SPECIFICATIONS

MiTek

MiTek New Zealand Limited

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

ISSUED BY: **MiTek New Zealand Limited**

TO: **Northland Frame Truss Ltd**

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

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

The MiTek 20/20® truss design program has been developed by MiTek New Zealand Limited for the design of MiTek® timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20 ® are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1/VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution, to satisfy the requirements of Clauses B1 and B2 of the New Zealand Building Code.

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

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

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

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

On behalf of MiTek New Zealand Limited, **Date: Saturday, 4 February 2017**

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

Job: RD-DAJI

Client:
Phone:

Site: Daji
Lot 2, Omapere
Northland

Description: RD-DAJI
Building Consent No.:

Phone:

MITEK FABRICATOR DESIGN STATEMENT

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

MiTek 20/20® TRUSS DESIGN DATA

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

Job Details

Roof Truss

Timber Group:	NFT2H1	Importance Level :	2	Design Working Life :	50 years
Roof		Pitch:	25.000 deg	Nominal Overhang:	600 mm
Material:	Galv Iron .5mm	**Ceiling**		**Wind**	
Dead Load:	0.210 kPa	Material:	Rondo screwed to BC	Area:	High (44.0 m/s)
Restraints:	900 mm centres	Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Live Load:	Qur = 0.250 kPa Qc = 1.100 kN	Restraints:	600 mm centres		
		Live Load:	Qc = 1.400 kN		

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

MiTek® Truss List

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

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	
ET1	1	8000	25.000	900	GB
ET2	2	8400	25.000	900	GB
T1	20	8000	25.000	900	
~~T2~~	~~4~~	~~8400~~	~~25.000~~	~~900~~	
T2A	4	8400	25.000	900	
V1	1	1260	25.000	900	

Total quantity : 32

The computer design input has been carried out by:

Signed: .....

Name of Detailer: Murray Webb

On behalf of: Northland Frame Truss Ltd

Date: ...Saturday, 4 February 2017....

Qualifications and Title: Mitek Detailer

SUB FLOOR: Bracing Calculation Sheet [redacted]

Box 1

Job Details (tick appropriate boxes)

Name	DAJI - HOUSE RELOCATION
Street Address	265 SH 12 OMAPERE
Lot No	DPS No
City/Town	

Location of Storey:	
Single/upper storey	
Upper storey of two	—
Lower storey of two	—

Floor type:	
Sub-floor	✓
Slab	—

Floor load:	
2kPa	—
3kPa	—

Key dimensions			
Building height to apex		4.5	Metres
Roof height above eaves		1.2	Metres
Stud height		2.4	Metres
Average roof pitch		12.5	Degrees
Building Length	BL	8.8	Metres
Building Width	BW	8.50	Metres
Gross Plan Area	GPA	79.11	Sq Metres

Note: When the average roof pitch is over 25 degrees, use the eaves length and width to determine BL and BW

Cladding weight	Light	Medium	Heavy
Sub-floor	✓		
Lower storey	—		
Upper or Single Storey	✓		

Roof weight	Light	Heavy
	✓	

Room in roof space	Yes	No
		✓

Box 2

Wind Zone

Action	Reference	Values available	Outcome
Wind Region	Figure 5.1	A, W	A.
Lee Zone	Figure 5.1	Yes, No	No.
Ground Roughness	Page 6	Urban, Open	Urb.
Site Exposure	Page 7	Sheltered, Exposed	Shelt.
Topographic Class	Tables 5.2 and 5.3 + Fig 5.2	Gentle to Steep	Gentle
Wind Zone	Table 5.4	L, M, H, VH, EH, SED	H

Box 3

Earthquake Zone

Action	Reference	Values available	Outcome
Earthquake Zone	Figure 5.4	1, 2, 3, 4	1
Site subsoil classification	Page 9	A, B, C, D, E	C

Box 4

BUs required Wind

W Across		75	BUs per m
W Along		80	BUs per m

(From NZS 3604:2011 tables 5.5, 5.6 and 5.7)

Total Wind Load

W Across	Enter BL from box 1	Multiply by	BUs per m Across	Equals Across W required
	8.8	x	75	660

W Along	Enter BW from box 1	Multiply by	BUs per m Along	Equals Along W required
	8.50	x	80	719.2

Box 5

BUs required Earthquake

E =	6	BUs per m²	(From NZS 3604:2011 tables 5.8, 5.9 and 5.10)

Note: For a room in the roof space use E + 8 BU/m²

FAR NORTH DISTRICT COUNCIL

Approved Documents

Total Earthquake Load

EQ Requirement Along and Across	Enter GPA from box 1	Multiply by	E	Equals E required
	79.11	x	6	474.66

Transfer to calculation sheet B

For manual calculations only

PROVIDED: 9 x ANCHOR P. = 9 x 160.
= 1440. BU's BOTH WAYS
OK ✓

This PS1 is only applicable for standard fixings and design parameters as detailed in the relevant manual

Building Code Clause(s).....B1, B2,F2, F4.....

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on page 2)

ISSUED BY:.....Nancekivell Cairn Ltd.....
(Design Firm)

TO: Gavin Daji
(Site Owner / Developer)

TO BE SUPPLIED TO: FNDC
(Building Consent Authority)

IN RESPECT OF: Juralco Homestead Balustrade System
(Description of Building Work)

AT: 265 SH 12 Omapere
(Address)

We have been engaged by the owner/developer referred to above to provide Structural Engineering review of Testing & design of connections of aluminium framed balustrades services in respect of the requirements of
(Extent of Engagement)
Clause(s) B1 (Structure), B2 (Durability, F2 (Hazardous Building Materials) & F4(Safety from Falling)..of the Building Code for
All ☐ or Part only ☒ (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

☐ Compliance Documents issued by the Ministry of Business, Innovation & Employment.....or
(verification method / acceptable solution)
☒ Alternative solution as per the attached schedule AS/NZS 1170, NZS 3603, AS / NZS 1664, AS / NZS 2208

The proposed building work covered by this producer statement is described on the drawings titled .

... Juralco Homestead Balustrade System Manual and numbered ... Issue 4/15.....;
together with the specification, and other documents set out in the schedule attached to this statement.
On behalf of the Design Firm, and subject to:
(i) Site verification of the following design assumptions Structure beyond immediate fixing of Balustrade to be designed by others
(ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:
☐CM1 ☐CM2 ☐CM3 ☐CM4 ☐CM5 (Engineering Categories) or ☐ as per agreement with owner/developer (Architectural)

I, ...Bruce Nancekivell..... am:
(Name of Design Professional)

☒CPEng ...30994.....#

☐Reg Arch .....#

I am a Member of : ☒ IPENZ ☐NZIA and hold the following qualifications.....BE.....AC# 1044.....
The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Design Firm is a member of ACENZ: ☒

SIGNED BY .....Bruce Nancekivell..... ON BEHALF OF .....Nancekivell Cairn Ltd.....
(Design Firm)

Date...27-01-2016..... (signature).....

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000.*

Juralco Homestead Balustrade System - Powder Coating Care and Maintenance

Powder Coating Installation Care

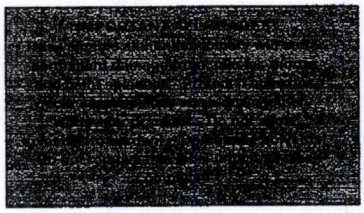
Warning re use of solvents:
- In some cases strong solvents are recommended for thinning various types of paints and also for cleaning up mastics and sealants.
- These can be harmful to the extended life of the powder coated surface, and must not be used for cleaning purposes.
- It is important to note that the damage will not be visible immediately and may take up to 12 months to develop.

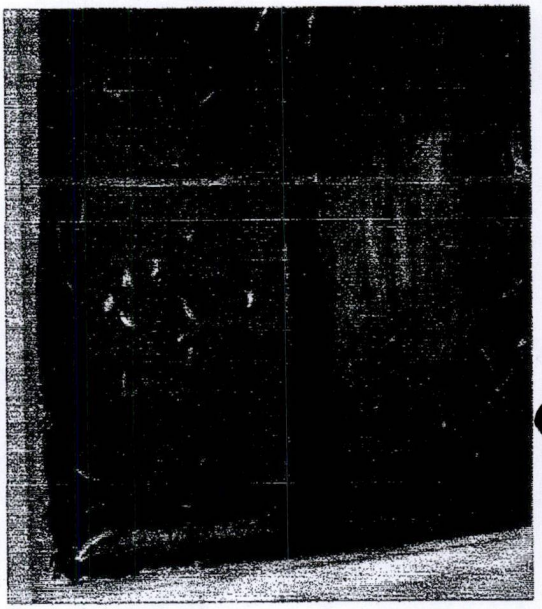
If paint splashes or sealants and mastics need to be removed then the following may be safely used:
Methylated Spirits, Ethyl Alcohol, Isopropanol or preferably a mild detergent in warm water.

Joinery Protection during Installation:
All the activity on a construction site means that your powder coated items may get knocked or scratched, splattered with mortar, plaster, textured coating or paint during the later stages of construction.

Please ensure that all powder coated articles are masked or covered at this time. It is far easier to prevent accidents than to try and correct them. Should your joinery receive mortar or paint splashes see that these are removed before cure and follow the instructions contained in this brochure.

Typical sticker used to warn other trades of the need to protect and mask off powder coated joinery (applies to anodised joinery also)





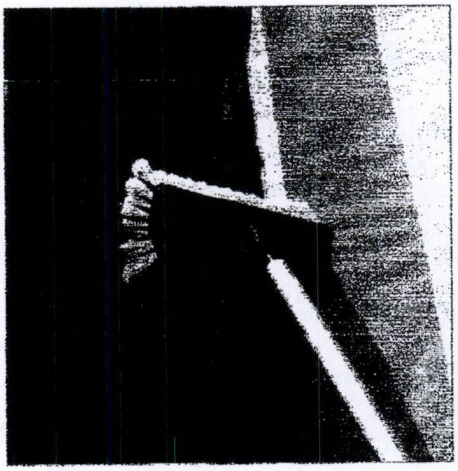
This photograph display damage that has occurred on site, post installation. The photo of the masked joinery displays clear signs of damage that could have occurred were it not masked. Please ensure that your joinery is protected right through the entire construction process.

Powder Coating Maintenance

External - Maintenance Program:
To extend the life of external powder coated articles and to comply with warranty requirements for powder coated aluminium joinery, a simple, regular maintenance program must be implemented.
The effects of ultra violet light, atmospheric pollution, dirt, grime and airborne salt deposits will all accumulate over time and must be removed or surface staining and weathering will occur, leading to an unsightly appearance.

For external coatings, cleaning should take place every six months. In areas where pollutants are more prevalent, such as beachfront houses and industrial or geothermal areas, then a cleaning program should be carried out on a more frequent basis ie. every one to three months.

Fences or Balustrades in close proximity to swimming pools must be washed down every six months, to clean off chlorine and salt deposits.



Cleaning your powder coating:
1. Carefully remove any loose surface deposits with a wet sponge.
2. Use a soft brush (non abrasive) and a mild household detergent (do not use solvents) in warm water, remove dust, salt and other deposits.
3. Rinse off with clean fresh water.

Restoring weathered or scratched surfaces:
Repair of Scuffed or Scratched surfaces
Dulux Spray Cans are available in all colour card colours.

Repair of Small Scratches or Chips.
Dulux Dabsticks are ideally suited for the repair of small scratches.
Dabsticks may not be available in all colour card colours.

Repair of Weathered areas .
Dulux Gloss Up is a light to medium cutting cream ideally suited for gloss restoration and has been specifically designed for this purpose.
Gloss Up contains no waxes or silicone and is a one step system.

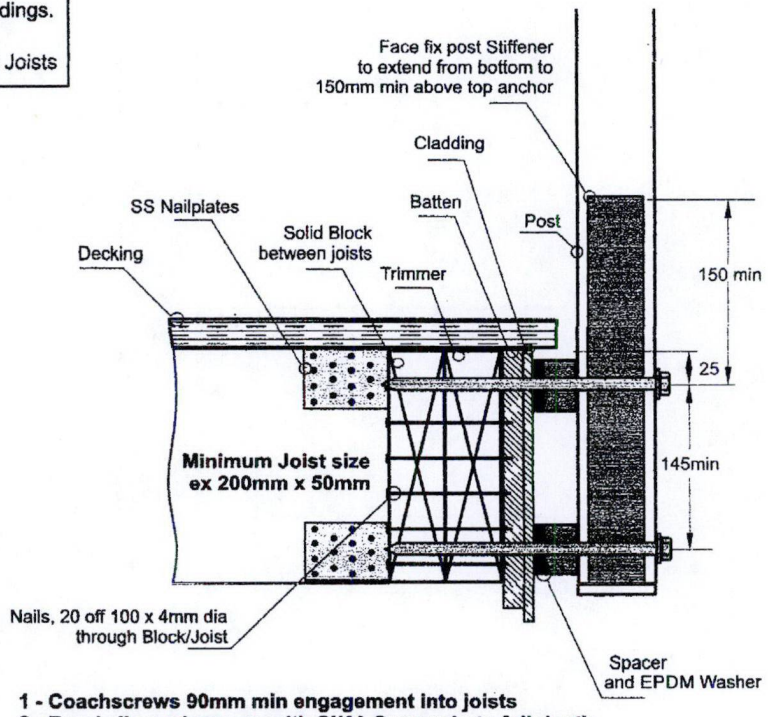
Contact Dulux Powder Coatings , ph 0064 9 441 8244

Juralco Homestead Balustrade Systems - Typical Post Fixing
Pre NZS3604:2011 - Single Boundary Joist

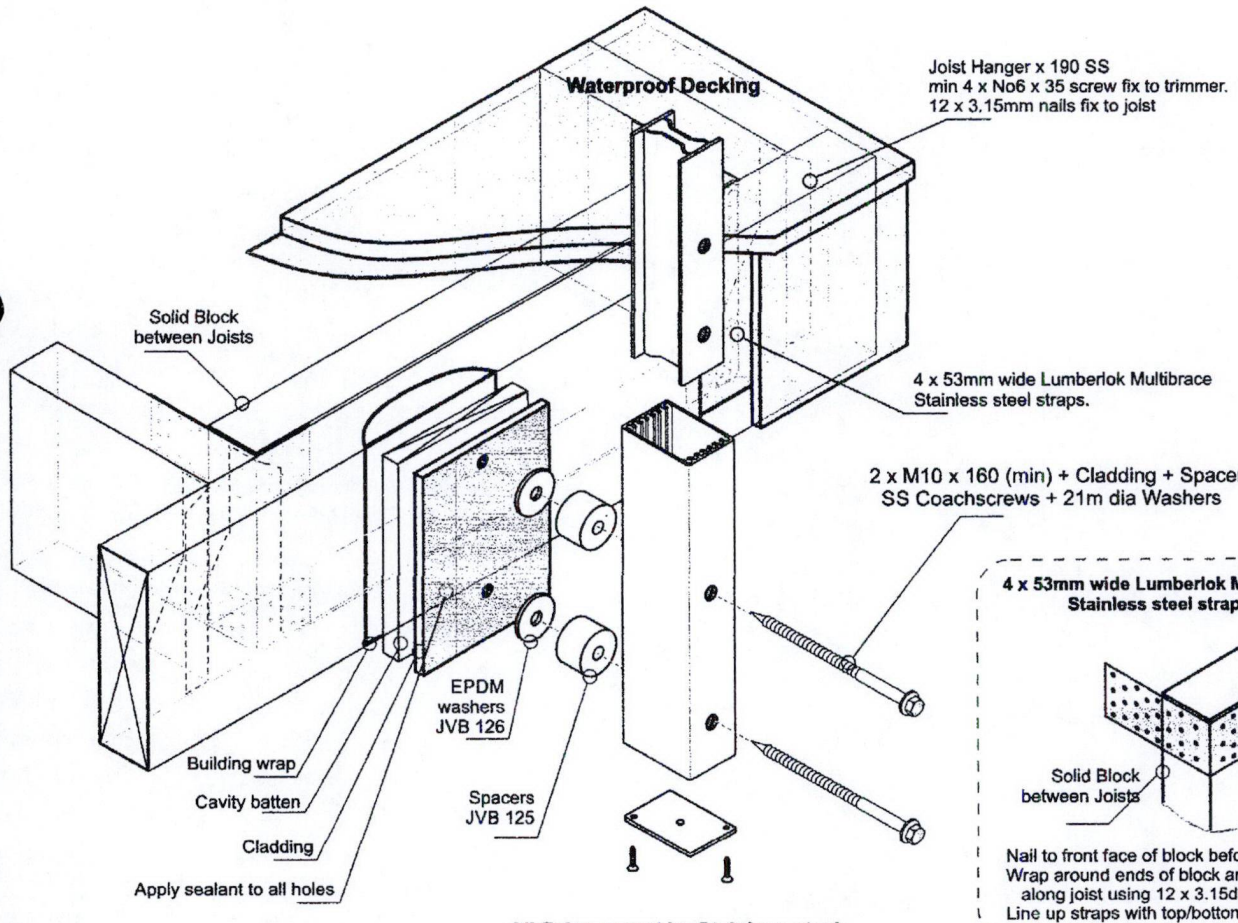
Typical FACE Fix Post to Waterproof Timber Deck - M10 Coachscrews and Spacers

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings. New buildings must comply with NZS3604:2011 - Double Boundary Joists



1 - Coachscrews 90mm min engagement into joists
2 - Bond all coachscrews with SIKA Supergrip to full depth



4 x 53mm wide Lumberlok Multibrace Stainless steel straps.

Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

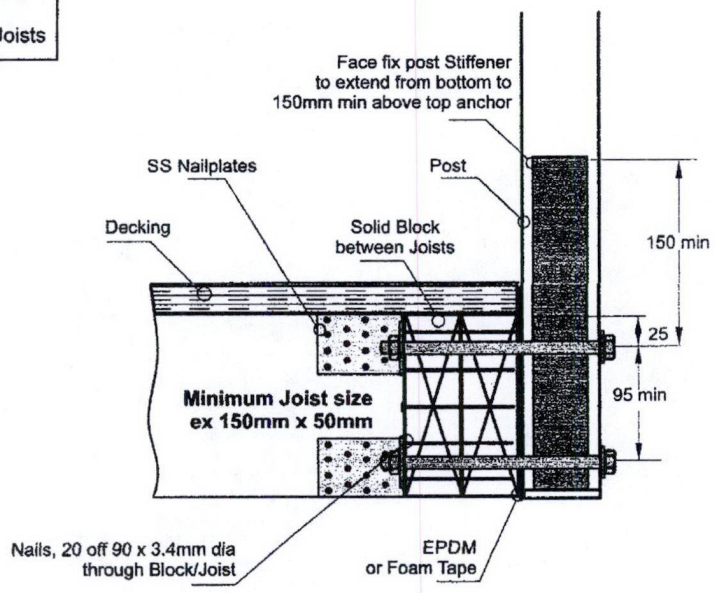
All fixings must be Stainless steel

Juralco Homestead Balustrade Systems - Typical Post Fixing
Pre NZS3604:2011 - Single Boundary Joist

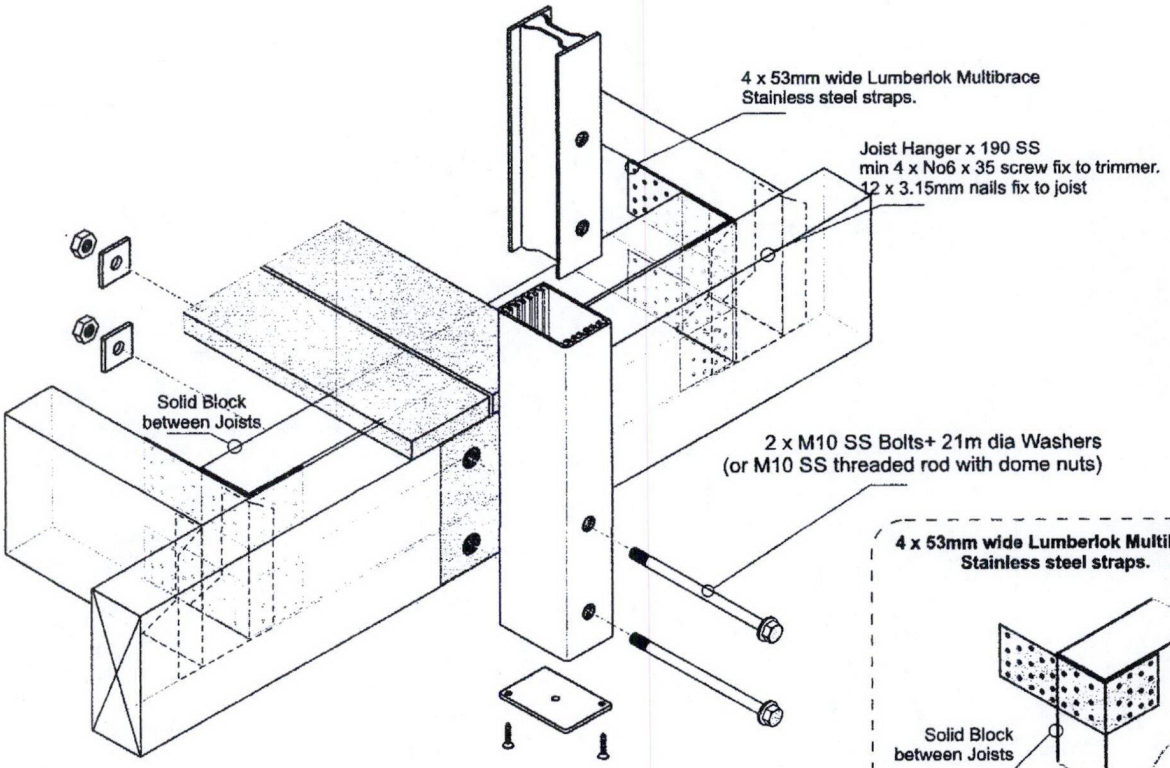
Typical FACE Fix Post to Timber - M10 Bolts or Threaded Rod

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings. New buildings must comply with NZS3604:2011 - Double Boundary Joists



1 - A Rubber or EPDM layer must be installed between the Post and Timber



4 x 53mm wide Lumberlok Multibrace Stainless steel straps.

Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

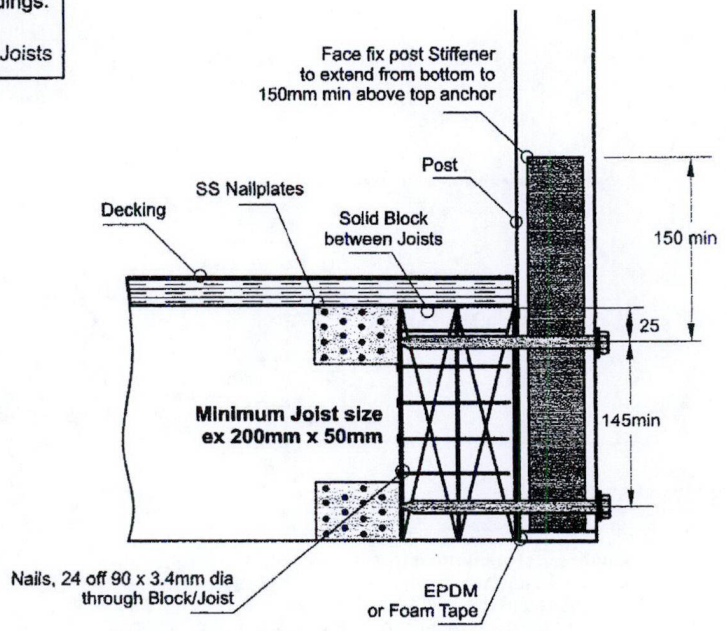
All fixings must be Stainless steel

Juralco Homestead Balustrade Systems - Typical Post Fixing
Pre NZS3604:2011 - Single Boundary Joist

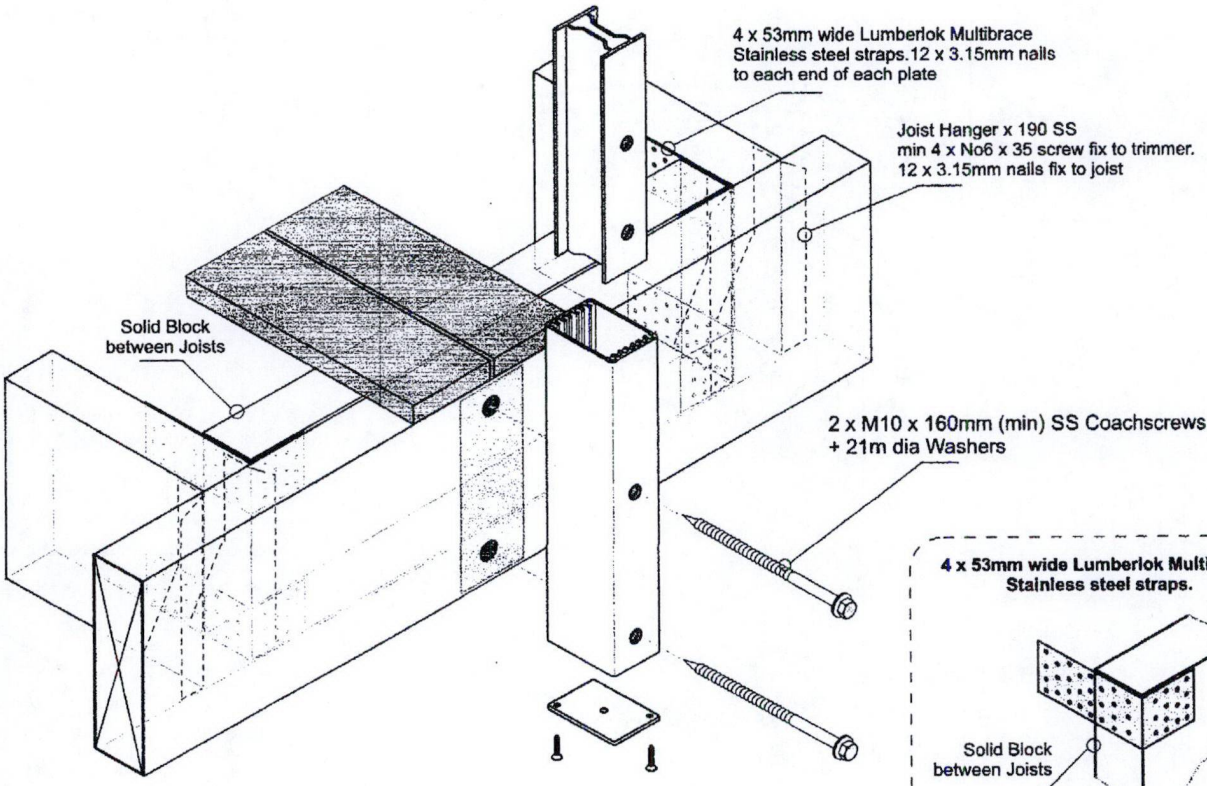
Typical FACE Fix Post to Timber - M10 Coachscrews

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings. New buildings must comply with NZS3604:2011 - Double Boundary Joists



1 - Coachscrews 90mm min engagement into joist
2 - Bond all coachscrews with SIKA Supergrip to full depth
3 - A Rubber, EPDM or Foam Tape layer must be installed between the Post and Timber



4 x 53mm wide Lumberlok Multibrace Stainless steel straps.

Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

All fixings must be Stainless steel

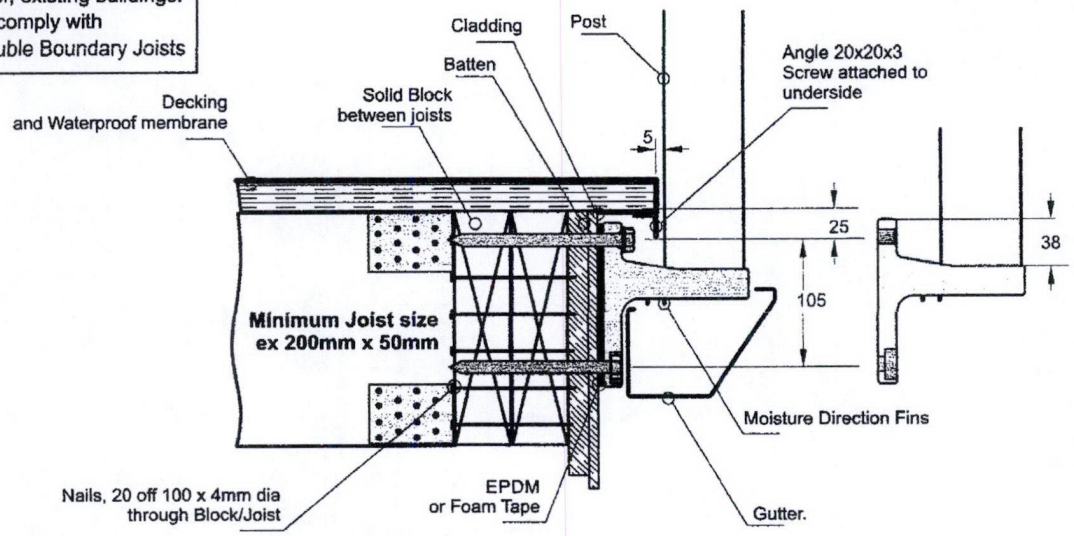
Juralco Homestead Balustrade Systems - Typical Post Fixing

Pre NZS3604:2011 - Single Boundary Joist

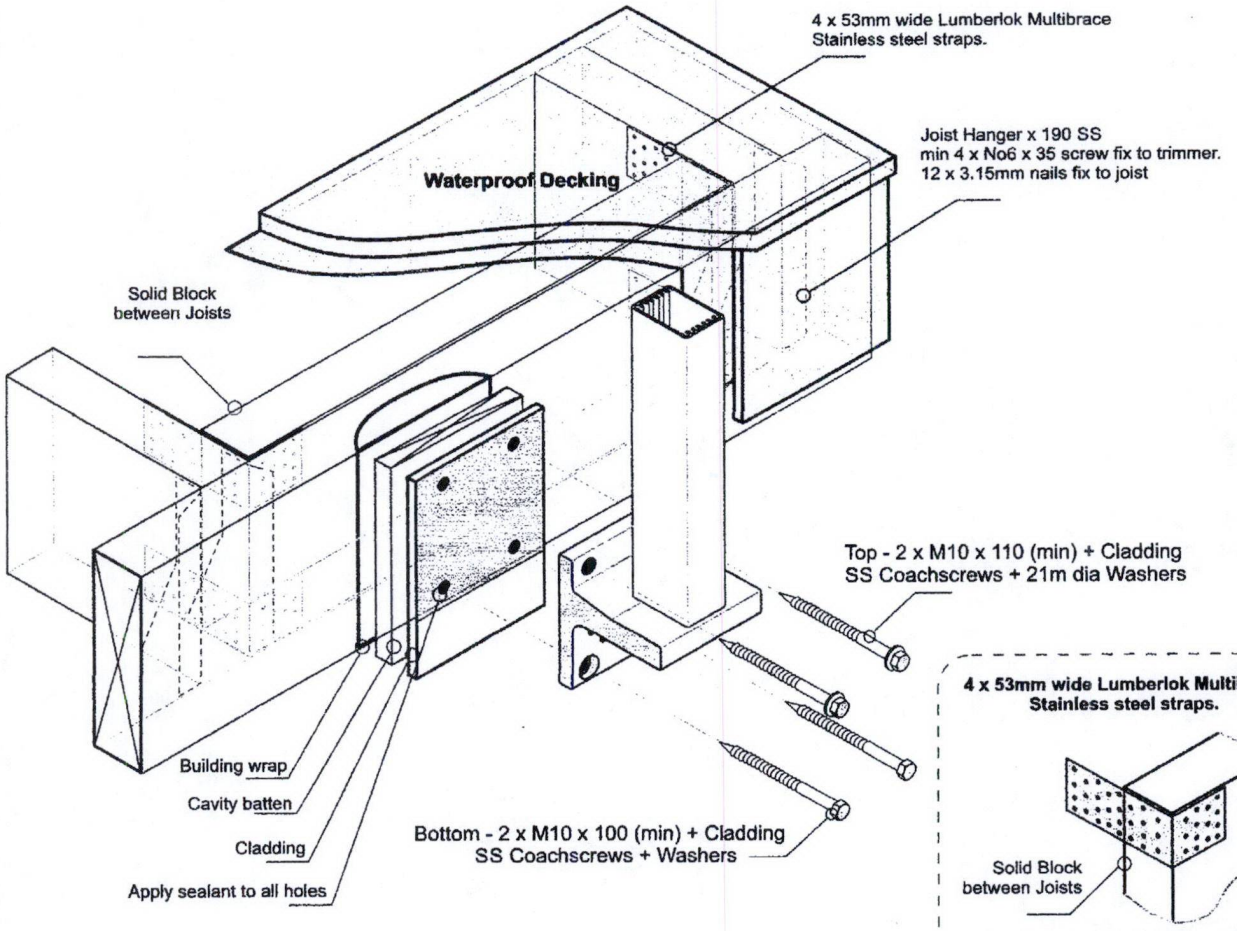
Typical FACE Fix to Waterproof Timber Deck - JEC 137/65, Gutter Bracket - M10 Coachscrews

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings. New buildings must comply with NZS3604:2011 - Double Boundary Joists



1 - Coachscrews 90mm min engagement into joist
2 - Bond all coachscrews with SIKA Supergrip to full depth
3 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter bracket and Timber



4 x 53mm wide Lumberlok Multibrace Stainless steel straps.

Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

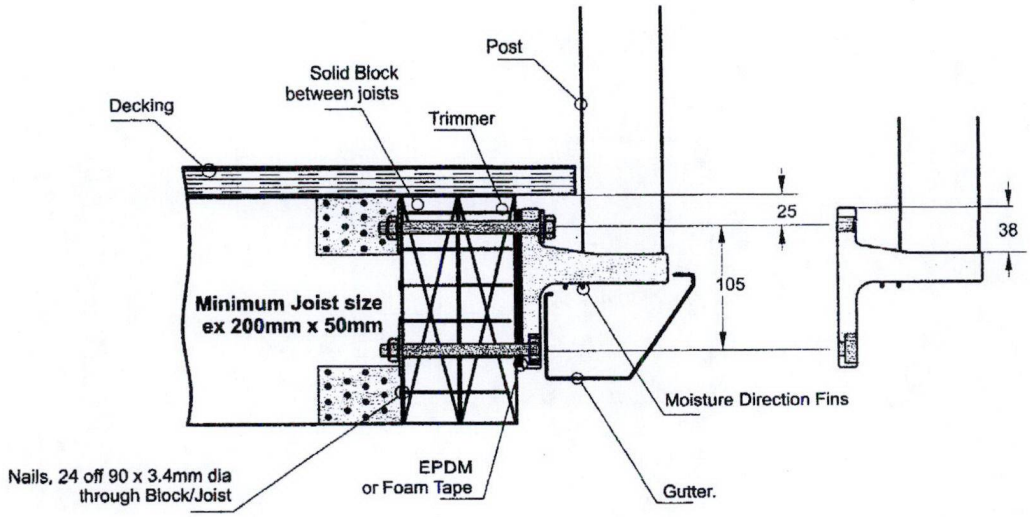
All fixings must be Stainless steel

Juralco Homestead Balustrade Systems - Typical Post Fixing
Pre NZS3604:2011 - Single Boundary Joist

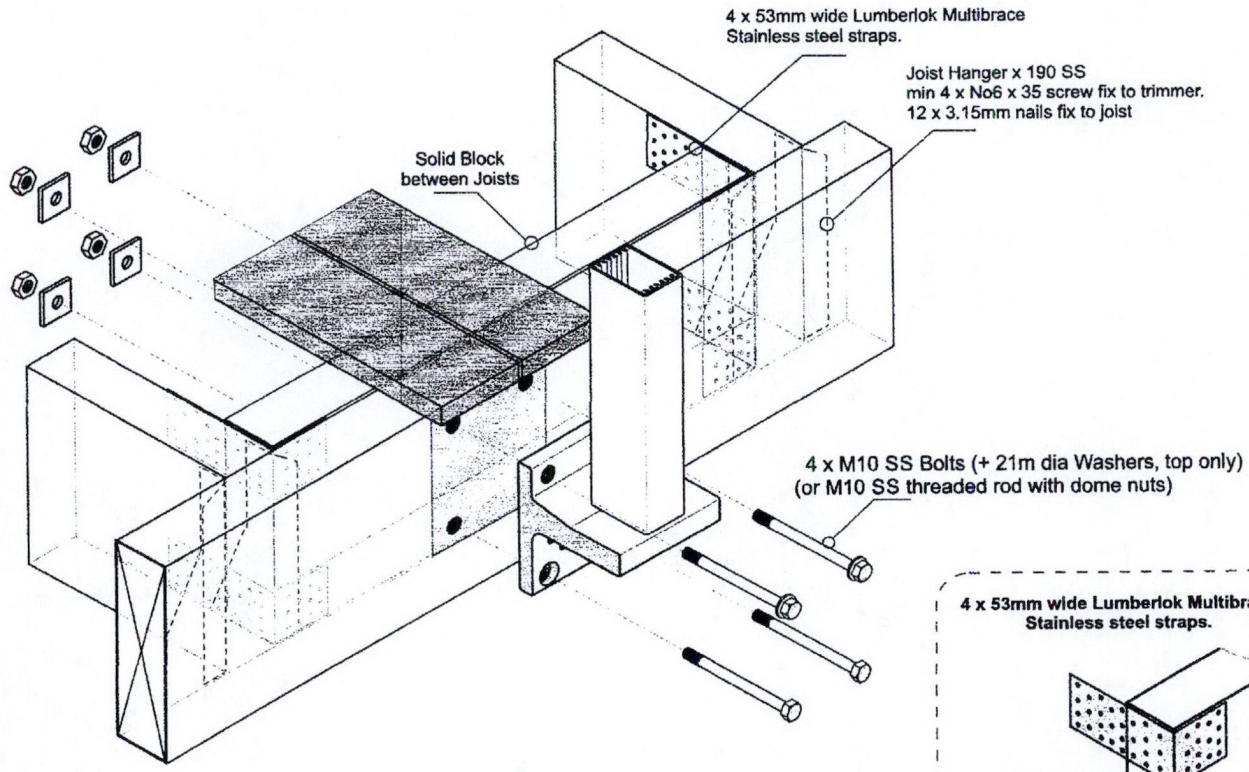
Typical FACE Fix to Timber - JEC 137/65, Gutter Bracket - M10 Bolts, or Threaded Rod

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings.
New buildings must comply with NZS3604:2011 - Double Boundary Joists



1 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter bracket and Timber



All fixings must be Stainless steel

4 x 53mm wide Lumberlok Multibrace Stainless steel straps.

Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

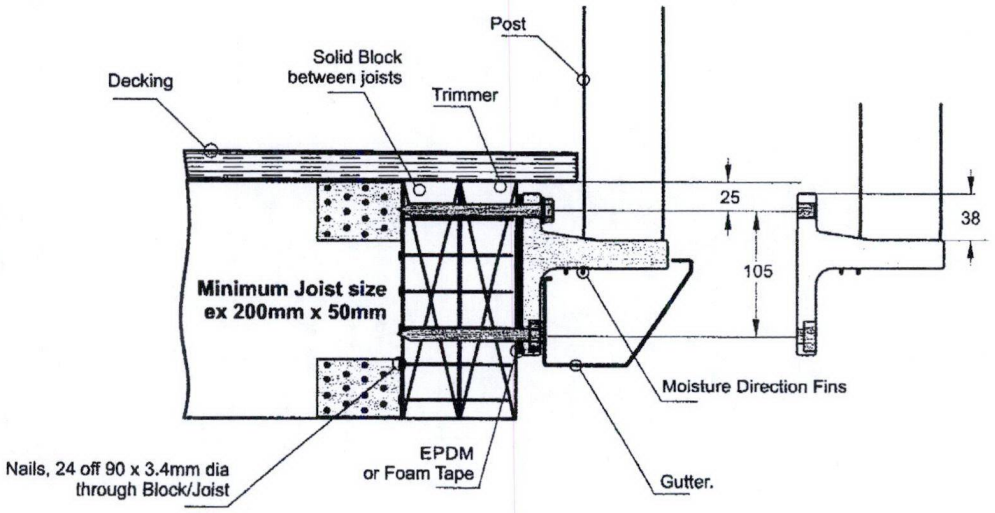
Juralco Homestead Balustrade Systems - Typical Post Fixing

Pre NZS3604:2011 - Single Boundary Joist

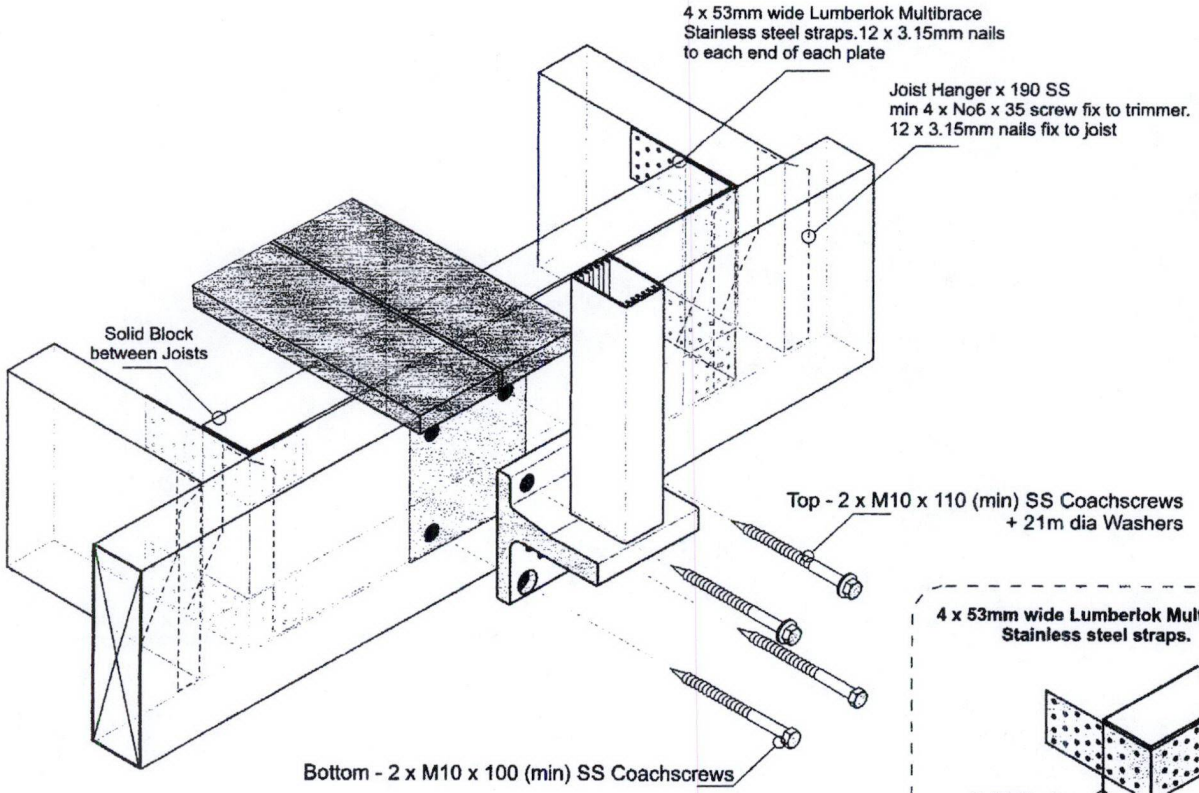
Typical FACE Fix to Timber - JEC 137/65, Gutter Bracket - M10 Coachscrews

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings.
New buildings must comply with NZS3604:2011 - Double Boundary Joists

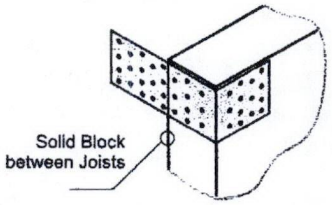


1 - Coachscrews 90mm min engagement into joist
2 - Bond all coachscrews with SIKA Supergrip to full depth
3 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter bracket and Timber



All fixings must be Stainless steel

4 x 53mm wide Lumberlok Multibrace Stainless steel straps.



