate connections

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

## Parapets and gable end walls

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

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

or

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

## Bottom plate fixing

### TIMBER FLOOR

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

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

### CONCRETE FLOOR – EXTERNAL WALL BRACING ELEMENTS

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

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

### CONCRETE FLOOR – INTERNAL WALL BRACING ELEMENTS

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

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

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

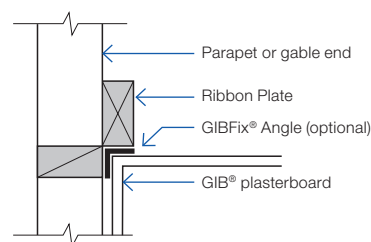
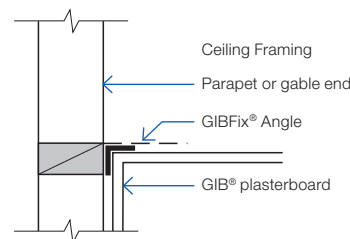


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

### BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

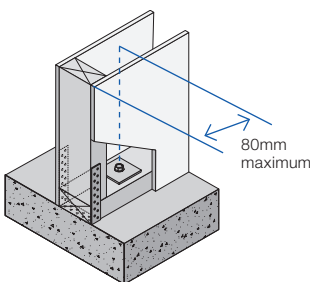
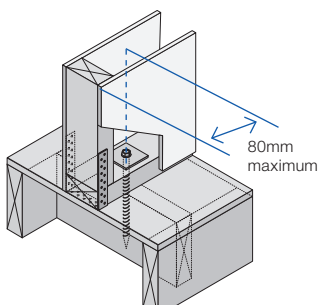
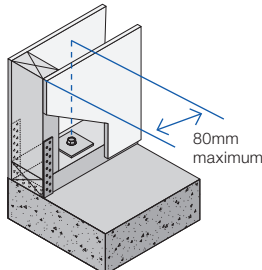
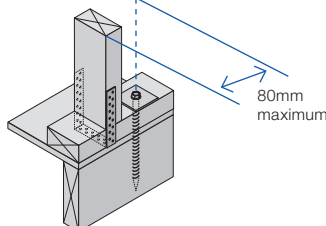
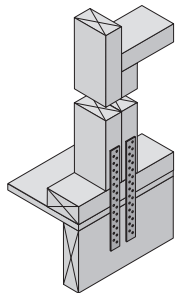
Brace type	Concrete slabs		Timber floors
	External wall	Internal wall	External and Internal walls
GS1-N	As per NZS 3604:2011. No specific additional fastening required.	As per NZS 3604:2011. Alternatively use 75 x 3.8mm shot-fired fasteners with 16mm discs, 150mm and 300mm from each end of the bracing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



## Bracing strap installation

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

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

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

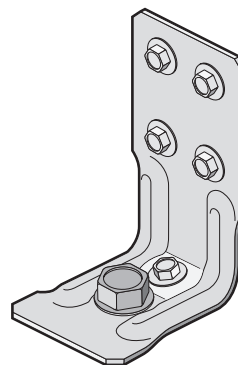


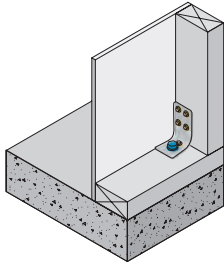
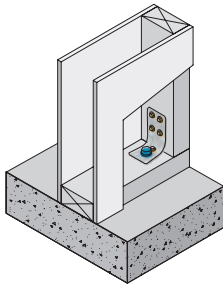
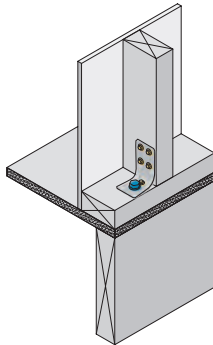
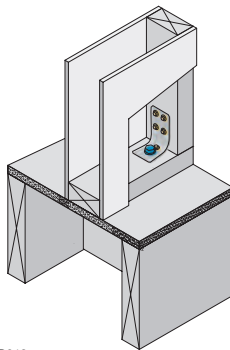
## GIB HandiBrac® installation

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

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

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



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



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

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

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

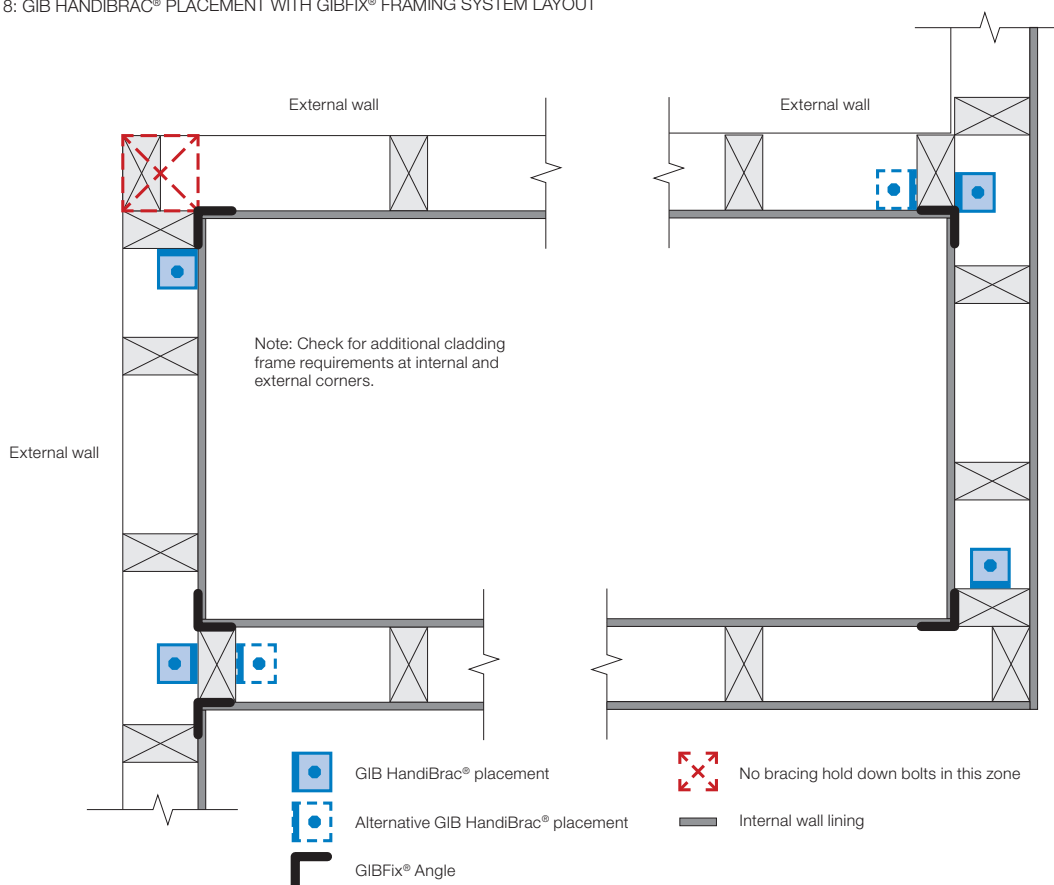
The GIB HandiBrac® is fixed to the stud which has the GIBFix® Angle.

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

### TIMBER FLOORS

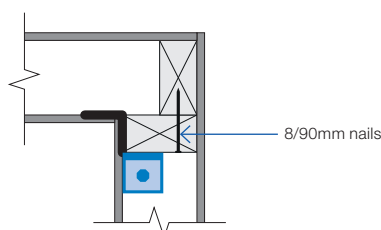
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

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



GEB013

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



GEB014





## Ceiling diaphragms

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

## Limitations for GIB® plasterboard ceiling diaphragms

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

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

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

Diaphragms outside these parameters must be specifically designed.

### General fixing requirements for GIB® Ceiling Diaphragms:

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

FIGURE 20: PROTRUSIONS AND CUTOUTS

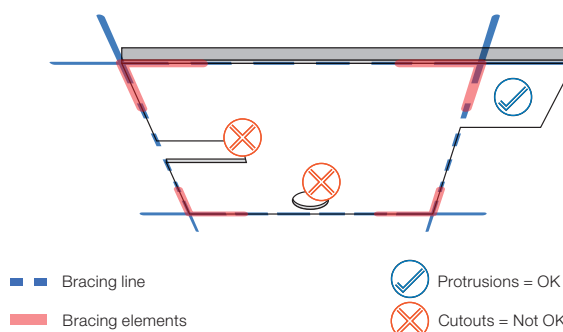


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

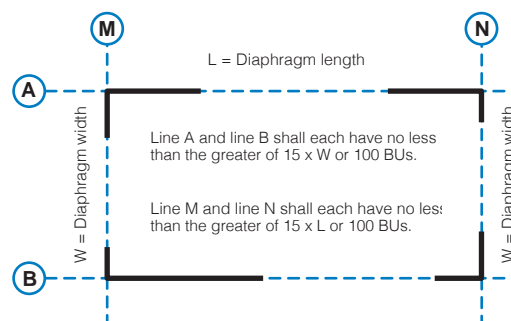


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS

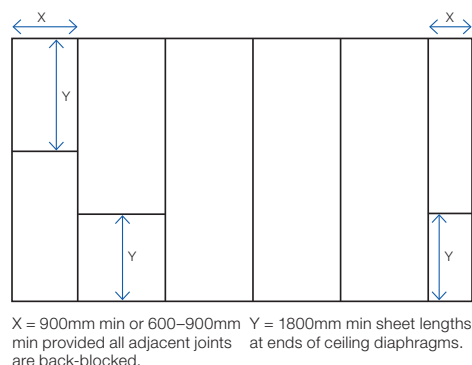
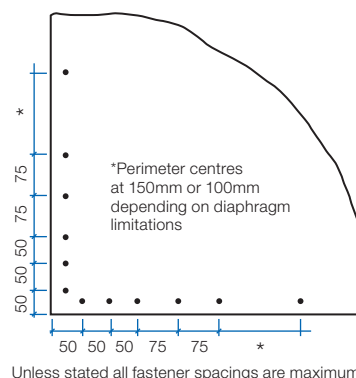


FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



GEB015



## Ceiling battens in ceiling diaphragms

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

Battens shall be spaced at a maximum of:

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

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

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

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

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

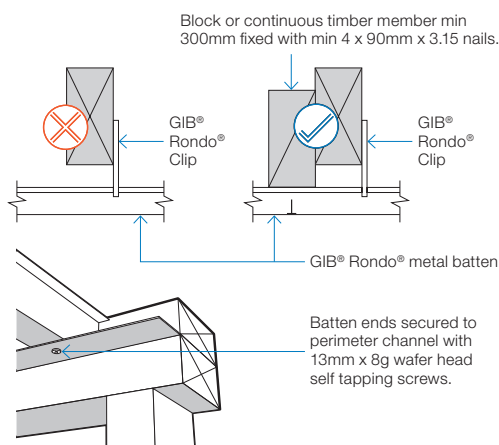
For GIB® Rondo® metal battens, a GIB® Rondo® metal channel or metal angle is required at the perimeter of the diaphragm. The perimeter channel shall be fastened to the top plate with 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screw at 300mm centres maximum.

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

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

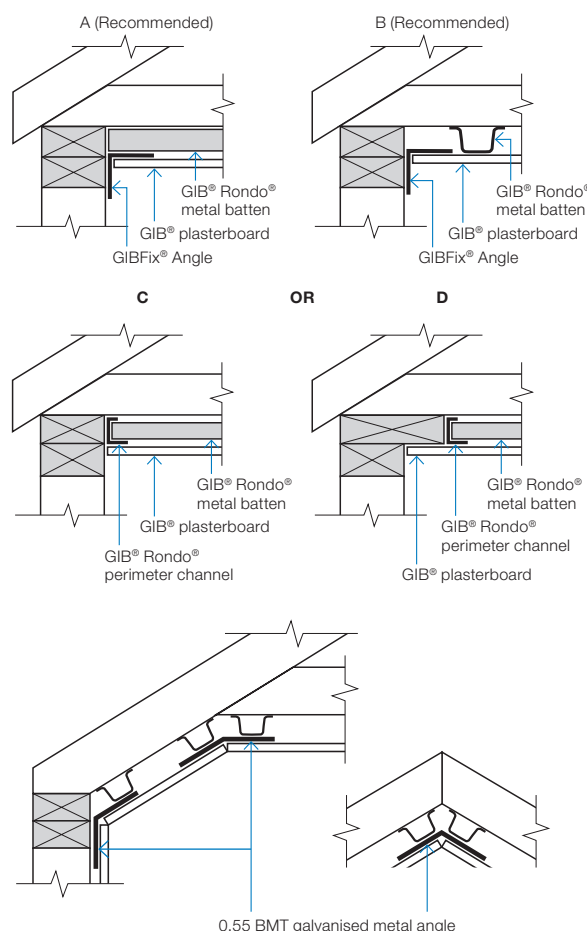
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screws.
- Fastened to timber framing using 32mm x 7g GIB® Grabber® Dual Thread screws when linings are installed.

FIGURE 26: GIB® RONDO® METAL CEILING BATTEN INSTALLATION



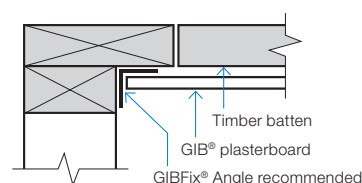
GEB016

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



GEB017

FIGURE 28: TIMBER CEILING BATTENS\*



GEB018





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

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

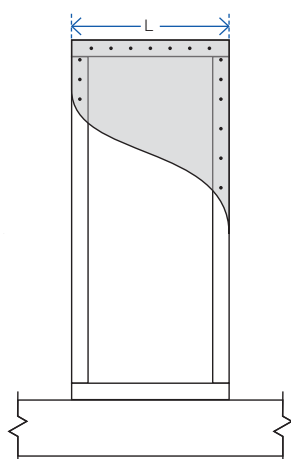
'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

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

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

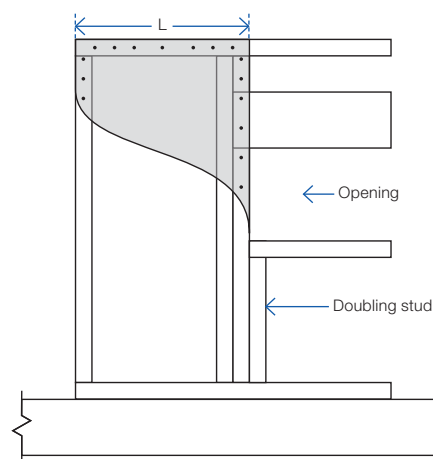
Fastener spacings and diagram scales shown in Figures 29-32 are indicative only. Refer to p.23-30 for construction details.

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



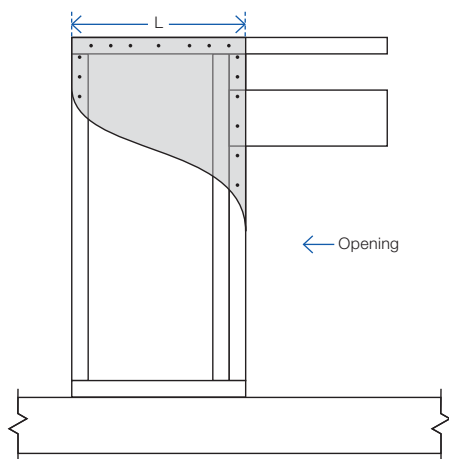
GS1-N, GS2-N elements  
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



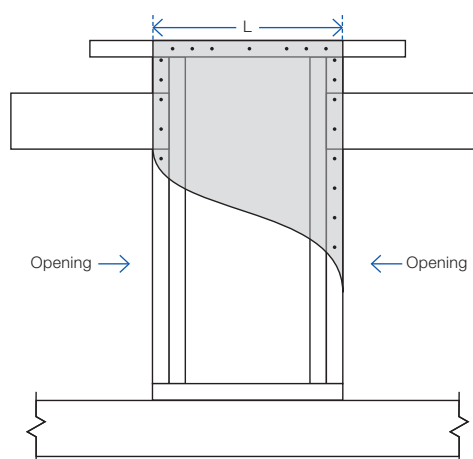
GS1-N, GS2-N elements  
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



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

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



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



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

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

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

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

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

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

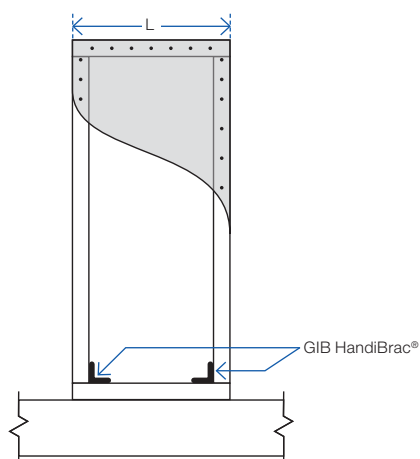
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

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

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

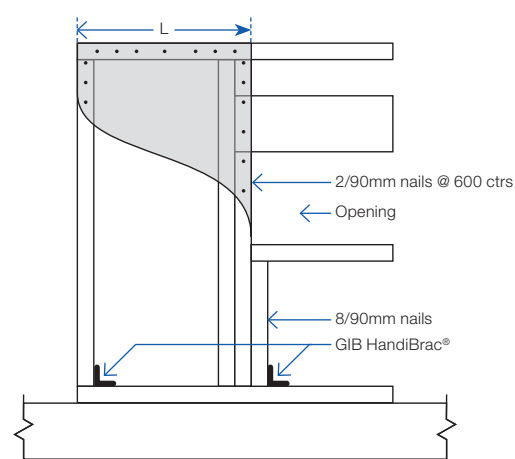
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



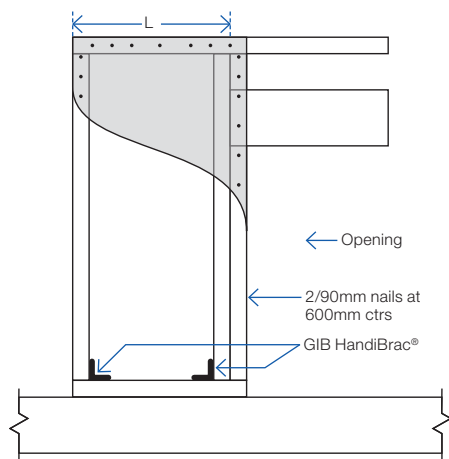
'H' type elements with specific hold downs  
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



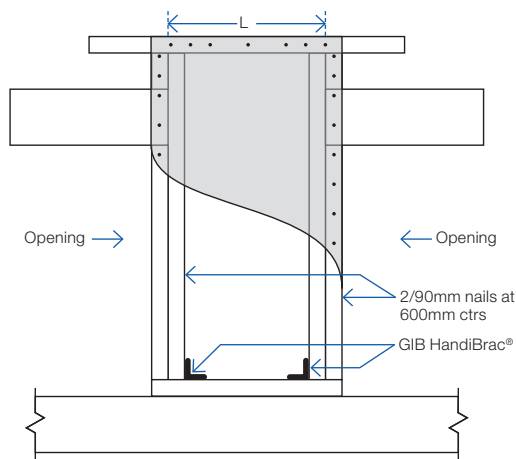
'H' type elements with specific hold downs  
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



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

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



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





## GIB EzyBrace® Systems specification GS1-N

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

#### Concrete floor

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

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

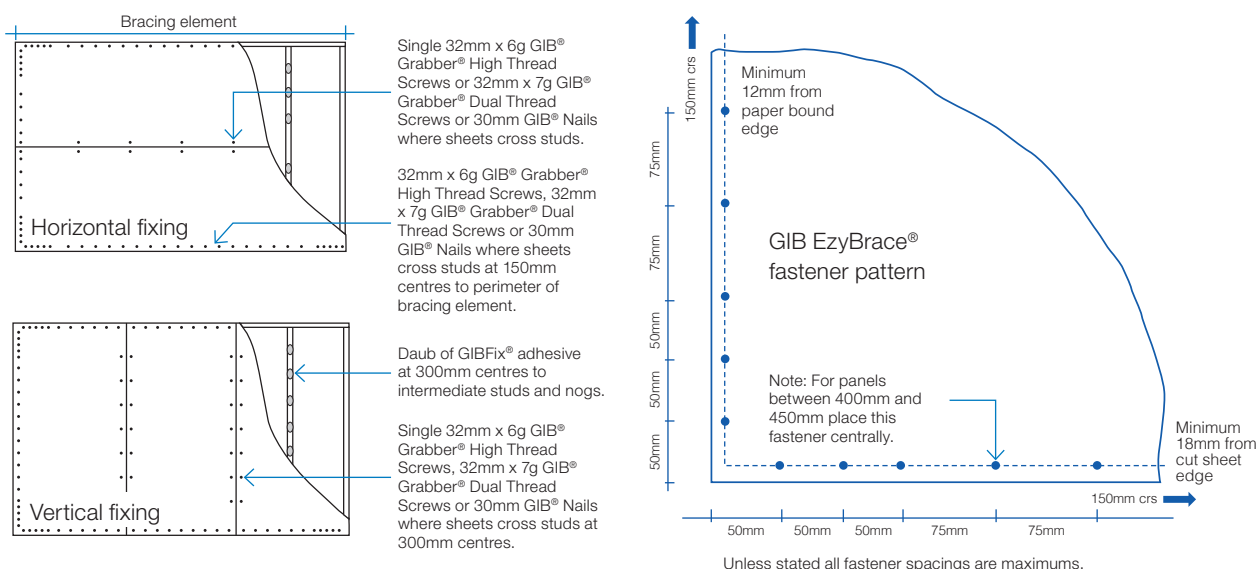
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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



## GIB EzyBrace® Systems specification GS2-NOM

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

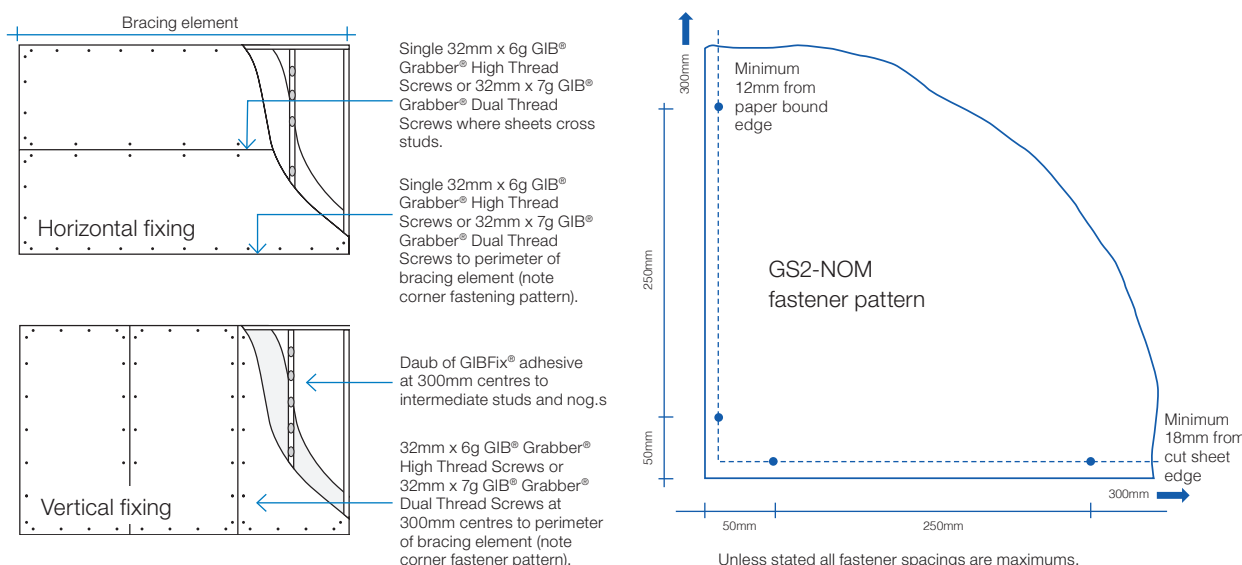
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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



### GS2-NOM ADHESIVE FIXING OPTION AT DOOR JAMBS

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

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

FIGURE 37: SCREW FIX FOR OPENINGS

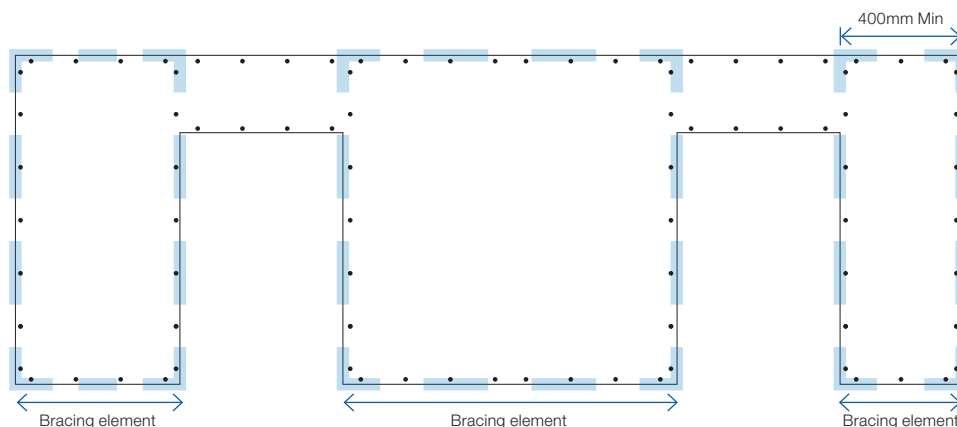
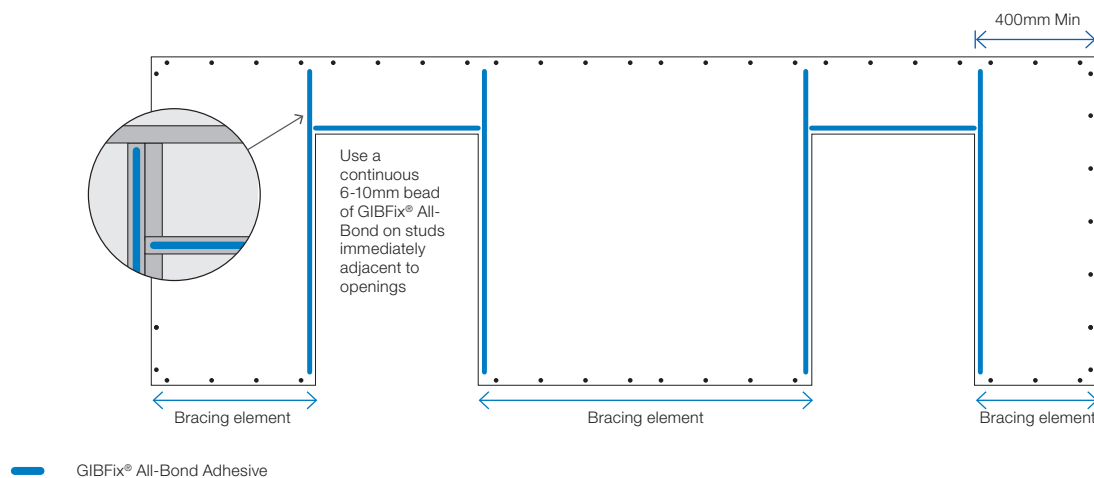
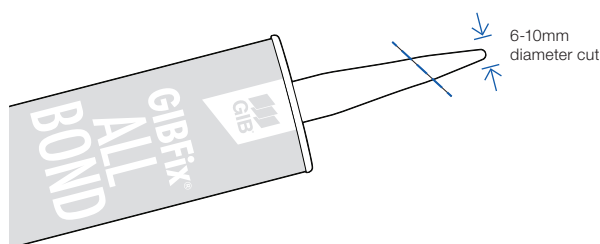


FIGURE 38: SCREW AND ADHESIVE FIX FOR OPENINGS



### ADHESIVE NOZZLE APERTURE





## GIB EzyBrace® Systems specification GS2-N

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber Floor

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

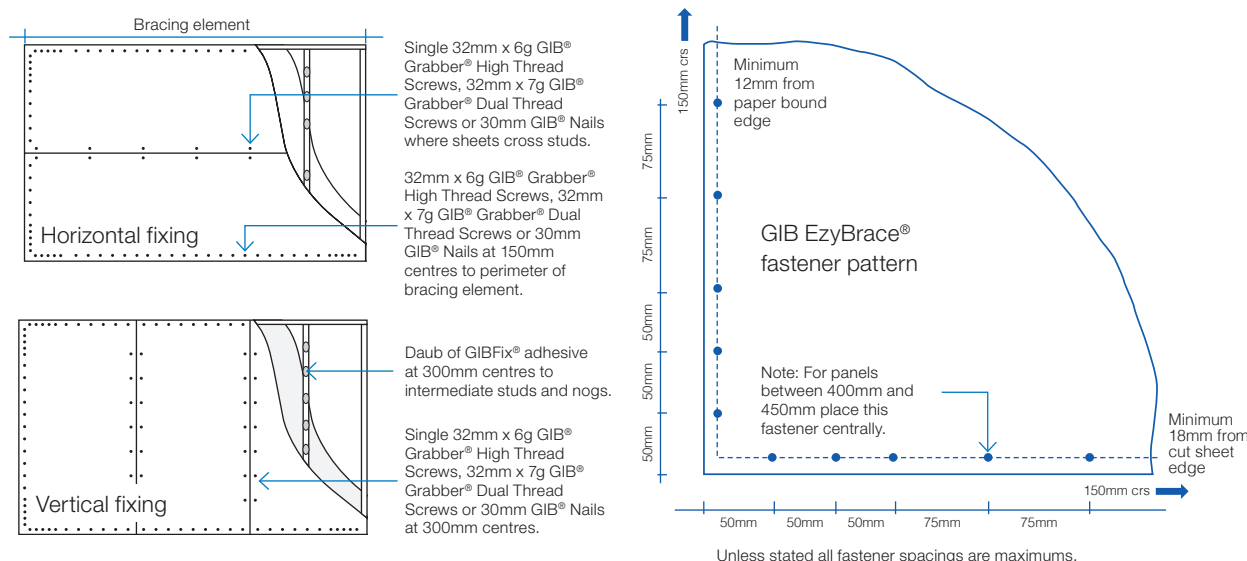
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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



## GIB EzyBrace® Systems specification GSP-H

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

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

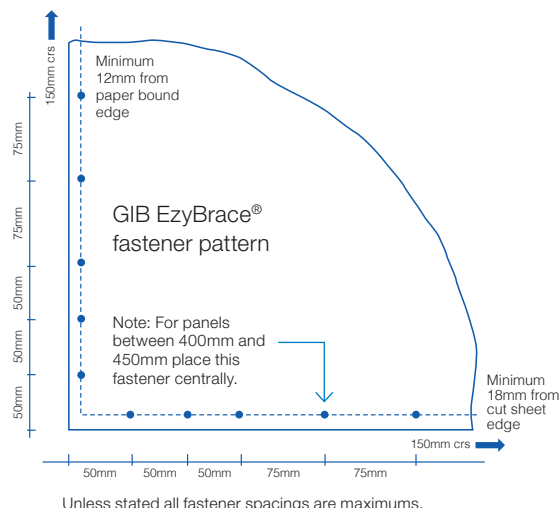
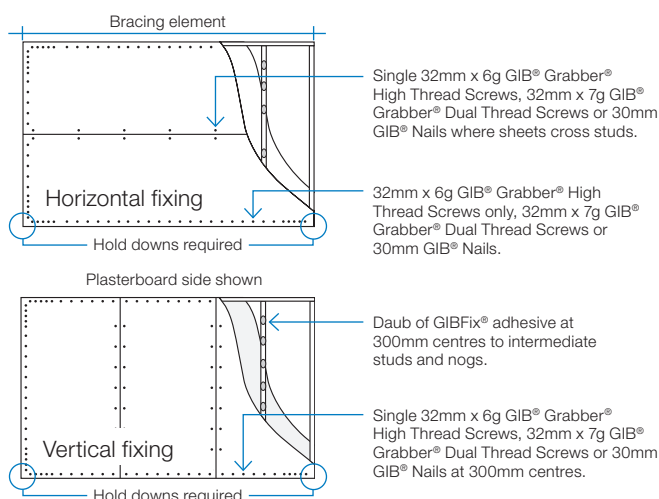
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

#### Fastener centres

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

### JOINTING

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



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





## GIB EzyBrace® Systems specification BL1-H

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

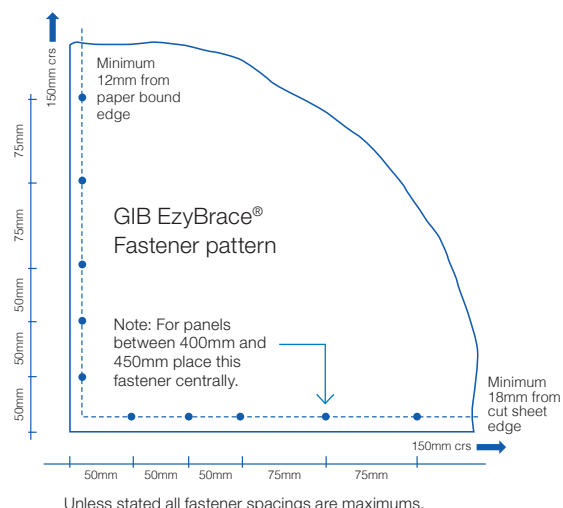
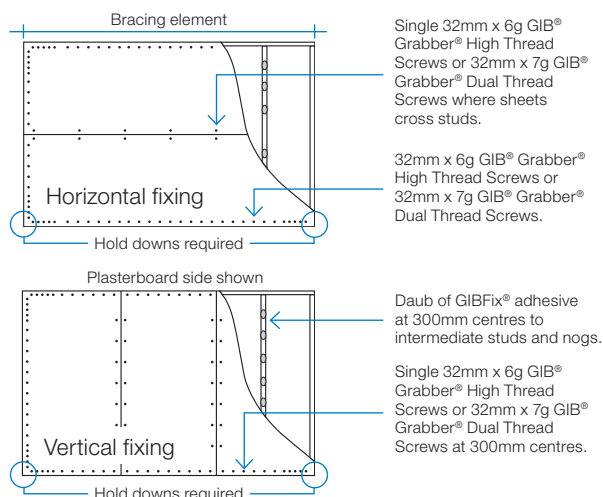
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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



## GIB EzyBrace® Systems specification BLG-H

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

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

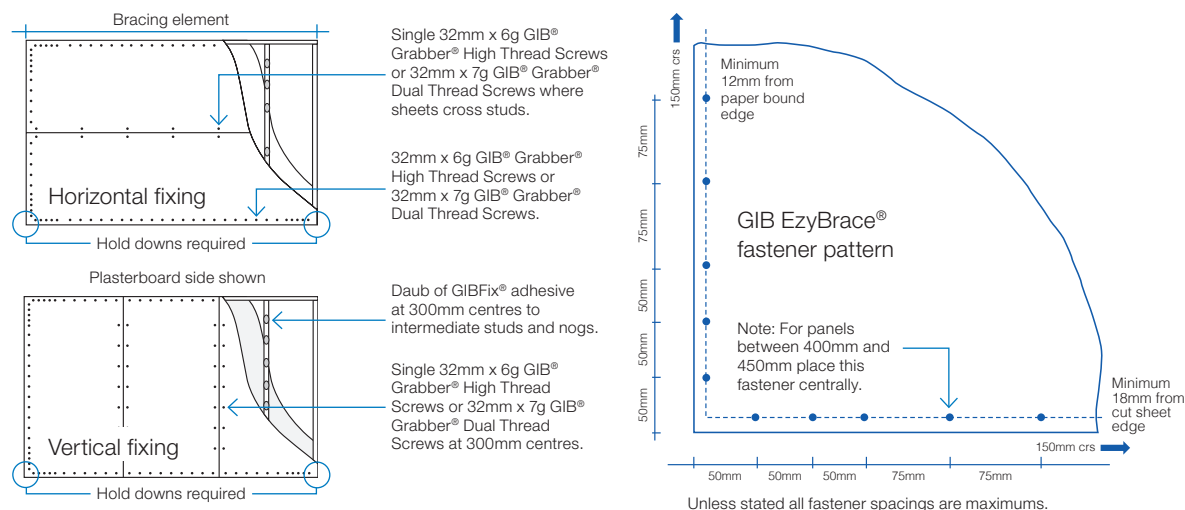
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

#### Fastener centres

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

### JOINTING

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



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



## GIB EzyBrace® Systems specification BLP-H

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

### WALL FRAMING

Wall framing to comply with;

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

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

### BOTTOM PLATE FIXING

#### Timber floor

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

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

#### Concrete floor

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

### WALL LINING

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

### PERMITTED ALTERNATIVES

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

### FASTENING THE LINING

#### Fasteners

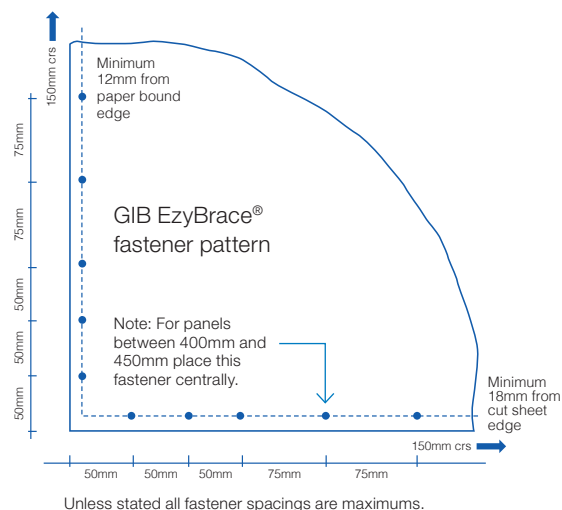
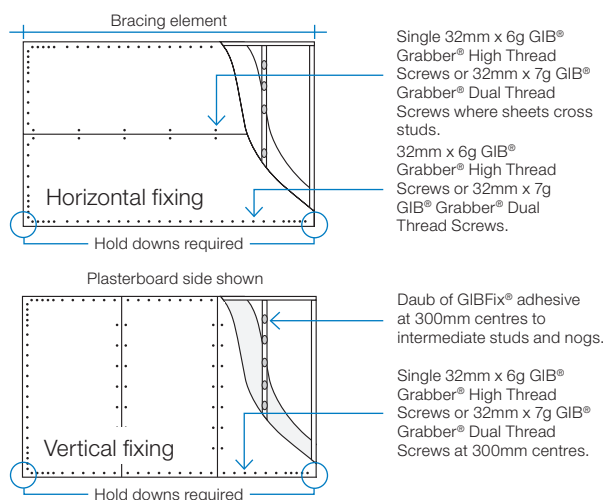
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread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

#### Fastener centres

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

### JOINTING

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



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



Winstone Wallboards is committed to protecting the environment. Environmental matters are integrated into all business activities:

- Our operations strive to exceed all environmental regulatory requirements at all times.
- Protection of the environment is a day to day responsibility that we all must accept.
- We allocate appropriate management time and resources to address relevant environmental issues and continuously improve our activities in that area.
- We will achieve our standards of performance through positive action, employee involvement and constant communication with our neighbours, local authorities and customers.

Minimise on-site waste when designing and/or installing GIB® Systems. For larger projects give consideration to our cut-to-length service to reduce waste. GIB® plasterboard off-cuts, if separated from other waste building materials, can be readily recycled.

For larger projects waste can be diverted to compost manufacturers who grind up the GIB® plasterboard and use it in compost. For smaller projects, the GIB® plasterboard can be ground up and spread around the building site.

#### GLOBAL GREENTAG<sup>CERT™</sup>

The Global GreenTag<sup>Cert™</sup> certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag<sup>Cert™</sup>.

GIB® plasterboard has a Level B green rating.

#### DECLARE CERTIFICATION

Declare is a database of non-toxic, sustainably sourced building products.

Many GIB® plasterboard products including GIB® Standard, GIB Braceline®, GIB Noiseline® and GIB Aqualine® have achieved Red List Free status in Declare certification.

For more information on Winstone Wallboards sustainability commitments visit [gib.co.nz](http://gib.co.nz).

#### COPYRIGHT

Copyright © Winstone Wallboards Ltd 2016. All of the material contained in this brochure, including all text, tables, charts, graphs, drawings, images, diagrams are protected by copyright. These materials may not be reproduced, adapted or transmitted in any form by any process, without the permission of Winstone Wallboards Ltd.

Winstone Wallboards asserts its moral rights and reserves all other intellectual property rights in the materials contained in this brochure and related to GIBFix® Framing System and GIB EzyBrace® Systems.

#### TRADEMARKS

The names GIB®, GIB Fyrelime®, GIB Ultraline®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, GIB HandiBrac®, GIB EzyBrace®, the colour blue for GIB Braceline®, the colour pink for GIB Fyrelime®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

#### PATENTS

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



**FOR MORE INFORMATION VISIT**

[gib.co.nz](https://gib.co.nz)

**OR CALL THE GIB® HELPLINE**

0800 100 442



**GIB®**

# Bracing Supplement Document

**Issue Date December 2016**

## GIB® Bracing design notes

### SUPPLEMENT

### ISSUE DATE

GIB Ezybrace® Systems 2016 BU/m Ratings	Sept-16
Designing and Building with GS2-NOM	Sept-16
Multi Layer Bracing Systems	Aug-16
GIB® News article: Wings, Blocks & Diaphragms	Apr-13
GIB® News article: Low Damage Solutions for Non- Structural Elements	Jul-12
GIB® News article: Canterbury Earthquake Online Guides	Mar-12
Bracing Light Timber Frame Buildings Using Sheet Materials	Nov-11
Distribution of Wall Bracing Elements	Nov-11
Designing Bracing Upgrades	Jun-11

**GIB®**

# GIB Ezybrace® Systems 2016 BU/m Ratings

Issue Date September 2016

The BU/m ratings for GIB EzyBrace® Systems shown below are responsibly conservative and are provided to allow manual calculation, and for use in alternative proprietary software.

The GIB EzyBrace® 2016 software delivers more accurate demand calculations based on specific building parameters entered, and bracing resistance

(BU/m) is often higher than the values presented below. Do not use this table to assess bracing substitutions.

**Table 1: GIB® Standard Bracing Unit Ratings**

Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
GS1-N	0.4	GIB® Standard plasterboard one side	N/A	50	55
	1.2			70	60
GS2-N	0.4	GIB® Standard plasterboard both sides	N/A	70	65
	1.2			95	85
GS2-NOM	0.4	GIB® Standard plasterboard both sides (standard GIB® site guide fastener pattern)	N/A	50	50
GSP-H	0.4	GIB® Standard plasterboard one side, structural plywood the other	Panel hold-down fixings	100	115
	1.2			150*	150*

**Table 2: GIB Braceline® Bracing Unit Ratings**

Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
BL1-H	0.4	GIB Braceline® one side	Panel hold-down fixings	90	100
	1.2			125*	105
BLG-H	0.4	GIB Braceline® one side,	Panel hold-down fixings	110	115
	1.2	GIB® Standard plasterboard the other		150*	145*
BLP-H	0.4	GIB Braceline® one side, structural plywood the other	Panel hold-down fixings	120*	135*
	1.2			150*	150*

\* Timber Floors – A limit of 120 BU/m for NZS 3604:2011 timber floors applies unless specific engineering ensures that uplift forces generated by elements rated higher than 120 BU/m can be resisted by floor framing.

**Wall Heights other than 2.4m**

The published Bracing Unit ratings are based on a 2.4 metre height. For greater heights, the ratings must be multiplied by a factor  $f = 2.4$  divided by the actual wall height. The Bracing Unit ratings for walls higher than 2.4 metres will reduce.

**For example:**

The Bracing Unit rating of a 2.7 metre high wall is obtained by multiplying the values in Tables 1 and 2 by  $f = 2.4/2.7 = 0.89$

The Bracing Unit rating of a 3.6 metre high wall is obtained by multiplying the values in Tables 1 and 2 by  $f = 2.4/3.6 = 0.67$

The height of walls with a sloping top plate can be taken as the average height.

Walls lower than 2.4 metres shall be rated as if they were 2.4 metres high.

**For more information visit [gib.co.nz/ezybrace](http://gib.co.nz/ezybrace) or call the GIB® Helpline on 0800 100 442.**



# Designing and Building with GS2-NOM

Issue Date September 2016

GIB EzyBrace® Systems 2016 literature and software includes the option of allowing nominally fixed internal walls lined on both sides with GIB® plasterboard to contribute to the building's bracing resistance. The fixing pattern as illustrated below represents the standard fixing pattern as published on page 38-39 of the GIB® Site Guide (December 2014).

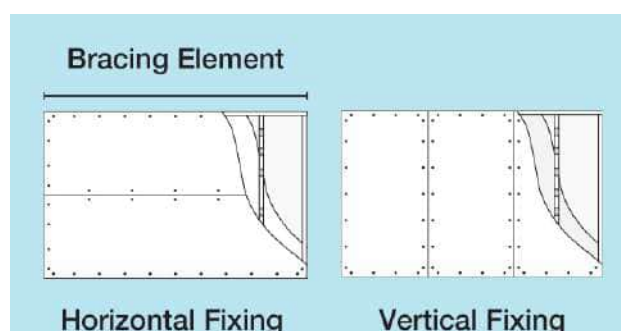
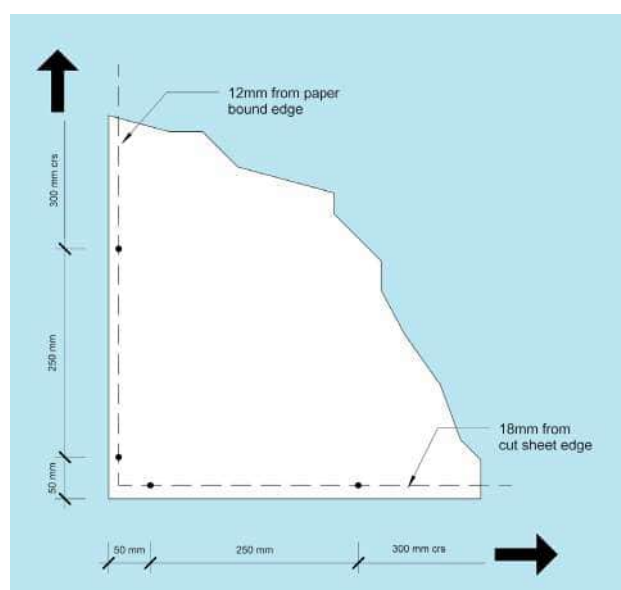
Building investigations following the Canterbury earthquakes have confirmed that not only designated bracing elements (such as GS1-N & GS2-N) resist lateral forces. Nominally fastened internal walls also contribute (often substantially) to the building's total resistance. An earthquake does not distinguish between designated GIB® plasterboard bracing elements and nominally fastened GIB® plasterboard linings. All the walls contribute to providing resistance against wind and earthquake forces.

Permitting nominally fixed internal GIB® plasterboard linings to contribute to bracing resistance means that the total number of nails or screws can be reduced significantly. This results in a simpler and more uniform fastener pattern and a reduction in the risks of fastener 'popping' as a result of timber movement. This improves the chance of achieving a high quality of finish.

When compared with GS1-N and GS2-N, the same Bracing Unit (BU) rating can be achieved with GS2-NOM using 30% to 40% fewer screws.

The design examples on the following pages illustrate how fastener numbers can be reduced.

**FIGURE 1: GS2-NOM SCREW FIXING PATTERN**





### GS2-NOM - DESIGN APPROACH 1

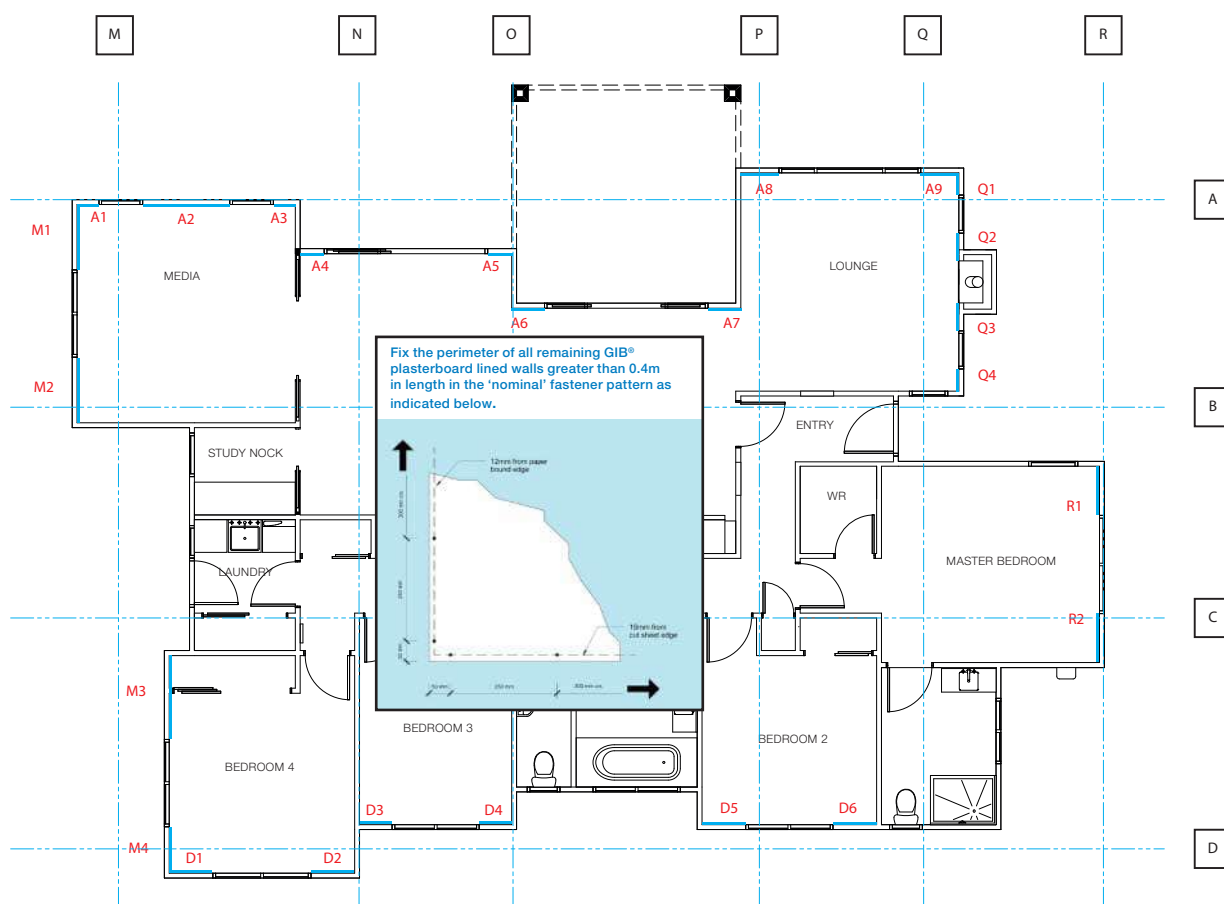
The design example in Figure 2 below shows designated bracing elements GS1-N and BL1-H used around the perimeter of the house. A note is added that all remaining GIB® plasterboard linings are fixed at the nominal GIB® Site Guide pattern.

In this particular case the design calculations in Figure 3 show that bracing resistance exceeds demand by 60% when accounting for nominally fixed GS2-NOM throughout. Had GS1-N or GS2-N designated internal bracing elements been used, in addition to nominally fixed (not counted) remaining walls, the fastener count could have increased by more than 500 screws.

The calculations also show how lengths of GS2-NOM can be accumulated on a bracing line. Lengths of internal wall equal or greater than 0.4 m can be added, provided walls are lined both sides with a minimum of 10 mm GIB® Standard plasterboard fixed in the nominal GIB® Site Guide pattern. The accumulated length is then entered in the bracing resistance calculations. Bathroom walls and walls with significant openings are not added to the accumulated length.

In this case the Building Official should be able to take the design redundancy into account, ensure internal walls lined both sides are generally fixed in accordance with the standard GIB® Site Guide GS2-NOM pattern, and focus more specifically on critical elements around the building perimeter.

**FIGURE 2: DESIGN APPROACH 1– BRACING LAYOUT PLAN**



*This design considers the inherent bracing provided by the structure and tops up with designated bracing elements where required. To avoid any potential for miscommunication and delays onsite during construction and inspection, designers should clearly note the intent to use standard GIB® Site Guide GS2-NOM fixing on bracing plans.*





FIGURE 3: DESIGN APPROACH 1 - BRACING RESISTANCE CALCULATIONS INCLUDING GS2-NOM

### Single Level Along Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									624	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	992 159%	976 137%
A	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	1.60		2.4	GS1-N	GIB®	110	95		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.50		2.4	GS1-N	GIB®	28	29		
	5	0.50		2.4	GS1-N	GIB®	28	29		
	6	0.70		2.4	GS1-N	GIB®	41	41		
	7	0.70		2.4	GS1-N	GIB®	41	41		
	8	0.80		2.4	GS1-N	GIB®	49	47		
	9	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									388 OK	377 OK
B	1	1.60		2.4	GS2-NOM	GIB®	80	80		
	2	1.60		2.4	GS2-NOM	GIB®	80	80		
									180 OK	160 OK
C	1	1.80		2.4	GS2-NOM	GIB®	90	90		
	2	1.80		2.4	GS2-NOM	GIB®	90	90		
									180 OK	180 OK
D	1	0.80		2.4	GS1-N	GIB®	49	47		
	2	0.80		2.4	GS1-N	GIB®	49	47		
	3	0.60		2.4	GS1-N	GIB®	34	35		
	4	0.60		2.4	GS1-N	GIB®	34	35		
	5	0.80		2.4	GS1-N	GIB®	49	47		
	6	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									264 OK	259 OK

### Single Level Across Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									785	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1155 147%	1103 155%
M	1	1.30		2.4	GS1-N	GIB®	90	78		
	2	1.30		2.4	GS1-N	GIB®	90	78		
	3	1.60		2.4	GS1-N	GIB®	110	96		
	4	0.90		2.4	GS1-N	GIB®	57	53		
External Length = 12									347 OK	305 OK
N	1	3.20		2.4	GS2-NOM	GIB®	160	160		
									160 OK	160 OK
O	1	3.20		2.4	GS2-NOM	GIB®	160	160		
									160 OK	160 OK
P	1	2.00		2.4	GS2-NOM	GIB®	100	100		
									100 OK	100 OK
Q	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	0.40		2.4	GS1-N	GIB®	21	23		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.40		2.4	GS1-N	GIB®	21	23		
	5	2.00		2.4	GS2-NOM	GIB®	100	100		
									185 OK	193 OK
R	1	0.90		2.4	BL1-H	GIB®	102	92		
	2	0.90		2.4	BL1-H	GIB®	102	92		
External Length = 12									204 OK	185 OK



## GS2-NOM - DESIGN APPROACH 2

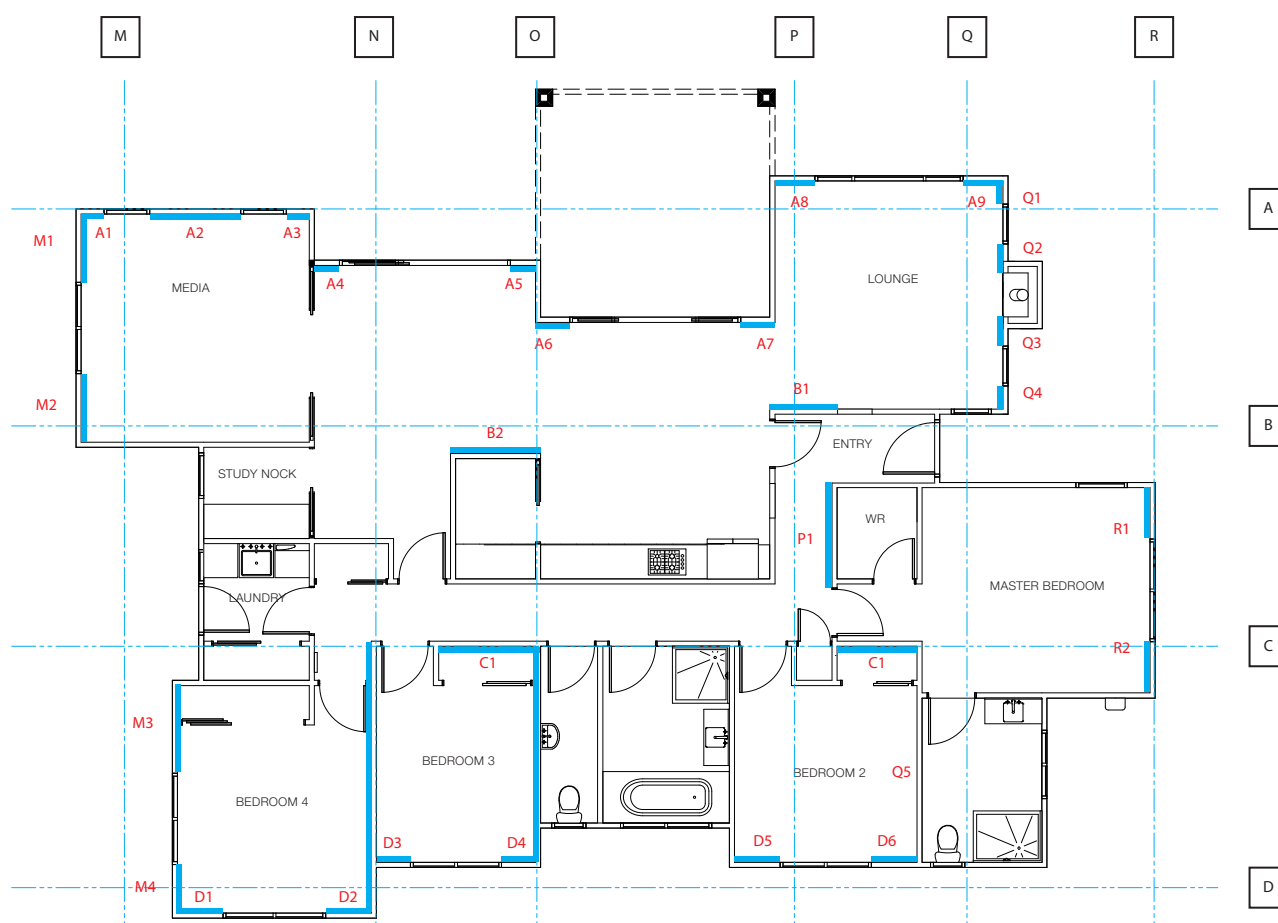
The design approach in Figure 4 below shows designated bracing elements GS1-N and BL1-H used around the perimeter of the house. Standard GIB® Site Guide fixing is used on internal walls lined both sides. Specific sections of these internal walls are nominated as GS2-NOM bracing elements, sufficient to meet or exceed the minimum bracing demand on the particular bracing grid line.

In this case GS2-NOM is used as a conventional bracing element. This method might be preferred by some designers, builders and building officials as it represents a more traditional approach to bracing resistance calculations and construction and permits focus on designated elements.

The outcome in terms of number of fastener is the same as that achieved with DESIGN APPROACH 1 where the fastener count could have increased by 500 screws if GS1-N or GS2-N designated internal bracing elements had been used in place of GS2-NOM.

In this case the calculations show how GS2-NOM is used as an orthodox bracing element and the building consent and inspection processes are also conventional. Given the many internal walls not counted in this case, it is still suggested that inspection focus should be more specifically on critical elements around the building perimeter.

**FIGURE 4: DESIGN APPROACH 2 – BRACING LAYOUT PLAN**



*This design uses GS2-NOM as a conventional bracing element and designers should clearly identify designated elements on the bracing plan. Not counted internal walls fastened in the standard GIB® Site Guide pattern add further redundancy.*



FIGURE 4: DESIGN APPROACH 2 – BRACING LAYOUT PLAN

### Single Level Along Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									624	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1152 185%	1136 160%
A	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	1.60		2.4	GS1-N	GIB®	110	96		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.50		2.4	GS1-N	GIB®	28	29		
	5	0.50		2.4	GS1-N	GIB®	28	29		
	6	0.70		2.4	GS1-N	GIB®	41	41		
	7	0.70		2.4	GS1-N	GIB®	41	41		
	8	0.80		2.4	GS1-N	GIB®	49	47		
	9	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									388 OK	377 OK
B	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
C	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
D	1	0.80		2.4	GS1-N	GIB®	49	47		
	2	0.80		2.4	GS1-N	GIB®	49	47		
	3	0.60		2.4	GS1-N	GIB®	34	35		
	4	0.60		2.4	GS1-N	GIB®	34	35		
	5	0.80		2.4	GS1-N	GIB®	49	47		
	6	0.80		2.4	GS1-N	GIB®	49	47		
External Length = 15									264 OK	259 OK

### Single Level Across Resistance Sheet

Job Name:

									Wind	EQ
									Demand	
									785	712
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1645 210%	1593 224%
M	1	1.30		2.4	GS1-N	GIB®	90	78		
	2	1.30		2.4	GS1-N	GIB®	90	78		
	3	1.60		2.4	GS1-N	GIB®	110	96		
	4	0.90		2.4	GS1-N	GIB®	57	53		
External Length = 12									347 OK	305 OK
N	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
O	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
P	1	5.00		2.4	GS2-NOM	GIB®	250	250		
									250 OK	250 OK
Q	1	0.40		2.4	GS1-N	GIB®	21	23		
	2	0.40		2.4	GS1-N	GIB®	21	23		
	3	0.40		2.4	GS1-N	GIB®	21	23		
	4	0.40		2.4	GS1-N	GIB®	21	23		
	5	5.20		2.4	GS2-NOM	GIB®	260	260		
									345 OK	353 OK
R	1	0.90		2.4	BL1-H	GIB®	102	92		
	2	0.90		2.4	BL1-H	GIB®	102	92		
External Length = 12									204 OK	185 OK



### GS2-NOM ADHESIVE FIXING OPTION AT REBATED JAMBS

When rebated jambs are used, GS2-NOM fastener numbers can be further reduced by using a continuous bead of GIBFix® All-Bond solvent-based

adhesive on studs adjacent to the opening, as illustrated below. This method only applies to GS2-NOM fixing and not to other designated bracing elements.

If the adhesive fixing method is preferred, it is strongly recommended that it is discussed with the site building official at an early stage, prior to starting lining installation, so that an inspection and sign-off process can be agreed.

There should be ample opportunity to do this given that lining installation commences at an advanced stage of the project.

### CLEAR COMMUNICATION BETWEEN THE DESIGNER, BUILDER AND BUILDING CONSENT AUTHORITY IS KEY!

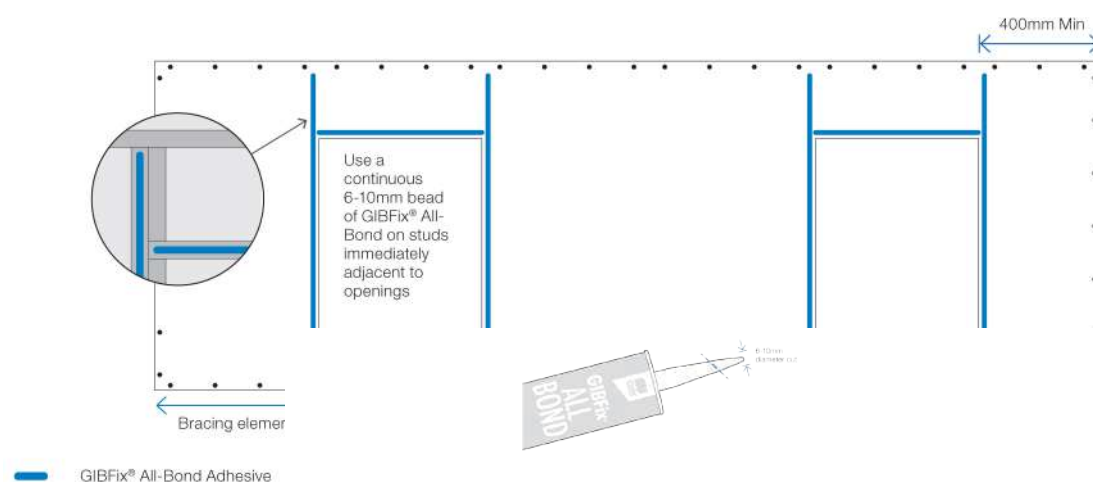
A poor outcome would be when the designer and builder have elected to use the adhesive fixing method but have failed to advise the site building official prior to lining. If the building official has reservations about the application of adhesive, one of the following processes can be agreed;

A number of random core holes can be requested. They can be drilled with a small hole-saw in locations above openings as agreed between the building

official and installer. If presence of GIB® All-Bond adhesive is evident it is at the building official's discretion to accept the installation 'on reasonable grounds'.

If the decision is made to reject the adhesive fixing method post-lining, screws can be installed in accordance with the Figure 1 GS2-NOM fixing pattern. If GIBFix® All-Bond adhesive has been used it is prudent to wait 7 days for the adhesive to fully cure before applying screws.

**FIGURE 6: GS2-NOM SCREW AND GIBFIX® ALL-BOND FIXING FOR REBATED JAMBS**





## SUMMARY GS2-NOM DESIGN, INSTALLATION AND INSPECTION

### GS2-NOM

- GS2-NOM permits internal walls lined in accordance with standard GIB® Site Guide fixing to contribute to bracing resistance
- Using GS2-NOM can result in a significant reduction of screw fixings which in turn aids quality of finish
- Using GS2-NOM can result in a more uniform fastener pattern
- The decision to use GS2-NOM requires agreement between the various parties involved in the design and construction process
- Using GS2-NOM in calculations often results in designs with bracing resistance well exceeding bracing demand because most internal walls can be counted. In addition, conservative Bracing Unit ratings have been assigned to GS2-NOM in the GIB EzyBrace® Systems 2016 software.
- When inspecting GS2-NOM installations, the design margin should be taken into account
- When design margins are tight, focus should first be on bracing distribution and the design and construction of critical bracing elements, e.g. narrow panels adjacent to significant openings such as large windows, ranch sliders or garage doors.

- GS2-NOM specifies 300 mm maximum perimeter screw centres. Closer fixing is permitted.

### GS2-NOM ADHESIVE FIXING OPTION

- If the GS2-NOM adhesive fixing method is preferred, prior communication between the contractor, installer, and building official is required. Installation of adhesive fixed GS2-NOM without prior consultation with the site building official is discouraged.
- The lining installer may wish to take a photographic record of the installation. However, acceptance depends on the practices adopted by the particular Building Control Authority and prior communication is once again recommended.
- If adhesive fixed GS2-NOM has been installed without prior consultation with the site building official, random core holes can be drilled to determine the presence of adhesive and establish 'reasonable grounds' for sign off. If required, installation of additional screws can be requested.

## COMMUNICATION IS KEY WHEN DESIGNING AND INSPECTING BRACING, INCLUDING GS2-NOM FIXING.

### PRODUCT SUBSTITUTION

- In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may compromise performance. Follow system specifications.

### TECHNICAL MATERIAL & ASSISTANCE

Technical specification materials are available from [www.gib.co.nz/ezybrace](http://www.gib.co.nz/ezybrace). Or call the GIB® Helpline 0800 100 442 for more information.







# Multi Layer Bracing Systems

Issue Date August 2016

In a two layer wall system such as GIB® Fire or Noise control systems, the plasterboard bracing element sheets can be either:

Applied directly to the framing, with fasteners set out as per the bracing instructions and a fastener length as per the system being installed. The inner layer can be left unstopped. Or,

Applied to the outer sheets with the outer layer fasteners being installed as per the bracing instructions and fastener length as per the system being installed.

The outer layer is to be tapped and stopped as per GIB® Site Guide.

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



# Wings, Blocks and Diaphragms

Issue Date April 2013

We are often asked if separate bracing calculation is required for 'wings' or 'blocks'.

NZS 3604:2011 paragraph 5.1.5 requires wings or blocks to 'provide sufficient bracing individually' if they extend more than 6 metres from main building. Note that this requirement refers to the provision of bracing, and that separate calculation is not mentioned as a requirement.

The intent of the clause is that provision of bracing is relative to floor area. In other words, if a wing represents 20% of the total building floor area, then at least 20% of the bracing demand must be provided in that wing. This can be achieved by separate calculation, but is often more readily achieved by treating the building as a single unit and simply ensuring bracing distribution is balanced and proportional to floor area.

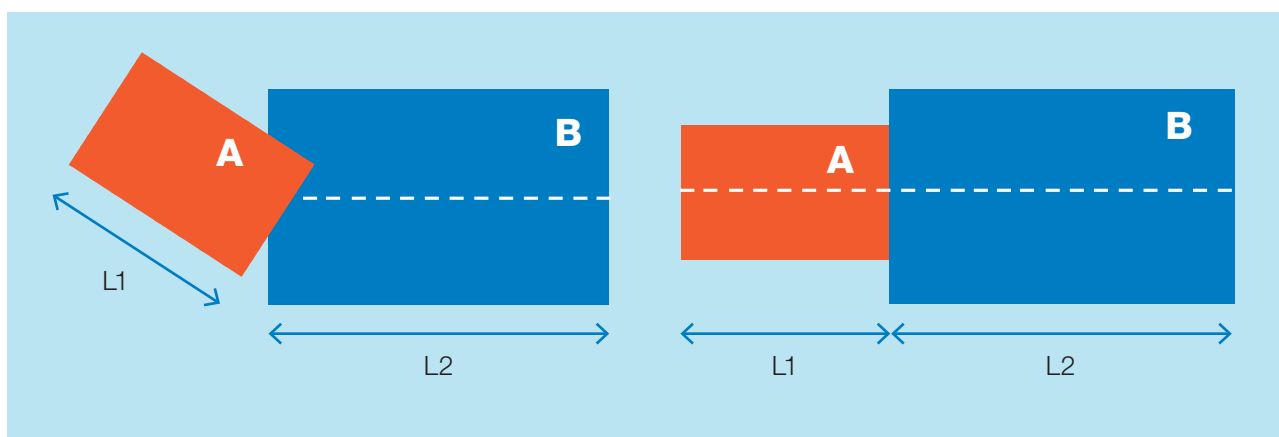
Even when wings or blocks are at an angle to the main building, a single calculation can be carried out. NZS3604:2011 paragraph 5.4.4 gives guidance for walls at angles to the bracing grid and is intended for single or few individual walls. Wings or blocks at an angle are better treated separately or by 'stretching' the building along the ridge line for calculation purposes and treating it as a single rectangular structure. The angle to bracing line function in the GIB EzyBrace® calculation sheet does not need to be applied in this situation.

Using a 'stretched' rectangular design will deliver the same outcome as doing two separate calculations. Again the important issue is to ensure that bracing provision and distribution is proportional to floor area.

---

**Calculating A and B separately give the same bracing demand as treating them as a single 'stretched' building. Ensure that bracing provision is proportional to floor area.**

---





The other frequently encountered bracing question relates to ceiling diaphragms and when they are required.

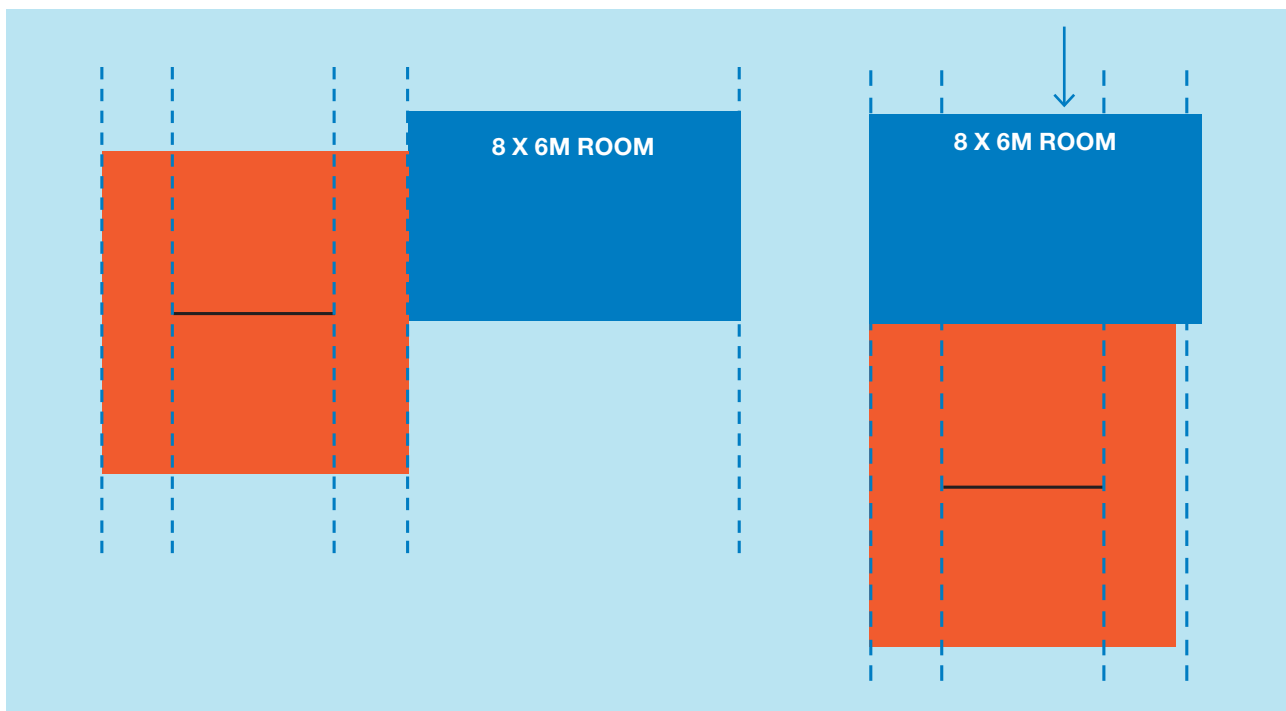
We often see diaphragms specified where they are not needed.

NZS3604:2011 paragraph 5.4.6 states that bracing lines 'shall not be at more than 6 m centres provided that there need be no bracing lines within the area covered by a diaphragm ...'. The need for a diaphragm is thus determined by the spacing of bracing lines and not by the dimensions of a particular room.

The illustration below shows two designs incorporating a 8 x 6 m room. In one case NZS3604:2011 requires a ceiling diaphragm and in the other case it does not because bracing lines dissecting the room are spaced at less than 6 m.

A point to note is that the underlying NZS3604 assumption is that structural framing, such as trusses, rafters and their connections, provide support to the external wall (indicated by an arrow) back to the bracing grid. Use a ceiling diaphragm if there is any doubt whether such structural connections exist.

**The 8 x 6m room on the left requires a ceiling diaphragm whilst the same size room on the right does not because bracing lines at less than 6m dissect the space.**





# Low damage solutions for non-structural elements

Issue Date July 2012

Over the past 12 months Winstone Wallboards has been working closely with the engineering faculty at the University of Canterbury to develop improved systems for interior linings within commercial buildings.

Following the Canterbury earthquakes, many commercial buildings have suffered significant damage. As widely reported most high rise buildings in the Christchurch CBD have been, or are being, deconstructed. The many low-to-medium rise buildings that survived have often suffered significant damage to non-structural elements such as internal partitions and ceilings. Damage to these elements has generally been more costly than damage to the structure itself. Damage to non-structural elements also causes significant business disruption, either directly or during the repair process.

Non-structural ceilings and partitions are commonly lined with gypsum plasterboard and the owner's preference, often guided by the specifier, is more often than not for a flush monolithic finish. Expansive wall and ceiling areas are flush-finished and corners at wall and wall-to-ceiling intersections are typically square stopped. Non-structural elements tend to be tightly fitted into the main structure. Once taped and stopped, gypsum plasterboard lined walls and ceilings are very stiff. When locked into the main structure these elements do not have the ability to follow expected structural movement and 'inter-storey drifts' that occur during serviceability and design level earthquakes.

As a result non-structural elements can suffer significant damage. This has been evident in Christchurch and even after re-fixing, plasterstopping and painting, damage has repeated following further aftershocks.

Testing at Canterbury University has shown that 'low damage' solutions can be achieved by simply incorporating regular control joints. Negative details at wall junctions and intersections with the main structure, and breaking up expansive areas with regular control joints, will provide freedom for the non-structural elements to accommodate movements of the main structure.

## Testing rig at University of Canterbury





### Comments from the researchers include;

"The details work astonishingly well. Partitions stay flawless till 2.0% drift"

"Even at triple the current serviceability requirements, damage was minimal or in serviceable condition"

"Gaps can be arranged by simple calculation with a very high precision"

"Gaps can easily be made aesthetically pleasing or hidden with trim finishes"

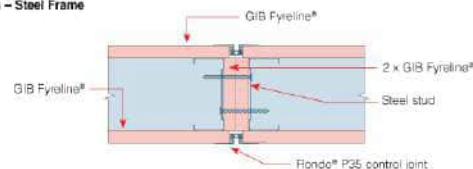
"This cannot be achieved with existing monolithic finish practices"

Recommended details are as simple as they are effective, but a shift in owner and architectural expectation is required to make them work. The challenge to the architectural profession is to incorporate and 'celebrate' these expressed details if we are to have 'low' or 'no damage' solutions for non-structural elements in seismic zones.

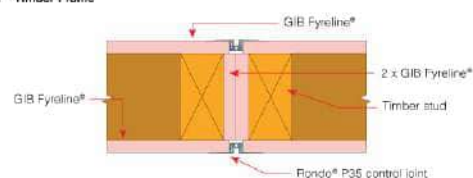
For further information contact the  
GIB® Technical Helpline 0800 100 442.  
A detailed information bulletin is being  
prepared and will be available shortly.

### Control joint illustrations from GIB® Fire Rated Systems 2006

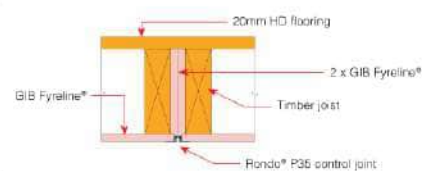
Fire Rated Walls – Steel Frame



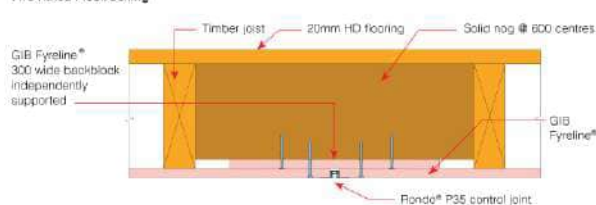
Fire Rated Walls – Timber Frame



Fire Rated Floor/Ceiling



Fire Rated Floor/Ceiling







# Canterbury Earthquake Online Guidelines

Issue Date March 2012

A series of possible details to provide freedom of movement & reduce earthquake damage to non-structural linings.

New updated Technical Bulletins can now be viewed at [www.gib.co.nz/canterburyearthquake](http://www.gib.co.nz/canterburyearthquake). These include guidelines for the damage assessment and repair of plasterboard linings in earthquake damaged properties. Guidance is also available for the repair of lath and plaster linings, and for the design of supplementary bracing using other sheet materials.

We must remember that the Canterbury earthquakes are structural events that test a building's bracing system in real life. Before committing to repairs it is essential to assess and reinstate where necessary, the structure's resistance to possible future events. Failure to do so can result in repeated damage and the need for ongoing repairs. Keep an eye out for updates on our website. Within the near future we will be launching a simple 'bracing assessment' tool aimed at assisting assessors, designers, and builders with evaluating structural adequacy of houses.

We have also posted a paper by our engineers Hans Gerlich and Richard Hunt summarising their observations relating to the performance of houses in and around Christchurch. In low-rise timber or steel framed buildings plasterboard linings will attract earthquake forces first and must be designed to resist them.

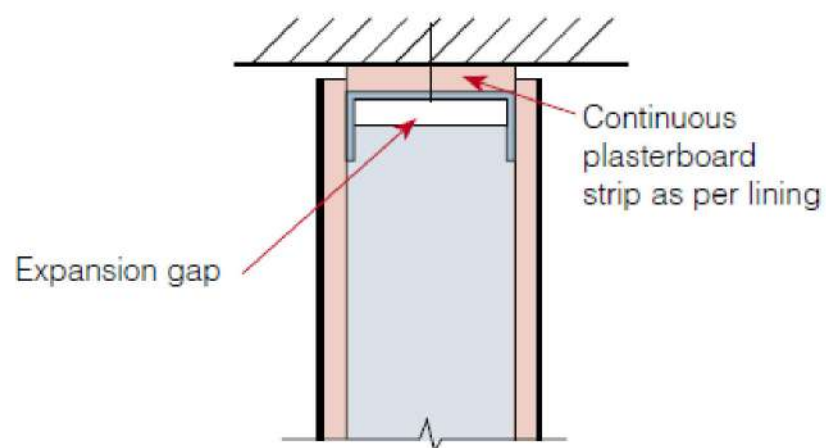
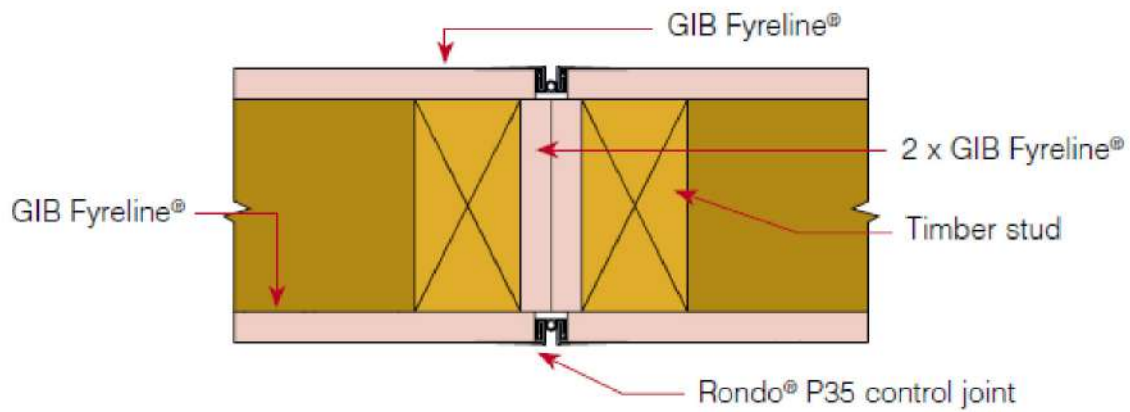
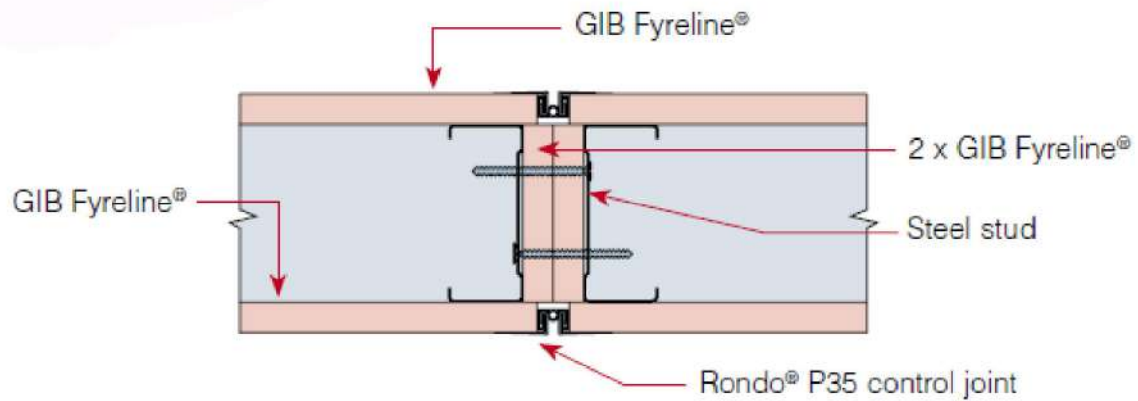
In commercial buildings, gypsum plasterboard linings obviously cannot be designed to resist forces resulting from imposed lateral movements of the main structure during a design level earthquake (see below).

## Gypsum plasterboard linings in a commercial building being severely damaged and forced off the wall framing by structural movement



Where gypsum plasterboard cannot be expected to resist such forces, a degree of freedom must be provided. The illustrations below show the principles of control and movements joints which can be easily incorporated in partition designs (whilst maintaining other performance attributes such as fire resistance or noise control).

Unfortunately architectural trends and owner requirements often dictate that walls are finished flush with a minimum of visual interruptions. A change in aesthetic design and acceptability of such details is required if we are to minimise post-earthquake damage in commercial structures.





# Bracing light timber framed buildings using sheet materials

Issue Date November 2011

## BRACING UNITS

Bracing Units (BUs) were introduced for use with NZS3604 in the late 1970s in recognition of the contribution sheet linings and claddings make to the bracing resistance of light timber framed structures. A 2.4 m high by 2.4 m long wall, with a cut-in metal angle brace and gypsum plasterboard on one face, was tested and achieved a bracing resistance of 5 kN (approximately 500 kg). This was defined as 100 BUs (or 42 BU/m).

Since then the bracing rating (BU/m) for many proprietary systems have been established using the BRANZ P21 Wall Bracing Test and Evaluation Procedure.

The approach adopted by NZS3604 aims to achieve bracing resistance by evenly distributing moderately rated bracing elements throughout the structure. The sum total of these BUs must exceed the design wind and earthquake forces (the demand).

## DISTRIBUTION

The NZS3604 rules regarding bracing distribution have been tightened in 2011, but they are still minimum guidelines. It is the responsibility of the building designer to ensure even distribution of bracing and to seek professional engineering input in case of any doubt.

“Lop-sided” distribution can result in irregular response to wind and earthquake forces causing unpredictable damage.

## COMBINING DIFFERENT SHEET MATERIALS

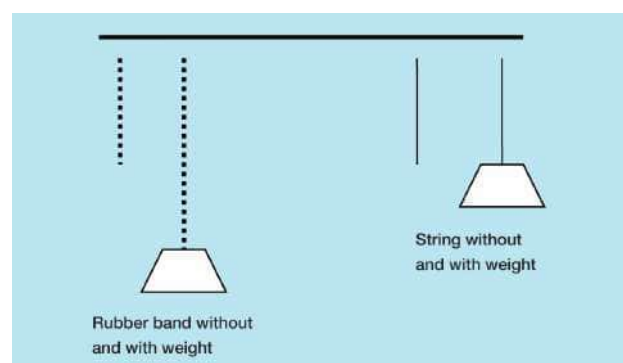
Different sheet materials bring different attributes. The internal gypsum plasterboard lining system is inevitably very stiff once sheets are interconnected,

taped and stopped. However, gypsum plasterboard bracing is less ductile than structural plywood sheet bracing.

Structural plywood sheet bracing, installed on the outside of external framing, provides excellent ductility but offers less stiffness than plasterboard.

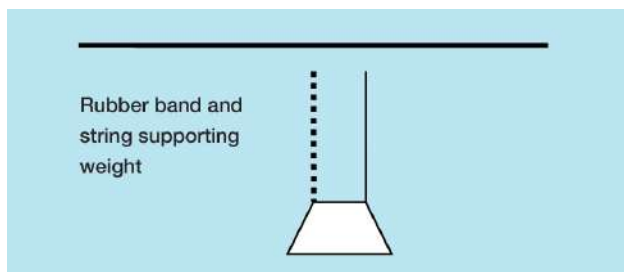
Whether we like it or not, the internal plasterboard linings will attract wind and earthquake forces first before they can be transmitted to other more flexible bracing systems. If we do not design plasterboard linings to accept these forces, then we can expect more damage than might otherwise be the case. The Canterbury earthquakes have shown plasterboard failures to be far more extensive when internal linings were poorly or not designed and installed to withstand earthquake forces.

To help illustrate this principle imagine a length of rubber band (ductile plywood bracing) and a similar length of string (stiff gypsum plasterboard bracing) both capable of supporting a certain weight (the bracing demand). The rubber band stretches considerably when the weight is applied. However, there is minimal stretch when the same weight is supported by the string.





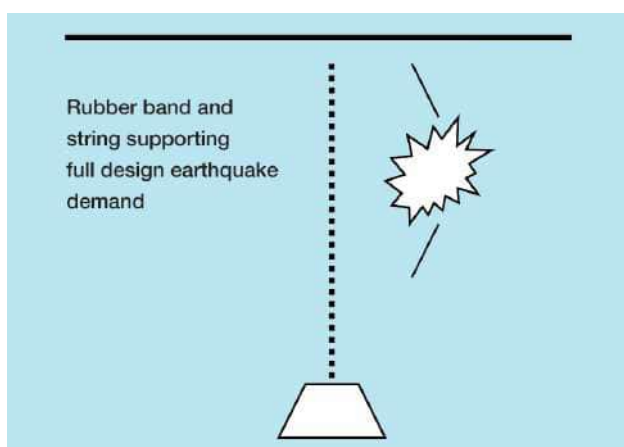
If we use the rubber band and string together to support the weight then the string does most of the work and needs to break before weight is transferred to the rubber band as illustrated below.



Now what happens when we apply these principles to buildings and do not design the stiffer element (gypsum plasterboard) to resist the full design wind and earthquake forces? In other words, what if the rubber band (plywood) has been designed to accept the bracing demand but the string (gypsum plasterboard) has only nominal fixings?

At frequent “serviceability” winds and small earthquake forces the string will perform as illustrated above.

However when forces approach “ultimate” design demand, the string will suffer damage or break before forces are transferred to the rubber band. So, although the plywood is likely to offer structural stability and protection from catastrophic failure well past design loads, the gypsum plasterboard lining system will suffer significant damage.



## CONCLUSIONS

Sheet materials provide the most effective means of achieving bracing resistance in light timber framed structures such as houses.

The internal gypsum plasterboard lining system is the stiffest structural element in light timber framed structures and will attract design wind and earthquake forces first. Gypsum plasterboard linings must be designed and fixed to resist these forces regardless of whether supplementary bracing, such as structural plywood, is installed.

Discretionary use of high performance sheet materials such as structural plywood provides added ductility to enhance protection of structures against catastrophic failure.

The combination of gypsum plasterboard and structural plywood provides early strength and stiffness at design level events and added ductility when structures are subjected to even greater wind or earthquake actions.

Using a more flexible bracing system alone, based on multiple individual sheets or discrete length panels, and not fixing internal gypsum plasterboard linings to withstand wind and earthquake forces, is likely to result in significantly greater internal lining damage during a design and even more frequent serviceability events.

**The best bracing system relies on a combination of internal gypsum plasterboard linings and plywood sheet bracing. Plasterboard provides strength and stiffness and plywood adds strength and ductility. To minimise damage during serviceability and ultimate design events, design plasterboard bracing to accept the full design demand and supplement with structural plywood for added strength and ductility as desired. Winstone Wallboards and Carter Holt Harvey publish combined GIB® / Ecoply® bracing systems where both the gypsum plasterboard and structural plywood are installed as a bracing element.**

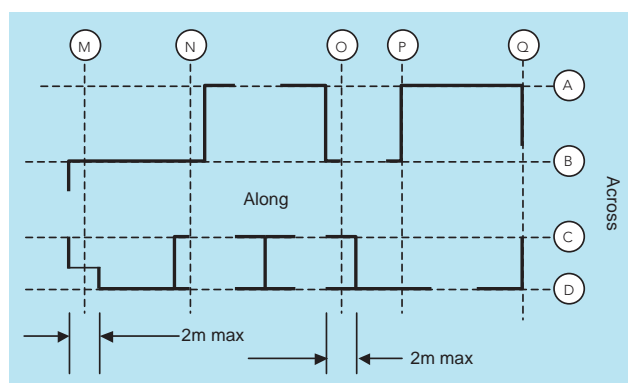


# Distribution of Wall Bracing Elements

Issue Date November 2011

Distribute bracing by drawing a grid pattern of bracing lines along and across the building. Bracing lines must coincide as much as possible with wall bracing elements.

Pairs of bracing elements may be counted on a single line provided they are no more than 2m apart as illustrated below. Locate wall bracing elements evenly throughout the building and as close as practical to corners of external walls.



## Bracing lines must be spaced no more than;

- 6m for standard construction with any GIB® plasterboard ceiling, or
- 7.5m where dragon ties in accordance with NZS 3604:2011 have been installed to provide lateral strength to walls, or
- 12m with a GIB® plasterboard ceiling diaphragm, constructed in accordance with this publication. (Refer to the GIB® Ceiling Diaphragms technical note).

No bracing line shall have a capacity less than the greater of 100 bracing units or 50% of the total bracing demand

(D) divided by the number of bracing lines (n) in the direction being considered ( $0.5 \times D/n$ ).

For this purpose bracing lines less than 1m apart shall be considered one line.

For example, if the bracing demand for the building shown in the diagram above is 2,500 BUs (Wind) and 2,000 BUs

(Earthquake) in the across direction (M, N, O, P, Q) each line must each have at least the maximum of  $0.5 \times 2,500 / 5 = 250$  BUs (Wind) and  $0.5 \times 2,000 / 5 = 200$  BUs (Earthquake).

In addition external walls shall have a bracing capacity no less than 15 bracing units per metre of external wall length.

Wall bracing elements on timber floors shall not be rated higher than 120 BU/m.

Wall bracing elements on concrete floors shall not be rated higher than 150 BU/m.





# Designing Bracing Upgrades

Issue Date June 2011

Following the earthquake events in Christchurch homeowners may be looking for additional bracing performance.

As the New Zealand Building Code is based on a minimum requirement, customers may decide to specify above this level. This bulletin has been created to assist designers with upgrading bracing resistance using GIB EzyBrace®, for buildings that fall within the design scope of NZS 3604:2011.

## PROBABILITY OF EXCEEDANCE AND BRACING RESISTANCE

The New Zealand Building Code requirements for Earthquake Bracing design are based on the probability that a certain design event is exceeded, as illustrated below.

Annual Probability of Exceedance	Return Period Factor for Specific Design <sup>1</sup>
Once in 500 years or 1/500	1.0
Once in 1000 years or 1/1000	1.3
Once in 2500 years or 1/2500	1.8

<sup>1</sup> Equivalent Static Method of NZS1170.5:2004 compared with the GIB EzyBrace® software

An earthquake with a probability of being exceeded once in 2500 years is much more severe than one with a 1/500 year probability of exceedance. Most residential buildings, such as those constructed in accordance with NZS 3604:2011, are required to meet a minimum 1/500 annual probability of exceedance, assuming a 50 year life expectancy. When a residential

home is designed for a 100 year life expectancy, the required earthquake design period is 1/1000.

Multi-tenanted and public buildings such as hotels, apartments, offices, schools, medical centres, etc. can often be built to NZS 3604:2011 but commonly need to be designed for a different annual probability of exceedance ranging from 1/500 to 1/2500, depending on importance level and design working life.

To place some perspective, analysis of the information from the 22nd February Christchurch earthquake indicates that this event was close to the 1/2500 annual probability of exceedance.

## UPGRADING BRACING RESISTANCE USING GIB EZYBRACE®

GIB EzyBrace® systems have been tested and appraised to meet the requirements of the New Zealand Building Code using New Zealand Standard NZS 3604:2011 and the default setting for earthquake design is an annual probability of exceedance of 1/500.

The GIB EzyBrace® software now incorporates an easy way to design for increased bracing resistance by selecting an increased annual probability of exceedance level.

Simply select the annual probability of exceedance using the drop down box in the demand sheet. For a 1/1000 probability, the bracing requirement (demand) increases by 30% and for a 1/2500 probability, bracing demand increases by 80% when compared with the default 1/500 minimum annual probability of exceedance.



Wind Zone	High	Earthquake Zone	Soil Type
Select by Building Consent Authority Map		3 ▼	D&E (deep to very soft) ▼
or Preference	High ▼	Annual exceedance probability	
Wind region	Preference selected ▼	1/1000 (NZS3604:2011 x 1.3) ▼ *	
Lee Zone	Preference selected ▼	This design has been upgraded to resist	
Ground Roughness	Preference selected ▼	an annual earthquake exceedance	
Site Exposure	Preference selected ▼	probability of 1/1000	
Topographic Class	Preference selected ▼	* Options include the default setting of 1/500, or increased annual probabilities of exceedance of 1/1000 or 1/2500	

When designing for increased bracing resistance a statement, similar to that below, should be highlighted on all bracing plans and associated information;

“The bracing design of this building has been upgraded at the clients request to exceed the requirements of a 1/[select] annual probability. This design must not be modified or substituted as this will affect the specified bracing performance of this building”

#### DESIGN ACROSS THE WHOLE BUILDING

As a general rule of thumb it is recommended to exceed the minimum bracing requirements by 10 to 20%. This means a target bracing resistance value of between 110 and 120%.

As is reflected in NZS 3604:2011 bracing should ideally be distributed evenly across the whole building and not just isolated to the external walls or building ends.

External walls generally only account for around 1/3 of the total bracing performance of a house. Therefore if

bracing on the external walls is increased by say 30%, the actual improvement over the whole building is likely to be only 10% or less.

Also modifying plasterboard linings alone will often deliver limited improvement. To achieve a higher overall building performance, full bracing system specifications must be installed which often includes additional hardware such as panel hold-downs.



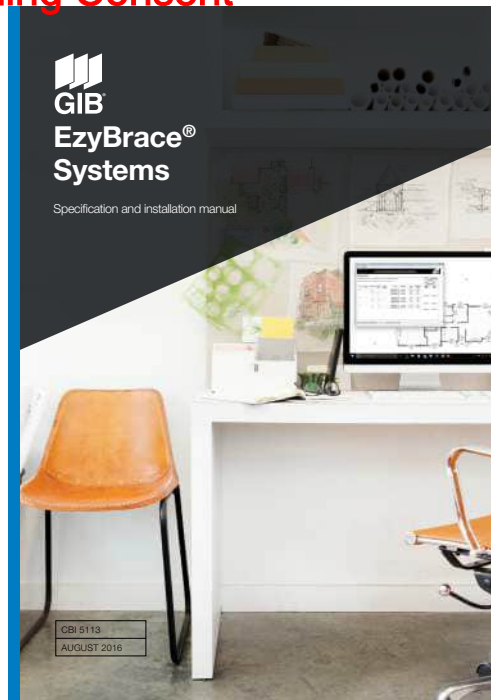
**BRANZ Appraised**

Appraisal No. 928 [2021]

**GIB EZYBRACE®  
SYSTEMS**

**Appraisal No. 928 [2021]**

This Appraisal replaces BRANZ  
Appraisal No. 928 [2016]



### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.



#### Winstone Wallboards Ltd

PO Box 12 256  
Penrose  
Auckland 1642  
Tel: 09 633 0100  
Fax: 09 633 0101  
Helpline Tel: 0800 100 442  
Helpline Fax: 0800 229 222  
Web: [www.gib.co.nz](http://www.gib.co.nz)  
Email: [info@gib.co.nz](mailto:info@gib.co.nz)



#### BRANZ

1222 Moonshine Rd,  
RD1, Porirua 5381  
Private Bag 50 908  
Porirua 5240,  
New Zealand  
Tel: 04 237 1170  
[branz.co.nz](http://branz.co.nz)



## Product

- 1.1 GIB EzyBrace® Systems are a range of wall and ceiling bracing systems based on the use of GIB® Standard, GIB Braceline® and other GIB® plasterboards. GIB EzyBrace® Systems are used to resist earthquake and wind loads on timber-framed buildings designed and constructed in accordance with NZS 3604 and the GIBFix® Framing System. The GIB EzyBrace® Bracing Software provides an electronic means of calculating bracing demand and resistance.

## Scope

- 2.1 GIB EzyBrace® Systems and the GIB EzyBrace® Bracing Software have been appraised for the design and use of interior wall and ceiling bracing systems in buildings within the scope limitations of NZS 3604.

## Building Regulations

### New Zealand Building Code [NZBC]

- 3.1 In the opinion of BRANZ, GIB EzyBrace® Systems, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

**Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4. GIB EzyBrace® Systems meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 [a], [f], [h] and [j]]. See Paragraphs 8.1-8.10.

**Clause B2 DURABILITY:** Performance B2.3.1 [a] not less than 50 years. GIB EzyBrace® Systems meet this requirement. See Paragraphs 9.1-9.4.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. GIB EzyBrace® Systems meet this requirement.



## Technical Specification

4.1 The GIB® plasterboards and accessories used with the GIB EzyBrace® Systems, and supplied or specified by Winstone Wallboards Ltd are as follows:

### GIB® plasterboards

- **GIB® Standard** - GIB® Standard plasterboard is a paper-bound, fibreglass reinforced gypsum-plaster core sheet lining material. GIB® Standard plasterboard is available in 10 mm and 13 mm thicknesses and a sheet width of 1,200 mm and 1,350 mm [GIB® Wideline]. The sheets have a taper on the two long sheet edges. The 10 mm thick sheets are also available with a square edge. Sheets are available in various lengths from 2,400 mm to 6,000 mm. The nominal sheet weight is 6.5 kg/m<sup>2</sup> for 10 mm thick sheets and 8.5 kg/m<sup>2</sup> for 13 mm thick sheets. GIB® Standard plasterboard face paper is a light buff colour.
- **GIB Braceline®** - GIB Braceline® is a high-density fibreglass reinforced, paper-bound gypsum-plaster core sheet lining material. GIB Braceline® is available in 10 mm and 13 mm thicknesses. The sheets have a taper on the two long sheet edges. GIB Braceline® has a sheet width of 1,200 mm and 1,350 mm, and is available in lengths of 2,400 mm, 2,700 mm, 3,000 mm, 3,600 mm and 4,800 mm. The nominal sheet weight is 9 kg/m<sup>2</sup> for 10 mm thick sheets and 12.5 kg/m<sup>2</sup> for 13 mm thick sheets. GIB Braceline® face paper is light blue in colour.
- **Alternative GIB® plasterboards** - in certain situations, as specified in the Technical Literature, substitution is permitted with GIB Aqualine®, GIB Fyrelite®, GIB Toughline® and GIB Ultralite®.

### Components and Accessories

- **GIB® Accessories and GIB® Jointing Compounds** - as specified in the GIB® Site Guide Technical Literature.
- **Fasteners**
  - GIB Grabber® High Thread Screws for fixing directly to timber - 32 mm x 6 g.
  - GIB Nail - 30 x 2.8 mm.
  - GIB Grabber® screws for fixing to light gauge steel battens - 32 mm x 6 g.
- **Adhesive and Sealants**
  - GIBFix® One - an off-white acrylic adhesive supplied in 375 ml cartridges and 600 ml sausages.
  - GIBFix® All-Bond - a green solvent-based adhesive supplied in 375 ml cartridges and 600 ml sausages.
- **GIBFix® Framing Components**
  - GIBFix® Angle - 45 x 45 x 0.55 mm galvanised steel angle with a knurled surface. Supplied in lengths of 2.4 m and 2.7 m.
  - GIB Grabber® Dual Thread Screws for fixing to timber through GIBFix® Angle - 32 mm x 7 g needle-point screw with coarse thread lower section and fine thread upper section.
- **Fasteners, Anchors and Connections**
  - GIB® HandiBrac® - a one-piece, 2 mm thick, galvanised steel angle bracket approximately 95 mm high, 65 mm long and 54 mm wide. The bracket is supplied with five Type 17 screws, 14 g x 35 mm.
  - BOWMAC® screw bolt - M10 x 140 mm screw anchor, with a blue painted hex head.
  - Coach screws - 12 mm x 150 mm and 50 x 50 x 3 mm washer, hot-dip galvanised for fixing to timber floors.
  - Cast-in bolts - M12 x 150 mm minimum and 50 x 50 x 3 mm washers for fixing to concrete floors.
  - Shot-fired fasteners - minimum 75 mm x 3.8 mm with 16 mm discs for fixing GS1-N, GS2-N and GS2-NOM internal line bracing elements to concrete slabs.
  - Galvanised or stainless steel strap - 25 x 0.9 mm top and bottom plate connections.
  - Strap fixings - 30 x 2.5 mm hot-dip galvanised or stainless steel flat head nails. [Note: For corrosion protection requirements, refer to NZS 3604, Section 4.]



- **Ceiling Diaphragms** - ceiling diaphragms are constructed using timber ceiling battens, or GIB® Rondo® or similar metal ceiling batten systems.
- **Plywood**
  - **Plywood** – minimum of 7 mm thick complying with AS/NZS 2269 D-D Structural Grade.
  - **Plywood fixings** – 50 x 2.5 mm hot-dip galvanised or stainless steel annular-grooved, flathead nails.

## Handling and Storage

- 5.1 The best results are achieved when GIB® plasterboards are treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the GIB® Site Guide. Sheets must be carried on edge and not dragged.
- 5.2 All accessories must be kept dry.

## Technical Literature

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

## Design Information

### General

- 7.1 NZS 3604 provides methods to distribute the bracing elements in walls to resist forces. The use of ceiling diaphragms is defined in the Technical Literature.
- 7.2 GIB EzyBrace® Systems are for use in dry, internal situations only.
- 7.3 GIB EzyBrace® Systems must not be exposed to temperatures of 52°C or greater for prolonged periods. Refer to appliance and fitting manufacturers for installation details.

### GIB EzyBrace® Bracing Software

- 7.4 The GIB EzyBrace® Bracing Software contains design procedures and an electronic calculation method for bracing demand calculated in accordance with NZS 3604, Section 5. Floor loadings can be selected in accordance with either NZS 3604, Bracing Demand Tables 5.5–5.10 for 2 kPa floor loads or less, or Tables 14.1–14.3 for 3 kPa floor loads.
- 7.5 The bracing demand calculations contained in the GIB EzyBrace® Bracing Software are based on first principles engineering and calculate wind and earthquake demand, based on the building parameters entered. Resulting bracing demand calculations are project specific and can differ from values derived using NZS 3604 wind and earthquake demand tables. The GIB EzyBrace® Bracing Software has been assessed as part of this Appraisal.
- 7.6 The bracing ratings for GIB EzyBrace® Systems are embedded in the GIB EzyBrace® Bracing Software.

### GIBFix® Framing System

- 7.7 The GIBFix® Framing System utilises GIBFix® Angles fixed at internal corners and at wall/ceiling junctions to reduce the potential for fastener ‘popping’ and joint cracking due to timber framing movement. The GIBFix® Framing System also offers an alternative arrangement of studs at corners and at intersecting walls to improve insulation and to reduce thermal bridging compared to traditional wall framing layouts. Refer to the Technical Literature for full details.
- 7.8 Where walls intersect, noggings are required at maximum 900 mm centres to enable fixing of the end stud of the intersecting wall to the main wall framing.
- 7.9 The GIBFix® Framing System permits the use of a single panel hold-down [e.g. GIB® HandiBrac®] at wall corners and T-intersections for both the across and along bracing directions.





### Framing

- 7.10 GIB EzyBrace® Systems can be installed using conventional timber framing layouts or by using the layouts provided in the GIBFix® Framing System. The bracing ratings embedded in the GIB EzyBrace® Bracing Software are equally applicable to both framing options.
- 7.11 Timber framing grade, spacing and construction must comply with NZS 3604. Timber treatment must comply with NZBC Acceptable Solution B2/AS1.
- 7.12 Winstone Wallboards Ltd recommends the use of kiln-dried stress-graded framing timber. The minimum actual framing dimensions are 90 mm x 45 mm for external walls and 75 mm x 45 mm for internal walls.
- 7.13 Joints in the top plates of bracing panels must be tied together with 3 kN and 6 kN top plate connectors using 25 mm x 0.9 mm hot-dip galvanised mild steel strap, three nails each side of joint for 3 kN and six nails each side of joint for 6 kN.

### Bracing System GS2-NOM

- 7.14 Most GIB EzyBrace® Systems require additional fasteners at the corners to achieve the published bracing ratings. The GS2-NOM system only requires fixings at 300 mm centres around the sheet perimeter.
- 7.15 Where internal doors penetrate a GS2-NOM bracing element and recessed door jambs are used, the sheets may be adhesive fixed around the door opening with GIBFix® All-Bond, instead of screw fixing. This is designed to reduce fastener 'popping' around internal doors when using grooved door frames. Screw fixing should be used where door frames are to be finished with architraves and the architrave will cover the screws. The adhesive fix option around door openings must not be used with any other GIB EzyBrace® Systems.

### Alternative GIB® plasterboards

- 7.16 GIB Ezybrace® Systems have been designed and tested using only the products specified. Occasionally additional properties may be required to be provided by a different GIB® plasterboard product. Table 1 provides acceptable alternative options.

**Table 1: Permitted Alternatives in GIB EzyBrace® Systems**

Specified	Permitted alternative GIB® plasterboard products								
GIB® plasterboard	GIB® Standard	GIB Ultraliner®	GIB Braceline/ Noiseline®	GIB Aqualiner®	GIB Toughliner®	GIB Fyreline®			
						10 mm	13 mm	16 mm	19 mm
GIB® Standard	N/A	✓	✓	✓	✓	✓ <i>Note 1</i>	✓ <i>Notes 1 and 3</i>		
GIB Braceline®	X	X	N/A	✓ <i>Note 2</i>	✓	X	✓ <i>Notes 1, 2 and 3</i>		

- **Note 1:** The fastener type and length and must be as required for the relevant Fire Resistance Rating (FRR) system but the fixing pattern must be as required for bracing elements.
- **Note 2:** The bracing element must be 900 mm or longer. Fasteners must be at maximum 100 mm centres to the perimeter of the bracing element. The bracing corner fastening pattern applies to all four corners of the element.
- **Note 3:** Specify traditional wall framing layout where a FRR is required. See Paragraph 11.4.

### BOWMAC Screw Bolts

- 7.17 When BOWMAC Screw Bolts are used as fixings for external walls with concrete masonry header block foundations, the minimum grout/concrete strength must be as specified in NZS 3604. BOWMAC Screw Bolts may be used in Corrosion Zones B and C as defined in NZS 3604. BOWMAC Screw Bolts may only be used in NZS 3604 Corrosion Zone D where the minimum concrete cover to the bolt is 60 mm. This cannot be achieved with standard 90 mm wide timber framing. An alternative option in this scenario is to use 140 mm wide framing.



## Structure

### Bracing

- 8.1 The bracing unit [BU] ratings are embedded in the GIB EzyBrace® Bracing Software and vary with the wall length.
- 8.2 The Technical Literature provides comprehensive construction and panel hold-down details. These include bottom plate fixings using anchor screws and cast-in bolts (concrete), coach screws (timber), GIB® HandiBrac® or nailed stud-to-plate straps.
- 8.3 Bracing units derived from the BRANZ P21 test method are based on a wall height of 2.4 m. The GIB EzyBrace® Bracing Software calculates bracing ratings for higher wall heights by multiplying the appropriate bracing rating by 2.4 m and dividing by the actual wall height in metres. For walls less than 2.4 m in height, the GIB EzyBrace® Bracing Software calculates bracing ratings as if they were 2.4 m high.
- 8.4 NZS 3604 limits wall bracing elements to a maximum of 120 BU/m for timber-framed floors and 150 BU/m for concrete floors.

### Ceiling Diaphragms

- 8.5 GIB® ceiling diaphragms are used to space bracing lines further apart than 6 m. The basic shape of a ceiling diaphragm must be square or rectangular and the length must not exceed twice the width.
- 8.6 For ceiling diaphragms not steeper than 15° and not exceeding 7.5 m in length, any GIB® plasterboard may be used provided the perimeter fixing are at 150 mm centres.
- 8.7 For ceiling diaphragms not steeper than 45° and not exceeding 7.5 m in length, and for diaphragms not steeper than 25° and not exceeding 12 m in length, any GIB® plasterboard may be used provided the perimeter fixings are at 100 mm centres.

### Openings in Bracing Elements

- 8.8 Small openings of 90 x 90 mm or less may be placed anywhere except within 90 mm of the edge of the bracing element.

### Shower Areas

- 8.9 GIB EzyBrace® Systems must not be located in shower cubicles or behind baths and the like. GIB EzyBrace® Systems may be used in water-splash areas provided they are protected as required by NZBC Clause E3 Internal Moisture. Refer to BRANZ Appraisal No. 427 GIB® Wet Area Systems.

### Impact Resistance

- 8.10 GIB® plasterboards provide adequate resistance to soft body impact, based upon history of use in domestic and light commercial applications.

## Durability

- 9.1 GIB EzyBrace® Systems, including linings and their fixings, have a serviceable life of at least 50 years. The ability of the systems to remain durable is dependent on them remaining dry in service, and being maintained in accordance with this Appraisal.

### Maintenance

- 9.2 The building must be maintained weatherproof and GIB® plasterboards must be protected from external and internal moisture in accordance with NZBC Clauses E2 and E3.
- 9.3 Holes resulting from damage to the lining, up to 100 x 100 mm square, will have no significant effect on the performance of the bracing panel. Such holes may be repaired by patching, stopping and finishing as appropriate. Independent expert advice must be sought to assess the effect and repair of larger areas of damage.
- 9.4 Bracing elements require no ongoing maintenance, apart from decoration and the repair of any damage.



### Prevention of Fire Occurring

- 10.1 Separation or protection must be provided to the GIB EzyBrace® Systems from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Verification Method C/VM1 and NZBC Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

### Fire Affecting Areas Beyond the Fire Source

- 11.1 For internal surface finish properties and fire resistance ratings, refer to BRANZ Appraisal No. 289 GIB® Fire Rated Systems.

### Internal Moisture

- 12.1 GIB® plasterboard must be used in dry internal situations, and must not be used where likely to be exposed to liquid water, or where extended exposure to humidity above 90% RH is expected, e.g., such as may be expected in sauna rooms, commercial kitchens and the like.

## Installation Information

### Installation Skill Level Requirement

- 13.1 Installation of GIB EzyBrace® Systems must be completed by, or under the supervision of a Licensed Building Practitioner with the relevant Licence Class, in accordance with the Technical Literature and this Appraisal.

### General

- 14.1 GIB EzyBrace® Systems must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

### Framing

- 14.2 To achieve an acceptable decorative finish, the GIB® Site Guide specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. Winstone Wallboards Ltd recommends a moisture content of 12% or less where buildings are to be air conditioned, centrally heated or have heat pumps installed.
- 14.3 Where the GIBFix® Framing System is used, GIBFix® Angles are tacked to the framing with flat head clouts prior to installation of the GIB® plasterboard.

### Cutting

- 14.4 GIB® plasterboard is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.

### Hold-downs

- 14.5 GIB EzyBrace® Systems which require hold-downs must either have a GIB® HandiBrac® fitted to each end of the bracing element or alternatively a metal stud-to-plate strap and hold-down anchor may be used. Refer to the Technical Literature for full installation details. Where a metal stud-to-plate strap is used, the hold-down anchor must be placed no more than 80 mm from the end of the bracing element.
- 14.6 Where the GIBFix® Framing System is used, a single hold-down located at a wall intersection may be used to provide the hold-down in both the across and along bracing directions.

### Plasterboard Sheet Fixing

- 14.7 Corner fixings must be 50 mm away from the sheet corner. Fixings must be no closer than 12 mm from the paper-bound sheet edge, and no closer than 18 mm from a cut edge, and driven at right angles to the sheet until the head is seated in a slight dimple just below the surface of the paper liner. Fixings must not be over-driven.



- 14.8 Wall bracing plasterboards [except for those used with the GS2-NOM system] are fixed at 150 mm centres around the perimeter framing of the bracing element *[Note: There is a variation for GIB Aqualine® and GIB Fyrelime®, see Table 1]*. At the corners of the wall bracing elements, a special fastening pattern is required with fasteners spaced at 50 mm, 100 mm, 150 mm, 225 mm and 300 mm from the corner and thereafter at 150 mm centres. Fixing to other framing is either mechanical or by using GIBFix® adhesives.
- 14.9 When installing GS2-NOM bracing elements, the GIB® plasterboard is fixed to framing around the bracing element perimeter and at sheet joints with fasteners at maximum 300 mm centres. Where recessed door jambs are used on internal door frames, the GIB® plasterboard may be fixed to the framing around the door opening with GIBFix® All-Bond, see Paragraph 7.15.
- 14.10 Where GIB Aqualine® or GIB Fyrelime® substitutes for GIB Braceline®, bracing elements must be longer than 900 mm and the bracing element perimeter fasteners must be spaced at 100 mm centres and the corner pattern described in Paragraph 14.8 used.
- 14.11 Full sheets must be used wherever possible.

#### **Fire Resistance Rated Bracing Elements**

- 14.12 Where a bracing element is also used as a fire-rated element, the method of fixing [including the length of the fixing specified] for the fire-rated element must be used, but the perimeter fixings of the bracing element must be at 150 mm centres and fixings at corners of the bracing element must be fixed as described in Paragraph 14.8. In two-layer systems, the inner layer must be used for bracing.

#### **Plywood Fixing**

- 14.13 Plywood is nail fixed at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing.

#### **Ceiling Diaphragms**

- 14.14 All GIB EzyBrace® System ceiling diaphragms require fixings around the perimeter at 100 mm or 150 mm centres, depending on the ceiling pitch and length. See Paragraphs 8.4-8.6 and refer to the Technical Literature.
- 14.15 The perimeter of the ceiling diaphragm is fixed to GIBFix® Angles, GIB® Rondo® perimeter channels, or alternatively, to an additional ex 150 x 40 mm timber plate fixed to the top plate.

#### **Jointing and Finishing**

- 14.16 All bracing element joints must be reinforced with GIB® tape and finished in accordance with the GIB® Site Guide.

#### **Health and Safety**

- 15.1 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.

### **Basis of Appraisal**

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

#### **Tests**

- 16.1 Bracing tests were carried out by Winstone Wallboards Ltd in accordance with BRANZ Technical Paper P21 to determine the performance of GIB EzyBrace® Systems when the building is subjected to lateral wind or earthquake loading. Nail and screw slip tests were carried out by BRANZ and Winstone Wallboards Ltd. Winstone Wallboards Ltd's test facilities, procedures and results have been reviewed by BRANZ and found to be satisfactory.



### Other Investigations

- 17.1 The GIB EzyBrace® Bracing Software has been assessed by BRANZ and found to be satisfactory.
- 17.2 The GIB EzyBrace® Systems and GIB® Site Guide Technical Literature have been examined by BRANZ and found to be satisfactory.
- 17.3 Site inspections were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.
- 17.4 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.
- 17.5 The properties of Winstone Wallboards Ltd GIB® plasterboards have been assessed for the following properties: MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, inspection for fungal spores, and hard and soft body impact tests.

### Quality

- 18.1 Winstone Wallboards Ltd's manufacturing process and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory.
- 18.2 The quality management systems of Winstone Wallboards Ltd have been assessed and registered by TELARC as meeting the requirements of ISO 9001, Registration No. 581.
- 18.3 Winstone Wallboards Ltd is responsible for the quality of the product supplied.
- 18.4 The quality of the application and finish on-site is the responsibility of the installation and stopping contractors.
- 18.5 Designers are responsible for the design of buildings.
- 18.6 Building owners are responsible for the maintenance in accordance with the instructions of Winstone Wallboards Ltd.

### Sources of Information

- AS/NZS 2269.0:2012 Plywood - Structural - Specifications.
- AS/NZS 2588:2018 Gypsum plasterboard.
- BRANZ Technical Paper P21:2010 A wall bracing test and evaluation procedure.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.





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

The Appraisal is issued only to **Winstone Wallboards Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

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

For BRANZ

**Chelydra Percy**

Chief Executive

Date of Issue:

01 December 2021

ecoply®

FLOORING

ecoply®

ROOFING

ecoply®

Square  
EDGE

ecoply®

BARRIER

# ECOPLY® SPECIFICATION & INSTALLATION GUIDE

DECEMBER 2023



# ECOPLY® SPECIFICATION & INSTALLATION GUIDE

## Contents

1.0 Ecoply® Product Range .....	3
1.1 Technical Information & CAD Details .....	3
1.2 Product Description & Range .....	4
1.3 Surface Grades .....	5
1.4 Preservative Treatment .....	6
1.5 Section Properties .....	7
1.6 Product Identification .....	8
1.7 Code Compliance .....	9
1.8 General Design Considerations .....	9
1.9 Sustainability .....	11
1.10 Health & Safety .....	11
1.11 Storage & Handling .....	11
2.0 General Installation Guide .....	12
2.1 Framing .....	12
2.2 Sheet Fasteners & Fixing .....	12
2.3 Adhesives .....	14
3.0 Structural Bracing & Ceiling Diaphragms .....	15
3.1 Design to Comply with the New Zealand Building Code .....	15
3.2 Ecoply Bracing Specifications Summary .....	17
3.3 Ecoply Bracing Specification - EPI .....	18
3.4 Ecoply Bracing Specification - EPG .....	20
3.5 GIB Handibrac® – Recommended Installation Method .....	22
3.6 Structural Ceiling Diaphragms .....	22
4.0 Roofs & Decks .....	23
4.1 Flexible Membrane Systems .....	23
4.2 Roof Tile Systems .....	24
4.3 Roofing & Decking – Product Selection Guide .....	24
4.4 Frame Spacings for Ecoply Roofs & Decks .....	25
4.5 Roofing – Design Considerations .....	26
4.6 Roofing – Installation .....	28
5.0 Flooring .....	30
5.1 Flooring – Range .....	30
5.2 Flooring – Installation .....	30
5.3 Flooring – Finishing .....	31
6.0 Frequently Asked Questions .....	32
7.0 References & Sources of Information .....	34
8.0 Limitations .....	34



## 1.0 ECOPLY® PRODUCT RANGE

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

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

Note: Some Ecoply plywood products may be manufactured by Carter Holt Harvey Plywood Australia. This product is manufactured from renewable plantation Radiata Pine under the EWPPA third party quality control program and treated in New Zealand to the requirements of Acceptable Solution B2/AS1.

For information relating to Shadowclad® panels and plywood used as an exterior cladding, refer to the current Shadowclad Specification and Installation Guide for Cavity Construction. For information relating to Ecoply Barrier used as a rigid air barrier refer to the current Ecoply Barrier Specification and Installation Guide. Both of these documents can be downloaded from [www.chhply.co.nz](http://www.chhply.co.nz).

Ecoply products must be competently installed in accordance with good building practices and sound design principles to satisfy the requirements of the Building Act 2004, the New Zealand Building Code (NZBC), and applicable New Zealand Standards. This is the responsibility of building owners and the design professionals and builders that they engage. This document contains information, limitations, and cautions regarding the properties, handling, installation, usage, and the maintenance of Ecoply products. However, to the maximum extent permitted by law, Carter Holt Harvey Plywood assumes no legal liability to you in relation to this information.

### 1.1 TECHNICAL INFORMATION & CAD DETAILS

When specifying or installing any Ecoply plywood products visit [www.chhply.co.nz](http://www.chhply.co.nz) or call 0800 326 759 to ensure you have current specification material and any relevant technical notes.

*The information contained in this document is current as at December 2023. It is your responsibility to ensure you have the most up to date information available.*

*The information contained in this publication relates specifically to Ecoply® structural plywood products manufactured by Carter Holt Harvey Plywood and must not be used with any other plywood manufacturer's product no matter how similar they may appear.*

*Alternative plywood products can differ in a number of ways which may not be immediately obvious and substituting them for Ecoply structural plywood products is not appropriate, and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the NZBC.*



## 1.2 PRODUCT DESCRIPTION &amp; RANGE

Ecoply® structural plywood panels are manufactured from radiata pine wood veneers. The veneers are placed at right angles to each other for maximum strength and stability then bonded together with synthetic phenolic (PF) resin to form a strong and permanent Type A bond.

The strength of Ecoply plywood is optimised for maximum performance parallel to the face grain with cross plies providing enhanced stability across the grain.

The Ecoply plywood range can be specified for:

- Surface grade (e.g. CD) - where the first letter describes the face veneer appearance and the second letter describes the back veneer of the Ecoply sheet. Surface grades are defined in AS/NZS 2269 and summarised in Tables 2A and 2B.
- Stress grade - utilises the symbol F and a suffix for both parallel and perpendicular to the grain directions, for example;
  - F8/F8 as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade in both directions.
  - For plywood 15mm thick and below all Ecoply products are F8/F8.
  - For Ecoply plywood products 17mm thick and above most products are F8/F5.
  - Ecoply 19mm Longspan Flooring is F11/F8 stress grade (See Tables 1, 4 and 5). Other Ecoply products are also available in F11/F8 upon request.

- Thickness - ranging from 7mm to 25mm. (Thicknesses above 25mm subject to availability).
- Length - being 2400mm and 2700mm with a standard nominal width of 1200mm.
- Preservative treatment - being untreated, H3.2 CCA or H3.1 LOSP Azole treated.
- Edge finish - being square edge or for Ecoply Flooring and Roofing, routed on the long edges of the sheet with a polypropylene plastic tongue inserted into one side for a tongue-in-groove joint.

For general installation advice refer to section 2.0: General Installation Guide.

For specification and installation advice for Ecoply used in typical applications refer to the following sections.

## Typical Application

## Section

Structural bracing and ceiling diaphragms	3.0
Roofs and decks	4.0
Flooring	5.0

**Note: Technical notes referenced in this guide can be downloaded from [www.chhply.co.nz](http://www.chhply.co.nz) or contact Carter Holt Harvey Plywood on 0800 326 759.**

Table 1: Ecoply® Product Range

Stress Grade (UNO)		F8/F8								F8/F5							
Nominal Thickness (mm)		7		9		12		15		17		19		21		25	
Sheet length (x 1200mm width)		2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
Ecoply® Structural Square Edge	CD	●		●	●	●	●			●	●	●	●	●	●	●	●
	DD	●	●	●	●	●	●			●	●	●	●	●	●	●	●
Ecoply Flooring (pt)	CD											●	●	●	●	●	●
Ecoply Roofing (pt) <sup>1</sup>	DD							●	●								

● Available untreated only

● Available either untreated or H3.2 CCA

● Available H3.2 CCA only

**pt** Machine grooves on both long edges with a plastic polypropylene tongue in one groove, 1200mm cover.

**1** Ecoply 15mm Roofing and Ecoply 19mm Longspan Flooring are supplied as standard in F11/F8 stress grade.

- Full range may not always be available ex stock, check with your Ecoply supplier to ensure availability.
- Non standard specifications, including thicker sheets may be available to special order in significant quantities.
- Other Ecoply products are also available in F11/F8 upon request.

1.3 SURFACE GRADES

Table 2A summarises the surface appearance grades in which Ecoply® structural plywood is available with some typical applications for each surface grade.

**The surface grade specifications are defined in AS/ NZS 2269.** Table 2B details surface appearance grades for speciality Ecoply plywood and typical applications.

Table 2A: Ecoply® Structural Square Edge Products





Face Grade C	Face Grade D
	
<p>Solid sanded surface with filled holes and splits, with intergrown knots. Suitable for a basic paint finish. Ecoply panels may include minor imperfections associated with veneer based wood products.</p> <p>Ecoply Panels are subject to natural characteristics of timber; Ecoply may contain filler and require additional preparation prior to coating application to achieve the desired aesthetic requirements.</p>	<p>Non appearance grade allowing open imperfections up to 75mm across the face veneer. Splits and knots allowable.</p>
<p><b>Possible Uses:</b></p> <ul style="list-style-type: none"><li>• Structural gussets</li><li>• Stressed skin panels</li><li>• Bins, boxes, crates</li><li>• Hoardings</li><li>• Membrane substrate</li></ul>	<p><b>Possible Uses:</b></p> <ul style="list-style-type: none"><li>• Non visual bracing</li><li>• Strength critical pallets</li><li>• Structural components</li><li>• Portal frame gussets</li></ul>

Table 2B: Speciality Ecoply® Products

Flooring CD	Roofing DD
	
<p>Solid sanded C grade surface with tongue and groove profile on long edges.</p>	<p>Unfilled D grade surface with tongue and groove profile on long edges.</p>
<p><b>Possible Uses:</b></p> <ul style="list-style-type: none"><li>• Substrate for flooring overlays such as linoleum, tiles and rigid coverings</li><li>• Substrate for membrane roofing and decking where visible appearance is critical</li></ul>	<p><b>Possible Uses:</b></p> <ul style="list-style-type: none"><li>• Substrate for asphalt shingles</li><li>• Substrate for roof systems where a smooth substrate is not required</li></ul>

Notes: A higher visual grade may be substituted if required, e.g. Ecoply® CD can be used anywhere DD is used. Pictures shown above are scaled down versions of typical Ecoply sheets. Grain pattern and colour may vary. If sheet appearance is critical select panels individually.



## 1.4 PRESERVATIVE TREATMENT

Ecoply® structural plywood is available untreated or treated in accordance with AS/NZS 1604.3:2012. If treated, Ecoply structural plywood is treated with either H3.2 CCA (Copper Chrome Arsenate) or H3.1 LOSP (Azole) clear treatment.

H3.2 CCA and H3.1 LOSP treated plywood in accordance with AS/NZS 1604.3 is described as suitable for: "outside, above ground, subject to periodic moderate wetting and leaching."

**Ecoply® plywood is envelope preservative treated. Where sheets are cut, cuts must be coated with a brush on timber preservative. Soudal® Metalex® Concentrated Timber Preservative Clear (Soudal® Metalex® Clear) is recommended. Failure to do so will affect the long term durability of the panel.**

The characteristics of the treatments are shown in Table 3.

**Table 3: Preservative Treatment**

	Untreated	H3.2 CCA	H3.1 LOSP (Azole)
<b>Preservative Carrier</b>	N/A	Water	Light organic oil (white spirits)
<b>Colour</b>	Natural	Green	Clear (i.e. natural)
<b>Fungicide</b>	Heat treated dry wood	Copper	Propiconazole and Tebuconazole
<b>Insecticide</b>	Heat treated dry wood	Arsenate	Permethrin
<b>Other Chemicals</b>	N/A	Chrome (to fix preservative in wood)	Butyl Oxitol (co-solvent to assist active stability)
<b>Mouldicide</b>	N/A	Copper (limited efficacy)	IPBC
<b>Notes</b>	Plywood for dry interior use, supplied ex mill at <15% moisture content	Dried after treatment to average 18% moisture content for use in service at higher moisture contents	Solvent does not affect dimensions. Solvent smell disappears over time
<b>Availability</b>	Readily available	Standard treatment	Treated to order for CD, DD, flooring and roofing products.
<b>Applications (Refer NZS 3602)</b>	Interior dry protected	Exterior/Interior damp (service performance subject to detailing and coatings)	

## H3.2 CCA

Ecoply structural plywood, which is H3.2 CCA treated (waterborne preservative with a green colour), is dried following treatment so that sheets may return to the correct dimensions. The moisture content after treatment with CCA and drying will be higher than the limits placed in AS/NZS 2269 on untreated product. The target is for an average moisture content of approximately 18% to provide a panel closer to the expected equilibrium moisture content for most H3.2 CCA applications.

The fillets used to separate sheets in drying may leave marks on the sheet surface. These will fade over time as the plywood weathers, and can be disguised with paint but may be visible under stain. The process of treating with H3.2 CCA and subsequent drying is likely to increase the face checking of the panel.

For more information on face checking refer to section 1.8 General Design Considerations - Aesthetics.

## H3.1 LOSP

H3.1 LOSP treated Ecoply retains the wood colour and does not contain moisture so the plywood remains at the same dimensions and moisture content during treatment. However, the plywood when freshly treated may contain more than 60 litres of organic fluid per cubic metre. When coating H3.1 LOSP treated plywood, traces of residual solvent may be present on the sheet surface from the treatment process. Sheets feeling greasy to touch should be placed in a well ventilated area and allowed to flash off to ensure proper adhesion of paints and stains to the sheet surface.

The H3.1 LOSP solvent smell can be quite strong and venting is recommended until most of the solvent has evaporated. Untreated plywood is recommended for internal applications where NZS 3602 allows the use of untreated plywood.

Mechanical fasteners are recommended to fix H3.1 LOSP treated Ecoply to framing. If adhesives are required, thorough venting is recommended and H3.1 LOSP tolerant adhesives should be applied according to the adhesive manufacturer's instructions. See section 2.3 Adhesives.

## 1.5 SECTION PROPERTIES

Table 4A: Section Properties of Ecoply® Structural Plywood

Section Properties per mm width								
Nominal Plywood Thickness <sup>2</sup> (mm)	ID Code <sup>2</sup>	Mass (kg/m <sup>2</sup> )	Parallel to the Face Grain			Perpendicular to the Face Grain		
			Parallel Moment of Inertia (mm <sup>4</sup> )	Section Modulus Z (mm <sup>3</sup> )	Shear Constant <sup>3</sup> I/Q (mm <sup>2</sup> )	Perpendicular Moment of Inertia I (mm <sup>4</sup> )	Section Modulus Z (mm <sup>3</sup> )	Shear Constant <sup>3</sup> I/Q (mm <sup>2</sup> )
7	7-24-3	4.0	30.0	8.3	5.2	2.1	1.0	1.6
9	9-30-3	5.0	58.6	13.0	6.5	4.0	1.5	2.0
12	12-24-5	6.6	114.9	19.0	9.3	33.4	8.3	5.2
15	15-30-5	8.3	224.5	29.7	11.6	65.2	13.0	6.5
17	17-24-7	9.2	284.5	33.5	12.2	122.5	19.0	9.3
	17-38-5	9.2	367.4	42.0	13.2	84.8	15.1	7.2
19	19-30-7	10.6	450.7	46.5	13.8	156.8	21.7	10.5
	19-38-5	10.6	456.3	47.7	14.8	132.5	20.9	8.2
21	21-30-7	11.6	555.7	52.3	15.3	239.2	29.7	11.6
	21-38-6	11.6	626.2	58.6	15.4	191.7	25.4	10.9
25	25-30-9	13.5	896.7	72.0	18.0	381.1	38.1	13.5
	25-38-7	13.5	991.6	78.6	17.9	349.6	36.8	13.7

Table 4B: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design

Nominal Strengths (Limit States) per mm width								
Nominal Plywood Thickness <sup>2</sup> (mm)	ID Code <sup>2</sup>	Stress Grade	Parallel to the Face Grain			Perpendicular to the Face Grain		
			Bending Stiffness EI (1000 Nmm <sup>2</sup> )	Bending Moment f <sub>pb</sub> Z (Nmm <sup>2</sup> )	Rolling Shear f <sub>pr</sub> I/Q (N)	Bending Stiffness EI (1000 Nmm <sup>2</sup> )	Bending Moment f <sub>pb</sub> Z (Nmm <sup>2</sup> )	Rolling Shear f <sub>pr</sub> I/Q (N)
12	12-24-5	F8/F8	1046.0	475.2	15.8	303.7	208.0	8.8
15	15-30-5	F8/F8	2043.0	742.5	19.8	593.2	325.0	11.1
	15-30-5	F11/F8	2357.3	920.7	21.0	593.2	325.0	11.1
17	17-24-7	F8/F5	2589.0	836.6	20.7	845.1	266.1	13.8
	17-24-7	F11/F8	2987.3	1037.3	22.0	1114.6	475.2	15.8
	17-38-5	F8/F5	3343.0	1049.3	22.5	585.2	211.0	10.7
	17-38-5	F11/F8	3857.3	1301.1	23.8	771.8	376.8	12.3
19	19-30-7	F8/F5	4101.4	1162.5	23.4	1082.0	304.2	15.5
	19-30-7	F11/F8	4732.4	1441.5	24.8	1427.0	543.3	17.8
	19-38-5	F8/F5	4152.0	1191.3	25.1	914.0	292.0	12.2
	19-38-5	F11/F8	4790.7	1477.2	26.6	1205.5	521.4	14.0
21	21-30-7	F8/F5	5056.7	1307.1	25.9	1650.6	415.8	17.2
	21-38-6	F8/F5	5698.1	1464.6	26.2	1322.5	356.3	16.1
25	25-30-9	F8/F5	8159.8	1800.9	30.5	2629.7	533.7	19.9
	25-38-7	F8/F5	9023.3	1963.9	30.5	2412.0	515.1	20.2

<sup>1</sup> Actual thickness of Ecoply® sheets manufactured to thickness tolerances stated in AS/NZS 2269.

<sup>2</sup> Identification code: panel thickness – outermost veneer thickness x 10 – number of plies.

<sup>3</sup> I/Q values for rolling shear are for stress at the neutral axis calculated as in NZS 3603.

Notes:

- The section properties in Tables 4A and B have been calculated in accordance with AS/NZS 2269.
- For section properties for other thicknesses and Shadowclad® products contact CHH Plywood on 0800 326 759.

**Structural Properties of Ecoply® Plywood**

The majority of Ecoply® plywood is either F8/F8 or F8/F5 grade (exceptions are identified in section 1.2: Product Description and

Range) and the characteristic values may be used in conjunction with both NZS 3603 and NZS AS 1720.1 for the design of timber components. The characteristic strengths in Table 5 have been used to provide the nominal strengths in Table 4B.

**Table 5: Structural Properties of Ecoply® Plywood**

Stress Grade	Characteristic Strength MPa		
	F5	F8	F11
<b>Bending (<math>f_{pb}</math>)</b>	14	25.0	31.0
<b>Tension (<math>f_{pt}</math>)</b>	9.6	15.0	18.0
<b>Panel Shear (<math>f_{ps}</math>)</b>	3.7	4.2	4.5
<b>Rolling Shear (<math>f_{pr}</math>)</b>	1.5	1.7	1.8
<b>Compression in Plane of Sheet (<math>f_{pc}</math>)</b>	12.0	20.0	22.0
<b>Compression Normal to the Plane of the Sheet (<math>f_{pn}</math>)</b>		9.7	12.0
<b>Modulus of Elasticity (E)</b>	6900	9100	10500
<b>Modulus of Rigidity (G)</b>	345	455	525

Source: AS/NZS 2269

Wood is strongest when stressed parallel to the grain and weakest across the grain, so the lay up or arrangement of veneers in the panel determines the properties. Because of its cross banded construction, plywood possesses significant strength and stiffness both parallel and perpendicular to the direction of the face grain, but is generally strongest and stiffest along the direction of the face grain.

The section properties of structural plywood in Table 4A are calculated in accordance with AS/NZS 2269 to allow for the reduced contribution of veneers perpendicular to the direction of stress. For engineering design to NZS 3603 and/or NZS AS

1720.1, the section properties are multiplied by stresses and 'k' and  $\phi$  factors to determine resistances for limit states design.

Resistances and nominal strengths in Table 4B assume all 'k' factors are equal to 1.0. Multiply tabled values by the strength reduction factor  $\phi$  and 'k' factors for specific in-service conditions for design to a structural code such as NZS 3603.

Strength Reduction Factors and Capacity Reduction Factors can be taken from NZS 3603 Clause 2.5 and NZS AS 1720.1 Clause Z22.3 as applicable.

**1.6 PRODUCT IDENTIFICATION**

In accordance with AS/NZS 2269, Ecoply structural plywood sheets have the following information marked on the back:

- Brand name: e.g. ECOPLY.
  - Face grade, back grade: e.g. CD.
  - Intended application: e.g. STRUCTURAL.
  - Panel construction code: e.g. 15-30-5 (Thickness (mm)-Face veneer thickness (mm x 10)-Number of veneers).
- Note:** In some cases the Panel construction code may be replaced by the Section Properties, in which case the values of second moment of area (moment of inertia) (I) and section modulus (Z) in the grain orientations are declared: e.g. 626.2, 58.6/191.7,25.4.

- Glue bond: e.g. A BOND.
- Formaldehyde emission class: E0 for A Bond Ecoply.
- Australasian Standard: e.g. AS/NZS 2269.
- Treatment Standard (if applicable): e.g. AS/NZS 1604.3:2012.
- Date and time of manufacture: e.g. 01/12/15 12:23:45.
- Stress grade: e.g. F8 (exceptions include Shadowclad® and Grooved Lining which are performance rated).
- The Engineered Wood Products Association of Australasia (EWPAA) brand and mill number: e.g. 911 (Tokoroa mill), 333 (Myrtleford Mill, Australia).
- Where applicable sheets will note "Made in Australia."

**Untreated example:**

ECOPLY® CD FLOORING STRUCTURAL  
19-30-7 A BOND E0 AS/NZS 2269.0:2012  
PAT 01/12/15 12:23:45 F11/F8



**Note:** Performance based products like Grooved Lining and Shadowclad® may include brand identification instead of visual quality, stress grade, and panel code. These panels, when accompanied with specification literature, are still deemed to comply with AS/NZS 2269.

**Treated example:**

ECOPLY CD STRUCTURAL  
25-30-9 A BOND E0 AS/NZS 2269.0:2012  
AS/NZS 1604.3:2012 046 01 H3 E CCA  
RETREAT CUTS PAT 01/12/15 12:23:45 F8/F8



## 1.7 CODE COMPLIANCE

Ecoply® plywood manufacture is third-party audited through the product quality control programme of the Engineered Wood Products Association of Australasia (EWPAA) which is itself audited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

CHH Plywood is licensed by the EWPAA to stamp plywood with the EWPAA/JAS-ANZ Product Certification Mark. This certifies it has been manufactured under the third party audited Joint Product Certification programme to monitor compliance with joint Australian/New Zealand Standard AS/NZS 2269 Plywood – Structural. Plywood to this standard is referenced in the NZBC Acceptable Solutions and Verification Methods through:

- NZS 3602 The Use of Timber and Wood-based products for Use in Building.
- NZS 3603 Timber Structures.
- NZS 3604 Timber Framed Buildings.
- AS/NZS 1604.3:2012 Specification for Preservative Treatment, Part 3:Plywood.
- E2/AS1 External Moisture.



**WARNING:** Plywood which is non-certified or is manufactured to standards other than AS/NZS 2269, such as US voluntary standard PSI-95, is not referenced in the NZBC. There can be significant differences between AS/NZS 2269 certified and non certified plywood around bond durability, structural ratings and veneer quality.

**Structure B1**

Design to NZS 3603 Timber Structures complies with the NZBC in Verification Method B1/VMI Clause 6.0 Timber. Plywood is the only sheet material with properties listed in NZS 3603. Ecoply structural plywood is available in F8/F5 and F8/F8 stress grade. Some specialty products are available F11/F8 or with specifically designed properties for specialised applications.

## 1.8 GENERAL DESIGN CONSIDERATIONS

**Durability (Clause B2) and Exterior Moisture (Clause E2)**

Ecoply plywood is made from softwood solid radiata pine veneer. Designers should assess the level of exposure to biological, moisture, and other hazards and apply appropriate preservative treatment and detailing to minimise exposure to these hazards.

Information in this manual outlines suggested practices for detailing building components to exclude moisture to comply with the durability requirements of the NZBC.

**Formaldehyde**

Ecoply plywood is manufactured using phenol formaldehyde resins which are fully cured in the hot press. Cured resin is thermally and moisture stable and formaldehyde emissions for the glued plywood are similar to background levels for the wood by itself when tested to AS/NZS 2098.11 Determination of formaldehyde emissions for plywood. Accordingly every panel is branded with the lowest emission class (less than 0.5mg/litre for E<sub>0</sub>).

Actual formaldehyde emissions for Ecoply plywood have been tested and approved as having an actual formaldehyde emission level of less than 0.3mg/litre (equivalent to a Super E<sub>0</sub> emission level).

**Moisture Content and Dimensional Change**

At the time of leaving the factory, the moisture content of untreated Ecoply plywood should generally be in the range of 8% to 15% as required by AS/NZS 2269. All wood products including plywood respond to changes in ambient humidity so the eventual moisture content of plywood varies according to how dry or how wet the environment is. After manufacture, the moisture content will move to equilibrium with the environment, and the veneers swell or shrink across the grain in response. The total expansion both along and across a 2400 x 1200mm panel can be in the order of 1.5mm to 3mm as the plywood changes from a dry to a saturated state.

Ecoply that is treated with waterborne preservatives (e.g. H3.2 CCA) is expected to be used in applications that have higher humidity than interior dry use, so following treatment it is dried to a higher average moisture content of approximately 18%. This provides for a more stable panel in service than placing a dry (less than 15%) sheet in a higher moisture environment.

Detailing and construction must allow for movement if the plywood will be subject to cycles of moisture change. Seasonal and daily cycles can be significant depending on the end use.

### Temperature

Wood will expand upon heating as do practically all solids. The thermal expansion of plywood is quite small and there is little effect on the structural performance or durability of plywood when used in temperatures below 54°C. The average co-efficient of thermal expansion of plywood is  $4.5 \times 10^{-6}$  mm/mm/°C. At temperatures above 55°C wood begins to deteriorate. Colours of coatings and finishes should be selected to reduce heat gain. For extreme conditions, further technical information is available by calling CHH Plywood on 0800 326 759.

The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214 Methods of determining the total thermal resistance of parts of buildings. e.g. Plywood has a Conductivity (k) of 0.13W/mK so a 12mm panel has a thermal resistance  $R = 0.012/0.13 = 0.09$ .

### Aesthetics

Ecoply® plywood products can be selected for decorative or weather protection functions as well as structural performance. Acceptable Solution E2/AS1 - External Moisture allows plywood manufactured to AS/NZS 2269, (minimum CD appearance grade, minimum 12mm thickness and treated as required by NZS 3602) to be used for exterior cladding. For exterior cladding applications CHH Plywood strongly recommends Shadowclad® exterior cladding rather than smooth faced plywood such as Ecoply.

Shadowclad features a textured (bandsawn) face which reduces the visibility of face checking and other appearance related issues which can occur on smooth faced plywood if not regularly maintained by the homeowner. For more information on plywood used as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction.

### Face Checks on Plywood Exposed to Weather

Face checks are lengthwise separations of wood fibres in the face veneer of the plywood. They result from the normal swelling and shrinking of wood as it gains and loses moisture. It is important to realise that these checks are superficial, being confined to the face veneer. They do not alter the structural integrity of the plywood in any way. **If you are the specifier, it is important to discuss these issues with your client and consider the length of exterior exposure, climate conditions and protection offered by the surface coating before finalising product choice.**

### Durability

The durability of Ecoply structural plywood will depend on the application. Detailing, treatment and installation details need careful consideration to satisfy the requirements of the NZBC.

Normally, 50 year durability can be achieved with untreated Ecoply in dry, interior exposure. For internal environments subject to high humidity or condensation H3.2 CCA treated Ecoply should be used.

For plywood as a rigid air barrier (including rigid air barrier acting as bracing) refer to the current Ecoply Barrier Specification and Installation Guide which can be downloaded from [www.chhply.co.nz](http://www.chhply.co.nz).

### Fire, Spread of Flame and Smoke Development

The following data on early fire hazard properties of uncoated Ecoply plywood are the result of tests carried out by Australian Wool Testing Authority AWTA to test structural plywood manufactured to AS/NZS 2269 in accordance with ISO 5660, reaction to fire tests (heat release, smoke production and mass loss rate). Part 1: Heat Release rate (cone calorimeter method).

Table 6 summarises the test configurations and associated material groups.

For plywood with decorative finish coatings or intumescent coating, performances depend on spread rates of the coating. For advice on specific coating systems and their suitability for use with Ecoply products, always refer to the coating manufacturer.

**Table 6: Early Fire Hazard Properties of Ecoply® Plywood**

Material	Species	Origin	Thickness	Treatment	Material groups
<b>Plywood</b>	Radiata Pine	New Zealand	7mm	CCA Treated	Group 3
<b>Plywood</b>	Radiata Pine	New Zealand	12mm	Untreated	Group 3
<b>Plywood</b>	Radiata Pine	New Zealand	12mm	LOSP Treated	Group 3
<b>Plywood</b>	Radiata Pine	New Zealand	19mm	Untreated	Group 3
<b>Plywood</b>	Radiata Pine	New Zealand	19mm	LOSP Treated	Group 3
<b>Plywood</b>	Radiata Pine	New Zealand	19mm	CCA Treated	Group 3

### Fire Rated Systems

The NZBC has specific requirements about the use of combustible materials in buildings. As a wood veneer based product, plywood is considered to be a combustible material.

For specific information about the use of combustible materials used in building solutions please refer to the NZBC Clauses C1 - C6 - Protection from Fire.



## 1.9 SUSTAINABILITY

### Sustainability

Carter Holt Harvey's commitment to the environment is fundamental to its business. From the use of plantation forests to promoting policies minimizing waste and emissions, CHH is proud of the sustainable base for its products.

CHH Plywood uses waste handling procedures to optimise recovery and manage the creation of arisings. This starts with the use of only radiata pine sourced from sustainably managed renewable plantation and includes the application of optimisation algorithms for veneer peeling to enhance finished goods recovery.

CHH Plywood has been actively involved in the development of markets for the use of downgraded arising product for use in industrial applications including packaging whilst peeler cores are often reprocessed for use as bearers. All waste product derived is assessed for downstream applications including bark for landscaping, boiler fuel and/or sold for use in wood fibre products.

### Environmental Product Declaration (EPD)

The CHH Plywood Environmental Product Declaration (EPD) is a demonstration of the continual focus and commitment to sustainability, through a science driven, independently verifiable process with standard methodology across all products. Note: The published CHH Plywood EPD is based on NZ production from our Tokoroa facility and is not a representation of product manufactured in Australia. If EPD data has been used as part of your project please note "CHH Plywood New Zealand manufactured plywood only."

### Environment, Social and Governance (ESG)

Carter Holt Harvey has developed a new Environment, Social and Governance (ESG) reporting programme. The company has focused on setting out what its stakeholders have identified as material ESG issues, how it manages, or plans to manage those issues, and key environmental indicators. In the future, Carter Holt Harvey will celebrate its ESG achievements and acknowledge those areas where it needs to improve, keeping on a path of steady improvement that will further strengthen Carter Holt Harvey in the years to come.

### FSC® and Sustainability Accreditations

CHH Plywood sources logs from sustainably managed plantation forests. The globally recognised independent body, the Forest Stewardship Council® (FSC®) has recognised the Tokoroa and Myrtleford mills for using responsibly sourced wood, awarding CHH Plywood with the FSC certifications (FSC® C012019 and FSC® C018480 respectively). This measure provides a formal assurance that gives CHH Plywood's customers confidence about its sustainability credentials. CHH Plywood's products can be supplied with a FSC certificate on request.

### DECLARE LABEL

The New Zealand manufactured CHH Plywood range of untreated products have been issued Declare labels and determined to be Red List Free through the International Living Future Institute, and as such the untreated range can be used in Living Building Challenge.

**To view and download certificates and documents related to Sustainability please visit [www.chhply.co.nz/sustainability](http://www.chhply.co.nz/sustainability)**

## 1.10 HEALTH & SAFETY

Ecoply should be handled in accordance with the Safety Data Sheets (SDS) for untreated, H3.2 CCA and H3.1 LOSP treated Ecoply, which can be downloaded from [www.chhply.co.nz](http://www.chhply.co.nz).

Always wear safety glasses or non-fogging goggles when machining Ecoply panels.

If wood dust exposures are not controlled when machining (sawing, routing, planing, drilling etc.) a class P1 or P2 replaceable filter or disposable face piece respirator should be worn.

Wear comfortable work gloves to avoid skin irritation and the risk of splinters. Wash hands with mild soap and water after handling panels.

## 1.11 STORAGE & HANDLING

Ecoply panels must be stored and handled with care to maintain good condition before use and after installation:

- The storage area must be protected from sun, rain and wind that would otherwise bring about rapid changes in temperature and humidity.
- Support for the sheets must be provided at both ends and middle to avoid distortion. Ensure bearers in packs above are aligned over bearers below (to avoid inducing curves in sheets).
- The stack must be kept dry and clear of ground contact, and placed so that it will not be exposed to mechanical damage.

- The sheets must be stacked flat, NOT on edge.
- To avoid staining, fading and surface checking, the sheets must not be exposed to the weather while awaiting installation.
- Store in well-ventilated areas away from sources of heat, flames or sparks.

## 2.0 GENERAL INSTALLATION GUIDE

The following is a general guide to be followed unless otherwise specified. For additional installation instructions for typical applications refer to sections 3, 4 and 5.

### 2.1 FRAMING

Use kiln dried framing e.g. Laserframe® in accordance with timber framing manufacturer's specifications and treated in accordance with NZS 3602. All timber frame sizes and set out must comply with NZS 3604 (or be specifically designed to NZS 3603). The current Laserframe Product Guide can be downloaded from [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz). Ecoply® may be specified for frame spacing determined by design, or using tables in section 3 for specific product applications such as bracing, flooring and as a substrate for shingle roofs or membrane roofs and decks.

H3.1 LOSP treated framing should be vented before fixing and if construction adhesives are required (for example to screw and glue floor panels) the adhesive must be compatible with H3.1 LOSP. See section 1.4: Preservative Treatment.

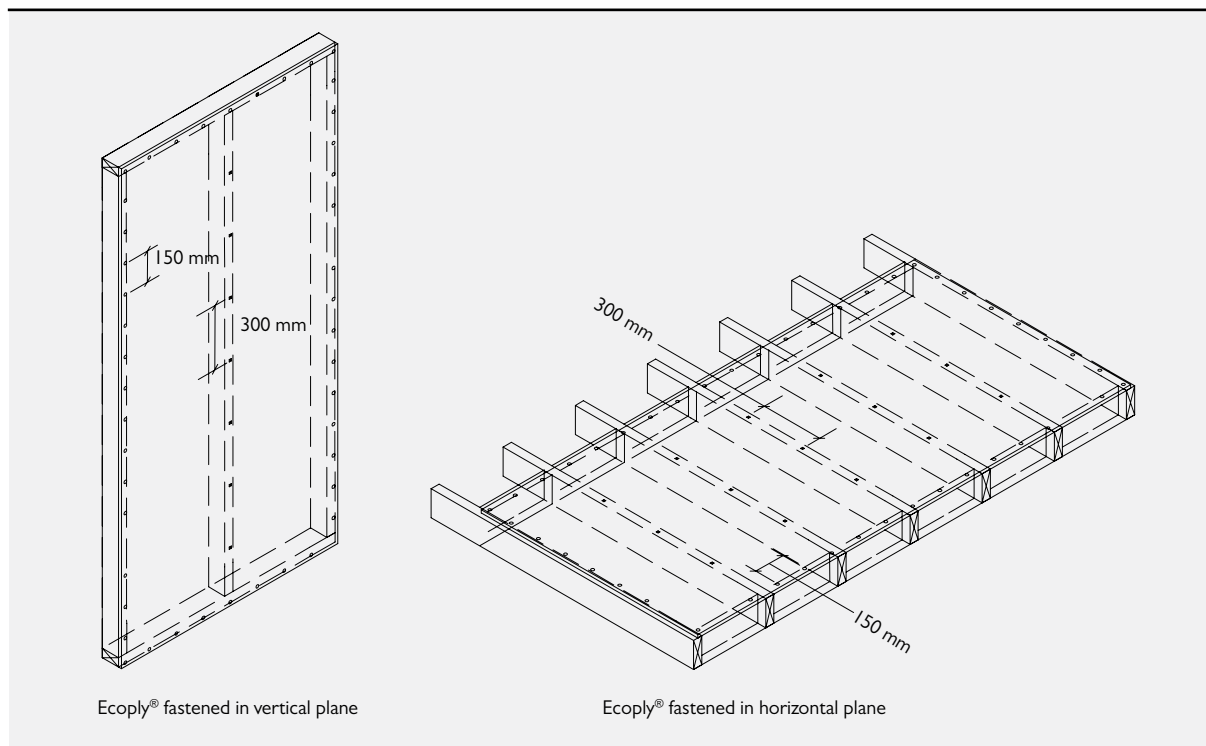
For plywood used as exterior cladding refer to the current Shadowclad® Specification and Installation Guide for Cavity Construction which can be downloaded from [www.chhpoly.co.nz](http://www.chhpoly.co.nz).

For plywood used as a rigid air barrier refer to the current Ecoply Barrier Specification and Installation Guide which can be downloaded from [www.chhpoly.co.nz](http://www.chhpoly.co.nz).

### 2.2 SHEET FASTENERS & FIXING

- Where there is risk of panel size change due to changes in moisture levels, allow a 2 to 3mm expansion gap between sheets.
- Use only flathead nails or screws, with or without construction adhesives.
- Fastener length should penetrate at least 10 nail diameters into the framing or be three times the sheet thickness, whichever is the greater. Longer or ring shank nails may be specified.
- Fasteners must be at least 3 fastener diameters or 7mm from the edge of the sheet.
- For tongue and groove products such as flooring and roofing fasten 15mm from tongue and groove edges.
- Standard fixing pattern: unless otherwise specified fasten edges and ends of sheets at 150mm centres, and within the panel at no more than 300mm centres (see diagram below).
- Use hot dipped galvanised fasteners or corrosion resistant fasteners (i.e. stainless steel) determined by design for specific hazards.
- Where using stainless steel nails, nails must be annular grooved.
- Refer to Table 7 for minimum fastener sizes.
- Do not overdrive power driven nails.

#### EC001: Fastener Spacings for Ecoply®



EC002: Fastener Spacings from Edges

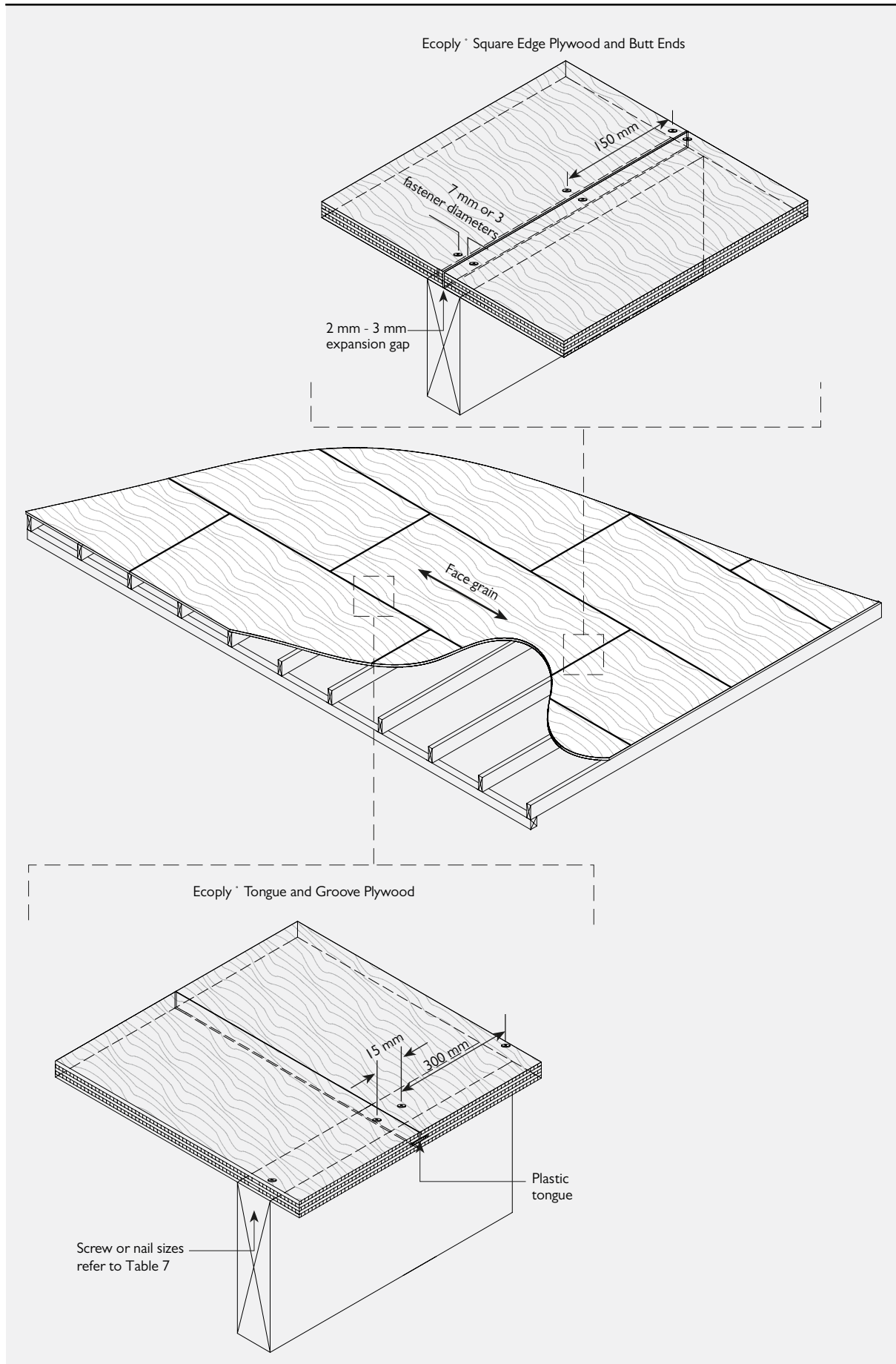


Table 7: Fasteners and Characteristic Shear Loads for Ecopyl®

Nominal Thickness (mm)	7mm 9mm	Load¹	12mm 15mm	Load¹	17mm	Load¹	19mm 21mm	Load¹	25mm	Load¹
Minimum nail size in timber framing²	40 x 2.5mm	570	60 x 2.8mm	736	60 x 2.8mm	736	60 x 2.8mm	736	75 x 3.15mm	883
Screw size in timber framing²	8g x 30mm	1230	8g x 40mm	1230	10g x 40mm	1650	10g x 45mm	1650	10g x 50mm	1650
1.15mm steel framing³	10-24-35⁴	1300	10-24-40⁴	2000	10-16-45⁴	2100	10-16-45⁴	2100	10-16-45⁴	2100
Screw size in 2.80mm steel framing³	10-24-35⁴	1200	10-16-40⁴	1200	14-20-45⁴	3000	14-20-45⁴	4000	14-20-45⁴	5000

¹ The load is the characteristic load (N) for one fastener in single shear.

² Characteristic load based on fixing into a timber of J5 joint group or better.

³ Self tapping, self countersinking screw.

⁴ Screw Numbers indicate: Gauge – Threads per inch – Length (mm).

Notes:

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested.
- Other screw sizes may be used. Screw properties vary between screw suppliers and the suitability of a particular size should be verified by the designer for performance under changing physical conditions and cyclic loading.
- Non-standard nailing may be specifically designed with NZS 3603 or similar:

#### Fasteners for H3.2 CCA Treated Ecopyl®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these

circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Notes: H3.2 CCA treated timber should not be fixed in direct contact with light gauge steel products. Refer to the framing manufacturer for advice on fixing and treatments.

## 2.3 ADHESIVES

#### Tube Applied Construction Adhesives

Site applied construction adhesive may be used together with nails and screws for non-permanent loads, reduced fastener popping, and to lower the risk of squeaking in floors. Available types include polyurethane (e.g. Soudal® Gorilla Grip) and solvent (e.g. Soudal® Gorilla Grab or Bostik® "tuff as Nails") based adhesives.

Adhesives should have appraisal from an independent authorising body such as BRANZ or equivalent authorities (e.g. AFG 01 Adhesives for field gluing) for plywood to wood framing for the specific application proposed. Follow manufacturer's recommendations. In addition:

- Use a bead or daubs of adhesive as per manufacturer's recommendations.
- Apply pressure using fastener patterns outlined in section 2.2: Sheet Fasteners and Fixing.
- Work from the middle of the sheet outwards to develop glue-line pressure.
- Ensure adhesives are compatible with treatment in the framing timber; see section 1.4: Preservative Treatment.

#### Structural Adhesive Joints

Structural bonds are generally only achievable in factory controlled conditions using approved structural adhesives in accordance with approved standards for glue lamination, e.g. Resorcinol formaldehyde joints made to AS/NZS 1328 Glued laminated structural timber. Site gluing is not recommended for structural plywood components. Contact CHH Plywood on 0800 326 759 for further information.

## 3.0 STRUCTURAL BRACING & CEILING DIAPHRAGMS

The Ecoply® bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading, to meet the requirements of the NZBC - BI Structure, and NZS 3604 Timber Framed Buildings or specifically designed to NZS 3603 Timber Structures Standard.

Any Ecoply structural panel may be used for bracing as long as it is 7mm, 9mm or 12mm thick, has a minimum wall length as described in Table 9, treated for the specific application in accordance with NZS 3602 (summarised in Table 8) and fixed in accordance with Ecoply bracing specifications outlined in this guide.

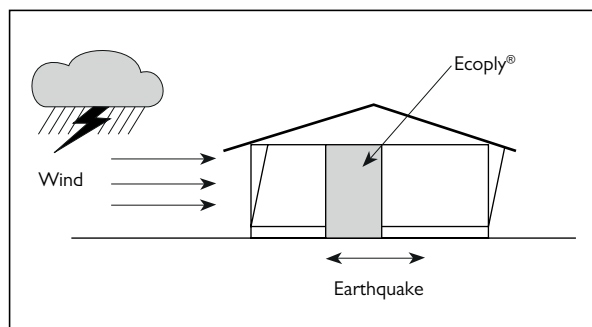
### 3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

#### Structure

Timber framed buildings to NZS 3604 Timber Framed Buildings is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution BI/ASI Structure.

CHH Plywood have developed a range of wall bracing elements tested using P21 testing methods referenced in NZS 3604.

#### Specific Design



Ecoply structural plywood is manufactured to AS/NZS 2269, and it is suitable for design and use in earthquake and wind bracing systems constructed in accordance with NZS 3603 and AS/NZS 1170.

Structural plywood to AS/NZS 2269 is the only sheet brace material with properties defined in a published New Zealand engineering design code, NZS 3603 Timber Structures, and so can be designed in compliance with Verification method BI/VM1 under Clause 6.0 Timber for use in buildings over three storeys in height.

Demand is calculated by following section 5, Bracing Design of NZS 3604 or using the GIB EzyBrace® software, downloadable from [www.gib.co.nz](http://www.gib.co.nz).

EP bracing systems properties can be easily loaded into the EzyBrace software by way of an Excel patch downloadable from [www.chhply.co.nz](http://www.chhply.co.nz) together with loading instructions.

#### Timber Floors

When carrying out a bracing design for buildings with timber floor structures, the maximum bracing rating that can be accounted for when summing up the bracing units is 120BUs/m. This does not exclude the installation of bracing elements that are rated higher than 120BUs/m, however the extra bracing capacity can not be accounted for in the bracing design.

Specific design of floor and sub-floor framing is required for elements rated higher than 120BUs/m.

#### Durability

Ecoply plywood is manufactured to meet the requirements of NZS 3602 Timber and Wood based products for use in buildings. If the product is used, handled and installed in accordance with CHH Plywood product literature it will meet the durability Clauses of the NZBC.

Table 8 summarises the applications in which Ecoply can be used as structural bracing together with the required preservative treatment and fastener material.

**Table 8: Ecoply® Suitability for Bracing Applications Including Treatment Type and Fastener Material**

Application	Plywood Treatment	Fastener Material
<b>Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray):</b> E.g. Interior linings.	Ecoply® Untreated	Hot dipped galvanised or better
<b>Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B and C, as per section 4 of NZS 3604:</b> E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/without building paper/wrap over, with/without cavity battens behind cladding.	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
<b>Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604:</b> E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/without building paper/wrap over, with/without cavity battens behind cladding.	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
<b>Rigid Air Barrier</b>	Refer to Ecoply® Barrier Specification and Installation Guide	
<b>Bracing on framing exposed to ground atmosphere in exposure zones B and C, as per section 4 of NZS 3604.</b>	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
<b>Bracing on framing exposed to ground atmosphere in exposure zones D.</b>	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
<b>Bracing in wet process buildings in all exposure zones, as per section 4 of NZS 3604 (including sea spray).</b>	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

Note: Power driven nails are suitable for use. Do not overdrive, nails must be full round head.

#### Rain Wetting and Construction Bracing

Untreated Ecoply® will withstand normal exposure conditions during construction for up to 3 months however aesthetically the sheet appearance will deteriorate as the level of exposure increases. Rain and exposure can cause thinner plywood panels to buckle. Plywood stability is related to the number of veneers and thickness of the panel. Where panel stability is critical, consider using thicker panels.

#### Humidity and Condensation

In conditions where the moisture content may exceed 18% for prolonged periods, Ecoply must be H3.1 LOSP or H3.2 CCA treated to resist decay or insect hazard.

#### Subfloor Sheet Bracing

H3.2 CCA treated Ecoply can be used as sheet bracing where dampness does not allow the use of untreated plywood or other sheet materials (section 5 of NZS 3604). Where Ecoply subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, 100% acrylic exterior coating system with a light reflectance value of 50% or greater.

#### Adjustments for Wall Height

Use section 5 of NZS 3604 to calculate bracing values: "Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

- For wall bracing elements of heights other than 2.4m, the bracing rating determined by test or from Table 9 should be multiplied by  $2.4 \div \text{element height in metres}$ , except that elements less than 2.4m high shall be rated as if they are 2.4m high.
- Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height."
- Walls with heights < 1.5m, Specific Engineering Design is required.

#### Joining Panels for Walls Higher Than Maximum Sheet Length

Ecoply bracing panels must be fixed from top plate to bottom plate. For wall heights over 2.4m, Ecoply and Shadowclad is available in 2.7m sheet lengths. Alternatively, a part sheet can be stacked above a full sheet, butt joined on a single row of nogs with each sheet/part sheet independently nailed off as per the nail spacing in the Ecoply bracing specifications and must be a minimum of 0.3m in height. (e.g. 2.4m x 1.2m sheet with a 0.3m x 1.2m part sheet above it to give a 2.7m x 1.2m bracing element).



Cladding as Bracing

12mm Ecoply® (CD face grade or better) can be H3 treated to meet the requirements of Acceptable Solution E2/AS1 and will perform as a structural, durable and weathertight cladding and bracing element when installed in accordance with E2/AS1.

It should be noted smooth faced plywood such as Ecoply may be prone to appearance related issues such as face checking which occurs naturally and is not considered by CHH Plywood to be a manufacturing or product fault. For more information refer to section 1.8: General Design Considerations - Face Checks on Plywood Exposed to Weather. H3.2 CCA treated Ecoply may also have a green tinge to the wood surface and may have fillet marks on the face of the sheet.

Plywood for exterior cladding applications where a high visual appearance is desired, CHH Plywood recommends the use of Shadowclad® as an exterior cladding. Shadowclad has a textured (bandsawn) face which reduces the visibility of face checking and is most commonly H3.1 LOSP treated (clear preservative treatment) which does not leave fillet marks on the panel face.

For further information on Shadowclad as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction which can be downloaded from [www.chhply.co.nz](http://www.chhply.co.nz).

Soil

Ecoply must not be allowed to come in contact with soil. The bottom edge of the plywood sheet must be a minimum of 100mm above decks or paved ground and a minimum of 175mm above unprotected ground.

Service Penetrations in Bracing Elements

A small opening ( e.g. power outlet) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the braced element, or a waste pipe outlet of maximum 150mm diameter placed at no closer than 150mm to the edge of the braced element.

Maximum one penetration per bracing panel.

3.2 ECOPLY® BRACING SPECIFICATIONS SUMMARY

CHH Plywood has a range of bracing specifications called the EP bracing series. The EP bracing series simplifies the design and construction of bracing elements using plywood, by itself or in conjunction with GIB® Plasterboard and features:

- Single sided and double sided bracing elements  
High performance bracing element utilising GIB® Standard plasterboard.

- A single type, GIB Handibrac®, hold-down for all bracing elements.
- Specifications for each bracing element type.

Table 9: Summary P21 Ratings for 2.4m High Ecoply® Wall Elements

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EPI	0.4m	Ecoply® one side	80	95
	0.6m		95	105
	1.2m		120	135
EPG	0.4m	Ecoply one side and 10mm GIB® Standard plasterboard other side	100	115
	1.2m		150	150

**Note: Bracing and other technical information has been specifically tested using Ecoply® branded structural plywood. This information cannot be used with any other plywood brand and bracing data must be sought directly from the specific plywood manufacturer.**

More Information

The following pages provide a full specification of EP bracing elements. Copies of specifications can be downloaded from [www.chhply.co.nz](http://www.chhply.co.nz).

NZS 3604 provides the method of calculating demand on a building. Calculation sheets are available from BRANZ or GIB EzyBrace® software is available as a free download from [www.gib.co.nz](http://www.gib.co.nz). Information is available at [www.chhply.co.nz](http://www.chhply.co.nz) which can be placed in the custom elements of GIB EzyBrace® for ease of calculation.

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by CHH

Plywood and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

DECEMBER 2023

### 3.3 ECOPLY® BRACING SPECIFICATION - EPI

**Table 10: Singled Sided Structural Plywood Brace**

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
<b>EPI_0.4</b>	0.4m	Ecoply® one side	80	95
<b>EPI_0.6</b>	0.6m	Ecoply one side	95	105
<b>EPI_1.2</b>	1.2m	Ecoply one side	120	135

#### Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

#### Bottom Plate Fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

#### Lining

One layer of 7mm, 9mm or 12mm Ecoply® plywood fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3mm expansion gap should be left between sheets.

#### Fastening the Ecoply® Panels

Fasten with 50 x 2.8mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

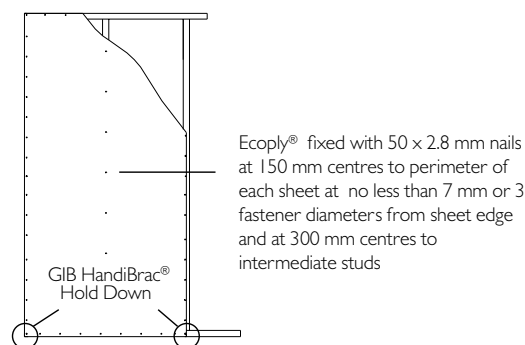
#### Fasteners for H3.2 CCA Treated Ecoply Panels

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

#### Fastening Centres

Fasteners are placed at 150mm centres around the perimeter of each sheet and 300mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by CHH

Plywood and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB Handibrac® are registered trade marks of Fletcher Building Holdings Ltd.

DECEMBER 2023

Table 11: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material\*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray):	Ecoply® Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B and C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification and Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B and C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

\* Refer to Table 8, page 16 of Ecoply® Specification and Installation Guide.

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by CHH

Plywood and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

DECEMBER 2023

### 3.4 ECOPLY® BRACING SPECIFICATION – EPG

**Table 12: Structural Plywood Brace With Plasterboard Other Side**

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
<b>EPG_0.4</b>	0.4m	Ecoply® one side and 10mm	100	115
<b>EPG_1.2</b>	1.2m	GIB® Standard plasterboard other side	150	150

#### Framing

Wall framing must comply with:

- NZBC B1 - Structure: ASI Clause 3 Timber (NZS 3604).
- NZBC B2 - Durability: ASI Clause 3.2 Timber (NZS 3602).

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

#### Bottom Plate Fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

#### Lining

Side 1: One layer of 7mm, 9mm or 12mm Ecoply® plywood exterior wall cladding fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3mm expansion gap should be left between sheets.

Side 2: One layer of 10 or 13mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

#### Fastening the Ecoply® Panels

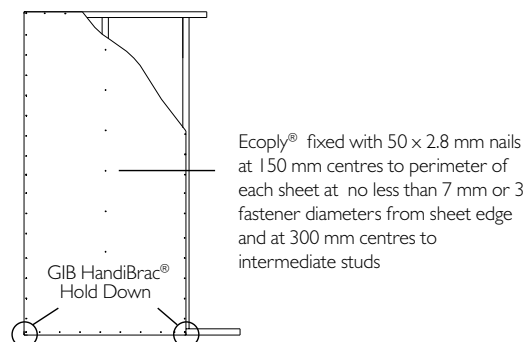
Fasten with 50 x 2.8mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

#### Fasteners for H3.2 CCA Treated Ecoply

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

#### Fastening Centres

Fasteners are placed at 150mm centres around the perimeter of each sheet and 300mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/ASI Structure. Testing was carried out using Ecoply manufactured by Carter

Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

DECEMBER 2023

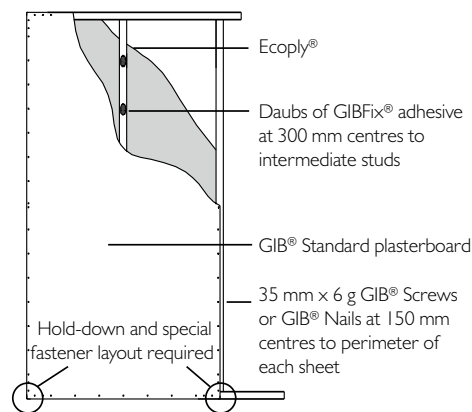
### Fastening the GIB® Plasterboard

32mm x 6g GIB® Grabber® Screws or 35mm GIB® Nails.

### Fastening Centres

Fasten 50, 100, 150, 225 and 300mm from each corner and 150mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12mm from paper bound edges and 18mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.



**Table 13: Ecoply® Suitability for Bracing Applications Including Treatment Type and Fastener Material\***

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones including sea spray, as per section 4 of NZS3604):	Ecoply® Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones I B and C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone I D (sea spray), as per section 4 of NZS3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification and Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B and C, as per section 4 of NZS 3604.	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zone D, as per section 4 of NZS 3604.	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604.	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

\* Refer to Table 8, page 16 of Ecoply® Specification and Installation Guide.

### 3.5 GIB HANDIBRAC® – RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as the hold-down in all EP bracing elements.

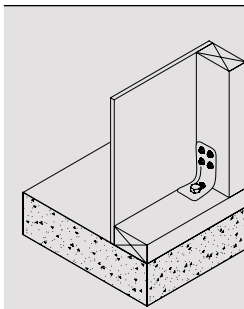
- The GIB HandiBrac® registered design provides for quick and easy installation.
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to

check in the framing as recommended with conventional straps.

- The GIB HandiBrac® is suitable for both new and retrofit construction.
- The design also allows for installation and inspection at any stage prior to fitting internal linings.

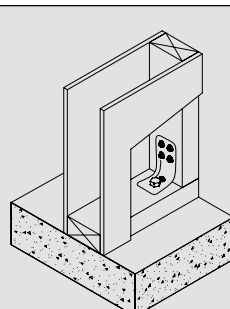
#### Concrete Floor

##### External Walls



Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.

##### Internal Walls



Position GIB HandiBrac® at the stud/plate junction.

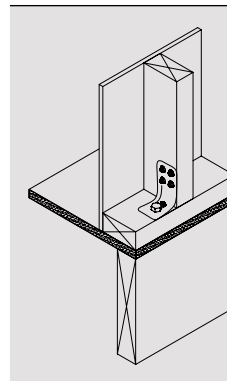
#### Hold-down Fastener Requirements

A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket

Reproduced with the permission of Winstone Wallboards Ltd

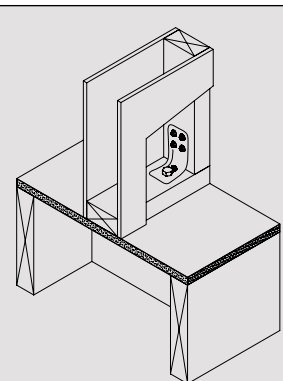
#### Timber Floor

##### External Walls



Position GIB HandiBrac® in the centre of the perimeter joist or bearer.

##### Internal Walls



Position GIB HandiBrac® in the centre of the floor joist or full depth solid block.

#### Hold-down Fastener Requirements

M12 x 150mm galvanised coach screw

### 3.6 STRUCTURAL CEILING DIAPHRAGMS

Diaphragms are used to transfer lateral loads to braced walls and allow for greater spacing between bracing lines. Diaphragms do not have a BU rating themselves.

Plywood diaphragms are an acceptable solution as described in section 13 of NZS 3604 13.5.2 which allows for plywood not less than 6mm thick and a minimum of three ply for:

- Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
- Diaphragms not steeper than 45 degrees to the horizontal and not exceeding 7.5 metres long under light or heavy roofs.

Plywood ceiling diaphragms required to comply with NZS 3604 must be constructed as follows:

- The length of diaphragm shall not exceed twice its width measured between supporting walls.
- The ceiling lining must consist of plywood over the entire area of the diaphragm.
- Complete sheets with a minimum size of 1800 x 900 must be used.
- Framing size and spacing must comply with NZS 3604.
- Fastener size should comply with Table 7 of this guide. E.g. 40mm x 2.5mm flat head nails for 7mm and 9mm Ecoply®.
- Fastening is at 150mm centres around the perimeter of each sheet and at 300mm centres to intermediate framing.
- Fixings are no closer than 10mm from sheet edges.
- Perimeter ceiling framing must be connected to wall framing by a perimeter 140mm x 35mm ribbon plate nailed to the top of the top plate or alternative such as a 0.55mm thick steel angle or proprietary steel channel.
- Sheets must be layed in a staggered pattern.
- The basic shape of a ceiling diaphragm should be rectangular. Protrusions are permitted but cut-outs are not (see Figure 13.4 NZS 3604).



## 4.0 ROOFS & DECKS

The section below covers the use of Ecoply® plywood used as a substrate for flexible membrane and tile systems in roofing and decking applications. The information below should be considered as supplementary to system specifications from roofing and decking suppliers.

Further guidance on installation and detailing factors can be found in the EWPAA Technical Note; Plywood Roofing and Flooring: Installation and Detailing Factors.

Ecoply is not recommended as a substrate for exterior decks without a properly detailed barrier material such as butyl rubber, vinyl or E.P.D.M to protect the surface from weathering.

**Always refer to the roofing and decking system supplier for installation, plywood selection and surface preparation requirements for specific roofing and decking products.**

### 4.1 FLEXIBLE MEMBRANE SYSTEMS

- Roofing and decking membranes may comprise synthetic rubber sheeting glued to the Ecoply, or torch welded bitumen membranes.
- Always ensure Ecoply is dry and free of imperfections such as surface dust and blemishes as membranes coatings will telegraph any substrate imperfections.
- Use Ecoply Flooring or Structural Square Edge (CD Grade).
- Where Ecoply Flooring is used consider the use of a small daub of glue or nail in the Tongue and Groove of each sheet if potential movement of the plastic tongue joint is not acceptable.
- For trafficable decks use a minimum 17mm thickness, refer to Table 15A and 15C for specification.
- Use countersunk stainless steel screws and adhesive on framing to avoid head popping. Apply adhesive between screw locations.
- Use kiln dried timber framing such as Laserframe® or appropriate LVL framing from the Futurebuild® range.
- Consult the membrane manufacturer regarding use of bond breaker tapes over joints to allow elongation with natural plywood movement.
- Where treatment is required use only H3.2 CCA treated Ecoply. Do not use H3.1 LOSP treated Ecoply (solvent based carrier). It is not compatible with most membrane systems. If there is evidence of treatment salt crystals on the Ecoply surface remove by scrubbing with a small amount of water and allow the surface to dry prior to laying the membrane system.

#### Plywood Substrates, Face Checking and Flexible Membrane Systems

All natural wood based products (including Ecoply) have the potential to develop natural surface face checks when exposed to external environmental conditions. The degree of face checking is dependent on a number of factors including the length of time and level of exposure to weather during construction which is outside the manufacturing control of CHH Plywood. For more information see section 1.8: General Design Considerations - Face Checking on Plywood Exposed to Weather.

Face checks, while typically not present after manufacture, do not affect structural performance of the sheet and are acceptable under AS/NZS 2269. They are not a manufacturing fault.

**Designers and membrane suppliers must carefully consider the suitability of plywood as a substrate for the membrane system in question if the potential of telegraphing of face checks onto the membrane surface is not acceptable.**

**The risk of telegraphing can be reduced by protecting the plywood surface from weather and moisture during the construction process.**

**Where the potential of face checking in the plywood substrate is not acceptable designers should consult the membrane supplier for a more suitable membrane or an alternative substrate.**

#### Allowing for Moisture Expansion of Plywood Under Roof and Floor Coverings

Membrane suppliers have held different views on the requirements for plywood substrates. The fixing instructions within this guide are the starting point but designers must detail joints that allow for expansion in accordance with practices recommended by the chosen membrane supplier.

CHH Plywood's view, and the recommendation of a number of suppliers here and in North America is that expansion and contraction at sheet edges should be allowed for by loosely butting tongue and grooved edges so that the tongues can absorb movement and providing a small gap (2 to 3mm) between square sawn edges. Use a bond breaking tape over these joints to spread elongation in the membrane over a longer distance than the narrow gap in the joint itself. This tape can double as a rain seal over the sheet edges during construction.

Other membrane suppliers believe that sheets should be tightly butted and glued and screwed hard up to each other. This practice constrains movement at the small joint between sheets, but over a wider area requires significant allowance for movement around the perimeter of a roof segment. Junctions between the roof slopes and walls need careful detailing to allow for the potential movement. Movement control joints should be provided at regular intervals following the recommendation of the membrane manufacturer, especially if this method is adopted.

## 4.2 ROOF TILE SYSTEMS

Most fibreglass, asphalt or wooden shingle and tile systems will tolerate DD grade surface characteristics.

- Use unsanded Ecoply® Roofing (DD grade), or sanded Ecoply of the required thickness in Table 15A.

- The unsanded surface provides extra grip on steeper roofs for roofers.
- Fix tiles according to the tile manufacturer's specification.
- Under asphalt shingles use felt underlay over the Ecoply.

## 4.3 ROOFING &amp; DECKING – PRODUCT SELECTION GUIDE

Table 14: Roofing and Decking Product Selection Guide

	Structural Square Edge (CD Grade)	Flooring (CD Grade)	Roofing (DD Grade)
Product Description	CD face grade sheets are available in a range of thicknesses and size	Solid sanded C grade surface with tongue and groove profile on long edges	Unfilled D grade surface with tongue and groove profile on long edges
Recommended Applications	Substrate for flexible coverings requiring a smooth substrate and where avoidance of visible surface indentations is critical. Use as a substrate for flexible roof and deck membranes and thin roofing tiles		Substrate for coverings with the ability to span holes in the D face grade (up to 75mm in diameter) such as asphaltic roof tiles and torch welded polyester reinforce membranes.  Do not use under flexible membrane coverings or where avoidance of visible surface indentation is critical
Face Grades	Front: C solid sanded, Back: D unsanded		Front and Back: D unsanded
	Refer to Table 1 for range and treatment options		
Product Features	Blocking required to support all edges	Blocking not required to support tongue and groove edges (unless otherwise specified).	Specifically designed for use under shingles and tiles that have a courser finish. Unsanded surface for extra grip for installers on steep roofs. Blocking not required to support tongue and groove edges (unless otherwise specified).
Thicknesses Available	12, 15, 17, 19, 21, 25mm	17, 19, 21, 25mm	15mm
Sheet Sizes Available	2400/2700 x 1200m		
Stress Grades Available	F8/F8, F8/F5' (F11/F8 available upon request)	F8/F5 (F11/F8 available upon request) 19mm Longspan supplied F11/F8 as standard	F11/F8
Treatment	Untreated, H3.2 CCA and H3.1 LOSP	Untreated, H3.2 CCA, (H3.1 LOSP available upon request)	
Span Capabilities	Refer to frame spacings in Tables 15A to 15C		

<sup>1</sup> Refer to Table 1 and 4B for availability of F8/F8 and F8/F5 products and thicknesses.