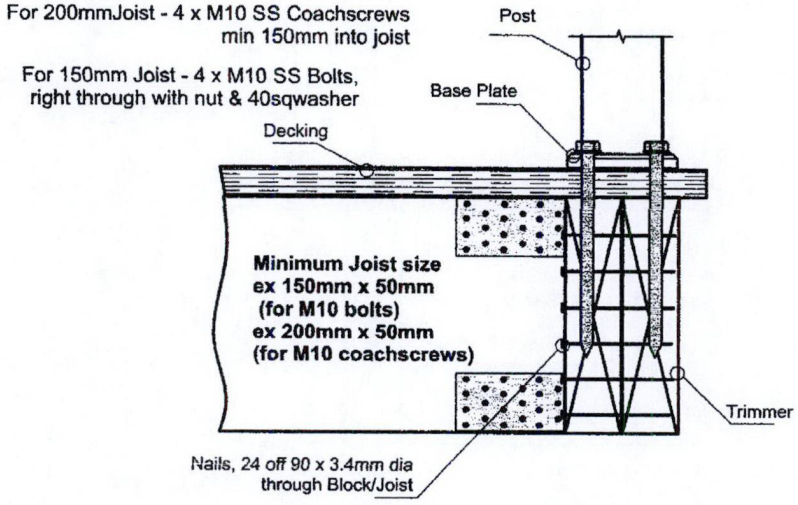
Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

Juralco Homestead Balustrade Systems - Typical Post Fixing
Pre NZS3604:2011 - Single Boundary Joist

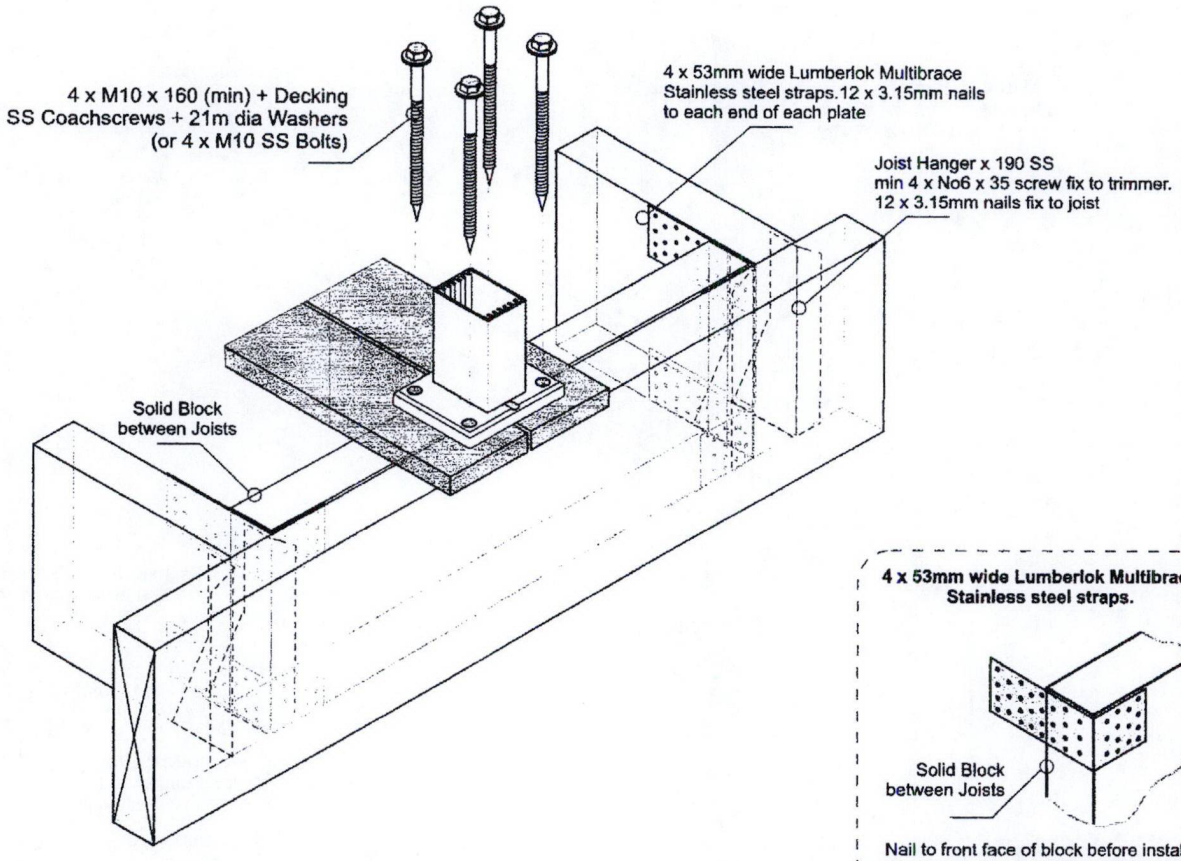
Typical TOP Fix to Timber - JEC 221, 110mm x 90mm, 4 hole Base Plate - M10 Coachscrews or Bolts

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings. New buildings must comply with NZS3604:2011 - Double Boundary Joists



1 - Coachscrews 150mm min engagement into joist/block
2 - Bond all coachscrews with SIKA Supergrip to full depth.



All fixings must be Stainless steel

4 x 53mm wide Lumberlok Multibrace Stainless steel straps.

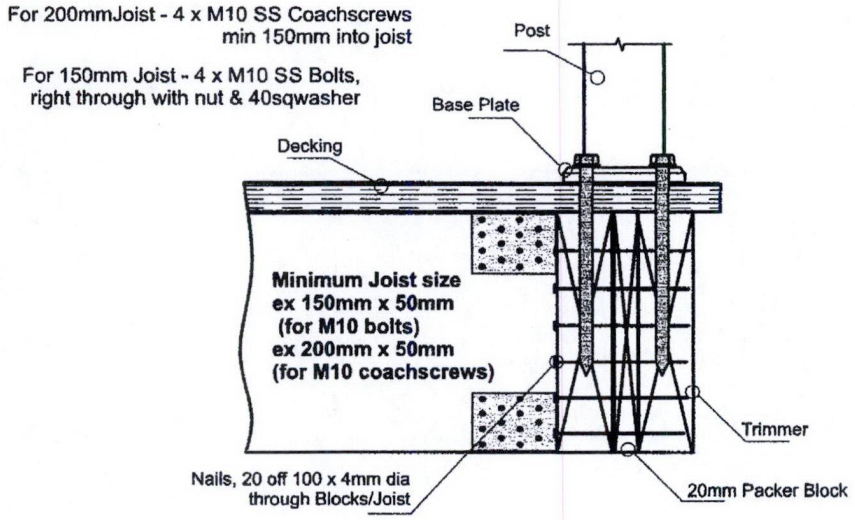
Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

Juralco Homestead Balustrade Systems - Typical Post Fixing
Pre NZS3604:2011 - Single Boundary Joist

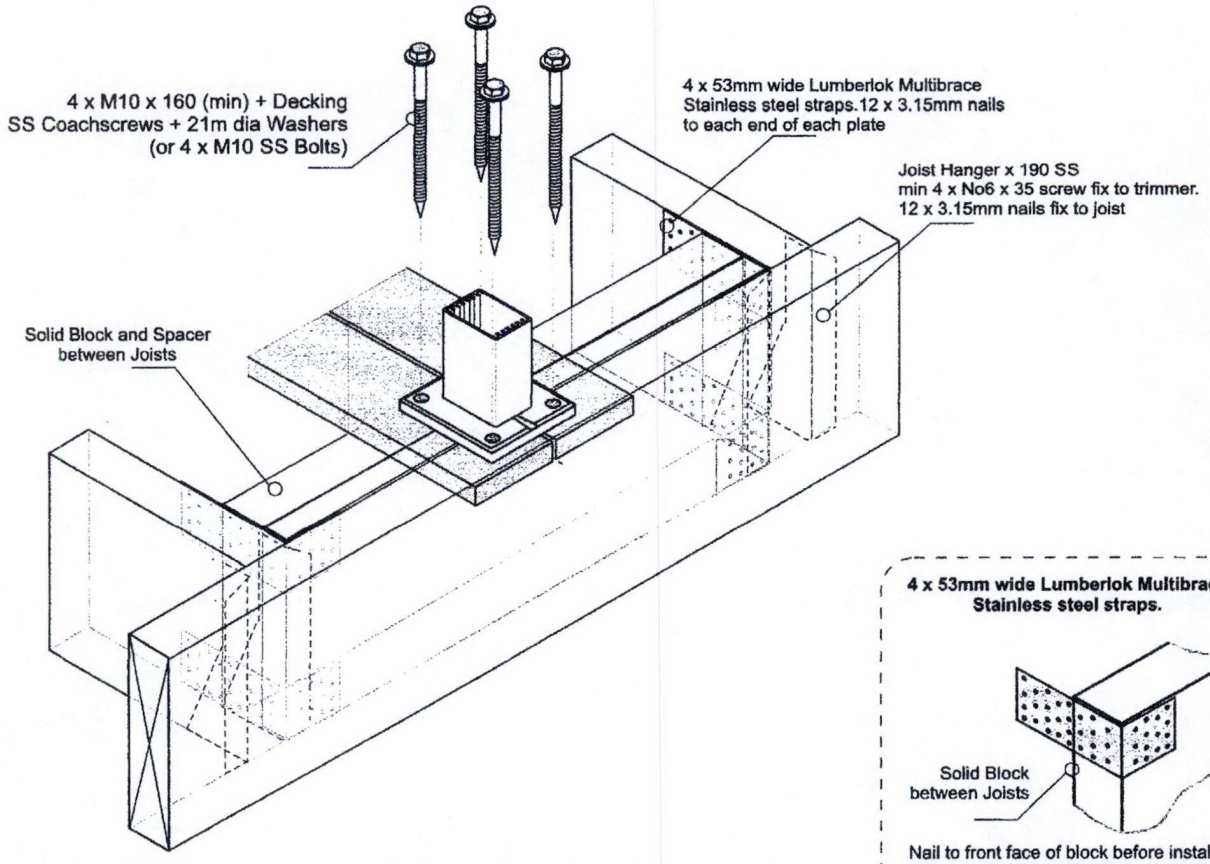
Typical TOP Fix to Timber - JEC 200, 110mm x 100mm, 4 hole Base Plate - M10 Coachscrews or Bolts

A Design engineer must ensure the structure can support the appropriate load applied at each post

The pre NZS3604:2011 mounting details are included for older, existing buildings. New buildings must comply with NZS3604:2011 - Double Boundary Joists



1 - Coachscrews 150mm min engagement into joist/block
2 - Bond all coachscrews with SIKA Supergrip to full depth.



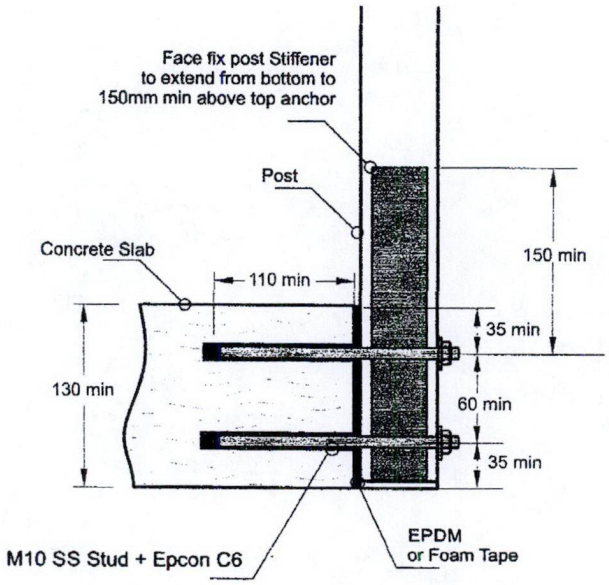
All fixings must be Stainless steel

4 x 53mm wide Lumberlok Multibrace Stainless steel straps.

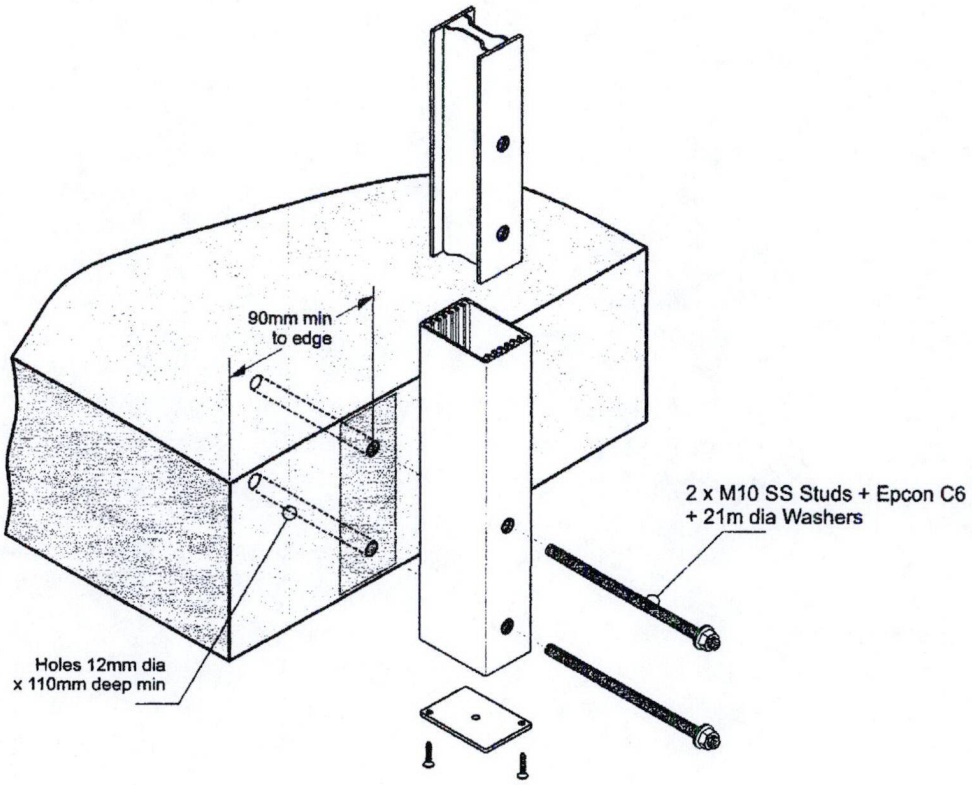
Nail to front face of block before installing. Wrap around ends of block and extend along joist using 12 x 3.15dia nails. Line up straps with top/bottom edges.

Typical FACE Fix Post to Concrete - M10 Studs

A Design engineer must ensure the structure can support the appropriate load applied at each post



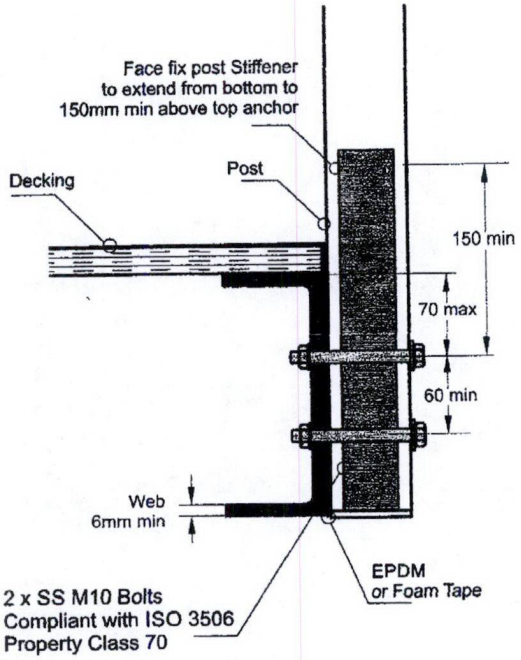
1 - All fixings must engage into the structural slab.
2 - A Rubber or EPDM layer must be installed between the Post and Concrete



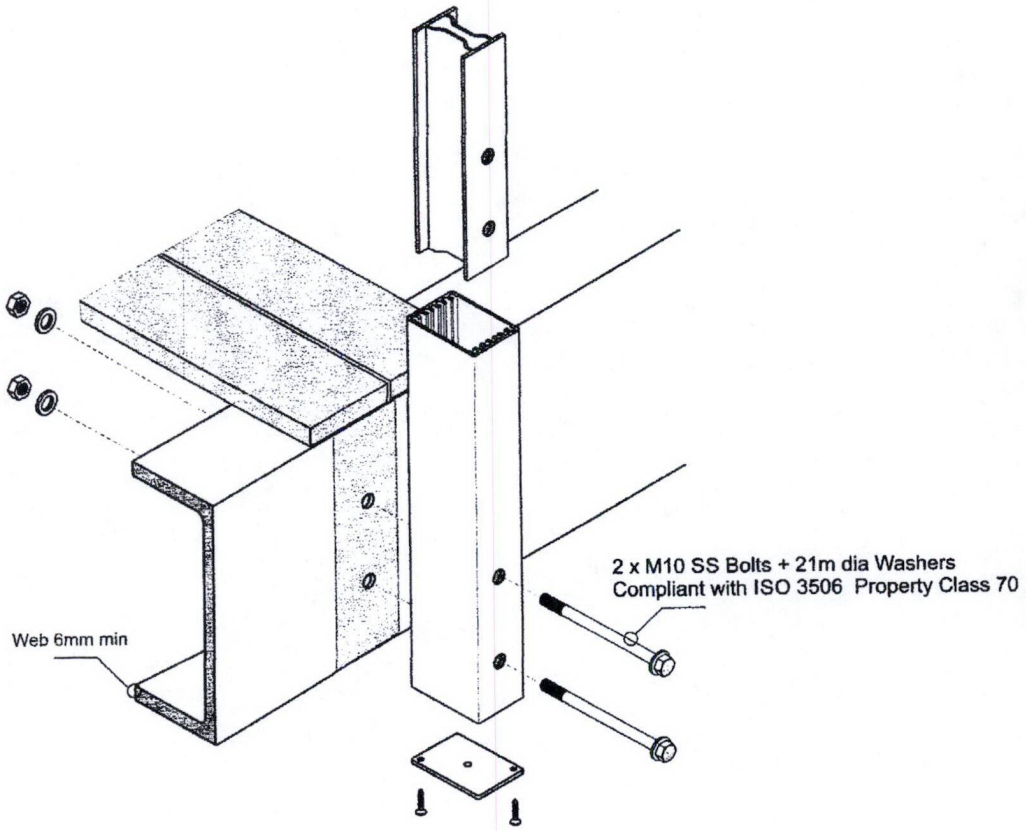
All fixings must be Stainless steel

Typical FACE Fix Post to Steel - M10 Bolts

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - A Rubber or EPDM layer must be installed between the Post and Steel

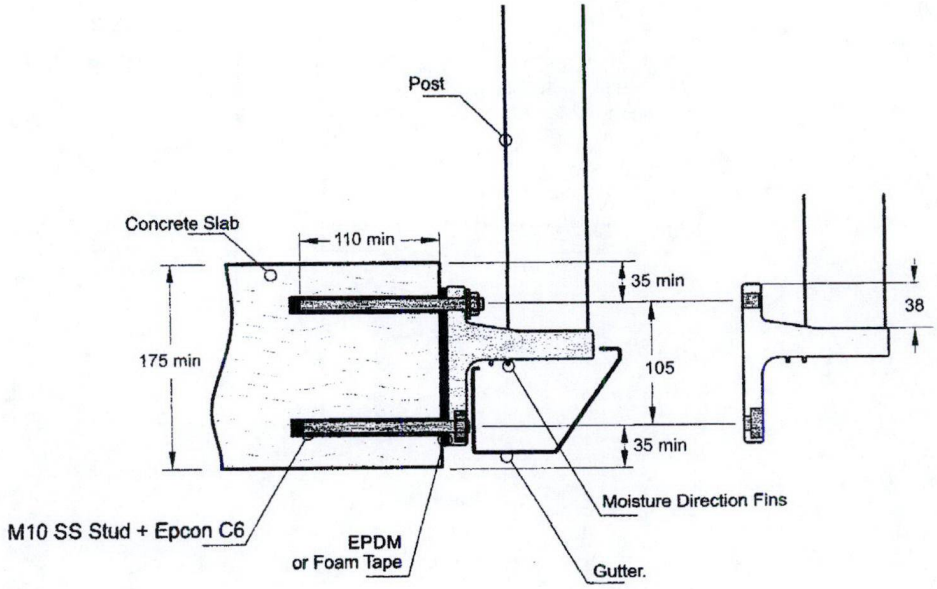


All fixings must be Stainless steel

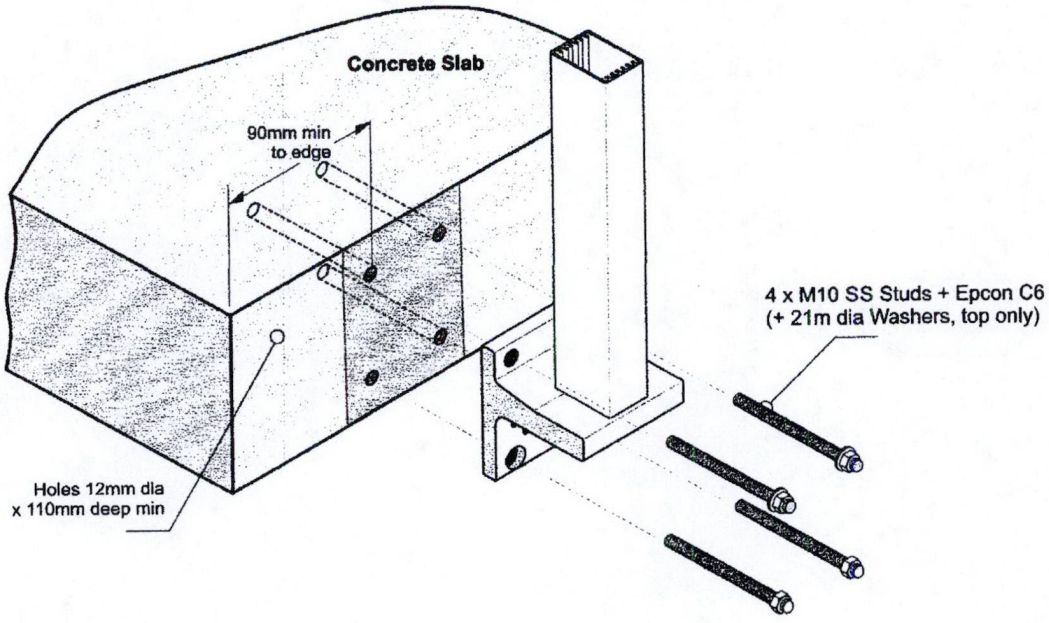
Juralco Homestead Balustrade System - Post Mounting Details

Typical FACE Fix to Concrete - JEC 137/65, Gutter Bracket - M10 Studs

A Design engineer must ensure the structure can support the appropriate load applied at each post



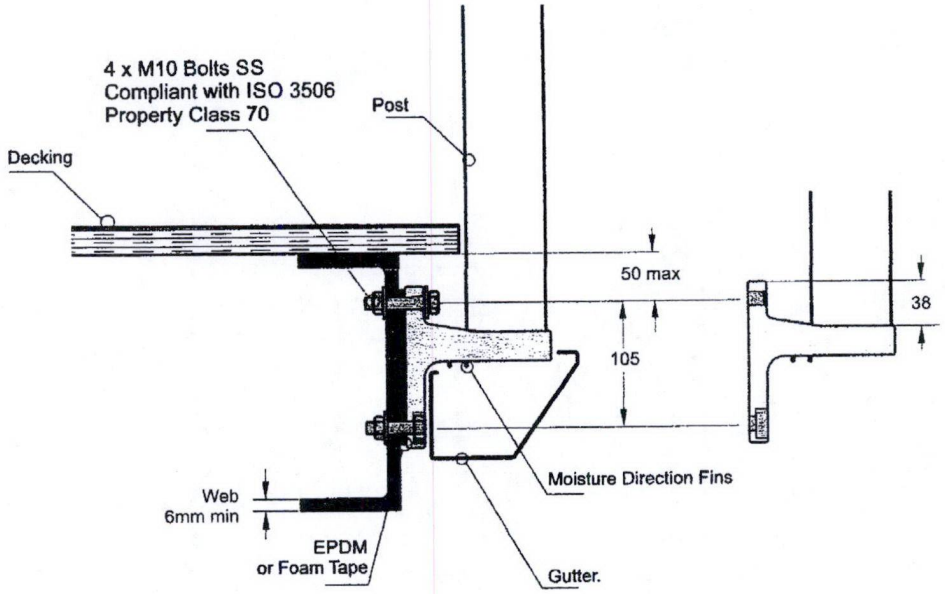
1 - All fixings must engage into the structural slab
2 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter bracket and Concrete slab



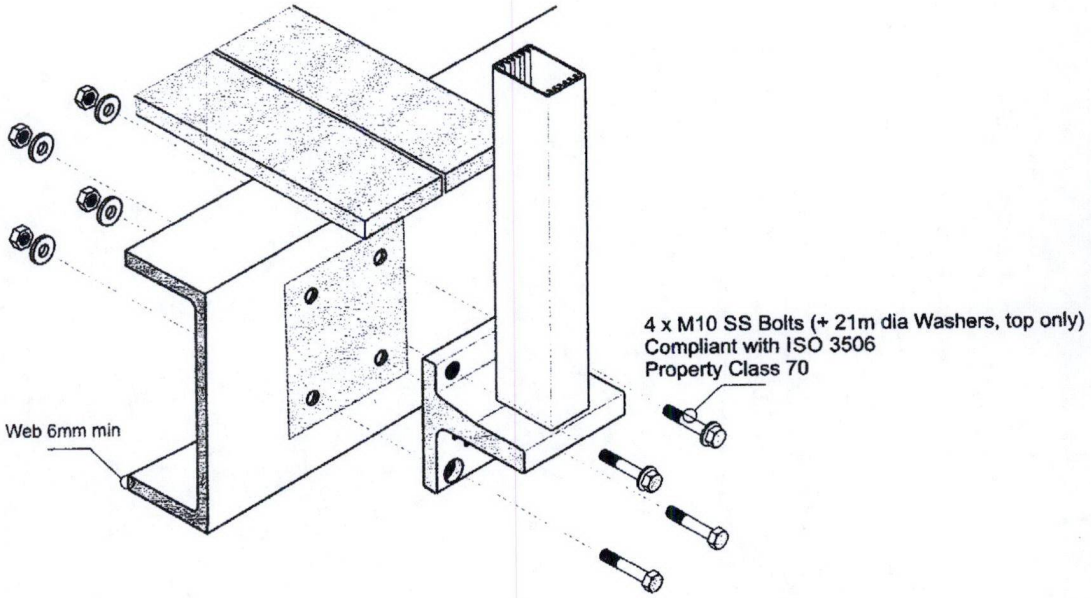
All fixings must be Stainless steel

Typical FACE Fix to Steel - JEC 137/65, Gutter Bracket - M10 Bolts

A Design engineer must ensure the structure can support the appropriate load applied at each post



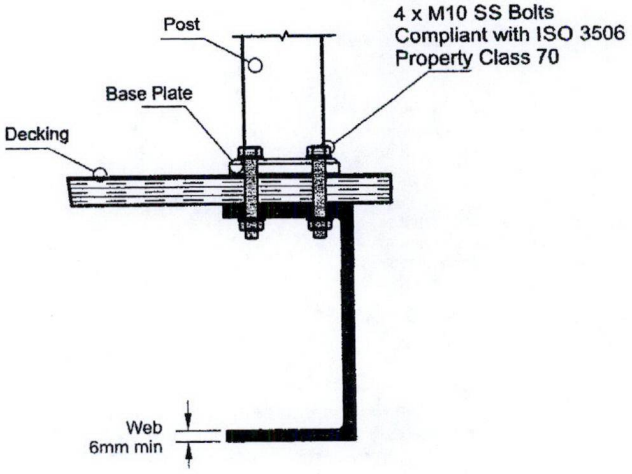
1 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter bracket and Steel

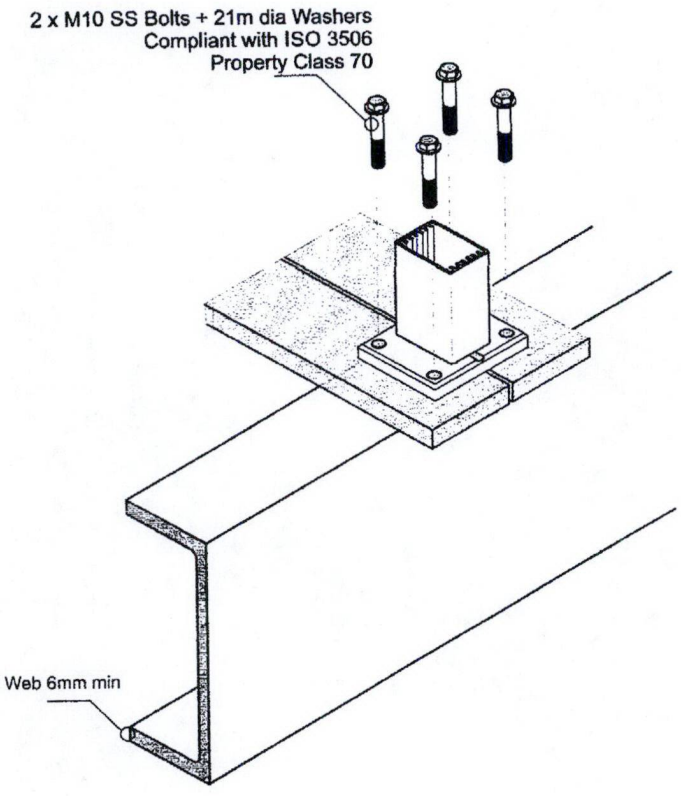


All fixings must be Stainless steel

Typical TOP Fix to Steel - JEC 221, 110mm x 90mm, 4 hole Base Plate - M10 Bolts

A Design engineer must ensure the structure can support the appropriate load applied at each post

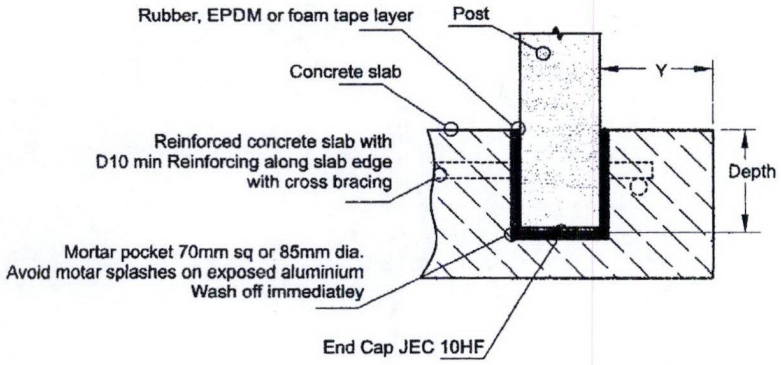




All fixings must be Stainless steel

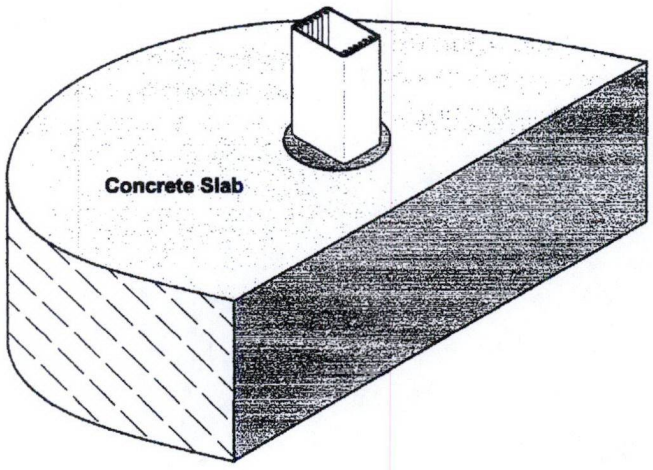
Typical TOP Fix to Concrete - Embed Post in Concrete Slab

A Design engineer must ensure the structure can support the appropriate load applied at each post



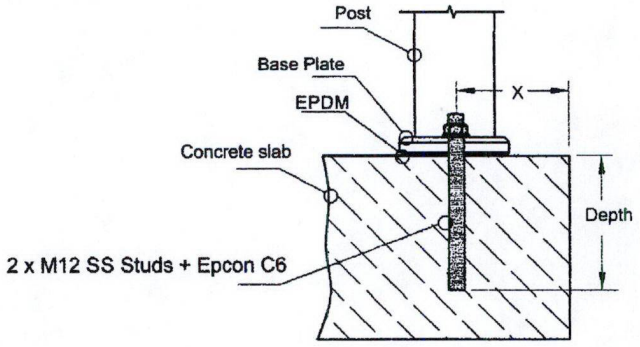
1 - All fixings must engage into the structural slab
2 - Rubber, EPDM of foam tape layer to be installed between the Post and Concrete slab

Concrete Type	Y (min)	Depth (min)
Reinforced Slab	70mm	95mm



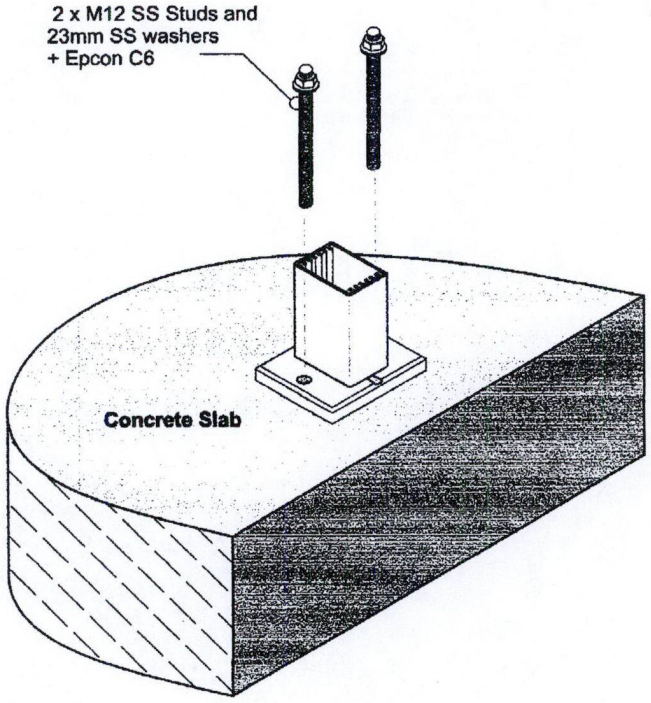
Typical TOP Fix to Concrete - JEC 201, 110mm x 90mm, 2 hole Base Plate - M12 Studs

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - All fixings must engage into the structural slab
2 - A Rubber or EPDM layer must be installed between the Baseplate and Concrete slab

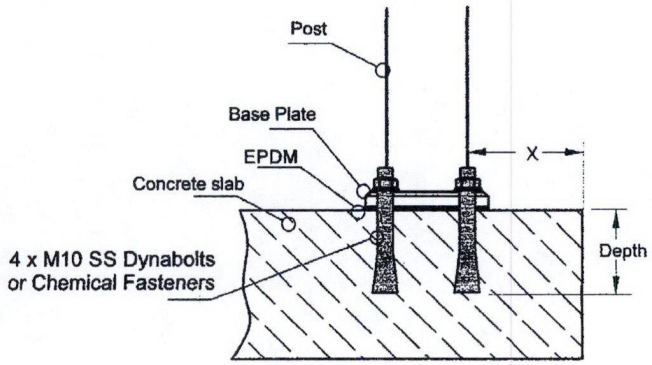
Base Plate JEC 201	X (min)	Depth (min)
2 off M12 SS Studs + Epcon C6	60mm	110mm



All fixings must be Stainless steel

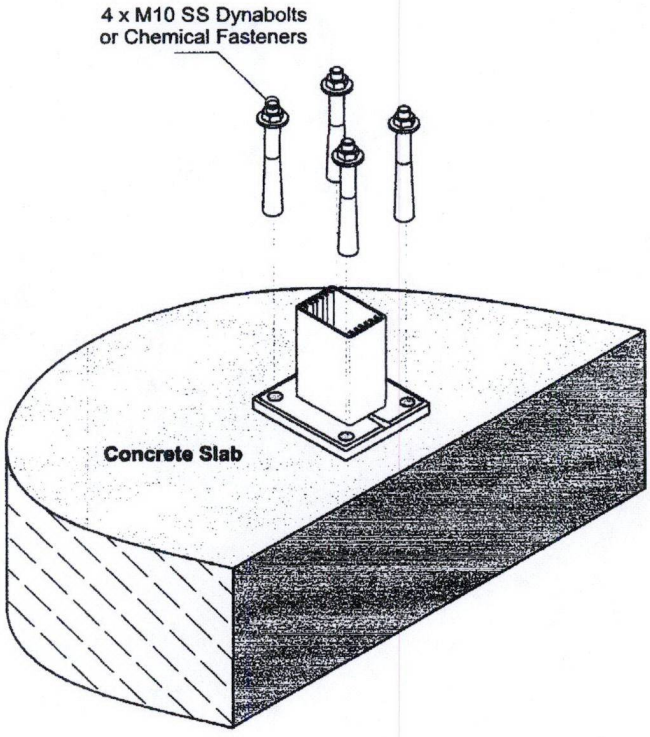
Typical TOP Fix to Concrete - JEC 200, 110mm x 100mm, 4 hole Base Plate - M10 Anchors

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - All fixings must engage into the structural slab
2 - A Rubber or EPDM layer must be installed between the Baseplate and Concrete slab

Base Plate JEC 200	X (min)	Depth (min)
4 off M10 x 98 Hex Dynabolts, Stainless Steel. DP 12100SS	90mm	75mm
4 off M10 x 90 Chemset Anchors, Stainless Steel + Chemset capsule CS10130SS	35mm	90mm

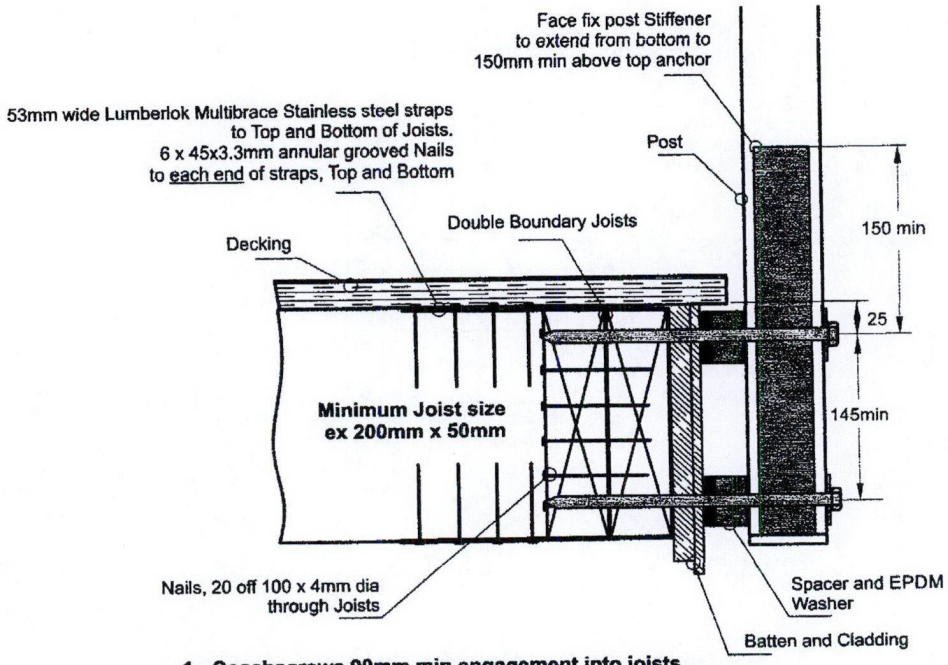


All fixings must be Stainless steel

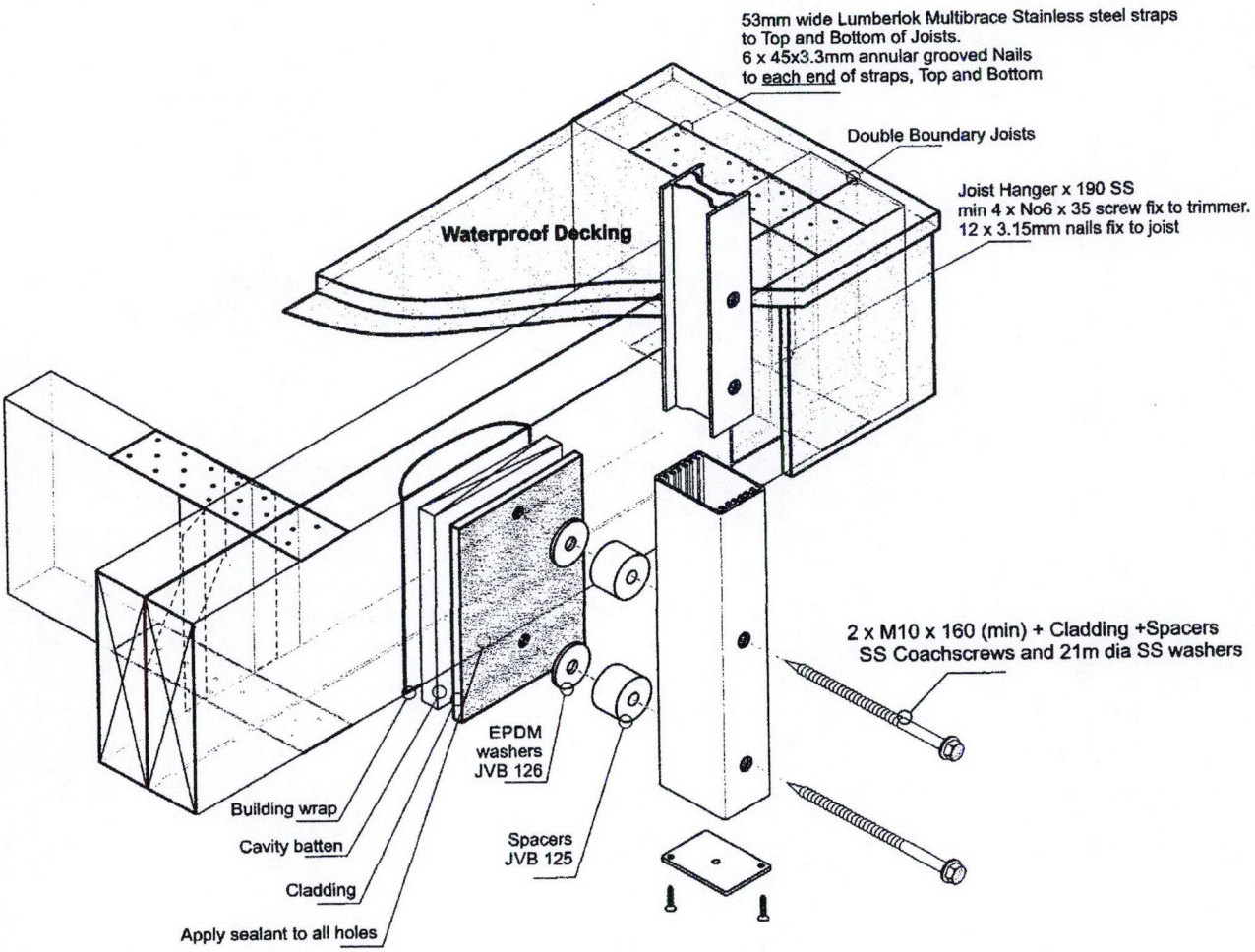
Juralco Homestead Balustrade Systems - Typical Post Fixing
Complies NZS3604:2011 - Double Boundary Joists

Typical FACE Fix Post to Waterproof Timber Deck - M10 Coachscrews and Spacers

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - Coachscrews 90mm min engagement into joists
2 - Bond all coachscrews with SIKA Supergrip to full depth.