<sup>2</sup> Where roofing products use tongue and groove CHH Plywood recommends fastening the tongue to rafters/joists at a minimum of one point.

## 4.4 FRAME SPACINGS FOR ECOPLY® ROOFS &amp; DECKS

Table 15A: Roofing - Sheathing, Non Trafficable, Above 2 Degree Pitch

Application	Roof Pitch	Maximum Wind Zone	Maximum Frame Centres (mm) for Ecopy® With Face Grain Across Framing			
			Ecopy Nominal Thickness (mm)			
			15	19	21	25
			Stress Grade			
			F11/F8	F8/F5		
Sheathing, non trafficable roof for all roof pitches above 2 degrees.  Suitable for roof mass up to 30kg/m² (additional to Ecopy® weight or 40kg/m² including Ecopy).	>2°	Extra High		800	800	900
	>28°	High	900			
		Very High	800			
		Extra High	800			
	>20°	Very High	900			
		Extra High	800			

- Suggested applications include substrates for Asphalt Shingle and Membrane type roofs. The above suggested maximum framing spans are based on the following deflection criteria:
- Under a short term 1kN point load, deflection is less than Span/130.
- Under a long term self weight load, deflection is less than Span/400.
- Under a short term wind gust load, deflection is less than Span/150.

Table 15B: Sub-Sheathing

Application	Maximum Frame Centres (mm) for Ecopy® With Face Grain Across Framing				
	Ecopy Nominal Thickness (mm)				
	12	15	19	21	25
	Stress Grade				
		F8/F8	F11/F8	F8/F5	
Under steel or self supporting cladding for support of building paper or lateral diaphragm action. Sag not critical.		800	1200		

Table 15C: Decking

Application	Maximum Frame Centres (mm) for Ecopy® With Face Grain Across Framing			
	Ecopy Nominal Thickness (mm)			
	17	19	21	25
	Stress Grade			
	F8/F5	F11/F8	F8/F5	
1. Trafficable roof decking limited by dynamic response of roof as floor	540	600	600	750
2. Roof decking to Clause 8.5.5.1 c) of E2/AS1	400	400	400	400

- The current requirement in E2/AS1 is extremely conservative when compared with calculations determined for other applications using VM1 Clause 6 and calibrating the spans against codes of practice from North America and Australia. CHH Plywood recommends designers consider the alternative solution in row 1 of Table 15C for membrane decking in consultation with the membrane manufacturer. Unless otherwise stated spans apply equally to square edge or tongue and groove panels. Check Table 1 for availability of grades and lengths to match span multiples in Table 16.
- Use the next lower recommended frame spacing or thicker Ecopy® where appearance is critical.
- To suit trusses at 900 centres, 2700 long sheets are available. See Table 16.

Table 16: Frame Set Outs to Match 2400mm and 2700mm Sheet Modules

Length (mm)	Typical Frame Spacing to Suit Sheet Length			
2400	400	480	600	800
2700	450	540	675	900

- Limitation for the use of Table 16.**
- CHH Plywood does not have access to information about designs for specific sites. Table 16 is a guide to estimate the initial selection of a span for design. Each site should be evaluated by qualified persons to ensure all loading parameters and site conditions have been considered, and appropriate changes should be made by the building designer.

## 4.5 ROOFING – DESIGN CONSIDERATIONS

### Durability

In general, H3.2 CCA treatment of Ecoply® plywood with waterborne preservatives is recommended for roofing.

### Roofing Materials

Various roofing materials used over Ecoply plywood have different durability expectations, normally in excess of the 15 years required by the NZBC Clause B2. Durability of the roofing is subject to the specifications, installation and maintenance requirements of the roofing manufacturer. The durability of the Ecoply can only be assured as long as the overlying roofing and detailing excludes moisture. With good building practice and maintenance, roofing materials can be repaired or replaced at regular intervals to achieve life from the Ecoply in excess of the original roofing. The durability of Ecoply structural plywood will continue to satisfy the relevant requirements of the NZBC for 50 years, if installed in accordance with the instructions and limitations within this guide and the roof system is adequately maintained.

### High Humidity, Condensation and Solar Driven Moisture

Where the moisture content of wood may exceed 18% for prolonged periods, Ecoply must be H3.2 CCA treated, to resist decay hazard. This includes Ecoply used under roof coverings that may be subject to condensation, or where rain moisture soaked in the roof covering can be driven into the Ecoply by the sun. Appropriate building detailing and ventilation is recommended which can reduce the need for treatment.

### Roof Ventilation

Good ventilation and the avoidance of moisture are important design considerations when using H3.2 CCA treated Ecoply panels. Poorly ventilated spaces can develop very high temperature and moisture levels. The most likely source of moisture is the condensation of vapour from warm interior air on the underside of cold roofing. Good ventilation can limit the build up of excess moisture vapour in warmer climates

but in regions where winter nights are consistently colder, H3.2 CCA treated Ecoply should be used. Moisture induced decay is only one risk that needs to be managed. If incorrectly detailed, roof spaces can be very tight and the dark colour of many roofing materials means that excessive heat can build up causing distortion in plywood or even framing members. Use the suggested details or alternatives to suit. Designers must consider roofing type, seasonal conditions, wind effects and the intended use of the building.

As a minimum, CHH Plywood recommends a vent area of 1/300th of the ceiling plan area (approx. 3350mm² per square metre of ceiling) equally distributed at the eaves and ridge to allow free flow under the Ecoply, up the roof slope, and out.

Roofing material suppliers should detail vent systems suited to their specific membrane or tile roofing. Proprietary ridge capping profiles or vents are available from roofing suppliers.

Detail gaps of 25mm in the plywood at ridges, and at walls where a roof slopes up to an upper storey. For flat roofs, natural ventilation flows may be impeded. Use proprietary roof vents. Consider forced ventilation as appropriate.

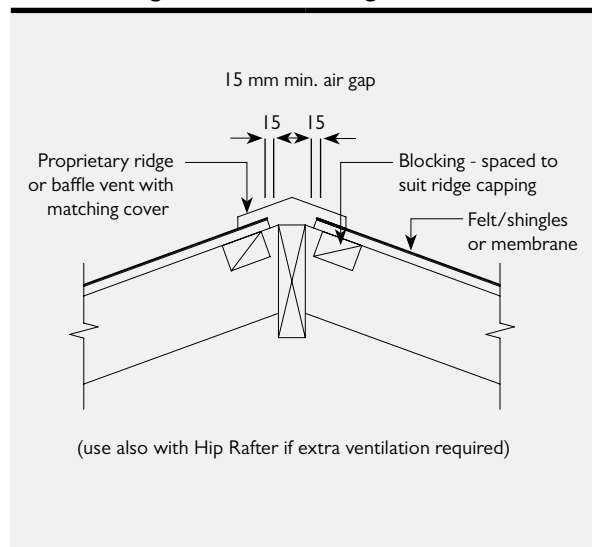
### Bubbling

Plywood bubbling occurs when moisture trapped in knot holes in inner veneers expands as the temperature rises. This moisture will dissipate through the face veneer and will not affect the structural integrity of the plywood panel. As membrane coverings can prevent moisture dissipation, Ecoply Flooring and Structural Square Edge CD is recommended if the visual appearance of bubbling is not acceptable, or a high visual finish is required.

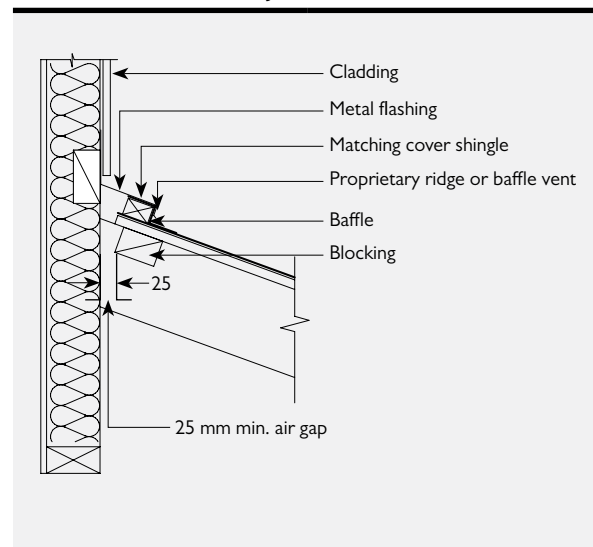
### Soil

Ecoply plywood (untreated or H3.1 LOSP/H3.2 CCA treated) must not be allowed to come in contact with soil. Surfaces, flashings and gutters should be detailed to avoid trapping detritus and moisture.

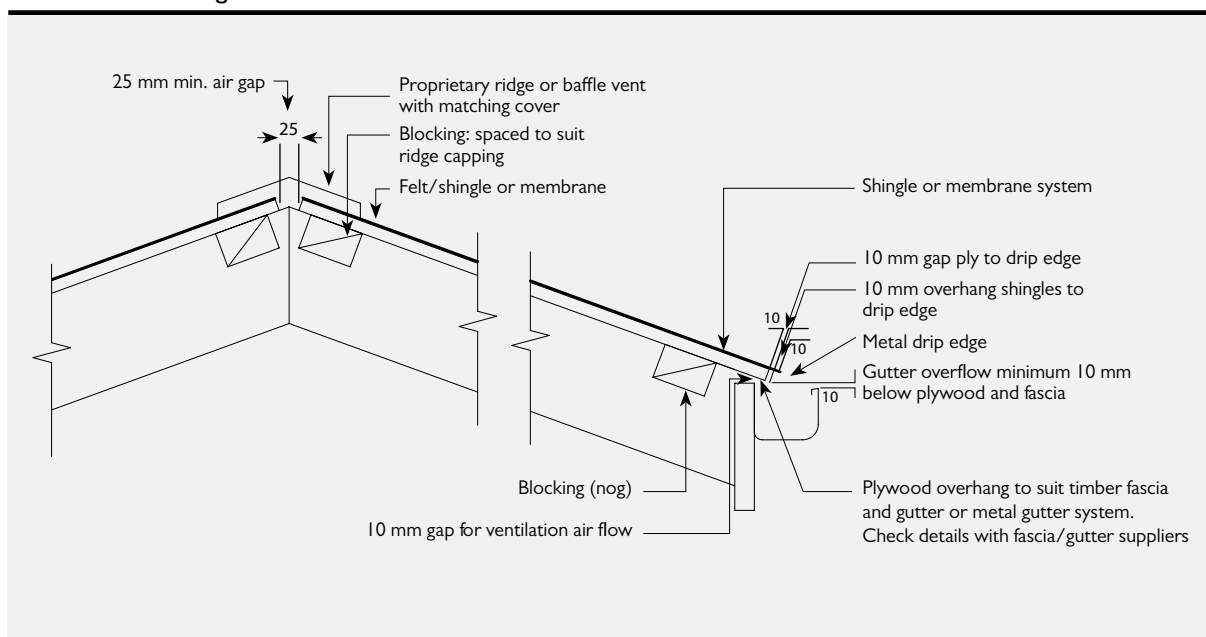
#### EC003: Ridge Detail With Ridgeboard



#### EC004: Roof to Wall Junction Vent



## EC005: Truss Ridge Detail



### Rain Wetting and Construction Time

Untreated Ecoply® will withstand a reasonable amount of rain wetting and exposure during construction for up to three months. In extreme weather conditions of high temperature and/or high rainfall this period may be less. Appearance issues such as discolouration and face checking of the sheet surface can be expected if Ecoply is exposed. For roofs uncovered for longer periods use H3 treated Ecoply to lower the risk of decay. Return Ecoply to below 18% moisture content before installing moisture sensitive materials, coverings, coatings or adhesives. Where a high visual finish is desired (such as membrane roofing and decking) protect Ecoply from exterior moisture during construction. For detailed information see section 4.1 Flexible Membrane Systems.

### Gutter Details

Where Ecoply structural plywood sub-sheathing supports roofing at gutters, a metal drip edge must be provided with appropriate gaps to shed water. Gutters should have a front edge overflow or ends lower than the back to shed water overflow away from framing and sub-sheathing Ecoply.

H3.2 CCA treatment is recommended for Ecoply sheets that protrude into gutters, with regular maintenance to avoid leaf mould (soil) development. Untreated Ecoply must not be exposed to gutter splash or moisture.

### Fastener Spacing for Wind Suction

Wind pressure applies withdrawal loads to nails holding plywood to purlins and trusses. For the frame spacing in Table 15A designers may use the following guidelines for wind zones expressed in NZS 3604.

**Note:** Full penetration of fasteners into the supporting member is assumed.

### The Main Body of the Roof

For wind zones up to and including high, use 60 x 2.8mm nails spaced at 150mm centres on all cross framing. For very high and extra high wind zones, use 75 x 3.15mm nails spaced at 150mm centres on all cross framing.

### Roof Edges

All Ecoply structural plywood used at local pressure suction zones at the roof edges, gutters, eaves and gable ends must be supported on framing, and fixed at 75mm centres with minimum 60 x 2.8mm nails for regions up to, and including high wind zones (use 75 x 3.15mm nails for very high and extra high wind zones). Local pressure zones are interpreted from AS/NZS 1170 as being within 20% of the building length, width or the average of the gutter and ridge height.

Designers and builders should review site conditions to ensure adequate fixing is applied. Buildings in exposed sites and lee zones should be specifically designed using the loading standard (AS/NZS 1170) and the timber structures standard NZS 3603. In some wind conditions, the tiles themselves may be sucked from the plywood. Use a consulting engineer to assess site conditions, calculate wind pressures for the specific site, and determine the fastening and span requirements, and to check that the truss system can resist the loads being applied through the plywood.

### Fixing of Roofing

**Fixing methods for tile, shingle and membrane systems must be designed for the expected wind and weather exposure to protect the Ecoply substrate.**

Some shingle systems may not be suitable for use in very high or cyclonic wind zones.

Follow the specifications of the roofing manufacturer and refer to the appropriate BRANZ Appraisals.

## 4.6 ROOFING – INSTALLATION

### Framing

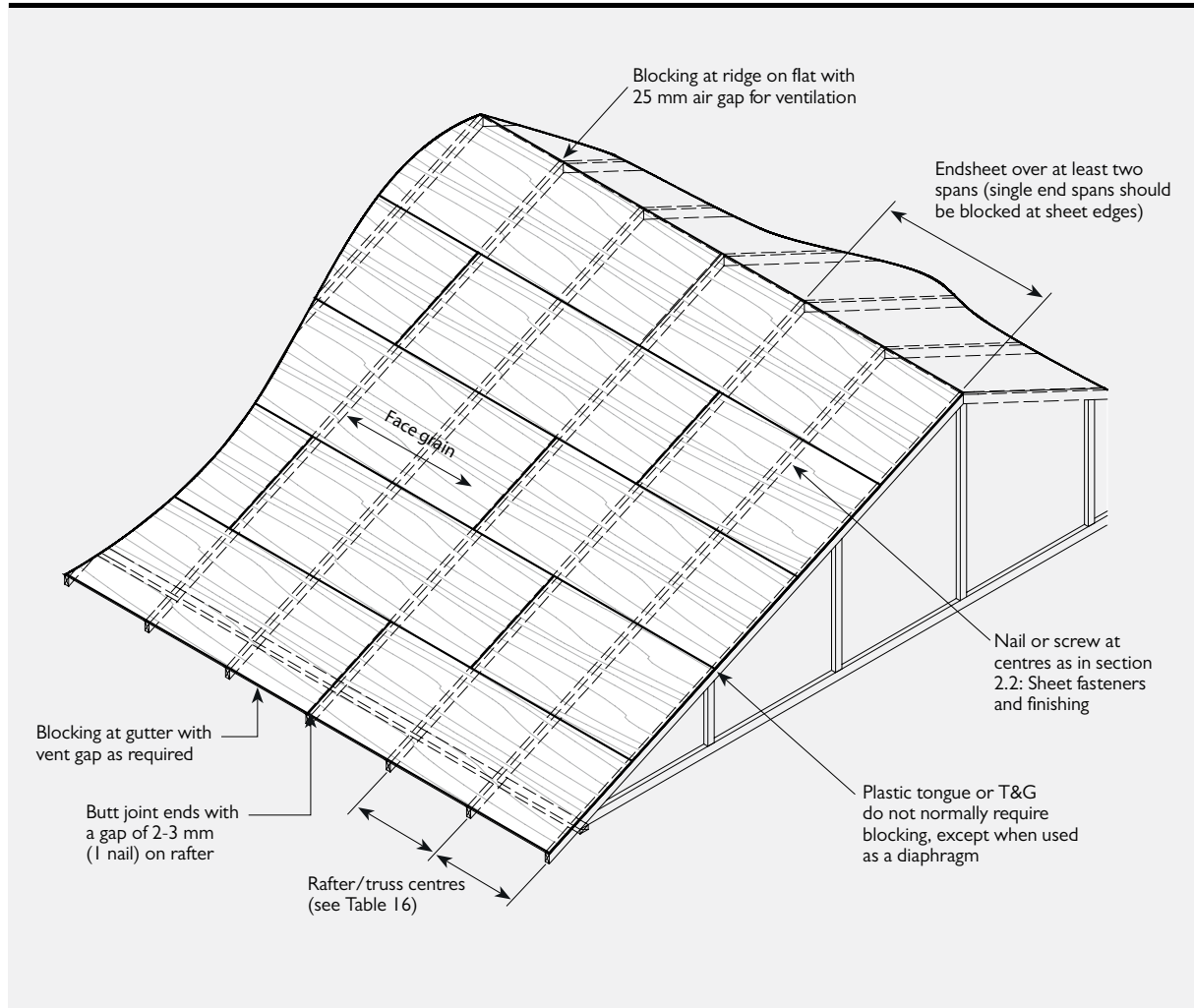
Frames should be at spacings to suit plywood thicknesses in Table 15A, page 25. Additional requirements for roof framing are:

- Ensure top edges of framing are properly aligned.
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to lower moisture level in roof spaces, second floor spaces, and reduce differential truss, rafter or joist deflections.

### Blocking (Nogs, Dwangs)

- Block all edges of EcoPLY® Structural Square Edge plywood.
- Block all edges at the ridge and gutter lines to prevent sag at capping or gutters.
- Block for high face loads or under areas accessed for maintenance.
- Blocking within the body of the roof is not required under tongue and grooved edges when using EcoPLY Flooring and Roofing, unless required for framing stability or the plywood is being used as a diaphragm to resist horizontal wind or earthquake loads. In this case fixings transfer shear across the joints and details should be specified on drawings.
- Use blocking on the flat to provide gaps where air flow is needed for ventilation.
- Specific roofing suppliers may require blocking to suit their system.

### EC006: Sheet and Framing Layout





### Sheet Layout

- Ensure Ecoply® sheets are dry before installation.
- Place face grain at right angles to supports.
- Sheets must be continuous over at least two spans (three framing members).
- Lay the sheets in a staggered pattern.
- Allow sufficient clearance inside confining structure such as concrete or brick walls adjacent to the roof. Use extra allowances with large areas.
- Allow clearance for ventilation as required.

### Fixing of Sheets

Ecoply may be fixed to different types of framing with nails, screws or a combination of fasteners and construction adhesives.

Fasteners should be corrosion resistant to a level appropriate to the end use life expectancy (15 or 50 years) and expected exposure to moisture. Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

The integrity of a plywood based roof system is directly related to how well the panels are fixed to the framing. Ecoply must be fixed to resist wind suction loads, and to maintain surface qualities of the overlying roof covering.

- Always refer to the roofing system supplier for system requirements.
- For roofing, check the additional requirements according to wind exposure.
- For very exposed sites, cyclonic conditions or roofs above 10 metres in height, carry out specific structural design to the relevant standards.
- Screw fixing must be used for membrane roofing, and is preferred for all systems because of increased holding power and avoidance of head popping.
- For minimum fastener spacing for wind suction, refer section 4.5 Roofing - Design Considerations - Fastener spacing for wind suction.

### Fixing to Timber Frames

- Ring shank nails or annular grooved nails or screws are recommended for additional holding power.
- Use flathead nails. Do not use jolt or bullet head nails.
- Stainless steel nails must be annular grooved.
- Ensure fastener is compatible with the roofing cover (consult roofing system supplier).
- Staples may be used provided that the withdrawal load is equivalent to the hand driven galvanised flathead nail. A suggested minimum is a 50mm long staple with 12mm crown and legs 1.8mm diameter. Space staples 20% closer than nails. Refer to the manufacturer's information for corrosion resistance and durability.

### Fixing to Steel Frames

- Fix directly to roll formed steel (up to 2mm thick) with self-drilling, self-tapping screws. If plywood gets damp and expands, screws in thicker steel may shear. Keep Ecoply dry or use larger screws or;
- Bolt or screw battens to the steel and apply Ecoply as above for timber. Ensure that battens have adequate thickness for the minimum nail or screw length.
- H3.2 CCA treated plywood must not be fixed to steel framing.

## 5.0 FLOORING

The following section covers the use of Ecoply® Flooring plywood used as a flooring substrate with flexible and rigid overlays.

Ecoply Flooring is suitable as a substrate for overlays such as carpet, tiles and some membrane products (refer to flooring manufacturer).

### 5.1 FLOORING – RANGE

- The tongue and groove on long sheet edges does not require support blocking under the joint (unless otherwise specified).
- Supplied in F8/F5 stress grade (F11/F8 available upon request).
- Ecoply 19mm Longspan Flooring supplied as standard in F11/F8 stress grade.
- Supplied standard with a sanded C grade surface with D grade back.
- Designers must expect the surface to dent or mark more easily than hardwood flooring systems as Ecoply is manufactured from relatively soft radiata pine.
- Available untreated or H3.2 CCA treated, (H3.1 LOSP treated available upon request).
- LOSP treated plywood is not recommended for internal applications.
- Refer to Table 1 for range and treatment options.
- Flooring - Critical Radiant Flux C/VM2 Appendix B gives a value of 2.2kW/m<sup>2</sup> for plywood and timber floors more than 12mm thick.

### 5.2 FLOORING – INSTALLATION

**Table 17: Flooring Frame Spacings**

Application	Maximum Frame Centres (mm) for Ecoply® with Face Grain Across Framing			
	Ecoply Nominal Thickness (mm)			
	17	19	21	25
1. Domestic flooring 2kPa - 1.8kN	540	600 F11/F8 Longspan	600	750
2. Institutional and public assembly up to 4kPa - 2.7kN	300	480	540	750
3. Institutional and crowd assembly up to 5kPa - 3.6kN		400	450	600
4. Corridors, industrial up to 5kPa - 4.5kN		300	400	540
5. Domestic garage floor** 2.5kPa - 9kN				270

\*\* Provide blocking to all edges of the sheet.

- Use the next lower recommended frame spacing or thicker Ecoply® flooring where appearance is critical.
- To suit frames at 900 centres, 2700 long sheets are available. See Table 16.

#### Floor Loads

For domestic garage floors blocking is required under all edges to control wheel loads on the tongue. Testing with 113mm diameter load head (0.01m<sup>2</sup>) confirms commercial floor capabilities.

Refer to Table 16 to match frame set outs with 2400mm and 700mm sheet modules.

#### Framing

- Joist spacings should be at spacings to suit plywood thicknesses in Table 17.
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to achieve a moisture content of 18% or less.

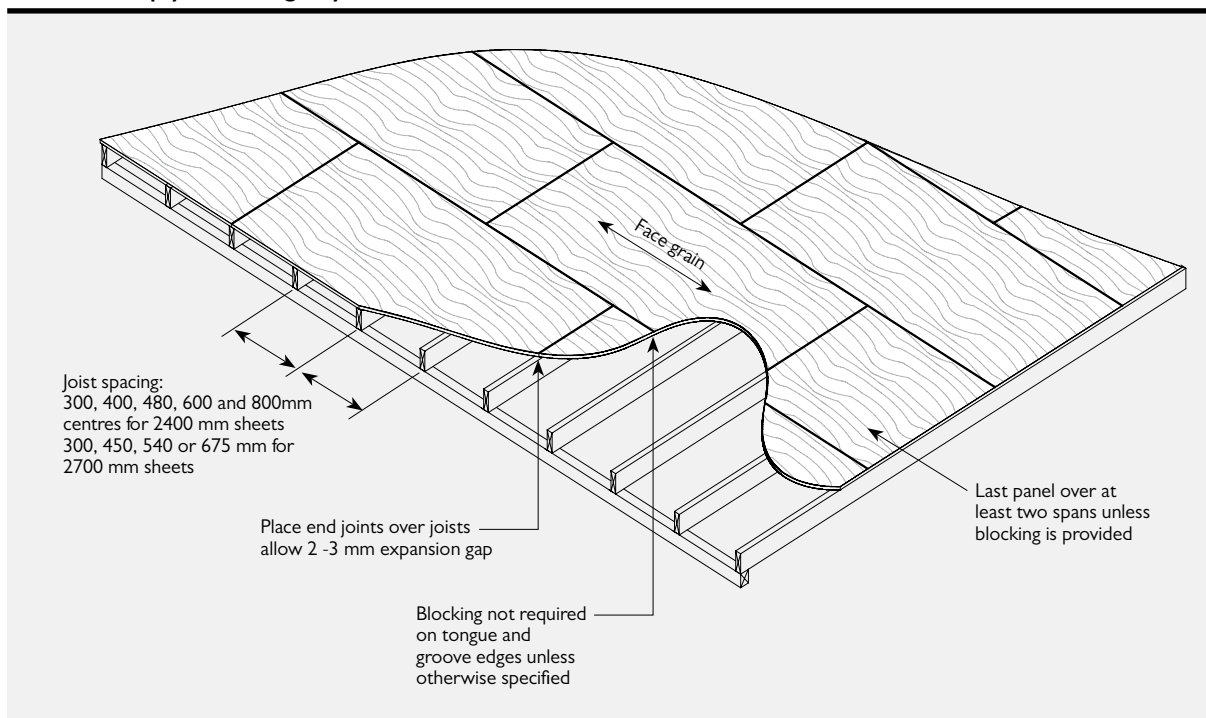
#### Blocking

- Blocking within the body of the floor is not required under tongue and groove edges unless otherwise specified (such as in domestic garage floors).

#### Sheet Layout

- Ensure Ecoply sheets are dry before installation.
- Place face grain at right angles to supports.
- Sheets must be continuous over at least two spans (three framing members).
- For panels at floor edges where a continuous two span coverage is not possible, sheet edges must be supported by blocking.
- Lay sheets in a staggered pattern.
- Allow clearance for ventilation as required.

## EC007: Ecoply® Flooring Layout



### Fastener Selection and Treatment

Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture.

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

### Fasteners and Fixing of Sheets

- Ecoply® Flooring may be fixed with nails or screws or a combination of mechanical fasteners and construction adhesives.
- For fastener specifications (including lay out and sizes) refer to section 2.2: Sheet Fasteners and Fixing.
- For construction adhesive specifications refer to section 2.3: Adhesives.
- Ring shank or annular grooved nails, or screws are recommended for additional holding power.
- To reduce the risk of fastener popping or floor squeak the use of construction adhesives is advised.
- Do not use jolt or bullet head nails.

## 5.3 FLOORING – FINISHING

- Overlays and coatings should be applied following the manufacturer's specifications.
- Avoid heavy sanding that may remove the critically important structural face veneer.
- Adhesives must be compatible with CCA (Copper Chrome Arsenic) treatment in H3.2 CCA treated sheets. Compatibility can often be improved by lightly washing, scrubbing and drying the plywood surface prior to fixing.
- Where clear or stained finishes are desired, designers should select sheets and protect the floor as much as possible from the weather and construction activities.
- Ecoply is made from relatively soft radiata pine and as such will dent or mark more easily than hardwood flooring systems. This is to be expected and designers must consider the long term appearance requirements of the project. Ecoply Flooring is a good substrate for harder wearing flooring overlays, and is not primarily intended for clear finishing, especially if it is exposed to moisture during construction.
- For improved surface finish, floors should be protected from weather during construction as soon as possible.

## 6.0 FREQUENTLY ASKED QUESTIONS

**Q:** How much space should be allowed for expansion?

**A:** Allow a 2 - 3mm expansion gap between square edges of Ecoply® sheets. If using Ecoply Flooring, a 5mm expansion gap is recommended at the perimeter of the floor or deck. Check by calculation for large areas.

**Q:** Can power driven nails be used to fix Ecoply®?

**A:** Paslode power driven nails have been tested for fixing Ecoply and Shadowclad® plywood products for particular bracing and cladding applications. For power driven nail specifications refer to the Paslode Special Fixing Applications document available from <https://www.paslode.co.nz/msds/partners/37-carter-holt-harvey-woodproducts-fixing-matrix/file>. Use the Paslode Impulse Compact Nailer fitted with a No Mar(k) work contact element to eliminate any contact marks on the plywood. Adjust the work contact element to the flush position and fire the nail at 90° to the work surface. Hammer any nails flush which are left proud. Do not overdrive.

**Q:** How close to sheet edges can I nail?

**A:** Fixings must be at least 3 fastener diameters or 7mm from the sheet edge.

**Q:** Do I have to use stainless steel nails when using Ecoply for bracing?

**A:** Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

**Q:** What is the weight of Ecoply?

**A:** Refer to Table 4A for weight (kg/m²) of different Ecoply thicknesses.

**Q:** What is the R-value of Ecoply?

**A:** The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214. Plywood has a conductivity (k) of 0.13W/mK so a 12mm panel has a thermal resistance  $R = 0.012/0.13 = 0.09$ .

**Q:** Are there any compatibility issues when using Ecoply with other materials?

**A:** Adhesives for flexible rubber membranes may react with LOSP treatment and should therefore only be applied to H3.2 CCA treated Ecoply unless the membrane supplier advises differently. Check with the membrane manufacturer if in doubt. H3.2 CCA treatment is also corrosive and this must be taken into account when specifying H3.2 CCA treated plywood next to metals. For further guidance, refer to Tables 21 and 22 in Acceptable Solution E2/AS1.

**Q:** Can Ecoply be used as a rigid sheathing (air barrier)?

**A:** CHH has a specific system called Ecoply Barrier. Ecoply Barrier has been developed as a rigid air barrier. Refer to the current Ecoply Barrier Specification and Installation Guide for further information. 7mm H3.2 CCA treated Ecoply can also be used if combined with building underlay in accordance with E2/AS1 for a rigid air barrier system.

**Q:** Flooring - what is the Critical Radiant Flux?

**A:** C/VM2 Appendix B gives a value of 2.2kW/m² for plywood and timber floors more than 12mm thick.

**Q:** What is the relevance of AS/NZS 2269?

**A:** Ecoply structural plywood is manufactured to AS/NZS 2269 Plywood Structural. This Standard is referenced by the NZBC Compliance Documents including NZS 3602 Timber and Wood-based Products for Use in Building, NZS 3603 Timber Structures, NZS 3604 Timber Framed Buildings, AS/NZS 1604.3 Specification for Preservative Treatment, Part 3: Plywood and Acceptable Solution E2/AS1 - External Moisture. Plywood not manufactured to AS/NZS 2269 does NOT meet the requirements of these NZBC Compliance Documents.

**Q:** What is the relevance of the EWPAA stamp?

**A:** Ecoply is manufactured under a third party audited, product quality control programme by the Engineered Wood Products Association of Australasia (EWPAA) to monitor compliance with AS/NZS 2269. Given that compliance with Standards is not actively policed by Standards New Zealand, this third party auditing provides important peace of mind for users and consumers of Ecoply plywood products.

**Q:** What is marine ply?

**A:** Marine plywood manufactured to AS/NZS 2272 Plywood Marine may contain species of low durability (source: BRANZ Good Practice Guide – Timber Cladding). Whilst marine plywood has a Type A glue bond, it is generally specified for its high surface appearance grade and lack of core knots as opposed to structural performance. AS/NZS 2272 limits marine plywood to a number of approved species that pass stringent property requirements for things like moisture permeability. These requirements are different from those in standards from other countries. Marine plywood is rarely treated as it is usually coated with resin, fibreglass, or a paint finish for long term durability.

**Q:** What should a specification for structural plywood include?

**A:** A specification for structural plywood should include:

Specification Check List	Example
Quantity/size	20 sheets of 2400 x 1200
Thickness	12mm
Edge finish	Square edge
Brand name	Ecoply® structural plywood
Reference to Standard	To AS/NZS 2269
Stress grade¹/(layup)	F8/F5 (12-24-5)
Surface grade/bond type	CD A-Bond²
Accreditation	EWPAA product certified³

¹ Stress grades may vary between different manufacturers and products.

² Type A-bonds are suitable for permanent exposed applications and structural applications.

³ The EWPAA JAS-ANZ Product Certification Mark certifies that Ecoply® structural plywood products have been manufactured under a third party audited joint product certification programme to monitor compliance with AS/NZS 2269.

**Q: What are F-grades?**

**A:** The stress grading system is a ranking system which utilises the symbol F and a suffix 8, 11 etc. as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. For plywood of a given thickness, the higher the F-grade, the further it will span. For load bearing applications (e.g. flooring, roofing) the required F-grade as well as the plywood thickness must be specified to achieve the required span. F8/F5 is the most common structural plywood grade found in New Zealand. All Ecoply® structural products are F8 in parallel to the grain direction. Ecoply 19mm Longspan Flooring are F11/F8. Other Ecoply Flooring products are also available in F11/F8 upon request.

**Q: What are surface/appearance grades (e.g. CD)?**

**A:** Appearance grades (e.g. CD, DD) denote the appearance grade of the plywood including the number and size of knot holes as defined in AS/NZS 2269 and summarised in Table 2A and 2B of this guide. The first letter describes the appearance of the face veneer and the second letter describes the back face.

**Q: How long can Ecoply® be left exposed to the weather?**

**A:** Untreated Ecoply will typically maintain its structural integrity when exposed to the weather during construction for up to 3 months. The surface colour will start to silver off and face checking will become evident. Where the finished appearance of the Ecoply is important, it should be protected during construction. Ecoply is also available H3 treated to resist decay or insect hazard. When used in accordance with this guide, it can be specified to meet the durability requirements of the NZBC, however appearance issues such as face checking may still occur dependent upon the degree of exposure to weather during construction.

**Q: What treatment levels and types are used for Ecoply?**

**A:** Ecoply is available untreated or preservative treated. Ecoply is treated to the H3 hazard class for above ground use. The standard Ecoply treatment type is H3.2 CCA (Copper Chrome Arsenate) although H3.1 LOSP Azole (Light Organic Solvent Preservative) may also be specified where a clear treatment is required. LOSP Azole is the standard treatment type for Shadowclad®. CCA treatment gives the plywood sheets a green tinge and the drying process after CCA treatment may leave fillet marks on the face of the sheet.

**Q: Does Ecoply have to be treated when used as structural bracing?**

**A:** Ecoply used as bracing must be treated unless it is installed in an interior dry situation. Note, behind exterior cladding and in cavities (even if the Ecoply is covered with building wrap) are not considered to be an interior dry situation.

**Q: Do I have to re-treat cut edges of treated Ecoply?**

**A:** It is important to re-treat any cuts and holes with a brush on remedial treatment such as Holdfast® Metalex® Clear.

**Q: What type of glue is used to manufacture Ecoply?**

**A:** Phenol formaldehyde (PF) resins are used to bond the plywood veneers. This forms a Type A (Marine) bond suitable for structural applications and exterior use. Phenol formaldehyde resins are dark red/brown in colour. Product details printed on the back of Ecoply sheets indicate the 'A Bond'.

**Q: Does Ecoply emit formaldehyde?**

**A:** Formaldehyde occurs naturally in the environment and is emitted by processes such as combustion, decay and naturally by all timber species. Ecoply and Shadowclad meets the lowest formaldehyde emission class (E<sub>0</sub> - less than 0.5mg/litre). Actual formaldehyde emissions have been tested to be less than 0.3mg/litre.

**Q: How should Ecoply be installed to maximise its stiffness properties?**

**A:** Structural plywood has greatest stiffness along the long grain of the sheet (i.e. along its length). Therefore, flooring/roofing should be laid across joists/rafters rather than parallel to them.

## 7.0 REFERENCES & SOURCES OF INFORMATION

- New Zealand Building Code (NZBC).
  - CHH Plywood technical notes - downloadable from <https://chhpoly.co.nz/librarytools>.
  - NZS 3640:2003 "Chemical Preservation of Round and Sawn Timber".
  - NZS 3602:2003 "Timber and Wood-based products for use in Buildings".
  - NZS 3603:1993 "Timber Structures Standard".
  - NZS 3604:2011 "Timber Framed Buildings".
  - AS/NZS 1170:2011 "Structural design actions".
  - AS/NZS 2269:2012 "Plywood Structural".
  - AS/NZS 1604.3:2012 "Specification for Preservative Treatment, Part 3: Plywood".
  - US Product Standard PSI-95.
  - Acceptable Solution 'E2/AS1 – External Moisture'.
  - Acceptable Solution 'B2/AS1 – Durability'.
  - BRANZ Bulletin 345: Flat membrane roofs – design and installation.
  - BRANZ Bulletin 346: Flat membrane roofs – materials.
  - BRANZ Bulletin 289: Asphalt shingle roofing.
  - BRANZ Appraisals 307, 404, 411.
  - BRANZ Bulletin 630: Roof Space Ventilation.
  - BRANZ Bulletin 610: Preventing Moisture Problems In Timber-Framed Skillion Roofs.
  - Shadowclad® Specification and Installation Guide for Cavity Construction.
  - Ecoply® Barrier Specification and Installation Guide.
  - Safety Data Sheets.
    - SDS Azole Treated Plywood, LVL and I-Joists.
    - SDS H3 CCA Treated Plywood and I-Joist.
    - SDS Untreated Plywood.
  - APA ([www.buildabetterhome.org](http://www.buildabetterhome.org)).
  - EWPAA ([www.ewp.asn.au](http://www.ewp.asn.au)).
  - Product Technical Statement and Building Product Information Sheet for Ecoply available online at [www.chhpoly.co.nz/librarytools](http://www.chhpoly.co.nz/librarytools).
  - EWPAA Technical Note - Plywood Roofing and Flooring: Installation and detail factors.
- Standards can be purchased online at [www.standards.co.nz](http://www.standards.co.nz). Building Code Compliance Documents can be downloaded free of charge at [www.building.govt.nz/building-code-compliance/](http://www.building.govt.nz/building-code-compliance/)

## 8.0 LIMITATIONS

The information contained in this document is current as at December 2023 and is based on data available to CHH Plywood at the time of going to print.

All photographic images are intended to provide a general impression only and should not be relied upon as an accurate example of Ecoply products installed in accordance with this document or NZBC compliance documents.

This publication replaces all previous CHH Plywood design information and literature relating to Ecoply structural plywood products. CHH Plywood reserves the right to change the information contained in this document without prior notice.

It is your responsibility to ensure that you have the most up to date information available, including at the time of applying for a building consent. You can call toll free on 0800 326 759 or visit [www.chhpoly.co.nz](http://www.chhpoly.co.nz) to obtain current information.

**CHH Plywood has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document. However, to the maximum extent permitted by law, CHH Plywood assumes no responsibility or liability for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.**







Private Bag 92-106  
Victoria Street West  
Auckland 1142  
New Zealand

**Freephone: 0800 326 759**

**[www.chhply.co.nz](http://www.chhply.co.nz)**

DECEMBER 2023  
ECOPLY: VI 21, 1223



40 BELOW™ FLASHING TAPE  
**SPECIFICATION  
GUIDE**



**MASONS**  
Designed Smart, Built Tough.

V3.0 March 2024

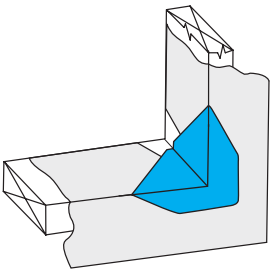
**CodeMark** >>>  
CMNZ70075

**1. GENERAL**

<b>1.1 PRODUCT DESCRIPTION</b>	40 Below™ Flashing Tape is a self adhesive flashing tape to seal around windows, doors, and other joinery openings as a secondary defense against water penetration. as a secondary defense against water penetration.
<b>1.2 PHYSICAL PROPERTIES</b>	<p>40 Below™ Flashing Tape:</p> <ul style="list-style-type: none"><li>› Is suitable for timber framed buildings</li><li>› Has been tested and passed by CodeMark</li><li>› For a risk score between 0-20 in accordance with NZBC Acceptable Solution E2/AS1</li><li>› Passed NZS3604 Building Wind Zones up to and including 'Extra High'</li><li>› Compatible with all building wraps</li><li>› 0.2mm thick adhesive layer</li><li>› Low temperature adhesion. Can be applied as low as -40°C (up to 65°C)</li><li>› Corner Guard is easy to install and increases protection to framing</li></ul>
<b>1.3 DURABILITY</b>	Provided it is not exposed to the weather or ultra-violet light for a total of more than 6 months, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, the MASONS 40 Below™ Window Flashing System is expected to have a serviceable life equal to that of the cladding.
<b>1.4 STORAGE</b>	<p>40 Below™ Window Tape must be:</p> <ul style="list-style-type: none"><li>› Stored on end under a cover, in a clean and dry area</li></ul>

1.5 PRODUCTS	DESCRIPTION	ROLL SIZES	MASONS CODE
	40 Below flashing tape 75mm	H 75mm x L 20m	40BELOW75x20
	40 Below flashing tape 100mm	H 100mm x L 20m	40BELOW100x20
	40 Below flashing tape 150mm	H 150mm x L 20m	40BELOW150x20
	40 Below flashing tape 230mm	H 230mm x L 20m	40BELOW230x20
	Hydro corner guards	50	HYDROCG50

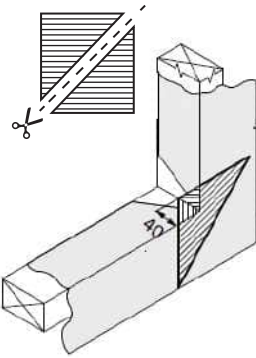
WINDOW SILL INSTALLATION INSTRUCTIONS



1. CORNER GUARD

OPTION 1

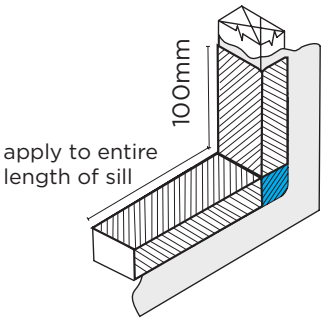
Place the Masons Corner Guard over the building wrap and into the bottom corners of the window or door sill, staple to the jamb. With steel frames use double sided tape to attach the Corner Guard to the metal.



1. CORNER GUARD

OPTION 2

Cut a 150mm square of Hydro Flashing Tape into two equal triangular pieces. Install these at the bottom corners of the frame opening. The triangle needs to reach 40mm in from the extreme end of the window sill. With the remainder overlapping the building paper.

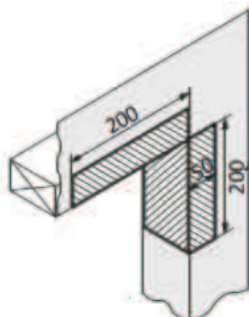


2. SILL GUARD

- A. Install sill tape flush with the interior face of the opening. Apply along entire length of sill, continue up each jamb with a minimum of 100mm
- B. IMPORTANT: Press tape firmly into the corner over the Corner Guard first, then fold around onto the frame face.
- C. Fold remainder Hydro Flashing Tape against outer face of frame/building. Smooth out all creases & press firmly for good adhesion.

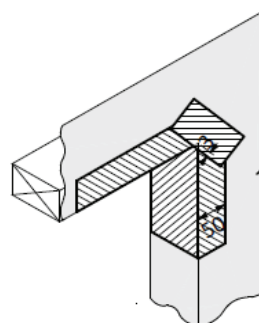


## WINDOW HEAD INSTALLATION



### 1. LINTEL PIECE

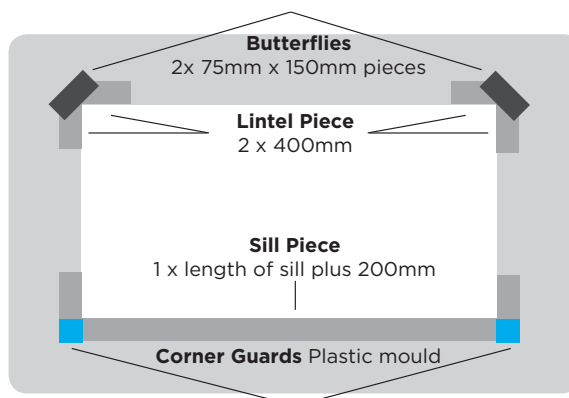
Install Lintel pieces on top corners of opening, 200mm along the lintel and 200mm down the jamb. Slit at each corner & fold onto outer face of building wrap (at least 50mm).



### 2. BUTTERFLIES

To create a seal at corner junction, Install butterflies at 45° across the corner of head/jamb.

## WINDOW HEAD FLASHING INSTALLATION



### CUTTING DIAGRAM:

Apply Masons Hydro Flashing Tape to top of window head flashing, up-stand and building wrap. Refer to window & cladding details for specific application.

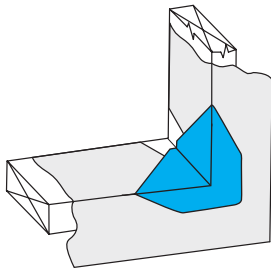


# 40 Below & Hydro Flashing Tape

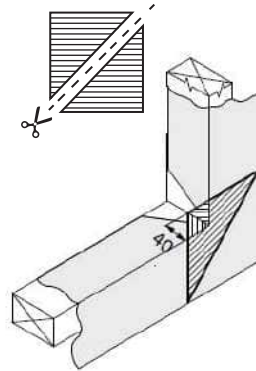
**Installation Instructions** for 40 Below (Ultra Sticky)  
40 Below Platinum, 40 Below Flex and Hydro

**40 Below Ultra Sticky and 40 Below Platinum ONLY:**  
**Two layers are required on the sill for nail and screw sealability**

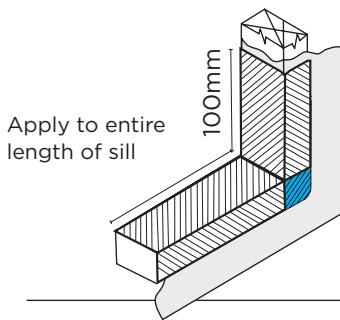
## Window Sill Installation Instructions



**1. Corner Guard *option 1***  
Place the *Masons Corner Guard* over the building wrap and into the **bottom** corners of the window or door sill and staple to the jamb. With steel frames use double sided tape to attach the *Corner Guard* to the metal.



**1. Corner Guard *option 2***  
Cut a 150mm square of *Flashing Tape* into two equal triangular pieces. Install these at the **bottom** corners of the frame opening. The triangle needs to reach 40mm in from the extreme end of the window sill, with the remainder overlapping the building paper.

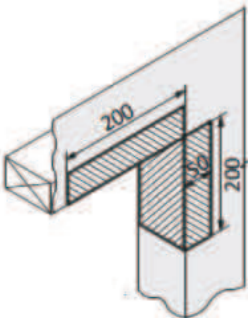


### 2. Sill Guard

- Install sill tape flush with the interior face of the opening. Apply along entire length of sill, continue up each jamb with a minimum of 100mm
- IMPORTANT:** Press tape firmly into the corner over the Corner Guard first, then fold around onto the frame face.
- Fold remainder *Flashing Tape* against outer face of frame/building. Smooth out all creases & press firmly for good adhesion.

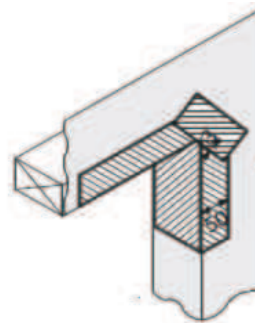


## Window Head Installation



### 1. Lintel Piece

Install lintel pieces on top corners of opening, 200mm along the lintel and 200mm down the jamb. Slit at each corner and fold onto outer face of building wrap (at least 50mm).



### 2. Butterflies

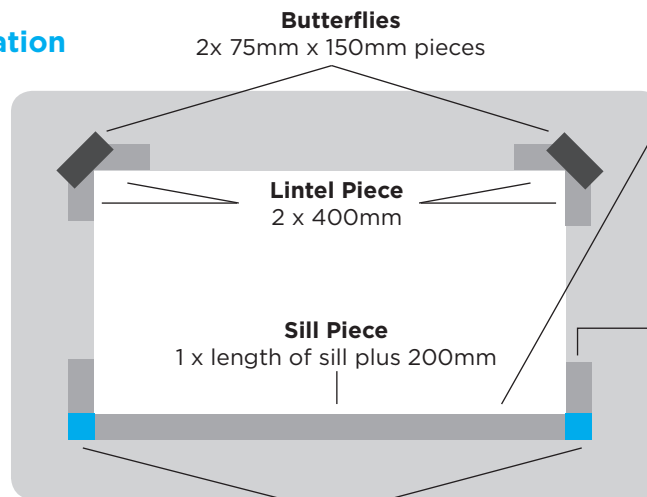
To create a seal at corner junction, install butterflies at 45° across the corner of head/jamb.

## Window Head Flashing Installation

Apply *Masons Flashing Tape* to top of window head flashing, up-stand and building wrap.  
Refer to window & cladding details for specific application.

**To ensure maximum adhesion of the tape, make sure the substrate surface is clean, dry and free from any dust or other contaminants.**

**Always use a Masons or similar plastic scraper to firmly press tape into the surface.**



Corner Guards Plastic mould

Install two layers of 40 Below and 40 Below Platinum to the sill to achieve nail and screw sealability. Only one layer of 40 Below Flex or Hydro is required to the sill.

100mm minimum tape up Jamb. 200mm up either side of Jamb is recommended.



Certificate no: CMNZ70075

Version: 3

Original issue date: 08 April 2021

Version date: 22 July 2024

## 1. Certificate Holder Details



### Masons NZ Ltd

18A David McCathie Place, Silverdale Auckland 0932  
New Zealand  
info@mpb.co.nz  
Ph: +64 9 414 7551  
www.mpb.co.nz

## 2. Product Certification Body

### Bureau Veritas Australia Pty Ltd

11/500 Collins Street  
Melbourne VIC 3000 Australia  
product.certification@bureauveritas.com  
Ph: 1800 855 190  
www.bureauveritas.com.au

**Complaints:** The complaints process for this certificate can be found here:  
[www.bureauveritas.com.au/your-feedback](http://www.bureauveritas.com.au/your-feedback)

Sam Guindi – Bureau Veritas Product Certification Manager



# Product Certificate

## MASONS Flashing Tapes

### 3. Description of Building Method or Product

Name of the product or method in Aotearoa New Zealand, including any brand names used. Description of what it is and the components that make up any system and its physical attributes including the materials and make-up of the product, where applicable. Matters that should be taken into account in the use or application of the building method or product can be found in item 6. Conditions and Limitations of Use. Continuation of description can be found in item 10 – Supporting Information about Description. [Delete if not applicable]. The building method's or building product's catalogue or model identification number or numbers or other unique identifiers that might be used to identify the building product or building method

Masons Flashing Tapes are made of three components: film or fabric carrier, adhesive, and a release liner.

This certificate covers the following products:

- 40 Below Window Flashing Tape
- 40 Below Platinum Flashing Tape
- 40 Below Flex Flashing Tape
- Hydro Flashing Tape
- Bayonet BayoWrap Window Sealing Tape

and the following optional accessories for sill flashing:

- CornerGuard
- BayoWrap Corner Guard

### 4. Intended use of Building Method or Product

Intended use of the building method or product as described in the product manual and other instructional materials. A statement of the function or purpose of the building method or product. Continuation of intended use can be found in item 11 – Supporting Information about Intended use. [Delete if not applicable]

Masons Flashing Tapes are used to flash around windows and doors as a secondary water-resistant barrier. Bayonet BayoWrap, 40 Below, 40 Below Platinum, 40 Below Flex tapes may be used to seal joints in rigid air barriers. Bayonet BayoWrap, 40 Below Platinum, 40 Below Flex and Hydro may also be used at joinery heads to seal flashing upstands to the wall underlay.

### 5. New Zealand Building Code Provisions

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

How the building method or product complies or contributes can be found in item 8. Basis for Certification. Any qualifications on the extent of that compliance can be found in item 6. Conditions and limitations of use.

**Clause B2 Durability:** Performance Clauses B2.3.1(a), B2.3.2

**Clause E2 External moisture:** Performance Clauses E2.3.2 (contributes to), E2.3.5 (contributes to), E2.3.6 (contributes to), E2.3.7

**Clause F2 Hazardous building materials:** Performance Clauses F2.3.1



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70075

Version: 3

Original issue date: 08 April 2021

Version date: 22 July 2024



# Product Certificate

MASONS Flashing Tapes

## 6. Conditions and Limitations of Use

The building method or product's use is to be in accordance with the installation instructions and requirements against which the building method or product was assessed.

Conditions or limitations of conformity for the performance requirements the building method or product is compliant with, including any requirements for people with the qualifications and skills to install or use the building method or product, any known or demonstrated situations where the building method or product should not be used. A statement as to whether there are any matters that should be taken into account in the use or application of the building product or building method and, if so, what those matters are.

1. Masons Flashing Tapes are certified for use in buildings:
  - a. within the scope of E2/AS1, and
  - b. located in any wind zone up to and including Extra High, and
  - c. located in any exposure zone (as defined in NZS3604:2011 Timber framed buildings).
2. 40 Below, 40 Below Platinum, 40 Below Flex Flashing Tapes shall be used in accordance with the 40 Below & Hydro Flashing Tape Installation Instructions, June 2022, and the requirements of Acceptable Solution E2/AS1.
3. Bayonet BayoWrap Window Sealing Tape shall be used in accordance with the Bayonet BayoWrap Window Sealing Tape. Installation Guide, Version 1 July 2023, and the requirements of Acceptable Solution E2/AS1.
4. Masons Flashing Tapes shall not be installed in areas where the tape has the potential to be exposed to heat, such as chimney flues.

## 7. Health and Safety Information

Health, safety, and well-being declarations associated with installation, maintenance, and use of the building method or product, and their specific editions and dates necessary to ensure the performance requirements of clauses F1 to F9 of the Building Code can be met.

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

## 8. Basis for Certification

How the performance requirements in the Building Code were met for each of the provisions. Where used as part of a system, the specific contribution to compliance.

B2 Durability - By testing and comparison with Acceptable Solution E2/AS1

E2 External moisture - By testing and comparison with Acceptable Solution E2/AS1

F2 Hazardous building materials - By comparison with the performance requirements of Building Code Clause F2.3.1



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70075

Version: 3

Original issue date: 08 April 2021

Version date: 22 July 2024



# Product Certificate

MASONS Flashing Tapes

## 9. Supporting Documentation for Certification

Reference to any acceptable solutions, verification methods, New Zealand Standards, or other compliance pathways referenced against each individual performance requirement the building method or product is compliant with, and their specific version and date. Reference to documents describing tests and evaluations and any other documents relied on for certification or used to prove compliance, including their full title, specific version and date.

1. Acceptable Solutions and Verification Methods for New Zealand Building Code Clause B2 Durability Second edition (Amendment 12), 28 November 2019.
2. Verification Methods E2/VM1 and Acceptable Solutions E2/AS1, E2/AS2 and E2/AS3 for New Zealand Building Code Clause E2 External Moisture Third edition (Amendment 10), 5 November 2020.
3. Acceptable Solutions and Verification Methods for New Zealand Building Code Clause F2 Hazardous building materials First edition (Amendment 3), 1 January 2017.
4. PRI Test Report 2309T0001-01 Tests on 40 Below Flashing Tape to AAMA 711 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 19 January 2021.
5. PRI Test Report 2309T0001-02 Tests on 40 Below Platinum Flashing Tape to AAMA 711 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 19 January 2021.
6. PRI Test Report 2309T0001-03 Tests on Gerband 587 Flashing Tape to AAMA 711 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 19 January 2021.
7. LABORATORIO SUDAMERICANO DE ENSAYOS E INVESTIGACIONES TERMODINAMICAS Test Report No 17-13632 Tests on Hydra Flashing Tape to AAMA 711, 3 August 2018.
8. Les Boulton & Associates Report 191235-02 Assessment of Masons Self-adhesive Window Flashing Tapes, 20 March 2019.
9. PRI Test Report 2309T0003 Tests on LS-E 4934 ST PO80 40 Below to AAMA 711-20 "Voluntary Specification for Self-Adhering Flashing Used for Installation," 12 October 2021.
10. PRI Test Report 2309T0004 Tests on LS-E 4930 ST PO80 Platinum to AAMA 711-20 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 12 October 2021.
11. PRI Test Report 2309T0005 Tests on LS-E 4832 PT/D 120w Below Flex to AAMA 711-20 "Voluntary Specification for Self-Adhering Flashing Used for Installation", 12 October 2021.
12. 40 Below & Hydro Flashing Tape Installation Instructions, June 2022.
13. Bayonet BayoWrap Window Sealing Tape. Installation Guide, Version 1 July 2023.



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70075

Version: 3

Original issue date: 08 April 2021

Version date: 22 July 2024



# Product Certificate

MASONS Flashing Tapes

## 10. Supporting Information About Description (Optional)

Any supporting information for section 3.

- 40 Below Window Flashing Tape has a white woven facing and is supplied in 20 m rolls; 75 mm, 100 mm, 150 mm or 230 mm wide.
- 40 Below Platinum Flashing Tape has a silver foil facing and is supplied in 20 m rolls; 75 mm, 100 mm, 150 mm or 230 mm wide.
- 40 Below Flex Flashing Tape has white flexible facing and is supplied in 20 m rolls; 75 mm, 100 mm, 150 mm or 230 mm wide.
- Hydro Flashing Tape has an aluminium facing and is supplied in rolls 75mm x 25m, 100mm x 25m, 150mm x 10m, 150mm x 25m, or 200mm x 25m.
- Bayonet BayoWrap Window Sealing Tape has a white woven facing and is supplied in 20 m rolls; 75 mm, 150 mm or 230 mm wide.

## 11. Supporting Information About Intended Use (Optional)

Any supporting information for section 4.

N/A

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

Any supporting information for section 6.

N/A

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

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



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

**MASONS UNI® FLEXIBLE AIR BARRIER (UNI® FAB)**  
**SPECIFICATION  
GUIDE****MASONS**  
Designed Smart, Built Tough.

V1.0 October 2021

## 1. GENERAL

### 1.1 GENERAL

This specification relates to the installation of Masons UNI® Flexible Air Barrier (UNI® FAB).

### 1.2 RELATED WORK

The installation of UNI® FAB relies on the installation of a timber or steel primary structure that:

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

### 1.3 DOCUMENTS

Refer to the following manufacturer's documents:

- Masons UNI® FAB pass™
- Masons UNI® FAB Design and Installation guide
- Masons UNI® FAB warranty.

Refer to the following related documents:

- NZS 3604:2011 Timber-framed buildings
- NASH Standard Parts 1 and 2: 2019
- NZS 3603:1993
- NZS 1170:2002 (set).

### 1.4 GENERAL DESIGN CONSIDERATIONS

The system must be specified in accordance with the Mason's UNI® FAB Design and Installation guide.

## 2. PRODUCTS

### 2.1 PRODUCT DESCRIPTION

UNI® FAB is a nonwoven, absorbent, water-resistant 180 GSM, synthetic wall underlay. It comprises three polypropylene layers: two outer layers of nonwoven polypropylene with a middle layer of a functional-technical film. It is manufactured to meet the European standard EN 13859-2:2014 as well as the absorbency performance requirement as per NZS 2295:2006. It is supplied coloured blue with a black underside unless an alternative colour is requested.



## 2.2 ASSEMBLY COMPONENTS

The following assembly components are supplied by Masons:

UNI® FAB

- Masons UNI® FAB 2.74 x 50 m
- Masons UNI® Soffit FAB 0.6 x 18.5 m

Fixings

- Masons UNI® Fasteners 32 mm
- Masons UNI® Cap Nails

Ancillary components

- Masons 40 Below™ (Platinum or Flex) flashing tape 150 mm x 20 mm
- Masons 40 Below™ (Platinum or Flex) flashing tape 75 mm x 20 mm
- Masons Penetration Seal 1-75 mm
- Masons Penetration Seal 80-170 mm
- Masons UNI® FAB Seam and Repair Tape
- Masons Corner Guards
- Masons PEF Backing Rod
- Masons Brick Ties.

## 2.3 SUBSTITUTIONS

Substitutions are not permitted to any of the specified components listed in this section.

# 3. EXECUTION

## 3.1 QUALIFICATIONS

The installation of the UNI® FAB must be carried out by a competent and experienced builder.

## 3.2 RESTRICTED BUILDING WORK

Where Restricted Building Work applies, the installer shall be a Licensed Building Practitioner (LBP) or be supervised by an LBP with the relevant license class.

## 3.3 CHECK RELATED WORK

Confirm the primary structure:

- complies with the NZ Building Code and is designed in accordance with NZS 3604:2011 or NASH Standard Parts 1 and 2: 2019, or
- is specifically designed to NZS 3603:1993 or AS/NZS 1170:2002, or
- where existing is suitable for the intended building work, and
- meets the fixing requirements as per Table 1 in the UNI® FAB Design and Installation Guide.





## 4. APPLICATION

### 4.1 GENERAL

The installation of the UNI® FAB must be completed in accordance with the instructions in the Masons UNI® FAB Design and Installation guide and the building consent documentation. All conditions contained in the building consent documentation must be met.

### 4.2 RECEIPT OF PRODUCT

Ensure that all product supplied by Masons is:

- free of defects at the time of delivery and
- handled and stored in accordance with all Masons' requirements.

## 5. COMPLETION

### 5.1 QUALITY CHECK

Check the installation to ensure all components have been installed in accordance with all Masons' requirements.

### 5.2 WARRANTIES

A manufacturer's warranty is available for the UNI® FAB. Refer to [www.mpb.co.nz](http://www.mpb.co.nz).

### 5.3 INFORMATION FOR CARE AND MAINTENANCE

The UNI® FAB requires minimal care and maintenance to maintain the performance of the underlay. Refer to [www.mpb.co.nz](http://www.mpb.co.nz).



## 6. PROJECT-SPECIFIC SELECTIONS

### PROJECT DETAILS

Project address

Lot/DP number

Date of plans

Purpose of plans

Description of building work and reference to drawing numbers

### DOCUMENTS SUPPLIED (CHECK WHICH APPLIES)

☐

Masons UNI® FAB pass™

☐

Masons UNI® FAB Design and  
Installation Guide

☐

Masons UNI® FAB Warranty

### DESIGNER CONFIRMATION (CHECK WHICH APPLIES)

#### Location

#### Wind zone or design pressure (ULS)

☐

Low

☐

Medium

☐

High

☐

Very high

☐

Extra high

☐

Design pressure (ULS) up to 4.6 kPa

#### Exposure zone as per NZS 3604:2011

☐

A

☐

B

☐

C

☐

D

#### Distance to boundary

☐

Less than 1 m

☐

Greater than 1 m

#### Building

##### Framing

☐

Timber

☐

Lightweight steel

☐

Existing building assessed at equivalent stiffness to NZS 3604:2011



## ASSEMBLY COMPONENT SELECTIONS

### UNI® FAB

- ☐ Masons UNI® FAB 2.74 x 50 m
- ☐ Masons UNI® Soffit FAB 0.6 x 18.5 m

### Fixings

- ☐ Masons UNI® Cap Nails for use with timber framing
- ☐ Masons UNI® Self Drilling Screws with washers for use with lightweight steel frames

### Ancillary components

- ☐ Masons 40 Below™ flashing tape (Flex) 150 mm x 20 mm
- ☐ Masons 40 Below™ flashing tape (Flex) 75 mm x 20 mm
- ☐ Masons 40 Below™ flashing tape (Platinum) 150 mm x 20 mm
- ☐ Masons 40 Below™ flashing tape (Platinum) 75 mm x 20 mm
- ☐ Masons Penetration Seal 1-75 mm
- ☐ Masons Penetration Seal 80-170 mm
- ☐ Masons UNI® FAB Seam and Repair Tape
- ☐ Masons Corner Guards
- ☐ Masons PEF Backing Rod
- ☐ Masons Brick Ties
- ☐ Masons Wrap Strap.

**MASONS UNI FLEXIBLE  
AIR BARRIER (UNI)  
TECH DATA SHEET**

**MASONS**  
Designed Smart, Built Tough.

V1.0 September 2021

**DESCRIPTION**

UNI is a three-layer flexible wall underlay. It is manufactured by thermally bonding outer spunbonded layers to an inner layer of microporous polypropylene film.

Property	Method	Units	Value
<b>Informative</b>			
Mass/unit area	EN 1849-2:2010	g/m <sup>2</sup>	180
Thickness	EN 1849-2:2010	mm	0.7
Width	EN 1849-2:2003	m	2.74 0.6 m
Length	EN 1849-2:2003	m	18.2
Straightness	EN 1849-2:2003	mm/10 m	30
Visible defects	EN 1850-2:2004		No defects
<b>Normative</b>			
Reaction to fire	EN ISO 11925-2 AC-2011	class	E
Resistance to water penetration	EN 1928:2002	class	W1
Water vapour transmission (sd)	EN ISO 12572:2004 EN 1931:2002	m	0.2
Water absorbance	NZS 2295	AS/NZS 4201:part 6	
Air resistance (Air permeability)	EN 12114	m <sup>3</sup> /(m <sup>2</sup> x h x 50 Pa)	≤ 0.01
Dimensional stability	EN 1107-2:2002	%	≤2
Flexibility at low temps	EN 495-5:2014	°	-40
Resistance to tearing MD	EN 12310-1:2010	N	210N



Property	Method	Units	Value
Resistance to tearing CD	EN 12310-1:2010	N	290N
Tensile strength MD	EN 12311-2:2013	N/50 mm	330
Tensile strength CD	EN 12311-2:2013	N/50 mm	230
Tensile strength – elongation MD	EN 12311-2:2013	%	40
Tensile strength – elongation CD	EN 12311-2:2013	%	80
<b>Performance after artificial aging</b>			
Method of aging	EN 1296 & EN 1297		
Water resistance, Resistance to water penetration	EN 1928:2002	class	W1
Tensile strength MD/ CD	EN 12311-2:2013	n/50 mm	280/195
Tensile strength elongation	EN 12311-2:2013	%	34/68

Certificate no: CMNZ70116

Version: 2

Original issue date: 25 November 2021

Version date: 22 July 2024

## 1. Certificate Holder Details



### Masons NZ Ltd

18A David McCathie Place, Silverdale Auckland 0932  
New Zealand  
info@mpb.co.nz  
Ph: +64 9 414 7551  
www.mpb.co.nz

## 2. Product Certification Body

### Bureau Veritas Australia Pty Ltd

11/500 Collins Street  
Melbourne VIC 3000 Australia  
product.certification@bureauveritas.com  
Ph: 1800 855 190  
www.bureauveritas.com.au

**Complaints:** The complaints process for this certificate can be found here:  
[www.bureauveritas.com.au/your-feedback](http://www.bureauveritas.com.au/your-feedback)

Sam Guindi – Bureau Veritas Product Certification Manager



# Product Certificate

## Masons UNI® and UNI® PLUS Flexible Air Barriers

## 3. Description of Building Method or Product

Name of the product or method in Aotearoa New Zealand, including any brand names used. Description of what it is and the components that make up any system and its physical attributes including the materials and make-up of the product, where applicable. Matters that should be taken into account in the use or application of the building method or product can be found in item 6. Conditions and Limitations of Use. Continuation of description can be found in item 10 – Supporting Information about Description. [Delete if not applicable]. The building method's or building product's catalogue or model identification number or numbers or other unique identifiers that might be used to identify the building product or building method

Masons UNI® and UNI® PLUS Flexible Air Barriers are tri-laminate synthetic sheets 2.74 metres wide consisting of two outer non-woven layers and a middle synthetic membrane which is dark grey.

- UNI® Flexible Air Barrier has a blue front face marked "UNI® Flexible Air Barrier" and a black rear face.
- UNI® PLUS Flexible Air Barrier has a blue front face marked "UNI® PLUS Flexible Air Barrier" and a white rear face.
- UNI® Flexible Air Barrier is also available as 600 mm wide sheet with a self-adhesive strip, marketed as UNI® Soffit.

## 4. Intended use of Building Method or Product

Intended use of the building method or product as described in the product manual and other instructional materials. A statement of the function or purpose of the building method or product. Continuation of intended use can be found in item 11 – Supporting Information about Intended use. [Delete if not applicable]

Masons UNI® and UNI® PLUS Flexible Air Barriers are wall underlays and flexible air barriers and are suitable for use as temporary weather protection to allow interior works to continue inside the building without the exterior wall cladding fully in place.

UNI® PLUS Flexible Air Barrier is fire retardant and suitable for use where exposed to view in an occupied space.

## 5. New Zealand Building Code Provisions

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

How the building method or product complies or contributes can be found in item 8. Basis for Certification. Any qualifications on the extent of that compliance can be found in item 6. Conditions and limitations of use.

**B2 Durability:** B2.3.1(a), B2.3.2

**C3 Fire affecting areas beyond the fire source:** C3.4(c) (UNI® PLUS)

**E2 External moisture:** E2.3.2 (contributes to), E2.3.5 (contributes to), E2.3.6 (contributes to), E2.3.7

**F2 Hazardous building materials:** F2.3.1

**H1 Energy efficiency:** H1.3.1(b) (contributes to)



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.



Certificate no: CMNZ70116

Version: 2

Original issue date: 25 November 2021

Version date: 22 July 2024



# Product Certificate

Masons UNI® and UNI® PLUS Flexible Air Barriers

## 6. Conditions and Limitations of Use

The building method or product's use is to be in accordance with the installation instructions and requirements against which the building method or product was assessed.

Conditions or limitations of conformity for the performance requirements the building method or product is compliant with, including any requirements for people with the qualifications and skills to install or use the building method or product, any known or demonstrated situations where the building method or product should not be used. A statement as to whether there are any matters that should be taken into account in the use or application of the building product or building method and, if so, what those matters are.

1. Masons UNI® and UNI® PLUS Flexible Air Barriers are certified for use as a wall underlay and air barrier on buildings:
  - a. within the scope limitations of:
    - i. NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area for timber-framed construction; or
    - ii. NZBC Acceptable Solution E2/AS4 with regards to building height and floor plan area for light-steel framed construction, and
  - b. situated in wind zones (as defined in NZS 3604:2011) up to and including 'Extra High', provided stud and fixing centres are no greater than specified in the Masons UNI® Flexible Air Barrier Design and Installation Manual V1.0, October 2021 - CM, or the Masons UNI® PLUS Flexible Air Barrier Design and Installation Manual V2.0, March 2022 - CM respectively, and
  - c. with absorbent or non-absorbent wall claddings directly fixed to the frame; or 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 NZBC Acceptable Solution E2/AS4 for steel framed buildings, and
  - d. Masons UNI® Flexible Air Barrier must not be used where the underlay is exposed to view in an occupied space
  - e. Masons UNI® PLUS Flexible Air Barrier may be used when exposed to view in an occupied space.
2. Masons UNI® and UNI® PLUS Flexible Air Barriers shall be:
  - a. installed in accordance with the Masons UNI® Flexible Air Barrier Design and Installation Manual V1.0, October 2021 - CM, or the Masons UNI® PLUS Flexible Air Barrier Design and Installation Manual V2.0, March 2022 - CM respectively, and
  - b. separated from fireplaces, heating appliances, flues and chimneys in accordance with the requirements of NZBC Acceptable Solutions C/AS1 and C/AS2, Paragraph 7.5.9 for the protection of combustible materials, and
  - c. protected from sunlight within 90 days.
3. Contribution to compliance with Building Code clause H1.3.1(b) is conditional on:
  - a. the element incorporating Masons UNI® and UNI® PLUS Flexible Air Barrier being part of the thermal envelope of the building, and
  - b. horizontal and vertical laps being securely taped.

## 7. Health and Safety Information

Health, safety, and well-being declarations associated with installation, maintenance, and use of the building method or product, and their specific editions and dates necessary to ensure the performance requirements of clauses F1 to F9 of the Building Code can be met.

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



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70116

Version: 2

Original issue date: 25 November 2021

Version date: 22 July 2024

# Product Certificate

Masons UNI® and UNI® PLUS Flexible Air Barriers

BC0571/24



## 8. Basis for Certification

How the performance requirements in the Building Code were met for each of the provisions. Where used as part of a system, the specific contribution to compliance.

- B2 Durability - By testing and comparison with Acceptable Solution E2/AS1 and referenced standard NZS2295
- C3 Fire affecting areas beyond the fire source - By testing and comparison with Acceptable Solutions C/AS1 and C/AS2
- E2 External moisture - By testing and comparison with Acceptable Solution E2/AS1 and referenced standard NZS2295
- F2 Hazardous building materials - By comparison with requirements of performance requirements of Building Code clause F2.3.1
- H1 Energy efficiency - By testing and comparison with Acceptable Solution E2/AS1 and referenced standard NZS2295

## 9. Supporting Documentation for Certification

Reference to any acceptable solutions, verification methods, New Zealand Standards, or other compliance pathways referenced against each individual performance requirement the building method or product is compliant with, and their specific version and date. Reference to documents describing tests and evaluations and any other documents relied on for certification or used to prove compliance, including their full title, specific version and date.

1. C1 - C6 Protection from Fire Acceptable Solution C/AS1 Protection from fire for buildings with sleeping (residential) and outbuildings (risk group SH) Second Edition, 2 November 2023.
2. C/AS2 Acceptable Solution for Buildings other than Risk Group SH for New Zealand Building Code Clauses C1-C6 Protection from Fire First edition (Amendment 2), 5 November 2020.
3. Verification Methods E2/VM1 and Acceptable Solutions E2/AS1, E2/AS2 and E2/AS3 for New Zealand Building Code Clause E2 External Moisture Third edition (Amendment 10), 5 November 2020.
4. Acceptable Solution E2 External Moisture E2/AS4 First edition, 28 November 2019.
5. NZS 2295:2006 Pliable, permeable building underlays.
6. AS1530.2:1993 Methods for fire tests on building materials, components and structures.
7. Masons Plastabrick Material Safety Datasheet V2, January 2022.
8. Scion Report No 2704886 [J31991 / QT8222VHPU] Evaluation of Roof VHP Ultra to NZS2295, July 2020.
9. ProConsult Report Reference 13038 HP Ultra wall underlay system compliance with NZBC B1 Structure (including fixing recommendations), 22 March 2021.
10. L H Bolton Report 201265 Assessment of Masons Roofing Underlays for Buildings, 21 October 2020.
11. NZWTA Test Report No.1374734.0 "SP180 Test for Flammability to AS1530 .2-1993", July 2021.
12. Scion Report No 45558911 [J32028 / QT9596] Assessment of SP180 TO NZS 2295, January 2022.
13. Masons UNI® Flexible Air Barrier Design and Installation Manual V1.0, October 2021 – CM.
14. Masons UNI® PLUS Flexible Air Barrier Design and Installation Manual V2.0, March 2022 – CM.



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70116

Version: 2

Original issue date: 25 November 2021

Version date: 22 July 2024



# Product Certificate

Masons UNI® and UNI® PLUS Flexible Air Barriers

## 10. Supporting Information About Description (Optional)

Any supporting information for section 3.

The following accessories are used with Masons UNI® Flexible Air Barrier :

- UNI Seam Tape
- UNI Fasteners
- Masons 40 Below, 40 Below Platinum and 40 Below Flex flashing tapes
- Masons Corner Guards
- Penetration seals

## 11. Supporting Information About Intended Use (Optional)

Any supporting information for section 4.

N/A

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

Any supporting information for section 6.

N/A

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

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



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

## Bitumac® 750 (860)

### Heavy Duty Non Fire Retardant Kraft Roof Underlay

#### Application

Bitumac® 750 is a heavy duty kraft recommended for use as a self-supporting roof underlay where fire retardant properties are not important.

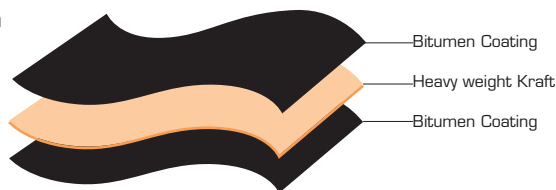
Suitable for:

- All roof cladding types including concrete and clay tiles, profiled metal and pressed metal tiles
- Direct fixing under absorbent and non absorbent roof claddings such as profiled metal

#### Features and Benefits

- Self-supporting heavy duty product that can be installed without support for spans up to 1200mm
- Absorbent allowing it to be used with all cladding types
- Vapour permeable - allowing vapour to pass through preventing the build-up of condensation

#### Technical Data



#### NZS 2295 – Pliable, Permeable Building Underlays

Properties	Requirement	Performance
Absorbency	$\geq 150 \text{ g/m}^2$	Pass
Water Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Resistance to Water Penetration	$\geq 100 \text{ mm}$	Pass
pH of Extract	$> 5.5$ and $< 8.0$	Pass
Moisture Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Tensile Strength	$MD \geq 11 \text{ kN/m}$ , $CD \geq 6 \text{ kN/m}$
	Edge Tear Resistance	$MD \geq 70 \text{ N}$ , $CD \geq 55 \text{ N}$
Air Resistance	$\geq 0.1 \text{ MN s/m}^3$	Pass
Additional Information		
Flammability Index	$> 5$	Non Fire Retardant
NZS 2295:2006 Classification	R2	Self-supporting
Wind load zone	R2	Up to Very High

#### New Zealand Building Code (NZBC) and Limitations

When used, installed and maintained in accordance with the requirements outlined in this datasheet, will meet or contribute to meeting the following provisions of the NZBC:

##### NZBC Clause E2: External Moisture

Bitumac® 750 meets the requirements of NZBC E2/AS1 Table 23 for use as a:

- Roof underlay
- Wall wrap
- Air barrier

##### NZBC Clause B2: Durability

Meets the requirement NZBC B2.3.1 a) 50 years and NZBC B2.3.1 b) 15 years

#### Limitations

To meet the above Bitumac® 750 *must* be

- Installed as specified on this data sheet
- Kept dry at all times and not allowed to remain wet during construction or in service
- Maintained in a cavity where it is subject to intermittent wetting only and not exposed to sustained humidities in excess of 90% RH i.e:
  - where timber moisture content  $> 18\%$
  - or where other building elements are releasing moisture (e.g: drying concrete)

## Installation

### General

- If roof pitch is less than 10 degrees, Bitumac® 750 should be run horizontally on support.
- If roof pitch is equal or greater than 10 degrees, Bitumac® 750 may be run horizontally or vertically.

Support is also required where Bitumac® 750 is installed on spans greater than 1200mm.

### For all wall types, Bitumac® 750 must be:

- Fixed across its width and secured adequately in place with 8mm staples or 20mm clouts at no greater than 600mm centres across the width of the paper capturing all edges by the fastenings
- Lapped by 150mm and face away from the prevailing wind
- Run at lengths no greater than 10m
- Run over any ridges by no less than 150mm
- Sufficiently tensioned to ensure ponding does not occur
- Clad on the same day as installation (7 days maximum if Bitumac® 750 can be kept dry and undamaged).

### Penetrations

- Bitumac® 750 must fit tightly and be lap taped around penetrations, allowing for free drainage of condensation

### Repairs

- Any damage must be repaired with a new piece of underlay

### Installation with LOSP treated timber

- Suitable for use with LOSP treated timber, conditional upon the solvent in LOSP treated timber having had sufficient time to evaporate (usually 4 days after treatment under appropriate environmental conditions)

## Specification Notes

State the following: Product required: Bitumac® 750 Non Fire Retardant Roof Underlay

### Product Specification

Description	Product Code	Roll Size	Area	GSM
Bitumac® 750	7886024	1250mm x 24m	30m²	330gsm
Bitumac® 750	7886040	1250mm x 40m	50m²	330gsm

### Storage

Bitumac® 750 must be protected against damage and weather. Rolls must be stored on end, under cover in a clean, dry environment. Do not crush product

## Accreditations/Appraisals/Certification

Tasman Insulation New Zealand Ltd  
Certified OMS



Distributed by:  
Tasman Insulation New Zealand Limited  
9-15 Holloway Place, Penrose,  
Auckland 1061, New Zealand

(1) This data sheet may have been superseded. Please refer to pinkbatts.co.nz for the most current information. This datasheet supersedes all previous versions. (2) Tasman Insulation New Zealand Ltd retains the right to change specifications without prior notification. (3) Do not use this product for any application not detailed in this data sheet. (4) Recommendations and advice regarding the use of this product are to be taken as a guide only. The purchaser should ascertain the suitability of this product for the particular end-use situation intended and when used in conjunction with other products. (5) Consult Tasman Insulation New Zealand Ltd for further information. (6) All claims about this product are subject to any variation caused by normal manufacturing process and tolerances. (7) The liability of Tasman Insulation New Zealand Ltd and its employees and agents for any errors or omissions in this data sheet or otherwise in relation to the product is limited to the fullest extent permitted by law. Except where the consumer acquires the goods for the purposes of a business, any rights a consumer may have under the Consumer Guarantees Act are not affected. (8) This information is provided without prejudice to Tasman Insulation New Zealand Ltd standard terms and conditions of sale.

**Please consider the environment before printing this.**

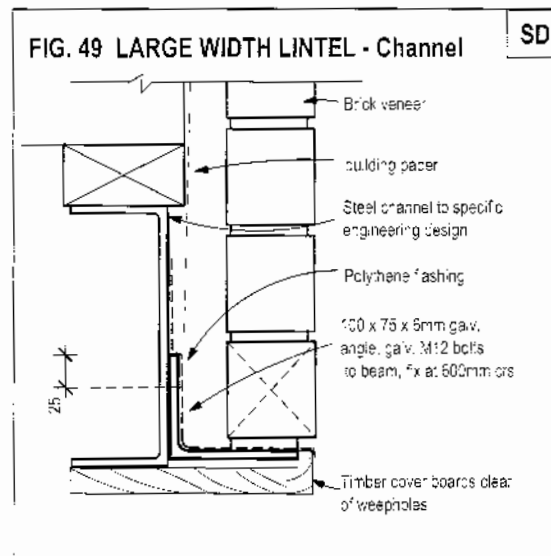
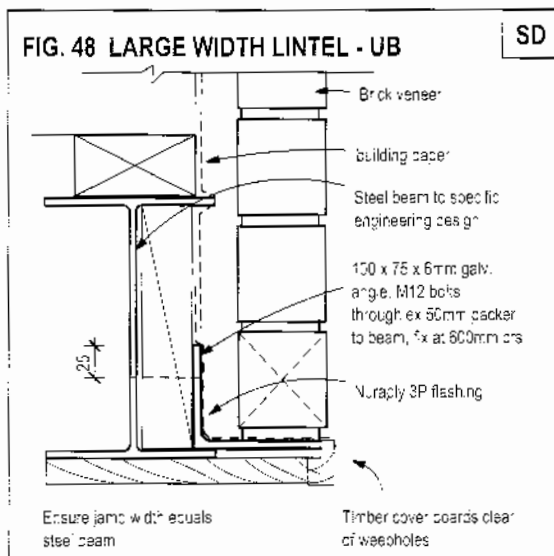
**For further information visit [pinkbatts.co.nz](http://pinkbatts.co.nz) or call 0800 746 522**

**ROOF**

**PRODUCT DATA SHEET**

Page 2 of 2  
Rev C  
May 2018  
#1026

TECHNICAL DETAILING



**FIG. 50 PIERS & RETURNS - Brick Veneer Openings & Arches**

PLAN VIEW

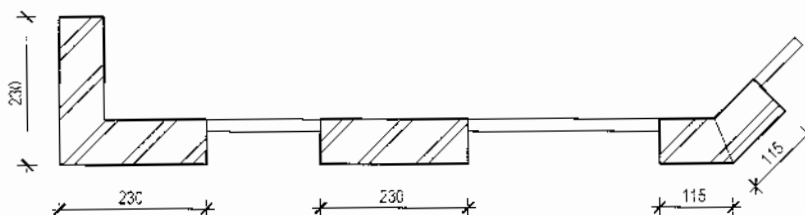
A) Alternative solution for BCA's when piers are less than 230mm wide

LIMITATIONS:

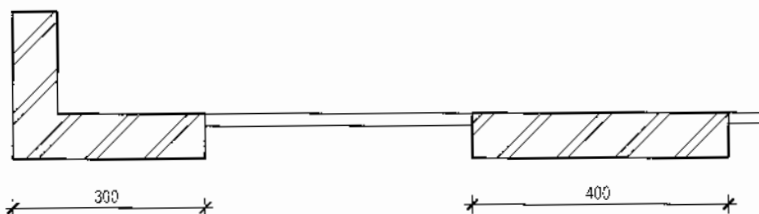
- Tie every second brick
- Single storey or top floor
- Not to support steel lintels



B) Bricks to be tied every second course  
230mm piers are too small to support lintels which require 200mm of landing each side. Ignore pier and treat as one large opening.



C) Galvanised steel lintels may be supported on 300mm returns and 400mm piers



Note: In most cases where brick veneers are tied to a timber or steel frame, it is in a non-structural situation and the width of the pier is not critical unless it is carrying a lintel load.  
Where the dimension of the end support is in question, the load may be transferred to the structural frame using Shelf Angles provided the specification is followed. Alternatively, consult a structural engineer for specific design

**General Comment on Concrete Reinforced Arches**

Avoid placing reinforced concrete (unless in concrete block form) between two skins of brick veneer to form arches. This may result in long term salt problems on the surface of the bricks due to salts in the concrete. Consult a structural engineer as specific designs are required.





# Axon™ Panel Timber Cavity Batten

Technical Specification  
March 2024 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](mailto:literaturefeedback@jameshardie.co.nz)

**Make sure your information is up to date**

When specifying or installing Hardie™ fibre cement products, ensure that you have the current manual. Additional installation information, warranties and warnings are available at [www.jameshardie.co.nz](http://www.jameshardie.co.nz) or **Ask James Hardie™** on 0800 808 868.

**THIS TECHNICAL  
SPECIFICATION  
IS FOR  
AXON™ PANEL  
OVER TIMBER  
CAVITY BATTEN.**

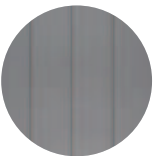


# Contents

<b>1</b>	<b>Product Information</b>	<b>4</b>	<b>7</b>	<b>Installation</b>	<b>17</b>
1.1	Product Sizes and Accessories	4	7.1	Flexible Underlay or HomeRAB™ Pre-Cladding	17
1.2	Components and Accessories	6	7.2	RAB™ Board or a Rigid Air Barrier	17
1.2	Manufacturing and Classification	8	7.3	Vent Strip	17
			7.4	Cavity Battens	17
<b>2</b>	<b>Application and Scope</b>	<b>8</b>	7.5	Intermediate Support	18
2.1	Application	8	7.6	Flashings	18
2.2	Scope	8	7.7	Board and Batten Look	18
2.3	Limitations	9			
2.4	Details	9	<b>8</b>	<b>Panel Fixing</b>	<b>18</b>
			8.1	General	18
<b>3</b>	<b>Compliance</b>	<b>9</b>	8.2	Fastener Durability	19
3.1	Compliance	9	8.4	Panel Layout	21
			8.9	Jointing	21
<b>4</b>	<b>Design</b>	<b>10</b>	<b>9</b>	<b>Finishing</b>	<b>22</b>
4.1	Responsibility	10	9.1	Preparation	22
4.2	Surface Clearances	10	9.2	Coating	22
4.3	Structure	10	9.3	Sealants	22
4.4	Moisture Management	11			
4.5	Energy Efficiency	11	<b>10</b>	<b>Care and Maintenance</b>	<b>23</b>
4.6	Bracing	11			
4.7	Control of External Fire Spread	11	<b>11</b>	<b>Details</b>	<b>24</b>
4.8	Resistance to Moisture/Rotting	11			
4.9	Fire Rated Walls	12	<b>Product Warranty</b>	<b>75</b>	
4.10	Alpine Regions	12			
4.11	Tolerances	12			
4.12	Cavity Construction	12			
<b>5</b>	<b>Safe Working Practices</b>	<b>13</b>			
5.1	Storage and Delivery	15			
5.2	Tips for Safe and Easy Handling of Axon™ Panel	15			
<b>6</b>	<b>Framing</b>	<b>16</b>			
6.1	General	16			
6.2	Timber Framing	16			
6.3	Steel Framing	16			
6.4	Cavity Construction Method	16			
6.5	Special Framing Requirements	17			

# 1 Product Information

## Grooved



**Axon™ Panel 133mm Grooved**  
The grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres.



**Axon™ Panel 133mm Grooved Grained**  
The grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres. Between the grooves is a look of traditional wood-grain texture.



**Axon™ Panel 400mm Grooved**  
The grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 400mm centres.

## Textured



**Axon™ Panel Smooth**  
*Formerly known as EasyLap™ Panel*  
Provides a durable, shiplap vertical joint panel appearance for residential/ commercial building façades. The panel is finished with either a site applied roll on textured acrylic paint to create a rendered look with subtle vertical joint or a full mesh texture coating system.

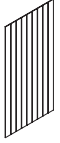

**Axon™ Brushed Concrete must be installed with the Hardie™ CLD™ Structural Cavity Batten. Refer to the Axon™ Panel Hardie™ CLD™ technical specification when installing the Axon Panel Brushed Concrete texture.**


## 1.1 Product Sizes and Accessories


Table 1

**Note:** Axon™ Panel cladding is defined as a Light Weight Wall Cladding (not exceeding 30kg/m²) as per the NZS 3604.

Axon™ Panel Grooved					
Product	Description	Thickness (mm)	Size		Product Code
	<b>Axon™ Panel 133mm Grooved</b> Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m²	9	Length (mm)	Width (mm)	
			2450	1200	403780
			2750	1200	403781
			3000	1200	403782
			3600	1200	404979

Axon™ Panel Grooved					
Product	Description	Thickness (mm)	Size		Product Code
	<b>Axon™ Panel 133mm Grooved Grained</b> Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m <sup>2</sup>	9	3000	1200	404512
	<b>Axon™ Panel 400mm Grooved</b> Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 400mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m <sup>2</sup>	9	2450	1200	404414
			2750	1200	404415
			3000	1200	404416

Axon Panel Textured					
Product	Description	Thickness (mm)	Size		Product Code
	<b>Axon™ Panel Smooth</b> <i>Formerly known as EasyLap™ Panel</i> A shiplap edge panel for subtle vertical joints Nom. Panel Mass: 12.1kg/m <sup>2</sup>	9	Length (mm)	Width (mm)	
			2450	1200	404764
			3000	1200	404763

Hardie™ Axent™ Trim information					
Product	Description	Thickness (mm)	Size		Product Code
	For box corners and facings	19	Length (mm)	Width (mm)	
			3000	45	405260
			3000	70	405257
			3000	89	405258

**Note:** All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

## 1.2 Components and Accessories

Table 2

Accessories/tools supplied by James Hardie			
Accessories	Description	Quantity/Size (approx)	Code
	<b>Hardie™ Aluminium Radius External Box Corner</b> A box corner mould to form the external joints. 9mm etch primed.	2750mm long 3000mm long 4000mm long	306215 306216 306217
	<b>Hardie™ Aluminium Invert External Box Corner</b> A corner mould to form the invert external joints. 9mm etch primed.	2750mm long 4000mm long	306213 306214
	<b>Hardie™ 9mm Panel Aluminium Horizontal 'h' Mould</b> A horizontal flashing to flash the horizontal joints. 9mm etch primed.	3000mm long	304508
	<b>Aluminium 'h' Mould Jointer</b> A jointer to cover the butt joint of 'h' mould.	100mm long	304512
	<b>Hardie™ 9mm Panel Aluminium h External Corner Jointer</b> 'h' mould external corner		305940
	<b>Hardie™ 9mm Aluminium Angle T Socket</b> A horizontal T flashing to flash the horizontal joints. 9mm etch primed.	3000mm long	306210
	<b>Hardie™ Angle T Horizontal Jointer</b> A jointer to cover the butt joint of T mould	100mm long	306221
	<b>Hardie™ Angle T External Corner Jointer</b> T mould external corner		306222
	<b>Hardie™ 9mm Aluminium Internal Corner</b> to join two 9mm panels at an internal corner	2750mm long 4000mm long	306218 306219
	<b>uPVC Vent Strip</b> Used to provide protection from vermin entering cavity space.	3000mm long	302490
<b>Tools</b>			
	<b>Hardie™ Blade Saw Blade</b> Diamond tip 184mm diameter fibre cement circular saw blade. Spacers not included.	Each	300660
	<b>Hardie™ Flex Stainless Steel 316 Nails</b> For fixing panels through cavity battens. 60 x 3.15mm	5kg	302782
	<b>Hardie™ Flex Hot Dip Galv. Nails</b> For fixing panels through cavity battens. 60 x 3.15mm	5kg	302784








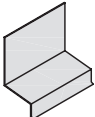
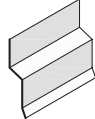






	<b>Hardie™ Flex Stainless Steel 316 Nails</b> For fixing panels through cavity battens. 75 x 3.15mm	5kg	304253
	<b>Hardie™ Flex Hot Dip Galv. Nails</b> For fixing panels through cavity battens. 75 x 3.15mm	5kg	304251

Table 3

#### Accessories/tools not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with Axon™ Panel. James Hardie does not supply these products and does not provide a warranty for their use. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description
	<b>Flexible Underlay</b> To comply with Table 23 of E2/AS1.
	<b>Flexible Tape</b> A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information. e.g. Super-Stick Building Tape® by Marshall Innovations or 3M™ All Weather Flashing Tape 8067 by 3M™ Marshall Innovations: 0800 776 9727 3M™: 0800 474 787
	<b>200mm wide Polypropylene DPC</b> Product used over flexible underlay at internal corners. ie. Super Course 500
	<b>Joint Sealant</b> Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information. e.g. Sika® Sikaflex® MS, Sika® AT Facade, Bostik® Seal N Flex™-1 or similar
	<b>Head Flashing</b> Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.
	<b>Flashing</b> Material as per Table 20, 'E2/AS1'
	<b>65 x 2.87mm RoundDrive Ring Shank Nail</b> For fixing Axon™ Panel to the framing. Paslode®: (09) 477 3000
	<b>Sika® Sikaflex® 11FC</b> Sika®: 0800 SIKAZ (0800 745 269)
	<b>CRC® ADOS® Builders Fill</b> Two part exterior grade fill to skim coat finish over brad nails.

	<b>Dulux® Acrasand or Dulux® Sedona acrylic texture</b> 0800 800 424
	Full mesh texture coating system e.g. STO®, or Resene® Construction Systems Texture coating system
	<b>Stain</b> Timbakote®, suitable for Axon™ Panel 133mm Grooved Grained Tel: 0800 846 225

1.2 Manufacturing and Classification

Axon™ Panel is a cellulose fibre reinforced cement building product. The basic composition is Portland cement, ground sand, cellulose fibre, water and proprietary additives. The panels are easily identified by the name ‘Axon™ Panel’ printed at regular intervals on the back face of panel.

Axon™ Panel is manufactured in Australia to the AS/NZS 2908.2 ‘Cellulose-Cement Products Part 2: Flat Sheets’ (ISO 8336 ‘Fibre Cement Flat Panels’) standards in New Zealand. James Hardie is an ISO 9001 certified manufacturer.

Axon™ Panel 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](http://www.jameshardie.co.nz) or Ask James Hardie on 0800 808 868.

2 Application and Scope

2.1 Application

Axon™ Panel installed as per this technical specification will meet the durability requirements for claddings as required under clause ‘B2-Durability’ of the NZBC.

Axon™ Panel are classified as lightweight wall claddings suitable for residential and light commercial buildings using timber framing. Axon™ Panel are pre-sealed on the face to take a suitable paint finish in any colour.

This document is intended for use by architects, designers and specifiers who may be involved with the specification of Axon™ Panel.

Axon™ Panel is classified as light weight wall cladding suitable for residential and light commercial buildings using timber framed buildings.

- Axon™ Panel is primed on the face to take a suitable paint finish in any colour.

For use of Axon™ Panel outside the 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.

## 2.2 Scope

The scope of this specification covers the use of Axon™ Panel fixed with timber cavity battens to buildings which fall within the scope limitations of 'Acceptable Solution E2/AS1 paragraph 1.1' of the New Zealand Building Code (NZBC) or the buildings covered by a specific engineering design (SED) up to design wind pressures of 2.5kPa (uls).

This document is intended for use by architects, designers and specifiers who may be involved with the specification of Axon™ Panel.

This specification covers the use of Axon™ Panel within the following scope:

- The Axon™ Panel must be installed vertically.
- An external wall structure that complies with the NZBC for an existing building or new building where the designer and/or installer has established that the external wall frame is suitable for this cladding installation.

**Note:** Refer to Axon™ Panel Direct Fix technical specification for direct fixed or Axon™ Panel Hardie™ CLD™ Structural Cavity Batten technical specification for the installation of Axon Panel/Axon Panel Brushed Concrete.

## 2.3 Limitations

- Axon™ Panel must not be used on curved wall applications
- Axon™ Panel must not be installed horizontally or angled
- The minimum ground clearances specified must be maintained
- Timber window joinery/recessed openings is subject to an alternative design by the designer
- Axon Panel must not be used for buildings over 10m height with timber cavity battens

## 2.4 Details

Various Axon™ Panel fixed to timber cavity batten figures are provided at the rear of this document. All dimensions shown are in millimetres unless noted otherwise. This specification and details in CAD file are also available for download at [www.jameshardie.co.nz](http://www.jameshardie.co.nz).

# 3 Compliance

## 3.1 Compliance

Axon™ Panel complies with E2 of the NZBC as an alternate solution.

Axon™ Panel claddings have been independently tested/assessed and meet the performance requirements of the NZBC. Axon™ Panel installed as per the details and information published in this technical specification are BRANZ Appraised. Refer to BRANZ Appraisal 1211(2022).



# 4 Design

## 4.1 Responsibility

The specifier or other party responsible for the project must run through a risk matrix analysis to determine which construction method is to be used. The designer must also ensure that the figures published 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 specification. The designers should ensure that the intent of their design meets the requirements of NZBC.

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, and associated details and material selection provided by the designer. All details provided in this document must be read in conjunction with this specification.

### Make sure your information is up to date

When specifying or installing Hardie™ fibre cement products, ensure you have the current manual. If you're not sure you do, or you need more information, visit [www.jameshardie.co.nz](http://www.jameshardie.co.nz) or Ask James Hardie on 0800 808 868.

**James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.**

## 4.2 Surface Clearances

The clearance between the bottom edge of the cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building .

Axon™ Panel must overhang the bottom plate on a concrete slab by a minimum of 50mm, as required by NZS 3604.

Axon™ Panel must have a minimum clearance of 100mm paved ground, and 175mm from unpaved ground.

On roofs and decks, the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground.

## 4.3 Structure

### 4.3.1 Timber Framing

Timber framed buildings must be designed in accordance with the NZS 3604 (Timber-framed buildings). When the framing is provided as per the specific engineering design, the framing stiffness must be equivalent to, or more than, the stiffness requirements of the NZS 3604.

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 etc.

#### 4.3.2 Wind Loading

Axon™ Panel is suitable for use in all wind zones in New Zealand up to and including EH as defined in the NZS 3604. A specific design is required for all situations where the buildings fall in a specific engineering design (SED) wind zone.

### 4.4 Moisture Management

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled.

Walls must include those provisions as required by the NZBC Acceptable Solution E2/AS1 'External Moisture'. In addition all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in external walls, must comply with the requirements of relevant standards, manufactures specifications and the NZBC.

### 4.5 Energy Efficiency

External walls constructed as per this technical specification, using Axon™ Panel 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 Bracing

Axon™ Panel installed to timber cavity batten cannot be used to achieve structural bracing. However 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. Refer to the Bracing Design Manual by James Hardie for further information.

### 4.7 Control of External Fire Spread

Axon™ Panel is suitable for use in external wall cladding applications where 'Non-Combustible Materials' are specified and complies with the requirements of Section 5.4 of C/AS1 and 5.8.1 (b) of C/AS2 of the NZBC.

Refer to Fire and Acoustic Design Manual by James Hardie for construction details.

### 4.8 Resistance to Moisture/Rotting

Axon™ Panel has demonstrated resistance to permanent moisture induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Heat Rain (Clause 6.5).
- Water Permeability (Clause 8.2.2).
- Warm Water (Clause 8.2.4).
- Soak Dry (Clause 8.2.5).

## 4.9 Fire Rated Walls

Axon™ Panel when fixed to timber cavity battens to external walls can achieve fire ratings up to 60/60/60 to comply with C/AS1 of the NZBC, when the walls are constructed in accordance with the current Fire and Acoustic Design Manual by James Hardie.

Axon™ Panel must be fixed at 150mm centres to the entire frame. Therefore top/bottom plate and nogs require suitable 150mm sloped cavity packers for the panel fixings.

Axon™ Panel are suitable for use where 'non-combustible' materials are required on walls close to a boundary.

## 4.10 Alpine Regions

In regions subject to freeze/thaw conditions, Axon™ Panel must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions must be protected where snow drifts over winter are expected.

The Axon™ Panel has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

## 4.11 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 the NZS 3604. All framing shall be made flush.

## 4.12 Cavity Construction

Buildings with a risk score of 7-20 calculated in accordance with Table 3 of Acceptable Solution E2/AS1 of the NZBC, require Axon™ Panel to be installed on a cavity. The battens provide airspace between the frame and the panel and are considered a “packer” only in this specification.



# 5 Safe Working Practices

## WARNING - DO NOT BREATHE DUST AND CUT ONLY IN WELL VENTILATED AREA

Hardie™ fibre cement 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/NZS 1716 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](http://www.jameshardie.co.nz).

**FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.**

### 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 Hardie™ Blade name 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.

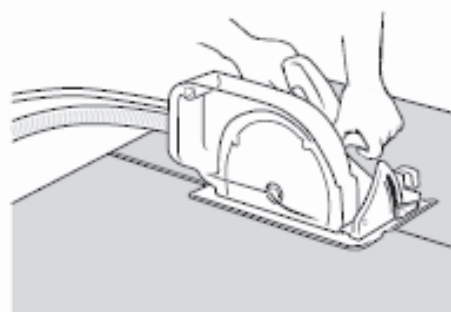
### When cutting Axon™ Panels:

- ✓ 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 Hardie™ Blade 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

## Working Instructions

### Hardie™ Blade Saw Blade

The Hardie™ Blade Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of 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.



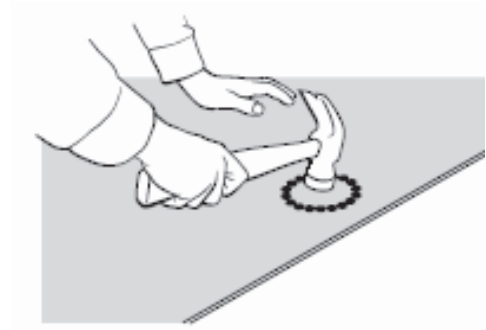
## Hole-Forming

### 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

- ✓ Hardie™ fibre cement products should be off-loaded carefully by hand or by forklift
- ✓ Hardie™ fibre cement products should not be rolled or dumped off a truck during the delivery to the jobsite

#### Storage

#### Hardie™ fibre cement 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

#### Hardie™ fibre cement 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 Axon™ Panel

- ✓ Carry with two people
- ✓ Hold near each end and on edge
- ✓ Exercise care when handling sheet products to avoid damaging the edges/corners

# 6 Framing

## 6.1 General

Axon™ Panels can be installed to timber-framed or steel-framed structures. Fixing to any other framing material is subject to a specific engineering design.

- Stud spacing must not exceed 600mm centres.
- Nog/dwang spacing must not exceed 800mm centres when studs are at 600mm centres.

## 6.2 Timber Framing

### 6.2.1 Dimensions

A 90 x 45mm minimum framing size is required.

A minimum 70mm wide stud is required at panel edges for cavity construction using Hardie™ Flex nails.

### 6.2.2 Structural Grade

Timber grade used must be in accordance with timber grades specified in NZS 3604.

### 6.2.3 Durability

The external framing must be treated to a minimum H1.2 treatment. Refer to NZBC Acceptable Solution B2/AS1 'Durability' for further information about the durability requirements.

For timber treatment and allowable moisture content information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round Sawn Timber) for minimum timber treatment selection and treatment requirements.

Also refer to framing manufacturer's literature for further guidance on timber selection. Framing must be protected from moisture at site in accordance with the recommendation of framing manufacturer's.

**Note:** Refer to NZS 3602 for the allowable moisture contents in timber.

### 6.2.4 Frame Construction

The framing must fully support all panel edges. The framing must be rigid and not rely on the cladding panel for stability.

All timber framing sizes and set-out must comply with the NZS 3604 and as specified in this specification.

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.

## 6.3 Steel Framing

Steel framing must either be in accordance with NASH 'Light Steel Framed Buildings' standard or as per SED.

## 6.4 Cavity Construction Method

For cavity construction method the following framing is required:

- When studs are spaced at 600mm centres maximum, the nogs/dwangs must be provided at 800mm centres maximum.

- A minimum 70mm wide or 2 x 90 x 45mm stud is required at vertical panel joint.
- When studs are spaced at 400mm centres then the nogs/dwangs may be provided at 1200mm centres.

## 6.5 Special Framing Requirements

The following are special framing requirements for both timber and steel framing:

- Double studs are required at internal corners, refer to Figure 8.
- Double studs are required at each shiplap vertical joint. Refer to Figures 6 and 7.

# 7 Installation

## 7.1 Flexible Underlay or HomeRAB™ Pre-Cladding

Flexible underlay must be provided as per the requirements of the NZBC Acceptable Solution E2/AS1 'External Moisture' Table 23. The flexible underlay must be fixed in accordance with E2/AS1 and the underlay manufacturer's recommendations. Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC Acceptable Solution E2/AS1 Table 23. HomeRAB™ Pre-Cladding is suitable for use in these applications. It must be installed in accordance with HomeRAB™ Pre-Cladding and RAB™ Board installation manual.

## 7.2 RAB™ Board or a Rigid Air Barrier

In EH wind zone or for specific design wind zone and building height up to 10m, a rigid air barrier ie, RAB™ Board, must be used instead of flexible underlay. RAB™ Board is suitable to withstand wind pressures up to 4.5kPa.

To achieve the temporary weathertightness using HomeRAB™ Pre-Cladding or RAB™ Board, windows/doors can be temporarily installed. Refer to HomeRAB™ Pre-Cladding and RAB™ Board installation manual for information regarding its installation.

## 7.3 Vent Strip

The Hardie™ uPVC cavity vent strip must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. Hardie™ uPVC vent strip has an opening area of 1000mm<sup>2</sup>/m length.

## 7.4 Cavity Battens

The timber cavity battens must be minimum H3.1 treated in accordance with NZS 3640 (Chemical preservation of rough and sawn timber) to comply with the durability requirements of B2/AS1.

Cavity battens must comply with E2/AS1 and:

- Be minimum 18mm thick
- Be as wide as the width of studs

- Be provided at 300mm centres where studs are fixed at 600mm centres or alternatively refer to clause 4.5.
- Be fixed by the cladding fixings to the main framing over the flexible underlay. Therefore until claddings are fixed the battens only need to be fixed to framing by 40 x 2.8mm nails at 800mm centres.

## 7.5 Intermediate Support

Where studs are at 600mm centres an intermediate means of restraining the building underlay and insulation from bulging into the cavity shall be installed. An acceptable method to achieve this is using one of the following options:

- Intermediate cavity batten between the studs; or
- 75mm galvanized mesh; or
- Polypropylene tape at 300mm centres fixed horizontally and drawn taut

No intermediate supports/battens are required:

- When studs are spaced at 400mm centres; or
- When rigid air barriers instead of building underlays are used.

## 7.6 Flashings

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to panel installation. Please refer to moisture management requirements in Clause 2.5.

The flexible underlays must be appropriately incorporated with penetration and junction flashings. Materials must be lapped in such a way that water tracks down to the exterior on the face of flexible underlay.

The selected flashing materials must comply with the durability requirements of the NZBC. For information refer to Table 20 of E2/AS1.

## 7.7 Board and Batten Look

In order to achieve a board and batten look, Hardie™ Axent™ Trim can be fixed vertically over the panel surface.

The trims can be placed to suit the project's aesthetic requirements. However, we recommend a spacing of minimum 200mm centres is maintained between the trims.

Refer to Figures 11 - 15 for information.

# 8 Panel Fixing

## 8.1 General

Axon™ Panel must be kept dry and under cover whilst in storage or prior to/during the installation. Every endeavour must be made to keep framing dry once panel fixing commences. All site cut panel edges must be sealed prior to installation.

The shiplap jointing of panels is only suitable for vertical fixing of panels. Do not fix in the groove of Axon™ Panel. Minimum sheet width around window/door openings or corners etc. to be 200mm.

This specifications covers the fixing of Axon™ Panel to timber cavity battens fixed over timber frame. When fixing to a steel frame, Ask James Hardie 0800 808 868.



8.2 Fastener Durability

Fasteners must meet the minimum durability requirements of the NZBC. Refer to Table 1 for fixing materials requirements to be used in relation to the exposure conditions.

Table 4

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.

8.3 Fastener – Size and Layout

Axon™ Panel must be fixed to framing using the fixings as specified in Table 2 below and follow the edge distance required for nails as shown in the details. Fixings must be finished flush with the panel surface. Refer to Figures 6 and 7.

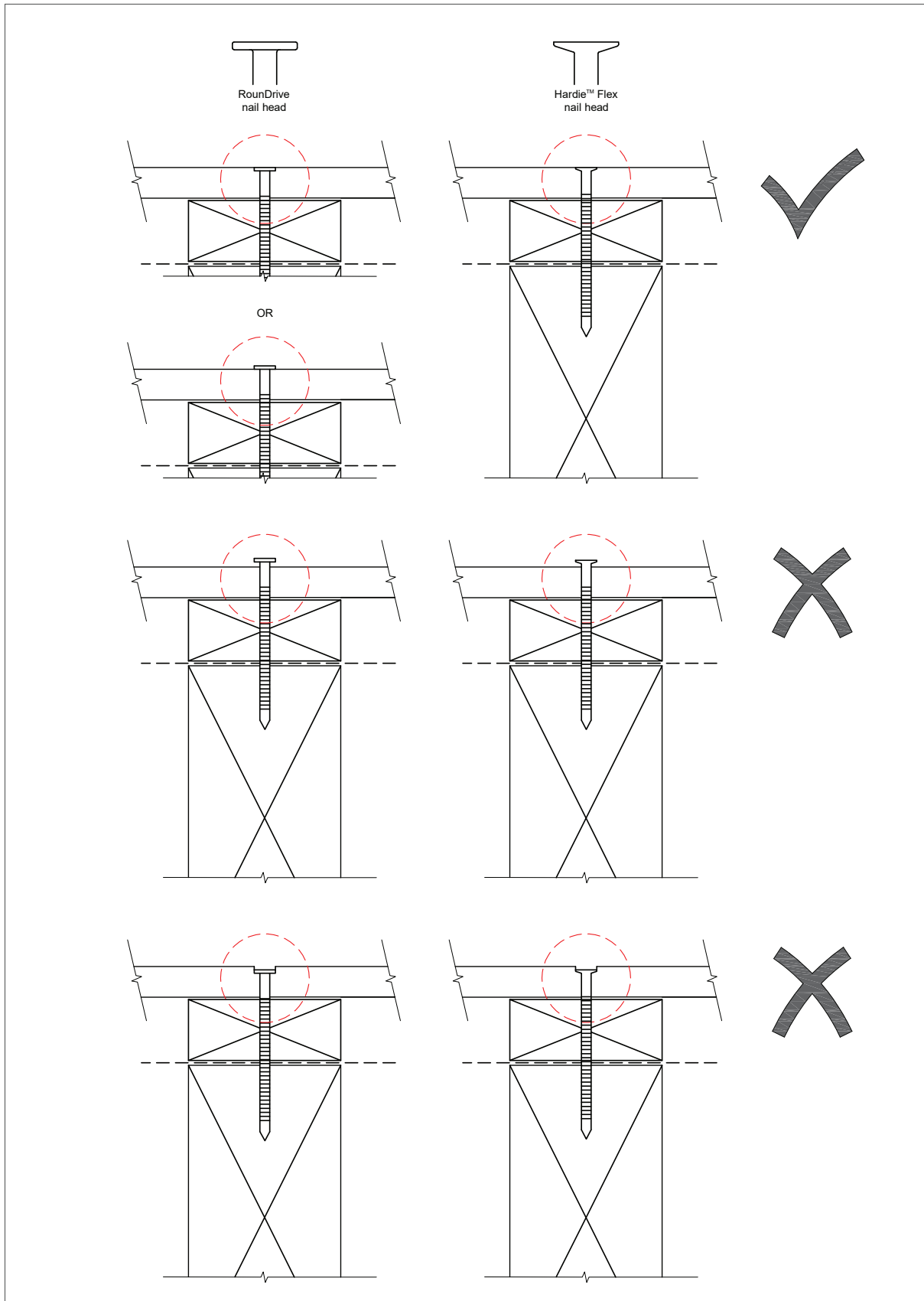
Table 5

Panel fixing	
Cavity construction over flexible underlay	
60 x 3.15mm Hardie™ Flex nails.	Fix at 200mm centres to all vertical framing. Stud width 70mm min required at vertical joint.
Cavity construction over HomeRAB™ Pre-Cladding or RAB™ Board	
75 x 3.15mm Hardie™ Flex nails.	Fix at 200mm centres to all vertical framing. Stud width 70mm min required at vertical joint.

For other fixing options Ask James Hardie on 0800 808 868.

- Special fixing arrangements are required for fire-resistance rated wall systems. Fixings are 150 around the perimeter and to nogs and studs, therefore small battens are required on nogs and plates. For more information Ask James Hardie on 0800 808 868.
- When studs spaced at 400mm centres using Axon™ Panel 400mm Grooved, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.
- When fixing the panels using nail guns, refer to the nail gun manufacturer for information about nails and the type of nail gun to be used.

**Note:** Do not use ‘D’ head nails.



## 8.4 Panel Layout

All panel edges must be supported by the framing. The shiplap joint must be formed vertically. The framing centres must be checked before the panel installation. Refer to Figure 3.

## 8.9 Jointing

Axon™ Panel are fixed to form a shiplap joint at vertical edges. The panels have factory made edges to suit this jointing.

### 8.9.1 Vertical Joint

Axon™ Panels are shiplap jointed keeping a gap of 1-2mm between the panels. A 50mm wide 3259 Inseal sealing tape is used under the joint. A flexible sealant must be applied to the full length of the joint before the panels are jointed. The edge distance for a Hardie™ Flex nail must be 18mm min. Refer to Figures 6 and 7.

### 8.9.2 Horizontal Joint

At floor joist levels a horizontal joint must be provided to accommodate the movement resulting from timber joist shrinkage and settlement. A Hardie™ 9mm aluminium horizontal 'h' mould or a Hardie™ 9mm aluminium angle 't' socket is used to form a horizontal joint. Use the respective aluminium 'h' mould jointer or 't' socket jointer to cover over the butt joint of flashings. A purpose made metal 'Z' flashing could also be used to flash the horizontal joint. Refer to Figure 43.

### 8.9.3 External Corner

An aluminium radius or invert box corner flashing is used to form the external box corner. The site cut sheet edges are sealed before butting them into the box corner.

On a two storey construction the aluminium box corner is finished under the aluminium 'h' mould. A Hardie™ 9mm aluminium 'h' mould external corner must be used over the corner when in this situation. Refer to Figures 9 and 30.

### 8.9.4 Internal Corner

The internal corner is formed using the Hardie™ 9mm aluminium internal corner behind the panel. Refer to Figure 8.

### 8.9.5 Flashing Material Durability

Please refer to Table 20 of E2/AS1 of the NZBC regarding the durability requirements of various flashing materials.

# 9 Finishing

## 9.1 Preparation

Painting of Axon™ Panel is mandatory to meet the durability requirements of the NZBC and 15 year James Hardie product warranties. Axon™ Panel must be dry and free of any dust or grime before painting. The panels must be painted within 90 days of their installation. There is no restriction on the LRV of paint to be applied on the Axon™ Panel.

Dark paints can be used when using the aluminium flashings.

Panels are pre-primed and are suitable for site applied acrylic paints. Pre-finished panels can also be installed using exposed head fasteners.

In order to seal cut edges or sanded patches, Dulux® 1 Step, Resene® quick dry, Taubmans® Underproof Acrylic Primer Undercoat or a similar product should be applied. The primer should be compatible with the paint to be used.

For best aesthetic results a low sheen paint is recommended.

## 9.2 Coating

### 9.3.1 Paint

Axon™ Panel are supplied pre-primed. Panels must be painted within 90 days of installation. Use only quality exterior paints complying with AS 3730. Manufacturer's specification for the selected paint must be followed.

#### 9.2.1 Staining - Only for Axon™ Panel 133mm Grooved Grained

Stains containing linseed oil are specifically designed for wood and may not be suitable for fibre cement cladding products, primed or unprimed. Semi-transparent stains can vary in uniformity of appearance depending on method of application and conditions, requiring a high level of skill and craftsmanship to achieve a uniform appearance. Clear coats have not proven durable in exterior exposure and James Hardie considers them a maintenance item that may require application of a refurbishing sealer at regular intervals. James Hardie does not warrant the appearance and durability of the use of semi-transparent stains and clear coats.

For further information contact the stain manufacturers. Refer to Section 13 for stain manufacturer details.

#### 9.2.3 Roll on Texture - Only for Axon™ Panel Smooth

Axon™ Panel Smooth can be finished with rolled on texture acrylic texture coatings. Panels are supplied pre-primed and are ready for acrylic textures to be applied directly to it. Acrylic texture products are available in a range of textures that vary from fine finish to rough texture for a fast application on site. Refer to Dulux® or other similar texture coating suppliers for further information.

## 9.3 Sealants

All sealants used must comply with the relevant requirements of the NZBC. The application and usage must be in accordance with manufacturer's instructions. Check with sealant manufacturer prior to coating over sealants. Some sealant manufacturers do not recommend coating over their product.

# 10 Care and Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. 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. Refer to your paint manufacturer for wash down requirements and do not use a water blaster to wash down the cladding.
- Re-applying of exterior protective finishes if necessary. Always refer to your paint manufacturer for re-coating requirements.
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants that may provide a means of moisture entry beyond the exterior cladding.
- Cleaning out gutters, blocked pipes and overflows as required
- Pruning back vegetation that is close to or touching the building
- The clearance between the bottom edge of Axon™ Panel and the finished ground must always be maintained.

# 11 Details

The following generic details have been provided in this document for cavity construction methods.

Table 6

Panel fixing	
Description	Page
Figure 1: Cavity fixed typical framing setout	26
Figure 2: Cavity batten fixing setout	27
Figure 3: Cavity fixed typical panel fixing setout	28
Figure 4: Cavity fixed foundation detail	29
Figure 5: Cavity fixed enclosed deck detail	30
Figure 6: Axon™ Panel cavity shiplap joint	31
Figure 7: Axon™ Panel cavity shiplap joint	31
Figure 8: Cavity internal corner detail	32
Figure 9: Cavity external corner	33
Figure 10: Hardie™ Axent™ Trim™ at internal corner	33
Figure 11: Axent™ Trim™ at external corner	34
Figure 12: Hardie™ Axent™ Trim to Axon™ Panel at joint	35
Figure 13: Hardie™ Axent™ Trim to Axon™ Panel at non joint	36
Figure 14: Hardie™ Axent™ Trim to Axon™ Panel at non joint	37
Figure 15: Hardie™ Axent™ Trim fixing	38
Figure 16: Vertical sealant joint	39
Figure 17: Soffit detail	40
Figure 18: Nil soffit detail	41
Figure 19: Window head	42
Figure 20: Window sill	43
Figure 21: Window jamb	44
Figure 22: Window jamb with scribe	45
Figure 23: Cavity alternative head flashing termination against batten	46
Figure 24: Window head with facing	47
Figure 25: Window sill with planted sill	48
Figure 26: Window and door jamb with facing	49
Figure 27: Cavity horizontal joint detail	50
Figure 28: Horizontal joint in tall wall	51
Figure 29: Cavity aluminium 'H' mould jointer	52
Figure 30: Cavity corner at 'H' mould joint detail	53
Figure 31: Internal corner at 'H' mould joint detail	54
Figure 32: Angle 'T' socket joint at floor joist	55
Figure 33: Horizontal joint in tall wall	56
Figure 34: Angle 'T' horizontal jointer	57
Figure 35: Angle 'T' external corner at 'T' mould joint	58



Figure 36: Internal corner at angle 'T' socket joint detail	59
Figure 37: Joining moulding	60
Figure 38: Cavity pipe penetration	61
Figure 39: h' mould joint at window head	62
Figure 40: Angle 'T' socket at window head	63
Figure 41: Horizontal flashing at window jamb	64
Figure 42: Angle 'T' socket butting window jamb	65
Figure 43: Drained flashing joint at floor joist	66
Figure 44: One piece apron flashing joint	67
Figure 45: Enclosed deck balustrade to wall junction aluminium internal corner	68
Figure 46: Enclosed deck balustrade to wall junction	69
Figure 47: Parapet flashing	70
Figure 48: Garage jamb	71
Figure 49: Garage head	72
Figure 50: junction between panel and fascia board	73
Figure 51: Enclosed roof to wall intersection	74

Figure 1: Cavity fixed typical framing setout

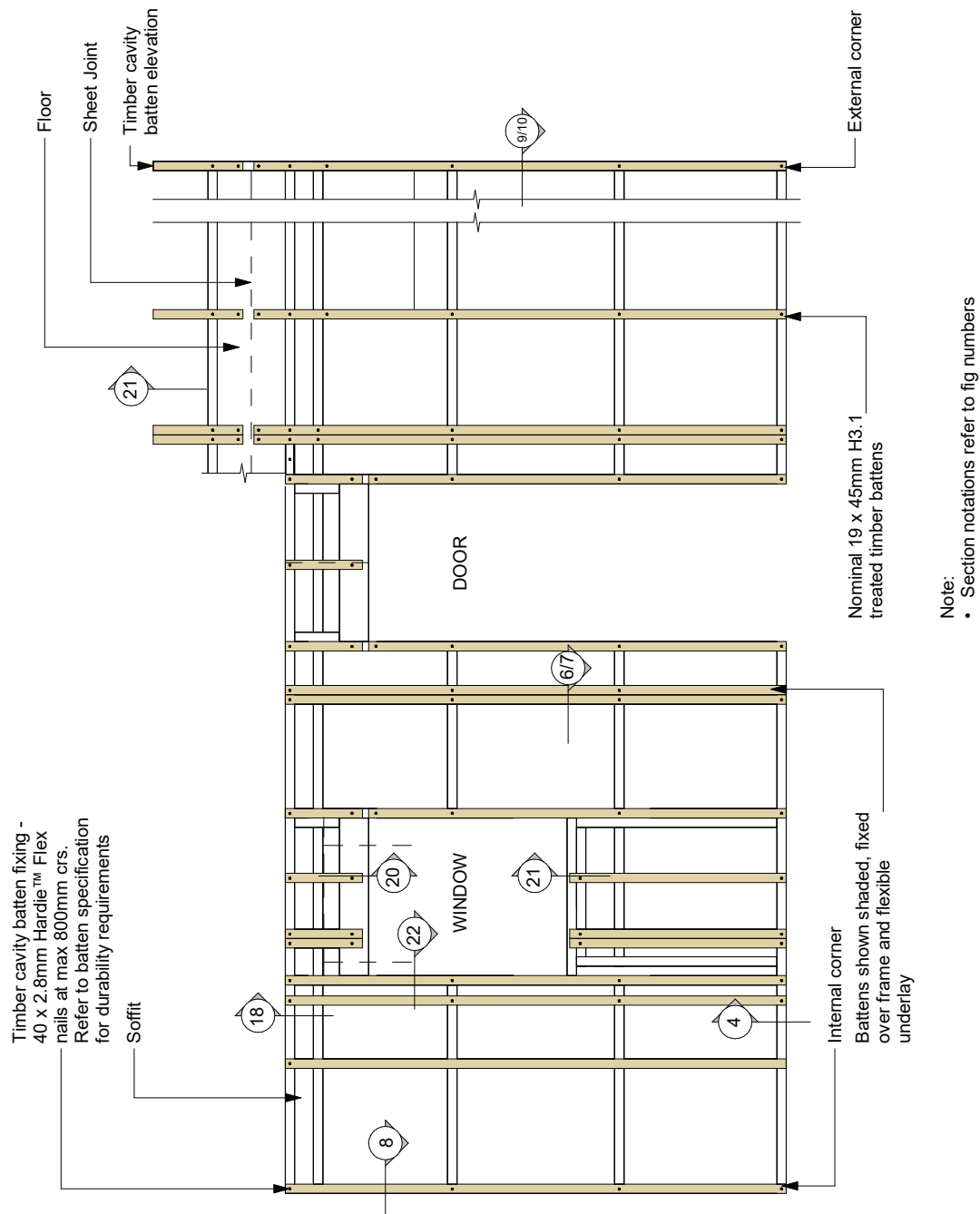
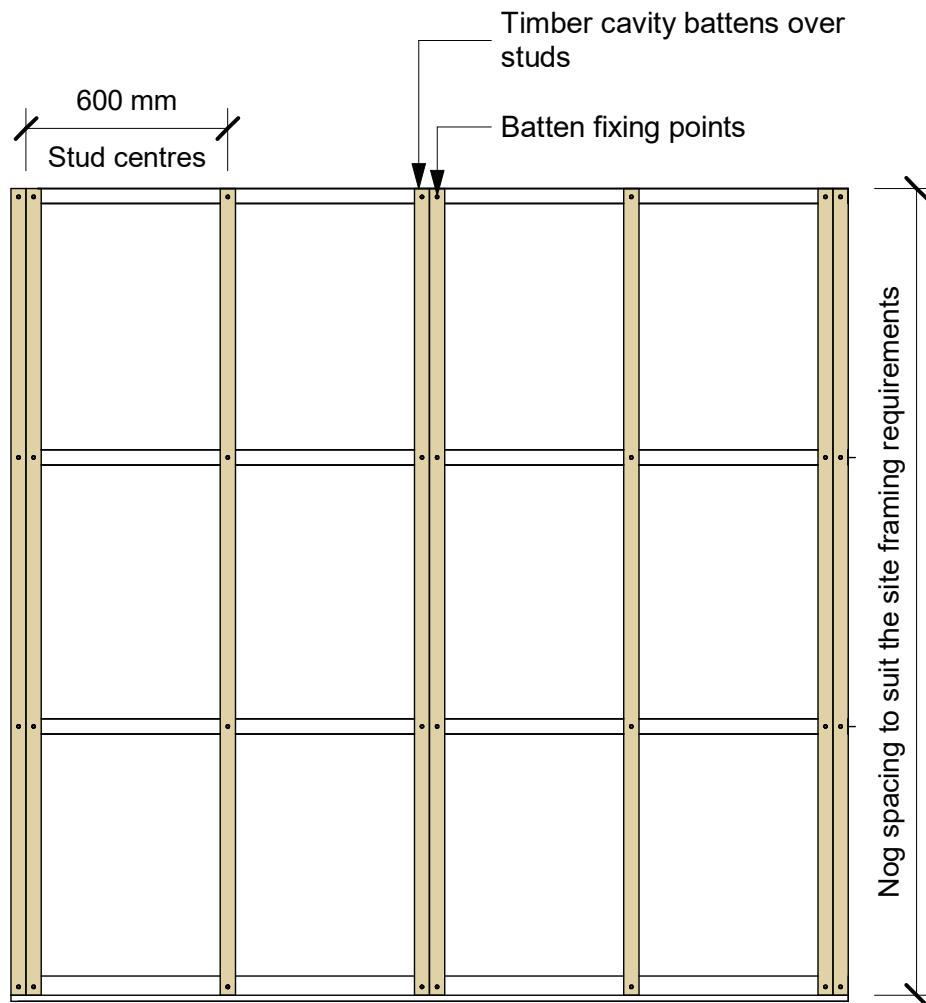


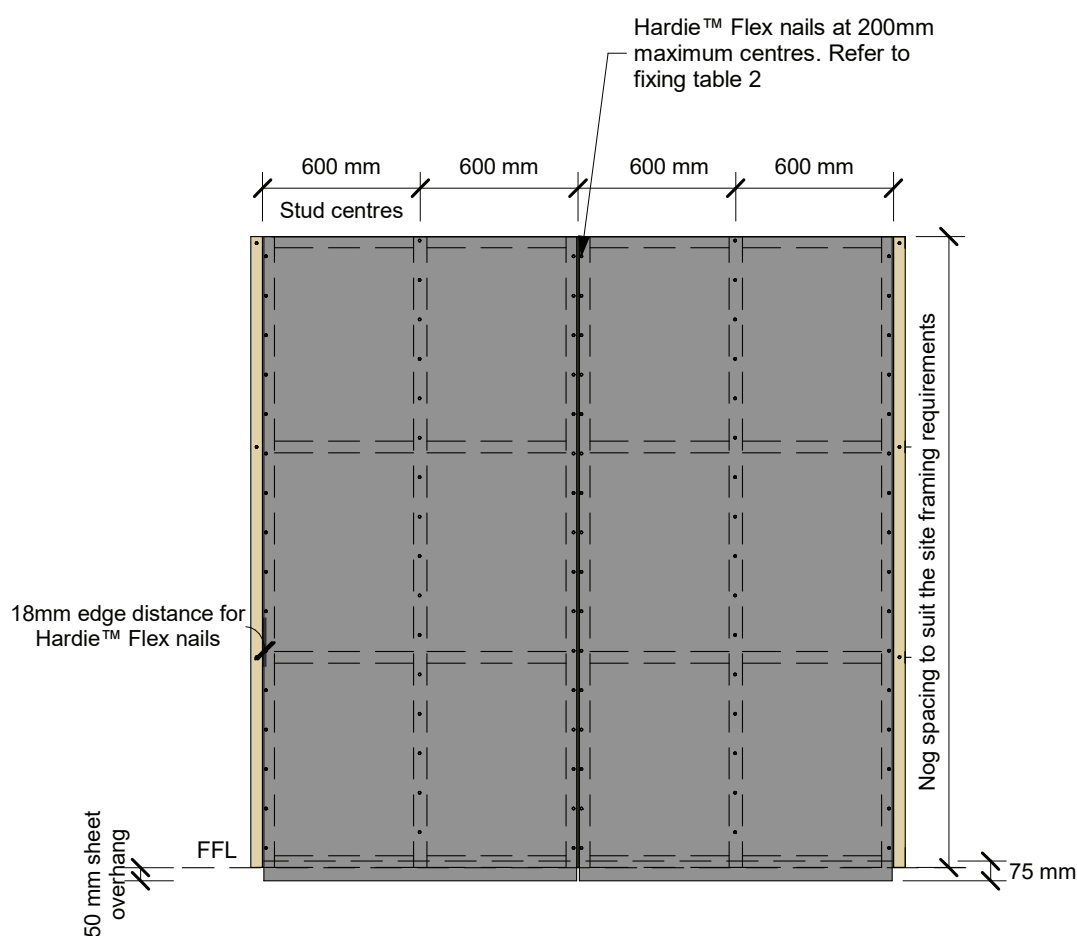
Figure 2: Cavity batten fixing setout



Note:

- Check Figure 6 and 7 for framing and batten requirements for vertical joint
- For fire rated wall systems by James Hardie nog spacing must be 800mm centres maximum
- For fire resistance rated wall systems, Axon™ Panel must be fixed at 150mm centres to the entire frame. Therefore top/bottom plate and nogs require suitable 150mm sloped cavity packers for the panel fixings

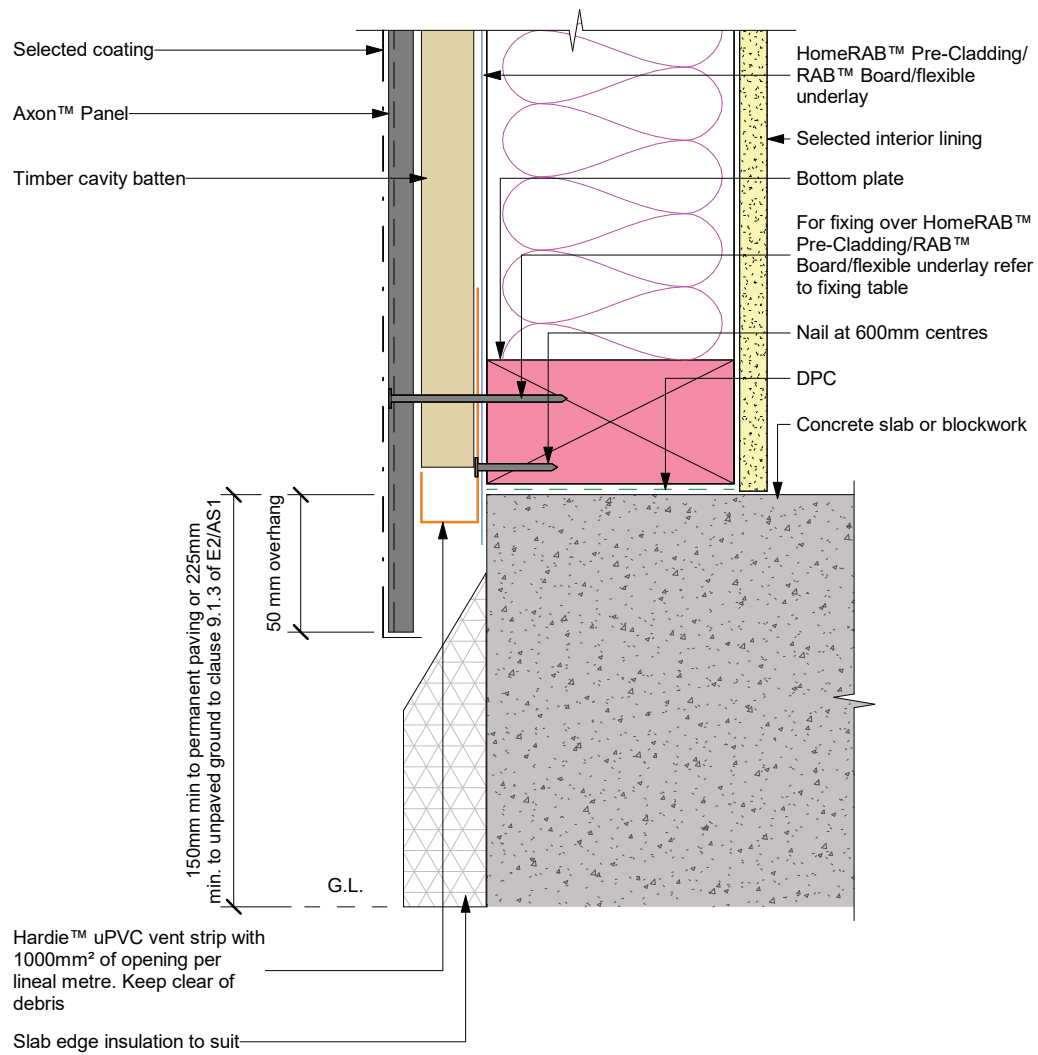
Figure 3: Cavity fixed typical panel fixing setout



Note:

- When studs spaced at 400mm centres using Axon™ Panel Grooved 400, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.
- For fire rated wall systems by James Hardie nog spacing must be 800mm centres maximum
- For fire resistance rated wall systems, Axon™ Panel must be fixed at 150mm centres to the entire frame. Therefore top/bottom plate and nogs require suitable 150mm sloped cavity packers for the panel fixings

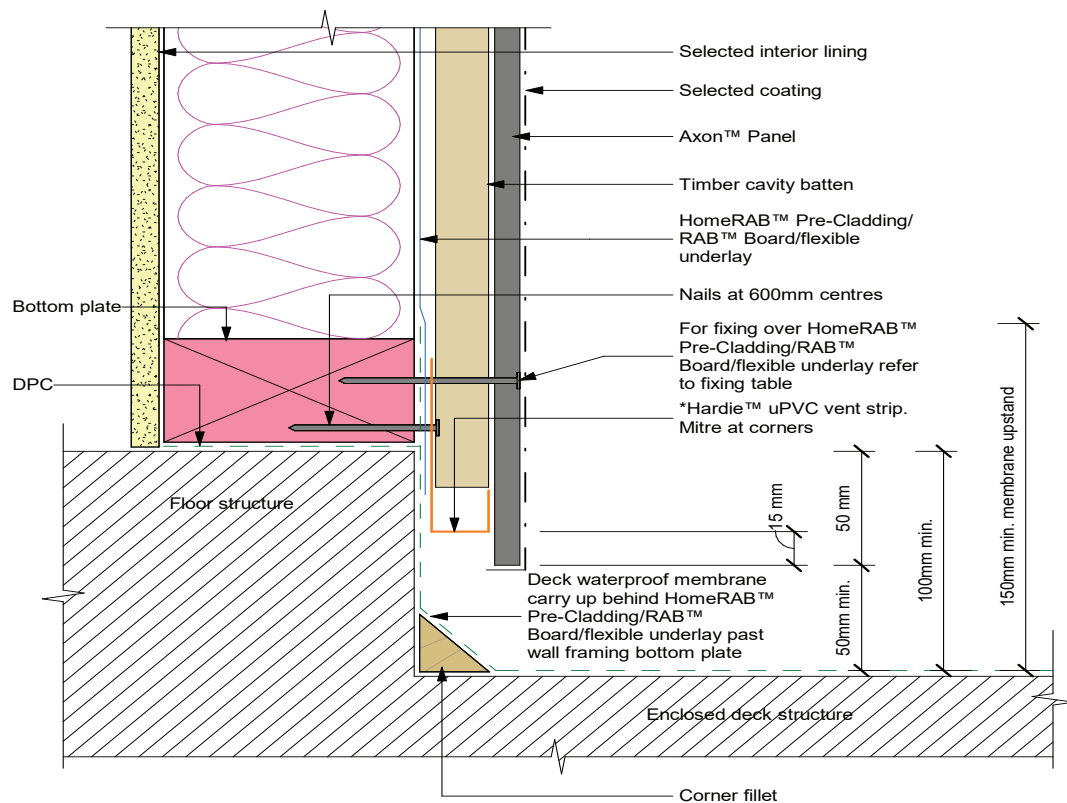
Figure 4: Cavity fixed foundation detail



Note:

- Site cut edges to be primed
- For uninsulated slab refer to jameshardie.co.nz
- Refer to section Surface Clearances for further information

Figure 5: Cavity fixed enclosed deck detail



\*Drain holes in Hardie™ uPVC vent strip to achieve the  
required ventilation openings of 1000mm<sup>2</sup> per lineal metre



Figure 6: Axon™ Panel cavity shiplap joint

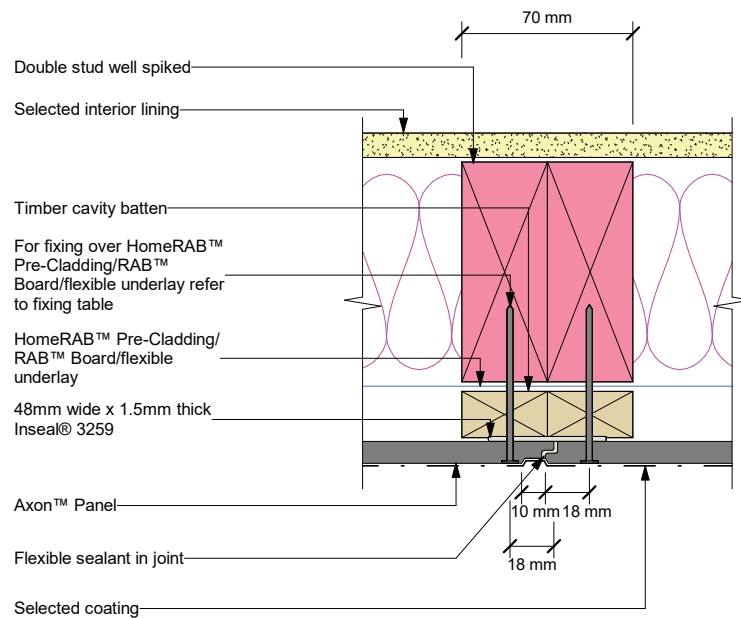


Figure 7: Axon™ Panel cavity shiplap joint

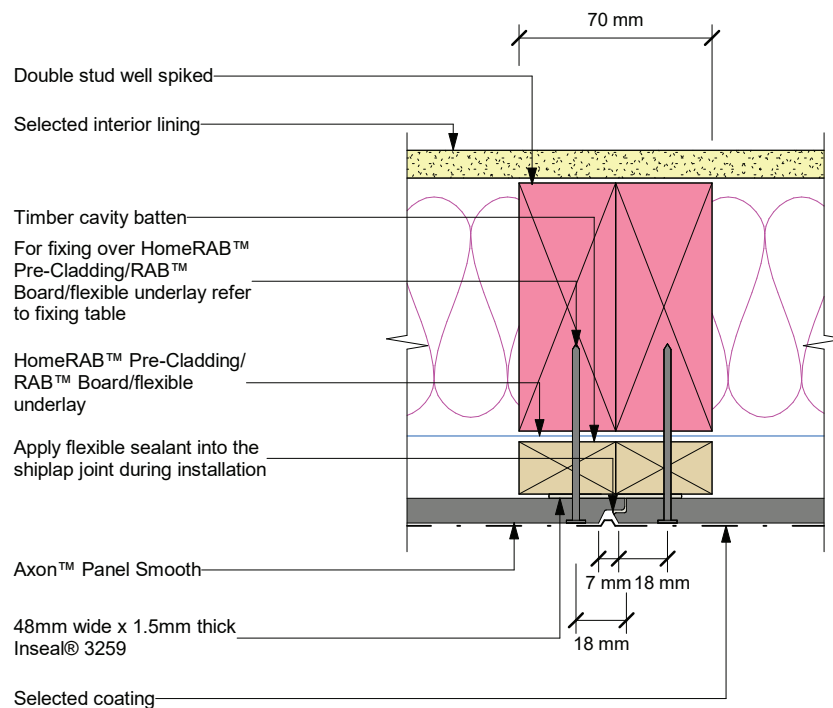


Figure 8: Cavity internal corner detail

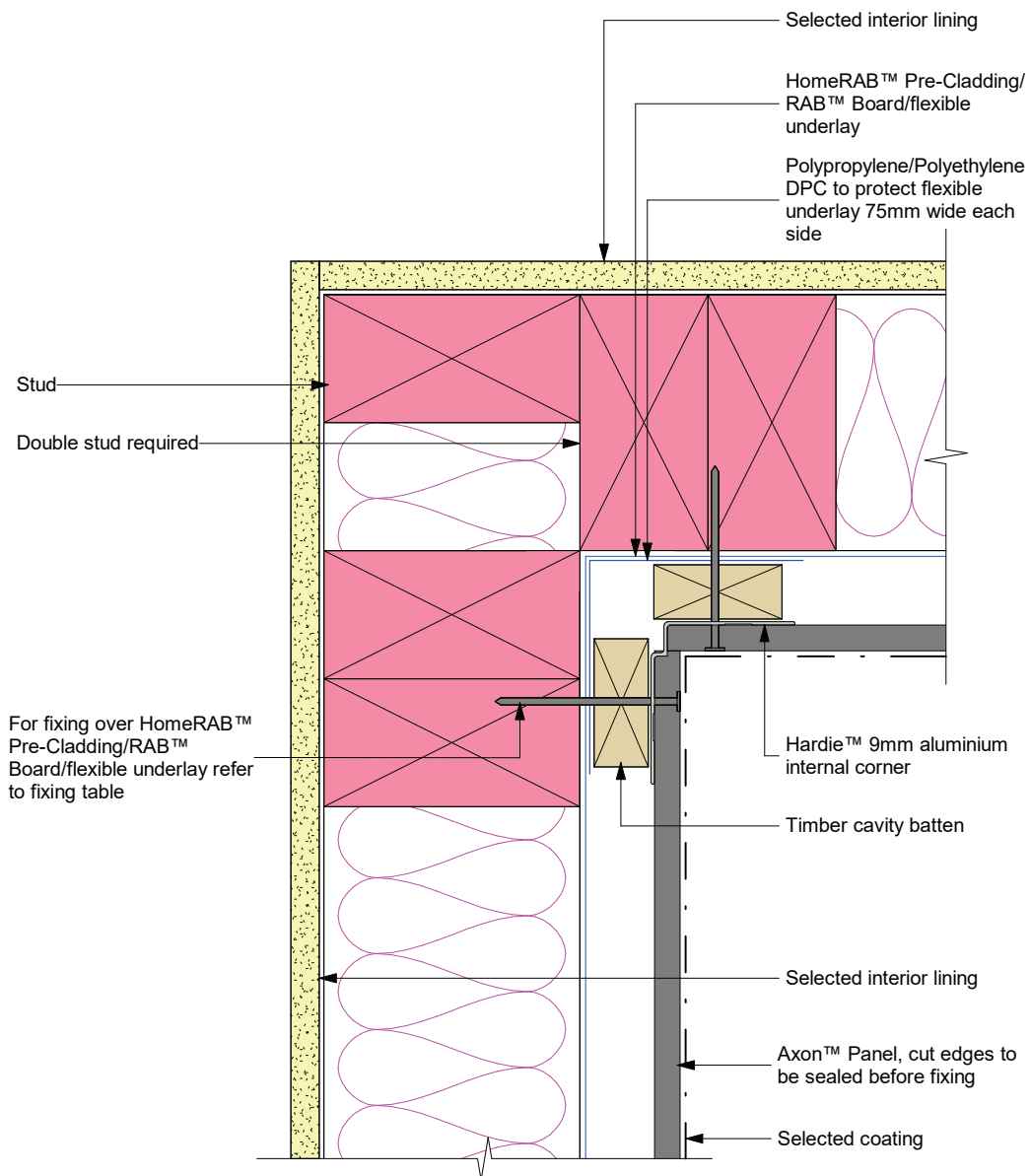
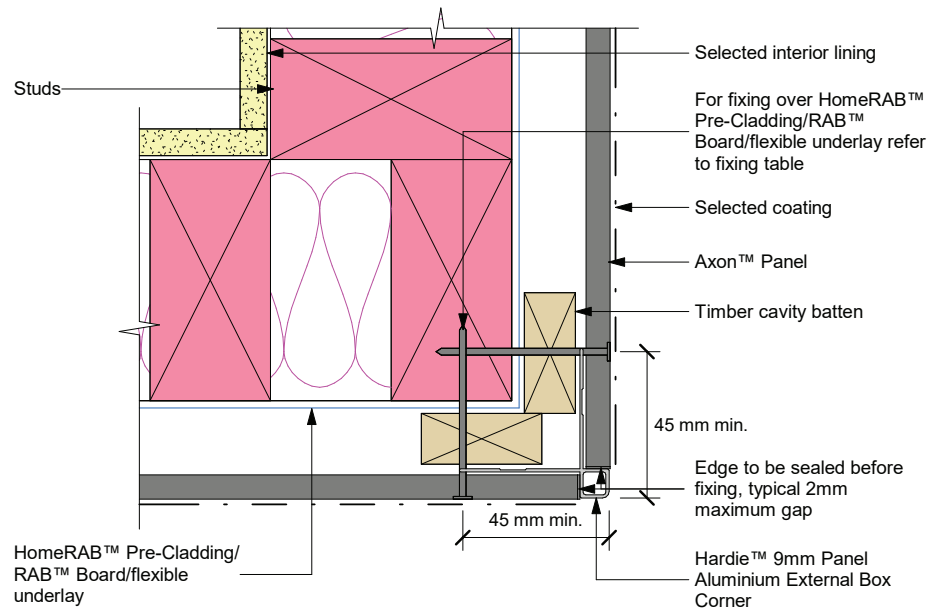


Figure 9: Cavity external corner



Note:

- Refer to Figure 30 for jointing with 'h' mould

Figure 10: Hardie™ Axent™ Trim™ at internal corner

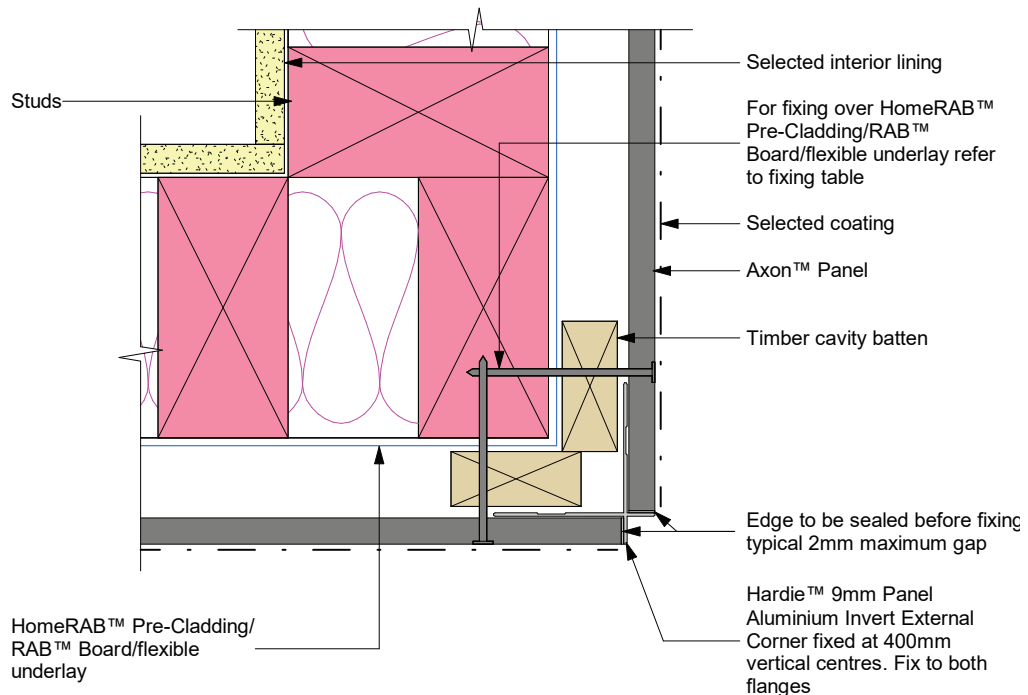


Figure 11: Axent™ Trim™ at external corner

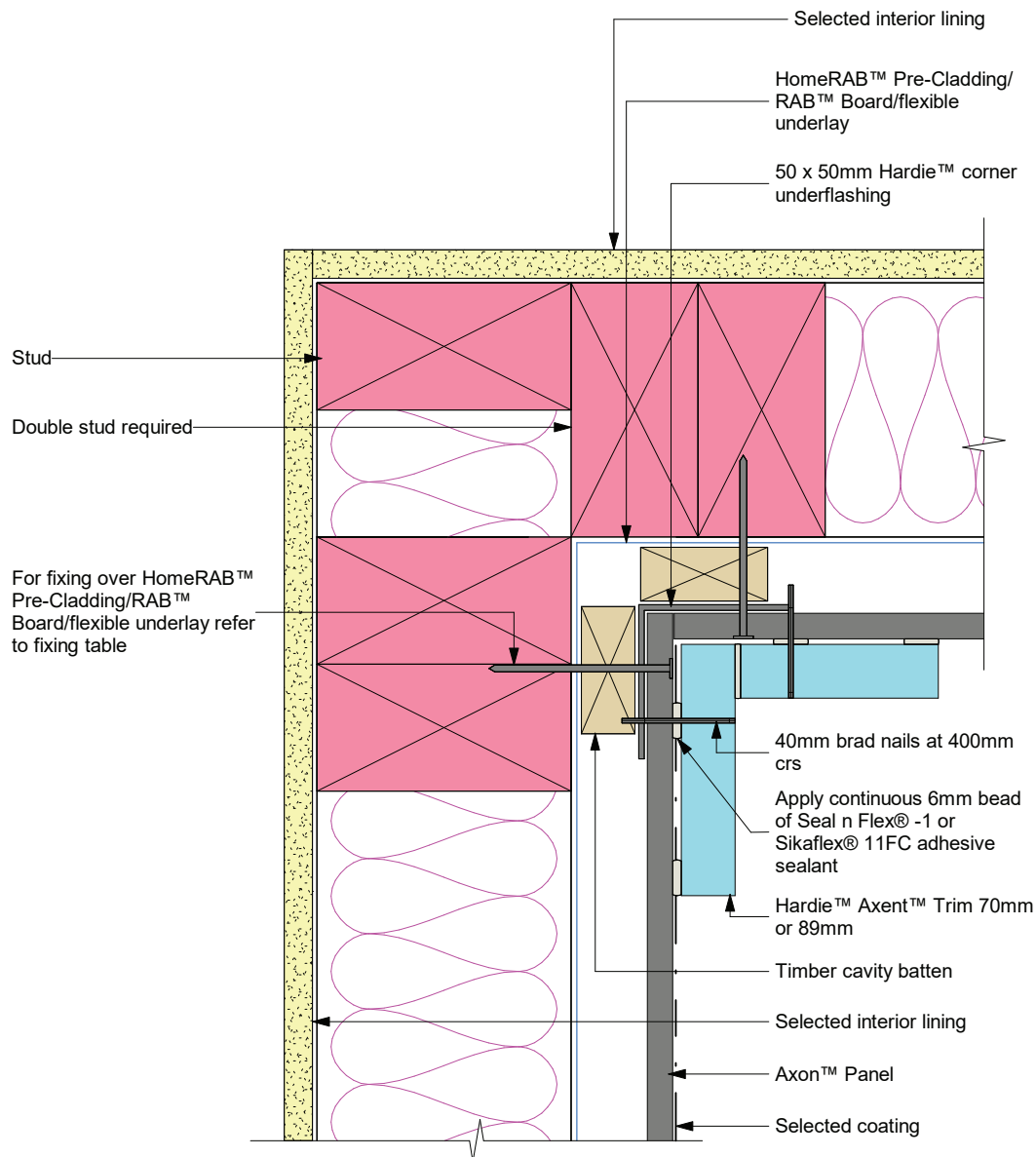


Figure 12: Hardie™ Axent™ Trim to Axon™ Panel at joint

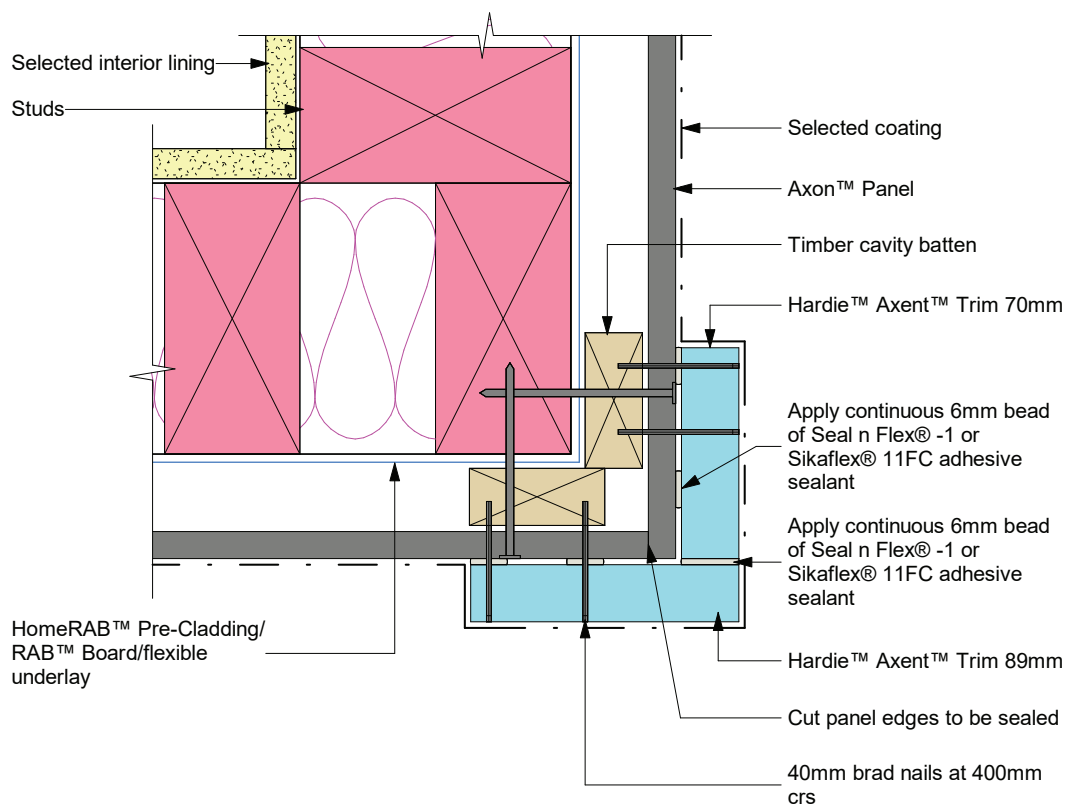


Figure 13: Hardie™ Axent™ Trim to Axon™ Panel at non joint

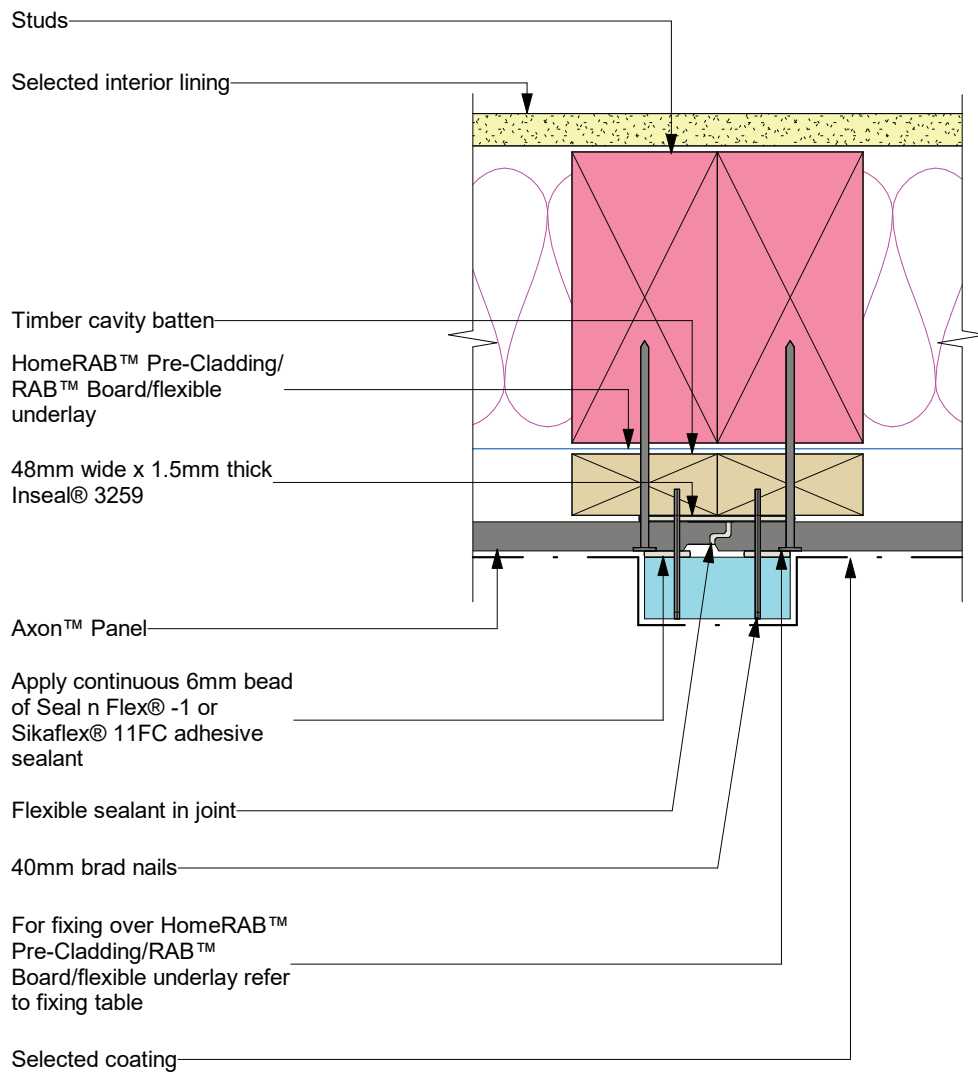
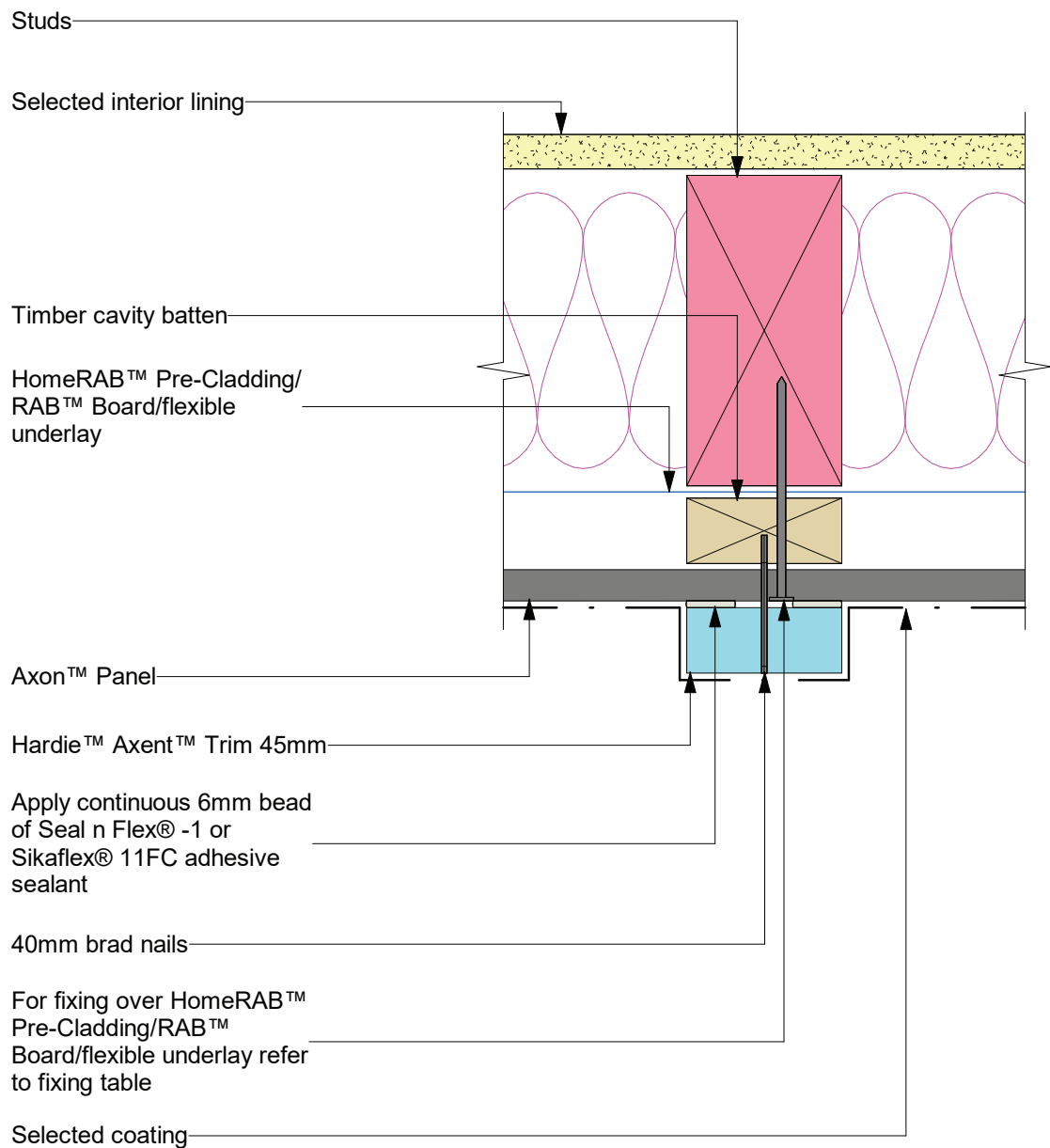




Figure 14: Hardie™ Axent™ Trim to Axon™ Panel at non joint



Note:

- \* Ensure that the required edge distance is maintained when fixing.
- \* Seal cut edges with a primer compatible with final coatings.

Figure 15: Hardie™ Axent™ Trim fixing

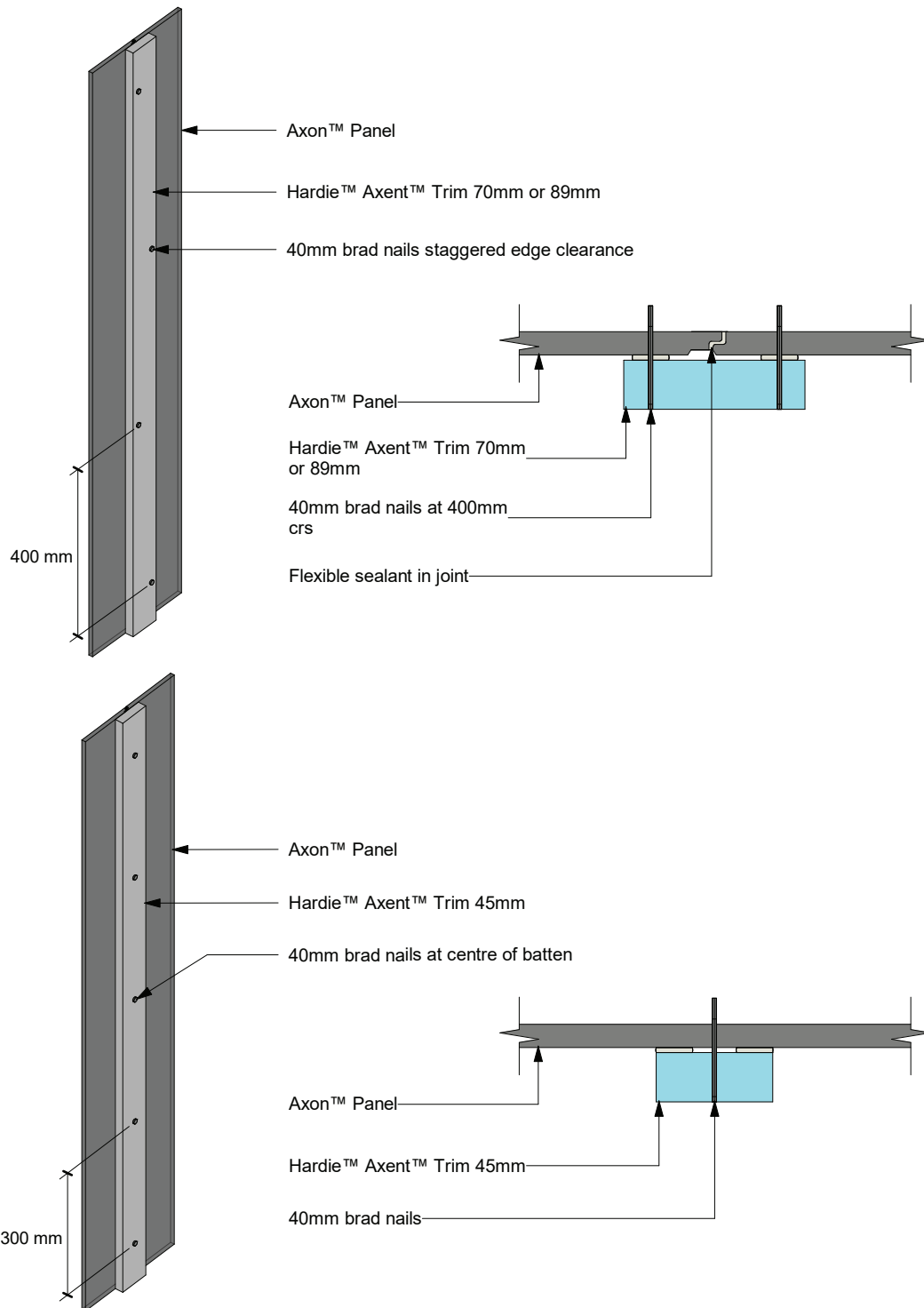
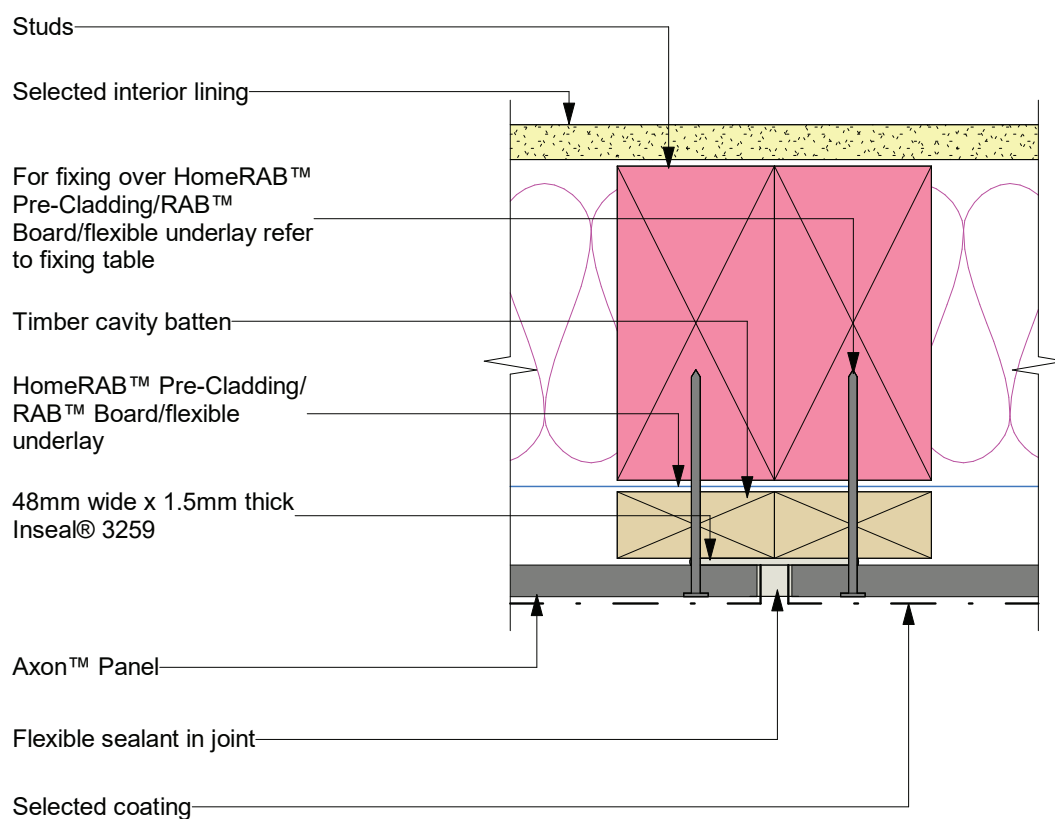


Figure 16: Vertical sealant joint

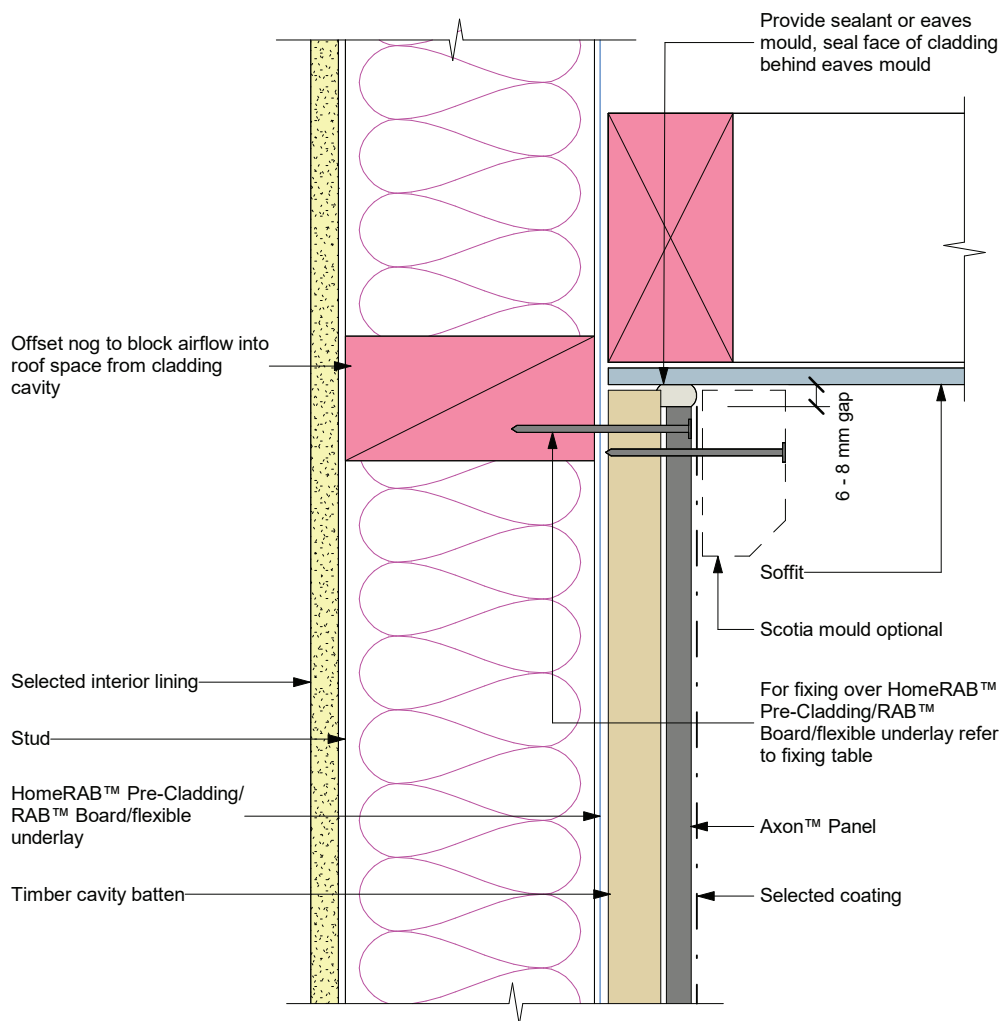


**Note:**

- \* Ensure that the required edge distance is maintained when fixing.
- \* Seal cut edges with a primer compatible with final coatings.

**For use ONLY where manufactured edge jointing not possible for build ie small window in full sheet**

Figure 17: Soffit detail



Note: Site cut edges to be primed.  
Ensure cavity does not vent into roof  
space. Refer to E2/AS1 clause 9.1.8.2

**Figure 18: Nil soffit detail**

Continuous packer behind fascia board to close off top of cavity

50 mm

Fascia board 50 mm min cover to Axon™ Panel

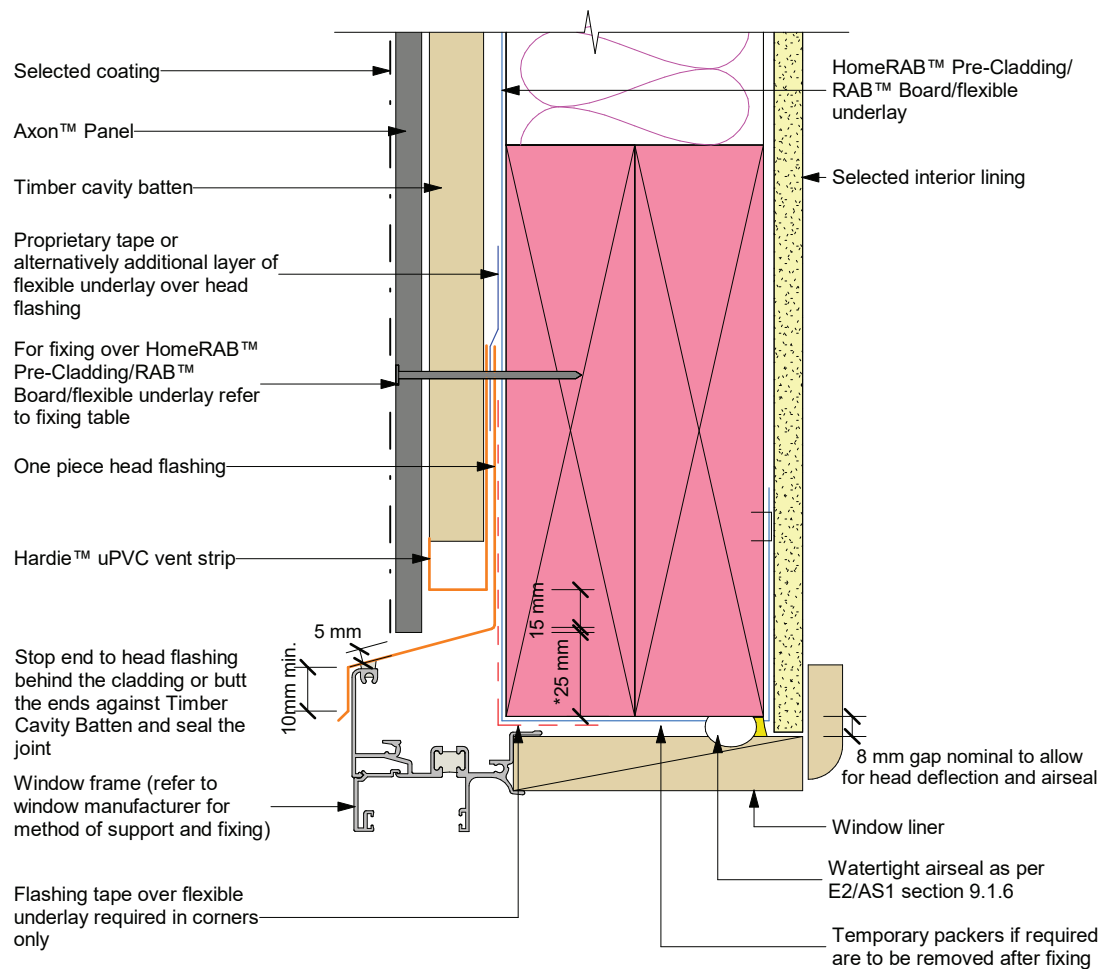
For fixing over HomeRAB™ Pre-Cladding/RAB™ Board/flexible underlay refer to fixing table

Hardie™ horizontal cavity batten

HomeRAB™ Pre-Cladding/RAB™ Board/flexible underlay

Axon™ Panel

Figure 19: Window head

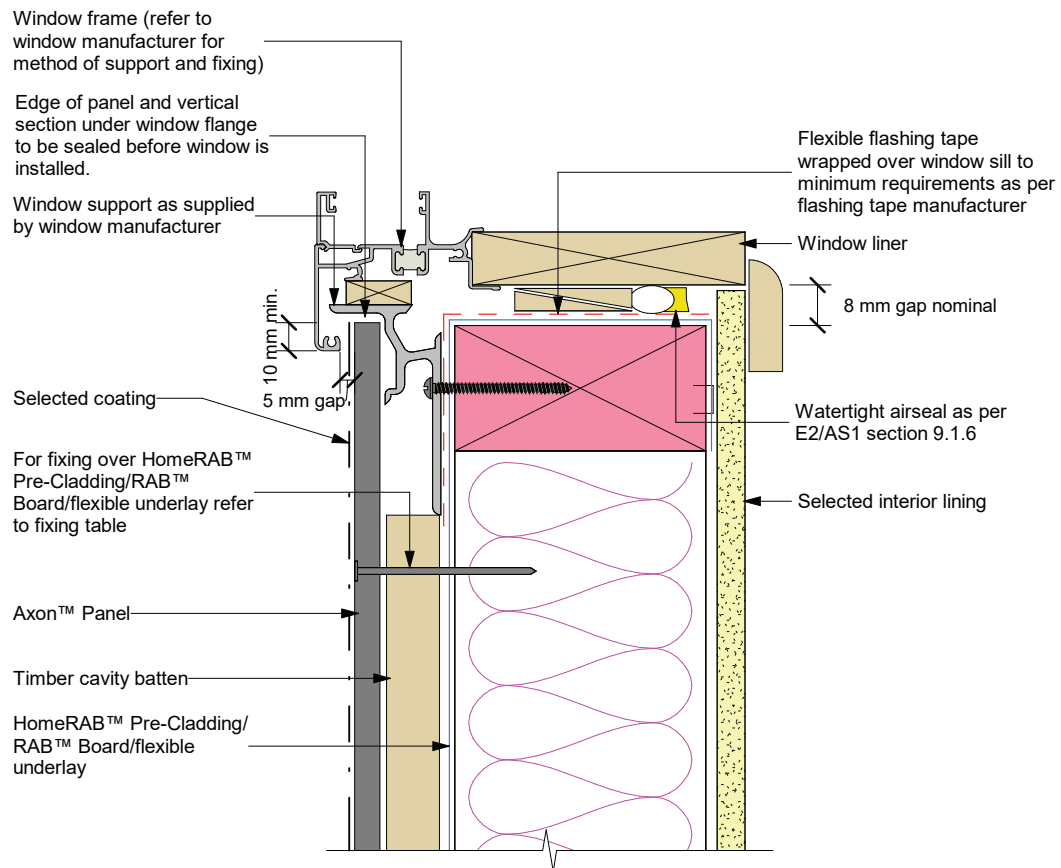


Note:

- \* When HomeRAB™ Pre-Cladding/RAB™ Board is used flashing tape to be applied to the entire window opening.
- \* Also refer to Figure 116 NZBC clause E2/AS1 for head and jamb details
- \* Sealant must be applied between head flashing and window flange VH and EH wind zones and SED wind pressures
- \* Alternatively, the head flashing can be formed with stop ends as per E2/AS1



Figure 20: Window sill

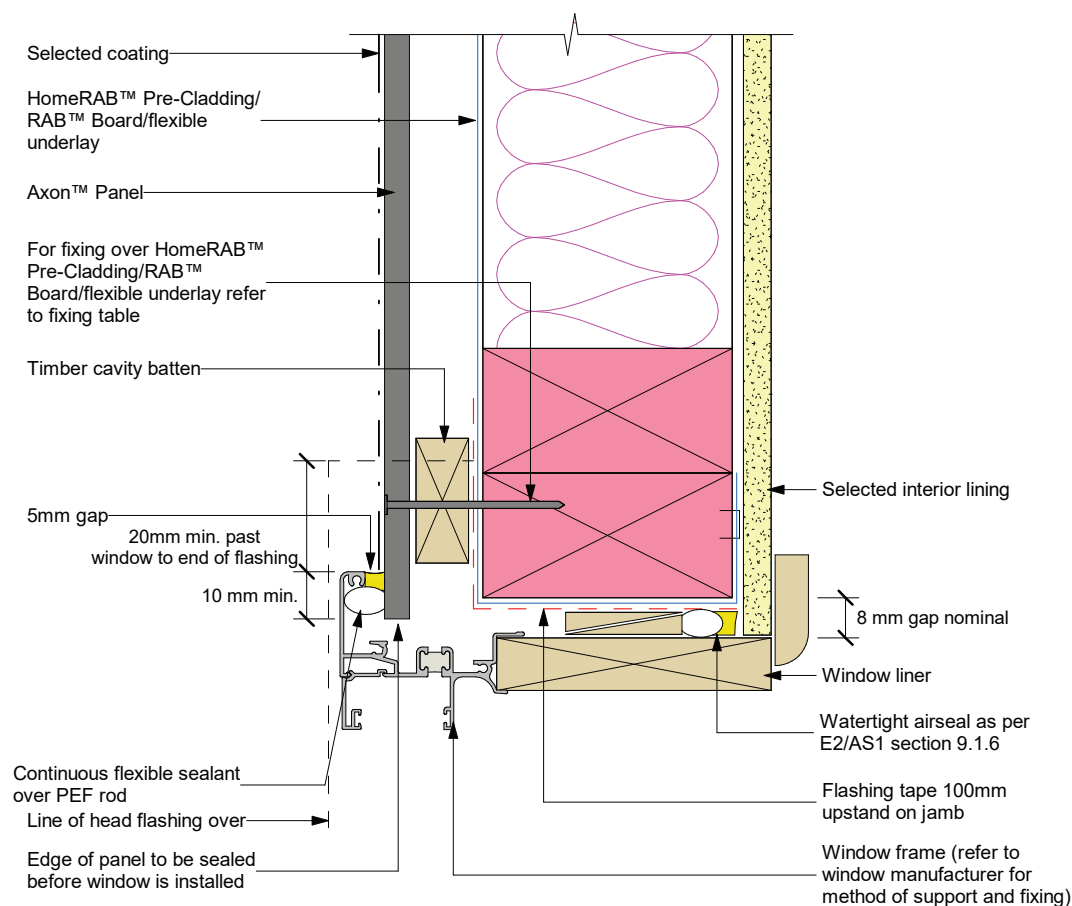


General notes for materials selection

- \* Flexible underlay must comply with acceptable solution E2/AS1.
- \* Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.
- \* When HomeRAB™ Pre-Cladding/ RAB™ Board are used flashing tape to be applied to the entire opening.

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

Figure 21: Window jamb



Note: When HomeRAB™ Pre-Cladding/RAB™ Board is used flashing tape to be applied to the entire window opening.

Selected coating

HomeRAB™ Pre-Cladding/  
RAB™ Board/flexible  
underlay

Axon™ Panel

For fixing over HomeRAB™  
Pre-Cladding/RAB™  
Board/flexible underlay refer  
to fixing table

Timber cavity batten

20mm min. past  
scribe to end of flashing

10mm min.

Scribe sealed to cladding

Line of head flashing over

Selected interior lining

8 mm gap nominal

Window liner

Watertight airseal as per  
E2/AS1 section 9.1.6

Flashing tape 100mm  
upstand on jamb

Window frame (refer to  
window manufacturer for  
method of support and fixing)

Note: When HomeRAB™ Pre-Cladding/RAB™ Board is used  
flashing tape to be applied to the entire window opening.

Figure 23: Cavity alternative head flashing termination against batten

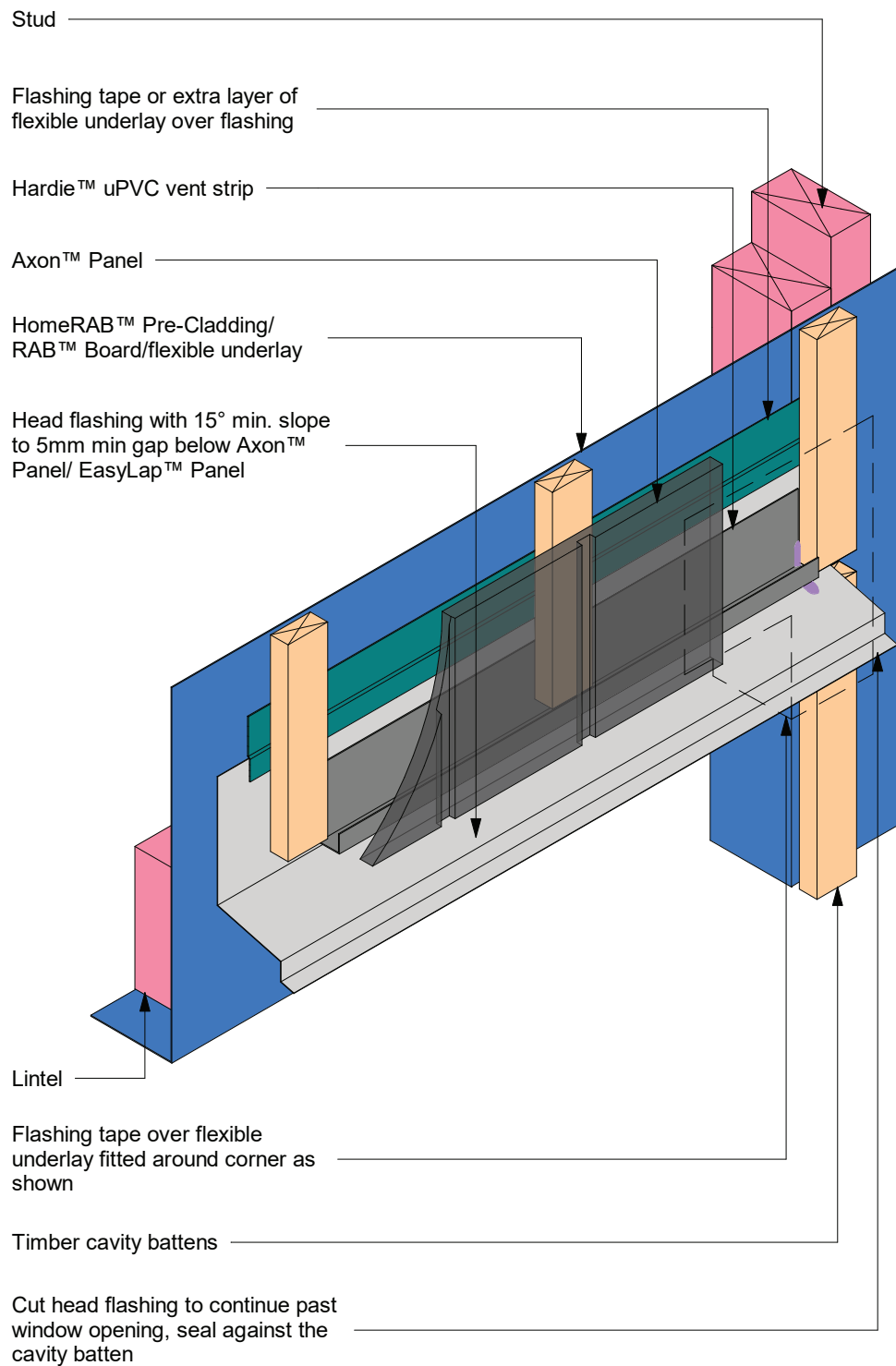
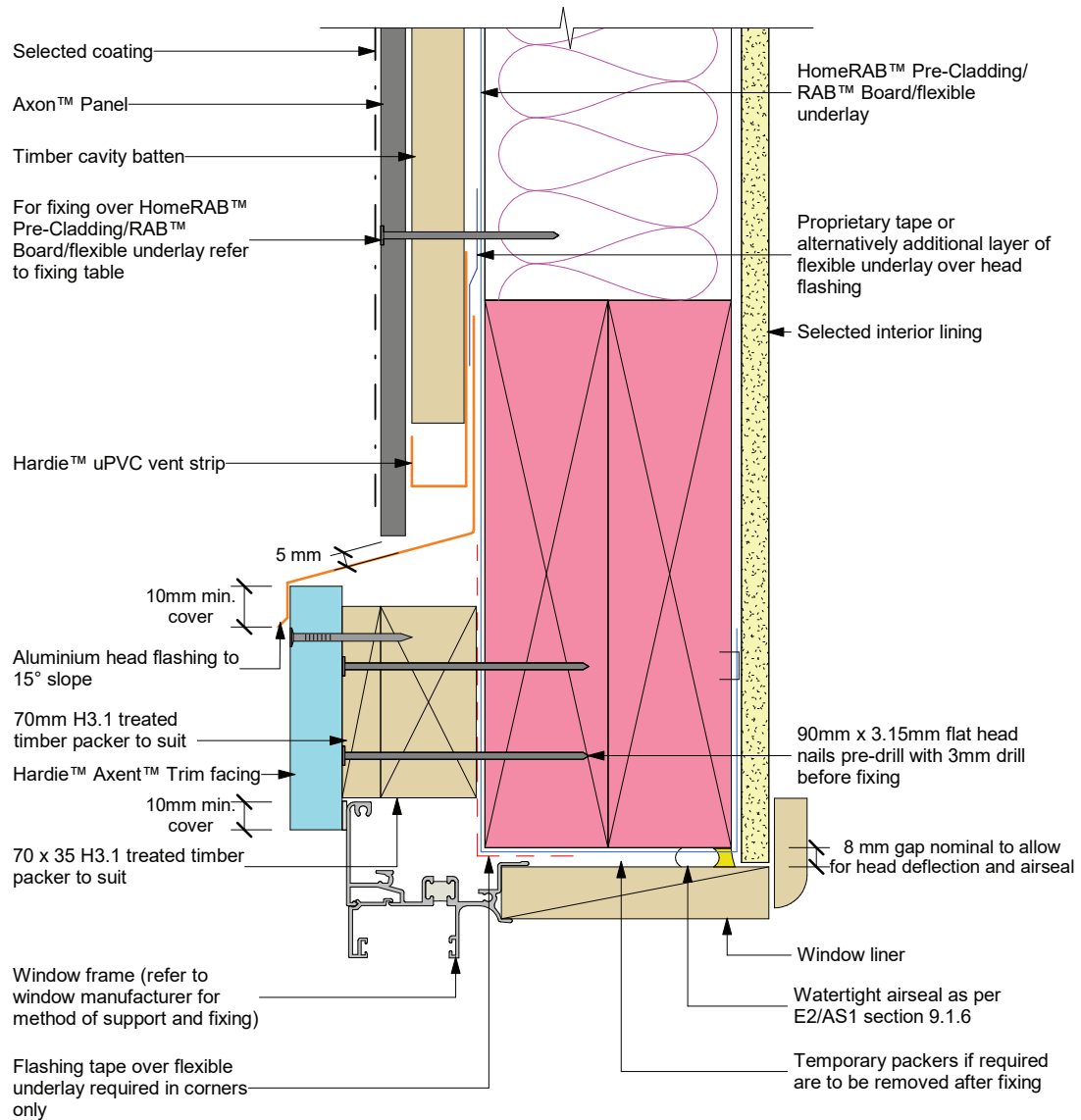


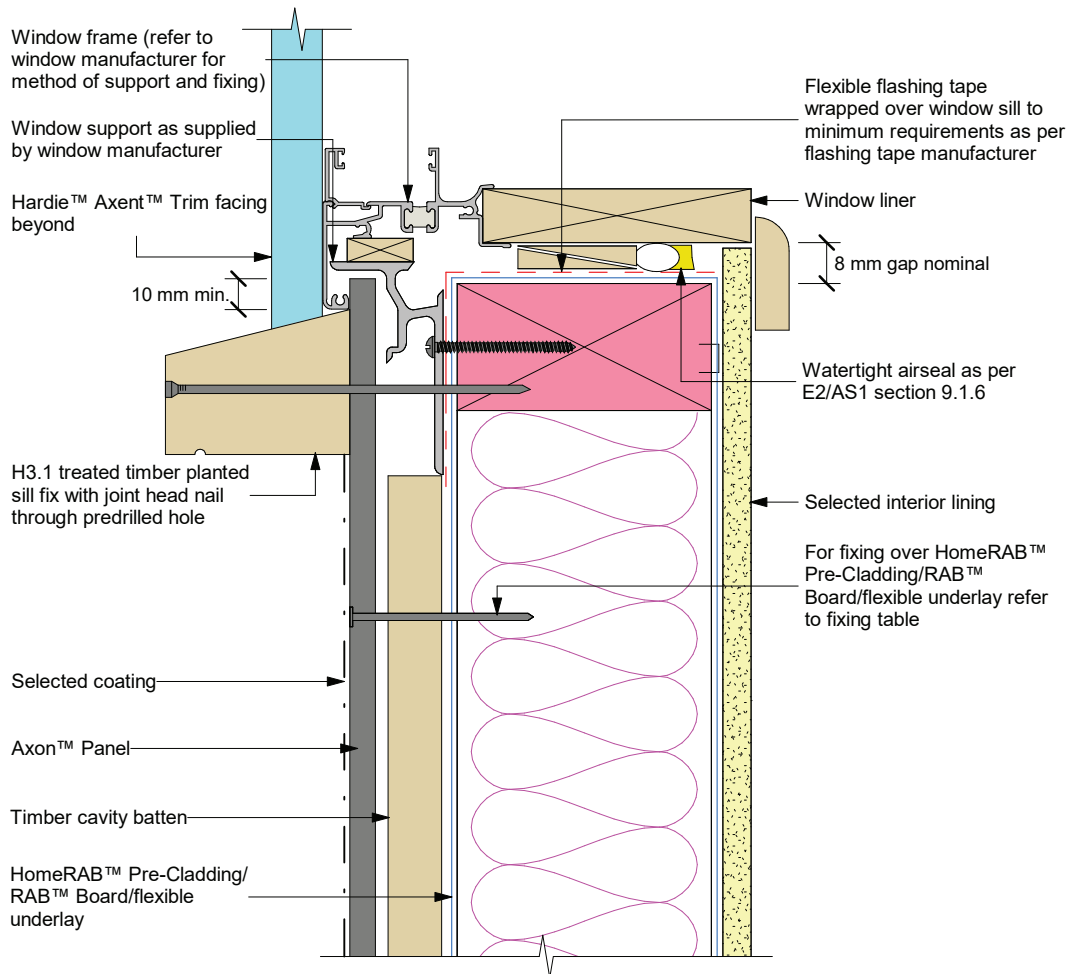
Figure 24: Window head with facing



Note:

- When HomeRAB™ Pre-Cladding/ RAB™ Board is used flashing tape to be applied to the entire window opening
- Sealant must be installed between Hardie™ Axent™ Trim and window flange in VH and EH wind zones and SED projects
- Alternatively, the head flashing can be formed with stop ends as per E2/AS1

Figure 25: Window sill with planted sill



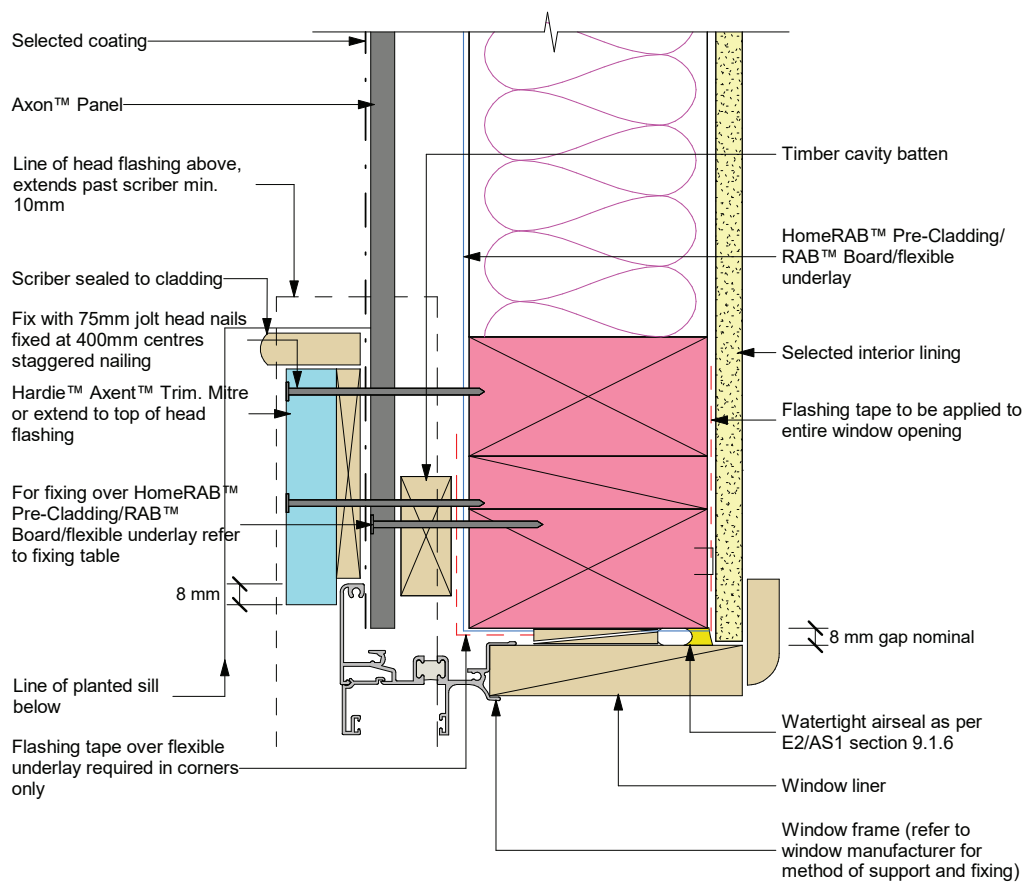
General notes for materials selection

- \* Flexible underlay must comply with acceptable solution E2/AS1.
- \* Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.
- \* When HomeRAB™ Pre-Cladding/RAB™ Board are used flashing tape to be applied to the entire opening.

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

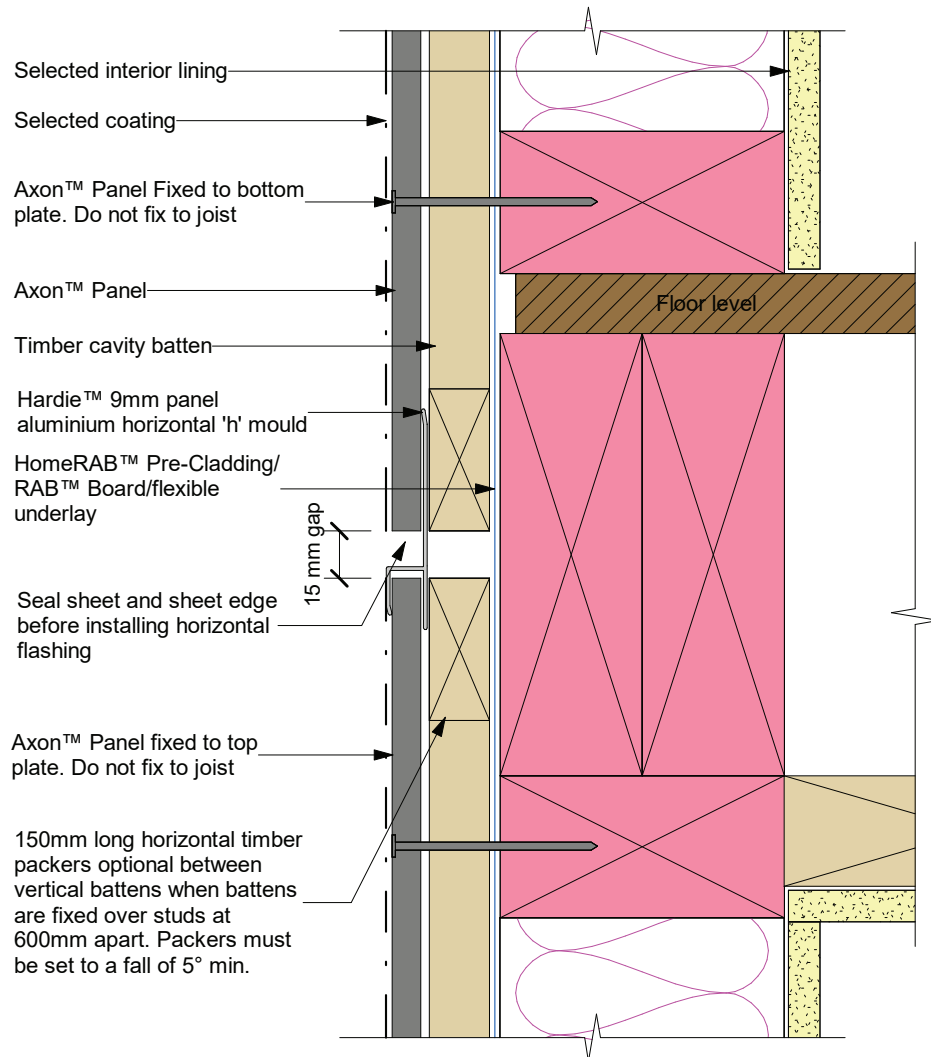


Figure 26: Window and door jamb with facing

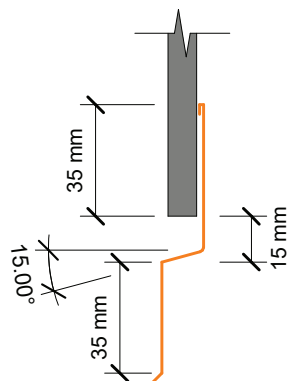


Note: When HomeRAB™ Pre-Cladding/RAB™ Board is used flashing tape to be applied to the entire window opening.

Figure 27: Cavity horizontal joint detail



Note: When 50 year durability is required refer Table 20 of NZBC E2/AS1 document.



Alternative Flashing Option

Figure 28: Horizontal joint in tall wall

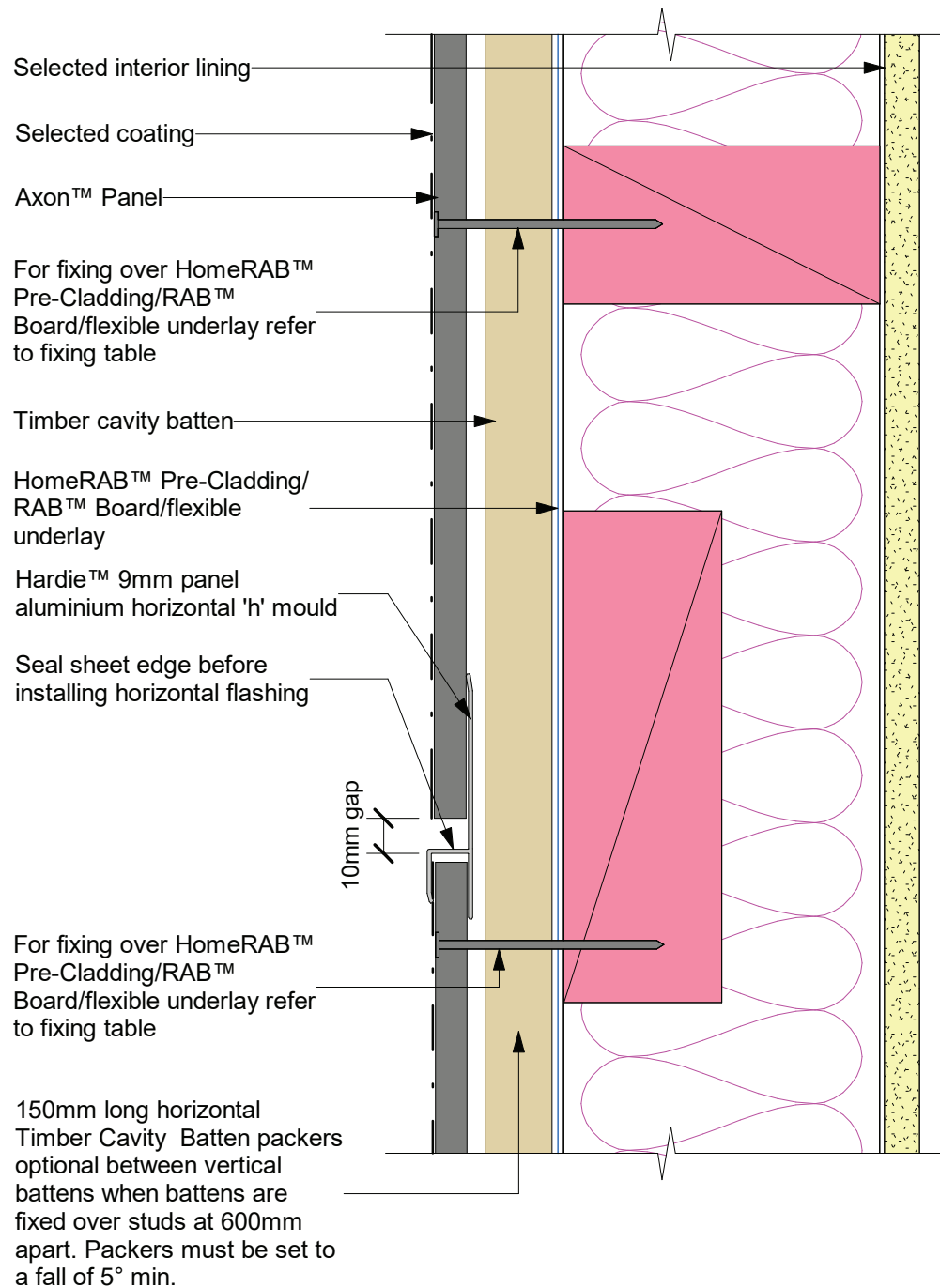


Figure 29: Cavity aluminium 'H' mould joiner

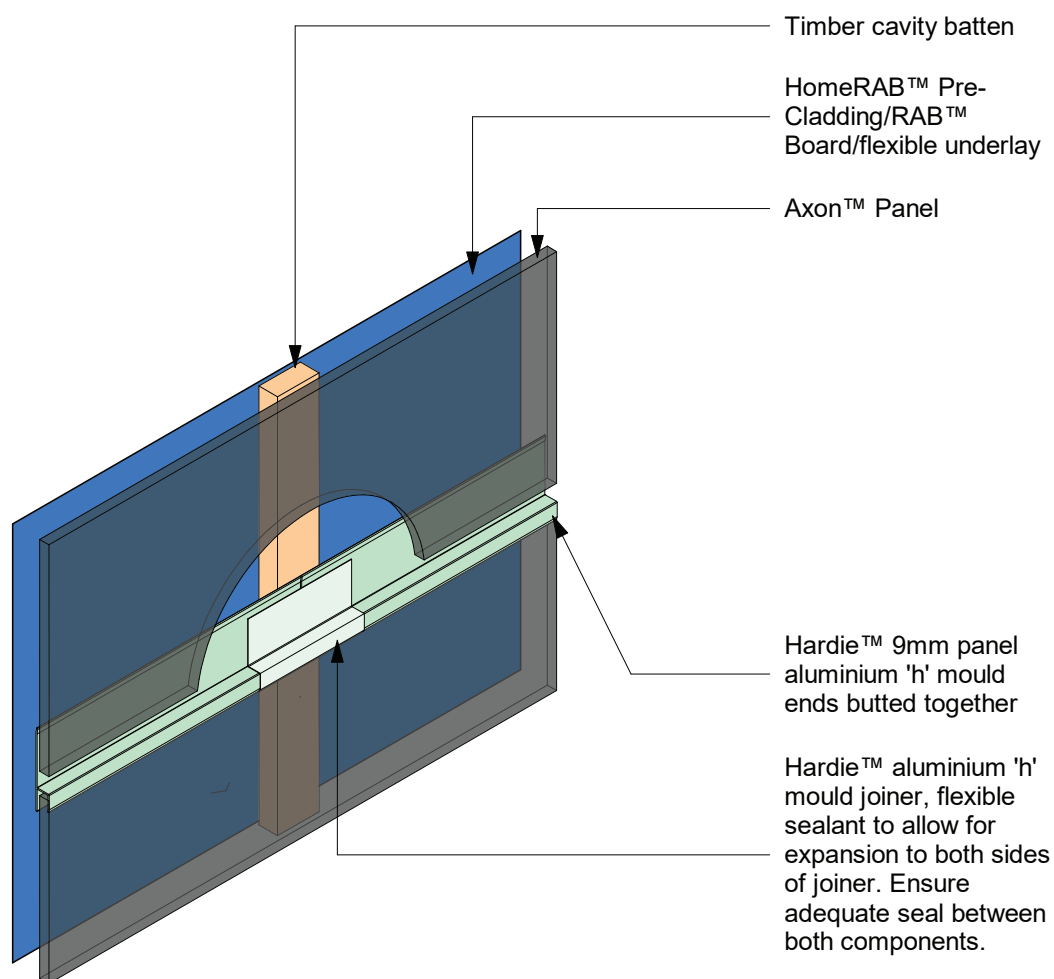
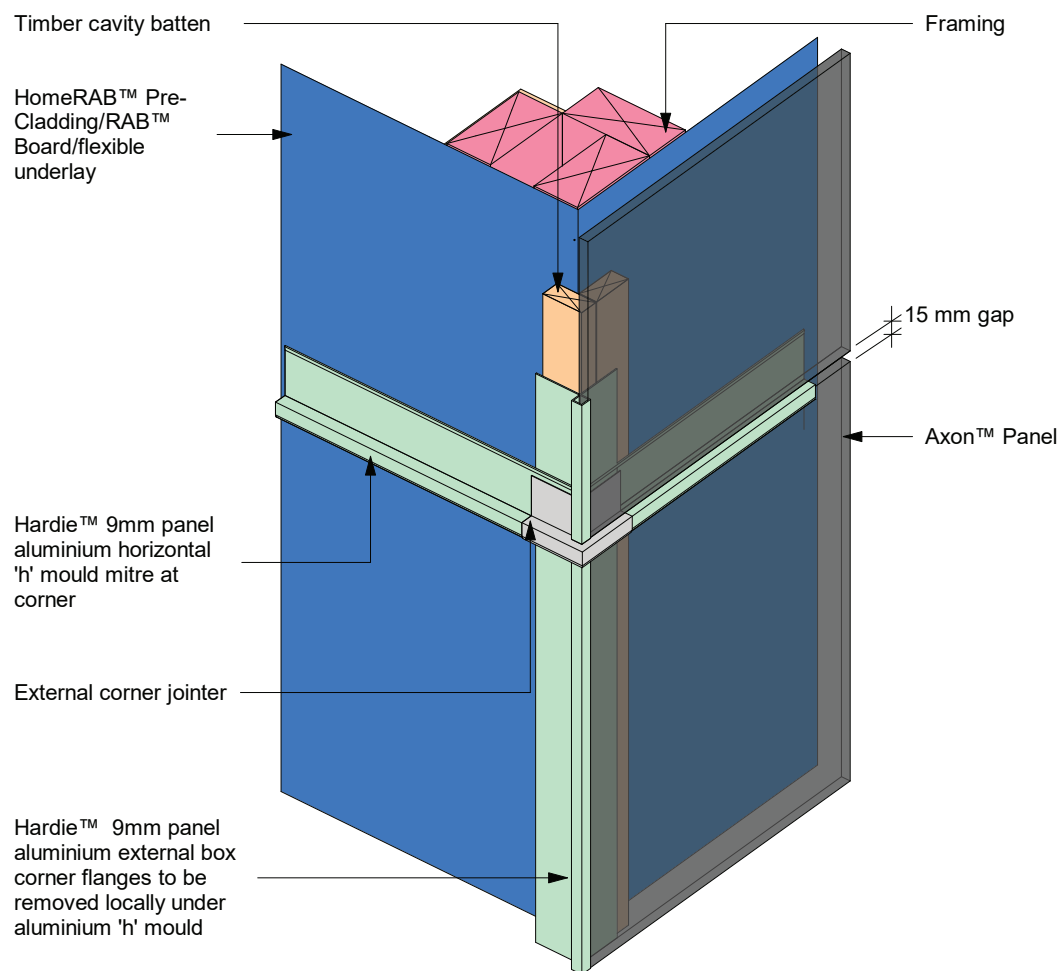


Figure 30: Cavity corner at 'H' mould joint detail



Note: Site cut edges to be primed

Figure 31: Internal corner at 'H' mould joint detail

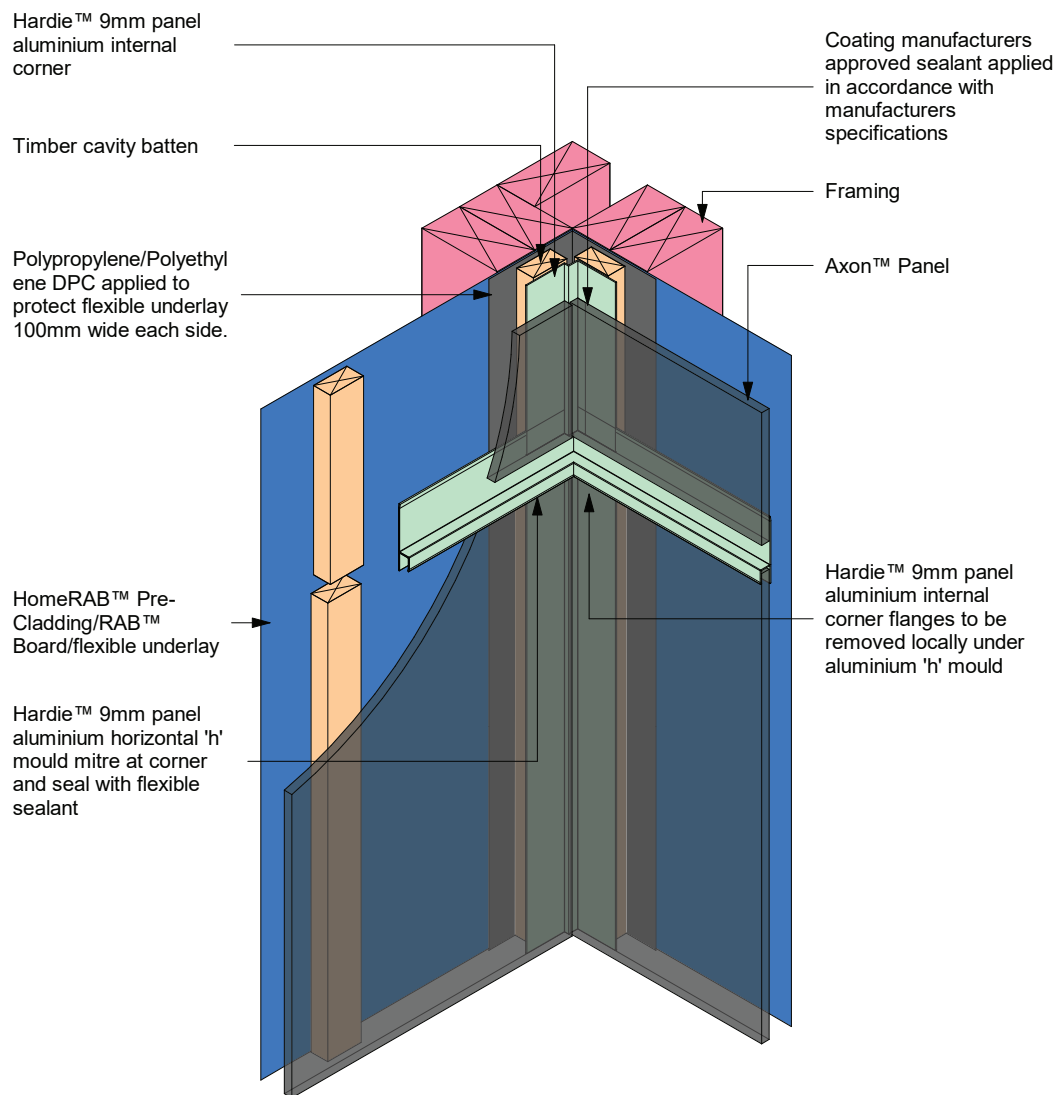
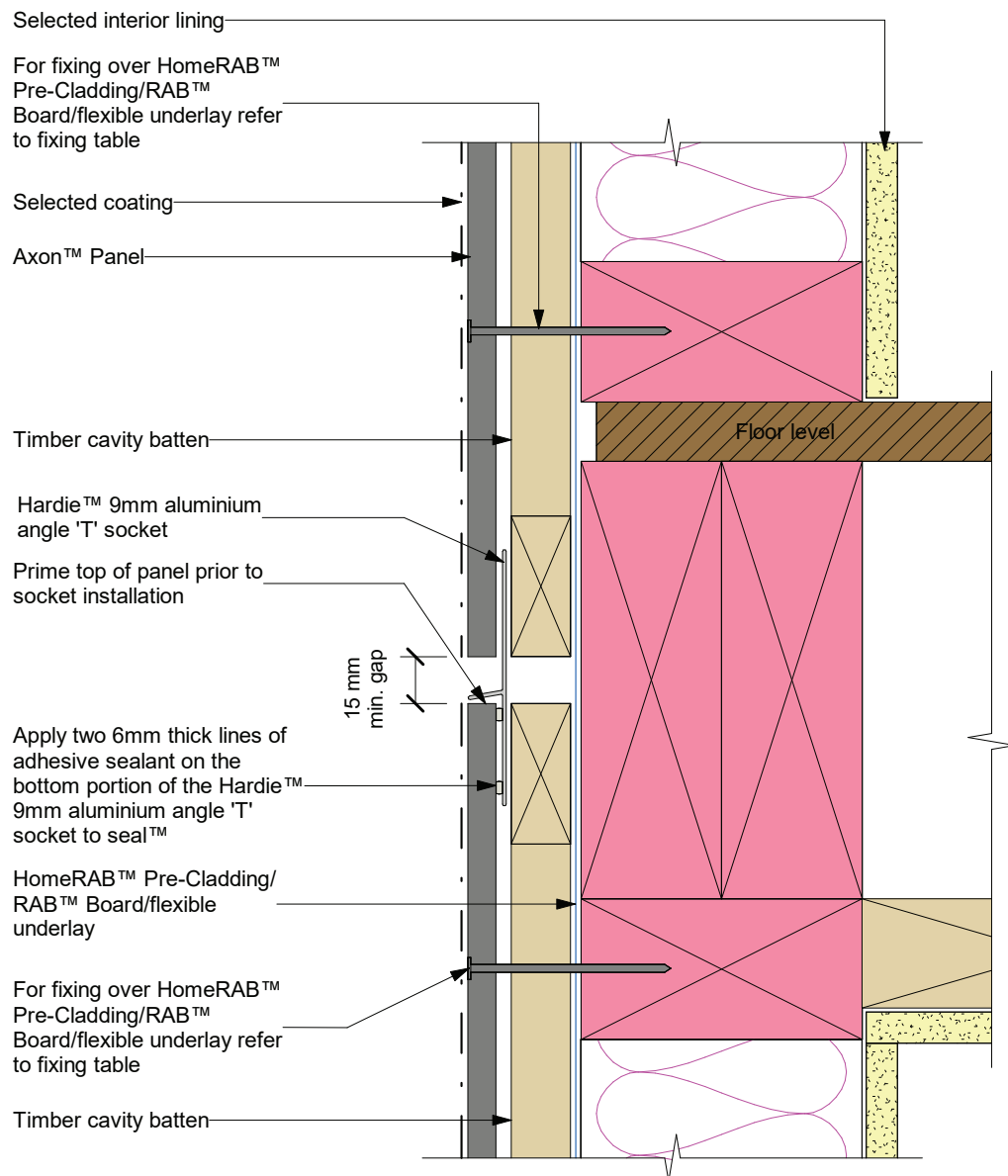




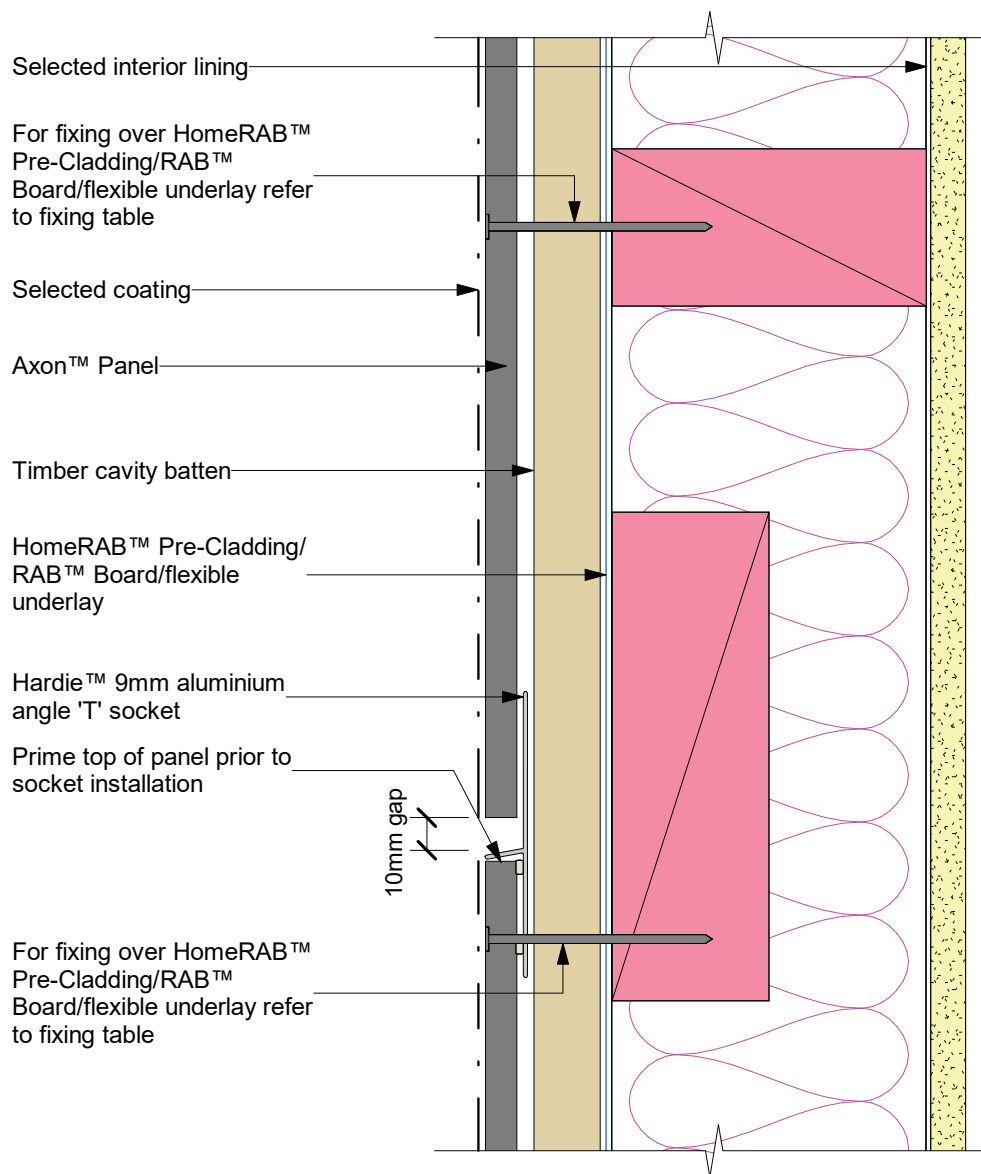
Figure 32: Angle 'T' socket joint at floor joist



Notes:

- When 50 year durability is required refer Table 20 of NZBC E2/AS1 document
- The flashing to be placed in the centre of the floor joists. Do not fix cavity battens or cladding into floor joists
- Hardie™ 9mm aluminium angle 'T' socket, take care to ensure continuous seal is formed between panel and the angle 'T' socket
- Hardie™ angle 'T' horizontal jointer will be required over the butt joint of the Hardie™ 9mm aluminium angle 'T' socket
- Site cut edges to be primed

Figure 33: Horizontal joint in tall wall



Notes:

- Hardie™ 9mm aluminium angle 't' socket, take care to ensure continuous seal is formed between panel and the angle 't' socket
- Hardie™ angle 'T' horizontal jointer will be required over the butt joint of the Hardie™ 9mm aluminium angle 't' socket
- Site cut edges to be primed

Figure 34: Angle 'T' horizontal jointer

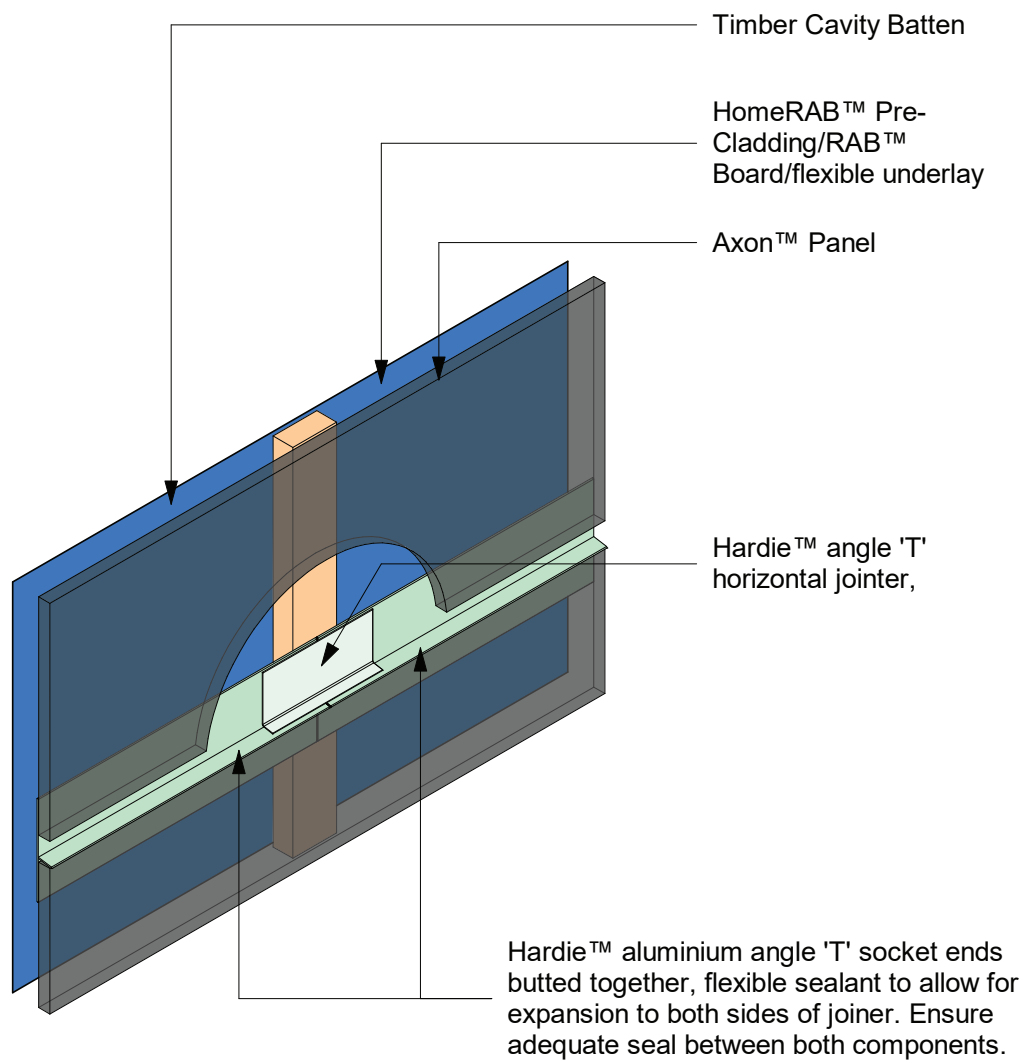
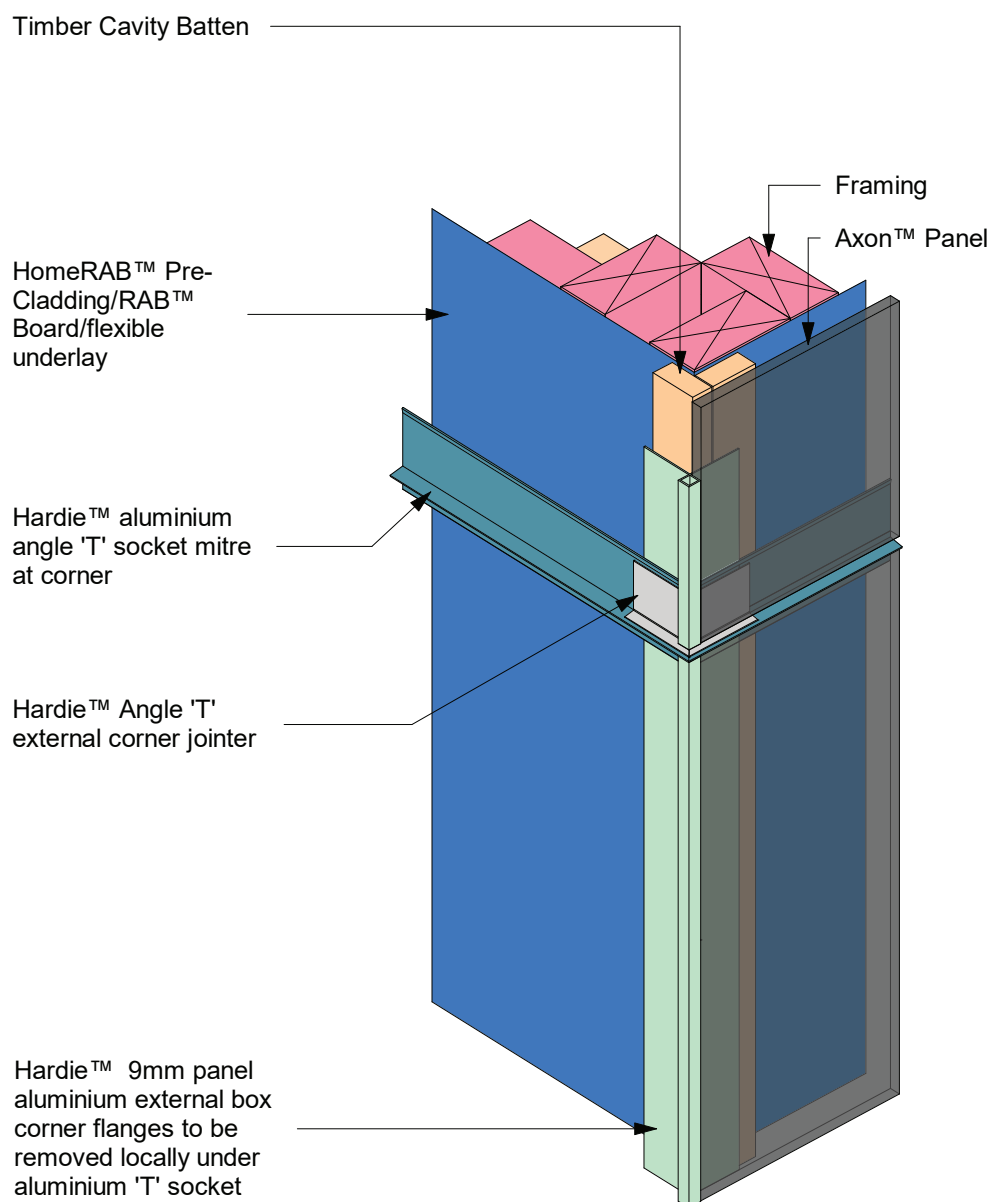


Figure 35: Angle 'T' external corner at 'T' mould joint



Note: Site cut edges to be primed

Figure 36: Internal corner at angle 'T' socket joint detail

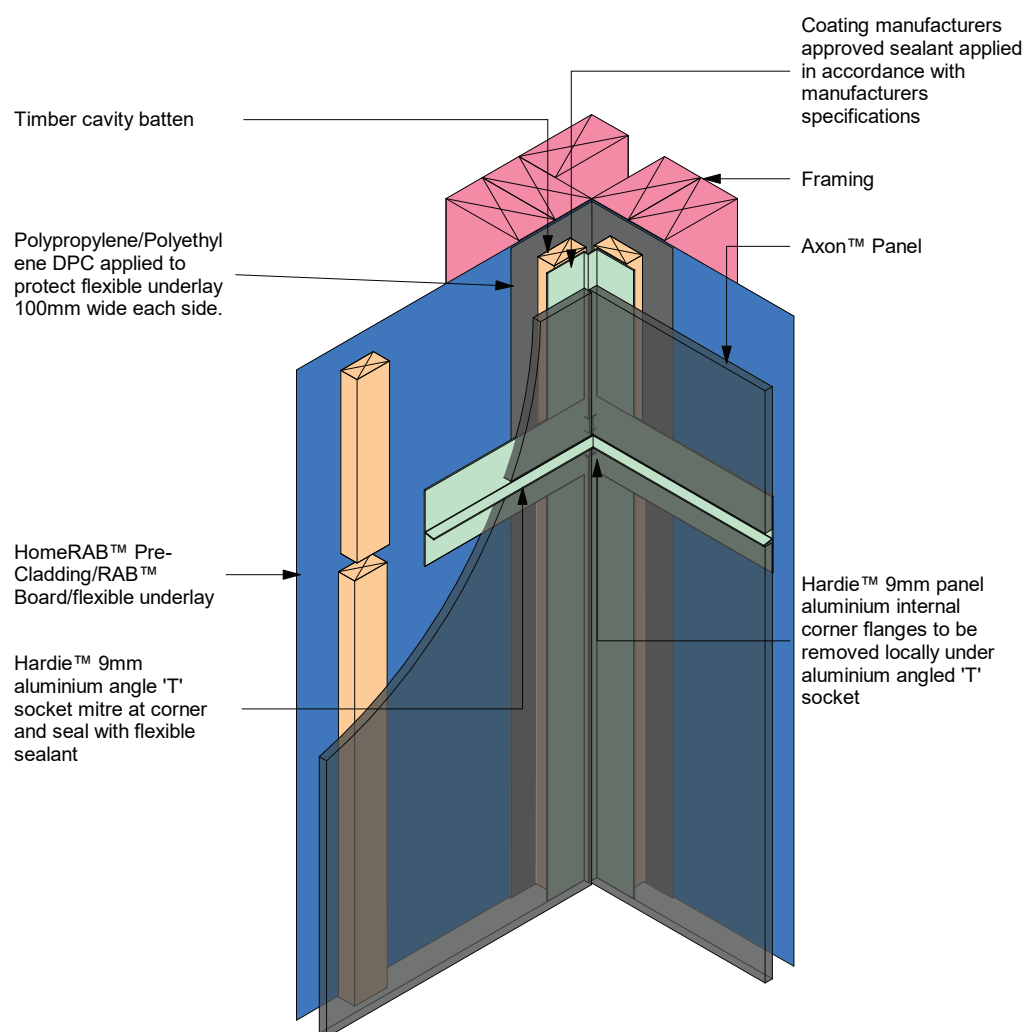


Figure 37: Joining moulding

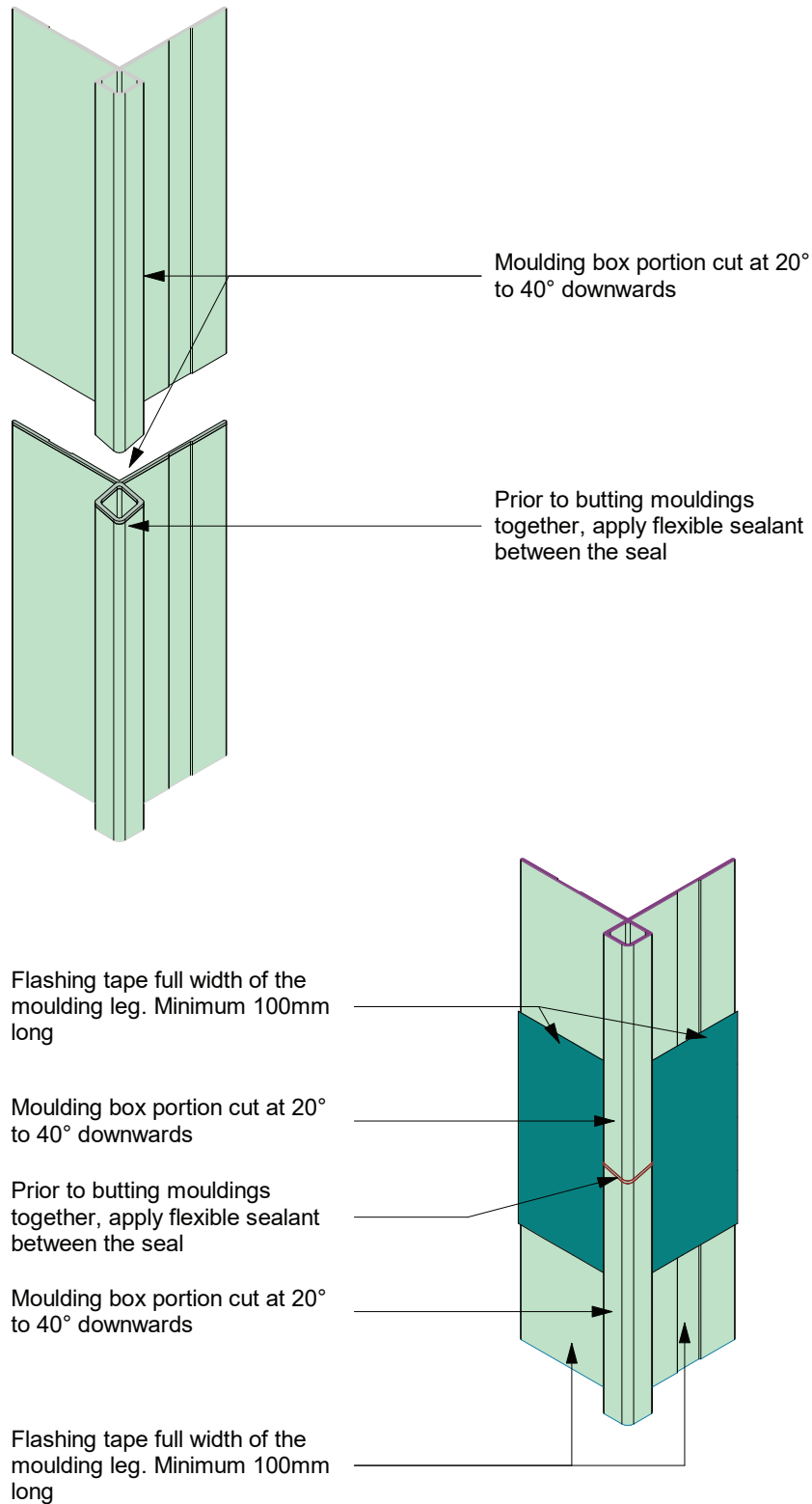
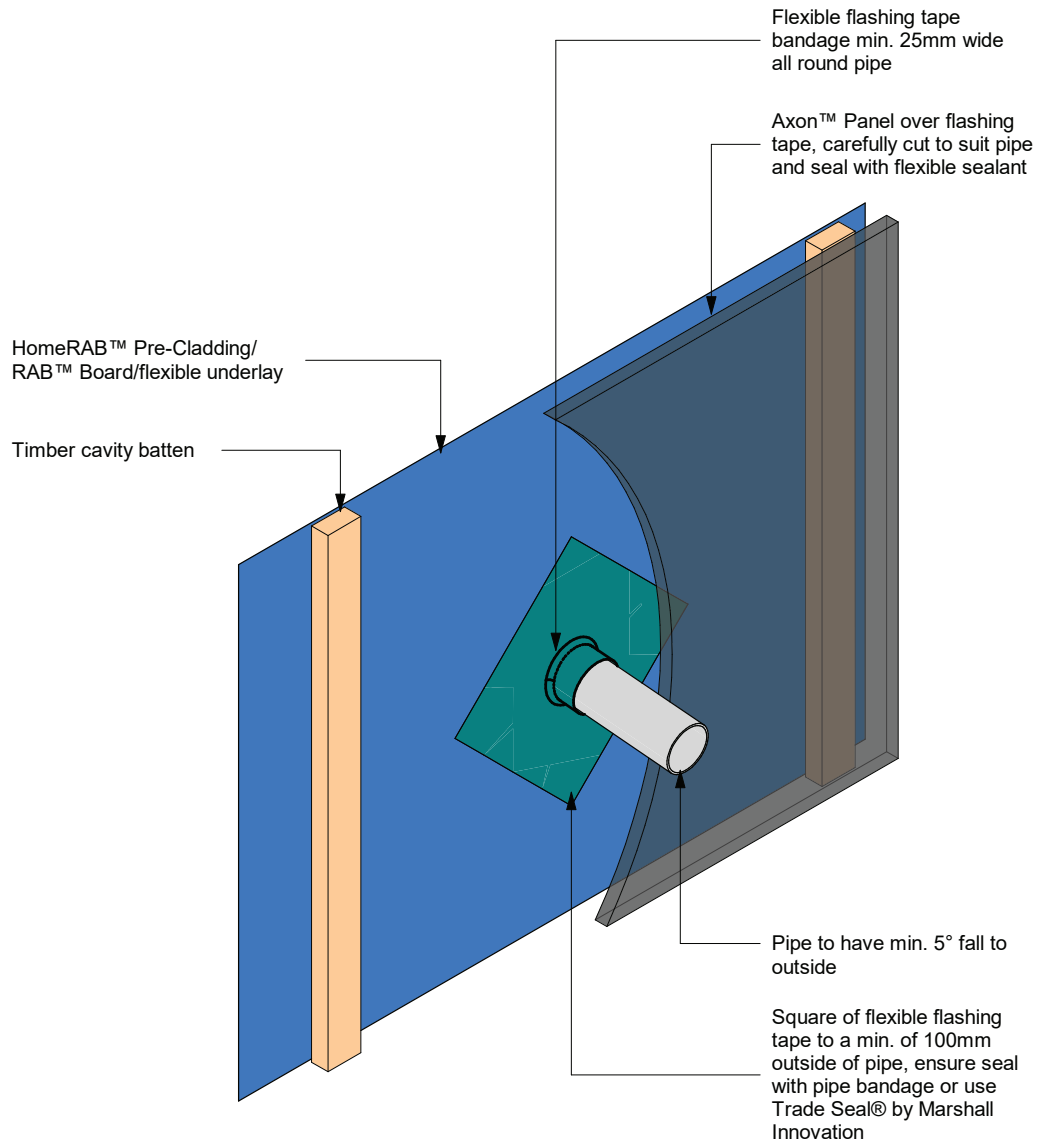




Figure 38: Cavity pipe penetration



Note: Site cut edges to be primed

Figure 39: h' mould joint at window head

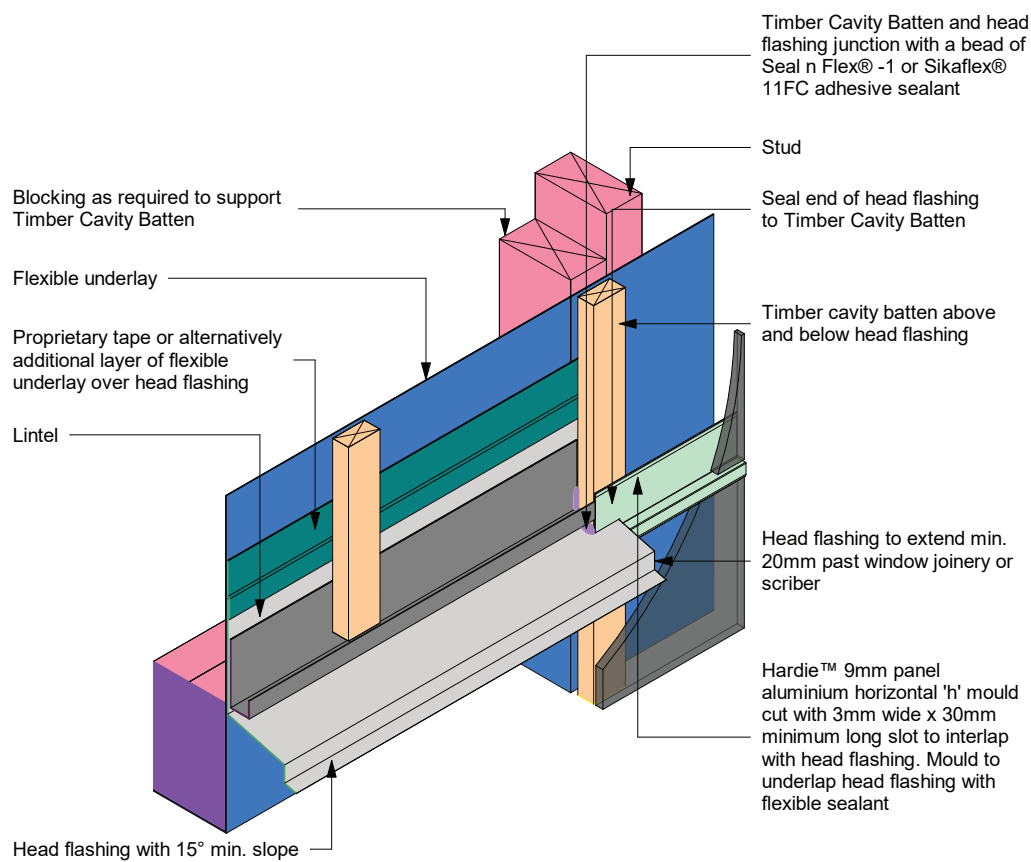


Figure 40: Angle 'T' socket at window head

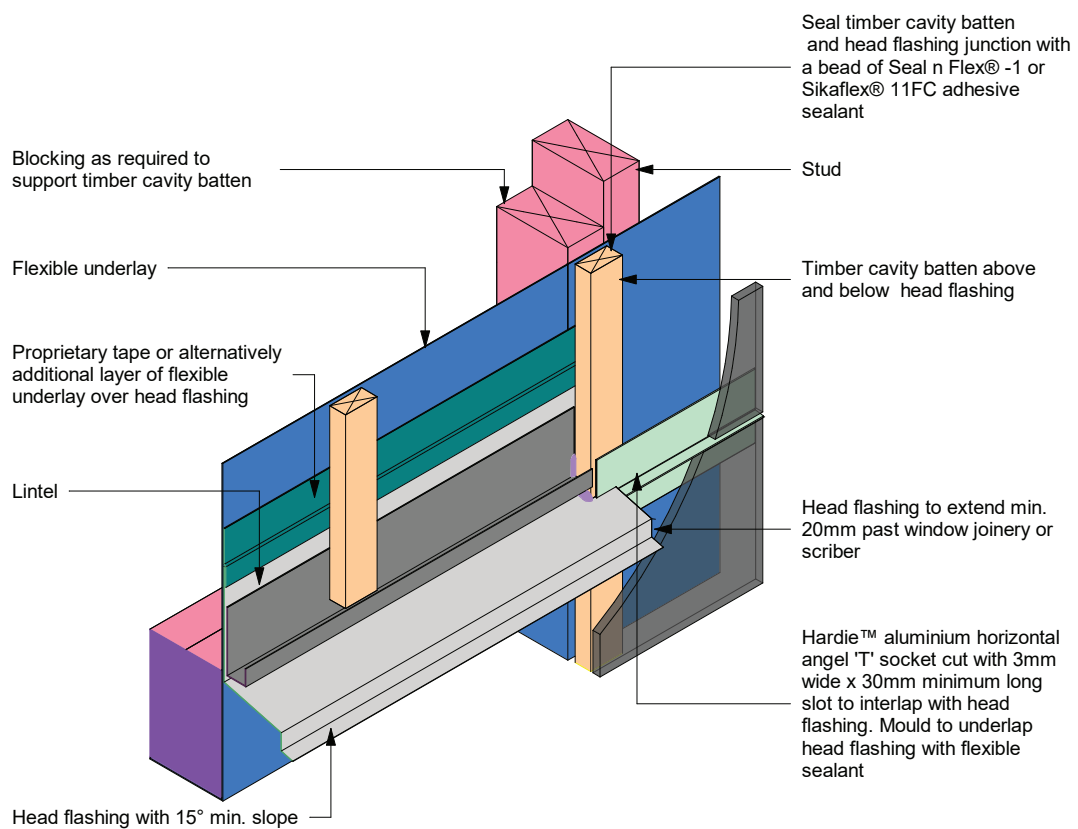


Figure 41: Horizontal flashing at window jamb

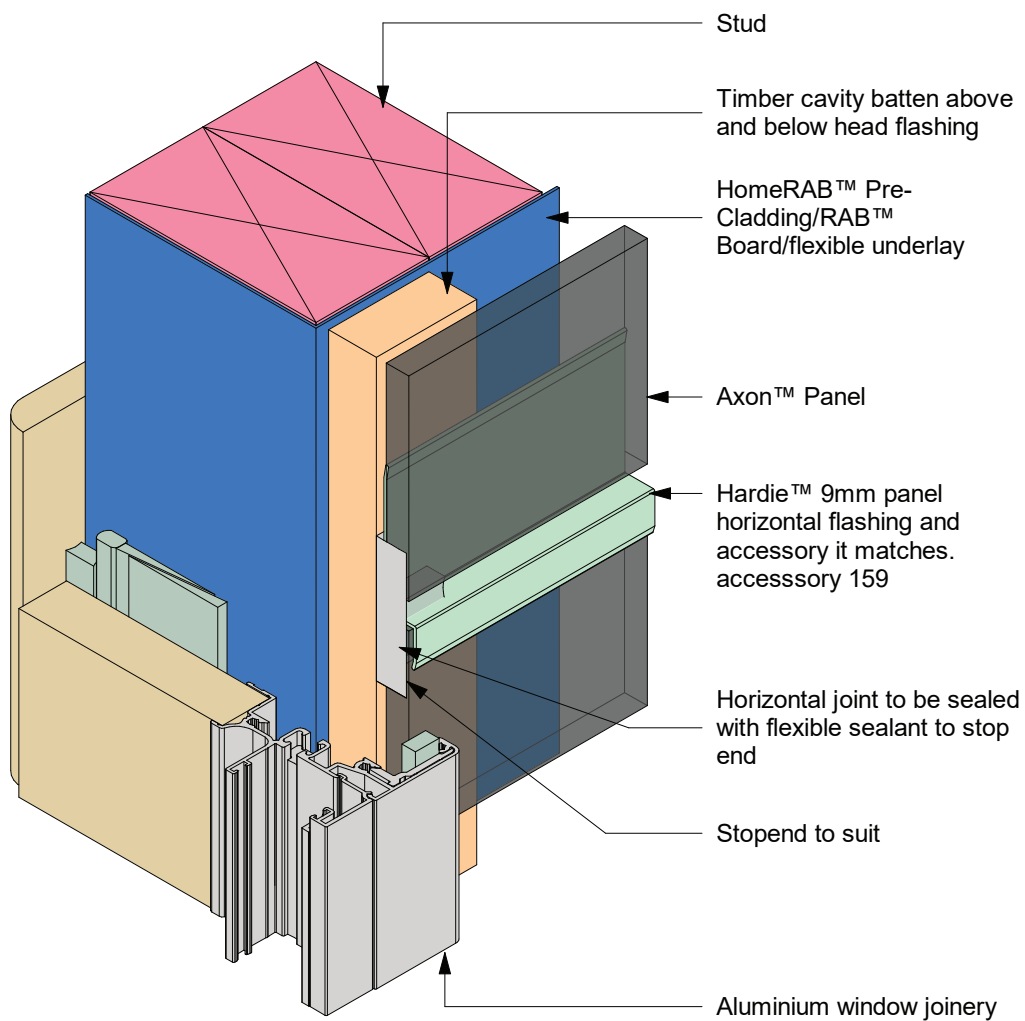


Figure 42: Angle 'T' socket butting window jamb

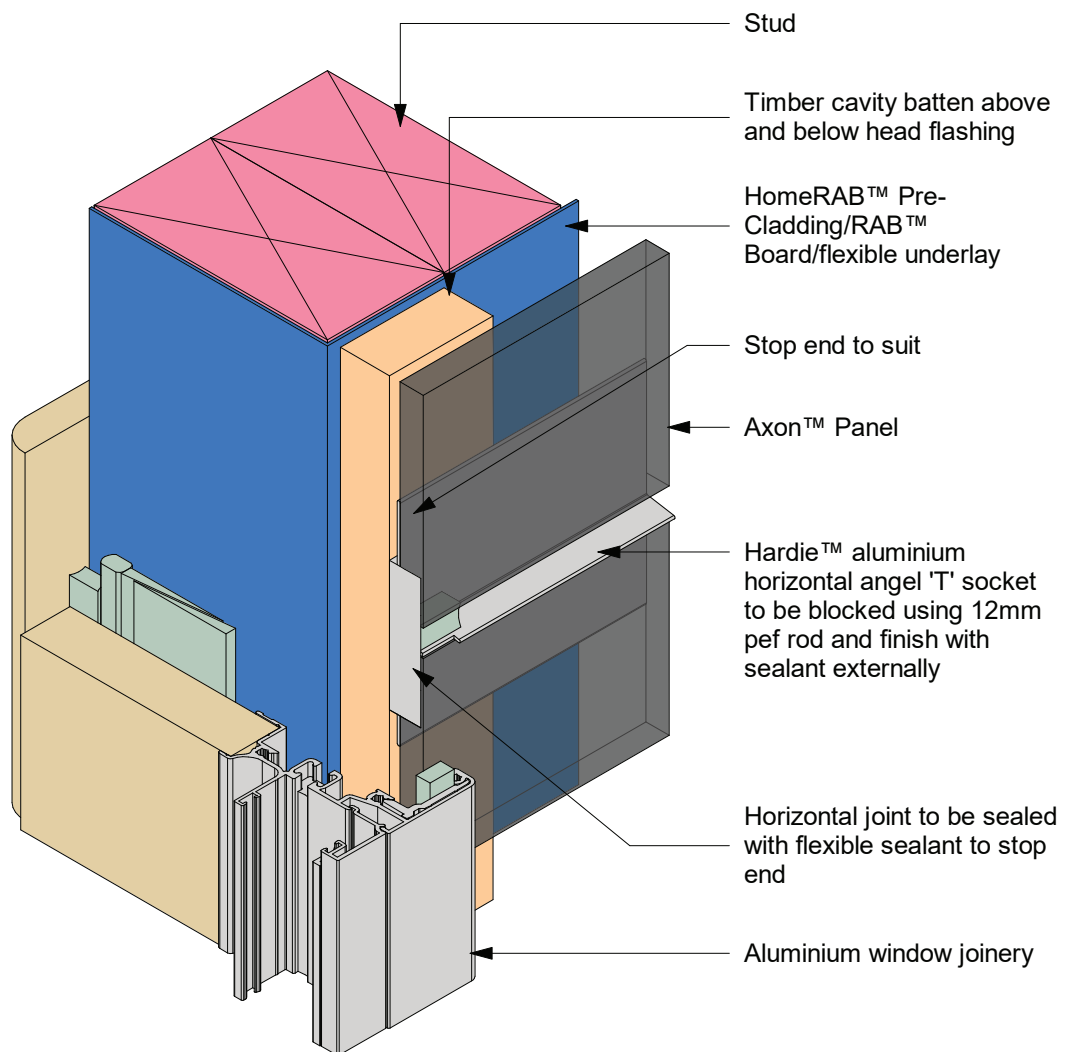
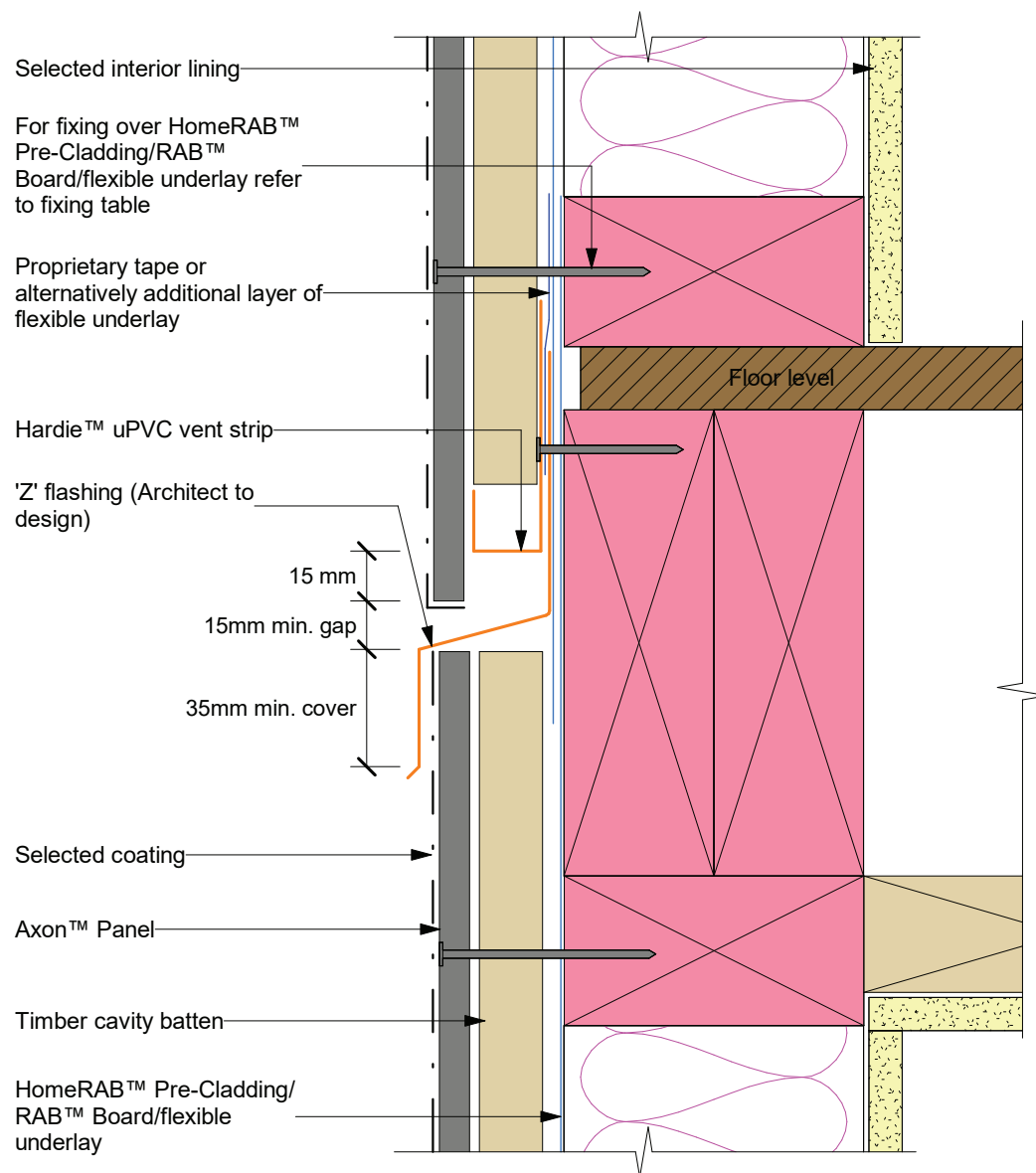


Figure 43: Drained flashing joint at floor joist



Note:

- \* Check architect's plans for the type of flashing to be used.
- \* Check fixing centres and edge distances.
- \* Cut edges need to be primed with sealer.
- \* When 50 year durability is required refer Table 20 E2/AS1.
- \* The flashing to be placed in the centre of the floor joists. Do not fix Cavity Battens or panels into floor joists.



Figure 44: One piece apron flashing joint

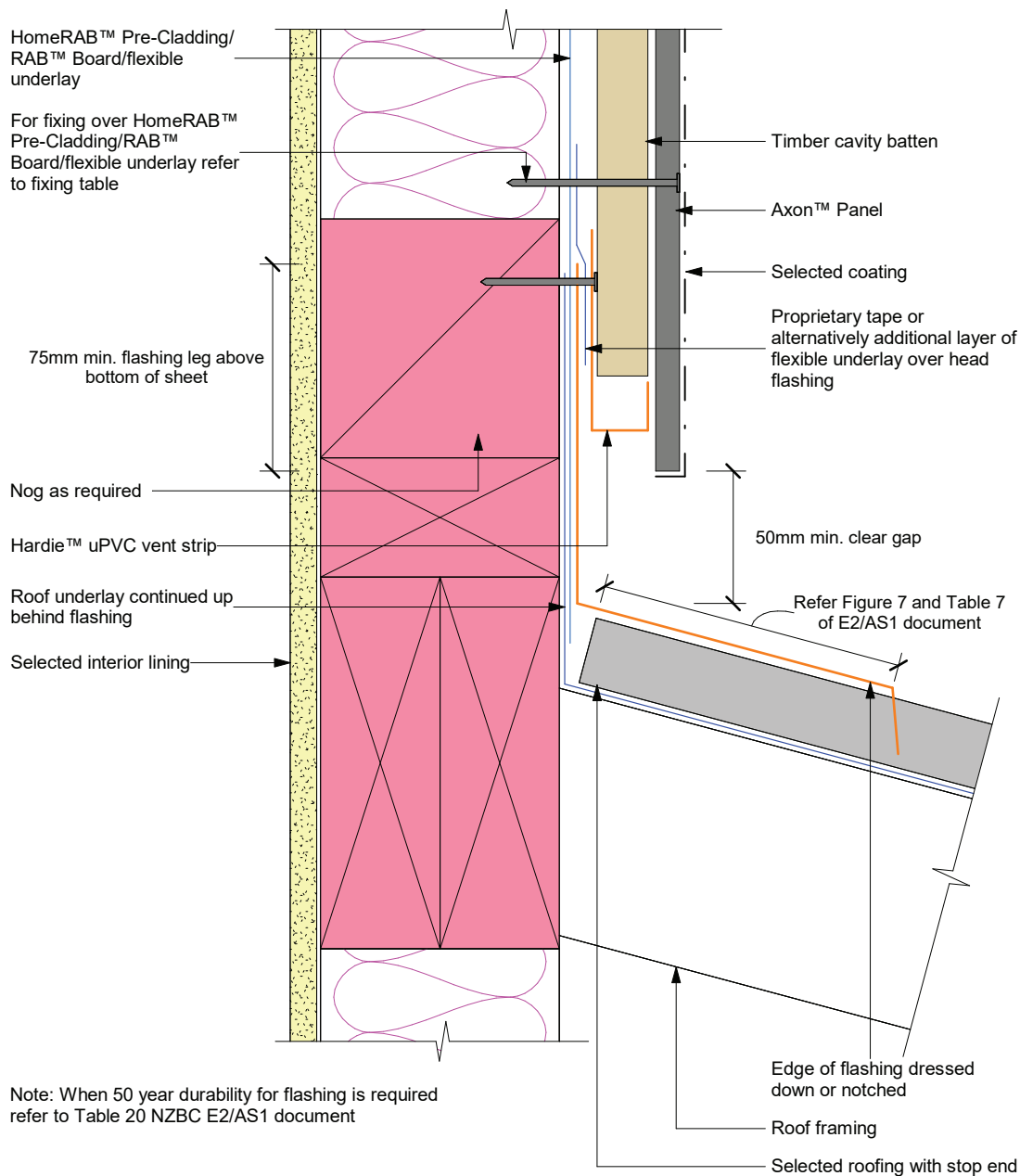


Figure 45: Enclosed deck balustrade to wall junction aluminium internal corner

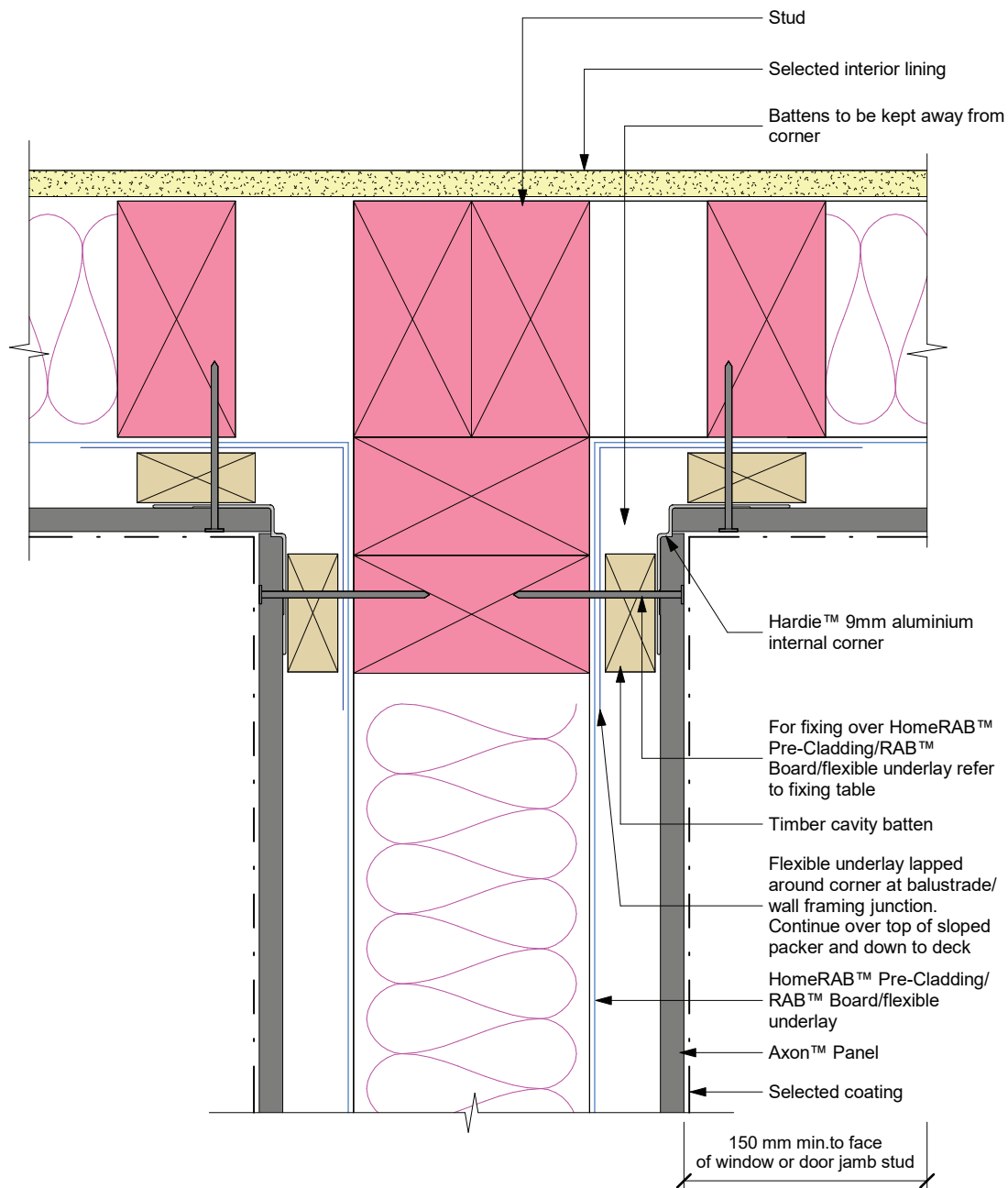


Figure 46: Enclosed deck balustrade to wall junction

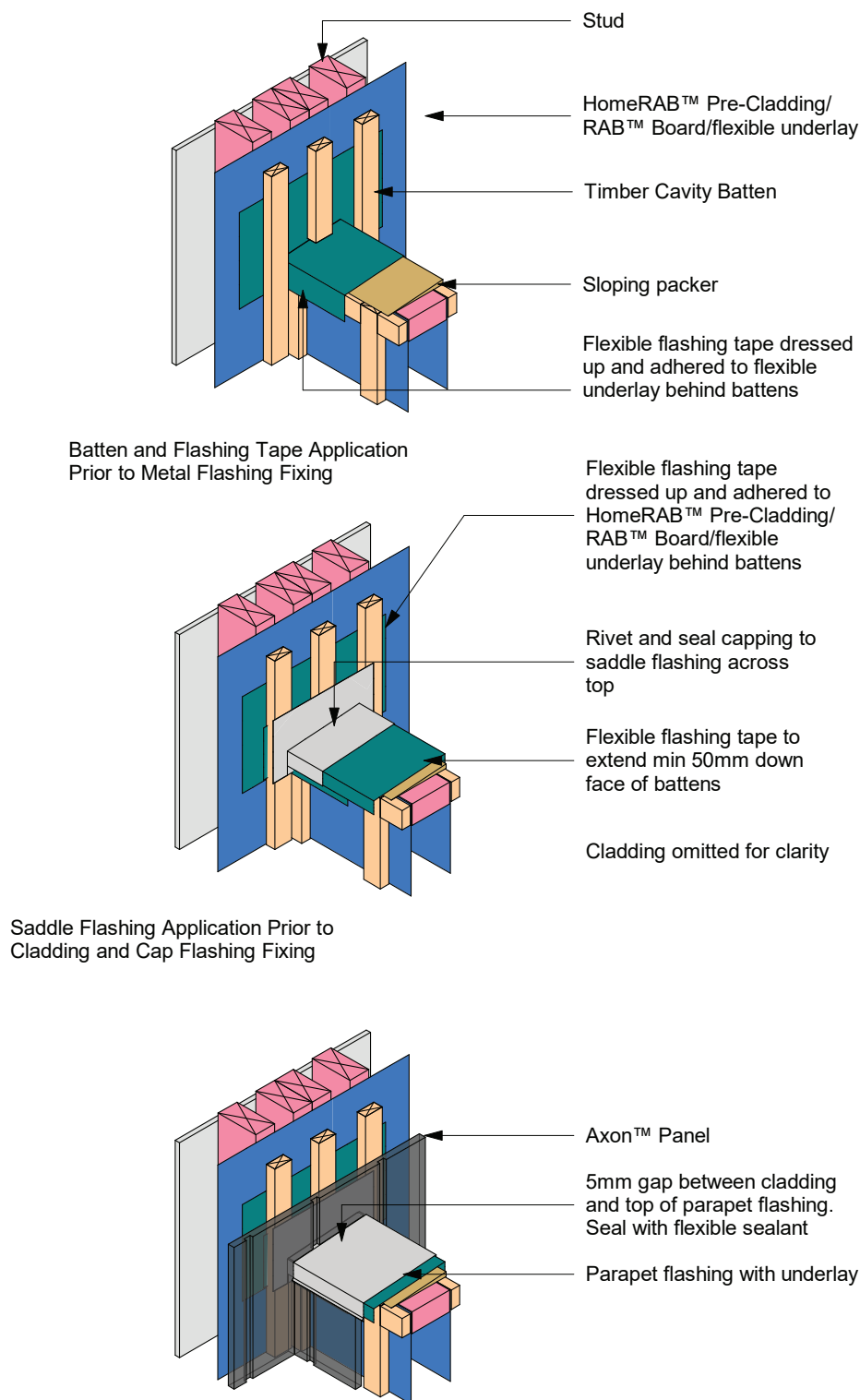


Figure 47: Parapet flashing

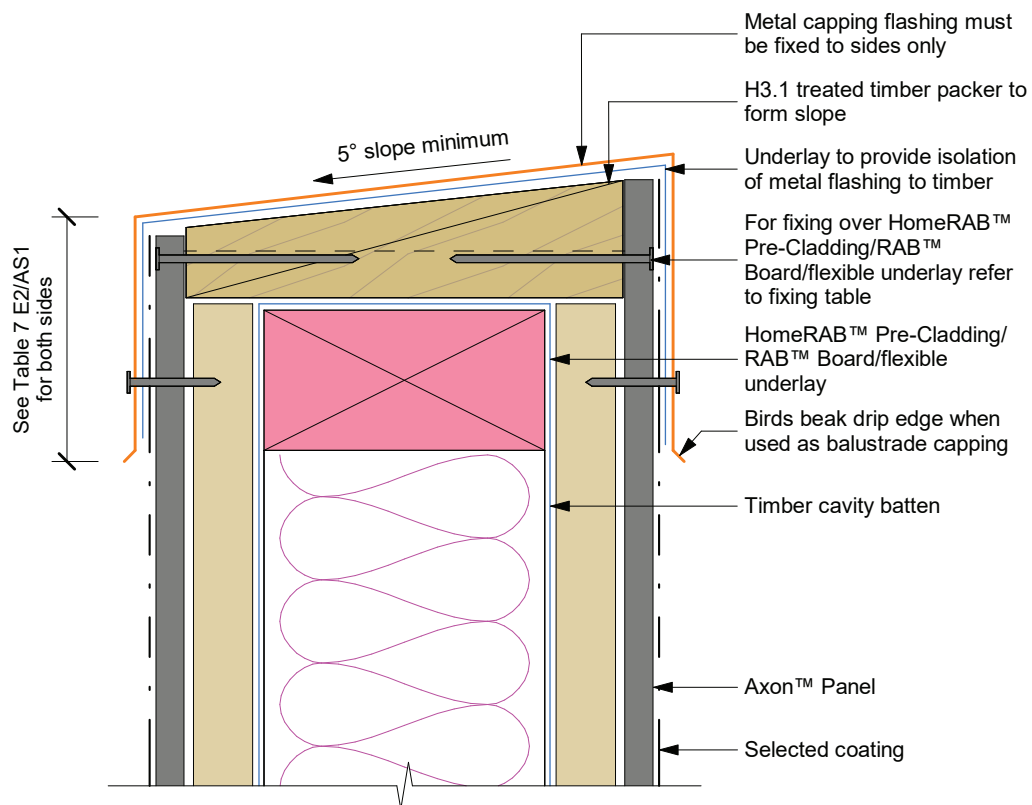


Figure 48: Garage jamb

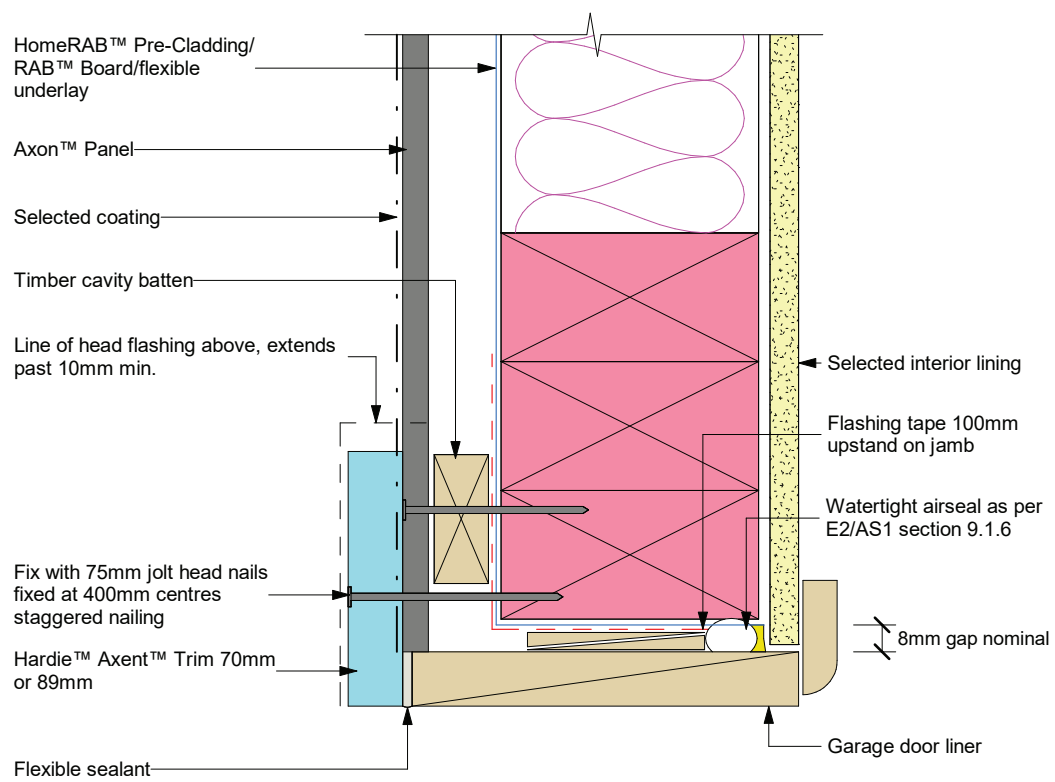
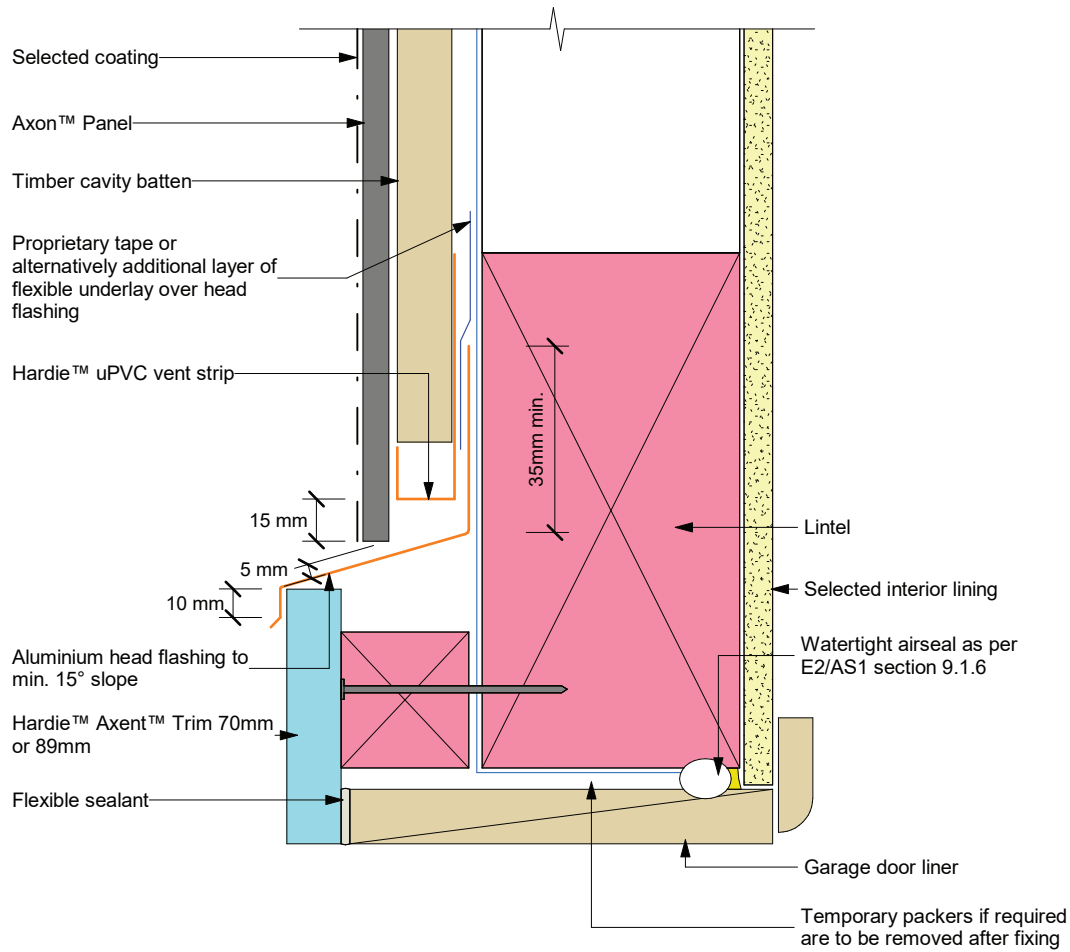


Figure 49: Garage head



- Sealant must be applied between head flashing and Hardie™ Axent™ Trim in VH and EH wind zones
- Site cut edges to be primed



Figure 50: junction between panel and fascia board

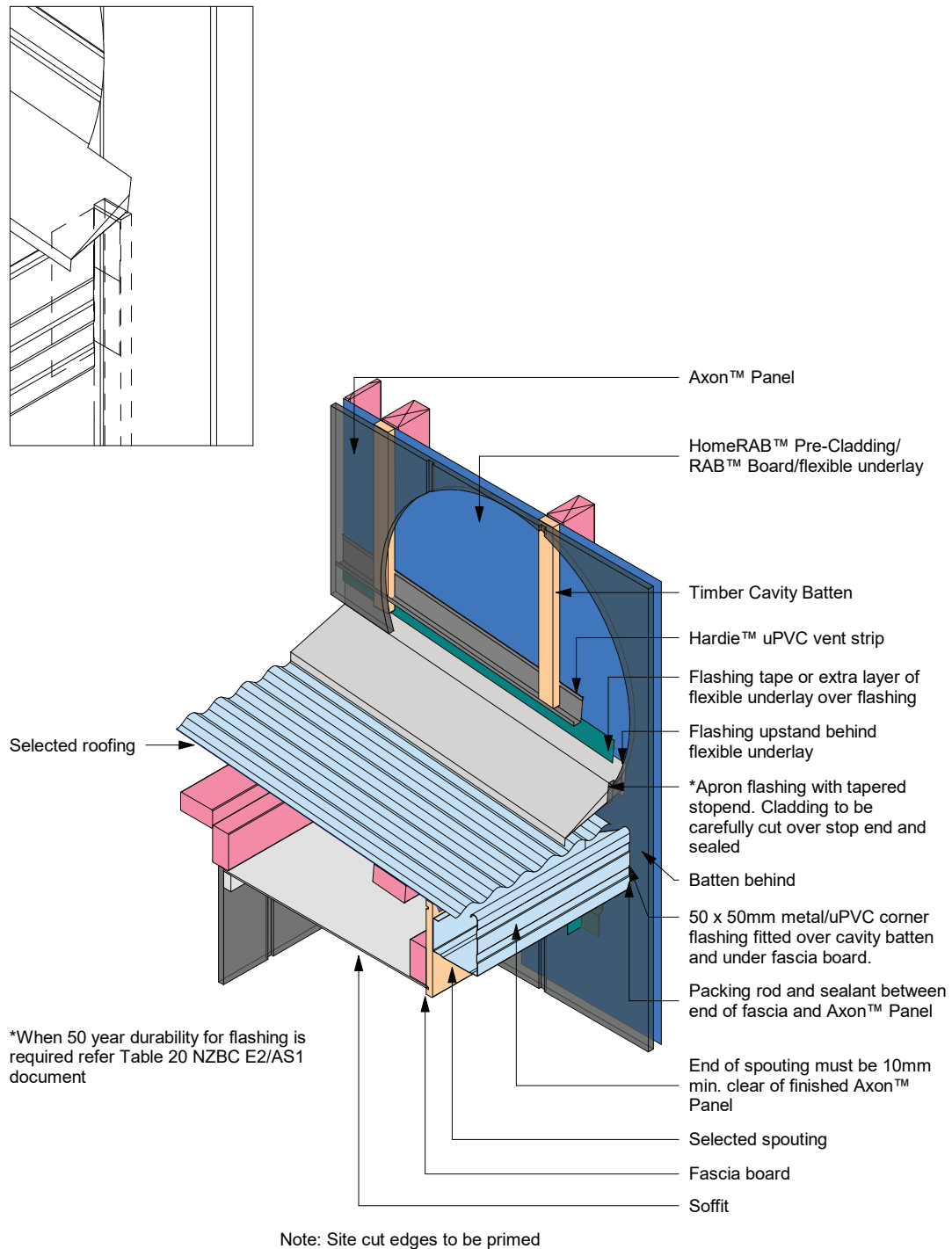
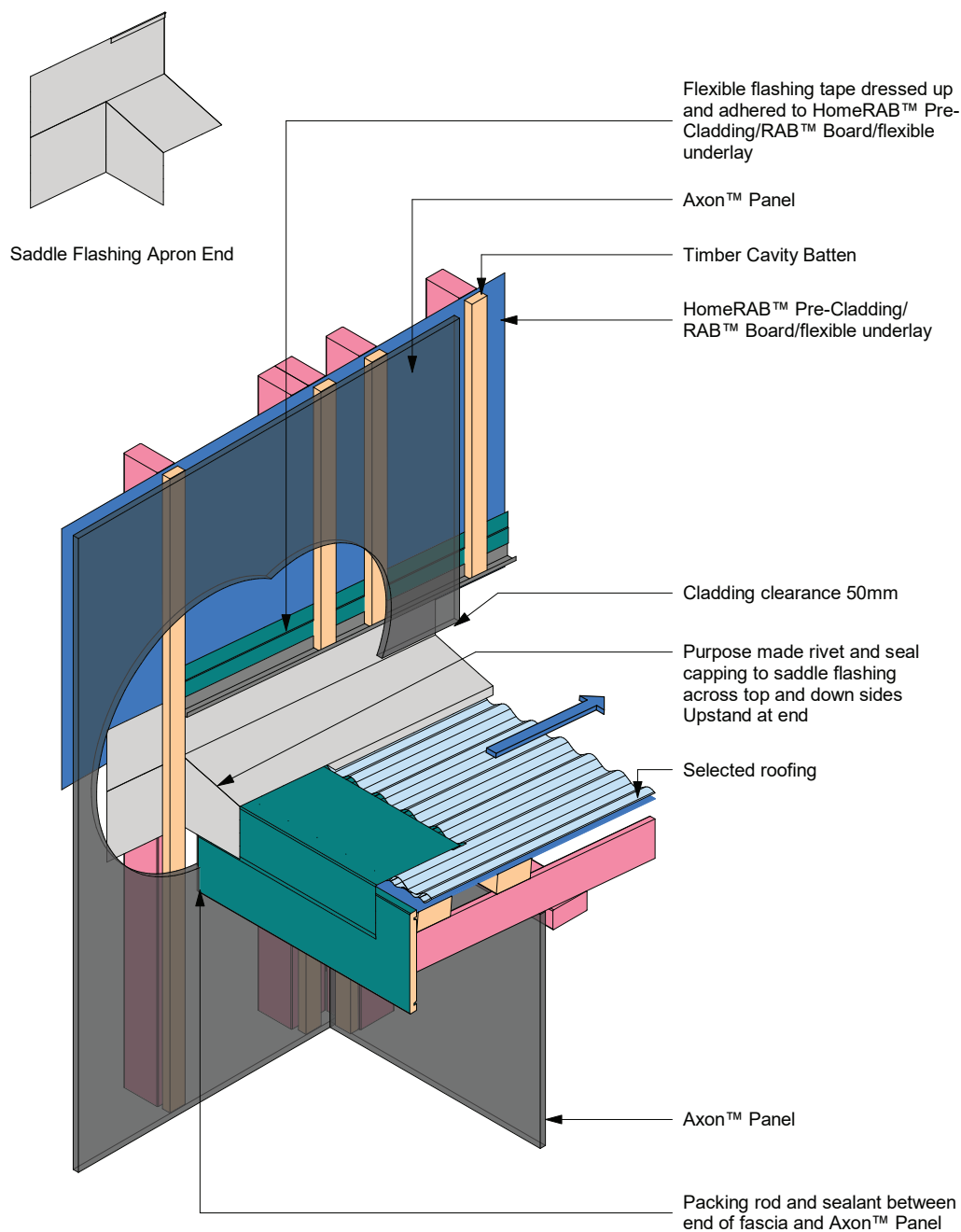


Figure 51: Enclosed roof to wall intersection





# Product Warranty

James Hardie New Zealand Limited ("James Hardie") warrants for a period of 15 years from the date of purchase that the Axon™ Panel (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

## CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested/assessed the performance of the Axon™ Panel when installed in accordance with the relevant Axon™ Panel technical specification, 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.

© 2023. James Hardie New Zealand Limited. TM and ® denotes a Trademark or Registered Mark owned by James Hardie Technology Limited.





**BRANZ Appraised**  
Appraisal No. 1211 [2022]

## AXON™ PANEL CLADDING

**Appraisal No. 1211 [2022]**

Amended 03 April 2024



### 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](http://www.jameshardie.co.nz)



**BRANZ**

**BRANZ**

1222 Moonshine Rd,

RD1, Porirua 5381

Private Bag 50 908

Porirua 5240,

New Zealand

Tel: 04 237 1170

[branz.co.nz](http://branz.co.nz)



### Product

- 1.1 Axon™ Panel Cladding is a cavity-based or direct-fixed, fibre cement sheet wall cladding. It is designed to be used as an external wall cladding for residential and light commercial type buildings where domestic construction techniques are used.

### Scope

- 2.1 Axon™ Panel Cladding has been appraised as a direct-fixed, external wall cladding for buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
  - with a risk score of 0-6, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
  - situated in NZS 3604 Wind Zones up to, and including, Very High.
- 2.2 Axon™ Panel Cladding, when installed over timber cavity battens, has also 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,
  - 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.
- 2.3 Axon™ Panel Cladding, when installed over Hardie™ CLD™ Structural Cavity Battens, has also been appraised for weathertightness and structural wind loading when used as an external wall cladding for buildings between 0 and 25 m high within the following scope:
- buildings with a building height not exceeding 25 m; 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 1.5 kPa where studs are at maximum 600 mm centres; and,
  - situated in specific design wind pressures up to a maximum design differential ULS of 3.2 kPa where studs are at maximum 400 mm centres; and,
  - with inter-storey deflections designed for and up to height/180 of horizontal in-plane movement during seismic serviceable limit state [SLS] events (based on a 3 m inter-storey height); and,
  - constructed with timber framing subject to specific engineering design; and,
  - when fixed over James Hardie RAB™ Board rigid air barrier for buildings over 10 m in height.
- 2.4 Axon™ Panel Cladding must only be installed vertically on vertical, flat surfaces.
- 2.5 Axon™ Panel Cladding has been appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *[Note: The Appraisal of Axon™ Panel Cladding relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone.]*





## Building Regulations

### New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Axon™ Panel 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. Axon™ Panel Cladding meets the requirements for loads arising from self-weight, wind, impact and creep [i.e. B1.3.3 (a), (h), (j) and (q)]. See Paragraphs 9.1-9.4.

**Clause B2 DURABILITY:** Performance B2.3.1 (b) 15 years and B2.3.2. Axon™ Panel Cladding meets these requirements. See Paragraphs 10.1-10.4.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.2. Axon™ Panel Cladding meets this requirement. See Paragraphs 14.1-14.5.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Axon™ Panel Cladding meets this requirement.

## Technical Specification

4.1 System components and accessories for Axon™ Panel Cladding, which are supplied by James Hardie New Zealand Limited are:

### Axon™ Panels

- Axon™ Panels are fibre cement panels manufactured from a water-resistant cellulose cement formulation. They are manufactured to conform to the requirements of AS/NZS 2908.2, in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.7.2. The panels are formed, cut to length and then cured by high-pressure autoclaving. They are branded 'Axon™ Panel' at regular intervals on the back face. Axon™ Panels are sealed and primed on the face and the back is clear sealed.

### Axon™ Panel Grooved

- Axon™ Panel 133 mm Grooved is a 9 mm thick shiplap-jointed panel with grooves on the front face nominal 10 mm wide by 2.25 mm deep, spaced at 133 mm centres. It is available 1,200 mm wide and 2,450, 2,750, 3,000 or 3,600 mm long.
- Axon™ Panel 133 mm Grooved Grained is a 9 mm thick shiplap-jointed panel with grooves on the front face nominal 10 mm wide by 2.25 mm deep, spaced at 133 mm centres. Between the grooves is a wood-grain texture. It is available 1,200 mm wide and 3,000 mm long.
- Axon™ Panel 400 mm Grooved is a 9 mm thick shiplap-jointed panel with grooves on the front face nominal 10 mm wide by 2.25 mm deep, spaced at 400 mm centres. It is available 1,200 mm wide and 2,450, 2,750 or 3,000 mm long.

### Axon™ Panel Textured

- Axon™ Panel Smooth [formerly known as EasyLap™ Panel] is a 9 mm thick shiplap-jointed panel, available 1,200 mm wide and 2,450 or 3,000 mm long.
- Axon™ Panel Brushed Concrete is a 8.5 mm thick shiplap-jointed panel with an embedded textured surface. It is available 1,200 mm wide and 2,440, 2,750, 3,000 or 3,600 mm long.

### Accessories

- Hardie™ CLD™ Structural Cavity Batten - 19 mm thick fibre cement cavity batten installed over RAB™ Board or a flexible underlay. It is 19 mm thick x 70 mm wide x 3,000 mm long.
- Hardie™ Aluminium Radius External Box Corner - a box corner mould to form the external joints, etch-primed and available in 2,750, 3,000 or 4,000 mm lengths.
- Hardie™ Aluminium Invert External Box Corner - a box corner mould to form the invert external joints, etch-primed and available in 2,750 or 4,000 mm lengths.
- Hardie™ 9 mm Panel Aluminium Horizontal 'h' Mould - a horizontal flashing to flash the horizontal joints, etch-primed and available in 3,000 mm lengths.





- **Hardie™ 9 mm Aluminium Angle T Socket** – a horizontal T flashing to flash the horizontal joints, etch-primed and available in 3,000 mm lengths.
- **Hardie™ Angle T Horizontal Jointer** – a jointer to cover the butt joint of T mould, etch-primed and available in 100 mm lengths.
- **Hardie™ Angle T External Corner Jointer** – a T mould external corner, etch-primed.
- **Aluminium 'h' Mould Jointer** – a jointer to cover the butt joint of 'h' mould. Available in 100 mm lengths.
- **Hardie™ 9 mm Panel Aluminium 'h' External Corner Jointer** – a 'h' mould external corner.
- **Hardie™ CLD™ Batten Corner Flashing Aluminium** – used at internal corner sealant joints at floor joist level.
- **Hardie™ Axent™ Trim** – for box corners and facings, 19 mm thick, 3,000 mm long and available 45, 70 or 89 mm wide.
- **uPVC Vent Strip** – available in 3,000 mm lengths.
- **uPVC Corner Under Flashing** – a 50 x 50 mm corner mould used for internal and external joints.
- **Inseal® 3259 tape** – black, compressible, medium density, polyvinyl chloride (PVC) closed cell foam. The tape is 1.5 mm thick and is supplied in rolls 48 and 80 mm wide, and 50 m long.

4.2 Accessories supplied by the building contractor are:

- **Cavity battens** – nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber cavity battens, treated to Hazard Class H3.1.
- **C-25 brad nail** – Grade 304 stainless steel brad nails used to fix Axon™ Panels to Hardie™ CLD™ Structural Cavity Battens.
- **ND 50 brad nail** – 50 mm stainless steel brad nail used to fix Axon™ Panels direct fixed to timber framing.
- **65 x 2.87 mm RounDrive ring shank nails** – hot-dip galvanised or stainless steel nails used for fixing Hardie™ CLD™ Structural Cavity Battens to timber framing.
- **Hardie™ Flex 60 x 3.15 mm nails** – for fixing panels through timber cavity battens. Hot-dip galvanised or 316 stainless steel.
- **Hardie™ Flex 75 x 3.15 mm nails** – for fixing panels through timber cavity battens. Hot-dip galvanised or 316 stainless steel.
- **Adhesive sealant** – Bostik® Seal N' Flex™-1 or Sika Sikaflex® 11FC.
- **Flexible wall underlay** – building paper complying with NZBC Acceptable Solution E2/AS1, Table 23, or breather-type membranes covered by a valid BRANZ Appraisal or CodeMark for use as wall underlays.
- **Flexible wall underlay support** – polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible wall underlay in place and preventing bulging of the bulk insulation into the drainage cavity. *[Note: Mesh and wire galvanising must comply with AS/NZS 4534.]*
- **Rigid wall underlay** – HomeRAB™ Pre-Cladding/RAB™ Board, plywood or fibre cement panel complying with NZBC Acceptable Solution E2/AS1, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal or CodeMark for use as rigid air barrier systems.
- **Horizontal drained joint flashing.**
- **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.
- **Window and door trim cavity air seal** – air seals and PEF rod 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 sill 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.



- **Flexible sealant** – sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal or CodeMark for use as a weather sealing sealant for exterior use.

#### Finishing System Specification

- 4.3 Paint systems, where elected to be applied by James Hardie New Zealand Limited, are selected in consultation with the designer and building contractor. Finishing systems applied by James Hardie New Zealand Limited have not been assessed by BRANZ, and are therefore outside the scope of this Appraisal.
- 4.4 All exposed faces, including top edges at sills and bottom edges of Axon™ Panels, trims and accessories must be finished with an acrylic exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730. Finishing must be carried out within 90 days of installation to protect the Axon™ Panels and give the desired finish colour to the exterior walls.
- 4.5 All cut edges of Axon™ Panels are to be sealed on-site with an acrylic sealer suitable for use with the selected proprietary acrylic paint system as listed in the Technical Literature for the Axon™ Panel Cladding.

### 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. Axon™ Panels are packed on pallets and must be kept dry during transport. The panels must be horizontally stacked on a flat surface and must always be sufficiently supported so that they do not sag. They must be kept dry at all times, either by storing under cover or providing water covers to the stack, so they are stored in a dry ventilated space. Axon™ Panels must always be lifted from a stack by two people and then 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 This Appraisal must be read in conjunction with:
  - Axon™ Panel Direct Fixed Technical Specification, dated March 2024.
  - Axon™ Panel Timber Cavity Batten Technical Specification, dated March 2024.
  - Axon™ Panel Fixed to Hardie™ CLD™ Structural Cavity Batten Technical Specification, dated March 2024.
- 6.2 All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

### Design Information

#### Framing

##### Timber Treatment

- 7.1 Timber wall framing behind Axon™ Panel 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 buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. 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 shall be at a maximum of 600 mm centres. Nogs/dwangs must be fitted flush between the studs and spaced to suit the site framing requirements.
- 7.3 The moisture content of the timber framing must not exceed 24% at the time of the cladding installation. *[Note: If Axon™ Panel Cladding 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 Axon™ Panels are available in a variety of sheet lengths to readily accommodate installations up to 3 m in height without requiring a horizontal junction between sheets.
- 8.2 When Axon™ Panel Cladding is used for specifically designed buildings up to 3.2 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.
- 8.3 At ground level, the bottom edge of Axon™ Panel Cladding 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 Axon™ Panel Cladding 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 Punchings in the cavity vent strip provide a minimum ventilation opening area of 1,000 mm<sup>2</sup> per lineal metre of wall.
- 8.6 All external walls of buildings must have barriers to airflow in the form of flexible wall underlays and interior linings with all joints stopped for Wind Zones up to, and including, Very High, and rigid wall underlays for buildings in the Extra High Wind Zone and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure.
- 8.7 All external walls of buildings must have barriers to airflow in the form of 9 mm thick RAB™ Board when used on buildings between 10-25 m high, or situated in specific design wind pressures over a maximum differential ULS of 1.5 kPa.
- 8.8 Unlined gables and walls must incorporate either RAB™ Board, 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 wall underlays are used, the panel fixing lengths must be increased by a minimum of the thickness of the underlay.
- 8.9 Where cladding penetrations through the Axon™ Panel Cladding are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities by leaving a minimum gap of 10 mm between the bottom of the vertical cavity batten and the flashing to the opening.
- 8.10 Where the system 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. Such details should be discussed with James Hardie New Zealand Limited technical team for guidance.

## Inter-storey Junctions

- 8.11 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). For buildings more than 10 m high, a drained horizontal joint must be provided at each floor to accommodate the inter-storey deflections.

## Structure

### Mass

- 9.1 The mass of Axon™ Panel Cladding, when installed on the wall, is 12.1 kg/m<sup>2</sup> at equilibrium moisture content [EMC]. The cladding is therefore considered a light wall cladding in terms of NZS 3604.

### Impact Resistance

- 9.2 Axon™ Panel Cladding will resist impacts likely to be encountered in normal residential use. The likelihood of impact damage to the cladding 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 provided for vulnerable areas.



### Wind Zones

- 9.3 Axon™ Panel Cladding, when installed as a direct-fixed cladding, is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1.
- 9.4 Axon™ Panel Cladding, when installed over timber cavity battens, 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.
- 9.5 Axon™ Panel Cladding, when installed over Hardie™ CLD™ Structural Cavity Battens, is suitable for use in buildings up to 25 m high, situated in specific design wind pressures up to maximum design differential ULS of 3.2 kPa, where studs are at maximum 400 mm centres.

### Durability

- 10.1 Axon™ Panel Cladding meets the performance requirements of NZBC Clause B2.3.1 [b] 15 years for the Axon™ Panels and flashings, when installed in accordance with the manufacturer's instructions and when painted within 90 days of installation.

### Serviceable Life

- 10.2 Axon™ Panel Cladding installations are expected to have a serviceable life of at least 50 years provided that they are maintained in accordance with this Appraisal and the Technical Literature.
- 10.3 Coastal locations can be very corrosive to fasteners, especially locations within 500 m from the sea, including harbours, or 100 m 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. It is recommended that Axon™ Panel Cladding be fixed with stainless steel fasteners in these situations.
- 10.4 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 Axon™ Panel Cladding 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 Axon™ Panel Cladding to continue to meet the NZBC durability performance provision and to maximise the serviceable life.
- 11.2 Annual inspections must be made to ensure that all aspects of the cladding, including applied finishing systems, flashings and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow moisture 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 finish is required to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Grime may be removed by brushing with a soft brush, warm water and detergent. Paint systems must be re-coated at approximately 7-10 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 may adversely affect the long-term durability of Axon™ Panel Cladding].*

### Prevention of Fire Occurring

- 12.1 Separation or protection must be provided to Axon™ Panel Cladding from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Acceptable Solution C/AS1 and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.



## Control of External Fire Spread

### Vertical Fire Spread - Buildings 10 m in height or less

- 13.1 When the system is used in 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.

### Vertical Fire Spread - Buildings greater than 10 m in height

- 13.2 Axon™ Panel Cladding can form part of an external wall cladding system designed to meet Vertical Fire Spread requirements. The following information is provided to support the specific engineering design.
- 13.3 Axon™ Panel Cladding, as part of the James Hardie External Cladding System, has been tested to NFPA 285 and has passed the test criteria. The components listed in Table 1 form a part of the James Hardie External Cladding System and have been tested and achieved the listed classifications.

**Table 1: Components of the Axon™ Panel Cladding system**

Component	Test Method	Result
Axon™ Cladding Panels	AS/NZS 3837:1998 Component of NFPA 285 test	Pass: Type A Pass
James Hardie Rigid Air Barrier (RAB™ Board)	AS/NZS 3837:1998 Component of NFPA 285 test	Pass: Type A Pass
Hardie™ CLD™ Structural Cavity Battens	Component of NFPA 285 test	Pass
Joinery and joint flashings and mouldings	Aluminium as defined in C/AS2 definitions	Non-combustible
Inseal Foam Tape	Component of NFPA 285 test	Pass
Fixings	Steel as defined in C/AS2 definitions	Non-combustible

### Horizontal Fire Spread

- 13.4 Axon™ Panels have a peak heat release rate of less than 100 kW/m<sup>2</sup> and a total heat released of less than 25 MJ/m<sup>2</sup>. Refer to NZBC Acceptable Solutions C/AS1 and C/AS2 and NZBC Verification Method C/VM2 for fire resistance rating [FRR] and control of external fire spread requirements for external walls.

### External Moisture

- 14.1 Axon™ Panel 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 subfloor space to meet code compliance with NZBC Clause E2.3.5.
- 14.3 Axon™ Panel 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 weathertightness design principles outlined in NZBC Acceptable Solution E2/AS1. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature and the relevant provisions of NZBC Acceptable Solution E2/AS1. 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 Where a designed cavity drainage path is used in conjunction with Axon™ Panel Cladding, it does not reduce the requirements 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 Axon™ Panel 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 Requirement

- 16.1 All design and building work must be carried out in accordance with the Axon™ Panel Cladding Technical Literature and this Appraisal, by competent and experienced tradespersons conversant with Axon™ Panel Cladding. Where the work involves Restricted Building Work [RBW], this must be completed by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant License Class.

## System Installation

### Wall Underlay and Flexible Sill and Jamb Tape Installation

- 17.1 Flexible underlay or rigid wall underlay and flexible sill and jamb tape systems must be installed by the building contractor, in accordance with the underlay and tape manufacturer's instructions and NZBC Acceptable Solution E2/AS1, prior to the installation of the cavity battens and the Axon™ Panel Cladding. 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. Rigid wall underlays must be installed in accordance with the instructions of the manufacturer and the Technical Literature. Particular attention must be paid to the installation of the wall 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.
- 17.2 In cavity installations where studs are at greater than 400 mm centres and a flexible wall underlay is used, a wall underlay support must be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

### RAB™ Board

- 17.3 RAB™ Board must be installed in accordance with the Technical Literature and BRANZ Appraisal No. 611 James Hardie Rigid Air Barriers.

### Timber Cavity Battens

- 17.4 Cavity battens must be installed vertically over the flexible or rigid wall underlay to the wall studs. The battens must be temporarily fixed in place with 40 x 2.8 mm or longer nails at maximum 800 mm centres. Where a rigid wall underlay is used, the length of the cladding fixing must be increased by a minimum of the thickness of the underlay.

### Hardie™ CLD™ Structural Cavity Battens

- 17.5 Hardie™ CLD™ Structural Cavity Battens must be fixed to the wall framing over the wall underlay to the studs 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. Where a rigid wall underlay is used, the length of the fixing must be increased by a minimum of the thickness of the underlay. The battens are run continuously over the studs but must not run continuously over the floor joists. The smallest section of Hardie™ CLD™ Structural Cavity Batten must be at least 300 mm long.





#### Axon™ Panel Cladding Installation

- 17.6 Axon™ Panels 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.
- 17.7 Axon™ Panels must be kept dry prior to installation. Before the panels 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. Prior to installing cladding, ensure all pipes and penetrations have been sealed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.
- 17.8 Cavity battens and cavity closers (when applicable) must be installed in accordance with the Technical Literature and NZBC Acceptable Solution E2/AS1.
- 17.9 Before the Axon™ Panels are installed, the sheet set out must be checked and the internal and external corners prepared to suit the selected design option, e.g. external box corners or corner soakers. The necessary flashings, including window flashings, must be installed before commencing with sheet fixing.
- 17.10 Axon™ Panel Cladding must be installed whilst ensuring alignment at the base of the cladding, ensuring the bottom edge of the Axon™ Panels overhang the bottom plate or bearer by a minimum of 50 mm.
- 17.11 Vertical sheet joints in Axon™ Panels must be made over solid support, either cavity battens in the case of a cavity installation, or over studs or vertical blocking within the wall frame in direct-fixed installations. Axon™ panel fixings must be installed as shown in the Technical Literature with regard to position from the sheet edge and installation angle. Vertical joints can be overlaid with a timber batten, in accordance with the details contained in the Technical Literature.
- 17.12 Axon™ Panels must be fixed in accordance with the Technical Literature and this Appraisal. Consideration shall be given to the type of installation (direct-fixed or cavity) and any requirements for corrosion resistance. In cases where a rigid wall underlay is used, cladding fixings shall be increased in length by at least the thickness of the rigid wall underlay to ensure the fixing performance is not compromised.

#### Aluminium Joinery Installation

- 17.13 Aluminium joinery and associated head and sill flashings and joinery support bars must be installed by the building contractor in accordance with the Technical Literature. A 7.5 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.
- 17.14 After installing the window and door joinery, trim profiles such as planted sills and scribes may be installed in accordance with the Technical Literature to provide additional weatherproofing for the joinery/cladding junction.

#### Finishing

- 17.15 The finish coating manufacturer's instructions must be followed at all times for application of the paint finish. Axon™ Panel Cladding must be clean and dry before commencing painting.

#### Inspections

- 17.16 The Technical Literature must be referred to during the inspection of Axon™ Panel Cladding installations.

#### Health and Safety

- 18.1 Cutting of Axon™ Panels 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 or forming holes, health and safety measures as set out in the Technical Literature must be observed.
- 18.3 Safe use and handling procedures for Axon™ Panel Cladding are provided in the Technical Literature.



## Basis of Appraisal

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

### Tests

- 19.1 Uniform wind face load tests to simulate wind pressures on Axon™ Panel Cladding were carried out by a James Hardie Australia Pty Ltd NATA accredited laboratory. The testing determined design wind suction pressures, and by comparing these pressures with the NZS 3604 and AS/NZS 1170 pressure coefficients, the fixing requirements were determined for timber-framed walls. The test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 19.2 Axon™ Panel Cladding has been tested by a James Hardie Australia Pty Ltd NATA accredited laboratory in accordance with AS/NZS 2908.2 and ISO 8336. The testing covered: soak-dry, bending strength, warm water soaking, heat/rain, freeze/thaw and apparent density. The test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 19.3 The James Hardie External Cladding System has been tested to NFPA 285 by Intertek and has passed the test criteria.
- 19.4 Axon™ Panel Cladding has been tested to AS/NZS 4284 by FacadeLab.

### Investigations

- 20.1 Structural, weathertightness and durability opinions of Axon™ Panel Cladding 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 Technical Literature for Axon™ Panel Cladding has been examined by BRANZ and found to be satisfactory.

### Quality

- 21.1 The manufacture of Axon™ Panel Cladding has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality of materials used and finished product was obtained by BRANZ and found to be satisfactory.
- 21.2 The quality of components and accessories supplied by James Hardie New Zealand Limited is the responsibility of James Hardie New Zealand Limited.
- 21.3 Quality of installation on-site is the responsibility of the installer, in accordance with the Axon™ Panel Cladding Technical Literature.
- 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, Axon™ Panels and accessories, in accordance with the instructions of James Hardie New Zealand Limited.
- 21.5 Sub-trades are responsible for the installation of penetrations, flashing etc. that are relevant to their trade, in accordance with the Axon™ Panel Cladding Technical Literature.
- 21.6 Building owners are responsible for the maintenance of Axon™ Panel Cladding in accordance with the instructions of James Hardie New Zealand Limited.



## Sources of Information

- AS 3566.1-2002 Self-drilling screws for the building and construction industries - General requirements and mechanical properties.
- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 2904:1995 Damp-proof courses and flashings.
- AS/NZS 2908.2:2000 Cellulose-cement products - Flat sheet.
- AS/NZS 4284:2008 Testing of building facades.
- AS/NZS 4680:2006 Hot-dip galvanised [zinc] coatings on fabricated ferrous articles.
- BRANZ Appraisal No. 611 James Hardie Rigid Air Barriers.
- BRANZ EM7 Performance of mid-rise cladding systems.
- ISO 5660.1:2015 Heat release rate [cone calorimeter method].
- ISO 8336:2017 Fibre-cement flat sheets - Product specification and test methods.
- NZS 3602:2003 Timber and wood-based products for use in building.
- NZS 3604:2011 Timber-framed buildings.
- SNZ TS 4211:2022 Specification for the performance of windows.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

## Amendments

### Amendment No. 1, dated 13 October 2022

This Appraisal has been amended to correct the serviceable life statement.

### Amendment No. 2, dated 03 April 2024

This Appraisal has been amended to change the Appraisal name and to increase the scope for buildings up to 25 m in height.



In the opinion of BRANZ, Axon™ Panel 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:

19 May 2022

# Product Technical Statement

## Gerard Roofs Pressed Steel Tiles

### Statement of Building Code Compliance

This system if designed, used, installed and maintained in accordance with the supporting technical information and additional conditions and limitations will meet the following provisions of the New Zealand Building Code:

- B1 Structure
- B2 Durability
- E1 Surface Water
- E2 External Moisture

### Evidence Base to Support Compliance

This system has the following evidence to support the above solution type declaration:

- Independent technical opinion
- In-house technical opinion
- Independent testing
- In-house testing
- Industry-based scheme
- Historical proof of performance

B1, B2, E1 & E2 reference NZ Metal Roofing & Wall Cladding Manufacturers Code of Practice. Section 10 relates to Pressed Metal Roofing Tiles.

### Compliance with NZS4217 Pressed Metal Tile Roofs

Aluminium-zinc coated steel complies with AS1397, not NZS3441 as prescribed in NZS4217. We are also comfortable that we meet the requirements of B2 based on the In-service History Evaluation allowed under B2/VM1. At two severe marine testing sites we have roofs which are in good condition after 23 and 25 years respectively. Evaluations continue on other roofs which are in excess of 30 years.

### Scope of Use

Buildings that comply with NZS3604 with a minimum roof pitch of either 10, 12 or 15 degrees (depending on chosen profile) and ranging up to a maximum pitch of 90 degrees.

### Environmental Conditions

This system is code-compliant for the following environmental conditions:

- Wind Zone - Specific Design
- Corrosion Zone - Sea Spray Extreme
- Seismic Zone - High

Specific design can allow higher wind speeds - batten rafter connections are the limitation.

### Installation Conditions

This system is code-compliant on the condition that it has been installed by:

- Licensed Applicator / Installer

### Additional Conditions & Limitations

A warranty for the system is supplied with a maximum 30 year duration.

### Material Compatibility with Modern Roofing Materials

If alterations are made to the home after the installation of the roof, such as fitting of chimneys, extensions, installation of skylights, etc., it is important to ensure that the materials that are used are compatible with the roofing material. Gerard Roofs' steel tiles are manufactured from 55% aluminium- zinc coated steel and then post coated with a protective and decorative coating system.

### Dissimilar Metal Corrosion

When two different metals are in contact and moisture is present, one metal is relatively protected while the other suffers accelerated corrosion. A similar effect commonly occurs with water flowing over dissimilar metals. This form of corrosion is commonly found where:

- Water is discharged from copper or brass systems over a galvanised or 55% aluminium-zinc coated steel roof
- Unpainted lead flashings are applied directly to 55% aluminium-zinc coated steel products, or
- Where fasteners are incompatible with the roofing material

Any electrical contact between dissimilar metals should be avoided.

### Consenting Instructions

Where Gerard Metal Roofing Tiles are specified on plans these must be installed by a trained installer. Substitution is not allowed.

### Critical Maintenance

**As detailed in our warranty:** "It is best to chemically clean the roof before growths are seen as a preventative maintenance measure. Spores may be present on the roof for up to two years before any visible organic growths are noticed. Treating the roof will not only kill the organic growths, but also the spores that lead to them. We suggest treating the roof every three to five years, however if you see growth occurring treat the roof more frequently."



## External Moisture

To Whom It May Concern

**Re: Gerard Roof Tiles External Moisture. NZBC and Specific Engineering Design.**

NZBC E2 requires that a roof provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

Gerard Roofs have been in service for more than 50 years and we offer a 50 year warranty on our metal roofing tiles even in extreme environments.

E2/AS1 Section 8.3 Pressed Metal Tile, The Metal Roofing and Wall Cladding Code of Practice and Gerard Roofs Installation manual provide details which outline the installation of the roofing system so that the roofing system meets the NZBC E2 requirements.

### Wall Flashing Details

E2/AS1 requires the use of wall flashings specific to the wind zone in which the roofs will be fastened - these relate to the minimum cover that the wall must cover the flashing up-stand. In situations where the wind zone is higher than Extra High the flashings specified in the Extra High Wind Zone should be used. This requires coverage of 90 mm.

Gerard roofs install roofs in cyclonic regions of Australia where wind speeds of 240 km/hr have occurred without issues with standard flashings.

### Roofing Underlays

Pressed metal tiles have to have an underlay that meets the requirements of NZS 2295:2006. The Bitumen based underlays are not suitable for Extra High or above Wind Zones however there are some Synthetic roofing underlays that have been approved by BRANZ which are suitable for the Extreme Wind Zones.

A Synthetic roofing underlay should be used under roofs that are located in Extra High or Specific Engineering Designed situation.

In summary, we have confidence that roofs installed as per Gerard Roofs installation manual and maintained in accordance with our warranty will last in excess of 50 years, we have installed roofs in New Zealand for more than 50 years and have significant numbers of installations in cyclonic regions where the wind and rainfall levels exceed those of the New Zealand Environment.

Should this not address your concerns, please feel free to contact me in person so I can better understand your reservations.

Regards

Dean Vincent

Sales and Marketing Manager

New Zealand and Pacific Regions

Peter Richards

Product Innovation Manager



# New Zealand installation manual

The worry-proof roof.

**Page 366 of 734**

# Gerard Roofs installation manual

## 1.0 Roofing tools

1.1 Gerard roofs specialised tools	10
1.2 Personal tools and hand tools	11

## 2.0 Checklists

2.1 Health and safety	14
2.1.1 General safety	14
2.1.2 Roofers	14
2.1.3 Building site	14
2.1.4 Roof traffic	14
2.2 Estimating building materials	16
2.3 Packaging	19
2.4 Identification	19
2.5 Storage and handling	20
2.6 Non-standard elements	20
2.7 Conditions of strong wind-driven rain or snow	20
2.8 Installation in extreme cold conditions	20
2.9 Responsibility	20

## 3.0 Products

3.1 Roof profiles	22
3.2 Accessories	26
3.2.1 General	26
3.2.2 Specific	29
3.2.3 Milano	30

## 4.0 Batten installation

4.1 Batten sizing	32
4.2 Batten selection	32
4.3 Batten fastening	33
4.4 Batten installation procedure	34
4.4.1 Batten setting out	34
4.4.2 Pin out	35
4.4.3 Pin out around obstacles in a roof plane	35
4.5 Batten location and fastening	36
4.6 Accessory batten installation	37
4.6.1 Ridge batten installation	37
4.6.2 Hip batten installation	38
4.6.3 Gable end batten installation	41
4.6.4 Valley board installation	41

## 5.0 Roofing underlays

5.1 Types of underlay	46	6.2.3 Nailing fastening technique	54
5.2 Roofing underlay installation	46	6.2.4 Gable roof	54
5.3 Eave roofing underlay	46	6.2.5 Hip roof	56
5.4 Ridges and hips	47	6.2.6 Ridge tiles	57
5.5 Valleys	47	6.2.7 Valley tiles	58
5.6 Wall Junctions	48	6.2.8 Laying tiles next to a wall	59
5.7 Repairs to roofing underlay	48	6.3 Nail guns and nails	60
5.8 Penetrations through the roofing underlay	49	6.4 Use of fixing tools	61

## 6.0 Cutting & installing

6.1 Site safety	52
6.1.1 Preparatory work	52
6.1.2 Tile selection - colour coding	52
6.1.3 Walking on tiles	52
6.1.4 Damaged tiles	52
6.1.5 Sub-trade damage	52
6.1.6 Work interruption	52
6.1.7 Clean up	53
6.1.8 Sign off	53
6.2 Tile laying	53
6.2.1 Laying tiles	53
6.2.2 Tile fastening	53

## 7.0 Product-specific installation

7.1 Gerard Corona	64
7.2 Gerard Senator	66
7.3 Gerard Rockport	68
7.4 Gerard Alpine	70
7.5 Gerard Colortile	72
7.6 Gerard Milano	74
7.7 Gerard Tuffcoat	76
7.8 Gerard Oberon	78

# Gerard Roofs installation manual

## 8.0 Installing hips, ridges & gables

<b>8.1 Barge installation (gable end)</b>	<b>82</b>
8.1.1 Box barge	82
8.1.2 Angle trim	83
8.1.3 Barrel 150	84
<b>8.2 Hip installation</b>	<b>85</b>
8.2.1 Box trim over a hip	85
8.2.2 Angle trim over a hip	86
8.2.3 Barrel over a hip	87
<b>8.3 Ridge accessory installation</b>	<b>88</b>
8.3.1 Box trim along a ridge	88
8.3.2 Angle trim along a ridge	89
8.3.3 Barrel along a ridge	90
8.3.4 Milano ridge flashing A installation	91

## 9.0 Valleys & wall flashings

<b>9.1 Valley installation</b>	<b>94</b>
9.1.1 Valley at an eave	94
9.1.2 Joining lengths of valleys	94
9.1.3 Fastening valley to the roof	95
9.1.4 Closing valley top	95
9.1.5 Valley junction on the top of a dormer	95
<b>9.2 Wall flashings for pitched roofs</b>	<b>95</b>
9.2.1 Side flashings	95
9.2.2 Side flashings - secret gutter	96
9.2.3 Apron flashings	97
9.2.4 Pitch flashings for brick veneer or cavity cladding systems	98
<b>9.3 Transverse wall flashings</b>	<b>99</b>
9.3.1 Side flashings	99
9.3.2 Apron flashings	100
9.3.3 Step flashings for brick veneer or cavity cladding systems	100



## 10.0 Roof junctions

<b>10.1 Gable end junction</b>	<b>106</b>	<b>10.9 Side flashing junctions</b>	<b>122</b>
10.1.1 External	106	10.9.1 External corner	122
10.1.2 Internal	108	10.9.2 Internal corner	122
<b>10.2 Hip ridge junction</b>	<b>110</b>	<b>10.10 Side flashing and step flashing junction</b>	<b>122</b>
10.2.1 Box trim	110	<b>10.11 Corner tiles</b>	<b>123</b>
10.2.2 Angle trim	110	10.11.1 Installation	123
10.2.3 Barrel 150	111	<b>10.12 Gable end wall top junction</b>	<b>124</b>
<b>10.3 Internal barge fascia junction</b>	<b>112</b>	<b>10.13 Mono pitch ridge &amp; wall junction</b>	<b>124</b>
<b>10.4 Valley junction</b>	<b>113</b>	<b>10.14 Gable end and wall junction</b>	<b>125</b>
<b>10.5 Valley split</b>	<b>113</b>	<b>10.15 Ridge valley roof junction</b>	<b>126</b>
10.5.1 Box trim	113	<b>10.16 Butyl valley at roof cross over junction</b>	<b>127</b>
10.5.2 Angle trim	114		
10.5.3 Barrel 150	114		
<b>10.6 Hip/ridge to wall</b>	<b>114</b>		
10.6.1 Install lower roof after wall cladding	114		
10.6.2 Install lower roof before wall cladding	118		
<b>10.7 Roof to wall stop end</b>	<b>119</b>		
10.7.1 External gutter system	119		
<b>10.8 Dormers</b>	<b>120</b>		
10.8.1 Detail A - Ridge to wall junction	120		
10.8.2 Detail B - Valley to roof	121		
10.8.3 Detail C - Side/Apron flashing junctions	122		

# Gerard Roofs installation manual

## 11.0 Penetrations

11.1 Chimneys	130
11.2 Skylights	132
11.2.1 Gerard roof skylight domes	132
11.2.2 Velux skylights	133
11.3 Sky tube base installation	134
11.4 Pipe vents	136
11.5 Ventilation	137
11.5.1 LV200	137
11.5.2 Sanitary vent	137
11.6 Solar brackets	138
11.6.1 Before installation	138
11.6.2 Solar bracket installation	138
11.6.3 Walking on tiles	140
11.6.4 Solar panel installation	140
11.7 Parapets	141
11.8 Back wall cricket	142

## 12.0 Unusual situations & circumstances

12.1 Top course too short or too long	144
12.1.1 Tuffcoat, Colortile, Rockport and Oberon	144
12.1.2 Corona, Senator and Alpine	144
12.2 Short valleys	145
12.3 Low pitched roof (>8°)	145
12.4 Butynol deck – Tile interface	145
12.5 Over length mono-pitched roof	146
12.6 Internal gutters	146
12.7 Change in pitch	147
12.7.1 High pitch to low pitch	147
12.7.2 Low pitch to high pitch	148

## 13.0 Re-roofing

13.1 Metal roof overlay with counter battens	150
13.1.1 Set out	150
13.1.2 Tile and accessory installation	152
13.2 Direct overlay method	152
13.2.1 Preparation	152
13.2.2 Set-out	152
13.2.3 Tile and accessory installation	154
13.3 Full roof strip and replacement	156

## 14.0 Roof installation on steel battens

<b>14.1 Batten setting out</b>	<b>158</b>	<b>14.7 Tile laying</b>	<b>165</b>
<b>14.2 Installing battens and roofing underlay</b>	<b>158</b>	14.7.1 Laying tiles	165
14.2.1 Install a RU Eave Flashing	159	14.7.2 Tile fastening	165
14.2.2 Underlay installation	159	14.7.3 Fastening technique	166
<b>14.3 Batten fastening</b>	<b>161</b>	14.7.4 Gable roof	166
<b>14.4 Accessory batten installation</b>	<b>162</b>	14.7.5 Hip roof	167
14.4.1 Ridge installation	162	14.7.6 Ridge tiles	169
14.4.2 Hip installation	162	14.7.7 Valley tiles	170
14.4.3 Ridge hip accessory junction	162	<b>14.8 Use of fixing tools</b>	<b>172</b>
14.4.4 Gable installation	162	14.8.1 Gable, hip and valley tiles	172
<b>14.5 Valley batten installation</b>	<b>163</b>	14.8.2 Ridge tiles	173
<b>14.6 Tile installation over steel battens</b>	<b>163</b>	14.8.3 Short tile bender	173
14.6.1 General	163	14.8.4 Long tile bender	173
14.6.2 Preparatory work	163		
14.6.3 Tile selection - colour coding	164		
14.6.4 Walking on tiles	164		
14.6.5 Damaged tiles	164		
14.6.6 Sub-trade damage	164		
14.6.7 Work interruption	164		
14.6.8 Clean up	165		
14.6.9 Sign off	165		





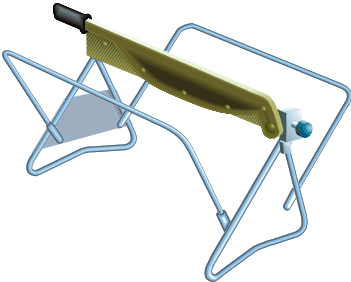
## 1.0 Roofing tools

The worry-proof roof.

**Page 374 of 734**

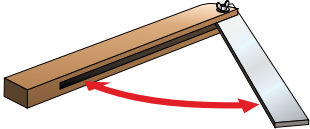
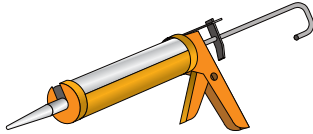
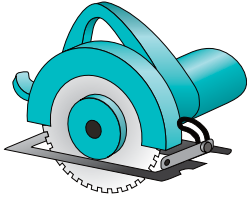

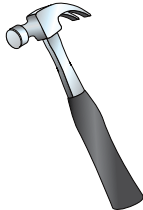



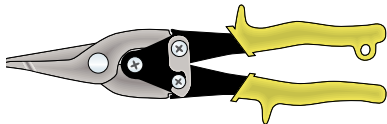
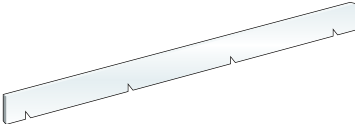


1.1 Gerard roofs specialised tools

Available from your Gerard roofs distributor.




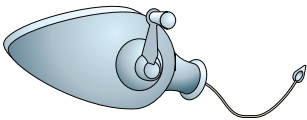
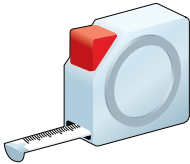


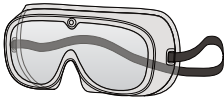

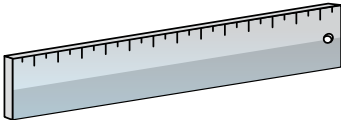
Guillotine		Long and short tile bending attachment		Short tile bender	
					
Figure 1.11		Figure 1.12		Figure 1.13	
Base	630 mm x 1200 mm	Base	1050 mm x 1660 mm	Base	840 mm x 760 mm
Height	620 mm	Height	1030 mm	Height	530 mm
Weight	36kg	Weight	36kg	Weight	32kg
<p>The legs are detachable for ease of transportation. The blade is manufactured from heavy-duty spring steel.</p>					



## 1.2 Personal tools and hand tools

Bevel	Caulking Gun	Circular Saw
		
Ear Muffs	Hammer	Duck Bills
		
Aviation Snips (Left)	Aviation Snips (Right)	Aviation Snips (Straight)
		
Pinout Rod	Nail Puller	Nail Gun CNP 65
		

1.0 Roofing tools

Nailgun Paslode IM 350	Pencil (non-graphite)	Soft-Soled Shoes
		
String Line	Tape Measure	Hard Hat (if required)
		
High Vis (if required)	Safety Glasses	Safety Site Sign
		
Ruler		
		



## 2.0 Checklists

The worry-proof roof.

**Page 378 of 734**

## 2.1 Health and safety

This is a simplified version of our Health and Safety on-site. For full Health and Safety documentation (i.e. Safe installation guidelines) please contact your GCR or Gerard Area Manager.

### 2.1.1 General safety

- Work should be supervised by an experienced supervisor or Gerard Area Manager to ensure it is done safely.
- Take all practicable safety precautions.
- All work should comply with Work Safe NZ "Guidelines for safe working at heights for residential and light commercial roofing".
- Temporary work (e.g. scaffolding/edge fall protection) is suitable, strong and meets Work Safe NZ requirements.
- Only experienced and trained contractors are to use guillotines, cutters and benders, or any power tools unless supervised by experienced contractors.
- Only competent and experienced contractors are to get onto the roof unless they are under supervision of experienced contractors or Gerard staff inspecting roofs.
- Other site workers, and members of public must be kept safe from site works e.g. footpaths must be kept safe from falling debris. "Danger Roofing Work in Progress" signs must be used on all sites.

### 2.1.2 Roofers

Roofers must be adequately trained in the safe use of the equipment in the place of work, including protective clothing and equipment.

Roofers should use sunscreen, sunglasses or hats, particularly during the time of highest exposure (11a.m. – 2p.m.) to ultraviolet radiation to avoid damage to skin and eyes.

### 2.1.3 Building site

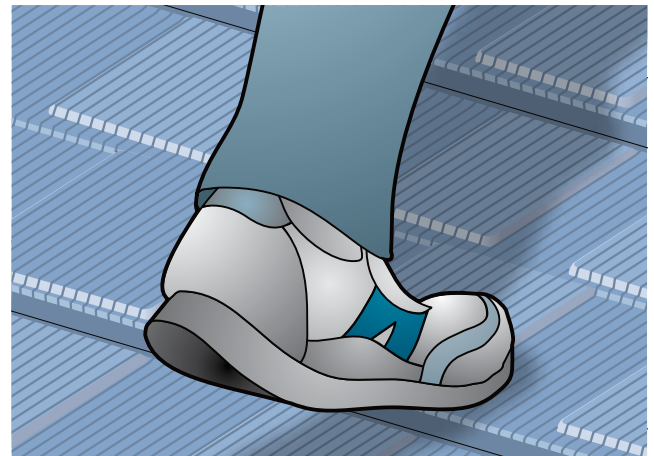
Before any work is commenced, in all cases there is a requirement that the roofing contractor will have had sufficient safety training and education, that site hazard identification has been undertaken, and that a contractors safety policy is in place.

### 2.1.4 Roof traffic

Use the correct footwear and technique.

#### Technique

Place your weight over the battens. Avoid walking on the roof when it is wet.



#### Footwear

Soft soled shoes, such as tennis shoes or old runners.

Check	Hazard identified	E	I	M	Action to be taken
	Brittle roofing (skylights, translucent, fibrecement or corroded sheets)				Not to be walked or stood on, risk of falling through
	Ceiling panels and battens				Not to be walked or stood on, risk of falling through.
	Slippery roof surfaces resulting from paint finishes, moss or lichen or dew and rain				
	Roof pitches above 35°				
	Roof projections such as pipework and flashing				
	Overhead power lines				Be aware of lines and have power turned off if necessary.
	Any roof penetration larger than 600 mm by 600 mm				
	Steeply sloping building sites				
	Wet or muddy ground conditions				Wear clean shoes on roof only
	Untidy site				Ensure no dangerous materials under work area
	Open foundations or drains				Put board over for access
	Within 2 m of any roof edge				
	Unsafe and/or inappropriate safety fall protection systems (choose from bump rail, safety mesh, edge protection, travel restriction and fall arrest devices)				Must meet OSH requirements
	Fall risk				Comply with Roofing Association of NZ (RANZ) guidelines for safe working at height. This is compulsory
	Rotten timber frame				Take extra care when walking on framing
	Loose accessories or loose tiles that have not been securely fastened must not be walked on				
	Valley boards not supported insufficiently to hold roofer's weight				Do not use valley boards for support when walking on the roof
	Fire damaged elements				
	Plant and equipment				
	Reinforcing starter bars				
	Asbestos check on existing material				
	Other Hazards noted				

Table 2.1.3.1 Site hazards checklist example

E = Eliminate I = Isolate M = Minimise

## 2.2 Estimating building materials

Estimating the nails you need			
Use	Size	Description	Packaging
Tile installation	50 x 2.8 mm	Galvanised or black cement, painted straight shank flathead	Box of 25kg or 5kg
Accessory installation	50 x 2.8 mm or 30 x 2.8 mm	Galvanised painted straight shank flathead	Box of 25kg
Batten installation – new roofing (refer 4.0 Batten installation for specific details)			
50 x 40 mm or 50 x 50 mm Battens (square cut)	100 x 3.75 mm or 90 x 3.15 mm or 80 mm 10 gauge screws	Bright steel or galvanised	Box of 25kg

## Roof estimating and quoting from Gerard Roofs

Builders or contractors only need to pass the building plan to Gerard Roofs and we will sort out the roof estimating for a small charge.

Table 2.2.0 Nail schedule

## Estimating tiles for a straight gable roof

- I. Determine the rafter length (**Figure 2.2.1**) and calculate the number of courses of tiles using formula **1** or from **Table 2.2.1**.

Always ensure that fractional tiles are counted as whole tile as these will have to be cut at ridge board.

- II. Determine the overall length of the roof (**Figure 2.2.2**) and calculate the number of tiles using formula **2** or from **Table 2.2.1**.

Ensure that fractional tiles are counted as whole tiles.

- III. Multiply tiles (I) x tiles (II)

- IV. Multiply result (III) x 2 when estimating for both sides of the roof.

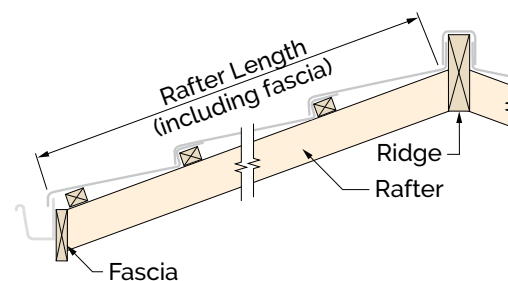


Figure 2.2.1

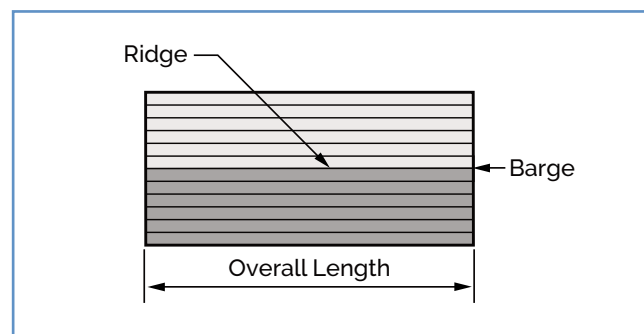


Figure 2.2.2



### Estimating tiles for hip and valley roofs

Extra tiles are required to compensate for wastage when cutting tiles for hips and valleys.

#### I. Hip roofs: (Figure 2.2.3).

Treat the roof initially as a straight gable. Calculate the number of tiles required for coverage using formula **1** and formula **2** for the body of the roof (or use **Table 2.2.1** to calculate the number of tiles.)

Multiply again by two to calculate tiles for both sides of the roof.

Find the total hip length and using formula **3** calculate the additional tiles required for hips.

Add this to the tiles required for the body of the roof.

#### II. Hip and valley roofs: (Figure 2.2.4).

First take the section with longest rafters (Section (A) **Figure 2.2.4**). Treat this section of the roof initially as a straight gable. Calculate the number of tiles required for coverage using formula **1** and formula **2** (or use **Table 2.2.1** to calculate the number of tiles.)

Multiply again by two when calculating tiles for both sides of the roof section.

Repeat the calculations for each section of the roof (Section (B)(C) **Figure 2.2.4**).

Find the total length of hips and valleys and using formula **3** calculate the additional tiles required for hips and valleys.

Add together the tiles for each section (A,B,C) and the additional tiles for hips and valleys to obtain the total tile requirement.

*All dimensions converted to metres.*

#### Formula 1:

Number of courses up rafter length

$$(RL-ES+WC)/WC$$

Where

RL – Rafter length

ES – Eave course spacing (0.33 m)

WC – Profile specified width of cover – refer to

#### 3.0 Products.

#### Formula 2:

Number of rows of tiles in overall length of roof

$$(OL-1.250^* + LC)/LC$$

Where

OL – Overall length

LC – Length of cover of profile – refer to **3.0 Products**

*\*Change to 1.215 for Milano profile*

#### Formula 3:

Additional tiles = total hip and or valley length in linear metres x 1.32 (wastage factor).

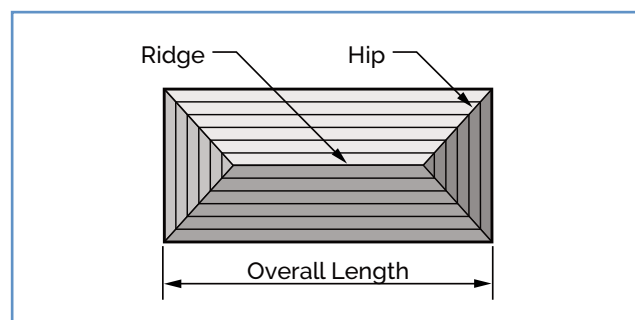


Figure 2.2.3

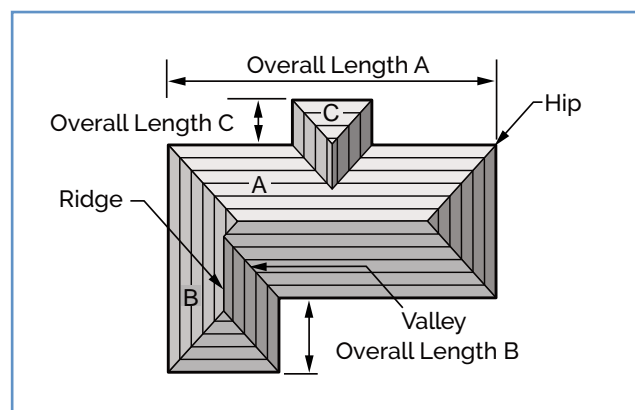


Figure 2.2.4

Rafter length*		Overall length	
To suit full course of tiles	No. of barge courses	Roof length	No. of tiles
0.330 m	1	1.365 m	1
0.700 m	2	2.615 m	2
1.070 m	3	3.865 m	3
1.440 m	4	5.115 m	4
1.810 m	5	6.365 m	5
2.180 m	6	7.615 m	6
2.550 m	7	8.865 m	7
2.920 m	8	10.115 m	8
3.290 m	9	11.365 m	9
3.660 m	10	12.615 m	10
4.030 m	11	13.865 m	11
4.400 m	12	15.115 m	12
4.770 m	13	16.365 m	13
5.140 m	14	17.615 m	14
5.510 m	15	18.865 m	15
5.880 m	16	20.115 m	16
6.250 m	17	21.365 m	17
6.620 m	18	22.615 m	18
6.990 m	19	23.865 m	19
7.360 m	20	25.115 m	20
7.730 m	21	26.365 m	21
8.100 m	22	27.615 m	22
8.470 m	23	28.865 m	23
8.840 m	24	30.115 m	24
9.210 m	25	31.365 m	25
9.580 m	26	32.615 m	26
9.950 m	27	33.865 m	27
10.320 m	28	35.115 m	28
10.690 m	29	36.365 m	29
11.060 m	30	37.615 m	30

Table 2.2.1

### Estimating accessories

When calculating accessory requirements a small allowance should be included to compensate for wastage.

- I. **Ridge/hip caps (RHC):** Determine the length of ridges and/or hips. Divide by the linear coverage per cap (i.e. 1900 mm) to calculate the number of units required.
- II. **Box barge cover (BBC):** Determine the length of barge boards. Divide by the linear coverage per box barge cover unit (i.e. 1900 mm) to calculate the number of units required.
- III. **Wall flashings, side flashings, step and pitch flashings, apron flashings:** Determine the overall length of flashings required (m). Divide the linear coverage by 1.9 to calculate the number of flashing units required.
- IV. **Barrel accessory:** Determine the total length of ridges, hips and barge boards to be covered. Divide by the linear cover of each unit (i.e. 370 mm) to calculate the number of barrel accessories required.

### Estimating battens for new roofing (standard accessories)

Provide 3 linear metres of battens per square metre of roof. 3.2 linear meters of batten per square metre where barrel accessories used.

### Estimating battens for overlay roofing

Provide 5 linear metres of battens per square metre of roof area.

### Estimating batten nail quantities

Refer to **4.0 Batten installation**

### Estimating tile nail quantities

Provide 1 kilogram of nails per 22 square metres of roof.

### Estimating accessory nail quantities

Refer to **8.0 Installing hips, ridges & gables**

## 2.3 Packaging

Tiles and accessories are stored on wooden pallets and protected by a plastic cover. A pallet consists of between 250 and 350 textured tiles which represent a roofing area of between 115 and 160 m<sup>2</sup>, or 500 maximum satin tiles which represent a maximum roofing area of 230 m<sup>2</sup>. Base dimension of tile pallets is 1400 x 1100 mm. The maximum height of a pallet is 1000 mm. Tiles are stacked on each pallet with a maximum weight of 1150 kg.

## 2.4 Identification

Each batch is identified individually; this identification can be found on the labels attached to the cardboards and on the back of the tiles. Product traceability is ensured from manufacturing to the installation site. The labels can be kept and filed.

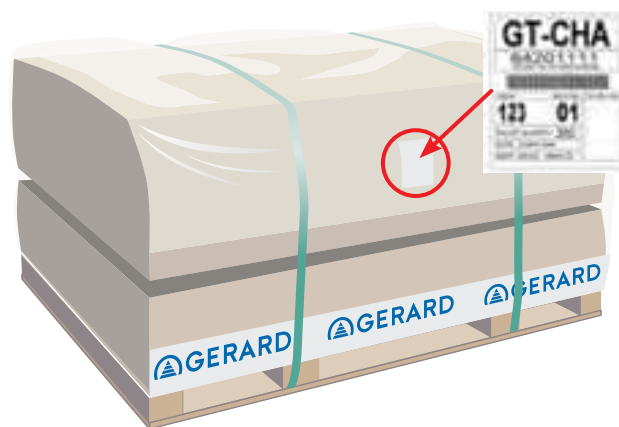


Figure 2.4.1 Label on the pallet

## 2.0 Checklists



Figure 2.4.2 Label on the back of the tile

### 2.5 Storage and handling

Tiles and accessories must be kept dry, covered and protected from damage while stored on the site. They should be stacked in a sheltered position preferably near areas of the building where they are to be installed. Tiles and accessories must be covered with a loose tarpaulin allowing air to circulate.

Once packs are opened and laying of the roof commences, a continual visual check should be made to ensure surface of the roofs and accessories are free of any noticeable defect or damage.

Where minor damage does occur, the touch up kit should be used to repair the surface.

### 2.6 Non-standard elements

When installing non-standard elements or gutters above the level of the roof, it is strongly recommended NOT to use materials that could cause corrosion (e.g. Cu, stainless steel etc.)

### 2.7 Conditions of strong wind-driven rain or snow

In areas prone to hurricane or strong wind-driven rain or snow, it is recommended that initial technical advice be sought from Gerard Roofs.

### 2.8 Installation in extreme cold conditions

Many installations have been completed in areas which are subject to lengthy periods of extreme cold. No detrimental effect has been noted on the surface coating of tiles, but special care is needed during installation to prevent chipping of the surface, and punching of the final 5 mm of the installation nail is recommended. In addition tiles should be warmed before either cutting or bending.

### 2.9 Responsibility

It is the responsibility of architects, builders and roof installers to ensure that local standards, by-laws and requirements are satisfied.

Care should be taken to ensure:

- All live electrical cables are well clear of any nailing positions
- Nailing is done in the position and manner specified by this manual
- Nails or fasteners are used according to specification



## 3.0 Products

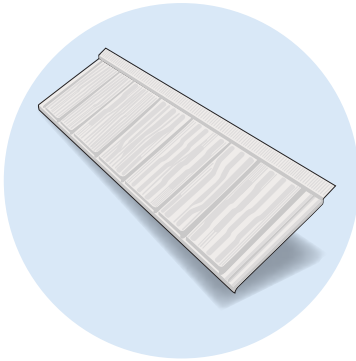
The worry-proof roof.

**Page 386 of 734**

### 3.1 Roof profiles

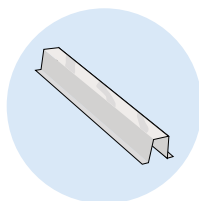
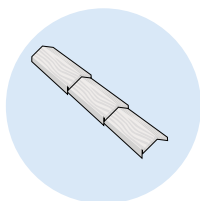
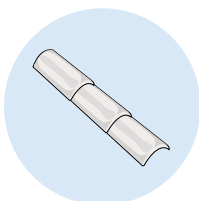
#### Gerard Corona

Combining a flat plane with continuous but irregular grooves gives Gerard Corona a recurring but slightly organic pattern that works with many styles of home.



Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	370 mm
Upstand	27 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	3.0 kg
Weight/panel Satin	2.1 kg
Weight/m <sup>2</sup> Textured	6.6 kg
Weight/m <sup>2</sup> Satin	4.7 kg

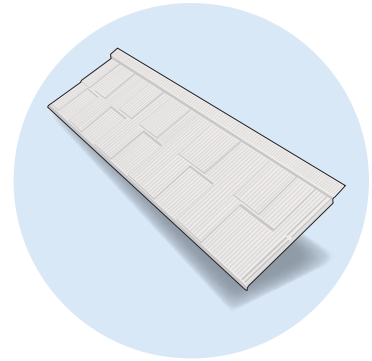
Gerard Corona is compatible with all three Gerard trims – **Barrel**, **Angle** and **Box**.



*Dimensions and weights given are nominal.*

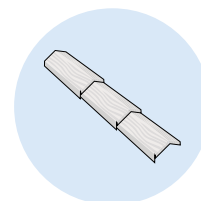
#### Gerard Senator

A profile with a modern look and subtle raised detailing. Senator is known for the simplicity and uniformity it brings to contemporary and traditional homes.



Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	368 mm
Upstand	16 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	3.0 kg
Weight/panel Satin	NA
Weight/m <sup>2</sup> Textured	6.6 kg
Weight/m <sup>2</sup> Satin	NA

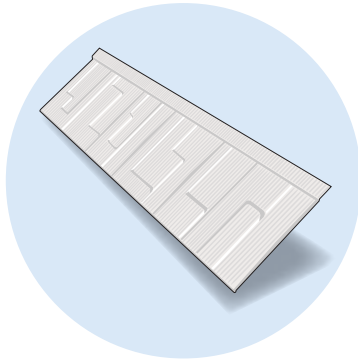
Gerard Senator is compatible with **Angle** trim.





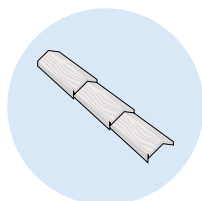
## Gerard Rockport

Among Gerard's flattest profiles, Rockport lends your roof a sleek, linear look and is often used on clean, simple architecture with a modern bias.



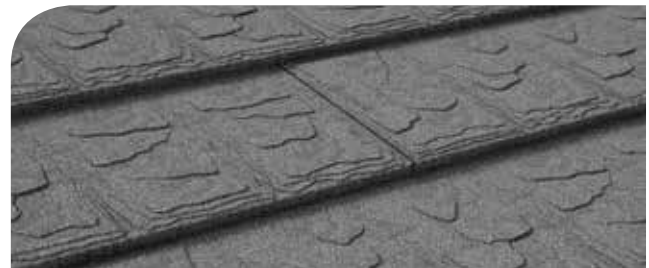
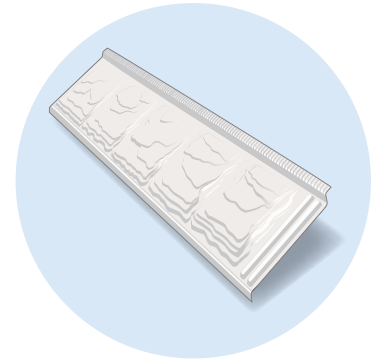
Pitch – min./max.	15-90°
Overall length	1330 mm
Length of cover	1250 mm
Width of cover	368 mm
Upstand	20 mm
Roof cover/panel	0.46 m²
Panels/m²	2.2
Weight/panel Textured	3.0 kg
Weight/panel Satin	NA
Weight/m² Textured	6.6 kg
Weight/m² Satin	NA

Gerard Rockport is compatible with **Angle** trim.



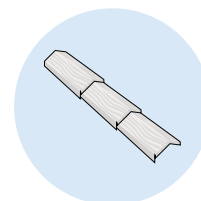
## Gerard Alpine

Inspired by the look of Welsh slate the Gerard Alpine profile lends a smooth, sleek linear look while surface detailing adds a slightly rustic overtone.



Pitch – min./max.	15-90°
Overall length	1335 mm
Length of cover	1260 mm
Width of cover	368 mm
Upstand	17 mm
Roof cover/panel	0.46 m²
Panels/m²	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	NA
Weight/m² Textured	6.4 kg
Weight/m² Satin	NA

Gerard Alpine is compatible with **Angle** trim.

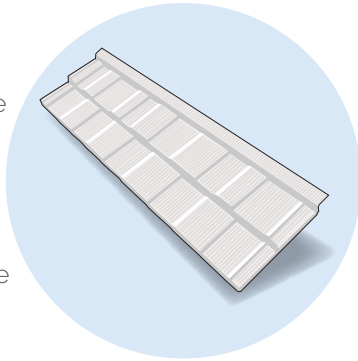


*Dimensions and weights given are nominal.*

### 3.1 Roof profiles

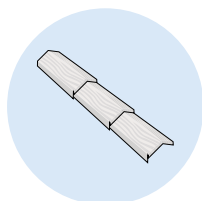
#### Gerard Oberon

The depth and dimension of Oberon make it most responsive to changes in light. It is often seen on substantial homes alongside dressed stone and natural timbers.



Pitch – min./max.	20-90°
Overall length	1310 mm
Length of cover	1230 mm
Width of cover	320 mm
Upstand	20 mm
Roof cover/panel	0.39 m <sup>2</sup>
Panel/m <sup>2</sup>	2.54
Weight/panel Textured	2.8 kg
Weight/panel Satin	NA
Weight/m <sup>2</sup> Texture	7.1 kg
Weight/m <sup>2</sup> Satin	NA

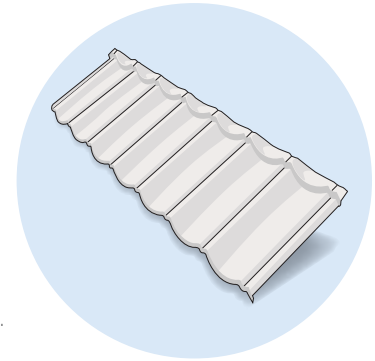
Gerard Oberon is compatible with **Angle** trim.



*Dimensions and weights given are nominal.*

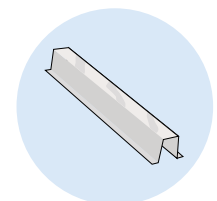
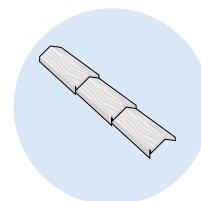
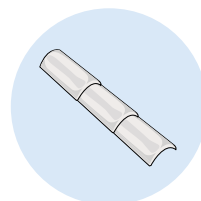
#### Gerard Colortile

The scalloped shapes of this profile bring a look that's similar to heavyweight tiles. The advantages of pressed steel mean this profile is often chosen as a substitute.



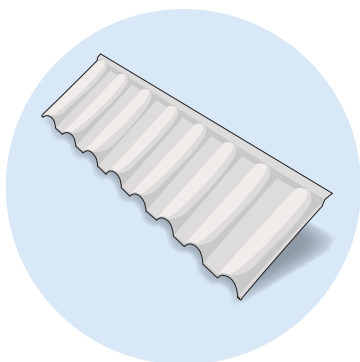
Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1257 mm
Width of cover	369 mm
Upstand	28 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	2.1 kg
Weight/m <sup>2</sup> Textured	6.4 kg
Weight/m <sup>2</sup> Satin	4.7 kg

Gerard Colortile is compatible with all three Gerard trims – **Barrel**, **Angle** and **Box**.



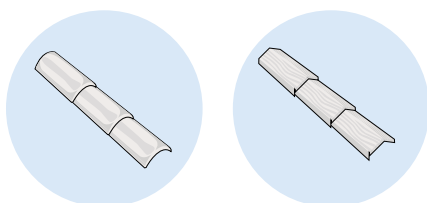
## Gerard Milano

With balanced arches and flats found in traditional design, Gerard Milano is a timeless profile that creates clean, elegant and classical looking roofs.



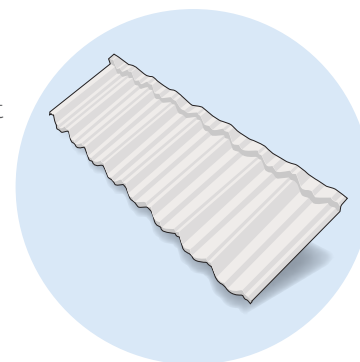
Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1215 mm
Width of cover	368 mm
Upstand	24 mm
Roof cover/panel	0.45 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	NA
Weight/m <sup>2</sup> Textured	6.4 kg
Weight/m <sup>2</sup> Satin	NA

Gerard Milano is compatible with **Barrel** and **Angle** trims.



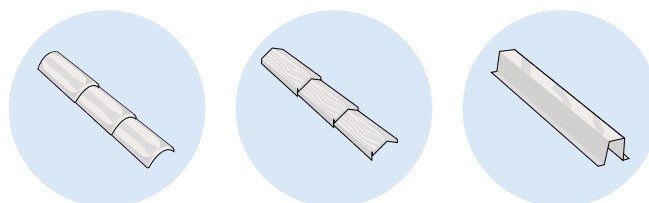
## Gerard Tuffcoat

Gerard Tuffcoat is a geometric profile with shapes and angles that accentuate light and shadow to emphasise its corrugations and create a look of strength and definition.



Pitch – min./max.	12-90°
Overall length	1320 mm
Length of cover	1257 mm
Width of cover	369 mm
Upstand	28 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	2.1 kg
Weight/m <sup>2</sup> Textured	6.4 kg
Weight/m <sup>2</sup> Satin	4.7 kg

Gerard Tuffcoat is compatible with all three Gerard trims – **Barrel**, **Angle** and **Box**.

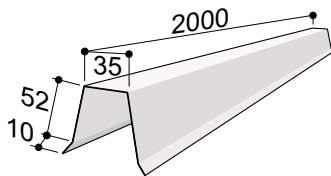


*Dimensions and weights given are nominal.*

## 3.2 Accessories

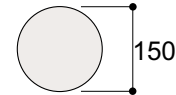
### 3.2.1 General

#### Box Trim



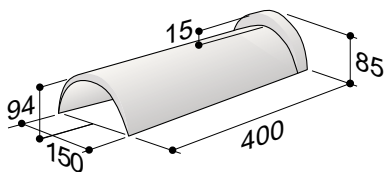
Overall length	2000 mm
Length of cover	1900 mm
Downturn	62 mm
Width	320 mm
Weight/unit Texture	35 mm
Roof cover/tile	2.0 kg
Weight/unit Satin	1.3 kg

#### Barrel Trim End



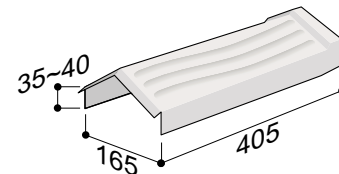
Diameter	150 mm
Weight/unit Texture	0.1 kg
Weight/unit Satin	0.1 kg

#### Barrel Trim



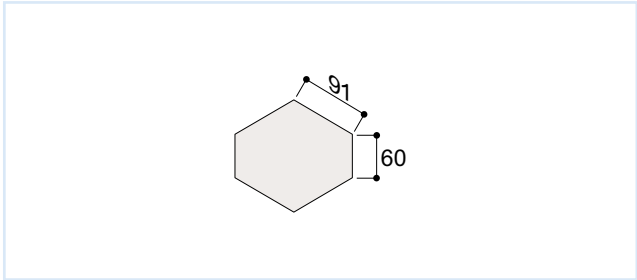
Overall length	400 mm
Length of cover	370 mm
Weight/unit Texture	0.6 kg
Weight/unit Satin	0.4 kg

#### Angle Trim



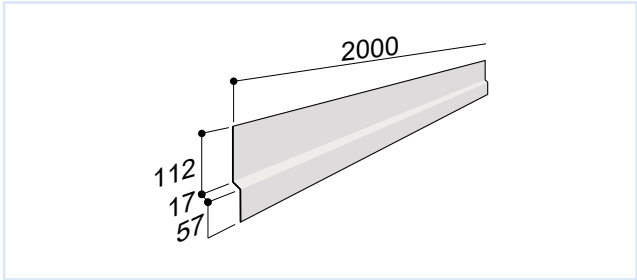
Overall length	405 mm
Length of cover	370 mm
Width	165 mm
Weight/unit	0.5 kg

Angle Trim End



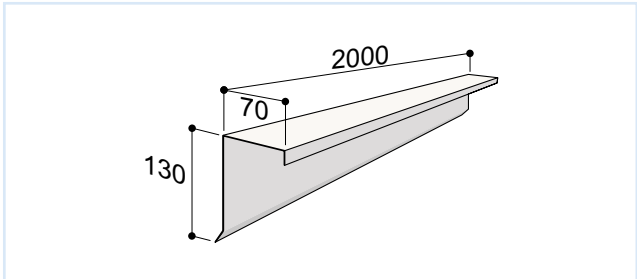
Weight/unit	0.1 kg
Width	157 mm
Height	150 mm

Side Flashing



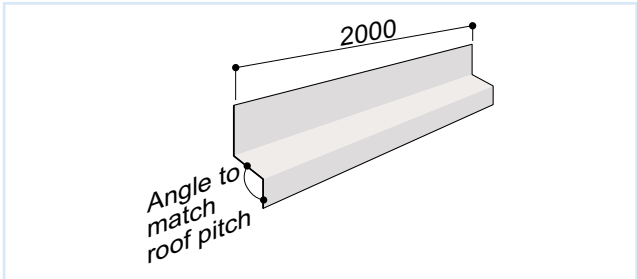
Overall length	2000 mm
Length of cover	1900 mm
Upturn	112 mm
Width	17 mm
Downturn	57 mm
Weight/unit Texture	1.8 kg
Weight/unit Satin	1.2 kg

Box Barge



Overall length	2000 mm
Length of cover	1900 mm
Downturn	130 mm
Width	70 mm
Weight/unit Texture	2.5 kg
Weight/unit Satin	1.6 kg

Step Flashing

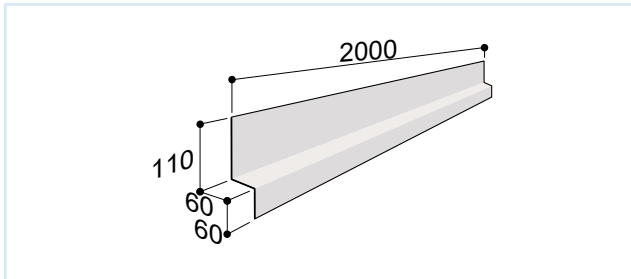


Overall length	2000 mm
Length of cover	1900 mm
Upturn	110 mm
Width	60 mm
Downturn	60 mm
Weight/unit Texture	2.3 kg
Weight/unit Satin	1.6 kg

## 3.2 Accessories

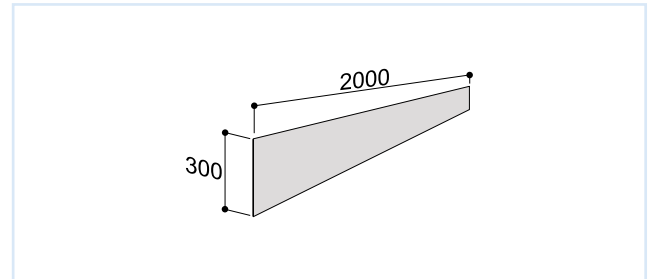
### 3.2.1 General

#### Pitch Flashing



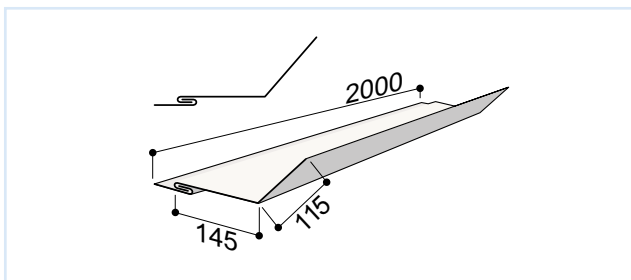
Overall length	2000 mm
Length of cover	1900 mm
Upturn	110 mm
Width	60 mm
Downturn	60 mm
Weight/unit Texture	2.3 kg
Weight/unit Satin	1.6 kg

#### Flat Sheet 300



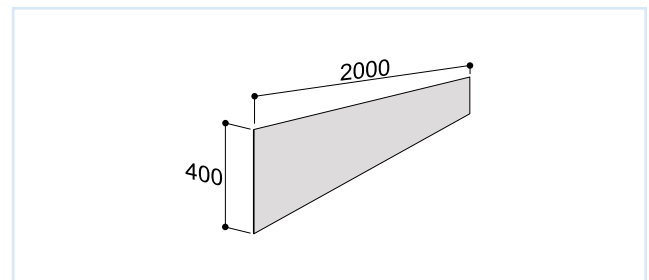
Overall length	2000 mm
Width	300 mm
Weight/unit Texture	2.9 kg
Weight/unit Satin	2.0 kg

#### Apron Flashing



Overall length	2000 mm
Width	300 mm
Weight/unit Texture	2.9 kg
Weight/unit Satin	2.0 kg

#### Flat Sheet 400

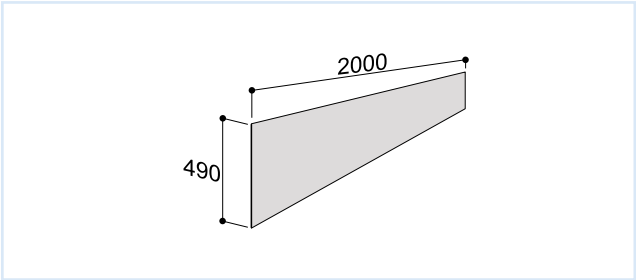


Overall length	2000 mm
Width	490 mm
Weight/unit Texture	4.8 kg
Weight/unit Satin	3.2 kg



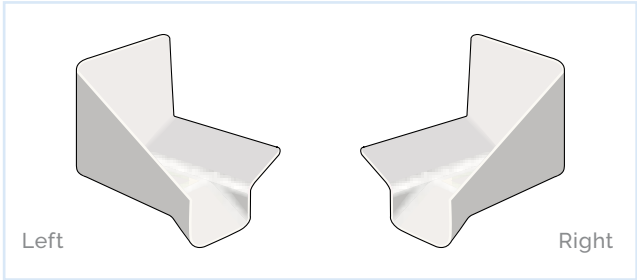
3.2.2 Specific

Flat Sheet 490



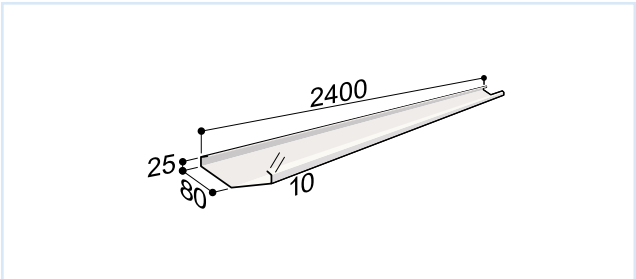
Overall length	2000 mm
Width	490 mm
Weight/unit Texture	4.8 kg
Weight/unit Satin	3.2 kg

Stop End left & right



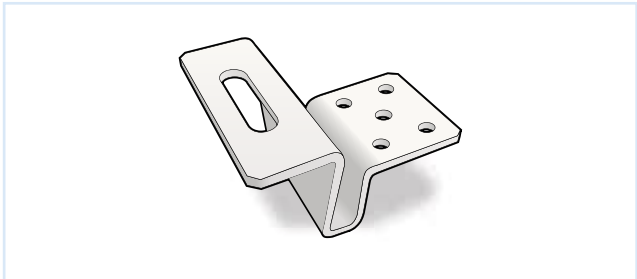
Material	PVC
Colour	White
Weight/unit	0.2 kg

Combination Valley



Overall length	2400 mm
Lap	150 mm
Width	160 mm
Weight/unit	2.1 kg

Solar Brackets

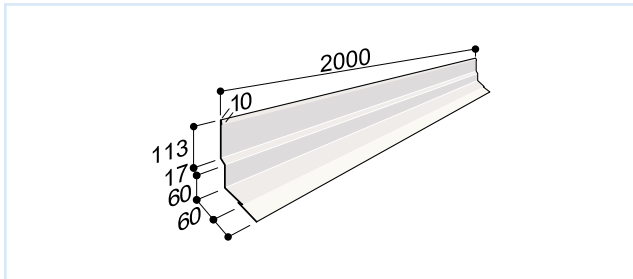


Weight/unit Senator	0.18 kg
Weight/unit HMCC	0.23 kg

### 3.2 Accessories

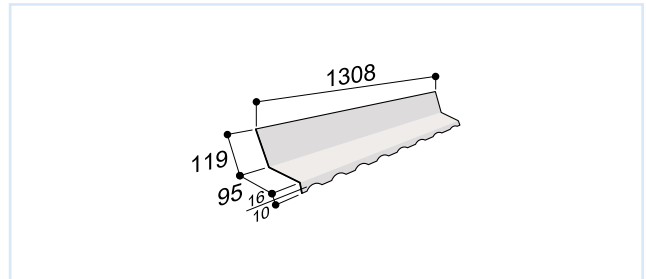
#### 3.2.3 Milano

#### EH Wind Wall Flashing



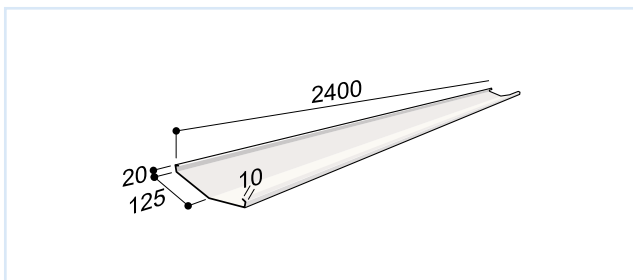
Overall length	2000 mm
Length of cover	1900 mm
Weight/unit Texture	3.3 kg
Weight/unit Satin	2.4 kg

#### Milano Wall Flashing



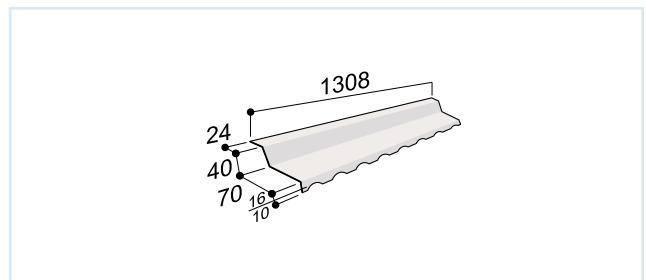
Overall length	1308 mm
Length of cover	1215 mm
Weight/unit	1.4 kg

#### E2 Wide Valley



Overall length	2400 mm
Length of cover	2250 mm
Weight/unit Painted	3.3 kg

#### Milano Ridge Flashing



Overall length	1308 mm
Length of cover	1215 mm
Weight/unit	1.0 kg



## 4.0 Batten installation

## 4.0 Batten installation

### 4.1 Batten sizing

Rafters or roof trusses can be set at various centres depending on the type of construction.

The following batten sizes are recommended:

Truss spacing (mm)	Batten size (mm)	Situation
900	40 x 50	Standard
1200	50 x 50	Occasional
1500	50 x 65 on edge	Unusual
1800	50 x 75 on edge	Unusual

Table 4.1.1 Batten size

Cost savings may be obtained if rafter lengths are designed to accommodate an exact number of tile courses. Where this is not possible, the tiles in the top course will need to be cut and bent.

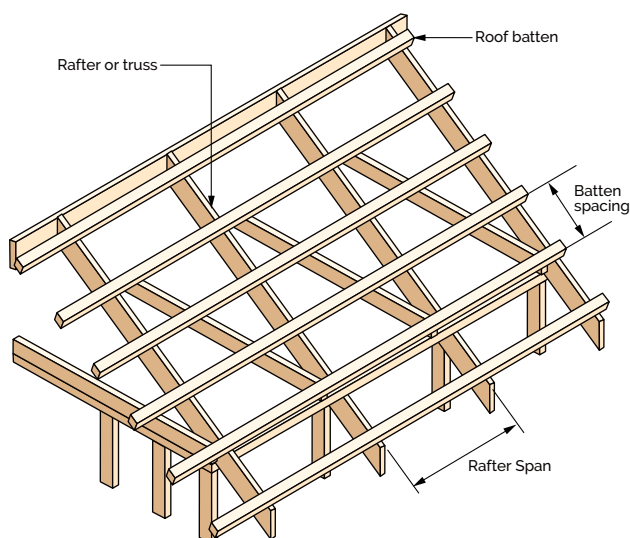


Figure 4.1.1 Roof battens

Splay cut or bevelled battens may be used for Colortile satin to reduce batten impressions.

### 4.2 Batten selection

Battens meeting NZ3604 must be used for all roofing.

Timber treatment grade, Pinus Radiata – H1.2,  
Douglas Fir – H1.2.