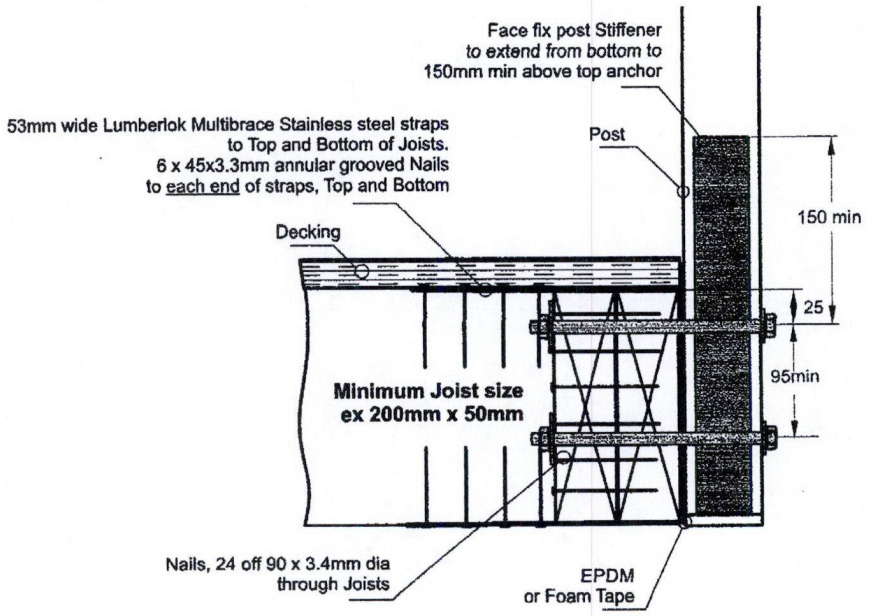


All fixings must be Stainless steel

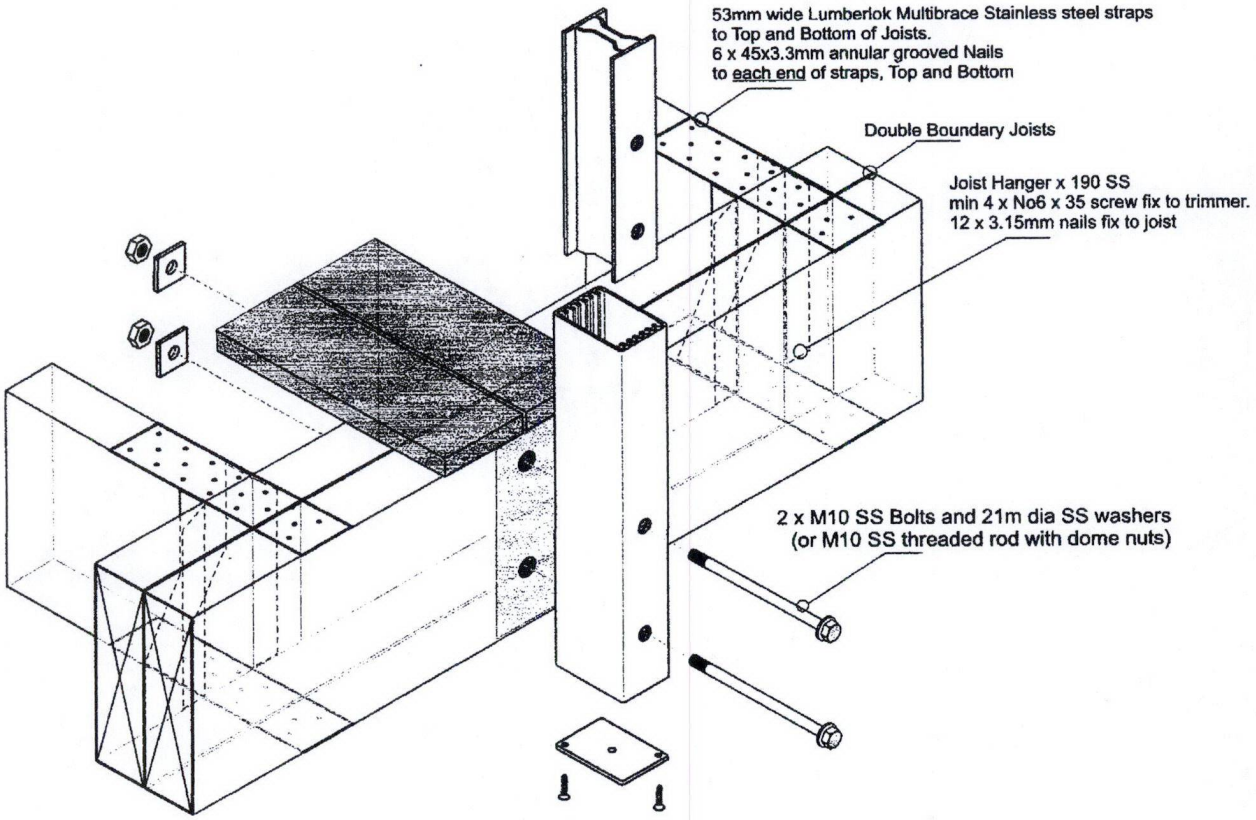
Juralco Homestead Balustrade Systems - Typical Post Fixing
Complies NZS3604:2011 - Double Boundary Joists

Typical FACE Fix Post to Timber - M10 Bolts or Threaded Rod

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - A Rubber, EPDM or Foam Tape layer must be installed between the Post and Timber

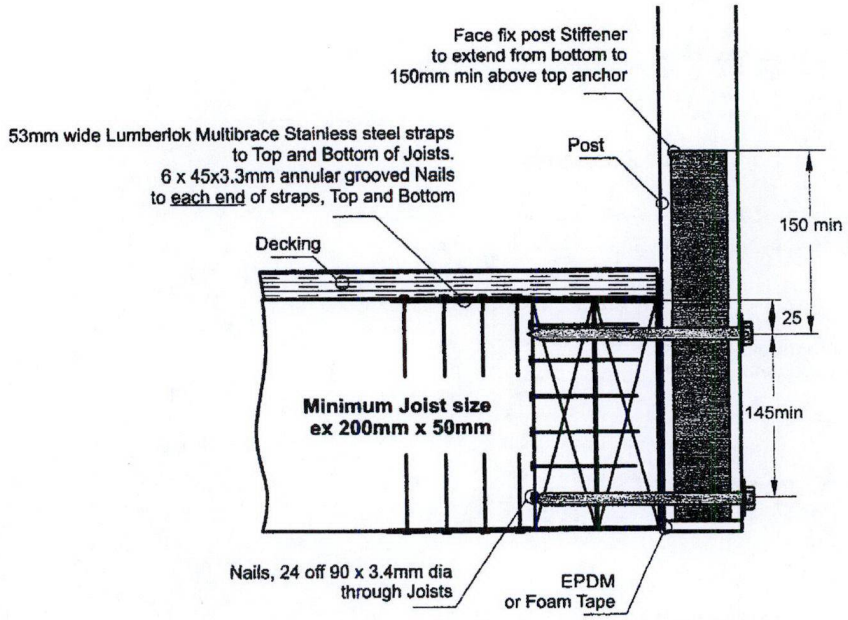


All fixings must be Stainless steel

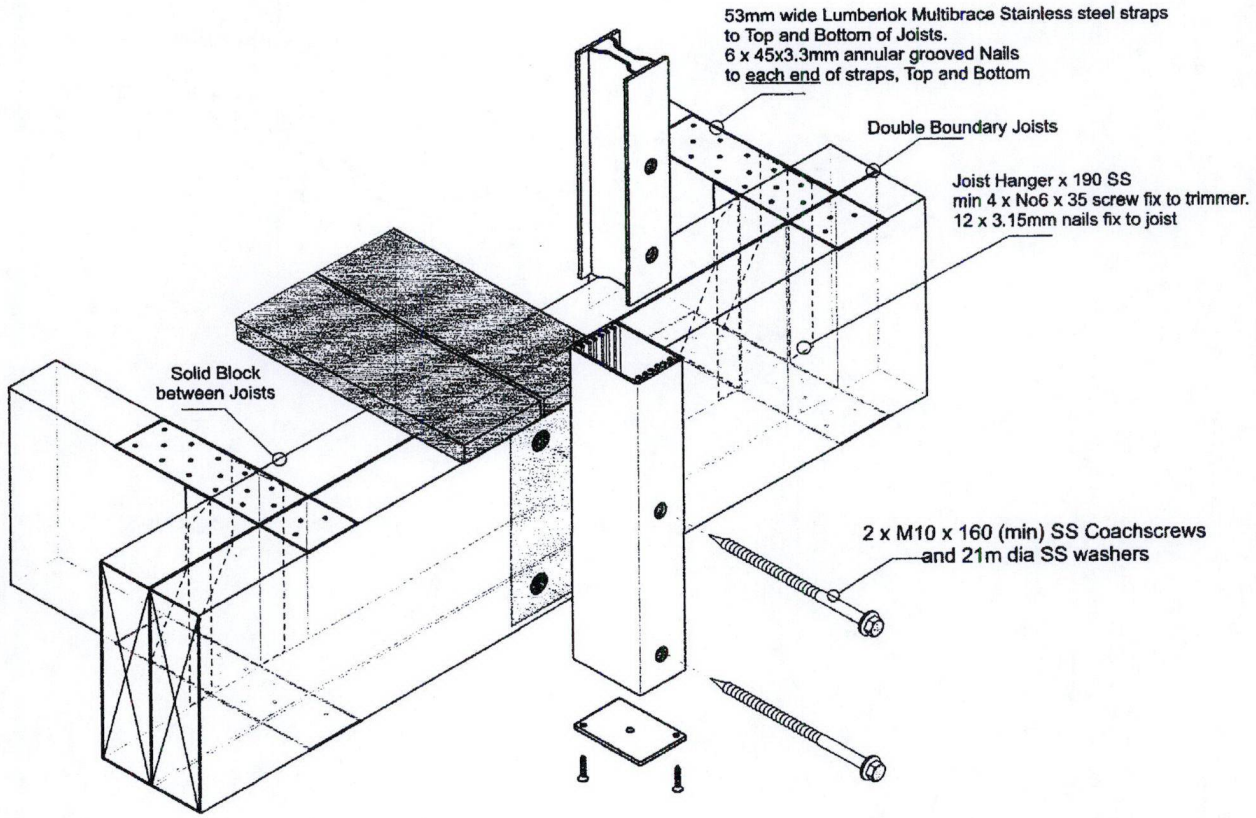
Juralco Homestead Balustrade Systems - Typical Post Fixing
Complies NZS3604:2011 - Double Boundary Joists

Typical FACE Fix Post to Timber - M10 Coachscrews

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - Coachscrews 90mm min engagement into joists
2 - Bond all coachscrews with SIKA Supergrip to full depth
3 - A Rubber, EPDM or Foam Tape layer must be installed between the Post and Timber

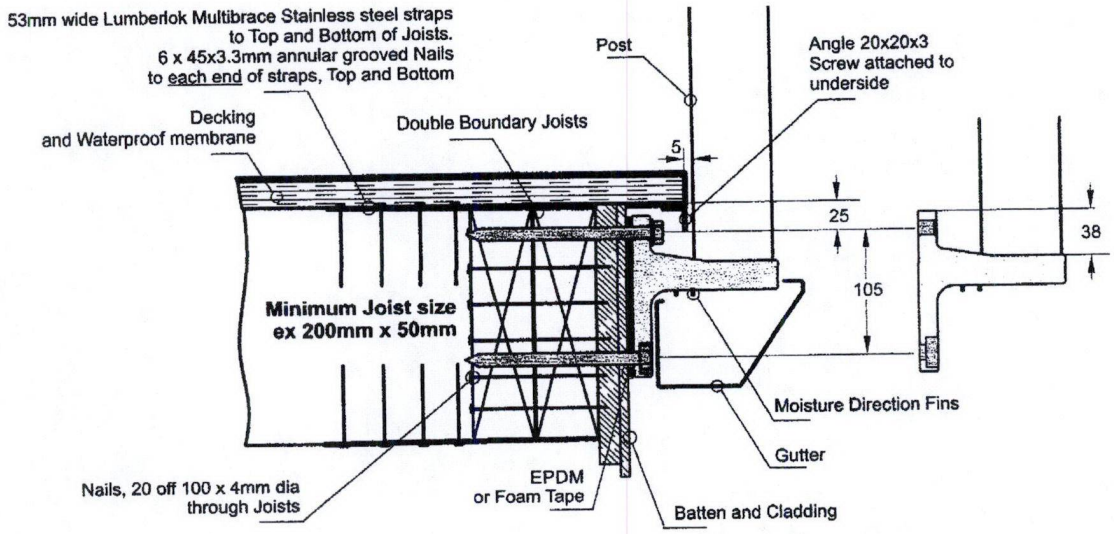


All fixings must be Stainless steel

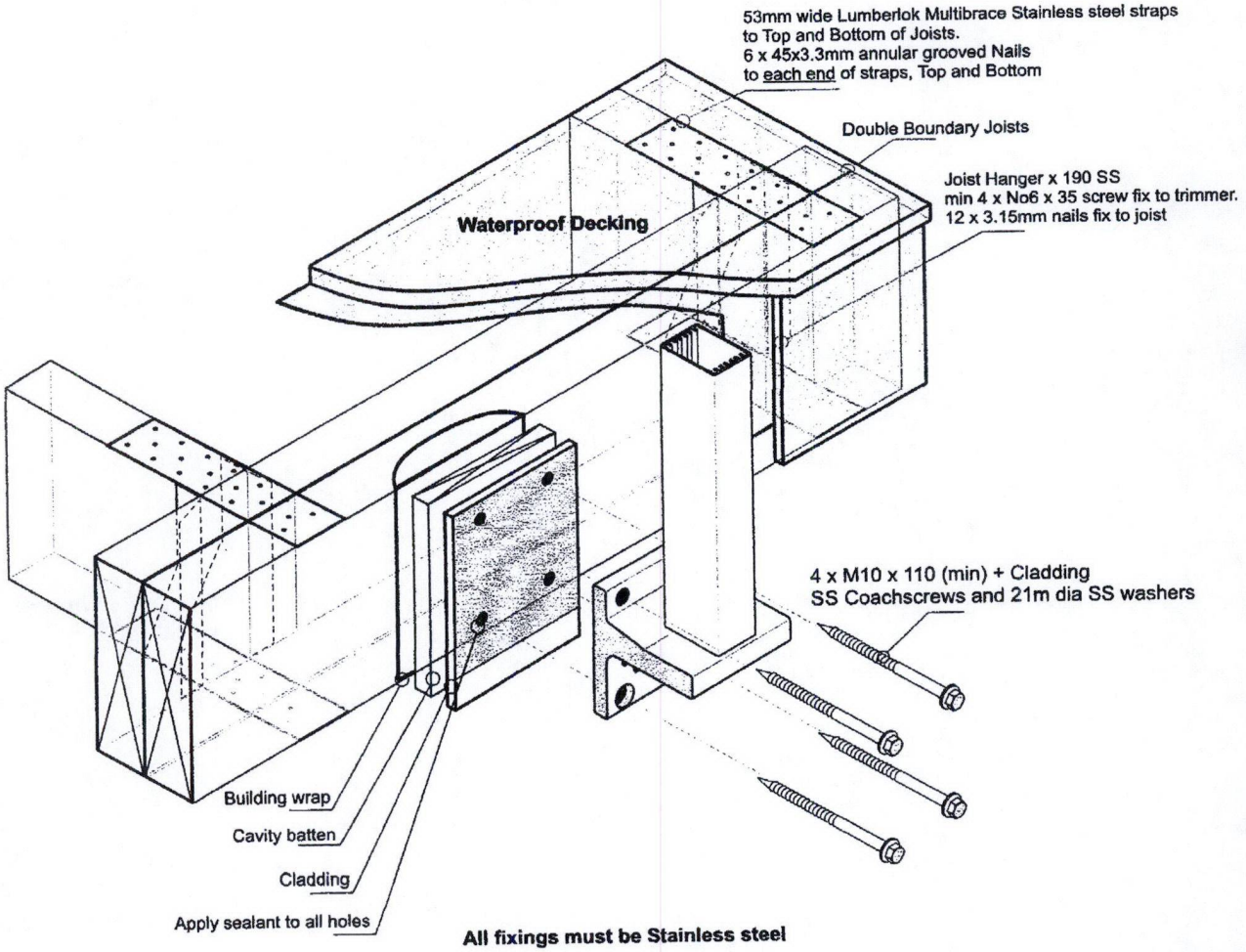
Juralco Homestead Balustrade Systems - Typical Post Fixing
Complies NZS3604:2011 - Double Boundary Joists

Typical FACE Fix to Waterproof Timber Deck - JEC 137/65, Gutter Bracket - M10 Coachscrews

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - Coachscrews 90mm min engagement into joists
2 - Bond all coachscrews with SIKA Supergrip to full depth
3 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter Bracket and Timber

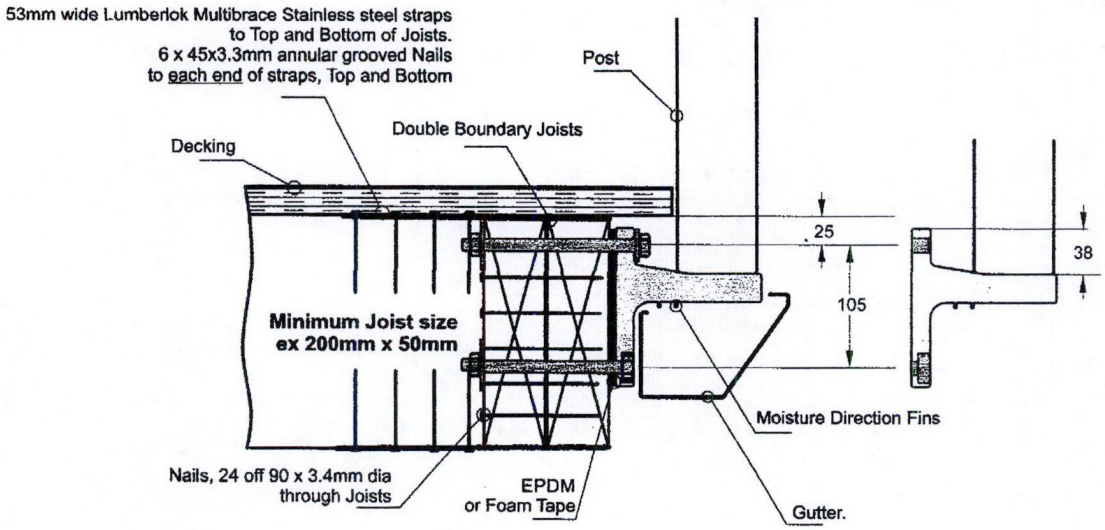


All fixings must be Stainless steel

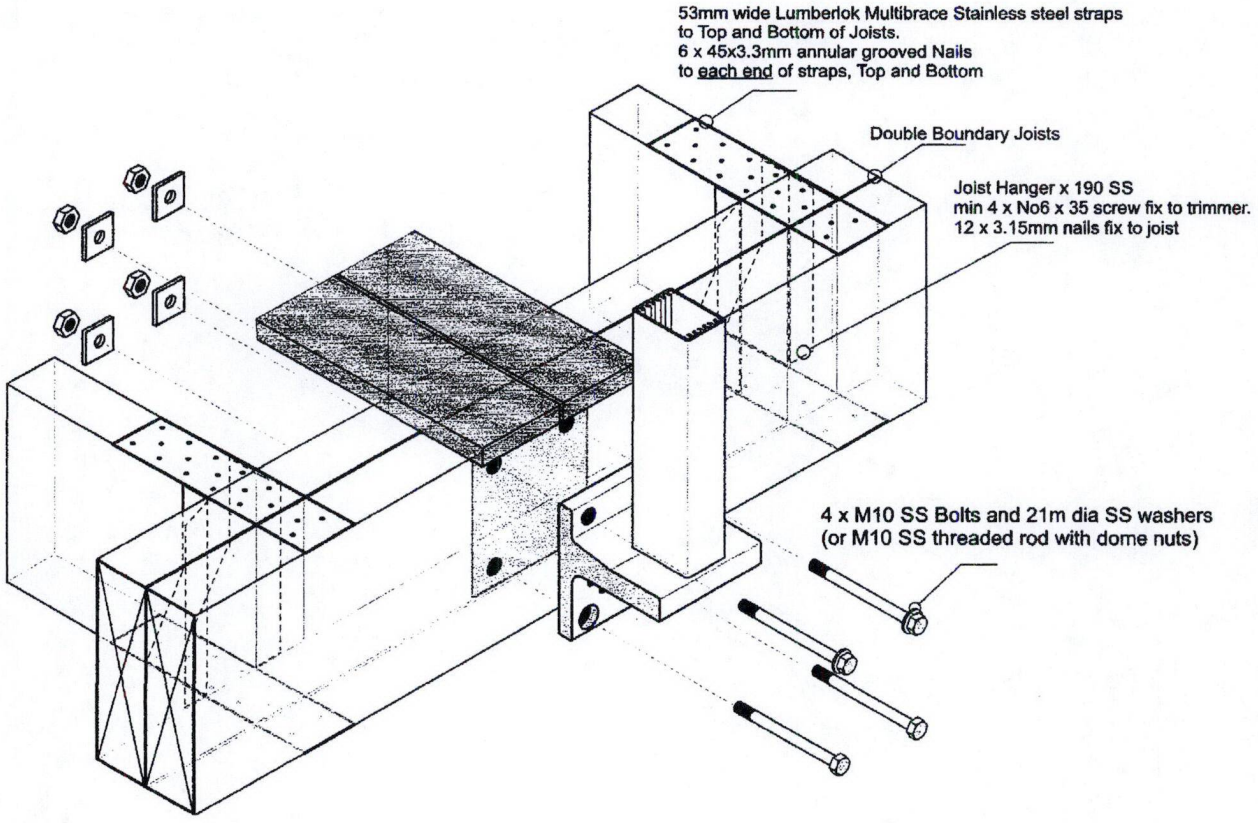
Juralco Homestead Balustrade Systems - Typical Post Fixing
Complies NZS3604:2011 - Double Boundary Joists

Typical FACE Fix to Timber - JEC 137/65, Gutter Bracket - M10 Bolts or Threaded Rod

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter Bracket and Timber

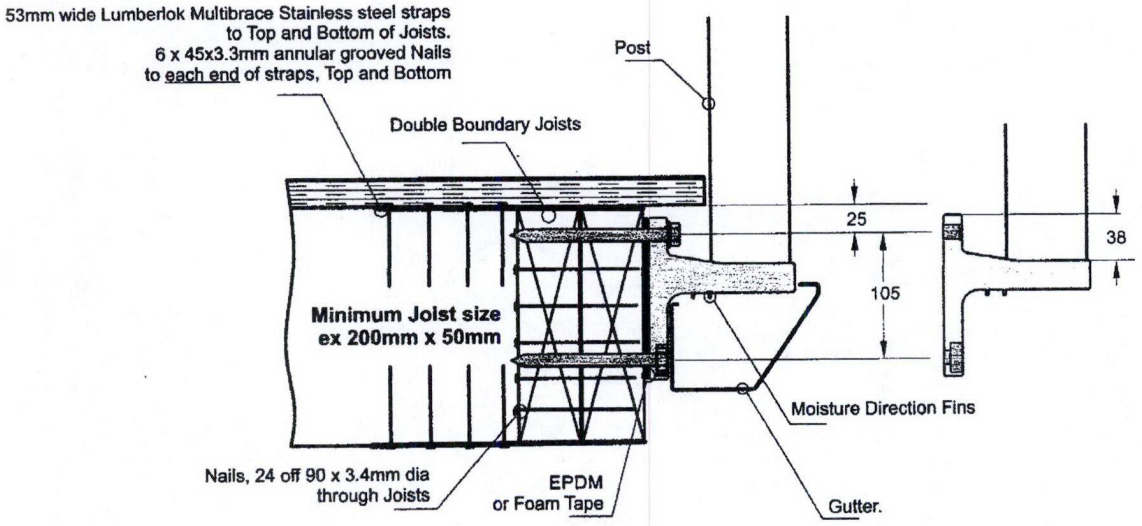


All fixings must be Stainless steel

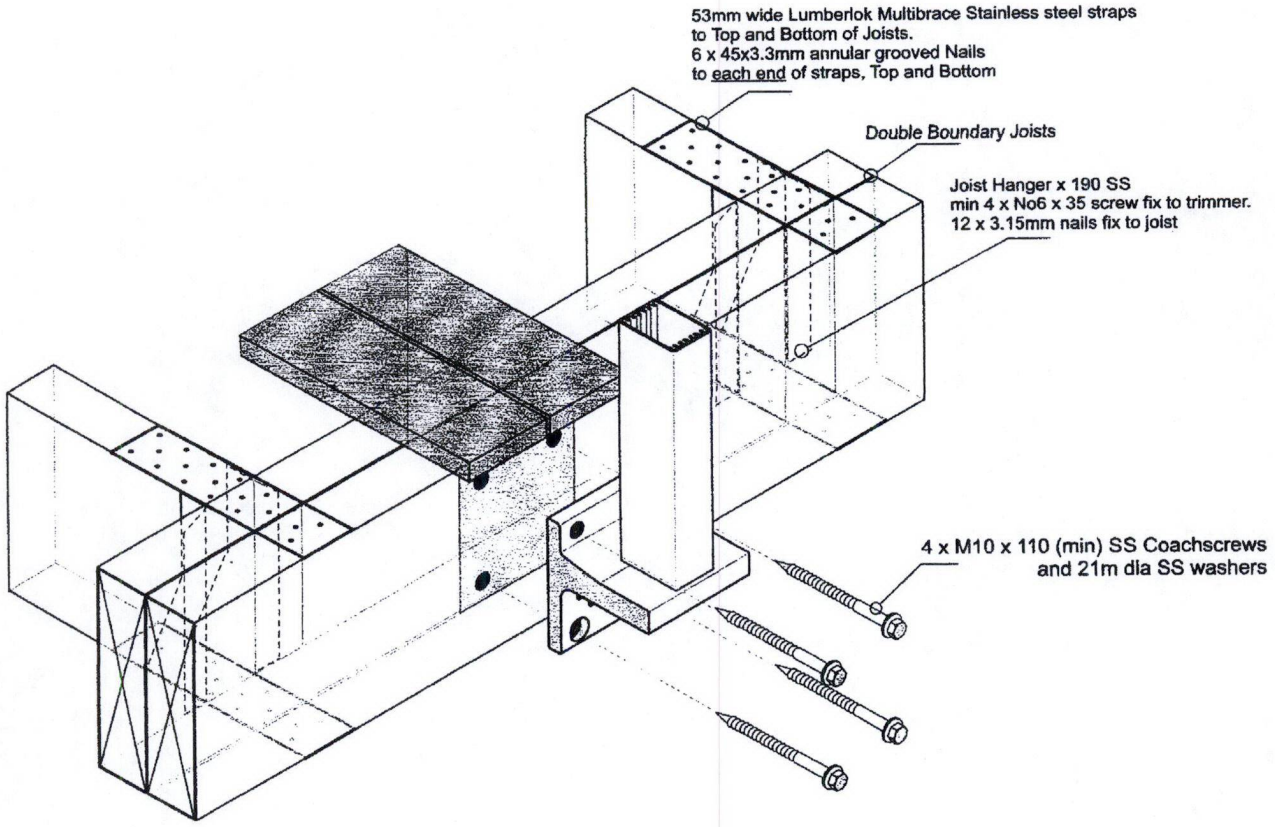
Juralco Homestead Balustrade Systems - Typical Post Fixing
Complies NZS3604:2011 - Double Boundary Joists

Typical FACE Fix to Timber - JEC 137/65, Gutter Bracket - M10 Coachscrews

A Design engineer must ensure the structure can support the appropriate load applied at each post



1 - Coachscrews 90mm min engagement into joists
2 - Bond all coachscrews with SIKA Supergrip to full depth
3 - A Rubber, EPDM or Foam Tape layer must be installed between the Gutter Bracket and Timber

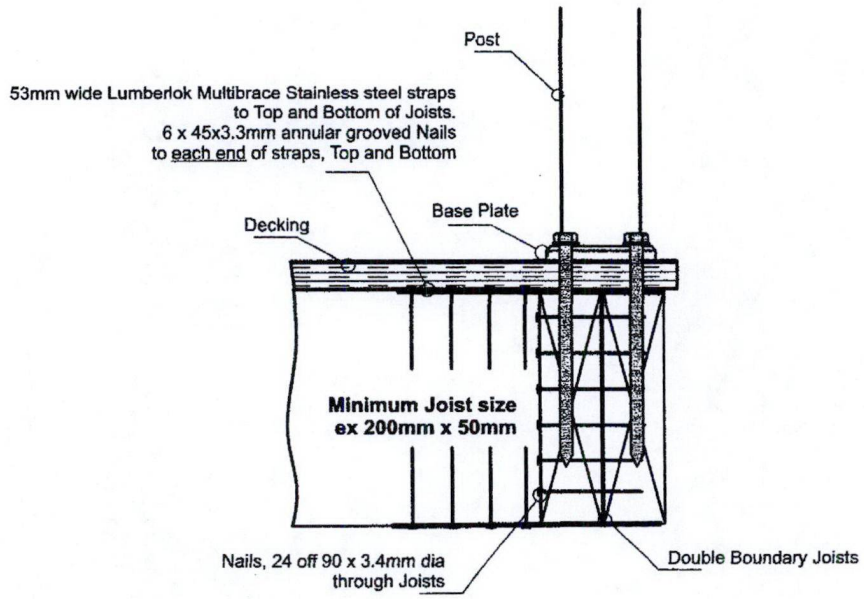


All fixings must be Stainless steel

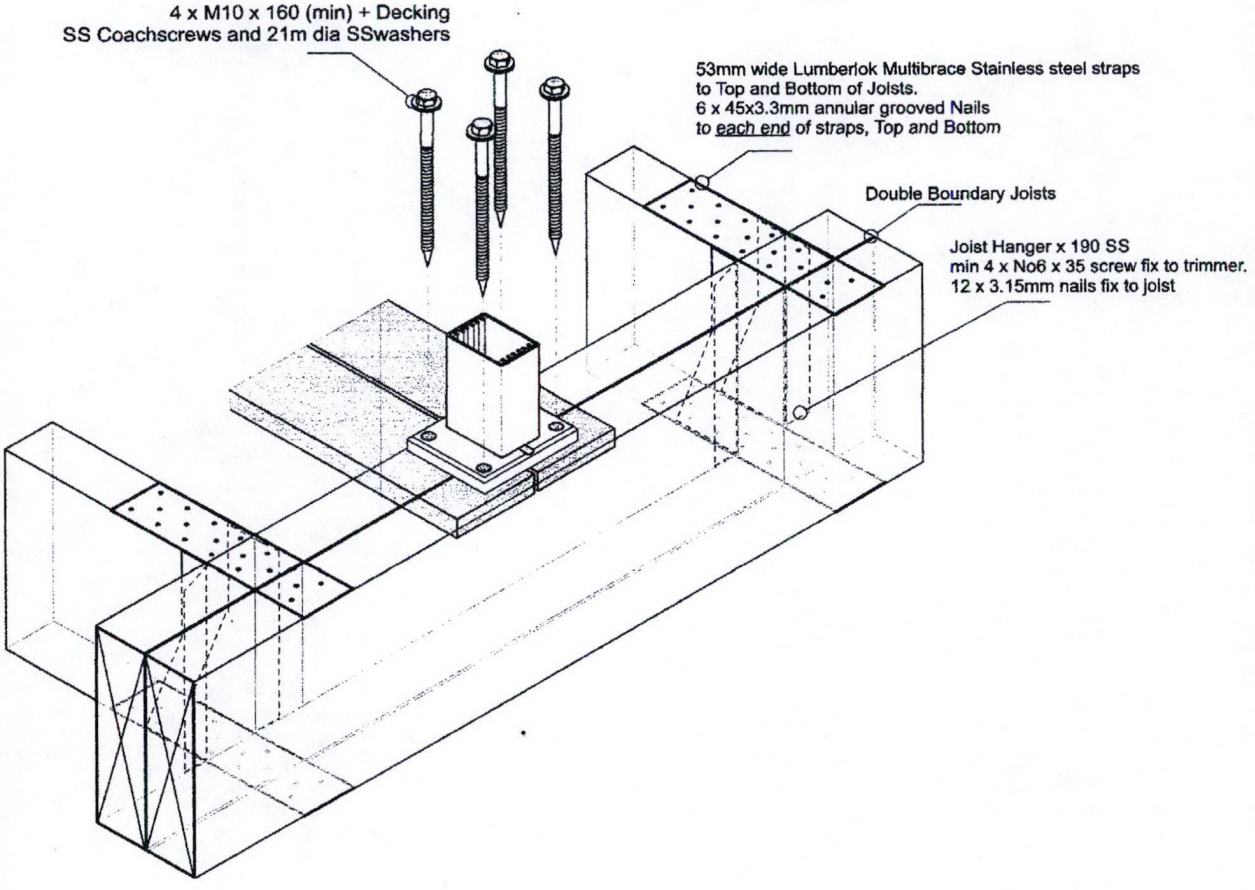
Juralco Homestead Balustrade Systems - Typical Post Fixing
Complies NZS3604:2011 - Double Boundary Joists

Typical TOP Fix to Timber - JEC 221, 110mm x 90mm, 4 hole Base Plate - M10 Coachscrews

A Design engineer must ensure the structure can support the appropriate load applied at each post

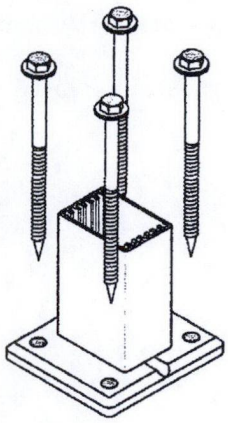


1 - Coachscrews 150mm min engagement into joists
2 - Bond all coachscrews with SIKA Supergrip to full depth.

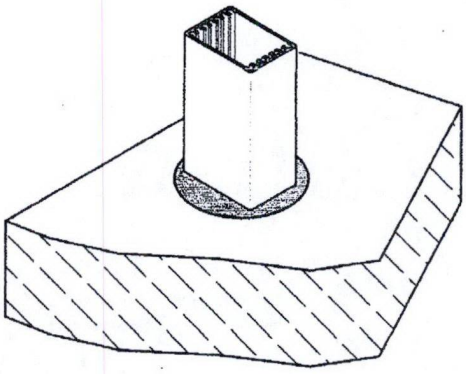


All fixings must be Stainless steel

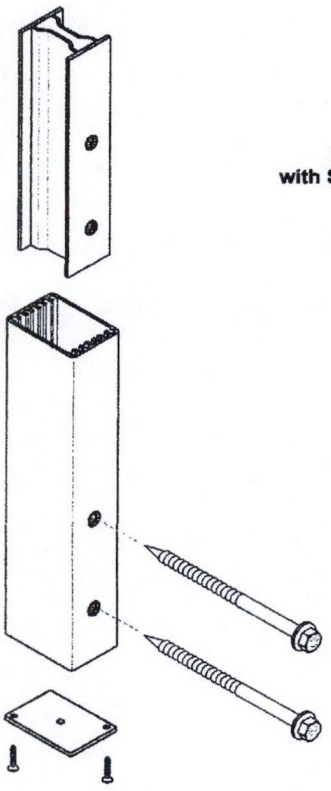
Juralco Homestead Balustrade System - Typical Post Mount Options



Top Mount
Base Plates in a variety
of sizes. Different fasteners types
depending on the Building substrate.
Includes a 90deg Corner Post

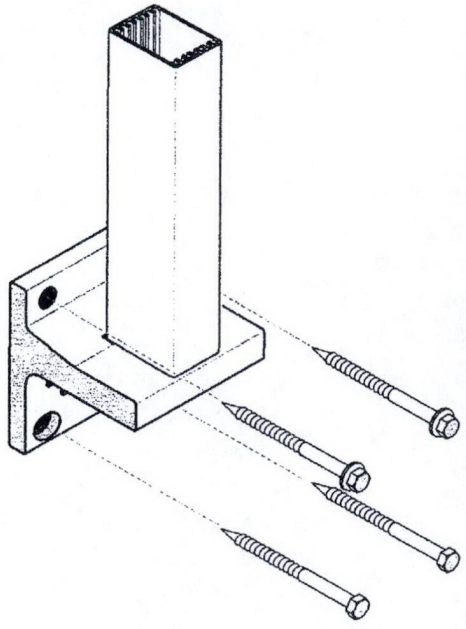


Top Mount
Concrete only.
Post cemented permanently in place



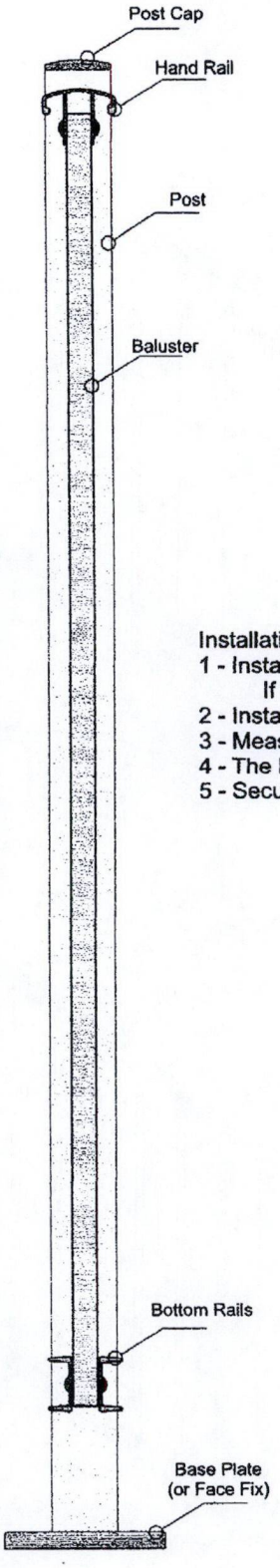
Face Fix
Different fasteners types
depending on the Building substrate.

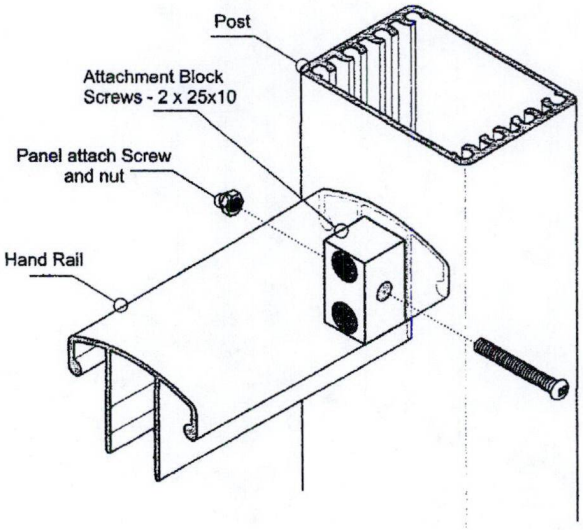
Bond all coachscrews
with SIKA Supergrip to full depth



Gutter Bracket - Face Fixed
Very suitable for Waterproofed Decks and
any overhanging decks.
Also allows for Guttering to be clipped under.
Different fasteners types
depending on the Building
substrate

Note - For all Face Fix, there must be a Rubber or EPDM membrane between post and structure

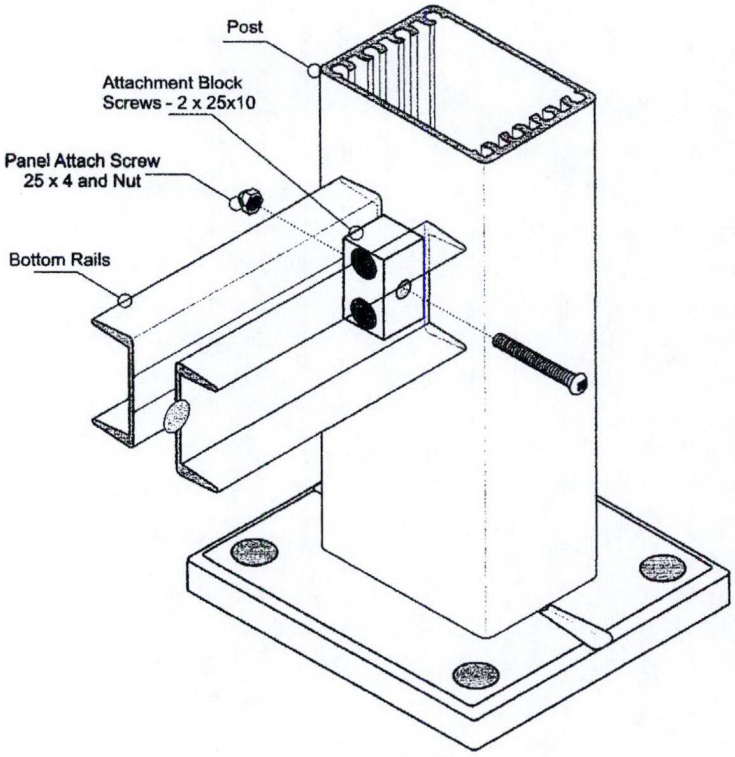




TOP of POST

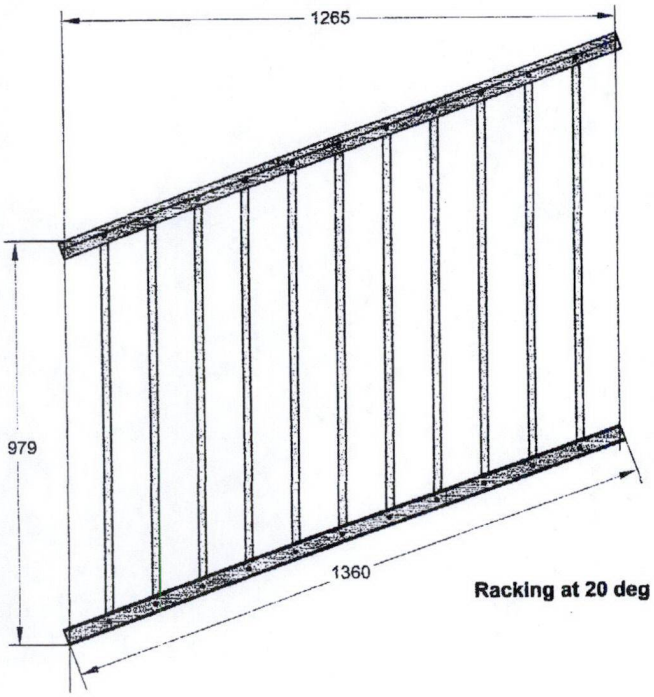
Installation

1 - Install posts, taking care to position at convenient c/l distance for easy cutting of the panel
If Panel angled ends must be cut at same angle
2 - Install the Attachment blocks
3 - Measure and cut the Panel to correct length; drill attach screw holes.
4 - The Balustrade panel then slips down from the top.
5 - Secure in place with the Attach screws at each end.