Length must be longer than 3 rafter spans.

**Installer must visually grade battens on site using the following criteria:**

Minimum finish – cut-of-log (COL) sawn timber.

- Must be free from defects, knots and splitting.
- No twisting and batten must be straight between rafters once fixed.
- Sizing as listed in the batten size: **Table 4.1.1** batten size.

Battens meeting these criteria are then classed as No.1 framing grade.

*A batten must be able to hold a load of 100 kg (1 kN) at centre span. You are selecting battens which you can safely work on.*

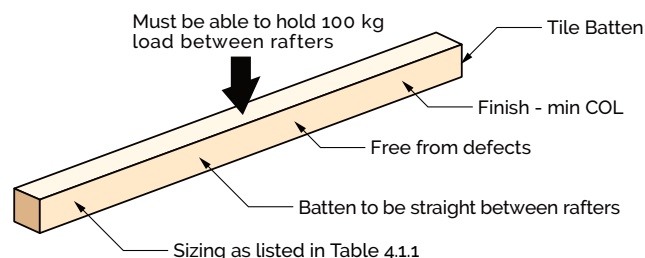


Figure 4.2.1 Roof battens

Battens are required by NZS 3604 to be No. 1 framing grade and able to support a load of 100 kg at mid-span. It has been agreed with the Department of Building and Housing (DBH) that this can be achieved by visual grading and selection by the fixer from standard battens, which are rough sawn "cut-of-log", so as to ensure battens which are straight in both directions, and safe to stand on at mid-span. It is the fixer's responsibility to make sure that the battens used are safe and suitable for good tile installation.

### 4.3 Batten fastening

Battens are attached to rafters using fasteners designed to hold the battens onto the rafters under various wind uplift loads.

Fastener type is selected based on the **wind zone**.

Generally, with batten size 40 x 50 mm and span

900 mm, 2 gun nails suit for all wind zones, up to and including very high wind zone, for domestic buildings.

If in doubt contact the Gerard Roofs Technical Service Division.

Gerard Roofs require that the battens are fastened with the fasteners described in **Table 4.3.1** or a fastener equivalent to, or greater than, the kN pullout max load for each batten rafter junction of the roof.

Fastener	Size	Quantity	Fixing type	kN pullout max
Gun nail	90 x 3.15	2	S	0.8
Purlin screw c/s head	80 mm x 10g	1	T	2.4
Type 17 screw	14g x 100	1	U	5.5

**Table 4.3.1 Batten fastener type**

Fixing type – designation and kN pullout loads from NZS3604:2011.

Wind zone	900 rafter 50x40 mm	1200 rafter 50x50 mm
Low 32m/s	<b>S</b>	<b>S</b>
Medium 37m/s	<b>S</b>	<b>S</b>
High 44m/s	<b>S</b>	T
Very high 50m/s	<b>S</b>	T
Extra high 55m/s	T	T
SED +55m/s*	Contact GR	Contact GR

**Table 4.3.2 Fasteners for panel battens - wind zones – NZS3604.**

**S** = 2 x 90 mm x 3.15 mm nails (0.8kN)

**T** = 80 mm x 10g screw (2.4kN)

*\*In SED Specific design situations refer to Gerard Roofs Technical Notes on installation in SED wind areas.*

When tiles are used for roofs of domestic buildings or other buildings with lined roofs (370 batten spacing), fastener types are determined as required for the higher uplift loads at the periphery of the roof based on local pressure factors in AS/NZS1170.2.

## 4.0 Batten installation

### 4.4 Batten installation procedure

#### 4.4.1 Batten setting out

The most critical factor in the laying out of the tiles is accurate setting out of the battens. If this is not adhered to, the tiles will not fit correctly.

All measurements should be made from the front of battens (face closest to eave). This is the surface where tiles will be fixed to the batten.

Use the following table to identify the batten spacing for the tile you are installing:

Tile profile	Batten spacing		
	Textured	Satin	Product requiring centre batten
Corona	370 mm	371 mm	
Senator*	368 mm		Refer Figure 4.4.1.3 below
Rockport	368 mm		
Alpine	368 mm		
Oberon^	320 mm		Refer Figure 4.4.1.2 below
Colortile	369 mm	370 mm	
Milano	368 mm		
Tuffcoat	369 mm	370 mm	

Table 4.4.1.1 Batten spacing

\*Centre batten 185 mm, second batten from eave not installed, ^Centre batten 160 mm, second batten from eave not installed.

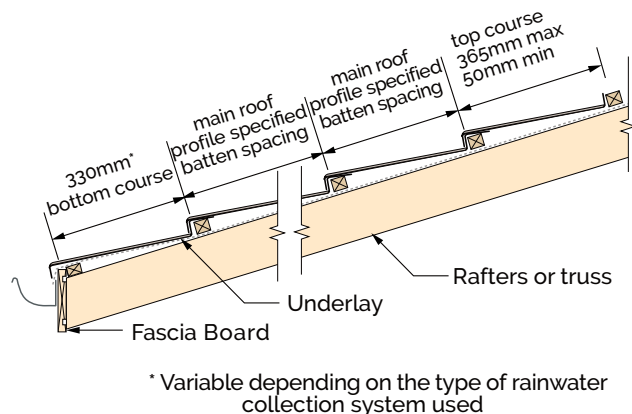


Figure 4.4.1.1 Rafter truss end-on view, batten spacing

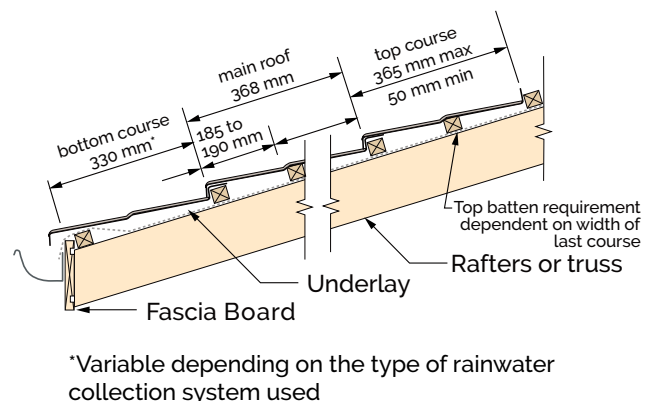


Figure 4.4.1.3 Senator setout, centre batten

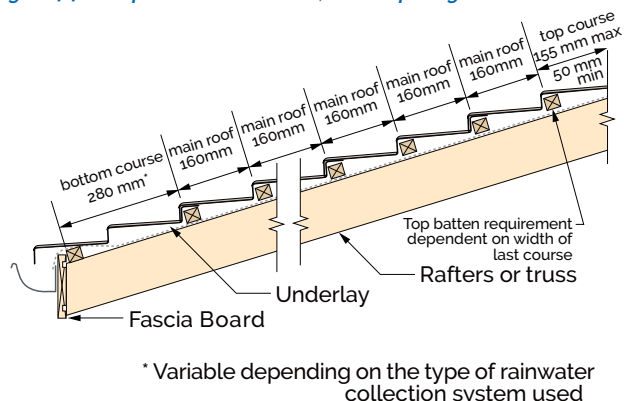


Figure 4.4.1.2 Oberon setout, centre batten



#### 4.4.2 Pin out

Measure up a rafter from the outside of the fascia board 330 mm\* to establish the position of the second batten, tack in a nail at this position. Repeat at the other end of the section of roof, then run a string line between the points. On each remaining rafter tack a nail at the string line.

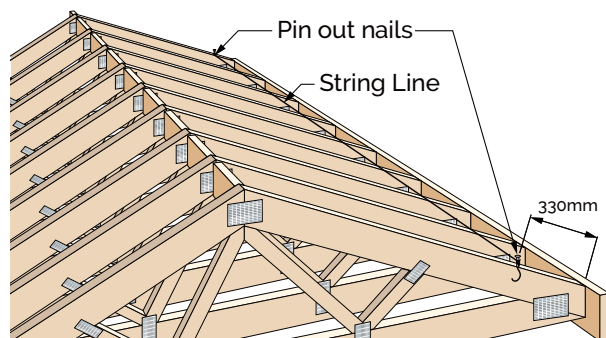


Figure 4.4.2.1 Pin out nail installation

In the event that the top course tile is too short or the rain water collection system conflicts with the tile nose, this dimension may be changed within -40 mm to +15 mm tolerance.

Roofing underlay is installed after pin out but before the tile battens are fastened. Refer to 5.0 Roofing underlays, to ensure that you have installed it correctly.

Using a measuring rod (pre-notched at the specific tile batten spacing) hook it over the nail so that it lays up the rafter. Tack a nail in each slot as markers for the battens.

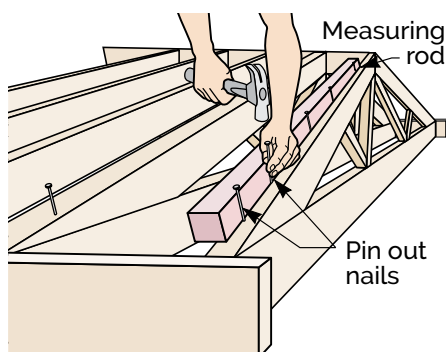


Figure 4.4.2.2

#### 4.4.3 Pin out around obstacles in a roof plane

When you encounter an obstacle in the roof. Sections where a valley results in a short eave, take a set of pin out nails to the ridge line (Figure 4.4.3.1 Step 1). Measure the distance from the last pin out nail to the ridge apex and transfer this to the opposite end of the ridge (Figure 4.4.3.1 Step 2) and then work down the rafters using the measuring rod to locate the pin out nail positions (Figure 4.4.3.2 Step 3).

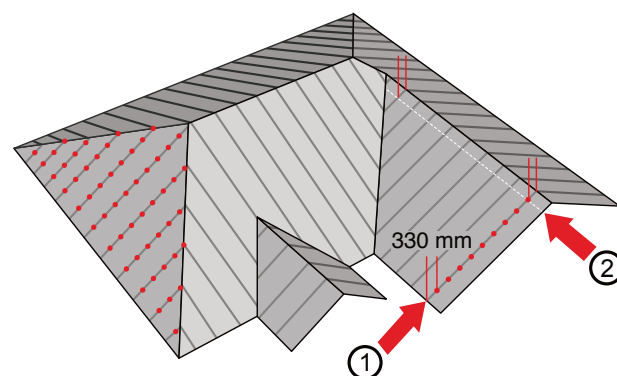


Figure 4.4.3.1

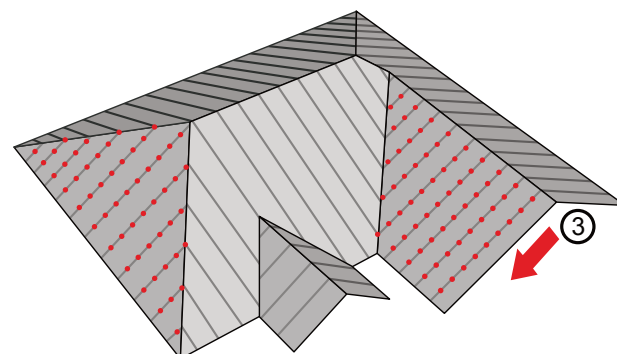


Figure 4.4.3.2

When you come across a dormer window, first of all, check if the fascia is of the same distance from the ridge. If the fascia is levelled, follow Figure 4.4.3.3. Step 1, 2 and Figure 4.4.3.4. Step 3 to provide pin out nails from eave to ridge, project a string line over the dormer using pin out nails on one side as a guide (Figure 4.4.3.4 Step 4), work up and down the other side with the measuring rod (Figure 4.4.3.5 Step 5). If the fascia is not levelled, a short eave course may be required – Refer 12.0 Unusual situations & circumstances.

## 4.0 Batten installation

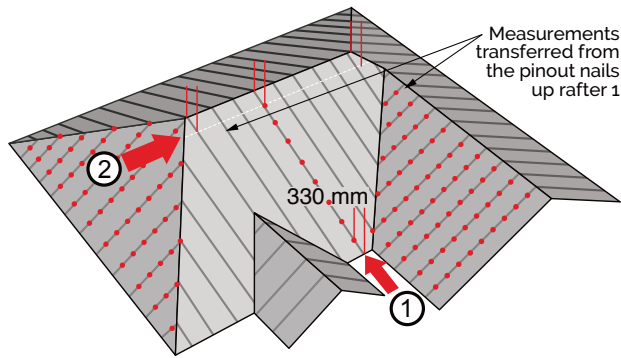


Figure 4.4.3.3

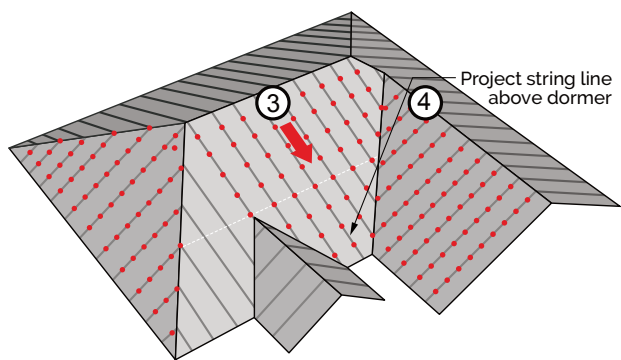


Figure 4.4.3.4

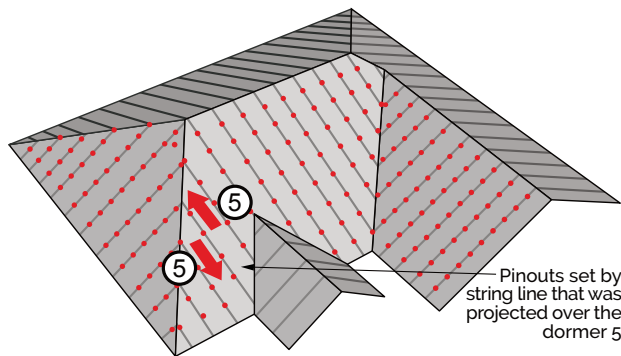


Figure 4.4.3.5

## 4.5 Batten location and fastening

Position eave batten just behind the fascia board.

Eave batten must close gap between fascia and rafter to prevent vermin and bird access.

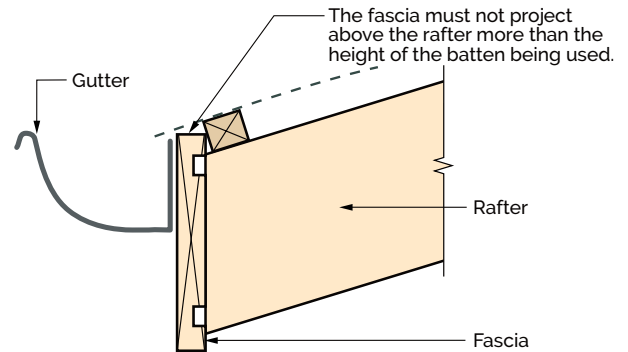


Figure 4.5.1

Pin out marker nails help hold the underlay in place, battens laid every third course but not fixed can be used to roll out the underlay. Batten joints are to be staggered and cut to length so that they butt together on top of a rafter. Battens must be fixed towards 3 rafters. Hold the battens firmly against the marking nail and fasten through the batten into the rafter. Once the battens are fastened remove the pin out nails.

Fasten battens over each length of underlay starting from the eave. Minimum overlap of a lower section of underlay is 75 mm (Refer to **5.0 Roofing underlays**).

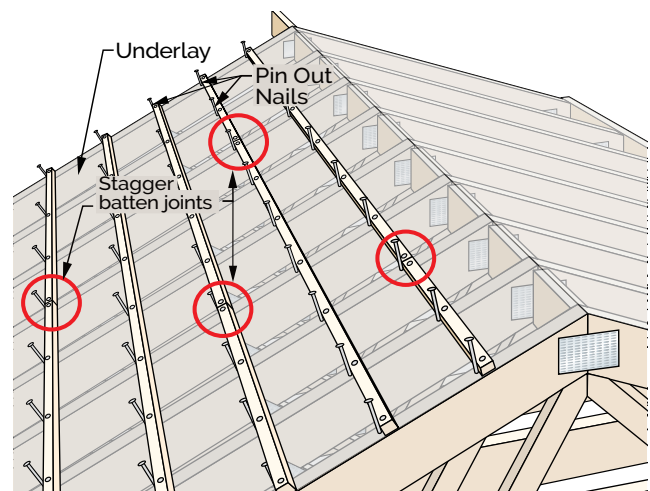


Figure 4.5.2

## 4.6 Accessory batten installation

### Ridges, hips, gables, valleys

There are several ridge configurations that may be used when constructing a roof:

Truss type (commonly used on new construction) and rafter/ridge board (Figure 4.6.1).

Battens need to be installed to accommodate the different accessories.

Accessory battens are fastened using the same size and number of fasteners as used for the tile battens – refer Table 4.3.1.

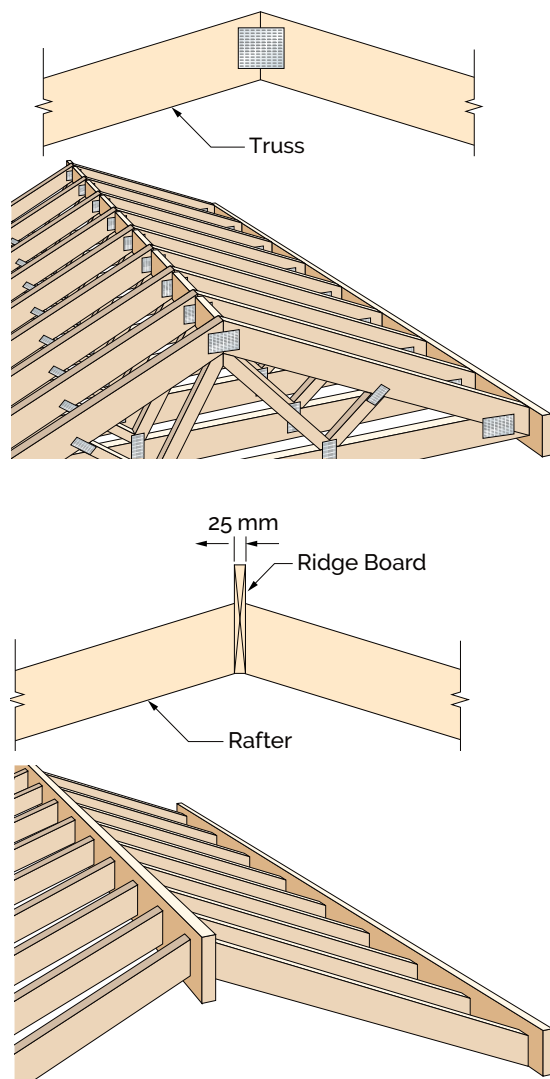
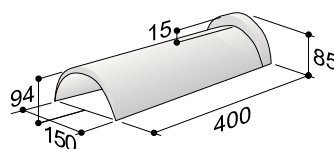
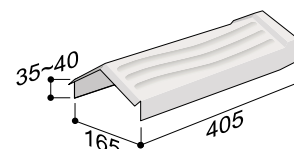


Figure 4.6.1

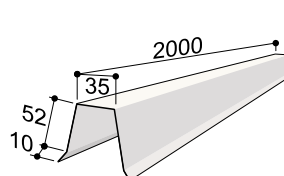
There are three accessories that are communally used on **ridges and hips**: Barrel 150, Angle trim and Box trim; **gable ends** may be finished with: Barrel 150, Angle trim or Box barge.



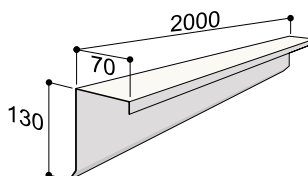
Barrel 150



Angle trim



Box trims



Box barge

### 4.6.1 Ridge batten installation

#### Barrel 150s and Angle trims

Set out of the battens is dependant on the pitch of the roof. Battens are usually positioned so that they are spaced apart evenly either side of the ridges apex. On steeper pitch roofs the battens need to be located closer together so the Barrels/Angle trims can be installed snugly against the turned up tile. Table 4.6.1.1 provides a guide to the width of battens at various pitches. It is good practice to use a string line to set battens for ridge/hips.

Two battens each side provide a base support for the back of the tile and for fastening the Barrels/Angle trims.

#### Barrel 150s

Typical ridge battens for Barrel 150s are spaced at 140 mm – check Table 4.6.1.1.

## 4.0 Batten installation

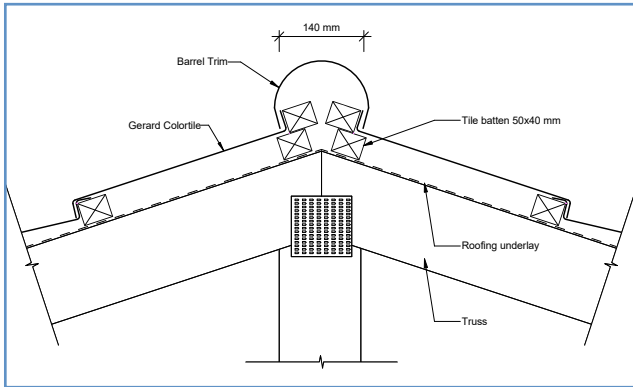


Figure 4.6.1.1.1 Barrel 150 trim on truss ridge

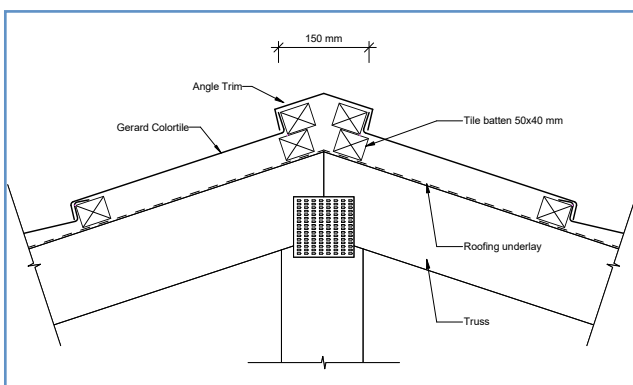


Figure 4.6.1.1.2 Angle trim on truss ridge

## Box trims

Box trims require a 25 mm wide board that stands 90 – 100 mm above the apex of the ridge.

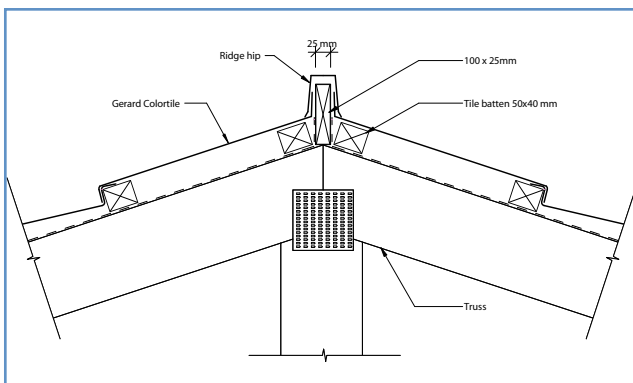


Figure 4.6.1.2.1 Box trim on truss ridge

## 4.6.2 Hip batten installation

## Barrel 150s and Angle trims

Set out of the battens is dependent on the pitch of the roof. Battens are usually positioned so that they are spaced apart evenly either side of the hips apex. On steeper pitch roofs the battens need to be located closer together so the barrels/angle trim can be installed tightly against the turned up tile.

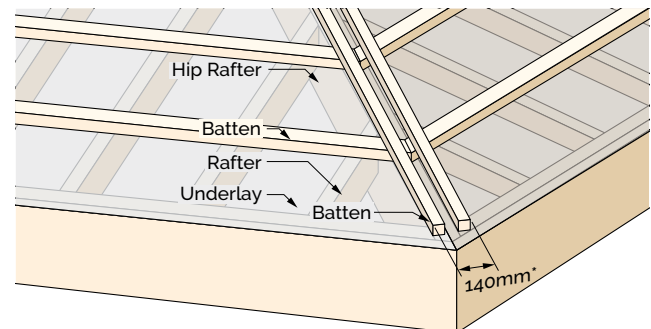
**Table 4.6.1.1** provides a guide to the width of battens at various pitches.

The battens each side are for supporting the turned up tiles and for fastening the Barrel 150s/Angle trims.

## Barrel 150s

Typical hip battens for Barrel 150s installed on top of the tile battens at spacing of 140 mm – refer to

**Table 4.6.1.1.**



\*May vary depending on roof pitch.

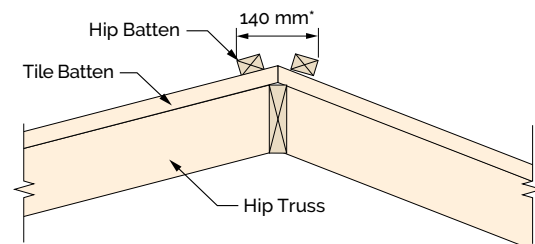
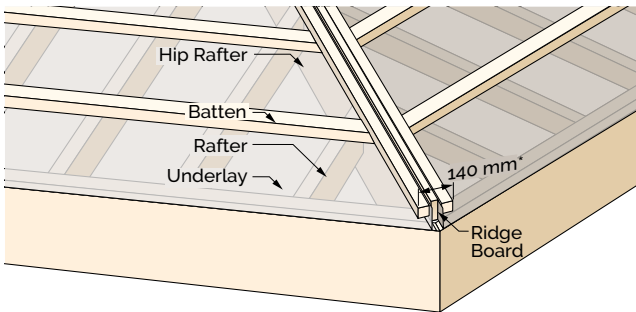


Figure 4.6.2.1.1

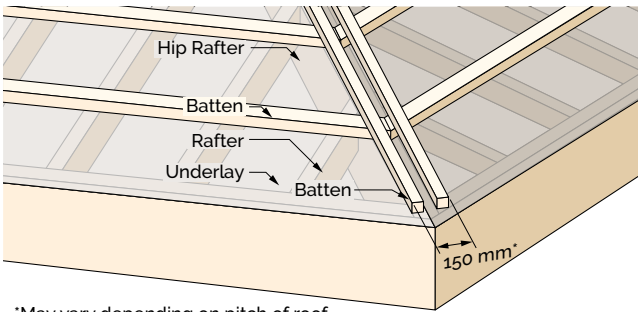
Ridge accessory	mm*			
		Roof pitch		
	Profile width	15-20°	20-35°	35-50°
Barrel 150	150 mm	145 mm	140 mm	125 mm
Angle trim	160 mm	155 mm	150 mm	135 mm
Box trim	25 mm	25 mm	25 mm	25 mm

Table 4.6.1.1 Ridge accessory batten spacing

Always use an Angle trim/Barrel to check set out and allow for tiles turn up.



\* May vary depending on pitch of roof



\* May vary depending on pitch of roof

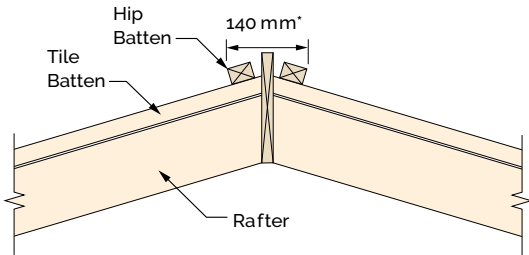


Figure 4.6.2.1.2

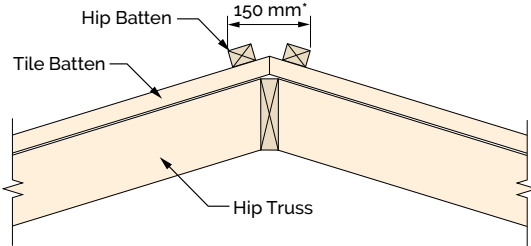
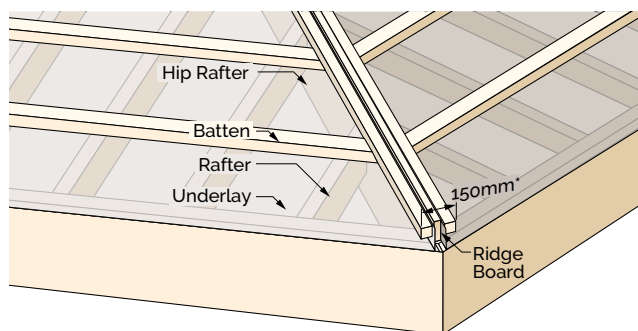


Figure 4.6.2.1.3

Angle trims

Typical hip battens for Angle trims installed on top of the tile battens at spacing of 150 mm – refer to Table 4.6.1.1.

## 4.0 Batten installation



\* May vary depending on pitch of roof

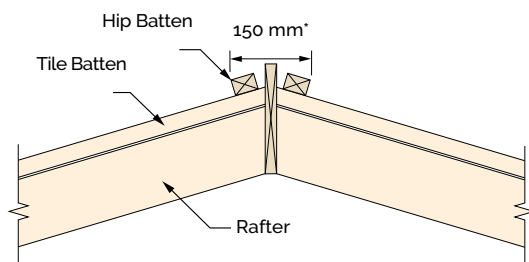


Figure 4.6.2.1.4

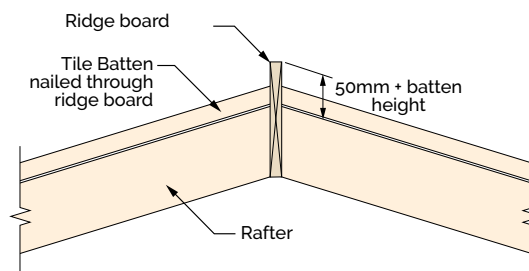
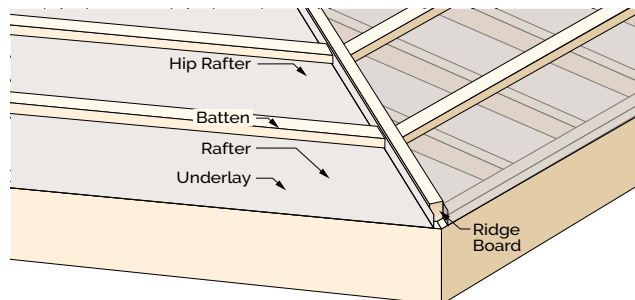


Figure 4.6.2.2.2

### Box trims

Box trims require a 25 mm wide board that stands 90 – 100 mm above the apex of the hip. This results in a 25 mm board projecting 40 – 50 mm above the tile battens.

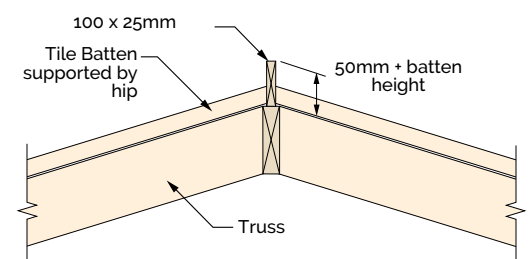
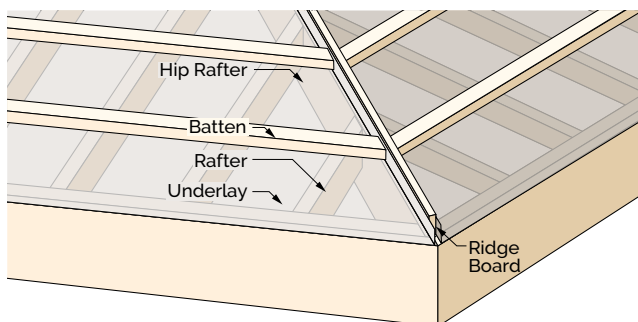


Figure 4.6.2.2.1



4.6.3 Gable end batten installation

A barge board should be installed before commencing batten installation.

The barge board should be installed 40 mm above the rafter. Tolerances of a minimum of 25 mm and a maximum of 60 mm above the rafter are permitted.

The measurement to locate the accessory batten is taken from the outside of the barge board

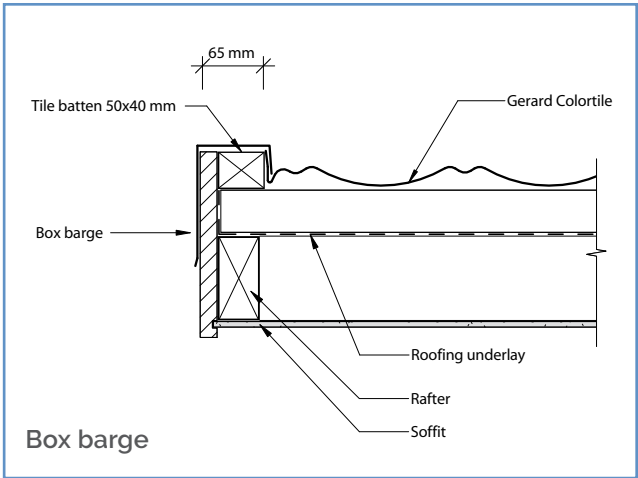
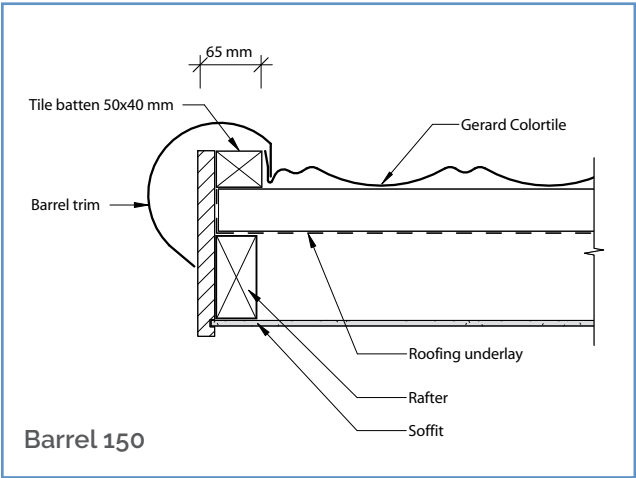
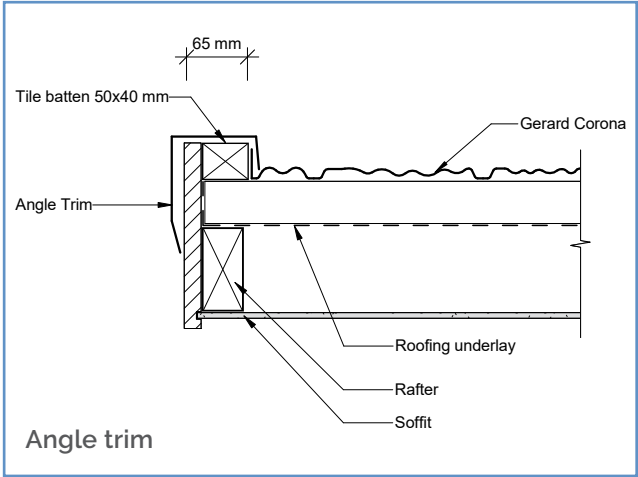


Figure 4.6.3.1

Gable accessory	Profile width as a gable accessory	Batten position for all roof pitches (from outside of barge board to inside of accessory batten)
Barrel 150	70 mm	65 mm
Angle trim	90 mm	65 mm
Box barge	70 mm	65 mm

Table 4.6.3.2

4.6.4 Valley board installation

Valley boards should be installed by the builder prior to the roof fixer starting batten installation. Timber should be treated to H3.

Valley boards are required to be set a minimum of 150 mm from the centre of the valley if Gerard Roofs

Combination valleys are used. These are required to support the valley, to attach the tile battens and they have to be able to support a load of 1.1 kN (110 kg).

Valley boards 150 x 25 mm are cut and installed between the trusses so that they can be nailed flush with the top of the rafter.

## 4.0 Batten installation

Valley boards 100 x 50 mm may be installed however these must be installed so that there is 25 mm clearance outside of where the valley sits so that tile battens have sufficient support and nailing width.

Roofing underlay is to be installed over the valley boards and under the tile battens. Refer to **5.0 Roofing underlays**.

### E2 Wide valley

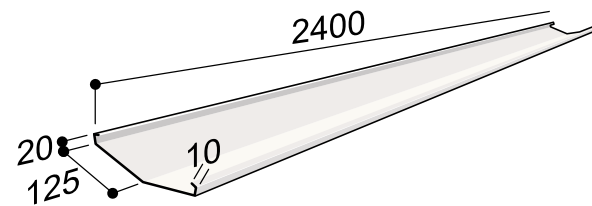
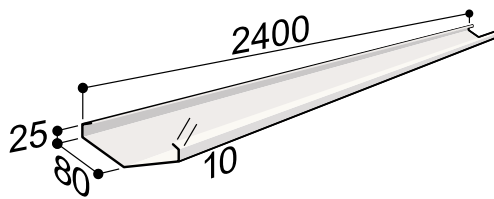


Figure 4.6.4.1

### Combination valley



### 100 x 50 mm Valley boards Combination valley

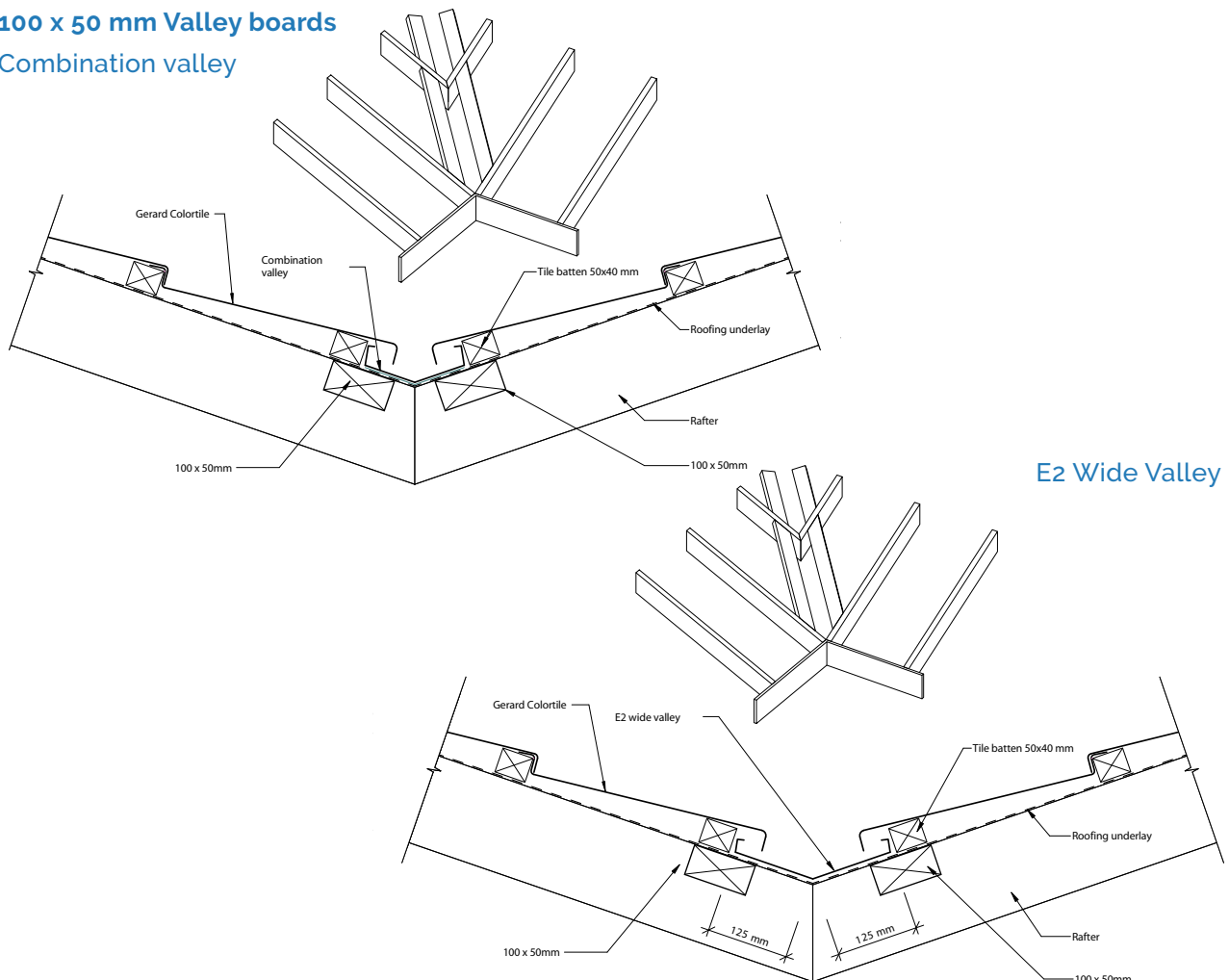
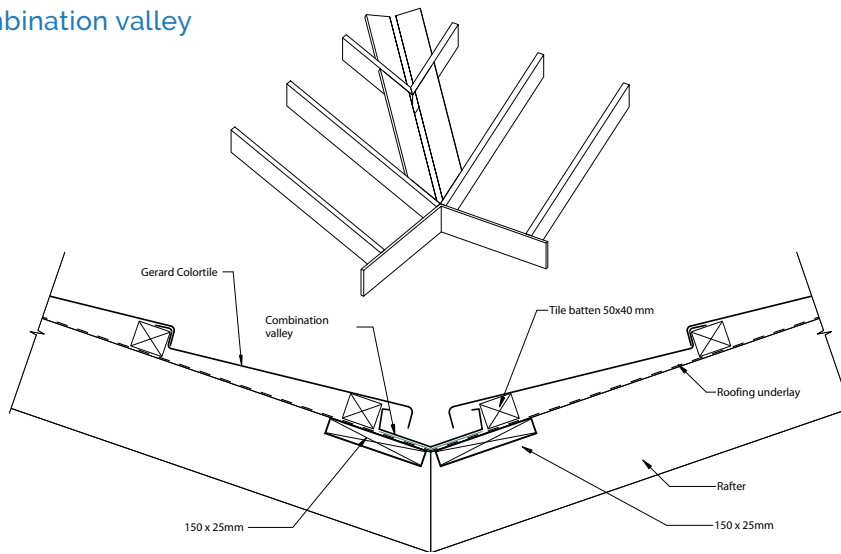


Figure 4.6.4.2 (continues on following page)

### 150 x 25 mm Valley boards

#### Combination valley



#### E2 Wide valley

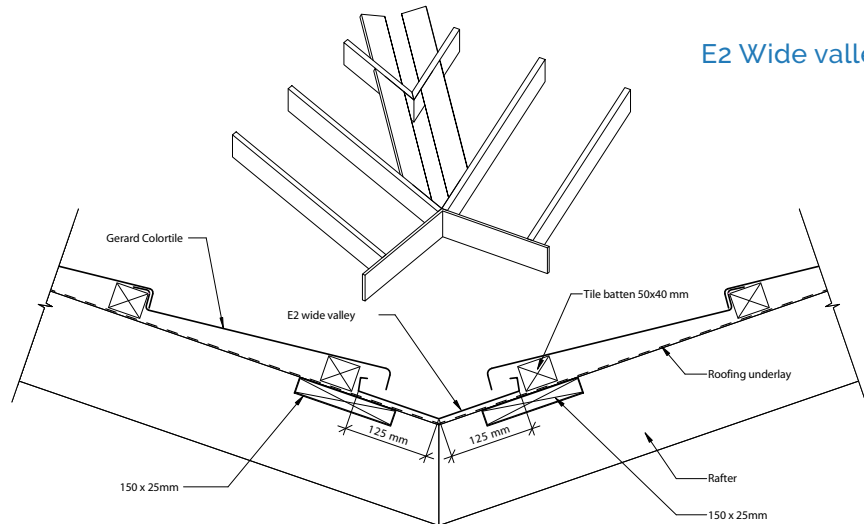


Figure 4.6.4.2





## 5.0 Roofing underlays

The worry-proof roof.

**Page 410 of 734**

## 5.0 Roofing underlays

## 5.1 Types of underlay

A self supporting roofing underlay or mesh supported underlay is required under all metal roofing. Must comply with standard NZS 2295 - Pliable and Permeable Building Underlays.

Type	Maximum
Bitumen Impregnated Kraft – self supporting	1200 mm
Fire Retardant Kraft – self supporting	1200 mm
Synthetic Roofing Underlay – self supporting	1200 mm
The above roofing underlays	>1200 mm to be wire mesh supported

Table 5.1.1 Roofing underlays

Roofing underlay should be installed so that any flow of moisture ultimately ends up in the eave gutter.

Roofing underlay should not be exposed to the weather for more than 1 week.

Roofing underlay is to be protected by a covering so that it does not get wet or is not exposed to UV until the roofing is completed. Fire retardant Kraft underlay must be covered the same day.

## 5.2 Roofing underlay installation

The roofing underlay is installed horizontally from the eave of the roof up to the ridge or hip, with a minimum edge overlap of 75 mm, ensuring that each higher length overlaps the lengths below. Vertical laps must be a minimum of 150 mm and be over a rafter so that both ends are held in place by battens.

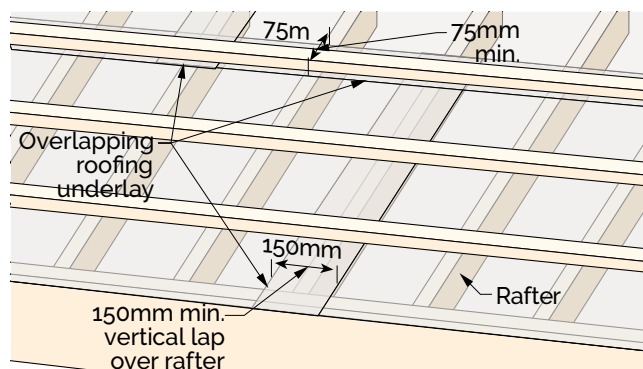


Figure 5.2.1

## 5.3 Eave roofing underlay

Install the first length so that the lower edge of the roofing underlay hangs 40 mm over the edge of the fascia board and into the gutter.

Roofing underlay at the eaves must be pulled tight so that it does not sag between the second batten and eave batten. Staple in place. Install an antiponding board if required.

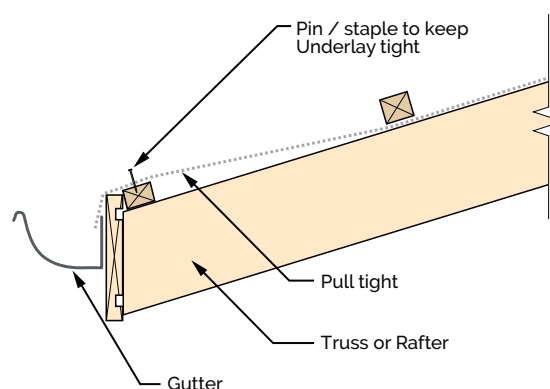


Figure 5.3.1

Use the eave batten and another batten laid horizontally to support the roll as it is rolled out. Push the roofing underlay down so that the pinout nails pierce the roofing underlay. This helps hold the roofing underlay in place. Place the tile battens on top of the roofing underlay and nail them in place, ensuring they are held correctly against the pinout nails. Subsequent lengths are installed up the rafters.



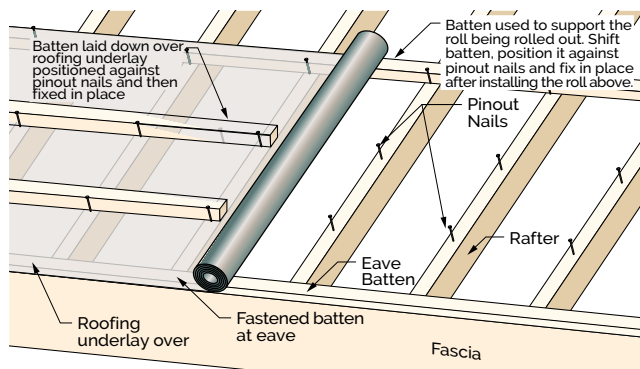


Figure 5.3.2

**Note:** Pinout nails have to be perpendicular to the rafters.

## 5.4 Ridges and hips

Roofing underlay must be lapped over ridges and hips so that the edges are held in place by battens on the opposite section of roof.

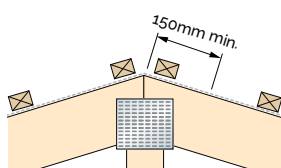
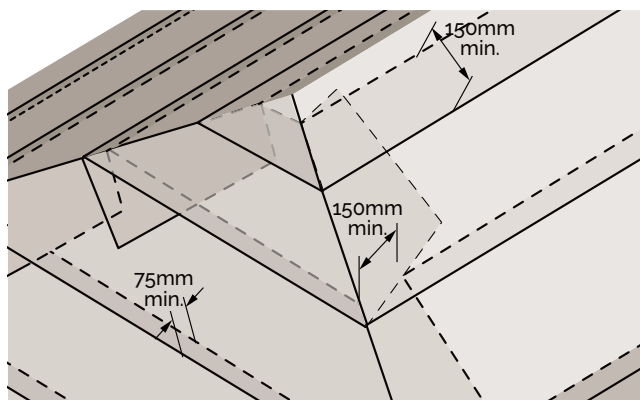


Figure 5.4.1

## 5.5 Valleys

### Option 1

A single length of roofing underlay laid down the valley section may be used - optional but not required (See 1 in Figure 5.5.1).

Roofing underlay must be lapped across valley sections so that the edges are held in place by battens on the opposite section of roof (See 2 and 3 in Figure 5.5.1).

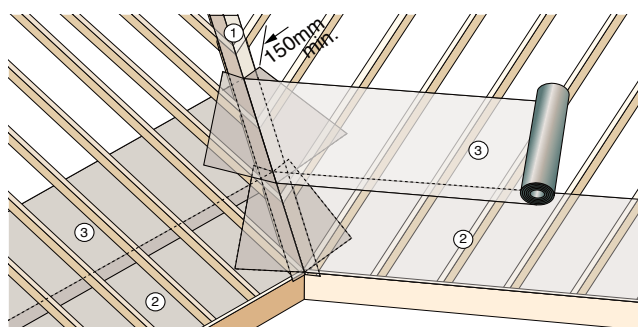


Figure 5.5.1

### Option 2

Lay down the valley section with a 400 mm strip underlay (See 1 in Figure 5.5.2). This allows Combination valleys to be put in position firstly (See 2 in Figure 5.5.2) for cutting tile battens up against them. Then lay roofing underlay from eave up. (See 3 and 4 in Figure 5.5.2).

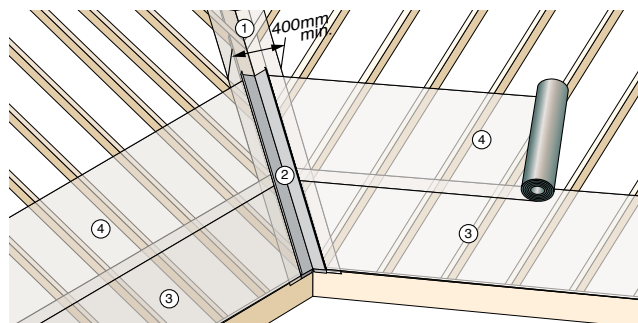


Figure 5.5.2

## 5.0 Roofing underlays

### 5.6 Wall Junctions

The roofing underlay must be turned up against the wall behind the building wrap so that it extends higher than any flashing.

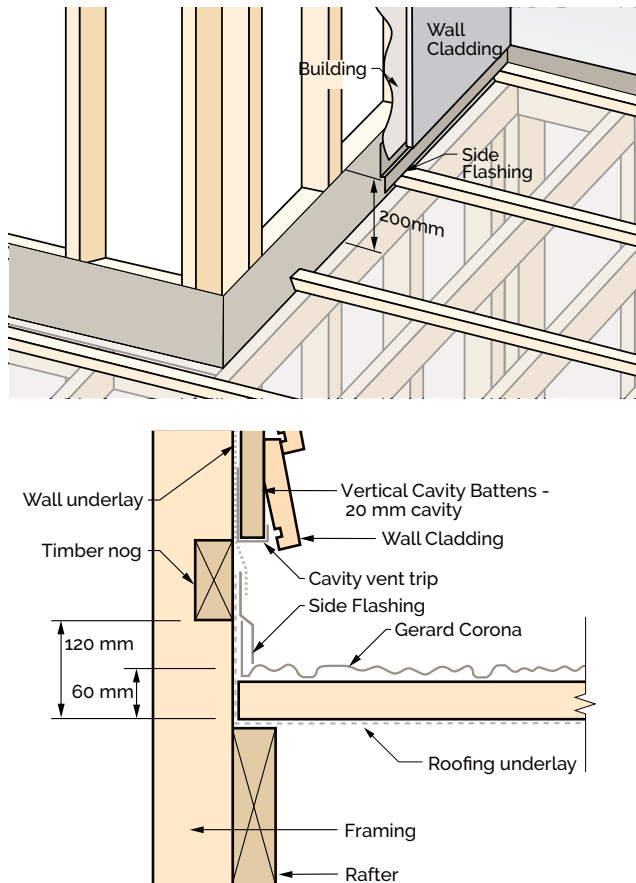


Figure 5.6.1

In situations where the roofing is not installed until after the wall cladding has been completed then a short section of roofing underlay is to be preinstalled at the roof wall junction. The width must be sufficient so that it overlaps the roofing underlay edge when it is installed. Roofing underlay must be turned up behind the lower sections of the side flashing as far as possible.

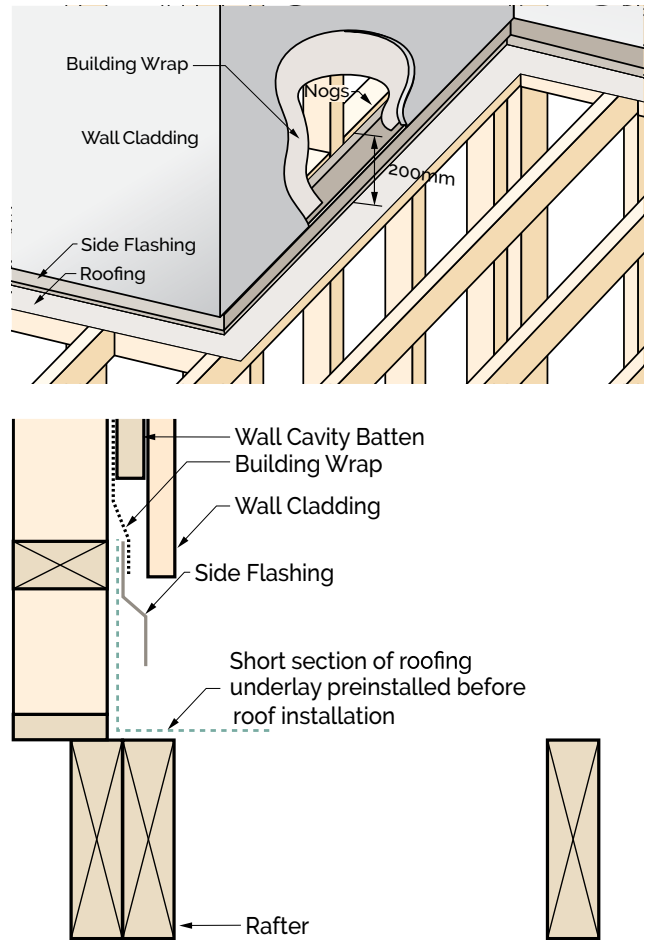


Figure 5.6.2

### 5.7 Repairs to roofing underlay

Tears or roofing underlay that has been exposed for more than one week will need to be repaired or replaced.

Replacement underlay must be under lap sections above and overlap sections below by 75 mm horizontally and 150 mm vertically.

Replacement underlay should be run from rafter to rafter and fixed to them.

This may require the lifting of battens in the affected area.

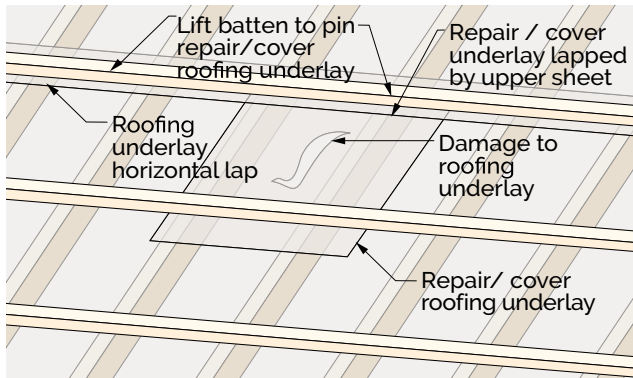


Figure 5.7.1

### Repairs to wall underlay

Damage to wall underlay should be covered by a new sheet of the same material running horizontally from stud to stud and fixed to the studs, and extending from 150 mm below the damage to lap under the sheet above or the nearest flashing above, or the top of the wall, which ever is closest. Laps above the damage do not need to be taped.

## 5.8 Penetrations through the roofing underlay

Cut outs off the roofing underlay and the tile should be minimised matching the size and shape of the penetration. The penetrations should be flashed and the flashing should be dressed to the tile profile (see **11.0 Penetrations** for aquaseal flashing installation for pipe penetrations).

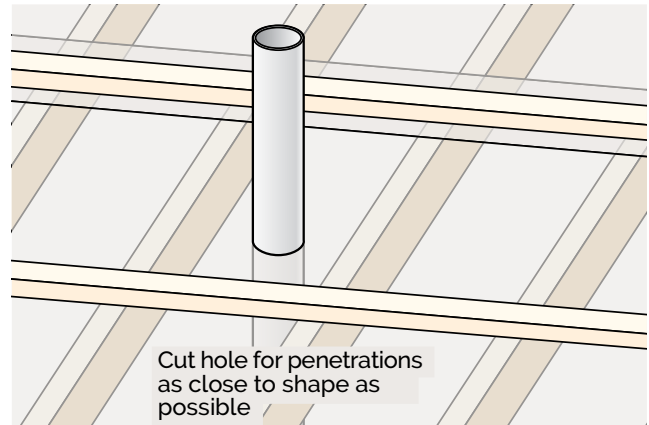


Figure 5.8.1

Sections above large penetrations such as skylight windows should be treated as an eave. A separate sheet of roofing underlay the width of the penetration should be installed so that the roofing underlay ends up on top of the penetration's flashing.

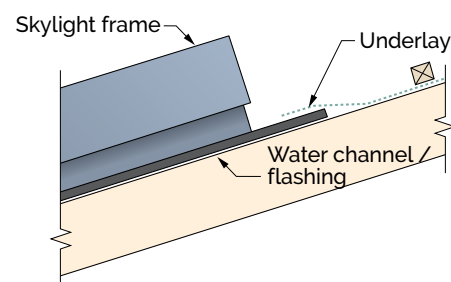
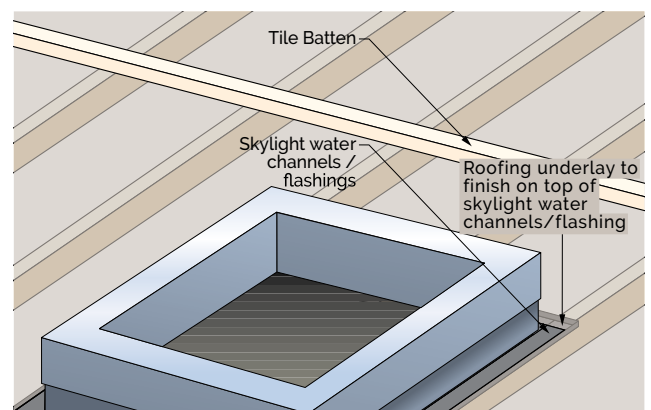


Figure 5.8.2





## 6.0 Cutting & installing

The worry-proof roof.

**Page 416 of 734**

## 6.1 Site safety

Safety signs and edge protection, if required, should be in place before installation starts.

### 6.1.1 Preparatory work

Underlay, tile and accessory battens, wall flashings, valleys and fascia boards should be in place before laying tiles.

### 6.1.2 Tile selection - colour coding

The roof installer should check that the tiles are of the correct colour and are in good condition. Gerard Roofs provides a colour code on each pallet (A - M).

Different colour coded tiles should NOT be installed on the same roof.

Tiles with surface defects should NOT be installed on the roof.

### 6.1.3 Walking on tiles

Soft soled shoes capable of providing secure footing should be worn.

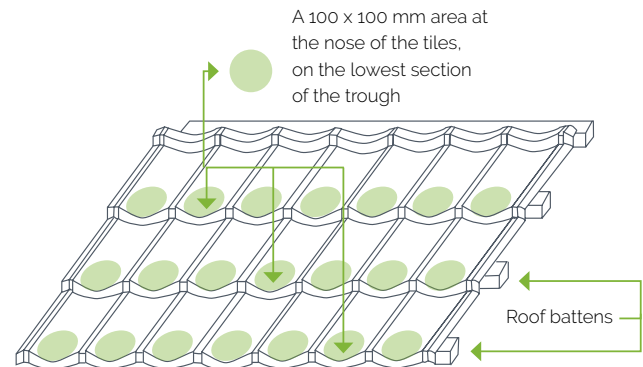
Extreme care is required when walking on wet tiles and this should be avoided if possible. Satin finish tiles can be very slippery and should NOT be worked on while wet.

The surface coating of the textured finish tiles may be damaged when they are wet, and damage increases as the pitch increases.

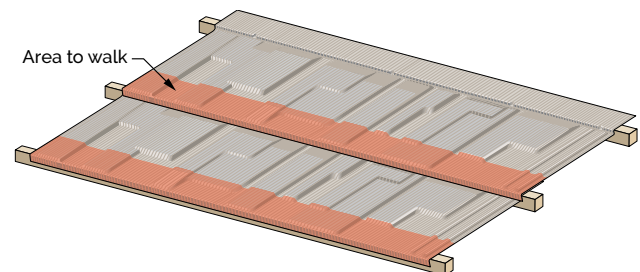
When walking on the tiles weight must be concentrated directly above the batten for Corona, Senator, Rockport, Oberon and Alpine and in the pan (lower section) of tiles above the batten.

Tile damage will occur if installer weight is applied to tile ridges or mid sections of Corona, Senator, Rockport, Oberon and Alpine.

#### For Colortile, Milano and Tuffcoat



#### For Corona, Senator, Rockport, Oberon and Alpine



### 6.1.4 Damaged tiles

Tiles damaged during installation should be removed and replaced.

### 6.1.5 Sub-trade damage

If substantial work is to be carried out above a section of roof, such as installation of walls, tiles should generally be installed after this work has been completed. Tiles may be installed prior however protection for the tiles and their surface coatings needs to be installed before the wall cladding is installed. This may involve drop sheets and/or a plywood covering. At this point it should be made clear to the building supervisor who is responsible for damaged tiles by sub-trades.

### 6.1.6 Work interruption

If work is interrupted for any reason, or at the end of a workday, all loose tiles, accessories and incomplete sections must be secured against possible movement by wind.



Tile and accessories must be left clean and dry and securely covered to protect against the weather.

### 6.1.7 Clean up

The building site should be left clean of any roofing materials. All batten and tile off cuts, nails and packaging must be removed from the site. The roof should be cleaned to remove any debris left by the installation process.

### 6.1.8 Sign off

Obtain sign off for the roof as soon as possible after completion of the clean up.

## 6.2 Tile laying

For Corona, Senator, Rockport, Oberon and Alpine tiles only, to prevent lines of tile joins showing down the roof make sure to randomly stagger the tiles (Refer to **7.0 Product-specific installation** for each tile profile laying pattern).

All tiles interlock. Depending on the tile profile they may be interlocked in both directions or only in one direction (Refer to **7.0 Product-specific installation** for each tile profile laying pattern).

Lay tile laps facing away from prevailing winds. Where possible the tiles should be laid with the laps facing away from the line of normal sight.

### 6.2.1 Laying tiles

Tiles are installed from the top of the roof to the eave. Install the second to top course tiles (usually the first full width tile), hold them in place by nailing through the flat of the back edge of the tile which sits on the batten (Step **1** in **Figure 6.2.1.1**). Lower courses of tiles may then be laid without having to fasten each tile.

Subsequent tiles are laid by lifting both tiles in the course above and sliding the next course under the nose of the tiles already in place (Steps **2** and **3** in

**Figure 6.2.1.1**). Tiles should be staggered so that side laps do not line up down the roof.

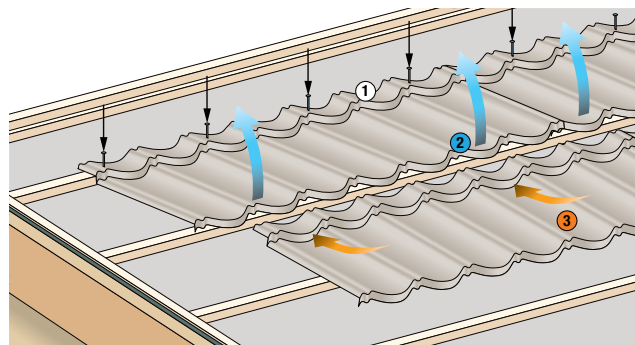


Figure 6.2.1.1

On lower pitched roofs all full tiles can be laid to cover the entire area without fastening. On higher pitch roofs, over 30°, tiles should be fastened two courses above the tiles being laid.

All tiles should be fastened in place before leaving the job site for any reason.

### 6.2.2 Tile fastening

Tiles in the body of the roof are fastened using 4 tile nails per tile (spacing 360 mm approx.) through the front downturn (tile nose) so that the nail penetrates the front face of the tile batten (see **Figure 6.2.2.1**). Nails should be placed 60 mm from the lowest section of a pan on tiles and not in the hidden water channels on Corona, Senator, Rockport, Oberon and Alpine (Refer to **7.0 Product-specific installation** for each tile profile). Fasteners should be installed a minimum of 10 mm from the edge of the nose or half the width of the nose.

Eave tiles are fastened through the tops of the tiles using 4 fasteners, not in the pans or water channels.

Cover the nail with basecoat and stone chips from the finish kit (texture finish).

Satin finish (painted) tile requires a rubber washer under the head of the eave nail.

## 6.0 Cutting & installing

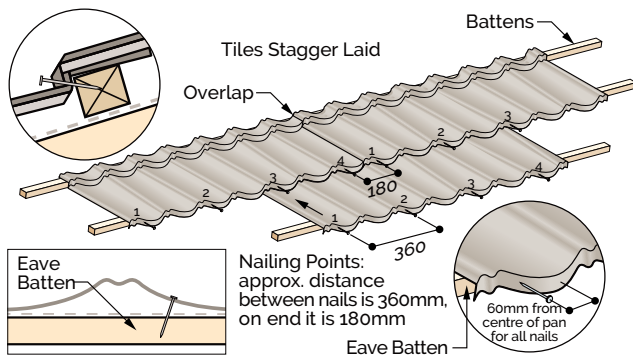


Figure 6.2.2.1 Nailing positions on Colortile

### 6.2.3 Nailing fastening technique

The person nailing the tiles should stand on the tile being fastened facing the eave and nailing as shown.



Figure 6.2.3.1

Gun Nailers using Gerard Roofs specified nails can also be used to secure tiles (Refer to **6.3 Nail guns and Nails**).

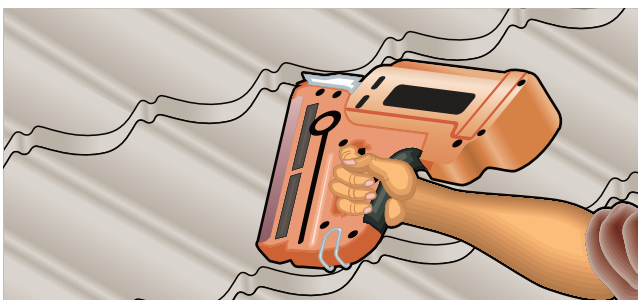
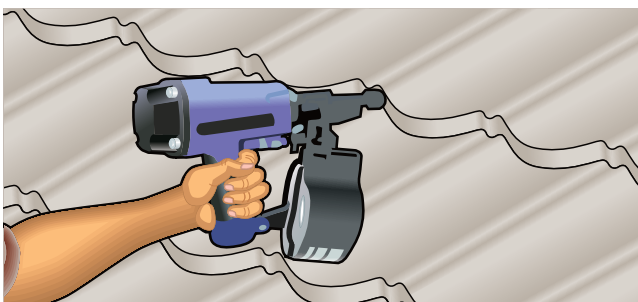


Figure 6.2.3.2

### 6.2.4 Gable roof

Tiles are turned up against the gable end accessory batten a minimum of 40 mm.

The end of the first tile is bent up 40 mm, this tile is then positioned against the accessory batten and second to top course tile batten, full tiles are then laid the length of the gable. These are held in place by tacking in place on the flat at the back of the tile.

Starting from the course already laid, lay the tiles two courses at a time end to end. The tile laps must be staggered down the roof. The staggered laying will result in gaps at either end of the gable. Tiles need to be measured, cut and bent to suit. When laying these cut and bent tiles make sure that the laps are laid the same way as the rest of the roof.

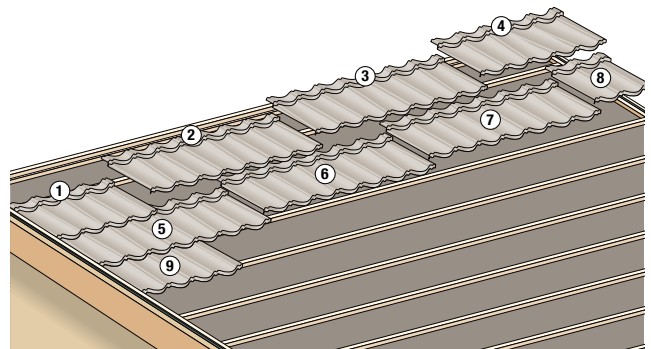


Figure 6.2.4.1 Stagger the tile laps down the roof, using part tiles at the gable end

Randomly stagger the laps of Corona, Alpine, Senator, Rockport and Oberon.

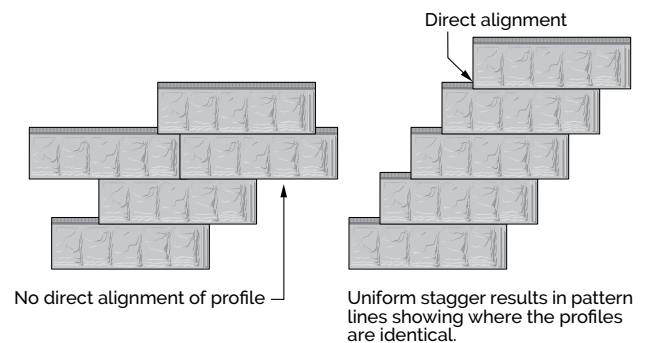


Figure 6.2.4.2 Random stagger

### Measuring, cutting and bending gable end tiles

Measurements for cutting and bending tiles are taken on the roof. The measurements are then transferred on to tiles on the ground where they are **cut**, **bent** and **stacked** in order.

**For Colortile, Tuffcoat and Milano;** the measurement is taken from the centre of the water channel of the tile, along the front face of the tile batten on the roof to the inside of the gable end accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools – guillotine and bender**).

**For Corona, Senator, Rockport, Oberon and Alpine;** the measurement is taken from the edge of the side lap of the tile, along the front face of the tile batten on the roof to the inside of the gable end accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools - guillotine and bender**).

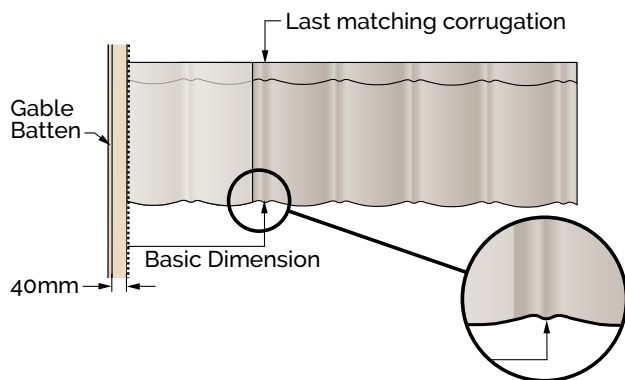


Figure 6.2.4.3



Figure 6.2.4.4 Gable end tile

If the gable is 90° then the bend can be made straight across the width of the tile. If it is an angled gable, treat the measurements the same way as a hip roof (Refer **6.2.5 Hip roof**).

Gable end tiles are installed from the eave up ensuring lapping is correct. Tiles are nailed in place through the front down turn and into the accessory batten through the turn up.

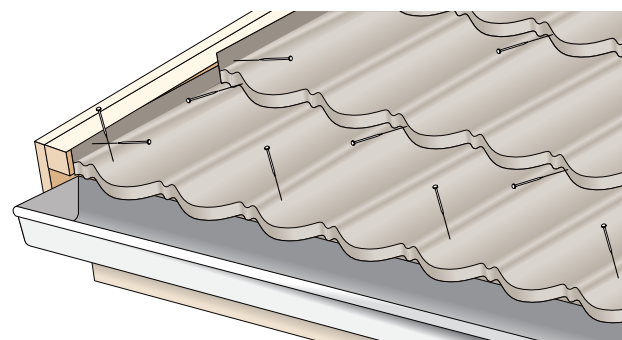


Figure 6.2.4.5

## 6.0 Cutting & installing

### 6.2.5 Hip roof

Tiles are turned up against the hip accessory batten a minimum of 40 mm.

Lay the first full tile at the second to top course (if it doesn't fit, lay from the third to top course) so that the back of the tile is a minimum of 150 mm from the inside edge of the hip accessory batten (see **Figure 6.2.5.1**). This allows a full module to be used for the cut and bent hip tile.

Stagger and lay full tiles across the length of the roof until the last full tile. If the hip tile for the end section cannot be cut and bent out of a full tile it will be necessary to insert a part tile before the end of the hip. Colortile, Milano and Tuffcoat can be cut in modular length, whereas Corona, Senator, Rockport, Oberon and Alpine have specific points where to cut (Refer to **7.0 Product-specific installation** for each tile profile).

Lay the remaining full tiles down the roof leaving gaps at each end where hip tiles will need to be inserted.

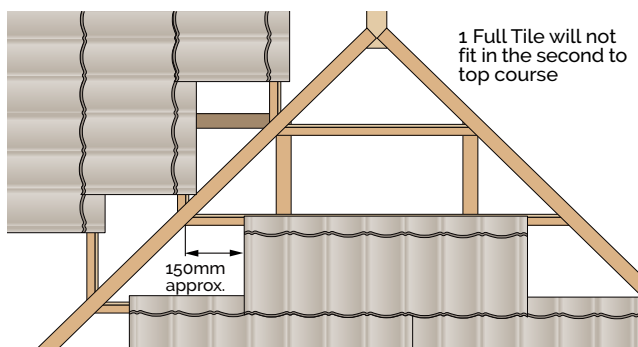


Figure 6.2.5.1

#### Measuring, cutting and bending hip tiles

Measurements for cutting and bending tiles are taken on the roof. The measurements are then transferred on to tiles on the ground where they are **cut**, **bent** and **stacked** in order.

**For Colortile, Tuffcoat and Milano;** the measurement is taken from the centre of the water channel of the tile, along the front face of the tile batten on the

roof to the inside of the hip accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools – guillotine and bender**).

**For Corona, Senator, Rockport, Oberon and Alpine;** the measurement is taken from the edge of the side lap of the tile, along the front face of the tile batten on the roof to the inside of the hip accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools – guillotine and bender**).

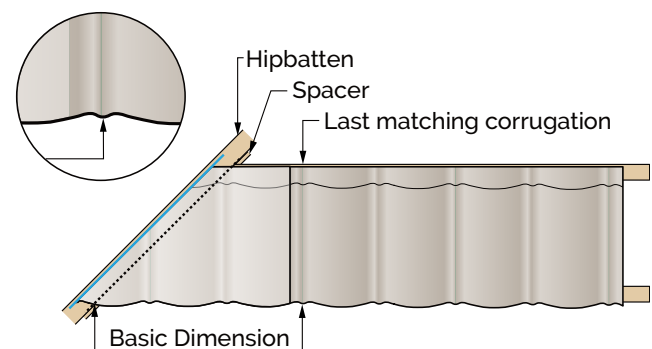


Figure 6.2.5.2



Fig 6.2.5.3 Hip tile being cut then bent

A bevel set to the angle of the hip may then be used to mark the required angle for the hip tile. Alternatively measurements of the front and back of the tile along the front face of the tile batten may be used to provide the angle.

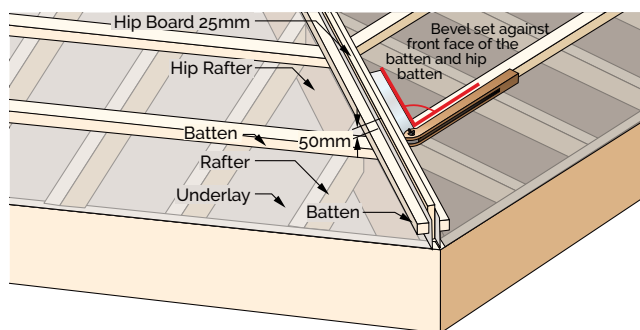


Figure 6.2.5.4 Transfer hip angle to the tile to be cut

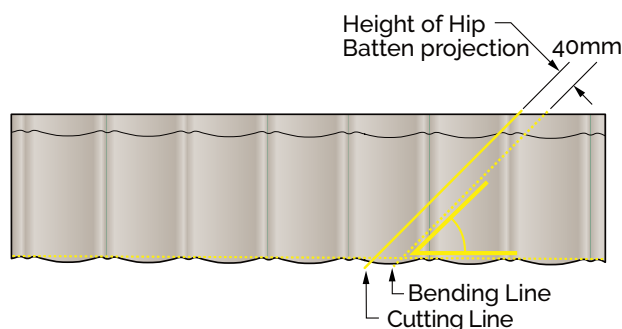


Figure 6.2.5.5

Hip tiles are then laid to fill the gaps from the eave up, nailing through the front downturn and through the turn up into the hip accessory batten.

Colortile, Milano and Tuffcoat need to be laid as described above as they are modular and require significant care in ensuring the modules line up down the roof.

Corona, Senator, Rockport, Oberon and Alpine may be installed by pre-cutting and bending them for the starting end of a hip. The angle of the hip tile is taken from the roof using a bevel; this is then transferred onto the tile on the ground. Corona, Senator, Rockport, Oberon and Alpine should be made slightly different length so that when the roof is completed it

will have a random pattern on the roof. This results in only having to measure the end hip tile gaps.

Each tile should supply two cut sections leaving a minimum wastage.

Careful cut tile selection and use of cut tiles for hips and valleys also reduces waste.

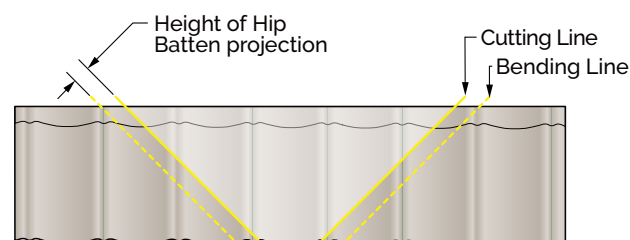


Figure 6.2.5.6

## 6.2.6 Ridge tiles

Measurements for bending and cutting tiles are taken on the roof. Ridge tiles are **bent** before **cutting**.

All measurements need to be taken along the front face of the batten as this is where the tiles are fastened. Tiles need to be marked along a line where the batten will eventually be positioned.

The measurement is taken from the front of the headlap of the tile to the front of the ridge tile batten. A in **Figure 6.2.6.1** & **6.2.6.2** this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools – guillotine and bender**).

Measurements along the ridge are required to ensure that the cut tiles are correct (do NOT assume that the ridge is exactly straight unless you have measured).

The measurements are transferred to tiles on the ground. The tiles are **bent**, **cut** and **stacked** in order as they will be laid on the roof.



## 6.0 Cutting & installing

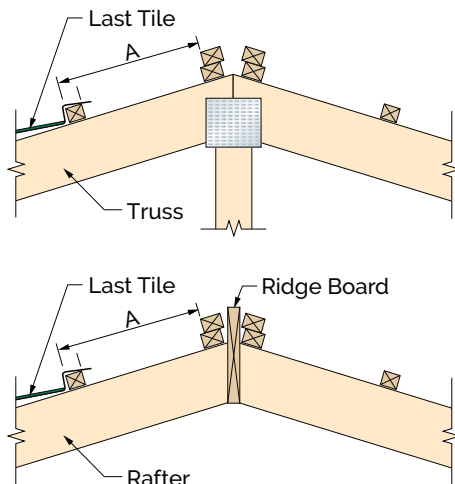


Figure 6.2.6.1 Standard ridge/hip setup

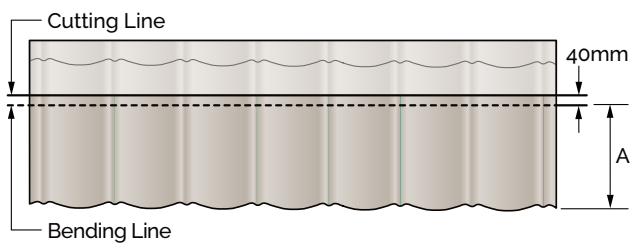


Figure 6.2.6.2



Figure 6.2.6.3 Ridge tile being bent then cut

### Installing ridge tiles

Fasten the ends of the front of the tile first (Steps **1** and **2** in Figure 6.2.6.4), then fasten the outside ends of the back of the tile so that the modules line up with other tiles on the roof, also nail the back so that the pitch of the top course tile is the same as the roof (Steps **3** and **4** in Figure 6.2.6.4). By nailing each end the back of the tile will bow up (due to the distortion created when bending) (see Figure 6.2.6.4); push the centre of the tile down and nail the upturn to the ridge batten in several places (see Figure 6.2.6.5).

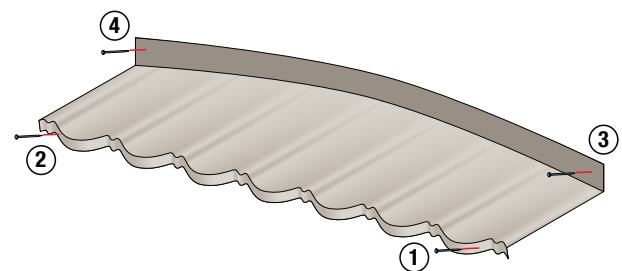


Figure 6.2.6.4

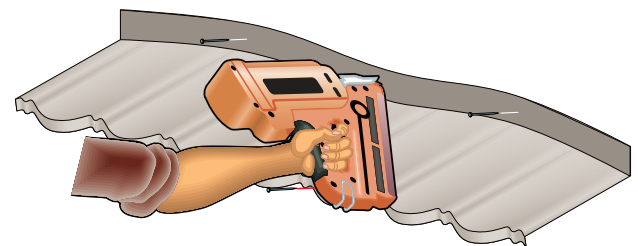


Figure 6.2.6.5

### 6.2.7 Valley tiles

Measurements for cutting and bending tiles are taken on the roof.

All measurements need to be taken along the front face of the batten as this is where the tiles are fastened. Tiles need to be marked along a line where the batten will eventually be positioned. Failure to follow this procedure will result in bends being incorrect on the modular tiles.

The measurements are then transferred on to tiles on the ground where they are **cut**, **bent** and **stacked** in order.



For Colortile, Tuffcoat and Milano; the measurement is taken from the centre of the water channel of the tile, along the front face of the tile batten on the roof to 30 mm past the edge of the valley. The turn down is not parallel to the bend line, add 40 mm at the front (nose) of the tile and 30 mm to the back of the tile, this is the cut line (see **Figure 6.2.7.1**). (Refer to **6.4 Use of fixing tools – guillotine and bender**).

For Corona, Senator, Rockport, Oberon and Alpine; the measurement is taken from the edge of the side lap of the tile, along the front face of the tile batten on the roof to 30 mm past the edge of the valley. The turn down is not parallel to the bend line, add 40 mm at the front (nose) of the tile and 30 mm to the back of the tile, this is the cut line (see **Figure 6.2.7.1**). (Refer to **6.4 Use of fixing tools – guillotine and bender**).

The slope on the cut made on valley tiles is required to make sure that the bottom edge of the valley tile appears straight in the valley.

The gap between tiles in a valley must be a minimum of 50 mm.

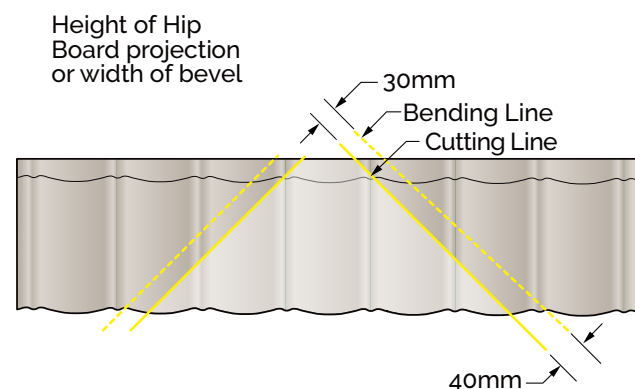


Figure 6.2.7.1



Figure 6.2.7.2 Valley tile being cut then bent

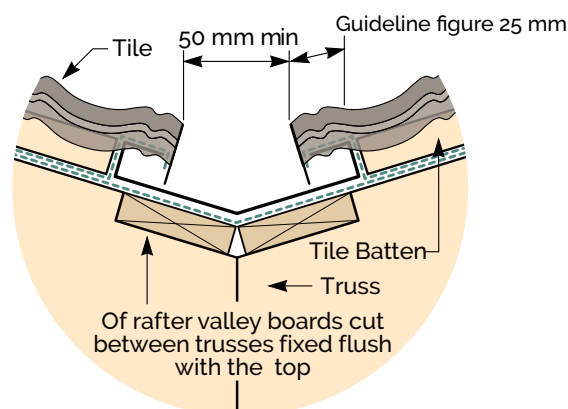


Figure 6.2.7.3

Cut and bend the tiles at the valley as straight as possible to obtain a straight line. Lay the valley tiles from the eave up fastening them through the front downturn. Never nail into a valley.

### 6.2.8 Laying tiles next to a wall

The tile turn up against a wall must be a minimum of 40 mm.

All measurements need to be taken along the front face of the batten as this is where the tiles are fastened. Tiles need to be marked along a line where the batten will eventually be positioned. Failure to follow this procedure will result in bends being incorrect on Colortile, Milano and Tuffcoat.

## 6.0 Cutting & installing

The measurements are then transferred onto tiles on the ground where they are **cut**, **bent** and **stacked** in order.

The measurement is taken from the water channel of Colortile, Milano and Tuffcoat (or centre of the side lap on Corona, Senator, Rockport, Oberon and Alpine) then along the front face of the tile batten on the roof to the surface of the wall framing, note that the bent up tile should install neatly behind the wall flashing accessory (usually a side flashing). If the flashings are already in place carefully insert the tiles under the flashing by tilting the tile up and sliding the bent section under the flashing. If the flashing has not been installed lay the tiles and install the flashing soon after.

Lay the wall tiles from the eave up fastening them through the front down turn but do not nail the tile to the wall framing.

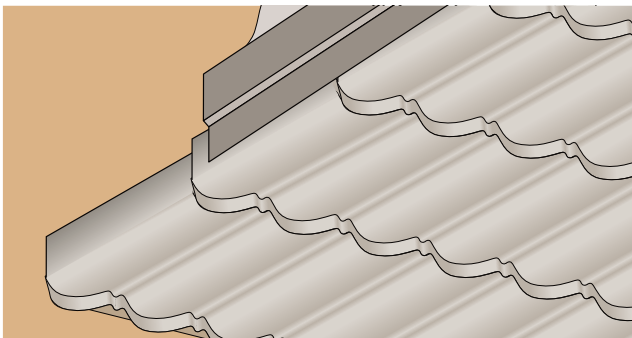


Figure 6.2.8.1

### 6.3 Nail guns and nails

There are two types of gun nails approved for fastening Gerard Roofs tiles. Each nail gun uses a different nail type.

**No other nails are to be used for fastening tiles.**

Nails may be painted before installation using a high quality spray paint suitable for touch up on metal roofing should a better colour match be required.

#### Standard Gerard Roofs tile nails

These are hammer driven nails supplied in boxes of 5 or 25 kg.

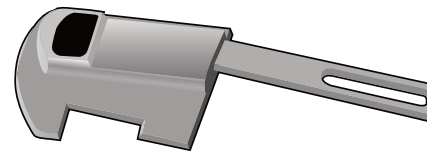


#### IM350 Nail framing gun

When fastening tiles with this nail gun a tile nose attachment must be installed. This nail gun is also popular for fastening tile battens with 90 mm nails.

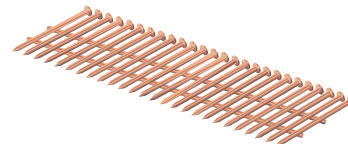


IM350 Nailer



Nailer Nose

The nails used in this nail gun are 50 mm Paslode Round Head Hot Dip Galvanised nails supplied in a stick of 40 nails.



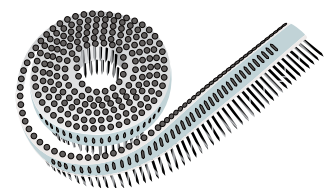
Stick Nails For IM350

#### Duofast CNP-65 pneumatic nail gun

Nails used with this nail gun are 50 mm Paslode Round Head Hot Dip Galvanised nails supplied in a coil of 325 nails.



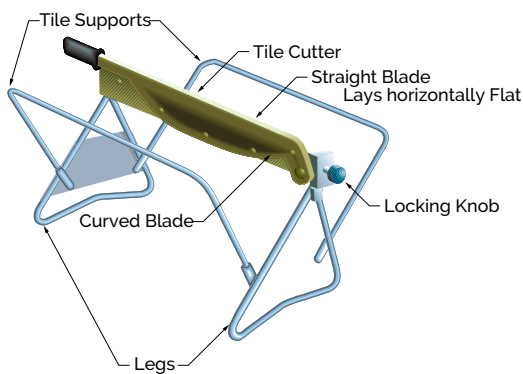
CNP65 Nail Gun



## 6.4 Use of fixing tools

### Guillotine

The guillotine can be used to cut tiles or accessories as required.



### Gable, hip and valley tiles

Flattening the nose and headlap before cutting the tile will make cutting easier.



Figure 6.4.1

Cut along the marked line, a quick single motion down while pulling the guillotine blade towards yourself (to the left) will keep the blades together and usually ensure that a cut is made in one operation. If more than one cut is required move the tile closer to where the blades intersect as this is where the guillotines cutting power is greatest.

Hold the tile so that the largest side is held in the left hand, this gives you greater control over the tile being cut.

### Cutting a tile



Figure 6.4.2

### Bending a tile



Figure 6.4.3

## 6.0 Cutting & installing

### Ridge tiles

These are bent in the long tile bender before cutting to help reduce tile distortion (splay).



Figure 6.4.4

These tiles are cut along the length of the tile, so it will take several cuts to complete a ridge tile.

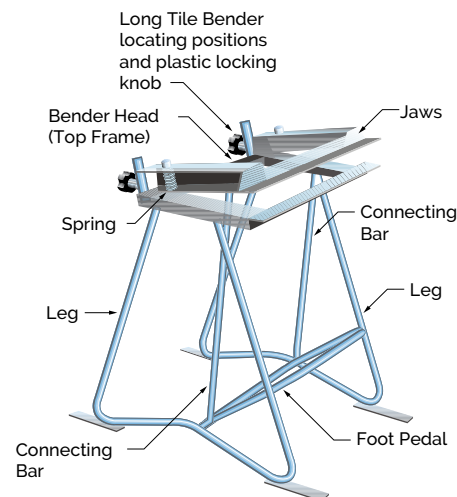
Start with the tile headlap to the right of the guillotine blade, make short cuts along the cut line pushing the tile into the first 1/3 of the cutting area of the guillotine. Continue the sequence until the tile is cut.



Figure 6.4.5

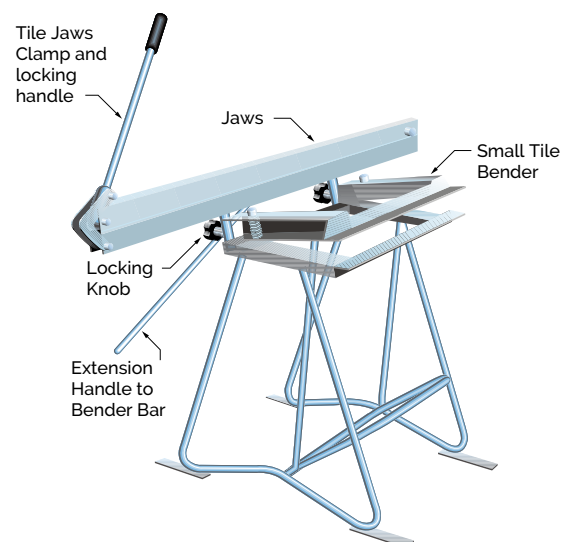
### Short tile bender

The short tile bender is used for folding the turn-ups required for gable and hip and wall tiles and for the turndown into valleys. It clamps and flattens the tile turn-ups so that the tiles can be installed under accessories.



### Long tile bender

This folder attaches to the back of the short tile bender. It can be used for folding ridge tiles and if necessary gable, hip or valley tiles.





## 7.0 Product-specific installation

The worry-proof roof.

**Page 428 of 734**

## 7.0 Product-specific installation

## 7.1 Gerard Corona

Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	370 mm
Uprand	27 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	3.0 kg
Weight/panel Satin	2.1 kg
Weight/m <sup>2</sup> Textured	6.6 kg
Weight/m <sup>2</sup> Satin	4.7 kg

## Batten spacing

Corona textured (chipped) 370 mm.

Corona satin (painted) 371 mm.

## Tile batten sizes

40 x 50 mm on 900 mm spaced rafter.

50 x 50 mm on 1200 mm spaced rafters.

## Tile batten fastening

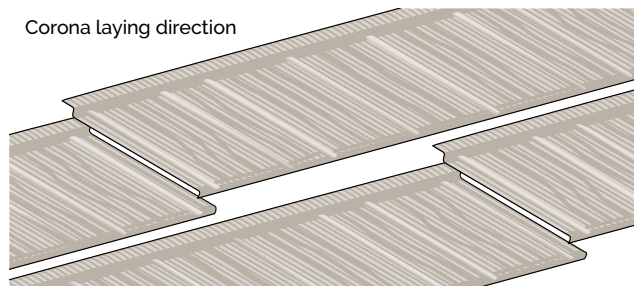
Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2**

900 mm rafter spacing. Minimum 2 x 90 x 3.15 mm nails for low, medium, high and very high wind zones.

1 x 80 mm x 10 gauge batten screw for extra high wind zone.

## Laying direction

Corona laying direction



## Left over right or right over left

Lay laps away from line of sight.

Lay away from prevailing winds.

Lay laps away from discharging rainwater pipes or roof valleys.

## Laying pattern

Stagger lay Corona down the roof to create a random pattern. Laps of tile above or below should not be closer than 200 mm.

## Fastening

Refer: **Tile installation – nailing position for Corona.**

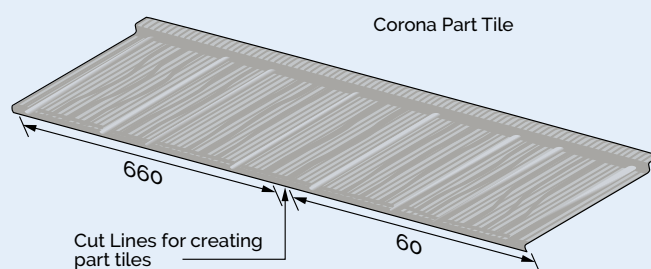
4 x 50 mm tile nails. Nail spacing ~320 mm, up to and including extra high wind zones or up to 3.8 kPa design load.

7 x 50 mm tile nails past 5.2 kPa design load.

**Only use tile nails approved by Gerard Roofs.**

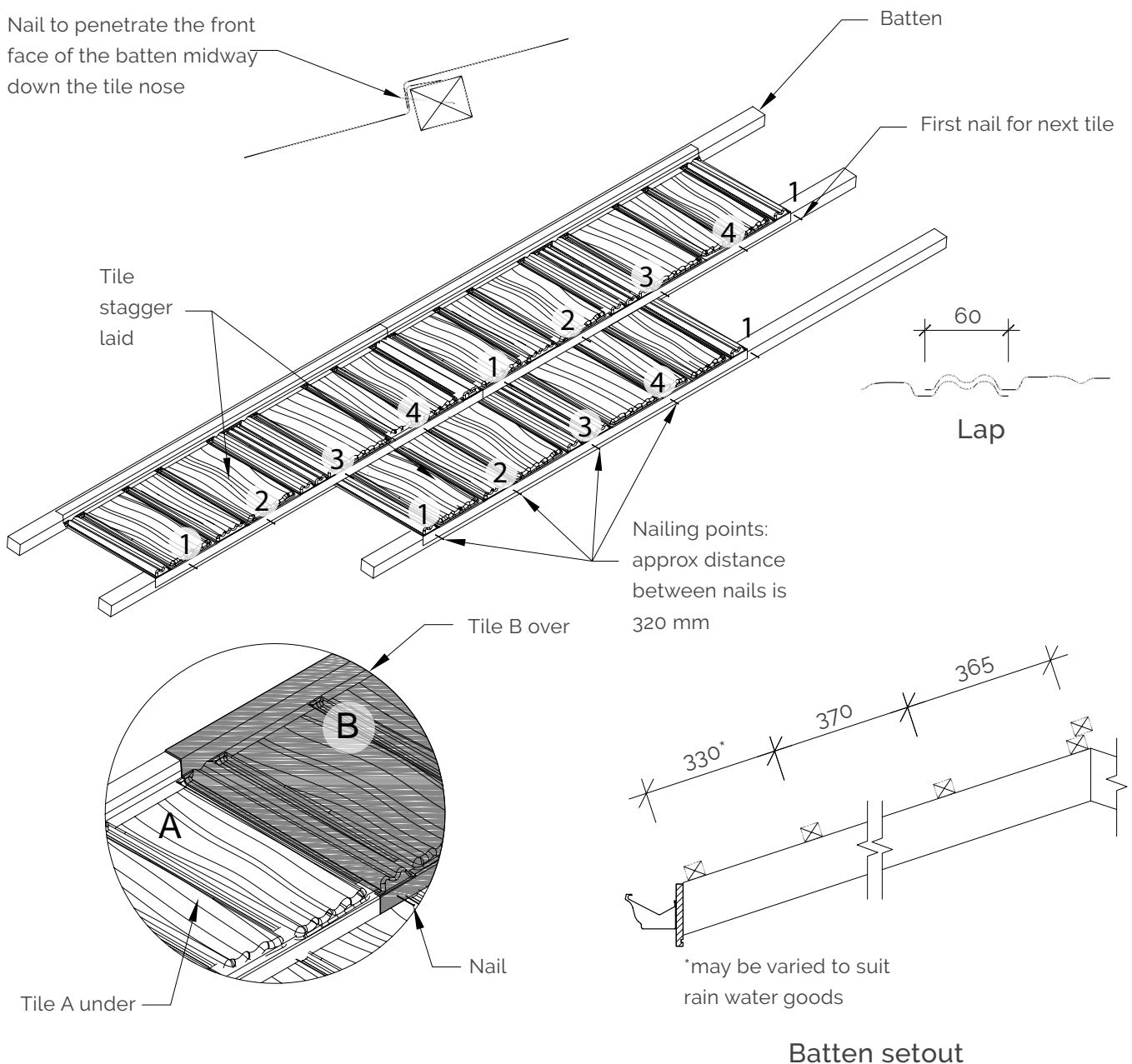
## Part tile

The centre section of a Corona is profiled so that a half tile can be cut 660 mm from either end of the tile.





## Tile installation – nailing position for Corona



### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

## 7.2 Gerard Senator

Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1250 mm
Width of cover	368 mm
Uprand	16 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	3.0 kg
Weight/panel Satin	NA
Weight/m <sup>2</sup> Textured	6.6 kg
Weight/m <sup>2</sup> Satin	NA

## Batten spacing

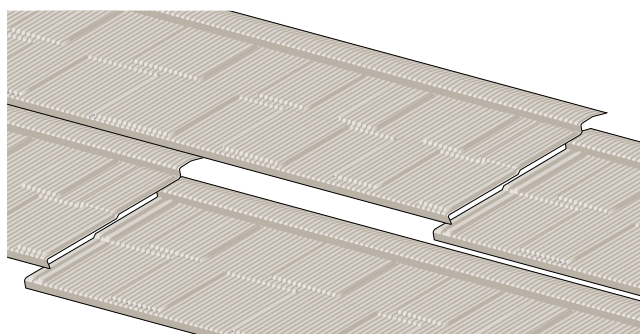
Senator textured (chipped) 368 mm.

## Tile batten sizes

40 x 50 mm on 900 mm spaced rafter.

50 x 50 mm on 1200 mm spaced rafters.

## Laying direction



One way lay – right to left

## Tile batten fastening

Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2.**

900 mm rafter spacing. Minimum 2 x 90 x 3.15 mm nails for low, medium, high and very high wind zones.

1 x 80 mm x 10 gauge batten screw for extra high wind zone.

## Laying pattern

Stagger lay Senator down the roof to create a random pattern. Laps of tile above or below should not be closer than 200 mm.

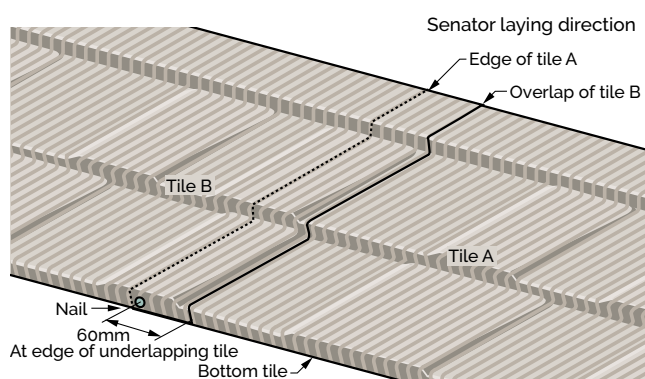
## Fastening

Refer: **Tile installation – nailing position for Senator.**

4 x 50 mm tile nails. Nail spacing ~320 mm, up to and including extra high wind zone or up to 3.8kPa design load.

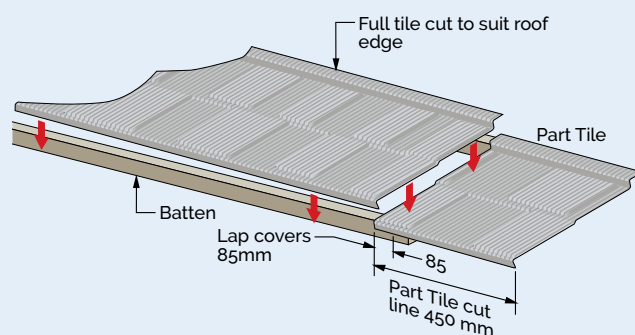
7 x 50 mm tile nails past 5.2 kPa design load.

Only use tile nails approved by Gerard Roofs.

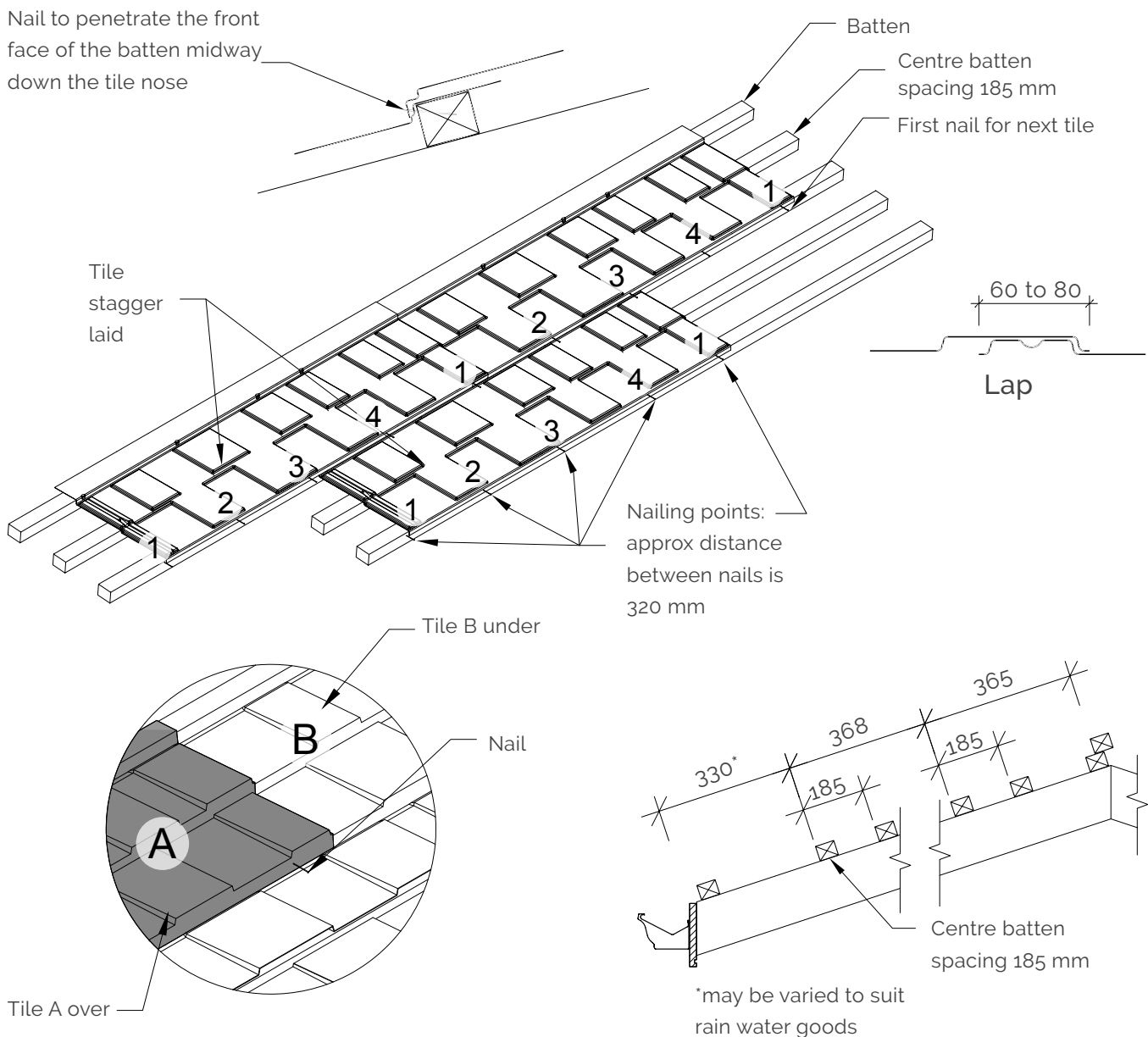


## Part tile

There is only one specific point where a part Senator can be created. This is 450 mm from the right hand end of the tile. The right hand end of the part tile is always overlapped by a full tile. Lap using the maximum coverage of the lap (80 mm).



## Tile installation – nailing position for Senator



## Batten setout

### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

### 7.3 Gerard Rockport

Pitch – min./max.	15-90°
Overall length	1330 mm
Length of cover	1250 mm
Width of cover	368 mm
Upstand	20 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	3.0 kg
Weight/panel Satin	NA
Weight/ m <sup>2</sup> Textured	6.6 kg
Weight/ m <sup>2</sup> Satin	NA

#### Batten spacing

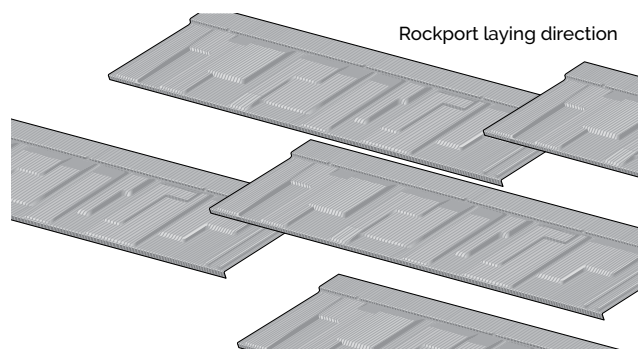
Rockport textured (chipped) 368 mm.

#### Tile batten sizes

40 x 50 mm on 900 mm spaced rafter.

50 x 50 mm on 1200 mm spaced rafters.

#### Laying direction



One way lay – right to left

#### Tile batten fastening

Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2.**

900 mm rafter spacing. Minimum 2 x 90 x 3.15 mm nails for low, medium, high and very high wind zones. 1 x 80 mm x 10 gauge batten screw for extra high wind zone.

#### Laying pattern

Stagger lay Rockport down the roof to create a random pattern. Laps of tile above or below should not be closer than 200 mm.

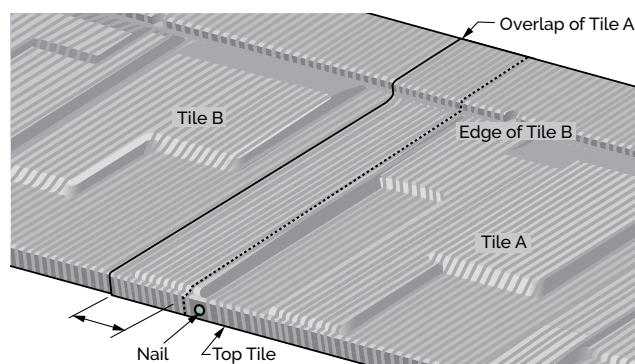
#### Fastening

Refer: **Tile Installation – nailing position for Rockport.**

4 x 50 mm tile nails, nail spacing ~320 mm, up to and including extra high wind zone or up to 3.8 kPa design load.

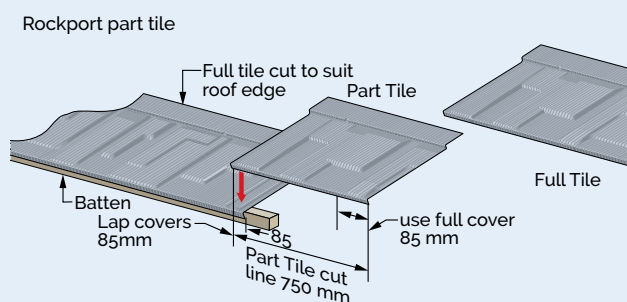
7 x 50 mm tile nails past 5.2 kPa design load.

Only use tile nails approved by Gerard Roofs.

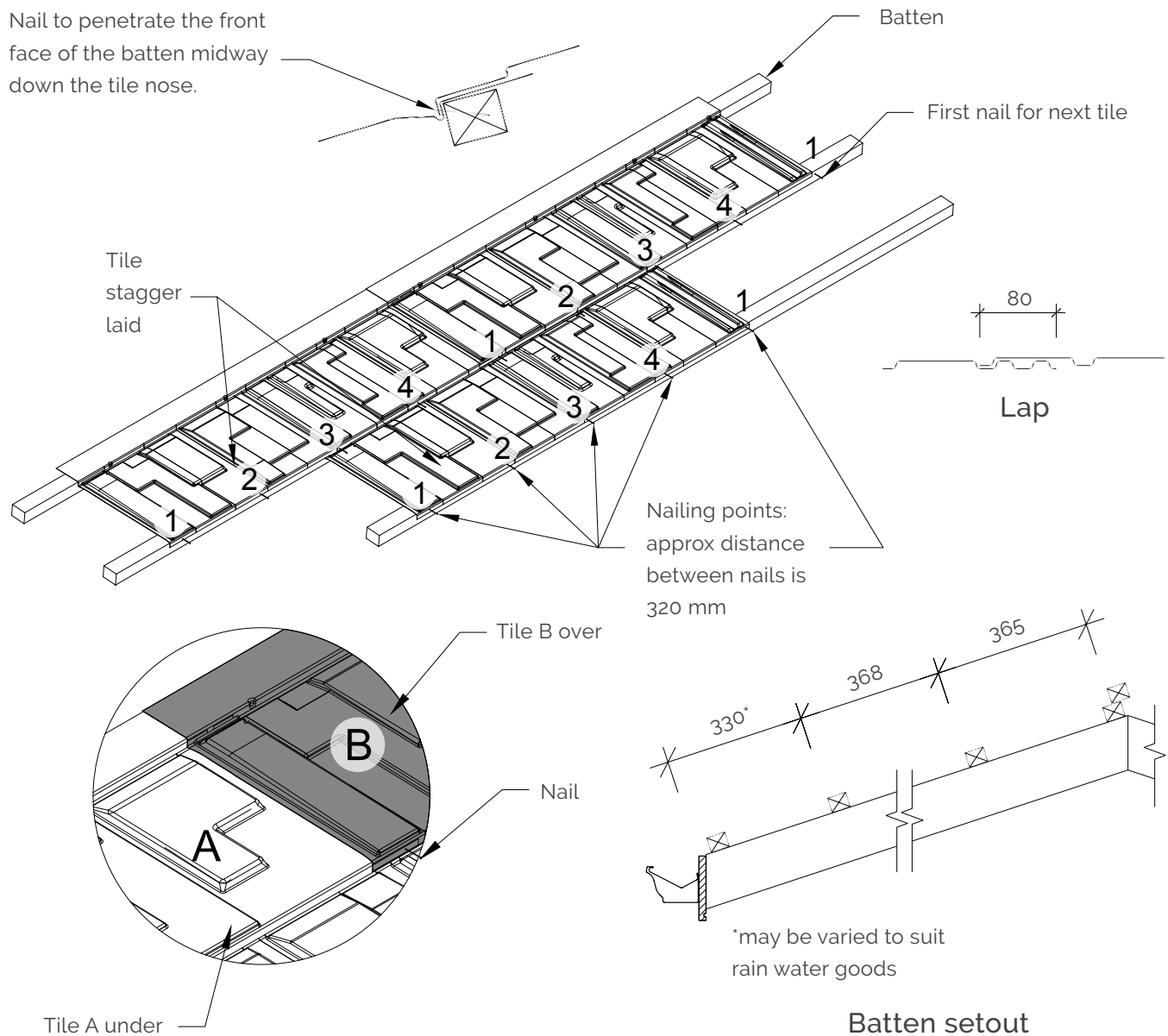


#### Part tile

There is only one specific point where a part Rockport can be created. This is 750 mm from the left hand end of the tile. The right hand end of the part tile is always overlapped by a full tile. Lap using the maximum coverage of the lap (85 mm).



## Tile installation – nailing position for Rockport



### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*



## 7.0 Product-specific installation

### 7.4 Gerard Alpine

Pitch – min./max.	15-90°
Overall length	1335 mm
Length of cover	1260 mm
Width of cover	368 mm
Upstand	17 mm
Roof cover/panel	0.46 m²
Panels/ m²	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	NA
Weight/ m² Textured	6.4 kg
Weight/ m² Satin	NA

#### Batten spacing

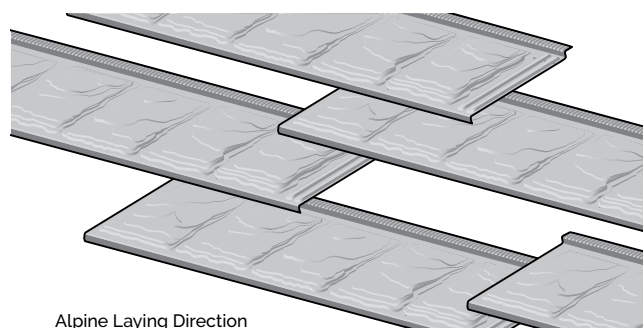
Alpine textured (chipped) 368 mm.

#### Tile batten sizes

40 x 50 mm on 900 mm spaced rafter.

50 x 50 mm on 1200 mm spaced rafters.

#### Laying direction



One way lay – left to right

#### Tile batten fastening

Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2.**

900 mm rafter spacing. Minimum 2 x 90 x 3.15 mm nails for low, medium, high and very high wind zones. 1 x 80 mm x 10 gauge batten screw for extra high wind zone.

#### Laying pattern

Stagger lay Alpine down the roof to create a random pattern. Laps of Alpine above or below should not be closer than 200 mm.

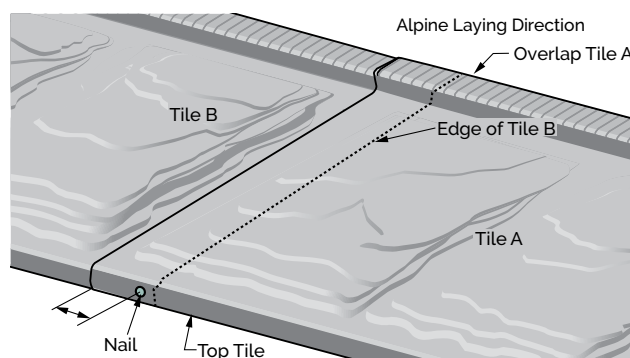
#### Fastening

Refer: **Tile Installation – nailing position for Alpine.**

4 x 50 mm tile nails, nail spacing ~320 mm, up to and including extra high wind zone or up to 3.8 kPa design load.

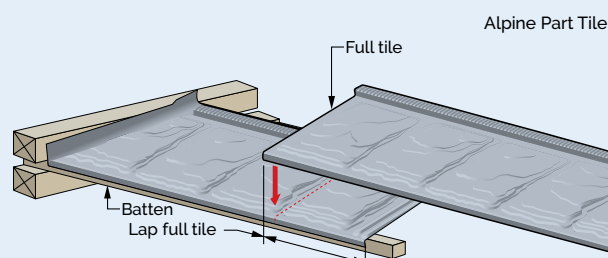
7 x 50 mm tile nails past 5.2 kPa design load.

Only use tile nails approved by Gerard Roofs.



#### Part tile

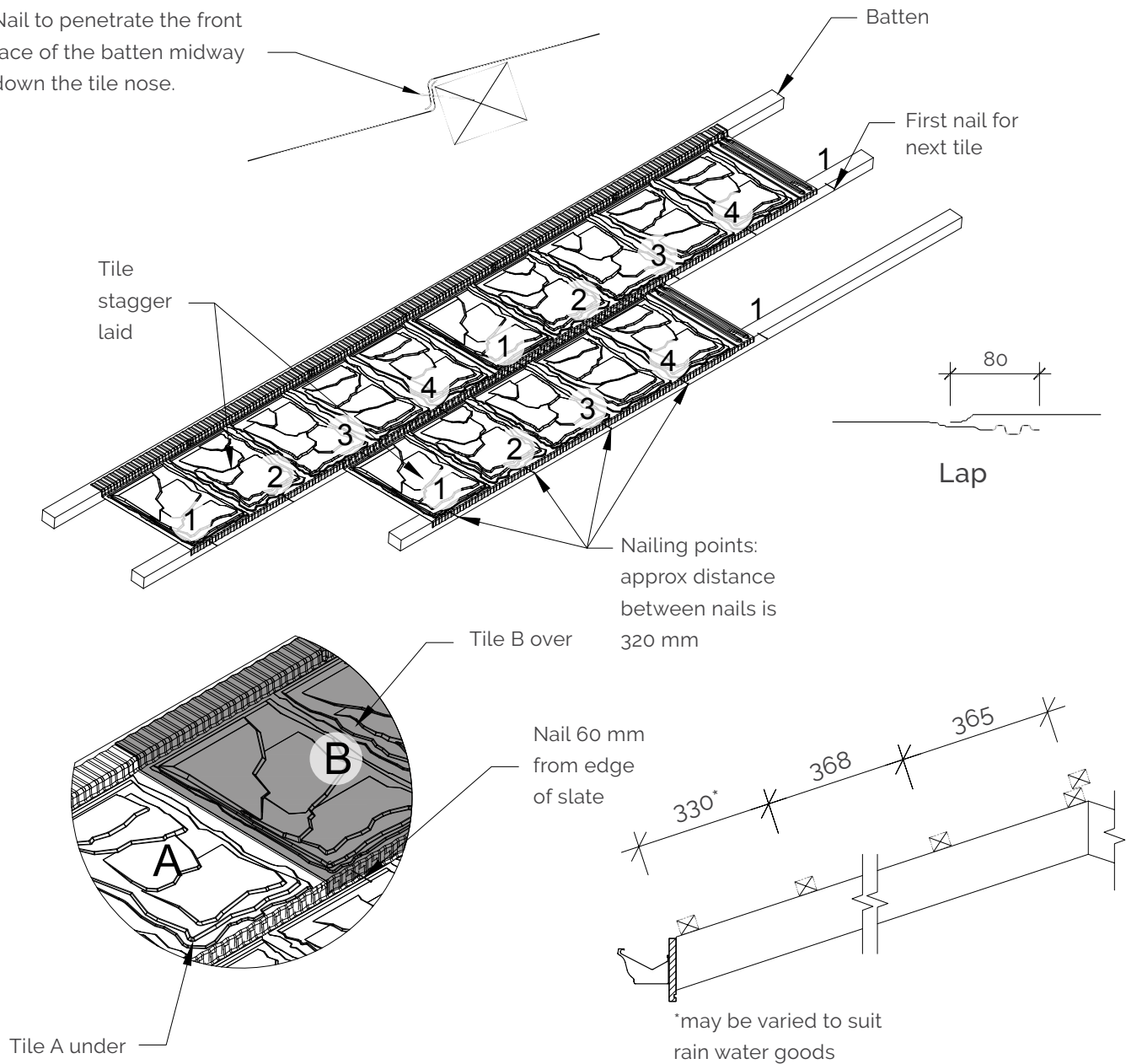
If a small part Alpine (less than a course width) is required then it will be necessary to lap the adjacent full Alpine by a module which will then allow a full Alpine to be cut and bent to suit. Lay the part Alpine one full tile from the end of the roof – this helps hide the module lap.





## Tile installation – nailing position for Alpine

Nail to penetrate the front face of the batten midway down the tile nose.



### Batten setout

#### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

#### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

## 7.5 Gerard Colortile

Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1257 mm
Width of cover	369 mm
Upstand	28 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	2.1 kg
Weight/m <sup>2</sup> Textured	6.4 kg
Weight/m <sup>2</sup> Satin	4.7 kg

## Batten spacing

Colortile textured (chipped) 369 mm.

Colortile satin (painted) 370 mm.

## Tile batten sizes

40 x 50 mm on 900 mm spaced rafter.

50 x 50 mm on 1200 mm spaced rafters.

## Tile batten fastening

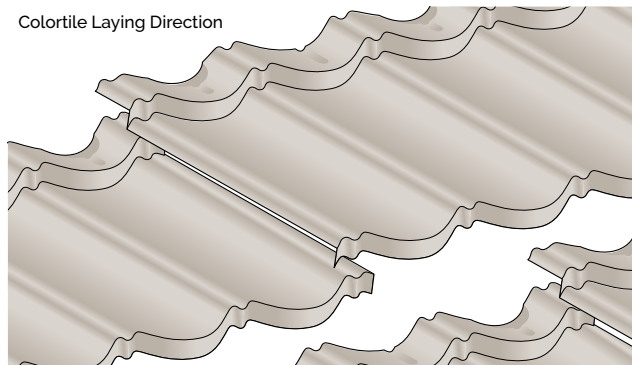
Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2.**

900 mm rafter spacing. Minimum 2 x 90 x 3.15 mm nails for Low, medium, high and very high wind zones.

1 x 80 mm x 10 gauge batten screw for extra high wind zone.

## Laying direction

Colortile Laying Direction



## Left over right or right over left

Lay laps away from line of sight.

Lay away from prevailing winds.

Lay laps away from discharging rainwater pipes or roof valleys.

## Laying pattern

Stagger lay tiles laps 2 or more modules apart down the roof.

## Tile fastening

Refer: **Tile installation – nailing position for Colortile**

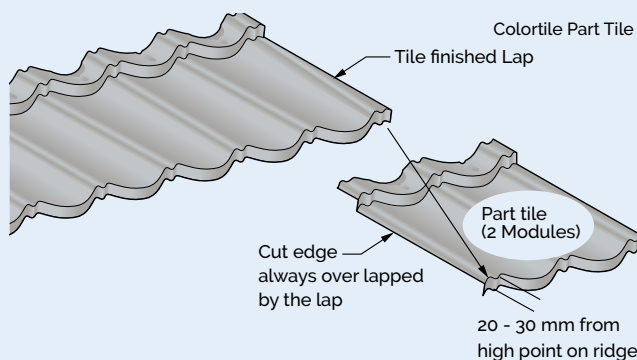
4 x 50 mm tile nails. Nail spacing 360 mm and 180 mm to hold at lap, every second module, up to and including extra high wind zone or up to 3.8 kPa design load.

7 x 50 mm tile nails – every module – above 3.8 kPa design load.

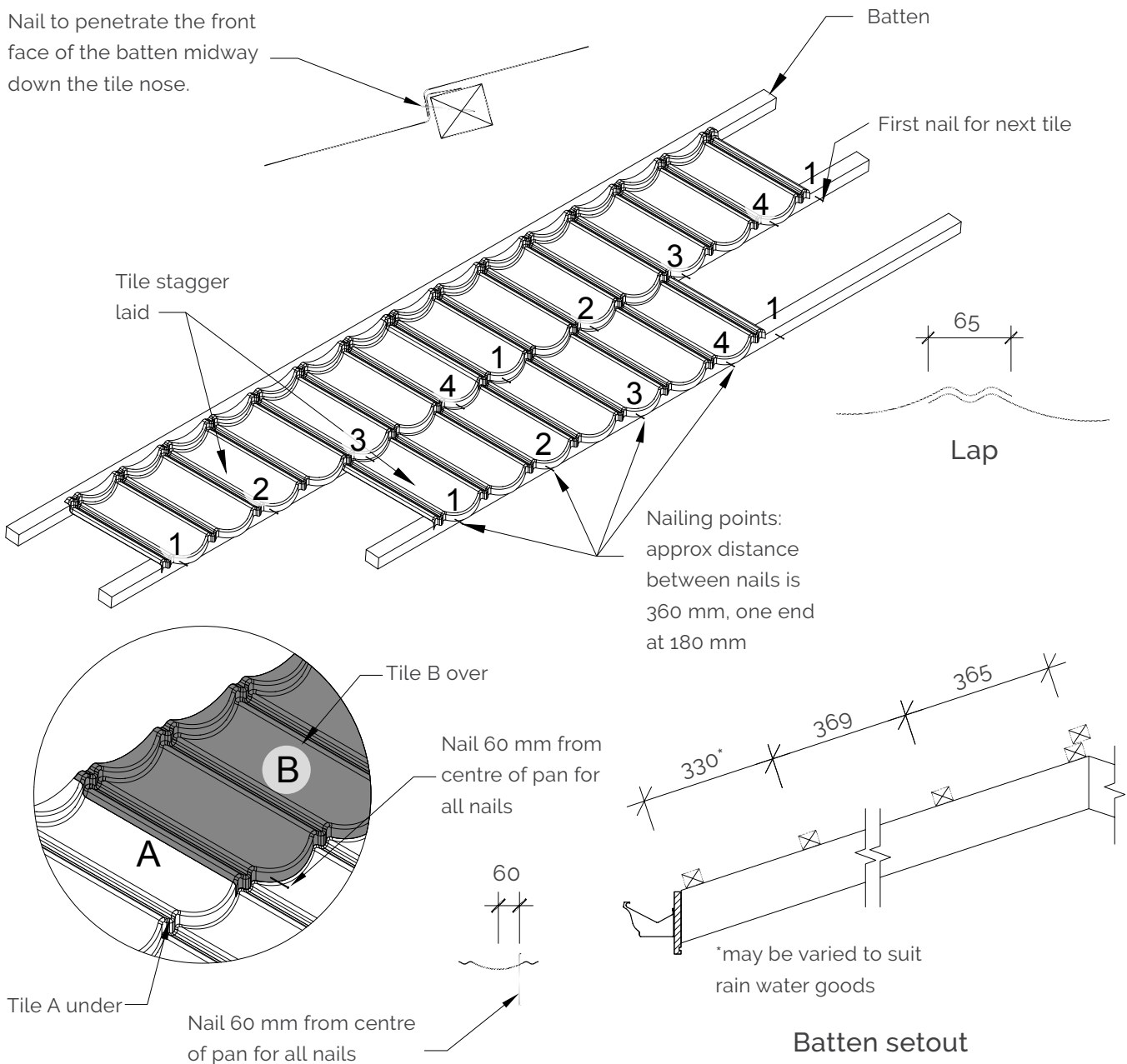
**Only use tile nails approved by Gerard Roofs.**

## Part tile

Tiles may be cut down to modular size;  
Cut edges should be overlapped by  
tile finish laps.



## Tile installation – nailing position for Colortile



### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

## 7.6 Gerard Milano

Pitch – min./max.	12-90°
Overall length	1330 mm
Length of cover	1215 mm
Width of cover	368 mm
Uprand	24 mm
Roof cover/panel	0.45 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	NA
Weight/m <sup>2</sup> Textured	6.4 kg
Weight/m <sup>2</sup> Satin	NA

## Batten spacing

Milano textured (chipped) 368 mm.

## Tile batten sizes

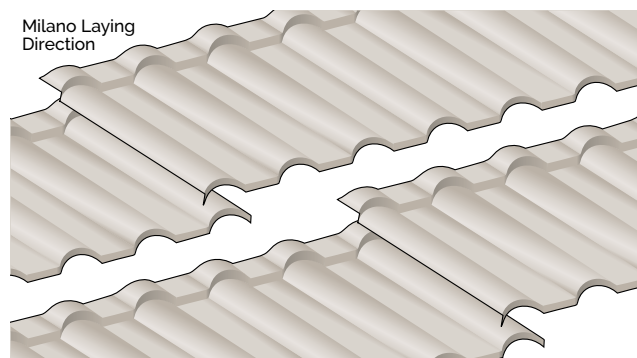
40 x 50 mm on 900 mm spaced rafter.  
50 x 50 mm on 1200 mm spaced rafters.

## Tile batten fastening

Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2.**

900 mm rafter spacing. Minimum 2 x 90 x 3.15 mm nails for low, medium, high and very high wind zones.  
1 x 80 mm x 10 gauge batten screw for extra high wind zone.

## Laying direction



## Left over right or right over left

Lay laps away from line of sight.  
Lay away from prevailing winds.  
Lay laps away from discharging rainwater pipes or roof valleys.

## Laying pattern

Stagger lay tiles laps 2 or more modules apart down the roof.

## Tile fastening

Refer: **Tile installation – nailing position for Milano**  
back and front of laps are to be nailed.

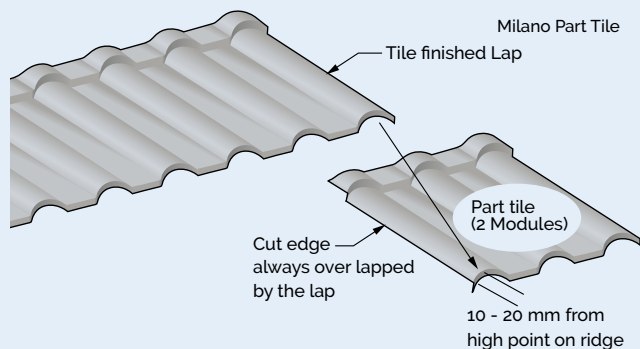
4 x 50 mm tile nails. Nail spacing 360 mm and 180 mm to hold at lap, up to and including extra high wind zone or up to 3.8 kPa design load.

7 x 50 mm tile nails up to 5.2 kPa design load.

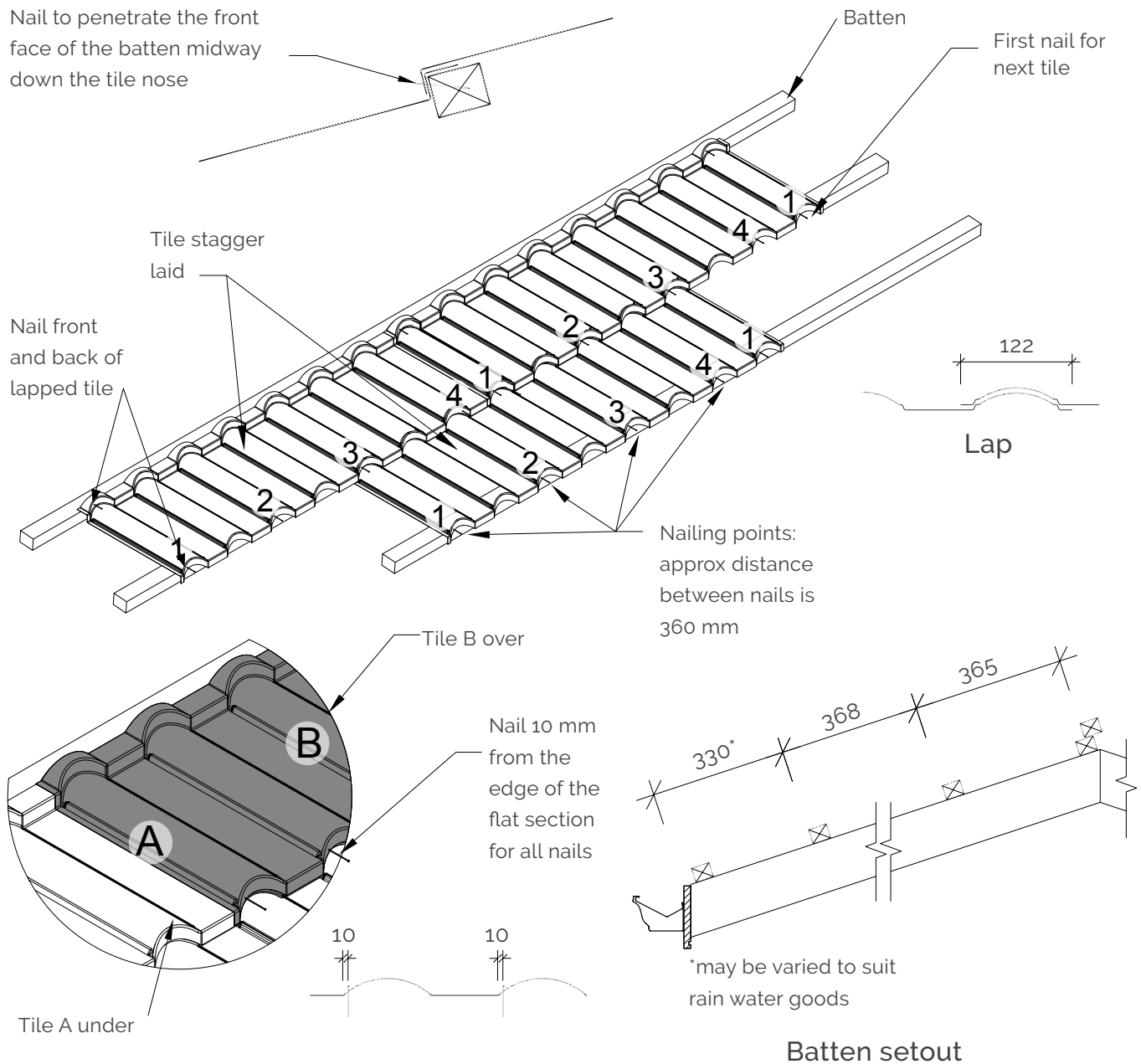
**Only use tile nails approved by Gerard Roofs.**

## Part tile

Tiles may be cut down to modular size; Cut edges should be overlapped by tile finish laps.



## Tile installation – nailing position for Milano



## Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.
- Nail front and back of lapped tile.

## Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

## 7.7 Gerard Tuffcoat

Pitch – min./max.	12-90°
Overall length	1320 mm
Length of cover	1257 mm
Width of cover	369 mm
Uprand	28 mm
Roof cover/panel	0.46 m <sup>2</sup>
Panels/m <sup>2</sup>	2.2
Weight/panel Textured	2.9 kg
Weight/panel Satin	2.1 kg
Weight/m <sup>2</sup> Textured	6.4 kg
Weight/m <sup>2</sup> Satin	4.7 kg

## Batten spacing

Tuffcoat textured (chipped) 369 mm.

Tuffcoat satin (painted) 370 mm.

## Tile batten sizes

40 x 50 mm on 900 mm spaced rafter

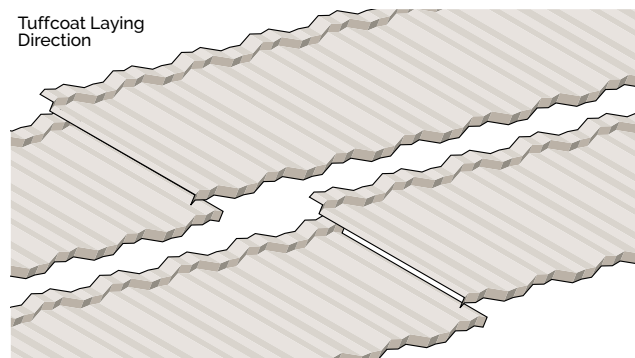
50 x 50 mm on 1200 mm spaced rafters

## Tile batten fastening

Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2.**

900 mm rafter spacing minimum 2 x 90 x 3.15 mm  
nails for low, medium, high and very high wind zones.  
1 x 80 mm x 10 gauge batten screw for Extra High  
Wind Zone.

## Laying direction



## Left over right or right over left

Lay laps away from line of sight.

Lay away from prevailing winds.

Lay laps away from discharging rainwater  
pipes or roof valleys.

## Laying pattern

Stagger lay tiles laps 2 or more modules apart down  
the roof.

## Tile fastening

Refer: **Tile installation – nailing position for Tuffcoat**

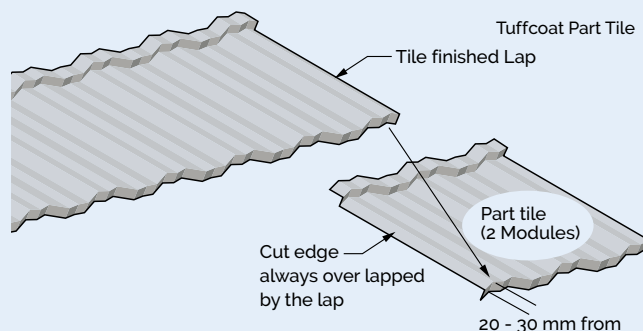
4 x 50 mm tile nails. Nail spacing 320 mm, every  
second module up to and including extra high wind  
zone or up to 3.8 kPa design load.

8 x 50 mm tile nails above 3.8 kPa design load.

**Only use tile nails approved by Gerard Roofs.**

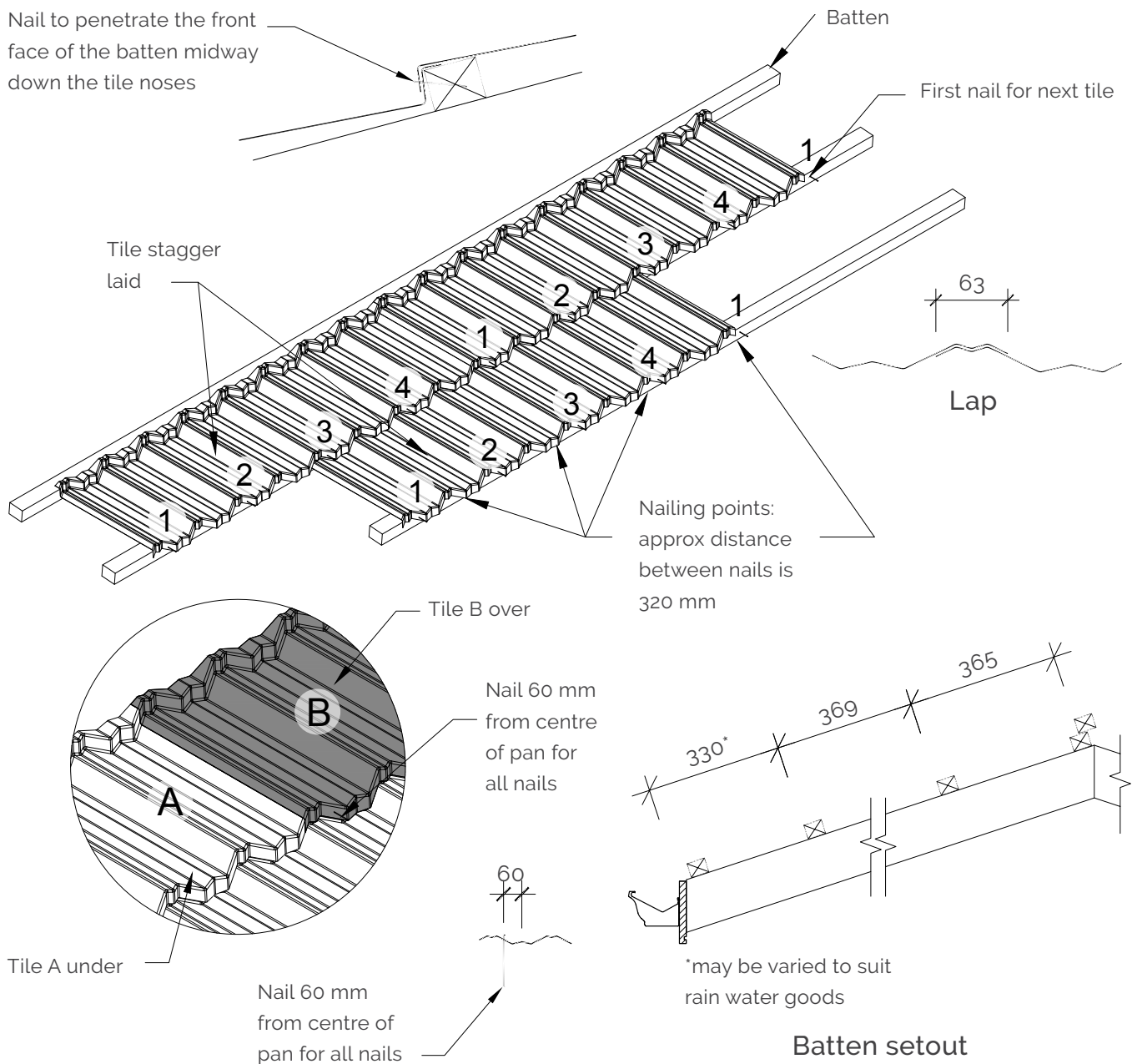
## Part tile

Tiles may be cut down to modular size;  
Cut edges should be overlapped  
by tile finish laps.





## Tile installation – nailing position for Tuffcoat



### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

### 7.8 Gerard Hedron

Pitch – min./max.	15-90°
Overall length	1320 mm
Length of cover	1165 mm
Width of cover	368 mm
Uprand	18 mm
Roof cover/panel	0.43 m <sup>2</sup>
Panels/m <sup>2</sup>	2.3
Weight/panel Textured	2.9 kg
Weight/panel Satin	NA
Weight/m <sup>2</sup> Textured	6.6 kg
Weight/m <sup>2</sup> Satin	NA

#### Batten spacing

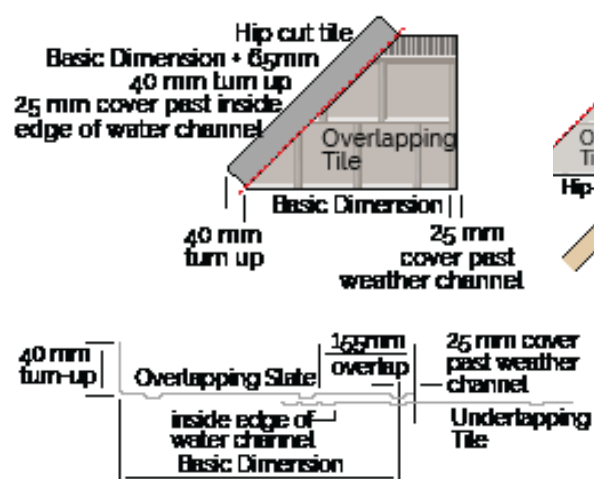
Hedron textured (chipped) 368 mm.

#### Tile batten sizes

40 x 50 mm on 900 mm spaced rafter.

50 x 50 mm on 1200 mm spaced rafters.

#### Laying direction



#### Tile batten fastening

Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2.** in the **Gerard Roofs Installation Manual - page 33.**

900 mm rafter spacing. Minimum 2 x 90 x 3.15 mm nails for low, medium, high and very high wind zones.

1 x 80 mm x 10 gauge batten screw for extra high wind zone.

#### Laying pattern

Stagger lay Hedron down the roof to create a random pattern. Laps of tile above or below should not be closer than 200 mm.

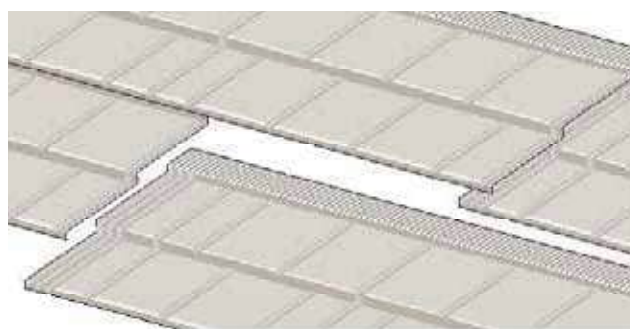
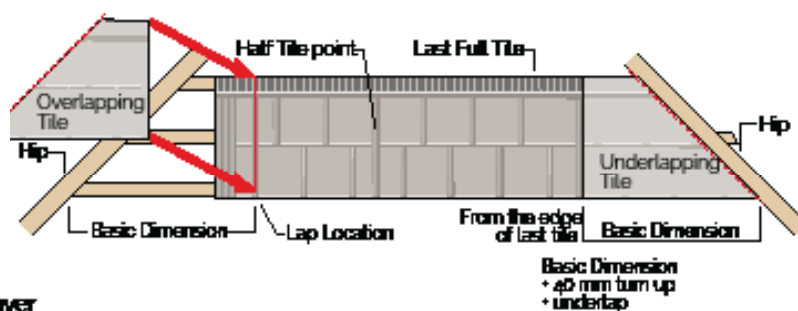
#### Fastening

Refer: **Tile installation – nailing position for Hedron.**

4 x 50 mm tile nails. Nail spacing ~300 mm, up to and including extra high wind zone or up to 3.8kPa design load.

7 x 50 mm tile nails past 5.2 kPa design load. Nail lap at centre step also.

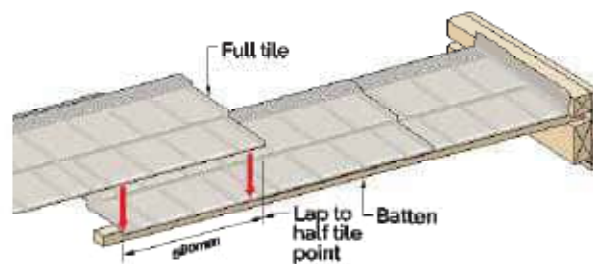
Only use tile nails approved by Gerard Roofs.



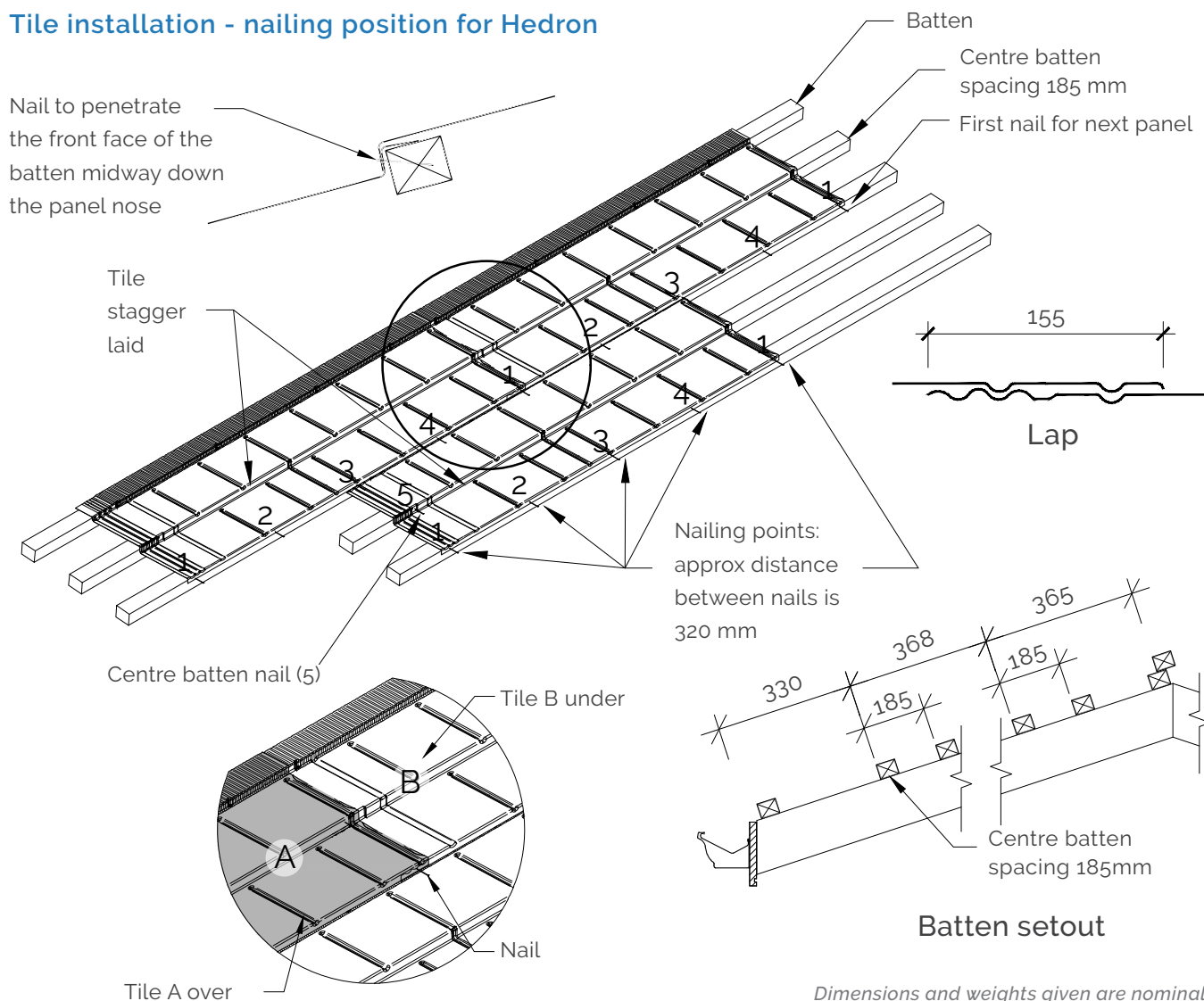
One way lay – right to left

### Part tile

If less than a course width is required then it will be necessary to lap the adjacent full tile by a half tile which will then allow a full tile to be cut and bent to suit.



### Tile installation - nailing position for Hedron



### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

### 7.9 Gerard Oberon

Pitch – min./max.	20-90°
Overall length	1310 mm
Length of cover	1230 mm
Width of cover	320 mm
Uprand	20 mm
Roof cover/panel	0.39 m <sup>2</sup>
Panel/m <sup>2</sup>	2.54
Weight/panel Textured	2.8 kg
Weight/panel Satin	NA
Weight/ m <sup>2</sup> Texture	7.1 kg
Weight/ m <sup>2</sup> Satin	NA

#### Batten spacing

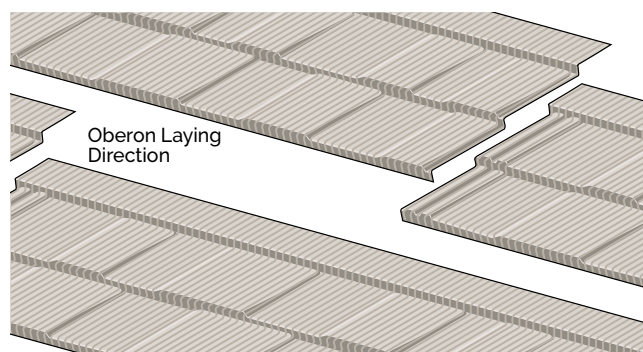
Oberon textured (chipped) 320 mm.

#### Tile batten sizes

40 x 50 mm on 900 mm spaced rafter.

50 x 50 mm on 1200 mm spaced rafters.

#### Laying direction



One way lay – right to left

#### Tile batten fastening

Refer to **Section 4.0 – Tables 4.3.1 and 4.3.2**

900 mm after spacing. Minimum 2 x 90 x 3.15 mm nails for low, medium, high and very high wind zones.

1 x 80 mm x 10 gauge batten screw for extra high wind zone.

#### Laying pattern

Stagger lay Oberon down the roof to create a random pattern. Laps of tile above or below should not be closer than 200 mm.

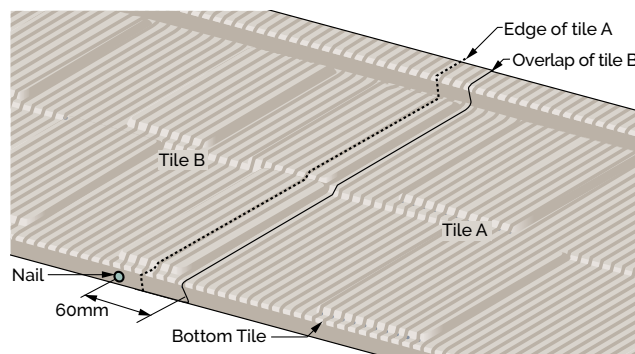
#### Tile fastening

Refer: **Tile installation – nailing position for Oberon**

4 x 50 mm tile nails. Nail spacing ~320 mm, up to and including Extra High Wind Zone or up to 3.8 kPa design load.

7 x 50 mm tile nails up to 5.2 kPa design load.

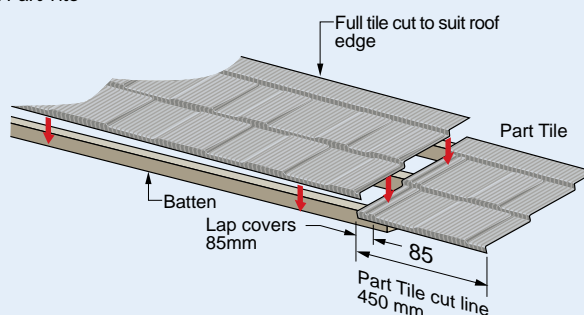
Only use tile nails approved by Gerard Roofs.



#### Part tile

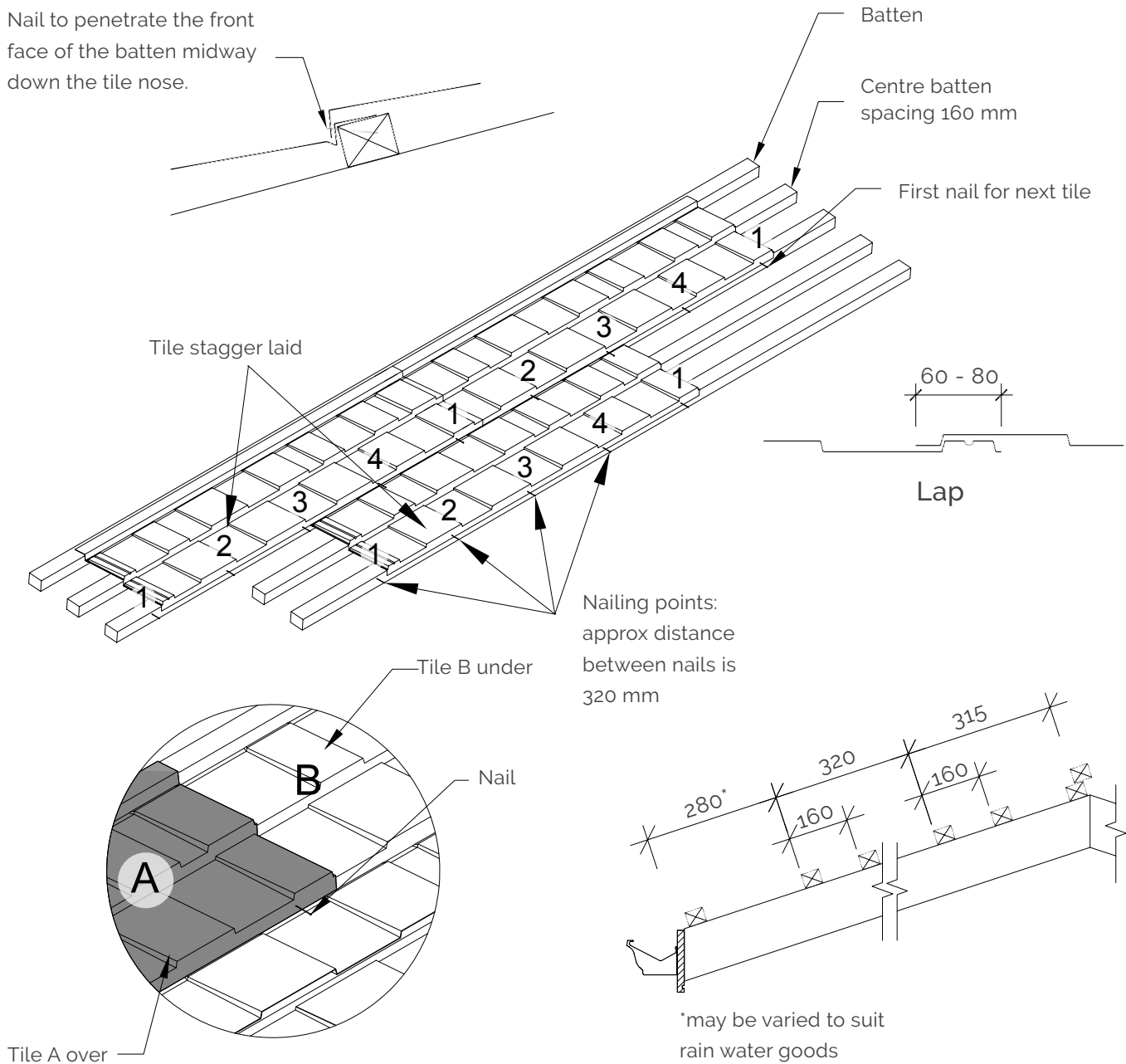
There is only one specific point where a part Oberon can be created. This is 450 mm from the right hand end of the tile. The right hand end of the part tile is always overlapped by a full tile. Lap using the maximum coverage of the lap (80 mm).

#### Oberon Part Tile



## Tile installation – nailing position for Oberon

Nail to penetrate the front face of the batten midway down the tile nose.



### Fixing

- The nose of each tile is held down at 5 points.
- This comprises 4 nails as per the diagrams plus the nailed overlap tile.

### Fastening Tiles in Cyclone Areas

- Where a building has been designed outside the scope of NZS 3604. Tiles on buildings with a wind load design of above 3.8 kPa should be fastened at approx 160 mm spacing (each module).

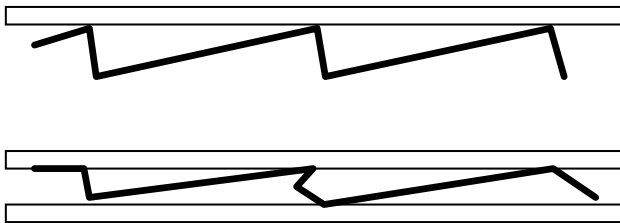
*Dimensions and weights given are nominal.*

## 7.0 Product-specific installation

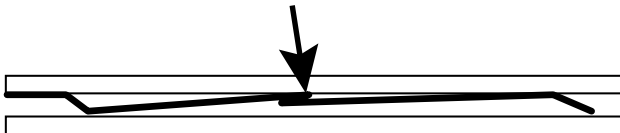
## Tile bending – Oberon

Flattening the centre step, head lap and nose of the Oberon will reduce the chances of splitting the tile during bending where the steel and coatings fold over each other. This is critical where bends are made on hips or gables where the height between the front and back sections is the largest.

## Cause

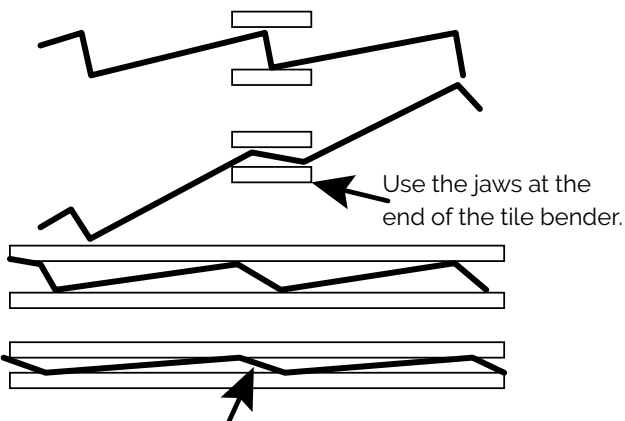


Folding of the centre step may result in splitting after bending.



## Solution

Pre flatten the centre step, head lap and nose before bending.



A flat single layer of Oberon is unlikely to split.





## 8.0 Installing hips, ridges & gables

The worry-proof roof.

**Page 448 of 734**

## 8.0 Installing hips, ridges & gables

### 8.1 Barge installation (gable end)

Box barge, Angle trim and Barrel 150 are installed over the turned up tile and fascia board. The accessories must cover the turned up sections of the tiles by a minimum of 25 mm.

#### 8.1.1 Box barge

Box barges are laid from the eave to ridge.

The box barge cover at the eave must be cut and bent to cover the lower end of the barge board which usually projects about 150 mm beyond the fascia. The cutting and folding are done on site to suit the barge board.

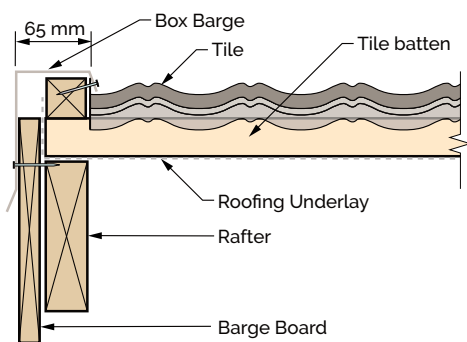


Figure 8.1.1.1 Accessory batten layout for box barge

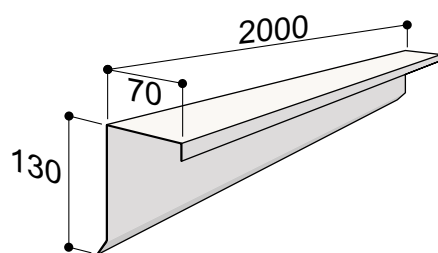


Figure 8.1.1.2 Box barge

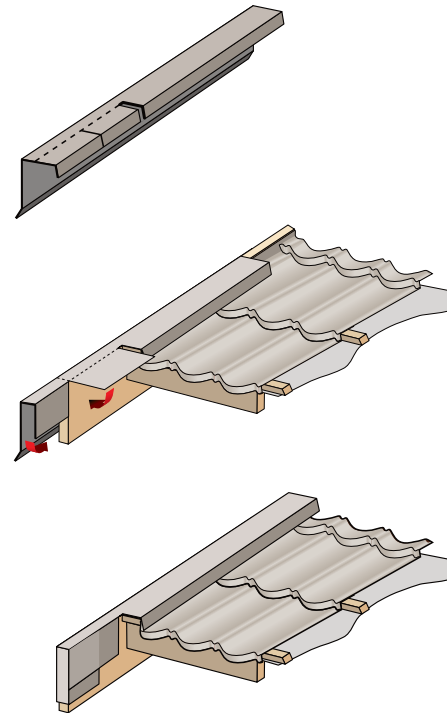


Figure 8.1.1.3

The Box barge accessories are tacked in place and checked for straightness before complete nailing. The nails are positioned near the bottom edge on the fascia side and mid way on the tile side of the box barge, nails are spaced approximately 600 mm apart or where holes are located on painted product. The nails are driven in so that the heads just make contact with the metal. Over driving them will crease the straight edge.

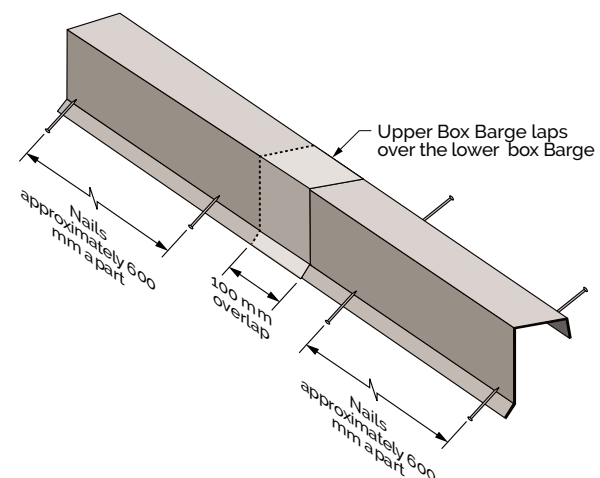


Figure 8.1.1.4

### 8.1.2 Angle trim

Angle trims are laid from the eave to ridge.

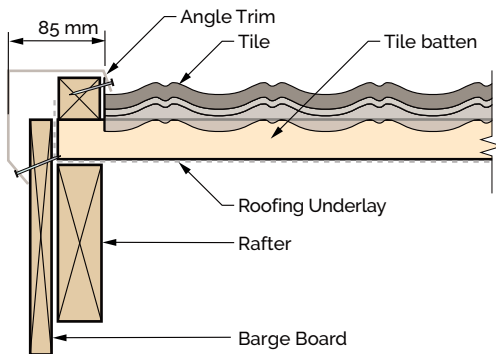


Figure 8.1.2.1 Accessory batten layout for angle trim

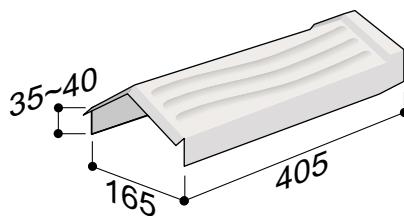


Figure 8.1.2.2 Angle trim

Angle trims are bent on site to a 90 degree angle and the edge that is to overlap the tiles is also bent to 90 degrees.

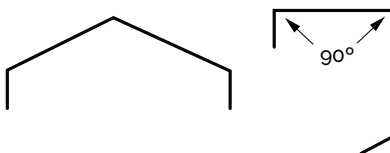


Figure 8.1.2.3

Cut Angle trim end to suit barge Angle trim shape.

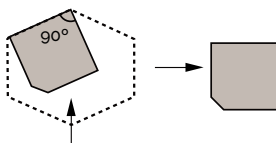


Fig 8.1.2.4 Angle trim end

The eave angle trim is created by fastening a trimmed Angle trim end to an angle trim with pop rivets.

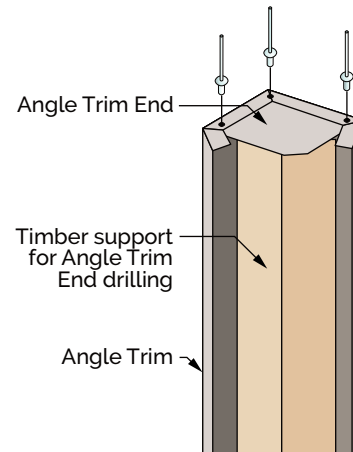


Figure 8.1.2.5

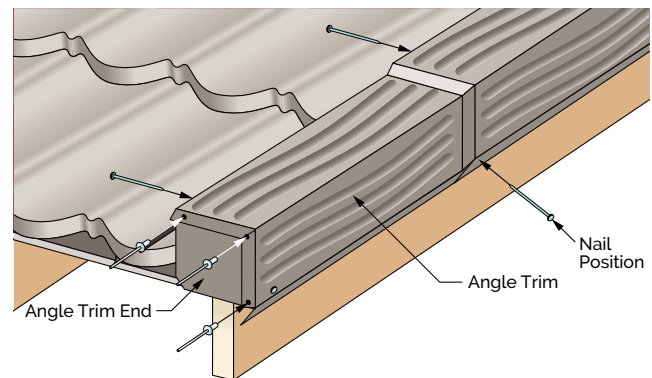


Figure 8.1.2.6

Angle trims are installed from the eave up overlapping so that the upper angle trim covers and fits neatly over the step of the lower angle trim.

## 8.0 Installing hips, ridges & gables

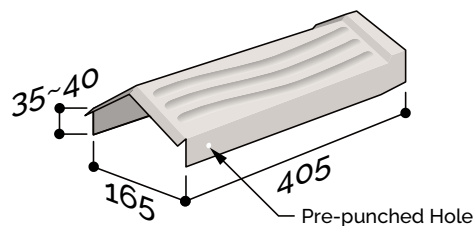


Figure 8.1.2.7

Pre-punched holes for fastening the Angle trims are located close to the front of the trim where it will overlap lower trim.

Line the Angle trims up the gable and then tack them in place, adjust heights if required and then finish nailing.

Drive the nails in sufficiently to bring the heads of the nails in contact with the Angle trims, do not over drive them as it will distort the Angle trim shape.

### 8.1.3 Barrel 150

Barrel 150s are laid from the eave to ridge.

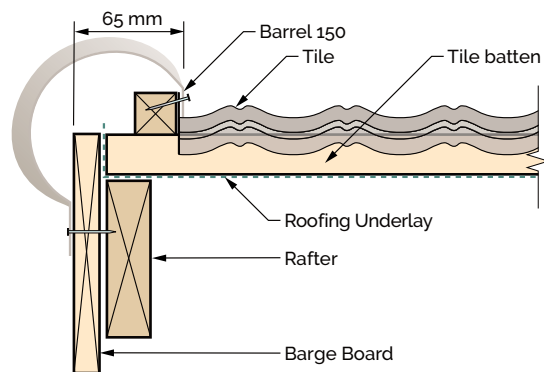


Figure 8.1.3.1 Accessory batten layout for Barrel 150

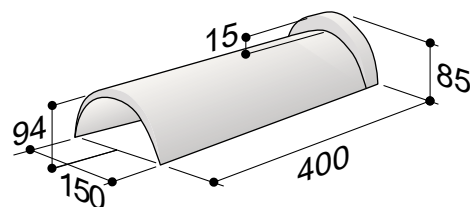


Figure 8.1.3.2 Barrel 150

Barrels are bent on site so that there is a vertical edge that will cover the bent up section tiles at the barge.

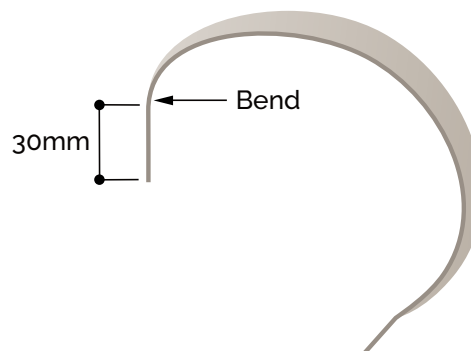


Figure 8.1.3.3

#### Barrel end disc

Cut and shape to suit eave barrel.

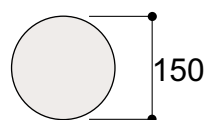


Figure 8.1.3.4

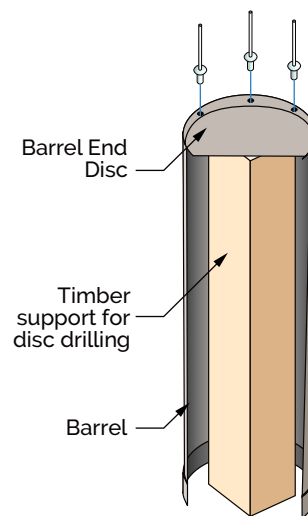


Figure 8.1.3.5

The eave barrel is created by shaping and fastening a barrel end disc to a barrel with pop rivets.

Barrels are installed from the eave up overlapping so that the upper barrel covers and fits neatly over the step of the lower barrel. Line the barrels up the gable and then tack them in place, adjust heights if required and then finish nailing.

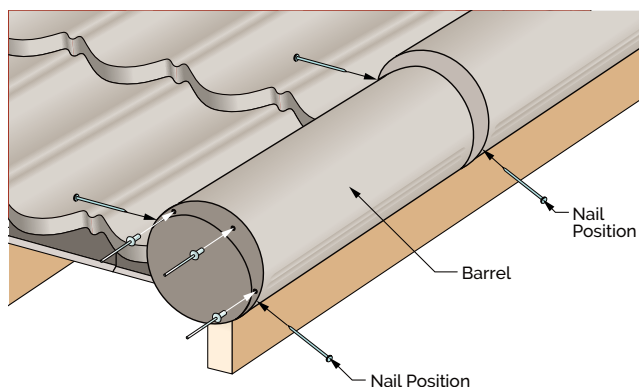


Figure 8.1.3.6

Pre-punched holes for fastening the barrels are located close to the front where it will overlap lower barrels.

Drive the nails in sufficiently to bring the heads of the nails in contact with the Barrels, do not over drive them as it will distort the Barrel shape.

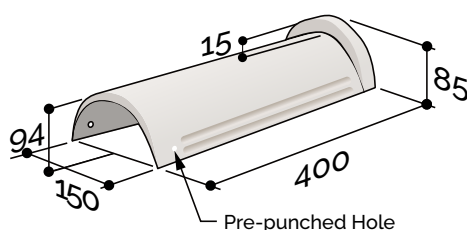


Figure 8.1.3.7

## 8.2 Hip installation

Box trim, Angle trim and Barrel 150 are installed over tiles that have been turned up against hip battens. The accessories must cover the turned up sections of the tiles by a minimum of 35 mm.

### 8.2.1 Box trim over a hip

Textured Box trims are tapered. The wider end of one cap fits neatly over the narrow end of the other.

Satin Box trims are straight and have holes punched for nailing every 630 mm.

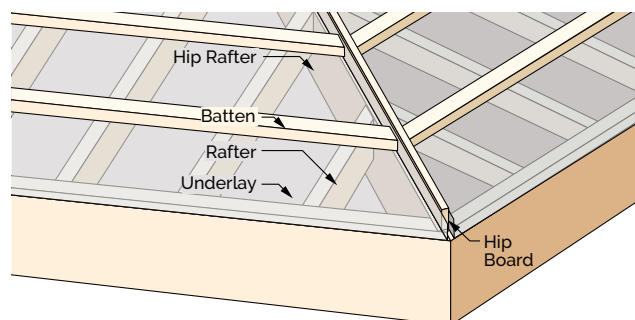


Figure 8.2.1.1 Accessory batten layout for Box trim

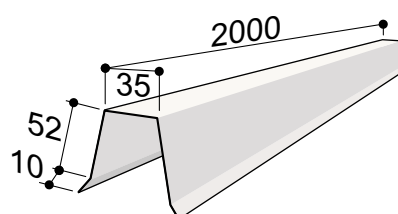


Figure 8.2.1.2 Box trim

The Box trim cap at the eave must be cut and bent to cover the lower end of the hip board. The cutting and folding are done on site to suit the hip. Cut the wide end in the case of the textured Box trim. (Steps shown in Figure 8.2.1.3).

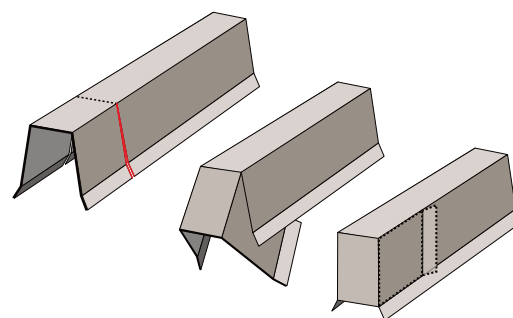


Figure 8.2.1.3

Box trims are laid from the eave up the hip lapping the lower Box trim by 100 mm (Figure 8.2.1.4). The Box trim accessories are tacked in place using 30 mm accessory nails and checked for straightness before complete nailing. The nails are positioned near the bottom edge just above the 10 mm crease on the sides, nails are spaced approximately 600 mm apart or where holes are located on painted product. The nails are driven in so that the heads just make contact with the metal. Over driving them will crease the straight lines of the accessory.



## 8.0 Installing hips, ridges & gables

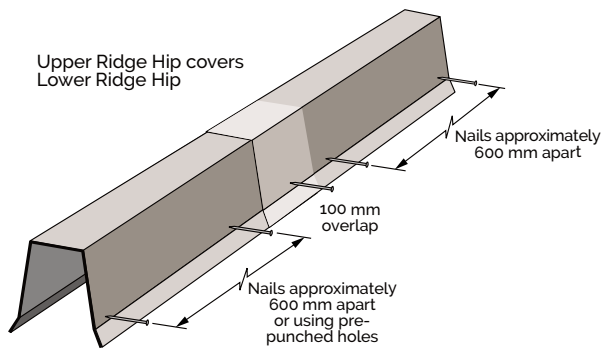
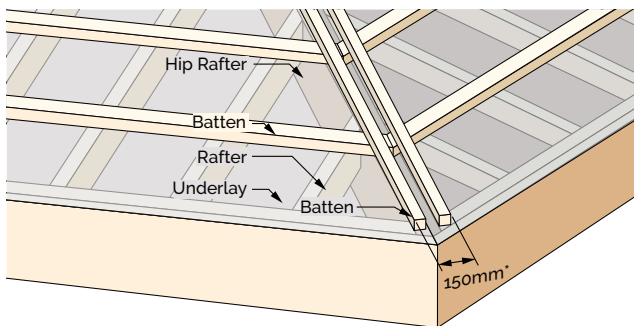


Figure 8.2.1.4

### 8.2.2 Angle trim over a hip

Angle trims are laid from eave to ridge.



\*May vary depending on pitch of roof

Figure 8.2.2.1 Accessory batten layout for hips - Angle trim

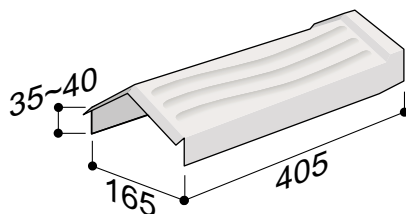


Figure 8.2.2.2 Angle trim

The eave Angle trim is created by fastening an Angle trim end (Figure 8.2.2.4) to an Angle trim with pop rivets.

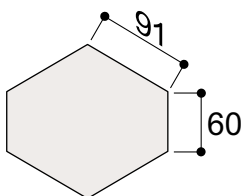


Figure 8.2.2.4 Angle trim end

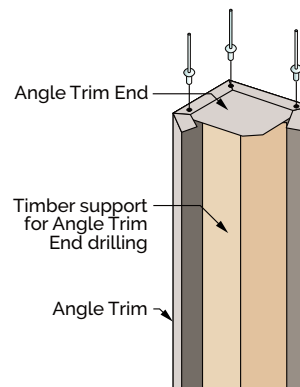


Figure 8.2.2.3

Angle trims are installed from the eave up overlapping so that the upper Angle trim covers and fits neatly over the step of the lower Angle trim (Figure 8.2.2.5 and Figure 8.2.2.6).

Line the Angle trims up the hip and then tack them in place, adjust heights if required and then finish nailing. Drive 50 mm tile nails in sufficiently to bring the heads of the nails in contact with the Angle trims, do not over drive them as it will distort the Angle trim shape.

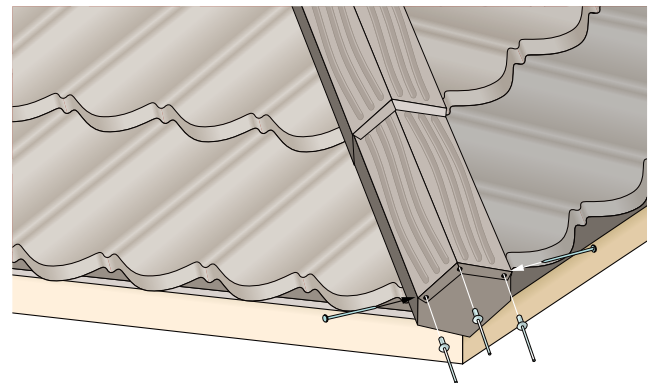


Figure 8.2.2.5

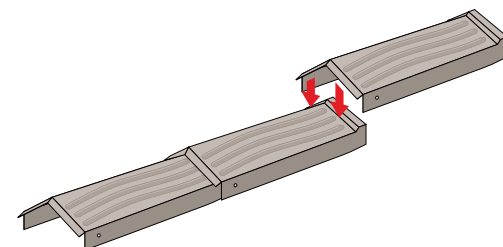


Figure 8.2.2.6



Pre-punched holes for fastening the Angle trim are located close to the front of the trim where it will overlap lower trim (Figure 8.2.2.7).

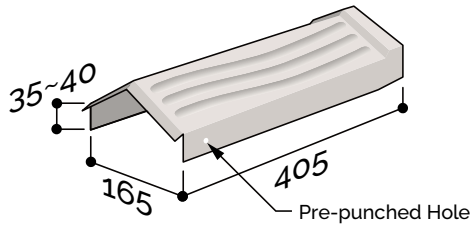


Figure 8.2.2.7

### 8.2.3 Barrel over a hip

Barrels are laid from eave to ridge.

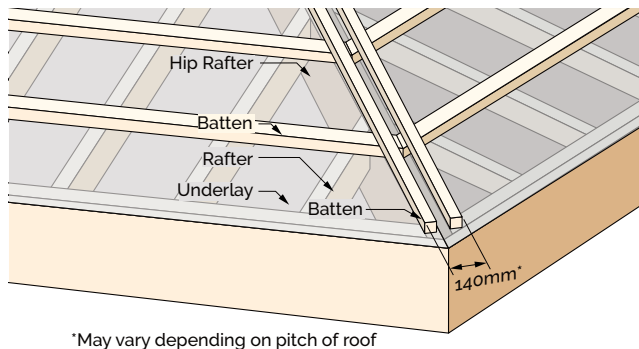


Figure 8.2.3.1 Accessory batten layout for Barrel 150

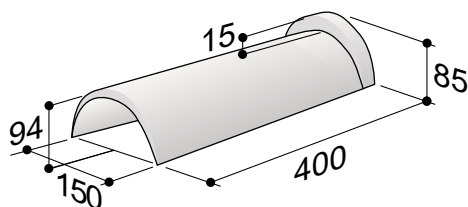


Figure 8.2.3.2 Barrel 150

Barrels are bent on site so that there is a vertical edge either side of the Barrel that will cover the bent up section of the tiles up the hip (Figure 8.2.3.3). This can be done in a short tile bender or in-between 2 tile battens fastened 5 mm apart.

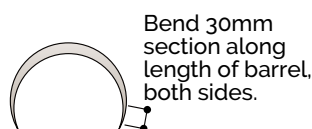


Figure 8.2.3.3

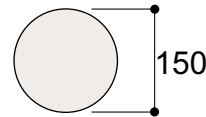


Figure 8.2.3.4

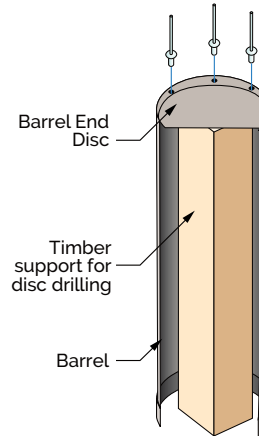


Figure 8.2.3.5

The eave Barrel is created by fastening a Barrel end disc to a Barrel with pop rivets (Figure 8.2.3.5).

Barrels are installed from the eave up overlapping so that the upper barrel covers and fits neatly over the step of the lower barrel (Figure 8.2.3.6 and Figure 8.2.3.7)

Line the Barrels up the hip and then tack them in place using 50 mm tile nails, adjust heights if required and then finish nailing.

Drive the nails in sufficiently to bring the heads of the nails in contact with the Barrels, do not over drive them as it will distort the Barrel shape.

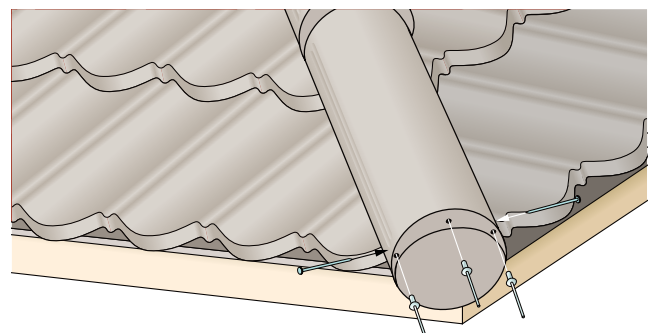


Figure 8.2.3.6

## 8.0 Installing hips, ridges & gables

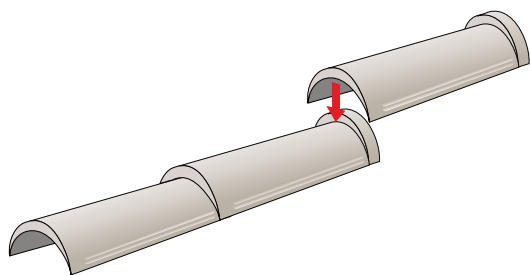


Figure 8.2.3.7

Pre-punched holes for fastening the barrels are located close to the front where it will overlap lower barrels (Figure 8.2.3.8).

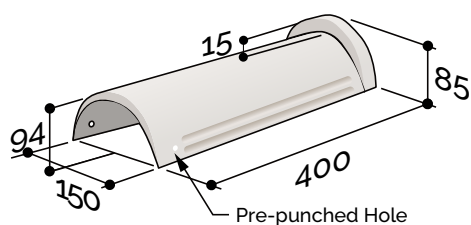


Figure 8.2.3.8

### 8.3 Ridge accessory installation

Box trim, angle trim and Barrel 150 are installed along the ridges.

Special profiled ridge accessories are used on Milano tiles instead of bending tiles up against the ridge battens. On all the other profiles the accessories are installed directly over the turned up tiles.

The accessories must cover the turned up sections of the tiles by a minimum of 35 mm.

#### 8.3.1 Box trim along a ridge

Textured Box trims are tapered. The wider end of one cap fits neatly over the narrow end of the other.

Satin Box trims are straight and have holes punched for nailing every 630 mm.