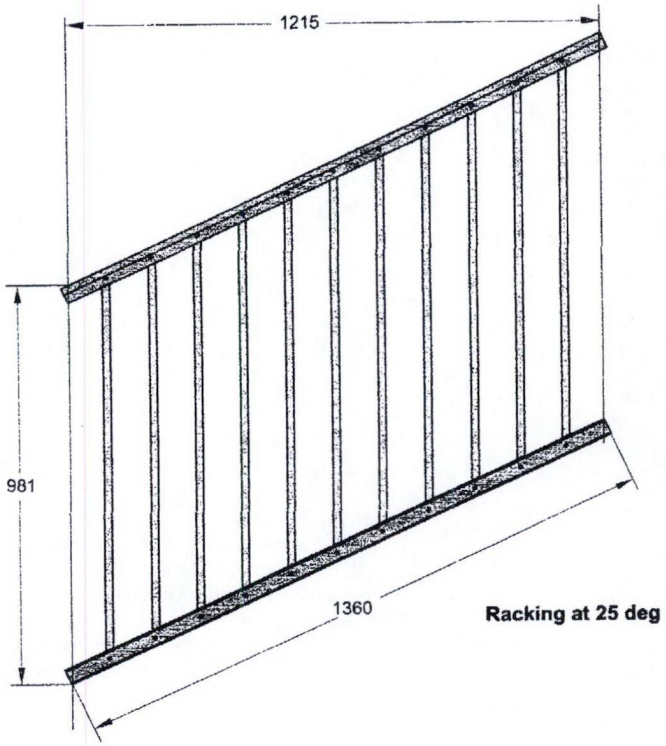


BOTTOM of POST

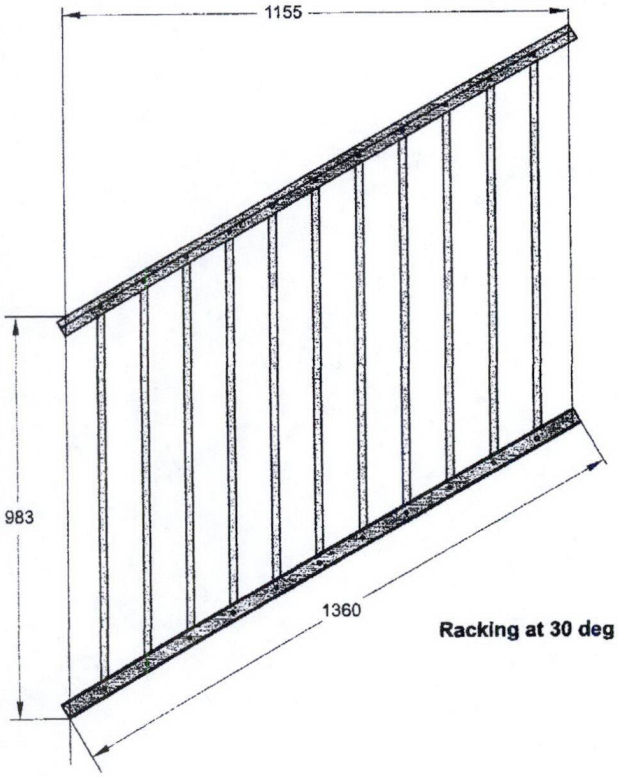
Juralco Homestead Balustrade System - Racking



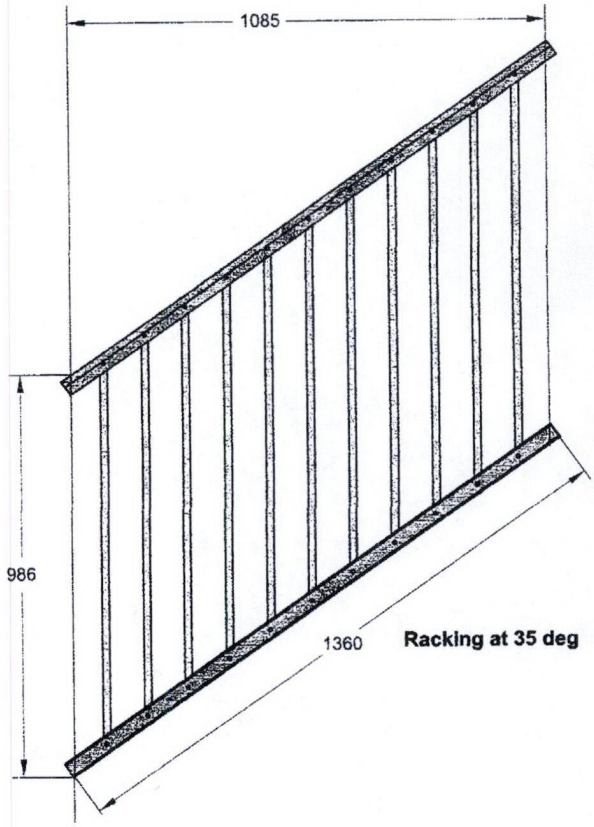
Racking at 20 deg



Racking at 25 deg

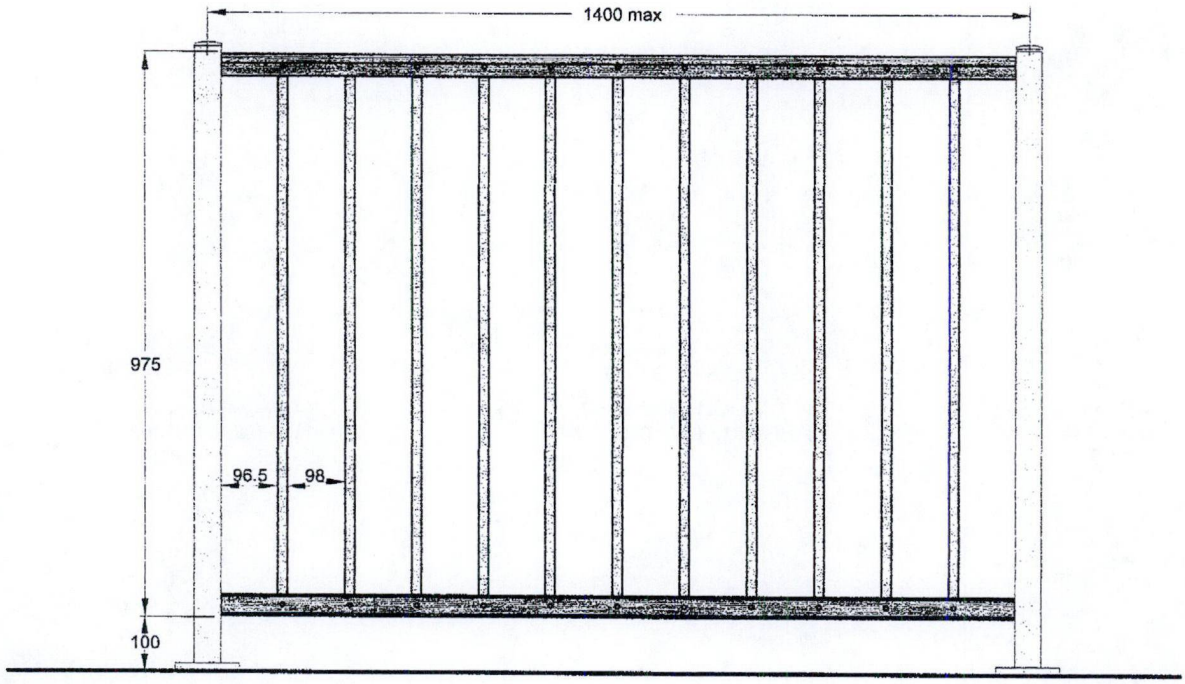


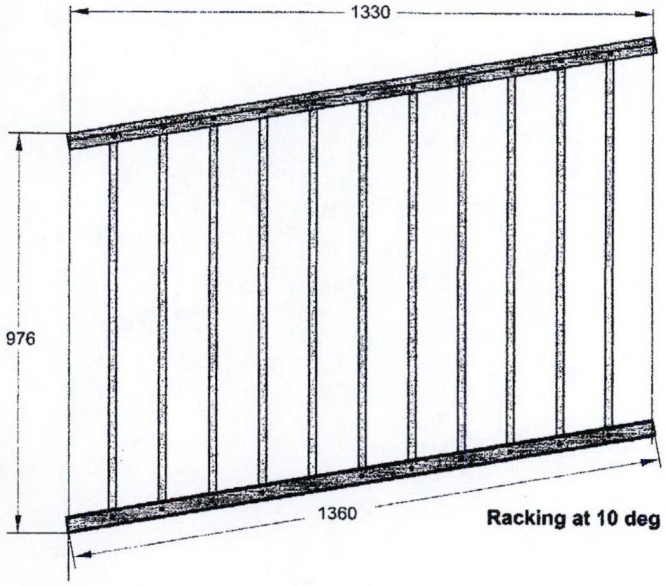
Racking at 30 deg



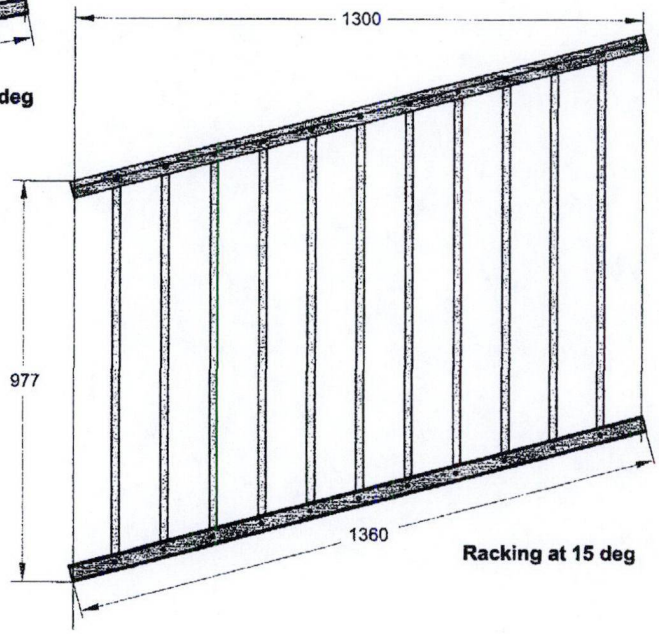
Racking at 35 deg

Juralco Homestead Balustrade System - Racking





Racking at 10 deg



Racking at 15 deg

Juralco Homestead Balustrade System - Components

Face Fix Spacer
Part No JVB 125/30mm

Face Fix

38mm dia x 15mm long.

Face Fix Spacer
Part No JVB 125/10mm

Face Fix

38mm dia x 10mm long.

EPDM Spacer Washer
Part No JVB 126

Face Fix

38mm dia x 3mm

Attachment Block Screw
Part No JHSHTSCREW/38x10

38mm SS HT PK C/S sq drive screw

Base Attach Screw
Part No JVBHTSCREW/50x10

50mm SS HT PK C/S sq drive screw

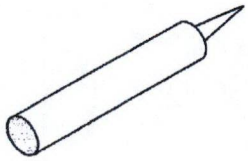
Panel Attach Screw
Part No JGFSCREW/25x4

M4 x 25mm SS posi drive screw and M4 Dome nut

WASHER SS
Part No JVB Washer 21x11

21dia x 11 x 2mm thick

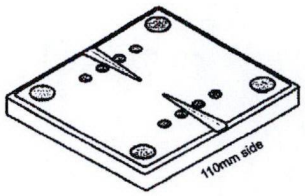
SIKA Supergrip 2hr
Part No JEC SUPERGRIP



For All Coachscrews fixings

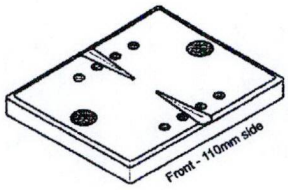
Juralco Homestead Balustrade System - Components

Base plate
Part No JEC 200
Top Mount



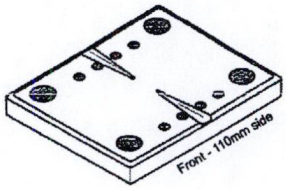
110mm x 100mm x 12mm - 4 x hole

Base plate
Part No JEC 201
Top Mount.



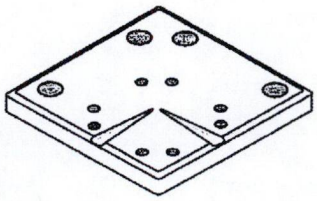
110mm x 90mm x 12mm - 2 x hole

Base plate
Part No JEC 221
Top Mount



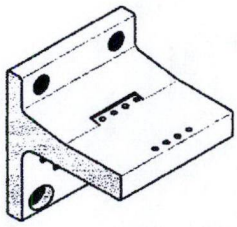
110mm x 90mm x 12mm - 4 x hole

Base plate - Corner Post
Part No JEC 222
Top Mount



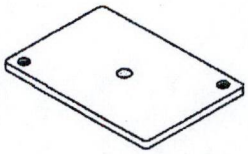
110mm x 110mm x 12mm - 4 x hole

Base plate
Part No JEC 137/65
Top/Face Mount



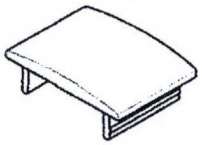
110mm wide x 135mm high - 4 x hole

Post Bottom Cap
Part No JEC16



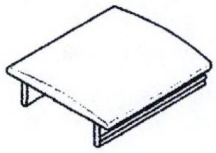
45mm x 65mm - Fits under face Fix Posts
Attach with No 6 x 12 C/S SS PK screws

Top Cap
Part No JEC 20



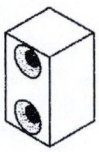
Fits over Post 65mm x 45mm

Top Cap - Corner Post
Part No JEC 27



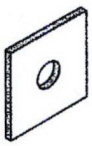
Fits over Post. 66mm x 66mm

Attachment Block
Part No JGF/HSBlock

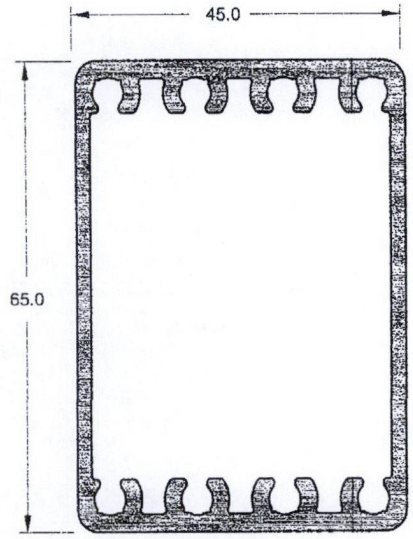


17mm x 17mm x 30mm high

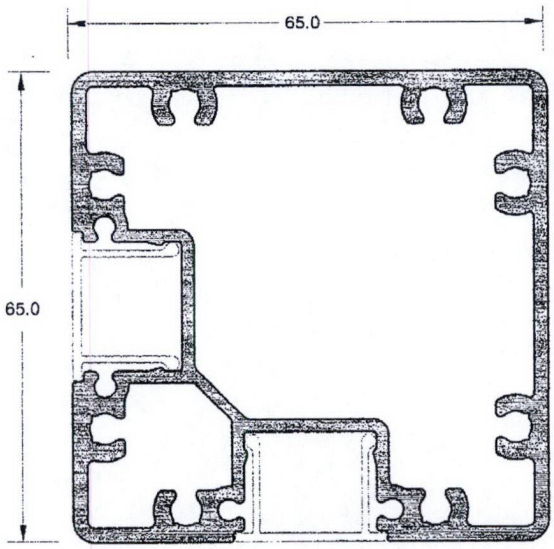
Square Washer
Part No JVB SQWSH
Face Fix



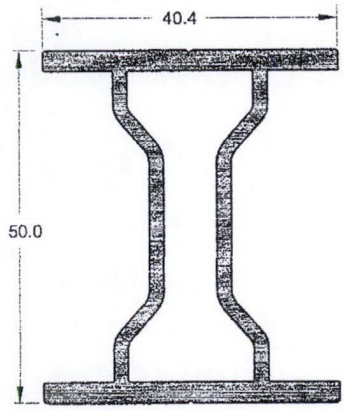
40mm sqx 3mm SS



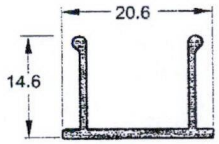
POST
Part No JGF/215/5



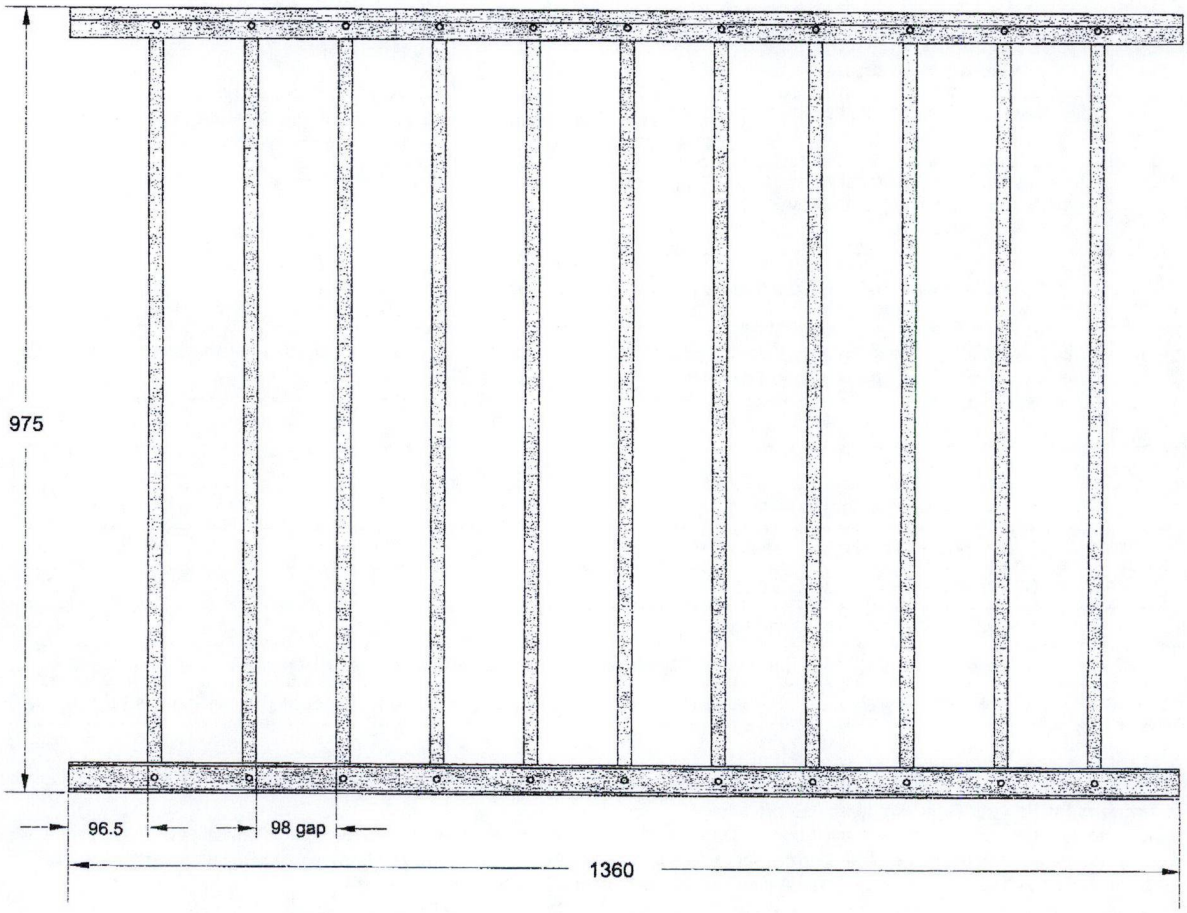
POCKETED CORNER POST
Part No JEB/213/5



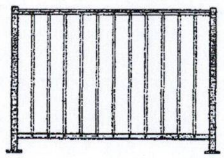
POST STIFFENER
JGF 213

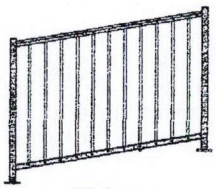


STANDARD INFILL CLIP
Part No JEB/206/5



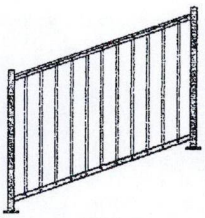
BALUSTRADE PANEL, RACKING
Part No JGF/HS975





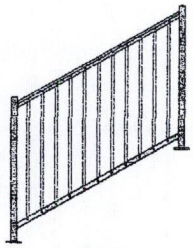
10 deg

15 deg

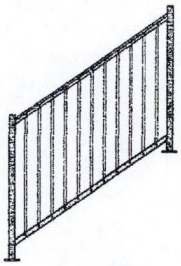


20 deg

25 deg



30 deg



35 deg

Post and Mounts attached to Racking Panels

Juralco Homestead Balustrade System

Complies With AS/NZS 1170:2002, NZBC B1, B2 and F4 and FOSP Act 1987

Juralco Homestead Balustrade is for Domestic and Residential Occupancy types A, A Other and C3 only

Code	Type of Occupancy for part of the building or structure	Specific Uses
A	Domestic and Residential activities	All areas within or serving exclusively one dwelling including stairs, landings etc, but excluding external balconies and edges of roofs. (see C3)
A Other, C3	Areas without obstacles for moving people and not susceptible to over crowding	Stairs, landings, external balconies, edges of roofs etc.

Juralco Homestead Balustrade is not suitable for Commercial C3 applications

Note 1 **Juralco Balustrade Systems building code compliance documentation requires all balustrade installations are to be completed in accordance with the requirements of our authorised installer certification.**

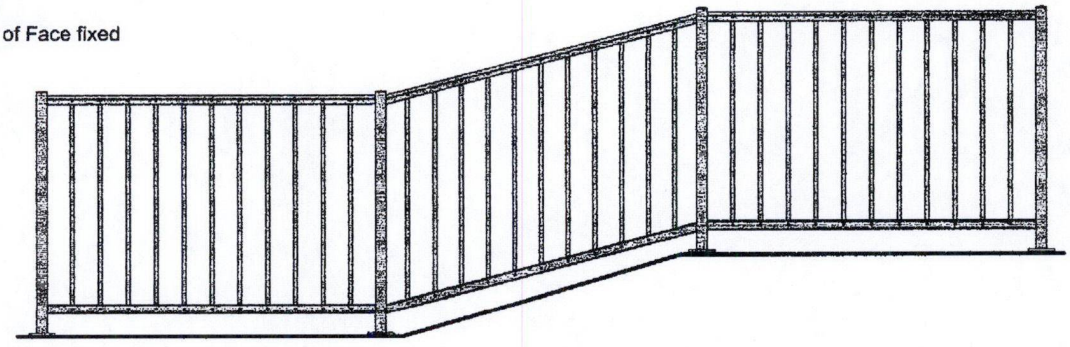
Index

Important instructions for Powder Coatings near Salt Water
The standard Dulux powder coating system used by Juralco is Duralloy® and is suitable for installations greater than 100 metres from high tide level and for buildings up to 3 stories above ground. Use Duratec® for installations between 10 and 100 metres from high tide level and for prestigious residential and commercial developments. For all other applications contact Juralco for alternative systems.
Note - Powder coated prices listed in Juralco price books are for the standard Duralloy® system. If the Duratec® system is required it must be specified upon placement of the order and will incur a surcharge – Duratec® prices on application.

Important instructions for Powder Coating - Attachment to structures
An EPDM or similar material spacer must be used to separate powder coated aluminium items from all timber, concrete and steel structures. Failure to do so can lead to the chemicals in the structure affecting the powder coating layer on the aluminium.

Powder Coating Warranty
The Dulux powder coating warranty period is conditional upon being maintained in accordance with the Dulux 'Care and Maintenance Instructions'. Contact your installer for a copy (or download from Dulux) of the Care and Maintenance instructions or refer to the back page of this manual.

Features.
- Single Panel size - 1360mm long x 975mm high.
- Panels can be used at any angle up to about 35deg, including stairs.
- Conforms to NZ building Code and AS/NZ1170 regulations
- Only for Residential applications up to1000mm high (not Commercial)
- Not suitable for Gates
- Powder Coat any colour
- Posts can be Top Mount of Face fixed

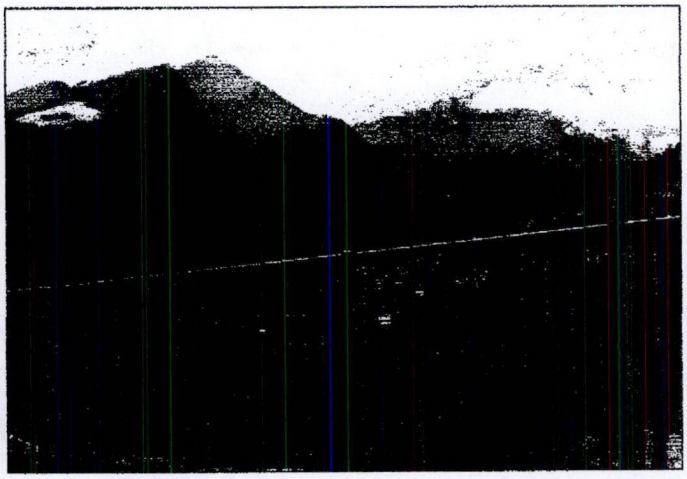


Juralco Aluminium Building Products Ltd designs and distributes specialist aluminium joinery systems through a national network of franchised fabricators and agents.

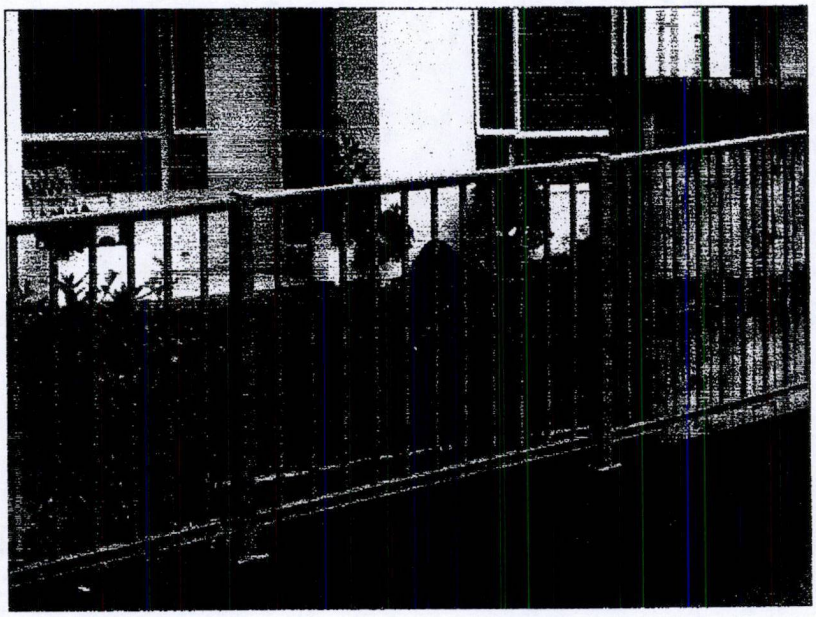
For more than 25 years we have been at the forefront of specialist aluminium door and window products suitable for New Zealand joinery and building methods. Our comprehensive product range includes security and insect screens, balustrades and gates, shutters and awnings, shower screens, wardrobe doors and organisers and internal doors.

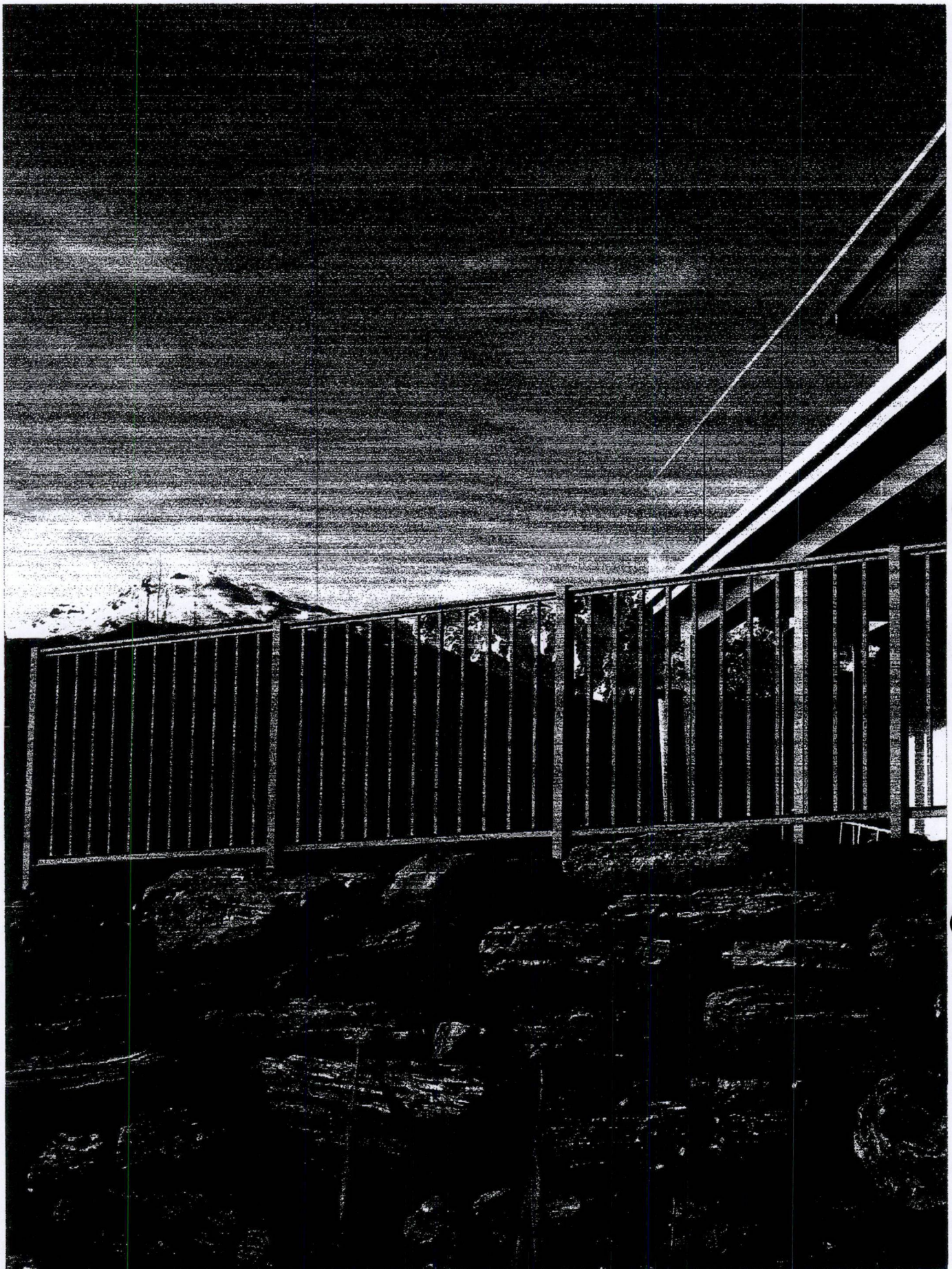
The Juralco Homestead Balustrade System combines a contemporary Aluminium frame with adjustable racking angle for stairs. The system is extremely versatile and can be installed in a range of configurations with powder coat colours to meet most modern architectural requirements.

This Guide is intended for use by Architects, Specifiers and Fabricators
See Index page 3



Typical Homestead Balustrade installations.



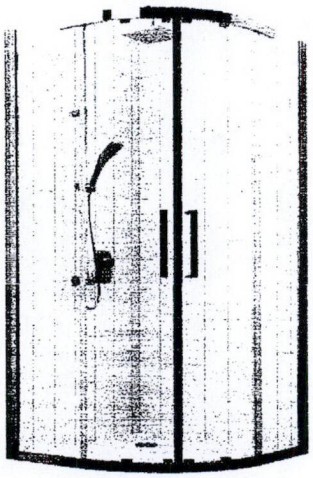


JURALCO HOMESTEAD BALUSTRADE SYSTEM

ISSUE 4/15

Milano™ Round Sliding Shower Door & Return Set

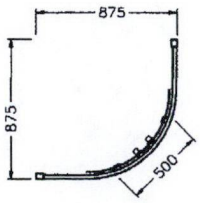
The Milano Door & Return Shower option is designed to fit directly onto a fully tiled floor and wall (tray not included). It features 8mm toughened safety glass which is coated on the interior with premium quality ClearShield® special glass protector so that it stays cleaner for longer and resists staining.



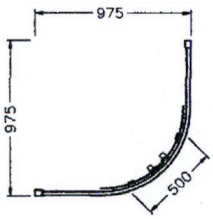
Note: Tapware and accessories illustrated in photography are not included

Shower Options	**Size:** 1000mm x 1000mm, 900mm x 900mm.
Material/Finish	Frame - anodised aluminium. Glass door - 8mm toughened safety glass (AS/NZS 2208 compliant) coated with premium Clearshield.
Included Components	Milano Door and Return Set. (NOTE: Tiles and adhesives not included).
Shower Height	1935mm.

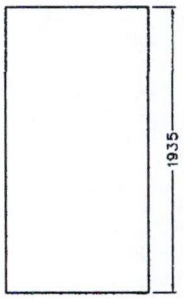
900 x 900



1000 x 1000



Front View (Generic)



Product Codes - 1000mm x 1000mm	
Door / Return Set	98960A-0

Product Codes - 900mm x 900mm	
Door / Return Set	98959A-0

ENGLEFIELD
Trusted in New Zealand Since 1982

New Zealand
133 Diana Drive, Glenfield, Auckland, New Zealand
PO Box 100-146 NSMC, Auckland, 0745
Ph: 0800 100 382 Fax: 0800 66 44 88
www.englefield.co.nz

All measurements shown are in millimetres.
Sizes are approximate.

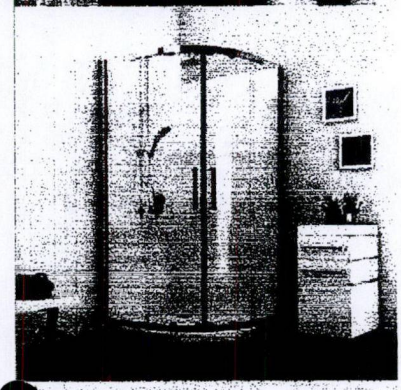
Mar 2013
1213830-A04-A

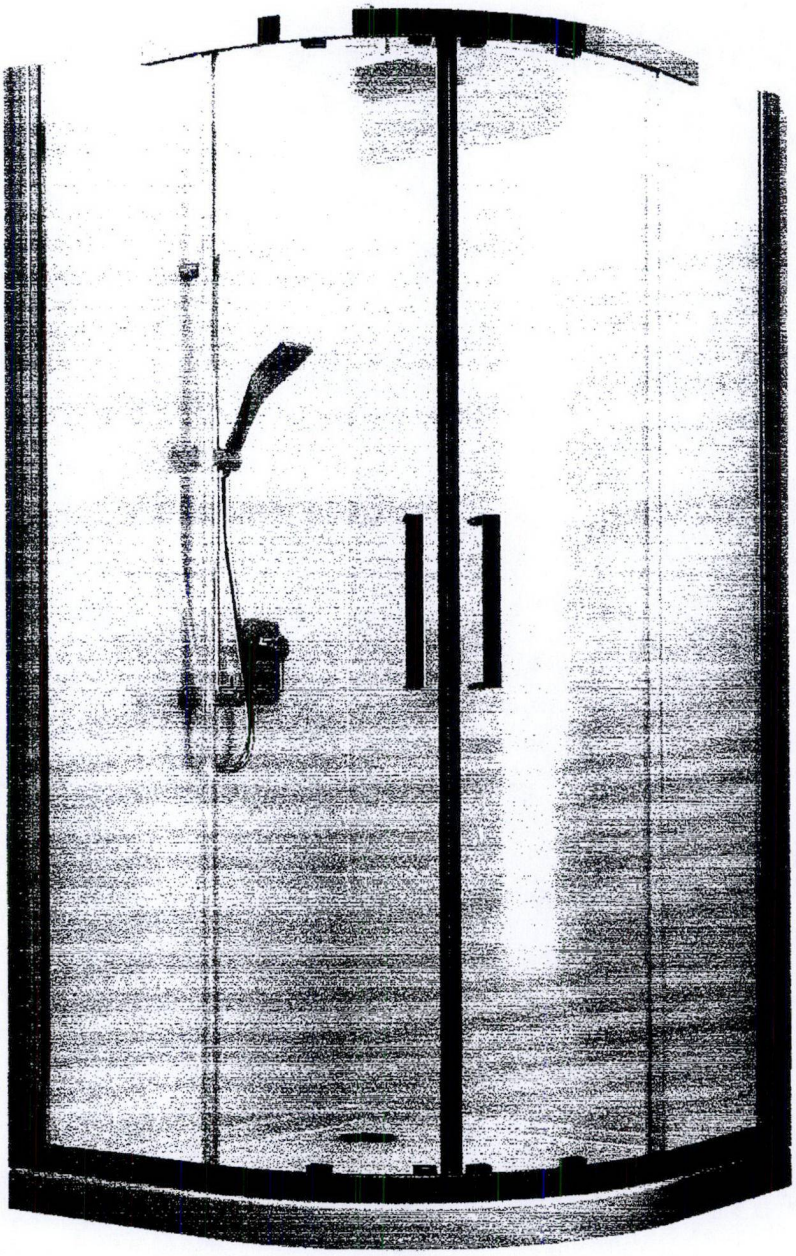
INSTALLATION INSTRUCTIONS

ENGLEFIELD
KOHLER

Trusted in New Zealand Since 1982

SHOWER





Englefield has a history of making superb showers and their popularity is testament to their quality and affordability.

It's the details that Englefield cares about - from pioneering the latest technology, to innovative design, it's all to make your showering experience the very best it can be.

Note: Tapware not included.

1213953-A02-C 04/10/2013

www.englefield.co.nz

BEFORE YOU BEGIN

Before installing the shower please read these instructions carefully to familiarise yourself with the required tools, materials and installation sequences. Please leave these instructions for the consumer after installation. Refer to the separate care and maintenance guide for important care and cleaning information.

Ensure that the shower tray and wall, if applicable, are completely finished prior to installing your shower door and return. Follow all warnings, cautions and instructions contained in this guide.

SAFETY

1. ENGLEFIELD strongly recommends that a minimum of TWO persons install this enclosure due to the weight of the door panels.
2. Toughened safety glass cannot be cut. Risk of injury or product damage.
3. Wear protective footwear when lifting panels.
4. Wear safety glasses when drilling.

ATTENTION

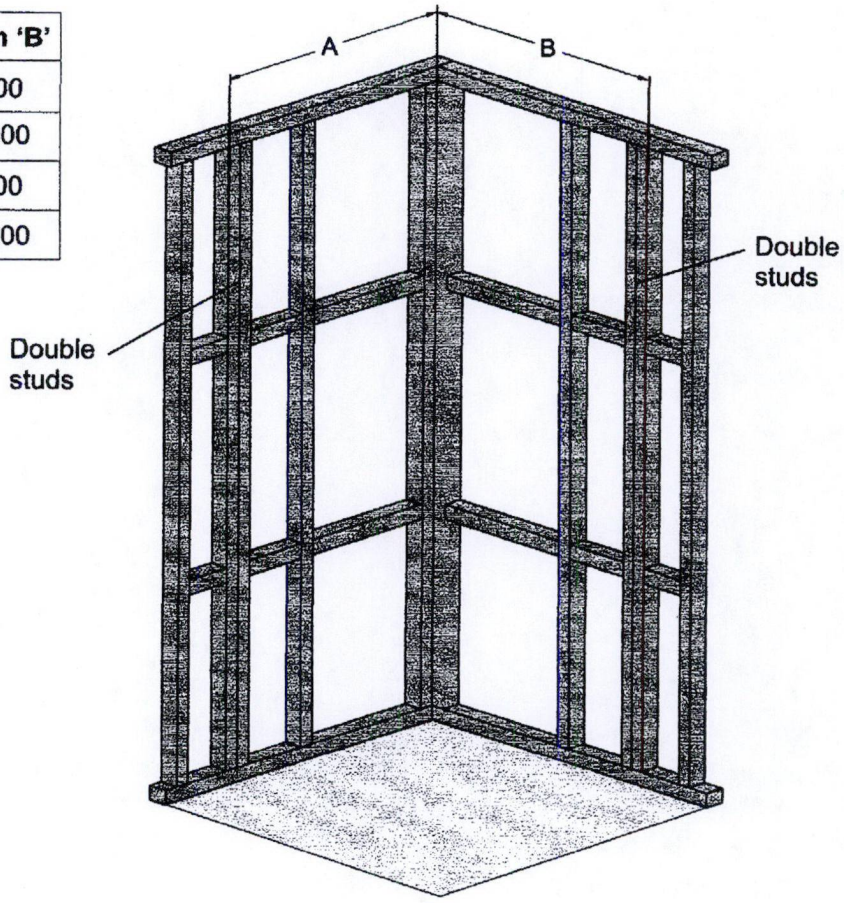
1. The wall retainers must be installed onto waterproof, vertical and flat wall surface. Failure to do so will result in an unsatisfactory seal, which may cause property damage. The wall inclination (out of squareness) is recommended to be out by no more than **+/- 4mm/m**.
2. Please install this door onto an ENGLEFIELD Quick - Fit® Low Profile shower tray only, unless installing directly onto tiled walls and floor.
3. Care must be taken when drilling into walls and floors to avoid any hidden pipes or wires.
4. It is the responsibility of the INSTALLER to ensure that the installation complies with council and or local authority bylaws.

CONSTRUCTION REQUIREMENTS

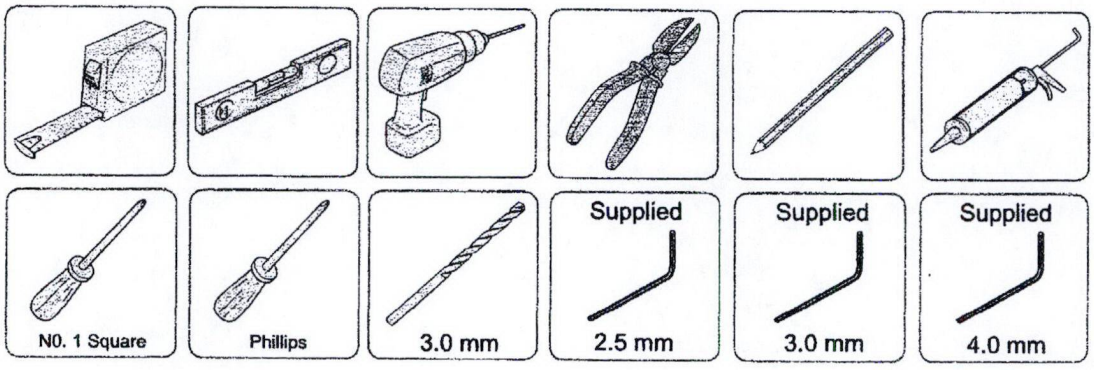
ATTENTION

Due to the weight of the glass panels Englefield strongly recommends constructing double studs (as below) to fix the wall retainers to.

Size	Dim 'A'	Dim 'B'
900 x 900	900	900
1000 x 1000	1000	1000
1200 x 900 LH	1200	900
1200 x 900 RH	900	1200

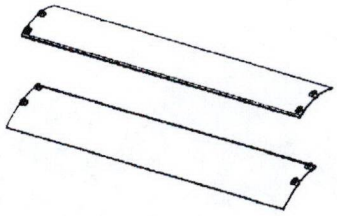


TOOLS AND MATERIALS REQUIRED



PARTS IDENTIFICATION

Door Pack

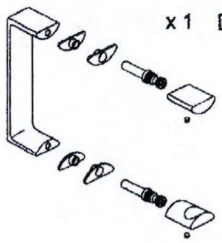


x 1 Door Panel (RH)

x 1 Door Panel (LH)

x 2 Extrusion - Door edge seal

Door Handle Pack x 2

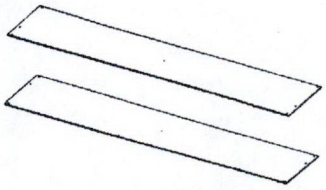


x 1 Door Handle

x 1 Allen key - 2.5mm

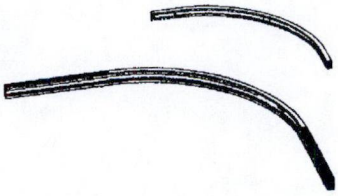
x 1 Allen key - 4mm

Return Pack



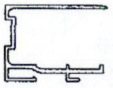
x 1 Return Panel (RH)

x 1 Return Panel (LH)



x 1 Extrusion - Top rail

x 1 Extrusion - Bottom rail



x 2 Extrusion - Return wall retainer

x 2 Extrusion - Wall retainer cover

x 1 Extrusion - Return glass retainer (RH)

x 1 Extrusion - Return glass retainer (LH)

x 1 Extrusion - Glazing gasket

x 2 Extrusion - Return edge seal

Hardware Pack

x 1 Cover - Return wall retainer (LH)

x 1 Cover - Return wall retainer (RH)

x 2 Cover - Return extrusion

x 2 Extrusion - Top rail backing plate

x 2 End cap

x 1 T end cap (RH)

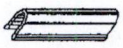
x 2 Glass fixing insert

x 1 T end cap (LH)

x 8 PVC grommet - Return glass

x 2 PVC bumper

x 2 Roller bumpers



x 8 White retainer cover inserts

x 1 Allen key - 3mm

x 12 PAN screw - ST 3.5 x 35mm

x 4 PAN screw - ST 3.9 x 12mm

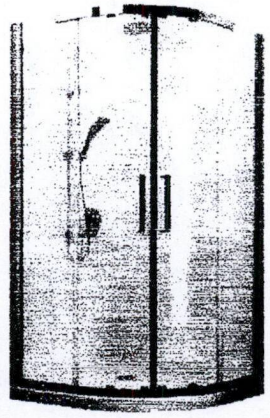
x 8 CSK screw - ST 3.5 x 10mm

x 2 CSK screw - ST M5 x 16mm

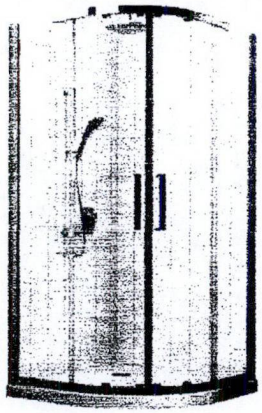
x 2 CSK screw - ST M5 x 12mm

1 - INSTALLATION - Options

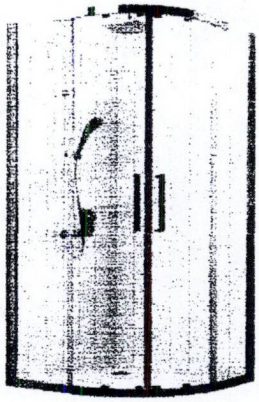
OPTION 1
Acrylic Wall & Tray



OPTION 2
Tiled Wall & Acrylic Tray



OPTION 3
Tiled Wall & Floor



OPTION 1 - Acrylic Wall & Tray

Tray: For tray installation refer to the instructions supplied with the tray.

Wall: For wall installation refer to the instructions supplied with the wall.

- Proceed to Section 2 - Door and return installation.

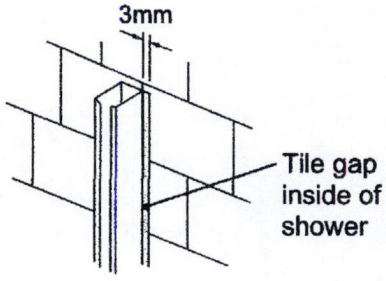
OPTION 2 - Tiled Wall & Acrylic Tray

Tray: For tray installation please refer to the instructions supplied with the tray.

Wall:
- The vertical wall retainers **MUST** be installed onto the waterproof membrane **PRIOR TO WALL TILING**. If possible the complete door system should be installed onto the waterproof membrane prior to wall tiling.

CAUTION: Failure to install the wall retainers first may mean the door system may not fit on the shower tray due to the tile thickness.

- If not installing the complete door system prior to tiling make sure to leave a 3mm gap between the wall retainer extrusion and the tiles on the inside of the shower to allow for wall retainer cover extrusion. Refer to image.



- Proceed to Section 2 - Door and return installation.

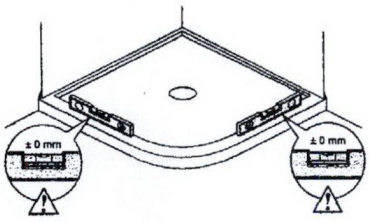
OPTION 3 - Tiled Wall & Floor

- The door and return can be installed directly onto the wall and floor tiles.

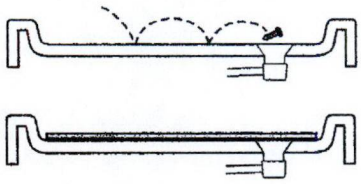
- Proceed to Section 2 - Door and return installation.

2 - INSTALLATION

Caution: Ensure tray or tiled floor is level & walls are vertical & square.



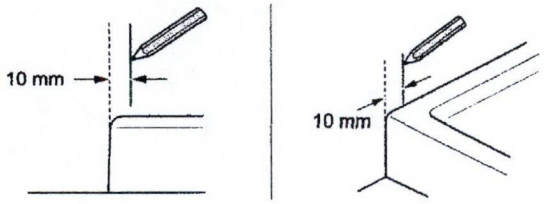
Tip: Cover the waste to prevent the loss of small parts. If installing onto a tray protect the tray surface during installation.



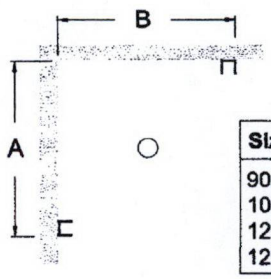
2.1 Wall Retainers

(a) Mark the locations of the wall retainers.

For tray base option:
- Mark 10mm in from top edge of tray.

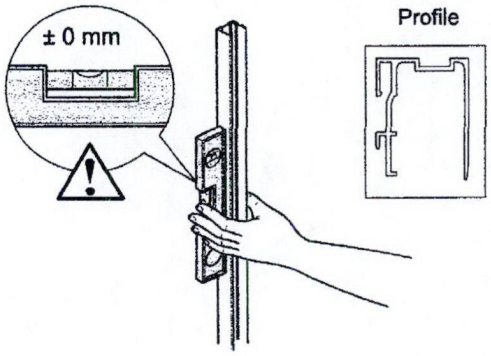


For tiled base option:
- Mark from finished wall to outer edge of retainer.

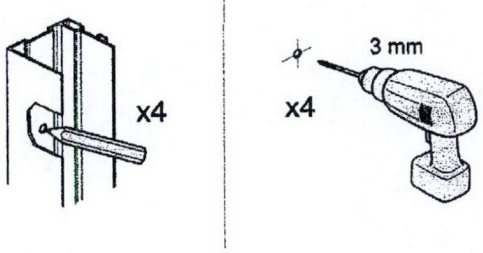


Size	A	B
900 x 900	875	875
1000 x 1000	975	975
1200 x 900 LH	1175	975
1200 x 900 RH	975	1175

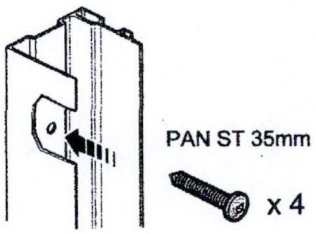
(b) Position a wall retainer on a wall with flat side facing outwards. Use a level to make sure it is upright. (This is critical to ensure correct operation of the door).



(c) Mark position of fixing holes, then remove wall retainer and drill holes using an appropriate 3mm drill bit (not supplied).



(e) Fix wall retainer to wall using 4 pan screws (supplied).

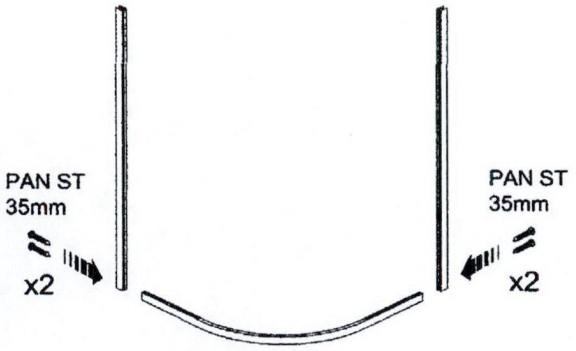


(f) Repeat steps (b) to (e) for other wall retainer.

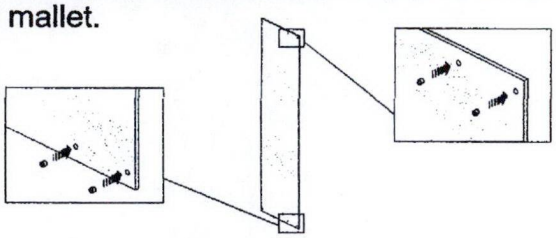
2.2 Return Assembly

This part of the installation is done away from shower location.

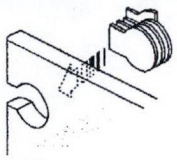
(a) Fix the return extrusions to the bottom rail using 2 screws (supplied) per side.
Tip: Once return extrusions are fixed to bottom rail lean them against a wall.



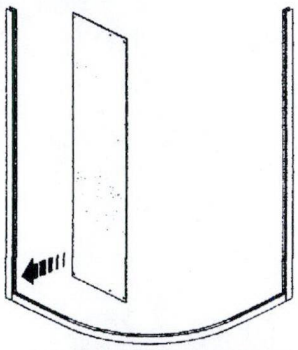
(b) Insert grommets into 4 return panel holes.
Tip: Place glass onto a soft flat surface & gently tap with a block of wood & a rubber mallet.



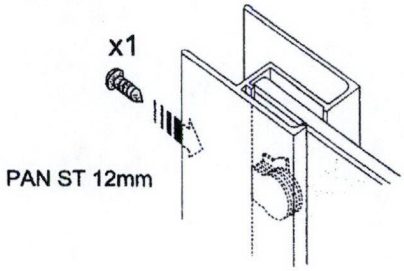
(c) Slot one glass fixing insert into top slot of a return glass panel. (Note orientation).



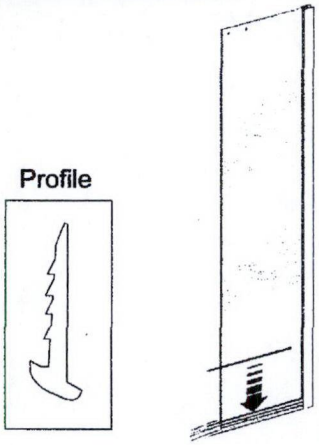
(d) Slot return glass panel into return extrusion and bottom rail.
(Note orientation).



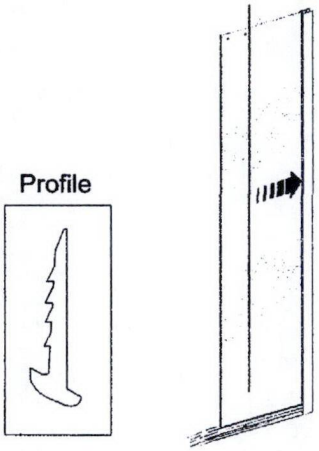
(e) Fix in place with pan screw (supplied) by screwing through extrusion into glass fixing insert.



(f) On inside of shower insert glazing gasket between glass and bottom rail, with flat side touching glass panel .
Tip: Lubricating seal with soapy water will help with installation.



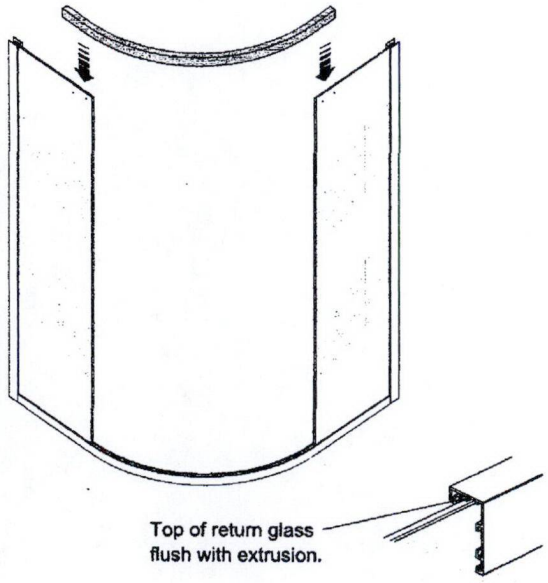
(g) On inside of shower insert glazing gasket between glass and extrusion, with flat side touching glass panel.
Tip: Lubricating seal with soapy water will help with installation.



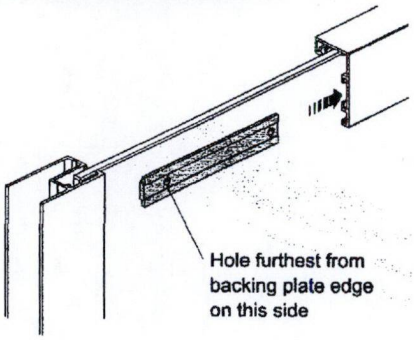
(h) Repeat steps (b) to (g) for other return.

2.3 Top Rail Assembly

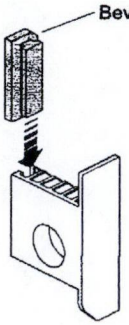
(a) Place top rail onto both return glass panels as shown below. Make sure glass is properly inserted into rail. Top of return glass should be flush with extrusion.



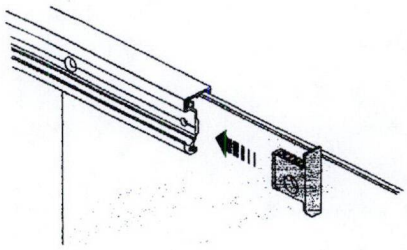
(b) Insert backing plate into outside end of top rail. Note orientation.



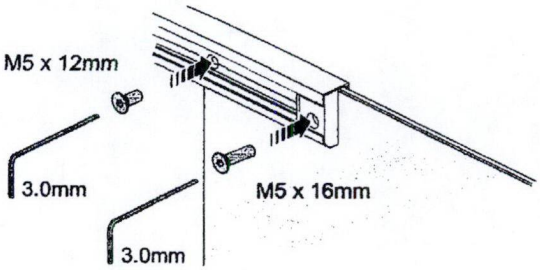
(c) Insert PVC bumper into T end cap. Note orientation.



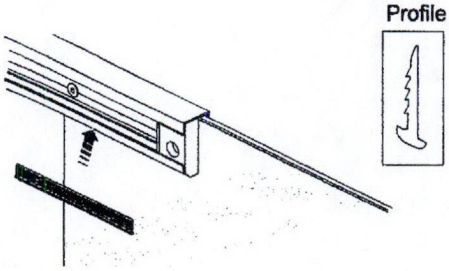
(c) Insert T end cap with bumper into end of top rail on inside of shower. Note orientation.



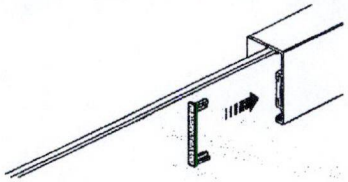
(d) Make sure holes align properly and insert 16mm hex screw into T end cap and 12mm hex screw into top rail. Loosely tighten.



(e) Insert gasket inbetween glass and top rail with flat side touching glass.



(e) Tap end cap into outside of top rail using a wooden block and soft mallet.



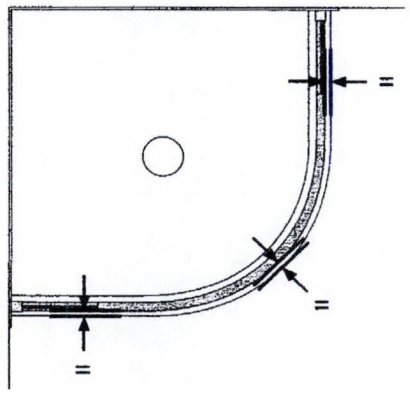
(f) Tighten screws. DO NOT overtighten.

(g) Repeat steps (b) to (f) for other end of rail.

2.4 Frame Installation

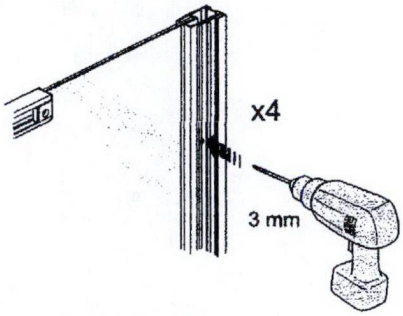
(a) Carefully lift the entire frame and move into position onto tray or tile floor. **CAUTION: This is a 2 person lift.**

Slide return extrusions into wall retainers. For tray installations ensure distance from edge of tray to frame extrusions is equal.

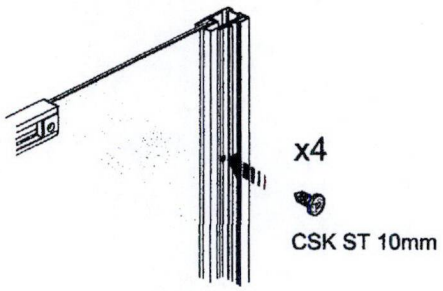


IMPORTANT: Make sure top rail is level and is still flush with return glass.

(b) Drill 4 x 3mm holes from inside of shower enclosure in return extrusion through pre-drilled holes in wall retainer.



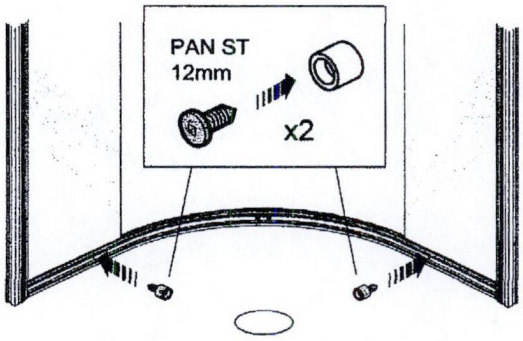
(c) Fix extrusion to wall retainer with countersunk screws (supplied).



(d) Repeat steps (c) to (d) for other wall retainer and return extrusion.

2.5 Lower Door Bumpers

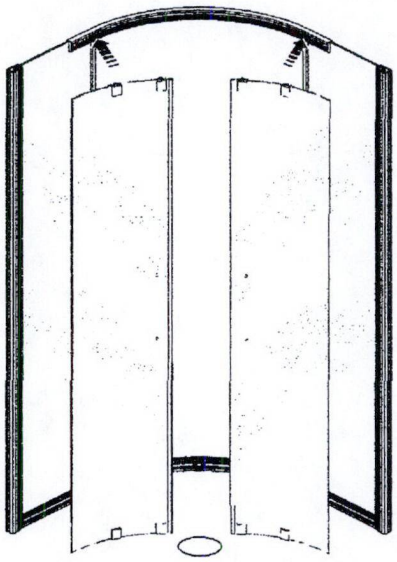
(a) Insert pan screws into bumpers and screw into bottom rail.



View from inside of shower

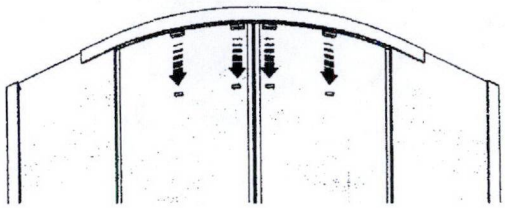
2.6 Door Installation

(a) Hang both doors on top rail from unsprung rollers on inside. Press down button on bottom rollers to allow bottom rollers to clamp onto bottom rail.

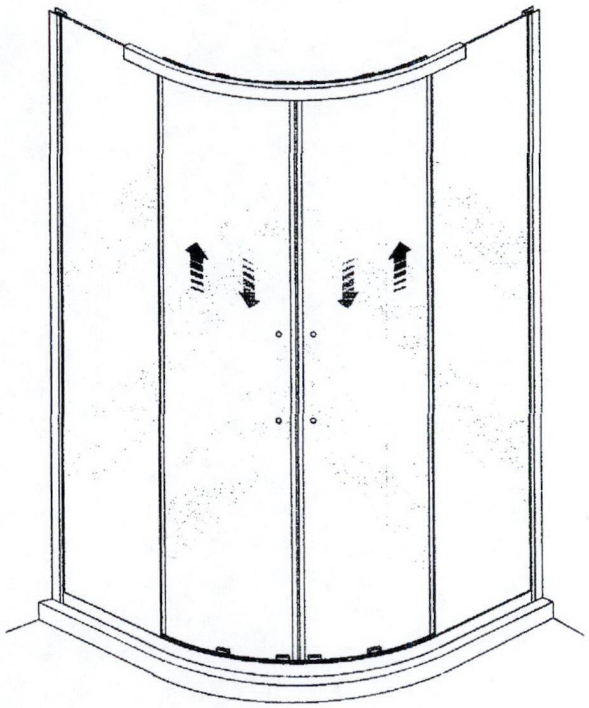


View from inside of shower

(b) To adjust doors up or down remove caps from underside of top rollers to allow access to adjusting screws.



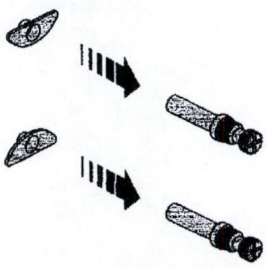
(c) Adjust doors up or down as necessary. When doors are level adjust both doors upwards evenly to lock them in place.



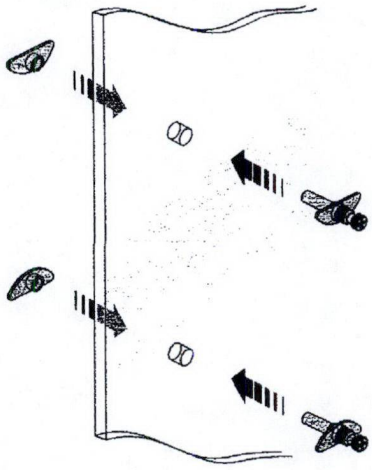
(d) Replace caps

2.7 Door Handles

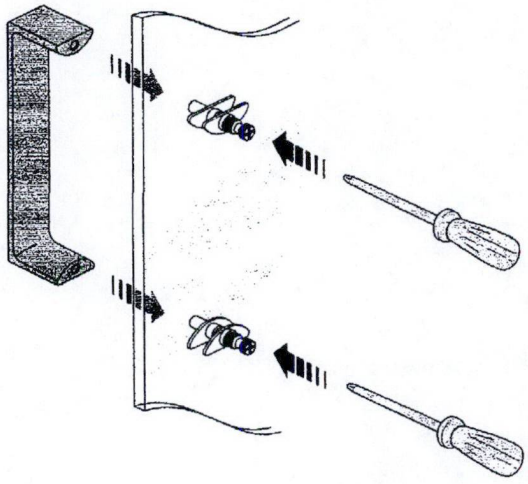
(a) Place a clear plastic washer onto threaded side of each spline. Note orientation.



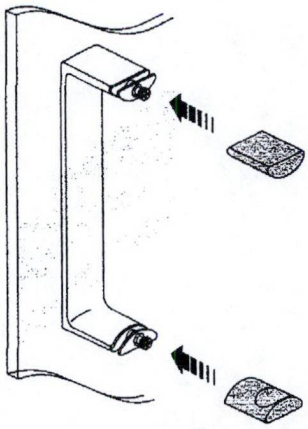
(b) Insert splines into holes in glass door from inside of shower and place a second clear plastic washer onto each spline. Note orientation.



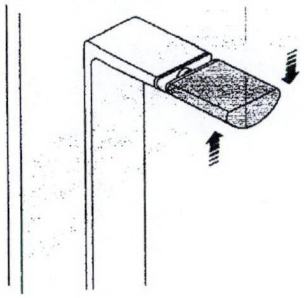
(c) Screw splines tightly into handle.



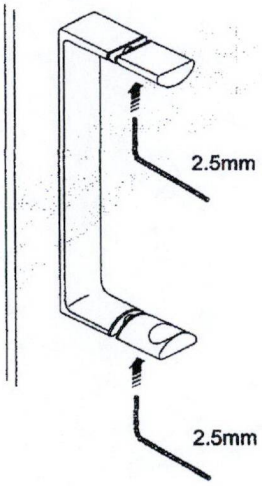
(d) Slide knobs onto splines. Grub screw holes must face down. Note orientation.



(e) If necessarry carefully twist inside handles to align with outside handle.



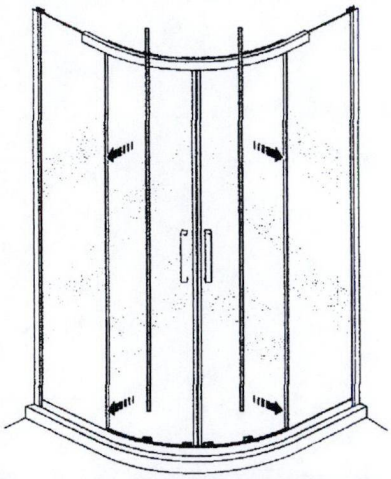
(f) Tighten inside handle grub screws using allen key (supplied).



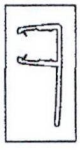
(g) Repeat (a) to (f) for other handle.

2.8 Drip seal installation

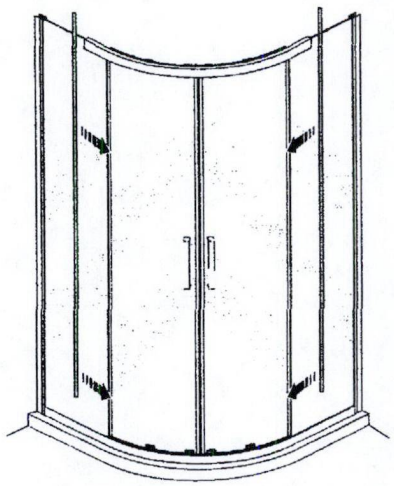
(a) Install seals on edges of return glass. Tail must face inside of shower.



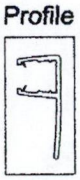
Profile



(b) Install seals on edges of door glass. Tail must face outside of shower.



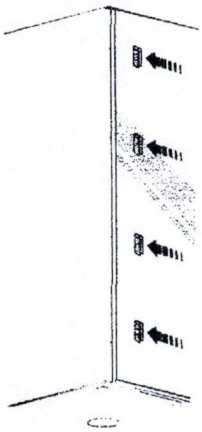
Profile



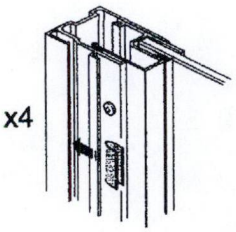
(c) Trim top edge of seal tail to same height as return seal to make clearance for rail.

2.9 Covers & Caps

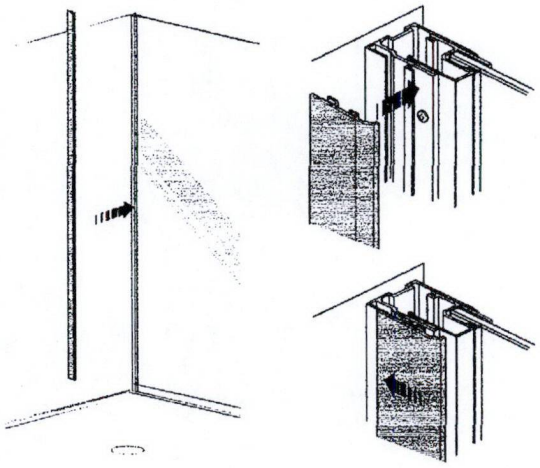
(a) Install 4 x retainer cover panel clips in return wall retainer.



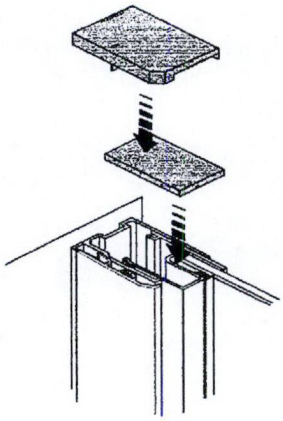
x4



(b) Install retainer cover panel on wall retainer. Place cover against retainer, then slide towards wall to clip in place. If necessary place a piece of wood against the cover and tap gently with a soft hammer.



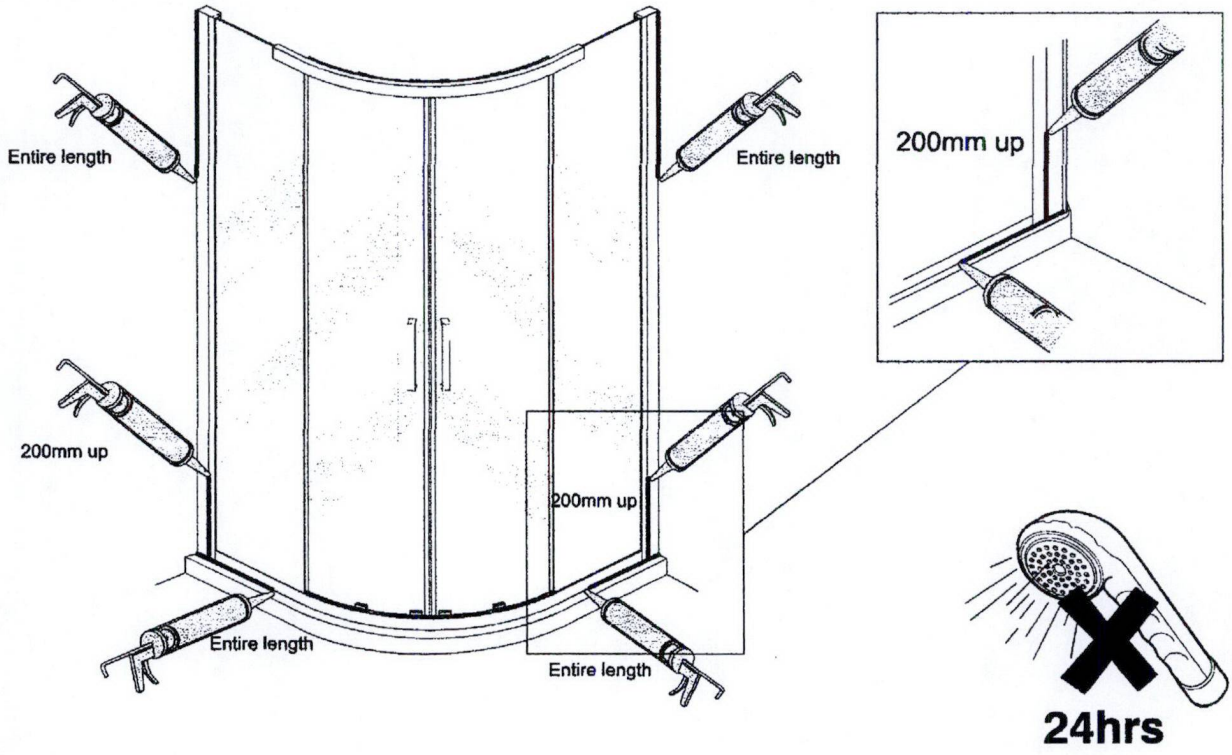
(c) Place 2 caps on top of the wall retainer. Note orientation. Top caps are handed. Below shows the right hand wall retainer. Apply a small bead of silicone to secure if necessary.



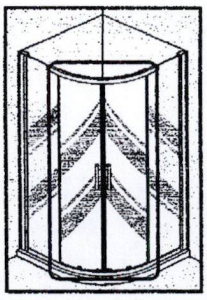
(d) Repeat steps (a) to (c) for other wall retainer.

2.10 Shower Sealing

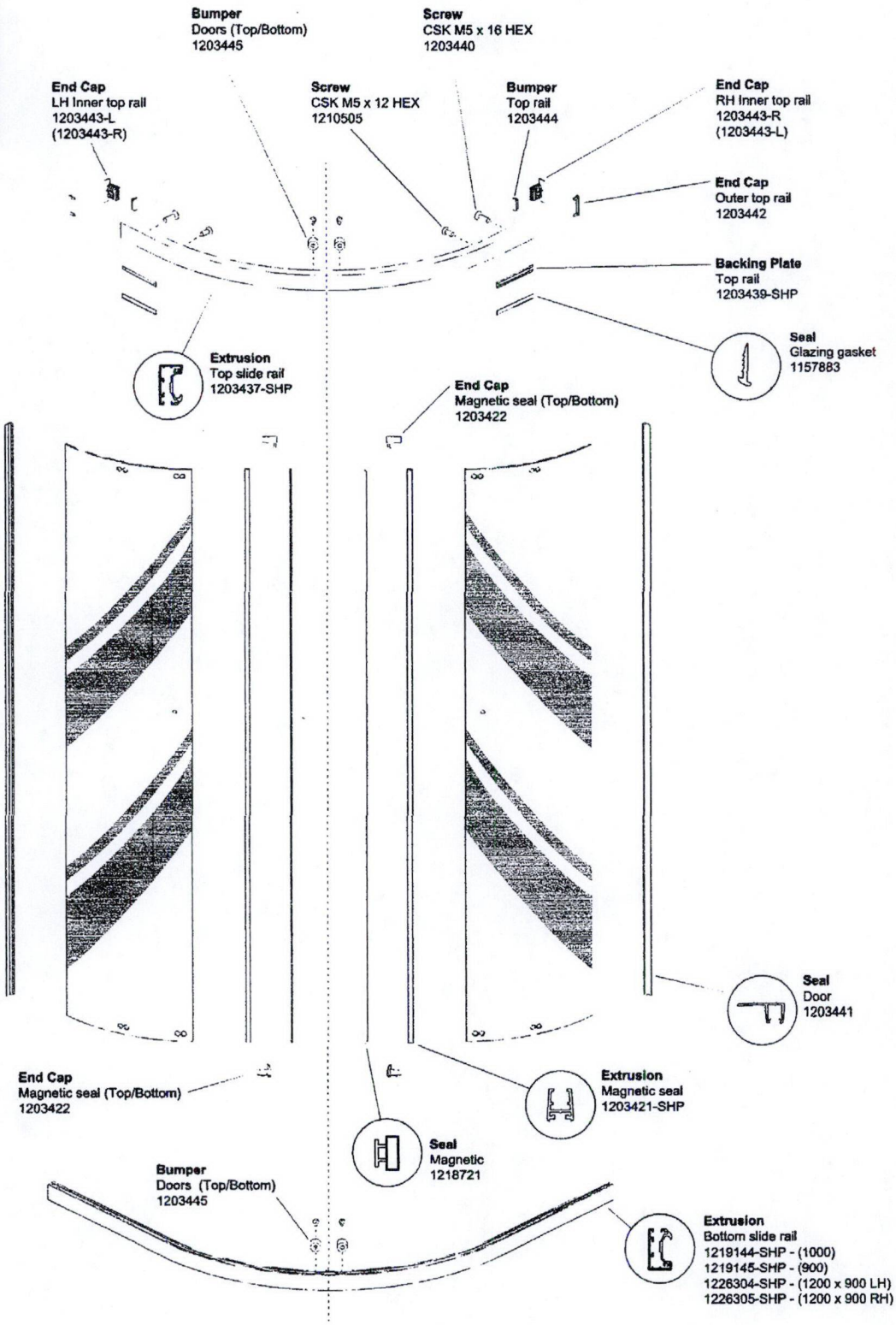
(a) Apply sealant (supplied) in accordance with the sealant manufacturers instructions along the outside surfaces of the door frame only. Allow the sealant to cure for 24 hours before use.

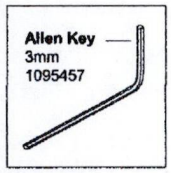


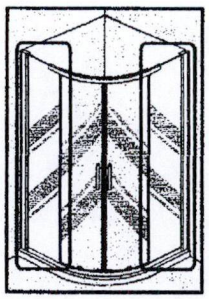
SPARE PARTS



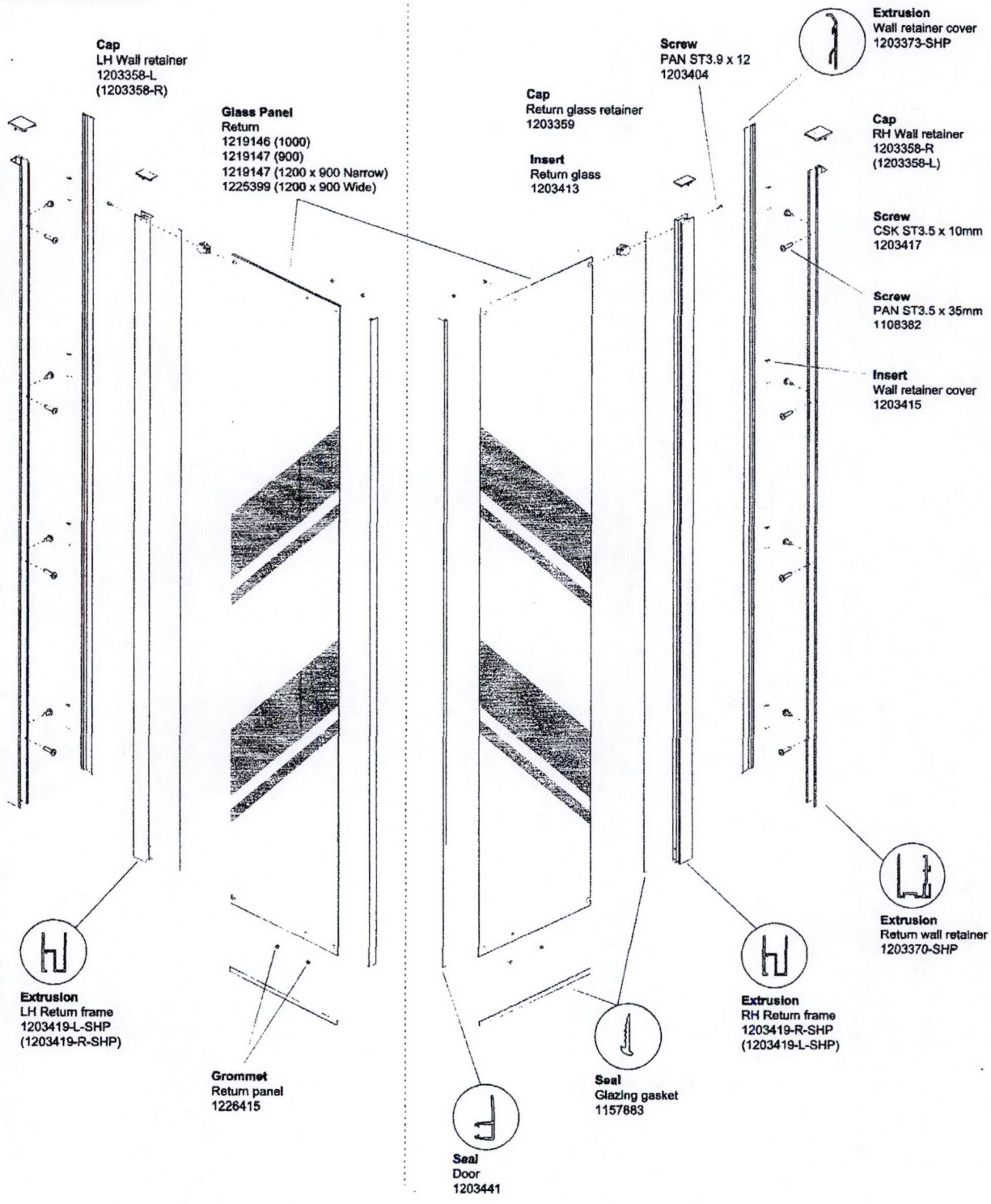
Doors

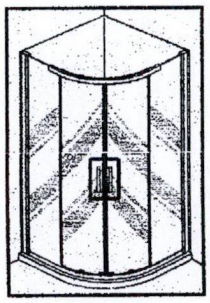






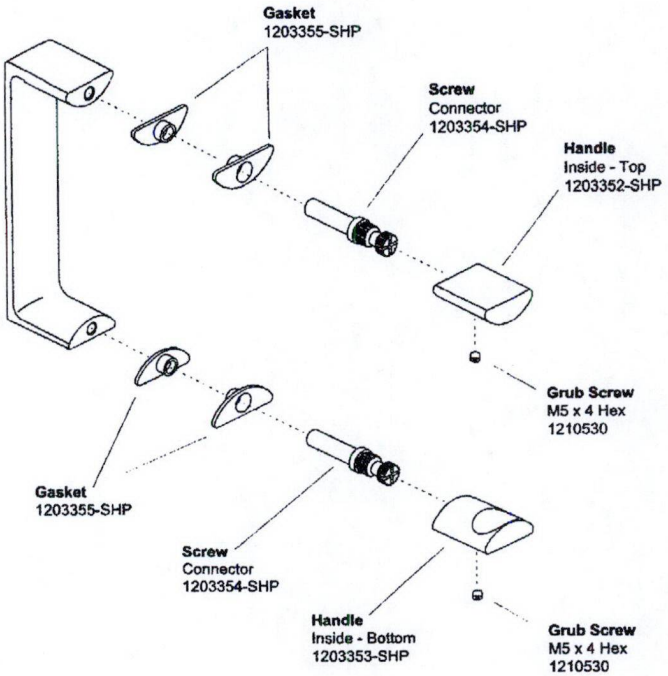
Returns

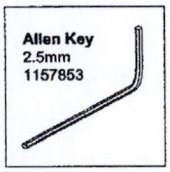

Cap
LH Wall retainer
1203358-L
(1203358-R)
Glass Panel
Return
1219146 (1000)
1219147 (900)
1219147 (1200 x 900 Narrow)
1225399 (1200 x 900 Wide)
Cap
Return glass retainer
1203359
Insert
Return glass
1203413
Screw
PAN ST3.9 x 12
1203404
Extrusion
Wall retainer cover
1203373-SHP
Cap
RH Wall retainer
1203358-R
(1203358-L)
Screw
CSK ST3.5 x 10mm
1203417
Screw
PAN ST3.5 x 35mm
1108382
Insert
Wall retainer cover
1203415
Extrusion
Return wall retainer
1203370-SHP
Extrusion
LH Return frame
1203419-L-SHP
(1203419-R-SHP)
Grommet
Return panel
1226415
Seal
Door
1203441
Seal
Glazing gasket
1157883
Extrusion
RH Return frame
1203419-R-SHP
(1203419-L-SHP)

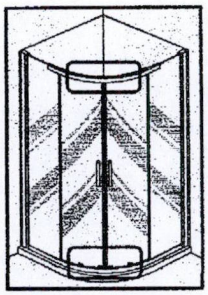


Handle

Handle Assembly - All
1203350-SHP

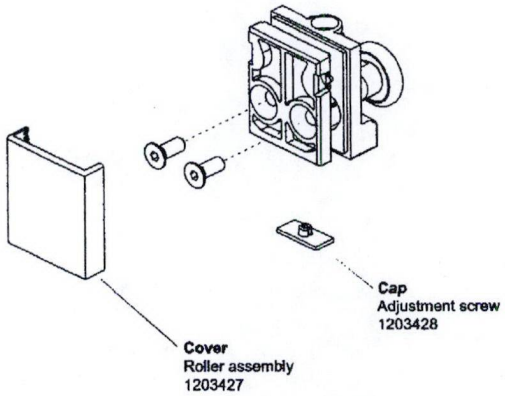


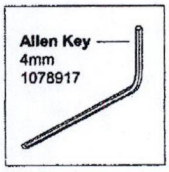




Rollers

Roller Assembly
1203483-SHP (Top rollers)
1203423-SHP (Bottom rollers)





CLEANING INSTRUCTIONS

Please refer to the Home Owner's Guide for cleaning instructions.

CONTACT AND WARRANTY INFORMATION

NEW ZEALAND
KOHLER NZ LTD

Free Ph: 0800 100 382
Free Fax: 0800 664 488
www.englefield.co.nz

AUSTRALIA
KOHLER CO.

Free Ph: 1 800 ENGLEFIELD
(1 800 364 533)
www.englefield.com

For warranty information, please visit our website

ENGLEFIELD
KOHLER

Trusted in New Zealand Since 1982

PRODUCER STATEMENT

Statement of Building Code compliance

VELUX Skylights sold in New Zealand comply with the performance requirements of New Zealand Building Code Clauses as shown below.

Scope of use

VELUX Skylights must be used as directed in VELUX Technical Information available in product brochure, CAD/PDF drawings, specification clauses, installation instructions and maintenance guide.

New Zealand Building Code Clauses		Compliance Documents	Updated: 11 March 2015
B2/AS1	Durability	B2.3.1(b) AS4285	15 years. 10 year guarantee on all VELUX skylights. VELUX Skylights satisfy the durability requirements specified for Non-structural Roof Cladding elements and External Window/Door Joinery. VELUX Skylights have passed tests for weather tightness, concentrated load, non-cyclonic and cyclonic wind pressures according to Australian Skylight Standard AS4285 test methods.
C3*	Protection from Fire	AS1530	VELUX Skylights have been classified as "non-combustible" according to AS 1530 test methods.
E2	External Moisture	AS4285	VELUX Skylights have passed tests for weather tightness, concentrated load, non-cyclonic and cyclonic wind pressures according to Australian Skylight Standard AS4285 test methods.
F2	Hazardous Building Materials	NZS4223 AS/NZS4666	VELUX Skylights comply with requirements for sloped Insulating Glass Units.
G4/AS1	Natural Ventilation (1.2, 2.1)		VELUX Opening Skylights can be used to meet the G4 Natural Ventilation requirements.
G7	Natural Light		VELUX Skylights can be used to meet the G7 Natural Light requirements.
H1	Energy Efficiency	NZS4218	VELUX Skylights exceed the minimum R-value requirements for skylights in all climate zones.