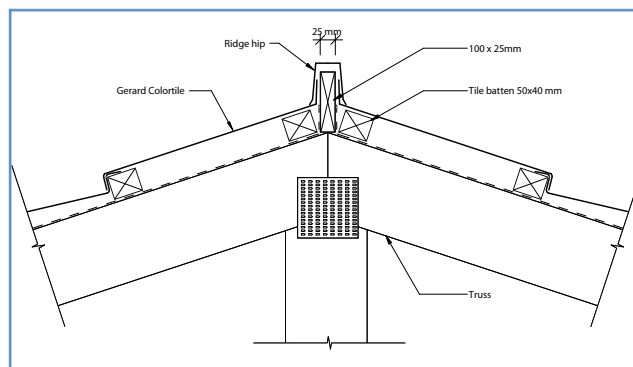


Figure 8.3.1.1 Accessory batten layout for Box trim along a ridge

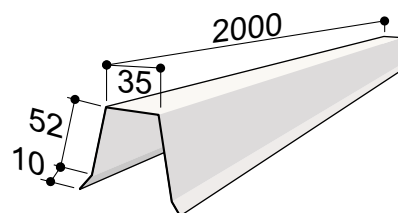


Figure 8.3.1.2

The Box trim may need to be installed at a hip or barge junction. The cutting and folding methods for these are covered in **10.0 Roof junctions**. Box trims are laid from one end of the ridge to the other lapping them by 100 mm (Figure 8.3.1.3).

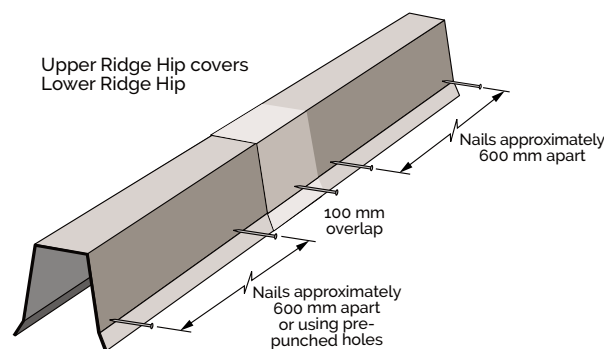


Figure 8.3.1.3

The Box trim accessories are tacked in place using 30 mm accessory nails and checked for straightness before complete nailing.

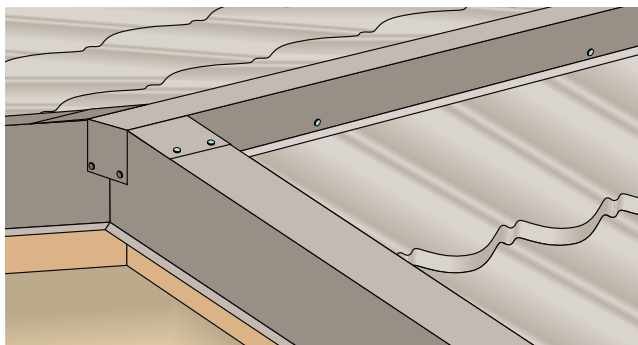


Figure 8.3.1.4

The nails are positioned near the bottom edge just above the 10 mm crease on the sides, nails are spaced approximately 600 mm apart or where holes are located on painted product. The nails are driven in so that the heads just make contact with the metal. Over driving them will crease the straight lines of the accessory.

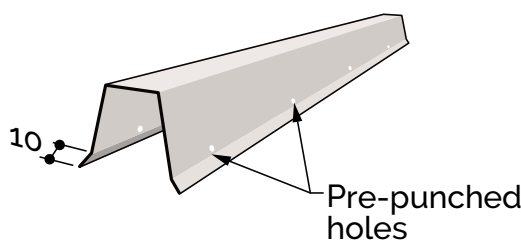


Figure 8.3.1.5

### 8.3.2 Angle trim along a ridge

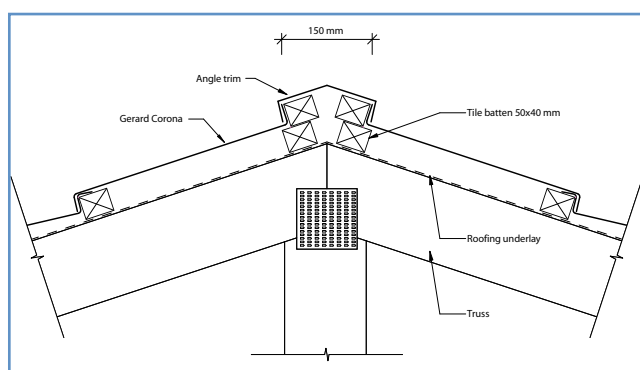


Figure 8.3.2.1 Accessory batten layout for Angle trim along a ridge

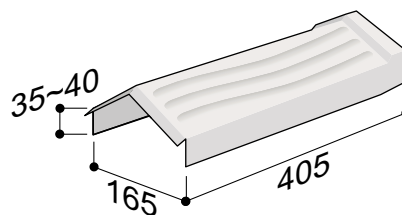


Figure 8.3.2.2 Angle trim

The angle trim may need to be installed at a hip or barge junction. The cutting and folding methods for these are covered in **10.0 Roof junctions**.

Angle trims are laid from one end of the ridge to the other overlapping them so that the over lapping angle trim sits neatly over the step (Figure 8.3.2.3).

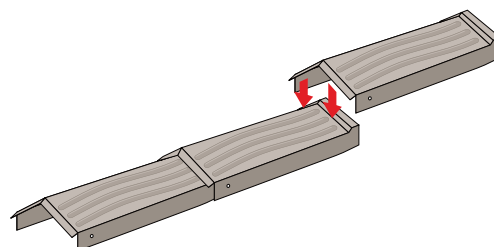


Figure 8.3.2.3 Angle trim overlap

Line the angle trims along the ridge and then tack them in place, adjust heights if required and then finish nailing.

Drive 50 mm tile nails in sufficiently to bring the heads of the nails in contact with the angle trims, do not over drive them as it will distort the angle trim shape.

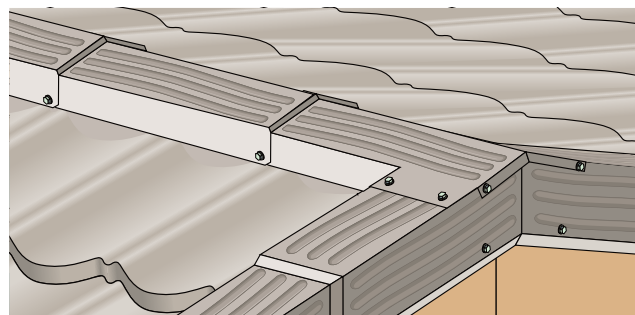


Figure 8.3.2.4

Pre-punched holes for fastening the angle trims are located close to the front of the trim where it will overlap lower trim (Figure 8.3.2.5).

## 8.0 Installing hips, ridges & gables

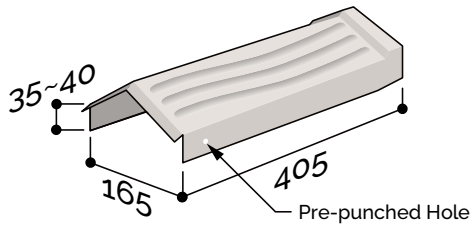


Figure 8.3.2.5

### 8.3.3 Barrel along a ridge

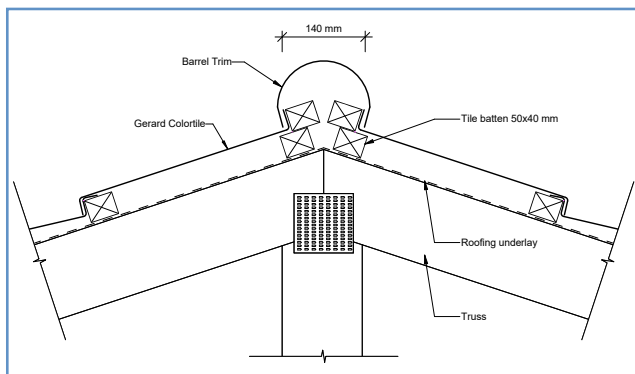


Figure 8.3.3.1 Accessory batten layout for barrel 150 along a ridge

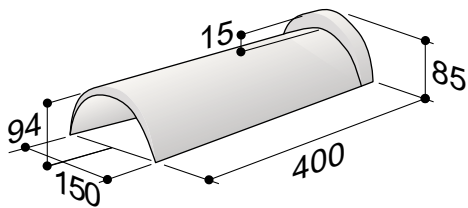


Figure 8.3.3.2 Barrel 150

Barrels are bent on site so that there is a vertical edge either side of the barrel that will cover the bent up section of the tiles that have been laid along the ridge (Figure 8.3.3.3). This can be done in a short tile bender or in-between 2 tile battens fastened 5 mm apart.

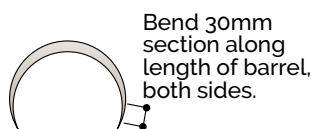


Figure 8.3.3.3

Barrels are installed along the ridge overlapping so that the upper barrel covers and fits neatly over the step of the lower barrel (Figure 8.3.3.4 and Figure 8.3.3.5).

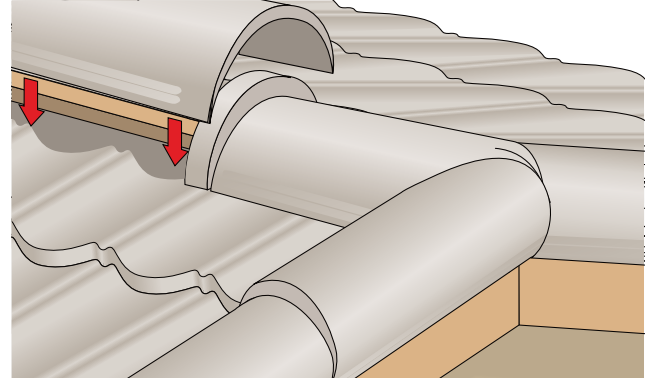


Figure 8.3.3.4

Line the barrels along the ridge and then tack them in place using 50 mm tile nails, adjust heights if required and then finish nailing.

Drive the nails in sufficiently to bring the heads of the nails in contact with the barrels, do not over drive them as it will distort the barrel shape.

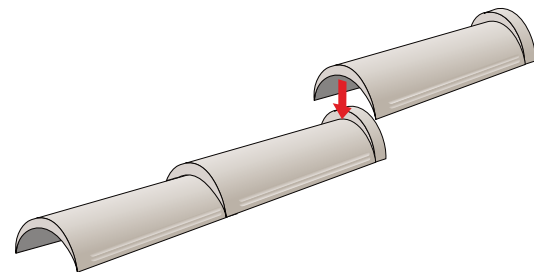


Figure 8.3.3.5

Pre-punched holes for fastening the barrels are located close to the front where it will overlap lower barrels (Figure 8.3.3.6).

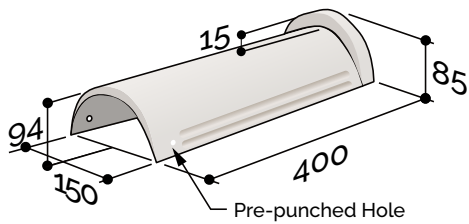


Figure 8.3.3.6

### 8.3.4 Milano ridge flashing A installation

There are two options in finishing a ridge where a Milano tile is used.

Milano tiles are usually turned up 40 mm against the ridge batten and covered with an accessory. This method is used for the other profiles as described in sections within **8.3 Ridge accessory installation**.

An alternative Milano ridge flashing A is available. This accessory is profiled to the shape of the Milano top surface. It provides a clean step just before the covering accessory. The Milano tile has to have the flat sections at the top of the tile turned up 10–25 mm, this reshapes the profile and provides a barrier to windblown moisture.

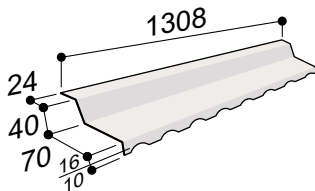


Figure 8.3.4.1 Milano ridge flashing A installed along each side of the ridge

Lay the Milano ridge flashing A along the ridge line and tack them in place at the ends so that they stay in place while installing the barrels.

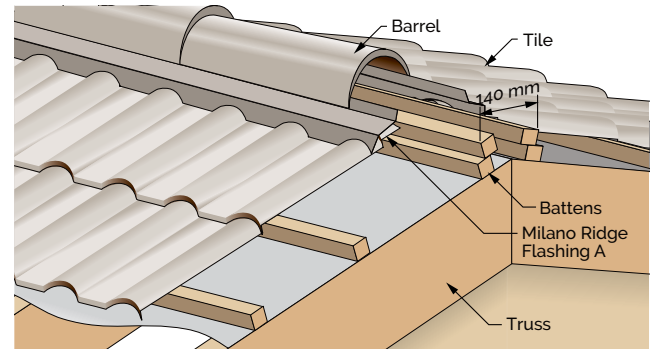


Figure 8.3.4.2







## 9.0 Valleys & wall flashings

The worry-proof roof.

**Page 460 of 734**

## 9.0 Valleys & wall flashings

### 9.1 Valley installation

Valleys are installed from the eave up to the point at which it terminates.

No fasteners should penetrate inside the valleys.

Valleys may be made in full lengths from prepainted 0.55 mm Aluminium Zinc coated steel or from Gerard Roofs Combination valleys and E2 Wide valley that are 2400 mm. The cross section shown is suitable for a roof area of 70 m<sup>2</sup> in a 200 mm (rainfall area). This is the minimum cross section size of any valley made for a Gerard Roof.

#### Combination valley

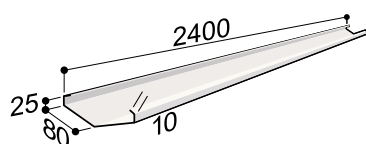


Figure 9.1.1

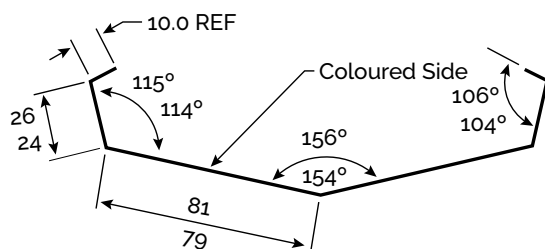


Figure 9.1.2

#### E2 Wide valley

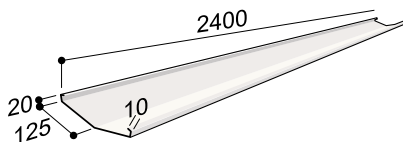


Figure 9.1.3

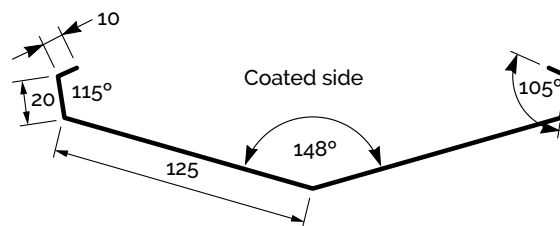
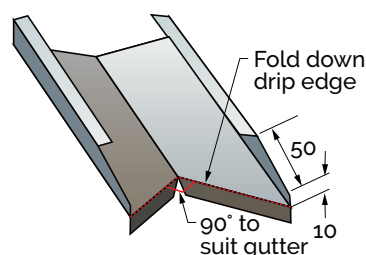


Figure 9.1.4

#### 9.1.1 Valley at an eave

Cut a V out of the valley where the valley laps in to the gutter.



Cut down top edge of valley wall. 10mm at eave up 50mm

Figure 9.1.1.1

If the edge of the valley is below the edge of the gutter the valley should be "sprung up" to the discharge level and not cut, to permit water to flow into the gutter.

#### 9.1.2 Joining lengths of valleys

Overlap minimum 150 mm. Notch valleys to stop thermal movement of lengths. Each valley joint must have a notched section.

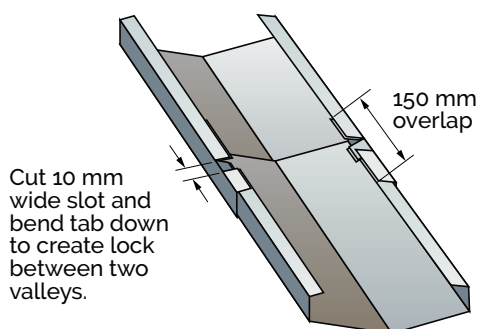


Figure 9.1.2.1

### 9.1.3 Fastening valley to the roof

Valleys are held in place with a clip or nail bent over the top of the valley. Nailing inside the valley is not good practice.

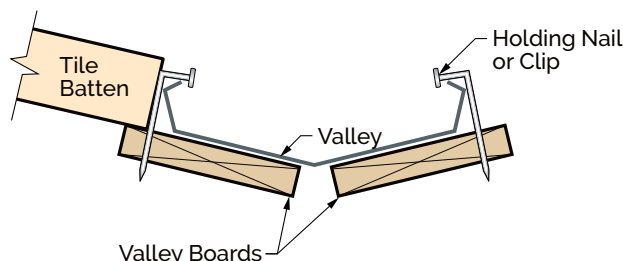


Figure 9.1.3.1

### 9.1.4 Closing valley top

Cut valley to create section for turning up. Turn up should be sufficient to reach top of the ridge battens. This provides no open sections where water could be blown over the top of the valley.

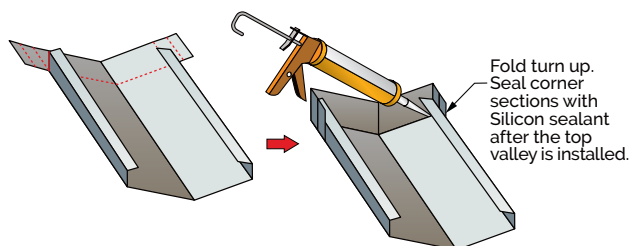


Figure 9.1.4.1

### 9.1.5 Valley junction on the top of a dormer

Cut valley to suit pitch of roof above the dormer, leave a minimum of 50 mm turn over edge to seal and rivet to join sections firmly together.

Seal with Silicon sealant between sheets. Pop Rivet together and seal over the rivet.

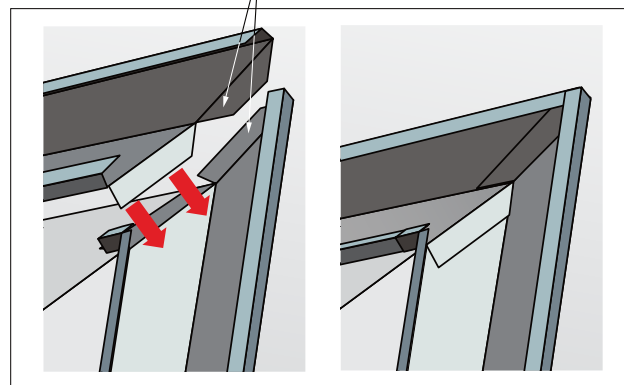


Figure 9.1.5.1

## 9.2 Wall flashings for pitched roofs

There are many approved wall cladding systems used on buildings that all need to be flashed when installing Gerard Roofs.

These flashings will provide adequate weather security through the width of cover or turn up of the tiles and will have sufficient height to be covered by the wall cladding so providing weather security (also meeting the requirements of E2AS1)

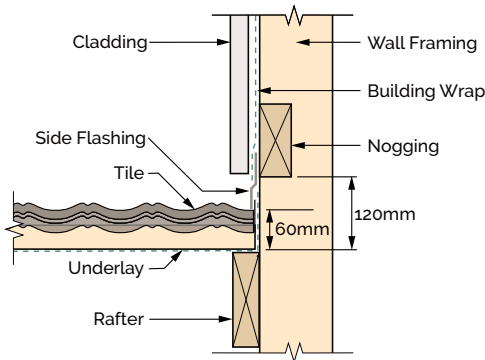
### 9.2.1 Side flashings

Side flashings are installed on to the wall framing before the cladding is installed. Noggins are optional. They do, however, provide support to the flashing. In some areas noggin may be required to support the flashing – change in slope or support for claddings. Noggins are to be installed so that the bottom edge is

## 9.0 Valleys & wall flashings

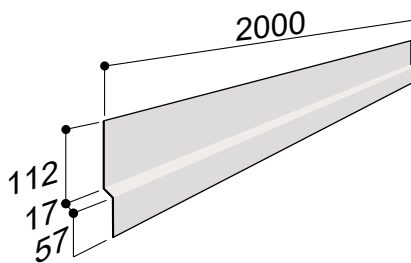
120 mm above the top of the rafter. This will give full support for the side flashing (**Figure 9.2.1.1**).

The side flashing is installed so that the lower edge is positioned 55–60 mm above the top of the rafter. This allows sufficient room for the tile batten and the turn up of the tile.

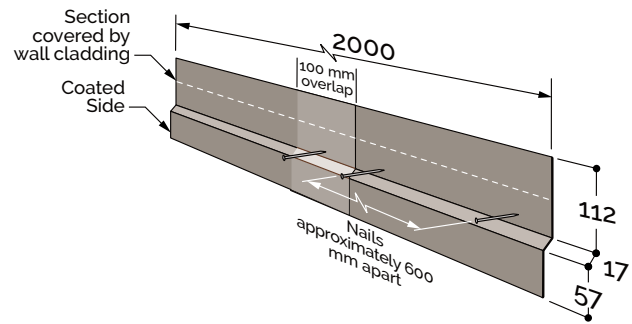


**Figure 9.2.1.1** Positioning of side flashing lap for installation

Side flashings are installed from the lower section of the roof with an overlap of 100 mm. They are nailed in place so that the nails will be hidden under the wall cladding; nails are spaced approximately 600 mm apart (**Figure 9.2.1.3**).



**Figure 9.2.1.2** Side flashing



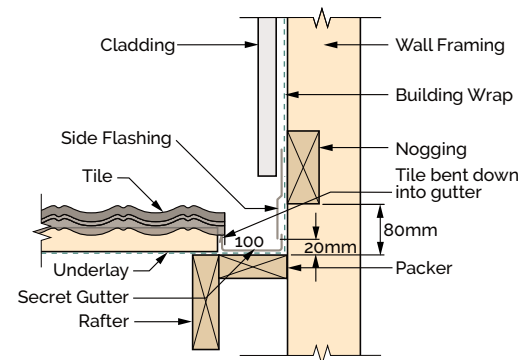
**Figure 9.2.1.3**

### 9.2.2 Side flashings - secret gutter

Side flashings are installed on to the wall framing before the cladding is installed. Noggins are optional. They do, however, provide support to the flashing.

In some areas noggin may be required to support the flashing – change in slope or support for claddings. Noggins are to be installed so that the bottom edge is 80 mm above the floor of the secret gutter. This will give full support for the side flashing (**Figure 9.2.2.1**).

The side flashing is installed so that the lower edge is positioned 20 mm above the top of base of the secret gutter. This allows sufficient room behind the side flashing for the turn up of the secret gutter.



**Figure 9.2.2.1** Side flashing installation over a secret gutter

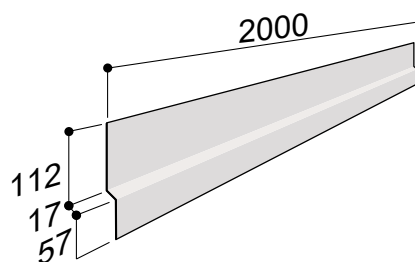


Figure 9.2.2.2 Side flashing

**Note:** The secret gutter must comply with the NZ Metal Roof and Wall Cladding Code of Practice.

In brief: the valley must be a minimum of 100 mm wide and have a minimum depth of 20 mm and be made of a non ferrous metal as it is required to last 50 years as it cannot be easily replaced.

Side flashings are installed from the lower section of the roof with an overlap of 100 mm. They are nailed in place so that the nails will be hidden under the wall cladding; nails are spaced approximately 600 mm apart (Figure 9.2.2.3)

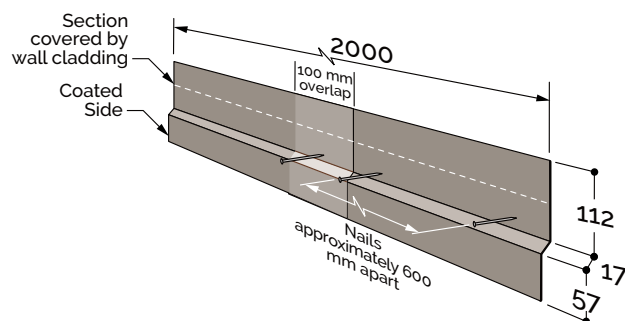


Figure 9.2.2.3

### 9.2.3 Apron flashings

Apron flashings are installed on to the wall framing before the cladding is installed. Noggins are optional. They do, however, provide support to the flashing. In some areas noggin may be required to support the flashing – change in slope or support for claddings. Noggins are to be installed so that the bottom edge is 120 mm above the top of the rafter. This will give full support for the apron flashing (Figure 9.2.3.1).

The apron flashing is installed so that the lower edge is

positioned 60 mm above the top of the rafter. This allows sufficient room for the tile batten and the turn up of the tile. The soft edge of the apron flashing is dressed down on to the surface of the tile.

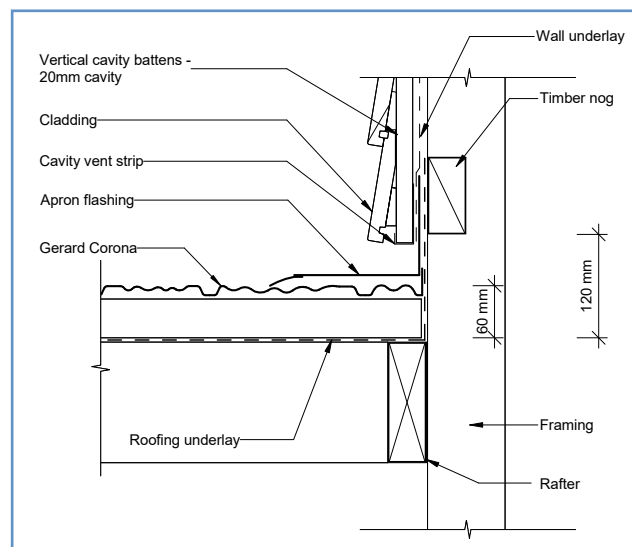


Figure 9.2.3.1 Positioning of apron flashing lap for installation

Apron flashings are installed from the lower section of the roof with an overlap of 100 mm (Figure 9.2.3.3). They are nailed in place so that the nails will be hidden under the wall cladding; nails are spaced approximately 600 mm apart.

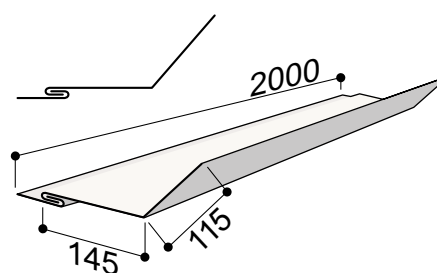


Figure 9.2.3.2 Apron flashing

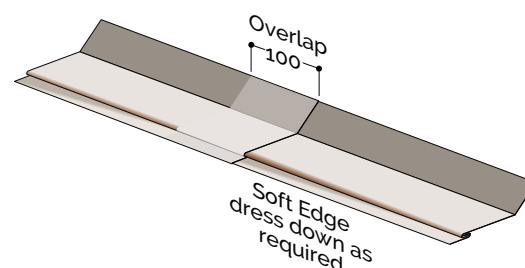


Figure 9.2.3.3

## 9.0 Valleys & wall flashings

### 9.2.4 Pitch flashings for brick veneer or cavity cladding systems

Pitch flashings or purpose made flashings perform the same function as side flashings however they have a step which brings them out close to the line of the wall. The purpose is to allow turned up tiles to be inserted under the flashings. They require support at the wall as well as at the point where the tiles turn up under them.

Critical elements are the length of the section that is attached to the wall and that it's covered by the wall cladding. It must be sufficiently long to provide a minimum of 75 mm wall cover while still leaving a minimum gap of 10 mm between the cladding and the top of the flashing. Gerard Roofs usually recommends a minimum height of 86 mm.

The width of the step is dependent on the cladding width. The length of the section covering the turned up tile should be a minimum of 50 mm.

Noggins are optional. They do, however, provide support to the flashing. In some areas noggin may be required to support the flashing – change in slope or support for claddings. Noggins are to be installed so that the bottom edge is 120 mm above the top of the rafter. This will give full support to the pitch flashing (Figure 9.2.4.1).

The pitch flashing is installed so that the lower edge is positioned 55-60 mm above the top of the rafter. This allows sufficient room for the tile batten and turn up of the tile while providing coverage for the turn up. A counter batten is installed down the roof section on top of the tile battens 5 mm shorter than the width of the pitch flashing away from the wall studs.

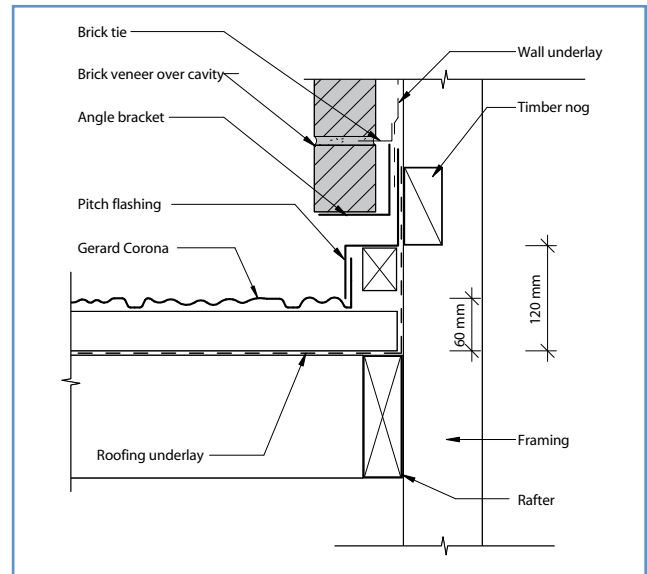


Figure 9.2.4.1 Nogging and positioning of pitch flashing for installation

Pitch flashings are installed from the lower section of the roof with an overlap of 100 mm. They are nailed in place so that the nails will be hidden under the wall cladding; nails are spaced approximately 600 mm apart (Figure 9.2.4.3).

There is no need to nail the pitch flashing edge against the turned up tile.

**Note:** Pitch flashings are used along the wall where the tiles are laid down the roof. There are various angled step flashings used for across horizontal sections. The two accessories pitch and step flashings meet neatly at corners where they are joined with rivets and sealant. Refer to 9.3.3 Step flashings and 10.0 Roof junctions.

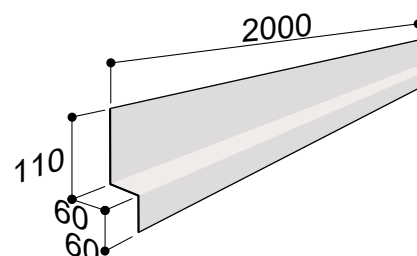


Figure 9.2.4.2 Pitch flashing



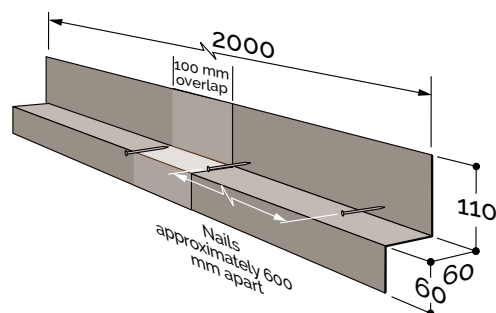


Figure 9.2.4.3

## 9.3 Transverse wall flashings

Where the roof wall junction runs horizontal the tiles are bent up a minimum of 40 mm except in the case of Milano where a profiled flashing is used. The bent up tiles are covered with a side flashing, apron flashing or a purpose made step flashing.

### 9.3.1 Side flashings

Side flashings are installed on to the wall framing before the cladding is installed. Noggins are optional. They do, however, provide support to the flashing. In some areas noggin may be required to support the flashing – change in slope or support for claddings. Noggins are to be installed so that the bottom edge is 120 mm above the top of the rafter. This will give full support for the side flashing (**Figure 9.3.1.1**).

The side flashing is installed so that the lower edge lines up with the lower edge of the side flashing installed down the pitched roof section. This allows sufficient room for the turn up of the tile. This should leave an (approx) 5 mm gap between the tile and the lower edge of the flashing.

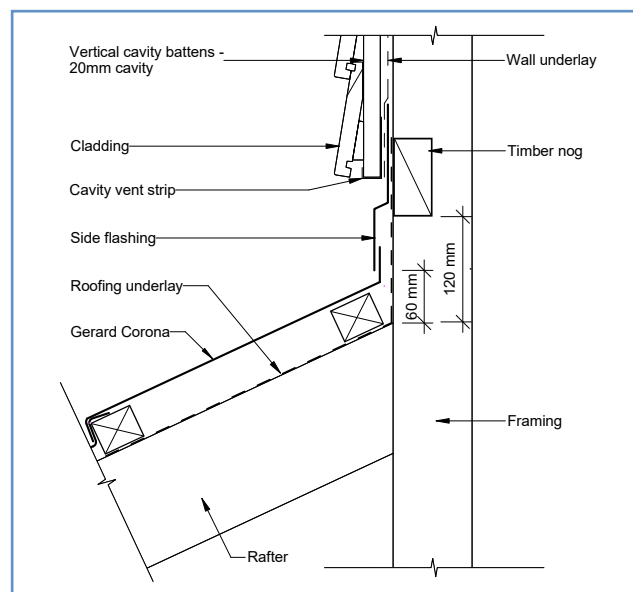


Figure 9.3.1.1 Position of side flashing

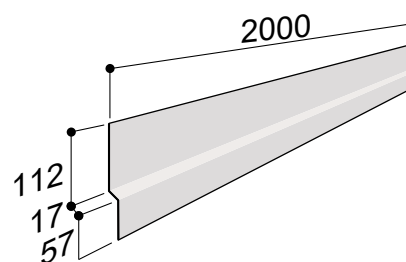


Figure 9.3.1.2 Side flashing

Side flashings are installed from the lower section of the roof with an overlap of 100 mm. They are nailed in place so that the nails will be hidden under the wall cladding; nails are spaced approximately 600 mm apart (**Figure 9.3.1.3**).

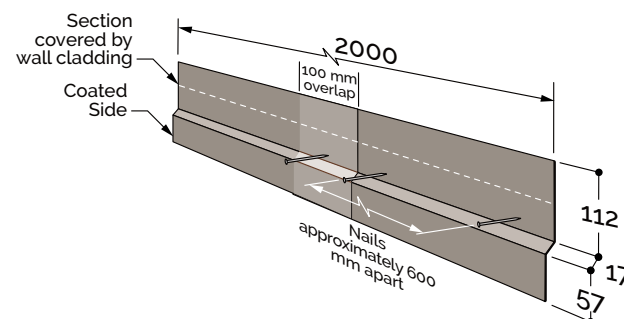


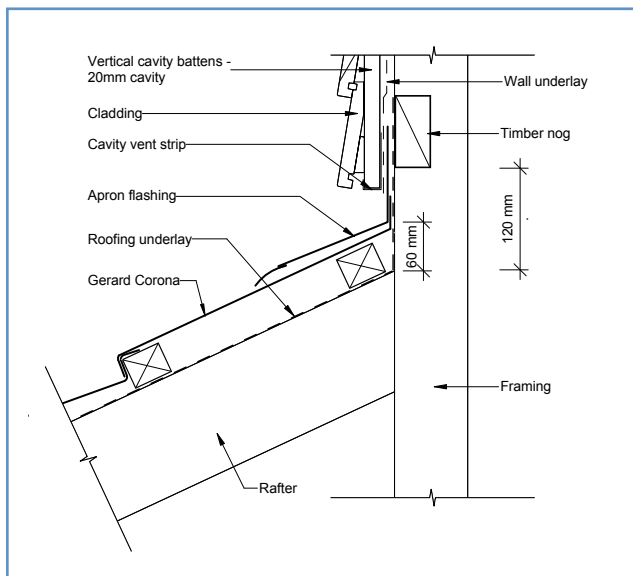
Figure 9.3.1.3

## 9.0 Valleys & wall flashings

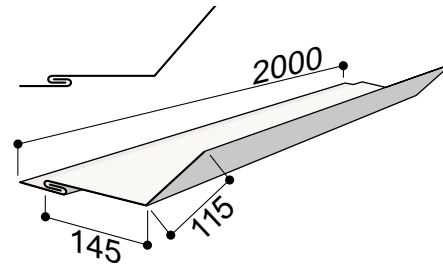
### 9.3.2 Apron flashings

Apron flashings are installed on to the wall framing before the cladding is installed. Noggins are optional. They do, however, provide support to the flashing. In some areas noggin may be required to support the flashing – change in slope or support for claddings. Noggins are to be installed so that the bottom edge is 120 mm above the top of the rafter. This will give full support for the apron flashing (**Figure 9.3.2.1**).

The apron flashing is installed so that the lower edge is positioned level with the surface of the tile and the apron flashing installed down the pitched section. The soft edge of the apron flashing is dressed down on to the surface of the tile.

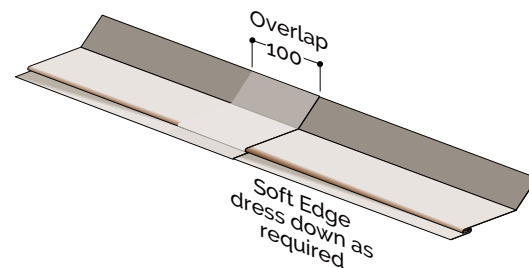


**Figure 9.3.2.1 Nogging and position of apron flashing**



**Figure 9.3.2.2 Apron flashing**

Apron flashings are installed across the roof section with an overlap of 100 mm (**Figure 9.3.2.3**). They are nailed in place so that the nails will be hidden under the wall cladding; nails are spaced approximately 600 mm apart.



**Figure 9.3.2.3**

### 9.3.3 Step flashings for brick veneer or cavity cladding systems

The angle of the slope in the step flashing should closely match the roof pitch (**Figure 9.3.3.2**). This provides a neater finish at corners where a step flashing meets a pitch flashing.

Step flashings are installed on to the wall framing before the cladding is installed. Noggins are optional. They do, however, provide support to the flashing. In some areas noggin may be required to support the flashing – change in slope or support for claddings. Noggins are to be installed so that the bottom edge is 120 mm above the top of the rafter. This will give full support for the step flashing (**Figure 9.3.3.1**).

The step flashing is installed so that the lower edge

lines up with the lower edge of the pitch flashing installed down the pitched roof section. This allows sufficient room for the turn up of the tile. This should leave an (approx) 5 mm gap between the tile and the lower edge of the flashing.

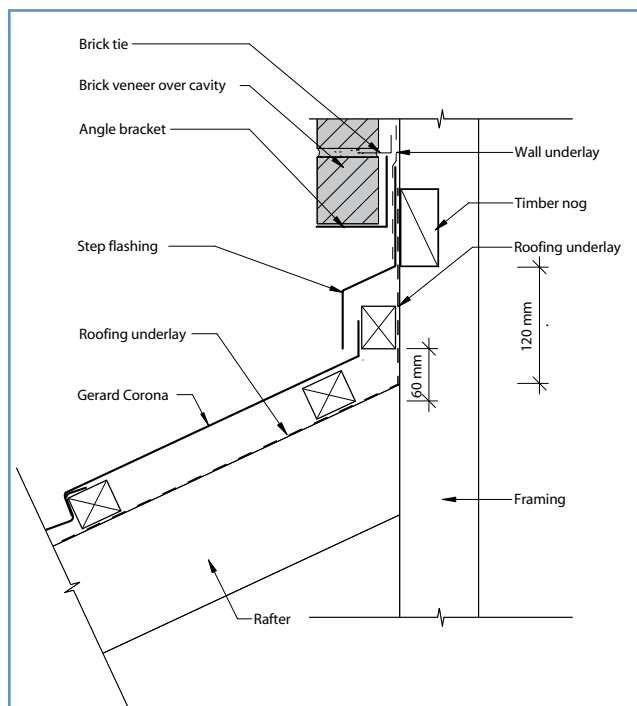


Figure 9.3.3.1 Batten and step flashing positioning

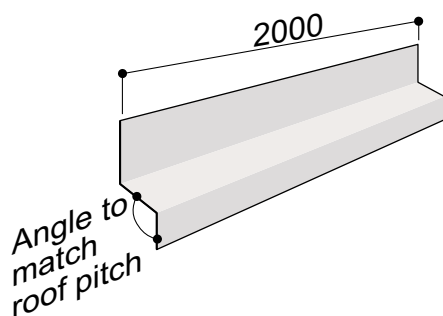
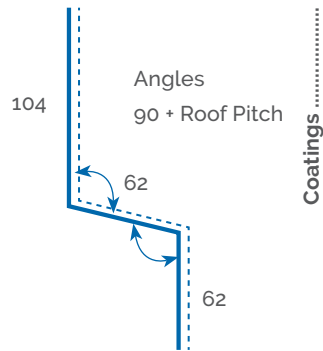


Figure 9.3.3.2 Step flashing

9.0 Valleys & wall flashings

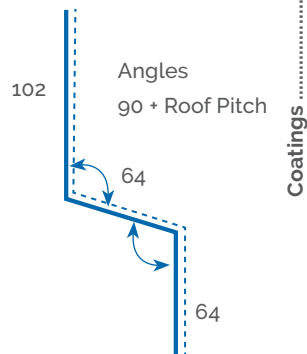
Standard item

Roof pitch 12.0° - 16.0°	
Angle required	
Items required	



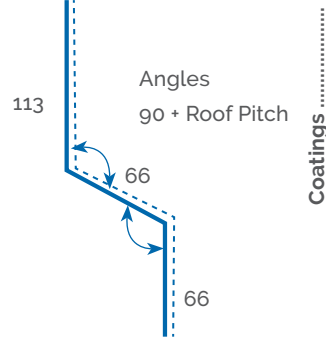
Substrate 230 x 2000 mm APS

Roof pitch 16.1° - 22.0°	
Angle required	
Items required	



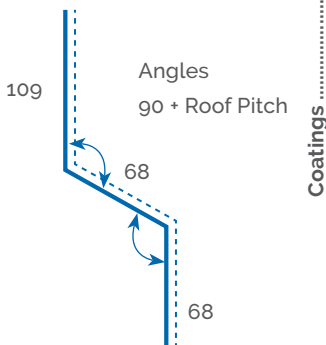
Substrate 230 x 2000 mm APS

Roof pitch 22.1° - 27.0°	
Angle required	
Items required	



Substrate 245 x 2000 mm APS

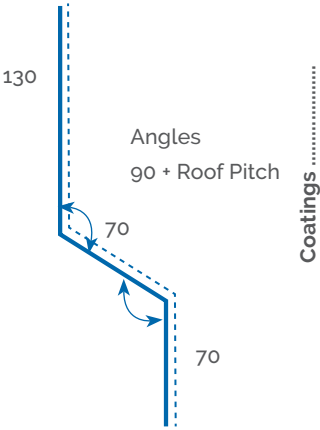
Roof pitch 27.1° - 29.0°	
Angle required	
Items required	



Substrate 245 x 2000 mm APS

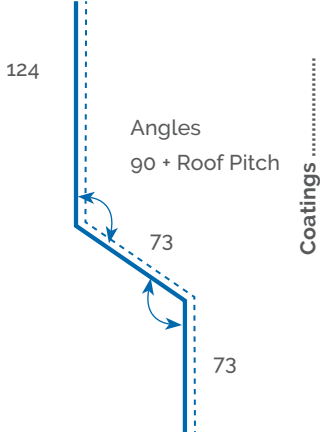
Figure 9.3.3.3 (continued on next page)

Roof pitch 29.1° - 32.0°	
Angle required	
Items required	



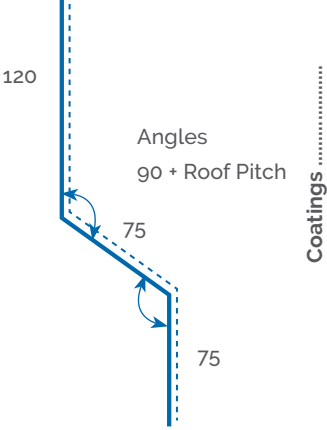
Substrate 270 x 2000 mm APS

Roof pitch 32.1° - 35.0°	
Angle required	
Items required	



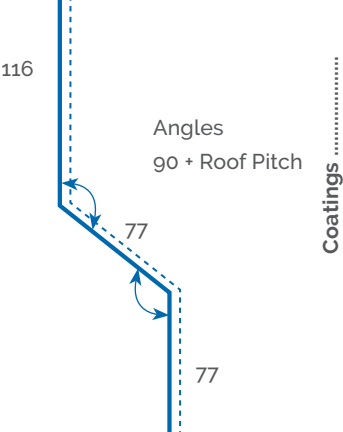
Substrate 270 x 2000 mm APS

Roof pitch 35.1° - 38.0°	
Angle required	
Items required	



Substrate 270 x 2000 mm APS

Roof pitch 38.1° - 40.0°	
Angle required	
Items required	



Substrate 270 x 2000 mm APS

Figure 9.3.3.3

## 9.0 Valleys &amp; wall flashings

Step flashings are installed along the wall overlapping by 100 mm. They are nailed in place so that the nails will be hidden under the wall cladding; nails are spaced approximately 600 mm apart (Figure 9.3.3.4).

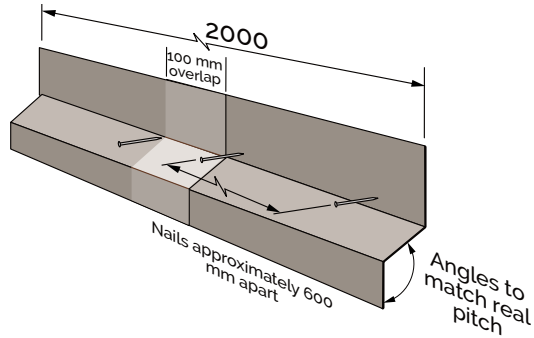


Figure 9.3.3.4





## 10.0 Roof junctions

The worry-proof roof.

**Page 472 of 734**

## 10.0 Roof junctions

Gerard Roofs recommends sealant MS Sealants for general use with our products. However, this product requires slightly higher application temperature (5°C), and resists only up to 70°C (darker roofing material may reach temperatures up to 80°C in direct sunlight in the height of summer). Sealant must always be used in conjunction with mechanical fastening and be applied between the two sheets to be lapped before they are fixed together. The excess sealant extruded from the lap must be removed. Rivets should be at 50 mm centres.

### 10.1 Gable end junction

#### 10.1.1 External

##### Box trim over Box barges

##### Method 1

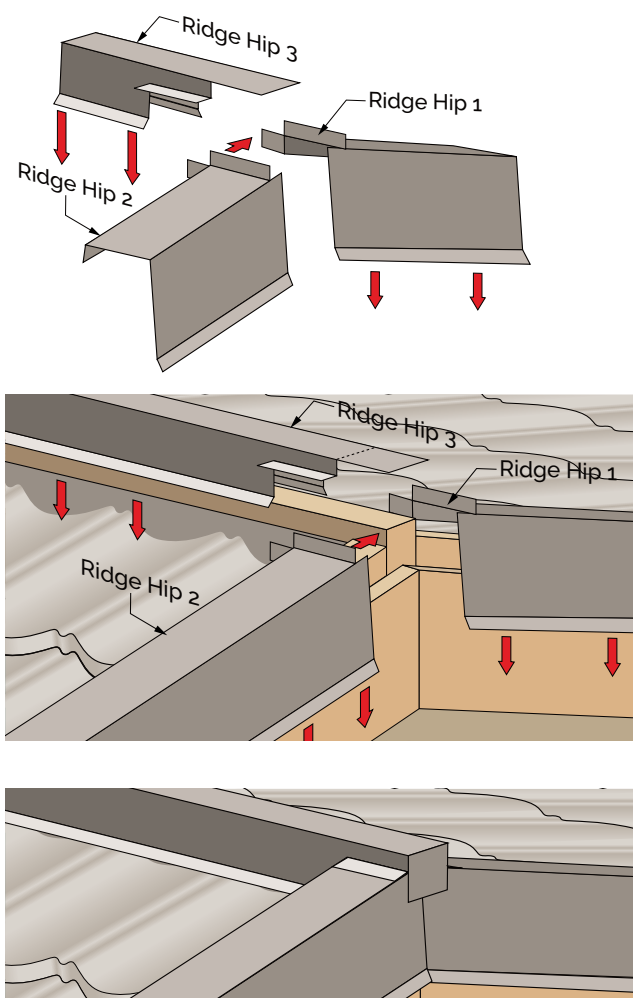


Figure 10.1.1.1

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

##### Method 2

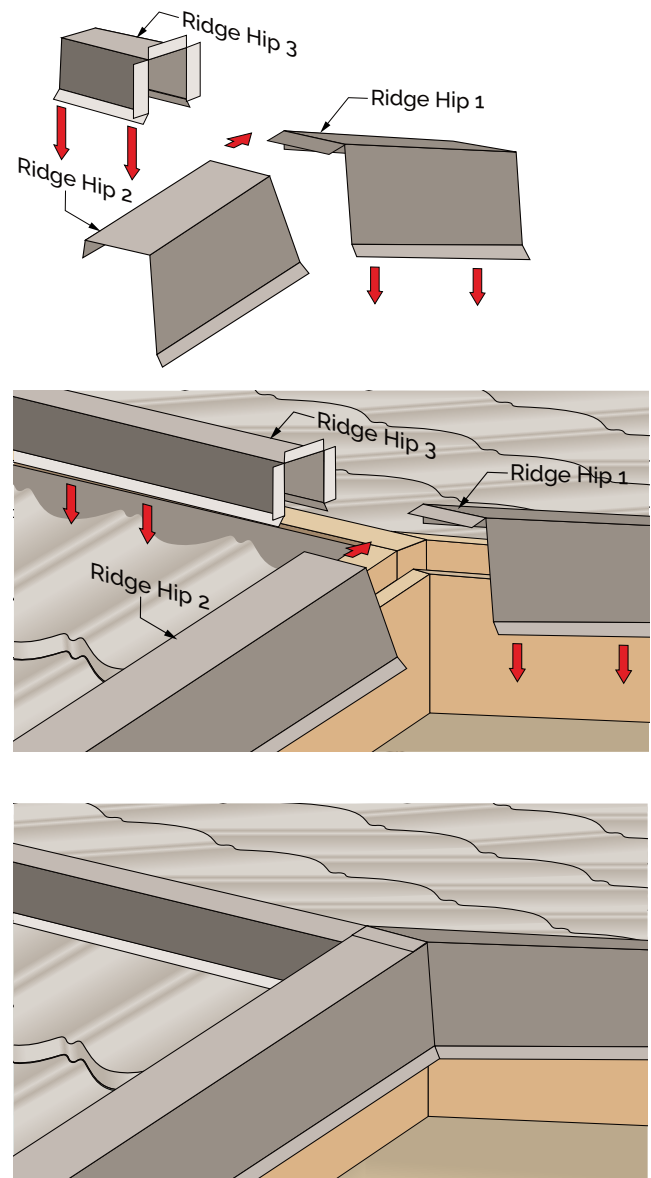


Figure 10.1.1.2

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

### Angle trims

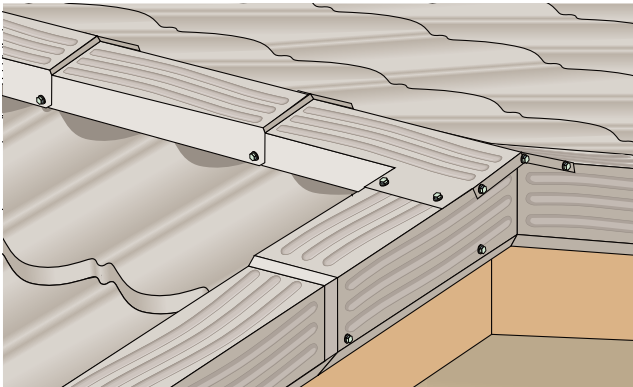
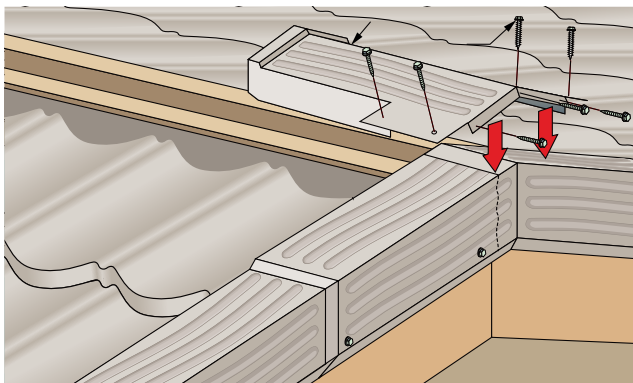
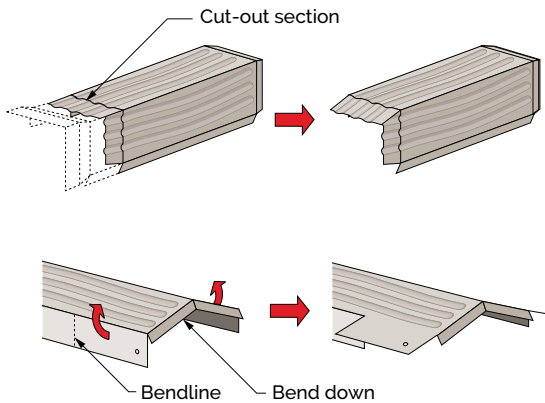


Figure 10.1.1.2.1

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

### Barrel 150s

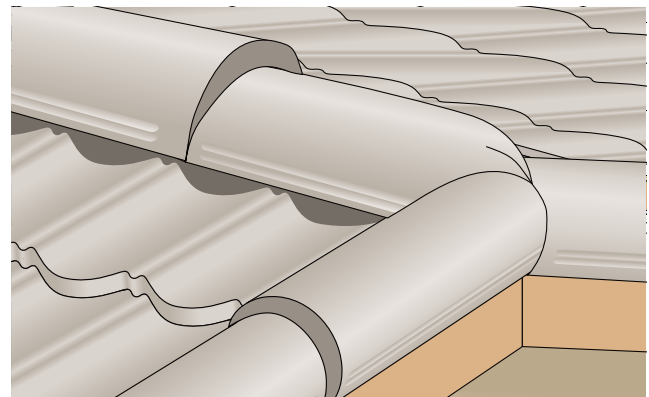
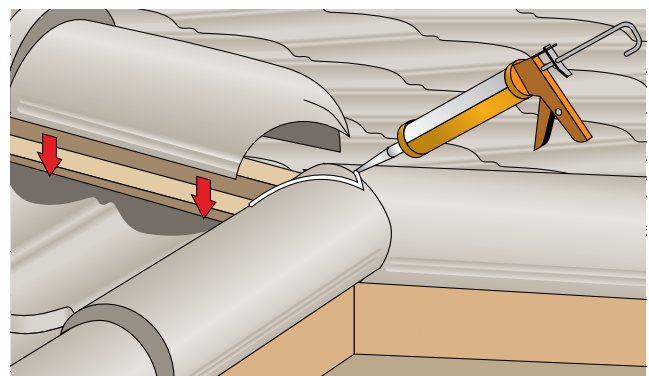
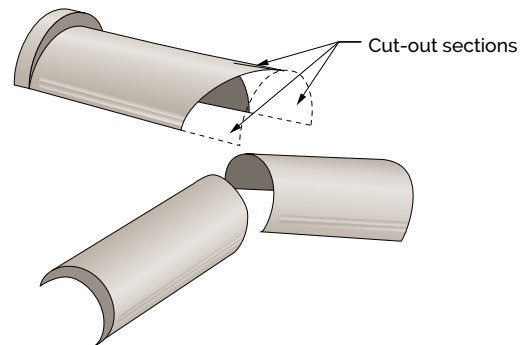


Figure 10.1.1.3.1

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

## 10.0 Roof junctions

### 10.1.2 Internal

#### Box barge over box trim

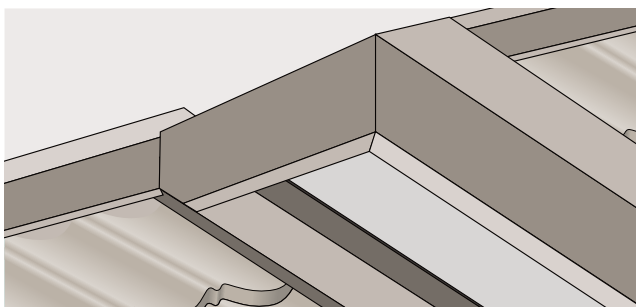
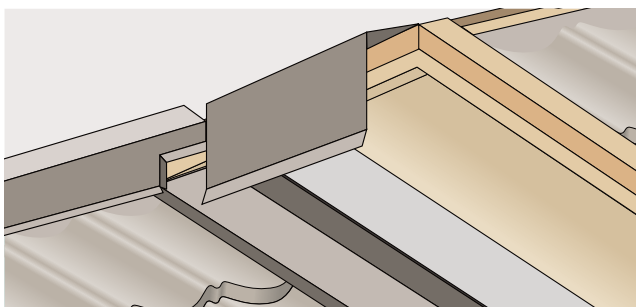
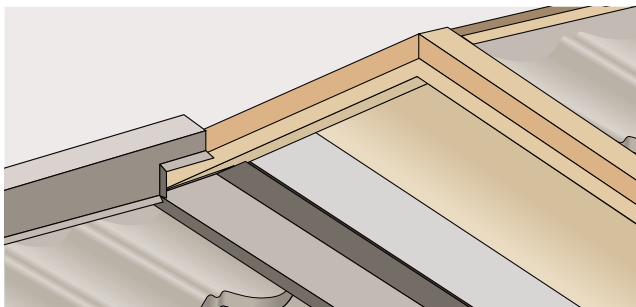
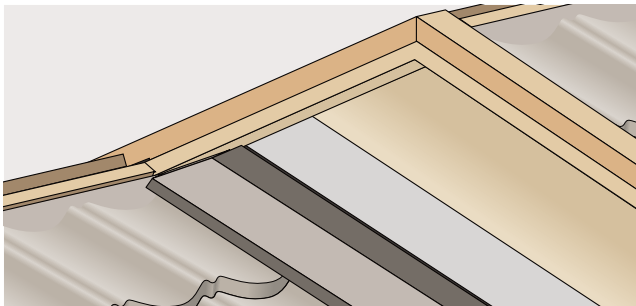
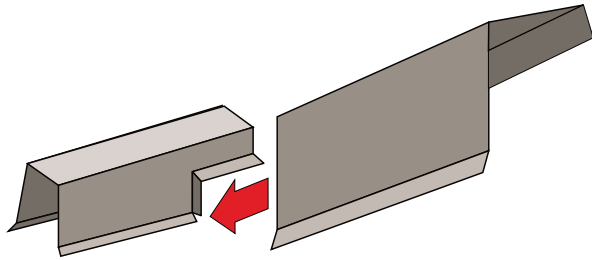


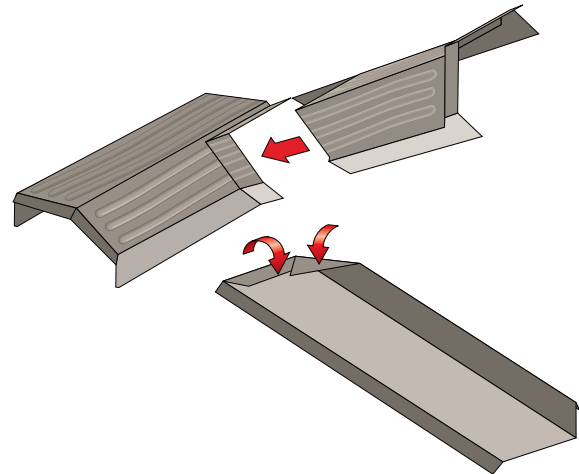
Figure 10.1.2.1.1

Side flashing can be installed instead of apron flashing. One end must be bent to fit under box trim and to stop water running sideways.

In most cases the apron flashing or the side flashing will be found to be in behind the metal fascia.

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

#### Angle trims





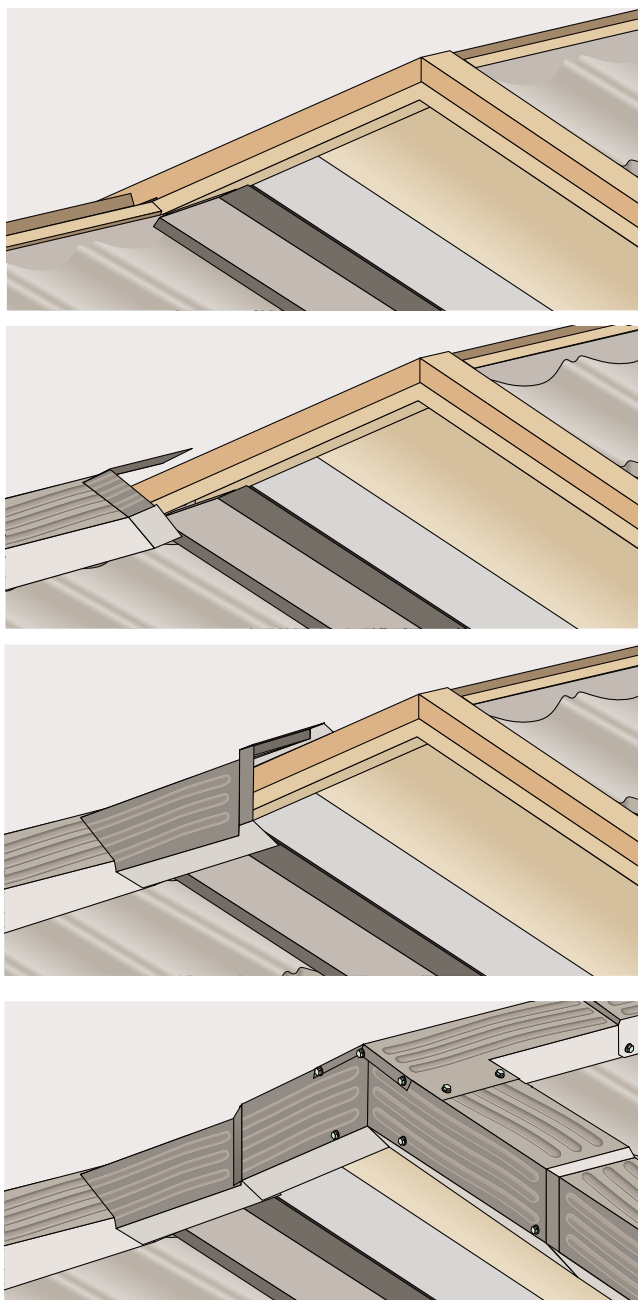


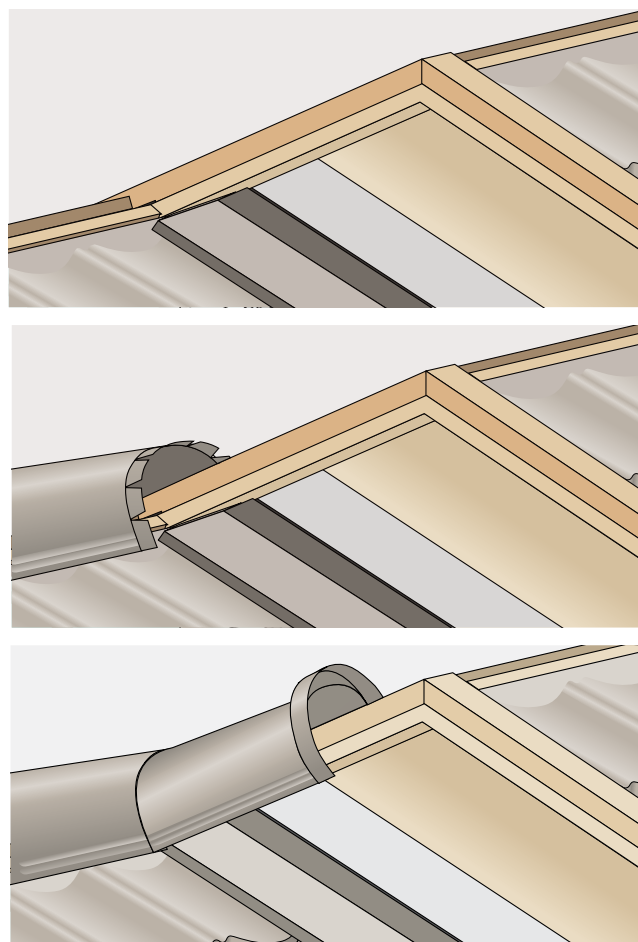
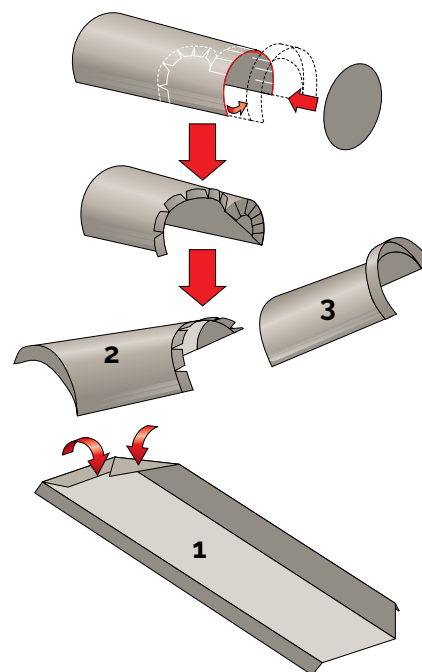
Figure 10.1.2.2.1

Side flashing can be installed instead of apron flashing. One end must be bent to fit under angle trim and to stop water running sideways.

In most cases the apron flashing or the side flashing will be found to be in behind the metal fascia.

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

Barrel 150s



## 10.0 Roof junctions

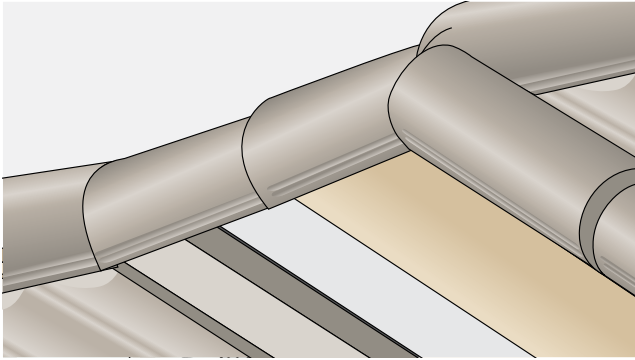


Figure 10.1.2.3.1

Side flashing can be installed instead of apron flashing. One end must be bent to fit under Barrel 150 and to stop water running sideways.

In most cases the apron flashing or the side flashing will be found to be in behind the metal fascia.

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

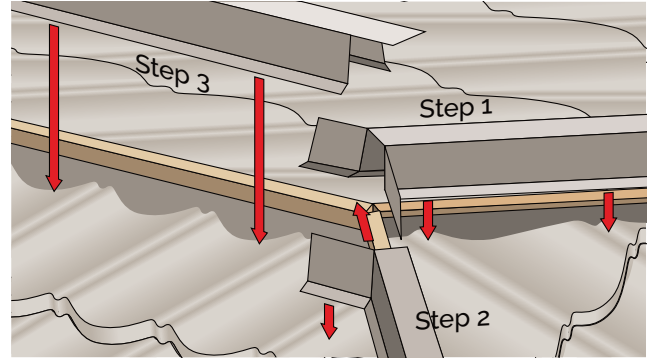


Figure 10.2.1.1

Box trims are laid from the eave to ridge.

**Step 1:** cut box trim 1 to correct angle

**Step 2:** align and cut box trim 2 to correct angle and seal with silicone on tags

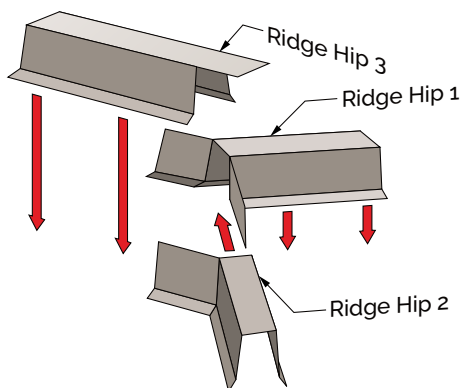
**Step 3:** cut and lay box trim 3 over the box trims 1 and 2 and seal with silicone on tags

Continue installing box trims along the ridge.

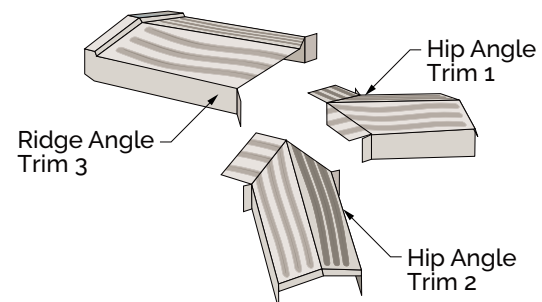
**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

## 10.2 Hip ridge junction

### 10.2.1 Box trim



### 10.2.2 Angle trim





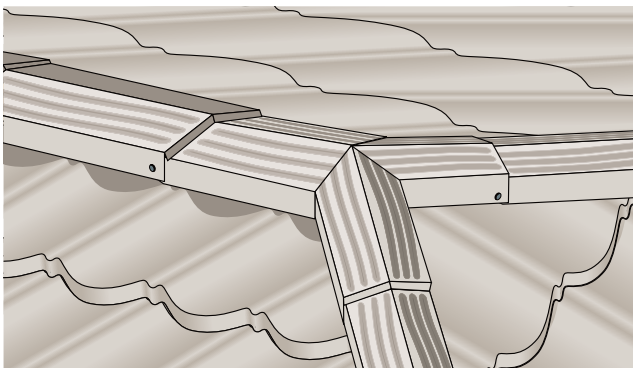
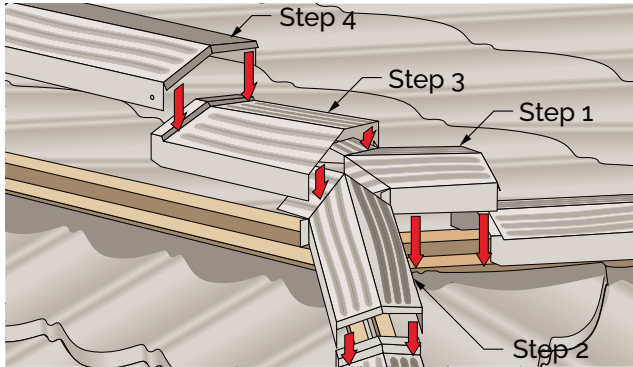
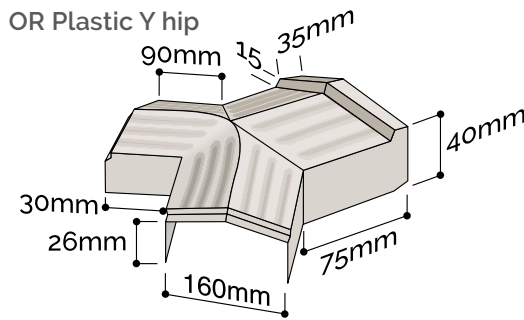


Figure 10.2.2.1

Angle trims are laid from the eave to ridge.

**Step 1:** cut first hip angle trim to correct angle

**Step 2:** align and cut second hip angle trim to correct angle and seal with silicone on tags

**Step 3:** cut and lay ridge angle trim over the hip angle trims and seal with silicone on tags

Or you can use a Gerard Roofs Angle trim plastic Y hip.

Continue installing angle trims along the ridge.

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

### 10.2.3 Barrel 150 trim

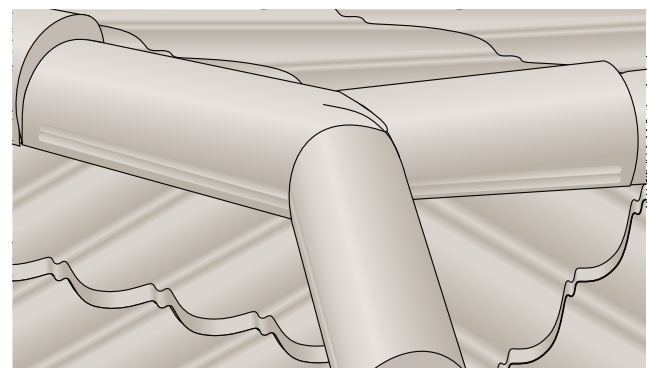
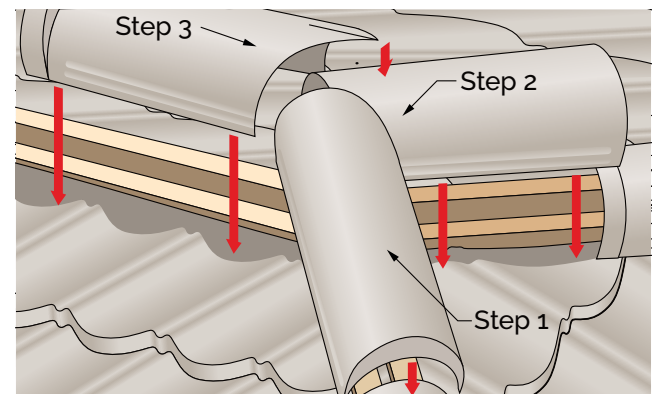
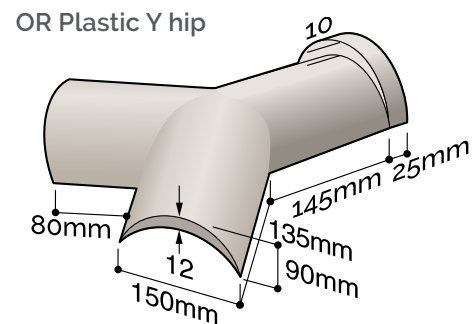
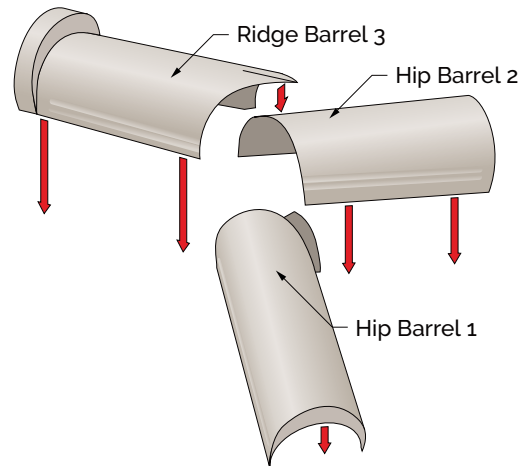


Figure 10.2.3.1

## 10.0 Roof junctions

Barrel 150s are laid from the eave to ridge.

**Step 1:** cut first hip barrel 150 to correct angle

**Step 2:** align and cut second hip barrel 150 to correct angle and seal with silicone on tags

**Step 3:** cut and lay ridge barrel 150 over the hip barrel 150s and seal with silicone on tags

*Or you can use a Gerard Roofs Barrel trim plastic Y hip.*

Continue installing barrel 150s along the ridge.

**Note:** sealants must always be applied on tags and between the two surfaces to be lapped. After that all the accessory joints must be riveted together. The excess sealant extruded from the lap must be removed.

### 10.3 Internal barge fascia junction

The internal barge is created by flashing the eave tile over the accessory. Sealant is to be applied between the tile and accessory before riveting the junction.

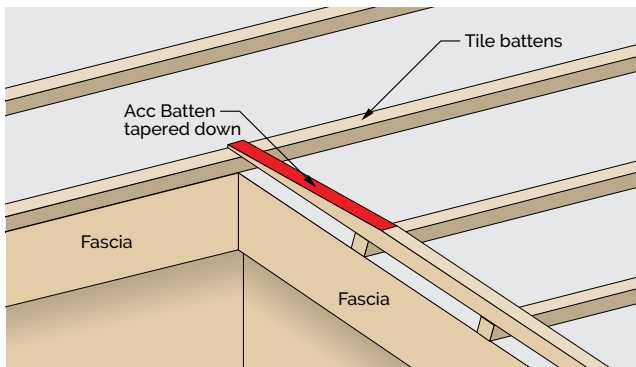


Figure 10.3.1

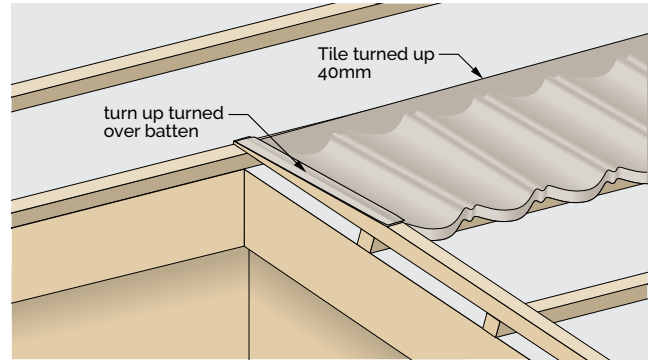


Figure 10.3.2

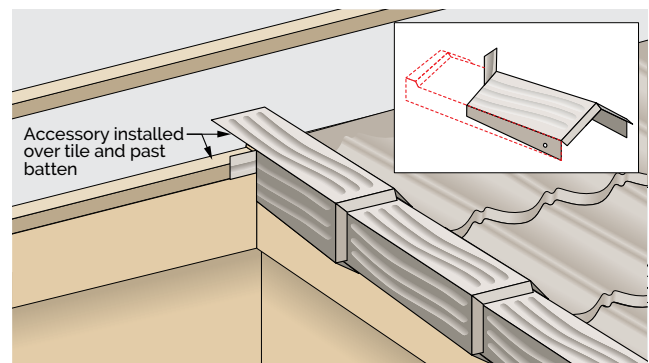


Figure 10.3.3

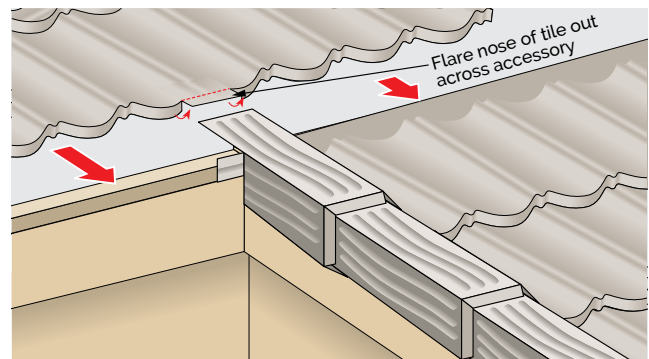


Figure 10.3.4

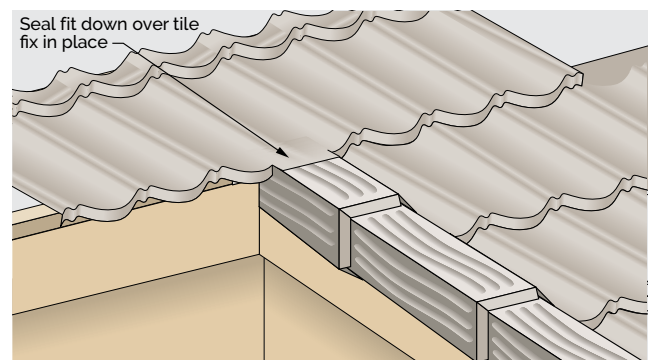


Figure 10.3.5

## 10.4 Valley junction

Seal with Silicon sealant between sheets. Pop Rivet together and seal over the rivet.

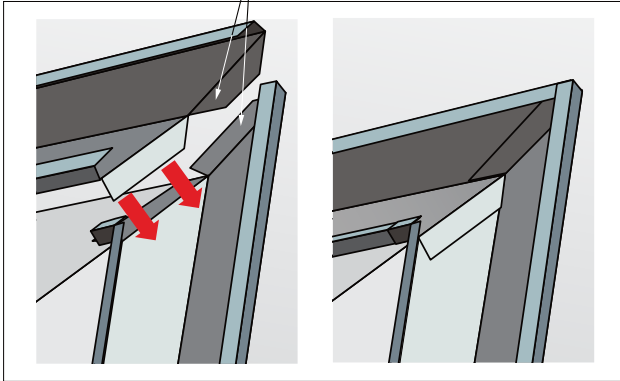


Figure 10.4.1

Cut valley to create section for turning up. Turn up should be sufficient to reach top of the ridge battens. This provides no open sections where water could be blown over the top of the valley.

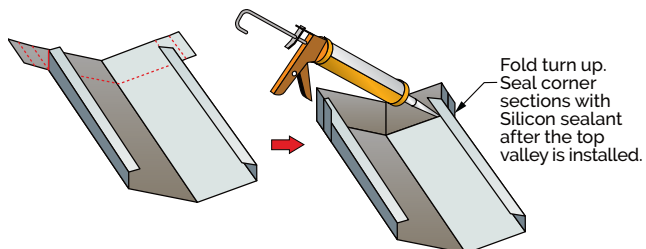


Figure 10.4.2

## 10.5 Valley split

### 10.5.1 Box trim

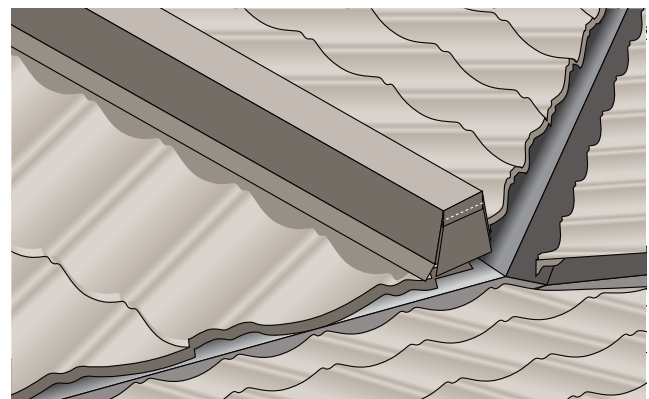
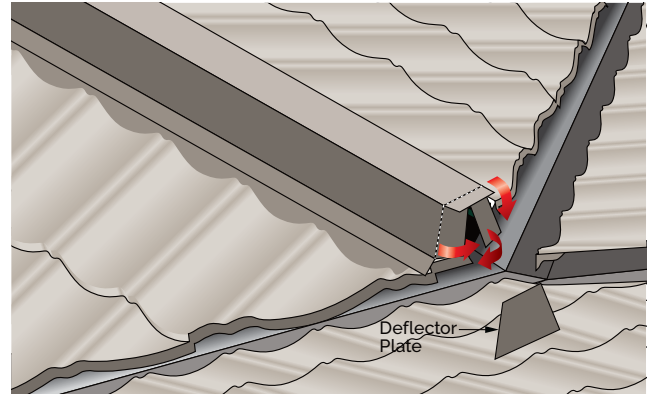


Figure 10.5.1.1

**Note:** sealants must always be applied on tags before the end cap and the tags are riveted together. The excess sealant extruded from the lap must be removed. The deflector plate must be cut down to the surface of the valleys.

## 10.0 Roof junctions

### 10.5.2 Angle trim

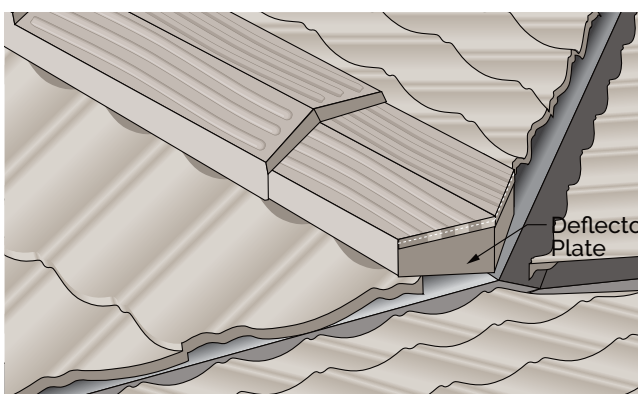
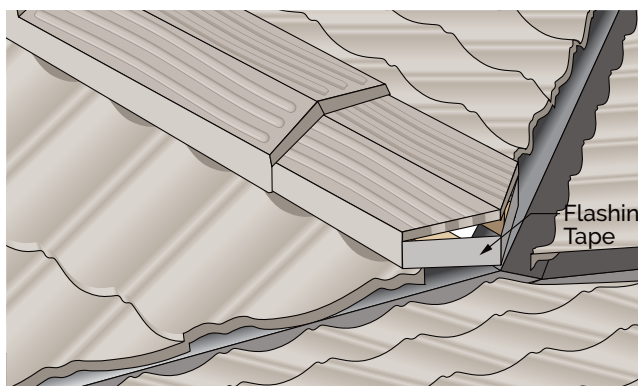


Figure 10.5.2.1

**Note:** sealants must be applied on nose of the angle trim before the angle trim and the deflector plate are riveted together. The excess sealant extruded from the lap must be removed. The deflector plate must be cut down to the surface of the valleys.

### 10.5.3 Barrel 150

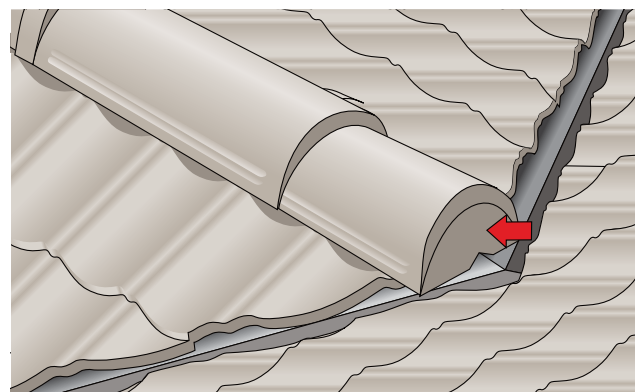
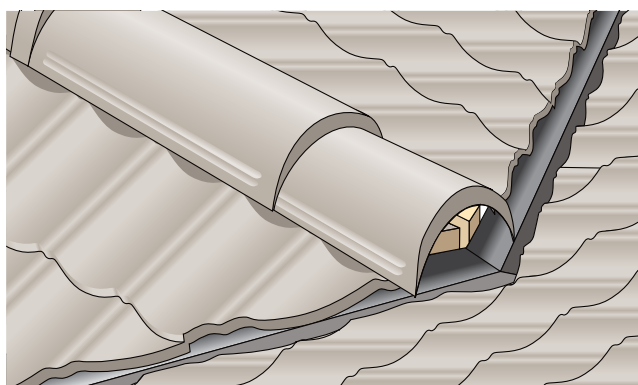


Figure 10.5.3.1

**Step 1:** cut the barrel end disc to fit valley junction

**Step 2:** fasten the barrel end disc to the barrel with pop rivet.

**Note:** the barrel end disc must be cut down to the surface of the valleys.

## 10.6 Hip/ridge to wall

### 10.6.1 Install lower roof after wall cladding

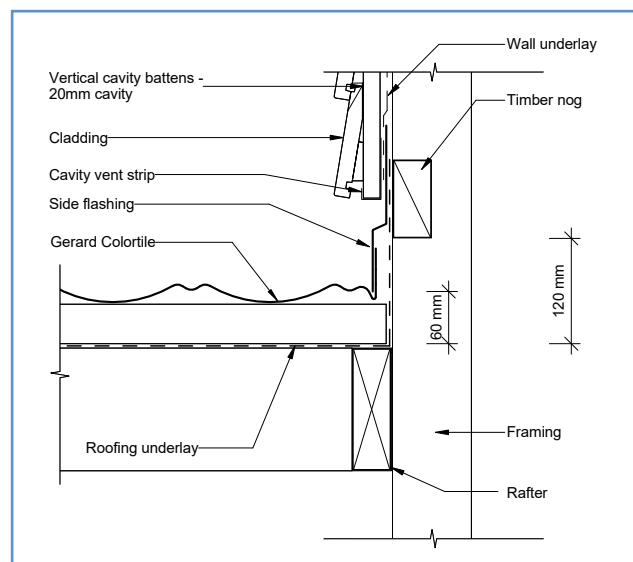


Figure 10.6.1.1

Box trim

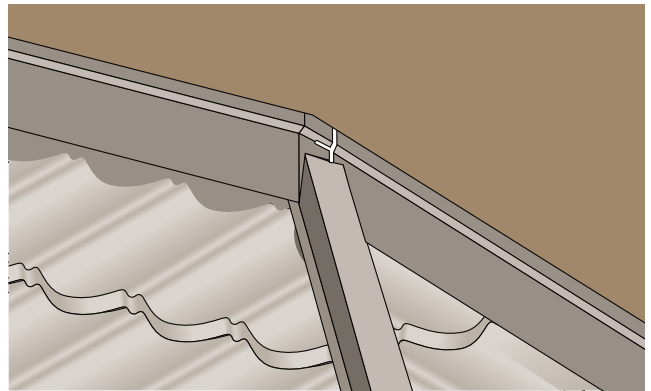
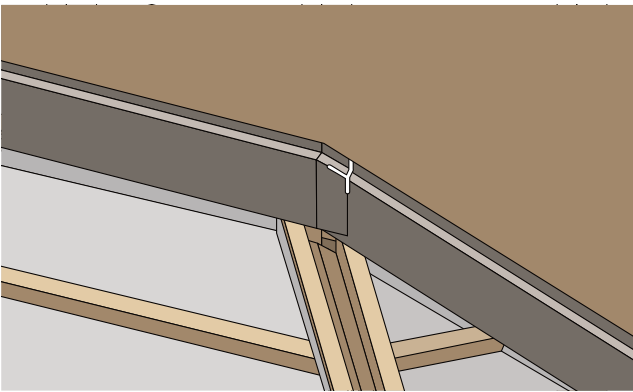
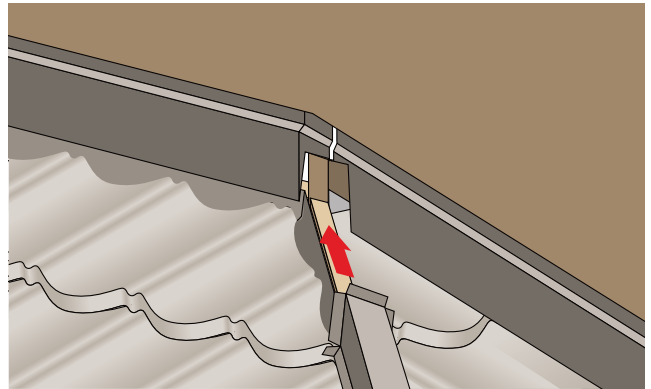
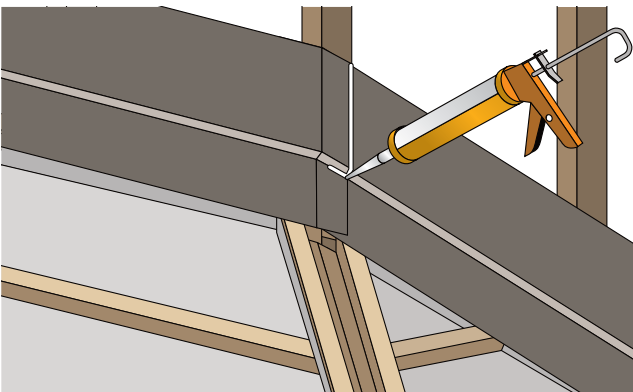
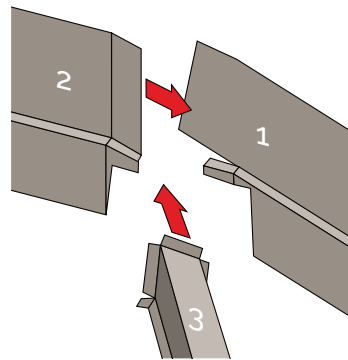
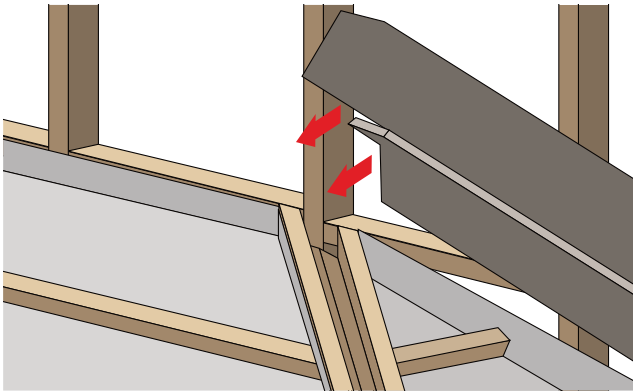
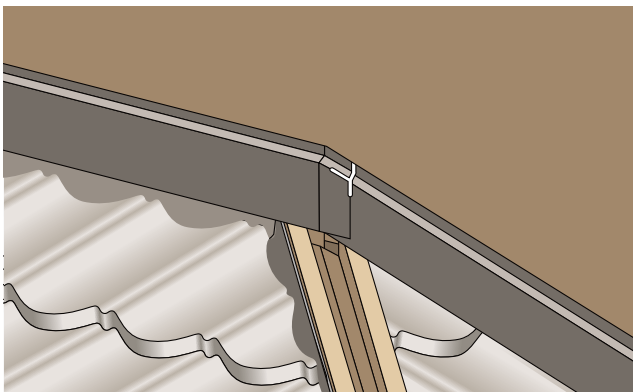


Figure 10.6.1.1.1

**Note:** sealants must be applied on tags and between the two surfaces to be lapped except for the lower sections of the side flashings where the box trim will be inserted behind. Rivet all the joints afterwards.





10.0 Roof junctions

Angle trim

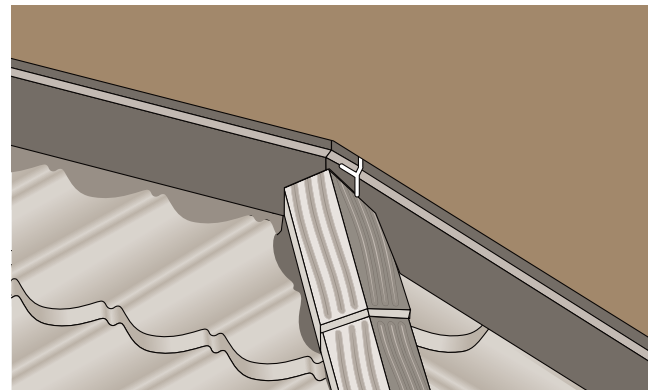
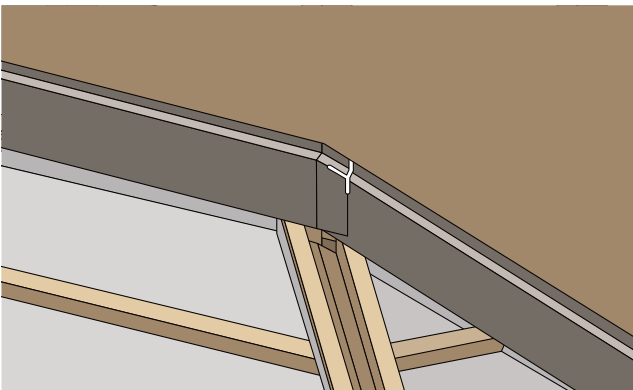
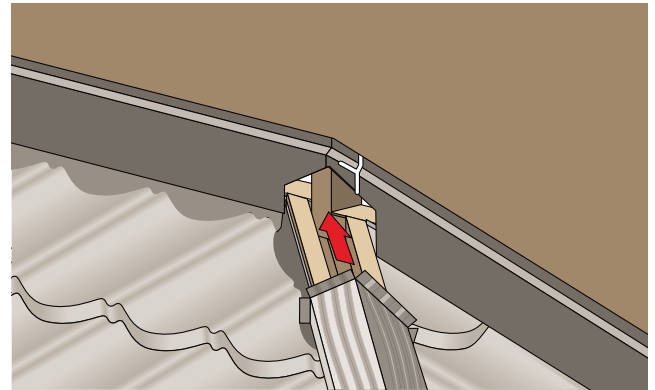
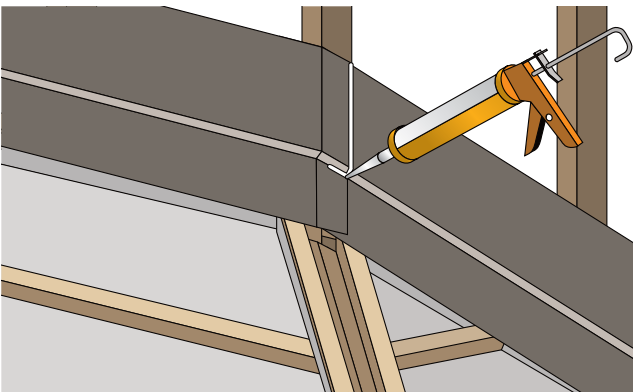
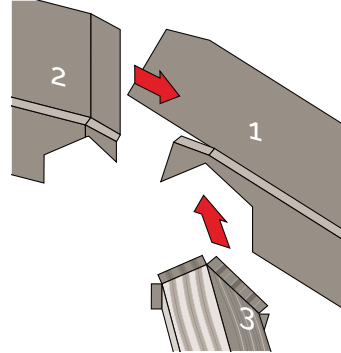
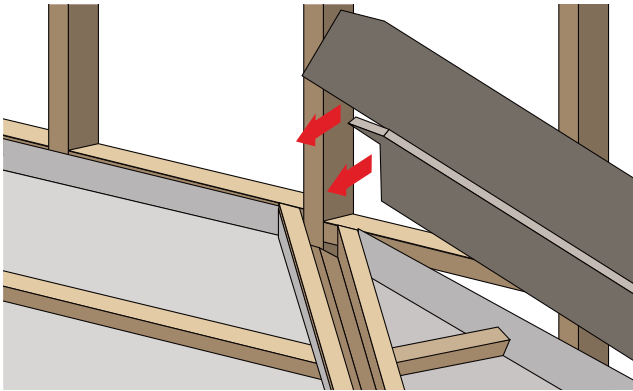
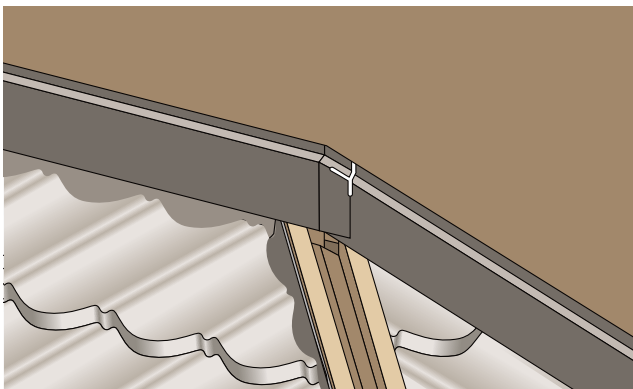


Figure 10.6.1.2.1

**Note:** sealants must be applied on tags and between the two surfaces to be lapped except for the lower sections of the side flashings where the angle trim will be inserted behind. Rivet all the joints afterwards.





Barrel 150

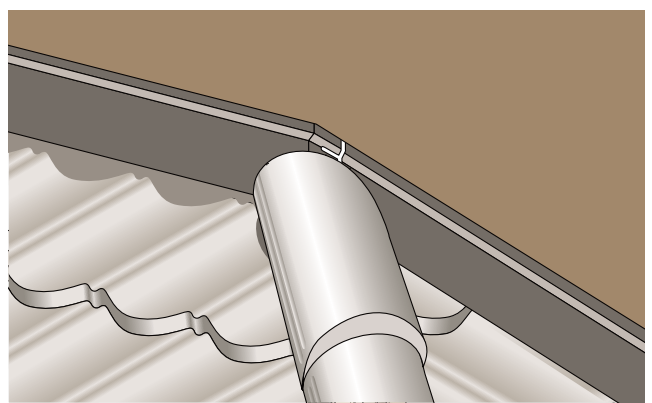
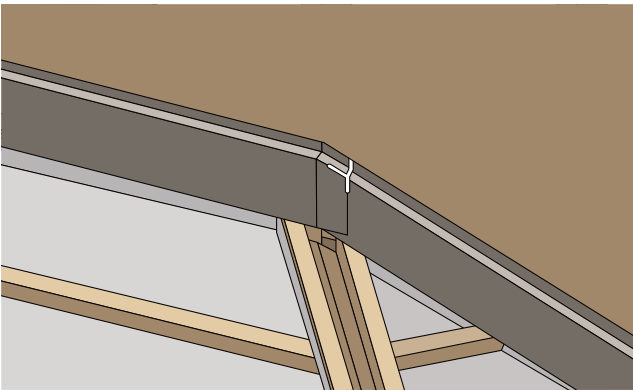
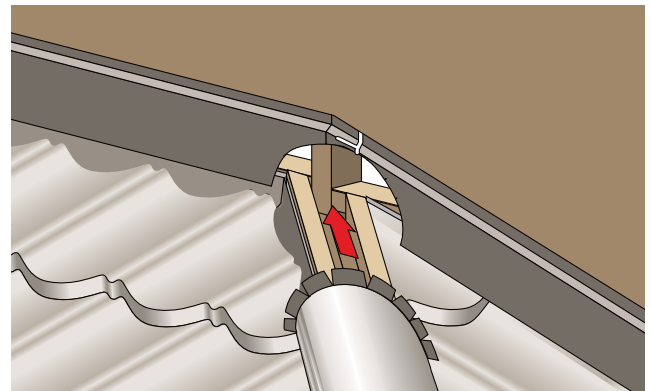
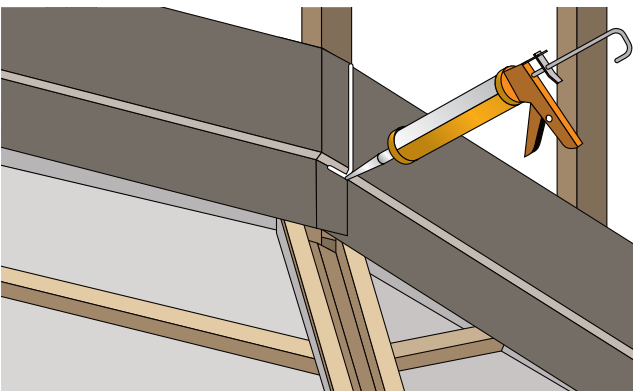
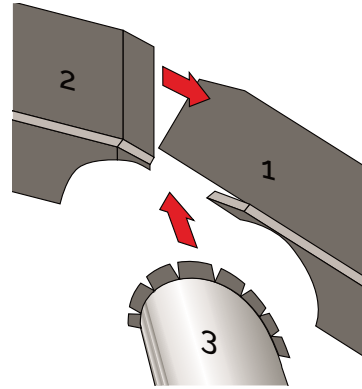
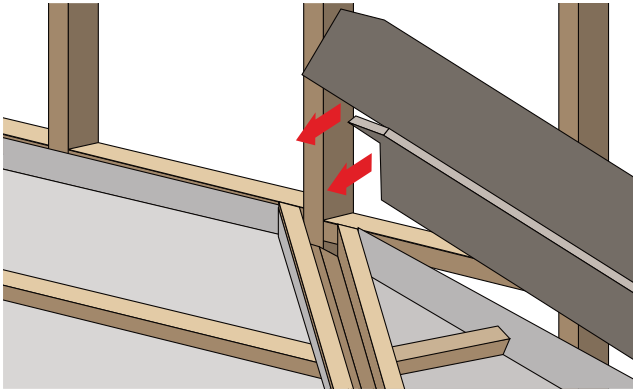
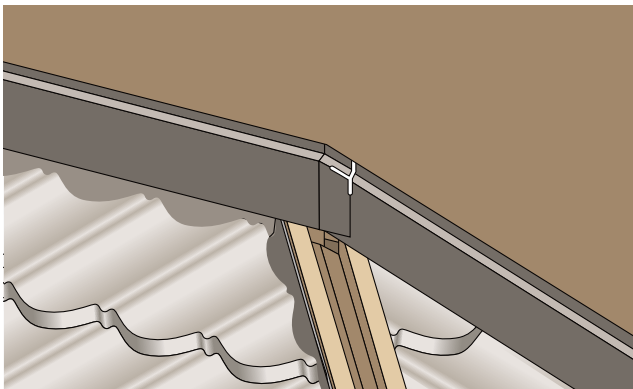


Figure 10.6.1.3.1



## 10.0 Roof junctions

**Note:** sealants must be applied on tags and between the two surfaces to be lapped except for the lower

sections of the side flashings where the barrel 150 will be inserted behind. Rivet all the joints afterwards.

### 10.6.2 Install lower roof before wall cladding

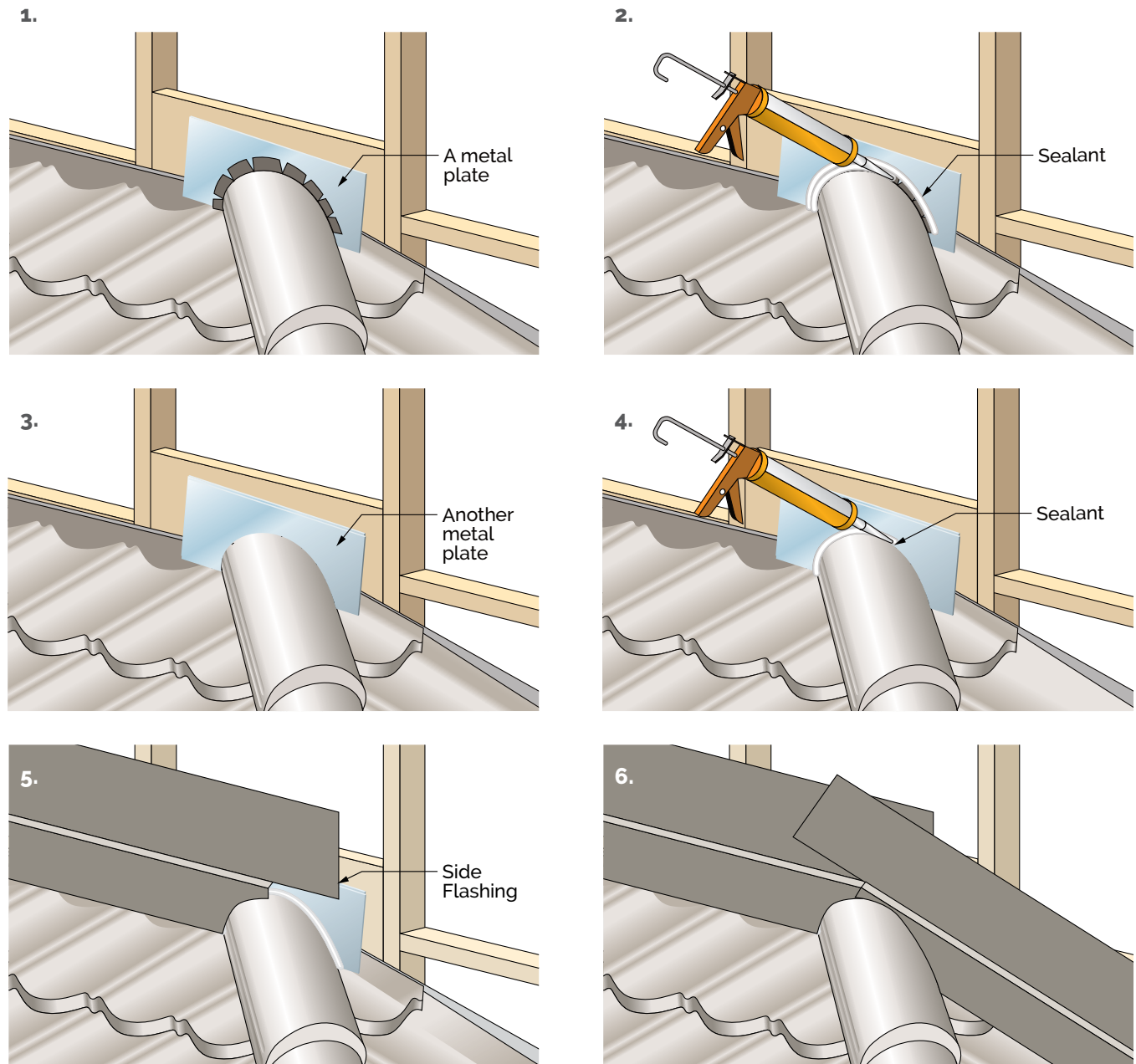


Figure 10.6.2.1

The roof underlay should be carried up behind the side flashing. It is omitted in **Figure 10.6.2.1** for clarity.

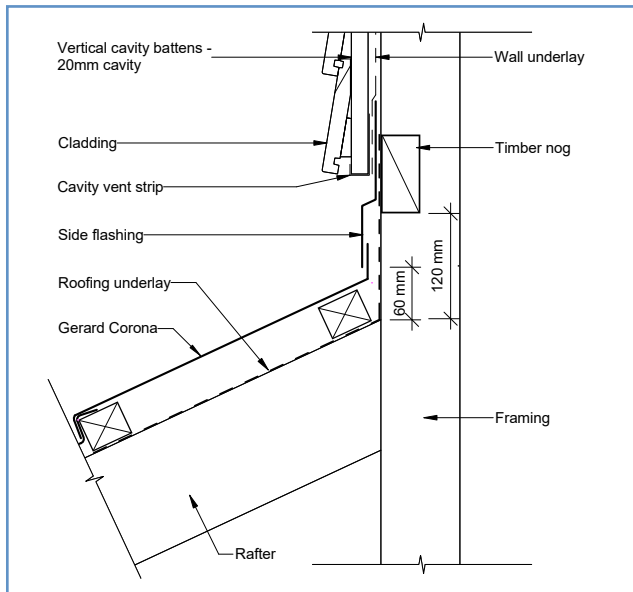


Figure 10.6.2.2

Box trim or Angle trim installation follows the same approach.

## 10.7 Roof to wall stop end

### 10.7.1 External gutter system

Stop end installation with a fascia board. An external gutter will be installed after the wall has been completed.

The stop end is positioned so that the angled edge is installed vertical, a 10 mm gap is left between the fascia board and that it contacts the top of the batten mid point.

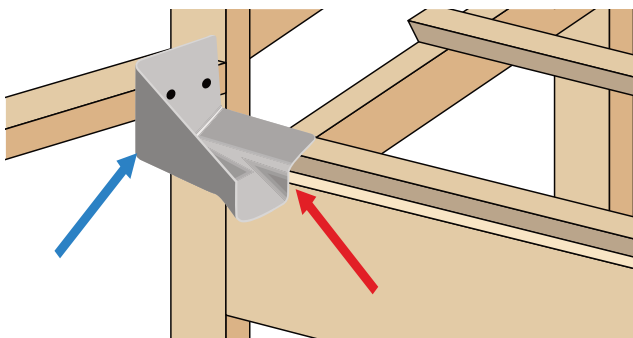


Figure 10.7.1.1

Underlay over the last batten and into the stop end.

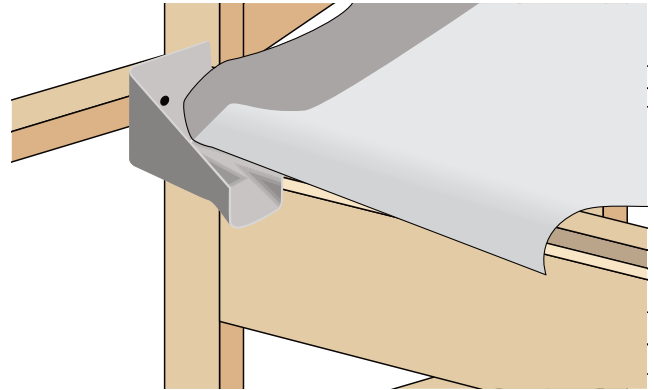


Figure 10.7.1.2

Roofing may be installed before or after wall system.

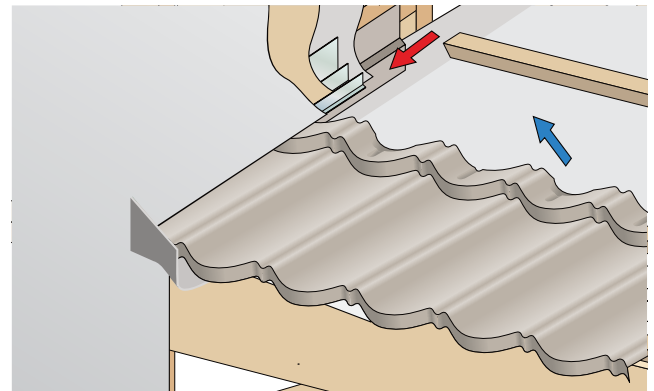


Figure 10.7.1.3

Once the wall system has been finished the gutter can be installed up close to the wall surface.

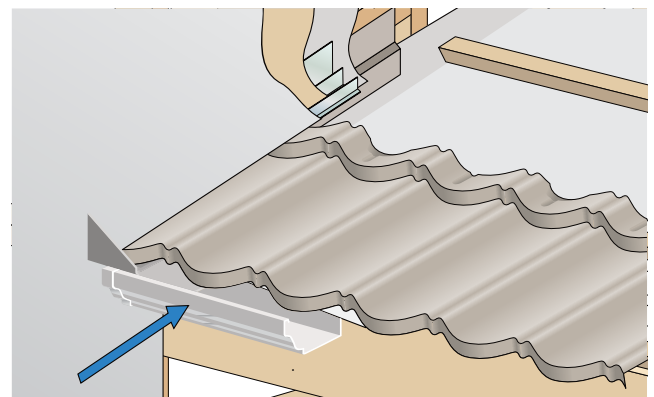


Figure 10.7.1.4

The stop end may be painted to match wall, gutter or roof, with preference being given to the lightest colour.

## 10.0 Roof junctions

### 10.8 Dormers

It is the designer or the roof contractor's responsibility to ascertain that the capacity of the valley profile chosen is adequate for the catchment area.

#### 10.8.1 Detail A - Ridge to wall junction

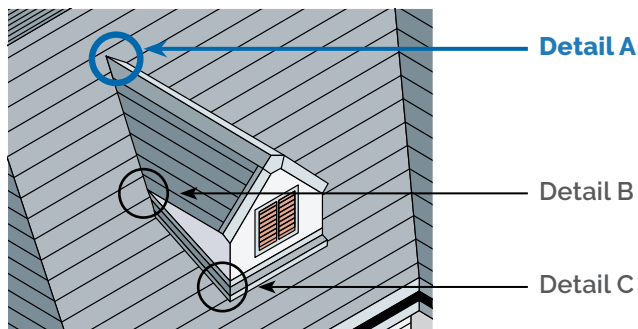


Figure 10.8.1.1

#### Box trim

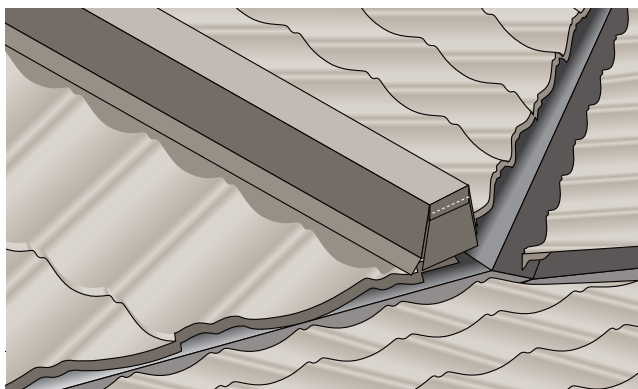


Figure 10.8.1.2

#### Angle trim

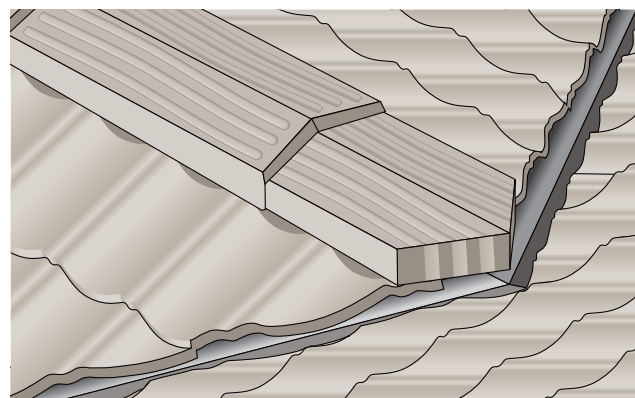
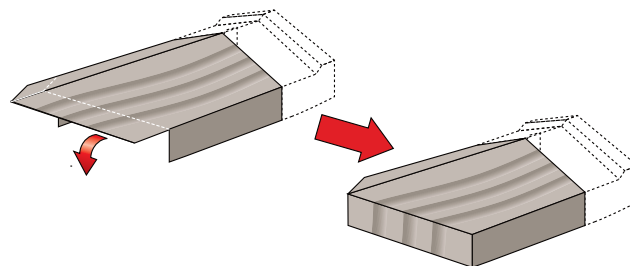
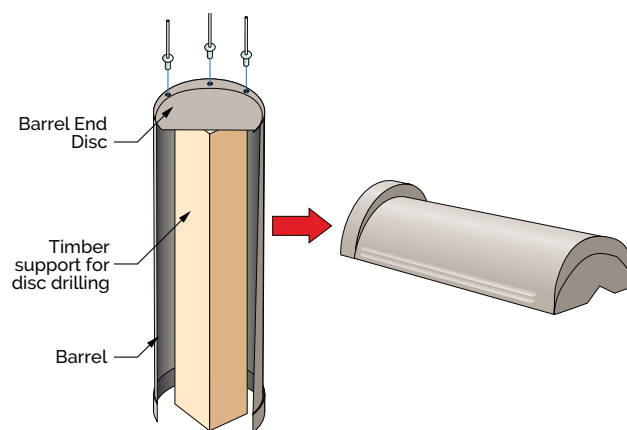


Figure 10.8.1.3

#### Barrel 150

##### Method 1



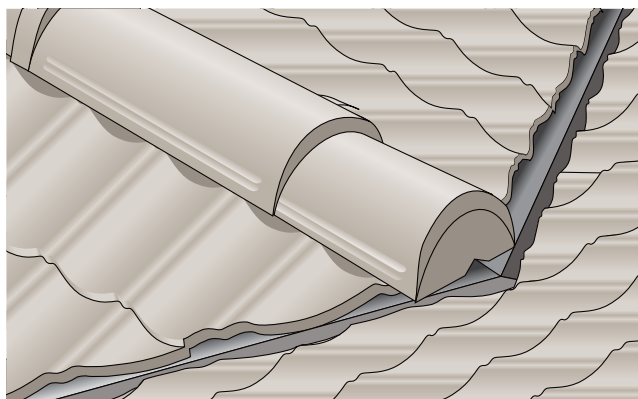


Figure 10.8.1.4

### Method 2

Mitre cut and sealant under the barrel at the junction.  
By carrying through to tile the barrel will act as diverter.

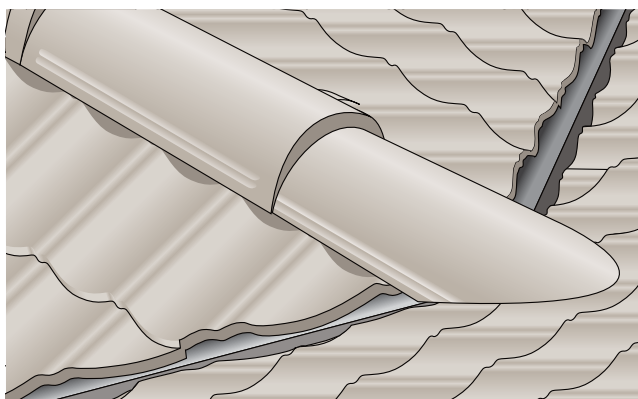
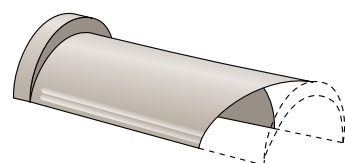


Figure 10.8.1.5

### 10.8.2 Detail B – Valley to roof

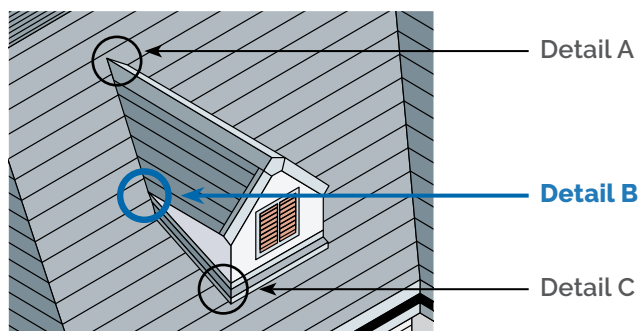


Figure 10.8.2.1

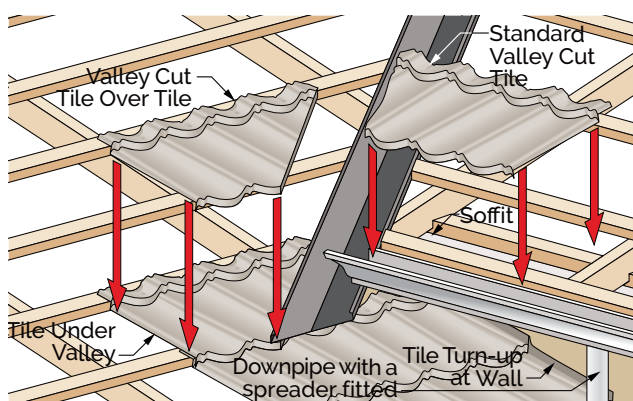


Figure 10.8.2.2

An extra valley cut tile is installed onto an existing panel so that the valley is concealed and held firmly in place.

Keep the valley cut tiles tight against the valley side walls so that the extra valley cut tiles do not impede the water flow.

Fold down drip edge to direct water flow onto the lower roof.

Tile turn-ups against wall should be inserted behind side flashings or apron flashings, which are omitted here for clarity (Refer 9.2 Wall flashings for pitched roofs).

## 10.0 Roof junctions

### 10.8.3 Detail C – Side/Apron flashing junctions

Refer 10.9 and 10.9.1 External corner.

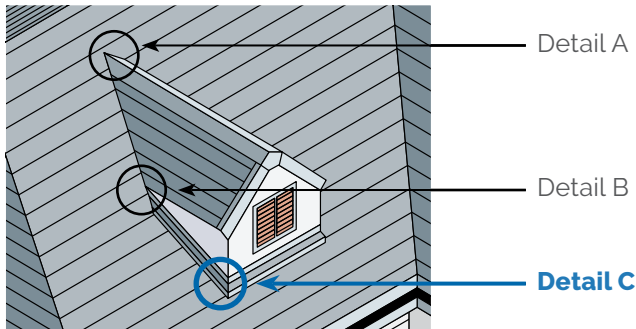


Figure 10.8.3.1

### 10.9 Side flashing junctions

#### 10.9.1 External corner

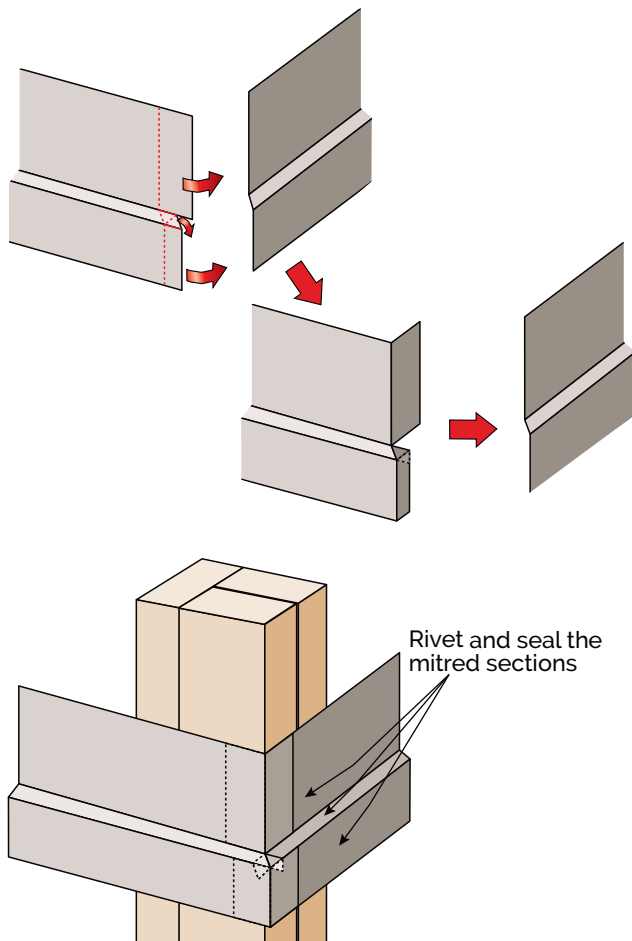


Figure 10.9.1.1

#### 10.9.2 Internal corner

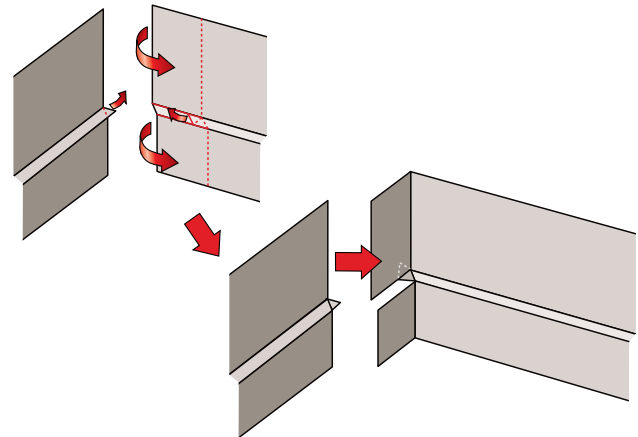


Figure 10.9.2.1

### 10.10 Side flashing and step flashing junction

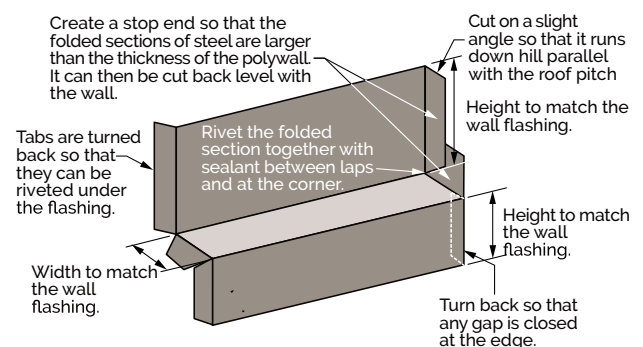


Figure 10.10.1



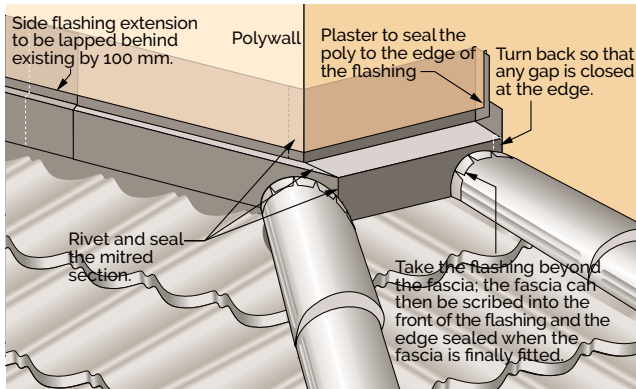


Figure 10.10.2

## 10.11 Corner tiles

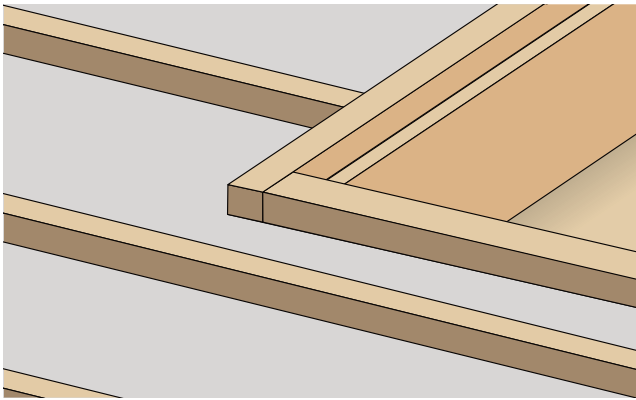


Figure 10.11.1

### 10.11.1 Installation

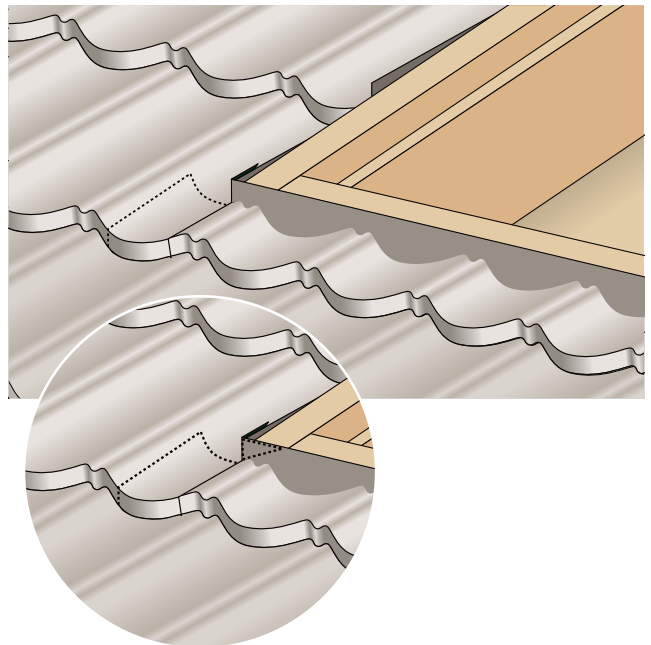
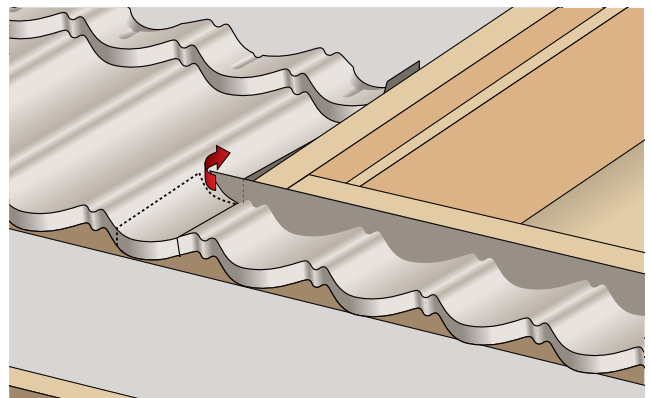
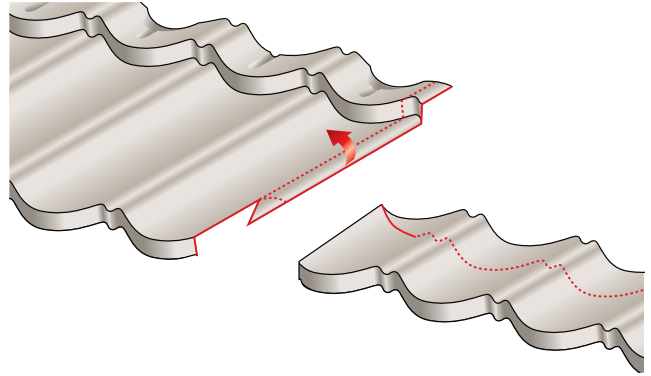


Figure 10.11.1.1

## 10.0 Roof junctions

### 10.12 Gable end wall top junction

A stop end needs to be made to ensure water does not penetrate the wall cavity. A flat vertical surface that projects out further than the wall cladding is created to allow the wall cladding to be sealed either side of the kick out.

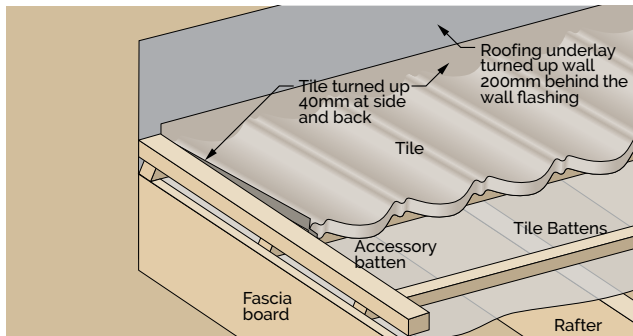


Figure 10.12.1

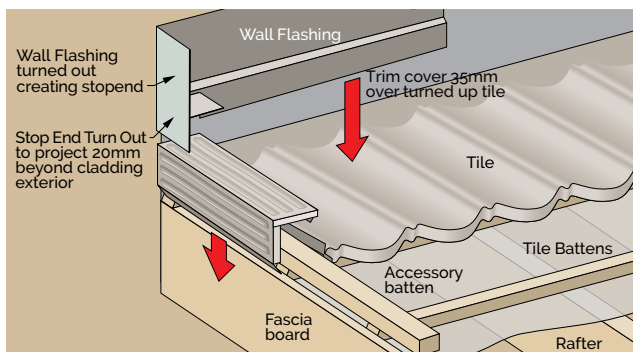


Figure 10.12.2

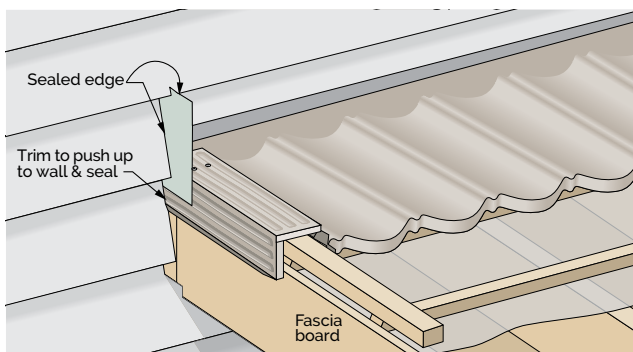
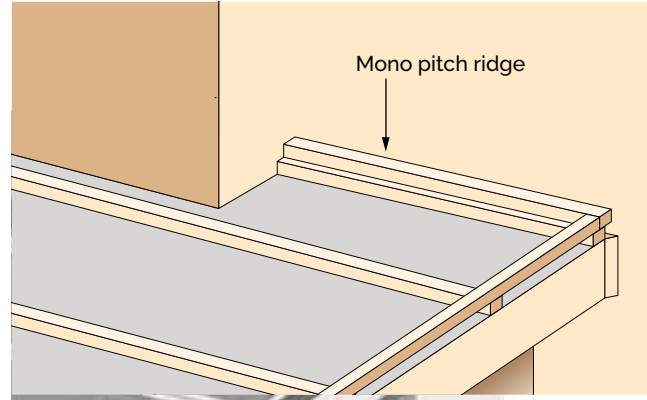
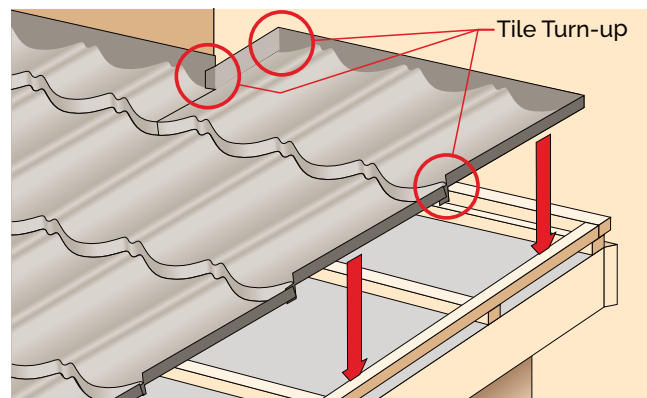


Figure 10.12.3

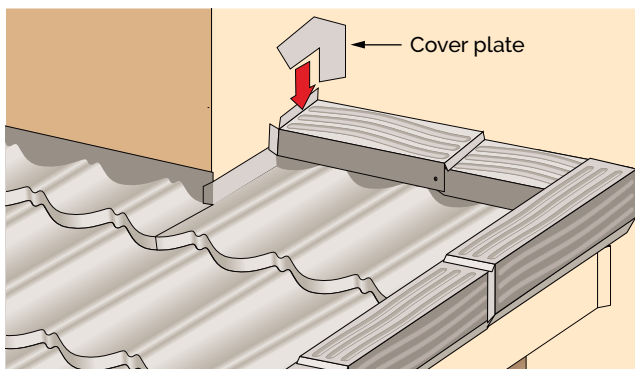
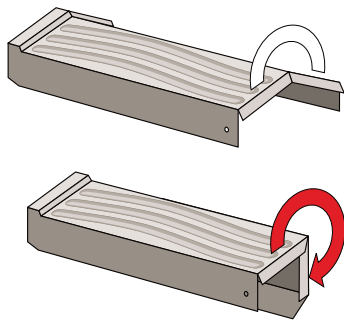
### 10.13 Mono pitch ridge & wall junction



Install tile and accessory battens to the mono ridge and gable to suit ridge and gable accessories.



Install tiles with a 40mm turn up against the accessory battens and walls.



Prebend the accessories to match the angle of the mono pitch at the ridge and for the gable end. Where the accessory butts against the wall turn the ends up a minimum of 25 mm and cut a cover plate to flash over the bent up ends. Seal the cover plate over the ends to ensure weather security.

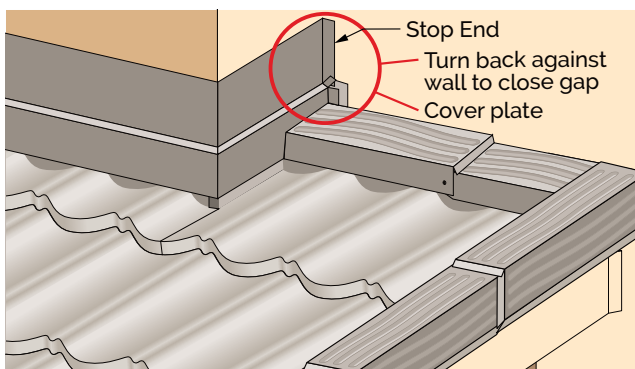
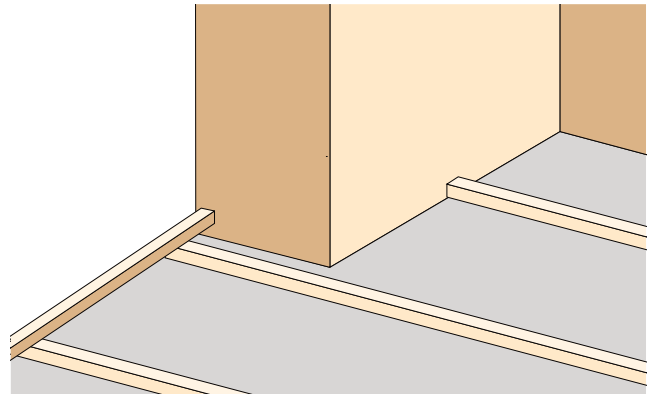


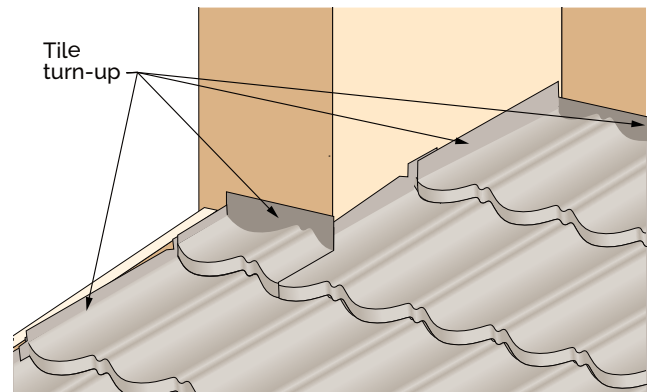
Figure 10.13.1

Scribe the side flashing over the accessory at the wall. Turn the outer section of the side flashing on the vertical side of the mono ridge in against the wall, closing the gap.

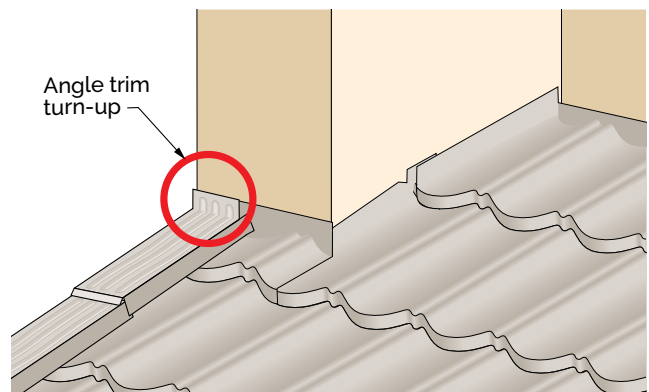
## 10.14 Gable end and wall junction



Install battens down the gable end.



Install tiles with a 40mm turn up against the gable end batten and walls.



Scribe the side flashing over the accessory at the wall. Turn the outer section of the side flashing out by 20 mm to create a stop end.

Wall wrap should lap over the side flashings.

## 10.0 Roof junctions

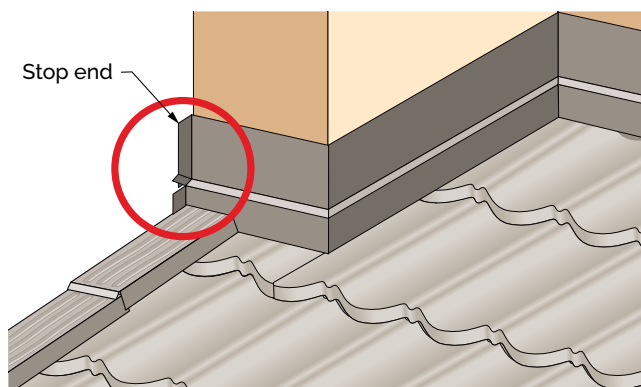
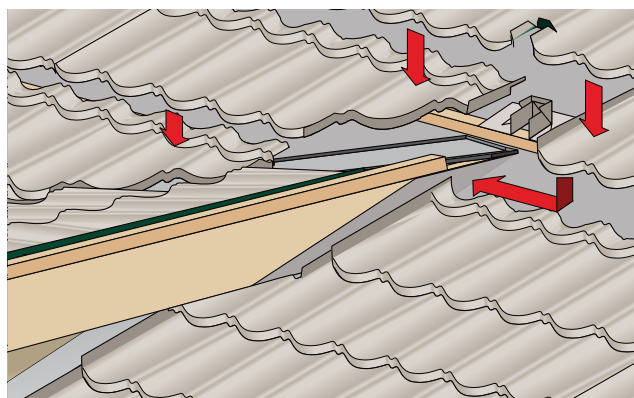
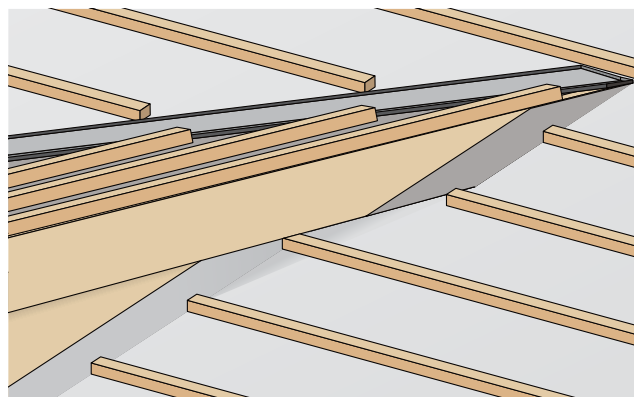
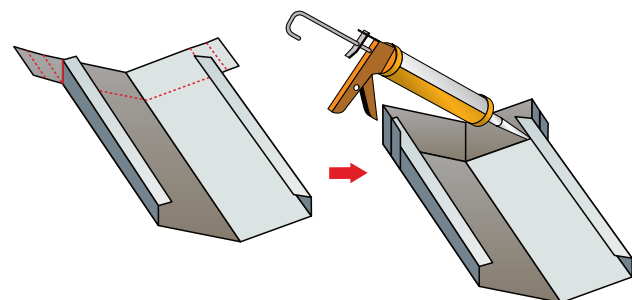
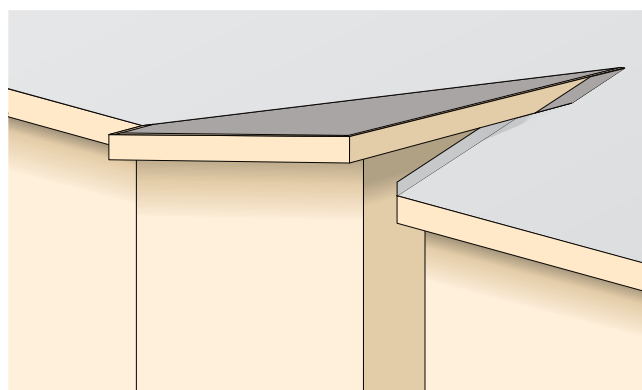


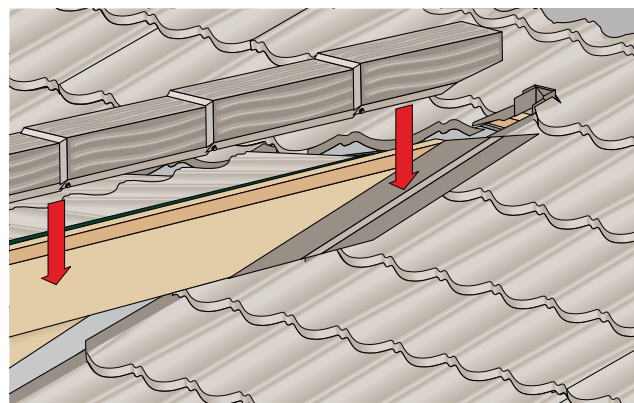
Figure 10.14.1

### 10.15 Ridge valley roof junction

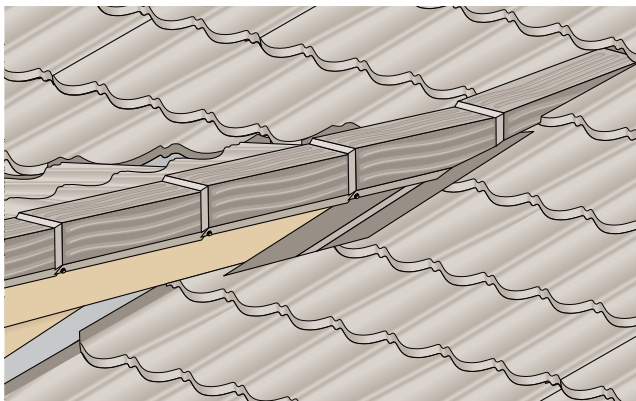
Install roofing under battens over the rafters. Install the combination valley up to the highest point, turn up the top end of the valley sealing corner sections (refer **Figure 10.4.2** for more info).



Install tiles into valley and up against the fascia board.



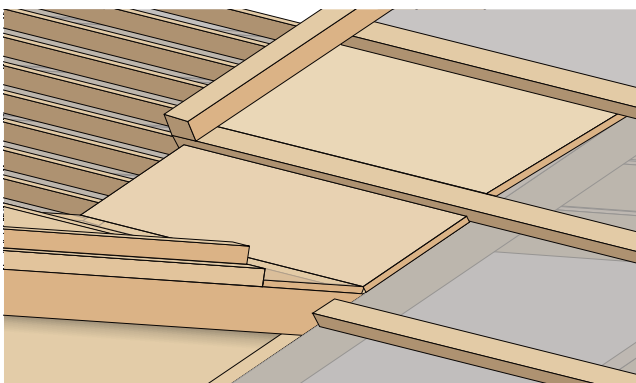
Install side flashing down fascia and accessory along the ridge.



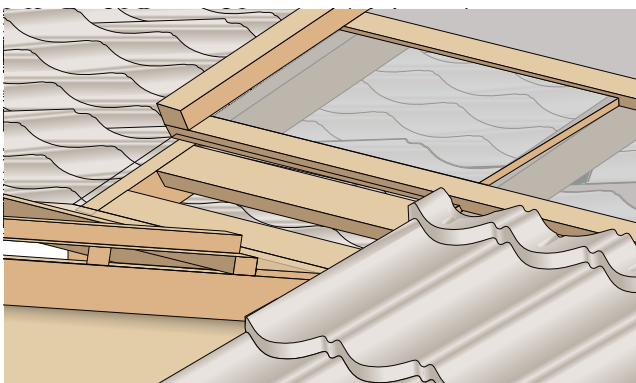
Install end accessory under nose of tile above the ridge and valley ensuring the junction is weather secure.

Figure 10.15.1

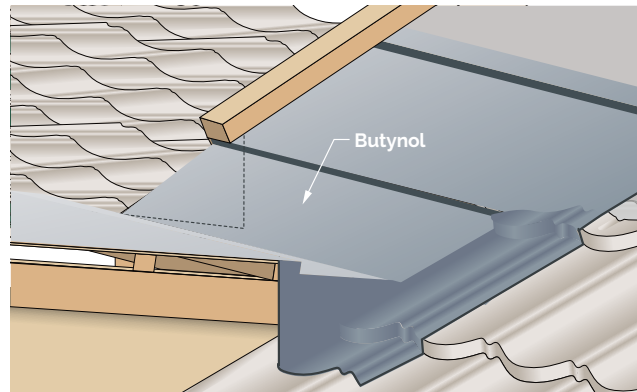
### 10.16 Butyl valley at roof cross over junction



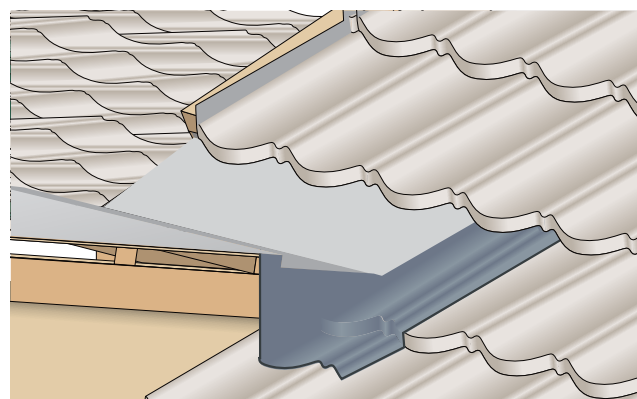
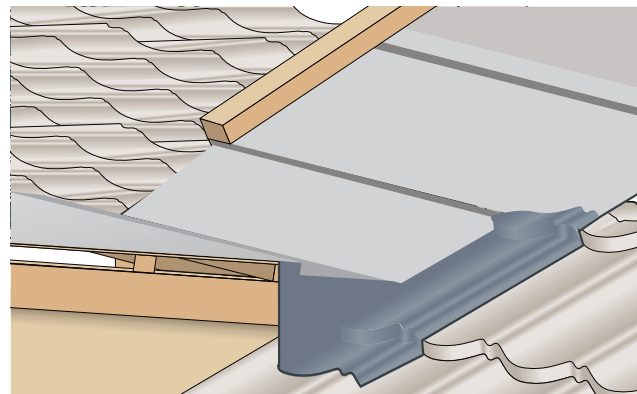
Install 12 mm plywood support boards for the valley. Install them between battens.



Lay tiles up to the valley.



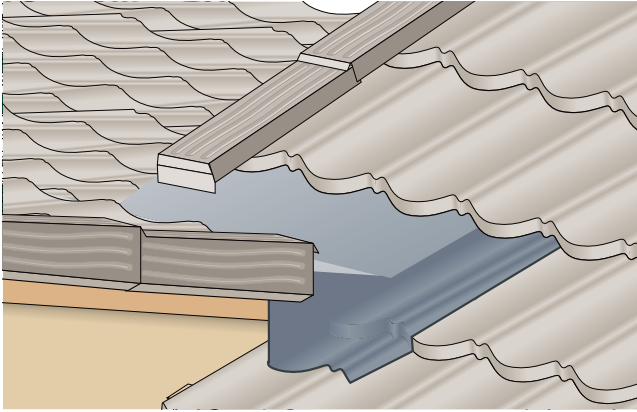
Install butyl valley over the plywood support and on to the tile surface. Install a layer of underlay over the butyl.



Install tiles with a 40 mm turn up against the gable end batten.



10.0 Roof junctions



Lay tiles and accessories up the remaining section of the roof.

*Figure 10.16.1*





## 11.0 Penetrations

The worry-proof roof.

**Page 496 of 734**

## 11.0 Penetrations

### General

Tiles cut for penetrations through the roof must be provided with up-stands and over-flashed to provide drainage from above without restricting the water flow.

All penetration flashings upstands should have a 10 mm minimum clearance from the finished wall cladding of the penetration structure.

Where roof penetrations are required for large openings such as skylights and chimneys:

The edge of roofing penetrations over 200 mm wide should be supported in either direction with additional framing as shown in **Figure 11.1**

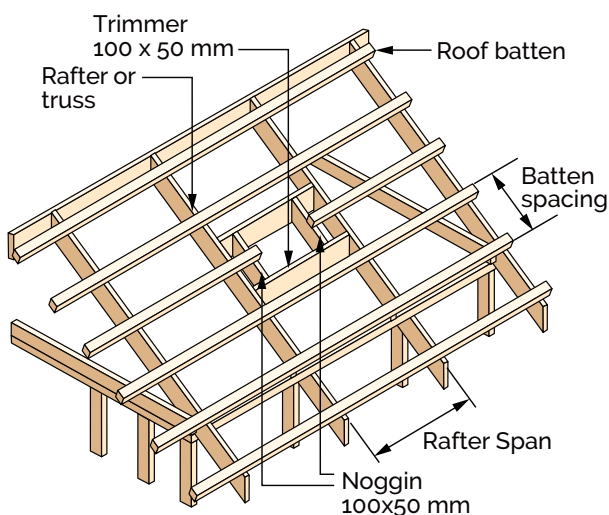


Figure 11.1

### 11.1 Chimneys

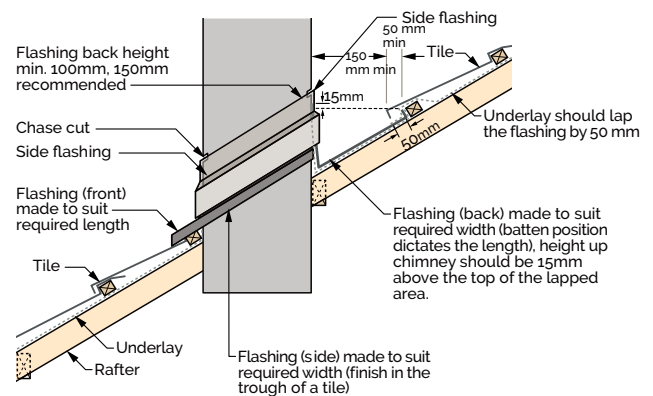


Figure 11.1.1 Elevation

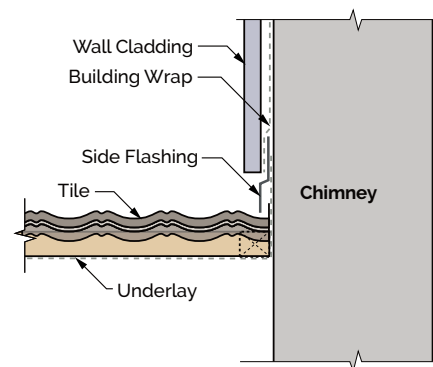


Figure 11.1.2 Section

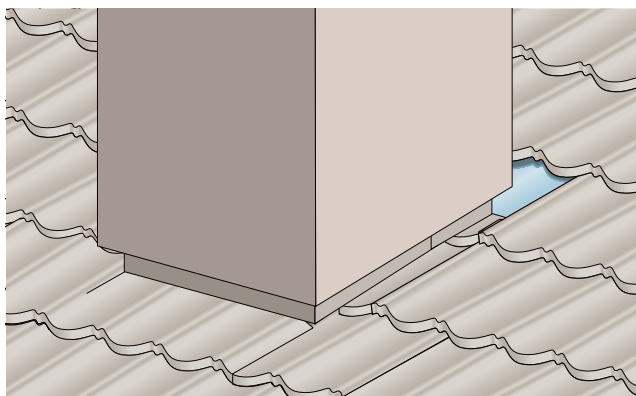
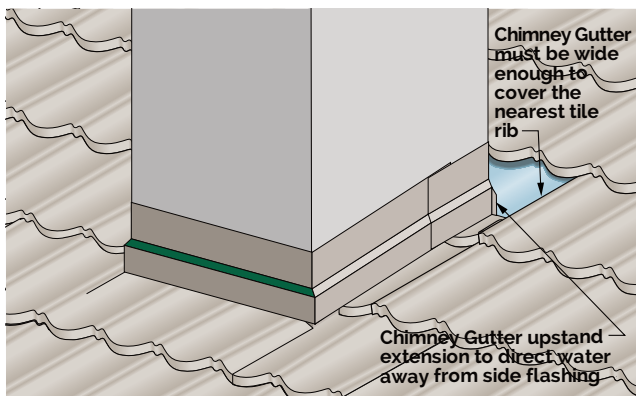
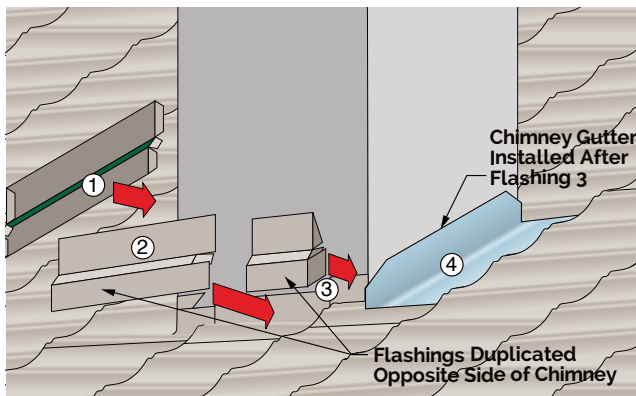
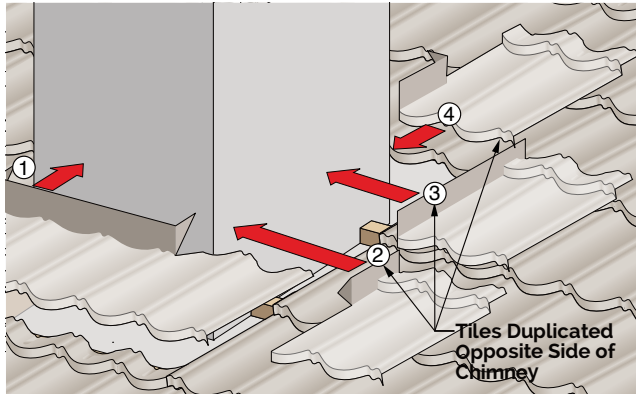


Figure 11.1.3 Installation

Where the use of sheet metal is not the most pragmatic method to flash a penetration, butyl rubber with a minimum thickness of 1.0 mm is the preferred alternative providing that they are compatible and comply with the design requirements and conditions outlined in ASTM D6134.

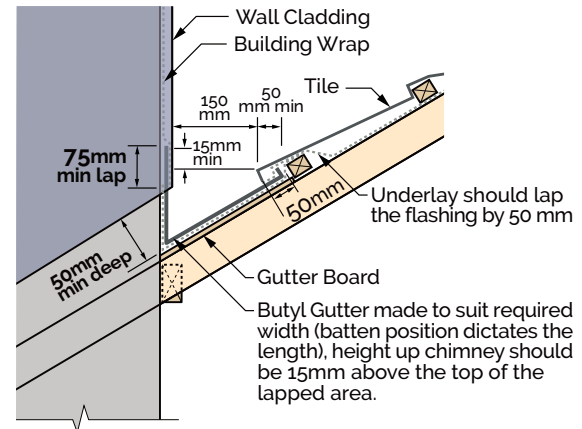


Figure 11.1.4 Elevation - Butyl gutter

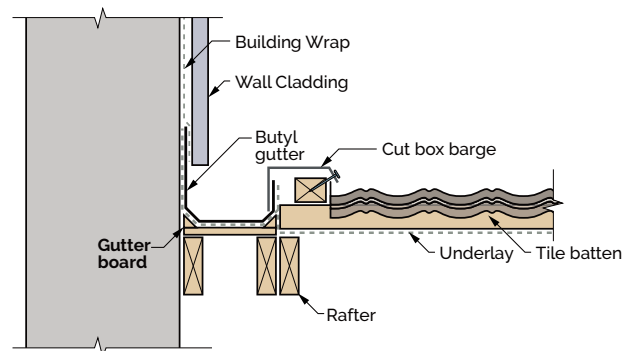


Figure 11.1.5 Section - Butyl gutter

Install the gutter board so that it hangs over the fascia board and into the gutter but avoid contact with the gutter. Glue the butyl rubber extension on the stop end.

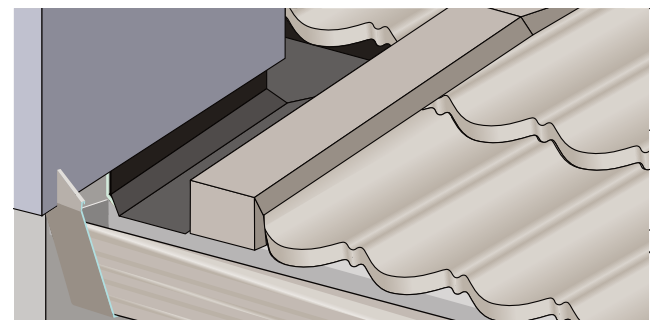


Figure 11.1.6 Chimney at eave - Butyl gutter

11.0 Penetrations

When the chimney construction is solid masonry or brickwork, and flashings cannot be installed under the wall cladding, a chase must be cut and an over flashing installed in the chase to provide weather protection.

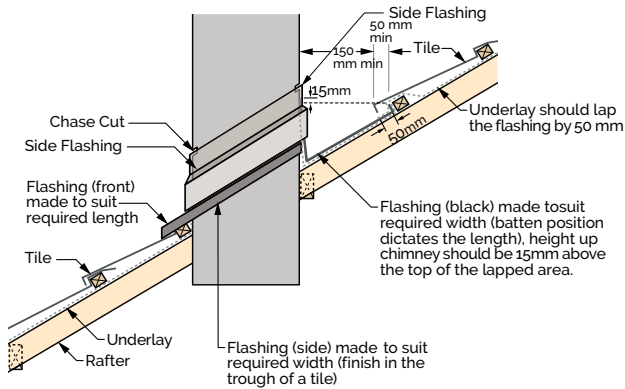


Figure 11.1.7 Elevation

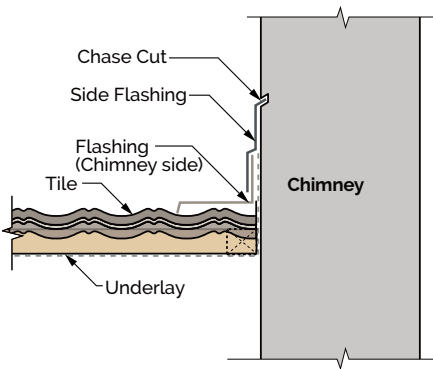


Figure 11.1.8 Section

11.2 Skylights

11.2.1 Gerard roof skylight domes

Skylight domes

Dome	Fixed
Material	3 mm acrylic
Dimensions	535 mm x 535 mm
Available in	Opaque or transparent
Base	
Material	3 mm ABS Plastic
Dimensions	4 Modules x 2 courses x 100 mm
Actual Cover	720 mm x 740 mm
Colours	Available in all Tuffcoat and Colortile colours
Profiles	Available in Tuffcoat and Colortile profiles

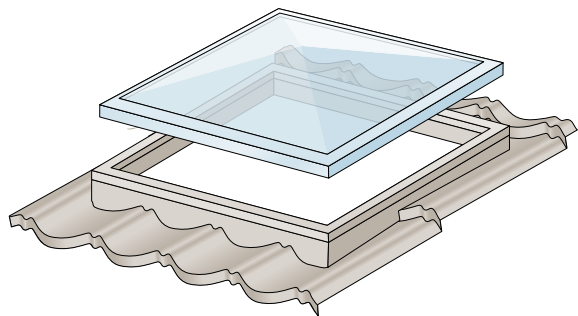


Figure 11.2.1.1 Frame support

The profiled surround means no flashing is required and the fitted skylight matches the roof exactly.

The ease of installation also means the likelihood of weather proofing problems around the skylight are significantly reduced. Skylights are available with either transparent or opaque dome. Both options are made from durable acrylic.

Adjust lateral skylight position to suit tiles and floor plan by moving noggins. The noggins and trimmers are 100 x 50 mm (h x w).

### 11.2.2 Velux skylights

An extra trimmer at both sides of the frame and two extra trimmers above the frame are installed to provide support to the tile battens. The trimmers are 40 x 50 mm (h x w).

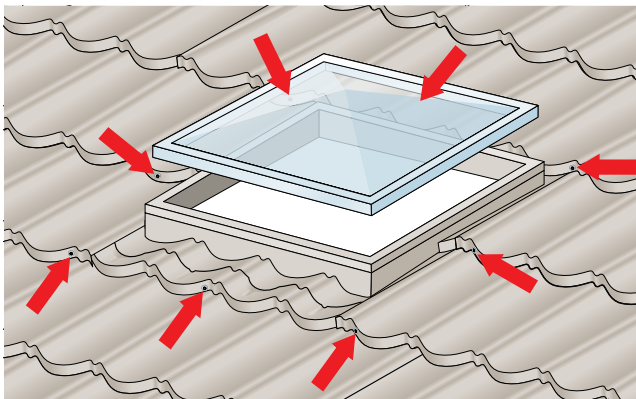
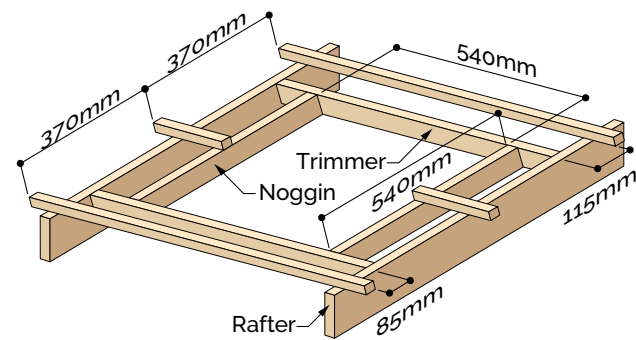


Figure 11.2.1.2

Allowance for expansion where the adjacent tiles are used to hold the skylight down rather than fixing directly through the base more than minimally. Skylights are only fixed through centre top and bottom.

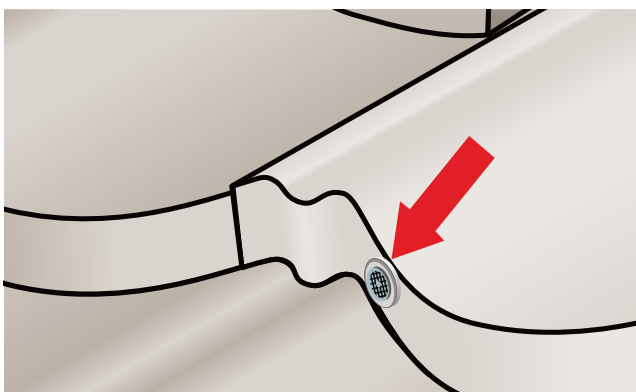


Figure 11.2.1.3

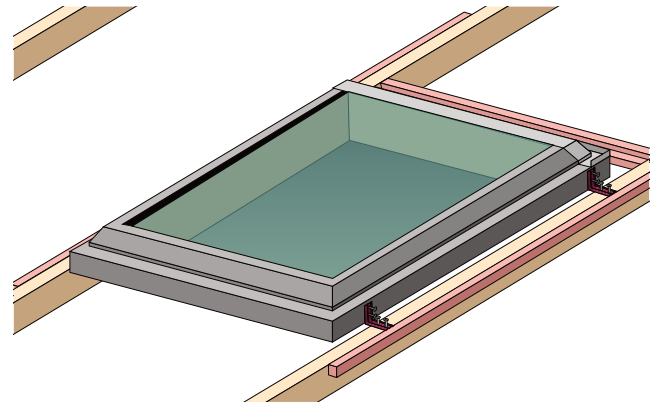


Figure 11.2.2.1 Frame support

Dress roofing underlay up around all four sides of the frame. Roofing underlay at bottom frame must not exceed groove.

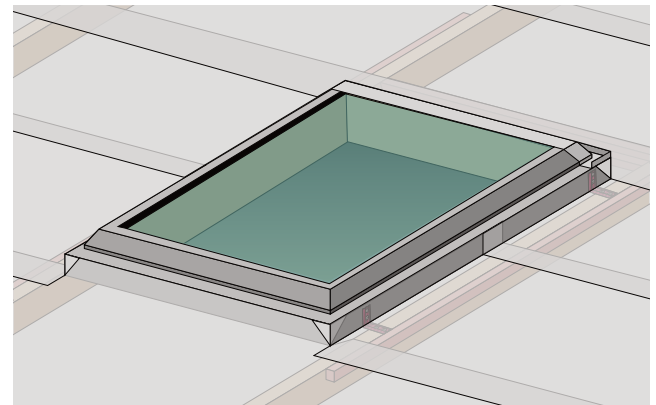


Figure 11.2.2.2 Underlay installation



## 11.0 Penetrations

Cut a groove (25 mm deep and 140 wide) in the tile battens at both sides and above the frame.

Install the tile batten below the frame so that the distance from its front edge to the bottom frame must be 140 mm.

Position an extra batten 30 mm below the frame to support the bottom flashing. The supporting batten to be positioned at a level 10 mm lower than that of remaining battens.

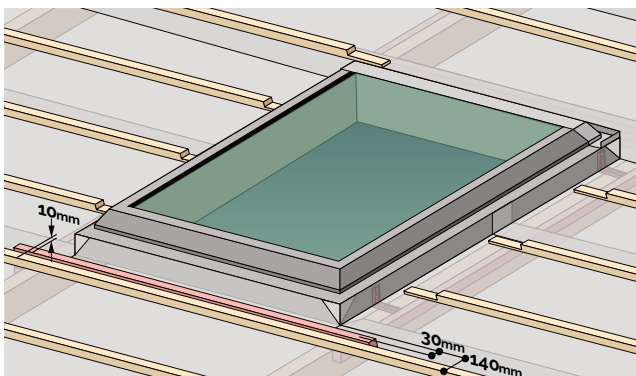


Figure 11.2.2.3 Batten set up

Install bottom, side and top flashings supplied by VELUX following VELUX Skylight Installation Instructions.

**Note:** NEVER nail/fasten the VELUX bottom flashing through the top of the tiles.

For VELUX Skylight Installation Instructions check on:

[http://www.velux.co.nz/professionals/  
installation-instructions](http://www.velux.co.nz/professionals/installation-instructions)

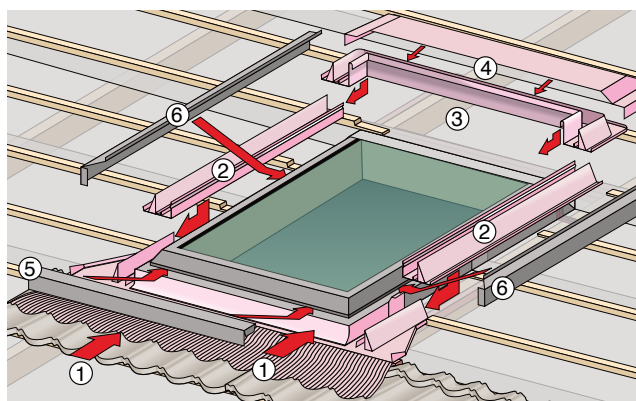


Figure 11.2.2.4 Flashings installation

### 11.3 Sky tube base installation

Mark the centre of hole to be cut in the roof based on the location of hole that will be cut in the ceiling below.

Mark where the hole in the roof is to be cut using chalk.

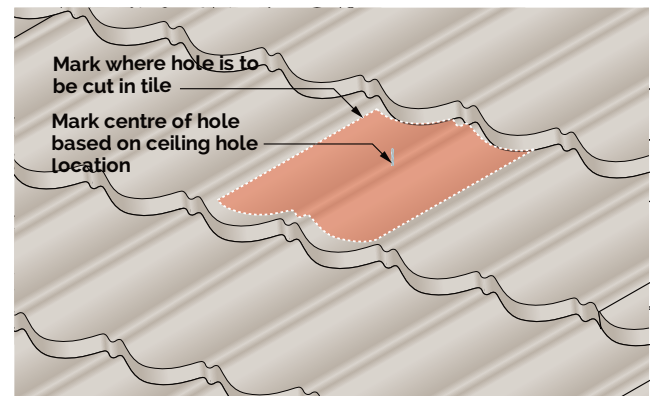


Figure 11.3.1

Position base above the hole and mark the side of the base where it is to be cut to suit the tile profile.

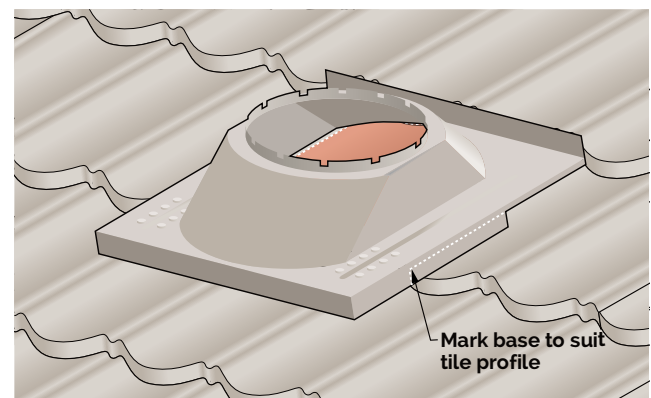


Figure 11.3.2

Remove the nails of the tile above the hole so that you can lift the nose of the tile.

Cut the hole with hacking knife or snips along pre-marked chalk line (Refer **Figure 11.3.1**).

Snip the hole ends 15 mm wider (horizontal) than the hole in preparation for turning back the sides of the hole. Cut roofing underlay so it can be dressed up around the four sides of the hole.



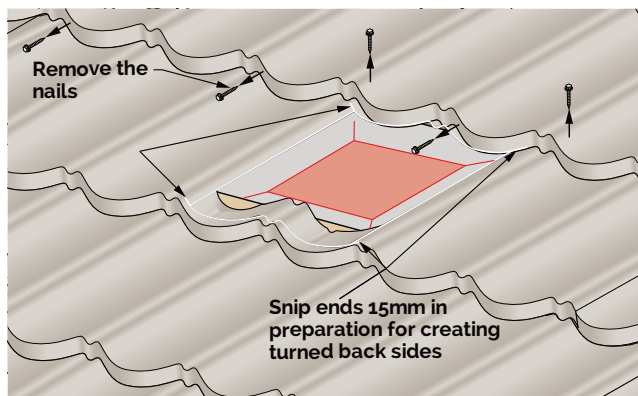


Figure 11.3.3

Turn the sides of the hole over (almost 180°) 15 mm using hand benders.

This provides weather security down the sides of the hole.

Cut the back out of the batten as shown in **Figure 11.3.4** so that the gap between the batten above and the cut batten is large enough to allow the solar tube to fit between the battens, usually cutting the batten back to the back of the tile is sufficient. **DO NOT** fully remove the batten as support is required for the tile and the base.

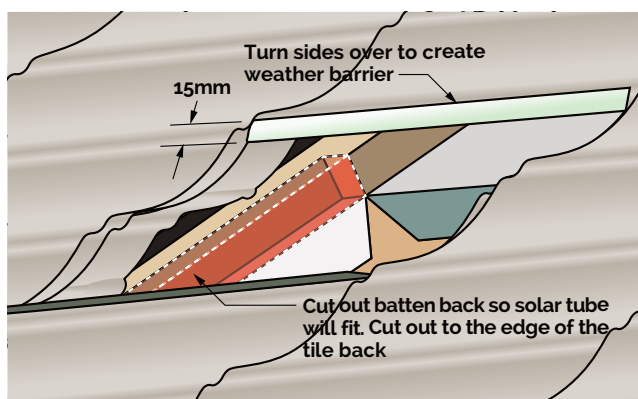


Figure 11.3.4

Lift up the tile above (and the remaining back of the cut tile) and turn up and staple the roofing underlay to the front face of the batten above.

Fold up and staple the roofing underlay to the back of the batten below.

Tape the roofing underlay to the two turned-over sides.

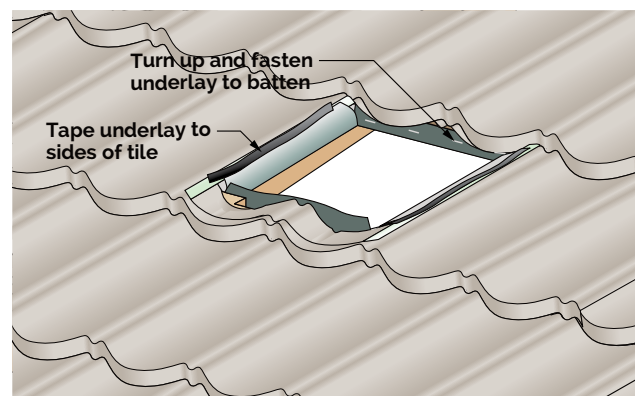


Figure 11.3.5

Seal the back edges of the folded sides using a suitable sealant.

Cut the base where it was marked earlier.

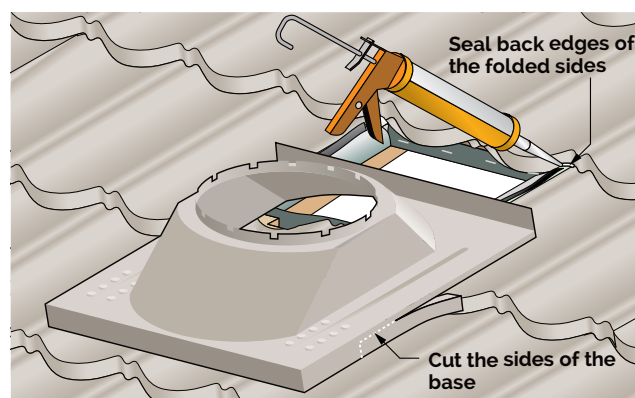


Figure 11.3.6

## 11.0 Penetrations

Place the base so that the nose of the tile below sits over the back turn up of the base. Refasten the tiles above; pre-drill if nailing through base, press the tile nose down onto the base as tight as possible whilst nailing.

Tek screw (supplied) the base to the tile batten. Pre-drill the hole in the base, the tek screw will cut through the tile surface and in to the tile batten.

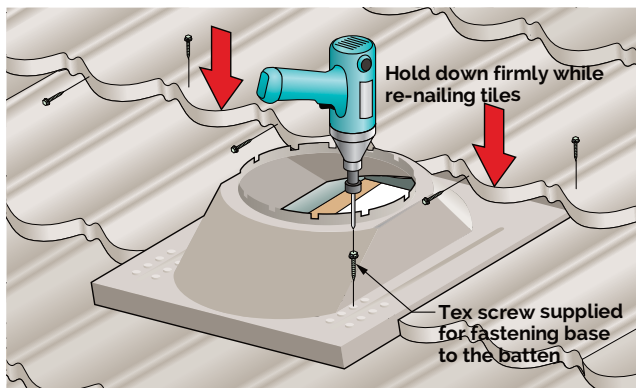


Figure 11.3.7

### 11.4 Pipe vents

Measure and cut the tile when it intersects with a vent pipe as per **Figure 11.4.1** and **Figure 11.4.2**.

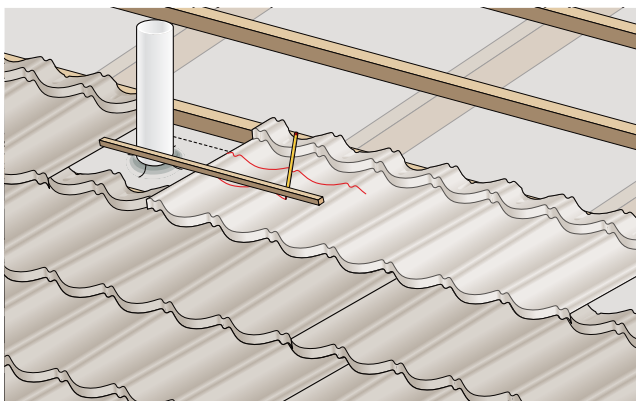


Figure 11.4.1

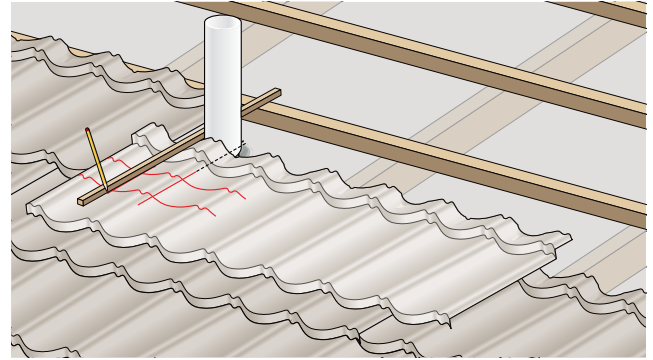


Figure 11.4.2

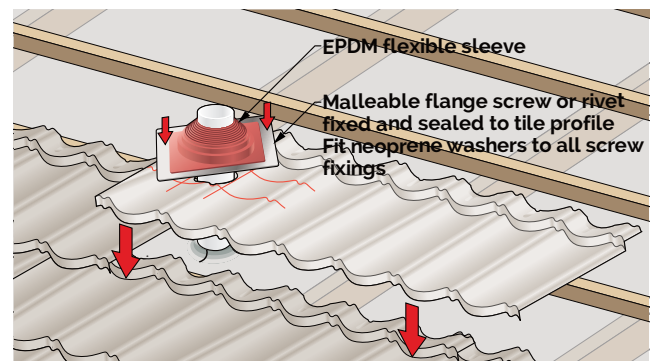


Figure 11.4.3

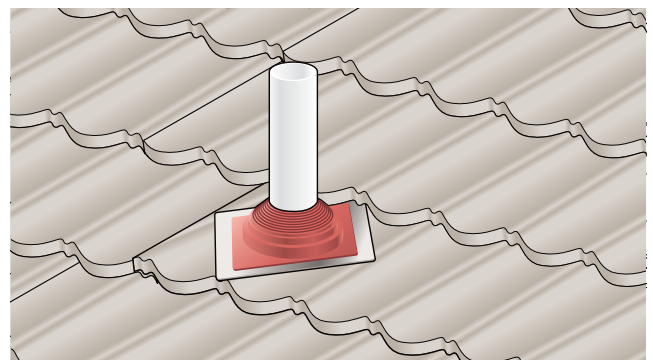


Figure 11.4.4

Pipe penetration should be flashed using an EPDM aquaseal pipe flashing or a butyl rubber pipe flashing as shown in **Figure 11.4.3**.

Hole cut out through the rib if possible and square base must be fixed diagonally to minimise holding of discharge water. Gerard Roofs recommends the MS sealant or Neutral Silicone to use with EPDM based through-roof fittings.

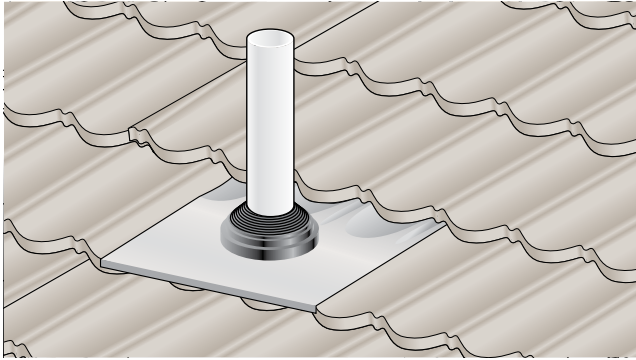


Figure 11.4.5

## 11.5 Ventilation

Gerard Roofs have been supplying passive flow roof vents for Gerard Roof tile profiles for over 30 years.

These profiles are still available however a new range from our European plant is available for use.

A passive/ducted vent LV200 and Sanitary Vents are available in a range of profiles.

### 11.5.1 LV200

Matched to each of the tile profiles it is easily installed in to the roof at the correct place.

This low profile 20,000 mm<sup>2</sup> vent provides a vent for both passive and mechanically vented spaces.

This vent provides a 160 mm diameter vent and can be provided with a reducer down to 80 mm so it can be connected up as a ducted vent for bathroom, kitchen or laundry extraction systems. It can also be used as a passive vent to allow moist or hot air from the space below the roof.

#### Installation

Determine the location of the vent, position the vent and remove and cut a circular hole in the roofing underlay for connection of the extraction system or for passive ventilation.

The vent tiles are overlapped by the above and side tiles, this interlocks them in place. Fasteners installed

next to the laps but not through the vents complete the installation.

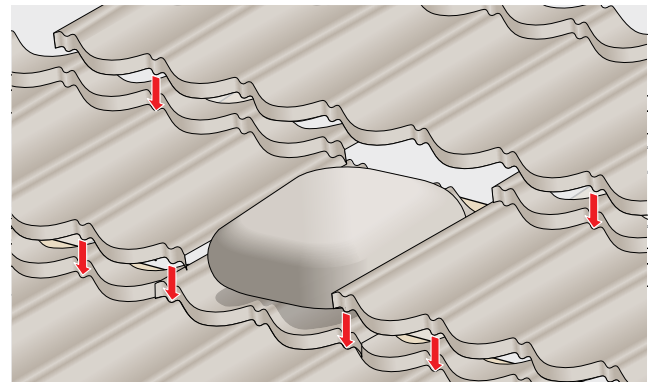


Figure 11.5.1.1

### 11.5.2 Sanitary vent

These vents are provided with a flexible duct pipe that can be connected to sanitary pipes or a ducted extraction system.

#### Installation

Check with the plumber where the vents are to be installed. Connect the flexible pipe to the base of the vent, cut a round hole in the roofing underlay and feed the flexi pipe through.

The sanitation vent tiles are overlapped by the above and side tiles, this interlocks them in place. Fasteners installed next to the laps but not through the vents bases complete the installation.

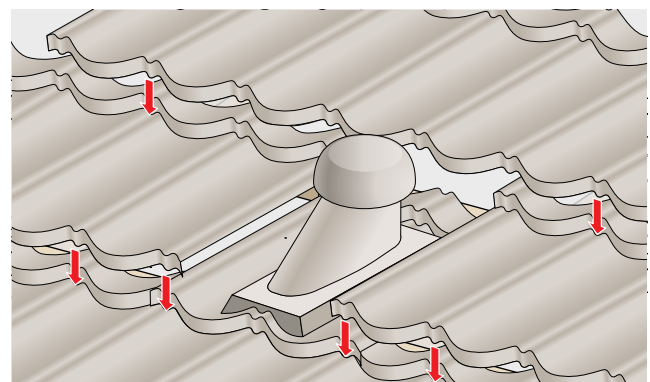


Figure 11.5.2.1

## 11.6 Solar brackets

Gerard Roofs solar brackets. These may be used for PV or Solar hot water systems.