*C3 excludes VELUX Sun Tunnels and Low Pitch Opening Skylights

VELUX.

technical data

skylights

FS – fixed skylight

(Installed pitch 15°– 90°)

SIZE CODES		FS C01	FS C04	FS M04	FS M08	FS S01	FS S06
External frame dimensions mm (wxh)		550 x 700	550 x 980	780 x 980	780 x 1400	1140 x 700	1140 x 1180
R-value complete unit incl frame (m^2 K/W)	1	0.53	0.53	0.53	0.53	0.53	0.53
Solar Heat reduction in %	2	74%	74%	74%	74%	74%	74%
UV light reduction in %	3	95%	95%	95%	95%	95%	95%
Sound reduction in db		29 db	29 db	29 db	29 db	29 db	29 db
Daylight area in m^2		0.28m^2	0.41m^2	0.62m^2	0.91m^2	0.64m^2	1.15m^2

VS – opening skylight

(Installed pitch 15°– 90°)

SIZE CODES		VS C04	VS M04	VS M08	VS S01	VS S06
External frame dimensions mm (wxh)		550 x 980	780 x 980	780 x 1400	1140 x 700	1140 x 1180
R-value complete unit incl frame (m^2K/W)	1	0.53	0.53	0.53	0.53	0.53
Solar Heat reduction in %	2	77%	77%	77%	77%	77%
UV light reduction in %	3	95%	95%	95%	95%	95%
Sound reduction in db		29 db	29 db	29 db	29 db	29 db
Daylight area in m^2		0.33 m^2	0.51 m^2	0.78 m^2	0.52 m^2	1.00 m^2
Ventilation with open sash in m^2		0.33 m^2	0.39 m^2	0.49 m^2	0.40 m^2	0.54 m^2

VSE – INTEGRA® electric skylight / VSS – INTEGRA® SOLAR skylight

(VSE Installed pitch 15°– 90°, VSS Installed pitch 15°– 60°)

SIZE CODES		VSE/S C04	VSE/S M04	VSE/S M08	VSE/S S01	VSE/S S06
External frame dimensions mm (wxh)		550 x 980	780 x 980	780 x 1400	1140 X 700	1140 x 1180
R-value complete unit incl frame (m^2 K/W)	1	0.50	0.50	0.50	0.50	0.50
Solar Heat reduction in %	2	77%	77%	77%	77%	77%
UV light reduction in %	3	99%	99%	99%	99%	99%
Sound reduction in db		29 db	29 db	29 db	29 db	29 db
Daylight area in m^2		0.33 m^2	0.51 m^2	0.78 m^2	0.52 m^2	1.00 m^2
Ventilation with open sash in m^2		0.33 m^2	0.39 m^2	0.49 m^2	0.40 m^2	0.54 m^2

low-pitch skylights

FCM – low-pitch fixed skylight

(Installed pitch 0°– 60°)

SIZE CODES		FCM 2222	FCM 2246	FCM 2270	FCM 3030	FCM 3434	FCM 4646
Actual Skylight dimensions mm		692 x 692	692 x 1302	692 x 1911	895 x 895	997 x 997	1302 x 1302
Outside Curb dimensions mm		648 x 648	648 x 1257	648 x 1867	851 x 851	952 x 952	1257 x 1257
Finished Inside Curb dimensions mm		572 x 572	572 x 1181	572 x 1791	775 x 775	876 x 876	1181 x 1181
R-value complete unit incl frame (m^2 K/W)	1	0.45	0.45	0.45	0.45	0.45	0.45
Solar Heat reduction in %	2	74%	74%	74%	74%	74%	74%
UV light reduction in %	3	95%	95%	95%	95%	95%	95%
Sound reduction in db		29 db	29 db	29 db	29 db	29 db	29 db
Daylight area in m^2		0.33 m^2	0.67 m^2	1.02 m^2	0.60 m^2	0.77 m^2	1.39 m^2

VCM – low-pitch opening skylight

(Installed pitch 0°– 60°)

SIZE CODES		VCM 2222	VCM 2246	VCM 3030	VCM 4646
Actual Skylight dimensions mm		692 x 692	692 x 1302	895 x 895	1302 x 1302
Outside Curb dimensions mm		648 x 648	648 x 1257	851 x 851	1257 x 1257
Finished Inside Curb dimensions mm		572 x 572	572 x 1181	775 x 775	1181 x 1181
R-value complete unit incl frame (m^2 K/W)	1	0.42	0.42	0.42	0.42
Solar Heat reduction in %	2	76%	76%	76%	76%
UV light reduction in %	3	95%	95%	95%	95%
Sound reduction in db		29 db	29 db	29 db	29 db
Daylight area in m^2		0.24 m^2	0.55 m^2	0.49 m^2	1.22 m^2
Ventilation with open sash in m^2		0.30 m^2	0.48 m^2	0.42 m^2	0.66 m^2

NOTE: INTEGRA® Skylights, Blinds and Controls operate at radio frequency of 2.4GHz

VELUX

technical data

low-pitch skylights

VCS – low-pitch INTEGRA® SOLAR skylight

(Installed pitch 0°– 60°)

SIZE CODES		VCS 2222	VCS 2246	VCS 3030	VCS 4646
Actual Skylight dimensions mm		692 x 692	692 x 1302	895 x 895	1302 x 1302
Outside Curb dimensions mm		648 x 648	648 x 1257	851 x 851	1257 x 1257
Finished Inside Curb dimensions mm		572 x 572	572 x 1181	775 x 775	1181 x 1181
R-value complete unit incl frame (m^2 K/W)	1	0.40	0.40	0.40	0.40
Solar Heat reduction in %	2	76%	76%	76%	76%
UV light reduction in %	3	99%	99%	99%	99%
Sound reduction in db		29 db	29 db	29 db	29 db
Daylight area in m^2		0.24 m^2	0.55 m^2	0.49 m^2	1.22 m^2
Ventilation with open sash in m^2		0.30 m^2	0.48 m^2	0.42 m^2	0.66 m^2

roof windows

GGU – roof window, EVERFINISH

(Installed pitch 15°– 90°)

SIZE CODES		GGU CK02	GGU CK04	GGU MK04	GGU MK06	GGU MK08	GGU SK06	GGU SK08
External frame dimensions mm (wxh)		550 x 780	550 x 980	780 x 980	780 x 1180	780 x 1400	1140 x 1180	1140 x 1400
R-value complete unit incl frame (m^2K/W)	1	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Solar Heat reduction in %	2	70%	70%	70%	70%	70%	70%	70%
UV light reduction in %	3	95%	95%	95%	95%	95%	95%	95%
Sound reduction in db	4	*35 db*	*35 db*	*35 db*	*35 db*	*35 db*	*35 db*	*35 db*
Daylight area in m^2		0.21 m^2	0.29 m^2	0.47 m^2	0.59 m^2	0.72 m^2	0.94 m^2	1.15 m^2
Ventilation with open sash in m^2		0.32 m^2	0.38 m^2	0.57 m^2	0.72 m^2	0.86 m^2	1.08 m^2	1.36 m^2
Ventilation through vent-flap in m^2		0.004 m^2	0.004 m^2	0.007 m^2	0.007 m^2	0.007 m^2	0.010 m^2	0.010 m^2

GGL – roof window, timber-finish

(Installed pitch 15°– 90°)

SIZE CODES		GGL CK04	GGL MK04	GGL MK06	GGL MK08	GGL SK06
External frame dimensions mm (wxh)		550 x 980	780 x 980	780 x 1180	780 x 1400	1140 x 1180
R-value complete unit incl frame (m^2K/W)	1	0.83	0.83	0.83	0.83	0.83
Solar Heat reduction in %	2	70%	70%	70%	70%	70%
UV light reduction in %	3	95%	95%	95%	95%	95%
Sound reduction in db	4	35 db	35 db	35 db	35 db	35 db
Daylight area in m^2		0.29 m^2	0.47 m^2	0.59 m^2	0.72 m^2	0.94 m^2
Ventilation with open sash in m^2		0.38 m^2	0.57 m^2	0.72 m^2	0.86 m^2	1.08 m^2
Ventilation through vent-flap in m^2		0.004 m^2	0.007 m^2	0.007 m^2	0.007 m^2	0.010 m^2

sun tunnels

TWF/TWR/TLR – sun tunnel

(Installed pitch 15°– 60°), TCR (Installed pitch 0°– 60°)

SIZE CODES		0K10	0K14
Internal diameter dimensions in mm		250	350
R-value complete unit (m^2K/W)	1	0.45	0.45
UV light reduction in %	3	95%	95%

Values are determined according to the following standards:

	MODELS	roof windows	skylights	sun tunnels
1	Thermal resistance of complete unit	EN ISO 12567-2	NFRC 100	NFRC 100
2	Solar Heat reduction in %	EN 410	NFRC 200	
3	UV light reduction	EN 410	NFRC 300	VELUX internal tests
4	Sound reduction of complete unit in dB	EN ISO 10140-2		
5	Air tightness	EN 1026		

Flashings for VELUX skylights – some clarification

There has been a misconception that should a VELUX skylight be installed with an alternative flashing to the VELUX flashing kit the company would not warrant the window. This is not the case.

It's not common knowledge that if roofers provide their own flashings for a VELUX skylight this will not invalidate the warranty. Provided the roofer's flashing is correctly installed in accordance with the building code and is weathertight then Velux has no issue if an installer chooses to provide an alternative flashing to the VELUX flashing kit.

In discussions recently between RANZ President, Mark Bishop and VELUX National Sales Manager in Australia and New Zealand, Robert Cussigh, it became clear that issues around VELUX windows needed to be better communicated.

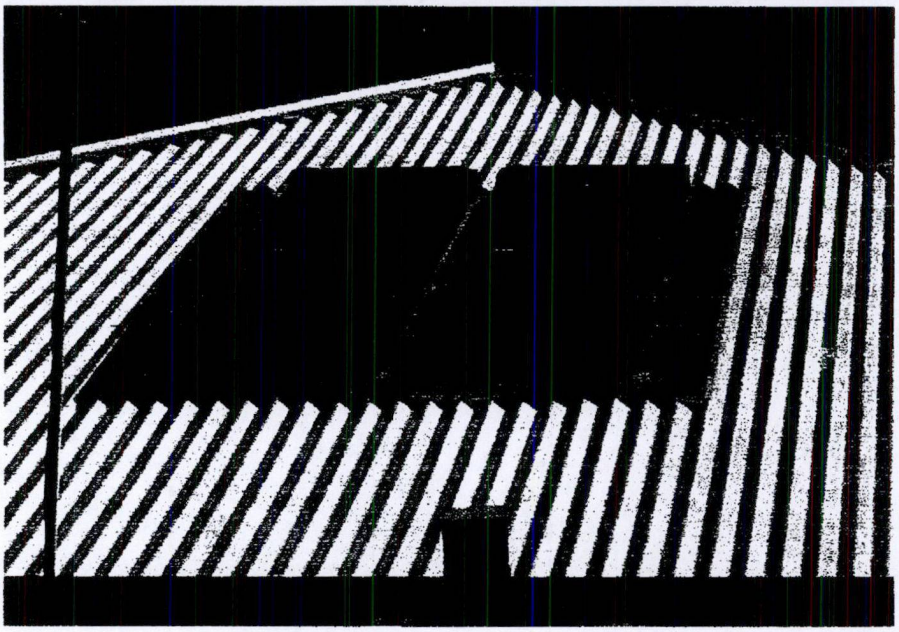
When it comes to installing VELUX skylights on metal roofs, which make up the majority of installations in New Zealand, many installers have opted to provide their own, alternative flashings, but some RANZ members do not know that this is acceptable.

VELUX accepts there are different ways to effectively flash their skylight and the company "has no issue – providing the flashing provided is compliant and watertight". Importantly the use of the roofer's own flashings will not invalidate the warranty if the flashings perform as intended.

Robert Cussigh says the company will more widely communicate this approach within the roofing sector. There have been problems with the VELUX flashing on long run contracts because the roofer usually has to join the roof sheet to accommodate the VELUX flashing and this can cause a bulge where the roofing meets the apron.

Robert says in Australia, installers of long run roofing have been opting to use their own flashings for some time and this has been widely accepted, whereas for concrete and clay tile roofs, metal tiles and shingles, the VELUX skylight flashing kit works well, as it does in New Zealand.

While it is not mandatory, the company prefers installers to be LBPs which is an additional assurance on the skill and quality of the workmanship. Their recommended installers are all LBPs.



VELUX has a dedicated technical department in New Zealand with representatives available to visit sites when required and training sessions can also be arranged in Auckland, Wellington and Christchurch.

And RANZ members should not forget they have a valuable tool at their disposal too – the RANZ How-to Guide on Penetrations covers flashings for skylights (not specifically the VELUX skylight) in some detail – a good reference source for roofers to ensure they are doing it right.

VELUX
PRODUCT GUARANTEE

Thank you for buying a VELUX product. We are very proud of all that we produce and also that the great majority of VELUX product owners never need to rely on a VELUX Guarantee. If end-users[1)] do ever have a concern regarding a VELUX product, this Guarantee will help you to be clear about how we would be able to respond.

We should also say that in addition to this Guarantee, an end-user[1)] will have separate legal rights, which arise from the sale of a VELUX product. Those rights are not affected in any way by this Guarantee. Guidance in regard to any separate legal rights can be obtained from the seller or other suitable adviser.

1. Application of this Product Guarantee
VELUX New Zealand Limited (**'VELUX'**) offers end-users[1)] a Guarantee in regard to VELUX products as follows:

The VELUX Product Guarantee covers the products set out below:	***Guarantee period:***
VELUX Skylights and VELUX Roof Windows and installation products	
VELUX Skylights and VELUX Roof Windows including insulating glazing units. VELUX flashings.	10 years
VELUX Sun Tunnels	
VELUX Sun Tunnels including glazing units.	10 years
VELUX decoration and sunscreening products	
Interior	
VELUX blinds, VELUX insect screens.	1 year
Exterior	
VELUX shutters and motorized VELUX awning blinds.	1 year
Manually operated VELUX awning blinds.	1 year
VELUX products for operation of VELUX decoration and sunscreening products	
VELUX products for manual operation (e.g. rods).	1 year
VELUX motors and other products used for electrical or solar-powered operation	
VELUX motors (electrical or solar-powered) for operating windows (including motors pre-installed by VELUX in VELUX Skylights and VELUX Roof Windows) and for operating VELUX decoration and sunscreening products (apart from motors for operating VELUX shutters and VELUX awning blinds). Other VELUX products used for electrical or solar-powered operation (control panels, control units, sensors, etc.), including components pre-installed by VELUX in VELUX Roof Windows.	1 year

VELUX motors for VELUX shutters and electrically operated VELUX awning blinds.	1 year
Electrical motors and supplementing electrical products used for smoke ventilation, including electrical VELUX components for smoke ventilation pre-installed by VELUX in VELUX Roof Windows.	1 year
Spare part products supplied by VELUX	
If a defect in a spare part product is brought to our attention during the Guarantee Period[2)] which shall commence from the date it is sold or otherwise supplied to the first end-user[3)] VELUX will, at its option: 1) repair the VELUX product without charge for material or labour or 2) provide a replacement VELUX product delivered free of charge to the original point of purchase or to the end-user[1)].	2 years
Other VELUX products	
Other VELUX products	2 years

This edition of the VELUX Product Guarantee applies with effect from 1 August 2016.

If you are eligible to benefit from this Guarantee then without affecting any separate legal rights you may have, under this Guarantee, VELUX will, at its option undertake one of the following: 1) repair the defective VELUX product at a VELUX location or at the end-user's[1)] location as shall be determined by VELUX, or 2) provide a replacement VELUX product free of charge to a VELUX location or to the end-user[1)] as determined by VELUX, 3) refund the end-user[1)] the original purchase price for the VELUX product, or 4) undertake such other options as relevant to the VELUX product in question.

This Guarantee will apply only to the VELUX products listed above subject to the conditions set out below including (but not limited to) the conditions in Section 4. In addition, this Guarantee only applies to a defect that has not been disclaimed as set out in Section 3.

2. Guarantee period
Claims under this Guarantee must be notified in accordance with Section 5 and within the period which, unless otherwise stated above, shall commence on the date when the VELUX product is sold to the first end-user[3)] and which will expire at the end of the relevant Guarantee Period[2)] for the VELUX product in regard to which the claim is made.

3. Defects covered under this Guarantee
Subject to the conditions, this Guarantee shall cover defects which arise from the product's manufacture including in any materials used in its manufacture. Other types of defects concerning VELUX products are not covered by this Guarantee and will be treated as disclaimed.

4. Conditions
Claims under this Guarantee will not be accepted where a defect has resulted directly or indirectly from a) the product's installation, (including (but not limited to) installation carried out contrary to VELUX installation instructions or contrary to good workmanship standards), b) installation of the product outside recommended installation areas, c) operation contrary to standard operation or misuse, d) wear and tear, e) use of incompatible spare parts, wear parts or accessories (e.g. power supply), f) transportation, g) any form of inappropriate handling, h) product modifications or i) other factors which are other than those relating to the product's manufacture or the materials used in manufacture.

In addition, this Guarantee will not apply in regard to any defects which result directly or indirectly from neglect including (but not limited to) where there has been a failure to maintain, carry out regular testing and/or servicing, or due to neglect in maintenance of the product as described in the user/maintenance instructions or directions for use, or where the defect could have been prevented through maintenance as described in the user/maintenance instructions or

directions for use. All such instructions or directions for use may be obtained from VELUX or may be downloaded from www.VELUX.com or www.VELUX.co.nz.

This Guarantee does not cover claims relating to:

VELUX does not guarantee that operation of product software will be error-free or uninterrupted, that defects in software will be corrected or that software will be compatible with future VELUX products or VELUX software.

- Discoloration of parts that are not visible by general use;
- Any change of colour and fading irrespective of these being caused by sun/condensation/acid rain/salty splashes or any other conditions with corroding or material changing effect;
- Any other cosmetic conditions, such as for example hanging fabric or Venetian blind slats, or changes in the sealant of the pane;
- Knots in the wood;
- Inevitable and/or expected reduction of the efficiency of the product, including technical values/specifications as well as general efficiency tolerances;
- Variations that occur naturally in the materials used;
- Malfunction, reduced or restricted function or water leakage resulting from blocking or the like due to ice, snow, twigs, etc.;
- Imperfections including colour variations, shadows or marks etc. in the glass, which were present at the time of delivery or have arisen within the Guarantee Period[2)], and which do not impair the view appreciably;
- Corrosion (on hardware);
- Degradation of solar cells;
- Damage as a result of accident, including but not limited to accidental glass breakage, dome breakage or crazing;
- Problems due to water penetration such as ice damming not resulting from default in a VELUX product;
- Faulty building design or construction;
- Movements in adjoining constructions or similar;
- Alterations of the covered VELUX products;
- Addition of non-approved components;
- Extreme weather conditions, lightning or severe hail;
- Applications in areas of high humidity, areas without proper or adequate ventilation or humidity control;
- Products subjected to conditions outside their design limitations;
- Exposure to processing after delivery e.g. sanding, sand blasting, etching, pasting or other surface treatment;
- Variations in glass or plastic coloration or damage caused by adverse conditions such as corrosive environmental factors including acid rain;
- Glass corrosion as a result of standing water and debris on glass;
- Condensation on roof windows and modular skylights and any related water damage, which may occur as a natural result of humidity inside or outside a building or a variation between indoor/outdoor temperatures;
- Claims in regard to insulated glass units where any film has been applied to the glass surface, and
- Any other conditions similar to the above, irrespective of these being characterized as defects.

VELUX does not by this Guarantee seek to limit or exclude liability which the end user's[1)] separate legal rights would make our attempts to do so unenforceable, subject to which VELUX accepts no liability under this Guarantee or otherwise for any loss of profit, or any indirect or consequential loss arising under or in connection with any claim made under this Guarantee. This shall include no liability for product liability and VELUX does not assume liability for losses caused directly or indirectly by incidents beyond the control of VELUX, including but not limited to industrial disputes, fire, war, terrorism, import restrictions, political unrest, unusual natural occurrences, vandalism or other force majeure.

While VELUX does not exclude, limit or seek to avoid liability which the end-user's[1] legal rights would make unenforceable, subject to which VELUX will not be responsible for any damage which occurs to persons or to property, including the covered VELUX product itself, caused by any unauthorised attempt to repair or replace the VELUX product.

VELUX may, at its option, refuse to provide any or all remedies under this Guarantee if any unauthorised attempt to repair or replace a covered VELUX product causes further damage. We advise that you do not attempt to repair or replace the VELUX product without VELUX authorisation and without which any claim regarding a defect which arises as a result shall be disclaimed.

It is the responsibility of the end-user[1] to mitigate and minimize water damage or any other damage that a covered VELUX product may cause.

5. Written complaint
To make a claim under this Guarantee the end-user[1] is required to give notice in writing of the claim within the relevant Guarantee Period[2] and in any event within two months of the date after which the end-user[1] became aware or ought reasonably to have become aware of the defect which is being claimed for. The written notice must be issued to VELUX to address listed below.

6. Additional conditions
If, at the time of repair or replacement the VELUX product is no longer in production or is no longer made in the same version (form, colour, covering, finish etc.) VELUX shall be entitled to repair or replace it with a similar VELUX product.

Also, as a condition of this Guarantee, VELUX shall have the right to request that the defective product is returned (at the cost of the end-user[1]) to a VELUX location or at the location of the end-user[1] as determined by VELUX.

7. Guarantee of repaired or replaced VELUX products
Where under this Guarantee VELUX has undertaken a repair or replacement of a VELUX product, the original Guarantee Period[2] relevant to that VELUX product shall continue to apply and shall not be extended.

8. Dismantling and reinstallation
This Guarantee does not include for the costs and expenses resulting from dismantling and re-installation of a VELUX product or for any covering with a tarpaulin or other measures arising while repair or replacement works are undertaken.

9. Service visits in case of non-coverage under the guarantee
VELUX shall have the right to claim compensation for the costs of service visits if the end-user's[1] claim is not covered by this guarantee. In addition, the end-user[1] shall pay any costs, including labour costs, incurred for the examination of the VELUX product, as well as any costs in connection with dismantling and re-installing the VELUX product and the protection of the VELUX product and the building with tarpaulins etc.

10. Procedure for benefitting from this Guarantee
Whether or not you make a claim under this Guarantee, if you have concerns in regard to your VELUX product or its installation, please contact VELUX customer service department directly at the address listed below. VELUX will seek to provide the best response and service possible.

Trained customer service team members are available to talk over on the phone any concerns you may have and which may then resolve matters in a way without the necessity of having to access your home or other location for an on-site visit.

Notes - Supplementary explanations for the above provisions

Note 1:
"End-user" means the natural or legal person who owns the VELUX product and who has not acquired it with a view to reselling or installing it in the course of business.

Note 2:
The guarantee period begins from the date the VELUX product is purchased from a VELUX dealer which at the request of VELUX must be substantiated with the original invoice or sales receipt. If the purchase date cannot be substantiated, the guarantee period will begin on the date of manufacture as indicated on each VELUX product.

Note 3:
"First end-user" means the end-user, cf. note 1, who first acquires the VELUX product from a VELUX sales company, from a dealer or any other natural or legal person who resells or installs the VELUX product in the course of business.

VELUX New Zealand Limited
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Maintenance Guide for VELUX Skylights, Roof Windows and Sun Tunnels (2015.02)

VELUX Skylights, Roof Windows and Sun Tunnels will be referred to as Skylights below unless maintenance guide refers to a specific product type or code. Proper care of your VELUX Skylights is essential to ensure the best day-lighting experience.

Safety

Skylights are typically installed out of reach, therefore it is assumed that ladders scaffolding or other equipment is being used to reach elevated places during maintenance and inspection. Follow all equipment manufacturer's instructions for safe operation. Use fall protection when applicable. Know your safe working limits. Falls from heights can result in serious injury or death.

Glass cleaning

All Skylights. For best results avoid cleaning skylight during the hottest part of the day. If there are multiple rows of skylights, start at the highest row and work down. Begin by soaking the skylight glass with a clean water and soap solution loosening dirt and debris. Next use a mild, non-abrasive glass cleaner along with a soft brush or other non-abrasive applicator to clean the glass. The cleaning solution should immediately be removed with a squeegee or lint free cloth. Use care not to touch any metal parts of the cleaning equipment to the glass or let any abrasive materials be dragged across the glass surface. Do not use metal scrapers, blades or knives for cleaning large areas of glass as this practice can easily scratch and cause permanent damage to the skylight glass. Scratches or damages to the glass as a result of scraping are not covered under any VELUX guarantee. For hard to remove spots like tree sap, label adhesive, paint or other construction material, a new razor blade may need to be used on small spots only. If a razor blade needs to be used, scrape only in one direction. Back and forth scraping can trap abrasive materials under the blade causing scratches and possible permanent damage to the glass. Cleaning your skylight as dirt appears will help prevent the use of scrapers.

Roof Windows GGU & GGL. The sash can be rotated fully and must be secured in this position by sliding the barrel bolt in the right side of the top sash into the bushing at the bottom of the side frame. This makes it easy to clean the outer glass pane.

Sun Tunnels TWR, TLR, TCR & TWF. The glass pane can only be cleaned from the outside.

Interior cleaning

Skylights VSE, VS & FS have a white pre-painted, wood frame. **Skylights VCE & VCM** have a maintenance free, PVC frame and sash. These surfaces can be cleaned with a damp cloth. A mild, soapy water solution can be used for tougher dirt. VSE, VS, VCE & VCM insect screens can be cleaned by removing the screen and spraying the screen with a garden hose. Let the insect screens thoroughly dry before replacing them into the skylights

Roof Windows GGL have a basic treatment and a top finish coating. **Roof Windows GGU** have a virtually maintenance free polyurethane encapsulated coating. These surfaces can be cleaned with ordinary household cleaners. The air filter can be removed and either washed or replaced. Drain holes in the corners of the bottom sash glazing gasket should be cleaned as and when required.

Sun Tunnels TWR, TLR, TCR & TWF diffuser pane can be cleaned from the inside. Before cleaning, the diffuser can be removed according to the installation instructions. Other visible surfaces can be cleaned with ordinary household cleaners. Do not use solvents as they may damage the product.

Interior maintenance

Skylights VSE, VS & FS and **Roof Windows GGL** with pre-finished wood frames need to be inspected annually. The finish that is applied to the wood surface is not considered a permanent coating. As with any finished surface it is subject to peeling, cracking or fading and will need to be re-finished/re-painted periodically. To re-finish/re-paint the skylight interior wood surfaces, prepare the skylight by removing the factory finish. After ensuring that the surface is clean, apply primer to the wood. When primer is dry, apply a coat of water based acrylic varnish/paint (always follow finish manufacturer's application instructions).For paint or finish damages to larger surfaces of the wood, apply the technique described above. Touch up paint for covering scratches to the wood surface is available from VELUX. Keep all varnish/paint off of skylight gaskets and glass.

Skylights VCE & VCM. It is not recommend to paint over abs (plastic) frames and sashes.

Roof Windows GGU & GGL. Hinges and striking plate need no lubrication. Surface treatment of the window components is not necessary.

Sun Tunnels TWR, TLR, TCR & TWF. No components need lubrication. No surface treatment of the sun tunnel components is necessary.

Exterior Cleaning – all Skylights

Rain will keep most dirt and grime off of the exterior surfaces. The exterior cladding surfaces can be cleaned with a mild soapy water solution. Avoid using abrasive cleaners or cleaning equipment as this can scratch the finish on the cladding. Rinse well with clean water.

Exterior Inspection – all Skylights

Keep all debris removed from around skylights. Skylight applications with multiple skylights grouped together using combi-flashing must have all vertical and horizontal gutters, between skylights, clear of dirt and debris. Make sure all exposed fasteners are secure. Inspect cladding and flashing for excessive wear or scratches on the cladding finish. Scratches in the cladding finish may be fixed with touch up paint available through VELUX. Damaged claddings or flashings should be replaced as soon as they are detected.

Controls

VSE & VCE INTEGRA Opening Skylights. Before performing maintenance turn the power off to avoid accidental injuries. Open skylights, then turn off power and wipe chain off using a clean, dry towel. Do not use any type of cleaner or solvent. Keep debris clear of chain.

VS & VCM Opening skylights. Inspect the loop or crank handle to make sure the set-screw is secure. Open skylights and wipe chain off using a clean, dry towel. Do not use any type of cleaner or solvent.

The internal workings of the manual and the INTEGRA electric operators are considered maintenance free over the lifetime of the skylight. Operators are pre-lubricated and need no additional lubrication.

Condensation

Condensation is not a skylight defect; it's a result of atmospheric conditions inside and outside the home. Condensation is the result of warm moist air coming in contact with a cooler surface, in this case, the skylight glass. Think of the glass of ice-water on a summer day and the "sweat" on the outside of the glass. Since outside conditions can't be controlled, condensation must be dealt with from inside the home.

General Information

For replacement parts or glass, get the skylight serial number and contact a VELUX customer service representative for ordering information.
Locating the serial number will expedite the ordering process and ensure the correct parts are sent. Refer to our Product ID page to locate the skylight serial number.

4554VS
VELUX OPENING & FIXED SKYLIGHTS

1
GENERAL

If you have pre-customised this work section using the "questions and answers" provided as part of the downloading process, it may be necessary to amend some clauses to suit the final project-specific version.

The section must still be checked and customised to suit the project being specified, by removing any other irrelevant details and adding project-specific details and selections.

This section relates to the manufacture, supply, and installation of VELUX opening and fixed skylights and roof windows:
It includes;

- operating systems
- accessories
- proprietary flashings

This section covers stand-alone VELUX skylight / roof window installations only. VELUX provide proprietary flashing solutions to be carried out as part of the system installation. Where custom flashings are required, refer to section 4821 FLASHINGS or the relevant roofing section.

Refer to VELUX Statement of Building Code Compliance, at www.velux.co.nz, under Technical Data.

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
AS/NZS 2208	Safety glazing materials in buildings
NZS 3604	Timber-framed buildings
NZS 4223.4	Code of practice for glazing in buildings - Wind, dead, snow and live actions

The following are related documents and if referred to in the work section need to be added to the list of DOCUMENTS.

NZBC G4/AS1	Ventilation
AS/NZS 1170	Structural design actions
NZS 3602	Timber and wood-based products for use in building
AS/NZS 1734	Aluminium and aluminium alloys - flat sheets, coiled sheet and plate
AS 3715	Metal finishing - Thermoset powder coatings for architectural applications
NZS 4223.1	Code of practice for glazing in buildings - Glass selection and glazing
NZS 4223.2	Glazing in buildings - Insulating glass units
AS/NZS 4666	Insulating glass units
BRANZ BU 313	Domestic glazing safety
BRANZ BU 598	Insulating glass units

1.3
MANUFACTURER/SUPPLIER DOCUMENTS
Manufacturer's and supplier's documents relating to this part of the work:
Current Sales Brochure
Installation instructions for GGU/GGL Roof Window and Flashing
Installation instructions for VS/VSE/VSS Skylight
Installation instructions for FS Skylight
Installation instructions for VCM/VCS curb mounted Skylight
Installation instructions for FCM curb mounted Skylight
Installation instructions for EDW flashing
Installation instructions for EDL flashing

Manufacturer/supplier contact details

Company:	VELUX New Zealand Limited
Web:	www.velux.co.nz
Email:	info@velux.co.nz
Telephone:	0800 650 445

Warranties
1.4
WARRANTY - MANUFACTURER/SUPPLIER
Provide a material manufacturer/supplier warranty:
10 years: For VELUX Skylights

1.5
WARRANTY - INSTALLER/APPLICATOR
Provide an installer/applicator warranty:
~ years: For installation of VELUX Skylights

Requirements
1.6
QUALIFICATIONS
Installers to be to be experienced, competent trades people familiar with the materials and techniques specified.

1.7
NO SUBSTITUTIONS
Substitutions are not permitted to any of the specified VELUX systems, components and associated products listed in this section.

Performance
1.8
PERFORMANCE, WIND, DEAD, SNOW, AND LIVE ACTIONS
The design wind pressures and snow loads to NZS 3604. Live loads and glazing design, for glass or equivalent plastics, to NZS 4223.4.
Use this clause for non-specific design for wind where all items are to the manufacturer's standard details and requirements. Modify this clause for specific design using appropriate parts of AS/NZS 1170.

NOTE: NZS 4223.4 does not match NZS 3604 for wind and snow loads.

2
PRODUCTS

2.1
SKYLIGHTS
VELUX Skylights, either top hinged with INTEGRA (electric or solar) or manual opening, or fixed skylight, for roof pitches between 15° to 90°. Manufactured from high quality treated timber, prefinished frame and sash in white, semi-gloss paint. External cappings in umber grey manufactured from polyester coated aluminium. Refer to SELECTIONS for type, finish and accessories.

2.2
ROOF WINDOWS - EVERFINISH - WHITE
VELUX opening Roof Windows, pivot hinged at centre with vent flap for roof pitches between 15º to 90º. Manufactured from high quality treated timber, encapsulated in a white, virtually maintenance free, 3mm thick polyurethane. External cappings in umber grey manufactured from polyester coated aluminium. Refer to SELECTIONS for type, finish and accessories.

2.3
ROOF WINDOWS - TIMBER FINISH
VELUX opening Roof Windows, pivot hinged at centre with vent flap for roof pitches between 15° to 90°. Manufactured from high quality treated timber, prefinished with a clear water-based lacquer, semi-gloss paint. External cappings in umber grey manufactured from polyester coated aluminium. Refer to SELECTIONS for type, finish and accessories.

2.4
LOW PITCH SKYLIGHTS
VELUX Low Pitch Skylights, either top hinged with solar or manual opening or fixed, for roof pitches between 0° to 60° manufactured from internal ABS frame in white high quality treated timber, prefinished frame and sash in white, semi-gloss paint. External composite cappings in umber grey manufactured of Kynar 500 coated aluminium. Refer to SELECTIONS for type, finish and accessories.
Modify description to suit selected roof window where required.
VELUX INTEGRA opening (model VCS), manual opening (model VCM) and fixed (model FCM) Skylights. Refer to VELUX at www.velux.co.nz for detailed descriptions of roof window material and finish.

Components
2.5
FIXINGS
VELUX proprietary fixings and brackets compatible with the skylight/roof window.

2.6
GLAZING - ELECTRIC OPENING SKYLIGHTS
VELUX proprietary heat strengthened, laminated double glazing with Argon gas fill and low E^3 coating.
INTEGRA Opening Skylights - models VSE

2.7
GLAZING - MANUAL OPENING SKYLIGHTS
VELUX proprietary toughened double glazing with Argon gas fill and low E^3 coating.
Manual Opening Skylights - models VS, VCM.

2.8
GLAZING - FIXED SKYLIGHTS
VELUX proprietary toughened double glazing with Argon gas fill and low E^3 coating.
Fixed Skylights - models FS, FCM.

2.9
GLAZING - ROOF WINDOWS
VELUX proprietary laminated double glazing with Argon gas fill and low E^2 coating.
Roof Windows - model GGU/GGL.

2.10
HARDWARE
Fasteners, stays, locks, vents and other hardware as supplied with the unit.

2.11
FLASHINGS FOR FS/VS/VSE/VSS/GGL/GGU
VELUX proprietary flashing solutions to VELUX instructions. Refer to SELECTIONS for type.
Modify clause to suit project specifications. VELUX proprietary flashings are categorised according to roof material and skylight/roof window application. Refer to VELUX for advice and types.
Note: All skylights except models VCS/VCM/FCM can be installed using VELUX proprietary flashing systems, subject to roof pitch and roof material.

2.12
FLASHINGS FOR FCM/VCM/VCS
Custom flashings are required in accordance with NZBC E2/AS1.

2.13
FLASHINGS FOR MEMBRANE AND METAL TROUGH SECTION ROOFS
Custom flashings are required when skylights or roof windows are installed in membrane or metal trough section roofing, in accordance with NZBC E2/AS1. Refer to section 4821 FLASHINGS for details.

Refer to VELUX at www.velux.co.nz for detail requirements when installing in membrane or metal trough section roofs.

Accessories
2.14
MANUAL OPENING DEVICES FOR VS/VCM/GGL/GGU
Proprietary rod for manual opening.
Manual control for out of reach situations.

2.15
MOTORISED OPENING DEVICES FOR GGL/GGU
Motorised control unit including remote, electric motor, keypad and transformer.
Rain sensor for automatic control of opening.
Modify to project requirements. Motorised controls are always included with VSE, VSS and VCS motorised opening skylights.
2.16
INTERNAL BLINDS/SCREENS
Blind/s to suit the type of Skylight. Refer to SELECTIONS for type.
Modify to project requirements. Refer to VELUX at www.velux.co.nz for detailed options, these include:
VSE INTEGRA opening skylight blinds: INTEGRA Solar Blackout Blind DSH
VSS INTEGRA solar opening skylight blinds: INTEGRA Solar Blackout Blind DSH
VS manual opening skylight blinds: INTEGRA Solar Blackout Blind DSH
FS fixed skylight blinds: INTEGRA Solar Blackout Blind DSD, Manual Blackout Blind DKD
GGU/GGL roof window blinds: Manual Venetian Blind PAL, Manual Blackout Blind DKL
VCS INTEGRA opening skylight blinds: INTEGRA Solar Blackout Blind DSC
VCM manual opening skylight blinds: INTEGRA Solar Blackout Blind DSC
FCM fixed skylight blinds: INTEGRA Solar Blackout Blind DSC, Manual Blackout Blind DKC both

with ZZZ 199 accessory tray

Note: Manual controlled blinds are suitable for skylights up to 3.2 metres above the floor level

2.17
INSTALLATION ACCESSORIES
VELUX installation accessories as supplied with the unit. Refer to SELECTIONS for type.

Finishes
2.18
FINISH
VELUX proprietary finishes.

3
EXECUTION
Conditions
3.1
DELIVERY, STORAGE AND HANDLING
Avoid distortion of elements during transit, handling and storage. Deliver in original containers, dry, undamaged with seals and labels intact. Prevent pre-finished surfaces from rubbing together. Prevent contact with mud, plaster and cement. Do not deliver to site any elements which cannot be immediately unloaded into suitable conditions of storage.

3.2
PRE-INSTALLATION REQUIREMENTS
Site measure during roof framing stage to ensure the VELUX proprietary Skylight / Roof Window and flashings can be installed correctly and in accordance with the installation instructions. Where a unit is installed adjacent to another unit confirm the set out distance between units in accordance with the installation instructions.

Refer to VELUX at www.velux.co.nz for installation details.
Add further information as to when site measurements should take place, especially where the timing of the installation is critical. Also relate this clause to shop and/or standard drawings and details (if supplied) as these should incorporate confirmed dimensions.

3.3
EXECUTION GENERALLY
Check that the preparation of the opening is to NZBC E2/AS1, 8.4.17, Roof penetrations.

3.4
HARDWARE GENERALLY
Factory fit all required and scheduled hardware.

3.5
RETAIN PROTECTIVE COVERINGS
Retain protective coverings and coatings in place during fixing wherever possible. Provide additional protection to prevent marking of surfaces visible in the completed work. Remove protection on completion.

Installation
3.6
GENERALLY
Check that the trimmed openings are formed and constructed to suit the required units. Do not proceed until roof and structural openings are properly formed.

3.7
INSTALL UNITS
Install and fix the units strictly in accordance with manufacturer's requirements and installation instructions. Repack any thermal insulation around rough openings where disturbed by the installation to maintain continuity of thermal barriers. When using VELUX flashings (EDW, EDL, EKW) with VELUX Skylights and Roof Windows, install as detailed by VELUX to make the installation completely weatherproof. Refer to VELUX at www.velux.co.nz for installation instructions. If using custom flashings, ensure upstand height and flashing meet NZBC E2/AS1 upstand height and flashing requirements.

3.8
ACCESSORIES AND OPERATING SYSTEMS
Install selected VELUX accessories and hardware and complete all operating systems.

Completion
3.9
CLEAN FRAMES AND GLAZING
On completion clean down both sides of unit frames, using the methods required by the manufacturer. Remove any manufacturer's stickers and clean glass. Ensure all installed units are adequately protected from damage and adverse weather during construction.

3.10
CONFIRM
Confirm the proper operation of hardware and operating systems on completion of the installation and again at completion of the contract works.

4
SELECTIONS
For further details on selections go to www.velux.co.nz
Substitutions are not permitted to the following, unless stated otherwise.
Select the options to suit the project and delete options not specified.

VELUX provide a total unit complete with flashings for most units, reveal lining and all hardware, glazing and operating systems.

Carefully read VELUX literature before selecting the preferred unit and detailing the required opening. Proprietary flashing work is carried out as part of the system installation.

Skylights
4.1
VELUX - VSE - INTEGRA OPENING SKYLIGHT, ELECTRIC

Location:	Roofs
Brand:	VELUX
Model:	VSE INTEGRA Opening (electric)
Type/size:	M04 780 × 980
Glazing:	Pre installed. VELUX proprietary laminated double glazing with Argon gas fill and low E^3 coating.
Colour:	White, semi gloss finish
Roof type/pitch:	Metal trough, 15°
Flashing:	Custom.
Controls:	Fully integrated INTEGRA electric motor and rain sensor, with radio frequency remote control

T.DRUPSTEEN CONSULTING ENGINEER B.E, CPEng, IntPE, MIPENZ

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drupsteenthijs65@gmail.com

TD Ref: 16/ 90
Date: 10 January 2017

Mr Gavin Daji
256 S H 12
Omapere
dajipanelbeaters@callplus.net.nz

Dear Mr Daji

Alterations/ Additions and Relocation at 265 SH 12, Omapere:
Flood Risk and Floor Levels *Revised for 2-Stage Project*

Preamble: This report sets floor levels and addresses flow issues in relation to the Omapere stream, which flows along the northern boundary of the property. Referenced plan is T.Drupsteen 16/ 90 A3 plan FR 1A of 2 (HM Design A3 size Sheet 1 dated 8/1/17) (*The previous plan submitted with my report of 30/12/16 showed the same four buildings, to be applied for as a single-stage project with building 4 located slightly differently))*

Brief: Your brief conveyed to me by your designer Mr. Hans Mitt was to set floor levels and address flood flow issues in relation to the four buildings proposed on the site.

Synopsis: NZ Building code clause E1 (Surface water) requires that buildings be constructed such that floods with a 2 % annual probability of occurrence will not enter them. The 50-year FNDC rainfall intensity curves (with allowance for climate change) have therefore been used in accompanying calculations. Rather than try to be exact about the interaction of local topography features and the design flood flow, a conservative upper-bound method has been used to set the floor levels.

Calculations: Using Tech Memo '61 to calculate the 50-year flood, a flow of 8.12 m3/ s was arrived at.

Flood Risk Design philosophy:
1 Your designer stated on site that the (concrete) floor level for building 4 would be set at 900mm above the culvert road level, i.e. at 11.2 m on the FR1 drawing (assumed) datum.

2 The rectangular box culvert that conveys the stream under the state highway has clear interior dimensions of 2.9 m width X 2.1 m height, i.e. 6.09 m2 cross-section. Assuming a flood flow speed of 2.0 m/s, the culvert will then convey 12.2 m3/s during the design event. With simultaneous of overtopping of the state highway deck by 0.5 m over the 20 m width of the state highway road reserve and an average flow speed at this level of 1.0 m/s another 10 m3/s is conveyed over the top of the culvert. 12.2 + 10 m3/s = 22.2 m3/s , nearly 3 times the design flow, which has a water surface level of 10.3 + 0.5 m = 10.8m at the centre of the state highway above the culvert.
4 With the floor level of building 4 set at 11.2 m, there will be 400 mm of freeboard above the (very conservatively) estimated flood level.
5 Building 3 (also concrete-floored) will also be constructed with an 11.2 m floor level
6 Building 2 (timber-floored) has a minimum existing ground level of about 11.2 m and with the normal 600 mm ground-to-floor height will have a floor level at 11.8 m, 1.0 m above flood level.
7 Building 1 (also timber –floored) has its ground level about 0.5 m higher than that of building 2 (i.e. 12.3 m), and will therefore be safe from flooding also.
8 Flow issues: Buildings 3 and 4, being concrete-floored, will be able to withstand any floodwater forces (The lowest existing ground level at the building being 10.7 m (and flood level being 10.8 m) the flood waters will only affect the lowest 100mm of the concrete masonry subwall. None of the other buildings will be affected by the floodwaters at all, as all their existing ground levels are equal to, or higher than the Maximum Credible Event flood.

Conclusions: By setting the concrete-floor levels of buildings 4 and 3 at 11.2 m, all flood water entry risks and flood flows around / against the proposed four buildings have been appropriately mitigated. (Timber-floored buildings 1 and 2 being safe by virtue of the existing ground levels being higher than the MCE flood)

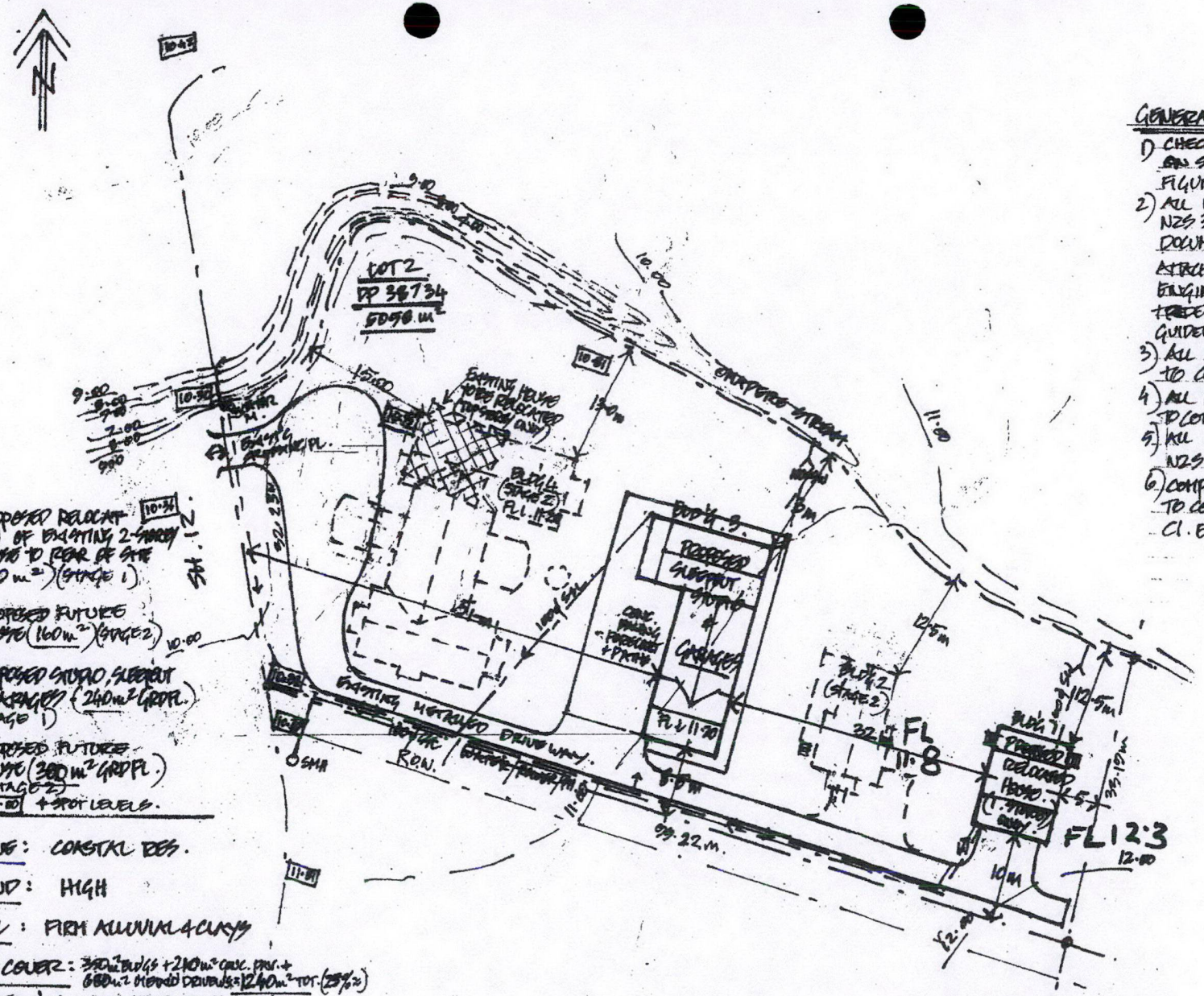
If you have any queries, please do not hesitate to contact me

Yours respectfully

T. Drupsteen

Thijs ("Tase") Drupsteen (Mr)
NZ Chartered Professional Engineer 61652

Enc: 1 T.Drupsteen 16/ 90 A3 plan FR 1A of 2 (HM Design Sheet 1 dated 10/1/17))
2 T. Drupsteen A3 plan FR 2 of 2 Aerial photo of site and surroundings from FNDC GIS website) showing ground levels and predicted flood flow paths
3 Flood flow calculations



KEY:

BLDG 1:- PROPOSED RELOCATED 10.35 LEN OF EXISTING 2-STOREY HOUSE TO REAR OF SITE (110 m²) (STAGE 1)

BLDG 2: PROPOSED FUTURE HOUSE (160 m²) (STAGE 2)

BLDG 3: PROPOSED STUDIO, SLEEPOUT + GARAGES (240 m² GRD FL.) (STAGE 1)

BLDG 4:- PROPOSED FUTURE HOUSE (380 m² GRD FL.) (STAGE 2)

DATUM. - 10.00 + SPOT LEVELS.