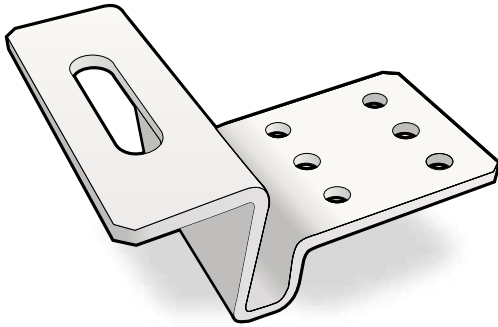


Figure 11.6.1 Senator solar bracket

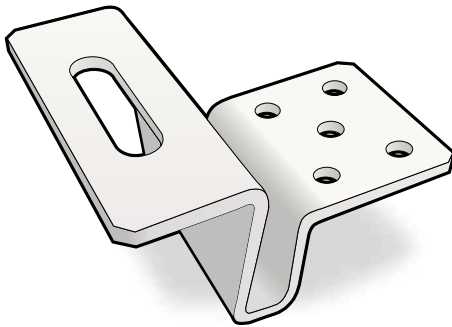


Figure 11.6.2 HMCC solar bracket

### 11.6.1 Before installation

Consult local authorities for regulations and solar panel manufacturers for installation and maintenance instructions.

### 11.6.2 Solar bracket installation

Solar brackets are best installed at the time a new roof is being installed. This ensures that every batten rafter junction is screw fastened in the solar area and that the brackets are installed in the best location/position.

Solar brackets are fastened with 2 x 80 mm 10 g screws or fixing equivalent to 2.4 kN.

When installing solar brackets on a Corona, Senator, Rockport, Oberon or Alpine profile ensure that the brackets are screw fastened directly over a rafter.

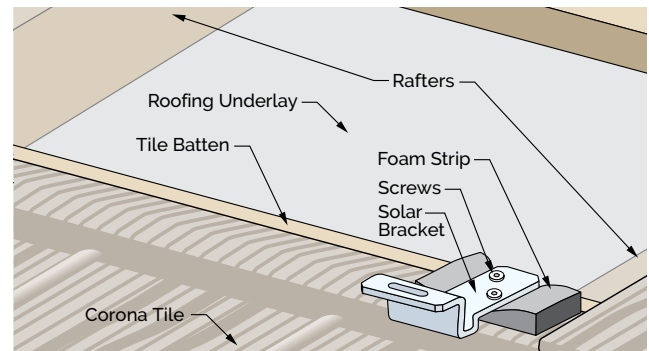


Figure 11.6.2.1 2 x 80 mm 10g screws through batten into rafter

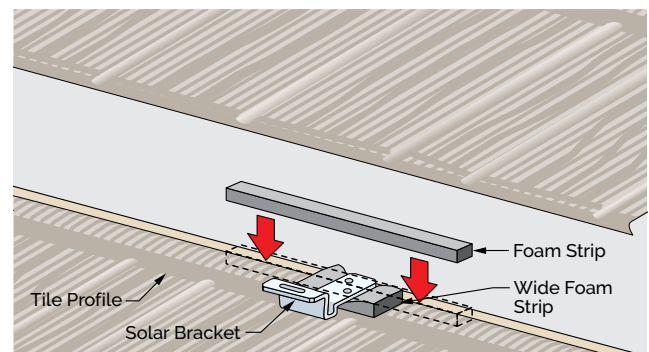


Figure 11.6.2.2 Solar brackets weather security strips



When a Colortile, Milano or Tuffcoat profile is used the brackets are always to be installed within 100 mm of a rafter. The rafter junction must always be screw fastened.

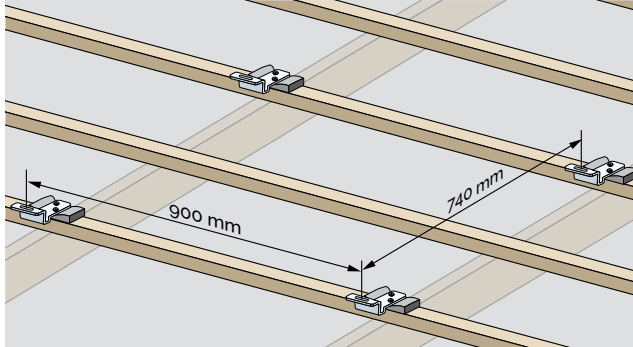


Figure 11.6.2.3 2 x 80 mm 10g screws through batten into rafter

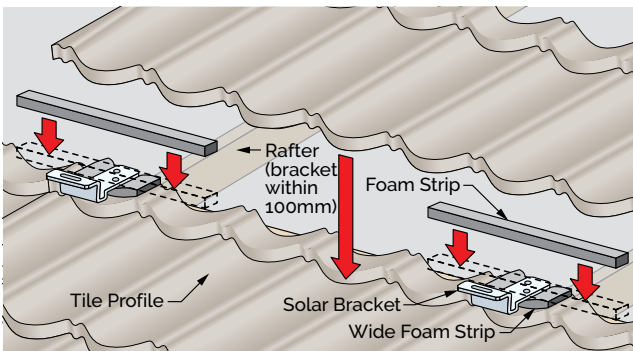


Figure 11.6.2.4 Solar bracket weather security strips

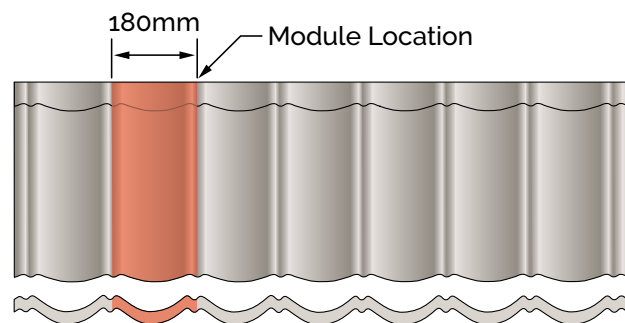


Figure 11.6.2.5 Module position

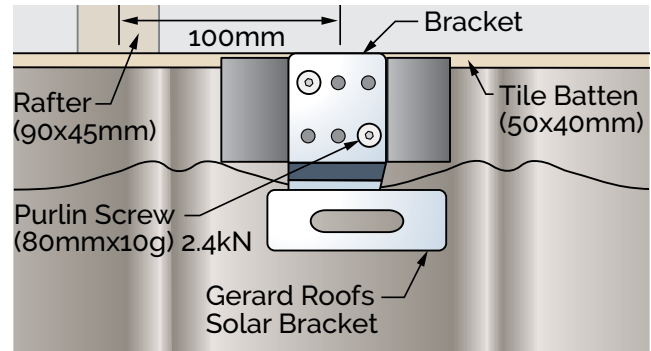


Figure 11.6.2.6 Solar bracket installation

The spacing between the brackets should not exceed 900 mm horizontally. Brackets installed up the roof should be spaced as per, Figure 11.6.2.7.

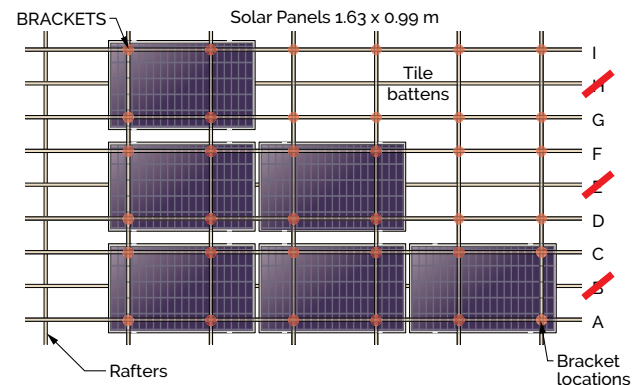


Figure 11.6.2.7 Solar bracket positions

Consult solar panel manufacturer's installer/supplier guide regarding pane sizes to be used and widths of panels. Ask them to provide a plan of bracket locations. Rails are connected to the solar brackets, these will support solar panels. It's important that the brackets are located in the correct place.

Retrofitting of solar brackets is possible however this involves removing tile fasteners from tiles where the brackets are to be installed. The tile nose is lifted and the brackets fastened in place.

**Note:** All batten rafter junctions are to also be fastened with a screw or 2.4 kN capacity fastener.

## 11.0 Penetrations

### 11.6.3 Walking on tiles

Soft soled shoes capable of providing secure footing should be worn.

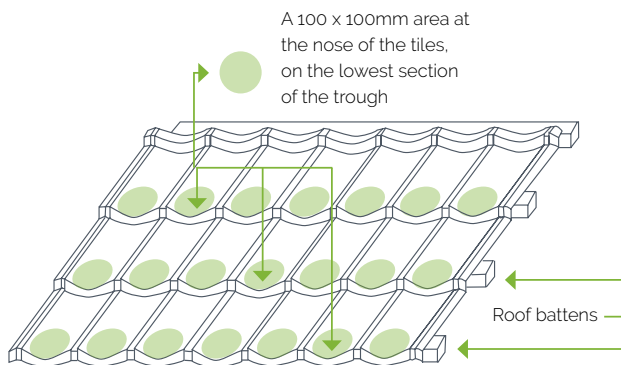
Extreme care is required when walking on wet tiles and this should be avoided if possible. Satin finish tiles can be very slippery and should NOT be worked on while wet.

The surface coating of the textured finish tiles may be damaged when they are wet, and damage increases as the pitch increases.

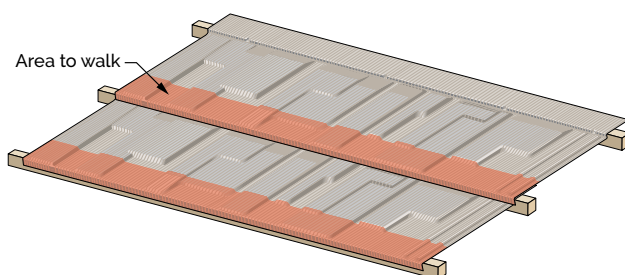
When walking on the tiles weight must be concentrated directly above the batten for Corona, Senator, Rockport, Oberon and Alpine and in the pan (lower section) of tiles above the batten.

Tile damage will occur if installer weight is applied to tile ridges or mid sections of Corona, Senator, Rockport, Oberon and Alpine.

#### For Colortile, Milano and Tuffcoat



#### For Corona, Senator, Rockport, Oberon and Alpine



### 11.6.4 Solar panel installation

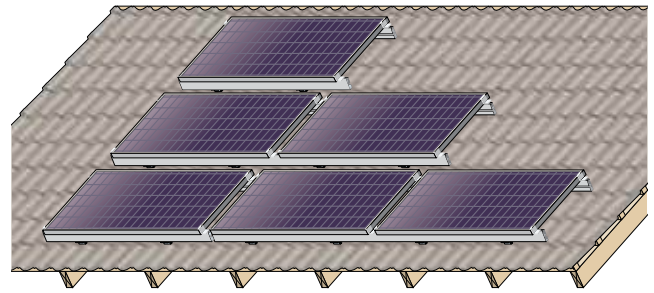


Figure 11.6.4.1

Rail spacing's are to suit each panel manufacturer's recommendations. They should not be spaced more than 0.9 m apart.

#### Photovoltaic (PV) solar panels

The final step is to run the conduit to connect the panels to the inverter. The electricity wiring enters the internal from the metal roof which must be properly flashed.

#### Solar water heating panels

The relief valve drains and water pipes which enter the internal from the metal roof must be properly flashed. The heated water pipes must be properly insulated to last for no less than 5 years.



## 11.7 Parapets

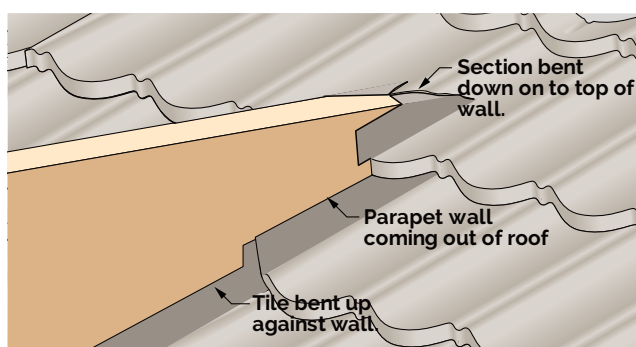
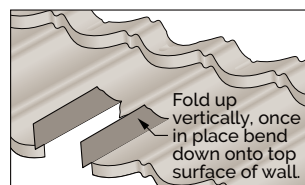
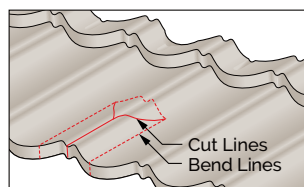


Figure 11.7.1 Install tiles

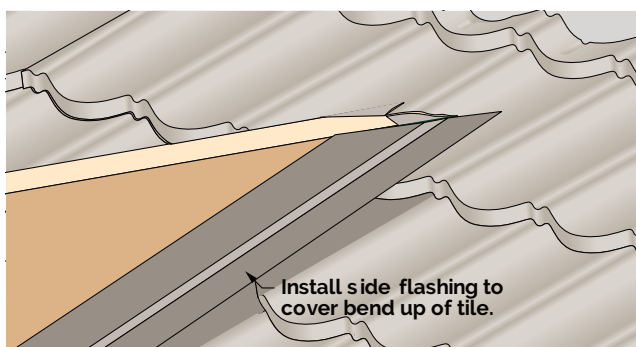


Figure 11.7.2 Install side flashing

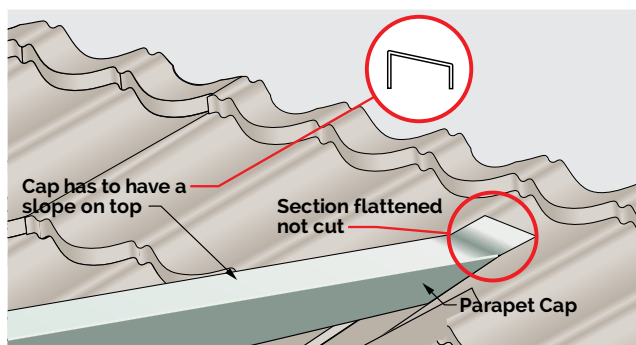


Figure 11.7.3 Install parapet cap

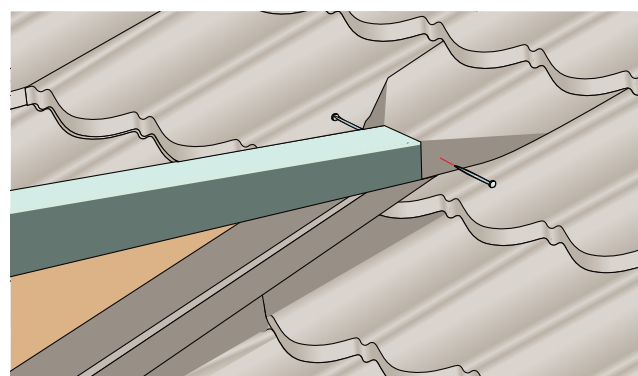
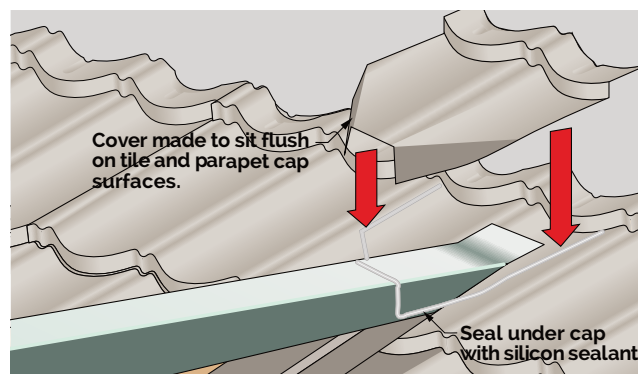
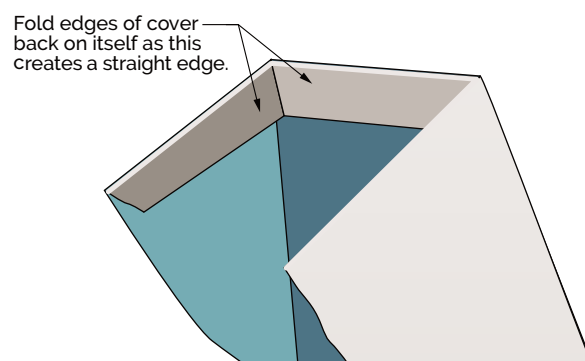
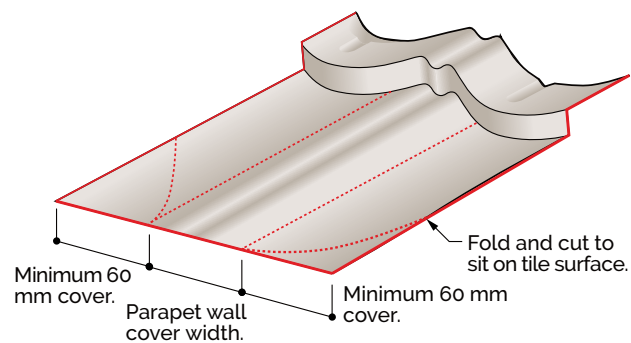


Figure 11.7.4 Install cover pan

## 11.0 Penetrations

### 11.8 Back wall cricket

Where the back wall or chimney is greater than 600 mm a cricket may be required to ensure water drainage.

Where the use of sheet metal is not the most pragmatic method to flash a penetration, butyl rubber with a minimum thickness of 1.0 mm is the preferred.

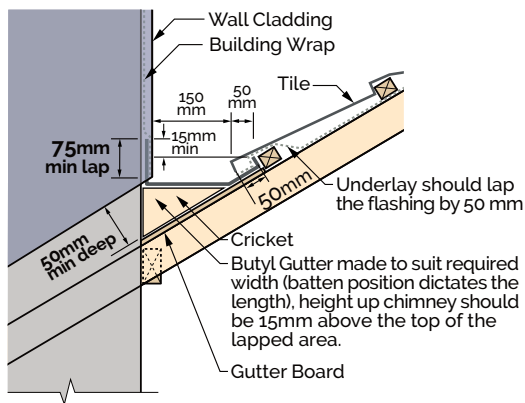


Figure 11.8.1 Elevation - Butyl gutter with cricket

Install the butyl gutter down the side of the chimney to the eave.

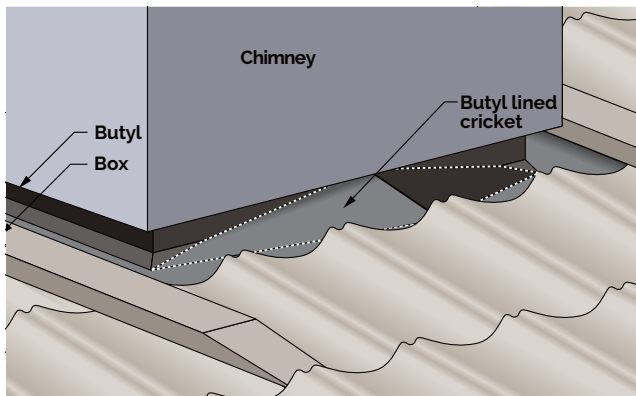


Figure 11.8.2 Butyl gutter with cricket

Install the gutter board so that it hangs over the fascia board and into the gutter but avoid contact with the gutter. Glue the butyl rubber extension on the stop end and the gutter board edge at the eave.

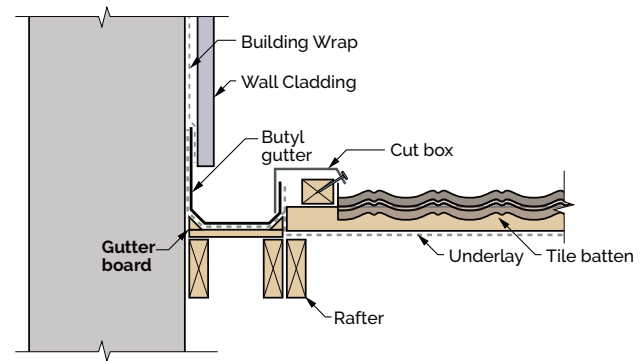


Figure 11.8.3 Elevation - Butyl gutter

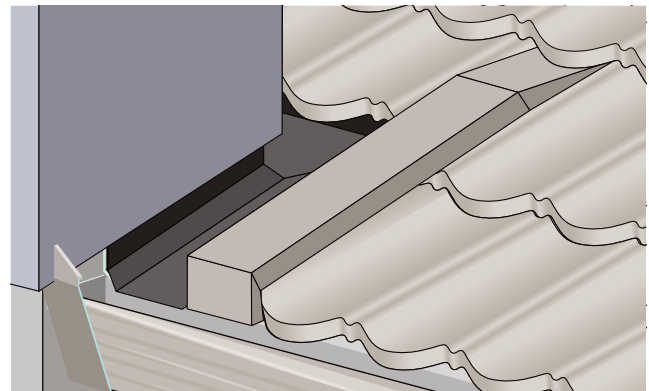
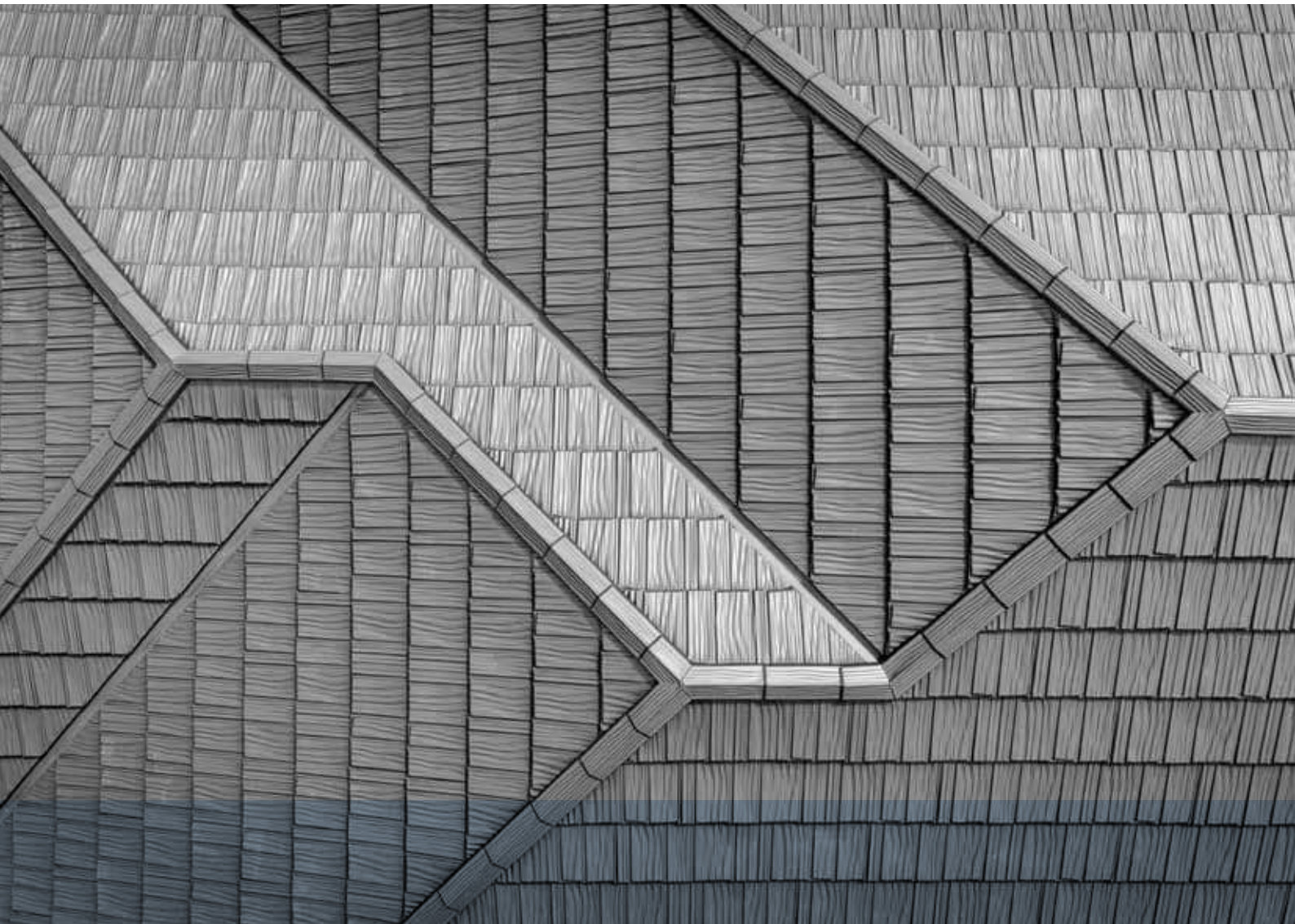


Figure 11.8.4 Chimney at eave - Butyl gutter



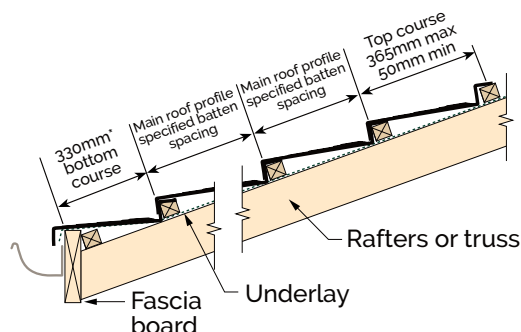
## 12.0 Unusual situations & circumstances

The worry-proof roof.

**Page 510 of 734**

## 12.0 Unusual situations & circumstances

### 12.1 Top course too short or too long



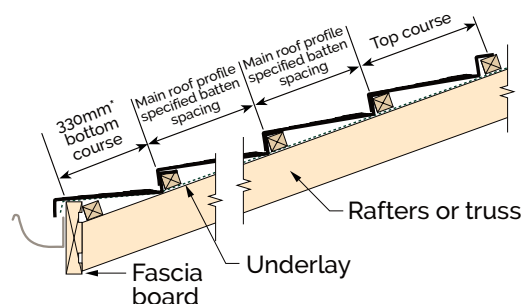
\* Variable depending on the type of rainwater collectionsystem used

Figure 12.1.1 Batten set out general rule

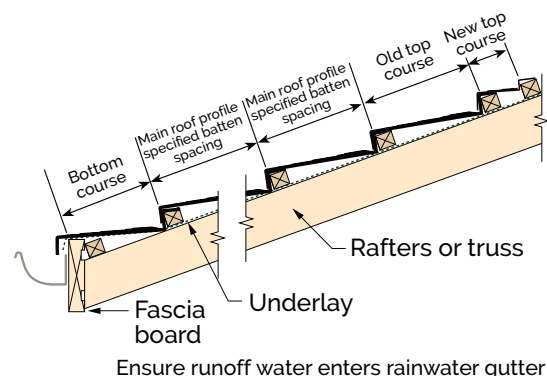
#### 12.1.1 Tuffcoat, Colortile, Rockport and Oberon

When the top course batten spacing is found out to be too short (less than 50 mm) or too long after pin out (more than 365 mm and less than 420 mm), the bottom course dimension may be changed to between 290 mm and 345 mm to solve the problem.

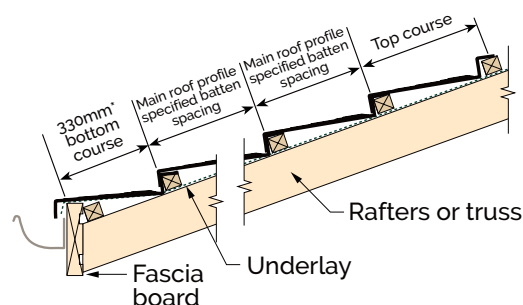
##### Example 1 reduce bottom course spacing



\* Variable depending on the type of rainwater collectionsystem used



##### Example 2 increase bottom course spacing



\* Variable depending on the type of rainwater collectionsystem used

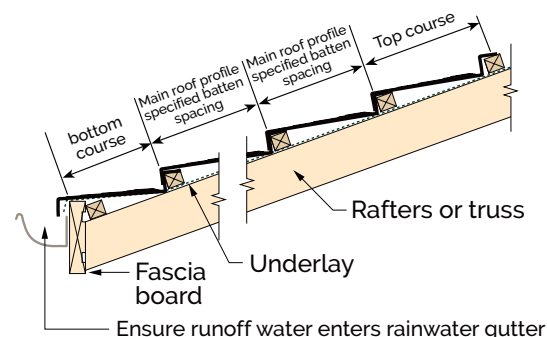


Figure 12.1.1.1

#### 12.1.2 Corona, Senator and Alpine

When the top course batten spacing is outside the range between 50 mm and 365 mm, the natural upstand of the Corona, Senator and Alpine remains and the front downturn can be created by bending the tile down before cutting.



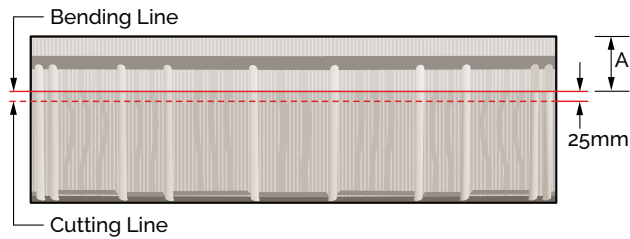


Figure 12.1.2.1

## 12.2 Short valleys

This situation occurs when a valley exits onto the roof surface well above the fascia. Cut end of the valley to protrude 50 mm and do not use cover pans. Fold down drip edge to ease water to flow down the roof.

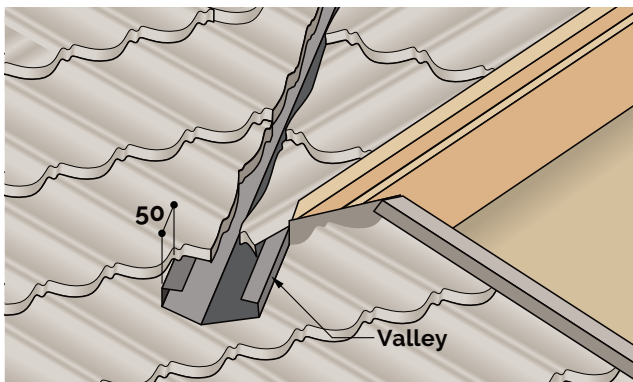


Figure 12.2.1

## 12.3 Low pitched roof (>8°)

If a side flashing is used against the wall, seal the small section of wall wrap over the butynol using a sealant tape and also use a foam closure.

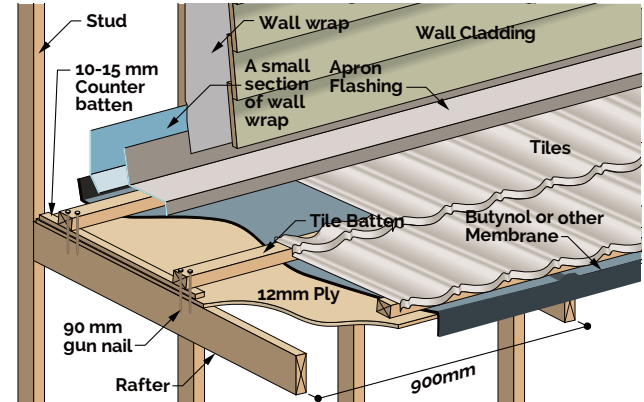


Figure 12.3.1

Use two 90 mm gun nails to compensate for the loss of ply plus counter batten plus membrane thickness.

The counter battens are to allow drainage if the tiles leak as is possible at pitch smaller than 15°.

At roof pitch lower than 8° a membrane roof or profiled steel roof is recommended.

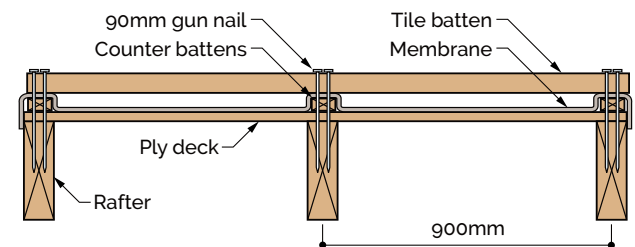


Figure 12.3.2

## 12.4 Butynol deck – Tile interface

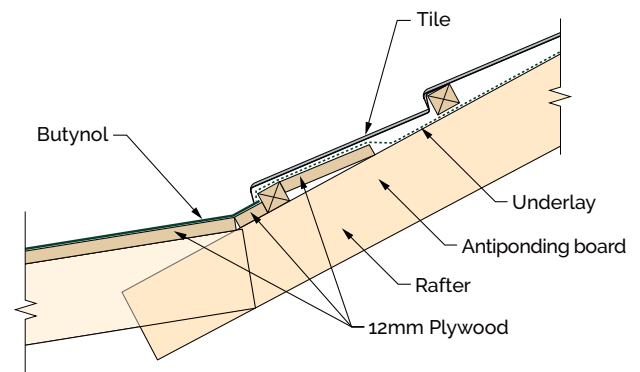


Figure 12.4.1

## 12.0 Unusual situations & circumstances

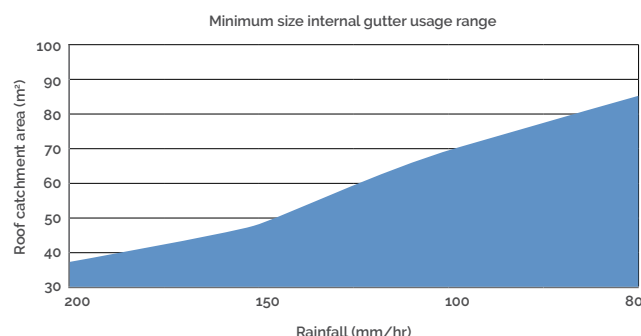
### 12.5 Over length mono-pitched roof

If a mono-pitch roof exceeds 12 m at its minimum roof pitch, the roof pitch should be increased by 1° per additional 0.5 m.

### 12.6 Internal gutters

Only either 5000 series aluminium to AS/NZS 1734 temper O, with a minimum thickness of 1.2 mm and a minimum fall of 1: 200, or butyl rubber, with a minimum thickness of 1.0 mm, should be used to form internal gutter.

The minimum size internal gutter suits for the roof catchment area as in **Graph 12.6**.

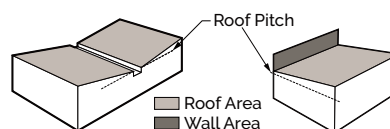
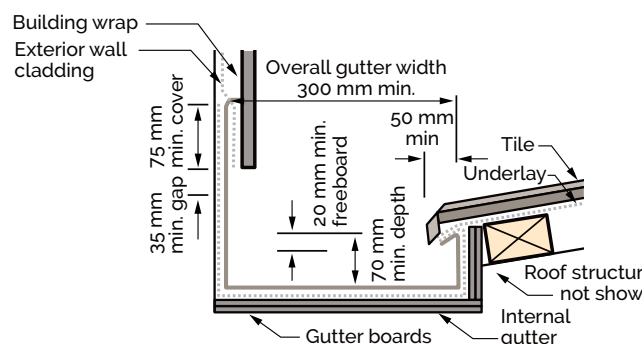
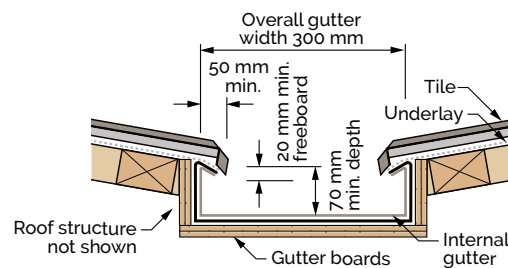


**Graph 12.6**


Bigger internal gutter should be used for larger roof area. A freeboard allowance of 20 mm should be added to the net capacity calculation to increase the maximum depth of flow in the gutter.

Angled internal gutter for the back wall should be installed using the details shown in **Figure 12.6.2**.

The same principles of installation apply to the back flashing/gutter of dormers. The capacity calculations of angled internal gutters are more complicated than those of box internal gutters (**Figure 12.6.1**). The roof pitch has to be taken into account.



**Figure 12.6.1**

Vertical wall/s adjacent to roof slope		
Factor	Pitches	
1.1	10°-25°	+ 0.5 x 
1.2	25°-35°	
1.3	35°-45°	
1.4	45°-55°	
1.5	55°-65°	

Catchment area =  x

Sloped roofs only	
Factor	Pitches
1.1	10°-25°
1.2	25°-35°
1.3	35°-45°
1.4	45°-55°
1.5	55°-65°

Catchment area =  x



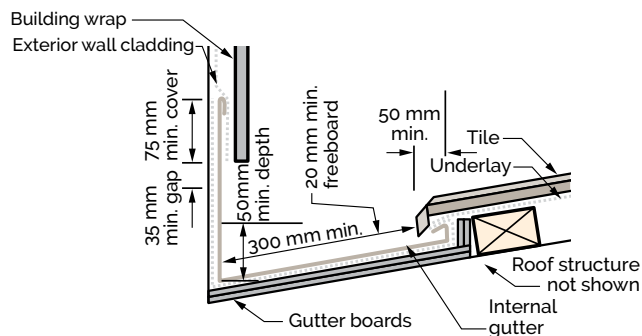


Figure 12.6.2

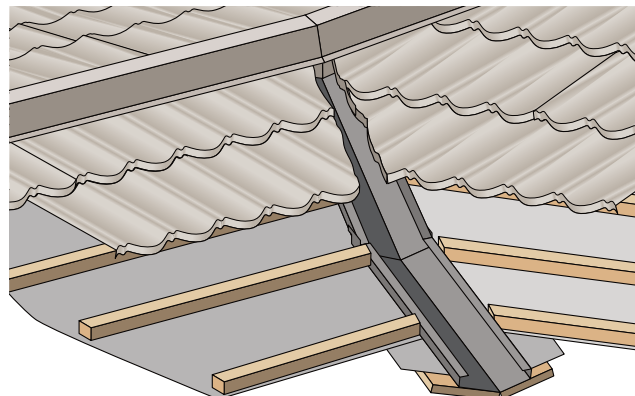


Figure 12.7.1.2 Valley installation

## 12.7 Change in pitch

### 12.7.1 High pitch to low pitch

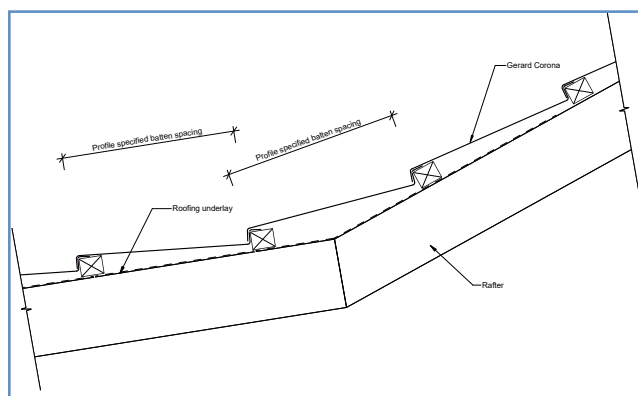
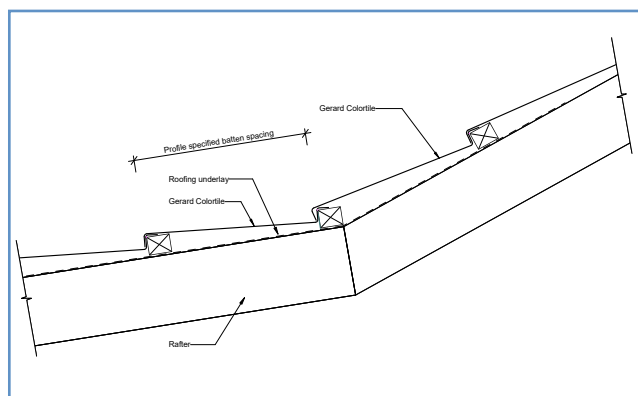


Figure 12.7.1.1 High pitch to low pitch

Gerard Roofs recommends sealant Silaflex MS for general use with our products. However, this product requires slightly higher application temperature (5°C), and resists only up to 70°C (darker roofing material may reach temperature up to 80°C in direct sunlight in the height of summer). Where operating temperature may be an issue, it may be preferable to use the Soudal MS Fix All 220. Sealant must always be used in conjunction with mechanical fastening and be applied between the two sheets to be lapped before they are fixed together.

The excess sealant extruded from the lap must be removed. Rivets should be at 50 mm centres.

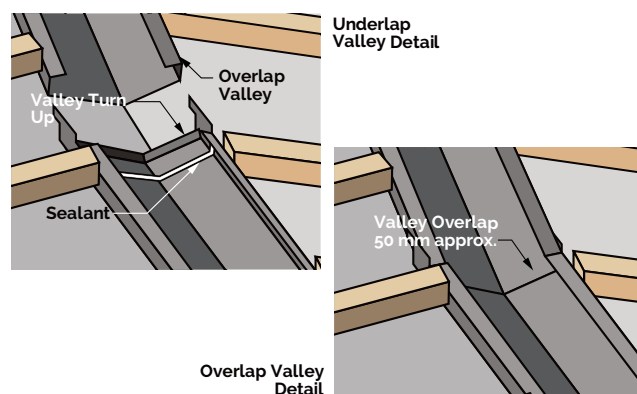


Figure 12.7.1.3 Low pitch to high pitch

## 12.0 Unusual situations & circumstances

### 12.7.2 Low pitch to high pitch

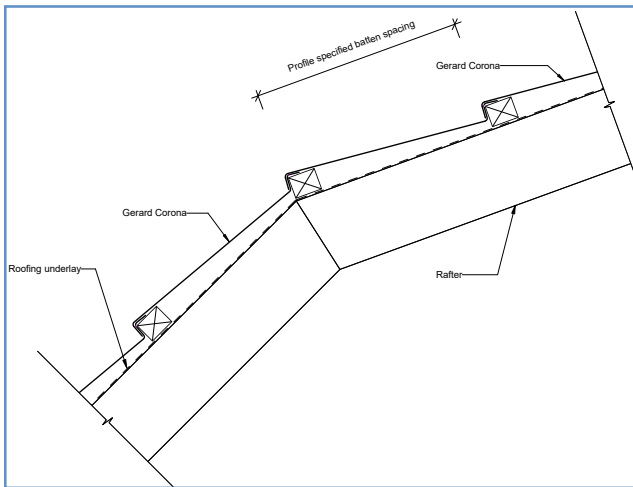


Figure 12.7.2.1 Low pitch to high pitch



## 13.0 Re-roofing

The worry-proof roof.

**Page 516 of 734**

## 13.0 Re-roofing

### Assessment of existing corrugated steel roof

This must be carried out by the sales representative who visits the roof and uses the re-roof check sheet supplied by Gerard Roofs.

The use of **direct overlay or counter** batten method requires the corrugated steel to be in a reasonable condition.

### Repairs to corrugated steel

Areas where corrosion has been found may be covered using sound (good condition) corrugated steel. The covering steel must be fixed to the roof purlins in the same way as the rest of the roof or to the roof purlins with the tek screws supplied for fastening the tiles.

## 13.1 Metal roof overlay with counter battens

The use of this method is not suitable for concrete or clay tiles and requires the roof to be in a reasonable condition.

### 13.1.1 Set out

#### Fascia

Existing roof cladding must be cut back inside fascia and preferably removed to behind the bottom eave batten.

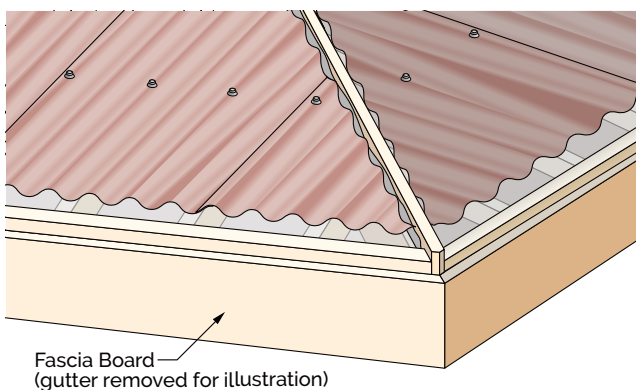


Figure 13.1.1.1

A tile batten should be installed immediately behind the fascia as a fixing point for the eaves course of tiles. In some cases the fascia board may need raising. Install the second tile batten 330 mm\* up from the outside of the fascia board.

*\* In the event that the top course tile is too short or the rain water collection system conflicts with the tile nose, this dimension may be changed within -40 mm to +15 mm tolerance.*

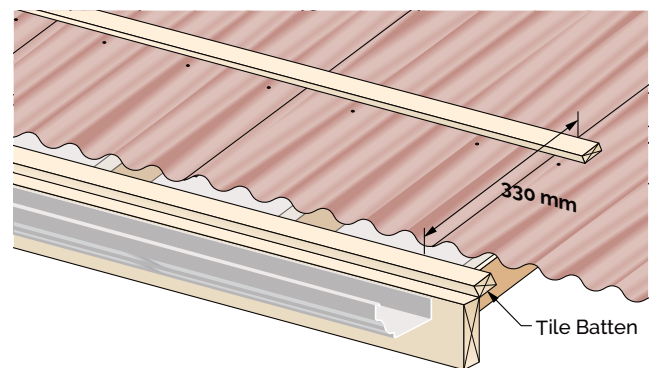


Figure 13.1.1.2

#### Counter battens

Counter battens are installed parallel (preferred directly above the rafter) to the rafter. They are usually the same size as the tile battens; 50 mm x 25 mm for most re-roofing applications. The maximum spacing for counter battens in various parts of the roof should be as set in **Table 13.1.1.2**.

Counter battens should be fixed in the troughs of the existing corrugated steel and nailed at every crossing of the purlins with suitable nails e.g. two 90 mm gun nails.

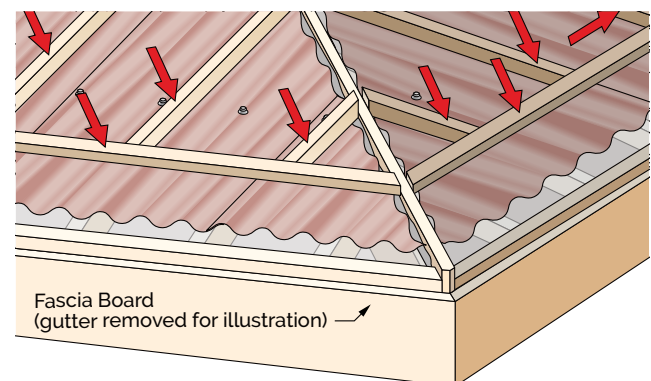


Figure 13.1.1.2.1

Wind areas	Spacing of purlins (mm)			
	≤750	750-900	≤750	300-900
	General roof area (no edge)		Roof edge zone within 1.2 m of eave, ridge, gable or hip	
Low & med	600	600	600	600
High	600	600	300	300
Very high	600	450	300	300
Extra high	Replace roof. Ensure correct batten rafter connections are used.			

Table 13.1.1.2 Spacing of 50 x 25 mm counter battens

Note: Additional short counter battens are required round edge zones between the normal counter battens to provide additional batten nailing points in high wind areas. Use batten fasteners outlined in Tables 4.3.1 and 4.3.2.

### Tile battens

Fix tile battens to counter battens at each crossing.

Batten set out will be as for a new roof  
(Refer 4.0 Batten installation).

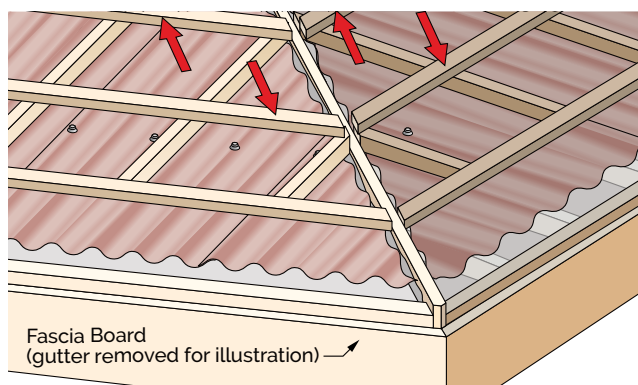


Figure 13.1.1.3.1

### Ridge/hip

Remove all existing ridge and hip caps starting a waste pile on the ground.

Roll out underlay on hips and ridges. This is optional to protect the structure during installation.

Hip and ridge boards/battens should be built

up at least 50 mm above the tile batten height (approximately 100 mm above existing roof) as in new roofing.

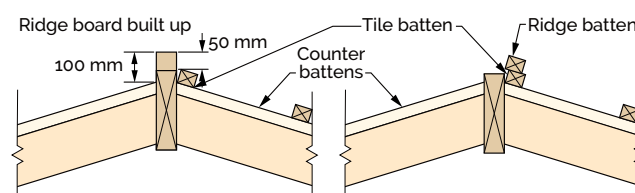


Figure 13.1.1.4.1 Ridge board/battens

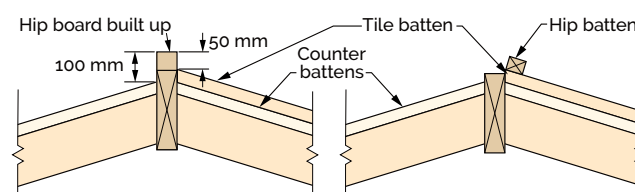


Figure 13.1.1.4.2 Hip board/battens

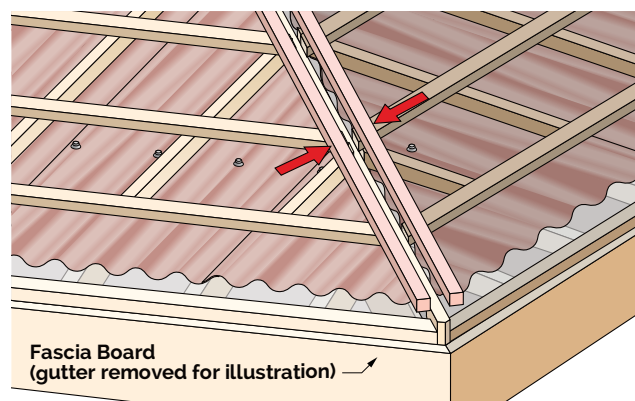


Figure 13.1.1.4.3 Hip battens installed above the tile battens

### Valleys

Where the steel has been cut back to behind the bottom eave batten (Figure 13.1.1.1.1) then it should also be cut back to the valley batten for the first 750 mm measured up from the fascia.

Valley support battens approx 50 mm x 25 mm are laid over the existing roof and held by 90 mm x 3.15 mm nails into the old battens or sheathing. The spacing between the two support battens depends on the valley accessories to be used.

Replacement valleys are placed between the valley support battens and held securely.

## 13.0 Re-roofing

**Note:** Capacity of valleys will depend on prevailing environmental conditions and roof size. Refer

### 9.1 Valleys & wall flashings.

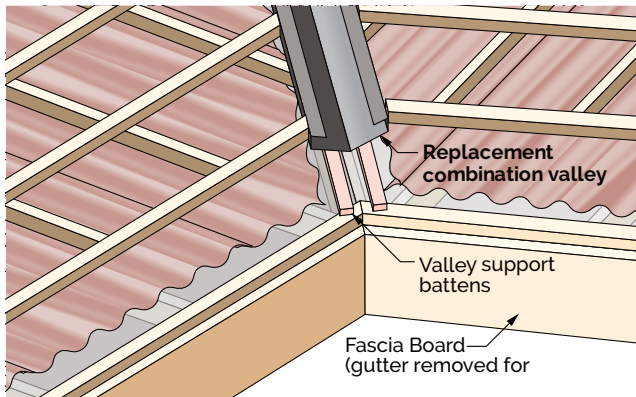


Figure 13.1.1.5.1

### 13.1.2 Tile and accessory installation

Roll out underlay on eaves where the steel has been cut back.

Tile and accessories will be laid and fitted as for a new roof (Refer **6.0 Cutting & installing the roof, 7.0 Product specific installation & 8.0 Installing hips, ridges & gables**). All roof flashing should be renewed except those in good order and of sufficient height to be re-used.

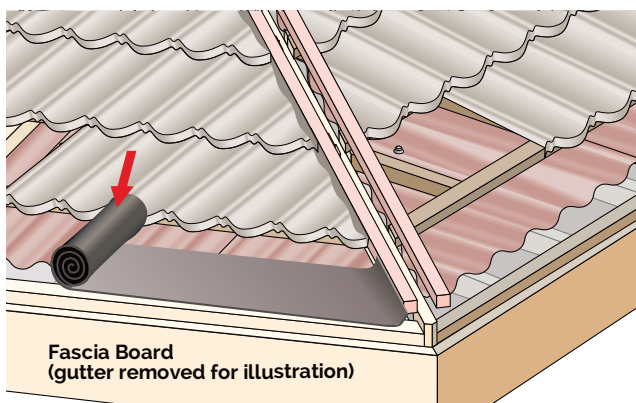


Figure 13.1.2.1

## 13.2 Direct overlay method

The use of this method requires the longrun or the corrugated steel roof to be in a reasonable condition.

This method, originally conceived for re-roofing using Senator, should also be suitable for Corona and Rockport.

This method is not suitable for extra high wind zones. Replace existing roof with new if roof is located in an extra high wind zone.

### 13.2.1 Preparation

#### Renailing existing roof

Remove lead head nails and renail the original roof to the battens close to the troughs in the corrugations with 90 mm nails, ensure the nail heads do not pierce the steel by using the correct settings if a nail gun is used. Nails are to be located every second corrugation. Install at least the same number as nails removed. Always nail where sheets of corrugated steel overlap.

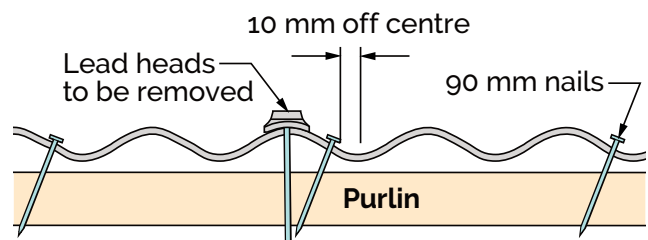


Figure 13.2.1.1

### 13.2.2 Set-out

#### Barge

Remove the existing barge covers.

Install a 50 x 40 mm batten up the gable spaced to suit accessory. Fasten with 90 mm nails at 600 mm centres to the rafter under the steel.



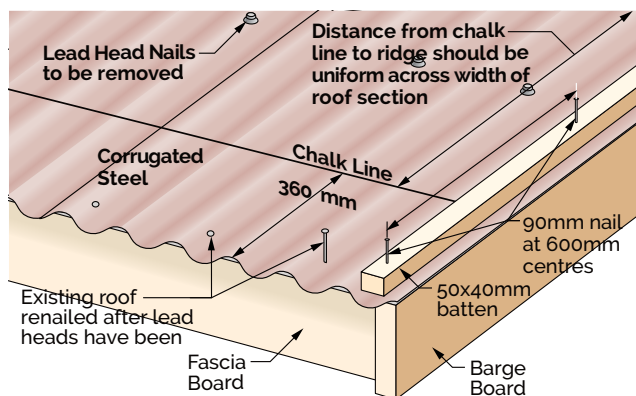


Figure 13.2.2.1.1

### Hip

Remove the existing hip.

Identify where the battens attach to the hip rafter.

Attach 50 x 40 mm batten(s) to the battens and/or the hip rafter with 90 mm nails at the required spacing for the selected accessories.

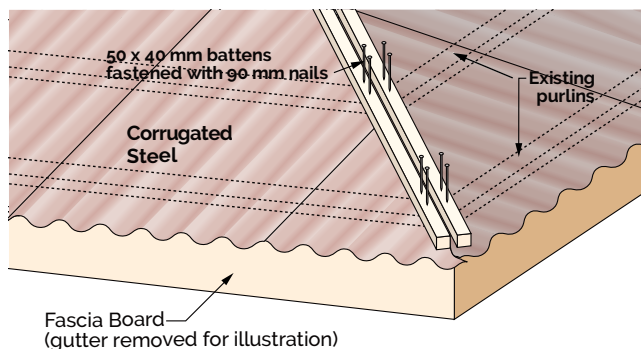


Figure 13.2.2.2.1

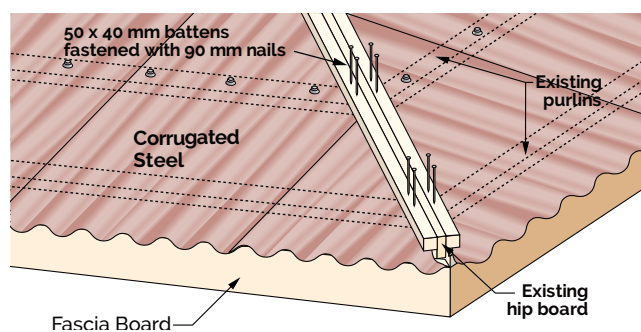


Figure 13.2.2.2.2

### Ridge

Remove existing ridge capping.

Identify where the top purlin is located under the existing roof.

Produce (if required, see below) profiled counter battens long enough to span the distance from the top purlin to the peak of the ridge.

Install the profiled counter battens at a minimum of 600 mm centres using 2 x 90 mm nails to attach them to the purlins.

Install 50 x 40 mm batten(s) along the ridge line. If two battens are installed, set them to the width required for the accessory to be used.

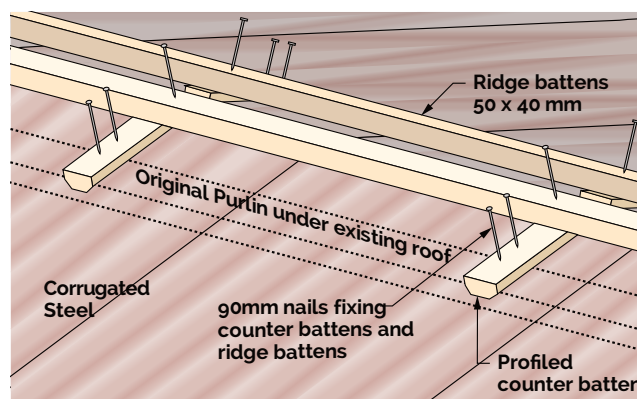


Figure 13.2.2.3.1

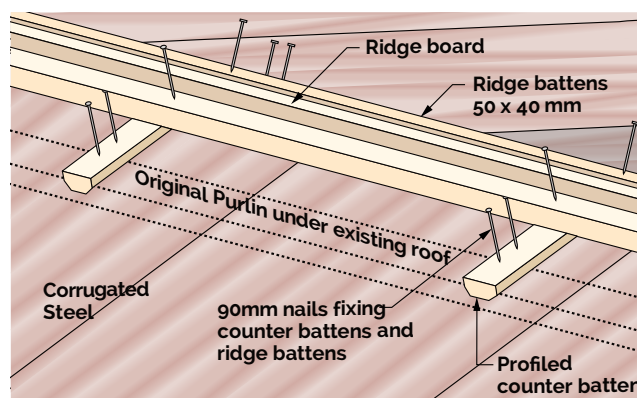


Figure 13.2.2.3.2

## 13.0 Re-roofing

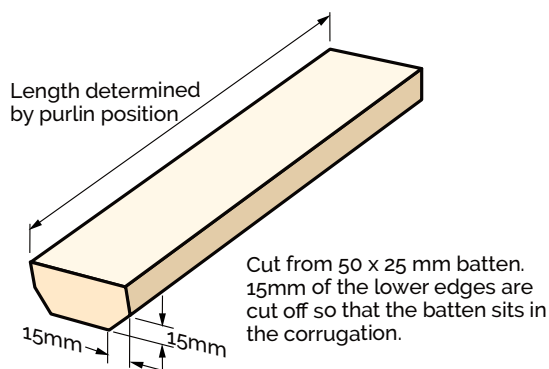


Figure 13.2.2.3.3 Profiled counter batten

### Valley

Valleys may be installed over the existing valley if the original is in good condition. Valleys with any signs of red rust should be removed.

If required, cut back the corrugated steel along the valley line so that a combination valley can be inserted over the existing valley. Insert the valley and fix it in place (with a nail bent over the edge) without penetrating the valley.

Modify the valley end if required (see **Figure 13.2.2.4.1** and **13.2.2.4.2**).

At the top of any valley it must be turned up as high as possible to eliminate any wind blown rain getting into the roof cavity.

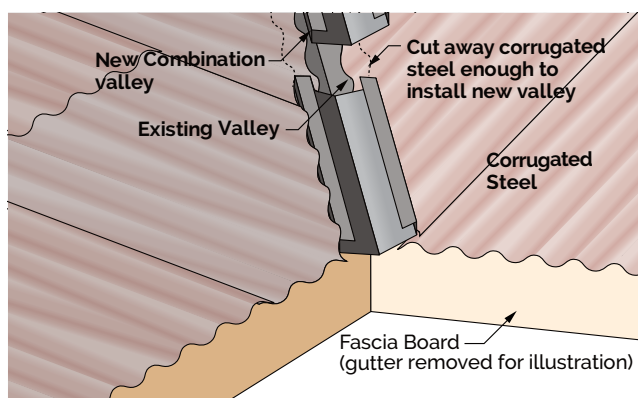


Figure 13.2.2.4.1

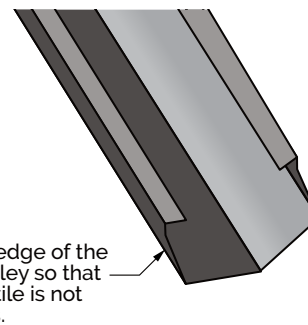


Figure 13.2.2.4.2

### 13.2.3 Tile and accessory installation

Screw fasteners supplied by Gerard Roofs should be used to fasten tiles to the corrugated steel that is structurally sound.

Mark using chalk, a line 360 mm up from the eaves of roof. Measure from the ridge down to ensure that the distance from the ridge is constant across the roof. If the eaves line is not parallel with the ridge line, make adjustments to the chalk line. Allow a minimum of 5 mm over-hang of the tile over the edge of the corrugated steel.

The back upturns of the eave tiles are aligned along the chalk line. The eaves tiles are then fastened along the back. Fasteners at the eaves are located approximately 50 mm up from the front nose. It is also important to place the fastener on a high point of the surface and NOT into the drainage channel that is over-lapped. Subsequent courses of tiles are held in place with fasteners through the nose and back upstand of the tile. Ensure that the noses of the tiles are hard against the back upstand before fastening to the corrugated steel.

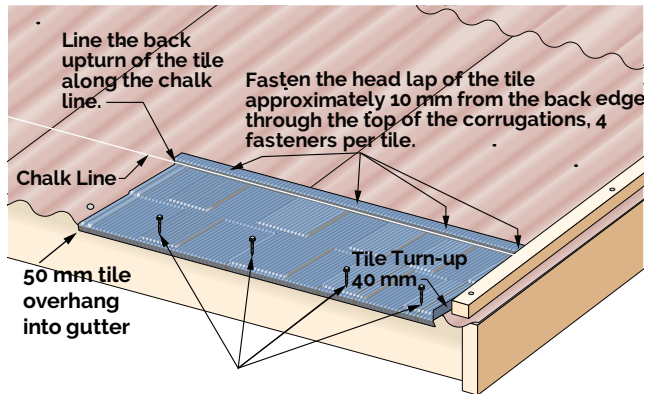


Figure 13.2.3.1

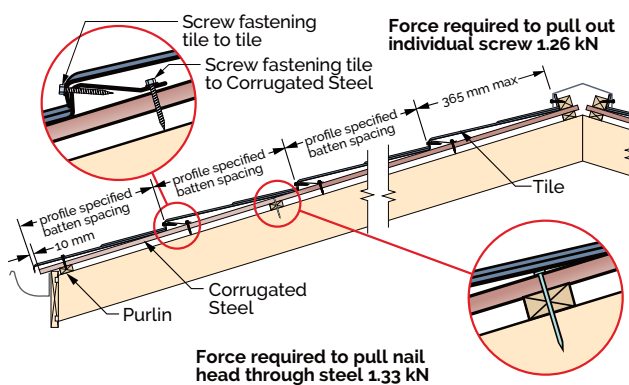


Figure 13.2.3.2

Tiles are fastened with 4 screws evenly spaced along the head lap. Care should be taken to ensure that the fasteners are located at the top of the corrugations of the underlying steel. This can be achieved by locating corrugation with the fingers under the nose of the tile or by noting the corrugation up the roof above the head lap of the tile. Fasteners should be installed where the corrugated steel overlaps, this results in the fastener penetrating 2 sheets of steel which provides greater pullout strength.

The fronts of the tiles are held in place with 4 horizontally installed fasteners. Care needs to be taken to ensure that the screws do not ride over the back of the head lap of the tiles.

Fasteners must not be installed in the drain channel at the side lap of tiles.

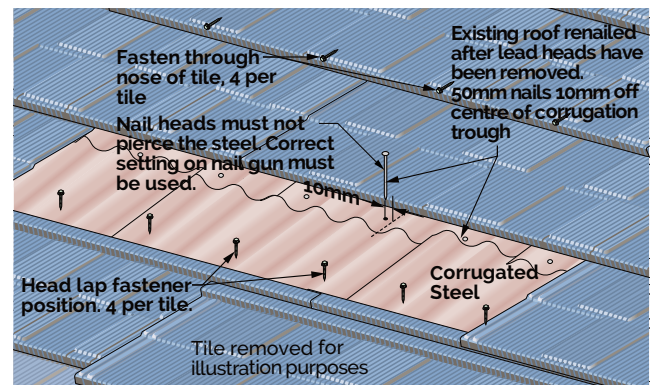


Figure 13.2.3.3

Tile and accessories will be laid and fitted as for a new roof (Refer 6.0 Cutting & installing the roof, 7.0 Product specific installation & 8.0 Installing hips, ridges & gables). All roof flashings should be renewed except those in good order and of sufficient height to be re-used.

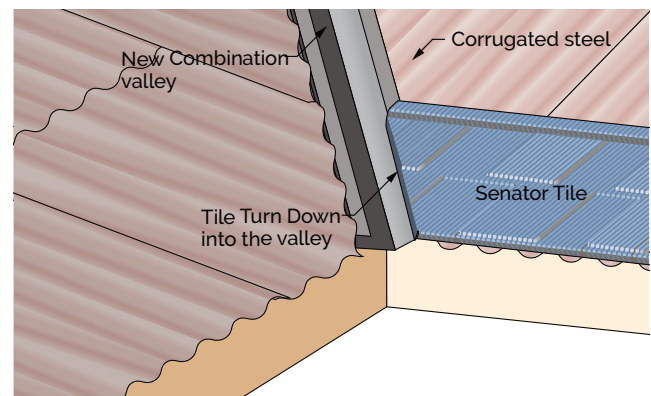


Figure 13.2.3.4 Valley detail

## 13.0 Re-roofing

### 13.3 Full roof strip and replacement

Prior to beginning re-roof work, evaluate whether a test for traces of asbestos is appropriate.

Remove old roofing material (steel, shakes, shingle, pressed metal tile, concrete or clay tiles, etc). Lift nails, flashings and battens. Follow with a thorough examination of the roof structure for decay and damage. Replace all unsound or suspect timber.

Hip and ridge boards must be built up to extend at least 50 mm above tile batten height as in new roofing.

Any fascia repairs or replacement must be completed before re-roofing commences.

All old valley trays should be replaced.

Batten set out, tile and accessory laying proceeds as for new roof (Refer **4.0 Batten installation**, **5.0 Roofing underlays**, **6.0 Cutting & installing the roof**, **7.0 Product specific installation** & **8.0 Installing hips, ridges & gables**).





## 14.0 Roof installation on steel battens

The worry-proof roof.

**Page 524 of 734**

## 14.0 Roof installation on steel battens

### 14.1 Batten setting out

Battens set out should proceed in a similar manner as for houses with wooden framing.

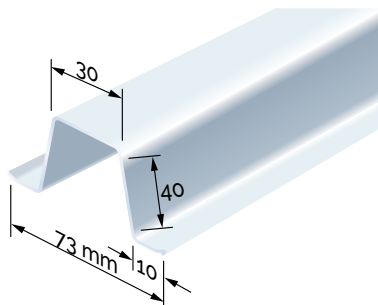


Figure 14.1.1 Steel batten

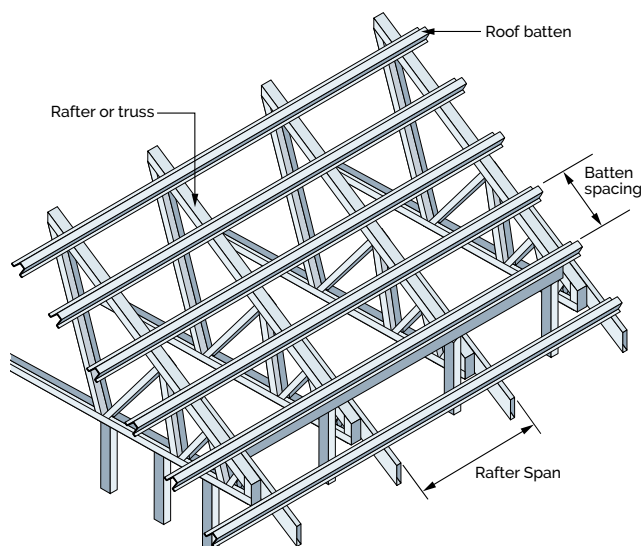
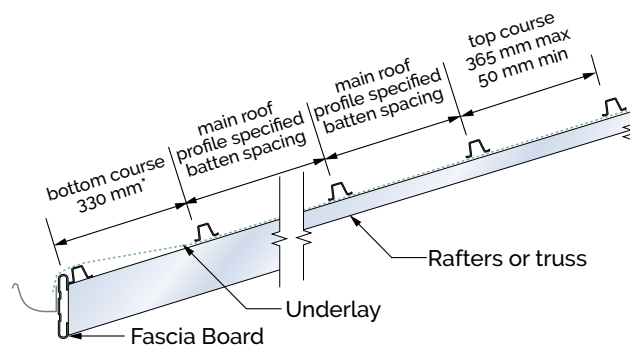


Figure 14.1.2 Steel framing

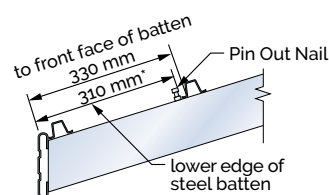
Steel battens are supplied by the steel frame supplier. These will be engineered to span up to 1200 mm however they may be used at narrower spacings.

**Battens must be secured every second rafter with at least one tek screw before walking on them during the installation process.** Once the section of roof has been covered with battens and underlay the battens must be fastened with the acceptable method as outlined in **section 14.3** before moving on to other sections or laying tiles.



\* Variable depending on the type of rainwater collection system used

Figure 14.1.3 Rafter truss end on view, batten spacing



\* Variable depending on the type of rainwater collection system used

Figure 14.1.4 Eave and first batten location/spacing

### 14.2 Installing battens and roofing underlay

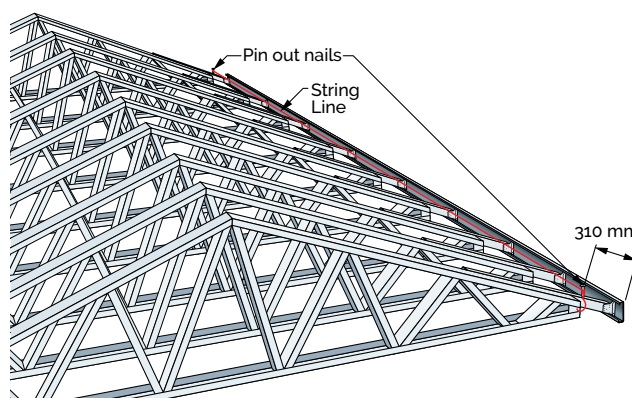


Figure 14.2.1 Batten pin-out

Mark/set out and fixing of the battens should be done sequentially throughout the batten installation process. The first batten is to be fixed behind fascia.

Pin-out the second row to the recommended spacing to ensure that the eave tile is far enough into the gutter (40 mm). Then place the batten on the pin-out



nail/screw, this will be used to support the first run of roofing underlay as rolled out across the roof.

The roofing underlay can then be rolled out placing a magnet strip on every second rafter to hold the roofing underlay in place.

### 14.2.1 Install a RU Eave Flashing

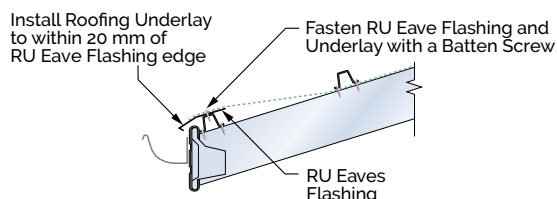


Figure 14.2.1.1

The RU Eave Flashing supports the roofing underlay at the edge and reduces or eliminates underlay vibration that can occur in high winds.

Lay the roofing underlay to within 20 mm of the edge of the RU Eave Flashing, the RU Eave Flashing overhangs the gutter by approximately 40 mm and the underlay is pinned by the batten screws so that any condensation will run into the gutter should it occur.

Minimum overlap of a lower section of under lap is 75 mm.

### 14.2.2 Underlay installation

**Do not** get on to the roof or top plate to roll out the roofing underlay, this is to be done from the working platform (Figure 14.2.2.1).

Once the roofing underlay is in place lift the second batten out from under the roofing underlay and fasten it in place against the pin-out nail/screw (Figure 14.2.2.2).

Roll out roofing underlay from the platform.

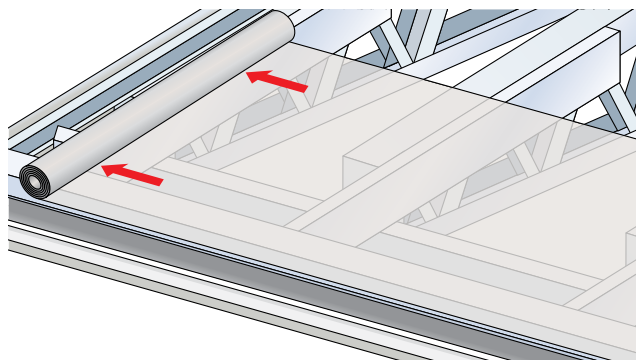


Figure 14.2.2.1

Fasten the second batten.

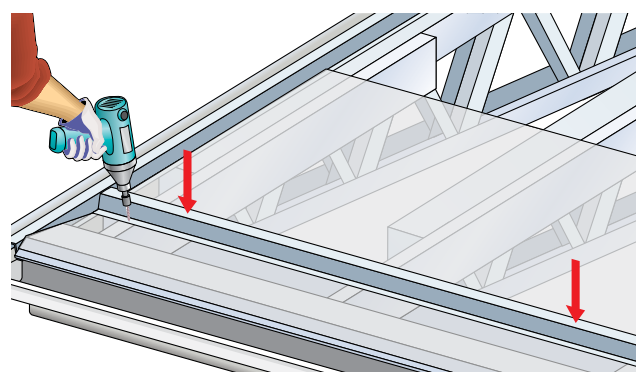


Figure 14.2.2.2

Space battens using batten spacers.

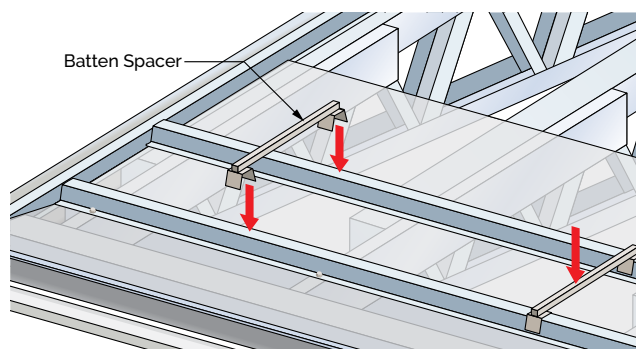


Figure 14.2.2.3

## 14.0 Roof installation on steel battens

Fasten only the bottom/lower edge of the batten at the top edge of the roofing underlay.

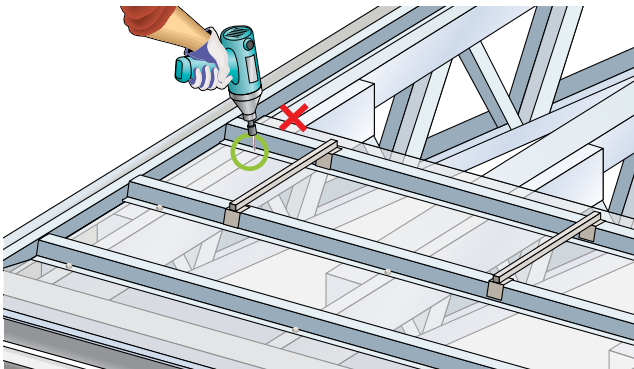


Figure 14.2.2.4

The batten at the top of the roofing underlay is to be screwed at the bottom only so it can be tilted up to enable the lap of the next run of roofing underlay to slide underneath. (Figure 14.2.2.4)

Place the next batten with the batten spacer off the top batten to support the next run of paper as in Figure 14.2.2.5.

Place supporting batten for second run of roofing underlay then roll out roofing underlay.

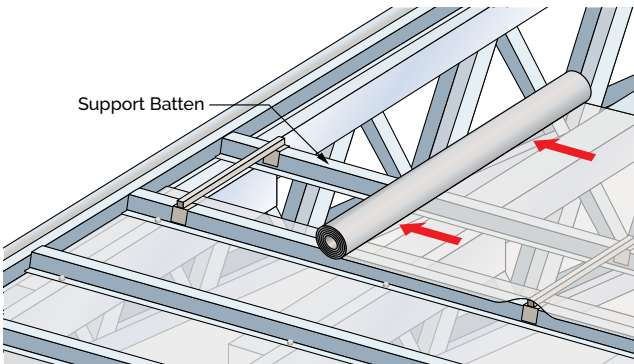


Figure 14.2.2.5

Roll out the next run of roofing underlay along the battens placing a magnet strip every second rafter.

Do not reach over open rafters to attach fixings to top of paper to hold in place.

Once the roofing underlay has been rolled out remove the batten spacer (Figure 14.2.2.6) allowing

the batten under the roofing underlay to slide down. Place the batten on top of the roofing underlay using the batten spacer to locate it (Figure 14.2.2.7), fasten this batten. The lower edge of the roofing underlay is then tucked under the top edge of the batten below. (Figure 14.2.2.8 & Figure 14.2.2.9)

Remove batten spacer and remove batten from under the roofing underlay.

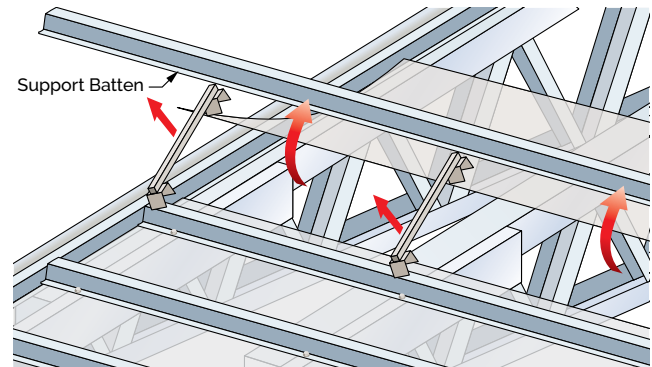


Figure 14.2.2.6

Place batten on top of the roofing underlay and fasten it in place.

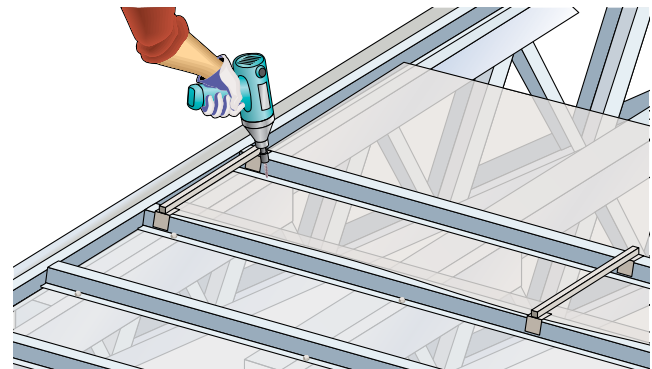


Figure 14.2.2.7

Tuck the roofing underlay under the top most batten of the rolled out underlay below.

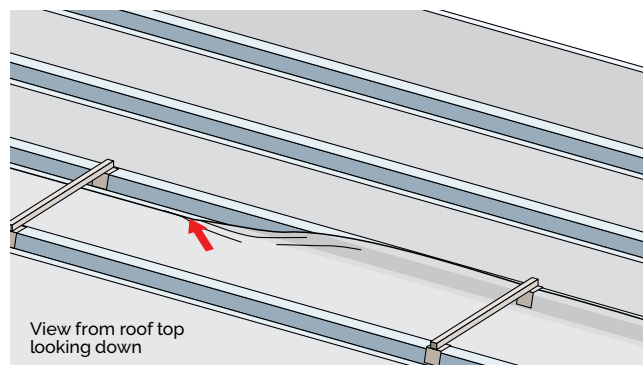


Figure 14.2.2.8

Tuck the underlay under the batten, then fasten the top edge of the batten.

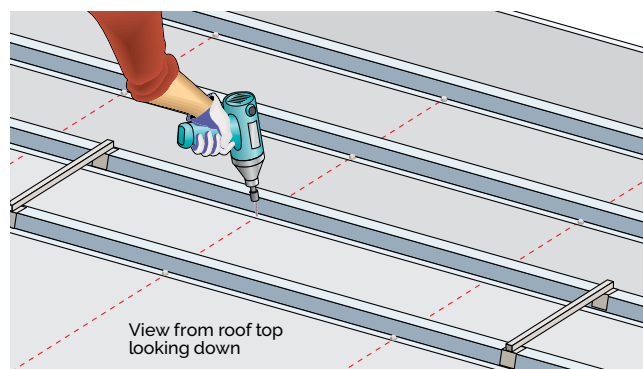
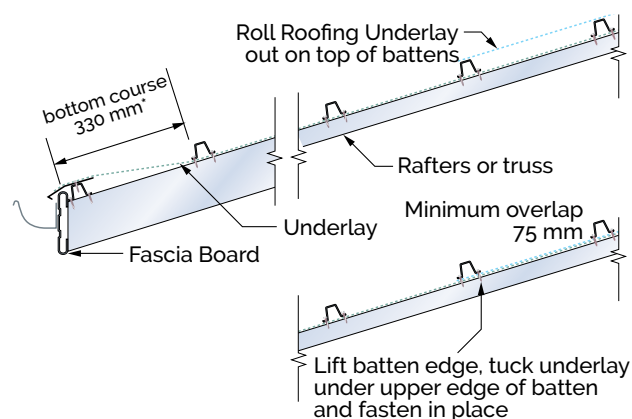


Figure 14.2.2.9



\* Variable depending on the type of rainwater collection system used

Figure 14.2.2.10 Installation and overlap of roofing underlay

## 14.3 Batten fastening

Batten joints are to be cut to length so that they lap together on top of a rafter.

Fasten through the batten into the rafter using the approved fastening technique of:

2 x 16 mm 10 gauge drill point screws or 2 x 12 gauge tile fasteners one each side of the batten.

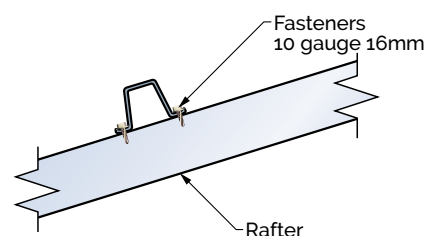


Figure 14.3.1

## 14.0 Roof installation on steel battens

### 14.4 Accessory batten installation

#### 14.4.1 Ridge installation

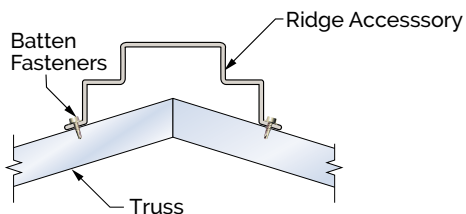


Figure 14.4.1.1 Ridge batten installation

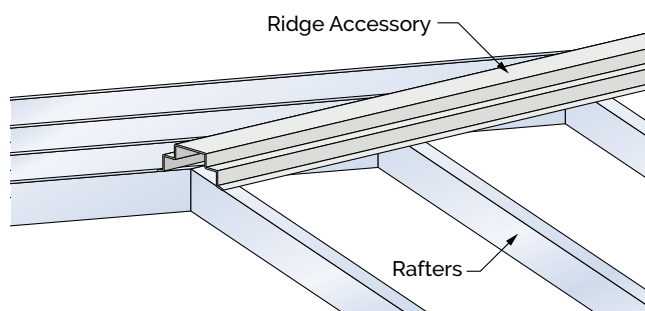


Figure 14.4.1.2

#### 14.4.2 Hip installation

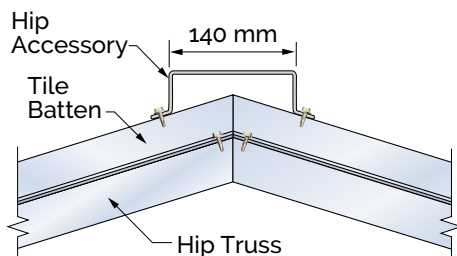


Figure 14.4.2.1 Hip batten installation

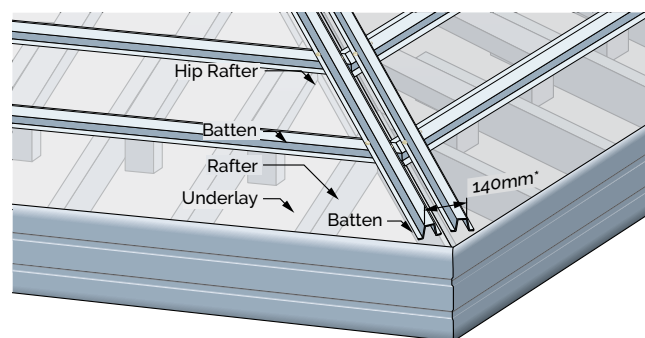


Figure 14.4.2.3 Hip batten installation alternative

#### 14.4.3 Ridge hip accessory junction

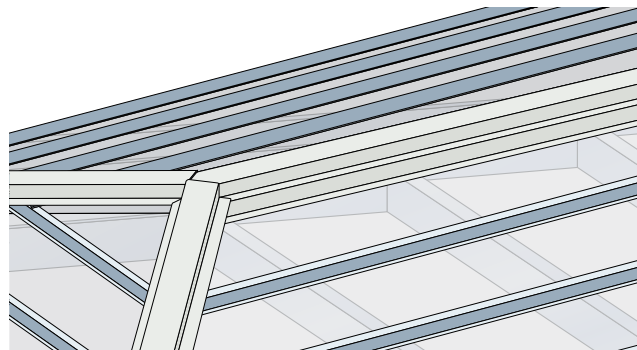


Figure 14.4.3.1

#### 14.4.4 Gable installation

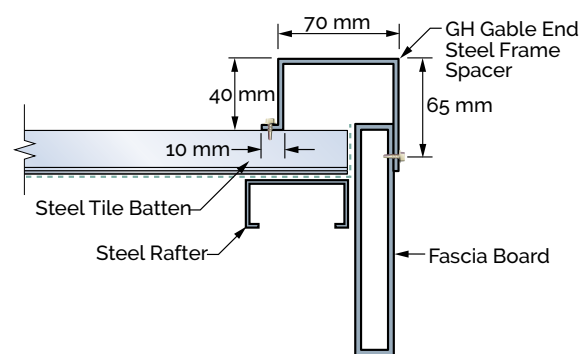


Figure 14.4.4.1 Gable batten installation Angle trim with steel frame gable end spacer

Locate gable and batten as close to the edge of the batten. Fasten trim to fascia and over turned up tile.

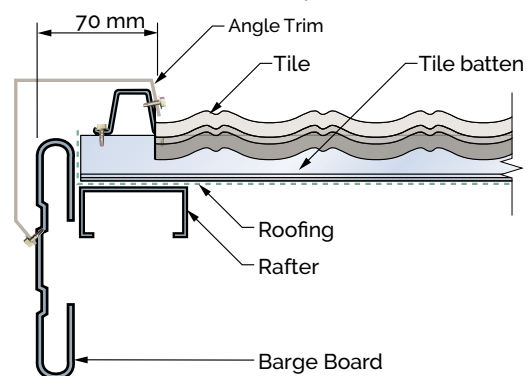


Figure 14.4.4.2 Gable batten installation Angle trim

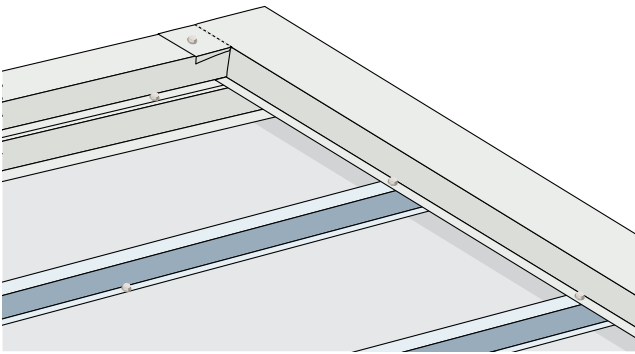


Figure 14.4.4.3

## 14.5 Valley batten installation

Steel valley boards should be installed by the builder prior to the roof fixers starting batten installation.

Roofing underlay is to be installed over the valley boards and under the tile battens.

Valleys may be held in place by clipping the top section of the valley and fastening it to the valley board. Valleys should be overlapped a minimum of 150 mm.

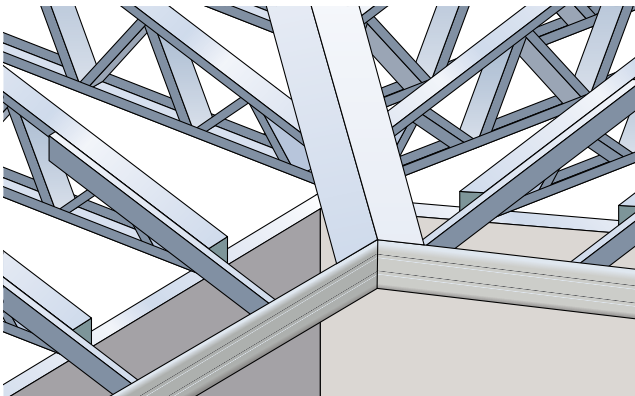


Figure 14.5.1 Two steel pieces riveted together

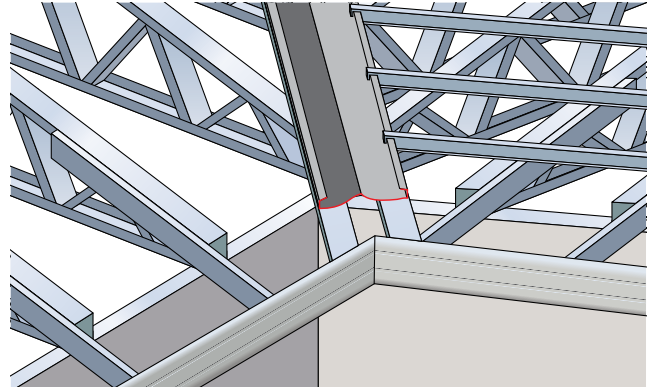


Figure 14.5.2 Two 'C' section steels

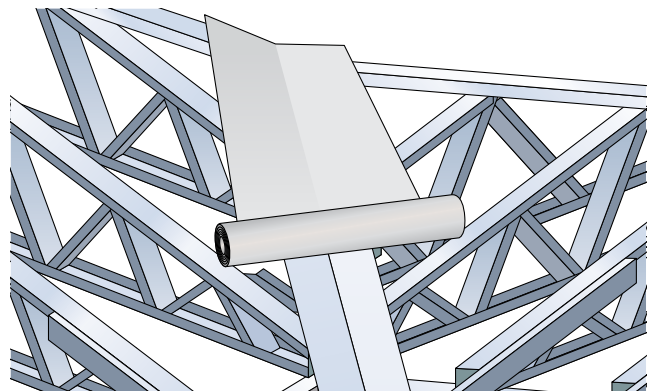


Figure 14.5.3 Installing the underlay from the top valley, note approach is from a fully battened section of roof

## 14.6 Tile installation over steel battens

### 14.6.1 General

Safety signs and edge protection, if required, should be in place before installation starts.

### 14.6.2 Preparatory work

Underlay, tile and accessory battens, wall flashings, valleys and fascia boards should be in place before laying tiles.



## 14.0 Roof installation on steel battens

### 14.6.3 Tile selection - colour coding

The roof installer should check that the tiles are of the correct colour and are in good condition. Gerard Roofs provides a colour code on each pallet (A - M).

Different colour coded tiles should NOT be installed on the same roof.

Tiles with surface defects should NOT be installed on the roof.

### 14.6.4 Walking on tiles

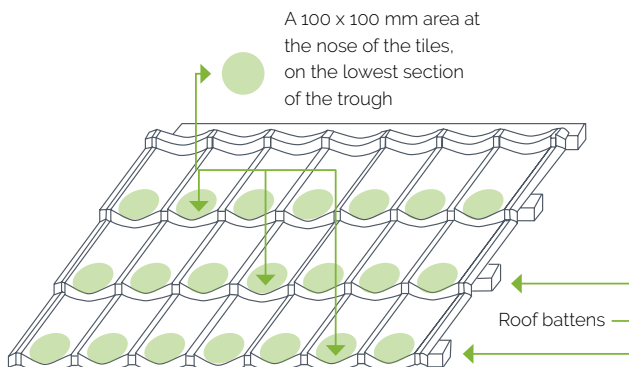
Soft soled shoes capable of providing secure footing should be worn. Extreme care is required when walking on wet tiles and this should be avoided if possible. Satin finish tiles can be very slippery and should NOT be worked on while wet.

The surface coating of the textured finish tiles may be damaged when they are wet, and damage increases as the pitch increases.

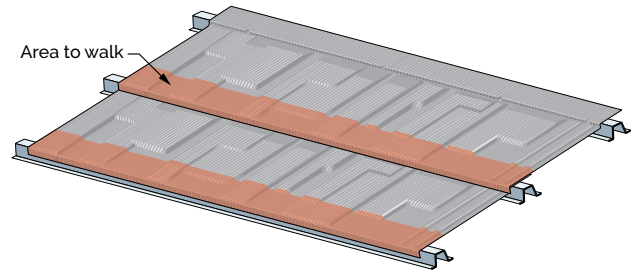
When walking on the tiles weight must be concentrated directly above the batten for Corona, Senator, Rockport, Oberon and Alpine and in the pan (lower section) of tiles above the batten.

Tile damage will occur if installer weight is applied to tile ridges or mid sections of Corona, Senator, Rockport, Oberon and Alpine.

#### For Colortile, Milano and Tuffcoat



#### For Corona, Senator, Rockport, Oberon and Alpine



### 14.6.5 Damaged tiles

Tiles damaged during installation should be removed and replaced.

### 14.6.6 Sub-trade damage

If substantial work is to be carried out above a section of roof, such as installation of walls, tiles should generally be installed after this work has been completed. Tiles may be installed prior however protection for the tiles and their surface coatings needs to be installed before the wall cladding is installed. This may involve drop sheets and/or a plywood covering. At this point it should be made clear to the building supervisor who is responsible for damaged tiles by sub-trades.

### 14.6.7 Work interruption

If work is interrupted for any reason, or at the end of a workday, all loose tiles, accessories and incomplete sections must be secured against possible movement by wind.

Tile and accessories must be left clean and dry and securely covered to protect against the weather.



### 14.6.8 Clean up

The building site should be left clean of any roofing materials. All batten and tile off cuts, nails and packaging must be removed from the site. The roof should be cleaned to remove any debris left by the installation process.

### 14.6.9 Sign off

Obtain sign off for the roof as soon as possible after completion of the clean up.

## 14.7 Tile laying

For Corona, Senator, Rockport, Oberon and Alpine tiles only, to prevent lines of tile joins showing down the roof make sure to random stagger the tiles (Refer to **7.0 Product-specific installation** for each tile profile laying pattern).

All tiles interlock. Depending on the tile profile they may be interlocked in both directions or only in one direction (Refer to **7.0 Product-specific installation** for each tile profile laying pattern).

Lay tile laps facing away from prevailing winds. Where possible the tiles should be laid with the laps facing away from the line of normal sight.

### 14.7.1 Laying tiles

Tiles are installed from the top of the roof to the eave. Install the second to top course tiles (usually the first full width tile), hold them in place by fastening through the flat of the back edge of the tile which sits on the batten (Step **1** in **Figure 14.7.1.1**). Lower courses of tiles may then be laid without having to fasten each tile.

Subsequent tiles are laid by lifting both tiles in the course above and sliding the next course under the nose of the tiles already in place (Steps **2** and **3** in **Figure 14.7.1.1**). Tiles should be staggered so that side laps do not line up down the roof.

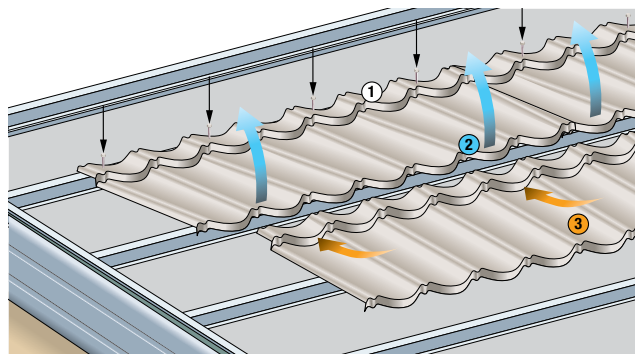


Figure 14.7.1.1

On lower pitched roofs all full tiles can be laid to cover the entire area without fastening. On higher pitch roofs, over 30°, tiles should be fastened two courses above the tiles being laid.

All tiles should be fastened in place before leaving the job site for any reason.

### 14.7.2 Tile fastening

Tiles in the body of the roof are fastened using 4 tile fasteners per tile (spacing 420 mm approx.) through the front downturn (tile nose) so that the fastener penetrates the front face of the steel tile batten (see **Figures 14.7.2.1 & 14.7.2.2**). Fasteners need to be placed 60 mm from the lowest section of a pan on tiles and not in the hidden water channels on Corona, Senator, Rockport, Oberon and Alpine tiles.

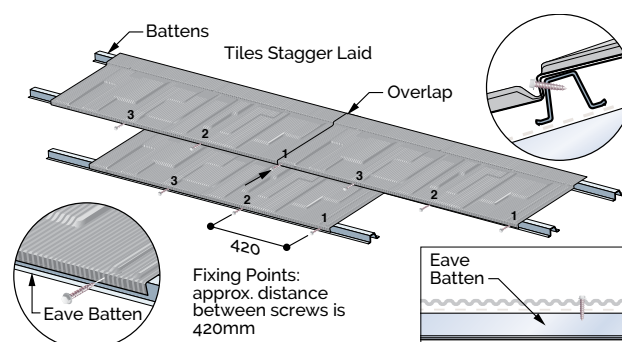


Figure 14.7.2.1

## 14.0 Roof installation on steel battens

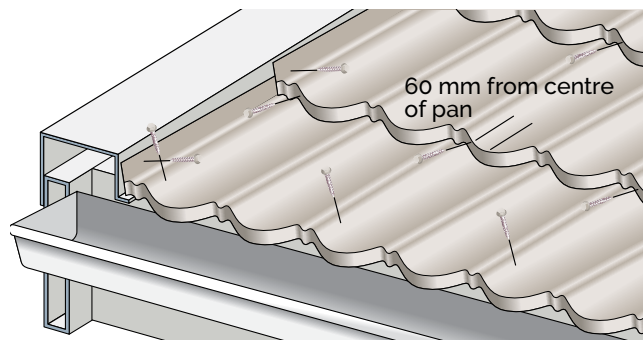


Figure 14.7.2.2

Fasteners should be installed a minimum of 10 mm from the edge of the nose or half the width of the nose.

Eave tiles are fastened through the tops of the tiles using 4 fasteners, not in the pans or water channels.

To ensure weather proofing - satin finish (painted) tile requires a rubber washer under the head of the eave fastener.

### 14.7.3 Fastening technique

The person fastening the tiles should stand on the tiles below, push down on the tile just above the location to be fastened. Push on the drill to drive the fastener into the nose and through the steel batten.

Clean any swarf that may fall on to the tile surface.



Figure 14.7.3.1

### 14.7.4 Gable roof

Tiles are turned up against the gable end accessory batten a minimum of 40 mm.

The end of the first tile is bent up 40 mm, this tile is then positioned against the accessory batten and second to top course tile batten, full tiles are then laid the length of the gable.

Starting from the course already laid; lay the tiles two courses at a time end to end. The tile laps must be staggered down the roof. The staggered laying will result in gaps at either end of the gable. Tiles need to be measured, cut and bent to suit. When laying these cut and bent tiles make sure that the laps are laid the same way as the rest of the roof.

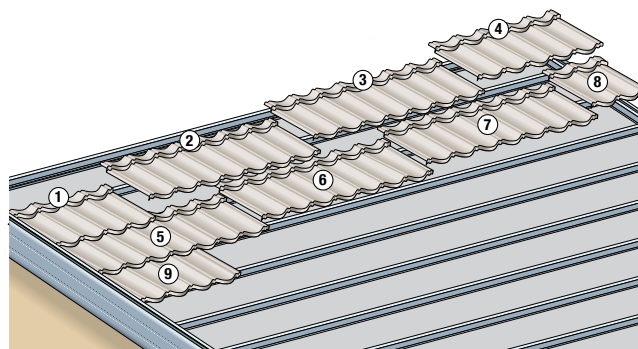


Figure 14.7.4.1 Stagger the tile laps down the roof, using part tiles at the gable end

#### Measuring, cutting and bending gable end tiles

Measurements for cutting and bending tiles are taken on the roof. The measurements are then transferred on to tiles on the ground where they are **cut**, **bent** and **stacked** in order.

**For Colortile, Tuffcoat and Milano:** the measurement is taken from the centre of the water channel of the tile, along the front face of the tile batten on the roof to the inside of the gable end accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools – guillotine and bender**).

For Corona, Senator, Rockport, Oberon & Alpine: the measurement is taken from the edge of the side lap of the tile, along the front face of the tile batten on the roof to the inside of the gable end accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools – guillotine and bender**).

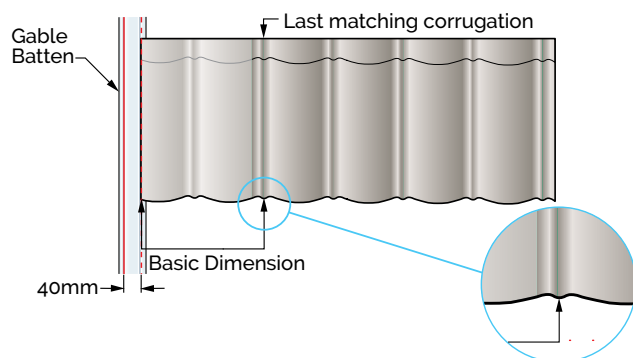


Figure 14.7.4.2 Gable end tile being cut then bent

If the gable is 90° then the bend can be made straight across the width of the tile. If it is an angled gable, treat the measurements the same way as a hip roof (Refer **14.7.5 Hip roof**).

Gable end, end tiles are installed from the eave up ensuring lapping is correct. Tiles are nailed in place through the front down turn and into the accessory batten through the turn up.

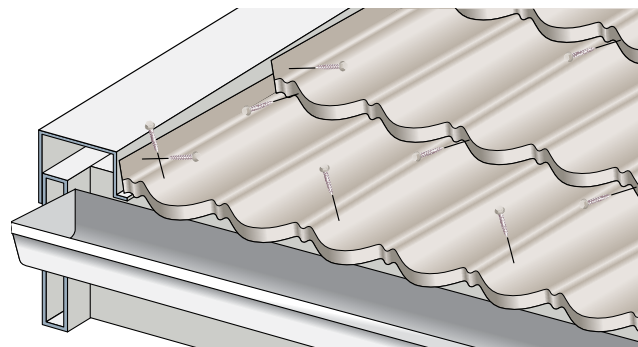


Figure 14.7.4.3 Fastener locations

Note the cut edge of a tile must be covered by accessories or other tiles on the roof to protect against weather.

### 14.7.5 Hip roof

Tiles are turned up against the hip accessory batten a minimum of 40 mm.

Lay the first full tile at the second to top course (if it doesn't fit, lay from the third to top course) so that the back of the tile is a minimum of 150 mm from the inside edge of the hip accessory batten (see **Figure 14.7.5.1**). This allows a full module to be used for the cut and bent hip tile.

Stagger and lay full tiles across the length of the roof until the last full tile. If the hip tile for the end section cannot be cut and bent out of a full tile it will be necessary to insert a part tile before the end of the hip. Colortile, Milano and Tuffcoat can be cut in modular length, Corona, Senator, Rockport, Oberon and Alpine have specific points where to cut (Refer to **7.0 Product-specific installation details** for each tile profile).

Lay the remaining full tiles down the roof leaving gaps at each end where hip tiles will need to be inserted.

## 14.0 Roof installation on steel battens

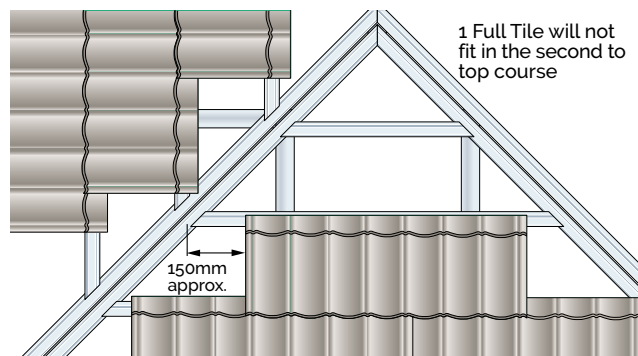


Figure 14.7.5.1 Laying tiles on a hip

### Measuring, cutting and bending hip tiles

Measurements for cutting and bending tiles are taken on the roof.

All measurements need to be taken along the front face of the batten as this is where the tiles are fastened. Tiles need to be marked along a line where the batten will eventually be positioned. Failure to follow this procedure will result in bends being incorrect on the modular tiles.

The measurements are then transferred on to tiles on the ground where they are **cut**, **bent** and **stacked** in order.

**For Colortile, Tuffcoat and Milano:** the measurement is taken from the centre of the water channel of the tile, along the front face of the tile batten on the roof to the inside of the hip accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to section 6.4 Use of Fixing tools – guillotine and benders).

**For Corona, Senator, Rockport, Oberon and Alpine:** the measurement is taken from the edge of the side lap of the tile, along the front face of the tile batten on the roof to the inside of the hip accessory batten, this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to section 6.4 Use of Fixing tools – guillotine and benders).

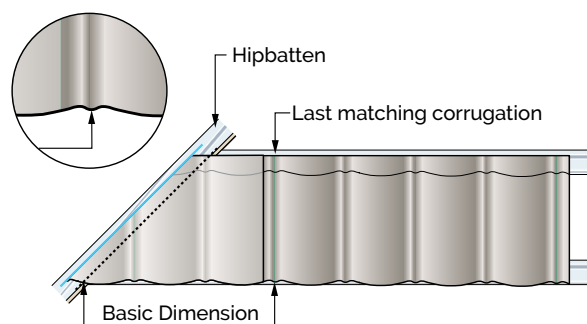
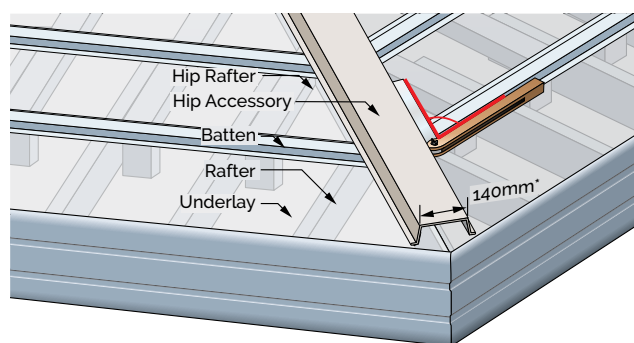


Figure 14.7.5.2 Cutting and bending a hip tile

A bevel set to the angle of the hip may then be used to mark the required angle for the hip tile. Alternatively measurements of the front and back of the tile along the front face of the tile batten may be used to provide the angle.



\* May vary depending on pitch of roof

Figure 14.7.5.3 Tile bevel hip angle measurement

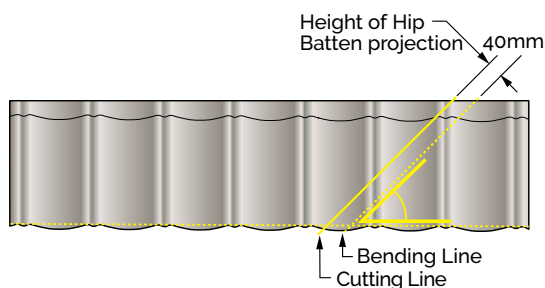


Figure 14.7.5.4 Transfer hip angle to the tile to be cut

Hip tiles are then laid to fill the gaps from the eave up, nailing through the front downturn and through the turn up into the hip accessory batten.

Colortile, Milano and Tuffcoat need to be laid as described above as they are modular and require significant care in ensuring the modules line up down the roof.

Corona, Senator, Rockport, Oberon and Alpine may be installed by pre-cutting and bending for the starting end of a hip. The angle of the hip tile is taken from the roof using a bevel; this is then transferred onto the tile on the ground. Each tile should be made a slightly different length so that when the roof is completed it will have a random pattern on the roof. This results in only having to measure the end hip tile gaps.

Each tile should supply two cut sections leaving a minimum wastage.

Careful cut tile selection and use of cut tiles for hips and valleys also reduces waste.

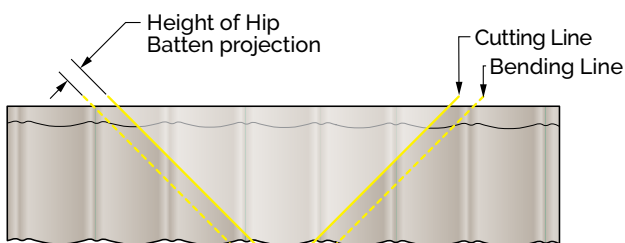


Figure 14.7.5.5 Hip cuts out of a tile

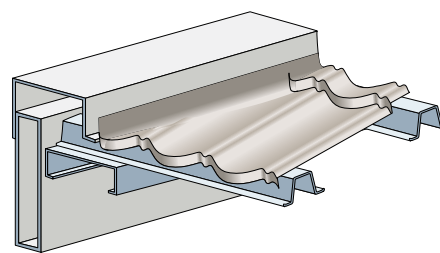


Figure 14.7.5.6 Hip cut against a batten

**Note:** the cut edge of a tile must be covered by accessories or other tiles on the roof to protect against weather.

### 14.7.6 Ridge tiles

Measurements for bending and cutting tiles are taken on the roof. Ridge tiles are **bent** before **cutting**.

All measurements need to be taken along the front face of the batten as this is where the tiles are fastened. Tiles need to be marked along a line where the batten will eventually be positioned.

The measurement is taken from the front of the headlap of the tile to the front of the ridge tile batten (A), this is the bend line. Add 40 mm for the turn up of the tile, this is the cut line. (Refer to **6.4 Use of fixing tools – guillotine and benders**).

Measurements along the ridge are required to ensure that the cut tiles are correct (do NOT assume that the ridge is exactly straight unless you have measured).

The measurements are transferred to tiles on the ground. The tiles are **bent**, **cut** and **stacked** in order as they will be laid on the roof.

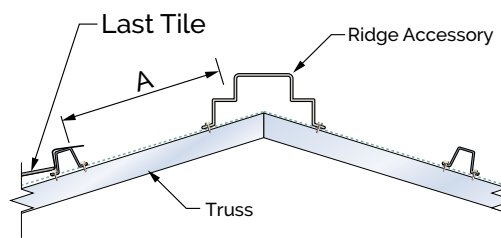


Figure 14.7.6.1 Standard ridge/hip setup



## 14.0 Roof installation on steel battens

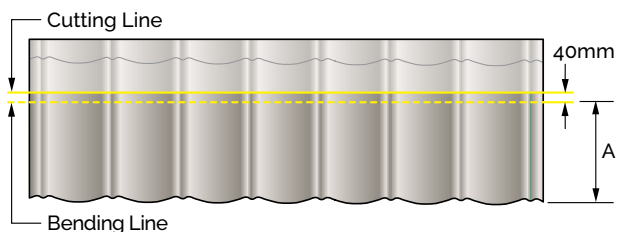


Figure 14.7.6.2 Standard ridge/hip cut and bend lines



Figure 14.7.6.3 Ridge tile being bent then cut

Bend the tile before cutting, if you cut and then bend the tile will bow excessively.

### Installing ridge tiles

Fasten the ends of the front of the tile first (Steps **1** and **2** in **Figure 14.7.6.4**), then fasten the outside ends of the back of the tile so that the modules line up with other tiles on the roof, also fasten the back so that the pitch of the top course tile is the same as the roof (Steps **3** and **4** in **Figure 14.7.6.4**). By fastening each end the back of the tile will bow up (due to the distortion created when bending) (see **Figure 14.7.6.4**); push the centre of the tile down and nail the upturn to the ridge batten in several places (see **Figure 14.7.6.5**).

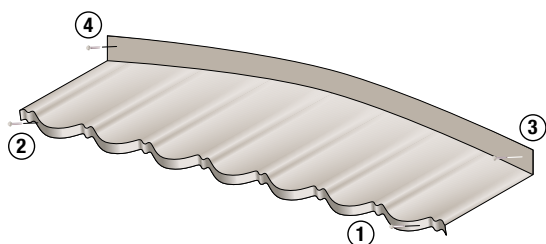


Figure 14.7.6.4



Figure 14.7.6.5

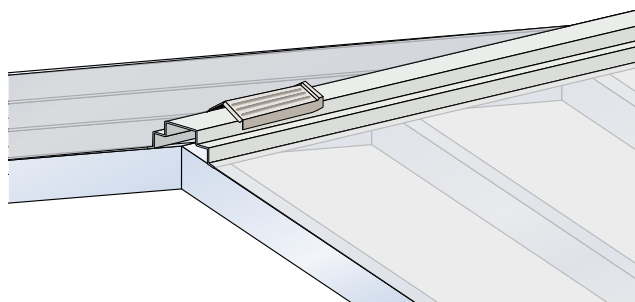


Figure 14.7.6.6 Ridge hip tile and Angle trim installed over a ridge accessory

**Note:** the cut edge of a tile must be covered by accessories or other tiles on the roof to protect against weather.

### 14.7.7 Valley tiles

Measurements for cutting and bending tiles are taken on the roof.

All measurements need to be taken along the front face of the batten as this is where the tiles are fastened. Tiles need to be marked along a line where the batten will eventually be positioned. Failure to follow this procedure will result in bends being incorrect on the modular tiles.

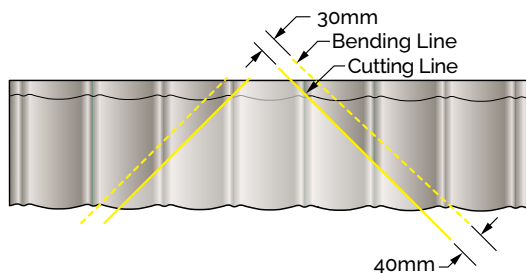


The measurements are then transferred on to tiles on the ground where they are **cut**, **bent** and **stacked** in order.

**For Colortile, Tuffcoat and Milano:** the measurement is taken from the centre of the water channel of the tile, along the front face of the tile batten on the roof to 30 mm past the edge of the valley. The turn down is not parallel to the bend line, add 40 mm at the front (nose) of the tile and 30 mm to the back of the tile, this is the cut line (see **Figure 14.7.7.1**). (Refer to **6.4 Use of fixing tools – guillotine and benders**).

**For Corona, Senator, Rockport, Oberon and Alpine:** the measurement is taken from the edge of the side lap of the tile, along the front face of the tile batten on the roof to 30 mm past the edge of the valley. The turn down is not parallel to the bend line, add 40 mm at the front (nose) of the tile and 30 mm to the back of the tile, this is the cut line (see **Figure 14.7.7.1**). (Refer to **6.4 Use of fixing tools – guillotine and benders**).

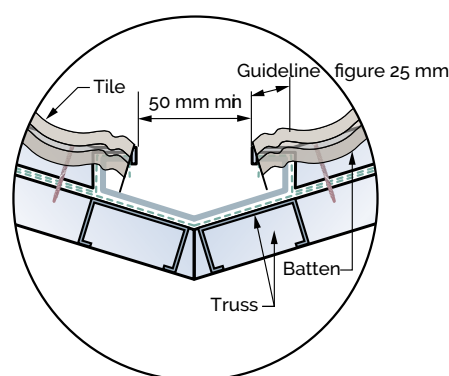
The slope on the cut made on valley tiles is required to make sure that the bottom edge of the valley tile appears straight in the valley.



**Figure 14.7.7.1** Cut and bend lines of a valley tile



**Figure 14.7.7.2** Valley tile being cut then bent



**Figure 14.7.7.3**

Cut and bend the tiles at the valley as straight as possible to obtain a straight line. Lay the valley tiles from the eave up. Never fasten into a valley.

## 14.0 Roof installation on steel battens

### 14.8 Use of fixing tools

#### Guillotine

The guillotine can be used to cut tiles or accessories as required.

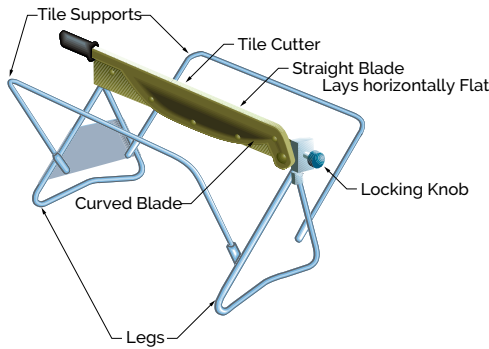


Figure 14.8.1

#### 14.8.1 Gable, hip and valley tiles

Flattening the nose and headlap before cutting the tile will make cutting easier.



Figure 14.8.1.1

Cut along the marked line, a quick single motion down while pulling the guillotine blade towards yourself (to the left) will keep the blades together and usually ensure that a cut is made in one operation. If more than one cut is required move the tile closer to where the blades intersect as this is where the guillotines cutting power is greatest.

Hold the tile so that the largest side is held in the left hand, this gives you greater control over the tile being cut.

#### Cutting a tile



Figure 14.8.1.2

#### Bending a tile



Figure 14.8.1.3

### 14.8.2 Ridge tiles

These are bent in the long tile bender before cutting to help reduce tile distortion (splay).



Figure 14.8.2.1

These tiles are cut along the length of the tile, so it will take several cuts to complete a ridge tile.

Start with the tile headlap to the right of the guillotine blade, make short cuts along the cut line pushing the tile into the first 1/3 of the cutting area of the guillotine. Continue the sequence until the tile is cut.



Figure 14.8.2.2

### 14.8.3 Short tile bender

The short tile bender is used for folding turn-ups required for gable, hip and wall tiles and for the turndowns into valleys. It clamps and flattens the tile turn-ups so that the tiles can be installed under accessories.

#### Short tile bender

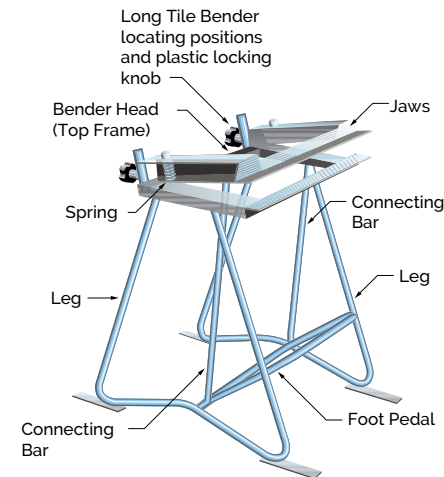


Figure 14.8.3.1

### 14.8.4 Long tile bender

This folder attaches to the back of the short tile bender. It can be used for folding ridge tiles and if necessary gable, hip or valley tiles.

#### Long tile bender

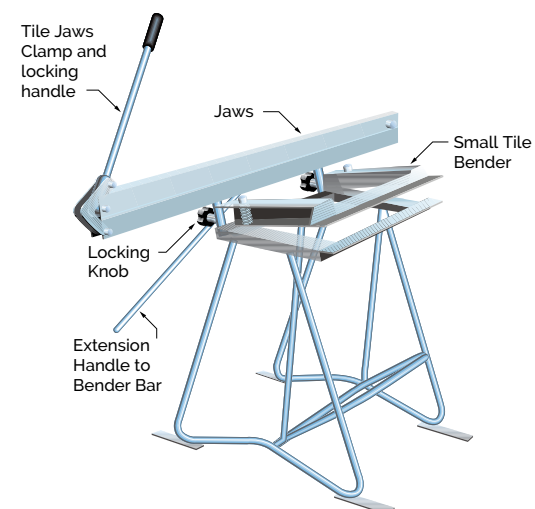


Figure 14.8.4.1

# Important information about this material

## The Gerard Roofing System

AHI Roofing Ltd accepts no liability if the Gerard roofing system is not used in accordance with instructions contained in this publication.

## Use only the current specification

This publication may be superseded by a new publication. AHI Roofing Ltd accepts no liability for reliance upon publications that have been superseded. Before using this manual check whether this is the current version; simply call the Gerard Roofs Helpline on **0800 104 868** or visit [www.gerardroofs.co.nz](http://www.gerardroofs.co.nz)

## Substitution

AHI Roofing Ltd accepts no liability if the systems are not installed in accordance with instructions contained in this and other Gerard Roofs technical literature. Substitution of specified or recommended components with alternative brands can compromise performance dramatically. The Gerard roofing system is not generic and must be installed as specified including the use of Gerard branded components.

## Trade marks

The names AHI®, Gerard®, Decragard®, Corona®, Senator®, Rockport®, Alpine®, Oberon®, Colortile®, Milano®, Tuffcoat®, The worry-proof roof® and the Gerard® Roofs logo are all registered trade marks that are owned by AHI Roofing Ltd.

## Copyright

Copyright © AHI Roofing Ltd 2018. All of the material contained in this manual, including all text, tables, charts, graphs, drawings, diagrams and the Gerard Roofs CAD Detail Numbering System are protected by copyright. These materials may not be reproduced, adapted or transmitted in any form by any process, without the permission of AHI Roofing Ltd.

AHI Roofing Ltd asserts its moral rights and reserves all other intellectual property rights in the materials contained in this manual.

PO Box 18071  
Glen Innes  
Auckland 1743

Freephone: **0800 104 868**

[www.gerardroofs.co.nz](http://www.gerardroofs.co.nz)

GER2019-28

*This edition published March 2019*

The worry-proof roof.



### **Flexible Cone Sleeve**

Dektite cone shape eliminates seal breakdown due to vibration or expansion and contraction, while isolation of pipe from sheeting dampens noise levels.

### **Stress Isolation Points**

Unique to Dektite, two flexible shoulders absorb distortion and stop transfer of stresses from base to cone, as unit is formed over roofing profile.

### **Bonded Aluminium Flange**

Corrosion-resistant, malleable flange, evenly distributes fastening pressure and allows ease of hand-shaping on most sheet profiles.

### **Integrity of Flashing Shape**

Minimal distortion after installation, maintains natural flashing shape and seal around pipe, while water run-off is improved.

### **UV Protection**

Dektite products are resistant to ultraviolet light damage and will remain fully flexible under all conditions.

### **Easily Identified Sizing**

Pipe diameter rings are clearly marked on the cone sleeve (metric and imperial) for cutting to match the appropriate pipe diameter.

### **Low Profile Design**

Sleek, unobtrusive shape is designed to minimise silhouette on roofline, while managing to provide generous internal clearance for steep, angular installations.

### **Improved Waterproofing**

Designed to strengthen sealant bond and improve waterproofing, the ribbed base also has a tapered edge to improve runoff and contribute to a superior waterproof seal.

### **Perfect for approved flues!**

Dektite EPDM polymer flashings have been officially tested and conform to all Australian and New Zealand Standards on approved flue systems. EPDM withstands temperatures from -50°C - 115°C and up to 150°C intermittently. withstands temperatures from -60°C - 200°C and up to 250°C intermittently.



# Dektite Aluminium

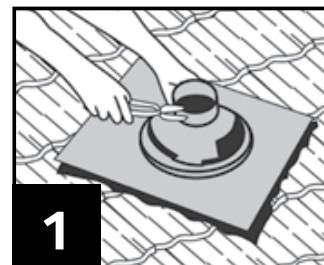
The best solution for stone chip and pressed metal tiles

- ✓ The base is 99.9% pure grade aluminium making it strong, malleable and easy to install.
- ✓ Environmentally friendly, ideal where potable water is collected.
- ✓ The best solution for stone chip and pressed metal tiles.
- ✓ EPDM withstands temperatures from -50°C to 115°C and up to 150°C intermittently.

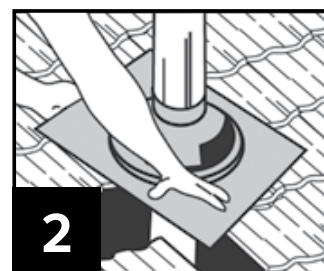
Code	Base (mm)	Pipe (mm)	Pitch	Colour
TFA 12-70	500 x 600	12-70	0-45°	BLACK (EPDM)
TFA 50-170	600 x 600	50-170	0-45°	
TFA 110-220	764 x 764	110-200	0-45°	
TFA 160-300	600 X 900	160-300	0-45°	
TFA 300-450	965 x 965	300-450	0-45°	



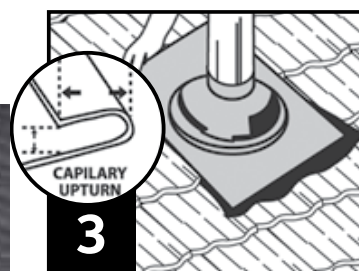
## Installation Instructions:



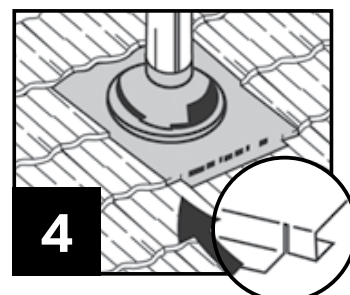
Trim Dektite cone to suit pipe size using sharp tin snips.



After lubricating the flue with water, slide Dektite down to the tile level.



Form an anti-capillary fold then place upper edge of base under up-stream tiles.



Dress base to profile, cut tabs on the bottom corners and fold under to stop wind lift.



Certificate no: CMNZ70114

Version: 6

Original issue date: 08 September 2021

Version date: 12 December 2023

## 1. Certificate Holder Details



**PGF INSULATION SDN BHD**

2449, Lorong Perusahaan Sepuluh Kawasan  
Perusahaan Perai 13600, Perai Penang, Malaysia  
info@ecowool.com.my  
+604 390 8460  
www.elimentinsulation.co.nz

## 2. Product Certification Body

**Bureau Veritas Australia Pty Ltd**

11/500 Collins Street  
Melbourne VIC 3000 Australia  
product.certification@bureauveritas.com  
Ph: 1800 855 190  
www.bureauveritas.com.au

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

Sam Guindi – Bureau Veritas Product Certification Manager



# Product Certificate

## ELIMENT® Insulation - Glass Mineral Wool Insulation

### 3. Description of Building Method or Product

Name of the product or method in Aotearoa New Zealand, including any brand names used. Description of what it is and the components that make up any system and its physical attributes including the materials and make-up of the product, where applicable. Matters that should be taken into account in the use or application of the building method or product can be found in item 6. Conditions and Limitations of Use. Continuation of description can be found in item 10 – Supporting Information about Description. [Delete if not applicable]. The building method's or building product's catalogue or model identification number or numbers or other unique identifiers that might be used to identify the building product or building method

ELIMENT® Insulation - Glass Mineral Wool Insulation is a non-combustible resin bonded glass mineral wool thermal insulation material. It is supplied in blanket form (ELIMENT® Insulation Blanket) and slab form (ELIMENT® Insulation Slab).

### 4. Intended use of Building Method or Product

Intended use of the building method or product as described in the product manual and other instructional materials. A statement of the function or purpose of the building method or product. Continuation of intended use can be found in item 11 – Supporting Information about Intended use. [Delete if not applicable]

ELIMENT® Insulation - Glass Mineral Wool Insulation is suitable for installation in walls and ceilings in new and existing timber and steel framed buildings.

### 5. New Zealand Building Code Provisions

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

How the building method or product complies or contributes can be found in item 8. Basis for Certification. Any qualifications on the extent of that compliance can be found in item 6. Conditions and limitations of use.

**Clause B2 Durability:** Performance Clauses B2.3.1 (a)

**Clause C3 Fire affecting areas beyond the fire source:** Performance Clauses C3.7 (a) (contributes to)

**Clause E3 Internal moisture:** Performance Clauses E3.3.1 (contributes to)

**Clause F2 Hazardous building materials:** Performance Clauses F2.3.1

**Clause H1 Energy efficiency:** Performance Clauses H1.3.1 (a), H1.3.2E (contributes to)



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70114

Version: 6

Original issue date: 08 September 2021

Version date: 12 December 2023



# Product Certificate

ELIMENT® Insulation - Glass Mineral Wool Insulation

## 6. Conditions and Limitations of Use

The building method or product's use is to be in accordance with the installation instructions and requirements against which the building method or product was assessed.

Conditions or limitations of conformity for the performance requirements the building method or product is compliant with, including any requirements for people with the qualifications and skills to install or use the building method or product, any known or demonstrated situations where the building method or product should not be used. A statement as to whether there are any matters that should be taken into account in the use or application of the building product or building method and, if so, what those matters are.

1. ELIMENT® Insulation - Glass Mineral Wool Insulation is certified for use in any building located in any climate zone (as defined Acceptable Solution H1/AS1 Appendix C).
2. ELIMENT® Insulation - Glass Mineral Wool Insulation shall be installed in accordance with the installation instructions applicable to the product:
  - ELIMENT® Ceiling Blanket Installation Instructions version BCII6899, 29 September 2023
  - ELIMENT® Ceiling Slab Installation Instructions version SCII6899, 29 September 2023
  - ELIMENT® Wall Blanket Installation Instructions version BWII6899, 1 June 2021
  - ELIMENT® Wall Slab Installation Instructions version SWII6899, 13 September 2023
3. ELIMENT® Insulation - Glass Mineral Wool Insulation shall:
  - a. be separated by 25 mm minimum from any rigid roof substrate or flexible roof underlay
  - b. remain dry during installation and throughout the life of the building
  - c. Avoid blocking ceiling vents and take care around downlights and other sources of heat. Check downlight compliance labels and manufacturer's installation instructions before installing around and over downlights, as well as NZS4246:2016 for recommended clearances for different downlight ratings.

## 7. Health and Safety Information

Health, safety, and well-being declarations associated with installation, maintenance, and use of the building method or product, and their specific editions and dates necessary to ensure the performance requirements of clauses F1 to F9 of the Building Code can be met.

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

## 8. Basis for Certification

How the performance requirements in the Building Code were met for each of the provisions. Where used as part of a system, the specific contribution to compliance.

B2 Durability - By testing and comparison with Verification Method B2/VM1

C3 Fire affecting areas beyond the fire source - By analysis and comparison with Verification Method C/VM2

E3 Internal moisture - By comparison with Acceptable Solution E3/AS1

F2 Hazardous building materials - By comparison with the performance requirements of Building Code clause F2.3.1

H1 Energy efficiency - By testing and comparison with Acceptable Solution H1/VM1



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70114

Version: 6

Original issue date: 08 September 2021

Version date: 12 December 2023



BUREAU  
VERITAS

# Product Certificate

ELIMENT® Insulation - Glass Mineral Wool Insulation

## 9. Supporting Documentation for Certification

Reference to any acceptable solutions, verification methods, New Zealand Standards, or other compliance pathways referenced against each individual performance requirement the building method or product is compliant with, and their specific version and date. Reference to documents describing tests and evaluations and any other documents relied on for certification or used to prove compliance, including their full title, specific version and date.

1. Acceptable Solutions and Verification Methods for New Zealand Building Code Clause B2 Durability Second edition (Amendment 12), 28 November 2019
2. C/VM2 Verification Method: Framework for Fire Safety Design For New Zealand Building Code Clauses C1-C6 Protection from Fire (Amendment 6), 5 November 2020
3. Acceptable Solutions and Verification Methods for New Zealand Building Code Clause E3 Internal Moisture Second edition (Amendment 7), 5 November 2020
4. H1 Energy Efficiency, Acceptable Solution H1/AS1, Energy efficiency for all housing, and buildings up to 300 m<sup>2</sup>, Fifth edition Amendment 1, 4 August 2022
5. TUD SUD Test Report No. 7191263506-MEC21-YWA, Non-combustibility test on Ecowool Brownie V2 roofing blanket insulation material, 30 July 2021
6. CETEC VOC Emission Test Certificate, 21 July 2021
7. R&D Services Test Report RD16031-R2 Thermal Resistance Test Report 25 mm Brownie EWBL, 1 February 2016
8. TUV Test Report No.719083340-MEC14/01-TYK Thermal Conductivity Brownie EWBL 1.35 50 mm, 24 March 2014
9. TUV Test Report No.719083340-MEC14/02-TYK Thermal Conductivity Brownie EWBL 1.45 50 mm, 24 March 2014
10. R&D Services Test Report RD16714 Thermal Resistance Test Report 50 mm Brownie EWBL 1.60, 14 December 2016
11. R&D Services Test Report RD15720-R2 Thermal Resistance Test Report Brownie Rigislab 50 mm, 15 December 2015
12. R&D Services Test Report RD19581-R2 Thermal Resistance Test Report Brownie Wall Slab R3.2, 5 August 2019
13. R&D Services Test Report RD19582-R2 Thermal Resistance Test Report Brownie Wall Slab R3.6, 5 August 2019
14. R&D Services Test Report RD19580-R2 Thermal Resistance Test Report Brownie Wall Slab R4.1, 5 August 2019
15. BRANZ Report DI0518/DU01 Thermal Resistance of Polyglass Fibre Insulation R3.2, 27 August 2015
16. BRANZ Report DI0518/DU03 Thermal Resistance of Polyglass Fibre Insulation R2.2, 18 September 2015
17. BRANZ Report DI0518/DU04 Thermal Resistance of Polyglass Fibre Insulation R2.6, 22 September 2015
18. BRANZ Report DI15702-01 Thermal Resistance of ELIMENT® Insulation Ceiling Slab R3.6, 19 January 2022
19. BRANZ Report DI15702-02 Thermal Resistance of ELIMENT® Insulation Ceiling Slab R4.0, 27 January 2022
20. BRANZ Report DI17304-02 Thermal Resistance of ELIMENT® Insulation Ceiling Slab R7.0, 15 May 2023
21. James Fricker CPEng (Australia), Review of Thermal Insulation Tests, 27 November 2023.
22. ELIMENT® Insulation Ceiling Segment Data Sheet version CTDS, 21 July 2021
23. ELIMENT® Insulation Wall Segment Data Sheet version WTDS, 21 July 2021
24. ELIMENT® Ceiling Blanket Installation Instructions version BCII6899, 29 September 2023
25. ELIMENT® Ceiling Slab Installation Instructions version SCII6899, 29 September 2023
26. ELIMENT® Wall Blanket Installation Instructions version BWII6899, 1 June 2021
27. ELIMENT® Wall Slab Installation Instructions version SWII6899, 13 September 2023



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70114

Version: 6

Original issue date: 08 September 2021

Version date: 12 December 2023



# Product Certificate

ELIMENT® Insulation - Glass Mineral Wool Insulation

## 10. Supporting Information About Description (Optional)

Any supporting information for section 3.

WALL - Slab Products for ELIMENT® Insulation Glass Mineral Wool Insulation - R Value@15°C

- R2.2 90mm x 0.58m x 1.14m
- R2.4 90mm x 0.58m x 1.14m
- R2.6 90mm x 0.58m x 1.14m
- R2.8 90mm x 0.58m x 1.14m
- R3.2 140mm x 0.58m x 1.14m
- R3.6 140mm x 0.58m x 1.14m
- R4.1 140mm x 0.58m x 1.14m

- R2.2 90mm x 0.56m x 1.14m
- R2.4 90mm x 0.56m x 1.14m
- R2.6 90mm x 0.56m x 1.14m
- R2.8 90mm x 0.56m x 1.14m
- R3.2 140mm x 0.56m x 1.14m
- R3.6 140mm x 0.56m x 1.14m
- R4.1 140mm x 0.56m x 1.14m

WALL - Blanket Products for ELIMENT® Insulation Glass Mineral Wool Insulation - R Value@15°C

- R1.8 75mm x 1.2m x 12m
- R2.2 90mm x 1.2m x 13m
- R2.4 90mm x 1.2m x 10m
- R2.6 90mm x 1.2m x 7m
- R2.8 90mm x 1.2m x 5m
- R3.6 140mm x 1.2m x 5m

CEILING - Slab Products for ELIMENT® Insulation Glass Mineral Wool Insulation - R Value@15°C

- R3.6 165mm x 0.432 m x 1.22m
- R4.0 195mm x 0.432m x 1.22m
- R5.0 230mm x 0.432m x 1.22m
- R6.0 278mm x 0.432m x 1.22m
- R7.0 285mm x 0.432m x 1.22m
- R7.0 285mm x 0.60m x 1.2m



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.

Certificate no: CMNZ70114

Version: 6

Original issue date: 08 September 2021

Version date: 12 December 2023



# Product Certificate

ELIMENT® Insulation - Glass Mineral Wool Insulation

- R7.0 285mm x 0.46m x 1.22m
- R7.0 2 layers of 165mm x 0.432m x 1.22m (total thickness 330mm, effective thickness 320mm)

CEILING – Blanket Products for ELIMENT® Insulation Glass Mineral Wool Insulation - R Value@15°C

- R2.7 120mm x 1.2m x 10m
- R2.9 130mm x 1.2m x 10m
- R3.3 145mm x 1.2m x 8.5m
- R3.6 160mm x 1.2m x 10m
- R4.0 180mm x 1.2m x 8m

MASONRY - Blanket Products for ELIMENT® Insulation Glass Mineral Wool Insulation - R Value@15°C

- R1.0 40mm x 1.2m x 30m
- R1.3 50mm x 1.2m x 15m
- R1.3 55mm x 1.2m x 30m

Refer to the ELIMENT® Insulation Data Sheets, 21 July 2021 for details of these products.

## 11. Supporting Information About Intended Use (Optional)

Any supporting information for section 4.

N/A

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

Any supporting information for section 6.

N/A

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

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



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004. This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>.



Date : 9 Feb 2023

To : Enveloped Solutions Limited

Sir,

**SUBJ.: Thermal Resistance Value (R Value) for Double Layer R3.6 Ceiling**

---

The ELIMENT Glasswool Ceiling Segments for R3.6 are produced at a nominal thickness of 165mm.

Our testing confirmed that the actual thickness with 2 pieces of R3.6 stacked on top of each other, up was measured at ~320mm.

The calculated R Value @ 15 Degrees Celcius from the actual 320mm thickness is sufficient to achieve a system R value of 7.0 m<sup>2</sup>K/W.

Yours faithfully,


WF CHIN  
QA / EHS Manager

**PGF Insulation Sdn. Bhd.** (228905-M)

No. 2449, Lorong Perusahaan Sepuluh,  
Kawasan Perusahaan Perai,  
13600 Perai, Penang,  
Malaysia.

Tel: +604-3908460  
Fax: +604-3996197  
E-mail: mail@polyglass.com.my  
www.polyglass.com.my



## INSTALLATION INSTRUCTIONS

### EARTHWOOL® GLASSWOOL INSULATION: CEILING R7.0 and R8.0

#### Introduction

The following provides guidance on how to achieve H1 compliance at the perimeter of a pitched roof. The following installation instructions support the use of the R7.0 and R8.0 ceiling insulation. It provides examples at 20° and 25° roof pitches using a 90 and 105mm heel heights. These calculations can be used as conservative values in situations where the roof pitch and heel depth are greater.

The schedule method, H1/AS1 requires the roof building element to have a construction R-value of R6.6. It also allows for the construction value to be reduced to R3.3 for up to 500mm from the outer edge of the ceiling perimeter. Using Knauf Insulation's R7.0 and R8.0 in a typical truss or pitched roof will achieve the R6.6 requirements over the main area of the roof. Using these products with a baffle / insulation barrier at the eaves will also meet the R3.3 requirements at the perimeter, without the need for a heel truss. Calculation method allows for building elements to be under the H1/AS1 schedule method's requirements. This is possible when they are offset with higher values elsewhere in the thermal envelope. Using Knauf Insulation's R7.0 and R8.0 significantly lifts the thermal performance of the ceiling and the thermal values at the perimeter, making them a great choice when using the calculation method.

#### Do not start work until the site is safe!

Assess the ceiling condition and structure together with the method of installation you are to use based on the appropriate requirements established in the building code, site assessment and or plans provided. Installation must be completed to the requirements of relevant standard: AS 3999 or NZS 4246.

#### Tools required:

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

#### BEFORE YOU START

- Determine the most suitable product for your project. Ceilings can be insulated using ceiling batts, blankets and rolls.
- 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 [www.knaufinsulation.co.nz](http://www.knaufinsulation.co.nz) for the most suitable product for your application.
- To calculate the number of packs needed, determine the area (m<sup>2</sup>) to be insulated by multiplying the length by the width or wall height. The number of m<sup>2</sup> of insulation material is clearly marked on each pack. Divide the total area to be insulated by the m<sup>2</sup> in a pack to determine the number of packs required (don't forget to round up to the nearest whole pack). Allowances should be made for areas that are unable to be insulated.
- 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 NZS 4246.

#### TRUSS ROOF / INSTALLATION FROM BELOW

- Release the insulation from the packs.
- Lightly bounce the slabs on their side to invigorate the insulation and help it recover to its 330mm nominal thickness.
- Feed the product up through the ceiling battens and position the insulation on top of the ceiling battens and against the truss cord.
- Gently push the ceiling batts against the truss to encourage them to fit around the timbers while creating room for the next ceiling batt to be installed beside it.
- Repeat the process, installing the other ceiling batts in a similar way, paying attention to all the joints between the slabs and timbers to ensure a tight and neat fit.
- Once a truss bay is completed it is recommended that you inspect from above to see that the top surface is smooth and consistent, lifting the ends and sides of the batts to ensure a tight and neat connection before moving to the next truss bay.
- Repeat this process until all truss bays are completed.
- When installing insulation in the eave (i.e. the junction between the roof, wall and ceiling), make sure the insulation covers the top plate but is not in contact with the roof. It is important to maintain a 25mm gap between the roofing substrates and the insulation.
- H1 allows for the insulation R-value to be reduced to R3.3 for 500mm from the top plate. This could assist with the 25mm requirement being met.
- Do not block ceiling vents and take care around downlights and other sources of heat. Consult the appliance manufacturer's instructions for appropriate clearances. Additional guidance is provided in NZS 4246.
- Try to fit insulation behind pipes or other obstructions unless this would compress the insulation. If so, cut the insulation to fit around objects, beams or other barriers.

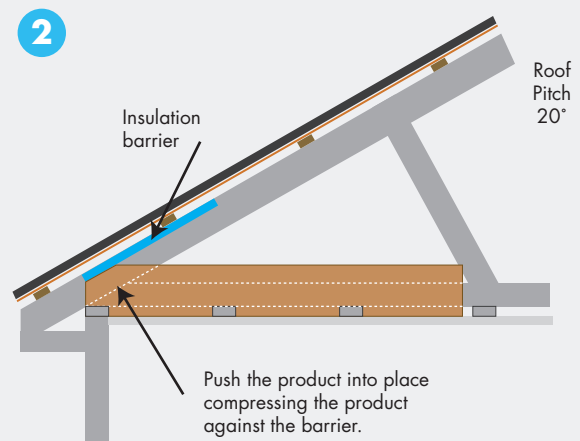
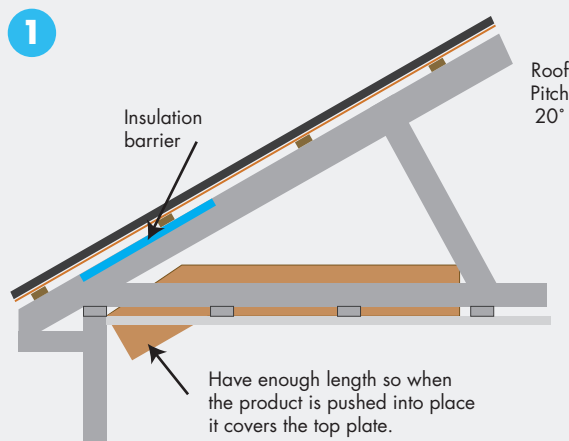
## INSTALLATION INSTRUCTIONS

### H1 PERIMETER INSULATION REQUIREMENTS

The H1 schedule method requires ceilings to achieve an R6.6 construction value with the ability to reduce the construction R-value to R3.3 for the first 500mm from the inside of the top plate. The following details the R7.0 and R8.0 ceiling batts compressed into the eaves with the use of a barrier to achieve the R3.3 compliance. Knauf Insulation's R7.0 and R8.0 product has been designed with a nominal density which allows the product to be easily compressed into the eaves. The following provides guidance and a calculation of the thermal performance in roofs with a roof pitch of  $\geq 20^\circ$ .

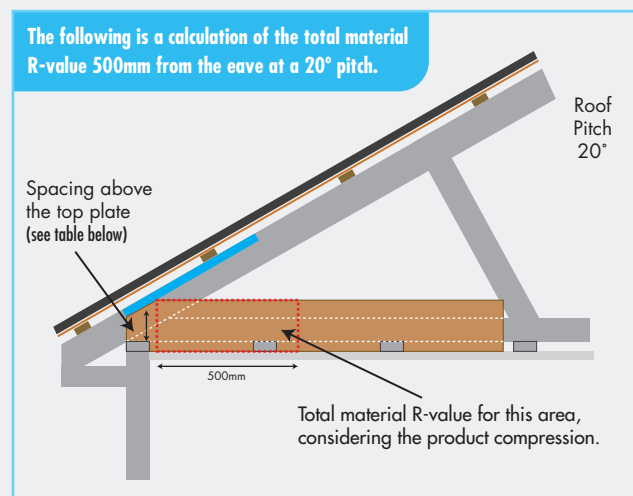
#### Install instructions

- If the eave barrier has not already been installed, cut the barrier between the truss timbers and staple into place.
- Running the ceiling batts length parallel with the truss, slide the ceiling batt into the eaves. The following two step procedure can help with this process.
- The ceiling batts can also be installed with the length of the product parallel to the eave if required.

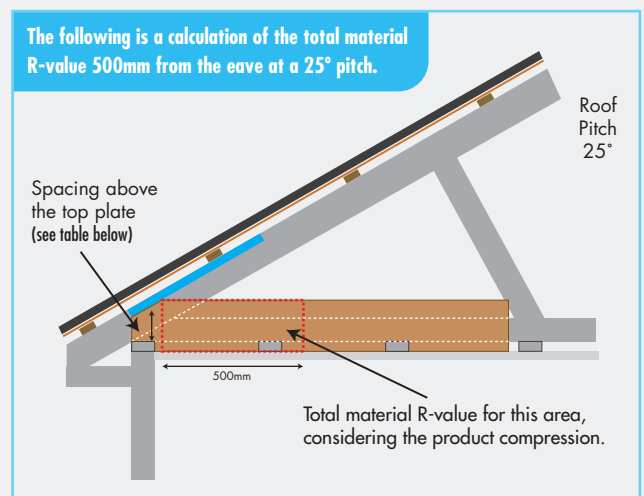


### THERMAL CALCULATION

H1 requires that the construction R-value is minimum of R3.3 the below values are material values and should be used to determine the construction R-values.



Heel Height (mm)	R-Value	Roof pitch ( $^\circ$ )	Material Performance
90	R7.0	20	R4.1
90	R8.0	20	R4.7
105	R7.0	20	R4.5
105	R8.0	20	R5.0



Heel Height (mm)	R-Value	Roof pitch ( $^\circ$ )	Material Performance
90	R7.0	25	R4.5
90	R8.0	25	R5.1
105	R7.0	25	R4.8
105	R8.0	25	R5.4

**Notes:** (1) The above values have been calculated using the BRANZ home insulation guide 6th edition. (2) The heel depth has been calculated based on the table above. Greater heel depth will increase the thermal calculation. If this value is critical to your project design, contact Knauf Insulation for a specific design.

## INSTALLATION INSTRUCTIONS

### RETRO FIT / INSTALLATION FROM ABOVE

- When retrofitting ceilings you must turn the power 'Off'. A torch or adequate lighting will be required. Step / kneeling boards can be used to help with access, especially in truss roof designs. A wooden, non-conductive positioning rod (1-2 metres long) can assist in insulating eaves or hard to reach areas.
- Ensure you have the right product for the application. Check the thermal resistance rating (R-value) required on the drawings / plans and that this matches the product selected. Check the condition of the roof ensuring that it is watertight repairing any damage to the roof sarking.
- Start installing the insulation at the far corners of the roof 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 (we recommend installing between the ceiling timbers and in contact with the ceiling linings. For installs over timbers refer to NZS 4246 for guidance).
- 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, be careful avoid gaps and maintain a continuous layer. 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. the junction between the roof, wall and ceiling), make sure the insulation covers the top plate but is not in contact with the roof. It is important to maintain a 25mm gap between the roofing substrates and the insulation.
- Once you have worked your way back to the ceiling access, make sure you insulate the ceiling access panel before exiting the roof space.
- Always take extra care while moving around in a ceiling space. Ensure sound footing at all times. Only use roof trusses or ceiling joists for support and never stand on ceiling plasterboard.
- Watch out for nails — especially in ceilings where roofing nails may protrude through the sheathing.
- To make access across the roof space easier, use kneeling boards. Place boards over roof trusses or ceiling joists to make a path.
- Do not take the insulation out of the packaging until you're in position and ready to install. Before installation, gently invigorate the insulation by 'bouncing' it on its side until it recovers to thickness stated on the label.
- Do not block ceiling vents and take care around downlights and other sources of heat. Consult the appliance manufacturer's instructions for appropriate clearances. Additional guidance is provided in NZS 4246.
- Try to fit insulation behind pipes or other obstructions unless this would compress the insulation. If so, cut the insulation to fit around objects, beams or other barriers.

### WHERE YOU HAVE EXISTING CEILING INSULATION

- When you are topping up existing insulation you may want to establish the thermal value of the existing insulation. A contribution of R0.2 for every 10mm of existing insulation is a conservative approach.
- Once you have determined your existing insulation levels, install Earthwool® glasswool with a suitable R-value to achieve the desired thermal performance. (allowance should be made for a slight compression of the lower layer)
- Place the insulation over the existing insulation at right angles to the ceiling joists ensuring a consistent layer with no gaps or voids.
- For further guidance of retrofit solutions refer to NZS 4246.

### CATHEDRAL/SKILLION ROOFS

- Where cavity depths allow the R7.0 and R8.0 products can be used in skillion roofs, take care to ensure that the 25mm gap between the insulation and the roof is maintained.
- For smaller cavities refer to the range Skillion roof products designed for this application.

## 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:
  - o access to the roof area,
  - o working at heights,
  - o electrical safety hazards,
  - o adequate ventilation of the work area and
  - o 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:
  - o systems to prevent falling when working at heights.
  - o ventilate the working area if possible.
  - o cover exposed skin. When working in an unventilated area, wear a disposable face mask.
  - o rinse hands in cold water before washing.
  - o wear goggles when working overhead.
  - o clean using vacuum equipment.

### DURING INSTALLATION

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

### Proven Performance

- Preferred by professional installers concerned with quality, appearance and productivity.
- Excellent acoustical properties reduce sound transmission in the home when properly installed.

## HEALTH AND SAFETY INFORMATION

### ELECTRICAL SAFETY CONSIDERATIONS BEFORE ISOLATING POWER

- Locate and review the incoming power supply, main switchboard and meter box.
- Ensure you understand if there is a main isolator and how power can be safely isolated.
- Ensure you understand the direction of the "On" and "Off" position of the main switch (NOTE: the "Off" position is not always as it seems - check with an electrician if you are unsure).
- Before installation, switch "Off" the electricity supply at the main switchboard (check with an electrician if you are unsure if power can be turned "Off" at the switchboard).
- Be aware that even after isolating the power via the switchboard there may still be an electrical mains cable in either the ceiling or underfloor space that is live. Take extreme care to avoid touching any live overhead electrical lines, supply cables or any other live cables in the workspace.

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

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

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

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

### REACTIVATING THE POWER

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

### SUITABLE CLOTHING

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



## BRANZ Appraised

Appraisal No. 648 [2022]

## KNAUF GLASSWOOL INSULATION

### Appraisal No. 648 [2022]

This Appraisal replaces BRANZ  
Appraisal No. 648 [2016]

Amended 09 January 2023



### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.



### Knauf Insulation Pty Limited

23 Corporate Drive  
Cannon Hill QLD 4170  
Australia

Tel: + 61 7 3343 1989

Web: [www.knaufinsulation.com.au](http://www.knaufinsulation.com.au)



### BRANZ

#### BRANZ

1222 Moonshine Rd,  
RD1, Porirua 5381  
Private Bag 50 908  
Porirua 5240,  
New Zealand  
Tel: 04 237 1170  
[branz.co.nz](http://branz.co.nz)



## Product

- 1.1 Knauf Glasswool Insulation is a range of thermal insulating materials manufactured from ECOSE® Technology resin-bonded, glass wool fibres and contains DriTherm® Technology which is a silicon treatment. The insulation is pre-cut to suit a range of thermal insulation requirements and framing set-outs in walls, ceilings and roofs of buildings.
- 1.2 Knauf Glasswool Insulation is a product range of Knauf Insulation and Earthwool® Glasswool Insulation and is detailed in Table 1.

## 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. Knauf Glasswool Insulation meets these requirements. See Paragraphs 8.1 and 8.2.

**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.





## Technical Specification

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

**Table 1: Earthwool Glasswool and Knauf Glasswool Insulation product ranges**

	R-value	Nominal Thickness [mm]	Width [mm]	Length [mm]	Density [kg/m³]
Earthwool Glasswool Insulation	Wall Segments				
	R1.3	45	450	1160	20.5
	R2.2	90	580	1160	10.8
	R2.4	90	580	1160	14.6
	R2.6	90	430 or 580	1160	20.1
	R2.8	90	430 or 580	1160	30.7
	R4.1	140	580	1160	22.6
	R4.4	140	580	1160	36.0
	Ceiling Segments				
	R3.3	155	430	1160	7.7
	R3.6	175	430	1160	7.4
	R4.1	195	430	1160	7.8
	R5.2	210	430	1160	11.4
	R6.3	275	430	1160	9.0
	R7.0	330	460	1200	8
	R8.0	330	460	1200	11
	Skillion Roof Segments				
	R3.2	105	430	1160	26.5
	R5.0	165	430	1160	29
	R6.0	215	430	1160	17.5
	R7.4	265	430	1160	18
	Multi Use Rolls				
	2.2	90	430 or 580	18,000	10.8
	Ceiling Rolls				
	R3.6	150	1200	7000	11.0
Knauf Insulation	Insulation Rolls				
	R2.4	100	1200	17500	10.2
	R3.1	120	1200	14500	12.8
	R1.9	75	1200	23000	11.6
	Smart Facade				
	R1.6	50	600	1200	38.0
	R2.3	75	600	1200	38.0
	R3.1	100	600	1200	38.0



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 Earthwool Glasswool Insulation Acoustic insulation is available as set out in Table 2. *[Note: These products have not been tested to AS/NZS 4859.1.]*

**Table 2: Earthwool Glasswool Insulation Acoustic insulation product range**

Nominal Thickness [mm]	Width [mm]	Length [mm]	Density [kg/m³]
50	600	2700	11.0
75	600	2700	11.0

4.4 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 Appraisals 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 the NZBC Verification Methods H1/VM1, H1 VM2, NZBC Acceptable Solutions H1/AS1 or H1/AS2. 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.

7.3 Knauf Glasswool Insulation is designed to be friction-fitted between wall, ceiling or roof framing. It can also be laid directly on a ceiling lining, 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 For new and existing buildings, the R7.0 and R8.0 ceiling products are designed to be friction-fitted between timber framing and spill above the timber framing to form a uniform insulation layer on the top.

7.5 When insulation is installed in a double layer over new or existing insulation, the possibility of compression of the bottom layer must be avoided or reduction of R-values for the bottom layer of the formed system must be taken into account.

7.6 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.



- 7.7 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.
- 7.8 Where 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.
- 7.9 To prevent moisture transfer and to provide roof ventilation, a separation of 25 mm minimum is required between the insulation and any rigid substrate or flexible roof underlay. Selecting specifically designed skillion roof insulation products with a controlled thickness can assist with this requirement.
- 7.10 The building envelope must be constructed to ensure the insulation remains dry during installation and throughout the life of the building.
- 7.11 The clearance requirements for heating appliances and downlights must be met and reference made to the manufacturers instructions and NZS 4246.

### **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 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, (e.g. moisture), Knauf Glasswool Insulation can expect to have a serviceable life of at least 50 years.

### **Maintenance**

- 9.1 Insulation that has become damp must be removed and the cause of dampness repaired. Cavities must be clean and dry before fitting new insulation of an equivalent thermal rating. NZS 4246 gives guidance on thermal insulation maintenance due to water damage.
- 9.2 Earthwool® Glasswool Insulation with DriTherm® Technology may be dried and retrofitted into the dried cavity if the cause of dampness was a potable water leak.

### **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 one 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.

### **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 NZBC 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 Methods H1/VM1, H1/VM2, NZBC Acceptable Solutions H1/AS1, or H1/AS2.
- 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 Requirement

- 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 Knauf Glasswool Insulation 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 [refer to 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 For new and existing buildings, the R7.0 and R8.0 ceiling products are designed to be friction-fitted between timber framing and spill above the timber framing to form a uniform insulation layer on the top.



- 16.6 The clearance requirements for heating appliances and downlights must be followed. Refer also to NZS 4246.

#### Inspections

- 16.7 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 investigations carried out:

#### Tests

- 18.1 BRANZ has carried out assessments of 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 Technical Literature has 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 material remains dry is the responsibility of the building owner.

### Sources of Information

- AS 1530.1:1994 Combustibility test for materials.
- AS/NZS 4859.1:2018 Thermal insulation materials for buildings.
- BRANZ Bulletin Number 610 Preventing moisture problems in timber-framed skillion roofs.
- BRANZ House Insulation Guide [Sixth Edition], 2022.
- 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 Record of amendments – Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



## Amendments

### Amendment No. 1, dated 09 January 2023

This Appraisal has been amended to incorporate changes to Table 1 and reflect the new NZBC H1 Energy Efficiency regulations.





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

### Conditions of Appraisal

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

For BRANZ

**Chelydra Percy**

Chief Executive

Date of Issue:

02 August 2022



# PRODUCT CERTIFICATE

Knauf Insulation

BC0571/24

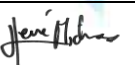


## KEY INFORMATION

CERTIFICATE: GM-CM30095 RevB

1	<b>SUMMARY OF DESCRIPTION OF BUILDING METHOD OR PRODUCT</b>
	Knauf Insulation and Earthwool® glasswool is a mineral fibre type bulk insulation with DriTherm® technology that complies with AS/NZS 4859.1:2018 and is supplied as batts or rolls with thickness between 50 mm and 275 mm, and nominal density between 8 kg/m³ and 32 kg/m³ with binder content no greater than 8%.
2	<b>SUMMARY OF INTENDED USE OF BUILDING METHOD OR PRODUCT</b>
	Non-combustible bulk thermal and acoustic insulation for residential and commercial construction within the following scope: <ul style="list-style-type: none"> <li>Walls when installed in the cavities between framing members.</li> <li>Floors when installed in the cavities between flooring members.</li> <li>Roofs when installed over and between roof framing.</li> <li>Ceilings when installed in the cavities between the ceiling members.</li> </ul>
3	<b>BUILDING CODE PROVISIONS</b>
	The System if installed and maintained in accordance with this Certificate, the system will meet the following provisions of the NZBC: <p><b>Clause B2 DURABILITY:</b> Performance B2.3.1(a) not less than 50 years, and B2.3.2. Earthwool® glasswool insulation products will meet these requirements.</p> <p><b>Clause C3 PROTECTION FROM FIRE:</b> Performance C3.7(a). Earthwool® glasswool insulation products are not combustible building materials and will contribute to meeting this requirement.</p> <p><b>Clause E3 INTERNAL MOISTURE:</b> Performance E3.3.1. Earthwool® glasswool insulation products will contribute to meeting this requirement.</p> <p><b>Clause F2 HAZARDOUS BUILDING MATERIALS:</b> Performance F2.3.1. Earthwool® glasswool insulation products do not present a health hazard to people.</p> <p><b>Clause G6 AIRBORNE AND IMPACT SOUND:</b> Performance G6.3.1. Earthwool® glasswool insulation products will contribute to meeting the requirement of STC not less than 55.</p> <p><b>Clause H1 ENERGY EFFICIENCY:</b> Performance H1.3.1(a) and H1.3.2E. Earthwool® glasswool insulation products will contribute to meeting these requirements.</p>

4	<b>CERTIFICATE HOLDER DETAILS</b>
	<b>Knauf Insulation Pty Ltd</b> 23 Corporate Drive Cannon Hill, QLD, 4170 Tel: +61 7 3393 7300 Email: tech.nz@knaufinsulation.com Web: www.knaufinsulation.co.nz

ISSUED	06/09/2018	LAST UPDATE	03/05/2021	RECERTIFICATION	03/05/2024
5	<b>SIGNATURE</b>				
	 Herve Michoux, Global Mark Managing Director				

6	<b>PRODUCT CERTIFICATION BODY</b>
	<b>Global-Mark Pty Ltd</b> 57 Willis Street, Wellington, 6011 customer.service@global-mark.co.nz +64 9 889 0622 www.global-mark.co.nz
	The complaints process for this certificate can be found here:
	<a href="https://www.global-mark.com.au/?s=complaint">https://www.global-mark.com.au/?s=complaint</a>



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

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

1



# PRODUCT CERTIFICATE

Knauf Insulation



## 7 CONDITIONS AND LIMITATIONS OF USE

1. Specification and incorporation of Earthwool® glasswool insulation products into the building design shall be carried out by a designer, architect, engineer, or building professional in accordance with NZS 4214:2006 Methods of Determining the Total Thermal Resistance of Parts of Buildings and NZS 4218:2009 Thermal Insulation – Housing and Small Buildings when incorporating Knauf Insulation products to achieve the required building performance.
2. Specification of Earthwool® glasswool insulation products shall be in accordance with the following documents, available at – [www.knaufinsulation.co.nz/products](http://www.knaufinsulation.co.nz/products):
  - Knauf Insulation Earthwool® glasswool Product Datasheets as follows:
    - Earthwool® glasswool insulation: Acoustic, Ref.: KINZ0914116DS, January 2021
    - Earthwool® glasswool insulation: Ceiling, Ref.: KINZ1213029DS, January 2021
    - Earthwool® glasswool insulation: Commercial roll, Ref.: KINZ0914115DS, January 2021
    - Earthwool® glasswool insulation: Wall, Ref.: KINZ0914114DS, January 2021
    - Earthwool® glasswool: Multi-Use roll, Ref.: KINZ0616396DS, January 2021
    - Earthwool® glasswool insulation: Underfloor Roll, Ref.: KINZ0616380DS, June 2016
    - Earthwool® glasswool: Quilted underfloor segments, Ref.: KINZ0317511DS, August 2017
3. Installation shall be carried out by a Knauf Insulation accredited installer and installed in accordance with NZS 4218:2009 Thermal insulation - Housing and small buildings or NZS 4246:2016 Energy efficiency – Installing bulk thermal insulation in residential buildings, and the relevant Earthwool® glasswool installation instructions as specified below and which are available at – [www.knaufinsulation.co.nz/products](http://www.knaufinsulation.co.nz/products) – to meet the stated thermal performance rating of the insulation:
  - Installation Instructions – Earthwool® glasswool Insulation Ceiling Segments, Ref : KINZ1017631MIS
  - Installation Instructions – Earthwool® glasswool Insulation Ceiling Rolls, Ref : KINZ1017632MIS
  - Installation Instructions – Earthwool® glasswool Quilted Underfloor Segments, Ref : KINZ0817602MIS
  - Installation Instructions – Earthwool® glasswool Insulation Underfloor Roll, Ref : KINZ1017636MIS
  - Installation Instructions – Earthwool® glasswool Insulation Wall Segments, Ref : KINZ1017633MIS
4. Installation shall be carried out only after the building is waterproof, and after the materials within the building have dried to a sufficient degree that moisture is not transported into the insulation material.
5. In residential construction, installation shall also be carried out in accordance with NZS 4246:2016 Energy efficiency – Installing bulk thermal insulation in residential buildings
6. Refer to Table 1 for a schedule of Earthwool® glasswool Insulation products covered by this certificate.



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advise or reports. In placing the **CodeMark** mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



# PRODUCT CERTIFICATE

## Knauf Insulation



Table 1: Knauf Earthwool® Glasswool Product Schedule

### Knauf Insulation

#### Climacoustic Ductwrap

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	Width (mm)	Length (mm)
2400374	636677	25	28.0	1200	18000
2400373	683676	40	28.0	1200	12000
2400372	690950	50	28.0	1200	9000

#### Acoustic Batt

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	Width (mm)	Length (mm)
529446	683669	50	11.0	600	2700
529447	683670	75	11.0	600	2700
471045	683649	50	14.0	580	1160
471049	683650	75	14.0	580	1160
471070	683655	90	20.1	430	1160
471071	683656	90	20.1	580	1160
471040	683646	90	30.7	430	1160
471041	683647	90	30.7	580	1160



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



## PRODUCT CERTIFICATE

## Knauf Insulation

## Roof Blanket

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
511826	683665	75	11.6	1.9	1200	23000
511830	683666	100	10.2	2.4	1200	17500
511837	683667	120	12.8	3.1	1200	14500
511842	683668	130	12.0	3.3	1200	13500

Earthwool® glasswool

## Wall Batt

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
471038	683644	90	10.8	2.2	580	1160
471039	683645	90	14.6	2.4	580	1160
471070	683655	90	20.1	2.6	430	1160
471071	683656	90	20.1	2.6	580	1160
471040	683646	90	30.7	2.8	430	1160
471041	683647	90	30.7	2.8	580	1160
471042	683648	140	9.3	3.2	580	1160
470319	683641	140	13.4	3.6	580	1160
505604	691267	140	22.6	4.1	580	1160



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



# PRODUCT CERTIFICATE

## Knauf Insulation



### Ceiling Batt

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
583500	683674	155	7.7	3.3	430	1160
471072	683657	175	7.4	3.6	430	1160
471053	731850	175	7.4	3.6	600	1200
471073	683658	195	7.8	4.1	430	1160
471054	683653	210	11.4	5.2	430	1160
471055	683654	275	9.0	6.3	430	1160

### Skillion Batt

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
470320	683642	105	26.5	3.2	430	1160

### Ceiling Roll

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
470311	690852	70	12.6	1.8	1200	13500
470313	690928	115	13.8	2.9	1200	8500
470315	690934	135	11.0	3.2	1200	8000
470317	690936	150	11.0	3.6	1200	7000



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.





# PRODUCT CERTIFICATE

## Knauf Insulation



### Handy Roll

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
681570	707760	90	10.8	2.2	430	18000
681564	707746	90	10.8	2.2	580	18000

### FloorShield: Ultimate

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
651677	691130	90	21.0	2.5	420	1160

### Faced Underfloor: Basic

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
546235	683671	75	10.9	1.8	500	10000
654389	723803	75	11.0	1.8	600	10000

### Quilted

Current Material Codes	Future Material Codes	Thickness (mm)	Density (kg/m³)	R-value (m²K/W)	Width (mm)	Length (mm)
596252	596252	70	9.2	1.5	470	2700

## 8 HEALTH AND SAFETY INFORMATION

Standard industry safety practices and manufacturer safety requirement as detailed in the technical literature including the applicable SDS must be observed at all times.  
Refer to Knauf Insulation Material Safety Data Sheet, Issue Date: October 2014 and NZS 4246:2016 Energy efficiency – Installing bulk thermal insulation in residential buildings.



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



# PRODUCT CERTIFICATE

## Knauf Insulation



9 SUPPORTING INFORMATION ABOUT DESCRIPTION			
<p>Earthwool® glasswool is manufactured with recycled glass and ECOSE® Technology binder which is created from renewable materials. The product types and special characteristics are listed below:</p> <ul style="list-style-type: none"><li>• Knauf Insulation Acoustic Batts – Basic at 11 kg/m³; Ultra at 14 kg/m³; and High-Density at 17 kg/m³, 20 kg/m³ and 27 kg/m³</li><li>• Knauf Insulation Roof Blanket – has optional foil backing</li><li>• Earthwool® glasswool Ceiling Rolls</li><li>• Earthwool® glasswool Ceiling Batts</li><li>• Earthwool® glasswool Multi-Use Rolls</li><li>• Earthwool® glasswool Underfloor Roll – faced with a black glass wind wash barrier</li><li>• Earthwool® glasswool Wall Batts</li></ul> <p>Knauf Insulation is a mineral fibre type bulk insulation complying with AS/NZS 4859.1:2018. It is manufactured with recycled glass and ECOSE® Technology binder which is created from renewable materials.</p> <p>Catalogue or model identification numbers: Refer to Table 1</p>			
10 SUPPORTING INFORMATION ABOUT INTENDED USE			
Nil.			
11 SUPPORTING INFORMATION ABOUT CONDITIONS AND LIMITATIONS OF USE			
Nil.			
12 BASIS FOR CERTIFICATION			
The certification decision is based on independent technical review(s) of test report(s), engineering opinion(s) and other documented evidence(s), factory audit(s) and site review(s)			
Code Clause	Compliance pathway	Evidence	
Performance B2.3.1(a) and B2.3.2	Testing in accordance with AS/NZS 4859.1:2018 and assessment by registered testing laboratory.	Doc. Ref.: 8	
Performance C3.7(a)	Testing in accordance with AS/NZS 1530.1 and assessments by registered testing laboratories and professional engineers.	Doc. Ref.: 1 to 7	
Performance E3.3.1	Compliance with NZS 4214:2006, NZS 4218:2009 and NZS 4246:2016 and assessment by registered testing laboratory	Doc. Ref.: 8 and 20	
Performance F2.3.1	Evaluation for Material Safety Data Sheet and assessment by registered testing laboratory	Doc. Ref.: 8 and 22	
Performance G6.3.1	Assessment by professional engineer as to acceptability for use where glasswool specified in an Acceptable Solution.	Doc. Ref.: 16 and 17	
Performance H1.3.1(a) and H1.3.2E	Testing of product thermal conductivity and determination of element R-values in accordance with AS/NZS 4859.1:2018, specification in accordance with NZS 4214:2006 and NZS 4218:2009, installation in accordance with NZS 4246:2016, and assessment by registered testing laboratory.	Doc. Ref.: 9 to 19, and 21	
13 SUPPORTING DOCUMENTATION FOR CERTIFICATION			
Ref	Author	Title	Date and/or revision
1	Exova Warringtonfire, UK	Classification of reaction to fire performance in accordance with EN 13501:2007+A1:2009 – product reference “SK Dritherm Cavity Slab 100mm”	Report No. WF 388511 7/09/2017



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



# PRODUCT CERTIFICATE

## Knauf Insulation



2	Exova Warringtonfire, UK	Fire Test For Non-Combustibility Of Building Products – product reference “HD-32-8-ET”, 80mm thickness, 32 kg/m3 density	Document Reference: 311313 27/09/2011
3	Exova Warringtonfire, UK	Determination Of The Heat Of Combustion For Building Products – product reference “HD-32-8-ET”, 80mm thickness, 32 kg/m3 density	Document Reference: 311316 27/09/2011
4	CSIRO	Likely fire performance of Knauf Earthwool glass mineral wool insulation	Assessment Number: FCO-3073 (Revision A) 28/08/2014
5	Exova Warringtonfire	Test in accordance with AS 1530.1-1994 Methods for fire tests on building materials, components and structures – Part 1: Combustibility test for materials. Test specimen – Knauf Earthwool – R2.7, 90 mm thick, 24 kg/m3 density. Result – NOT DEEMED COMBUSTIBLE.	EWFA Test Report No.: 56297900b.1 11/08/2018
6	Exova Warringtonfire	Test in accordance with AS 1530.1-1994 Methods for fire tests on building materials, components and structures – Part 1: Combustibility test for materials. Test specimen – Knauf Earthwool – R3.5, 175 mm thick, 9.5 kg/m3 density. Result – NOT DEEMED COMBUSTIBLE.	EWFA Test Report No.: 56297900a.1 11/08/2018
7	Ignis Solutions	Engineer’s report – Evaluation of Knauf Insulation against AS 1530.1-1994	Evaluation No. IGNS-7424 Issue 02 Revision 01 [2019] 29/04/2020
8	BRANZ	New Zealand Building Code appraisal	Appraisal No. 648 2016
9	BRANZ	Thermal Insulation Report – Earthwool New Zealand: 90 mm, R2.4	Project Number DI0448 Test No. DU03A – 2/04/2014
10	BRANZ	Thermal Insulation Report – Earthwool New Zealand 70 mm, R1.8 115 mm, R2.9 135 mm, R3.2 150 mm, R3.6	Project Number DI0455 Test No. DU01 – 1/05/2014 Test No. DU02 – 2/05/2014 Test No. DU03 – 8/05/2014 Test No. DU04 – 22/05/2014
11	BRANZ	Thermal Insulation Report – Earthwool New Zealand 140 mm, R3.2 140 mm, R3.6	Project Number DI0463 Test No. DU07A – 10/06/2014 Test No. DU08A – 18/06/2014
12	BRANZ	Thermal Insulation Report – Earthwool New Zealand 105 mm, R3.2	Project Number DI0468 Test No. DU01A – 6/06/2014
13	BRANZ	Thermal Insulation Report – Earthwool New Zealand 140 mm, R4.1	Project Number DI0522 Test No. DU01A – 19/05/2015
14	BRANZ	Thermal Insulation Report – Earthwool New Zealand	Project Number DI0653



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advise or reports. In placing the **CodeMark** mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



# PRODUCT CERTIFICATE

## Knauf Insulation



		130 mm, R2.9	Test No. DU01A – 6/06/2017
15	Knauf Insulation	Engineer’s report – Technical Report: Compliance of Cwmbran products to AS/NZS 4859.1(2018) 50:90 thermal requirements	Document No.: NPD_CP_PR_0014 30/04/2020
16	Marshall Day Acoustics	INSUL Materials Editor – Knauf Key No. 1715	v8.0.10 23/03/2018
17	Marshall Day Acoustics	Assessment report Ref: Rp 002 20170139 – Knauf Insulation Cavity Infill Substitution	6/09/2019
18	Standards New Zealand	AS/NZS 4859.1:2018 Thermal insulation materials for buildings – Part 1: General criteria and technical provisions	2018
19	Standards New Zealand	NZS 4214:2006 Methods of Determining the Total Thermal Resistance of Parts of Buildings	2006
20	Standards New Zealand	NZS 4246:2016 Energy efficiency – Installing bulk thermal insulation in residential buildings	2016
21	Standards New Zealand	NZS 4218:2009 Thermal Insulation – Housing and Small Buildings	2009
22	Knauf Insulation	Material Safety Data Sheet: Glass Mineral Wool with ECOSE® Technology	October 2014
14	CONDITIONS RELATING TO NOTIFICATION		
<p>(a) the certificate holder notifies the product certification body in writing of any intended change to any of the following particulars:</p> <ul style="list-style-type: none"><li>(i) the name, address, or contact details of the certificate holder:</li><li>(ii) any address of a location where a certified product is produced or manufactured:</li></ul> <p>(b) the certificate holder notifies the product certification body in writing of any intended change, modification, or alteration to any of the following:</p> <ul style="list-style-type: none"><li>(i) the certified building method or product:</li><li>(ii) the method of its production or manufacture:</li><li>(iii) the product quality plan prepared in respect of the certified building method or product:</li><li>(iv) the application or installation instructions for the certified building method or product:</li><li>(v) any documentation relating to the use and maintenance of the certified building method or product:</li></ul> <p>(c) if the certificate holder has any reason to suspect that the certified building method or product does not comply with the Building Code, the certificate holder notifies the product certification body in writing of the reason for that suspicion:</p> <p>(d) if the certificate holder or the product certification body finds that a certified building method or product that has been released on the market does not comply with the Building Code, the certificate holder discloses that fact in disclosure statements published in a form that is acceptable to the product certification body and to the chief executive:</p> <p>(e) if the certificate is suspended or revoked, the certificate holder—</p> <ul style="list-style-type: none"><li>(i) notifies all customers to whom the building method or product is regularly supplied; and</li></ul>			



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advice or reports. In placing the CodeMark mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



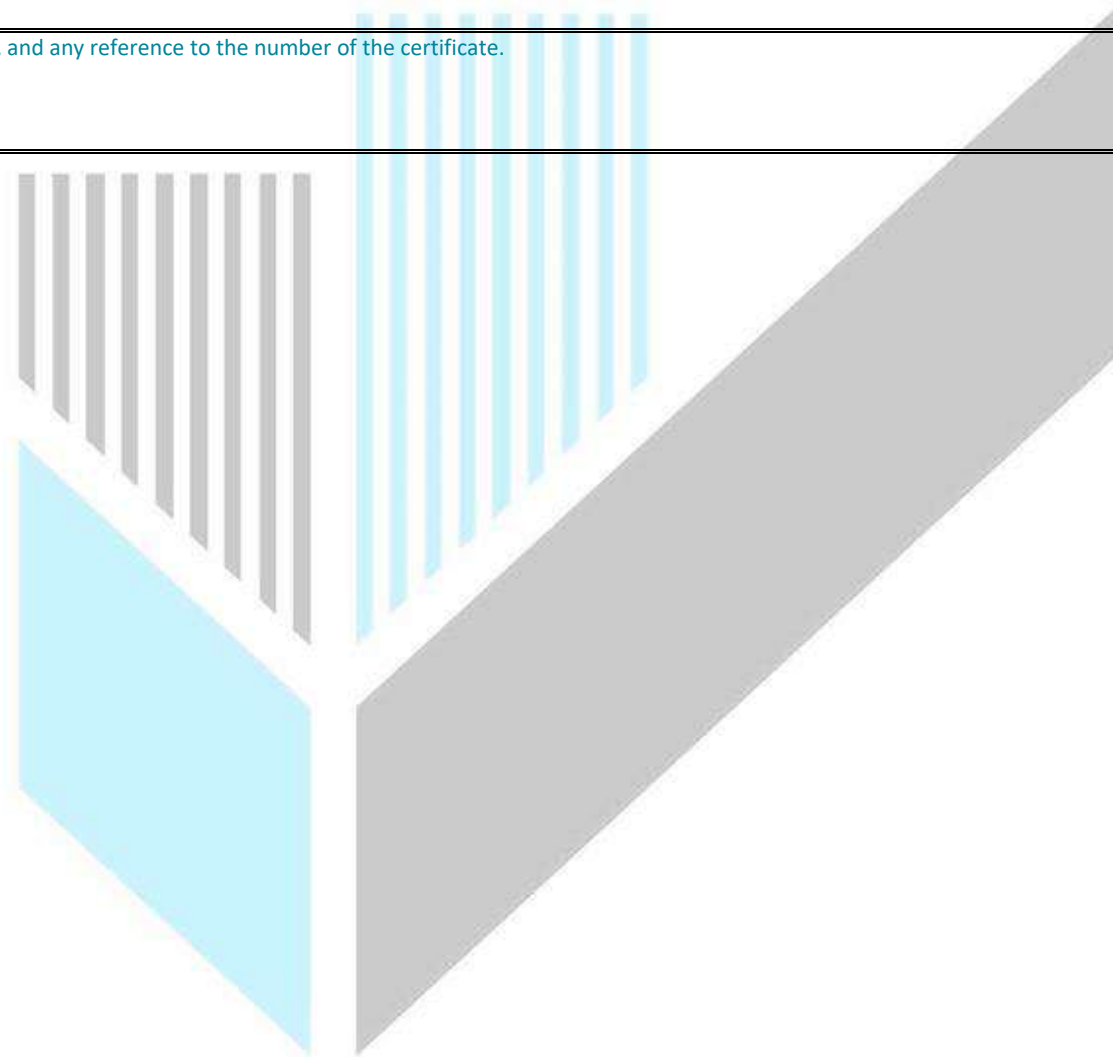
# PRODUCT CERTIFICATE

## Knauf Insulation



(ii) immediately ceases using the certificate, the mark of conformity, and any reference to the number of the certificate.

End of the document



This certificate is issued by an independent certification body accredited by JAS-ANZ, the product certification accreditation body appointed by the Chief Executive of the Ministry of Business, Innovation and Employment under the Building Act 2004.

This certificate may only be reproduced in its entirety. It is advised to check that this certificate is currently valid and not withdrawn or suspended by referring to the Register of Product Certificates on the Building Performance website <http://www.building.govt.nz>. The purpose of construction site audits is to confirm the practicability of installing the product; and to confirm the appropriateness and accuracy of installation instructions. In issuing this certificate, Global-Mark has relied on the independent expert and/or laboratory advise or reports. In placing the **CodeMark** mark on the product/system, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein.



**WEISS™**

# Technical Data Sheet

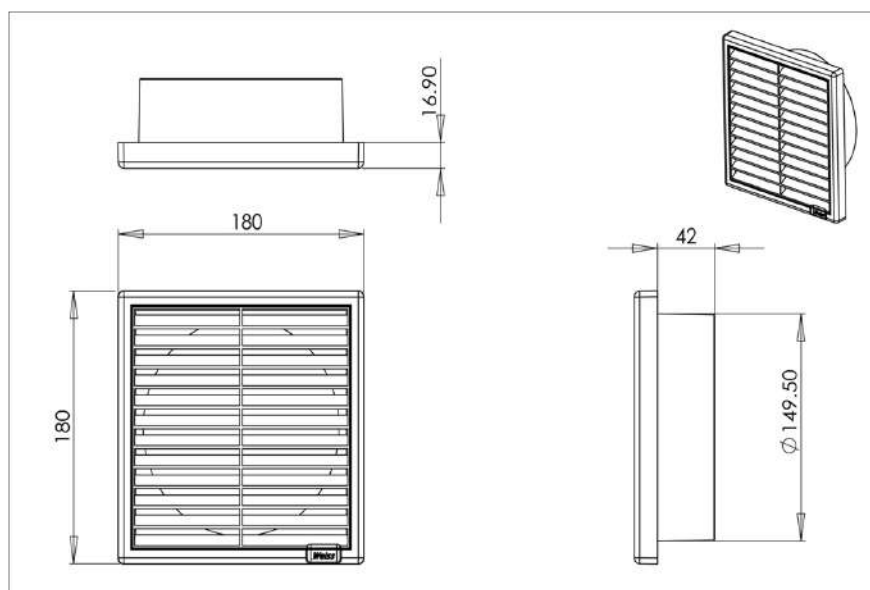
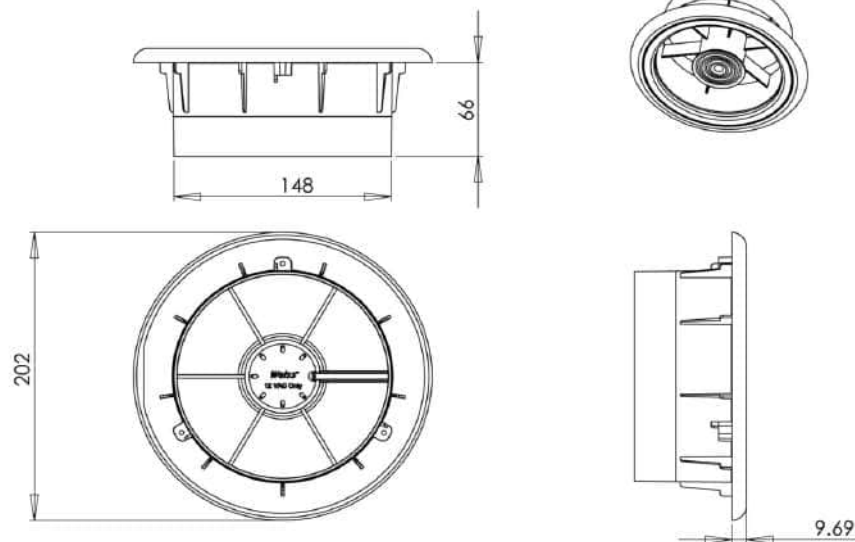
## FV130

Shower Fan Unit

150mm ducting

### Dimensions

Cut-out size for inlet fascia	170mm
Cut out size for outlet vent	155mm



### Specifications

Weight	2kg
Colour of front fascia	White
Housing material	ABS

### Approval

AS/NZS 3350.2.80:1998 Amdts 1-3 "Electrical Fan"

### Features

- Easy to install
- 6 metres of 150mm ducting supplied
- Unique 'no fuss' all in one unit
- Allows moisture to be removed to the outside of your home
- All parts are included
- 3 year extended warranty



# Technical Data Sheet

## Product Use

The FV130 is used for the extraction of mist and steam

Typical applications:

- Bathrooms
- Toilets
- Laundries

## Environmental Conditions

Operation	to IEC 721-3-3
Climatic conditions	class 3K5
Temperature	0...+50°C
Humidity	<95% r.h.