PLANNING NOTES.

ZONE: COASTAL RES.

WIND: HIGH

SOIL: FIRM ALLUVIAL & CLAYS

SITE COVER: 380 m² BLDGS + 240 m² GRVL. DRIVE + 660 m² MEASURED DRIVEWAY = 1240 m² TOT. (25%)

EARTHWKS: SLOPE & FOOTINGS ONLY

CONTOURS: 1.00 m APART. (ABOVE MSL ≈)

GENERAL NOTES:

1) CHECK ALL MEASUREMENTS ON SITE PRIOR TO START. USE FIGURED DIMENSIONS ONLY.
2) ALL WORK TO COMPLY WITH NZS 3604/2011, NZBC AND APPROVED DOCUMENTS, LOCAL BODY REG'S, FNDG STAMPED ATTACHED PLANS, SPECIFICATIONS & CALCULNS ENGINEERS REPORTS AND BEST TRADE PRACTICE AND PRODUCT LITERAT, GUIDELINES & REQUIREMENTS
3) ALL PLUMBING & DRAINAGE WORK TO COMPLY WITH NZS/AS 3500 2.2
4) ALL WINDOW + EXT. DOOR JOINERY TO COMPLY WITH NZS 4211
5) ALL GLAZING TO COMPLY WITH NZS 4223: 2016
6) COMPACTIBLE GRANULAR HARDFILL TO COMPLY WITH NZS 3604/2011 Cl. E 5.2.

FR1A
0 of 2

T. DRUPSTEEN
Consulting Engineer

TD Ref: 16/95

Drawn: T. Drupsteen
10/1/17

FLOOD RISK

DA31 - PROPOSED HOME STUDIO/SLEEPOUT/GARAGES

SITE PLAN (STAGE 1) 1:500 (A3) Sheet 1

H.M DESIGN Revised R'Us. 8/1/17

T. DRUPSTEEN Consulting Engineer
B.E. CPEng, IntPE, M.I.P.E.N.Z.
3264 SH 12, RD 3 Kaikohe 0473
Ph 64 9 401 4737 Fax 64 9 401 4738
Email: drupsteenthijs65@gmail.com

16/90
(3)
T. Drupsteen
28/12/16.

R-factor

from Tc = 0.45 hrs, (27 mins)
get from Fig 3A std Rainfall depth = 54 mm

From 27 minute intensity (50yr ARI)
FND graphs
with climate change
Intensity = 85 mm/hr
→ Depth = 85 × 0.45 = 38 mm/hr.
(27 mins Tc)

∴ R = actual / standard
= 38/54
= 0.71

R = 0.71

S

calculate K = $\frac{A}{(Ld)^2} = \frac{1.38}{(1.7\text{km})^2}$

d meet length in km to furthest point

= 0.48.

→ S = 0.95

S = 0.95.

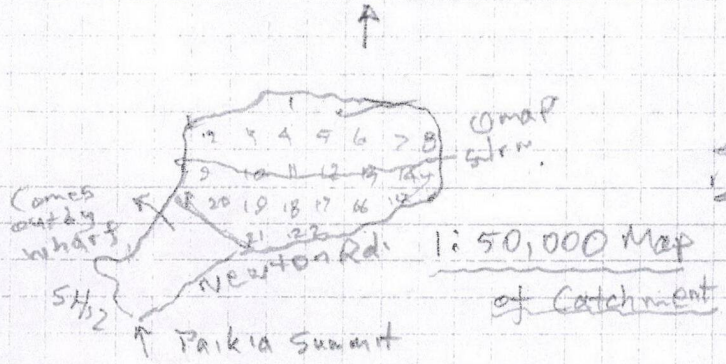
Final Qp

$Q_P = 0.0139\ C R S A^{3/4}$ (A = 1.38 km²)

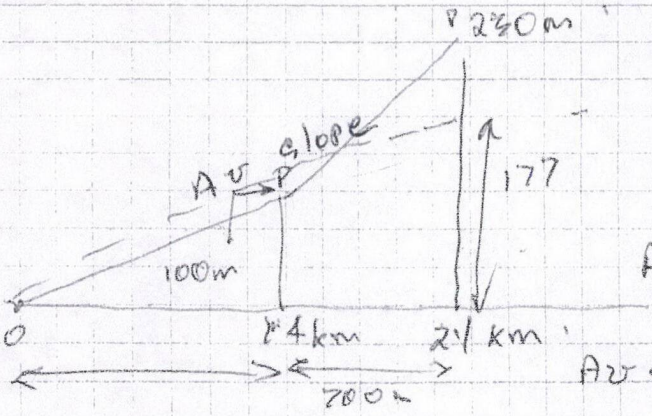
$= 0.0139 \times 680 \times 0.71 \times 0.95 \times 1.27$

$= 8.12\ m^3/s$

$Q_{peak} = 8.12\ m^3/s$



1 sq = 250m² = 2.5² x (100)²
= 6.25 ha.
2.25q x 6.25 ha = 13.8 ha.
1km² = 10 x 10 (100 x 100)
= 100 ha.
∴ Catchment = 1.38 km²



Total Area = $\frac{100 \times 1,400}{2} + \left(\frac{100+230}{2}\right) \times 700$

= 7 E⁴ + 11.6 E⁴

= 18.6 E⁴

A = L x h/2

∴ h = $\frac{2A}{L} = \frac{2 \times 18.6E^4}{2,100} = 177$

Av slope = $\frac{177}{2100} = 8.4\%$ 16/90 (2)

T Drupsteen.
28/12/16

Omapere Stream.

Av Gradient

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16/90 ①
T. Drupsteen
28/12/16.

Daji Housing Development.
50-year Flood Level Calculation

Method : Tech Memo 61

$Q_p = 0.0139 C R S A^{3/4}$ m^3/s

A = 1.38 km^2 (from pg 2)

C = catchment physiography factor
R = Rainfall
S = Catchment shape factor

Area = 1.38 km^2
channel length = 2.1 km
av slope = 8.4%

C

$W_{IC} + W_S \rightarrow W \rightarrow C$

$W_{IC} = 0.95$ (Table 1, 45% in bush). $W_{IC} = 0.95$

From fig 1, (1.38 km^2, 8.4% slope → slope factor = 44). W_S

$W = W_S \times W_{IC} = 44 \times 0.95 \rightarrow W = 41.8$

From Fig 2 W 41.8 → C = 0.800

T_c

1) Ramser - Kirpich.

$T_{mins} = 0.0195 L^{0.77} S_{av\ slope}^{-0.385}$

$= 0.0195 \times 2,100^{0.77} \times \left(\frac{1}{0.084}\right)^{0.385}$

$= 0.0195 \times 362 \times \frac{1}{0.385}$

$= 18.3$ mins [0.305 hrs] 1.2

2) Bransby - Williams $T_c = \frac{0.953 L_{km}}{A_{km^2}^{0.1} \times H^{0.2}}$ hrs

H = 230m

$= \frac{0.953 \times 2.44}{1.03 \times 2.97}$

$= 0.76$ hrs

3) US Soil Conservation Service

$T_c = \left[\frac{0.87 L^3}{H}\right]^{0.385} = 0.275$ hrs

(L a Has in ft)

Av of the 3 = 0.45 hrs

$T_c = 0.45$ hrs. = 27 mins

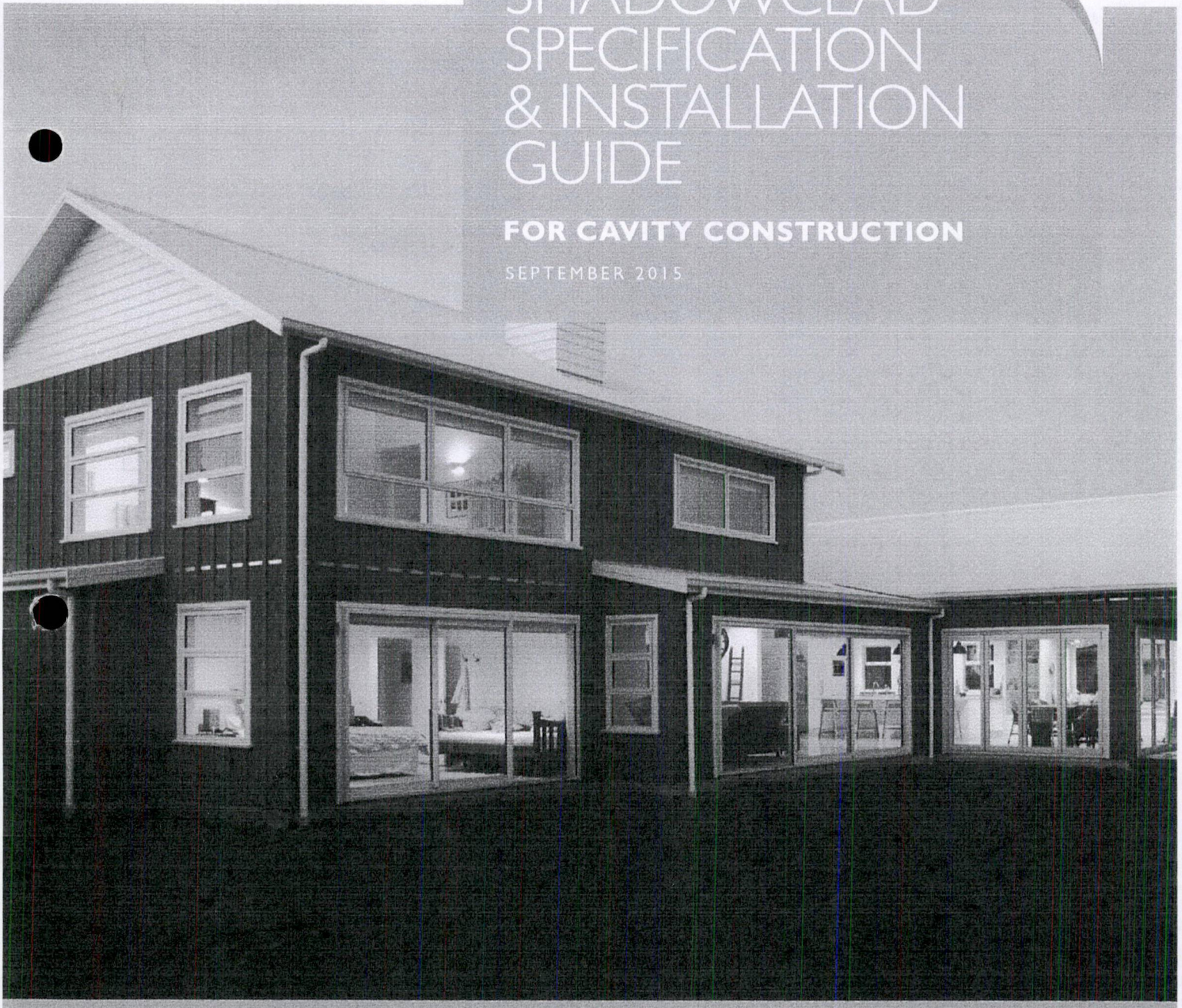
shadowclad®

Natural GROOVE | Natural TEXTURE | Ultra GROOVE | Ultra TEXTURE | FLASHINGS

SHADOWCLAD® SPECIFICATION & INSTALLATION GUIDE

FOR CAVITY CONSTRUCTION

SEPTEMBER 2015



CarterHoltHarvey Woodproducts New Zealand

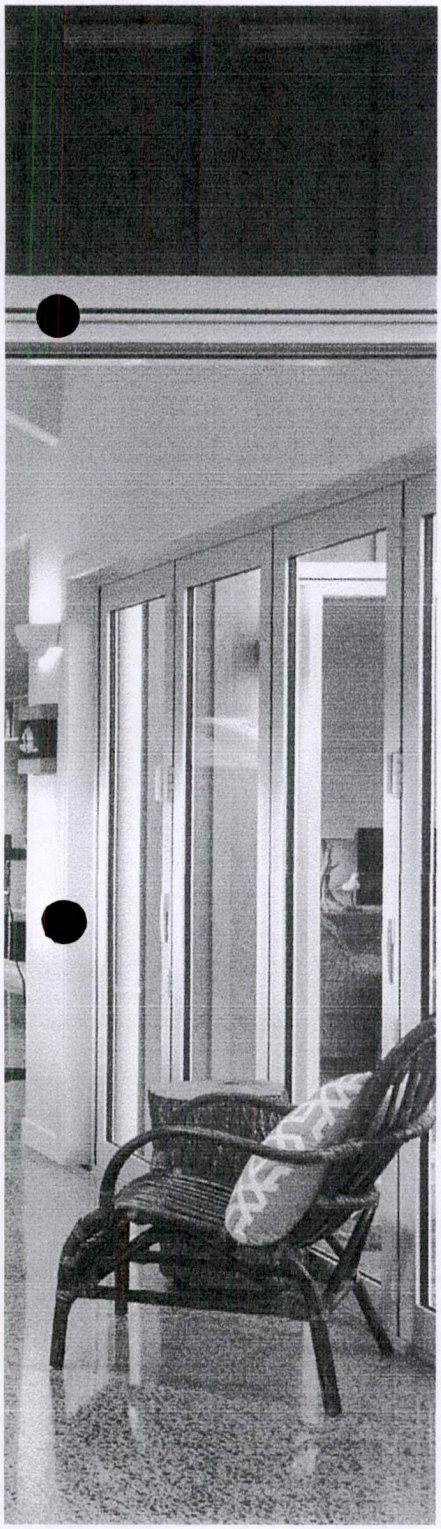
Information contained within is specific to Shadowclad® structural plywood products and must not be used with any other plywood products, no matter how similar they may appear.

shadowclad®

CAVITY CONSTRUCTION

Contents

CarterHoltHarvey
Woodproducts New Zealand



1.0 SHADOWCLAD® PRODUCT RANGE

Manufactured in New Zealand by Carter Holt Harvey® Woodproducts, Shadowclad panels are suitable for use as an exterior wall cladding when using H3 treated panels or as an internal wall or ceiling lining when using untreated panels.

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

Shadowclad has been BRANZ appraised as a cladding material for cavity wall construction. To view the appraisal visit www.chhwoodproducts.co.nz.

For information relating to Ecoply® structural plywood and applications other than exterior cladding, refer to the current Ecoply Specification & Installation Guide. For specific information on plywood as a rigid air barrier, and/or bracing, refer to the current Ecoply Barrier Specification and Installation Guide. These are both available to be downloaded from www.chhwoodproducts.co.nz.

The Shadowclad BRANZ Appraisal No. 764 (2011) does not cover:

- Shadowclad® used as an interior lining
- Handiply® Utilityclad™ plywood products
- Shadowclad® in direct fix cladding applications

Shadowclad 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 Shadowclad products. However, to the maximum extent permitted by law, Carter Holt Harvey assumes no legal liability to you in relation to this information.

1.1 TECHNICAL INFORMATION AND CAD DETAILS

When specifying or installing any Shadowclad product visit www.chhwoodproducts.co.nz or call 0800 326 759 to ensure you have current specification material and any relevant technical notes.

Having trouble installing Shadowclad visit www.chhwoodproducts.co.nz to view the installation of common Shadowclad junctions.

The information contained in this document is current as at September 2015. It is your responsibility to ensure you have the most up to date information available.

The information contained in this publication relates specifically to Shadowclad structural plywood products manufactured by Carter Holt Harvey Woodproducts and must not be used with any other plywood manufacturer's products 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 Shadowclad 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.

Shadowclad 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.

Shadowclad is available in panel sizes 2440 / 2745 x 1216mm (to provide 1200mm cover) and features a unique textured (bandsawn) appearance which also helps to diffuse UV rays for increased aesthetic performance when exposed to weather.

Shadowclad is available as a Textured or Grooved profile and in either Natural or Ultra finishes.

Shadowclad Natural

Shadowclad Natural is an uncoated panel suitable for use with penetrating stains, film forming stains and paint systems. If Shadowclad is left uncoated or is clear coated in exterior applications the long term aesthetics of the board will be significantly reduced. While the product will meet the B2 and E2 durability and weathertightness requirements for cladding, a high visual appearance will not be achieved in the long term.

Shadowclad Ultra

Shadowclad Ultra features a factory applied exterior grade performance coating suitable for use with most paint and film forming stain systems. Using a unique powder coating process on the panel face and edges means Ultra panels can be immediately top coated on site, eliminating (in most cases) the need for expensive and time consuming wet primers.

CHH Woodproducts recommends the use of Shadowclad Ultra where suitable paint or film forming stains are being used.

Shadowclad Ultra features:

- High 60-80 microns film build, can be up to 2-3 times thicker than traditional wet primers
- Continuous powder coated surface forms an effective moisture barrier for a drier more consistent painting surface
- Saves time and money as traditional wet primers are not normally required
- Panel surface, edges and bottom 150mm of sheet factory coated for increased panel durability
- Once installed Shadowclad Ultra can be exposed to weather for up to 3 months prior to application of finishing coats
- Low volatile organic compound (VOC) primer coating

Shadowclad Ultra is available H3 treated for use as an exterior cladding. It is available H3.1 LOSP treated for residential and commercial applications or H3.2 CCA if required. H3.2 CCA treatment is only available in the Ultra finish and is not available with Natural finish products.

Shadowclad Ultra is not suitable for use with penetrating stains. The selection, application and maintenance of coatings is the responsibility of the building owners and the professionals that they engage. For advice on specific coating systems and their suitability for use with Shadowclad Ultra, always refer to the coating manufacturer.

Table 1 **Surface finishes**

Natural		**Ultra**	
Texture	Groove	Texture	Groove
			
Shadowclad Natural is an uncoated panel suitable for staining and painting. Untreated panels can be clear coated for internal, dry applications.		Shadowclad Ultra features a performance coated surface ready for top coating saving time and money when using paints and film forming stains. It is suitable for use in exterior applications only.	

Table 2 **Shadowclad Product Range**

	Texture	**Groove**
Finish	Natural or Ultra	Natural or Ultra
Sheet Length	2440 & 2745mm	2440 & 2745mm
Width (overall)	1216mm	1216mm
Width (effective)	1200mm	1200mm
Cover / Width Tolerance	+/ –1mm	+/ –1mm
Nominal Thickness	12mm	12mm
Weight (kg/m²)	6.6	6.6
R-value (m^2.C/W)	0.104	0.104
Groove Profile	N/A	9mm wide, 5mm deep at 150mm centres
Edge Profile	Shiplap with weather groove	Shiplap with weather groove
Treatment Available	• H3.1 LOSP (Azole) • H3.2 CCA (Ultra finish only) • Untreated – internal dry applications (Natural finish only)	• H3.1 LOSP (Azole) • H3.2 CCA (Ultra finish only) • Untreated – internal dry applications (Natural finish only)

Shadowclad™ Exterior Flashing Range

Manufactured from extruded aluminium or folded from 0.5 mm thick G304 stainless steel, the Shadowclad™ flashings range is purpose designed to complement Shadowclad panels used in exterior applications.

Independently tested for weathertightness and compliant with Table 20 of E2/AS1, Shadowclad™ flashings achieve 50 year durability in all NZS 3604 exposure zones including zone D (sea spray).

The range includes internal and external angles, horizontal and inter-storey 'Z' flashings and a cavity base closure.

Aluminium horizontally installed flashings come in 3600mm lengths and vertically installed angles are available in 3000mm & 6000mm lengths - refer Table 3. Stainless Steel flashings are available in 3000mm lengths - refer Table 4.

The information, details and performance statements provided in this guide are based on Shadowclad plywood panels and Shadowclad™ flashings being used together as a system. CHH Woodproducts does not recommend that Shadowclad plywood panels be installed with non-CHH Woodproducts flashings. Flashings not supplied by CHH Woodproducts must, as a minimum, comply with E2/ AS1 specifications and be compatible for use with H3.1 LOSP or H3.2 CCA treated plywood. It is the Designer's responsibility to ensure that any non-CHH Woodproducts flashings are fit for purpose and compatible with Shadowclad products and any other building materials or components of the exterior wall.

Aluminium Flashing Finishes

Shadowclad™ aluminium flashings are available in either natural anodised finish (silver colour) for immediate installation or mill finished allowing customers to powder coat flashings to any desired colour finish.

Refer to your local powder coating supplier for more information.

Exterior Flashings & H3.2 CCA Treated Shadowclad®

Exposure Zone B & C

H3.2 CCA treated Shadowclad in exposure zones B and C (where flashings are exposed to weather) must use mill finished flashings which must be powder coated to the desired colour or use stainless steel flashings.

H3.2 CCA treatment contains copper. As such, some form of isolation between aluminium flashings and H3.2 CCA treated panels such as powder coating of the flashings is required. Refer to Table 21 "Compatibility of Materials in Contact" in E2/AS1 for more information.

Exposure Zone D (Sea Spray)

In exposure zone D (sea spray) flashings exposed to weather must be stainless steel for H3.2 CCA treated Shadowclad.

H3.2 CCA Treated Shadowclad

Uncoated aluminium flashings are not permitted to be in direct contact in any zone with H3.2 CCA treated Shadowclad under any circumstances.

For further information relating to H3.2 CCA treated Shadowclad contact CHH Woodproducts on 0800 326 759

Table 3 Aluminium Shadowclad™ Flashings Range

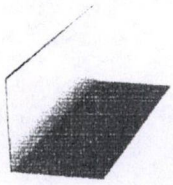
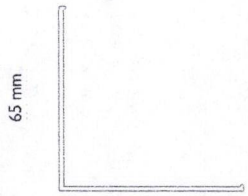
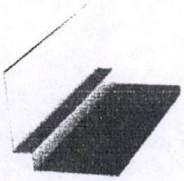
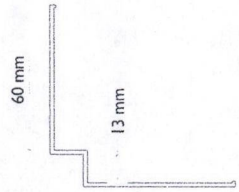
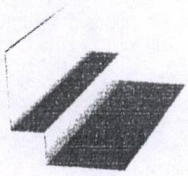
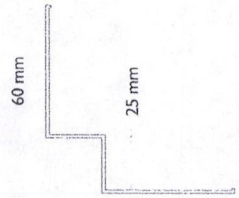
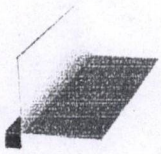
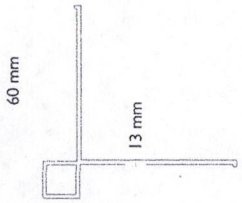
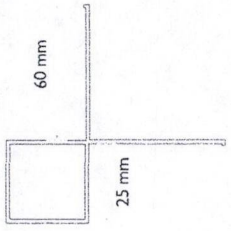
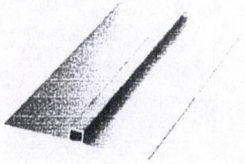
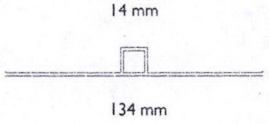
Flashing	Line Drawing	Description	Finish Available	Length (mm)
Internal 90° Angle	 	Back flashing for internal corners	Natural Anodised	3000 6000
Internal 'W' Angle	 	'W' back flashing for internal corners providing a flush finish with panels (13mm x 13mm)	Natural Anodised Mill	3000 6000
Large Internal 'W' Angle	 	'W' back flashing for internal corners (25mm x 25mm) **Design Tip:** Use a Large 'W' where a flush junction between the Horizontal 'Z' flashing and corner flashing is desired	Natural Anodised Mill	3000 6000
External Box Angle	 	Box corner for external corners providing a flush finish with panels	Natural Anodised Mill	3000 6000
Large External Box Angle	 	Box corner for external corners (25mm x 25mm) **Design Tip:** Use Large External Box where a flush junction between the Horizontal 'Z' flashing and corner flashing is desired	Natural Anodised Mill	3000 6000
Vertical Top Hat	 	Vertical sheet joint flashing	Natural Anodised Mill	3000 6000

Table 3 **Aluminium** **Shadowclad™ Flashings Range**

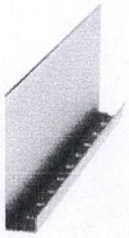
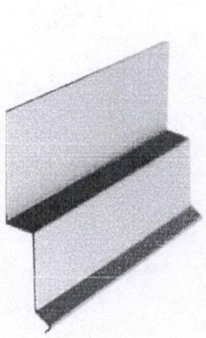
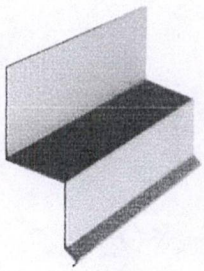
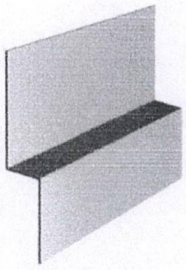
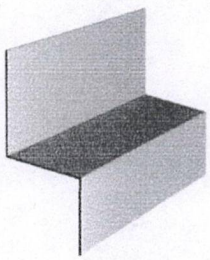
Flashing	Line Drawing	Description	Finish Available	Length (mm)
Cavity Base Closure		Restricts vermin from accessing the cavity space	Natural Anodised	3600
Horizontal 'Z' Flashing		Horizontal Z flashing for horizontal joints between panels	Natural Anodised Mill	3600
Inter-Storey 'Z' Flashing		Horizontal Z flashing for horizontal joints between panels when limiting continuous cavities to a height of two storeys or 7 meters	Natural Anodised Mill	3600
Horizontal 'Z' Back Flashing		Back flashing for junction of butt jointed horizontal 'Z' flashing.	Mill	300
Inter-storey 'Z' Back Flashing		Back flashing for junction of butt joint 'Z' Flashing inter-storey.	Mill	300

Table 4 Stainless Steel Shadowclad™ Flashings Range

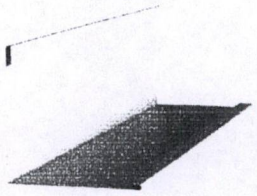
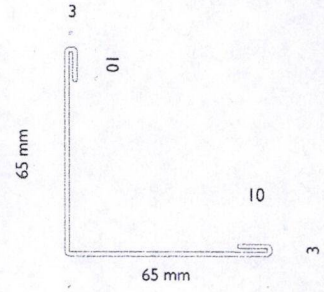
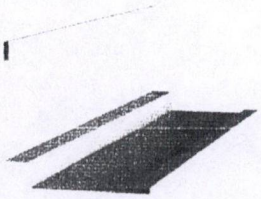
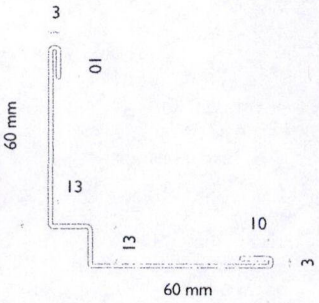
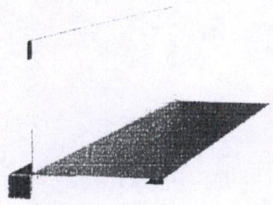
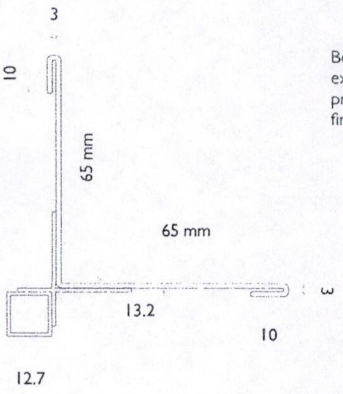
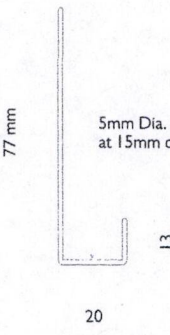
Flashing	Line Drawing	Description	Finish Available	Length (mm)
Internal 90° Angle	 	Back flashing for internal corners	Stainless Steel	3000
Internal 'W' Angle	 	'W' back flashing for internal corners providing a flush finish with panels (13mm x 13mm)	Stainless Steel	3000
External Box Angle	 	Box corner for external corners providing a flush finish with panels	Stainless Steel	3000
Cavity Base Closure	 	*Restricts vermin* from accessing the cavity space	Stainless Steel	3000

Table 4 **Stainless Steel** **Shadowclad™ Flashings Range**

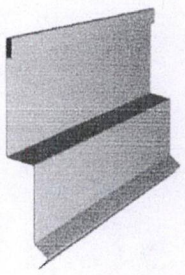
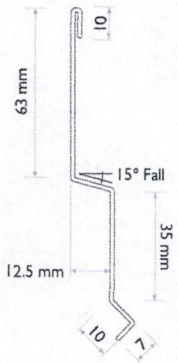
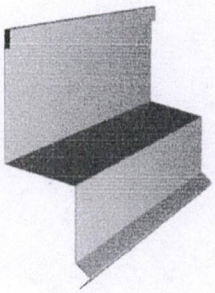
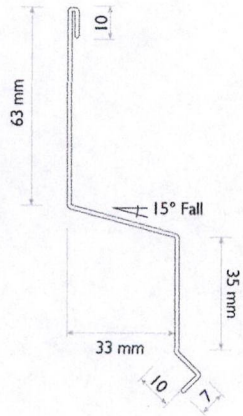
Flashing	Line Drawing	Description	Finish Available	Length (mm)
Horizontal 'Z' Flashing	 	Horizontal Z flashing for horizontal joints between panels	Stainless Steel	3000
Inter-Storey 'Z' Flashing	 	Horizontal Z flashing for horizontal joints between panels when limiting continuous cavities to a height of two storeys or 7 meters	Stainless Steel	3000

Table 5 **Materials available from CHH Woodproducts**

	Description	Treatment	Size/Length
Frame Flashing Tape[1]	For a secure and permanent seal of all Ecoply Barrier openings (Use in conjunction with Sill Tape)	-	150mm / 200mm x 30m
Sealing Tape[1]	For a secure and permanent seal of all Ecoply Barrier vertical joints	-	60mm x 30m
Sill Tape[1]	One piece stretchable sill tape for window and door sills. 2 rolls per box.	-	150mm / 200mm x 20m
Ecoply® Barrier[1]	Rigid Air Barrier System	H3.2 CCA	2440mm / 2745mm x 1200mm
Cavity Batten	45 x 20mm (nominal)	H3.1 LOSP	Random
Flashings	Aluminium and stainless steel flashings range	Refer Tables 3 & 4	Refer Tables 3 & 4

1 Please refer to the Ecoply Barrier Specification and Installation Guide for more information.

Building Materials Supplied by Other Manufacturers

- Fasteners (i.e. nails or screws) in accordance with Table 8: Fastener Lengths for Shadowclad fixing
- Building underlay compliant with Table 23 of E2/AS1
- Window/door head flashings supplied by window joinery company
- Paint in accordance with paint manufacturer's recommendations (refer to 5.3 Coating Selection for more details).

Shadowclad is available either H3 treated for use as an exterior cladding or untreated (Natural finish products only) for interior wall and ceiling linings. H3 treated Shadowclad is treated in accordance with AS/NZS 1604.3 with the standard treatment for Shadowclad panels being H3.1 LOSP (Azole). H3.2 CCA treatment is available for Shadowclad Ultra panels if required.

Shadowclad is envelope preservative treated. Where sheets are cut, cuts must be coated with a brush on timber preservative. Holdfast® Metalex® Concentrated Timber Preservative Clear (Holdfast® Metalex® Clear) is recommended. Failure to do so will affect the long term durability of the panel.

H3.1 LOSP Treatment

H3.1 LOSP treatment is the standard treatment for Shadowclad panels as it does not discolour the panel surface and does not use water in the treatment process allowing panels to remain at uniform dimensions.

When coating H3.1 LOSP treated plywood some 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.

Mechanical fasteners are required to fix H3.1 LOSP treated Shadowclad to framing. Do not glue Shadowclad to frames.

H3.2 CCA Treatment

H3.2 CCA uses water during the treatment process and may leave panel surfaces with a slight green colour. For this reason H3.2 CCA treatment is available only in the Shadowclad Ultra finish.

Table 6 **Preservative treatment options**

	Untreated	H3.1 LOSP (Azole)	H3.2 CCA
Preservative carrier	N/A	Light organic oil (white spirits)	Water
Colour	Natural	Natural	Green
Fungicide	Heat treated dry wood	Propiconazole and Tebuconazole	Copper
Insecticide	Heat treated dry wood	Permethrin	Arsenate
Other chemicals	N/A	Butyl Oxitol (co-solvent to assist active stability)	Chrome (to fix preservative in water)
Mouldicide	N/A	IPBC	Copper (limited efficiency)
Notes	Plywood for dry interior use, supplied ex mill at <15% moisture content	Solvent does not affect dimensions. Solvent smell disappears when exposed to air flow	Dried after treatment to average 18% moisture content
Applications (Refer NZ3602)	Interior dry protected	Exterior (service performance subject to detailing & coatings used)	Exterior (service performance subject to detailing & coatings used)

1.5 SUSTAINABILITY

Shadowclad is manufactured from radiata pine. It is grown on tree farms which are tended and harvested to provide wood for plywood manufacture. The crop is managed on a sustainable basis to yield millable trees.

New Zealand plantations are managed in compliance with the New Zealand Forest Accord.

Shadowclad is manufactured in New Zealand at CHH Woodproducts Tokoroa plywood mill.

Shadowclad is available Forestry Stewardship Council (FSC) (SCS-COC-001316) certified upon request.

1.6 PRODUCT IDENTIFICATION

In accordance with AS/NZS 2269, every sheet of Shadowclad plywood has the following information marked on the back:

- Brand name: eg.SHADOWCLAD
- Intended application: eg. STRUCTURAL
- Glue bond: eg. A BOND
- Formaldehyde emission class: eg. E0
- Australasian Standard: eg. AS/NZS 2269:2012
- Treatment Standard (if applicable) eg. AS/NZS 1604.3:2012
- Date and time of manufacture: eg. 01/12/15 12:34:56
- The Engineered Wood Products Association of Australasia (EWPAA) brand and mill number: e.g. 911 (Tokoroa mill)

Treated example:

SHADOWCLAD STRUCTURAL A BOND
E0 AS/NZS 2269.0:2012
AS/NZS 1604.3:2012 400 64 H3 E LOSP
RETREAT CUTS PAT 01/12/15 12:23:45
911

Untreated example:

SHADOWCLAD STRUCTURAL A BOND
E0 AS/NZS 2269.0:2012
UNTREATED – FOR INTERNAL USE
ONLY PAT 01/12/15 12:23:45
911

2.0 DESIGN CONSIDERATIONS

2.1 DESIGN RESPONSIBILITY

Design responsibility lies with the building owner and the professionals that they engage. The specifier for the project must ensure that the details in the specification for their individual projects are appropriate for the intended application. The specifier must also ensure that additional detailing is provided for specific design or any areas that fall outside the scope and specifications of this literature. It is the specifier's responsibility to ensure that non-CHH products are fit for purpose, and compatible with Shadowclad products.

Good detailing which avoids moisture or dust accumulation on the sheet surface can help increase durability and aesthetics. Roof overhangs contribute to performance as they offer shade and will protect walls from rain and dust. Trims should be bevelled to shed moisture and flashings should be detailed with gaps that do not trap water at the panel edges.

2.2 LITERATURE SCOPE

Shadowclad can be used for those structures which fall within the scope of Acceptable Solution E2/AS1- External Moisture. Shadowclad is recommended for a drained and ventilated cavity, where the cladding is fixed onto timber battens fixed over the timber frame and building underlay.

Shadowclad is not recommended where a risk score >20 in accordance with E2/AS1 is established.

2.3 CODE COMPLIANCE

Shadowclad on a cavity wall system is tested in accordance with E2/VM1 and AS/NZS 4284 "Testing of Building Facades" for compliance with the NZBC Clause E2 - External Moisture.

2.4 SITE & FOUNDATIONS

The site on which the building is situated must comply with the Acceptable Solution E1/AS1 of the Approved Document for the NZBC Clause E1 - Surface Water.

The bottom edge of each Shadowclad sheet must be a minimum of 50mm above decks and verandahs, 100mm above paved ground and a minimum of 175mm above unprotected ground.

Shadowclad must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZS 3604 and E2 - External Moisture. Maximum distance from the bottom of the sheet to the fixing shall not exceed 75mm.

For garage door openings, refer Paragraph 9 "Openings to garages" in Acceptable Solution E2/AS1.

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design and site exposure.

Wall construction design must effectively manage moisture, accounting for both the interior and exterior environments of the building. This is particularly important in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled.

Where a deck is attached to the building and the Shadowclad extends below the deck to cover the framing, keep decking clear of the Shadowclad surface and detail to avoid moisture entrapment.

All wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate Shadowclad™ flashings for waterproofing. Materials, components and the installation used to manage moisture in framed wall construction must, at a minimum, comply with the requirements of the NZBC.

Shadowclad is suitable for use in all wind zones up to and including extra high (55 m/s) as defined by NZS 3604 and specific design wind pressures up to design differential ultimate limit state (ULS) of 2.5 kPa.

The durability level applicable to Shadowclad is dependent upon the application and coating applied. Detailing, treatment and installation methods need careful consideration to satisfy the requirements of the NZBC.

Internal Linings – 50 year Durability

Untreated Shadowclad used in dry, interior situations will meet the requirements for 50 year minimum durability if coated or uncoated.

Exterior Cladding – 15 year Durability

CHH Woodproducts does not recommend Shadowclad is left uncoated when used as an exterior cladding.

The NZBC Clause B2 requires claddings to achieve a minimum structural durability level of 15 years.

Shadowclad coated with stains or paints (regardless of colour choice) will meet this requirement. If using dark colours (colours with an LRV of less than 50%) homeowners should expect an increased level of coating maintenance over the life of the cladding than would normally be expected where lighter colours are used.

Using dark colours with an LRV of less than 50% and failure to adequately maintain the surface coating of the cladding increases the risk of aesthetic related issues such as face checking.

Additional Notes:
For further advice on coatings refer to section 5.0: Coating and Application – Exterior Cladding.

Structurally, some smooth faced plywood products may meet the requirements of E2/AS1 however in CHH Woodproducts opinion smooth faced plywood does not retain a high visual appearance when directly exposed to weathering.

Where a high visual appearance is desired (such as exterior cladding) CHH Woodproducts recommends the use of Shadowclad rather than smooth faced plywood.

Shadowclad features a textured (bandsawn) face which reduces the visibility of natural face checking which can occur in any wood based product which has been exposed to weather for a prolonged period.

Face checks are not considered a manufacturing fault as they are part of a natural process and are merely an indication that it is time to re-apply the surface coating on the product.

2.10 HEALTH & SAFETY

Shadowclad should be installed and used as per the Material Safety Data Sheet (MSDS) which can be downloaded from www.chhwoodproducts.co.nz.

Always wear safety glasses or non-fogging goggles when cutting Shadowclad panels and flashings.

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.

2.11 STORAGE & HANDLING

Shadowclad panels:

- Keep Shadowclad panels dry
- Store under cover
- Handle and stack with care to avoid damage
- Stack flat; clear of ground, on at least three evenly spaced bearers
- Store in well-ventilated areas away from sources of heat, flames or sparks

Shadowclad™ flashings:

- Keep dry. Should a shipment of Shadowclad™ flashings arrive in a wet condition, they should be immediately dried before storing
- When storing flashings avoid contact with other metals which may cause scratches or marks. The use of shelving or racks faced with dry wood is recommended
- Keep away from caustics, nitrates and acids

3.0 INSTALLATION – INTERIOR LININGS

The use of untreated Shadowclad is acceptable under NZS 3604, NZBC for internal wall and ceiling linings where NZS 3602 allows the use of untreated plywood.

For detailed installation advice for plywood used as an internal lining refer to the Internal Linings Technical Bulletin, which is available to be downloaded from www.chhwoodproducts.co.nz.

Refer to NZBC Acceptable Solution B2/AS1 "Durability". External timber framing must be treated to a minimum H1.2 treatment. For timber treatment and allowable moisture content, refer to NZS 3602 as well as framing manufacturer's literature (e.g. Laserframe®). The current Laserframe Product Guide can be downloaded from www.chhwoodproducts.co.nz.

Use kiln dried framing such as Laserframe in accordance with timber framing manufacturer's specifications and treated in accordance with NZS 3602. The current Laserframe Product Guide can be downloaded from www.chhwoodproducts.co.nz.

Timber frame sizes and set out must comply with NZS 3604 (or specifically designed to NZS 3603) and with stud and nog centres and timber width required by this specification.

All Shadowclad sheet edges must be fully supported by framing.

- Studs must not exceed 600mm centres
- Nogs must be provided at a maximum of 800mm centres
- An extra stud is required at internal corners for ventilated cavities
- Refer to NZS 3602 for moisture content requirements as a guide, frame and cavity batten moisture content should be no greater than 20%
- Framing must be kept as dry as possible at all times
- Single spans of Shadowclad should not exceed 600mm (e.g. Below windows or balustrades)

The use of building underlay compliant with Table 23 of E2/AS1 or an alternative solution rigid air barrier must be provided over framing prior to the installation of exterior cladding

- Barriers to air flow are required
- Rigid air barriers are required in extra high wind zones and above.
- Rigid air barriers are also required in high wind zones and above for Ministry of Education school properties.

For more information on rigid air barriers refer to the current Ecoply Barrier Specification and Installation Guide which can be downloaded from www.chhwoodproducts.co.nz

Cavity Construction

A Shadowclad cavity base closure must be installed at the bottom of all walls and above window heads, this provides vermin proofing to ventilation openings. The holes in the cavity base closure must be kept clear to enable ongoing drainage and ventilation of the cavity.

Cavity Battens

Cavity battens provide an air space between the frame and the sheet and are considered a "packer" when installed in accordance with Acceptable Solution E2/AS1.

The battens must be fixed over the building underlay or a rigid air barrier.

All timber battens must: be nominal 20mm thick (between limits of 18mm and 25mm in thickness); at least the same width as the stud; and minimum H3.1 LOSP treated in accordance with NZS 3640.

Polystyrene battens MUST NOT be used with H3.1 LOSP treated Shadowclad panels, as they may melt in contact with solvents.

Battens must be fixed over the building underlay/rigid air barrier to all studs, as follows.

If studs are at 600mm centres:

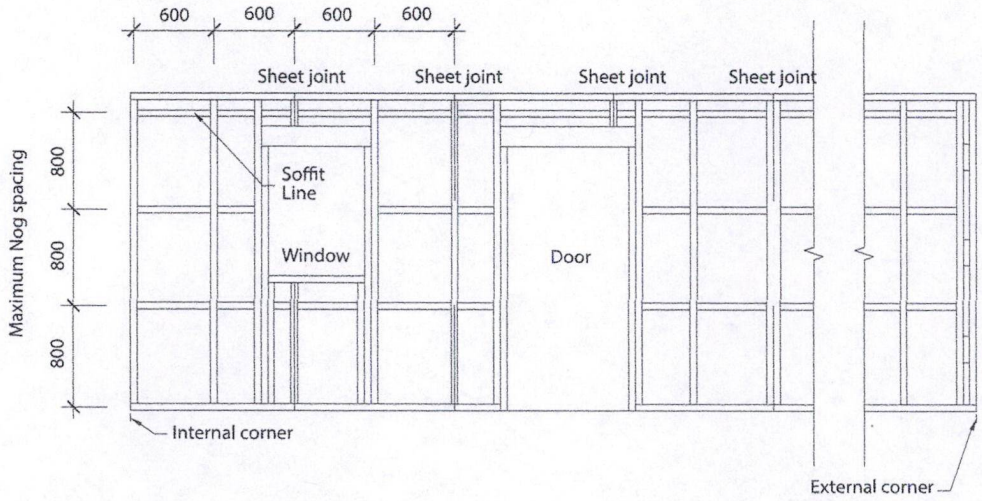
- Battens must be fixed vertically at 300mm centres (i.e. a batten on studs and one in between the two studs fixed to top and bottom plates and nogs)
- Battens fixed between studs are to restrain the building underlay and insulation from bulging into the drained cavity
- The Shadowclad must not be fixed to these cavity battens where there is no framing behind them

If studs are at 400mm centres battens may be fixed on studs only.

Horizontal battens must be used at the top of the wall to block the top of the cavity from venting into the roof space.