## Standards

Test standards	AS/NZS 3350.2.80: 1998 Amdts 1-3 "Electrical Fan"
Test Report no	SD3190
EMC Compliance	This is a Level One product with an C frame motor that has a very low risk of causing EMC Interference

## General

Free Air Fan Performance	362m³/ hr 100.6L/sec
Installed decibel rating	45DB

## Ordering

When ordering please give name and type,	
Reference	FV130
Barcode	942000490093-8

## Technical Data

Power Supply	230 VAC
Power consumption	max. 0.4 Amps
Supply Line fusing	max. 10A
For solid wires	2 x 1.5mm²
Motor	230-240VAC 50Hz 0.4 Amp
Motor insulation class	B1
Total motor wattage	40 Watts
Motor protection	Thermally protected
Total product wattage	40 watts



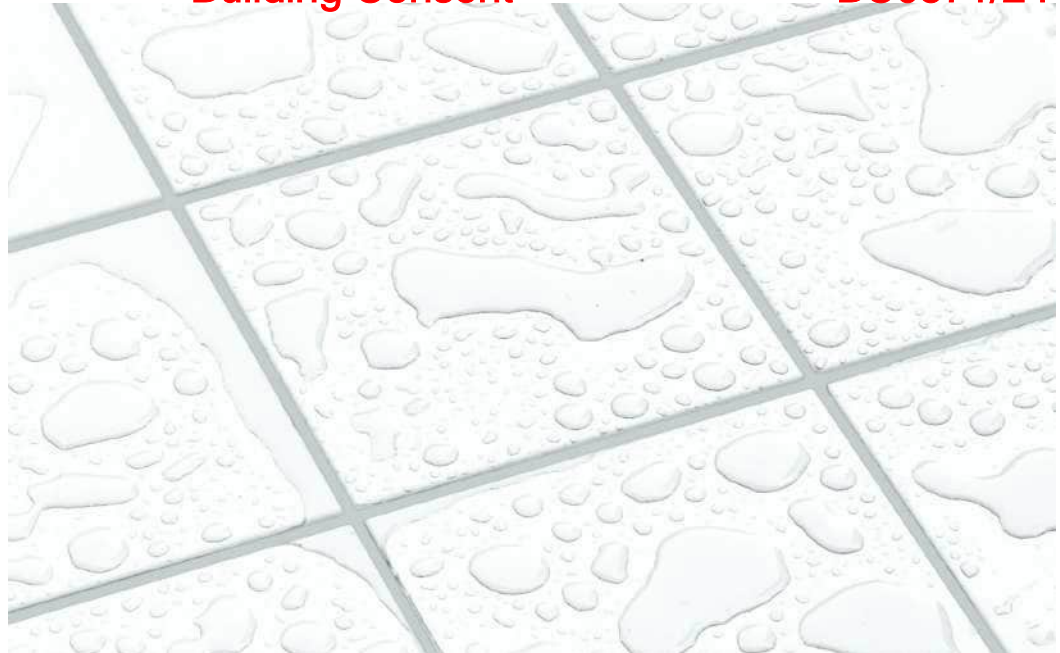
**BRANZ Appraised**

Appraisal No. 472 [2022]

**ARDEX UNDERTILE  
INTERNAL LIQUID  
WATERPROOFING  
MEMBRANES**

**Appraisal No. 472 [2022]**

This Appraisal replaces BRANZ  
Appraisal No. 472 [2017]



**BRANZ Appraisals**

Technical Assessments of  
products for building and  
construction.



**ARDEX New Zealand  
Limited**

15 Alfred Street  
Onehunga  
Auckland

Tel: 09 636 0005

Web: [www.ardex.co.nz](http://www.ardex.co.nz)



**BRANZ**

**BRANZ**

1222 Moonshine Rd,  
RD1, Porirua 5381  
Private Bag 50 908  
Porirua 5240,  
New Zealand  
Tel: 04 237 1170  
[branz.co.nz](http://branz.co.nz)



**Product**

- 1.1 ARDEX Undertile Liquid Membranes are premixed and two-part liquid-applied waterproofing membranes for use under ceramic or stone tile finishes in internal wet areas.

**Scope**

- 2.1 ARDEX Undertile Liquid Membranes have been appraised for use as waterproofing membranes for the internal wet areas of buildings, within the following scope:
- on floor substrates of concrete, reconstituted wood panel flooring, plywood, compressed fibre cement sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
  - when protected from physical damage by ceramic or stone tile finishes; and,
  - where floors are designed and constructed such that deflections do not exceed 1/360<sup>th</sup> of the span.
- 2.2 The use of ARDEX Undertile Liquid Membranes on concrete slabs where hydrostatic or vapour pressure is present from below is outside the scope of this Appraisal.
- 2.3 Movement and control joints in the substrate must be carried through the membrane and tile finish. The design and construction of the substrate and movement and control joints is specific to each building, and is therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.4 The ceramic or stone tile finishes are outside the scope of this Appraisal.
- 2.5 The membranes must be installed by trained installers, approved by ARDEX New Zealand Limited.

**Building Regulations**

**New Zealand Building Code (NZBC)**

- 3.1 In the opinion of BRANZ, ARDEX Undertile Internal Liquid Waterproofing Membranes, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

**Clause B2 DURABILITY:** Performance B2.3.1 (b) 15 years and B2.3.2. ARDEX Undertile Liquid Membranes meet these requirements. See Paragraph 9.1.

**Clause E3 INTERNAL MOISTURE:** Performance E3.3.6. Internal wet area floors and walls incorporating ARDEX Undertile Liquid Membranes meet this requirement. See Paragraphs 11.1-11.6.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. ARDEX Undertile Liquid Membranes meet this requirement.



## Technical Specification

4.1 Materials supplied by ARDEX New Zealand Limited are as follows:

- **ARDEX WPM 001** is a one-part, polymer-based, ready-to-use, liquid-applied membrane containing micro-fibres. It is supplied as a light blue thixotropic paste in 20 kg (approximately 15 L) pails.
- **ARDEX WPM 002** is a fast drying, two-part, flexible, cementitious-based, liquid-applied membrane containing micro-fibres. It is supplied as ARDEX WPM 002 Part A Liquid in 20 kg pails and ARDEX WPM 002 Part B Powder in 10 kg multi-wall bags. When dry, the membrane is light grey in colour.
- **ARDEX WPM 155 Rapid** is a one-part, water-based polyurethane acrylic, ready-to-use, liquid-applied, rapid setting membrane. It is supplied as a blue colour in 4 and 15 L pails.
- **ARDEX STB Tape** is an uncured butyl tape with a fleece layer that is used in the ARDEX WPM 155 Rapid under tile waterproofing system.
- **ARDEX Multiprime** is a water-based primer used to seal substrates and enhance the adhesion of the membranes. It is supplied as a red coloured liquid in 1, 4 and 20 L plastic containers.

## Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

## Technical Literature

6.1 This Appraisal must be read in conjunction with:

- ARDEX WPM 001 Superflex Bathroom and Balcony Premixed, March 2012.
- ARDEX WPM 002 Superflex Bathroom and Balcony Two Part, Jan 2022.
- ARDEX WPM 155 Rapid, May 2013.

6.2 All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 ARDEX Undertile Liquid Membranes are for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 ARDEX WPM 002 and ARDEX WPM 155 Rapid are designed to be used where a quicker curing time is required, such as in cool or humid conditions.
- 7.3 The membrane must be protected from physical damage by the application of ceramic or stone tile finishes.
- 7.4 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ Good Practice Guide: Tiling.
- 7.5 Timber framing systems must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases, framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed  $1/360^{\text{th}}$  of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.



## Substrates

### Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with the sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used.
- 8.2 The plywood must be supported with dwangs or framing with a maximum span of 400 mm in each direction, fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres along the sheet edges and 200 mm centres through the body of the sheets.

### Fibre Cement Compressed Sheet/ Fibre Cement Sheet Tile Underlay

- 8.3 Fibre cement compressed sheet and tile underlay must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area membrane substrate. Installation must be carried out in accordance with the instructions of the manufacturer.

### Reconstituted Wood Panel Flooring

- 8.4 Non-oriented strand board panels that are bonded with PMDI resin, are water-repellent, have an average density of 680 kg/m<sup>3</sup>, are treated to H3 with a waterborne treatment not LOSP, and are suitable for use as the timber substrate under wet area waterproof membrane systems.

### Concrete and Concrete Masonry

- 8.5 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229, and concrete masonry to NZS 4229 and NZS 4230.

### Wet Area Wall Linings

- 8.6 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588 and be suitable for use in internal wet areas.
- 8.7 Fibre cement sheet must be suitable for use in wet areas and comply with AS/NZS 2908.2.
- 8.8 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

## Durability

### Serviceable Life

- 9.1 ARDEX Undertile Liquid Membranes, when subjected to normal conditions of environment and use, are expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design serviceable life of 15-25 years.

## Maintenance

- 10.1 No maintenance of the membrane will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grout and sealant.
- 10.2 In the event of damage to the membrane, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.
- 10.3 Drainage outlets must be maintained to operate effectively, and tile finishes must be kept clean.

## Internal Moisture

- 11.1 ARDEX Undertile Liquid Membranes are impervious to water, and when appropriately designed and installed will prevent water from penetrating behind linings or entering concealed spaces.
- 11.2 Surfaces must be finished with ceramic or stone tiles. A means of compliance with NZBC Clauses E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1 Paragraph 3.1.1 b), 3.1.2 b) and 3.3.1 b).



- 11.3 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1,500 mm out from the shower rose. Floor wastes and drainage flanges must be provided and the floor must fall to the outlet.
- 11.4 ARDEX Undertile Liquid Membranes are suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of compliance for overflow is given in NZBC Acceptable Solution E3/AS1, Section 2.
- 11.5 The waterproofing membranes must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1,500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, the BRANZ Good Practice Guide: Tiling, and the flooring and wall lining manufacturers.
- 11.6 Where water-resistant wall finishes such as prefinished sheet materials are used, they must overlap the membrane a minimum of 30 mm.

## Installation Information

### Installation Skill Level Requirement

- 12.1 Installation of the membranes must be completed by trained installers, approved by ARDEX New Zealand Limited.
- 12.2 Installation of substrates must be completed by, or under the supervision of, Licensed Building Practitioners [LBP] with the relevant Licence Class, in accordance with instructions given within the ARDEX New Zealand Limited Technical Literature and this Appraisal.

### Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be even and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of concrete substrates must be 75% or less before membrane application. The concrete can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.
- 13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have reinforcements installed as set out in the Technical Literature.
- 13.4 The moisture content of reconstituted wood flooring at the time of priming must not exceed 16%. All face surfaces and edges must be primed prior to membrane installation.
- 13.5 Substrates must be primed with ARDEX Multiprime and allowed to dry fully before the membrane is installed.

### Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 10°C or above 35°C.
- 14.2 ARDEX WPM 002 liquid and dry components must be mixed and left to stand for 5 minutes before re-mixing, then applying. ARDEX WPM 001 and ARDEX WPM 155 Rapid must be thoroughly stirred before application.
- 14.3 The membranes must be applied in a minimum of two coats at the rates set out in the Technical Literature to give a total finished thickness of 0.5-1.2 mm. Subsequent coats must be applied at an opposite direction to the previous coat.
- 14.4 Application can be made by roller (medium/long nap), brush (long bristle), or a flat steel trowel.
- 14.5 Reinforcement fabric is bedded into the wet layer between coats to provide movement protection at wall/wall and wall/floor junctions, and at any other areas such as joints in the flooring substrate, floor cracks or around penetrations in the membrane. ARDEX STB Tape must be used with ARDEX WPM 155 Rapid to take advantage of the rapid/fast drying features.
- 14.6 Clean up may be undertaken with water.



### Tiling

- 15.1 The membrane must be fully cured before tiling. The cured membrane must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide: Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer or ARDEX New Zealand Limited.

### Inspections

- 16.1 Critical areas of inspection are:
- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
  - Moisture content of the substrate prior to the application of the membrane.
  - Acceptance of the substrate by the membrane installer prior to application of the membrane.
  - Installation of the membrane to the supplier's instructions, particularly installation to the correct thickness and use of reinforcement.
  - Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

### Health and Safety

- 17.1 Safe use and handling procedures for the membrane are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

### Basis of Appraisal

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

#### Tests

- 18.1 The following testing of ARDEX WPM 001 and ARDEX WPM 002 has been undertaken by ARDEX Australia Pty Limited research and development laboratory: water vapour transmission, water absorption, tensile strength and elongation before and after UV exposure, immersion in bleach, immersion in industrial detergent and immersion in water. Test methods and results were reviewed by BRANZ and found to be satisfactory.
- 18.2 The following testing of ARDEX WPM 001 was undertaken by the Commonwealth Scientific Industrial Research Organisation [CSIRO] Australia:
- In accordance with ANSI A118.10 for ICBO Evaluation Service - dimensional stability, waterproofness, shear strength to ceramic tile and cement mortar, and fungal and micro-organism resistance.
  - In accordance with AS 1145 - behaviour under cyclic strain.
- 18.3 Testing of ARDEX WPM 001 and ARDEX WPM 002 has been undertaken by BRANZ for low temperature flexibility and peel adhesion after heat/humidity aging.
- 18.4 The following testing of ARDEX WPM 155 Rapid was undertaken by various organisations:
- Durability testing to AS/NZS 4858 Appendix A including effect of heat aging, bleach, detergent and water on tensile strength and elongation.
  - Cyclic movement resistance requirements of AS/NZS 4858:2004 Appendix B.
  - Water vapour transmission using both wet and dry cup methods from ASTM E96.
  - Water transmission behaviour following the procedures of AS/NZS 4858 Appendix C.
- 18.5 The above test methods and results have been reviewed by BRANZ and found to be satisfactory.





### Other Investigations

- 19.1 An assessment was made of the durability of the ARDEX Undertile Liquid Membranes by BRANZ technical experts.
- 19.2 Site inspections have been carried out by BRANZ to examine the practicability of installation.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

### Quality

- 20.1 The manufacture of the membrane 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.
- 20.2 The quality management system of membrane's manufacturer has been assessed and found to be satisfactory.
- 20.3 The quality of supply of the membrane system materials to the market is the responsibility of ARDEX New Zealand Limited.
- 20.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the framing systems and substrate.
- 20.5 Quality on-site is the responsibility of the trained installers, approved by ARDEX New Zealand Limited.
- 20.6 Building owners are responsible for the maintenance of the ceramic or stone tiles in accordance with the instructions of ARDEX New Zealand Limited.

### Sources of Information

- AS 3740:2021 Waterproofing of domestic wet areas.
- AS 3958.1:2007 Ceramic tiles - Guide to the installation of ceramic tiles.
- AS/NZS 1170:2002 Structural design actions
- AS/NZS 2908.2:2000 Cellulose-cement products - Flat sheets.
- AS/NZS 4858:2004 Wet area membranes.
- AS/NZS 2269:2012 Plywood - Structural.
- BRANZ Good Practice Guide: Tiling [Third Edition], April 2015.
- NZS 3101:2006 Concrete Structures Standard.
- NZS 3602:2003 Timber and wood-based products for use in buildings.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4229:2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230:2004 Code of practice for the design of masonry structures.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



In the opinion of BRANZ, **ARDEX Undertile Internal Liquid Waterproofing Membranes** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **ARDEX 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. **ARDEX 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 **ARDEX 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 **ARDEX New Zealand Limited** or any third party.

For BRANZ

**Chelydra Percy**

Chief Executive

Date of Issue:

02 August 2022



---

# ARDEX WPM 001

## One-Part Undertile Waterproofing Membrane

---

Fast-drying acrylic undertile liquid waterproofing membrane

Class III Membrane - Conforms to AS4858:2004

BRANZ Appraised (No. 472 and No. 473)

Suitable for internal use

Low VOC content – meets Green Building Council of Australia  
Green Star IEQ-13 requirements



---

**ARDEX Australia Pty Ltd**  
20 Powers Road  
Seven Hills NSW 2147  
Phone: 1300 788 780  
Fax: 1300 780 102  
Email: [technicalservices@ardexaustralia.com](mailto:technicalservices@ardexaustralia.com)  
[www.ardexaustralia.com](http://www.ardexaustralia.com)

**ARDEX New Zealand Ltd**  
15 Alfred Street  
Onehunga, Auckland 1061  
Phone: 0800 227 339  
Fax: (03) 384 9779  
Email: [info@ardexnz.com](mailto:info@ardexnz.com)  
[www.ardex.co.nz](http://www.ardex.co.nz)

# ARDEX WPM 001

## One-Part Undertile Waterproofing Membrane

### PRODUCT DESCRIPTION

ARDEX WPM 001 is a tough, ready to use waterproofing membrane specifically designed for use under tiles. ARDEX WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

ARDEX WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

ARDEX WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

### FEATURES/BENEFITS

- Fast drying ARDEX WPM 001 can be tiled over in 48 hours in non critical areas\*
- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat
- Flexible: Accommodates normal building movement class 3 membrane as per AS/NZ 4858: 2004 Wet Area Membranes
- Advanced acrylic: Will not re-emulsify once cured
- Designed for tiling - Fully compatible with ARDEX tile adhesive systems
- Water based, safe to use, low odour & easy cleaning
- CSIRO Appraisal #91 for undertile waterproofing in shower recesses
- Conforms to the requirements of AS/NZ 4858: 2004 Wet Area Membranes.  
(Ref: CSIRO Report 3779)

\*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

### APPLICATION RANGE

#### Performance Levels

Commercial and residential

#### Location

Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic. Only recommended on concrete, screed and render substrates externally.

### Surfaces

Walls & floors

### Substrates

Concrete

Cured for min. 28 days or sealed when set with one coat of ARDEX WPM 300 (HydrEpoxy 300) at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.

Renders and  
screeds

Cured for min. 7 days or sealed when set with one coat of ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of ARDEX WPM 300 as above.

Fibre cement

Suitable for wet area grade fibre cement.

Plasterboard

Wet area grade only.

Plywood

Structural plywood (PAA branded), marine grade or other wet area grade only. Not recommended for external use (Refer ARDEX). Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing. The maximum recommended span in E2/AS1 is 400mm. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. External edges shall be chamfered with a minimum radius of 5mm. Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets. All joints in the plywood and junctions of plywood with other materials shall have 25mm ARDEX Release tape applied before application of the membrane.

Particleboard

Wet area grade, internal use only (special preparation is required – contact ARDEX).

Permanent

In conditions of permanent immersion,

Immersion

it is recommended that ARDEX WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.

Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

TABLE 1

	Thickness per Coat		Total Dry Film Thickness (2 coats)	Theoretical Coverage		Per Unit
	Dry Film	Wet Film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m <sup>2</sup>	7.5m <sup>2</sup>	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m <sup>2</sup>	15m <sup>2</sup>	20kg(15L) unit

**PACKAGING**

Single component: 20kg (approx. 15 litres)

**SHELF LIFE**

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

**COVERAGE**

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5-15m<sup>2</sup> (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table 1.

**DRYING TIMES****Recoat time**

1-2 hours at (23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet.

**Dry through**

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. ARDEX WPM 001 is totally dry in 48 hours at 23°C/50% RH, but can take up to 72 hours at 10°C/50% RH in corners or for thick films.

**Fully cured**

The shower should not be used until the membrane has reached its full strength. ARDEX WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

**CLEANING**

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

**SAFETY PRECAUTIONS**

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the ARDEX WPM 001.

For substrates or situations other than those listed contact ARDEX.

**SAFETY DATA**

ARDEX WPM 001 is non-hazardous and non dangerous. It may produce discomfort of the eyes, respiratory tract and skin. Do not breathe gas/fumes/vapour/spray. Avoid contact with skin. Wear eye/face protection. In case of contact with eyes, rinse with plenty of water and seek medical advice.

ADDITIONAL INFORMATION IS LISTED IN THE SAFETY DATA SHEET.

**QUALITY PRODUCT**

ARDEX WPM 001 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

# ARDEX WPM 001

## One-Part Undertile Waterproofing Membrane

### USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with ARDEX instructions and in applications for which they are intended.

### APPLICATION

Apply ARDEX WPM 001 by brush or roller. A medium nap (12-15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

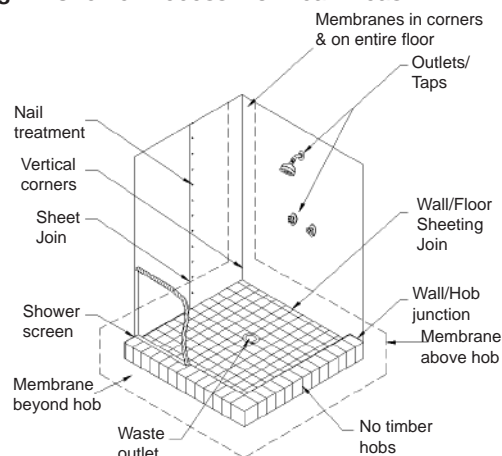
To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25-40 micrometers wet film thickness while ARDEX WPM 001 needs to be applied at between 0.5 and 1.0 mm per coat depending on product and application (Refer Table 1).

### CRITICAL AREAS:

#### INTERNAL WET AREAS

1. Construction should be in accordance with Australian 3740 - 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall & floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber).

**Fig.1 – Shower Recess – Critical Areas**

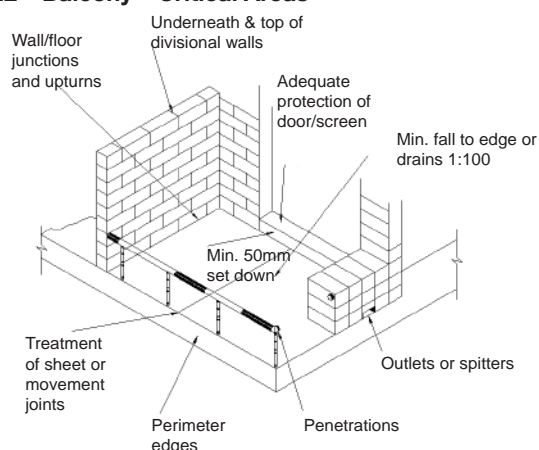


5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr)) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls. Spreading the sealant to 6mm on either side of the joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 & the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

#### BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else

**Fig.2 – Balcony – Critical Areas**





achieve the fall with a sand/cement screed.

2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).
3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/ sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls, or other items such as planter boxes.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. Ensure all weep holes are above the membrane application area.

## APPLICATION NOTES

### Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2mtr (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means

(shot blasting, grinding, etc).

### Priming

The primer is a critical part of the waterproofing system. Apply one coat of ARDEX WPM 265 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the ARDEX WPM 001 membrane. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m<sup>2</sup> per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

## GENERAL APPLICATION

### Crack preparation

#### Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with ARDEX WPM 265 and allow to dry before applying two coats of ARDEX WPM 001 membrane in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

#### Cracks 2-6mm:

(Refer Fig. 3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

#### Cracks >6mm:

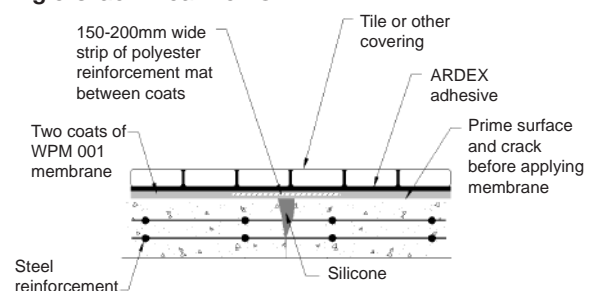
Contact your local ARDEX representative.

### Movement/construction joints

#### Movement joints (<6mm)

Use same procedure as in crack preparation.

**Fig.3 Crack Treatments**



# ARDEX WPM 001

## One-Part Undertile Waterproofing Membrane

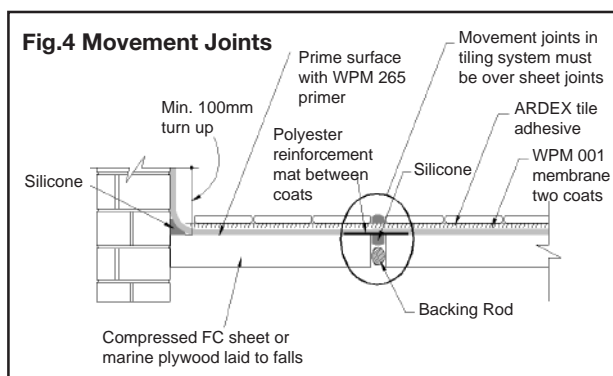
Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of ARDEX WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the mat and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

### Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of ARDEX Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)

### Corners & coving areas

After priming with ARDEX WPM 265 and allowing to dry,



apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates in coving areas and corners. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry.

Apply a first coat of ARDEX WPM 001 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be minimum of 1.0mm). Alternatively, if a polyester reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

### WALL/FLOOR JUNCTION

After priming with ARDEX WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX "Deckweb" polyester

woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The ARDEX WPM 001 should be applied to at least 100 mm up the wall surfaces as per the recommendations for the application of ARDEX WPM 001 to floors.

### Walls

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 0.5mm.

After priming with ARDEX WPM 265 and allowing to dry, apply two coats of ARDEX WPM 001 (to achieve a minimum dry film thickness of 0.5mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

### Floors

Two coats of ARDEX WPM 001 are required to achieve a minimum total dry film thickness of 1.0mm. The flooring recommendations should be extended at least 150 mm up all perimeter walls.

Prime the surface with ARDEX WPM 265 and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1-2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone treatment. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

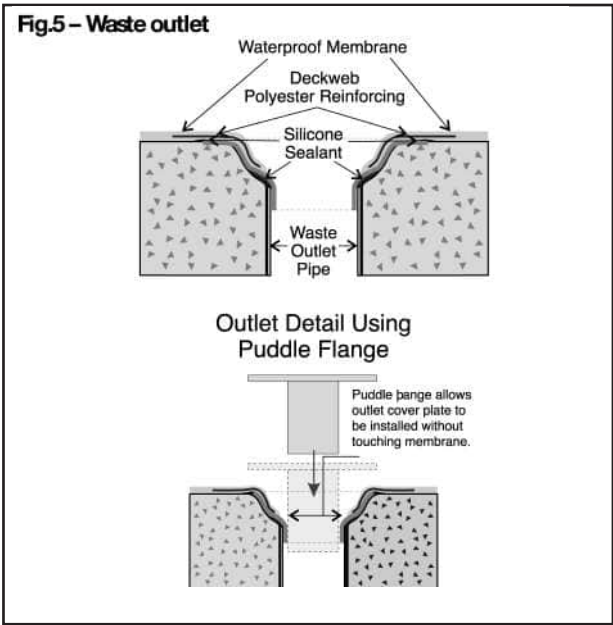
### Waste Outlet

Prime the surface with ARDEX WPM 265 and allow to dry. Surfaces of the outlet flange must be primed with an appropriate primer.

Apply ARDEX WPM 001 over the adjacent floor surface extending down into the waste outlet flange overlapping the edge of flange by at least 30mm. Place ARDEX "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig. 5)

### Balcony penetrations (Refer Fig.6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.



Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of ARDEX WPM 001 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.0mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

**Tiling systems**

It is advisable to conduct a flood test of the shower once the membrane has cured (normally after 72 hours), and before the tiling commences. A broad

range of ARDEX tile adhesives can be used over ARDEX membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

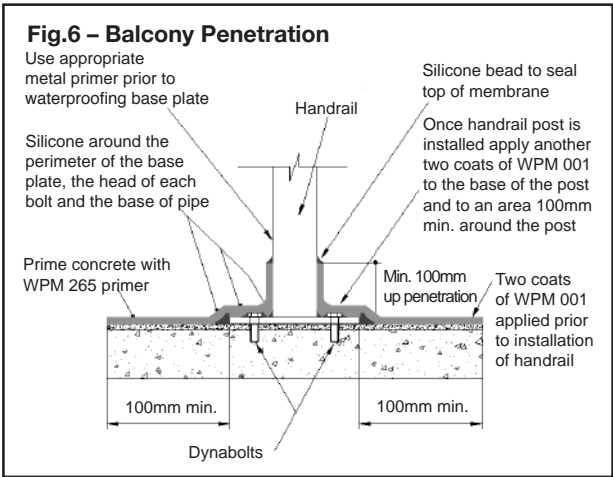
**TECHNICAL DATA**

**ARDEX WPM 001**  
**Characteristics of liquid**

Form & Colour	Blue viscous paste
Type	Single part
Specific Gravity	Approx. 1.34kg/litre
pH of Liquid	8.5
Viscosity of Liquid (RVT Brookfield, spindle 7 speed 10)	52,000cps
Non Volatile Matter (volume) AS1321.10	50.3%±1
Tensile Strength 7 days dry AS1145	1.04 MPa
Full Cure	1.92 MPa
Elongation at Break 7 days dry AS1145	780%

Conforms to requirements of class 3 membrane of AS/NZ 4858: 2004 Wet Area Membranes.

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% R.H)



# ARDEX WPM 001

## One-Part Undertile Waterproofing Membrane

---

### **Toll Free Technical Services:**

**1800 224 070 (Australia)**

**0800 227 339 (New Zealand)**

### **ARDEX Australia Pty Ltd**

20 Powers Road

Seven Hills NSW 2147

Phone: 1300 788 780

Fax: 1300 780 120

Email: [technicalservices@ardexaustralia.com](mailto:technicalservices@ardexaustralia.com)

**[www.ardexaustralia.com](http://www.ardexaustralia.com)**

### **ARDEX New Zealand Ltd**

32 Lane Street, Woolston

Christchurch, New Zealand 8023

Phone: 0800 227 339

Fax: (03) 384 9779

Email: [info@ardexnz.com](mailto:info@ardexnz.com)

**[www.ardex.co.nz](http://www.ardex.co.nz)**

### **DISCLAIMER**

The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable New Zealand Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program. Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them. © ARDEX New Zealand Ltd. All aforementioned products are the trade marks of ARDEX New Zealand Ltd.



---

# ARDEX WPM 002

## (Superflex Bathroom and Balcony Two Part)

---

Rapid drying time

Two component undertile waterproofing membrane

Advanced acrylic – will not re-emulsify

Fibre reinforced – eliminates the need for reinforcing mat

Meets class III category for AS 4858 Wet Area Membranes

Low VOC content – meets Green Building Council of Australia  
Green Star IEQ-13 requirements



**BRANZ Appraised**  
Appraisal No.473 [2022]



**BRANZ Appraised**  
Appraisal No.472 [2022]

---

**ARDEX New Zealand Ltd**  
15 Alfred Street  
Onehunga, Auckland 1061  
0800 227 339  
info@ardexnz.com  
ardex.co.nz



# ARDEX WPM 002

## (Superflex Bathroom and Balcony Two Part) Two Component Undertile Waterproofing Membrane

### DESCRIPTION

ARDEX WPM 002 (Superflex Bathroom and Balcony Two Part) is a tough, fast drying two component waterproofing membrane specifically designed for use under tiles. The product has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. ARDEX WPM 002 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification.

ARDEX WPM 002 is flexible, low in odour, and is fully compatible with polymer modified tile adhesives. ARDEX WPM 002 is one of the fastest drying acrylic membranes on the market – normally ready to tile in 16–24 hours @ 23°C. ARDEX WPM 002 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

### FEATURES/BENEFITS

- Fast drying ARDEX WPM 002 can be tiled over in 16–24 hours, or 4 hours @ 23°C / 50% RH in non critical areas\*.
- Fibre reinforced: Excellent strength, eliminates need for reinforcing mat.
- Flexible: Accommodates normal building movement.
- Advanced acrylic: Will not re-emulsify.
- Designed for tiling: Fully compatible with ARDEX tile system adhesives.
- Water based, low odour and easy cleaning for undertile waterproofing in shower recesses.
- Conforms to the requirements of AS/NZ 4858:2004 Wet Area Membranes.

\*Critical areas include areas where the membrane is applied over impermeable substances such as bond breakers or incorporating reinforcement. Longer drying times are necessary in these areas.

### APPLICATION RANGE

#### Performance levels

Commercial and residential.

#### Location

Internal and external wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic.

#### Surfaces

Walls and floors.

#### Substrates

##### Concrete

Cured for min. 28 days or sealed when set with one coat ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0m<sup>2</sup> per litre and allowed to cure overnight.

Wet concrete should be allowed to dry thoroughly or sealed

with one coat of ARDEX HydrEpoxy WPM 300 as above.

#### Renderers and screeds

Cured for min. 7 days or sealed when set with one coat ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0m<sup>2</sup> per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of ARDEX HydrEpoxy WPM 300 as above.

#### Fibre cement

Wet area grade only.

#### Plasterboard

Wet area grade only.

#### Plywood

Structural plywood (PAA branded) or marine grade or other wet area grade only. Not recommended for external use (refer ARDEX).

#### Particleboard

Wet area grade, internal use only (special preparation is required – contact ARDEX). Not recommended for external use (refer ARDEX).

#### Permanent Immersion

It is recommended that ARDEX WPM 002 must be covered with tiles for permanent immersion applications. Contact ARDEX for use over existing membranes, covering materials, and any other substrates not listed.

### SPECIFICATION CLAUSE

#### ARDEX WPM 002

The waterproofing membrane shall be ARDEX WPM 002, a two component cementitious acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

#### PACKAGING

Two component: 20kg (approx 20 litres) liquid pail and 1x 20kg bag.

#### SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Protect from frost. Use remaining contents from part used containers within 3 months.

#### MIXING

The mixing ratio of ARDEX WPM 002 is 1 part liquid (by weight) to 1 part powder (by weight). The unit is broken into equal components for accurate measurement. Stir the ARDEX WPM 002 liquid thoroughly and pour the accurate measure into a suitable clean plastic container. Add ARDEX WPM 002 powder to the liquid whilst stirring. Stir until a homogenous, lump free paste is achieved.

#### COVERAGE

Two coats are recommended for an effective waterproof membrane. Coverage will vary depending on the porosity of the surface. One 40kg kit will cover approximately 16–24m<sup>2</sup> (based on two coats) depending on area requirements between wall and floor surfaces to be treated.



## ARDEX WPM002

**(Superflex Bathroom and Balcony Two Part)  
Two Component Undertile Waterproofing Membrane**

Table 1

	Thickness per coat		Total dry film thickness (2 coats)	Theoretical Coverage		Per Unit
	Dry film	Wet film		Per coat	For 2 coats	
Floors	0.6mm	0.9mm	1.2mm	32m <sup>2</sup>	16m <sup>2</sup>	40kg kit
Walls	0.4mm	0.6mm	0.8mm	48m <sup>2</sup>	24m <sup>2</sup>	40kg kit

**DRYING TIMES**

Curing time will vary depending on temperature and humidity.

**Recoat time**

1–2 hours (23°C / 50% RH) between first and second coats. Alternatively, if a woven cloth reinforcement mat is used in corners between coats then the second coat can be applied whilst the first coat is still wet.

**Dry through**

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry.

ARDEX WPM 002 membrane is totally dry in 16 hours at 23°C / 50% RH but can take up to 24 hours at 10°C / 50% RH in corners or for thick films. In areas where bond breakers or additional reinforcement are not used, ARDEX WPM 002 can be tiled over after 4 hours at 23°C / 50% RH.

**Fully cured**

The shower should not be used until the membrane has reached its full strength. Normally ARDEX WPM 002 membranes are fully cured after 3 days at 23°C, or after 5 days at 10°C. Drying times will vary depending on humidity, surface temperature and surface porosity. Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

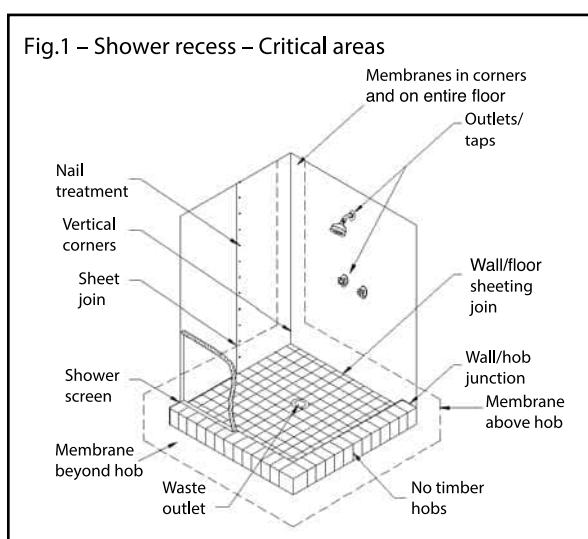
**CLEANING**

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

**APPLICATION**

Apply ARDEX WPM 002 by brush or roller. A medium nap (12–15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time. For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25–40 micrometers wet film thickness while ARDEX WPM 002 needs to be applied at between 0.6 and 0.9mm per coat depending on product and application (Refer to Table 1).

**Critical areas:****INTERNAL WET AREAS**

1. Construction should be at a minimum in accordance with AS 3740-2004 which is pictured above. ARDEX however recommends waterproofing the entire walls to at least 80 mm above the shower rose.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall and floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber), and that the top of the hob does not slope outwards.
5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2m) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 8mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls.
11. Waste outlets shall incorporate a leak control flange or similar in accordance with AS 3740 and the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the leak control flange and the screed/floor.

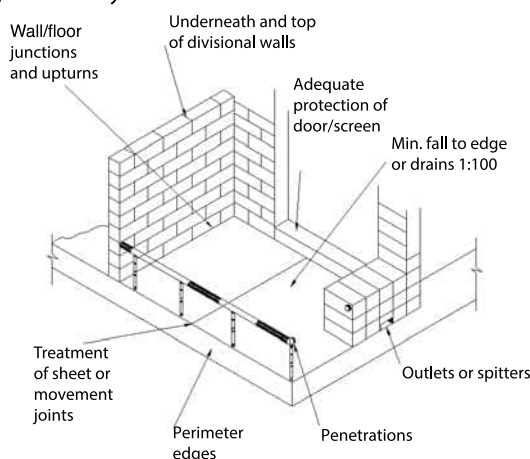
# ARDEX WPM002

## (Superflex Bathroom and Balcony Two Part) Two Component Undertile Waterproofing Membrane

12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 100mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Plastic (eg. PVC) fittings should be primed with a solvent based plumbers primer. Prime metal surfaces with a suitable metal primer.
14. Apply the membrane minimum 1800mm up the walls or 80mm above the height of the shower rose within the shower recess. In circumstances where the shower rose is positioned on the ceiling, ARDEX recommends the WPM 002 membrane be installed to the ceiling height.
15. Install the shower screen to inside edge of the hob.

### BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/  
Fig.2 – Balcony – Critical areas



drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.

2. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/sliding door.
3. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
4. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
5. Apply the membrane as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
6. Where possible, apply the membrane prior to building divisional walls.
7. Apply the membrane to the entire balcony floor and at least 100mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
8. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
9. Apply the membrane down over the front edge of the balcony onto the drip rail.
10. Carefully seal any gaps around balcony penetrations prior to applying the membrane.

11. Apply the membrane down into outlets and drains, ensuring excess material is removed.
12. Ensure all weep holes are above the membrane application area.

### APPLICATION NOTES

#### Surface preparation

Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.

- Falls to outlets of at least 1:60 or approx. 30mm in 2m (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired, levelled and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.
- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

#### Priming

The primer is a critical part of the waterproofing system. Apply one coat of ARDEX Multiprime water based primer by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to be completely dry prior to the application of the ARDEX WPM 002 membrane. This will take around 20–30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m<sup>2</sup> per litre. Plastic (e.g. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

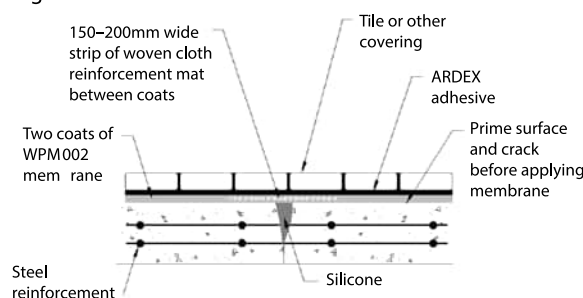
### GENERAL APPLICATION

#### Crack preparation

#### Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the

Fig.3 – Crack treatments



# ARDEX WPM002

## (Superflex Bathroom and Balcony Two Part) Two Component Undertile Waterproofing Membrane

crack and adjacent area carefully with ARDEX Multiprime water based primer and allow to dry before applying two coats of ARDEX WPM 002 membrane, in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

### Cracks 2–6mm:

(Refer to Fig.3) prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of ARDEX WPM 002 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

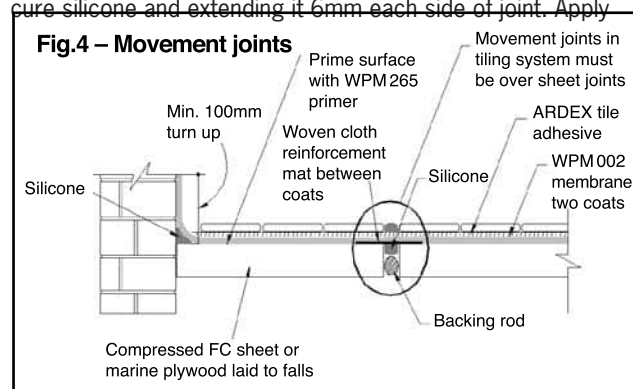
### Cracks >6mm:

Contact ARDEX Technical Services for specifics with this.

### Movement/construction joints

#### Movement joints (<6mm)

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply



a 300mm wide band of ARDEX WPM 002 (Superflex Two Part) equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

#### Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of ARDEX Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer to Fig.4).

### Corners and coving areas

After priming with ARDEX Multiprime water based primer and allowing it to dry, apply a generous bead (16mm) of neutral cure silicone sealant in coving areas and corners. Smooth over the silicone so that it extends 8mm up the wall and 8mm over the floor and allow to touch dry. Apply a first coat of ARDEX WPM 002 to the area and allow the membrane to dry. Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be around 1.2mm) Alternatively, if a woven cloth reinforcement mat is

used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

### WALL/FLOOR JUNCTION

After priming with ARDEX Multiprime water based primer and allowing to dry, apply a generous bead (16mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 8mm up the wall and 8mm over the floor and allow to touch dry. Place a 190mm wide band of ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The ARDEX WPM 002 should be applied to at least 150mm up the wall surfaces as per the recommendations for the application of ARDEX WPM 002 to floors.

### Walls

Two coats of ARDEX WPM 002 are required to achieve a minimum total dry film thickness of 0.8mm. After priming with ARDEX Multiprime water based primer and allowing to dry, apply two coats of ARDEX WPM 002 (to achieve a minimum dry film thickness of 0.8mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

### Floors

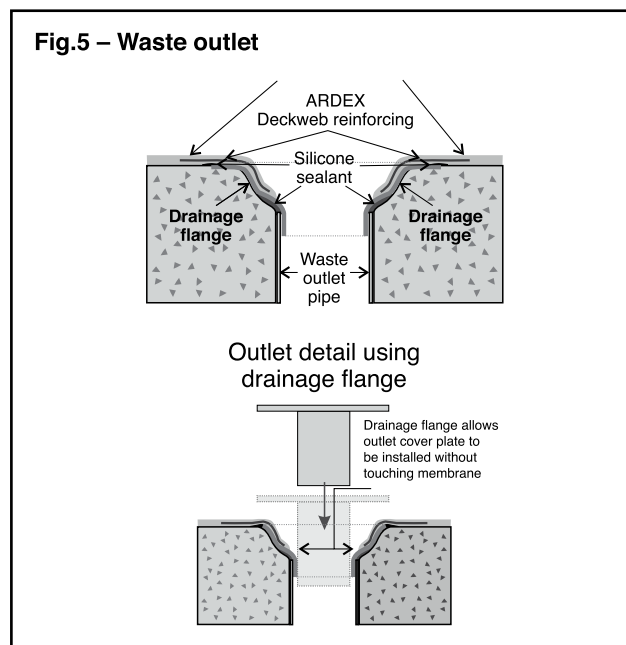
Two coats of ARDEX WPM 002 are required to achieve a minimum total dry film thickness of 1.2mm. The membrane should be extended at least 100mm up all perimeter walls.

Prime the surface with ARDEX Multiprime water based primer and allow to dry. Apply the first coat over the primed surface and allow it to dry (1–2 hours at 23°C, 50% RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone sealant. If a flange is not installed the membrane must be applied down into the pipe. (Refer to Fig.5). Allow the membrane to dry completely before tiling.

## ARDEX WPM 002

(Superflex Bathroom and Balcony Two Part)  
Two Component Undertile Waterproofing Membrane

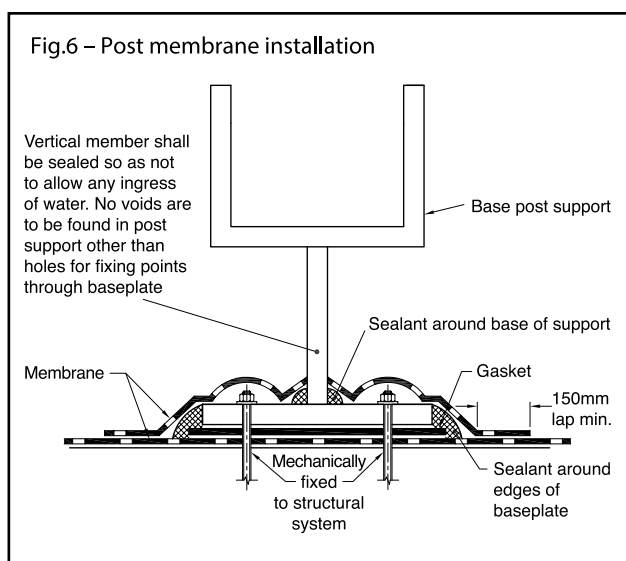
## Waste outlet



Prime the surface with ARDEX Multiprime water based primer and allow to dry. Surfaces of outlet flange must be primed with an appropriate primer.

Apply ARDEX WPM 002 over the adjacent floor surface extending down into the waste outlet pipe overlapping the pipe surfaces by at least 30mm. Place ARDEX Deckweb woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer to Fig.5).

## Balcony penetrations (Refer Fig.6)



All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm bead of neutral cure silicone around the perimeter of the penetration.

Apply the first coat of ARDEX WPM 002 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.2mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

## ARDEX WPM 002 &amp; STB TAPE INSTALLATION

1. Ensure area is free from contaminants and clean making sure to remove all dust and prime fibre cement sheet with an approved primer (listed in the primers section). Apply the tape and use a roller to ensure that a secure bond is made between the tape and substrate and carefully moulded into the corners.
2. Apply a first coat of ARDEX WPM 002 to the entire area to be waterproofed using a brush or roller, a medium nap (8–12mm pile) or 50mm long bristle paint brush is recommended. This first coat should be applied at 0.6mm (wet film thickness). Allow to dry. Dry time is approximately 1-2 hours.
3. Apply a second coat of the ARDEX WPM 002 membrane at a thickness of 0.6mm (wet film thickness). This will provide a total dry film thickness of 0.8mm over the ARDEX STB Tape. Care should be taken to ensure excessive build up of membrane is avoided over the ARDEX STB Tape. It is crucial that the dry film thickness at the edge of the tape of the ARDEX WPM 002 is at least 1.2mm so that stress and movements at this point are accommodated. The increase in film thickness is likely to slow down drying and curing in this area relative to the rest of the membrane areas. Final dry film thickness over floor and wall areas not covered by ARDEX STB Tape should be 1.2mm for floors and 0.8mm for walls.

## Tiling systems

It is advisable to conduct a flood test of the waterproofed areas once the membrane has cured (after a minimum of 48 hours), and before the tiling commences. A broad range of ARDEX tile adhesives can be used over ARDEX Superflex membranes. Contact ARDEX or your nearest ARDEX stockist for advice on the most suitable system.

## QUALITY PRODUCT

ARDEX WPM 002 is manufactured and tested to ARDEX procedures which are maintained in accordance with Quality System Standard ISO 9001.

## PAY ATTENTION TO THE FOLLOWING

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with ARDEX HydrEpoxy WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of ARDEX HydrEpoxy WPM 300 at a coverage rate of 3.0m<sup>2</sup> per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).



## ARDEX WPM 002

**(Superflex Bathroom and Balcony Two Part)  
Two Component Undertile Waterproofing Membrane**

- Where substrates have ponding water or fail to meet the required falls in the applicable standards. It is recommended a corrective screed be installed or falls be created, prior to the application of ARDEX WPM 002.

For substrates or situations other than those listed contact ARDEX Technical Services.

Before any substrate preparation, installation or finishing methods relating to ARDEX product are undertaken, please be aware of any potential risks and use appropriate PPE (personal protective equipment). This may involve contacting substrate manufacturers for Safety Data Sheets.

**SAFETY DATA****ARDEX WPM 002 Part A Liquid**

This product may cause irritation and an allergic reaction to the skin. Avoid contact with skin and eyes. In case of contact with the eyes rinse with running water until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. If irritation continues, seek medical attention. Wear protective gloves, clothing, face and eye protection. Avoid inhaling dust/fumes/gas/mist/vapours/spray. This product is harmful to aquatic life with long lasting effects. Ensure adequate ventilation during mixing and application.

**ARDEX WPM 002 Part B Powder**

This product may cause irritation and an allergic reaction to the skin. It may cause serious eye injury and irritation to the respiratory system. May cause cancer. May cause damage to organs through prolonged or repeated exposure. In case of contact with the eyes rinse with running water until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. Wear protective gloves, clothing, eye and face protection. Avoid inhaling dust/fumes/gas/mist/vapours/spray. Ensure adequate ventilation during mixing and application. Store locked up. Check with your local Council regarding the disposal of contents. Keep out of the reach of children. Call the Poisons Information Centre on 0800 764 766 (NZ) or call a doctor if you feel unwell. At times updates can occur to data. For additional information and to ensure you have the most current technical and safety information please consult the latest Safety Data Sheet (SDS) and Technical Data Sheet found on the product page at [ardex.co.nz](http://ardex.co.nz)

**TECHNICAL DATA****CHARACTERISTICS OF COMPONENTS****Form and colour****Liquid**

White, medium viscosity

**Powder**

Off White

**CHARACTERISTICS OF MIXED PRODUCT****Mixing ratio**

1:1 by weight

**SG of mixed product**

1.4kg/litre

**Colour**

Light Grey/Green

**CHARACTERISTICS OF CURED MEMBRANE****Shore A hardness ASTM D2240****Dry film**

85 – 90

**Wet film**

75 – 80

**Tensile strength****7 days dry AS 1145**

1.7 MPa

**Full cure 28 days**

2.9 MPa

**Elongation at break****7 days dry AS1145**

&gt;300%

**VOC content**

25g/L

NOTE: Most of the tests have been carried out in the ARDEX laboratory under standard conditions (23±2°C, 50±5% RH).

**DISCLAIMER**

The technical details, recommendations and other information contained in this datasheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable New Zealand Standards. Our instructions and recommendations are only for the uses they are intended. Users are advised to confirm that this product is suitable for their application and conforms with the specifications of the system. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program. Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may affect specific installation recommendations. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them.

© ARDEX New Zealand Ltd 2023.

All aforementioned products are the trademarks of ARDEX New Zealand, its licensors and affiliates.

Always refer to [ardex.co.nz](http://ardex.co.nz) for the latest technical data from ARDEX New Zealand Ltd.



**BRANZ Appraised**

Appraisal No. 484 [2018]

**MAPEGUM WPS, MAPELASTIC,  
MAPELASTIC SMART AND  
MAPELASTIC AQUADEFENSE  
WET AREA MEMBRANES**

**Appraisal No. 484 [2018]**

This Appraisal replaces BRANZ  
Appraisal No. 484 [2012]

Amended 06 October 2022



**BRANZ Appraisals**

Technical Assessments of  
products for building and  
construction.



**MBP [NZ] Ltd**

Exclusive distributor of Mapei  
products in New Zealand

PO Box 12 326

Penrose  
Auckland

Tel: 09 921 1994

Fax: 09 921 1993

Web: [www.MBPLtd.co.nz](http://www.MBPLtd.co.nz)



**BRANZ**

**BRANZ**

1222 Moonshine Rd,  
RD1, Porirua 5381  
Private Bag 50 908  
Porirua 5240,  
New Zealand  
Tel: 04 237 1170  
[branz.co.nz](http://branz.co.nz)



**Product**

- 1.1 Mapegum WPS and Mapelastic AquaDefense are one-component, liquid-applied waterproofing membranes for internal applications under trafficable floor finishes.
- 1.2 Mapelastic and Mapelastic Smart are two-component liquid-applied waterproofing membranes suitable for internal applications on substrates under trafficable floor finishes.

**Scope**

- 2.1 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes have been appraised for use as waterproofing membranes for the internal wet areas of buildings, within the following scope:
  - on floor substrates of concrete, flooring grade particle board, plywood, fibre cement compressed sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
  - when protected from physical damage by trafficable floor finishes; and,
  - where floors are designed and constructed such that deflections do not exceed 1/360<sup>th</sup> of the span.
- 2.2 The use of Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Movement and control joints in the substrate must be carried through the membrane and trafficable floor finish. The design and construction of the substrate and movement and control joints is specific to each building, and is therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.4 The trafficable floor finishes are outside the scope of this Appraisal.
- 2.5 The membranes must be installed by trained applicators, approved by MBP [NZ] Ltd, to the conditions of the Technical Data Sheet [TDS] of the products.





## Building Regulations

### New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

**Clause B2 DURABILITY:** Performance B2.3.1 [b] 15 years and B2.3.2. Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes meet these requirements. See Paragraph 9.1.

**Clause E3 INTERNAL MOISTURE:** Performance E3.3.6. Interior wet area floors and walls incorporating Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes will meet this requirement. See Paragraphs 11.1-11.7.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes meet this requirement.

## Technical Specification

4.1 Materials supplied by MBP [NZ] Ltd are as follows:

- **Mapegum WPS** - a one-part, fast drying, polymer-based, ready-to-use, liquid-applied membrane. It is supplied as a light grey-coloured paste in 5, 10 and 25 kg buckets.
- **Mapelastic** - a two-part, flexible, cementitious, liquid-applied membrane. It is supplied as a Part A powder in 24 kg multi-wall bags and a Part B liquid in 8 kg plastic containers. When dry, the membrane is grey in colour.
- **Mapelastic Smart** - a two-part, flexible, cementitious, liquid-applied membrane. It is supplied as a Part A powder in 20 kg multi-wall bags and a Part B liquid in 10 kg plastic containers. When dry, the membrane is light grey in colour.
- **Mapelastic AquaDefense** - a one-part, solvent-free, ultra-quick drying synthetic resin-based paste in water dispersion liquid-applied membrane. It is supplied as a light blue coloured paste in 15 kg drums.
- **Mapeband and Mapeband Gaskets** - a rubber-coated polyester tape for waterproofing expansion joints and sealing around drains and pipes. Available as a tape 120 mm wide in rolls 50 m long, and also in ready-made internal and external corners [90 and 270 degrees] and pipe gaskets 118 x 118 mm and 300 x 300 mm, "T" profiles 515 mm x 315 mm and cross profiles 515 x 515 mm.
- **Mapeband PE120** - a PVC fabric tape used to reinforce wall/wall and floor/wall joints. It is only used with Mapegum WPS and Mapelastic AquaDefense. Available as a tape 120 mm wide, in rolls 10 m and 50 m long, and also as preformed angles 90° and 270°.
- **Mapetex Sel** - a macro-holed non-woven fabric, used to reinforce the first and second layer of the waterproofing membranes. It is supplied as a polypropylene white fabric, in rolls 100 mm, 200 mm and 1 m wide x 25 m long.
- **Mapenet 150** - a glass fibre mesh used to reinforce the membranes. It is supplied as a blue mesh in rolls 1 m wide and 50 m long.
- **Mapeband SA** - a self-adhesive butyl rubber tape used to reinforce all joints. It is supplied as a 2 mm thick, 100 mm wide tape in rolls 25 m long.
- **Mapei Primer 3296** - an acrylic primer for absorbent surfaces. It is an opaque colour and supplied in 5 and 10 kg drums.

## Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and out of freezing conditions. The membrane products have a shelf life of 24 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.



## Technical Literature

- 6.1 This Appraisal must be read in conjunction with:
- Mapelastic Smart, Version 2013-4-2022-gb, 2022.
  - Mapegum WPS, Version 2014-10-2020-en (IT), 2020.
  - Mapelastic, Version 331-5-2018-gb, 2018.
  - Mapelastic AquaDefense, Version 2013-11-2016-gb, 2016.
- 6.2 All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes are for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 Mapegum WPS and Mapelastic AquaDefense are designed to be used where a one-component product is preferred.
- 7.3 The membranes must be protected from physical damage by the application of trafficable floor finishes.
- 7.4 Movement and control joints may be required depending on the shape and size of the building or room, and the floor finish specified. Design guidelines can be found in the BRANZ Good Practice Guide: Tiling.
- 7.5 Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases, framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed 1/360<sup>th</sup> of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

### Substrates

#### Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used.
- 8.2 The plywood must be laid with the face grain at right angles to the floor joists. The plywood must be supported with dwangs or framing with a maximum span of 400 mm in each direction, fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres along the sheet edges and 200 mm through the body of the sheets.

#### Fibre Cement Compressed Sheet/Fibre Cement Sheet Tile Underlay

- 8.3 Fibre cement compressed sheet and tile underlay must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Installation must be in accordance with the instructions of the manufacturer.

#### Particleboard

- 8.4 Particleboard must be specified for the end use in accordance with NZS 3602.

#### Concrete and Concrete Masonry

- 8.5 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229 and concrete masonry to NZS 4229 and NZS 4230.



#### Wet Area Wall Linings

- 8.6 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be suitable for use in internal wet areas.
- 8.7 Fibre cement sheet must be suitable for use in wet areas and comply with AS/NZS 2908.2.
- 8.8 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

#### Durability

##### Serviceable Life

- 9.1 The Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes, when subjected to normal conditions of environment and use, are expected to have a serviceable life of at least 15 years and be compatible with trafficable floor finishes with a design service life of 15-25 years.

#### Maintenance

- 10.1 No maintenance of the membranes will be required provided significant substrate movement does not occur and the trafficable floor finish remains intact. Regular checks must be made of the floor finish to ensure it is sound and will not allow moisture to penetrate. Any issues must be repaired immediately by repairing the floor finish.
- 10.2 In the event of damage to a membrane, the trafficable floor finish must be removed and the membrane repaired by removing the damaged portion and applying a patch with sufficient overlap over the damaged section.
- 10.3 Drainage outlets must be maintained to operate effectively, and floor finishes must be kept clean.

#### Internal Moisture

- 11.1 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes are impervious to water, and when appropriately designed and installed, will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Surfaces must be finished with a trafficable floor finish. A means of compliance with NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 b), 3.1.2 b) and 3.3.1 b).
- 11.3 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1,500 mm out from the shower rose. Floor wastes and drainage flanges must be provided and the floor must fall to the outlet.
- 11.4 Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes are suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of compliance for overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1,500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, the BRANZ Good Practice Guide: Tiling, and flooring and wall lining manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must be installed as per the NZBC requirements. They must flash over the membrane a minimum of 30 mm.
- 11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms where timber and plywood floors are used.



## Installation Information

### Installation Skill Level Requirement

- 12.1 Installation of the membranes must be completed by trained applicators approved by MBP [NZ] Ltd
- 12.2 Installation of substrates must always be carried out in accordance with the Mapegum WPS, Mapelastastic, Mapelastastic Smart and Mapelastastic AquaDefense Wet Area Membranes Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.

### Preparation of Substrates

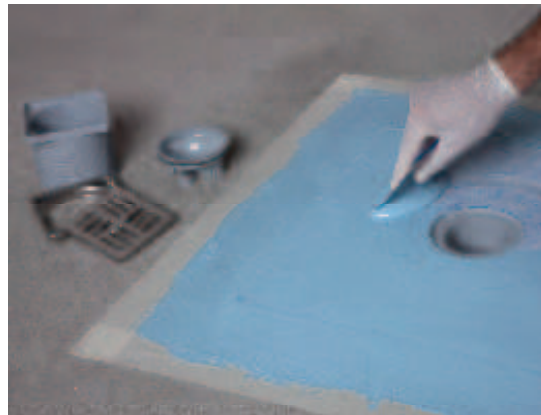
- 13.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of concrete substrates must be 75% or less before membrane application. The concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.
- 13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have a reinforcement installed as set out in the Technical Literature.
- 13.4 Refer to the product manufacturer for correct priming requirements.

### Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 8°C or above 35°C.
- 14.2 Mapelastastic and Mapelastastic Smart require the liquid and powder to be mixed and left to stand for 5 minutes before re-mixing, then applying. Mapegum WPS and Mapelastastic AquaDefense must be thoroughly stirred before application.
- 14.3 The membranes must be applied in a minimum of two coats, at the rates set out in the Technical Literature. Subsequent coats must be applied in an opposite direction to the previous coat. The total finished system thickness of the Mapegum WPS and Mapelastastic AquaDefense membranes must be a minimum of 1 mm and the Mapelastastic and Mapelastastic Smart Membranes must be a minimum of 2 mm.
- 14.4 Application can be made by roller [medium/long nap], brush [long bristle], or a notched steel trowel [finished with a flat steel trowel].
- 14.5 Reinforcement fabric or Mapeband is bedded into the wet layer between coats to provide movement protection at wall/wall and wall/floor junctions, or any other areas such as joints in the flooring substrate, floor cracks, or around penetrations in the membrane. In all other situations, reinforcement provisions as set out in this Appraisal and the Technical Literature apply.
- 14.6 Clean up may be undertaken with water.
- 14.7 For further information, refer to the Technical Literature.

### Floor Finishes

- 15.1 The membranes must be fully cured before installing the trafficable floor finish. The cured membranes must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Practice Guide: Tiling. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer or MBP [NZ] Ltd.



Impregnating Drain Vertical fabric with Mapelastiq  
AquaDefense



Application of Mapeband to a wall-floor joint with  
Mapelastiq AquaDefense



Application of the first coat of Mapelastiq  
AquaDefense



Application of the second coat of Mapelastiq  
AquaDefense



### Inspections

- 16.1 The Technical Literature must be referred to during the inspection of membrane installations.
- 16.2 Critical areas of inspection are:
- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
  - Moisture content of the substrate prior to the application of the membrane.
  - Acceptance of the substrate by the membrane installer prior to application of the membrane.
  - Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness and use of reinforcement.
  - Membrane curing and integrity prior to the installation of floor finish including protection from mechanical damage during curing and prior to installation.

### Health and Safety

- 17.1 Safe use and handling procedures for the membranes are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

### Basis of Appraisal

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

### Tests

- 18.1 The following testing has been undertaken by various organisations:
- Mapegum WPS and Mapelastic Wet Area Membranes in accordance with; EN 14891 for initial tensile adhesion strength, tensile strength after water contact, tensile adhesion strength after heat ageing, tensile adhesion strength after contact with lime water, tensile adhesion strength after contact with chlorine water, tensile adhesion strength after freeze-thaw cycles, waterproofing and crack bridging ability; DIN 53504 for tensile strength and maximum elongation after exposure to air and water immersion [Mapegum WPS only] and; Mapei internal method for water absorption after exposure and water immersion.
  - Mapelastic Smart in accordance with EN 1502-4 for bond strength to concrete, freeze thaw, flexibility, static and dynamic crack bridging, water vapour permeability, impermeability to water and bond strength after water immersion, heat ageing, freeze-thaw and alkali ageing.
  - Mapelastic in accordance with; EN 14891 for crack bridging after 28 days exposure to air, crack bridging after 7 days exposure to air and 21 days immersion in water, adhesion to concrete surface after 28 days exposure to air, adhesion to concrete surface after 28 days exposure to air and 21 days immersion in water; DIN 52615 for resistance to water vapour transmission and; Mapei internal method for deformability under low temperatures.
  - Mapegum WPS in accordance with; EN 1384 for tensile adhesion strength after exposure and water immersion; UNI 8202/22 for water absorption after exposure and water immersion and; DIN 53505 for shore A hardness.
  - Mapelastic AquaDefense in accordance with AS/NZS 4858 Appendix A including effect of heat ageing, bleach, detergent and water on tensile and elongation, water vapour transmission to ASTM E96-92 and cyclic movement resistance requirements of AS/NZS 4858 Appendix B. Testing to ANSI 118.10-1999 including seam strength, breaking strength, dimensional stability, resistance to fungi, static head and shear strength to ceramic tile and cement mortar. Also tensile adhesion on a plywood substrate and low temperature flexibility of the membrane.
- 18.2 The above test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 18.3 Testing of Mapegum WPS and Mapelastic has been undertaken by BRANZ for durability in accordance with AS/NZS 4858, Appendix A covering tensile strength and elongation after immersion in water, bleach, detergent, and after heat ageing.
- 18.4 Testing for suitability of Mapelastic over particleboard in accordance with AS/NZS 4858, Appendix C has been undertaken by BRANZ and found to be satisfactory.





### Other Investigations

- 19.1 An assessment was made of the durability of the Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic AquaDefense Wet Area Membranes by BRANZ technical experts.
- 19.2 Site inspections have been carried out by BRANZ to examine the practicability of installation and to examine completed installations.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

### Quality

- 20.1 The manufacture of the membranes has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 20.2 The quality management system of the membranes manufacturer has been assessed and found to be satisfactory.
- 20.3 The quality of supply of the membrane system materials to the market is the responsibility of MBP [NZ] Ltd.
- 20.4 Quality on-site is the responsibility of the MBP [NZ] Ltd trained applicators.
- 20.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the framing systems and substrates.
- 20.6 Building owners are responsible for the maintenance of the trafficable floor finish in accordance with the instructions of MBP [NZ] Ltd.

### Sources of Information

- AS 3958.1:2007 Guide to the installation of ceramic tiles.
- AS/NZS 1170:2002 Structural design actions.
- AS/NZS 2908.2:2000 Cellulose-cement products – Flat sheet.
- AS/NZS 2269:2012 Plywood-Structural.
- AS/NZS 4858:2004 Wet area membranes.
- BRANZ Good Practice Guide: Tiling, April 2015.
- DIN 53504 May 1994 Determination of tensile stress/strain properties of rubber.
- EN 1348: 1997/A1 Adhesives for tiles – Determination of tensile adhesion strength for cementitious adhesives.
- EN 14891 March 2003 Liquid applied waterproofing membranes for use beneath ceramic tiling – Definitions, specifications and test methods.
- NZS 3101:2006 The design of concrete structures.
- NZS 3602:2003 Timber and wood-based products for use in buildings.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4229:2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230:2004 Code of Practice for the design of masonry structures.
- UNI 8202 – 22: 1987 Building. Water proof sheets. Determination of behaviour in water.
- Ministry of Business, Innovation and Employment Record of amendments – Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

### Amendments

#### Amendment No. 1, dated 25 February 2021

This Appraisal has been amended to update the Appraisal holder.

#### Amendment No. 2, dated 06 October 2022

This Appraisal has been amended to include trafficable floors and to remove Mapelastic Turbo.



In the opinion of BRANZ, Mapegum WPS, Mapelastic, Mapelastic Smart and Mapelastic Aquadefense Wet Area Membranes are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to MBP [NZ] Ltd, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

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

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

09 February 2018



# Wet Area Systems

Specification and installation manual

CBI 5113

FEBRUARY 2021

**NATIONAL SUPPORT**

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

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

**PHONE:** +64 9 633 0100

**EMAIL:** [info@gib.co.nz](mailto:info@gib.co.nz)

**WEB:** [gib.co.nz](http://gib.co.nz)

**GIB® HELPLINE**

0800 100 442

# RESIDENTIAL AND NON-RESIDENTIAL APPLICATIONS. BATHROOMS, LAUNDRIES, TOILETS AND KITCHENS.

Protection from internal moisture is an important consideration when designing interior lining systems for homes, multi-unit apartments, educational, healthcare and commercial applications.

The New Zealand Building Code sets out minimum standards for wet area spaces in residential dwellings. However, often higher levels of performance and protection from internal moisture is demanded.

The GIB® Wet Areas System specification and installation manual provides internal lining options and details for specifiers, builders and building owners.

## USE ONLY THE CURRENT SPECIFICATION

This manual supersedes the publication GIB Aqualine® Wet Area Systems March 2007. Winstone Wallboards Ltd accepts no liability for reliance upon publications that have been superseded.

If you are unsure whether this is the current publication, call the GIB® Helpline on 0800 100 442 or go to [gib.co.nz](http://gib.co.nz)

## BEWARE OF SUBSTITUTION

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





CONTENTS

<b>Introduction</b>	<b>5</b>	<b>Construction Details</b>	<b>18-30</b>
<b>Design considerations</b>	<b>6-11</b>	Limitations	31
Where to use GIB® Wet Area linings	6	Use only the current specification	31
Benefits	6	Substitution	31
Handling and storage	6	Trademarks	31
Limitations	6	Copyright	31
Board substitution options	7		
Penetrations and sealants	8		
Renovations	8		
Maintenance	8		
Compliance with the NZ Building Code	9-11		
<b>Installation</b>	<b>12-17</b>		
Non-tiled walls – Timber Framing	12		
Non-tiled walls – Steel Framing	13		
Tiled walls – Timber Framing	14		
Tiled walls – Steel Framing	15		
Metal angles and maximum tile weights	16		
Ceilings	17		



## This publication

This publication is a best practice guide to the design and construction of wall and ceiling linings in wet areas with intermittent water exposure within residential and non-residential buildings, as covered by NZ Building Code Clause E3 Internal Moisture.

The information is designed to be helpful to designers, contractors and home-owners wishing to achieve a result that is easy to incorporate into modern design, simple and clear to construct, and that will satisfy the needs, requirements and expectations of both the NZ Building Code and the end user.

Wet areas in the home often require relatively frequent and expensive renovation or repair, often because of the ingress of water to the structure of the building.

To form a complete wet area system it is important to specify compatible materials and systems, designed to cope with conditions that are common in wet areas, and to ensure correct installation using best practice.

### WET AREAS

Generally, wet areas are described as spaces to where fresh water is reticulated, such as bathrooms, toilets, laundries and kitchens. Within wet areas the following requirements apply;

1. NZBC Clause E3.3.4 states that wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.
2. NZBC Clause E3.3.6 states that surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

NZ Building Code Clause E3 also refers to other requirements not covered in this publication, such as ventilation, condensation control and overflow management. Ongoing maintenance of wet areas is also important to maximise service life.

### GIB AQUALINE®, GIB TOUGHLINE® AQUA AND GIB WEATHERLINE®

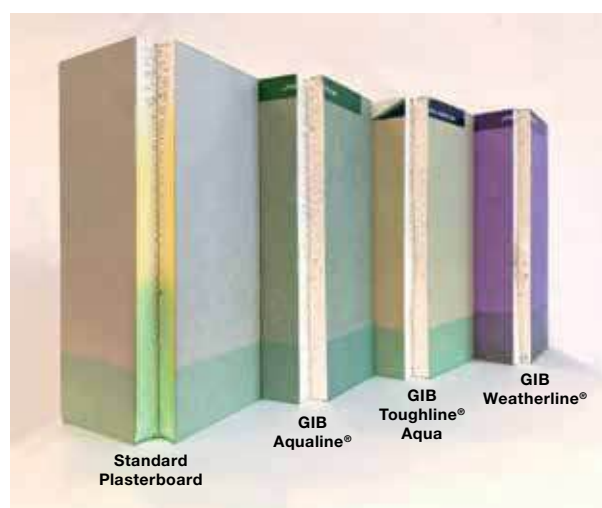
Although able to cope with infrequent short-term exposure, standard gypsum plasterboard will have a shortened life expectancy when frequently exposed to water or a high moisture environment.

The NZ Building Code does not call for water resistant linings in wet areas but it is desirable to specify lining materials which will maintain their integrity longer when exposed more frequently to moisture, and to one-off events such as leaks or flooding.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® feature a water-resistant polymer impregnated core, designed for wet area applications. These core formulations not only resist penetration of moisture through the lining into the framing behind, but also resist water “wicking” up the core, a common cause of long-term damage where a water-resistant lining has not been used.

### WATER ABSORPTION TEST

The illustrations below show how GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® compare with standard plasterboard after soaking for two-hours in green dye.



**WHERE TO USE GIB® WET AREA LININGS**

In order to prolong the life expectancy of the space it is highly desirable to include wet area linings in situations where there is an increased risk of water or moisture damage. Applications include walls and ceilings in bath and shower rooms, and walls in laundries, toilets and kitchens.

**BENEFITS**

- Water resistant and durable linings help protect against water damage
- Proven substrate for paint, wallpaper, waterproofing membranes, tiles, sheet vinyl and rigid sheet shower linings
- Suitable for both residential and non-residential applications
- Dimensionally stable and an excellent substrate for ceramic tiles
- Conventional jointing methods
- Easy to cut and form openings
- Contains glass fibres and other additives to increase strength and fire resistance
- May be used in GIB® Bracing, GIB® Fire Rated and GIB Noise Control® Systems (see Compliance with the NZ Building Code, Clauses B1, C3 and G6). Consult the appropriate GIB® literature for installation details

**HANDLING AND STORAGE**

- GIB® plasterboard must be stored under cover, stacked flat and clear of the floor with sufficient support to avoid sagging
- GIB® plasterboard must be handled as a finishing material

**LIMITATIONS**

- GIB® wet area linings must not be used for bracing purposes in shower cubicles or above baths. For more information refer to page 9 of this manual
- Do not use GIB® wet area linings where exposed for extended periods to humidity levels above 90% RH, such as in group shower or steam rooms, or where exposed to moisture and chlorine rich environments such as in indoor swimming pools
- GIB® wet area linings used in a bathroom or other high humidity environment must not be directly applied to solid plaster (gypsum or cement), wood-based sheet linings or similar materials, masonry or concrete, without strapping or steel furring channels
- GIB® wet area linings must not be installed over a vapour barrier or a wall acting as a vapour barrier
- Cracked or damaged sheets must never be used
- GIB Aqualine® or GIB Toughline® Aqua must not be used in external applications
- GIB® plasterboard must not be exposed to temperatures in excess of 52°C for prolonged periods. Heat-generating devices may include halogen lighting, cooking elements, radiant heating, solid fuel exhausts and fire surrounds. Consult the appliance manufacturer for installation details

**Table 1: GIB® Wet Area linings sheet dimensions and weights**

Product	Sheet face colour	Thickness (mm)	Sheet width (mm)	Edge Type	Sheet length (mm)						Max. Weight (kg/m²)
					2400	2450	2700	3000	3600	4800	
GIB Aqualine®	Green	10	1200	TE/TE							8.0
			1200	TE/SE							
			1350	TE/SE							
		13	1200	TE/TE							11.0
GIB Toughline® Aqua	Mauve	13	1200	TE/TE							11.4
GIB Weatherline®	Purple	10	1200	SE/SE							9.0
		13	1200	SE/SE							11.5

**BOARD SUBSTITUTION OPTIONS**

<b>Acceptable GIB Aqualine® alternatives</b>	
10mm GIB Aqualine® can be replaced with:	10mm GIB Weatherline® 13mm GIB Toughline® Aqua
13mm GIB Aqualine® can be replaced with:	13mm GIB Weatherline® 13mm GIB Toughline® Aqua

GIB® Wet Area System construction details in this manual refer to the use of GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® sheets may also be used in place of GIB Aqualine®.

**FLEXIBLE SHEET VINYL – SHOWERS AND OTHER WET AREAS**

- GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® are suitable substrates for flexible vinyl wall finishes in wet areas of residential, commercial or institutional buildings
- Framing requirements and installation procedures are presented in this literature, except that the lining gap at the floor is no more than 5mm when a pencil cove detail is used
- The installation of galvanised steel reinforcing angles behind internal lining corners is recommended for sheet vinyl applications in showers or shower over bath situations
- The lining must be jointed and stopped to a paint quality finish (Level 4) – trowel marks can telegraph even through a commercial grade 2mm vinyl
- A commercial grade vinyl is recommended in commercial or institutional bathrooms and showers
- In areas directly exposed to liquid water, all joints in flexible sheet vinyl must be heat welded
- Installation of flexible vinyl must be carried out strictly in accordance with the specifications provided by the suppliers/ manufacturers of the vinyl

**RIGID SHEET SHOWER LININGS**

- The wall surface must be free of dust before installation of the lining
- Avoid lining joints as much as possible and where necessary flush with plaster to achieve a level surface
- Do not pre-seal or paint areas which are to be covered by the rigid shower linings
- The suppliers of thin (usually 2-3mm) and rigid acrylic shower linings commonly recommend direct adhesive fixing to wall linings using solvent-based adhesives
- Care must be taken to ensure that rooms are adequately ventilated
- Water temperature changes will cause movement of the thin acrylic sheet, which in turn will stress the adhesive and wall lining substrate
- Consult the supplier of the shower lining for full installation details
- Suppliers of rigid sheet acrylic shower linings recommend a minimum of 24 hours for the adhesive to cure fully prior to the shower being put into service

**WATERPROOF MEMBRANE SYSTEMS AND TILING**

- A waterproof membrane system must be applied to lining materials used as a substrate for ceramic tiles in a shower or shower over bath situation
- The wall surface in a shower or shower over bath situation is not complete and ready for tiling until coated with a waterproof membrane system over the lining and once penetrations for shower mixers, taps and associated fittings are sealed
- The installation of galvanised steel reinforcing angles behind internal lining corners is required for tiled wall applications in showers or shower over bath situations
- In-situ waterproofing membrane materials manufactured to AS/NZS 4858:2004 “Wet Area Membranes” are recommended and must be applied to manufacturer’s recommendations. Typically, these types of membrane systems are not suitable for paint and wallpaper finishes
- Waterproof membrane systems must be fully cured and dry prior to application of tiling adhesives
- Preformed sheet membranes are also available and may be more suitable where curing times or specialist skills are an issue
- The details shown in this manual are generic in nature. For accurate detailing, follow the specifications provided by the supplier of the proprietary waterproof membrane system

For further information on tiling consult the BRANZ Good Practice Guide – Tiling.

## PENETRATIONS AND SEALANTS

As leaks and water ingress typically occur at junctions between building elements and at penetrations, it is essential that particular attention is given to these details at the time of installation. Lack of attention to detail can result in water damage that could remain undetected for a long time.

- Ensure that all cut-outs for pipe penetrations are made neatly, and slightly oversize, with a hole saw. These penetrations should be of a diameter no more than 12mm greater than that of the pipe
- Ensure shower mixer and tap penetrations are sealed with a proprietary flange system to prevent the passage of moisture into the wall cavity
- Sealants should be of a mould inhibiting type and be paintable. Neutral cure silicones will generally meet these requirements
- Surfaces should be dry and free from dust before application, a minimum of a 4mm joint width provided and the depth should not exceed the width
- Apply a bead of sealant to the full depth of the lining in the following locations:
  - Around all tap/pipe bodies
  - The gap between the bath rim and the bottom edge of the wet area lining
  - Between the upstand of preformed shower bases and the bottom edge of the lining
  - Where an impervious junction is required at the floor/wall line, carefully seal the gap between the bottom edge of the board and the finished floor. Leave a 5-10mm gap at the bottom of the wall lining for this purpose, ensuring the gap is free from dirt and dust
- Do not locate shower heads or taps on fire rated or intertenancy walls. Should this be unavoidable always use tested and approved proprietary penetration seals

## RENOVATIONS

Bathrooms, kitchens and laundries are the most renovated rooms in the house, partly due to fashion considerations and partly because of damage sustained by ingress of water and moisture.

When renovating these rooms it is often easier and more cost-effective to remove the existing linings and replace them. This allows for a new start in the room and offers sound substrates for new surfaces such as tiling and painting, where otherwise flaking paint or damaged plasterboard may compromise good and sound finish or practice. At the very least re-lining will:

- Allow for inspection of framing where damage may have occurred and provide the opportunity to repair such damage
- Allow plumbing and electrics to be checked and altered or replaced where required
- Provide the opportunity to install thermal and acoustic insulation, water-resistant linings, and propriety plumbing penetration flange systems where appropriate
- Make the job easier

## MAINTENANCE

Lack of maintenance is frequently the cause of premature and often expensive failure of components and building elements within wet areas.

It is important to regularly inspect and repair any potential problem before it becomes expensive to reinstate. Good maintenance should include:

- Ongoing ventilation. At the very least, good passive ventilation (e.g. window vents); but good active ventilation (e.g. extraction fans) of an appropriate size for the room is recommended
- Impervious coatings and surfaces should be checked for wear and damage and maintained and re-coated before ingress of water to the substrate occurs
- Regular cleaning with appropriate cleaners so that build-up of matter, such as mould, is well controlled
- Sealants at junctions and penetrations should be checked for adhesion on a regular basis and replaced where adhesion failure to substrates occurs
- Where pipe leaks have become evident, however small, they should be repaired promptly and any area around such leaks dried out completely before any other repairs are carried out

## Compliance with the NZ Building Code

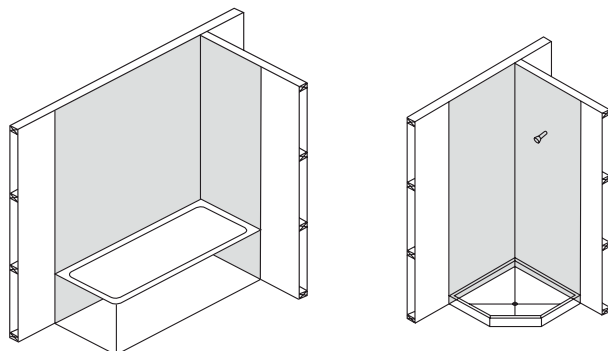
### STRUCTURE – CLAUSE B1

The design and material specification for steel and timber framing used in GIB® Wet Area systems must be in accordance with the performance requirements of NZ Building Code Clause B1 (Structure).

Bracing elements are required to have a durability of 50 years. GIB® bracing elements are not to be located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members, such as at bath and shower tray locations.

Otherwise, GIB® Bracing Systems can be used in water-splash areas, provided these are maintained impervious for the life of the building.

GIB Aqualine®, GIB Toughline® Aqua and GIB Weatherline® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. They can also be used in place of GIB Braceline® in GIB® bracing elements 900mm or longer, provided the perimeter of the element is fixed with GIB® Grabber 32mm x 6g screws at 100mm centres, using the GIB Braceline® corner fixing pattern. Refer to the GIB® Bracing System literature.



**No bracing in the shaded areas.**

### DURABILITY – CLAUSE B2

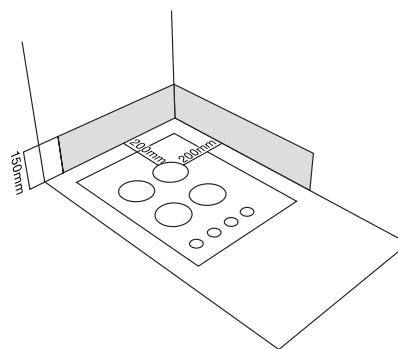
When installed and maintained in accordance with this literature, GIB® Wet Area systems tiled or vinyl covered have a serviceable life of at least 15 years. They comply with the requirements of NZ Building Code Clause B2 (Durability) for use in wet areas directly exposed to liquid water, e.g. showers, showers over baths and splash-backs.

When used as a general wet area lining and maintained under normal dry internal conditions, GIB® Wet Area Systems have a serviceable life of at least 50 years and comply with NZ Building Code Clause B2 (Durability) for use within toilets, kitchens, bathrooms and laundries not directly exposed to liquid water.

### FIRE AFFECTING AREAS BEYOND THE SOURCE – CLAUSE C3

GIB® Fire Rated Systems provide passive fire protection in accordance with the requirements of NZ Building Code Clause C3. When GIB Aqualine® or GIB Toughline® Aqua is substituted into fire rated systems in place of the equivalent thickness GIB Fyrelite®, the Fire Resistance Rating (FRR) of that system will be maintained.

The protection of combustible surfaces surrounding gas cooking appliances is covered by the latest version of AS/NZS 5601.1.



As a guide the following options are acceptable for wall surfaces within 200mm of the periphery of a gas element to a height of 150mm above the element for the full dimension (width and depth) of the cooktop surface area:

- 5mm tiles on GIB® plasterboard
- 5mm toughened glass on GIB® plasterboard
- or any system that can be demonstrated to meet the specific requirements of AS/NZS 5601.1

GIB® plasterboard products must not be exposed to temperatures in excess of 52°C for sustained periods. Check with the appliance manufacturer that this requirement will be met. It would be unusual for surfaces outside 200mm to exceed 52°C for sustained periods.

### INTERNAL MOISTURE – CLAUSE E3

The New Zealand Building Code Clauses that relate to wall surfaces are;

E3.3.4 - Wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.

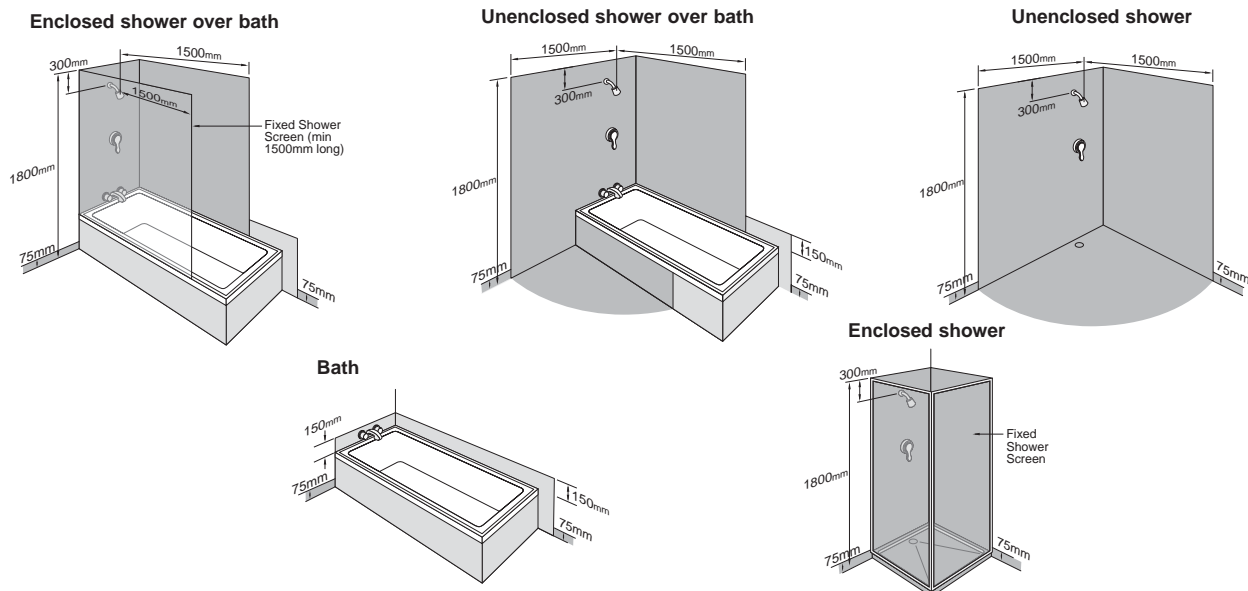
E3.3.5 - Surfaces of the building elements likely to be splashed or become contaminated in the course of the intended use of the building, must be impervious and easily cleaned.

E3.3.6 - Surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

New Zealand Building Code Acceptable Solution E3/AS2 substantially refers to the Waterproof Membrane Association Incorporated (WMAI) Code of Practice for Internal Wet Area Membrane Systems (IWAM), August 2020.

The IWAM Code of Practice refers to wet area membranes and over-surfaces that are easy to clean and suggests an extent as outlined below for a typical bathroom application. For further details refer to the IWAM Code of Practice which also lists suitable rigid sheet materials and tiling membranes.

Shaded areas in the diagrams below represent the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.







---

**HAZARDOUS BUILDING MATERIALS – CLAUSE F2**

At no stage during its serviceable life does GIB Aqualine® constitute a health hazard. It therefore meets the provisions of NZ Building Code Clause F2 (Hazardous Building Materials). Dust resulting from the sanding of stopping compounds may be a respiratory irritant and the use of a suitable facemask is recommended.

---

**VENTILATION – CLAUSE G4**

NZ Building Code Clause G4 (Ventilation) requires buildings to have a means of collecting or otherwise removing steam generated from laundering, utensil washing, bathing or showering. To prolong the life of interior linings and surface finishes and to minimise the risk of moisture related problems such as condensation and mould growth, adequate heating, thermal insulation and mechanical ventilation must be provided in kitchens, bathrooms and laundries.

---

**AIRBORNE AND IMPACT SOUND – CLAUSE G6**

GIB® Noise Control Systems can be used to provide ratings for Sound Transmission Class (STC) and Impact Insulation Class (IIC) in accordance with the requirements of NZ Building Code Clause G6 (Airborne and Impact Sound). When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyrelite®, the STC and IIC rating of that system will be maintained. When GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur. For further information refer to the GIB Noise Control® Systems literature or contact the GIB® Helpline 0800 100 442.

## TIMBER WALL FRAMING

Framing dimensions must comply with the requirements of NZS 3604:2011.

- The moisture content of timber framing shall be 18% or less at the time of lining
- Studs shall be spaced at 600mm centres maximum for both 10mm and 13mm GIB® plasterboard
- Nogs to be evenly spaced with a maximum spacing of 1350mm. Alternatively, nogs may be staggered 150mm maximum either side of a horizontal joint line
- Nogs are not required behind horizontal joints except in shower situations or specific fire or noise control systems

## FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread screws.

## FASTENER CENTRES

- 300mm centres to top and bottom plates and to perimeter studs
- Single fasteners to each stud where the horizontal joint crosses the studs

- Place fasteners 12mm from sheet edges and 18mm from sheet ends
- Daubs of GIBFix® adhesive at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners. Sheet edges at door or window openings can be adhesive fixed unless forming part of the perimeter of a bracing element

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

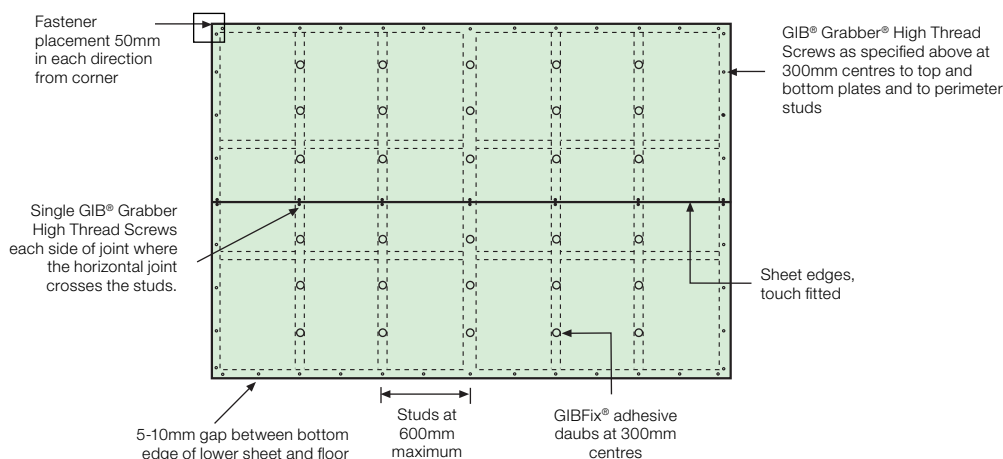
## LINING

- Use minimum 10mm GIB® plasterboard
- Install the sheets leaving a 5-10mm gap at the floor line to allow for movement of the framing members and to allow for cleaning dirt and rubbish before sealing
- Sheets to be touch fitted.

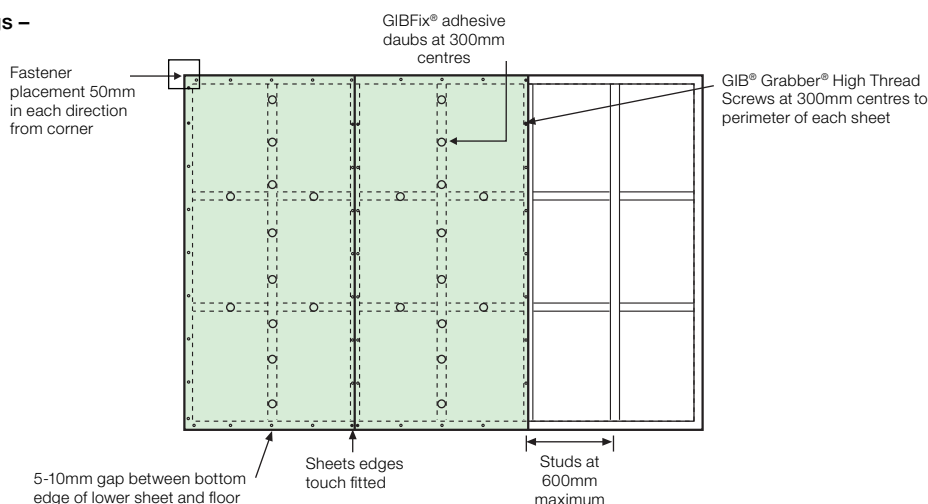
## JOINTING

- Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide.

### Fastening the Linings – Horizontal Fixing Only



### Fastening the Linings – Vertical Fixing Only



## STEEL WALL FRAMING

The minimum sheet thickness for fixing on light gauge 0.55mm base metal thickness (BMT) steel framing is 13mm GIB® plasterboard. For bracing, noise control or fire rating applications consult the relevant GIB® technical publication.

Steel frame for residential construction is in accordance with NZBC B1/AS1 9.1 NASH Standard Part 2 Light Steel Framed Buildings, or by specific design. 10mm GIB plasterboard is commonly used on minimum 0.75mm BMT residential steel framing.

## FASTENERS

- Minimum 25mm x 6g GIB® Grabber® Self Tapping Screws.

## FASTENER CENTRES

- 300mm centres to top and bottom channels and to end studs
- Single screws to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends

- Daubs of GIBFix® All-Bond adhesive or screws at 300mm centres to intermediate studs
- Do not place adhesive at sheet edges or under fasteners.
- Sheet edges at door or window openings can be adhesive fixed.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

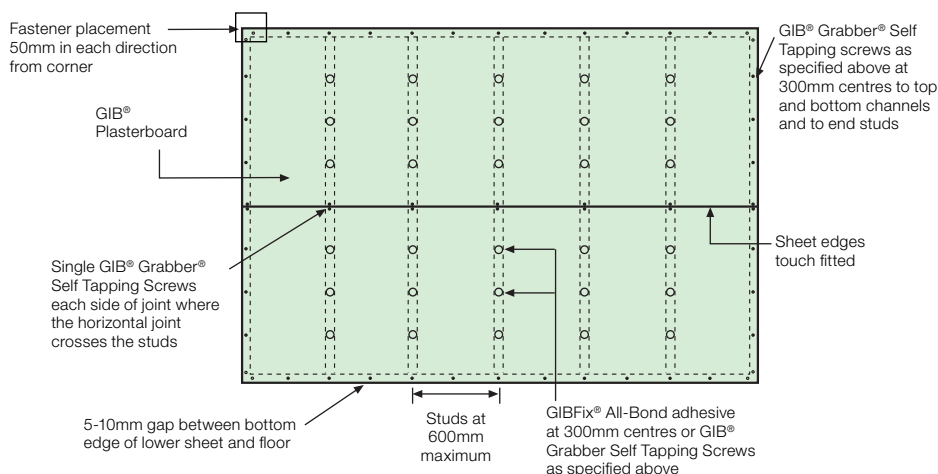
## LINING

- Lay the sheets, leaving a 5-10mm gap at the floor line.  
Note: If friction fitted steel studs have been used, sheets must be fitted hard to the floor. Ensure floor is cured and dry
- Sheets to be touch fitted.

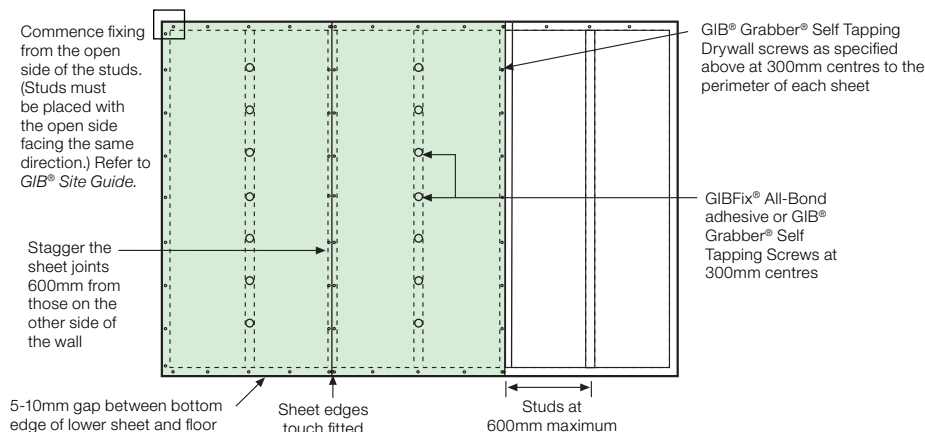
## JOINTING

- Jointing shall be carried out in accordance with the instructions in the GIB® Site Guide

### Fastening the Linings – Horizontal Fixing Only



### Fastening the Linings – Vertical Fixing Only



## TIMBER WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NZS 3604:2011 Timber Framed Buildings, or relevant specific design Standard.

## NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

## CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Each leg shall be fastened to the framing at 300mm centres

## FASTENERS

- Minimum 32mm x 6g GIB® Grabber® High Thread Screws

## FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Place fasteners 12mm from sheet edges and 18mm from sheet ends

- Single fasteners to each stud where the horizontal joint crosses the studs
- Where relevant, fastener lengths must comply with the requirements of GIB® Fire Rated Systems or GIB® Noise Control Systems

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

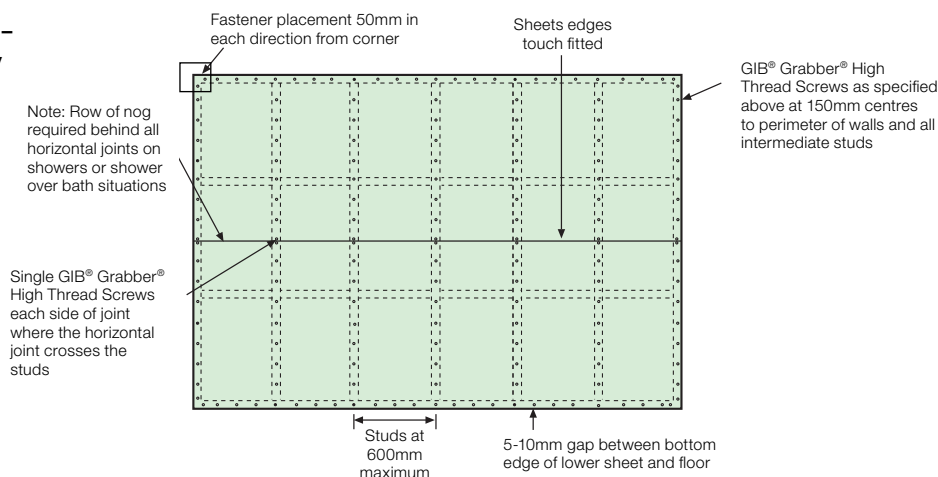
## LINING AND TILE WEIGHTS

- Use minimum 10mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

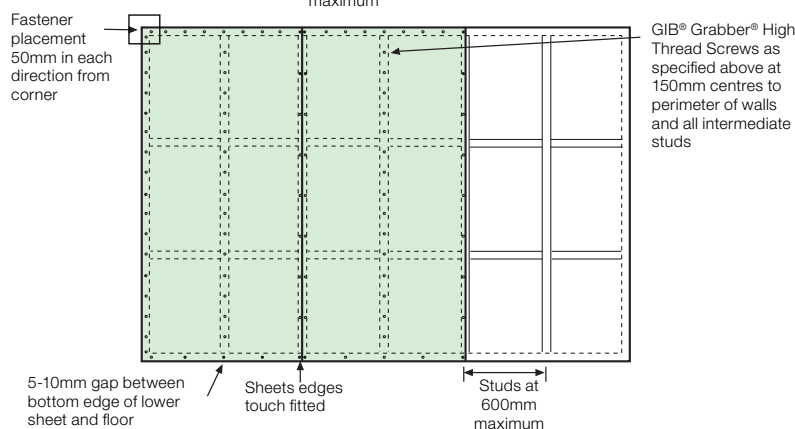
## JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

### Fastening the Linings – Horizontal Fixing Only



### Fastening the Linings – Vertical Fixing Only



## STEEL WALL FRAMING

Framing dimensions and spacing must be appropriate for the tile weight and comply with the requirements of NASH Standard Part 2:2019 Light Steel Framed Buildings, or relevant specific design Standard.

- Linings are placed hard to floor, bedded into a sealant bead
- Steel framing for tiling to have a minimum base metal thickness (BMT) of 0.75mm

## NOGS

For impact protection in shower cubicles or shower over bath situations it is important that all sheet joints are made on solid framing. This may require vertical fixing or the installation of additional nogs. Also provide nogs:

- Adjacent to each pipe penetration and behind sink and tub flashings
- Between all studs above bath flanges and preformed shower bases

## CORNER REINFORCING

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum
- 32 x 32 x 0.55mm NZ18 or 45 x 45 x 0.55mm GIBFix® Angle. Each leg is fastened to the framing at 600mm centres

## FASTENERS

- Minimum 32mm x 6g GIB® Grabber® Self Tapper screws

## FASTENER CENTRES

- 150mm centres to perimeter of wall and all intermediate studs
- Adhesive is not to be used in place of mechanical fasteners
- Single screws to each stud where the horizontal joint crosses the studs
- Place fasteners 12mm from sheet edges and 18mm from sheet ends.

For bracing, noise control or fire rating applications including fastener lengths consult the relevant GIB® technical publication.

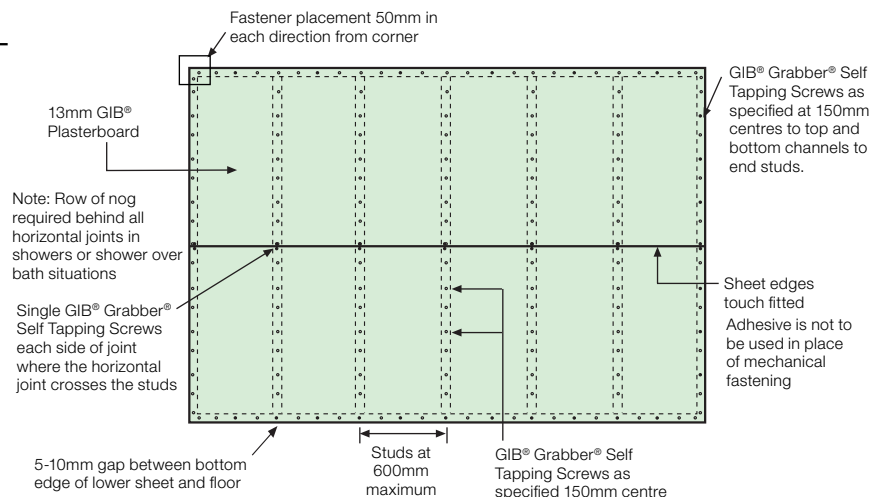
## LINING AND TILE WEIGHTS

- Use minimum 13mm GIB® plasterboard
- For maximum permitted tile weights refer to pg 16 of this manual
- GIB® Wet Area linings may be fixed vertically or horizontally
- Sheets are touch fitted
- Provide a 5-10mm gap at the wall/floor junction and between the bottom edge of the lining and any bath rim or preformed shower base to allow for placement of sealant
- Do not tile on the resilient side of GIB Rail® or STWC Acoustic Clip (ST001) and channel noise control system
- GIB® Wet Area linings are suitable for tiling full height of walls, but if a wall is to be partially tiled (e.g. half high), only the area of wall under the tiles needs to be fixed as required for tiled areas. The remainder of the wall may be fixed as for non-tiled areas

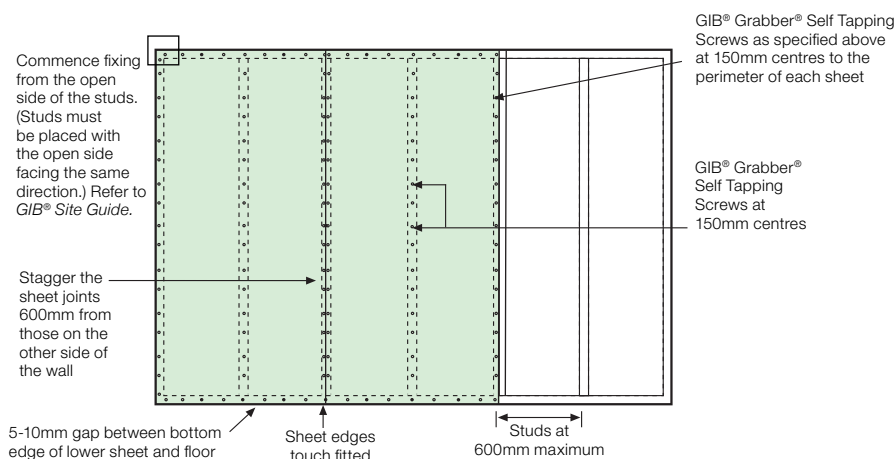
## JOINTING

- Jointing shall be carried out in accordance with the instructions of the GIB® Site Guide

### Fastening the Linings – Horizontal Fixing Only



### Fastening the Linings – Vertical Fixing Only



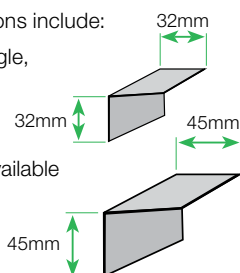
### METAL ANGLES FOR TILED INTERNAL CORNERS

- Prior to lining in tiled areas (shower cubicles and shower over bath only) the internal corners shall be reinforced with a minimum 32 x 32 x 0.55mm galvanised metal angle.

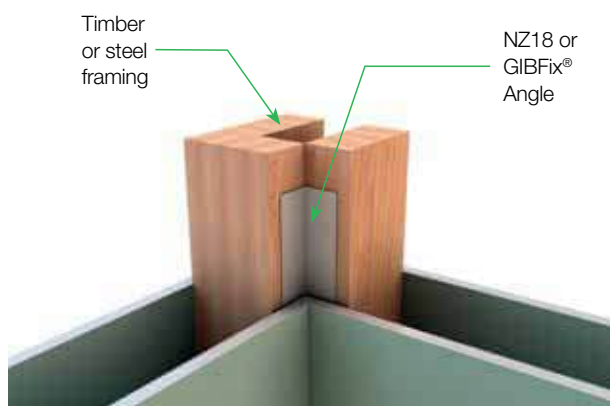
- Suitable GIB® metal angle options include:

- GIB® Rondo® NZ18 metal angle, available length: 3.0m

- GIBFix® Angle metal angle, available lengths: 2.4m and 2.7m



- Each side of the angle is secured to the framing with at 600mm centres
- Minimum height of the metal angle is 1800mm



### WATERPROOF MEMBRANE SYSTEMS

A waterproof membrane system must be applied to all lining materials used as a substrate for ceramic tiles in a shower or shower over a bath application, or any other tiled application exposed to frequent water splash.

For further information see p10.

### TILES AND TILE WEIGHTS

In areas likely to be directly exposed to water, tiles may be ceramic, porcelain or stone must comply with the over-surface finish requirements of the IWAM Code of Practice and be bedded with a suitable tile adhesive on the waterproof membrane system. See page 10 for the minimum extent of wall surfaces requiring impervious sheet materials or waterproof membrane systems prior to tiling.

Smaller mosaic tiles are often lighter, but the integrity of grout joints might be more prone to impact, whilst heavier tiles are larger and have less and deeper grout and sealant joints. For more information also see AS 3958:2007 Ceramic tiles – Guide to the installation of ceramic tiles.

**Table 2: Recommended maximum tile weights**

Maximum Tile Weights for GIB Aqualine®, GIB Toughline® Aqua or GIB Weatherline®			
Stud Centre (maximum)	Fasteners Centre (maximum)	Lining Thickness	Tile Weight
600mm maximum	150mm maximum	10mm	26kg/m <sup>2</sup>
		13mm	40kg/m <sup>2</sup>

### ADHESIVE AND GROUT WEIGHTS

The weight of adhesive and grout can vary depending on the type of tile and the installation process used. The maximum tile weights stated in table 2 are conservative and refer to the tile weight excluding grout and adhesive used. An additional 3kg/m<sup>2</sup> has been factored into tile adhesion testing on top of the above stated tile weights to account for adhesive and grout weight used during the installation of the tile.



### CEILING FRAMING

Framing dimensions and spacing must comply with the requirements of NZS 3604:2011, NASH for steel or relevant NZ Standard.

For noise control or fire rating applications consult the relevant GIB® technical publication.

### FASTENERS

- Steel battens – 25mm x 6g GIB® Grabber® Self Tapping screws
- Timber battens or Joists – 32mm x 6g GIB® Grabber® High Thread screws

### ADHESIVES

- Steel battens - GIBFix® All-Bond
- Timber battens - GIBFix® All-Bond or GIBFix® One

### FASTENERS CENTRES

- Single screws to the edges and centre of the sheets across each batten
- Single screw at 600mm maximum to the perimeter of the ceiling
- Screws to be 12mm from sheet edges
- Daubs of adhesive at 200mm centres between the screws
- Do not place adhesive at sheet edges or under fasteners, this may lead to screw pops

### LINING

- The lining shall be fixed at right angles to the battens or joists
- Commence fixing from the centre of the sheets outwards.
- Sheets to be touch fitted
- Use long length sheets to minimise sheet end butt joints.
- Back-block sheet end butt joints
- See GIB® Site Guide for sheet edge backblocking requirements

### BATTEN SPACINGS

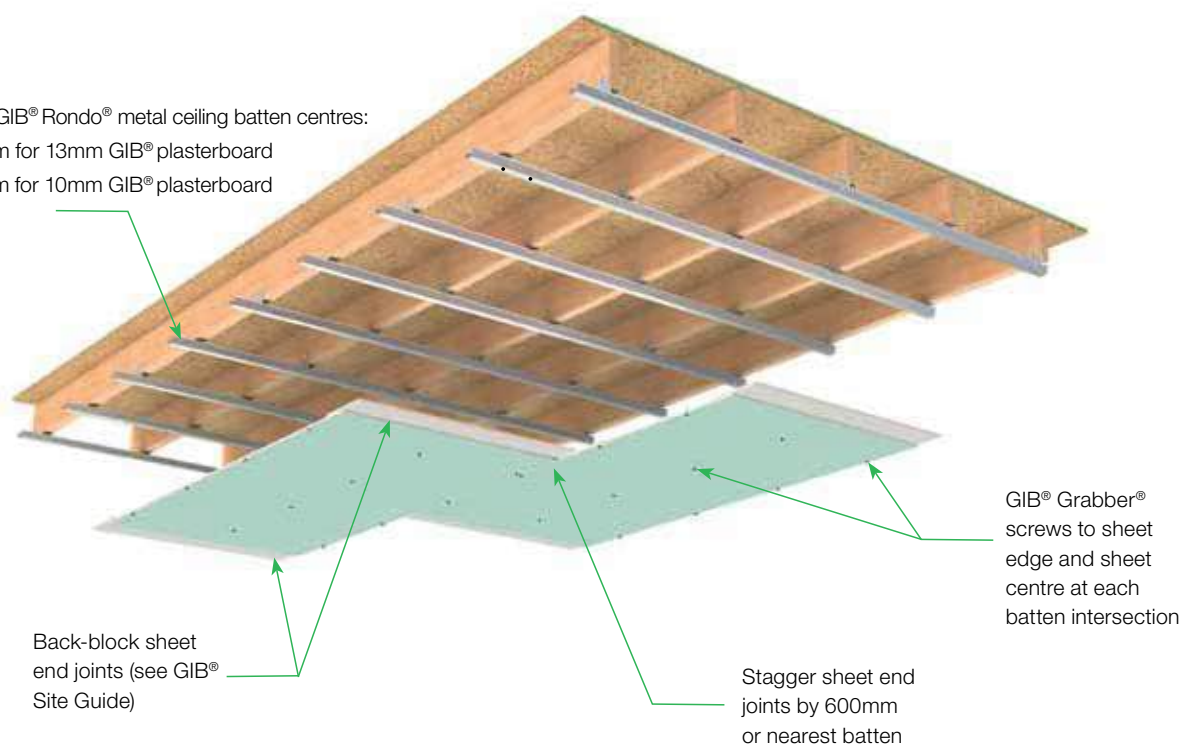
- 13mm GIB® plasterboard – 600mm centres maximum
- 10mm GIB® plasterboard – 450mm centres maximum

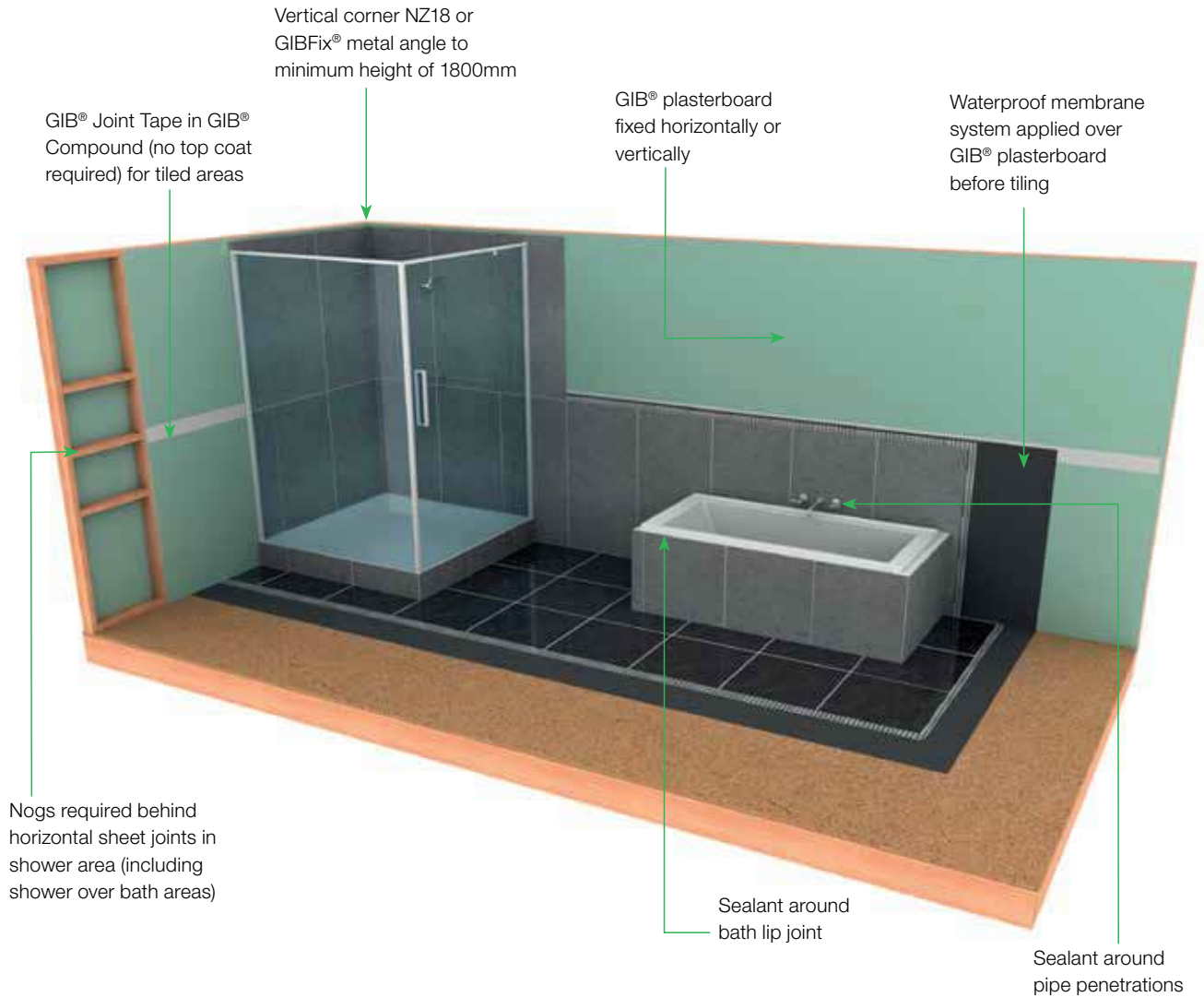
### JOINTING

- All sheet joints must be paper tape reinforced and stopped in accordance with instructions in the GIB® Site Guide
- Do not fix tiles to GIB® plasterboard ceilings

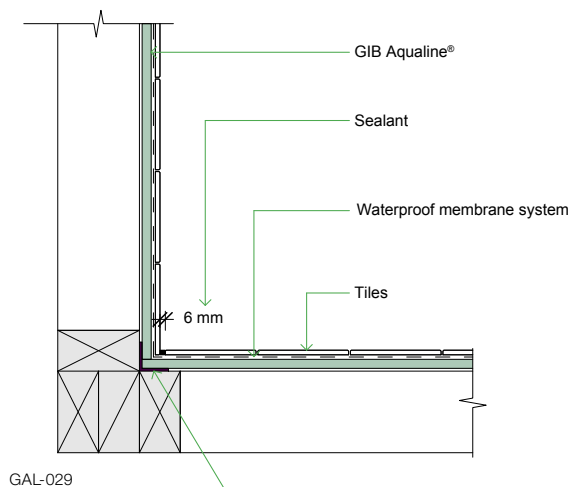
Maximum GIB® Rondo® metal ceiling batten centres:

- 600mm for 13mm GIB® plasterboard
- 450mm for 10mm GIB® plasterboard



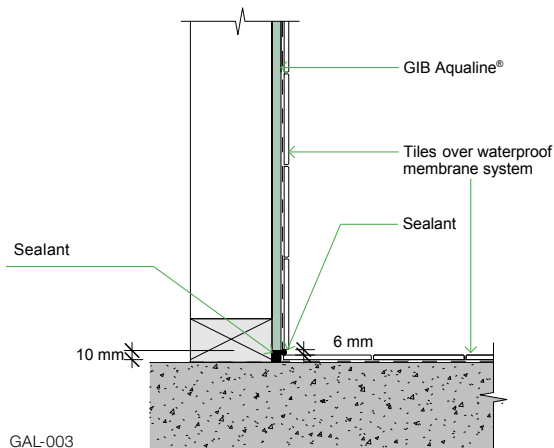


### A: TILED INTERNAL CORNER

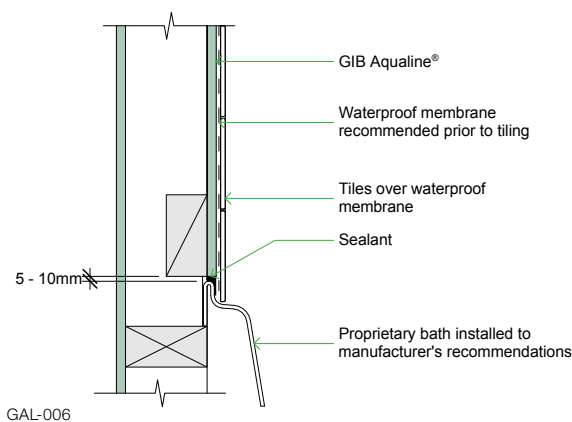


32 x 32 x 0.55mm vertical fixed galvanised steel angle NZ18 or GIBFix® Angle

### B: CERAMIC FLOOR LINING JUNCTION



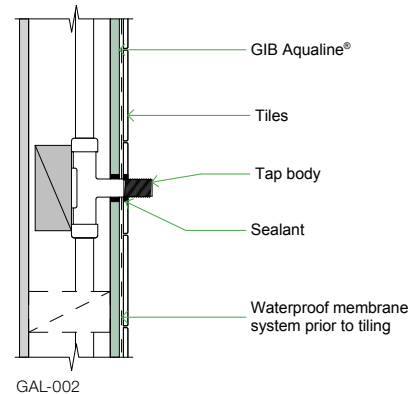
### C: BATH LINING JUNCTION



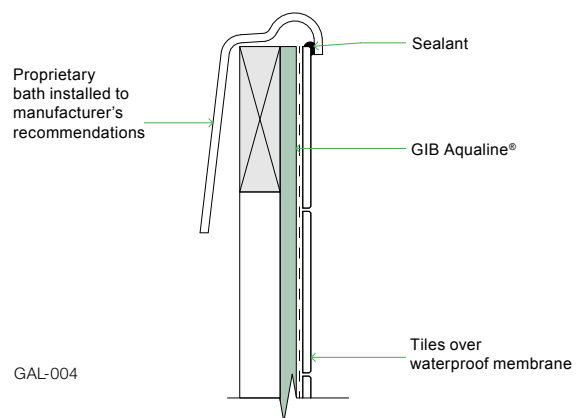
### G: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.

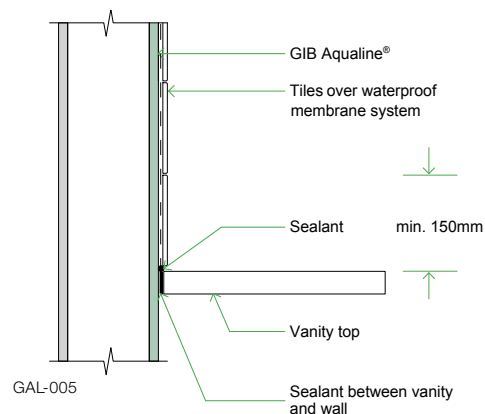
### D: SEALING WET AREA PENETRATION



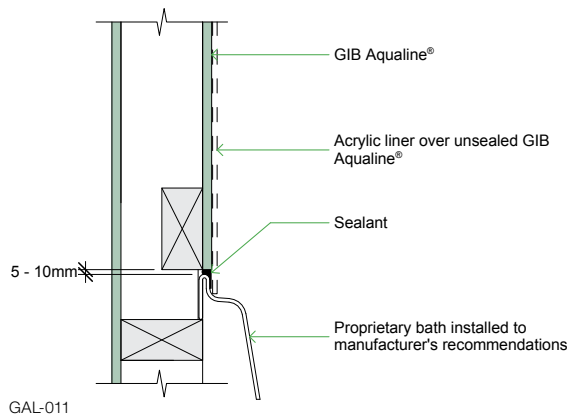
### E: BATH CRADLE LINING DETAIL



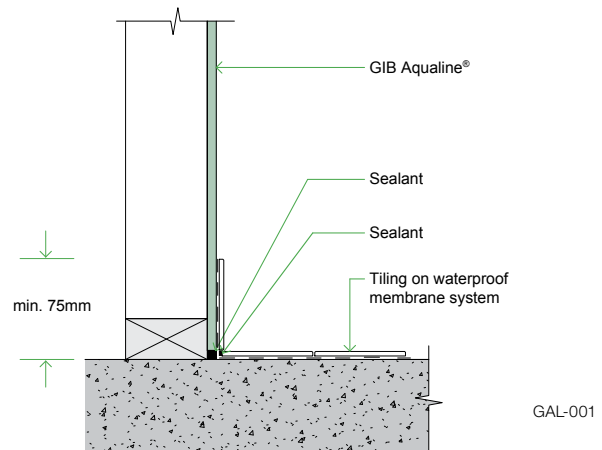
### F: VANITY TOP LINING JUNCTION



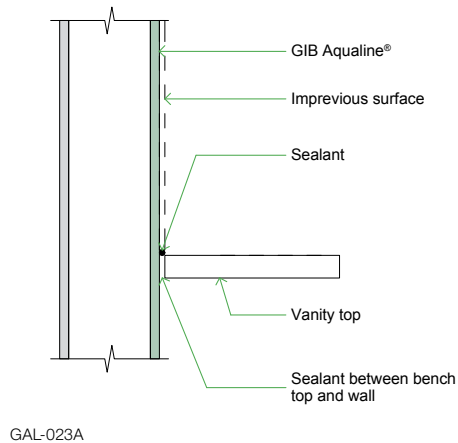
### A: BATH LINING JUNCTION



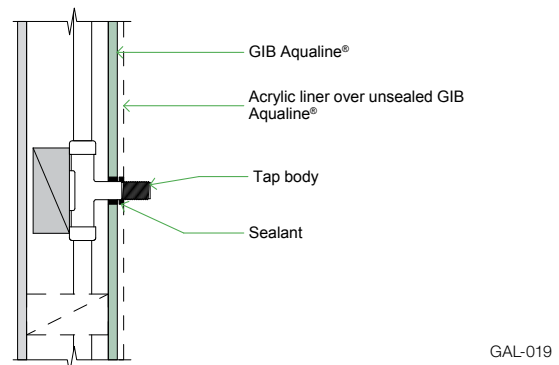
### D: CERAMIC FLOOR SKIRTING LINING JUNCTION



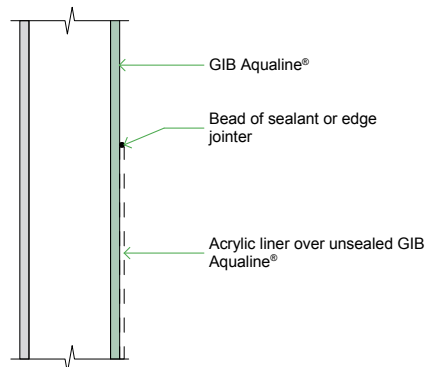
### B: VANITY TOP LINING JUNCTION



### E: SEALING SEMI WET AREA PENETRATION



### C: UNSEALED PLASTERBOARD LINING

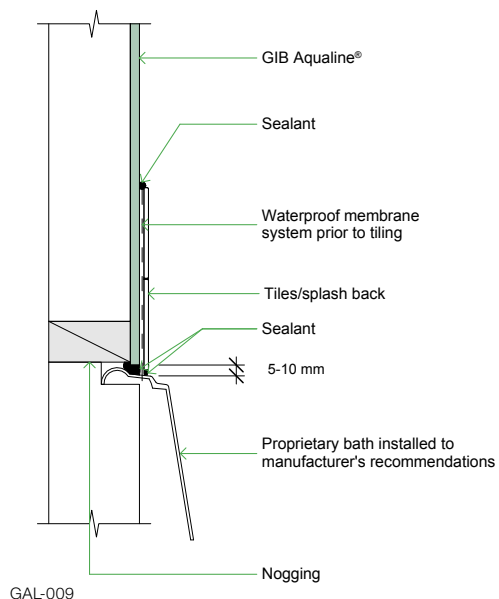


### F: SHOWER MIXER PENETRATION IN WET WALL LININGS

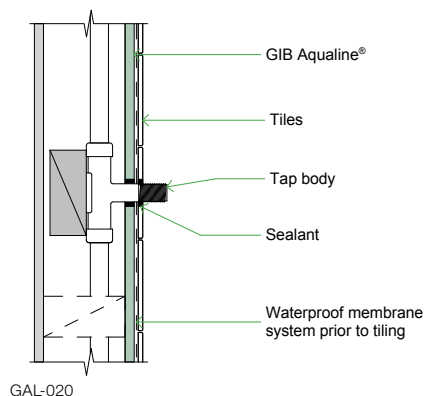
Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



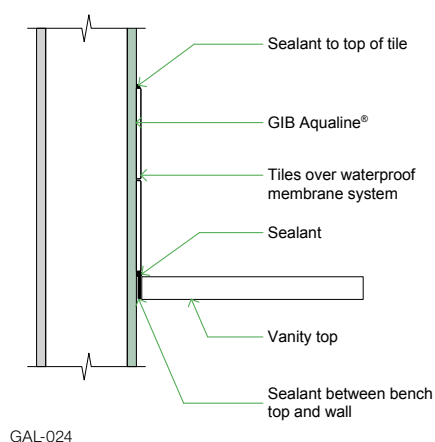
### A: BATH LINING JUNCTION



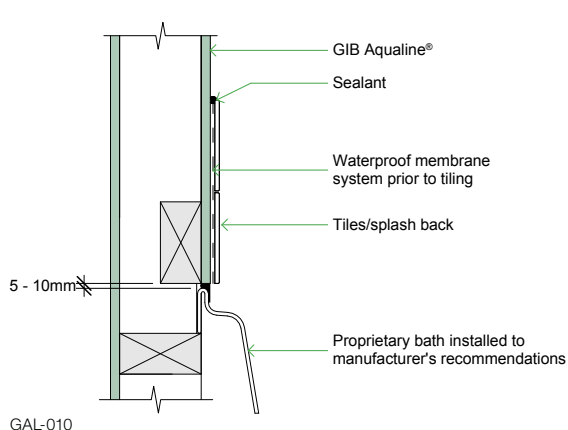
### B: SEALING SEMI WET AREA PENETRATION



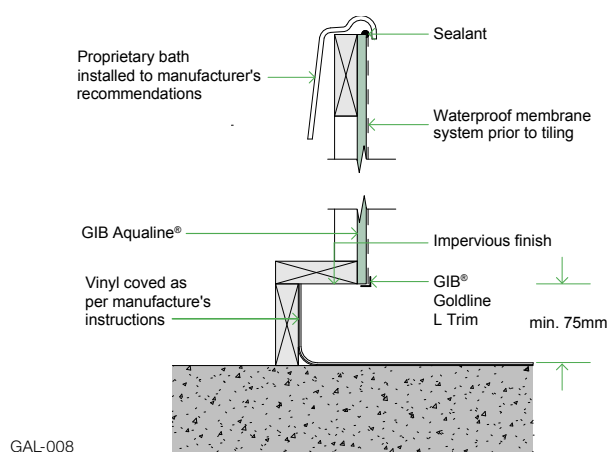
### C: VANITY TOP LINING JUNCTION



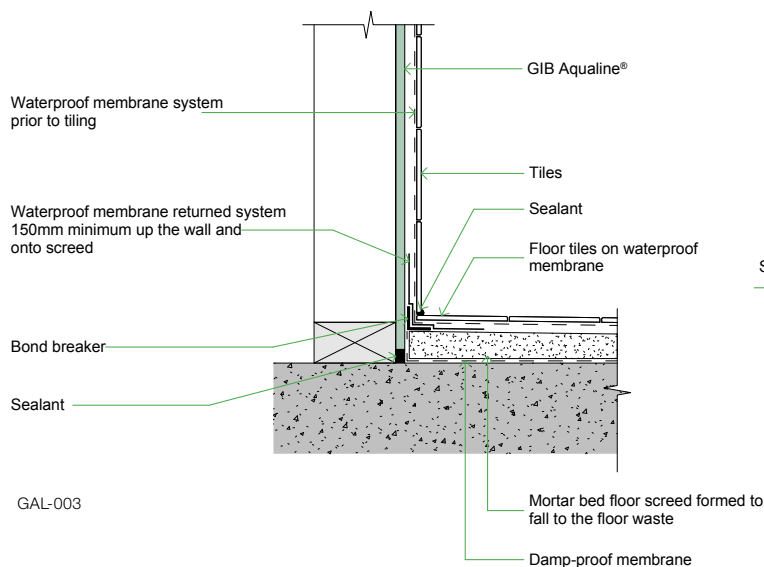
### D: BATH LINING JUNCTION



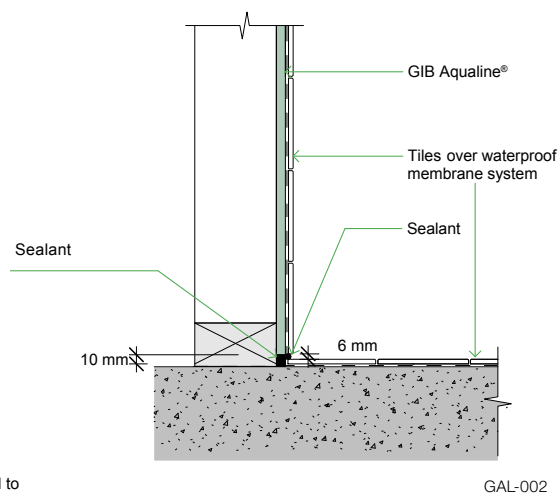
### E: CRADLE VINYL LINING JUNCTION



### A: MORTAR UNDER CERAMIC FLOOR LINING JUNCTION



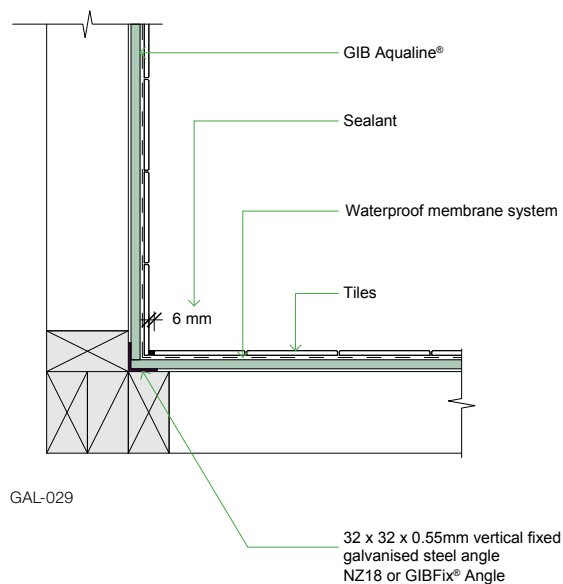
### C: CERAMIC FLOOR LINING JUNCTION



### PREFORMED SHOWER BASE JUNCTIONS

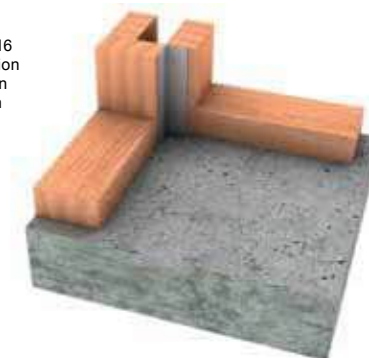
Refer to the shower base manufacturer for proprietary shower tray installation detailing including wet wall lining junction detailing.

### B: TILED INTERNAL CORNER



### D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.



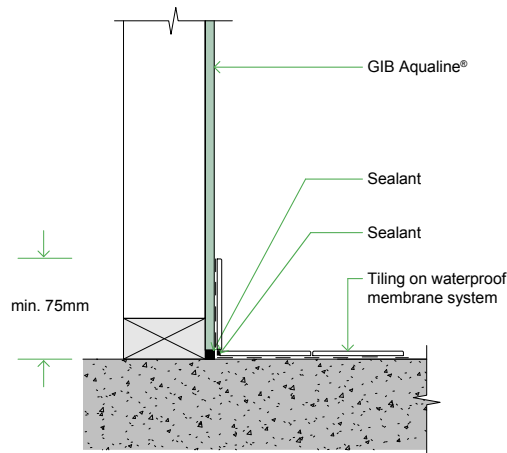
### E: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



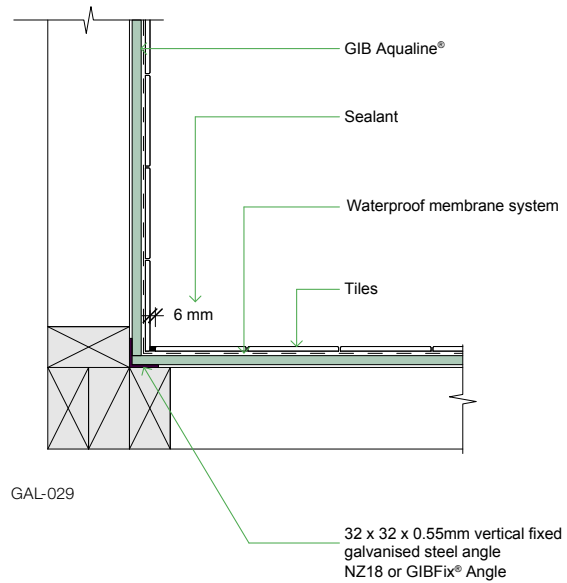


### A: CERAMIC FLOOR SKIRTING LINING JUNCTION



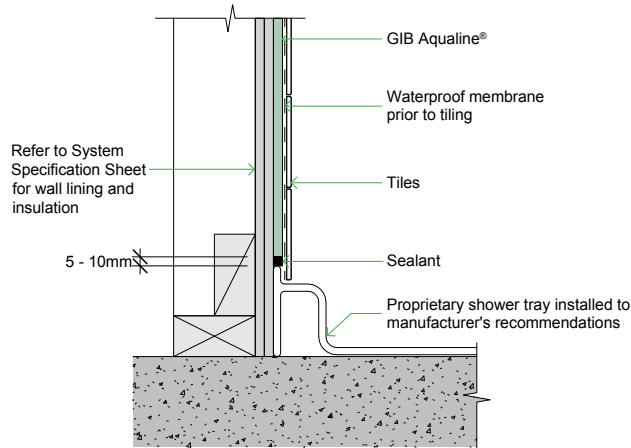
GAL-001

### C: TILED INTERNAL CORNER



GAL-029

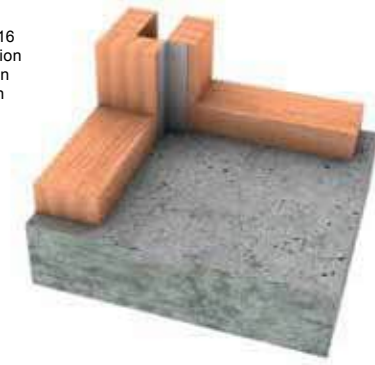
### B: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



GAL-016

### D: TILED INTERNAL CORNER METAL ANGLE POSITION

Refer to page 16 of this publication for specification and installation guidance.



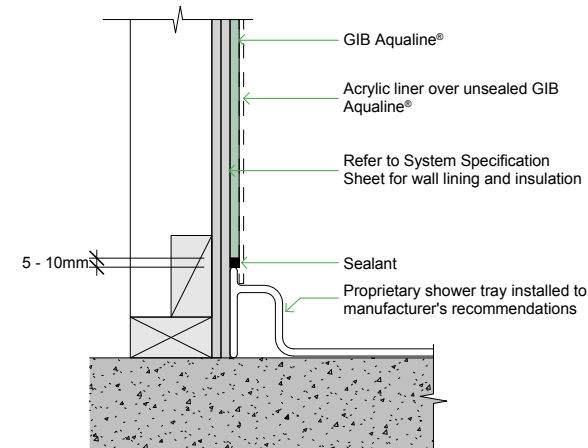
GAL-030

### E: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.

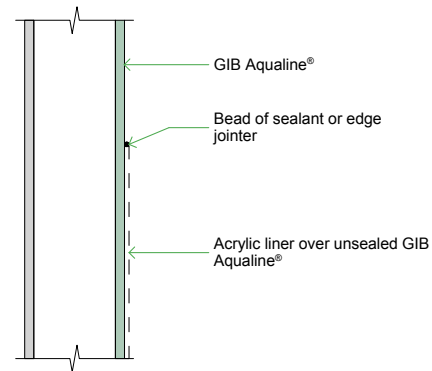


#### A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



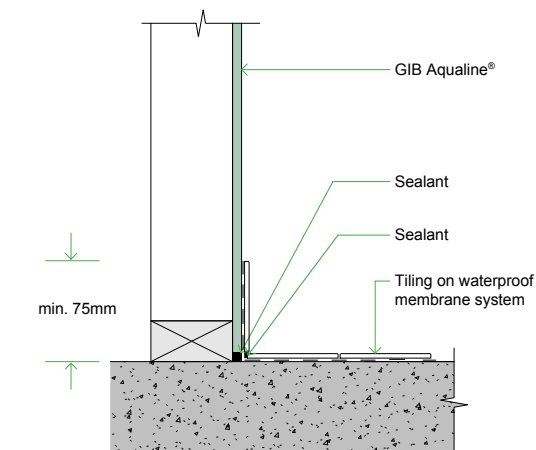
GAL-015

#### C: UNSEALED PLASTERBOARD LINING



GAL-028

#### B: CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

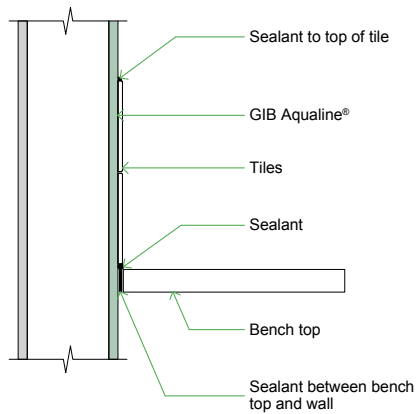
#### D: SHOWER MIXER PENETRATION IN WET WALL LININGS

Refer to the shower mixer manufacturer for shower mixer installation detailing including the use of proprietary products to prevent water or moisture ingress behind the wet wall lining.



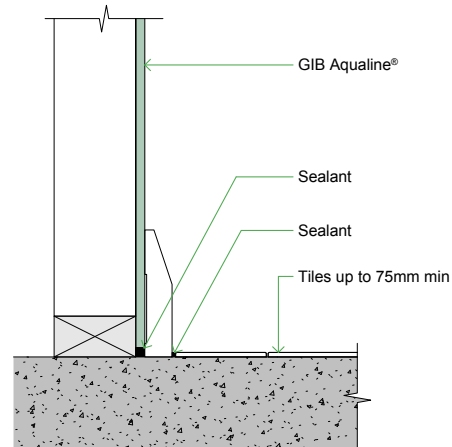


### A: BENCH TOP LINING JUNCTION



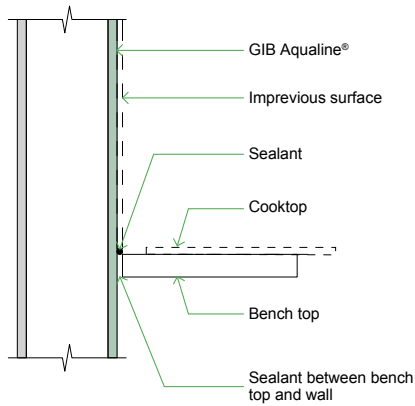
GAL-024

### CERAMIC FLOOR SKIRTING LINING JUNCTION



GAL-001

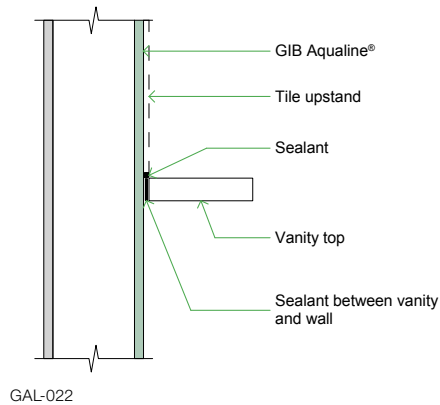
### B: COOKTOP LINING JUNCTION



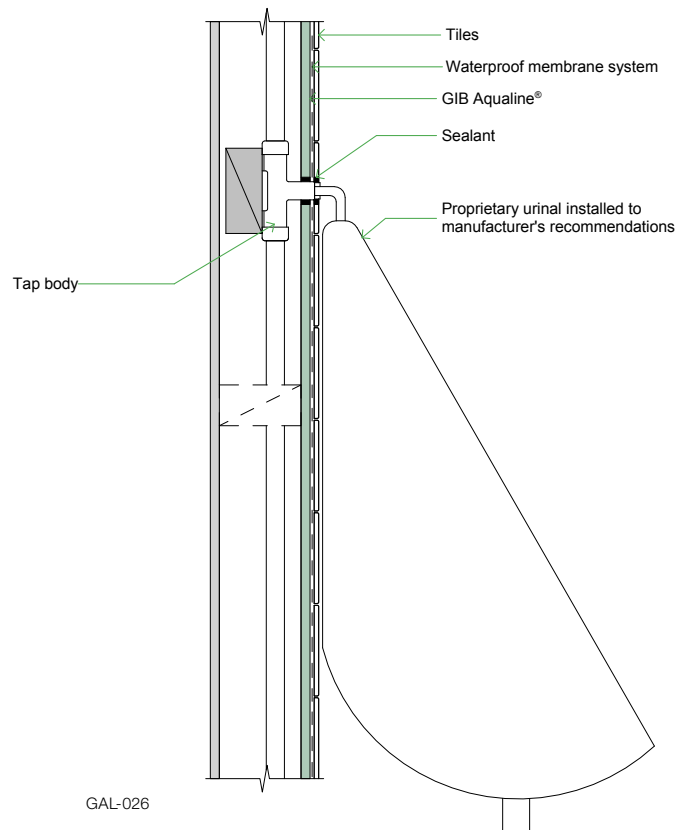
GAL-023B



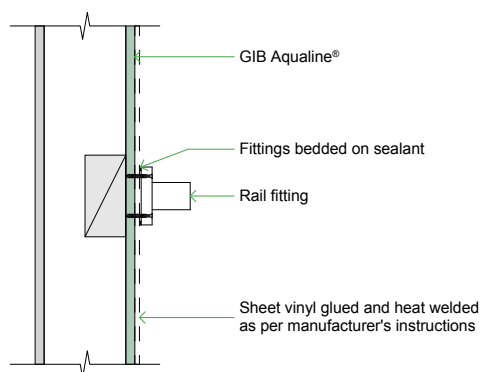
**A: VANITY TOP LINING JUNCTION**



**B: SEALING WET AREA PENETRATION LINING JUNCTION**

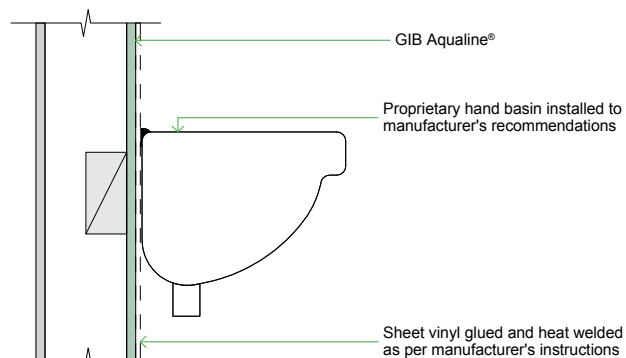


### A: SURFACE MOUNTED WITH NOG



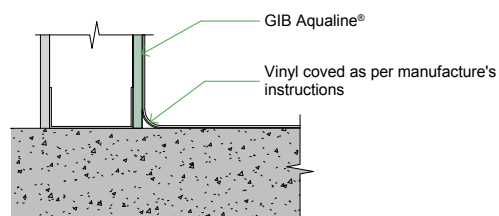
GAL-027

### C: BASIN LINING JUNCTION



GAL-025

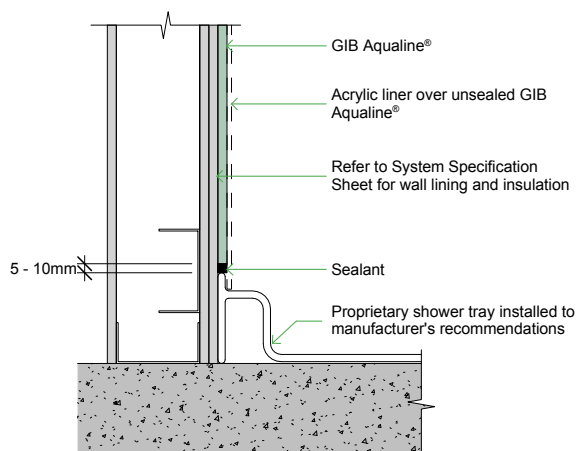
### B: VINYL FLOOR LINING JUNCTION



GAL-006

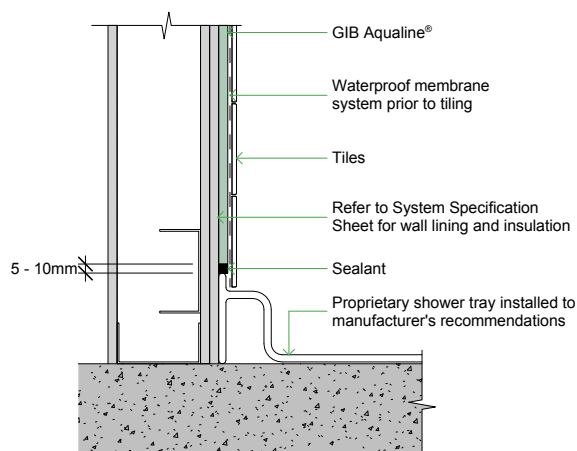


### A: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



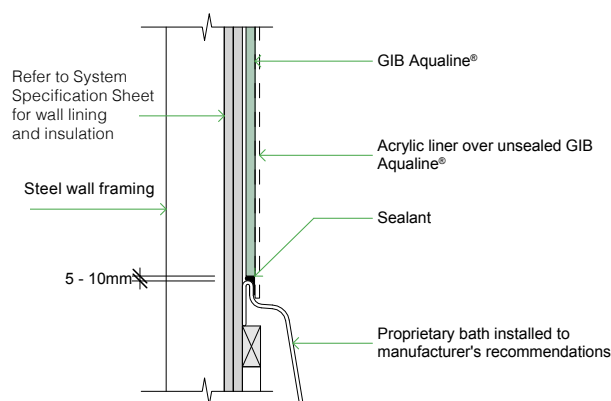
GAL-017

### C: MOULDED SHOWER TRAY DOUBLE LINING JUNCTION



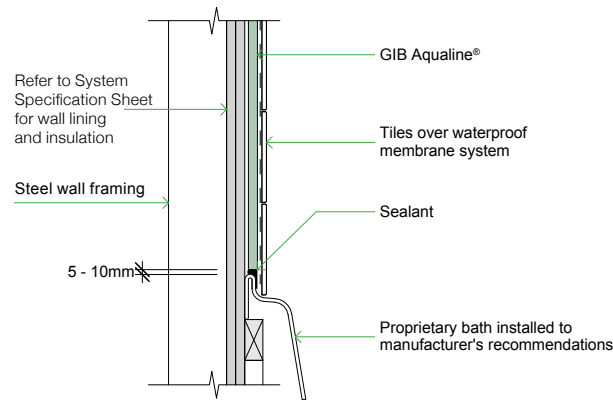
GAL-018

### B: BATH DOUBLE LINING JUNCTION



GAL-013

### D: BATH DOUBLE LINING JUNCTION



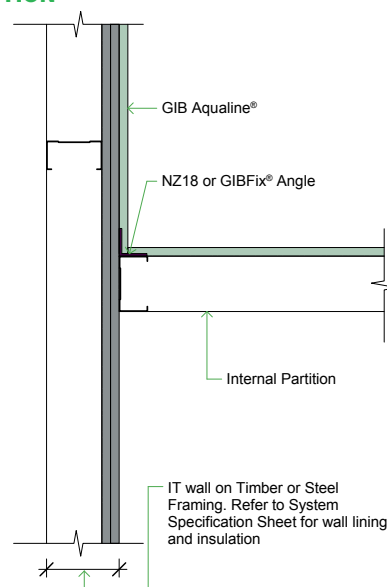
GAL-014

### GIB® WET AREA SYSTEMS FIRE RESISTANCE AND NOISE CONTROL PERFORMANCE

Given recesses required for shower trays, bath upstands, etc., and the likelihood of renovations during the service life of the building, it is recommended that GIB® Wet Area linings in water splash areas are installed in addition to and over required fire and noise control systems in commercial or multi-residential applications.

Do not tile on the resilient side of a GIB Rail® or Acoustic Resilient Mount (ST-001) and channel noise control system.

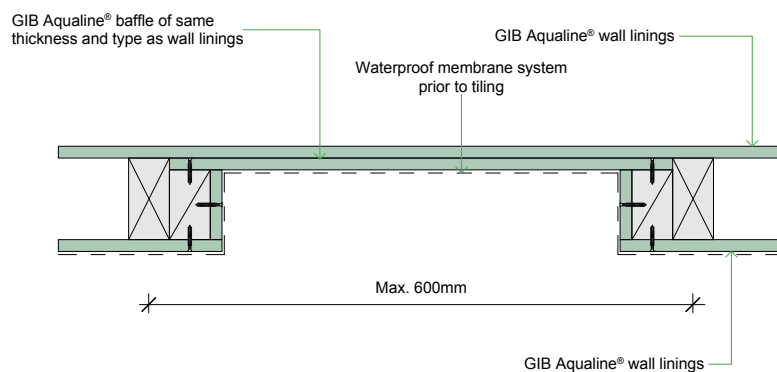
### E: INTERTENANCY WALL AND WET AREA WALL JUNCTION



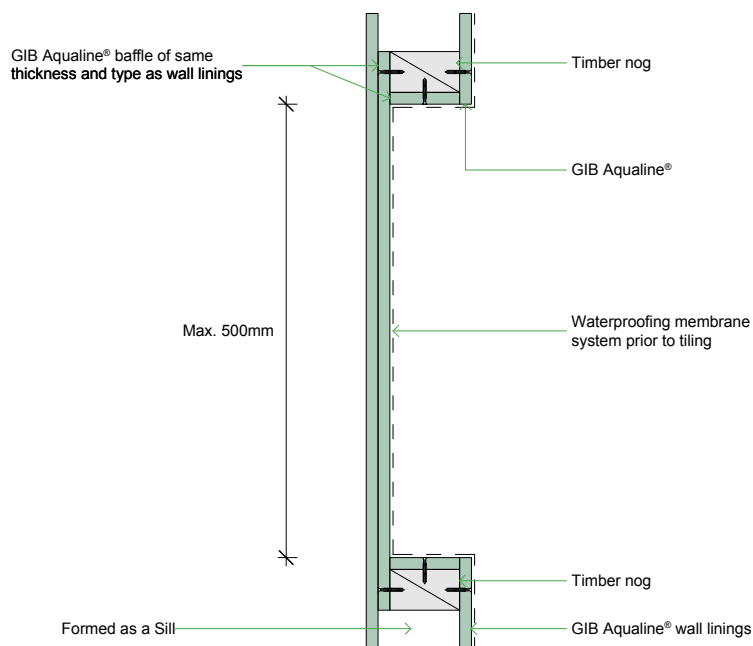
GAL-031C



## TIMBER FRAME TILE RECESS

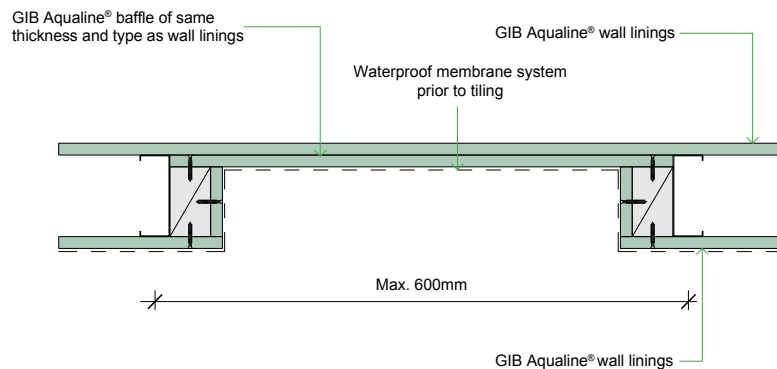


*Larger recesses can be accommodated depending on specific framing layout provided 500mm is not exceeded in at least one direction.*

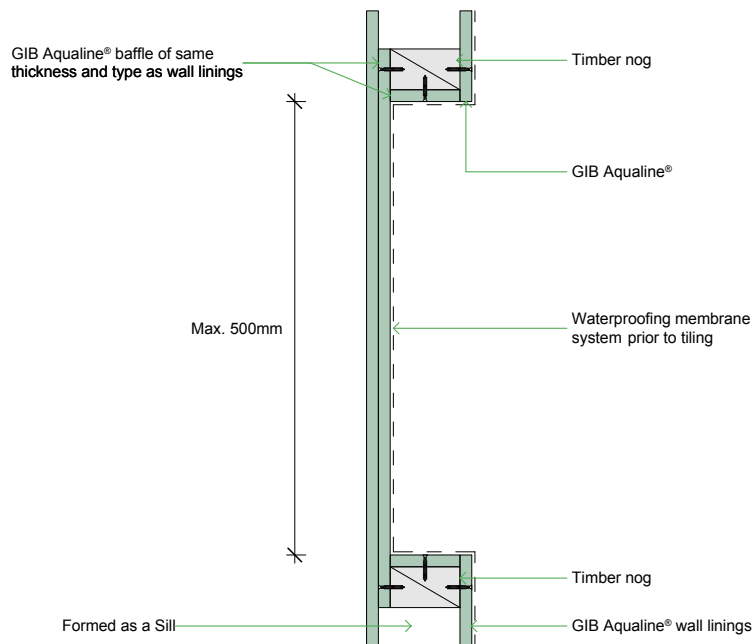


GAL-029

## STEEL FRAME TILE RECESS



*Larger recesses can be accommodated depending on specific framing layout provided 500mm is not exceeded in at least one direction.*



GAL-030

## GIB® Wet Area Systems, February 2021

### LIMITATIONS

Winstone Wallboards Ltd accepts no liability if the GIB® Wet Area Systems and junction details are not installed in strict accordance with instructions contained within this publication.

### USE ONLY THE CURRENT SPECIFICATION

This publication may be superseded by a new publication. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. You should check the GIB® website to ensure you are using the current publication. If you are unsure whether this is the current publication, simply call the GIB® Helpline on 0800 100 442.

### SUBSTITUTION

GIB® Wet Area Systems have been specifically designed and tested to achieve the stated performance levels. To maintain the GIB® Product and System Warranty, all system components detailed in this publication must be used when specifying and installing GIB® Wet Area Systems.

### TRADEMARKS

The names GIB®, GIB Fyreline®, GIB Ultraline®, GIB Toughline®, GIB Braceline®, GIB Noiseline®, GIB Aqualine®, GIB Weatherline®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, GIB® Quiet Stud®, GIB Rail®, GIB Barrierline®, GIB X-Block®, GIB Fire Soundseal®, GIB Clip®, the colour mauve for GIB Toughline®, the colour blue for GIB Braceline®, GIB Noiseline®, the colour pink for GIB Fyreline®, the colour green for GIB Aqualine®, the colour purple for GIB Weatherline® and the shield device are registered trademarks of Fletcher Building Holdings Limited.

### COPYRIGHT

All of the material contained in this brochure, including all text, tables, charts, graphs, drawings, images and diagrams, are protected by copyright. These materials may not be reproduced, adapted or transmitted in any form by any process, without the permission of Winstone Wallboards Ltd.

Copyright© Winstone Wallboards Ltd, 2021.



**FOR MORE INFORMATION VISIT**

[gib.co.nz](https://gib.co.nz)

**OR CALL THE GIB® HELPLINE**

0800 100 442

February 2021



# HardieBacker®

Cement Board

## Installation Guide



**MADE BETTER.  
INSTALLS BETTER.  
PERFORMS BETTER.**™

ESPAÑOL AL OTRO LADO

## CUTTING CEMENT HARDIEBACKER® BOARD



- Use a straight edge as a guide to score the board's face and snap upward along the score line. We recommend using a carbide-tipped scoring knife, but a utility knife may also be used. The use of shears (manual, electric or pneumatic) is also acceptable.
- For cutouts and small holes, score around perimeter and break out from the face side with hammer.
- NEVER use high-speed power tools (e.g. saws, grinders, etc.) to cut James Hardie® products indoors as they may generate excessive silica dust.

- NEVER dry sweep – Use wet dust suppression methods or HEPA vacuum for clean-up.
- To further limit respirable silica dust exposures, wear a properly-fitted, NIOSH-approved dust mask or respirator (e.g. N-95 dust mask) in accordance with applicable government regulations and manufacturer instructions.

## COUNTERTOP INSTALLATION

### 1 | Ensure cabinets are level and secure

- Use minimum 1/2 in exterior grade plywood or equivalent, positioned across the wood cabinet. Space between plywood supports is not to exceed 16 in on center.

### 2 | Determine layout of HardieBacker cement board

- Do not align HardieBacker cement board joints with plywood joints.
- Score and snap boards to required sizes and make necessary cutouts.
- We recommend an 1/8 in gap from board edges.

### 3 | Attach HardieBacker cement board to countertop

- Apply a supporting bed of dry-set mortar or modified thinset to plywood with a 1/4 in square-notched trowel. Mastic can also be used with a 5/32 in V-notched trowel.
- Use the fastener pattern as a guide. Fasten HardieBacker cement board with specified nails or screws (as listed in "Materials Required") every 8 in over the entire surface. Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in from board corners.

### 4 | Tape joints prior to tiling

- Prior to setting the tile, fill all joints with the same mortar used to set the tiles.
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.

### 5 | Exterior application (Limited to HardieBacker 500 in HZ10 climate zones) ‡ *Additional details on page 4*

- Follow Countertop installation steps 1 thru 4
- Mastic (organic adhesives) shall not be used in exterior applications



## FLOOR INSTALLATION

*(Interior Application Only)*

We recommend 1/4 in HardieBacker® board for floor applications, unless 1/2 in thickness is needed for transition.

### 1 | Ensure subfloor is structurally sound

#### On existing structures:

- Ensure subfloor is not damaged. Replace any loose, warped, uneven or damaged sections of floor.
- Make certain subfloor is a clean and flat surface.

#### For all floors:

- Use minimum 5/8 exterior grade plywood or 23/32 OSB with Exposure 1 classification or better, complying with local building codes and ANSI A108.11.
- Joist spacing not to exceed 24 in on center.
- The floor must be engineered not to exceed the L/360 deflection criteria (L/720 for natural stone), including live and dead design loads, for the specific joist spacing used.

### 2 | Determine layout of HardieBacker cement board

- Stagger all HardieBacker cement board joints. Do not align with subfloor joints.
- Never allow all four corners of boards to meet at one point.
- We recommend an 1/8 in gap between board edges.
- Keep sheet edges 1/8 in back from walls and cabinet bases.
- Score and snap boards to required sizes and make necessary cutouts.

### 3 | Attach HardieBacker cement board to subfloor

- Apply a supporting bed of mortar or modified thinset to subfloor using a 1/4 in square-notched trowel.
- Embed HardieBacker cement board firmly and evenly in the wet mortar.
- Use the fastener pattern as a guide. Fasten HardieBacker cement board with specified nails or screws (as listed in "Materials Required") every 8 in over the entire surface. Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in from board corners.
- Set fastener heads flush with the surface without overdriving.

### 4 | Tape joints prior to tiling

- Prior to setting the tile, fill all joints with the same mortar used to set the tiles.
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.





### 1 | Ensure framing is structurally sound

- Must comply with local building codes and ANSI A108.11.
- Use a minimum of 2 in x 4 in wood studs or 20-gauge metal studs, which must be straight, properly aligned and spaced a maximum of 16 in on center.
- In tub and shower enclosures, ensure that the framing is adequately reinforced at the corners.

### 2 | Determine layout of HardieBacker cement board

- Boards may be installed vertically or horizontally.
- Edges of the board parallel to framing must be supported by a structural framing member.
- Score and snap boards to required sizes and make necessary cutouts.

### 3 | Attach HardieBacker cement board to framing

- For interior installations, the use of a waterproof membrane, vapor barrier or vapor retarding membrane is optional unless the local building code requires it.
- If required by the local building code, install a code compliant waterproof membrane, vapor barrier or vapor retarder membrane, check with the membrane manufacturer for suitability for applicable conditions and follow the manufacturer's installation instructions for these materials.
- Install boards 1/4 in above floor, tub or shower pan and caulk accordingly.
- Fasten cement board with specified nails or screws (as listed in "Materials Required") a maximum of 8 in on center at all supports.
- Keep fasteners 3/8 in from board edges and 2 in in from sheet corners.
- Set fastener heads flush with the surface, without overdriving.

### 4 | Tape joints prior to tiling

- Fill all joints with mortar (see "Materials Required").
- Embed 2 in wide high-strength alkali-resistant glass fiber tape in the mortar and level.

### 5 | Exterior application (Limited to HardieBacker 500 in HZ10 climate zones)<sup>†</sup> *Additional details on page 4*

- Install HardieBacker 500 over sub-sheathing with a code approved water-resistive barrier, or in accordance with applicable code.
- May be used up to a height not exceeding the lesser of: through the second-story above grade or 30 feet above grade.
- Follow wall installation steps 1 thru 4



## FINISHING WITH TILE

1. Refer to ANSI A108 and the mortar and tile manufacturers' published application guidelines for complete tiling instructions.
2. Wipe the surface of HardieBacker® cement board clean with a damp sponge just prior to adding mastic or mortar.
3. Spread the mastic or mortar with a notched trowel (Note: Please see "Materials Required" to see which setting material is required for your application).
4. Twist or press and beat in tiles complying with ANSI A137.1.
5. Allow a minimum of 24 hours curing set time before grouting.



## FINISHING WITH NATURAL STONE

Natural stone often has hidden weaknesses which can result in surface cracks in finished floors. To reduce the risk of job failures, always consult The Marble Institute of America Handbook.

In addition to the steps outlined under "Floor Installation," the following is required:

- Always follow the recommendations of the flooring material manufacturer.
- Marble and natural stones must have sufficient flexural strength for use in flooring systems.\* Where the quality and strength of the stone is unknown, the floor must be engineered not to exceed the L/720 deflection criteria, including live and dead design loads, for the specific joist spacing used. The strength of your natural stone will have an impact on the ultimate performance of your flooring system.

*\*Testing has shown that a minimum 2900 psi is preferable for flooring application.*

## FINISHING WITH PAINT, WALLPAPER OR TEXTURE

*(Interior Application Only)*

### 1 | Painting or Wallpapering

Apply a drywall primer suitable for high-moisture areas, as recommended by the paint manufacturer. Paint HardieBacker board as you would drywall. If wallpapering, prime surface of HardieBacker board with a primer suitable for high-moisture areas as recommended by the wallpaper manufacturer.

### 2 | Texturing

Texture can be applied to HardieBacker board in the same way as drywall.

## STEAM ROOM APPLICATION

HardieBacker® board is recognized for use in residential steam rooms when installed over conventional framing and in accordance with HardieBacker board printed installation instructions, TCNA guidelines (Tile Council of North America Handbook, [www.tileusa.com](http://www.tileusa.com)), and local building codes. Questions and concerns regarding design and construction should be directed to a knowledgeable professional.

## ‡ EXTERIOR APPLICATION

*(This application has limited warranty coverage. Refer to Exterior Warranty for coverage information on page 8)*

HardieBacker 500 may be used up to a height not exceeding the lesser of: through the second-story above grade or 30 feet above grade. The HardieBacker 500 must be installed over sub-sheathing with a code approved water-resistive barrier, or in accordance with the applicable code. Install flashings, clearances, and other building practices per local code. James Hardie will assume no responsibility for water infiltration. Use a minimum No. 11 ga. 1¾ in long roofing nails or No. 8-1¾ in long



(0.375 in HD) or ribbed wafer head corrosion resistant screws spaced a maximum of 8 in OC. The maximum weight of the overlayment (tiles, stones and veneers) is not to exceed the code limit of 15 lbs/sq ft. Exterior application is limited to HZ10® product zone only.

Follow installation procedure in accordance with the stone and mortar manufacturer's recommendations.<sup>1</sup> Stones must be free of any substance that may impede proper adhesion. Skim coat is recommended to be 1/8 in - 1/4 in thick and the tile/stone is to be installed while the skim coat is wet.

CAUTIONS: This product shall not be used in the following applications:

- As a backer board in balcony railings and balcony parapet walls.
- HardieBacker 500 may not be used to a height exceeding through the second-story above grade or greater than 30 feet above grade.

## VINYL AND RESILIENT FLOORING *(Interior Application Only)*

### Materials Required

#### 1 | Fasteners

- Minimum 7/8 in long galvanized or polymer-coated 18-gauge chisel point staples with 1/4 in crown.
- Minimum 7/8 in long galvanized ring shanked underlayment flooring nails.
- Fasteners should be long enough to reach the bottom of the subfloor, but not penetrate it.
- Avoid using resin, rosin or cement-coated fasteners that can discolor vinyl flooring.

#### 2 | Patch

- Use the cement-based, rapid-setting patching compound recommended by the floor covering manufacturer.
- Do not use a gypsum-based patch. Follow the patch manufacturer's instructions.

### Preparation for Underlayment

#### 1 | Ensure subfloor is structurally sound and properly installed

##### On existing floors:

- HardieBacker® cement board may be installed under or over Vinyl Composition Tile (VCT) and other resilient flooring. For best results, remove existing floor covering, especially if it is in poor condition.
- If installing HardieBacker cement board over existing floor, ensure the floor is flat and floor covering is thoroughly adhered to the subfloor.

##### On all floors:

- Ensure subfloor is not damaged. Replace any loose, warped, uneven or damaged sections of floor.
- Make sure subfloor is dry, level and fastened correctly. All fasteners must be countersunk or flush with the subfloor. All seams or other areas that are not level must be sanded flat.
- Subfloor must be free of all debris, oil, grease, paint or other foreign substances.

<sup>1</sup> See IRC Table R703.4, IBC §2101.2 and §1405.10

## 2 | Basements and crawl spaces

- Crawl spaces must be well ventilated with a minimum of 18 in between the ground and joists. A vapor barrier over the ground is required.



## Underlayment Installation

### 1 | Determine layout of HardieBacker® cement board

- Install smooth side up.
- Install HardieBacker boards perpendicular to subfloor panels.
- Stagger all HardieBacker board joints. Do not align HardieBacker board joints with subfloor joints
- Never allow all four corners of boards to meet at one point.
- Lightly butt the board joints. Do not leave a gap or force edges together.
- Join factory-cut edges together in the body of the floor.
- Keep board edges 1/8 in back from walls and cabinet bases.

### 2 | Attach HardieBacker boards to subfloor

- Fasten one board at a time. HardieBacker boards must be flush with subfloor during installation.
- Begin the fastening pattern in a corner of the board, then fasten the two adjacent edges. Return to the corner and fasten in a diagonal pattern from that corner until the board is completely fastened.
- Place fasteners in a random, staggered pattern across HardieBacker board. Avoid fastening in a straight line.
- Fasten HardieBacker boards with proper fasteners (as listed in “Materials Required”) a maximum of 3 in on center around the perimeter and 6 in on center in the field.
- Keep fasteners between 3/8 in and 3/4 in from board edges and 2 in in from board corners.
- Fastener heads/crowns must be flush with or slightly countersunk a maximum of 1/16 in below the surface.

### 3 | Finishing surface and joints *(not necessary for carpet or wood flooring)*

- If necessary, lightly hand-sandseams to achieve a smooth transition between boards. Avoid over-sanding. Sanding will generate significant respirable silica dust and those in the immediate area must wear NIOSH-approved respiratory protection (e.g. N95) in accordance with applicable government regulations.
- Thoroughly clean HardieBacker board surface to remove all debris prior to patching.
- Using a wide flat trowel, apply a skim coat of patch (as listed in “Materials Required”) to all seams, sanded areas, hammer indentations, holes, gaps, gouges, chips and voids to achieve a smooth surface. Avoid building a ridge over the seams by feathering the patch out several inches on both sides of the seams.
- Obtaining a perfectly smooth surface may require more than one coat of patch.
- After the patch has thoroughly dried, lightly sand or scrape off any surface imperfections caused by the patch to achieve a smooth surface.
- Wait until patch is thoroughly dry before installing the floor covering.

### 4 | Flooring installation

- Prepared HardieBacker cement board surface must be free of all debris, oil, paint, caulk, joint compound and other foreign substances.
- Do not install floor covering seams directly over the HardieBacker board seams.
- Install floor covering according to the adhesive and floor covering manufacturers’ instructions.



**BASIC COMPOSITION**

90% Portland cement and sand with selected additives. Contains no asbestos, formaldehyde, gypsum, paper facing, or abrasive aggregate.

**1/4 in HardieBacker cement board:**

Sheet size: 3 ft x 5 ft (EZ Grid® board) and 4 ft x 8 ft

Thickness: 1/4 in

Weight: 1.9 lbs. psf (9.3 kg/m<sup>2</sup>)

Complies with ASTM C1288 & ANSI A118.9

**HardieBacker® 500 cement board:**

Sheet sizes: 3 ft x 5 ft and 4 ft x 8 ft

Thickness: 0.42 in

Weight: 2.6 lbs. psf (12.7 kg/m<sup>2</sup>)

Complies with ASTM C1288 & ANSI A118.9

**MATERIALS REQUIRED****1 | Mortar****For floors:**

- Latex or acrylic modified thinset (complying with ANSI A118.4).
- Dry-set mortar for use between subfloor and cement board only (complying with ANSI A118.1).

**For walls and countertops:**

- Latex or acrylic modified thinset (complying with ANSI A118.4).
- Type 1 mastic (complying with ANSI A136.1) (Not to be used in exterior applications).
- For Exterior applications, follow stone and mortar manufacturers recommendations.

**2 | Tape**

- 2 in wide high-strength alkali-resistant glass fiber tape.

**3 | Fasteners****For floors and walls:**

- Minimum 1-1/4 in (for interior) & 1-3/4 in (exterior walls) long corrosion-resistant roofing nails.
- Minimum 1-1/4 in (for Interior) & 1-3/4 in (exterior walls) long No. 8 x 0.375 in HD self-drilling corrosion-resistant ribbed waferhead screws.
- If compliance with ANSI A108.11 is not required, minimum 1 in long No. 8 x 0.323 in HD self-drilling corrosion-resistant ribbed buglehead screws may be used for floors.

- If applying HardieBacker 500 cement board over gypsum, use minimum 1-3/4 in long corrosion-resistant roofing nails.

**For countertops:**

- Minimum 3/4 in long corrosion-resistant roofing nails.
- Minimum 3/4 in long ribbed countersinking corrosion-resistant screws.
- 18-gauge corrosion-resistant polymer coated 3/4 in staples with a 1/4 in crown.
- For HardieBacker 500 cement board, use minimum 1-1/4 in long corrosion-resistant roofing nails or ribbed countersinking screws.

**For vinyl and resilient flooring: (Interior Only)**

- Minimum 7/8 in long galvanized or polymer-coated 18-gauge chisel point staples with 1/4 in crown.
- Minimum 7/8 in long galvanized ring shanked nails.
- Fasteners should be long enough to reach the bottom of the subfloor, but not penetrate it.
- Avoid using resin, rosin or cement-coated fasteners that can discolor vinyl flooring.

HardieBacker board delivers more compressive and flexural strength than any board on the market.

**SILICA WARNING:** Refer to the product Safety Data Sheet before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust from the product Do not eat, drink or smoke when using this product.

The hazard associated with fiber cement arises from crystalline silica present in the dust generated by activities such as cutting, rebating, drilling, routing, sawing, crushing, or otherwise abrading fiber cement, and when cleaning up, disposing of or moving the dust. When doing any of these activities in a manner that generates dust: (1) comply with the OSHA PEL for silica dust and/or other applicable law, (2) follow James Hardie instructions and best practices to reduce or limit the release of dust; (3) warn others in the area to avoid the dust; (4) when using mechanical saw or high speed cutting tools, work outdoors and use dust collection equipment; and (5) if no other dust controls are available, wear a dust mask or respirator that meets NIOSH requirements (e.g. N-95 dust mask). During clean-up, use a well maintained vacuum and filter appropriate for capturing fine (respirable) dust or use wet clean-up methods - never dry sweep.

BK050905



## ENVIRONMENTAL CONSIDERATIONS

HardieBacker® board's proprietary cement formulation provides a moisture resistant wallboard and tile backer substrate that stands tough over time, reducing the need for product replacement. James Hardie has demonstrated a commitment to reducing energy consumption, while improving process efficiencies and waste management. It avoids the use of environmentally damaging materials and uses renewable resources that are abundant in the manufacture of HardieBacker cement board. HardieBacker cement board does not contain any glass fibers, gypsum, asbestos or formaldehyde. The company also focuses on water conservation and attempts to recycle water and waste product as much as possible during the manufacturing process.

## RECOGNITIONS

HardieBacker cement board is recognized as an interior substrate by the following:

- International Code Council Evaluation Service ESR-2280
- City of Los Angeles Research Report No. 24862
- HUD Materials Release Nos. 1263 and 1268
- City of New York MEA No. 223-93M
- IBC 2509.2
- IRC R702.4.2

Consult these documents for additional information concerning conditions for use in applicable jurisdictions.

*\*Cementitious Backer Unit/Fiber-Cement Underlayment*

Compressive Strength Compressive Strength at Equilibrium Moisture Content  
(ASTM D2394)

1/4 in HardieBacker EZ Grid® cement board: 7000 psi (48 MPa)

HardieBacker 500 cement board: 6500 psi (45 MPa)

Non-Combustibility HardieBacker cement board is recognized as non-combustible in accordance with ASTM E136.

Surface Burning Characteristics When tested in accordance with ASTM method E-84: Flame Spread – 0, Fuel Contributed – 0, Smoke Developed – 5.

Fire Rated Assemblies HardieBacker cement board may be used as a component in one-hour fire-resistive wall construction; consult ESR-2280 website listings for recognized assemblies, or contact James Hardie's Technical Services at 1-800-9HARDIE (1-800-942-7343).

## HARDIEBACKER WARRANTIES

## INTERIOR APPLICATIONS

The HardieBacker cement board limited lifetime warranty covers both the product and replacement labor for the life of the product. Download a copy of the HardieBacker limited lifetime warranty from [hardiebacker.com](http://hardiebacker.com) or obtain one from wherever James Hardie product are sold.

## EXTERIOR APPLICATIONS

James Hardie offers a limited 10 year warranty for Hardiebacker 500 cement backerboard installed in exterior applications in HardieZone HZ10 regions only. To find out the HardieZone designation for your ZIP code, go to [HardieZone.com](http://HardieZone.com)

# CHOSEN BY PROS. UNRIVALED IN PERFORMANCE.

HardieBacker® Cement Board's **unique cement formulation** and structure provide the ideal combination of **strength, uniform composition and performance** that no other backer board can provide. That's why it was named **The Most Preferred Brand of Backer Board** by tile installers and contractors in the Tile and Stone Report\*.



## MADE BETTER

Compared to other cement boards, HardieBacker Cement Board offers the **highest flexural strength** and up to **3x the compressive strength** to enable a solid foundation for your tile job.



## INSTALLS BETTER

HardieBacker Cement Board is easier to work with, regardless of how you cut it.

- **Less debris**, whether you're cutting manually or with power tools.
- **Cleaner cuts** and sharper edges for tighter seam lines.
- **Less dust**, which means minimal mess and cleanup.



## PERFORMS BETTER

Our unique cement formulation resists moisture. Additionally, it provides excellent tile adhesion to help protect your work—and your reputation.

\*According to the 2019 Tile and Stone Installation Contractor Market Study conducted by Clear Seas Research in partnership with the NTCA and TILE Magazine.



# Hot Water for your Home



**Residential  
Water Heating Range**

Edition 6.1  
June 2024  
**Page 648 of 734**

# We're committed to Aotearoa – the land, the people, and our future.

## We're designing for zero waste.

Since 1958, Rheem has been a leader in water heating innovation in New Zealand, and this isn't changing any time soon.

We're committed to improving our products and processes, so we can dramatically cut our impact on the environment.

It's all part of our bold vision for the future.

Intelligent products, responsible processes and inspired people are all integral to achieving our zero waste goal – so that's exactly where we are focusing our efforts.

Rheem is a member of the Sustainable Energy Association of New Zealand, SEANZ.







Install a Rheem®

# Rheem HAS GONE SOLSTICE<sup>zd</sup> Green

SOLSTICE<sup>zd</sup> LBA IS  
THE NEW STANDARD  
FOR THERMAL FOAM  
INSULATION

- BETTER FOR THE ENVIRONMENT
- EXCEEDS NZ MINIMUM ENERGY PERFORMANCE STANDARDS (MEPS)
- ZERO OZONE DEPLETING PROPERTIES
- ULTRA LOW GLOBAL WARMING POTENTIAL (GWP)\*

## Go Green, Install a Rheem

\*Visit [ww2arb.ca.gov/resources/documents/high-gwp-refrigerants](http://ww2arb.ca.gov/resources/documents/high-gwp-refrigerants) for more information

For further information  
call 0800 657 336 or  
visit [www.rheem.co.nz](http://www.rheem.co.nz)

REC-IND072019

# CONTENTS

Types of Water Heating	6
Why Choose Rheem	7
Hot Water Safety	7
Mains Pressure Cylinders	8
Low Pressure Cylinders	11
Gas Water Heating	12
Heat Pump Water Heating	15
Solar Water Heating	16
Pool & Spa Water Heating	17
Boiling Water	18
Specifications	22
Warranties	31



Image courtesy of Voda Plumbingware



# The brand you can trust

Hot water is one of life's true luxuries and at Rheem we pride ourselves on producing reliable quality products backed by the best in customer service.

Rheem are proud to bring you this easy to read reference guide which details not only the best water heating products on offer but also key information about hot water, its uses, volumes, heating and energy alternatives.

This reference guide will help you understand hot water heating options so you can choose the most suitable hot water solution for your needs.

For more information please visit our website [www.rheem.co.nz](http://www.rheem.co.nz) or call our Customer Service specialists on 0800 657 336.



Install a Rheem®  
Page 652 of 734

# TYPES OF WATER HEATING

There are many energy sources but only two types of water heaters.

These include electricity, gas (ULPG or Natural) and renewable energy sources such as the sun, wind, wood and even pellet type fuel sources. What's more you can combine energy sources for incredibly efficient and sustainable water heating solutions.

Water heaters fit into two categories – storage and continuous flow. There are many ways to heat your water and here at Rheem we are dedicated to bringing you the right solution for the needs of your home and family.

## Storage Water Heaters

These are the well known upright cylinders in our homes which are generally heated by electricity or gas. Suitable for mains pressure or low pressure.

### Mains Pressure Storage

Mains Pressure systems deliver full flow and allow for a wider range of modern fittings. Tank or bore water can also be pumped to mains pressure. If you are living in a residential area you will almost certainly have mains pressure available at your gate. Refer to page 7 for further information.

### Low Pressure Storage

Low Pressure water heaters are a common sight in older homes and while they are typically electric, some gas systems do exist. Rheem has a large range of low pressure copper and vitreous enamel (VE) lined cylinders. The VE cylinders can provide more pressure and copes better with a wider range of problematic water types such as high chlorination. Refer to page 10 for further information.

### Heat Pump

Heat pumps are the most advanced and efficient water heating option currently available. Heat is extracted from the surrounding air and converted into energy which is then used to heat the stored water. Refer to page 14 for further information.

### Gas Continuous Flow

Working differently from traditional storage water heaters, gas continuous flow water heaters only heat water on demand rather than heating and storing water until needed. Appliances are compact and an excellent choice where space is at a premium. They are ideal for homes with high peak loads or when hot water is required occasionally such as at a holiday home.

Available in either ULPG (bottled) or Natural Gas, Rheem gas continuous flow models have the option of remote temperature controllers for added convenience and safety. Refer to page 11 for further information.



### Solar

Solar captures free energy from the sun using roof-mounted panels (collectors), this energy is then transferred to a storage cylinder. This can be paired with electric, gas storage or gas continuous flow for a reliable and energy efficient hot water system. Refer to page 15 for further information.

# WHY CHOOSE RHEEM?

Rheem has been a trusted name in New Zealand since the company was formed in 1958.

Rheem started with gas fired mains pressure water heaters and low pressure electric cylinders moving through to mains pressure electric in 1973. Even in the early days, Rheem was at the leading edge of hot water heating technology quickly expanding its range to offer the best products for domestic and commercial water heating needs.

Remember the old wall mounted Zip that would whistle when the water was boiled? Rheem continues to evolve its technology and has created a range of super smart Lazer® boiling water appliances as well as the Rheem 'On-Tap' instant boiling and chilled water dispensing tap – a first for New Zealand manufacturing.

Rheem New Zealand is part of a trusted global family of brands. Its highly skilled and committed Research and Development team right here in New Zealand continues to improve water heating technology for future generations to benefit from.



## HOT WATER SAFETY

Abundant hot water is a lovely thing, however, almost 40% of New Zealand homes have hot water that's dangerously hot and nearly 10% have water so hot that burns are inevitable. (BRANZ Research)

A safe bath temperature for young children is between 37–38°C.\*

New Zealand Building Code compliance law requires hot water to be stored at 60°C or higher to eliminate the risk of Legionella bacteria growth.

A tempering valve installed is the acceptable solution to provide safe hot water to your showers, hand basins and bath. This valve mixes in cold water to provide safer water temperature at the outlet for personal hygiene. Laundry and kitchens do not require tempering.



At 70°C the skin  
is burned instantly

Water at 60°C will cause  
bad burns within one second

At 54°C it takes  
ten seconds to burn

38°C is a safe  
bathing temperature

\*Source: [www.safekids.co.nz](http://www.safekids.co.nz)

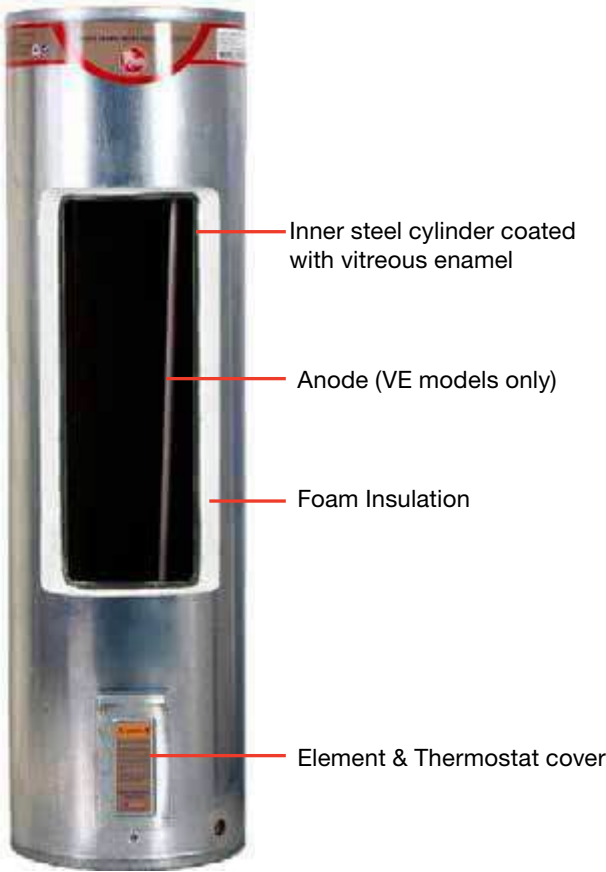


# MAINS PRESSURE CYLINDERS

Vitreous enamel (VE), is a long established and trusted finish for metal. It is entirely inorganic and the enamel coating is fused (i.e. not coated) to the metal substrate of the water heater at temperatures in excess of 900°C. This provides a durable, impervious, hygienic and hard finish to prevent rusting and corrosion.

Rheem Vitreous Enamel water heaters provide the best corrosion resistance to a wide range of water conditions including varying pH levels, high chlorides, hard water and MIC (Microbiological Induced Corrosion) as found in parts of the country and areas with untreated bore water.

Vitreous Enamel technology is tried and true and has been dated back to the ancient Egyptians. In New Zealand, Rheem continues to develop its VE technology and has introduced higher resistant enamels and steel manufacturing techniques to produce a world class range of water heaters.



## Vitreous Enamel (VE)

Mains Pressure		
Large range of sizes		
Twin & dual element models		
Can deliver up to 40 litres of hot water per minute		
Suitable for a wide range of water conditions		
All VE water heaters are fitted with a sacrificial magnesium anode to provide additional corrosion protection to the cylinder in adverse water conditions		
1-7 people	25-300L	Indoor installation
Refer to page 21 for specifications		

# Vitreous Enamel provides superior durability in all water conditions.



## Purpose built for the outdoors

The Rheem Optima is a mains pressure electric storage cylinder that is a family favourite. Suitable for indoor or outdoor installation and available in capacities from 180 to 400 litres.

The 300 and 400 litre models feature twin heating elements to offer night rates\*. Only one element will come on at any one time. This is known as a non-simultaneous system. When the tank is full of cold water the upper element will take priority heating the top portion of the water. Once the desired temperature is reached the upper thermostat flips the power to the lower thermostat and element to heat the lower portion of the tank.

## Optima Vitreous Enamel (VE)

Mains Pressure

Colour-bond jacket

Twin element models (300L and 400L)

All VE water heaters are fitted with a sacrificial magnesium anode to provide additional corrosion protection to the cylinder in adverse water conditions

2-7 people

180-400L

Indoor/Outdoor installation

Refer to page 21 for specifications



### \*Night rates

You may be able to switch to a night rate electricity tariff which could halve your hot water bill. It's not available in all areas of the country though - check with your electricity supplier first.

# MAINS PRESSURE STAINLESS STEEL

As older low pressure systems need replacing, the trend is to replace these with mains pressure.

With up to 40 litres per minute flow rate you can have multiple showers and taps running while maintaining a stable shower temperature.

Our stainless steel mains pressure water heaters are generally heated with electricity and most models are also heat pump and solar compatible.

Available in various sizes from 135 to 300 litres.

## Stainless Steel

Heat pump and solar compatible (excludes 135L model)

Suitable for a wide range of water conditions

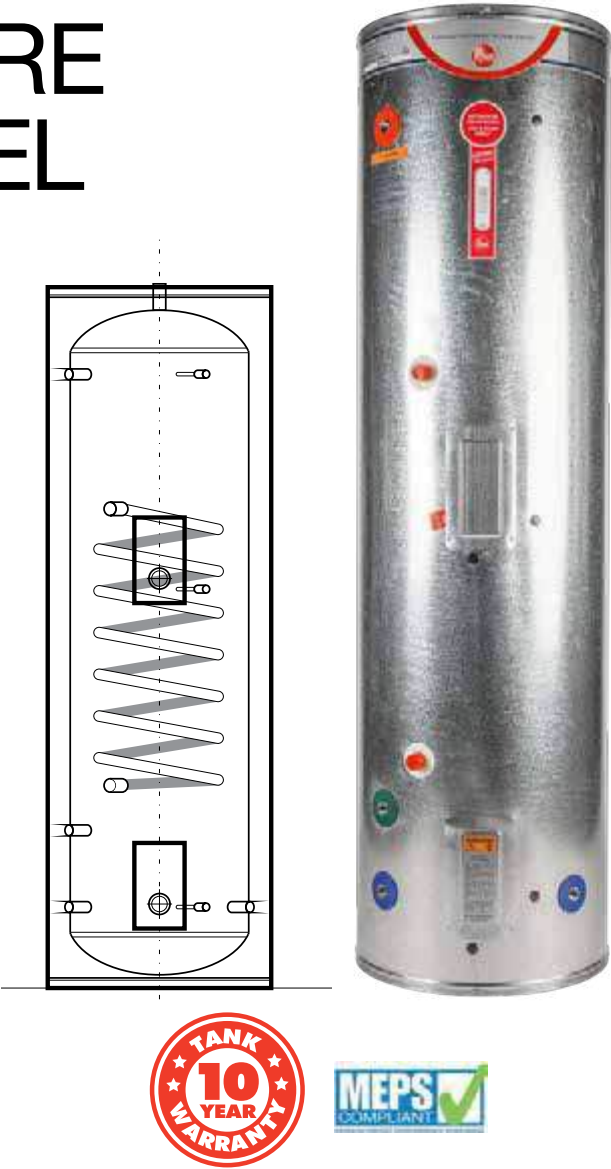
Colour-bond jacket

Incoloy element (top element kit-set available as spare part for 180, 250 and 300L models)

TPR valve setting: 135 & 180L = 1000 kPa, 250 & 300L = 850kPa

1-7 people	135-300L	Indoor/outdoor installation
------------	----------	-----------------------------

Refer to page 22 for specifications



The tried and tested coil heat exchanger system provides an opportunity to future proof your hot water supply. It can be connected to either solar, wetback or heat pump or a combination of these sources.

Each unit comes with a lower element installed and an upper element can also be added to act as a back-up or booster.

## Stainless Steel Coil

Mains Pressure

Designed and engineered in New Zealand

Single or dual coil options

Versatile and economical

Heat pump, solar or wetback compatible

2-7 people	250 & 300L	Indoor installation
------------	------------	---------------------

Refer to page 22 for specifications



# LOW PRESSURE

Low Pressure cylinders were the only option available in New Zealand until the 70's. There are three ways you can identify these water heaters; a copper pipe which protrudes through the roof venting to the atmosphere, a large pressure reducing valve on the inlet or a header tank in the ceiling space.

They are still popular today and a good choice for like-for-like replacement. Rheem also offer low pressure vitreous enamel models which can operate at higher pressure (120kPa) and are ideal for pumped systems and areas where water quality is poor.

## Low Pressure Copper

Choice of 3 inlets (90–180L only)

Tall, medium, short size options

Wetback models available from 135L

1–6 people

15–300L

Indoor installation

Refer to page 23–24 for specifications



## Low Pressure Vitreous Enamel (VE)

Proven & tested Vitreous Enamel Technology

Built to suit a wide range of water conditions

Designed to operate as Low Pressure Heavy Head - 120 kPa

Triple inlet as standard

1–7 people

90–270L

Indoor installation

Refer to page 23 for specifications



# GAS CONTINUOUS FLOW

Rheem are world leaders when it comes to manufacturing continuous flow gas water heaters. World class Japanese built gas water heaters are sold to multiple countries on a global scale including the USA and Rheem is proud to offer these in New Zealand.

Working differently from traditional storage water heaters, continuous flow water heaters only heat water on demand rather than heating and storing water until needed. Appliances can be conveniently mounted to, or recessed into, your exterior wall, taking up less space. They are ideal for homes with high peak loads or when hot water is required occasionally such as at a holiday home.

Either connected to Natural Gas or to ULPG storage bottles, the water temperature is pre-set on the appliance or is adjustable with optional remote temperature controllers installed indoors.

In homes where there is a high demand for water, or in colder areas where ambient water temperature is low, two appliances can be linked together using the Rheem EZ Link® system to supply twice the flow.



## Gas Continuous Flow

Flamesafe overheat protection system	
6 star energy rating	
Digital display for easy fault diagnosis and service	
Frost protection	
Can link two units for increased supply with EZ Link®	
Indoor and outdoor models	
Control your water temperature with remote controllers	
16L–27L per minute	Natural Gas or ULPG
Refer to page 25 for specifications	

Go with  
the Flow®

## How Continuous Flow works

The water heater operates automatically, heating the water as it passes through the appliance. When a hot tap is opened, the gas burners ignite to provide immediate heating of the water. The heat produced by the burner is transferred to the water through the heat exchanger. The gas burners extinguish when the hot tap is closed.



### Outdoor - Rheem 16

1–1.5 Bathrooms  
1–3 people

An ideal solution for compact home sites, baches, cribs or apartments.



### Outdoor - Rheem 20

1.5–2 Bathrooms  
2–4 people

Medium capacity model ideal for small to medium sized homes and apartments.



### Outdoor - Rheem 26

2–3 Bathrooms  
4–6 people

A popular model in more temperate areas, with the capacity to suit most homes.



### Outdoor - Rheem 27

2.5–3 Bathrooms  
4–6 people

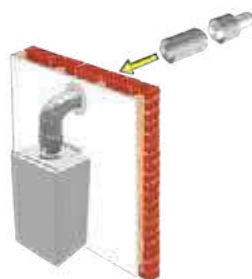
Our most popular capacity, ideal for larger families with limited space and high demands for hot water.



### Indoor - Rheem 27

2.5–3 Bathrooms,  
4–6 people

The only Rheem indoor continuous flow model (must be flued to the outside of the building).



### Flue Kit

The Indoor model must be installed using a certified Rheem flue system. Always check with local authorities that the installation complies with all regulations applicable in your area.



### Recess Box

Comes with door and mounting brackets for recessing into exterior walls.



### Pipe Cover

Designed to cover pipework and valves.



### EZ Link® Kit

Links two units together and provides staged heating to reduce wear and energy use. Kit contains 1.8m cable and fittings.

# GAS STORAGE

Rheem Stellar can only be described as the “King” of gas water heaters. New Zealand’s most efficient domestic gas storage water heater is designed for a long life outdoor installation.

The balanced super-flue design pulls the gas heated hot air through the unit twice to maximise efficiency. The exhaust temperature exits at a very safe temperature through a very modern stylish exterior flue that looks the part.

The Stellar delivers hot water at up to 40 litres per minute, ideal for the modern home with high delivery tapware, massage showers and multiple bathrooms. If your home uses reticulated natural gas for heating and cooking, then it makes sense to heat your water with gas.



## Stellar Outdoor Gas Storage

No electricity required		
Suitable for all water pressures		
Most efficient domestic gas storage water heater		
Advanced SuperFlue Technology		
Natural Gas only		
2–6 people	130 & 160L	Outdoor installation
Refer to page 24 for specifications		

Mains Pressure gas storage water heaters deliver hot water instantly by keeping a generous quantity stored hot and ready for your use.



## Indoor Gas Storage

Mains Pressure		
No electricity required		
Advanced SuperFlue Technology		
Natural Gas only		
2–6 people	130 & 160L	Indoor installation
Refer to page 24 for specifications		

# HEAT PUMP

Rheem Heat Pump water heaters are an energy efficient, affordable way to heat water. Heat Pumps use the heat from the surrounding air to heat your water and help reduce your water heating energy consumption compared to an electric water heater. They work all year round, day or night, in sunshine or rain and even on cooler days, as there is always heat in the atmosphere which can be used.

Heat pumps deliver similar benefits to solar without the need to install roof mounted solar panels. Environmentally friendly heat pumps are the future of water heating and are available now.



## HDc-270 Ambiheat Heat Pump

Advanced wrap around microchannel heating technology for uniform and faster water heating

Suitable for cold climates (-5°C to 43°C)

Suitable for harsh water conditions

High recovery rate for fast heating and 2.4kW back-up element for emergency heating

Leading technology with user-friendly touch screen LED display

Variable temp control

2-5 people

270L

Outdoor installation

Refer to page 29 for specifications

## MPi-325 Heat Pump

Mains Pressure

Whisper Technology for quieter operation

Reduces greenhouse gas emissions

Suitable for climate temperatures of 3°C to 45°C

The size of the cylinder allows the heat pump to run at a constant optimised rate topping up as water is drawn off

Back-Up element provides hot water regardless of the weather

Frost protected

2-5 people

325L

Outdoor installation

Refer to page 29 for specifications

## How much could you save?

Monthly Power Bill	Electric Hot Water	Heat Pump Hot Water	Est. Annual Savings*
\$200	\$80	\$27	\$639
\$400	\$160	\$53	\$1,279
\$600	\$240	\$80	\$1,918
\$800	\$320	\$107	\$2,557
\$1,000	\$400	\$134	\$3,197

\*Based on annual average heat pump water heater efficiency of 300%. Estimated annual savings have been rounded to the nearest dollar. Based on 22 cents per kW/h and 24 hour continuous tariff. Prices may vary from region to region. For the most up to date pricing, check with your power company.





# PREMIER LOLINE SOLAR®

Free energy from the sun. Closed loop split solar is Rheem NZ's Solar Premier water heating system which is designed for top performance in our environment, even when it is frosty or water quality is poor.

The highly efficient CSA2007 collector, with a heat exchange cylinder, stores 270 litres of hot water. The closed system uses heat transfer fluid (glycol), similar to antifreeze used in car radiators, this protects the system from freezing or calcium formation due to poor water quality, freezing or stagnation. Sacrificial anodes in the vitreous enamel lined storage tank offers long term protection.

We advise that all solar water heating systems be backed up with an alternative heating system. Rheem Solar Premier has a built-in electrical boost as standard but there is the option to have a gas boost using a gas continuous flow unit. This is essential to ensure hot water availability on poor weather days (low solar gain) or when stored water temperature drops below 58°C.

Rheem also offers a range of solar ready storage tanks allowing you to future proof your home and/or allowing for solar conversion when you are ready to make the change.

## Premier Loline Solar®

Cut hot water heating costs by up to 70%

Drain Back protection

Electric boost as standard, gas boost is optional

Overheat protection built-in

Cylinder suitable for either indoor or outdoor installations

TPR valve setting: 1000 kPa

**Refer to page 28 for specifications**

See [www.niwa.co.nz](http://www.niwa.co.nz) for the sunshine hours in your area.





# POOL & SPA HEATING

## Raypak Residential Pool Heater Models 200-430

Raypak® Residential pool and spa heaters are capable of heating all sizes of pools and spas, extending your swimming time and enjoyment.

## Raypak Premium Pool Heater Models 280 & 430

Raypak® Premium pool & spa gas heaters are built to meet the toughest of operating conditions and environments as well as suitable for small to medium commercial installations.

## Raypak Spa Heater Model Spartan 131

The Spartan 131 spa heater is a purpose built spa heater. It is capable of heating almost any spa on demand.



## Pool Heater Models Residential 200, 280, 350 & 430 Premium 280 & 430

- Cupro-nickel heat exchanger for greater protection against corrosion
  - Energy-saving 'hot surface ignition'
  - Remote control connection available as an option
  - Suitable for either indoor or outdoor installations (Outdoor hood supplied standard with heater)
- Refer to page 29 for specifications

## Spa Heater Model Spartan 131

- Digital thermostat display
  - Integration capabilities with other pool and spa control equipment
  - Energy-saving 'hot surface ignition'
  - Remote control available as an option
  - Suitable for outdoor installations only
- Refer to page 29 for specifications



# BOILING WATER

## On-Tap

### Delivering boiling water instantly and safely

Rheem On-Tap is on call when you need it and ideal for many homes and offices - so no more waiting for kettles to boil and wasting bench space.

### Flexibility and Style

Rheem On-Tap features separate boiler and chiller units allowing greater flexibility when installed in under-bench spaces which would not normally be possible with some other systems. A sink-free kit allows you to install your On-Tap without the need for a sink.

### Energy Efficient

The 7 day programmable timer means that you can have filtered boiling or chilled water when you want it and save energy when you don't. The ability to set your boiling water between 70–99°C plus a selectable timer for sleep mode can reduce energy consumption by up to 40% over a normal week.

### Safety

Implementing the safety lock for two-finger operation provides extra safety for children and those most at risk. The no splash, drip free tap ensures safety at every step of operation.

### Filtered

The superior 5 micron filter reduces chlorine taste and odour as well as lime-scale build-up. A filter light indicates when the filter is due to be changed and the simple filter system makes filter changes a breeze.



## Optional Chiller

A separate chiller can be added to provide filtered chilled water from the same tap.



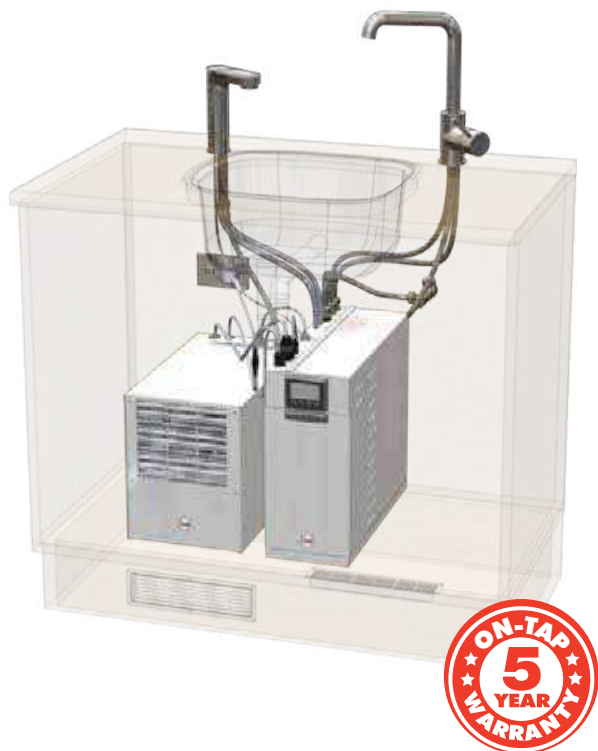
Compact  
1.8L Chiller

# On-Tap Plus

## All your water supplied from under the bench

The combination of On-Tap with its matching mixer provides a superior all-in-one underbench solution for your new or existing work or kitchen space.

With the convenience of drawing all your boiling, chilled and mixed water from the compact underbench appliances, this range is easy to install and avoids the costs associated with connecting to your existing hot water system.



On-Tap Plus with its matching mixer tap is your all-in-one underbench water solution.

Typical installation with chiller (sold separately)

On-Tap	On-Tap (tap plus mixer)
Available in two stylish tap designs	Works independently from your existing hot water system - cold water supply only required
Sink-free options available	Available in two designs with matching mixer tap
24/7 timer, sleep mode and adjustable delivery temperature for saving energy	Hands-free filling
Hands-free filling	Safety lock feature
Safety lock feature	Energy saving - sleep mode and adjustable delivery temperature
Superior 5 micron filter	Up to 20L boiling water p/hr
Up to 20L boiling water p/hr	Sink installation
Sink or sink-free installation	Refer to page 26 for specifications
Refer to page 26 for specifications	

# LAZER® BOILING WATER

## Energy efficient

The Lazer® Office and Commercial appliances feature a seven-day programmable timer and a selectable sleep mode which will turn the unit off if it has not been used for a set period of time. The Lazer® Eco features an 'Eco Mode' which turns the unit off 2 hours after use to reduce unnecessary power consumption.

## Safety first

Lazer® Eco and Commercial models feature the option of the Rheem Safety Tap. Retro-fitted to any Lazer® Eco or Commercial unit, the safety tap prevents accidental dispensing with its 3-step action. The Lazer® Office unit has an integrated tap with push button activation. All Lazer® units have been designed with automatic safety devices to safeguard the unit from boiling dry.

## Installation

The mounting bracket is easily mounted on the wall above your sink or benchtop. This allows for quick installation and easy removal when service or maintenance is required. Mounting brackets come standard with the Lazer® Office range and is an optional extra for the Lazer® Eco 3L and 5L units.

## Filter

All Rheem Lazer® models can be connected with a remote filter kit for clean, crisp water delivery. Both the Lazer® Office and Lazer® Commercial appliances will alert via the display when the filter needs replacing.



**Lazer® Eco**  
Energy Saving

## Lazer® Eco



Available in 3, 5 and 7.5L capacities

Eco Mode button control

Indicator light changes colour, so you know at a glance when it's heating or in Eco Mode

Optional safety tap available

Easy to clean white powder coat finish

Max 185 cups\* per hour

3L-7.5L

Wall mounted

**Refer to page 27 for specifications**

\*Cup size 170ml



## Lazer® Office



Available in 3 and 5 litre capacities

Delivers up to a maximum of 170 cups\* of boiling water per/hr

Available in powder coat white or brushed stainless steel

Integrated tap

Easy clean

Mounting bracket supplied

Max 170 cups* per hour	3L & 5L	Wall mounted
------------------------	---------	--------------

**Refer to page 27 for specifications**

\*Cup size 170ml



Lazer® Office  
Stylish & Efficient



Lazer® Commercial  
High Capacity

## Lazer® Commercial



Delivers a maximum of 512 cups\* per hour (depending on model)

Fast flow tap

Available in powder coat white or brushed stainless steel

Easy clean

Large range of capacities available

Safety Tap (optional)

Max 512 cups* per hour	7.5–40L	Wall mounted
------------------------	---------	--------------

**Refer to page 27 for specifications**

\*Cup size 170ml

## Zip – a Kiwi classic

### Rheem Zip®



Sight glass to view water level

Manual fill and boil operation

Optional safety tap available

An economical option when hot water is required infrequently

4.5L – 34L	Wall mounted
------------	--------------

**Refer to page 27 for specifications**

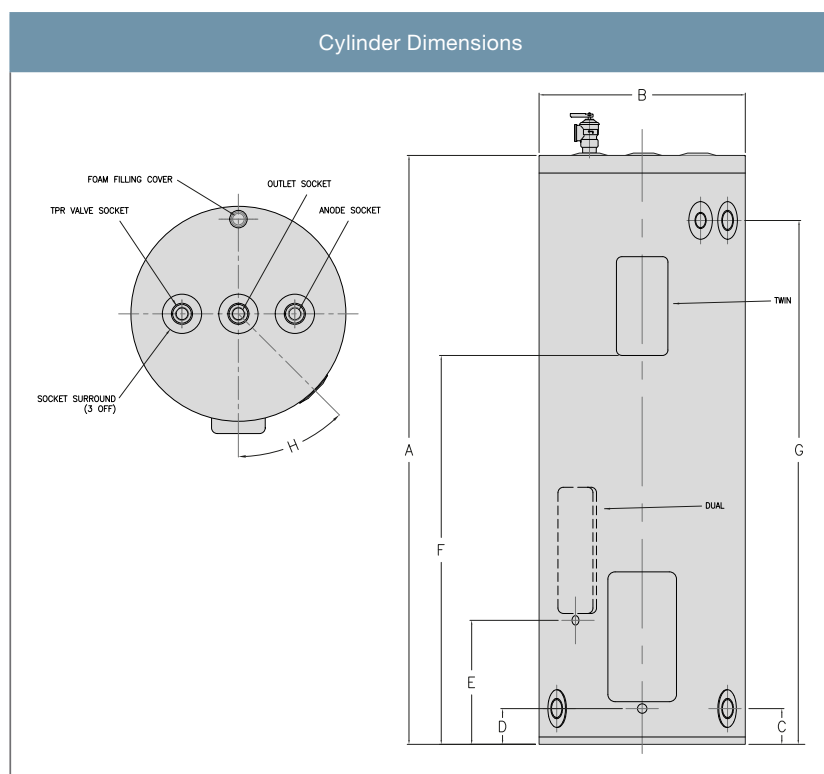


# SPECIFICATIONS

## MAINS PRESSURE – VITREOUS ENAMEL (VE)

Product		Models											
Single Element Indoor		31202519V	31204515	31209015	31213513	32213515	31218013		32218015	31225015	31230015		
			31204513	31209013	31213515	32213513	31218015		32218013				
Twin Element (non-simultaneous) Indoor							31218025			31225025			
Dual Element (simultaneous) Indoor											31230033		
											31230055		
Optima Outdoor/Indoor								91318015					
Optima Twin Element (non-simultaneous) Outdoor/Indoor												91330025	492400G8
Approx. Storage Capacity	Litres	25	45	90	135	135	180	180	180	250	300	300	400
Boost Capacity (Twin Element)	Litres	-	-	-	-	-	45*	-	-	50**	50	47	90
Height	A (mm)	398	525	925	1325	935	1710	1720	1165	1555	1815	1820	1840
Width	B (mm)	400	490	490	490	580	490	490	580	580	580	580	690
	C (mm)	116	120	120	120	120	120	120	120	120	120	120	120
	D (mm)	32	65	65	65	65	65	-	65	65	65	-	105
	E (mm)	-	-	-	-	-	-	-	-	-	162	-	-
	F (mm)	-	-	-	-	-	1182*	-	-	1126**	-	1298	1323
	G (mm)	246	-	-	-	-	-	1546	-	-	-	1636	1479
	H (°)	45	45	45	45	45	45	36	45	45	45	36	97
Approx Weight Empty	Kg	15	26	38	49	54	60-62	64	64	80-82	91	97	113
TPR Valve Setting	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Water Connections		RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20	RP ¾ /20
Element Rating (@230V)	kW	2.0	2.0 or 3.0	2.0 or 3.0	2.0 or 3.0	2.0 or 3.0	2.0 or 3.0	3.0	2.0 or 3.0	3.0	3.0 or 5.0	3.0	4.8^

\*31218025 only \*\*31225025 only ^ @ 240V



- Inlet/Outlet and tpr valve are side mounted on left-hand side of 31202519V.
- Inlet/outlet and TPR valve are side mounted on right-hand side of 91318015 and 91330025.

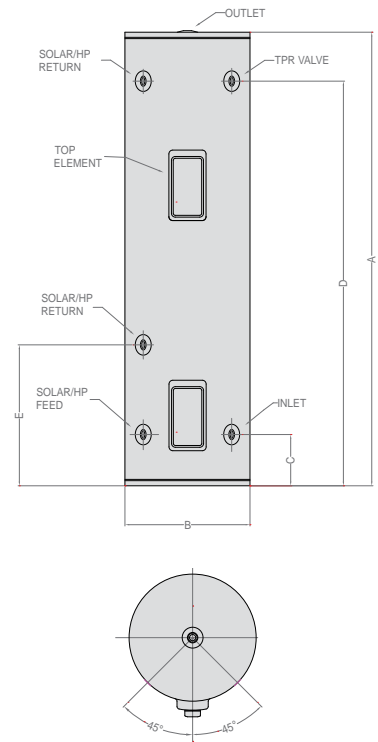
Specifications Electric (@230V)		
kW	Recovery on a 50°C rise	AMPS
2.0 kW	34 litres per hr	8.7 A
2.4 kW	40 litres per hr	10.4 A
3.0 kW	51 litres per hr	13.1 A
3.6 kW	62 litres per hr	15.7 A
4.8 kW	82 litres per hr	21.0 A
5.0 kW	85 litres per hr	21.8 A
6.0 kW	103 litres per hr	26.1 A
2 × 3.0 kW	103 litres per hr	26.2 A
2 × 5.0 kW	171 litres per hr	43.6 A





## MAINS PRESSURE – STAINLESS STEEL

Rheem Stainless Steel Mains Pressure Electric*					
	Screw-in	32513513 32513515	32518013 32518015	32525015	32530015
Approx. Storage Capacity	Litres	135	180	250	300
Weight Empty	Kg	30	37.5	41	48
Inlet/Outlet Connections			RP ¾" / 20		
Solar/HP Feed Connection		-	RP ¾" / 20		
Solar/HP Return Connection		-	RP ¾" / 20		
TPR Valve Connection			RP ½" / 15		
TPR Valve Setting	kPa	1000	1000	850	850
Dimensions:	mm				
A		1350	1770	1620	1910
B		490	490	580	580
C		195	200	205	205
D		1170	1575	1395	1690
E		-	550	605	605
Element Rating	kW	2.0 or 3.0	2.0 or 3.0	3.0	3.0
Top Element Rating (kit-set)	kW	-	2.0	3.0	3.0
Boost Capacity (Twin Element)	Litres	-	60	110	135



## MAINS PRESSURE – STAINLESS STEEL COIL

Description	Connection	Lower Coil		Mid Coil		Dual Coil	
Models	L = Left R = Right	35625015LL 35625015LR	35630015LL 35630015LR	35625015ML 35625015MR	35630015ML 35630015MR	35625015DL 35630015DL	35630015DL
Approx. Storage Capacity		250L	300L	250L	300L	250L	300L
Cylinder Diameter (mm)		560	560	560	560	560	560
Cylinder Height (mm)		1725	2045	1725	2045	1725	2045
A Hot Water Draw-Off	¾" BSP F	1725*	2045*	1725*	2045*	1725*	2045*
B Right/Left Cold Feed (High Pressure) Inlet	¾" BSP F	200*	200*	200*	200*	200*	200*
C Left/Right Cold Feed (High Pressure)	¾" BSP F	200*	200*	200*	200*	-	-
D Safety TPR	¾" BSP F	1500*	1810*	1500*	1810*	1500*	1810*
E From Solar (Inlet)/Heat Pump Return Kit set	¾" BSP F	370*	370*	370*	370*	370*	370*
F To Solar/Heat Pump (Direct Outlet)	¾" BSP F	200*	200*	200*	200*	370*	370*
G Secondary Solar/Wetback Flow (Coil)	¾" BSP F & 1" BSP M	685*	685*	1285*	1285*	1340*	1340*
H Secondary Solar/Wetback Return (Coil)	¾" BSP F & 1" BSP M	245*	245*	485*	485*	540*	540*
J Lower Element (3kW)	1 1/4" BSP F	-	-	-	-	-	-
K Upper Element*** (3kW)	1 1/4" BSP F	-	-	-	-	-	-
L Sensor Probe Pocket	Ø8.5mm x 120mm Tube	-	-	-	-	-	-
M1 Coil*		10m	10m	10m	10m	10m	10m
M2 Coil*		-	-	-	-	7.6m	7.6m

F = Female M = Male \*Fitting heights measured from bottom of cylinder (mm).

All measurements are nominal.

\*\*Compressed solar coils require a pumped base system.

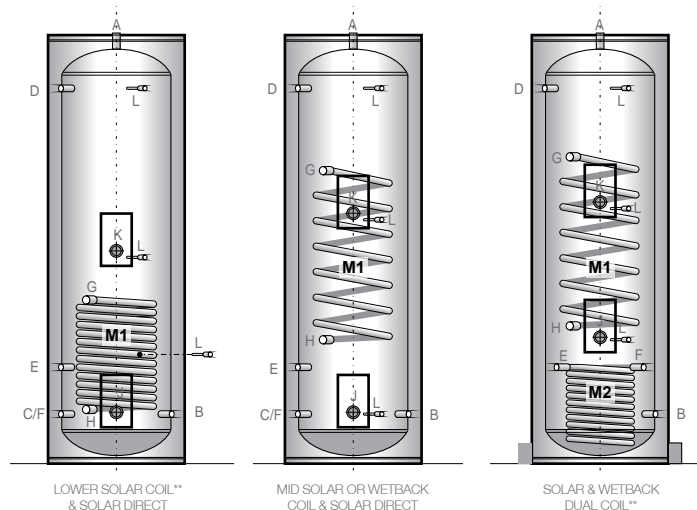
\*\*\*Upper element supplied plugged. Element and thermostat kit sold as optional extra (part 417026).

All cylinders supplied with 46kW TPR Valve 850kPa.

^Incoming heat source of 80°C

= nominal 25kW for M1 Coil

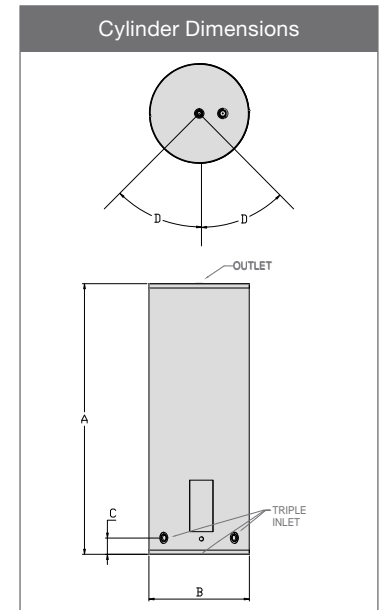
= nominal 20kW for M2 Coil



## LOW PRESSURE – VITREOUS ENAMEL (VE)

Models		148 090 **T	148 135 **T	158 135 **T	148 180 **T	158 180 **T	158 270 15T
Approx. Storage Capacity (L)		90	135	135	180	180	270
Height	A (mm)	915	1315	880	1710	1135	1640
Width	B (mm)	490	490	580	490	580	580
	C (mm)	120	120	120	120	120	120
	D (°)	45	45	36	45	36	36
Approx weight Empty (Kg)		29	39	40	51	53	85
TPR Valve Settings (kPa)		120	120	120	120	120	120
Element Rating (@230v) (kW)		2.0 or 3.0	2.0 or 3.0	2.0 or 3.0	2.0 or 3.0	2.0 or 3.0	3.0

\*\*Add to end of product code: 13T for 2kW; or 15T for 3kW



## LOW PRESSURE – COPPER

Model	Cap. (L)	w x h (mm)	ELM. (kW)	Inlet
-------	----------	------------	-----------	-------

### LP DOMESTIC INDOOR ELECTRIC STORAGE (COPPER)

149 040 13	40	460 x 490	2	Bottom
14T 090 13	90	510 x 785	2	Triple
14T 110 13	110	510 x 950	2	Triple
12T 135 13	135	610 x 800	2	Triple
14T 135 13	135	560 x 955	2	Triple
16T 135 13	135	510 x 1140	2	Triple
18T 135 13	135	460 x 1465	2	Triple
54T 135 13	135	540 x 1030	2	Triple
12T 180 13	180	610 x 1020	2	Triple
12T 180 15	180	610 x 1020	3	Triple
14T 180 13	180	560 x 1220	2	Triple
14T 180 15	180	560 x 1220	3	Triple
54T 180 13	180	540 x 1355	2	Triple
54T 180 15	180	540 x 1355	3	Triple
16T 180 13	180	510 x 1510	2	Triple
16T 180 15	180	510 x 1510	3	Triple
149 225 15	225	610 x 1250	3	Bottom
169 225 15	225	560 x 1510	3	Bottom
149 270 15	270	610 x 1470	3	Bottom
149 270 25	270	610 x 1470	2 x 3	Twin element (simultaneous)
169 270 15	270	560 x 1800	3	Bottom
169 270 25	270	560 x 1800	2 x 3	Twin element (simultaneous)
149 350 25	350	655 x 1595	2 x 3	Twin element (simultaneous)

### LP DOMESTIC INDOOR ELECTRIC STORAGE (COPPER) UNDERBENCH

199 015 13	15	365 x 370H	2	Top Inlet & Outlet
199 025 13	25	365 x 525H	2	Top Inlet & Outlet
199 040 13	40	460 x 490H	2	Top Inlet & Outlet

Model	Cap. (L)	w x h (mm)	ELM. (kW)	Inlet
-------	----------	------------	-----------	-------

### LP HEAVY HEAD

146 180 15	180	560 x 1220H	3	
166 180 15	180	510 x 1510H	3	

### LP TANK UNITS

T49 135 13	135	560 x 1260H	2	
T49 180 15	180	560 x 1530H	3	

### LP DAIRY

109 250 1G	250	760 x 1235H	3/3	
109 350 1G	350	760 x 1530H	3/3	
109 450 1G	450	760 x 1835H	3/3	
109 600 1G	600	840 x 1885H	3/3	

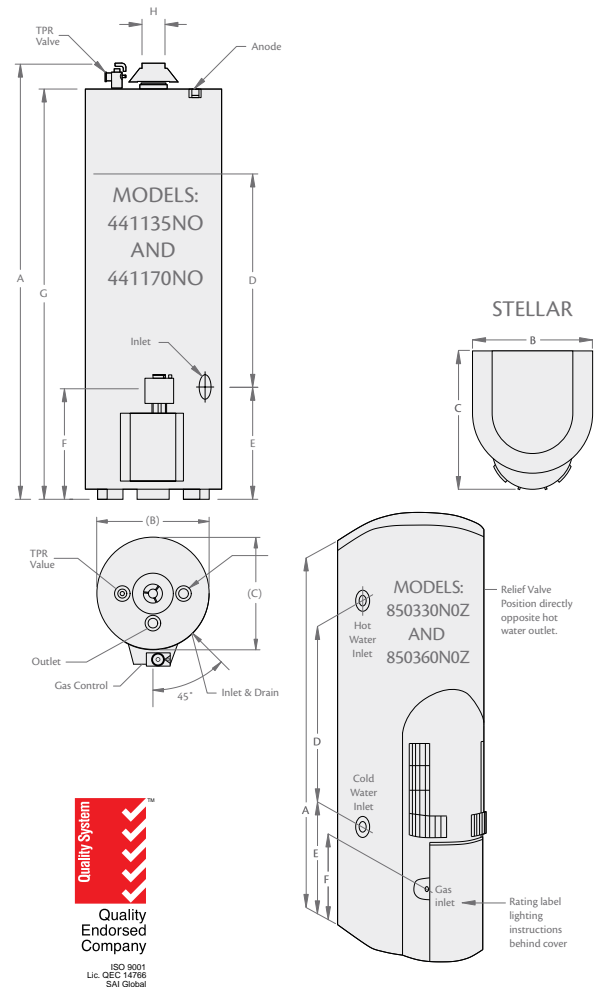
## LOW PRESSURE – COPPER WETBACK

Model	Approx. Storage Capacity	Dimensions w x h (mm)	Element Rating (kW)	Connection
145 135 13	135L	560 × 955H	2	BCRL
165 135 13	135L	510 × 1140H	2	BCRL
185 135 13	135L	460 × 1465H	2	BCRL
125 180 15	180L	610 × 1020H	3	BCRL
143 180 15	180L	560 × 1220H	3	RHSC
144 180 15	180L	560 × 1220H	3	LHSC
145 180 15	180L	560 × 1220H	3	BCRL
545 180 13	180L	540 × 1355H	2	BCRL
545 180 15	180L	540 × 1355H	3	BCRL
165 180 15	180L	510 × 1510H	3	BCRL
145 225 15	225L	610 × 1250H	3	BCRL
165 225 15	225L	560 × 1520H	3	BCRL
145 270 15	270L	610 × 1465H	3	BCRL
165 270 15	270L	560 × 1800H	3	BCRL

## GAS STORAGE

Product		Outdoor Models		Indoor Models	
Rheem Gas Storage				441135NO	441170NO
Stellar Gas Storage		850330NOZ	850360NOZ		
Approx. Storage Capacity	Litres	130	160	130	160
Recovery @ 45°C (Natural Gas)	Litres	200	200	110	126
**First Hour Capacity (Natural Gas)	Litres	330	360	240	286
Hourly Gas Consumption (Natural Gas)	MJ	42	42	29	33
kW Output	kW	10.5	10.5	5.8	6.6
Height	A (mm)	1600	1900	1555	1855
Width	B (mm)	485	485	430	430
Depth	C (mm)	558	558	515	515
	D (mm)	988	1213	N/A - Outlet on Top	N/A - Outlet on Top
	E (mm)	328	409	332	407
	F (mm)	298	298	300	300
	G (mm)	-	-	1475	1775
	H (mm)	-	-	75	75
Approx Weight Empty	Kg	70	80	50	69
TPR Valve Setting	kPa	1400	1400	1000	1000
Water Connections (LHS)		RP 3/4 /20	RP 3/4 /20	RP 3/4 /20	RP 3/4 /20
Gas Connection		RP 1/2 /15	RP 1/2 /15	RP 1/2 /15	RP 1/2 /15

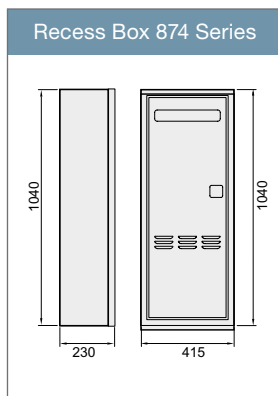
\*\*First hour capacity is a method of comparing the capabilities of different gas water heaters.  
Please contact Rheem for actual hot water delivery for specific applications.



## GAS CONTINUOUS FLOW

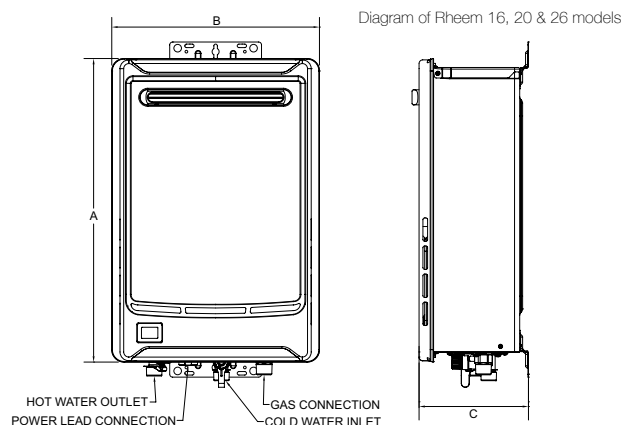
	Rheem 16	Rheem 20	Rheem 26	Rheem 27	Indoor 27*
Model Number	874A16NFZ 874A16LFZ	874820LFZ 874A20NFZ	874826LFZ 874A26NFZ	874627NFZ/LPZ	864627NFZ/LPZ
Nominal L/Min @25°C Rise	16L/Min	20L/Min	26L/Min	27L/Min	27L/Min
Gas Input Max	126 MJ/hr	157 MJ/hr	199 MJ/hr	205 MJ/hr	205 MJ/hr
Gas Type	NG or ULPG	NG or ULPG	NG or ULPG	NG or ULPG	NG or ULPG
Gas Connection	R ¾ / 20	R ¾ / 20	R ¾ / 20	R ¾ / 20	R ¾ / 20
Min Gas Supply Pressure NG/ULPG	1.13 kPa/ 2.75 kPa	1.13 kPa/ 2.75 kPa	1.13 kPa/ 2.75 kPa	1.13 kPa/ 2.75 kPa	1.13 kPa/ 2.75 kPa
Water Pressure (kPa) Min-Max	120-1000	120-1000	120-1000	140-1000	140 - 1000
Minimum Flow Rate	2.0L/Min	2.0L/Min	2.0L/Min	2.0 L/Min	2.0 L/Min
Cold Water Connection	R ¾ / 20	R ¾ / 20	R ¾ / 20	R ¾ / 20	R ¾ / 20
Hot Water Connection	R ¾ / 20	R ¾ / 20	R ¾ / 20	R ¾ / 20	R ¾ / 20
Approx. Weight (empty)	16kg	16kg	16kg	23kg	24kg
Freeze Protection	Yes	Yes	Yes	Yes	Yes
A Unit Height (mm)	520	520	520	601	650
B Unit Width (mm)	355	355	355	351	351
C Unit Depth (mm)	187	187	187	226	240
D Hot Water Outlet (mm)	105	105	105	132	132
E Gas Inlet (mm)	83	83	83	127	127
F Cold Inlet (mm)	10	10	10	28	28
G Gas Inlet (mm)	77	77	77	97	119
H Cold Inlet (mm)	68	68	68	64	86
J Hot Water Outlet (mm)	87	87	87	84	107
Gas Energy Rating	6 Stars	6 Stars	6 Stars	6 Stars	6 Stars

Continuous Flow Accessories	Part Number
Horizontal Flue Kit Side Exit	318278
Horizontal Flue Kit Rear Exit	318279
Vertical Flue Kit	318280
Recess Box - For Rheem 27	320316
Recess Box - For Rheem 16, 20 & 26 874 Series	318994
Pipe Cover - For Rheem 27	320116
Pipe Cover - For Rheem 16, 20 & 26	320117
EZ LINK® Cable	290141
Standard Kitchen Temperature Controller	A299850
Standard Bathroom 1 Temperature Controller	A299851
Standard Bathroom 2 Temperature Controller	A299852
Recess door only 874A Series - 16L, 20L & 26L	320759
Recess Box 874A Series - 16L, 20L & 26L	320758
Flue Divertor (Standard) - Natural Gas only	299336
Flue Divertor (Extended) - Natural Gas only	299334

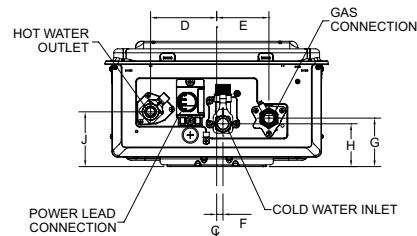


### \*Rheem 27 Indoor Flue System

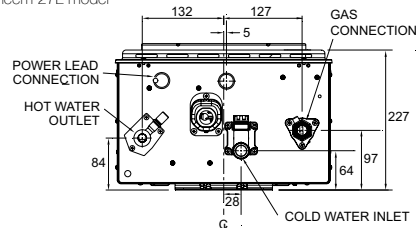
A certified Rheem coaxial flue system must be used with all Rheem 27 indoor models. There are three indoor flue kits available:- Horizontal Side Exit, Horizontal Rear Exit and Vertical. Please contact your local plumber, plumbing merchant or Rheem Customer Service on 0800 657 336 to discuss the best solution for your needs. The Rheem flue system uses a twin pipe design (one pipe inside the other) ; an inner pipe of stainless steel for exhaust, and an outer steel pipe for inlet air. This flue system can exhaust either through a roof or wall. (Subject to Building Regulations).



Rheem 16, 20 & 26 models



Rheem 27L model



## ON-TAP FILTERED, CHILLED AND BOILING WATER

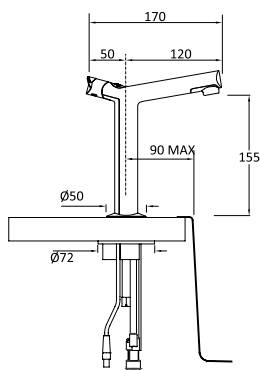
Rheem On-Tap Series		On-Tap 3L	On-Tap 5L	On-Tap Plus 5L	Push-thru 1.8L Chiller
On-Tap Aqua™		743003F	743005F		318844
On-Tap Azure™		743103F	743105F		
On-Tap Plus Aqua™				7430054SR	
On-Tap Plus Azure™				7431054DR	
Boiling Delivery – p/hr	Litres	16.6	20	20	-
Boiling Delivery – p/hr	Cups*	98	118	118	-
Mixed Delivery – p/hr^	Litres	-	-	57	-
Chilled Delivery – p/hr	Litres	-	-	-	12.5
Chilled Delivery – p/hr	Glasses**	-	-	-	63
Weight empty	Kg	12	12	12	12
Weight full	Kg	18	18	18	14
Recommended Min water pressure	kPa	300	300	300	140
Max water pressure	kPa	500	500	500	400
Element	kW	1.5	1.8	1.8	-
Electrical connections		10 amp 3 pin plug and flex			
Plumbing connections		½" BSP			
A Width (mm)		175	175	175	205
B Depth (mm)		460	460	460	408
C Height (mm)		405	405	405	278
Accessories	Part No				
Aqua™ Sink Free & Extension Kit	317453	Optional	Optional	Optional	
Azure™ Sink Free & Extension Kit	319042	Optional	Optional	Optional	
Azure™ Combined Base Sink Free & Extension Kit	319047	Optional	Optional	Optional	

\*Cup size 170ml \*\*Glass size 200ml ^ @ 50°C

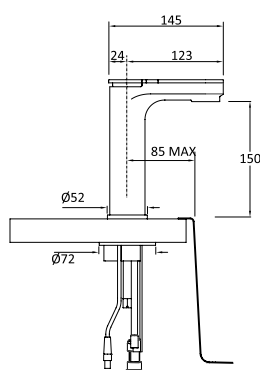
Calculations based on incoming water temperature of 17°C

### DISPENSING TAPS

Aqua™

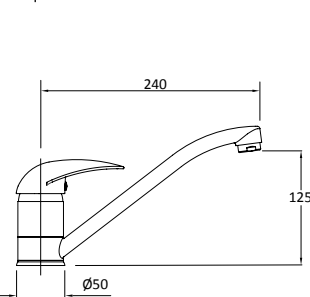


Azure™

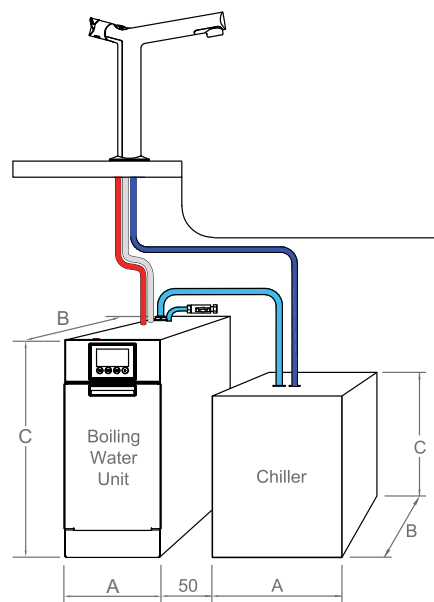
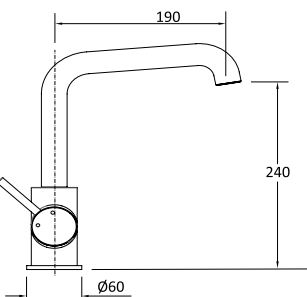


### MIXER TAPS

Aqua™



Azure™

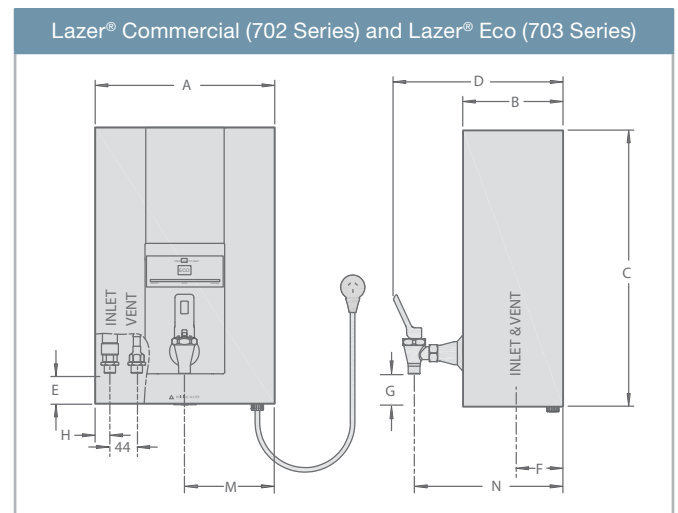
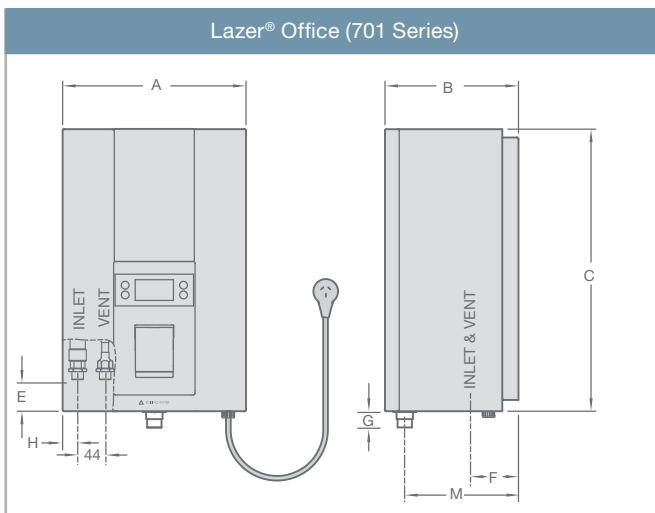


## LAZER® BOILING WATER

Lazer® Boiling Water Unit		Lazer® Office		Lazer®Eco			Lazer® Commercial				
White		70103W-NZ	70105W-NZ	70303W-NZ	70305W-NZ	70307W-NZ	70207W-NZ	70210W-NZ	70215W-NZ	70225W-NZ	70240W-NZ
Stainless Steel		70103S-NZ	70105S-NZ				70207S-NZ	70210S-NZ	70215S-NZ	70225S-NZ	70240S-NZ
Capacity	Litres	3	5	3	5	7.5	7.5	10	15	25	40
Delivery – Initial	Litres	3.5	6	3.5	6	8.5	8.5	11	17	27	42
	Cups*	21	35	21	35	50	50	65	100	159	247
Recovery	L/hr	17.5	23	17.5	23	23	23	23	23	35	45
– Cups per hour	Cups*	103	135	103	135	135	135	135	135	206	265
Weight empty	Kg	6	8	6	8	9	9	10	15	17	19
Weight full	Kg	10	15	10	15	19	19	22	34	47	67
Min water pressure	kPa	50	50	50	50	50	50	50	75	75	100
Max water pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Element Rating @ 240V	kW	1.8	2.4	1.8	2.4	2.4	2.4	2.4	2.4	3.6	4.6
Electrical connections		Supplied with 10 amp 3 pin plug and flex								Hard-wired	
Plumbing connections		½" BSPM									
A Width		285	334	283	336	336	336	336	336	336	490
B Depth		209**	241**	160	192	192	192	192	299	299	340
C Height		435	465	435	465	515	515	615	515	720	615
D		–	–	280	312	312	312	312	419	419	460
E		65	65	65	65	65	65	65	65	65	65
F		70**	70**	45	45	45	45	45	45	45	45
G		33	33	50	50	50	50	50	50	50	50
H		20	20	23	23	23	23	23	23	23	23
M		142	167	142	168	168	168	168	168	168	245
N		174**	210**	238	270	270	270	270	377	377	418

\*Cup size 170ml \*\*Includes 25mm for supplied backing plate.

Calculations based on incoming water temperature of 18°C

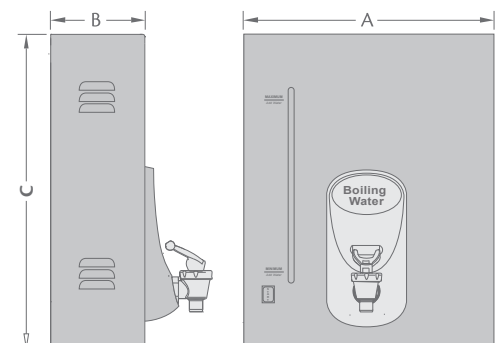


## ZIP® BOILING WATER

Models	83204514	83207014	83215014	83223014	83235014
Delivery Capacity (L)	4.5	7.0	15	23	34
Dimension A mm	340	340	490	490	490
Dimension B mm	180	180	180	235	325
Dimension C mm	430	515	615	615	615
Weight Empty (kg)	9	10	15	17	20
Weight Full (kg)	16	20	35	45	62
Element Rating @ 240V (kW)	2.4	2.4	2.4	2.4	2.4

### Approximate Heat Up Times From Cold (18°C)

	16	23	46	67	102
Maximum Level (mins)	16	23	46	67	102
Minimum Level (mins)	4	6	14	24	28





## PREMIER LOLINE SOLAR®

Models	
Electric / 2 Collectors	A591270/2C
Electric / 3 Collectors	A591270/3C
Gas Boost / 2 Collectors	A591270/2CGL/2CGN (ULPG/Natural Gas)
Gas Boost / 3 Collectors	A591270/3CGL/3CGN (ULPG/Natural Gas)
Storage Capacity	270 Litres
Roof Space Required - 2 Collectors	2.4m x 2.0m
- 3 Collectors	3.6m x 2.0m
Dimensions - Cylinder	H 1700mm x D 650mm
Weight Empty - Cylinder	146kg
Weight Empty - Collector	48kg
Temperature Pressure	1000kPa
TPR Valve Setting	
Expansion Control Valve (ECV) Setting	850kPa
Minimum Supply Pressure	150kPa (Gas boosted only)
Water Connections - Inlet	¾ /20 BSPF
- Outlet Tempered	¾ /20 BSPF
- Gas	¾ /20 BSPM
- Solar Flow and Return	½ /15 BSPM

Sizing Guide	Zone	People	
Boosting Type		Gas	Electric
Moderate Climate	1	2 - 6	1 - 3
Cold Climate	2	2 - 5	1 - 3

### Recommended Minimum Panel Inclination Angles

Auckland	20°	Hamilton	22°	Wellington	25°
Christchurch	30°	Dunedin	35°	Invercargill	37°

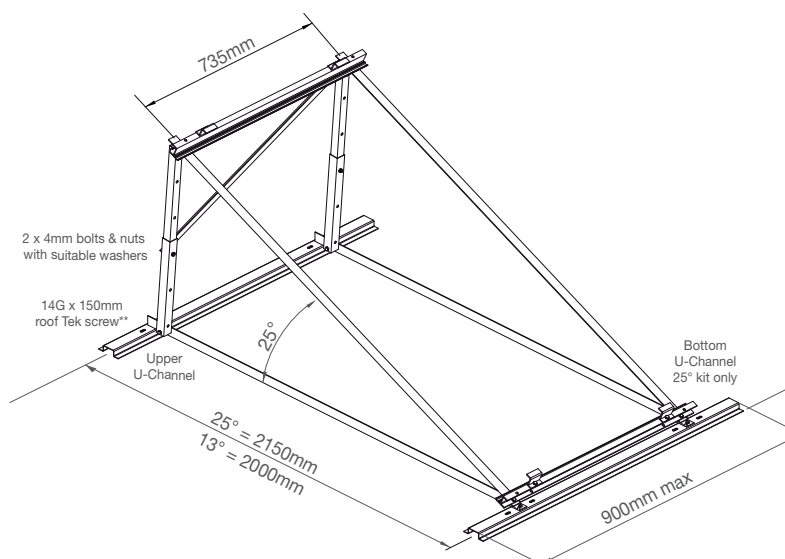
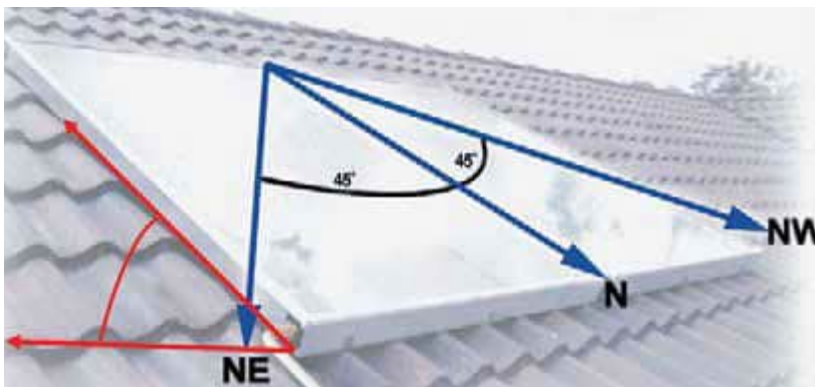
### Boost Specifications

Electric Supply Voltage	Volts 220-250	
Available in 3.6kW (15 amp)		
Gas Input - Natural Gas	MJ/hr	205
Available in Natural Gas and ULPG		

### Solar Ready MPVE\* Storage Tanks- Non-Coiled

Model	A51127007	A51134007	A51143007
Storage Capacity (L)	270	325	410
Boost Volume (L) 3.6kW Element	160	200	285
Height x Width (mm)	1395 x 640	1640 x 640	1840 x 690
Weight Empty (kg)	70	87	111

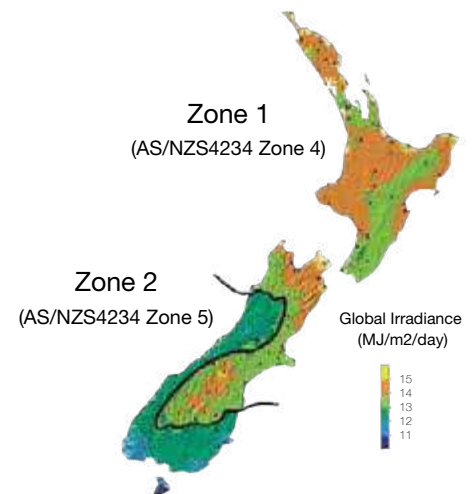
\*Mains Pressure Vitreous Enamel



N.B. Collector size (1023 x 1941mm) is greater than frame size.

\*\*Screws must be compatible with substrate/roofing material.

AS/NZS4234 Climate Zones (Solar)



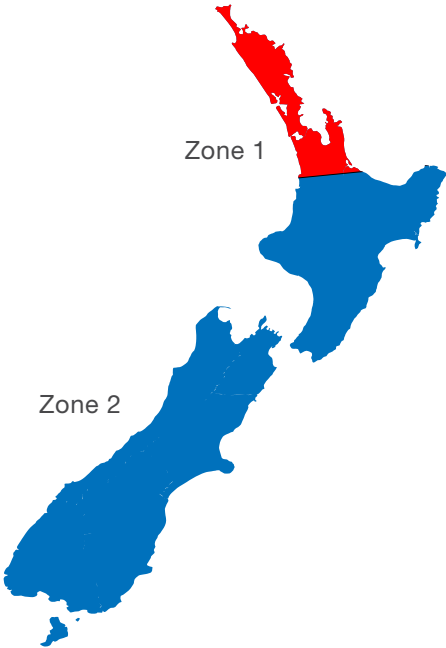
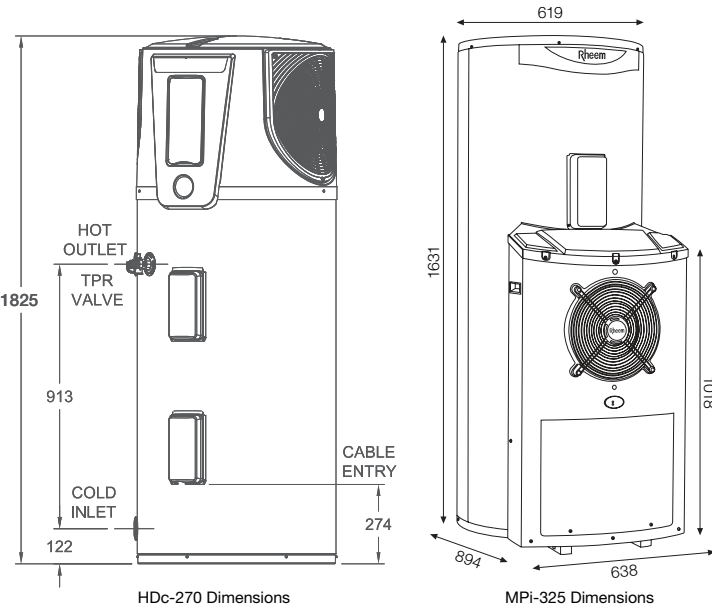
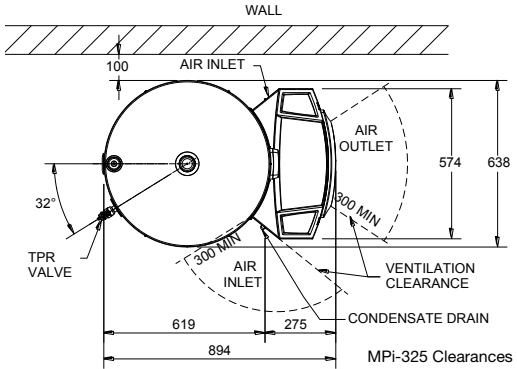
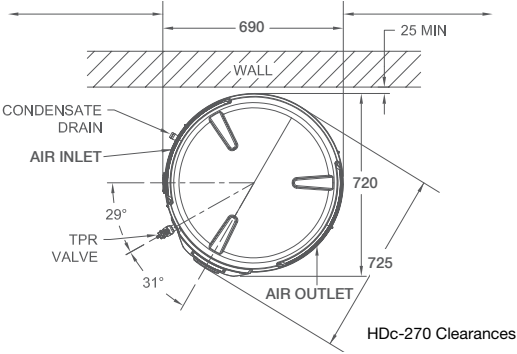
HEAT PUMP

		HDc-270	MPi-325
Model No.		A55127005	A55132507
Approx. Storage Capacity	Litres	270	325
Height	mm	1825	1630
Width	mm	690	638
Depth	mm	720	863
Approx Weight Empty	Kg	135	136
TPR Valve Setting	kPa	1000	1000
With Expansion Control Valve	kPa	680	680
Without Expansion Control Valve	kPa	800	800
Minimum Water Pressure	kPa	200	200
Water Connections		RP ¾	RP ¾
Element Rating	kW	2.4	3.6
Power Input	W	985	800

Performance		
Model	Litres Per Hr	Ambient Air Temp (C)
HDc-270	54	7
	77	19
	90	32
MPi-325	25	10
	34	20
	42	30

350mm minimum distance from air inlet to wall or obstruction measured horizontally along wall. 900mm minimum recommended for service.

1000mm minimum distance from air inlet to wall or obstruction measured horizontally along wall. 900mm minimum recommended for service.



Model Name	Heat Pump Mpi-325	Ambiheat HDc-270
Model Code	A55132507	A55127005
Outside Operating Temperature range for use	+3°C to +45°C	-5°C to +43°C
Can be installed in Zone	1	1 and 2

## RAYPAK® POOL &amp; SPA WATER HEATERS

Model		Temperature Rise per Hour (Spa)				Temperature Rise over 24 Hours (Pool)*				
		Spa Volume (Litres)				Pool Surface Area (m2)				
		2000	3000	4000	5000	20	40	60	80	100
131 Spartan	Outdoors only	10°	6°	5°	4°	-	-	-	-	-
200 Residential	Indoors & Outdoors	17°	12°	9°	7°	21°	15°	10°	8°	6°
280 Residential or Premium	Indoors & Outdoors	25°	17°	12°	10°	26°	20°	14°	10°	8°
350 Residential	Indoors & Outdoors	32°	21°	16°	12°	32°	25°	18°	13°	10°
430 Residential or Premium	Indoors & Outdoors	38°	26°	19°	15°	34°	27°	20°	15°	12°

\*Ideally 14° or more over 24 hours is desirable

Model	Nominal Rating				Approximate Dimensions				Connections		Indoor Installations	
	Natural Gas		ULPG		All Models				Gas	Water		
	Input MJ/h	Output kW	Input MJ/h	Output kW	Height mm	Width mm	Depth mm	Weight kgs	mm	mm	Flue Diameter mm	Height Overall mm
131 Spartan	120	24	117	24	860	440	650	35	20	40	N/A	N/A
200 Residential	196	44	185	41	1580	530	650	70	20	50	175	1550
280 Residential or Premium	278	62	261	58	1085	640	650	75	20	50	200	1550
350 Residential	343	76	323	72	1085	730	650	85	20	50	225	1605
430 Residential or Premium	420	94	369	88	1085	870	650	90	20	50	250	1605

## DOMESTIC WARRANTIES\*

## ELECTRIC

Mains Pressure Electric Vitreous Enamel Indoor  
10 years tank, 5 years tank labour, 1 year parts and labour.

Mains Pressure Electric Vitreous Enamel Optima  
12 years tank, 5 years tank labour, 3 years parts and labour.

Mains Pressure Electric Stainless Steel & Coil  
10 years tank, 3 years tank labour, 1 year parts and labour.

Low Pressure Electric Vitreous Enamel  
10 years tank, 5 years tank labour, 1 year parts and labour.

Low Pressure Electric Copper  
5 years tank, 1 year tank labour, 1 year parts and labour.

## GAS

Gas Continuous Flow  
10 years on heat exchanger, 3 years parts and labour.

Mains Pressure Gas Storage  
5 years tank, 1 year tank labour, 1 year parts and labour.

Stellar Gas Storage  
10 years tank, 5 years tank labour, 1 year parts and labour.

## HEAT PUMP

MPi-325 Heat Pump  
5 years tank, 3 years tank labour, 1 year parts and labour.  
2 years sealed system including labour.

Ambiheat™ Heat Pump  
7 years tank, 3 years tank labour, 1 year parts and labour.  
3 years sealed system including labour.

## SOLAR

Solar Premier  
5 years tank, 3 years tank labour, 1 year parts and labour,  
5 years collector parts and labour

## BOILING WATER

Lazer® Office, Eco & Commercial & On-Tap  
Boiling Water Unit  
5 years tank, 2 years tank labour, 2 years parts and labour  
Zip® Boiling Water Unit  
5 years tank, 1 year tank labour, 1 year parts and labour

\*The water heater warranties listed on this page are for single family premises in a domestic application. These warranties apply to New Zealand only.

For Raypak and Rheem Commercial Warranty information, call 0800 667 336 or visit [www.rheem.co.nz](http://www.rheem.co.nz)

# Join the smart energy revolution



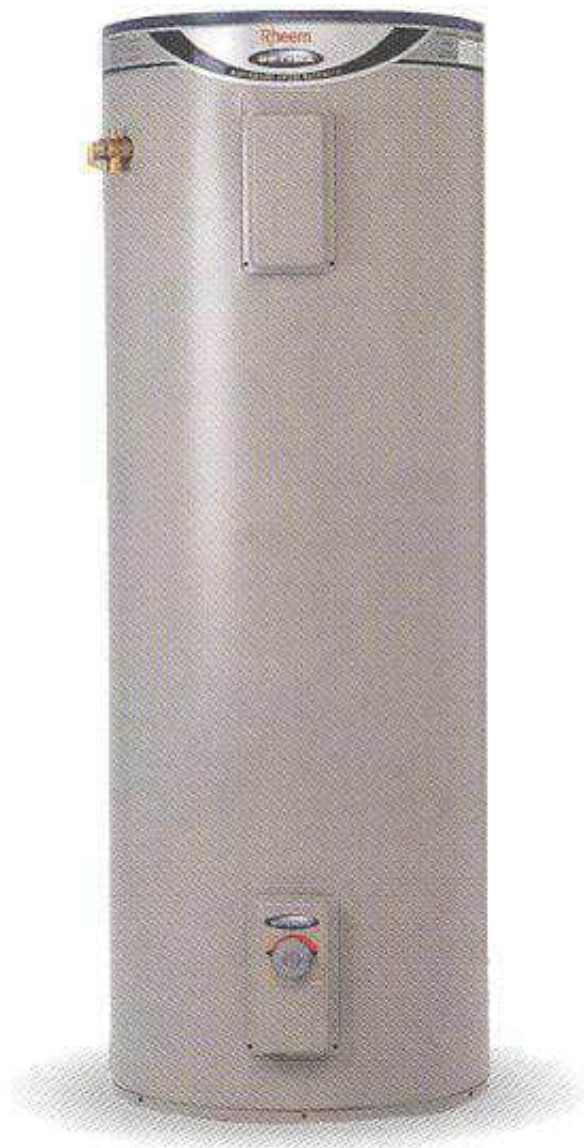
**Install a Rheem®**

**Rheem New Zealand Limited**

475 Rosebank Road, Avondale 1026, PO Box 19011, Avondale, Auckland 1746. Freephone 0800 657 336 – [www.rheem.co.nz](http://www.rheem.co.nz)  
All specifications contained in this brochure are subject to change without notice. Please check the specifications are current at the time of ordering. All information is current at the time of publication (June 2024).

**Page 679 of 734**

# *Owner's Guide and Installation Instructions*



## *Electric Domestic Water Heater*



*Install a Rheem*

*This water heater must be installed and serviced by an authorised person.  
Please leave this guide with the householder.*

---

**PATENTS**

This water heater may be protected by one or more patents or registered designs in the name of Rheem Australia Pty Ltd.

**TRADEMARKS**

® Registered trademark of Rheem Australia Pty Ltd.  
™ Trademark of Rheem Australia Pty Ltd.

**Note:** Every care has been taken to ensure the accuracy in preparation of this publication. No liability can be accepted for any consequences, which may arise as a result of its application.



---

CONTENTS

---

**HOUSEHOLDER - We recommend you read pages 4 to 17.**  
The other pages are intended for the installer but may be of interest

About Your Water Heater .....

Regular Care .....

Water Supplies .....

Save A Service Call .....

Installation .....

Connections – Plumbing .....

Connections – Electrical .....

Commissioning .....

Draining The Water Heater .....

Warranty .....

4

9

11

15

18

25

28

31

34

36

## ABOUT YOUR WATER HEATER

### MODEL TYPE

The Rheem® water heater you have chosen is an Optima™ model. The Optima model has a temperature adjusting knob on the lower front of the water heater. Optima models are available with either a single heating unit or with twin heating units. (refer to “Single Element Model” on page 7 and “Twin Element Model” on page 7). The water heater can be installed indoor or outdoor. Optima models have an extended warranty (refer to the warranty on page 36).

Water is stored in a vitreous enamel lined steel cylinder and heated by the electric immersion heating unit. The thermostat controls the temperature. Automatic safety controls are fitted to the water heater to provide safe and efficient operation.

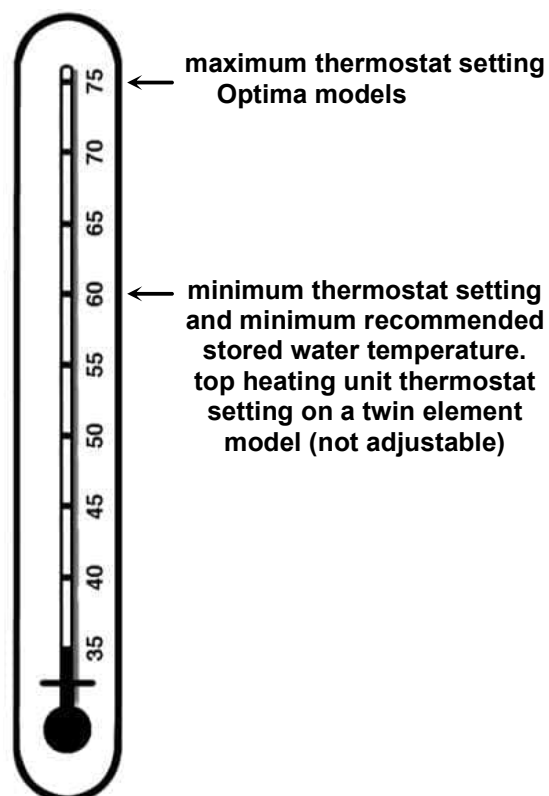
### MAINS PRESSURE

The water heater is designed to operate at mains pressure by connecting directly to the mains water supply. If the mains supply pressure in your area exceeds that shown on page 19, a pressure limiting valve must be fitted. The supply pressure should be greater than 350 kPa for true mains pressure operation to be achieved.

### HOW HOT SHOULD THE WATER BE?

The water heater features an adjustable thermostat, which allows you to choose the most suitable temperature for your hot water needs. Refer to “Temperature Adjustment” on page 5.

To meet the requirements of the G12 Building Code the temperature of the stored water must not be below 60°C.



**HOTTER WATER INCREASES THE RISK OF SCALD INJURY**

This water heater can deliver water at temperatures which can cause scalding. Check the water temperature before use, such as when entering a shower or filling a bath or basin, to ensure it is suitable for the application and will not cause scald injury.

We recommend and it may also be required by regulations that an approved temperature limiting device be fitted into the hot water pipe work to the bathroom and ensuite when an Optima water heater is installed.

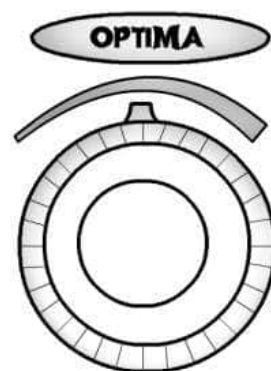
This will keep the water temperature below 55°C at the bathroom and ensuite. The risk of scald injury will be reduced and still allow hotter water to the kitchen and laundry.

**THERMOSTAT**

The thermostat automatically controls the electricity supply to the heating unit so a constant temperature is maintained. The thermostat and its protective over temperature cut out is mounted inside the front cover of the water heater. There is no need to switch the water heater off when it is not in use, except when you are on an extended holiday. The thermostat is fully automatic and power is only used when heating is required.

**TEMPERATURE ADJUSTMENT**

An Optima water heater features a user adjustable thermostat, which allows you to choose the most suitable temperature for your hot water needs. To adjust the temperature, push in the child resistant knob and turn anticlockwise to decrease or clockwise to increase the temperature setting. The Optima has a minimum temperature setting of 60°C and a maximum temperature setting of 75°C.



**⚠ WARNING**

This water heater is only intended to be operated by persons who have the experience or the knowledge and the capabilities to do so. This water heater is not intended to be operated by persons with reduced physical, sensory or mental capabilities i.e. the infirm, or by children. Children should be supervised to ensure they do not interfere with the water heater.

This water heater uses 240 V AC power for the electrically operated components. The removal of the front cover(s) will expose 240 V wiring. It must only be removed by an authorised or qualified person.

Take care not to touch the power plug on a water heater fitted with a power supply cord and plug with wet hands.

**SAFETY**

This water heater is supplied with a thermostat, an over-temperature cut-out, and a combination temperature pressure relief valve.

These devices must not be tampered with or removed.

The water heater must not be operated unless each of these devices is fitted and is in working order.

The operation of the over-temperature cut-out on the thermostat indicates a possibly dangerous situation. If the over-temperature cut-out operates, it must not be reset and the water heater must be serviced by an authorised or qualified person.

**⚠ Warning:** For continued safety of this water heater it must be installed, operated and maintained in accordance with the Owner's Guide and Installation Instructions.

**The warranty can become void if relief valves or other safety devices are tampered with or if the installation is not in accordance with these instructions.**

## SINGLE ELEMENT MODEL

This type of water heater has one heating unit with its own thermostat. The heating unit is at the base of the water heater.

- **Continuous electricity supply**

This type of connection is suited to where the storage capacity is less than the normal daily usage.

- **Off-Peak electricity supply**

This type of connection will only allow heating to occur during set hours. A volume of water sufficient for the day's total use is heated and stored. This type of heating will be more economical due to reduced tariffs by the electricity authority.



## TWIN ELEMENT MODEL

This type of water heater has two heating units, each with its own thermostat. One heating unit is at the base of the water heater and the other near the top.

- **Bottom heating unit**

During normal operation this heating unit supplies all the hot water.

- **Top heating unit (Booster)**

This heating unit only operates during periods of high demand to provide an additional supply of heated water.

- **Electrical connection**

The two heating units are wired for non-simultaneous operation, so that only one heating unit can operate at a time. The bottom heating unit is usually connected to an Off-Peak (overnight) or time controlled electricity supply and the top heating unit to a continuous supply. Some electricity suppliers allow both heating units to be metered at the Off-Peak or controlled tariff.



**NOTE: Power must be available to the top heating unit circuit at all times for this water heater to operate as designed.**

## TO TURN OFF THE WATER HEATER

If you plan to be away from home for only a few nights, we suggest you leave the water heater switched on.

If it is necessary to turn off the water heater:

- Switch off the electrical supply at the isolating switch to the water heater.
- Unplug the power supply cord from the power outlet (power supply cord model only).
- Close the cold water isolation valve at the inlet to the water heater.

## TO TURN ON THE WATER HEATER

- Open the cold water isolation valve fully on the cold water line to the water heater.
- Plug in the power supply cord at the power outlet (power supply cord model only).
- Switch on the electrical supply at the isolating switch to the water heater.

## GOING ON HOLIDAY?

If you plan to be away from home for one or two nights, we suggest you leave the water heater switched on. However, if you plan to stay away more than a few nights, conserve energy by switching the water heater off at either the switchboard or isolating switch.

## HOW DO I KNOW IF THE WATER HEATER IS INSTALLED CORRECTLY?

Installation requirements are shown on pages 18 to 26. The water heater must be installed by an authorised person and the installation must comply with National Standards AS/NZS 3500.4, AS/NZS 3000 and all local codes and regulatory authority requirements. The installation must conform with the New Zealand Building Code.

## DOES THE WATER CHEMISTRY AFFECT THE WATER HEATER?

The water heater is suitable for most public water supplies, however some water chemistries may have detrimental effects on the cylinder and fittings. **If you are in a known harsh water area you must read page 11.** If you are not sure, have your water chemistry checked against the conditions **described on page 11.**

## HOW LONG WILL THE WATER HEATER LAST?

There are a number of factors that will affect the length of service the water heater will provide. These include the water chemistry, the water pressure, the water temperature (inlet and outlet) and the water usage pattern. However, your water heater is supported by a comprehensive warranty (**refer to page 36**).



## REGULAR CARE

### TEMPERATURE PRESSURE RELIEF VALVE

This valve is near the top of the water heater and is essential for its safe operation. It is possible for the valve to release a little water through the drain line during each heating period. This occurs as the water is heated and expands by approximately 1/50 of its volume.

Continuous leakage of water from the valve and its drain line may indicate a problem with the water heater (refer to **“Temperature Pressure Relief Valve Running”** on page 16).

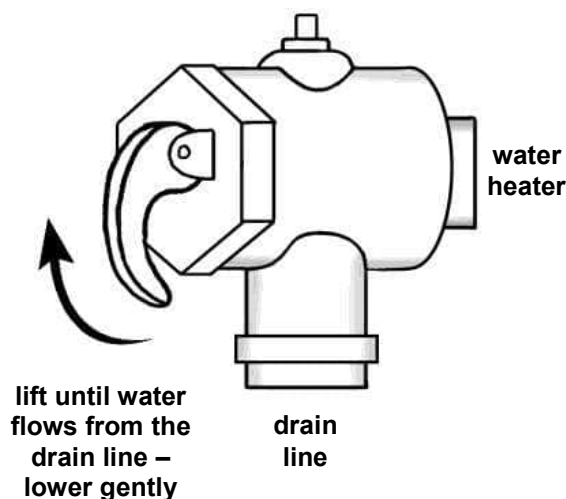
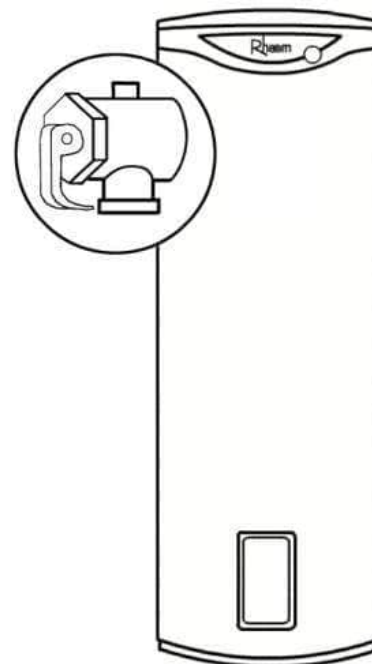
**⚠ Warning:** Never block the outlet of this valve or its drain line for any reason.

Operate the easing lever on the temperature pressure relief valve once every six months. **It is very important you raise and lower the lever gently.**

**⚠ DANGER:** Failure to do this may result in the water heater cylinder failing, or under certain circumstances, exploding.

If water does not flow freely from the drain line when the lever is lifted, then the water heater should be checked by a Rheem Service Centre.

The temperature pressure relief valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to **“Water Supplies”** on page 11).



## TEMPERATURE LIMITING VALVE

The valve should be checked for performance every twelve months. This can be performed by measuring the water temperature from a hot tap with a thermometer. If the water is being delivered at a temperature exceeding 55°C, phone a Rheem Service Centre.

The valve should be replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to “Water Supplies” on page 11). Failure to do this may result in water at a temperature up to 70°C being delivered at the hot tap, increasing the risk of scald injury.

## EXPANSION CONTROL VALVE

An expansion control valve must be fitted to the cold water line to the water heater. The expansion control valve may discharge a small quantity of water from its drain line during the heating period instead of the temperature pressure relief valve on the water heater.

Operate the easing lever on the expansion control valve once every six months. **It is very important you raise and lower the lever gently.** The expansion control valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits.

## GENERAL MAINTENANCE

The jacket of the water heater can be cleaned with a soft cloth and warm mild soapy water on a 3 monthly interval in coastal areas. Under no circumstances should abrasive materials or powders be used.

## WATER SUPPLIES

**This water heater must be installed in accordance with this advice to be covered by the warranty.**

This water heater is manufactured to suit the water conditions of most public reticulated water supplies. However, there are some known water chemistries which can have detrimental effects on the water heater and its operation and / or life expectancy. If you are unsure of your water chemistry, you may be able to obtain information from your local water supply authority. This water heater should only be connected to a water supply which complies with these guidelines for the water heater warranty to apply.

### ANODE

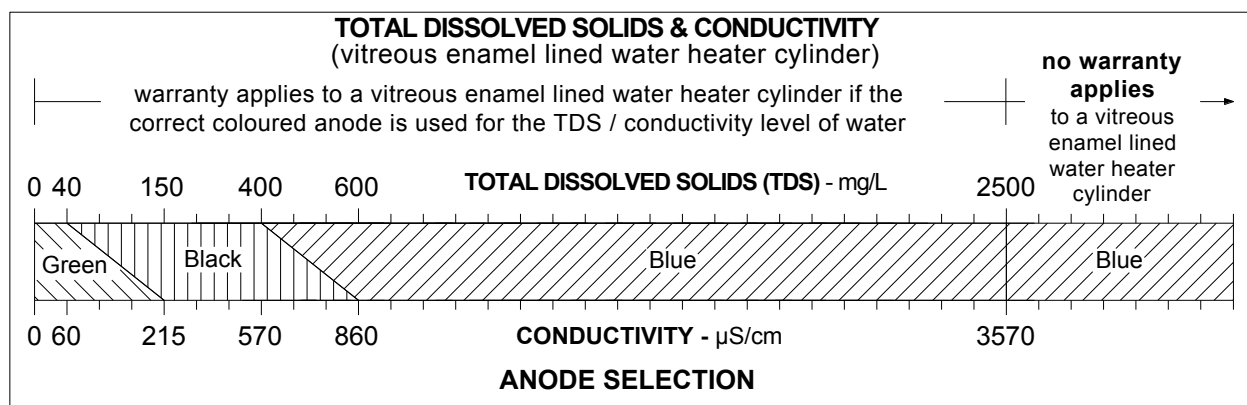
The vitreous enamel lined cylinder of the water heater is only covered by warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is installed. The use of an incorrect colour coded anode will void the cylinder warranty and may shorten the life of the water heater cylinder.

The correct colour coded anode must be selected and fitted to the water heater in accordance with the following advice and the **Anode Selection chart** on page 11 for warranty to apply to the water heater cylinder.

Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

The changing of anodes must be carried out by a plumber or authorised service person.

**Note:** Some water analysis reports may state the conductivity of the water rather than the level of total dissolved solids. Conductivity, measured in microsiemens per centimetre ( $\mu\text{S} / \text{cm}$ ), is directly proportional to the TDS content of the water. TDS, in mg / L, is approximately 70% of the conductivity in  $\mu\text{S} / \text{cm}$ .



## ANODE INSPECTION

The anode installed in your water heater will slowly dissipate whilst protecting the cylinder. The life of the water heater cylinder may be extended by arranging for an authorised person to inspect the anode and replace if required.

The suggested time after installation when the anode should be inspected is:

Optima 10 years

For water supplies which are either softened, desalinated or where the water supply may alternate between a water tank and a reticulated public supply or another supply, it is recommended the anode be inspected 3 years earlier than shown (refer to "Anode" on page 11).

## CAUTION

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use.

If, under these conditions, the water heater has not been used for two or more weeks the following procedure should be carried out before using any electrical appliances (automatic washing machines and dishwashers) which are connected to the hot water supply.

The hydrogen, which is highly flammable, should be vented safely by opening a hot tap and allowing the water to flow. There should be no smoking or naked flame near the tap whilst it is turned on. Any hydrogen gas will be dissipated. This is indicated by an unusual spurting of the water from the tap. Once the water runs freely, any hydrogen in the system will have been released.

## SATURATION INDEX

The saturation index is used as a measure of the water's corrosive or scaling properties.

In a corrosive water supply, the water can attack copper parts and cause them to fail. Where the saturation index is less than  $-1.0$ , the water is very corrosive and warranty does not apply to a copper sheathed heating unit. A corrosion resistant heating unit must be used for warranty to apply to the heating unit.

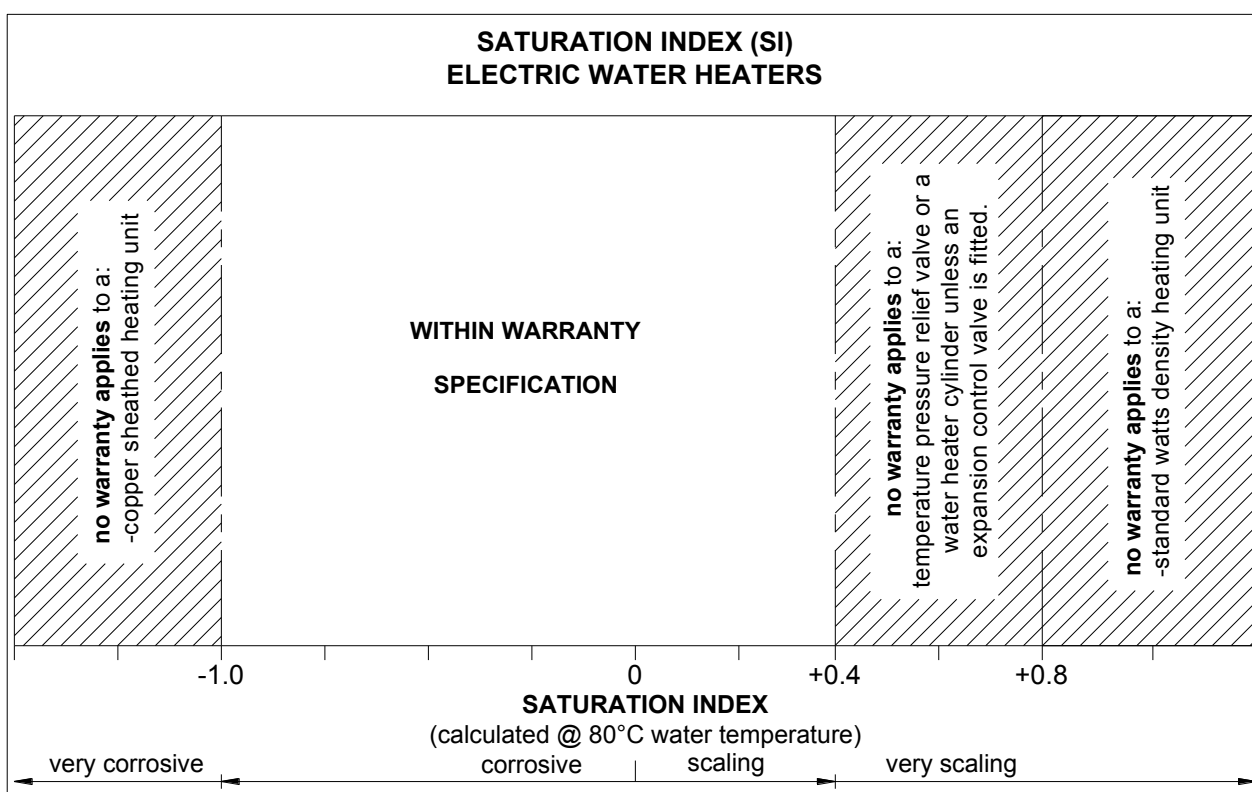
In a scaling water supply calcium carbonate is deposited out of the water onto any hot metallic surface. Where the saturation index exceeds  $+0.40$ , the water is very scaling. An expansion control valve must be fitted on the cold water line after the non-return valve to protect and for warranty to apply to the temperature pressure relief valve and water heater cylinder.

Where the saturation index exceeds  $+0.80$ , warranty does not apply to a standard watts density heating unit. A low watts density heating unit must be used for warranty to apply to the heating unit.

Water which is scaling may be treated with a water softening device to reduce the saturation index of the water.

Refer to the [Saturation Index chart](#) on page 13. Refer to the [cold water connection detail on page 27](#) for the position of the expansion control valve.

Contact Rheem Service Centre if a replacement heating unit is required.



## CHANGE OF WATER SUPPLY

The changing or alternating from one water supply to another can have a detrimental effect on the operation and / or life expectation of a water heater cylinder, a temperature pressure relief valve and a heating unit.

Where there is a changeover from one water supply to another, e.g. a rainwater tank supply, bore water supply, desalinated water supply, public reticulated water supply or water brought in from another supply, then water chemistry information should be sought from the supplier or it should be tested to ensure the water supply meets the requirements given in these guidelines for warranty to apply.

## SUMMARY OF WATER CHEMISTRY ADVICE AFFECTING WARRANTY

The warranty of this water heater does not apply on the components listed below if the water heater is connected at any time to a water supply with water chemistry of:

Water Chemistry	Component
Total Dissolved Solids (TDS) > 2500 mg/L	water heater cylinder
Total Dissolved Solids (TDS) not suitable for anode type	water heater cylinder
Saturation Index (SI) < -1.0	copper sheathed heating unit
Saturation Index (SI) > +0.4 (if expansion control valve is not fitted)	water heater cylinder temperature pressure relief valve
Saturation Index (SI) > +0.8	standard watts density heating unit



## SAVE A SERVICE CALL

Check the items below before making a service call. You will be charged for attending to any condition or fault that is not related to the manufacture or failure of a part.

### NOT ENOUGH HOT WATER (OR NO HOT WATER)

- **Is the electricity switched on?**

Inspect the isolating switch marked “HOT WATER” or “WATER HEATER” at the switchboard and the isolating switch (if one is installed) near the water heater and ensure they are turned on.

**Note:** Check the electricity supply to which the water heater is connected. If on an Off-Peak or time controlled electricity supply, remember heating hours are restricted (refer to “Off-Peak Electricity Supply” on page 7).



Check the fuse marked “HOT WATER” or “WATER HEATER” at the switchboard.

- **Twin element water heaters**

A twin element non-simultaneous model must have power available to the top heating unit circuit at all times for the water heater to operate as designed.

- **Are you using more hot water than you think?**

Is one outlet (especially the shower) using more hot water than you think? Very often it is not realised the amount of hot water used, particularly when showering. Carefully review the family’s hot water usage. Have your plumber fit a flow control valve to each shower outlet to reduce water usage.

- **Temperature pressure relief valve running**

Is the relief valve discharging too much water? (Refer to “Temperature Pressure Relief Valve Running” on page 16).

- **Thermostat setting**

Ensure the thermostat setting is appropriate. You may choose to adjust the thermostat upwards to gain additional hot water capacity.

Refer to “temperature Adjustment” on page 5

**⚠ Warning:** Hotter water increases the risk of scald injury.

- **Water heater size**

Do you have the correct size water heater for your requirements? The sizing guide in the Rheem sales literature and on the Rheem website ([www.rheem.co.nz](http://www.rheem.co.nz)) suggests average sizes that may be needed.

## TEMPERATURE PRESSURE RELIEF VALVE RUNNING

- **Normal Operation**

It is normal and desirable that this valve allows a small quantity of water to escape during the heating cycle. However, if it discharges more than a bucket full of water in 24 hours, there may be another problem.

- **Continuous dribble**

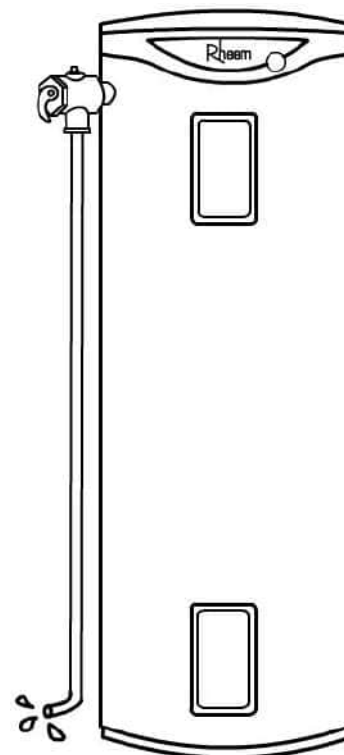
Try gently raising the easing lever on the relief valve for a few seconds (refer to "Temperature Pressure Relief Valve" on page 9). This may dislodge a small particle of foreign matter and clear the fault. Release the lever gently.

- **Steady flows for long period (often at night)**

This may indicate the mains water pressure sometimes rises above the designed pressure of the water heater. Ask your installing plumber to fit a pressure limiting valve.

- **Heavy flows of hot water until water heater is cold - then stops until water reheats**

The water heater **must** be switched off at the switchboard. Phone a Rheem Service Centre



**⚠ Warning:** Never replace the relief valve with one of a higher pressure rating.

## EXPANSION CONTROL VALVE RUNNING

If an expansion control valve is fitted in the cold water line to the water heater (refer to page 27) it may discharge a small quantity of water instead of the temperature pressure relief valve on the water heater. The benefit is that energy is conserved as the discharged water is cooler.

## HIGHER THAN EXPECTED ELECTRICITY BILLS

Should you at any time, feel your electricity account is higher than expected, we suggest you check the following points:

- Is the relief valve running excessively?

Refer to “Temperature Pressure Relief Valve Running” on page 16.

- Is one outlet (especially the shower) using more hot water than you think?

Refer to “Not Enough Hot Water” on page 15.

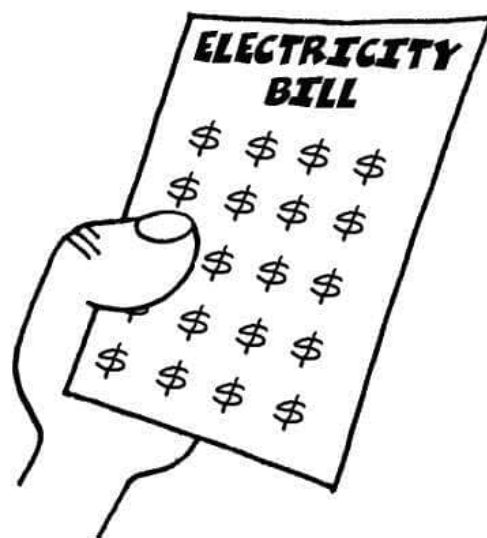
- Is there a leaking hot water pipe, dripping hot water tap, etc?

Even a small leak will waste a surprising quantity of hot water and electricity. Replace faulty tap washers, and have your plumber rectify any leaking pipe work.

- Has there been an increase in hot water usage?

An increase in hot water usage will result in an increase in water heater operation.

- Has your water heating tariff rate been increased by your electricity retailer since your previous account?



## ELECTRICITY TARIFFS

The electricity tariff to which your water heater is connected will determine the overall operating cost of the system. It is important you are aware of this tariff, i.e. Off-Peak (overnight) or time controlled supply, Extended Off-Peak (overnight and day) or Extended time controlled supply, Domestic / Continuous. For types of tariffs, refer to “Single Element Model” on page 7 and “Twin Element Model” on page 7.

**IF YOU HAVE CHECKED ALL THE FOREGOING AND STILL BELIEVE YOU NEED ASSISTANCE, PHONE A RHEEM SERVICE CENTRE.**

## INSTALLATION

---

### THIS WATER HEATER IS NOT SUITABLE FOR POOL HEATING

The installation must comply with the requirements of AS/NZS 3500.4, AS/NZS 3000 and all local codes and regulatory authority requirements. In New Zealand, the installation must conform with the New Zealand Building Code.

All packaging materials must be removed from the water heater prior to its installation. This includes the removal of the cardboard base of the carton from the underside of the water heater.

### WATER HEATER LOCATION

This water heater is suitable for either outdoor or indoor installation (a model with a supply cord and plug is suitable for indoor installation only). Whether located outdoor or indoor, the water heater should be installed close to the most frequently used outlet and its position chosen with safety and service in mind.

Clearance must be allowed for servicing of the water heater. The water heater must be accessible without the use of a ladder or scaffold.

Make sure the temperature pressure relief valve lever is accessible and the front cover, thermostat, heating unit and if fitted, the side cover and temperature limiting valve can be removed for service.



You must be able to read the information on the rating plate. If possible leave headroom of one water heater height so the anode can be inspected or replaced. Remember you may have to take the entire water heater out later for servicing.

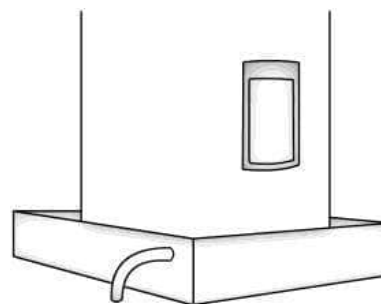
It is recommended the water heater be installed at ground or floor level and must stand vertically upright. The base of the water heater is made of corrosion resistant material, and it may be placed directly in contact with the supporting surface. It is not necessary to allow for free air circulation under the base of the water heater.

**Note:** The water heater should not be placed in direct contact with a concrete surface that is less than two months old and not fully cured as this may attack the metal coating of the water heater base. A moisture barrier should be used between the two surfaces in this instance.

Remember all local authorities have regulations about putting water heaters into roof spaces.

### SAFE TRAY

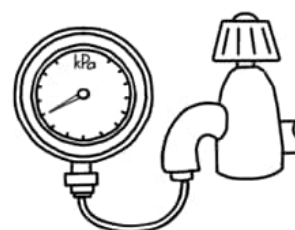
It is a requirement of AS/NZS 3500.4 that for a new installation, a water heater be installed in a safe tray where in the event of a leak, property may otherwise be damaged. Construction, installation and draining of a safe tray must comply with the abovementioned Standard.



### MAINS WATER SUPPLY

Where the mains water supply pressure exceeds that shown in the table below, an approved pressure limiting valve is required and should be fitted as shown in the installation diagram (refer to diagram on page 27).

Model	025 to 160	250 to 400
Relief valve setting	1400 kPa	1000 kPa
Expansion control valve setting*	1200 kPa	850 kPa
Max. mains supply pressure		
With expansion control valve	950 kPa	650 kPa
Without expansion control valve	1120 kPa	800 kPa



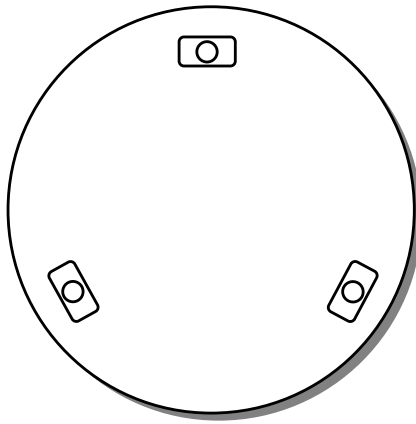
\* Expansion control valve not supplied with water heater

### TANK WATER SUPPLY

If the water heater is supplied with water from a tank supply and a pressure pump system is not installed, then the bottom of the supply tank must be at least 1 m above the highest point of the hot water plumbing system, including the water heater. Care must be taken to avoid air locks. The cold water line to the water heater should be adequately sized and fitted with a full flow gate valve or ball valve.

## Feet for Rheem Externally Mounted Cylinders

### Optima 180, 300 and 400L Mains Pressure Water Heaters (3 pieces)



**Outside diameters**  
**180 model–488mm**  
**300 model–580mm**  
**400 model–690mm**

Feet are 50mm in from edge of cylinder

#### Installation options:

1. Push tags into soft concrete at correct points according to cylinder diameter
2. Cut off tags and use a blob of construction adhesive to hold feet in place at correct points according to cylinder diameter
3. Cut off tags and screw feet into place on wooden platform at correct points according to cylinder diameter

Note: It is important that only three feet are used to avoid “rocking” and that the feet are positioned at 50mm from outside edge of cylinder to outside edge of feet.



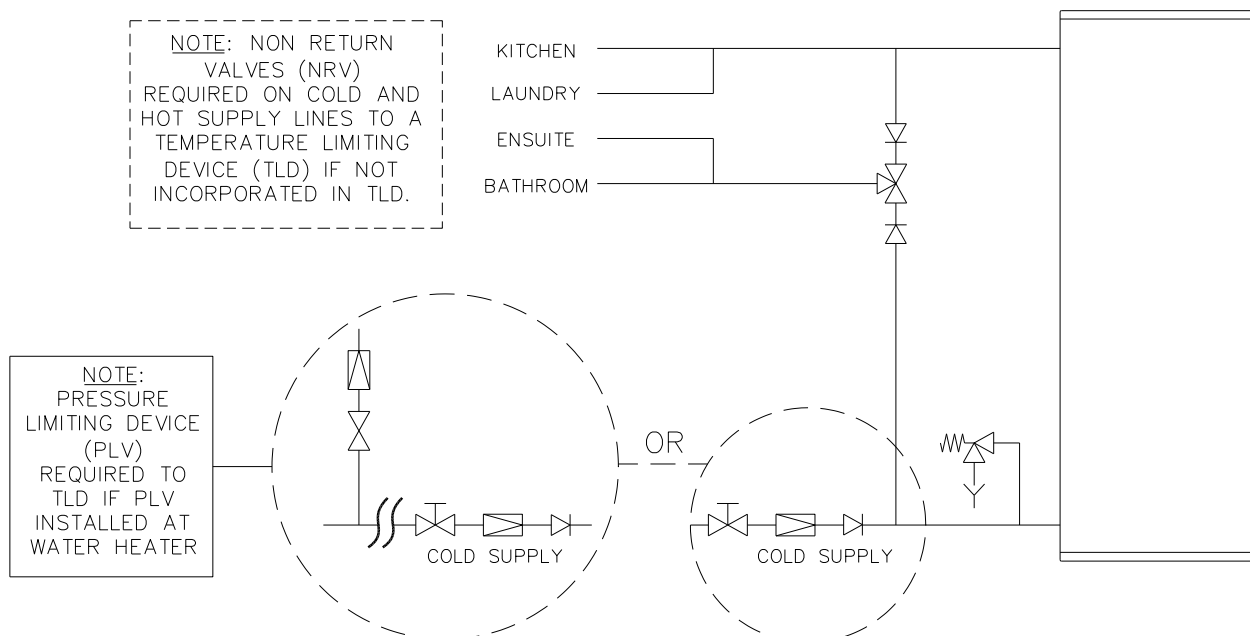
## HOT WATER DELIVERY

This water heater can deliver water at temperatures which can cause scalding.

It is necessary and we recommend that a temperature limiting device be fitted between a Rheemglas or Optima water heater and the hot water outlets in any ablution area such as a bathroom or ensuite, to reduce the risk of scalding. The installing plumber may have a legal obligation to ensure the installation of this water heater meets the delivery water temperature requirements of AS/NZS 3500.4 so that scalding water temperatures are not delivered to a bathroom, ensuite or other ablution area.

Where a temperature limiting device is installed adjacent to the water heater, the cold water line to the temperature limiting device can be branched off the cold water line either before or after the isolation valve, pressure limiting valve and non return valve to the water heater. If an expansion control valve is required, it must always be installed after the non return valve and be the last valve prior to the water heater.

If a pressure limiting valve is installed on the cold water line to the water heater and the cold water line to a temperature limiting device branches off before this valve or from another cold water line in the premises, then a pressure limiting valve of an equal pressure setting may be required prior to the temperature limiting device.



**Two Temperature Zones Using a Temperature Limiting Device**

## CIRCULATED HOT WATER FLOW AND RETURN SYSTEM

If a Rheem water heater is to be installed as part of a circulated hot water flow and return system, a storage water heater able to provide a hot water outlet temperature of at least 60°C must be used. **Note:** The thermostat must always be above 60°C. Refer to the **diagram on page 23**

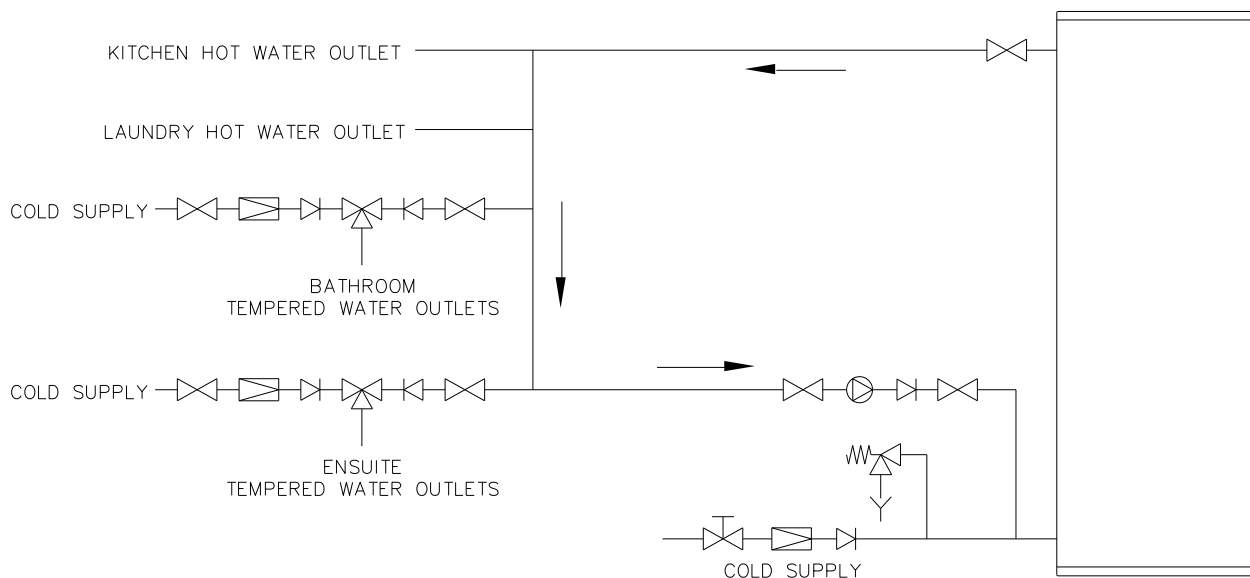
### Temperature Limiting Device

A temperature limiting device cannot be installed in circulated hot water flow and return pipe work. The tempered water from a temperature limiting device cannot be circulated. Where a circulated hot water flow and return system is required in a building, a temperature limiting device can only be installed on a dead leg, branching off the circulated hot water flow and return pipe.

If circulated tempered water were to be returned back to the water heater, depending on the location of the return line connection on the water supply line to the water heater, then either:

- water will be supplied to the cold water inlet of the temperature limiting device at a temperature exceeding the maximum recommended water supply temperature, or
- when the hot taps are closed no water will be supplied to the cold water inlet of the temperature limiting device whilst hot water will continue to be supplied to the hot water inlet of the temperature limiting device.

These conditions may result in either water at a temperature exceeding the requirements of AS/NZS 3500.4 being delivered to the hot water outlets in the ablution areas, or the device closing completely and not delivering water at all, or the device failing. Under either condition, the operation and performance of the device cannot be guaranteed.



### Circulated Hot Water Flow and Return Continuous Electric Water Heater

#### Off-Peak or Time Controlled Electricity Supply

A single or twin element electric water heater connected to an Off-Peak electricity supply should not be installed as part of a circulated hot water flow and return system in a building. The benefits of the Off-Peak electricity supply will be significantly reduced.

#### REDUCING HEAT LOSSES

The cold water line to and the hot water line from the water heater must be insulated in accordance with the requirements of AS/NZS 3500.4. The insulation must be weatherproof and UV resistant if exposed. When using a hot water recirculation system, an increase in running costs can be expected due to the heat loss that occurs through the pipework.

The cold water line to and the hot water line from the water heater must be insulated in accordance with the requirements of AS/NZS 3500.4. The insulation must be weatherproof and UV resistant if exposed.

**ANODE**

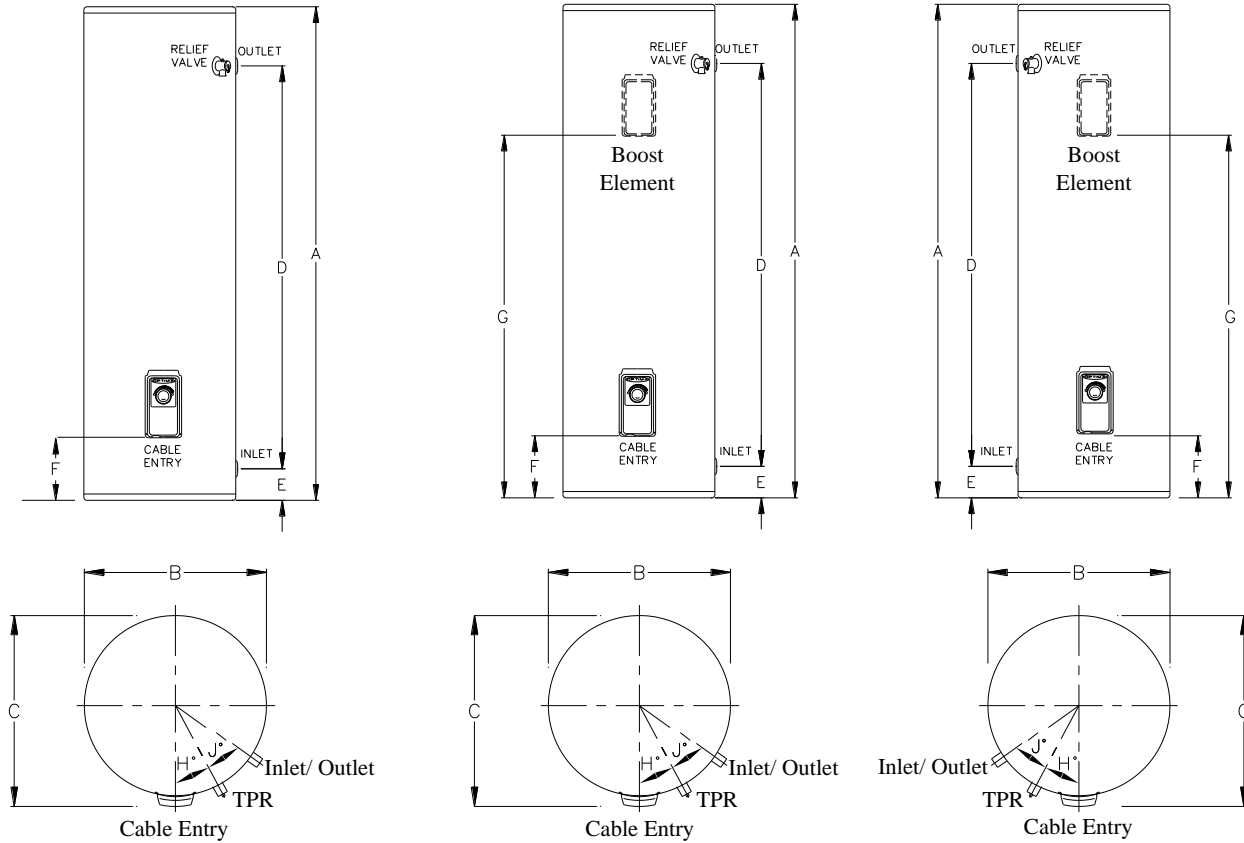
The vitreous enamel lined cylinder of the water heater is only covered by warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is installed. The use of an incorrect colour coded anode will void the cylinder warranty and may shorten the life of the water heater cylinder.

The correct colour coded anode for the water supply being used must be selected and fitted to the water heater for warranty to apply to the water heater cylinder (refer to “Water Supplies” on page 11 and the Anode Selection chart on page 12). The black anode is typically fitted as standard.

Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use. In areas where this is likely to occur, the installer should instruct the householder on how to dissipate the gas safely (refer to “Caution” on page 12).

## DIMENSIONS AND TECHNICAL DATA



**Optima 180 Litre**

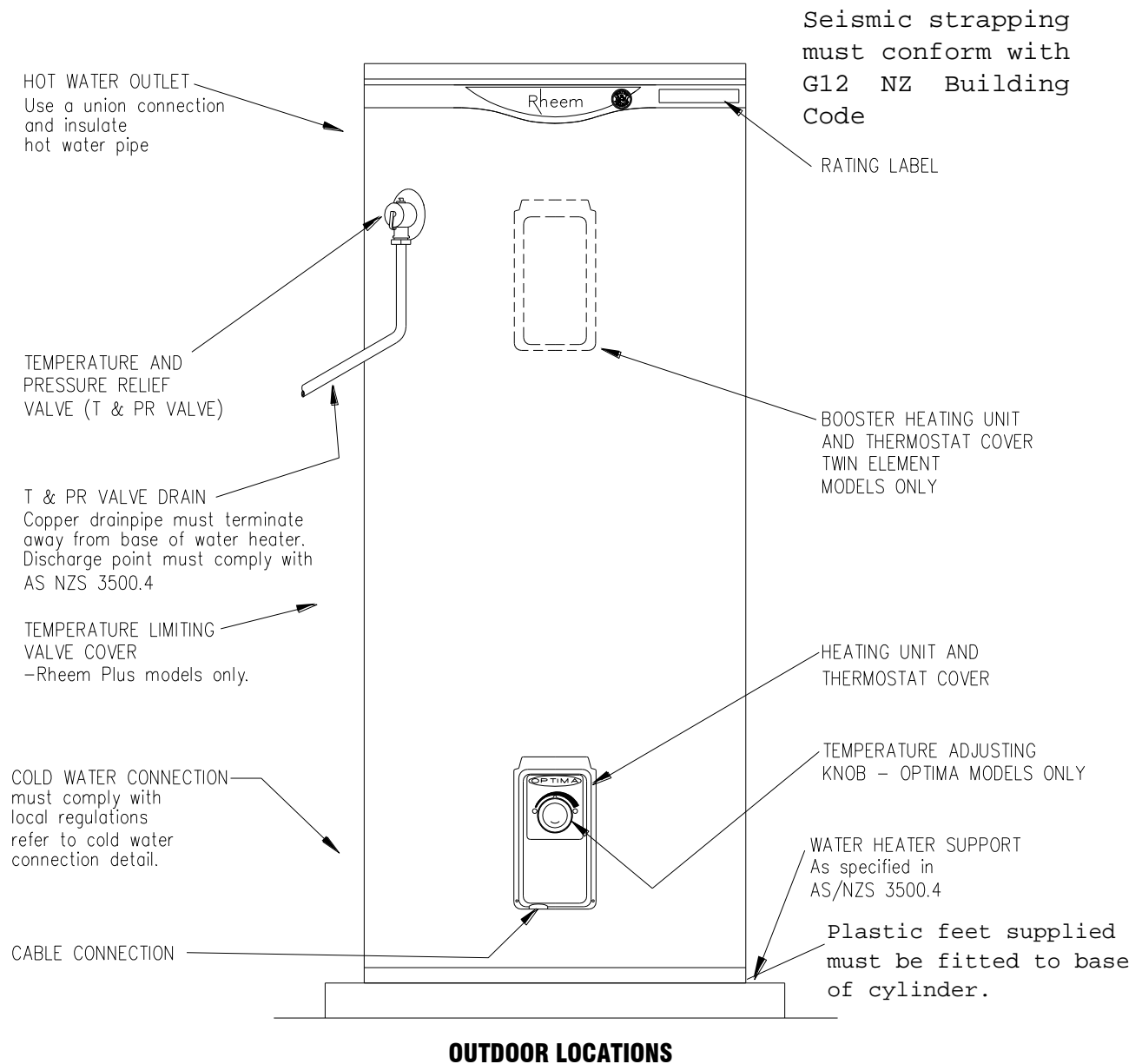
**Optima 300 Litre**

**Optima 400 Litre**

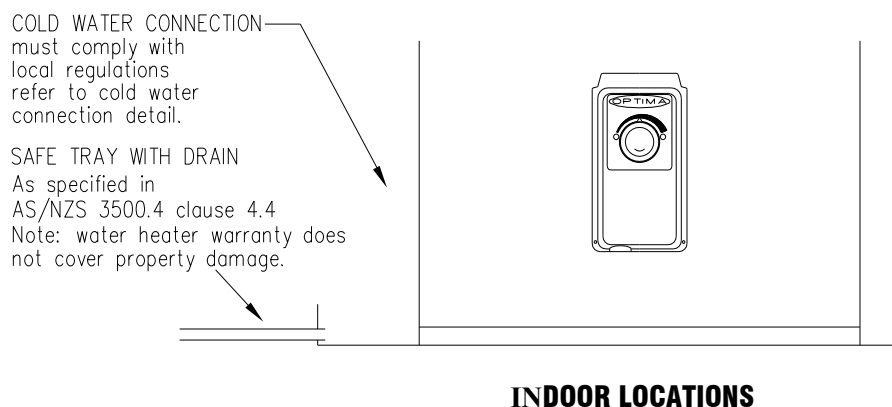
Optima Single Element Optima Twin Element			913 180 -	- 913 300	- 913 400
Hot Water Delivery		Litres	180	300	400
Boost Capacity		Litres	-	50	90
Dimensions	A	mm	1720	1825	1840
	B	mm	488	580	690
	C	mm	554	646	755
	D	mm	1482	1569	1479
	E	mm	74	74	121
	F	mm	90	90	120
	G	mm	-	1295	1346
	H	deg	23	18	53
	J	deg	22	18	30
Approx. Weight empty		kg	64	97	118

400 Litre models have left hand connections.  
Technical data is subject to change.

## TYPICAL INSTALLATION – OUTDOOR LOCATION



## TYPICAL INSTALLATION – INDOOR LOCATION





## CONNECTIONS – PLUMBING

### CONNECTION SIZES

Optima

- Hot water connection: RP ¾/20
- Cold water connection: RP ¾/20
- Relief valve connection: RP ½/15

All plumbing work must be carried out by a qualified person and in accordance with the Plumbing Standard AS/NZS 3500.4 and local authority requirements.

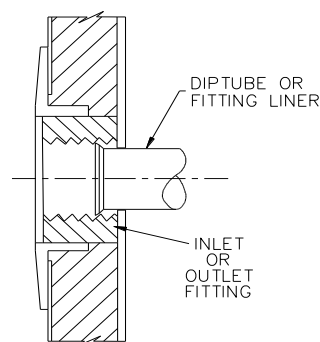
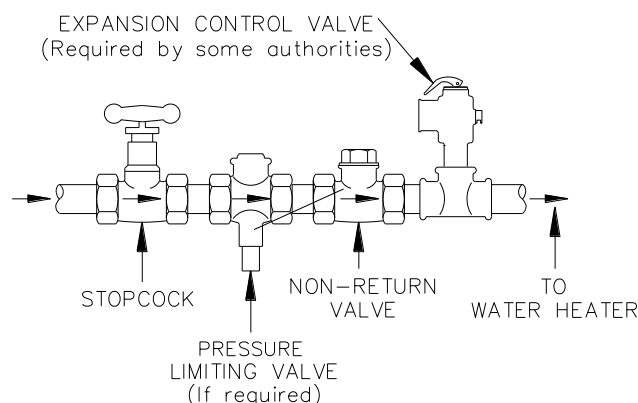
### WATER INLET AND OUTLET

All pipe work must be cleared of foreign matter before connection and purged before attempting to operate the water heater. All olive compression fittings must use brass or copper olives. Use thread sealing tape or approved thread sealant on all fittings.

An isolation valve and non-return valve must be installed on the cold water line to the water heater. An acceptable arrangement is shown in the diagram. Refer also to “**Hot Water Delivery**” on page 21 and to “**Mains Water Supply**” on page 19.

A disconnection union must always be provided at the cold water inlet and hot water outlet on the water heater to allow for disconnection of the water heater.

This water heater has either a plastic dip tube or fitting liner in the inlet and outlet fittings (see diagram). These must be in place for the water heater to function properly. Do not remove or damage them by using heat nearby. They will be pushed into the correct position as the fitting is screwed in.



## PIPE SIZES

To achieve true mains pressure operation, the cold water line to the water heater should be the same size or bigger than the hot water line from the water heater.

The pipe sizing for hot water supply systems should be carried out by persons competent to do so, choosing the most suitable pipe size for each individual application. Reference to the technical specifications of the water heater and local regulatory authority requirements must be made.

## TEMPERATURE PRESSURE RELIEF VALVE

The temperature pressure relief valve is shipped either under the top flap of the water heater carton or behind the front cover or in a plastic bag attached to the water heater. The temperature pressure relief valve must be fitted before the water heater is operated. Before fitting the relief valve, make sure the probe has not been bent. Seal the thread with Teflon tape - never hemp. Make sure the tape does not hang over the end of the thread.

Screw the valve into the correct opening (refer to the installation diagram on page 25) leaving the valve outlet pointing downwards. Do not use a wrench on the valve body - use the spanner flats provided. A copper drain line must be fitted to the temperature pressure relief valve (refer to "Relief Valve Drain" on page 27).

## EXPANSION CONTROL VALVE

Local regulations may make it mandatory to install an expansion control valve (ECV) in the cold water line to the water heater. In other areas, an ECV is required if the saturation index is greater than +0.4 (refer to "Water Supplies" on page 11).

The expansion control valve must always be installed after the non return valve and be the last valve installed prior to the water heater (refer to diagram on page 27). A copper drain line must be fitted to the expansion control valve (refer to "Relief Valve Drain" on page 27).

The valve must be insulated with closed cell polymer insulation or similar (minimum thickness 9 mm) and the insulation installed so as not to impede the operation of the valve. The insulation must be weatherproof and UV resistant if exposed.

**RELIEF VALVE DRAIN**

DN15 copper drain lines must be fitted to the temperature pressure relief valve and expansion control valve (if one is installed) to carry the discharge clear of the water heater. Connect the drain lines to the valves using disconnection unions. The drain line from the valve to the point of discharge should be as short as possible, have a continuous fall all the way from the water heater to the discharge outlet and have no tap, valves or other restrictions in the pipe work. A drain line from a relief valve must comply with the requirements of AS/NZS 3500.4. or G12 NZ Building Code

A drain line must be comply with AS/NZS 3500 or G12 NZ Building code.

Subject to local regulatory authority approval, the drain lines from the temperature pressure relief valve and expansion control valve from an individual water heater may be interconnected. Refer to local regulations.

The outlet of a drain line must be in such a position that flow out of the pipe can be easily seen, but arranged so discharge will not cause injury, damage or nuisance. The termination point of a drain line must comply with the requirements of AS/NZS 3500.4. Drain lines must not discharge into a safe tray.

In locations where water pipes are prone to freezing, drain lines must be insulated, must not exceed 300 mm in length and are to discharge into a tundish through an air gap of between 75 mm and 150 mm.

If a drain line discharges into a tundish, the drain line from the tundish must be not less than DN20. The drain line from a tundish must meet the same requirements as for a drain line from a relief valve.

**Warning:** As the function of the temperature pressure relief valve on this water heater is to discharge high temperature water under certain conditions, it is strongly recommended the pipe work downstream of the relief valve be capable of carrying water exceeding 93°C. Failure to observe this precaution may result in damage to pipe work and property.

## CONNECTIONS – ELECTRICAL

---

**The power supply to the water heater must not be switched on until the water heater is filled with water** and a satisfactory megger reading is obtained.

All electrical work and permanent wiring must be carried out by a qualified person and in accordance with the Wiring Rules AS/NZS 3000 and local authority requirements.

### WATER HEATER

A water heater not fitted with a supply cord and plug must be directly connected to a 240 V AC, 50 Hz mains power supply with an isolating switch installed at the switchboard.

The power supply to a **twin element model** should be Off-Peak (overnight) to the **bottom heating unit** and continuous to the **top heating unit**. The power supply to a **single element model** can be either an **Off-Peak (overnight)**, **Extended Off-Peak (overnight and day)** or **continuous** electricity supply. Check with the local electricity supply authority as to their requirements.

An Off-Peak (overnight) power supply will provide the maximum financial savings. Discuss the power supply requirements with the householder.

A flexible 20 mm conduit is required for the electrical cable to the water heater. The conduit is to be connected to the unit with a 20 mm terminator. Connect the power supply wires directly to the terminal block and earth tab connection, ensuring there are no excess wire loops inside the front cover. The temperature rating of the power supply wires insulation must suit this application.

### THERMOSTAT SETTING

The thermostat on an Optima model is user adjustable from 60°C to 75°C.

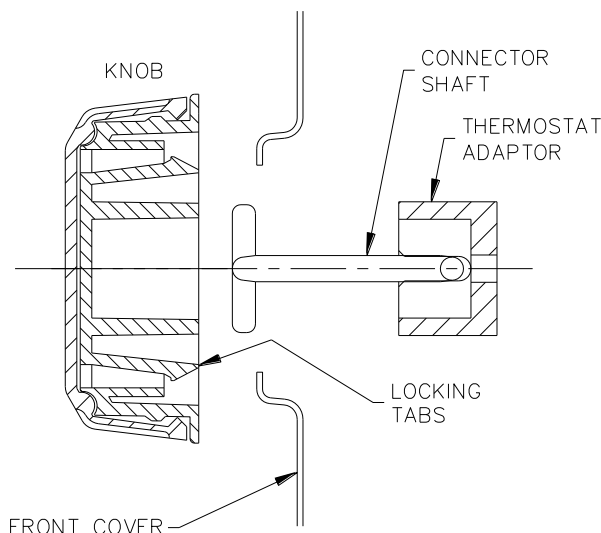
The thermostat is adjusted by turning the knob anticlockwise to decrease the temperature setting and clockwise to increase the temperature setting. The top thermostat on a twin element model is fixed at 60°C.

For reasons of safety and economy, we advise the thermostat be set at the lowest temperature that will provide sufficient hot water. Dishwasher running costs can be adversely affected if the thermostat is set below 65°C. Discuss the thermostat setting requirements with the householder.

### ASSEMBLY OF ADJUSTER MECHANISM ON OPTIMA MODEL

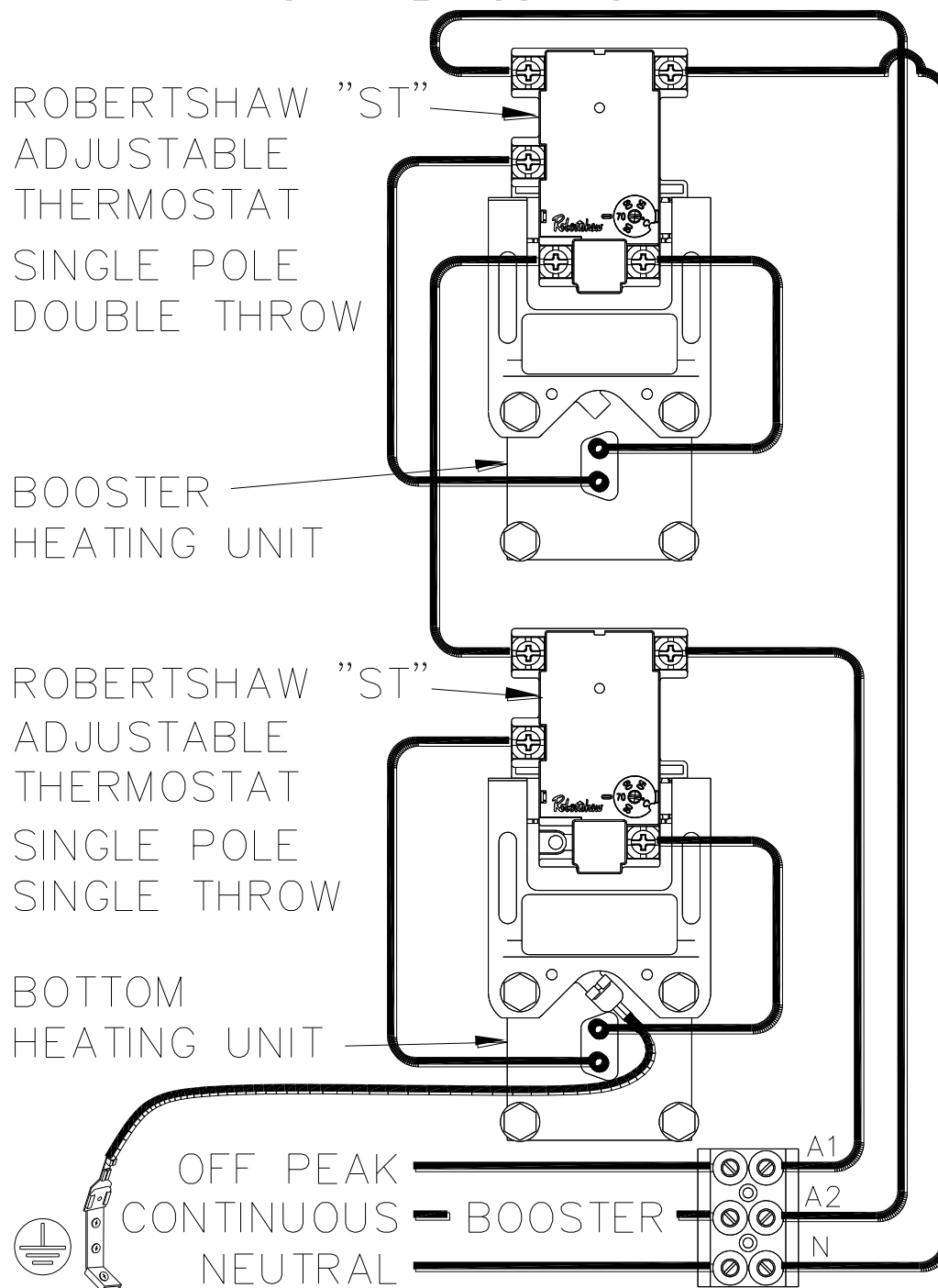
When the front cover has been removed, reassemble as follows:

- Remove the knob from the front cover by depressing the locking tabs on the inside of the front cover.
- Turn the thermostat to the lowest temperature (refer to "Temperature Adjustment" on page 5).
- Fit the front cover.
- Insert the connector shaft through the hole into the thermostat adaptor slots.
- Align the knob slots over the 'T' drive on the connector shaft, with the dial at the lowest setting – a firm push with the hand on the knob front face will engage the locking tabs.



# WIRING DIAGRAM TWIN ELEMENT ELECTRIC WATER HEATERS NON-SIMULTANEOUS OPERATION OFF-PEAK CONNECTION

THIS DIAGRAM IS FOR ROBERTSHAW  
"ST" THERMOSTATS



## Electrical Circuit for Twin Element Models – Robertshaw "ST" Thermostats

The active from the continuous supply must be connected to the top heating unit circuit and the active from the Off-Peak or time controlled supply must be connected to the bottom heating unit circuit.



## COMMISSIONING

---

### TO FILL AND TURN ON THE WATER HEATER

**The power supply to the water heater must not be switched on until the water heater is filled with water** and a satisfactory megger reading is obtained.

- Open all of the hot water taps in the house (don't forget the shower).
- Open the cold water isolation valve fully on the cold water line to the water heater.

Air will be forced out of the taps.

- Close each tap as water flows freely from it.
- Check the pipe work for leaks.
- Switch on the electrical supply at the isolating switch to the water heater.

Explain to the householder or a responsible officer the functions and operation of the water heater. Upon completion of the installation and commissioning of the water heater, leave this guide with the householder or a responsible officer.

### TO TURN OFF THE WATER HEATER

If it is necessary to turn off the water heater on completion of the installation, such as on a building site or where the premises is vacant, then;

- Switch off the electrical supply at the isolating switch to the water heater.
- Close the cold water isolation valve at the inlet to the water heater.

## DRAINING THE WATER HEATER

---

To drain the water heater:

- Turn off the water heater (refer to “To Turn Off The Water Heater” on page 33).
- Close all hot water taps.
- Operate the relief valve release lever - do not let the lever snap back or you will damage the valve seat.

Operating the lever will release the pressure in the water heater.

- Undo the union at the cold water inlet to the water heater and attach a hose to the water heater side of the union.

Let the other end of the hose go to a drain.

- Operate the relief valve again.

This will let air into the water heater and allow the water to drain through the hose.

# RHEEM ELECTRIC DOMESTIC MAINS PRESSURE WATER HEATER WARRANTY

---

## WARRANTY CONDITIONS

1. This warranty is applicable only to water heaters manufactured from 1<sup>st</sup> Oct 2010.
2. The water heater must be installed in accordance with the water heater installation instructions, supplied with the water heater, and in accordance with all relevant statutory and local requirements of the State in which the water heater is installed.
3. Where a failed component or water heater is replaced under warranty, the balance of the original warranty period will remain effective. The replaced component or water heater does not carry a new warranty.
4. Where the water heater is installed outside the boundaries of a metropolitan area as defined by Rheem or further than 25 km from a regional Rheem branch office, or a Rheem Service Centre the cost of transport, insurance and traveling costs between the nearest Rheem Service Centre's premises and the installed site shall be the owner's responsibility.
5. Where the water heater is installed in a position that does not allow safe, ready access, the cost of accessing the site safely, including the cost of additional materials handling and /or safety equipment, shall be the owner's responsibility.
6. The warranty only applies to the water heater and original or genuine (company) component replacement parts and therefore does not cover any plumbing or electrical parts supplied by the installer and not an integral part of the water heater, e.g. pressure limiting valve; isolation valves; non-return valves; electrical switches; pumps or fuse.
7. The water heater must be sized to supply the hot water demand in accordance with the guidelines in the water heater literature.

## WARRANTY EXCLUSIONS

1. REPAIR AND REPLACEMENT WORK WILL BE CARRIED OUT AS SET OUT IN THE WATER HEATER WARRANTY, HOWEVER THE FOLLOWING EXCLUSIONS MAY CAUSE THE WATER HEATER WARRANTY TO BECOME VOID AND MAY INCUR A SERVICE CHARGE AND / OR COST OF PARTS.
  - a) Accidental damage to the water heater or any component, including: Acts of God; failure due to misuse; incorrect installation; attempts to repair the water heater other than by a Rheem Service Centre or the Rheem Service Department.
  - b) Where it is found there is nothing wrong with the water heater; where the complaint is related to excessive discharge from the temperature and / or pressure relief valve due to high water pressure; where there is no flow of hot water due to faulty plumbing; where water leaks are related to plumbing and not the water heater or water heater components; where there is a failure of electricity or water supplies; where the supply of electricity or water does not comply with relevant codes or acts.
  - c) Where the water heater or water heater component has failed directly or indirectly as a result of: excessive water pressure; excessive temperature and / or thermal input; blocked overflow / vent drain; corrosive atmosphere; ice formation in the pipe work to or from the water heater.
  - d) Where the water heater is located in a position that does not comply with the water heater installation instructions or relevant statutory requirements, causing the need for major dismantling or removal of cupboards, doors or walls, or use of special equipment to bring the water heater to floor or ground level or to a serviceable position.
  - e) Where the water heater has been connected at any time to a water supply that does not comply with the water supply guidelines as outlined in the Owner's Guide and Installation Instructions.
2. SUBJECT TO ANY STATUTORY PROVISIONS TO THE CONTRARY, THIS WARRANTY EXCLUDES ANY AND ALL CLAIMS FOR DAMAGE TO FURNITURE, CARPETS, WALLS, FOUNDATIONS OR ANY OTHER CONSEQUENTIAL LOSS EITHER DIRECTLY OR INDIRECTLY DUE TO LEAKAGE FROM THE WATER HEATER, OR DUE TO LEAKAGE FROM FITTINGS AND / OR PIPE WORK OF METAL, PLASTIC OR OTHER MATERIALS CAUSED BY WATER TEMPERATURE, WORKMANSHIP OR OTHER MODES OF FAILURE.

## RHEEM ELECTRIC DOMESTIC MAINS PRESSURE WATER HEATER WARRANTY

### WARRANTY

In addition to your legal rights, Rheem New Zealand makes the following promise to the customer. We will repair, or if necessary, replace a defective domestic water heater, or part, which has failed due to faulty manufacture on the following terms and conditions.

Component	Installation	Model	Warranty Period	Warranty
<b>All components</b> (from date of installation)	All installations	Optima	Up to 3 Years	New component or water heater, free of charge, including labour.
<b>Inner Cylinder</b> (from date of installation)	Water heater installed in a "single-family domestic dwelling" With a thermostat set below 76°C	Optima	First 5 years	New water heater, free of charge, including labour.
			Years 6-10	New water heater, free of charge, with installation and labour costs being the responsibility of the owner.
	Water heater installed in other than a "single-family domestic dwelling" With a thermostat set below 76°C	Optima	First 12 months	New component or water heater, free of charge, including labour.
			Years 2-5	New water heater, free of charge, with installation and labour costs being the responsibility of the owner.

### DURABILITY

Your Rheem water heater meets the durability standards of the New Zealand Building Code provided the water heater is:

1. Installed in accordance with the New Zealand Building Code and the Rheem installation instructions
2. Maintained in accordance with these instructions
3. Not damaged in any way
4. Stored correctly prior to use,
5. Your water quality remains within the requirements stated in the installation instructions

Warranty Conditions: see Page 35

Note: The water heater must be installed and maintained in accordance with the Rheem Installation Guides supplied with the water heater, and comply fully with all the requirements of the New Zealand Building Code.



# Double Glazing Technical Specification Data.

**Low E**  
Double Glazing



# METRO'S HIGH PERFORMANCE DOUBLE GLAZING IS CRAFTED FOR NEW ZEALAND CONDITIONS

Your windows are crucial for creating comfortable, light filled spaces.  
Talk to us today about how our Low E double glazing options can give  
you the perfect fit for your performance needs.  
Our double glazing range is Declare label certified and RedList Free.



Clear - Air - Standard Spacer - Clear

Building Code Acceptable Solution H1/AS1 Schedule (see schedule notes)					EN 673	EN410						
					Heat Loss & Condensation	Visibility			Heat Gain			Fading
					Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
Make-up mm <sup>1</sup>	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damaged Weighted Transmission
4-8-4					3.1	82%	15%	15%	77%	0.89	1.06	0.74
4-10-4					3.0	82%	15%	15%	77%	0.89	1.06	0.74
4-12-4					2.9	82%	15%	15%	77%	0.89	1.06	0.74
4-14-4					2.8	82%	15%	15%	77%	0.89	1.06	0.74
4-16-4			Zones 1-6 Stage One	Zones 1-6 Stage One	2.7	82%	15%	15%	77%	0.89	1.06	0.74
4-18-4			Zones 1-6 Stage One	Zones 1-6 Stage One	2.7	82%	15%	15%	77%	0.89	1.06	0.74

(Note argon needs to be requested for building code compliance to achieve U Value of 2.6 for uPVC and Timber)



Max™ Low E - Argon - Thermal Spacer - Clear

Building Code Acceptable Solution H1/AS1 Schedule (see schedule notes)					EN 673	EN410						
					Heat Loss & Condensation	Visibility			Heat Gain			Fading
					Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
Make-up mm <sup>1</sup>	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar heat gain co-efficient	Shading co-efficient	Light to solar gain ratio	Damaged Weighted Transmission
4-8-4			Zones 1-6 Stage One	Zones 1-6 Stage One	2.0	69%	12%	13%	57%	0.66	1.21	0.64
4-10-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.8	69%	12%	13%	57%	0.66	1.21	0.64
4-12-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.6	69%	12%	13%	57%	0.66	1.21	0.64
4-14-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.5	69%	12%	13%	57%	0.66	1.21	0.64
4-16-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.5	69%	12%	13%	57%	0.66	1.21	0.64
4-18-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.5	69%	12%	13%	57%	0.66	1.21	0.64

## TERMINOLOGY

- R:** The higher the R value the better the double glazing and correspondingly the window's thermal performance.
- Ug:** The lower the U Value the lower the heat transfer, the better the thermal insulation.
- Cog:** Both U and R values are Cog which = centre-of-glass measure designating glass performance only and not the whole window.
- VLT:** The higher the percentage the more daylight transmitted and the greater the glare.
- VLR-E:** The higher the percentage the more the light reflection looking into the building.
- VLR-I:** The higher the percentage the more the light reflection looking out of the building.
- SF:** The lower the solar factor or total energy transmittance coefficient the lesser the solar heat transmitted. SF is designated g value in Europe.
- SC:** The lower the shading coefficient the lesser the solar heat gain and the greater the shading provided by the glass.
- LSG:** If the LSG is greater than 1.0, then the glass transmits more light than solar heat, also termed as selectivity.
- Tdw-ISO:** The lower the Tdw-ISO the greater the reduction in fading damage through the glass.





Xcel™ Low E - Argon - Thermal Spacer - Clear

Double Glazing					EN 673	EN410						
					Heat Loss & Condensation	Visibility			Heat Gain			Fading
						Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>
	Building Code Acceptable Solution H1/AS1 Schedule (see schedule notes)											
	Window System Material Type by Climate Zone											
Make-up mm <sup>1</sup>	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damaged Weighted Transmission
4-8-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.7	80%	12%	12%	59%	0.68	1.36	0.69
4-10-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.4	80%	12%	12%	59%	0.68	1.36	0.69
4-12-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.3	80%	12%	12%	59%	0.68	1.36	0.69
4-14-4	Zones 1-6 Stage One	Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	80%	12%	12%	59%	0.68	1.36	0.69
4-16-4	Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	80%	12%	12%	59%	0.68	1.36	0.69
4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	80%	12%	12%	59%	0.68	1.36	0.69



SunX™ Grey Low E - Argon - Thermal Spacer - Clear

Double Glazing					EN 673	EN410						
						Heat Loss & Condensation	Visibility			Heat Gain		
					Building Code Acceptable Solution H1/AS1 Schedule (see schedule notes)				Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>
Window System Material Type by Climate Zone												
Make-up mm <sup>1</sup>	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damaged Weighted Transmission
4-8-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.8	42%	8%	12%	33%	0.38	1.27	0.45
4-10-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.6	42%	8%	12%	33%	0.38	1.27	0.45
4-12-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.4	42%	8%	12%	33%	0.38	1.33	0.45
4-14-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.3	42%	8%	12%	33%	0.38	1.33	0.45
4-16-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.3	42%	8%	12%	33%	0.38	1.33	0.45
4-18-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.3	42%	8%	12%	33%	0.38	1.33	0.45



Xtreme™ Low E - Argon - Thermal Spacer - Clear

Double Glazing	Building Code Acceptable Solution H1/AS1 Schedule (see schedule notes)				EN 673	EN410						
					Heat Loss & Condensation	Visibility			Heat Gain			Fading
						Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>
Window System Material Type by Climate Zone					U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damaged Weighted Transmission
Make-up mm <sup>1</sup>	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber								
4-8-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.6	74%	12%	13%	41%	0.47	1.80	0.58
4-10-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.4	74%	12%	13%	40%	0.46	1.85	0.58
4-12-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.2	74%	12%	13%	40%	0.46	1.85	0.58
4-14-4	Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	74%	12%	13%	40%	0.46	1.85	0.58
4-16-4	Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	74%	12%	13%	40%	0.46	1.85	0.58
4-18-4	Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	74%	12%	13%	40%	0.46	1.85	0.58

# SOLAR CONTROL TINT & LAMINATE PERFORMANCE DATA

SunX™ Grey has a neutral grey tone, the colour is consistent when used across different thickness, unlike other tinted glass which gets darker as the glass gets thicker. The Low E coating also provides improved U Value and solar control.

Tinted double glazed units are subject to greater heat buildup on building elevations that are exposed to direct sunlight. Heat buildup in glass can lead to thermal breakage, this risk can be reduced through heat treated glass.

All other tints below are Body Tints used to increase privacy, reduce glare, heat gain or fading. They do not improve the U value and should be of the same thickness, as the tint get darker as the glass gets thicker.

Combining a laminate in double glazing is used to reduce UV transmission and reduce noise transfer.

Classic Double Glazing	Make-up mm <sup>1</sup>	Ug <sup>2</sup>	VLT (%) <sup>3</sup>	VLR-E (%) <sup>3</sup>	VLR-I (%) <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	UV Tdw-ISO <sup>35</sup>
		Heat Loss & Condensation	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor g value	Shading co-efficient	Light to solar gain ratio	Fading Reduction
Green Tint	4-12-4	2.9	73%	13%	14%	55%	0.64	1.31	0.60
Bronze Tint	4-12-4	2.9	56%	9%	13%	60%	0.68	0.95	0.46
Grey Tint	4-12-4	2.9	52%	8%	13%	56%	0.64	0.92	0.45

Laminated Double Glazing	Make-up mm <sup>1</sup>	Ug <sup>2</sup>	VLT (%) <sup>3</sup>	VLR-E (%) <sup>3</sup>	VLR-I (%) <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	UV Tdw-ISO <sup>35</sup>
		Heat Loss & Condensation	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor g value	Shading co-efficient	Light to solar gain ratio	Fading Reduction
Clear Float	4-12-6.38	2.9	80%	15%	15%	75%	0.86	1.07	0.57
Green Tint	4-12-6.38	2.9	71%	13%	14%	59%	0.67	1.20	0.48
Bronze Tint	4-12-6.38	2.9	55%	9%	13%	64%	0.74	0.86	0.36
Grey Tint	4-12-6.38	2.9	50%	8%	12%	61%	0.70	0.82	0.35

Low E Double Glazing	Make-up mm <sup>1</sup>	Ug <sup>2</sup>	VLT (%) <sup>3</sup>	VLR-E (%) <sup>3</sup>	VLR-I (%) <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	UV Tdw-ISO <sup>35</sup>
		Heat Loss & Condensation	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor g value	Shading co-efficient	Light to solar gain ratio	Fading Reduction
Laminated	4-12-6.38	1.6	68%	12%	12%	56%	0.65	1.20	0.50
Green Tint	4-12-4	1.6	61%	11%	11%	49%	0.57	1.24	0.52
Bronze Tint	4-12-4	1.6	47%	8%	10%	51%	0.59	0.92	0.39
Grey Tint	4-12-4	1.6	44%	7%	10%	48%	0.55	0.90	0.39

Low E Double Glazing	Make-up mm <sup>1</sup>	Ug <sup>2</sup>	VLT (%) <sup>3</sup>	VLR-E (%) <sup>3</sup>	VLR-I (%) <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	UV Tdw-ISO <sup>35</sup>
		Heat Loss & Condensation	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor g value	Shading co-efficient	Light to solar gain ratio	Fading Reduction
Laminated	4-12-6.38	1.3	79%	12%	12%	58%	0.67	1.36	0.55
Green Tint	4-12-4	1.3	71%	11%	12%	46%	0.53	1.54	0.56
Bronze Tint	4-12-4	1.3	54%	8%	10%	45%	0.51	1.20	0.42
Grey Tint	4-12-4	1.3	50%	7%	10%	43%	0.49	1.16	0.42

Low E Double Glazing	Make-up mm <sup>1</sup>	Ug <sup>2</sup>	VLT (%) <sup>3</sup>	VLR-E (%) <sup>3</sup>	VLR-I (%) <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	UV Tdw-ISO <sup>35</sup>
		Heat Loss & Condensation	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor g value	Shading co-efficient	Light to solar gain ratio	Fading Reduction
Laminated	4-12-6.38	1.4	42%	8%	12%	32%	0.37	1.33	0.34

Low E Double Glazing	Make-up mm <sup>1</sup>	Ug <sup>2</sup>	VLT (%) <sup>3</sup>	VLR-E (%) <sup>3</sup>	VLR-I (%) <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	UV Tdw-ISO <sup>35</sup>
		Heat Loss & Condensation	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor g value	Shading co-efficient	Light to solar gain ratio	Fading Reduction
Laminated	4-12-6.38	1.2	74%	12%	13%	40%	0.46	1.85	0.50
Green Tint	4-12-4	1.2	66%	12%	12%	41%	0.47	1.61	0.50
Bronze Tint	4-12-4	1.2	50%	8%	11%	36%	0.42	1.39	0.36
Grey Tint	4-12-4	1.2	47%	8%	11%	35%	0.40	1.34	0.37

# NEW ZEALAND BUILDING CODE (NZBC) CLIMATE ZONES

When selecting the right double glazing for your home, the building code stipulates the minimum standard, by climate zone as pictured below:

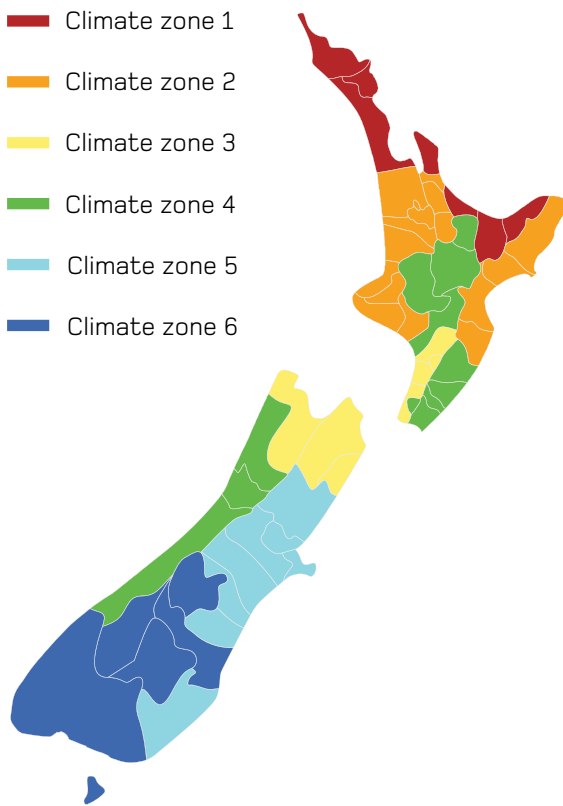
The climate zones also align to territorial authorities to enable clear performance requirements for building consents.

The minimum requirement by system type is shown in the data tables and info graphic on the back page, for the three stages of implementation.

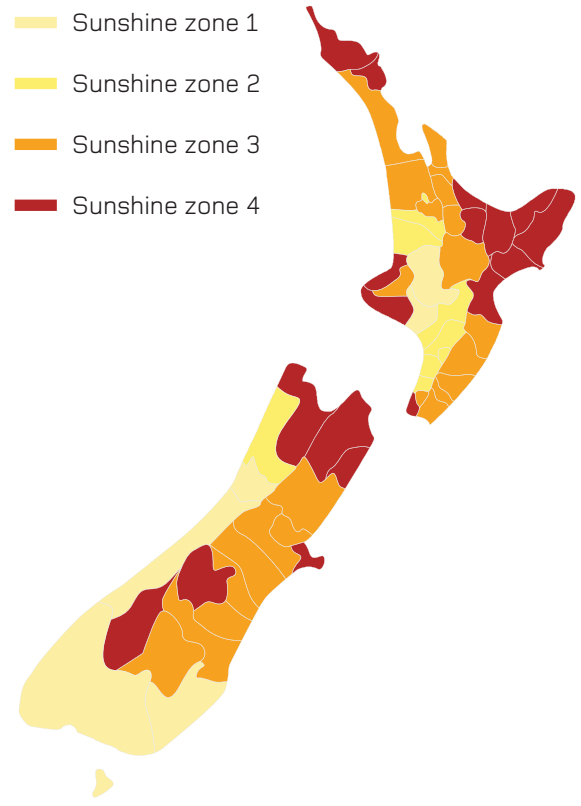
Across New Zealand there are also zones with significant amounts of sunshine in the summer, resulting in the potential for overheating. Choose double glazing with a lower solar factor to reduce the chance of overheating. Illustrated as Sunshine Zone 4 the most likely to have high sunshine hours.

## NZ CLIMATE ZONES (FROM THE NZ BUILDING CODE) & SUNSHINE ZONES

- Climate zone 1
- Climate zone 2
- Climate zone 3
- Climate zone 4
- Climate zone 5
- Climate zone 6



- Sunshine zone 1
- Sunshine zone 2
- Sunshine zone 3
- Sunshine zone 4



*Territorial Authority climate zone lookup - [www.metroglass.co.nz/window-glazing/window-specifying-new-homes-and-housing/](http://www.metroglass.co.nz/window-glazing/window-specifying-new-homes-and-housing/)*

### NOTES:

<sup>1</sup>Low E Coating on Surface 2 for standard units and Surface 3 for tint units.

<sup>2</sup>Ug Value is centre of glass (COG in W/m<sup>2</sup>.K) calculated for glass oriented vertically, with proprietary software using CEN boundary conditions. Cavity infills based on air or argon = (90% argon, 10% air mix).

<sup>3</sup>SC, SF, VLT, VLR-E, VLR-I, Tdw-ISO calculated with proprietary software using CEN boundary conditions.

<sup>4</sup>LSG = VLT / SF (If the LSG is greater than 1.0, then the glass transmits more light than total solar heat).

<sup>5</sup>Tdw-ISO is a damage-weighted transmittance from the International Standards Organization (ISO) based on the contribution to fading at each wavelength from 300nm to 700nm that include the UV and Visible parts of the solar spectrum.

**Tolerances** - stated performance values can vary based on variations during production, use of float glass substrates on the basis of availability etc. Allowable variation is 3 basis points above or below (+/- 3) the specified values for VLT, VLR-E, VLR-I and SF and +/- 0.1 for U-Value.

**Condensation** - Low E double glazed units make the internal glass temperature warmer and reduce the likelihood of condensation on the inner glass surface.

**External Condensation (Dew)** - Low E double glazed units are so efficient they can, subject to external environmental conditions and factors, sometimes cause external condensation as the outer pane surface 1 can get colder due to less heat loss from the inside.

**Quality** - It should be noted that each pane of double glazing units is subject to the same quality standards as single glass. The applicable standard is AS/NZ4667:2000 standard and is applied in conjunction with the viewing criteria documented by the Window and Glass Association ([www.wganz.co.nz](http://www.wganz.co.nz) Guide to Visual Quality of Glass in Residential Buildings) and MBIE Guide ([www.building.govt.nz](http://www.building.govt.nz) Guide to tolerances, materials and workmanship in new residential construction)

# NZBC SELECTION - NEW HOUSING TRANSITION STAGES

The H1/AS1 Schedule method allows the choice of a generic window frame type and what Low E double glazing option will meet the Schedule minimums. This covers the majority of NZ homes

with a maximum 30% window-to-wall ratio\*. Homes with glazing beyond this will use either calculation or modeling for compliance, however the Schedule method still provides indicative guidance\*\*\*.

## Stage One

Consents lodged for Housing  
3<sup>rd</sup> Nov 2022 - 30<sup>th</sup> Apr 2023

Based on 14mm Spacer\*\*

Climate Zones

1, 2, 3, 4, 5 & 6

R<sub>window</sub> R0.37

**Classic**  
Double Glazing

Standard clear double glazing -std spacer  
need to add argon

U<sub>g</sub> Value 2.6

uPVC	Timber

**Low E** Max  
Double Glazing

Entry level soft coat Low E, argon gas thermal spacer

U<sub>g</sub> Value 1.5

	Thermal Aluminum
uPVC	Timber

**Low E** Xcel  
Double Glazing

Extra clear soft coat Low E, argon gas, thermal spacer

U<sub>g</sub> Value 1.1

Standard Aluminum	Thermal Aluminum
uPVC	Timber

**Low E** SunX Grey  
Double Glazing

Grey tone soft coat Low E, argon gas, thermal spacer

U<sub>g</sub> Value 1.3

	Thermal Aluminum
uPVC	Timber

**Low E** Xtreme  
Double Glazing

High performance soft coat Low E, argon gas, thermal spacer + solar control

U<sub>g</sub> Value 1.1

Standard Aluminum	Thermal Aluminum
uPVC	Timber

## Stage Two

Consents lodged for Housing  
1<sup>st</sup> May 2023 - 1<sup>st</sup> Nov 2023

Based on 14mm Spacer\*\*

Climate Zones

1 & 2

R<sub>window</sub> R0.37

Climate Zones

3 & 4

R<sub>window</sub> R0.46

Climate Zones

5 & 6

R<sub>window</sub> R0.50

**Classic**  
Double Glazing

Standard clear double glazing -std spacer  
need to add argon

U<sub>g</sub> Value 2.6

uPVC	Timber

**Low E** Max  
Double Glazing

Entry level soft coat Low E, argon gas thermal spacer

U<sub>g</sub> Value 1.5

	Thermal Aluminum
uPVC	Timber

**Low E** Xcel  
Double Glazing

Extra clear soft coat Low E, argon gas, thermal spacer

U<sub>g</sub> Value 1.1

Standard Aluminum	Thermal Aluminum
uPVC	Timber

**Low E** SunX Grey  
Double Glazing

Grey tone soft coat Low E, argon gas, thermal spacer

U<sub>g</sub> Value 1.3

	Thermal Aluminum
uPVC	Timber

**Low E** Xtreme  
Double Glazing

High performance soft coat Low E, argon gas, thermal spacer + solar control

U<sub>g</sub> Value 1.1

Standard Aluminum	Thermal Aluminum
uPVC	Timber

N/A				
	uPVC	Timber	uPVC	Timber

N/A				
	uPVC	Timber	uPVC	Timber

## Stage Three

Consents lodged for Housing  
and Buildings upto 300m2  
From 2<sup>nd</sup> Nov 2023

Based on 14mm Spacer\*\*

Climate Zones

1, 2, 3 & 4

R<sub>window</sub> R0.46

Climate Zones

5 & 6

R<sub>window</sub> R0.50

**Classic**  
Double Glazing

Standard clear double glazing -std spacer  
need to add argon

U<sub>g</sub> Value 2.6

N/A	

**Low E** Max  
Double Glazing

Entry level soft coat Low E, argon gas thermal spacer

U<sub>g</sub> Value 1.5

	Thermal Aluminum
uPVC	Timber

**Low E** Xcel  
Double Glazing

Extra clear soft coat Low E, argon gas, thermal spacer

U<sub>g</sub> Value 1.1

	Thermal Aluminum
uPVC	Timber

**Low E** SunX Grey  
Double Glazing

Grey tone soft coat Low E, argon gas, thermal spacer

U<sub>g</sub> Value 1.3

	Thermal Aluminum
uPVC	Timber

**Low E** Xtreme  
Double Glazing

High performance soft coat Low E, argon gas, thermal spacer + solar control

U<sub>g</sub> Value 1.1

	Thermal Aluminum
uPVC	Timber

N/A				
	uPVC	Timber	uPVC	Timber

### Notes:

- \* Other criteria for using the Schedule method, along with the 30% window-to-wall ratio, is detailed in section 2.1.2.1 of H1/AS1.
- \*\* U<sub>g</sub> Value is centre-of-glass (in W/m<sup>2</sup>.K) calculated for glass oriented vertically, with proprietary software using CEN boundary conditions.
- \*\*\* Calculation can be used for window-to-wall ratio 0-40%, modeling for greater than 40% whereby it may be possible to use a lower performing glass or frame on the margins.
- \*\*\*\* Compliance in the H1/AS1 Schedule to a colder climate zone requirement automatically ensures compliance to a warmer climate.



# Avvio



100  
Voile



120  
Batik



150  
Lantana



160  
Cerville



180  
Viyella



300  
Linen



350  
Camile



500  
Moire



550  
Camlet



700  
Octavius



720  
Batiste



750  
Barathea

# Avvio

Avvio vinyl plank flooring combines excellent durability with great style and performance. Perfect for every area of your home Avvio is 100% Waterproof, easy to maintain and stain resistant.

## Technical Data

Type:	Vinyl Plank Flooring	Colours:	12
Dimensions:	1320mm x 196mm	Finish:	Matte
Thickness:	2mm	Surface:	Embossed
Wear Layer:	0.3mm	Profile:	Micro Bevel
Units Per Box:	18 boards	Coating System:	Superguard®
m² per box:	4.66	Installation Method:	Direct Stick
m² per pallet:	260.79		

## Performance

E3 Internal Moisture: All wet areas - E3/AS1 – 3.0 Watersplash – (Alternative Solution)^

## Sustainability

Product Transparency:	Global Green Tag, GreenRate Level A certified.
Accreditation:	Manufactured under a quality and environmental system certified and complying with ISO 9001 and ISO 14001 by an accredited certification body.



Waterproof Surface^



Embossed



Matte Finish



Micro Bevel Edge



ISO 9001



ISO 14001



Easy To Clean



Quiet Underfoot



Affordable



Global Green Tag



# Vinyl Plank Flooring

New Zealand

Godfrey Hirst

## E3/AS1 – Alternative Solution Lining Materials - 3.0 Water Splash

Please find below Godfrey Hirst requirements for Vinyl plank flooring when submitted as an alternative solution to meet E3/AS1 Amendment 7 – effective from 5th November 2021.

Please find the following methodology and technical statements to meet wet area requirements for kitchen, bathroom, toilet, laundry and powder room where there are sanitary fixtures and sanitary appliances.

Please ensure that this is submitted alongside adherence to Godfrey Hirst Vinyl technical specifications, installation instructions and care and maintenance guidelines.

### Product Schematic



1. Protective layer: protects your floors from dirt, stains and scratches, and makes them easy to clean and maintain.
2. Decor film: the high-grade printing technique used for this layer gives your Vinyl floor its unique and authentic design appearance.
3. Waterproof and sound-reducing Vinyl floor additional dimensional stability.
4. Stabilising layer: this layer contains super dense fibres to give the Vinyl plank floor additional dimensional stability.
5. Impact-resistant Vinyl plank backing: Water proof layer guarantees a perfectly balanced floor board which prevents cupping or warping.

# Vinyl Plank Flooring

New Zealand

Godfrey Hirst

## Product Range Identification

### All wet area applications:

- Aaria DS/DS Plus
- Regent 1200 / 1500
- Vega DS
- Olympus
- Avvio

## In Service History

Godfrey Hirst are a part of the Mohawk Industries Group which manufactures and distributes a wide range of Vinyl products designed for domestic and commercial spaces. There is a long successful history both globally and here in New Zealand.

## Plank Composition and Finish

Godfrey Hirst vinyl planks are a multi layered PVC based product providing 100% waterproof and non porous product. Further surface protection is provided with applied wear layer and coating technology providing hygienic, durable and impervious surface.

## Fully Bonded Installation system provides waterproof surface

Use of adhesives tested and approved by Godfrey Hirst - Wet area application provide protection of the floor surface and plank edges. Once installed the surface is fully bonded, providing long term protection from prolonged water on the top surface.

## Protection of Perimeter

Hydro kit. (Or similar low modulus) High-quality waterproof, transparent and elastic one-component joint sealant. Designed for watertight sealing of connection joints between skirting boards, walls and trim profiles. Sealant to be used for the protection of floor and floor perimeter from the risk of splash providing sealed edges 1.5 meters from all sanitary fixtures and sanitary appliances.

Bathroom, toilet and Laundry, apply sealant to the entire perimeter of the floor and around sanitary fixtures, fittings.

## Easily Cleaned

Godfrey Hirst floors are easily cleaned using a vacuum or soft broom. Weekly mop the floor using a well rung out damp mop and a non-abrasive soap-free cleaner suitable for Vinyl floors to remove any footprints, dirt and other stains or marks. Refer to our online care and maintenance guides.



# Vinyl Plank Flooring

New Zealand

*Godfrey Hirst*

## Installation Method

### Fully Bonded Glue Down System

Sub floor must comply with NZS AS 1884 and be solid, level, dry, smooth, clean and free from all contaminants and substances which could be harmful to vinyl or adhesive. The installer must inspect and approve the sub floor as satisfying these requirements prior to installation. If required, remove any contaminants. Do not install over existing floor coverings as any such installation may void warranty.

Only use Godfrey Hirst recommended Hard-Set Adhesive (in accordance with the relevant Godfrey Hirst Adhesive Recommendation guides online). Please note requirements for high temperature areas, Areas exposed to direct/strong sunlight, and all wet area installations.

Silicone to be used in wet area applications. Please refer to detailed installation guide and use of Hydro kit sealant as noted.



### Wet Area Installation Requirement

Godfrey Hirst vinyl plank flooring is suitable for all area use. Please note the system application and adhesive requirements pertaining to your area of use. Refer to Godfrey Hirst technical specifications and Care and Maintenance guides on our website for product specific detail.

Kitchens, integrated laundry and powder rooms. Apply sealant to skirting, toe kicks, and perimeter within 1.5 meters of a sanitary fixture or sanitary appliance.

Bathroom, toilet and laundry. Apply sealant to the entire perimeter of the floor and around sanitary fixtures and sanitary appliances.

See Hydrokit technical data sheet for further detailed drawings.

### Godfrey Hirst Supporting Literature Available Online and on Request

- Technical Data Sheets specific to each Vinyl range.
- Installation instructions for fully bonded flooring systems.
- Care and Maintenance guidelines for end consumer.
- Godfrey Hirst adhesive guidelines and recommendations specific to the area of use.
- Testing Certification – VOC – Slip – Fire – Acoustic - Sustainability.

Please also refer to E3 Internal Moisture Building Code for further information and pathways for compliance specific to your building requirements. Please note alternative pathways for compliance can be achieved with building design elements depending on the building type and area of use. ie: Flow restrictors and floor wastes.

## BUILDING SPECIFICATION

For

Lot 146, Trevors Road, Ashburton

BETWEEN

Shameer Sher Ali  
**(the Purchaser)**

and

JNF Construction Ltd  
**(the Builder)**

Job Number: nz7-860864

*MS*



INITIAL ALTERATIONS

**PURCHASER** : Shameer Sher Ali

**SITE ADDRESS:** Lot 146, Trevors Road, Ashburton

**COUNCIL** : Ashburton District Council

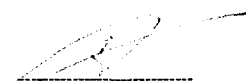
**PLEASE READ CAREFULLY BEFORE COMPLETING THE SPECIFICATION**

**INTERPRETATION AND USE OF SPECIFICATION**

1. This specification forms part of the contract for the proposed work when executed and initialled by both parties.
2. Where multiple choices are available, only one choice is permitted. If choice/s is/are not clarified by the Purchaser at the time of signing the choice/s is/are to be at the Builder's sole discretion.
3. All items are to be selected within the range as determined by the Builder as allowable for this style of building.
4. The Purchaser acknowledges that the Builder [JNF Construction Ltd] is the independent owner and operator of a GJ Gardner Homes franchise and agrees this building contract is exclusively between the Purchaser and the Builder [JNF Construction Ltd].

ITEM	DESCRIPTION	INITIAL ALTERATIONS
1.	<b>GENERAL</b> <ol style="list-style-type: none"><li>a. Unless otherwise specified, the works shall be constructed in accordance with the Building Act 2004 (as amended) in conjunction with the New Zealand Building Code.</li><li>b. Unless otherwise specified, the Purchaser is responsible to provide a house site clear of any obstructions to building including removal of long grass, shrubs and trees where necessary.</li><li>c. It is acknowledged by the Purchaser that it is the Purchaser's responsibility to engage a licensed surveyor to peg the boundary corners of the allotment prior to commencement of site works if the survey pegs are not in place.</li><li>d. The Purchaser acknowledges that it is their responsibility to provide all weather access suitable to allow vehicles and machinery, as normally used in the building industry, to drive in and out of the property.</li><li>e. Unless otherwise specified, the contract price allows that town water supply will be available from an existing main of the Local Authority prior to commencement of construction. Where no such water supply exists, the Purchaser is to arrange at their expense, a temporary fresh water supply for building purposes by means satisfactory to The Builder, and to be available prior to commencement of construction.</li><li>f. This contract allows for 240 Volt single phase power being available prior to and during the construction of the dwelling. Where no such power is available the Purchaser is to arrange temporary power to the satisfaction of The Builder at the Purchaser's expense.</li><li>g. Complying with statutory obligations and any notices and obtaining relevant approvals is the responsibility of The Builder.</li><li>h. The Builder and the Purchaser acknowledge that notwithstanding proper requests by the Builder the Local Authority does not on all occasions carry out final inspections in relation to the works. The Purchaser further acknowledges and irrevocable agrees that they will not make any objection to the lack of provision of a final inspection report subsequent to practical completion and further will not</li></ol>	

2

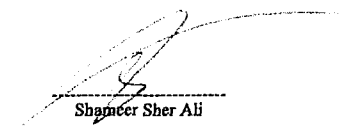
  
Shameer Sher Ali

  
Builder

INITIAL ALTERATIONS

- withhold or cause to be withheld any progress payments due to The Builder, either directly or through their financier that are due to be paid to The Builder on practical completion of the works.
- i. The Purchaser acknowledges and agrees that should their financier refuse to advance all or any funds until the provision of a final inspection report from the Local Authority which may not be available, The Builder will at the Purchaser's cost obtain a final inspection report suitable to the financier from a qualified engineer/registered Builder.
  - j. Unless otherwise specified, all council building fees are paid for by The Builder. Any Bonds called for or development application fees requested by any Local or Other Authority or statutory body are to be arranged and paid for by the Purchaser.
  - k. It is the responsibility of the Purchaser to obtain any necessary building consents from the relevant developer or land corporation where a covenant applies.
  - l. Unless otherwise specified, an Engineer's soil report, footing and slab designs are to be provided by The Builder. The cost of which is taken from the initial deposit.
  - m. Should this Contract not proceed for any reason whatsoever all moneys expended by The Builder on Local Authority fees, obtaining soil reports and footing and slab designs, engineers fees and an administration fee of \$250.00 for the costs of preparation of contracts and plans shall be deducted forthwith from any deposit paid by the Purchaser. If the deposit paid by the Purchaser is insufficient to cover such costs then the Purchaser shall pay such extra costs to The Builder within fourteen days after receiving notification that the same are due and payable.
  - n. Colour selection must be completed before council approval has been received to enable the Purchaser's home to be built within the construction period stated in this contract. The colour selection forms part of this contract and any item at a cost above standard allowance will be charged as an extra.
  - o. Any valuations required by the lending body (other than Council final inspection) are to be the responsibility of the Purchaser to organise
  - p. The Builder takes no responsibility for any colour variation in the roof tile, brick, ceramic wall and floor tile, between those shown in displays or brochures to those delivered by the manufacturer. These products may vary slightly in colour from time to time and any discrepancy is the responsibility of the manufacturer.
  - q. Unless otherwise specified, an Electrical plan is to be completed and returned to this office within seven days from the date the Purchaser signs the contract, failing which the standard electrical plan will apply.
  - r. The Purchaser and The Builder hereby agree that any extension of time claimed for practical completion due to wet or inclement weather shall be based on notification pursuant to the relevant clause of the Contract and shall be claimed as per the logged days by the nearest post office or weather bureau.
  - s. Unless otherwise specified, the Purchaser acknowledges that it is their responsibility to pay a deposit to the electrical authority to connect power. Any delay by the electrical authority in connecting power shall not on its own delay practical completion or final payment to The Builder.
  - t. Where due to soil conditions, Local or Other Authority requirements, pump out tanks, submersible pumps and irrigation systems are needed over and above the normal septic system, the Purchaser agrees to bear the costs thereof and proceed by way of variation pursuant to the relevant clause of the Contract.
  - u. The Builder reserves the right to charge a \$200.00 fee for each variation requested by the Purchaser subsequent to execution of the contract. Variations are deemed to be changes, additions, deletions and alterations to contract, colour selection, allowances or prior variations. Each variation may add one week to the contract time.

3

  
Sharneer Sher Ali

  
Builder



## INITIAL ALTERATIONS

- v. The Builder accepts no responsibility to contact the owners of adjoining properties in relation to fencing. It is the Purchaser's responsibility to contact the adjoining neighbours to arrange rebates. Should the Purchaser not arrange rebates, The Builder will install the fence(s) as per the contract at the Builder's discretion.
- w. The Purchaser acknowledges that they have not relied upon any representations made by The Builder, its agents, employees or workmen in entering into this contract other than those representations as are included in and form part of this contract.
- x. Provisional cost or prime sum items (to the value of items) in this contract will be adjusted with a margin for recovery of profit and administration as indicated in the building contract. Adjustments will be made on receipt of final invoice and credited off the final progress claim. These allowances are non-transferable and will be subject to a 5% retention if deleted.

### 2. EXCAVATION

The Owner acknowledges that after breaking the surface of the ground, if variations are required by the Engineer, or Territorial or other Authorities, or due to the nature of site access or due to extra excavations or footings required if rock or other obstacles are encountered, then the Builder will notify the Owner as provided for in Clause 4 of the contract and the cost of such variation together with a reasonable allowance for overheads and profits shall be adjusted against the contract sum.

- a. Site scrape is to the house area only
- b. 300mm of excavation and compacted fill is included
- c. Disposal of excavated material to clean fill site is included. Disposal of contaminated soil if required is not included and the cost will be covered by variation
- d. The testing of soil for contamination is not included
- e. Any de-watering, if required, is not included
- f. Retaining walls are not included
- g. Please note, no allowance for unearthing any unforeseen complications during the construction phase. Including, but not limited to, neighbours services, ground contamination, additional excavation, tree roots or other large items

### 3. FOUNDATION

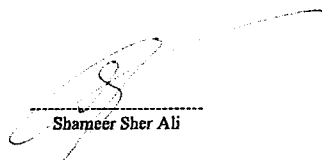
- a. Footings and slab are designed for good ground, or will be specifically designed by an engineer
- b. Extra piers, beams, steel etc. if required by the Engineer or Territorial Authority after Territorial Authority approval is at the Owner's expense
- c. Engineered slab to be TC1 Waffle Slab with Quickedge foundation system
- d. IMPORTANT NOTE: Concrete floors are susceptible to shrinkage and movement. All care is taken to minimise this occurring by installing mesh to the entire floor and applying shrinkage control cuts to top of floor as required. However, shrinkage and movement is beyond GJ Gardner's control therefore we do not guarantee cracking will not occur
- e. Edge of slab to be Quickedge foundation system finish. Please note, Builder is not liable for any consequential damage that may occur to the perimeter finish due to normal activity associated with building a new home

### 4. DRAINLAYER

- a. Sewerage installation to be in accordance with the Territorial Authority approved plan and connected to existing lateral located at boundary Sewerage pump is not included
- b. Stormwater installation to be in accordance with Territorial Authority approved plan and connected to existing lateral located at boundary or to soak pit as per plan
- c. Surplus excavated material to be removed from site
- d. Septic system is not applicable
- e. Drainage vents to be unpainted PVC plastic

### 5. CARPENTER/JOINER

4

  
Shameer Sher Ali

  
Builder

INITIAL ALTERATIONS

- a. External and internal framing timber to be 90mm x 45mm SG8 graded, kiln dried, Radiata PG H1.2 to Placemakers or Carters design or to NZS3604
- b. Roof trusses to be H1.2 GANGNAIL fixed with ceiling ties and multi grips in accordance with producer statement and layout plan
- c. All ceiling batons to be metal Rondo ceiling batons at 600mm centres throughout
- d. Ceiling height is 2.4m unless otherwise specified on plans
- e. Building wrap is Masons UNI Flexible Air Barrier building wrap
- f. Attic stairs are not included

**6. PLUMBER/STEEL FASCIA**

- a. Fascia and gutters to be pre-coated steel
- b. Downpipes to be 80mm round Colorsteel
- c. Gutter to be Colorsteel quad gutter or equivalent
- d. Snow straps are not included

**7. ROOF COVERING**

- a. Roof covering to be Gerard Startos OR Heritage smooth pressed metal roof tiles
- b. THERMAKRAFT 215 bituminous self - supporting roof or equivalent underlay is included
- c. Colour to be from Builder's standard range

**8. ALUMINIUM WINDOWS AND DOORS**

- a. Window frames to be thermally broken powder coated aluminium finish from standard colour range
- b. Reveals to be pre-primed finger-jointed pine
- c. House units to be low E excel as per window schedule
- d. Glass to be clear, except to bathroom(s), WC(s) and ensuite(s) which will be obscure
- e. Door hardware to be Malta colourmatched

**9. EXTERNAL WALL CLADDING BRICK**

- a. Brick cladding to be 70mm series with drained cavity
- b. Bricks to be from The Brickery - Silver Range
- c. Joints to be raked
- d. Mortar colour to be standard grey. Other colours are available for additional cost. Please note, mortar colour is not a perfect match to bricks
- e. Sills to be bricks laid on edge

**10. EXTERNAL CLADDING OTHER**

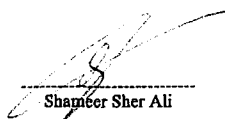
- a. Feature cladding to be James Hardie smooth 133mm Axon unless otherwise noted
- b. Soffits to be 4.5mm x 600mm James Hardie sheets

**11. INTERNAL LININGS AND INSULATION**

- a. All walls are lined with 10mm standard GIB board, with the exception of bathroom walls and ceilings that are lined with 10mm GIB Aqualine. Walls adjacent to garage door will be lined with MDF. Ceilings to be lined with 13mm Gib board
- b. All stopping (plastering) to interior walls and ceilings is finished to Grade 4. Please note, this is the highest grade without going to a full skim coat. Any light fixtures (or windows) that wash the light over the walls or ceilings will show the joins and other imperfections. GJ Gardner Homes can arrange a price to skim coat the affected areas to improve (not eliminate) the effects
- c. Wall/ceiling junctions to be coving to be standard cove pattern 55mm
- d. Internal exterior GIB corners are to be 90 degree square stopped
- e. Insulation to be R 2.4 Pink Batts to exterior perimeter walls (excluding garage) and internal garage house walls
- f. Ceiling insulation to be double layer R3.6 insulation excluding garage ceiling

**12. DOORS (INCLUDING TYPE, FINISH, FURNITURE)**

5

  
Shamber Sher Ali

  
Builder

INITIAL ALTERATIONS

- a. Front entrance door to be Smooth or Textured FV or FV3 Parkwood Duramax Composite Door OR Latitude LAT00 in a standard powder coat colour finish
- b. Exterior laundry door to be aluminium glass as per plans
- c. Garage door(s) to be pre-finished Dominator Valero sectional door(s) as per plan. Electric opener and 2 remote controls are included
- d. Internal doors to be flush panel 3.5mm MDF hollow core paint finish 1980mm high
- e. Internal door handles to be Windsor Futura range and satin chrome door stops
- f. Front door handle to be Aria lever type door hardware

**13. INTERNAL FINISHING TIMBERS**

- a. Architraves to be nominal 40 x 12mm bevelled MDF
- b. Skirting to be 60 x 12mm bevelled MDF
- c. Door jambs to be 110mm x 13mm FJ Pine

**14. ELECTRICIAN**

- a. Single phase connection to be provided by the Builder
- b. 28 LED lights are included
- c. 3 external LED lights are included
- d. 1 two way light switches are included
- e. 20 double power points are included
- f. 1 single power point per auto garage door(s) is included (if applicable)
- g. 1 single power point for fridge is included
- h. 1 single power point for rangehood is included
- i. 1 single power point for dishwasher is included
- j. 1 single power point for waste disposal is not included
- k. 1 single power point and circuit is included for hot water system
- l. 2 data/phone points are included
- m. 2 TV Points are included
- n. Extractor fan(s) are included to bathroom and ensuite
- o. Bathroom heaters are not included
- p. Cavius 10 year smoke alarms are included to council requirements
- q. Fibre optic hub, pathway and digital system is included
- r. TV antenna is included

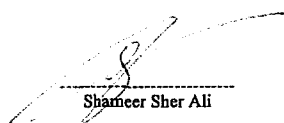
**15. ENSUITE**

- a. Ensuite shower (Bedrooms 2 and 3) to be Englefield Valencia white acrylic 1200x900mm moulded with acrylic base, wall liner and safety glass door
- b. Ensuite vanity to be 750mm Clearlite Statesman single draw wall hung
- c. Ensuite tapware to be Methven Glide and shower slide to be Methven Echo Strata
- d. Ensuite toilet to be Caroma Stylus Basis BTW toilet suite with Caroma Cosmo toilet roll holder
- e. Ensuite towel rail to be Caroma cosmo 600mm rail
- f. Mirrors in the ensuite are 900mm high by (maximum) length of the vanity
- g. Ensuite wall tiles above vanity are included

**16. BATHROOM**

- a. Bathroom shower to be Englefield Valencia white acrylic 1000x1000mm moulded with acrylic base, wall liner and safety glass door
- b. Bathroom vanity to be 750mm Clearlite Statesman single draw wall hung
- c. Bathroom tapware to be Methven Glide and shower slide to be Methven Echo Strata
- d. Bathroom toilet to be Caroma Stylus Basis BTW toilet suite with Caroma Cosmo toilet roll holder
- e. Bath is not included
- f. Bathroom towel rail to be Caroma cosmo 600mm rail
- g. Mirrors in the bathroom are 900mm high by (maximum) length of the vanity

6

  
Shameer Sher Ali

  
Builder

INITIAL ALTERATIONS

- h. Bathroom wall tiles above vanity are included

**17. KITCHEN**

- a. Kitchen to be as per kitchen plan and specifications. PC Sum of \$14,000.00 including GST is included
- b. Benchtop to be as per final design. Please note if stone or composite tops are chosen then the contract build time will be extended by 15 days by way of variation
- c. Kitchen wall tiles up to splashback by (maximum) width of rangehood, from Builder's selection is included
- d. Kitchen sink to be as per kitchen plan and specs
- e. Kitchen tapware to be Methven Echo Minimalist goose neck mixer EM8105

**18. LAUNDRY & SHELVING**

- a. Shelving is included as per plans
- b. Laundry joinery is not included
- c. Laundry tub to be Aquatica Laundratubbie
- d. Laundry wall tiles are not included
- e. Hot water cylinder to be Cocks 300LTR solar ready HWC (560x 2070)300SDB

**19. PAINTER**

Owner to do no painting

- a. Refer to colour selection for colour scheme
- b. External painting by Builder.
  - 1. External James Hardie sheets to have two coats of acrylic paint
  - 2. Other external surfaces to be painted in accordance with manufacturer's specifications.
- c. External brick walls to be unpainted
- d. Internal painting by Builder to be premium Dulux paint in 3 white base wall colours and 1 white base ceiling colour
- e. Ceilings to be one coat sealer and two coats of acrylic paint to manufacturer's specification
- f. Walls and skirting to be one coat sealer and two coats acrylic paint to manufacturer's specification
- g. Inside cupboards to be wall colour
- h. Any additional colours, feature walls, or colours from a dark or pastel base will be charged as extra to the contract sum by way of variation
- i. Doors, door jambs, architraves and reveals to be painted one colour in low sheen enamel
- j. Wallpaper is not included

**20. APPLIANCES**

- a. Oven to be Samsung 60cm NV7B41201AS
- b. Cooktop to be Samsung 60cm ceramic cooktop CTR164NC01/XSA
- c. Rangehood to be Robinhood 90cm Canopy RWY3CL9SS
- d. Dishwasher to be Samsung DW60M6055FS
- e. Waste disposal is not included
- f. Microwave not included
- g. Fridge and freezer is not included

**21. GAS SERVICE**

- a. Gas is not applicable

**22. FLOORING**

- a. Carpets are included from Builder's Silver range with 11mm underlay
- b. Bathroom flooring to be vinyl planking from Builder's selection
- c. Ensuite flooring to be vinyl planking from Builder's selection
- d. Kitchen flooring to be vinyl planking from Builder's selection
- e. Entrance flooring to be vinyl planking from Builder's selection

7

  
Shameer Sher Ali

  
Builder

INITIAL ALTERATIONS



- f. Laundry flooring is not included
- g. Garage flooring is not included

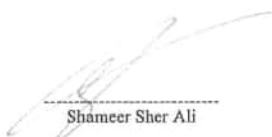
23. HEATING


- a. Heat pump to be MITSUBISHI HI WALL AP50VGKD M Series 6.0kW (With in built Wifi)
- b. Fireplace is not included

24. EXTERNAL WORKS

- a. 60m<sup>2</sup> of sponge finish concrete (with mesh) is included
- b. Driveway crossing between boundary and road is included. The Builder is not liable for any damage that may occur to the crossing or footpath due to normal use associated with building a new home
- c. Fencing is not included
- d. Turf is not included
- e. Landscaping is not included
- f. Clothesline is not included
- g. Letterbox to be brick
- h. 2 hose taps are included and positioned as per plans

Dated this <u>21</u> day of <u>Nov</u> 202 <u>4</u>	
Signed by the purchaser..... 	SIGNED by the Builder..... 

  
Shameer Sher Ali

8  
  
Builder