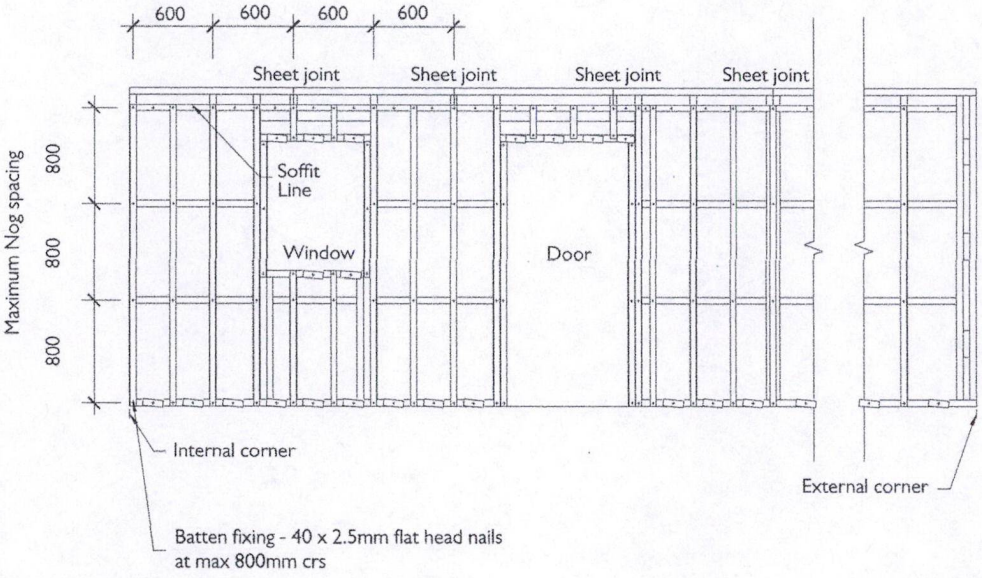
Cavity spacers (i.e. short pieces of cavity batten) may be used to support the bottom sheet edge (or provide intermediate support where required eg above window openings) but must allow water drainage to the outside. The cavity spacers must be fixed at a 5° minimum slope with a 50mm minimum air gap at either side.

SC001: Typical Framing Setout (without Battens)



Note: Single spans of Shadowclad® must not exceed 600 mm (e.g. Below windows or on balustrades)

SC002: Typical Framing Setout (with Battens)



A sheet layout should form part of architectural drawings and be used from the basis of stud/framing layout

- Sheet edges must be supported by the framing
- Sheets are designed to be vertically fixed. **Do not fix sheets horizontally**
- When laying up on to framing, start at framing corners and work across the wall
- All treated Shadowclad panels are envelope preservative treated. Where sheets are cut, edges **must** be coated with a brush on timber preservative such as Holdfast® Metalex® Clear
- Cut edges must be placed at the top of the sheet to avoid rain drips soaking in to cut end grains
- Priming the bottom edges and the back (rear) of the sheets to a height of 150mm is required
  - Shadowclad Ultra sheets are coated on the rear to a height of 150mm (min.) to meet this requirement

Table 7 **Fastener Durability for Shadowclad®**

Finish	Treatment	Exposure Zone (refer to section 4 of NZS 3604)	Material Required
Shadowclad Natural/Ultra	H3.1 LOSP	Zones B & C	Minimum hot dipped galvanised or better
		Zone D (sea spray)	Stainless Steel
Shadowclad Ultra	H3.2 CCA	All Zones	Stainless Steel

Table 8 **Fastener Lengths for Shadowclad®**

	Minimum Fastener Length and size (Cavity Fix)
Nails in Timber	60 x 2.8mm
Screws in Timber	8 g x 65mm

Shadowclad must be nailed or screwed to timber as per below:

- Use flat head (full round head) nails or rose head nails with timber framing. Rose head nails should be considered where a more decorative fastener is desired.
- Standard fixing pattern: fasten sheet edges at 150mm centres and within the panel on all supports at 300mm centres
- Do not fix to battens that are not installed over studs as the nails will puncture the building wrap
- Fasten no closer than 7mm to sheet edges except on edge with top lap (weather groove lap), **do not nail through top lap.**
- Fasten shiplap joints independently to ensure natural sheet expansion is not restricted
- When using a rigid air barrier the Shadowclad fastener lengths should be increased by the thickness of the panel to ensure required fastener pull out loadings are achieved
- Drive nails & screws flush
- Do not nail through the grooves in Shadowclad Groove panels

Power Driven Fastening

- Best practice is to hand drive nails as better control of nail depth is achieved
- Paslode Impulse Nailers may be used to fire power driven nails. Refer to Paslode for suitable fasteners as per the minimum lengths stated in table 8
- Do not overdrive nails into the sheet

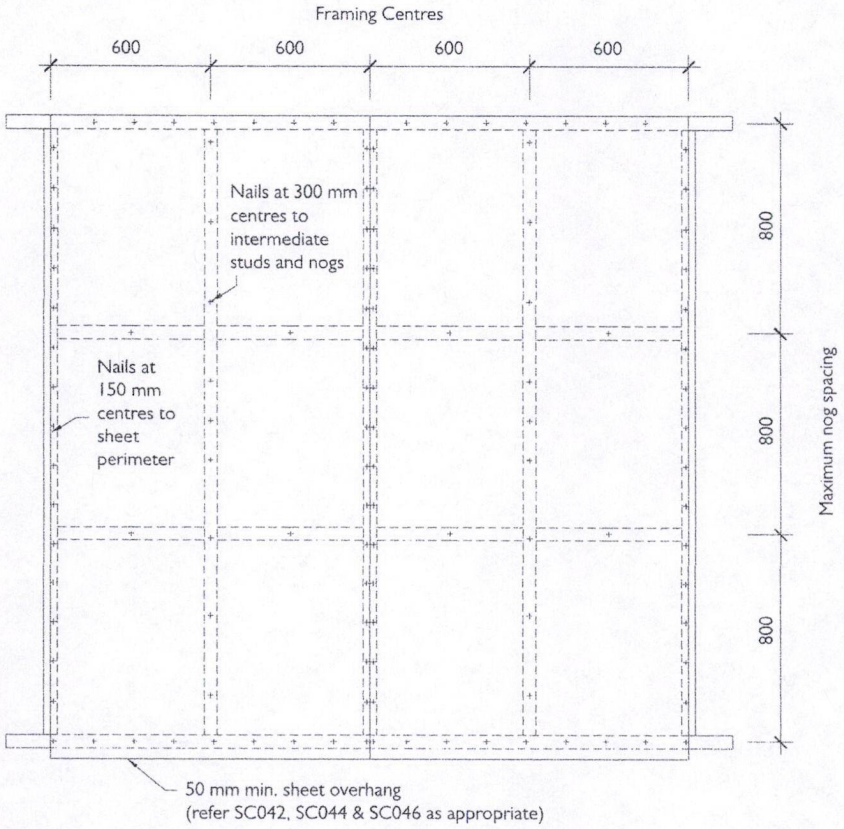
4.8 SHADOWCLAD KEY INSTALLATION AND DESIGN POINTS

The following tasks are provided to installers to point out key installation and design factors when used as an exterior cladding. These do no detract from the requirements to read and understand this literature as a whole.

Task	Tick when checked
Prior to Specification and Installation	
Read the Shadowclad Specification and Installation Guide in its entirety	☐
Framing Plan	
Framing setout drawings to suit Shadowclad fixing and installation guidelines	☐
Sheet Cuts	
Coat all sheet cuts with a preservative timber treatment such as Holdfast® Metalex® Clear	☐
After applying Holdfast® Metalex® Clear, apply the surface coating (e.g. paint or stain) to cut edges	☐
Place uncut edge to bottom	☐
Fastener Material Type	
Galvanised fasteners or better used (Stainless steel annular groove nails required in sea spray zones and with H3.2 CCA treated Shadowclad Ultra)	☐
Sheet Fastener Pattern	
Around sheet edge – maximum 150mm centre spacing	☐
Within sheet body – maximum 300mm centre spacing	☐
Horizontal Sheet Joints	
Minimum 9mm separation gap between sheets above all Horizontal Z flashings	☐
Prime the bottom of the sheet edge and 150mm up the back (rear) of the sheets	☐
50 mm strip of neutral cure silicon sealant or stop ends at all Z flashing terminations excluding terminations at Shadowclad™ metal corner flashings	☐
Back flashings or 150 mm overlap to all flashing butt joints	☐
Expansion Gaps Between Sheets (Vertical Sheet Joints)	
Texture Profile Sheets - 2mm gap between vertical edges of sheets	☐
Groove Profile Sheets - 9mm gap (i.e. full groove space) between vertical edges of sheets	☐
Note: Expansion gaps required between vertical edges of sheets to accommodate natural expansion and contraction of sheets	
Ground Clearances	
Paved/ Sealed Ground - minimum 100mm distance from the ground to sheet bottom	☐
Broken Ground - minimum 175mm distance from the ground to sheet bottom	☐
Prime the bottom of the sheet 150mm up the back (rear) of the sheet	☐

Refer to the current Shadowclad Specification and Installation Guide for full installation specifications and suggested details

SC003: Shadowclad® Fastener Layout

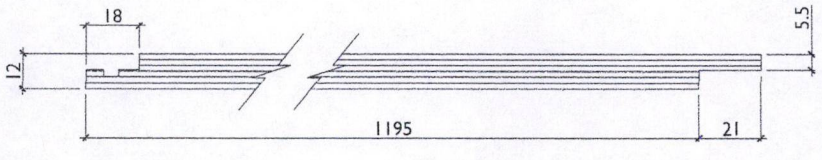


Shadowclad sheets have a built-in shiplap joint and weather groove on the long edges of all sheets.

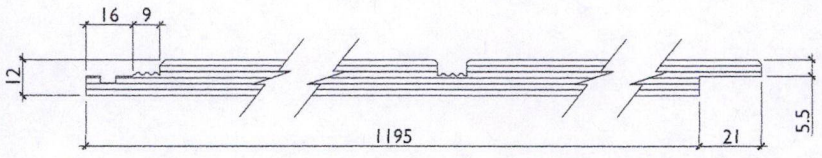
When installing Shadowclad Groove profile sheets, use a 9mm temporary spacer in the groove alongside shiplap joint to establish correct expansion gap.

Treat all cut edges with a suitable brush on preservative treatment such as Holdfast® Metalex® Clear.

SC004: Shadowclad® Texture and Groove Sheet Dimensions

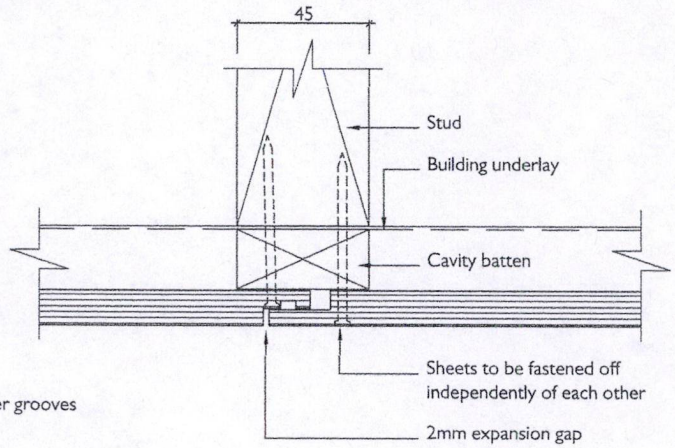


Texture Profile



Groove Profile

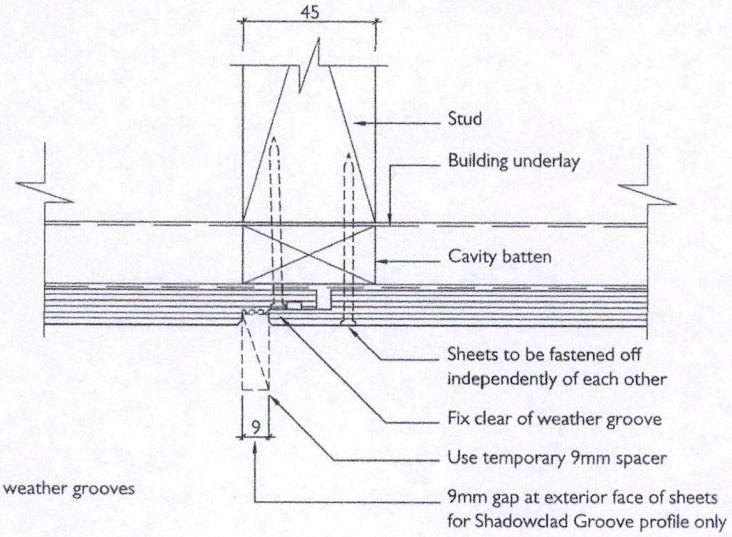
SC006: Shadowclad® Texture Vertical Joint (Cavity)



Note:

1. Do not nail through weather grooves

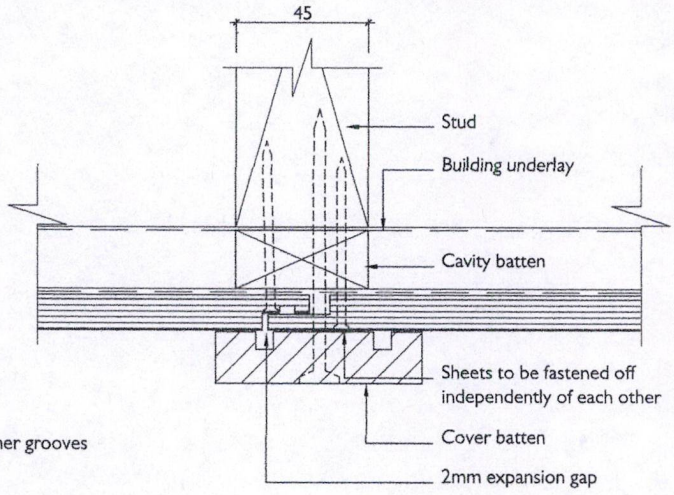
SC008: Shadowclad® Groove Vertical Joint (Cavity)



Note:

1. Do not nail through weather grooves

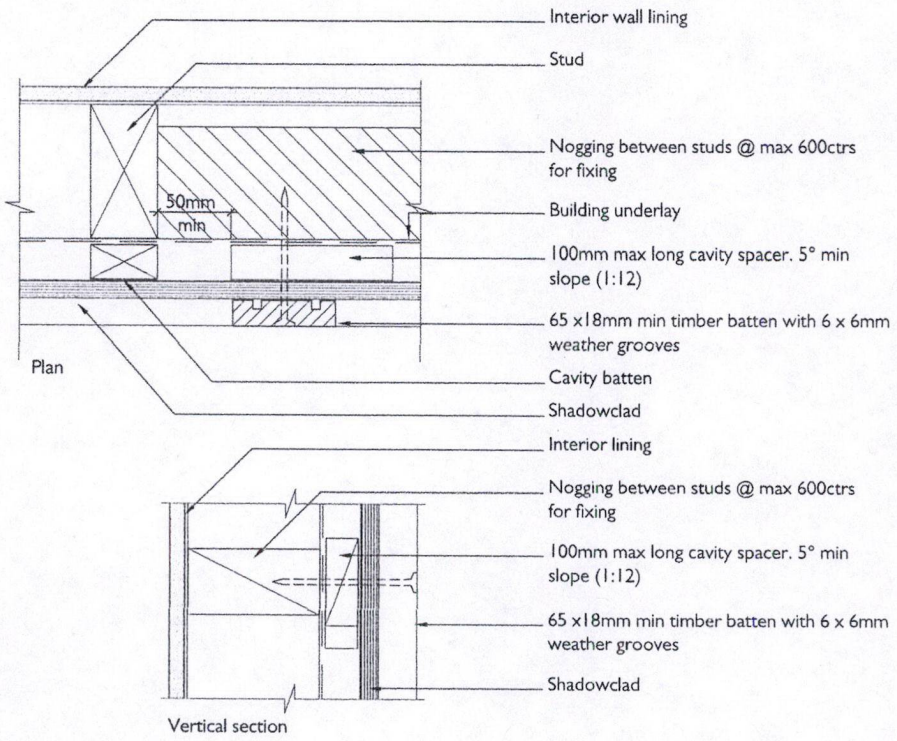
SC010: Shadowclad® Vertical Joint with Optional Cover Batten (Cavity)



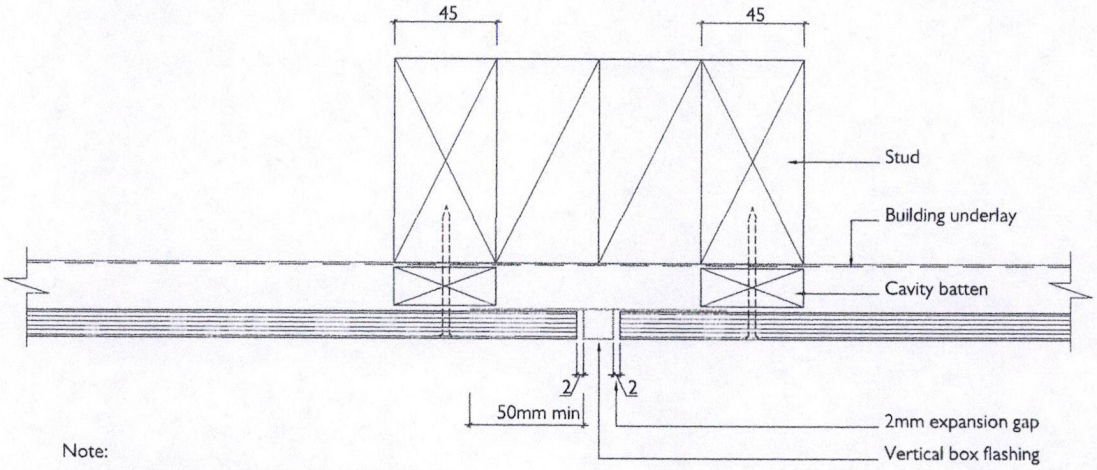
Note:

1. Do not nail through weather grooves

SC012: Shadowclad® Nogging for Vertical Cover Batten Between Studs (Cavity)



SC014: Shadowclad® Vertical Joint with Top Hat Flashing (Cavity)



Note:

1. Treat all cut edges with Holdfast® Metalex® Clear

4.10 HORIZONTAL SHEET JOINTS

At floor joist level a horizontal joint must be provided to accommodate the movement resulting from timber joist shrinkage and settlement.

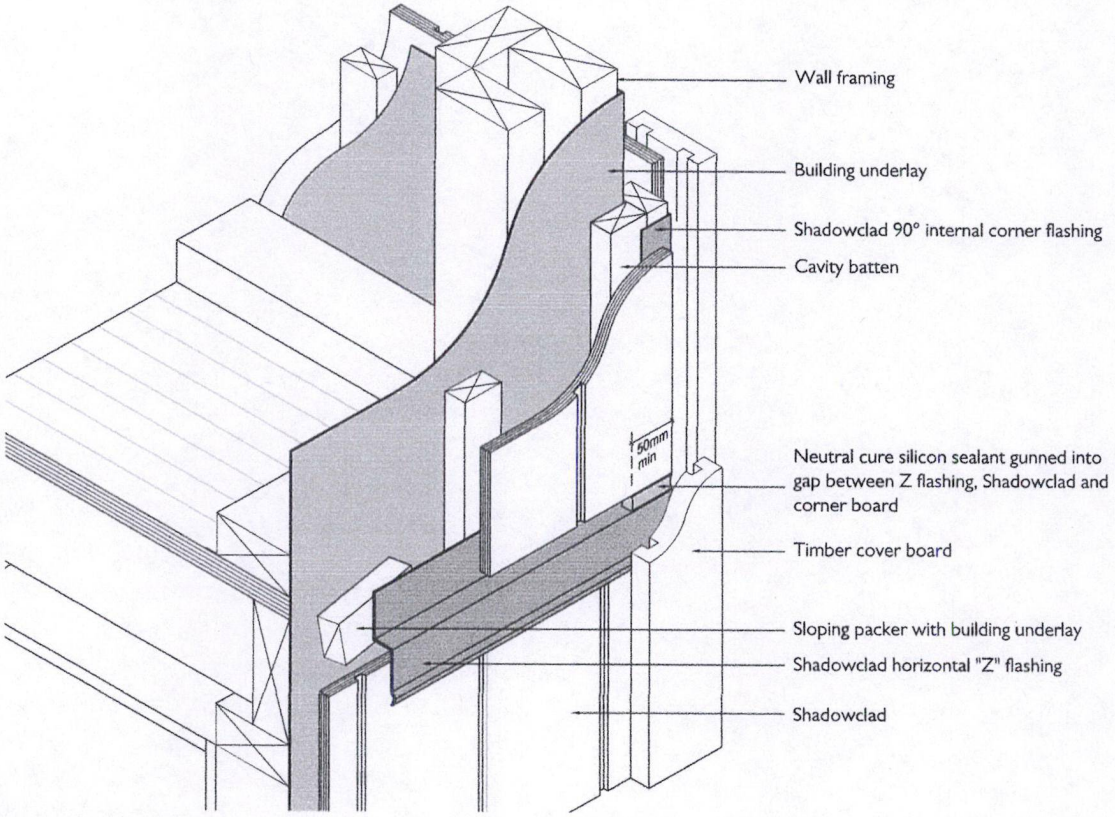
A Shadowclad™ horizontal 'Z' flashing should be used for horizontal sheet joints.

Acceptable Solution E2/AS1 requires drained cavities to be limited to a height of two storeys.

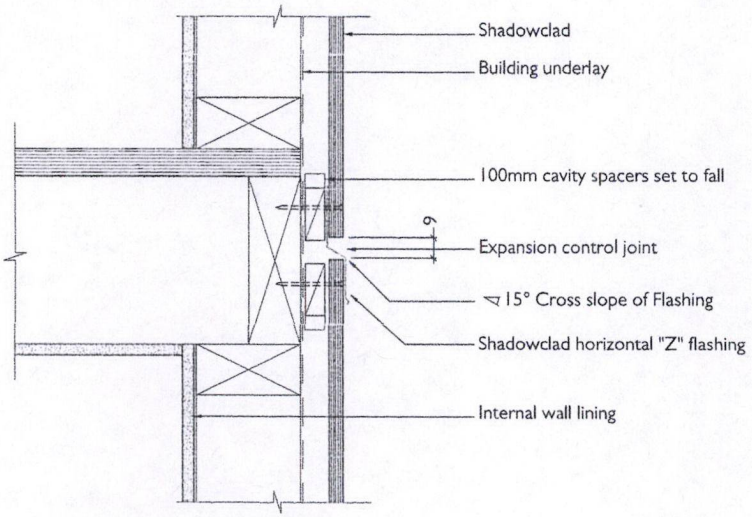
If aluminium 'Z' flashings are being used, all butt joints must include proprietary back flashings. Stainless steel flashings should be lapped by a minimum 150 mm at joins.

A 50 mm strip of neutral cure silicon (refer General Silicon Sealing of Horizontal 'Z' Flashings detail below) or stop ends (as applicable) required at all 'Z' flashing terminations excluding terminations at Shadowclad metal corner flashings.

Shadowclad® General Silicon Sealing of Horizontal 'Z' Flashings



SC016: Shadowclad® Mid Floor Horizontal Joint (Cavity)

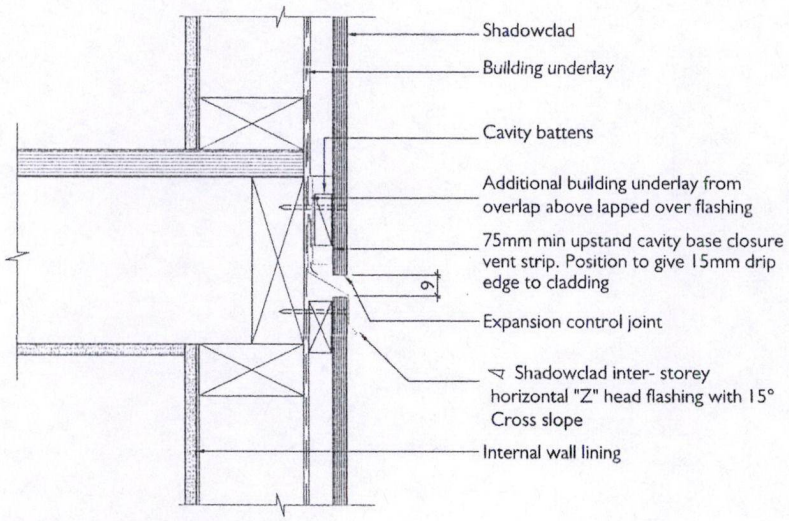


Vertical section

Note:

1. 50mm strip of neutral cure silicon sealant must be provided at the termination point of all Z flashings at windows, corner boxes, etc.
2. Detail is only suitable for drained cavities up to two storeys or 7m in height. For drained cavities over two storeys or 7 m in height refer to detail SC018 Horizontal Joint - Non Continuous (Cavity)
3. Back flashings or 150mm overlap required at all horizontal flashing butt joints
4. Treat all Shadowclad cut edges with Holdfast® Metalex® Clear

SC018: Shadowclad® Mid Floor Horizontal Joint – Non Continuous (Cavity)

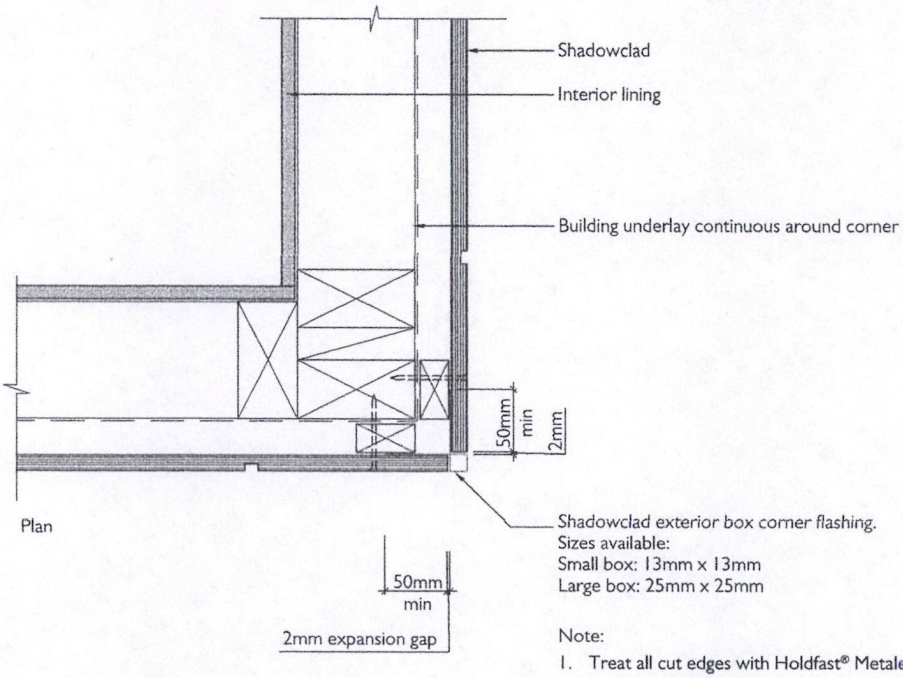


Vertical section

Note:

1. Stop ends must be provided at the termination point of all inter-storey Z flashings.
2. Detail SC016 Mid Floor Horizontal Joint (Cavity) may be used for continuous cavity up to two storey or 7 m in height
3. Back flashings or 150mm overlap required at all horizontal flashing butt joints.
4. Treat all Shadowclad cut edges with Holdfast® Metalex® Clear

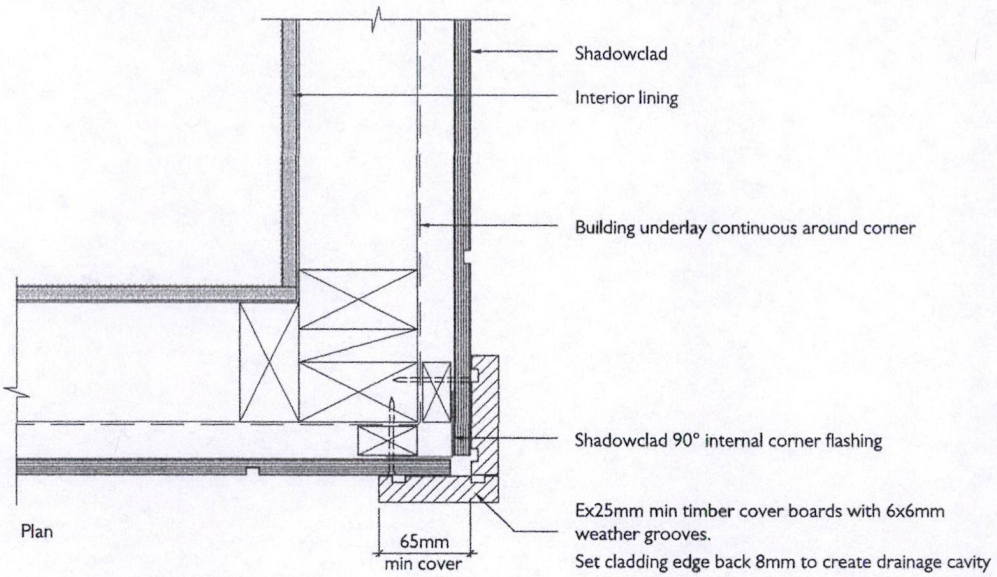
SC020: Shadowclad® External Corner with External Box Flashing (Cavity)



Note:

1. Treat all cut edges with Holdfast® Metalex® Clear

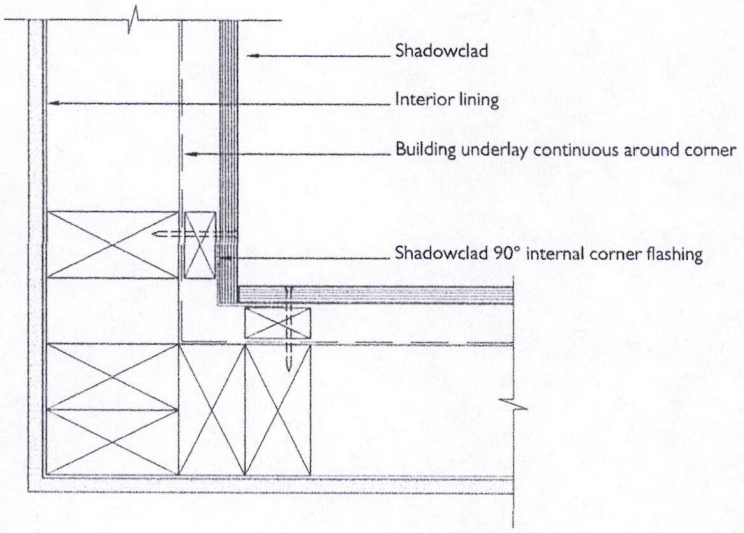
SC022: Shadowclad® External Corner with Cover Boards (Cavity)



Note:

1. Treat all cut edges with Holdfast® Metalex® Clear
2. 50mm strip of neutral cure silicon sealant must be provided at the termination point of all Z flashings at windows, corner boxes, etc.

SC024: Shadowclad® Internal Corner with 90° Flashing (Cavity)

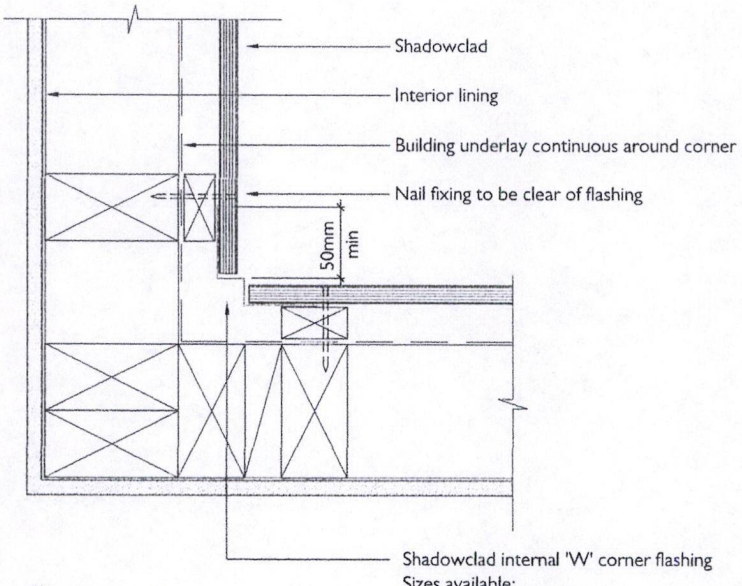


Plan

Note:

1. Treat all cut edges with Holdfast® Metalex® Clear

SC026: Shadowclad® Internal Corner with W Flashing (Cavity)



Plan

Sizes available:
Small 'W': 13mm x 13mm
Large 'W': 25mm x 25mm

Note:

1. Treat all cut edges with Holdfast® Metalex® Clear

4.13 SHADOWCLAD™ FLASHING JUNCTION POINTS

Flashings should have expansion joints where necessary to provide adequate allowance for thermal expansion as set out below.

- Expansion joints to be provided for joined flashings with a combined length exceeding 8 metres
- Where both ends of a flashing are constrained, allowance should be made for expansion

Cavity Base Closure

Fix Shadowclad cavity base closures to bottom plates through the upstand with 40 x 2.5mm, hot dipped galvanised or stainless steel (as appropriate) flat head nails at 300mm centres.

The cavity base closure should be positioned to allow a minimum drip edge to the wall cladding of 15mm at the base of walls, and 15mm above window head flashings.

Internal and External Flashings

Internal and external angles and 'Z' flashings can be nominally fixed with hot dipped galvanised or stainless steel (as applicable) flat head nails and then permanently fixed with the Shadowclad fasteners penetrating the flashing wings/upstands.

Horizontal 'Z' Flashings

Horizontal aluminium 'Z' flashings should be butted together with a back flashing to create a weathertight joint.

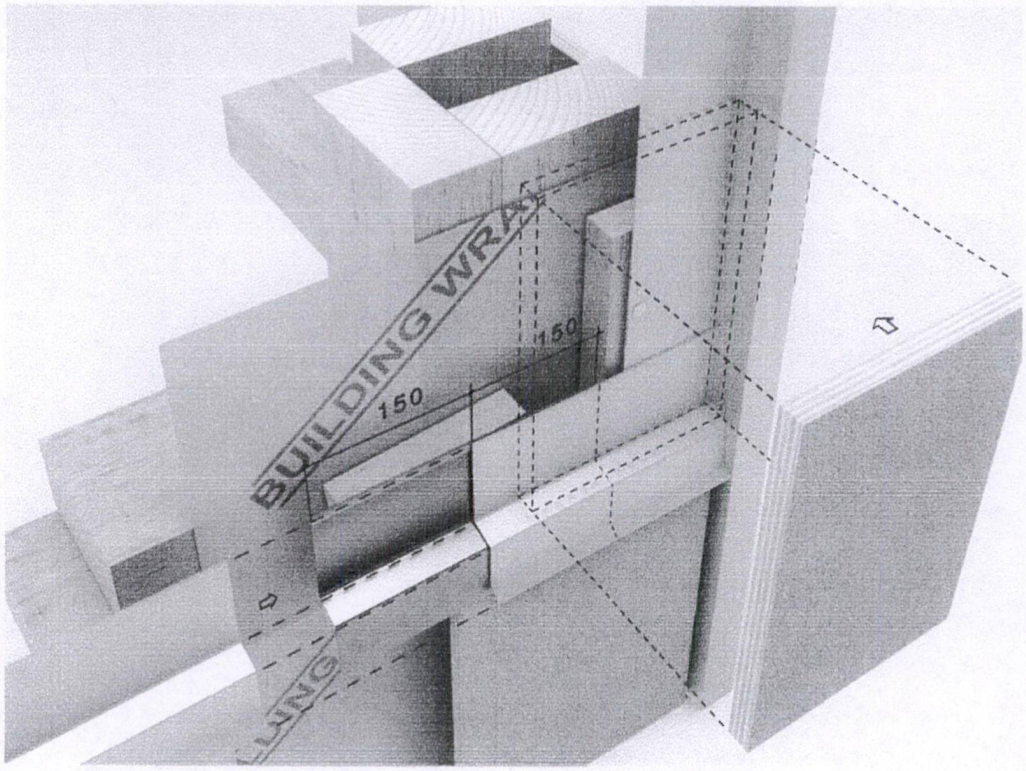
Stainless steel back flashings should overlap by a minimum of 150 mm at joins to create weathertight joints where horizontal flashings meet.

'Z' Flashings Terminations

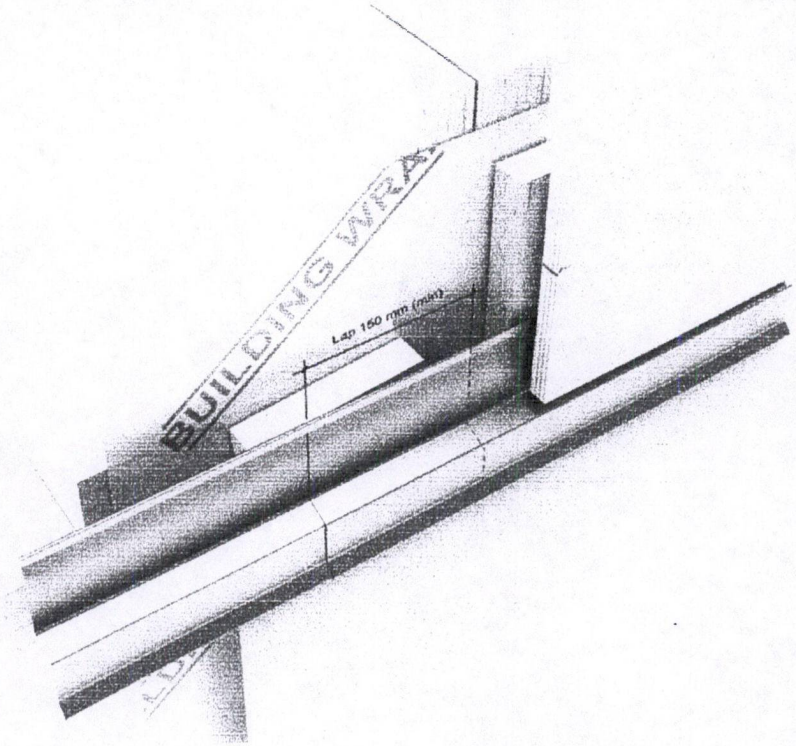
Where inter-storey 'Z' flashings terminate stop ends must be installed.

A 50 mm strip of neutral cure silicon (refer General Silicon Sealing of Horizontal 'Z' Flashings detail page 21) or stop ends (as applicable) required at all 'Z' flashing terminations excluding terminations at Shadowclad metal corner flashings.

Shadowclad™ Aluminium Flashing Junctions and Connections (Cavity)



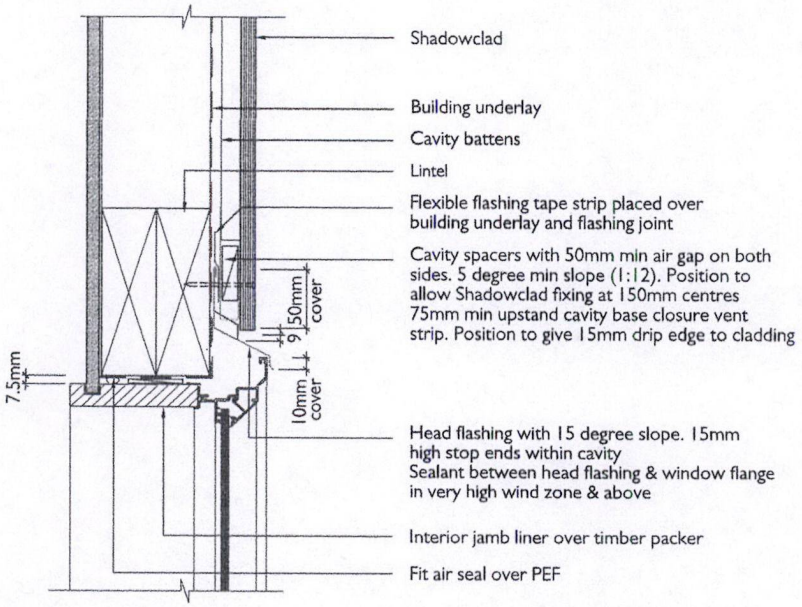
Shadowclad® Stainless Steel 'Z' Flashing Joins (Cavity)



4.14 WINDOW PENETRATIONS

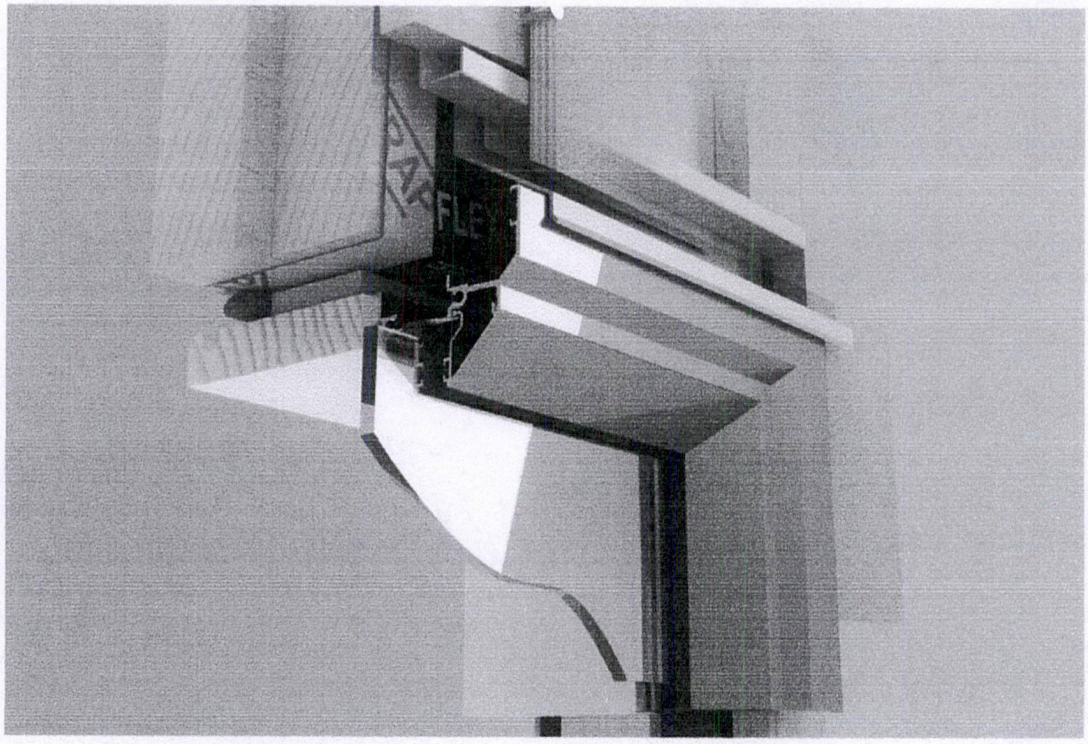
Window joinery flashings (ie head and sill flashings) should be sourced from the joinery fabricator to meet the requirements of Acceptable Solution E2/AS1 or an Alternative Solution such as the Window Association of New Zealand Window Installation System (WANZ WIS) which can be downloaded at www.wanz.org.nz.

SC028: Shadowclad® Window Head Detail (Cavity)

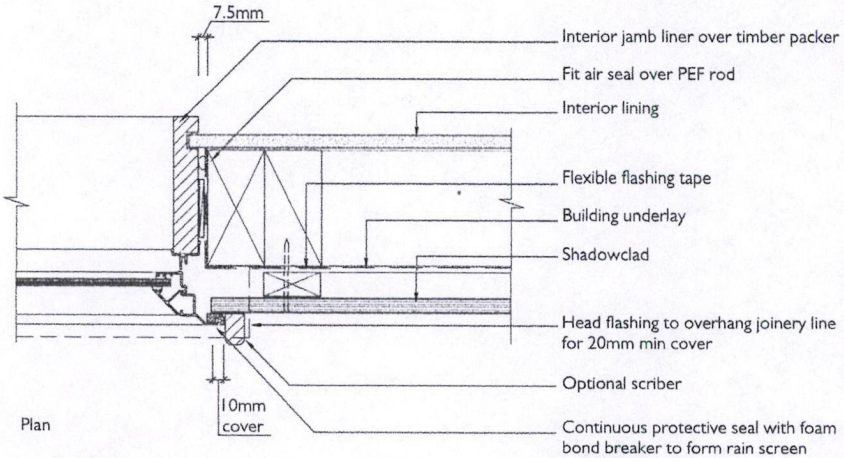


Note:

1. Treat all cut edges with Holdfast® Metalex® Clear
2. Stop ends to head flashing terminations



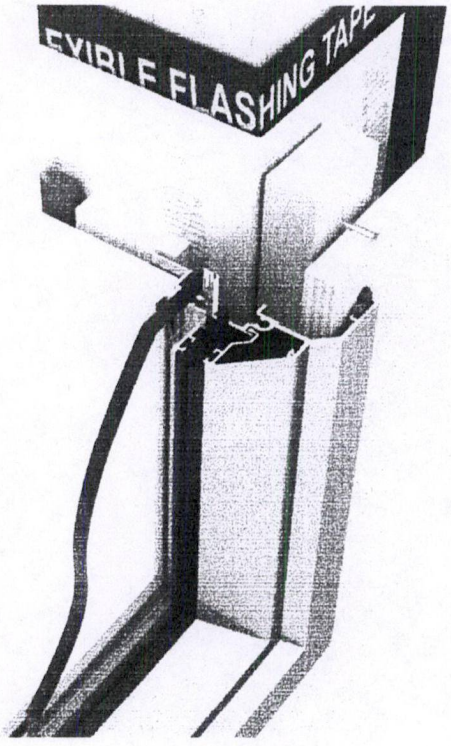
SC030: Shadowclad® Jamb Detail (Cavity)



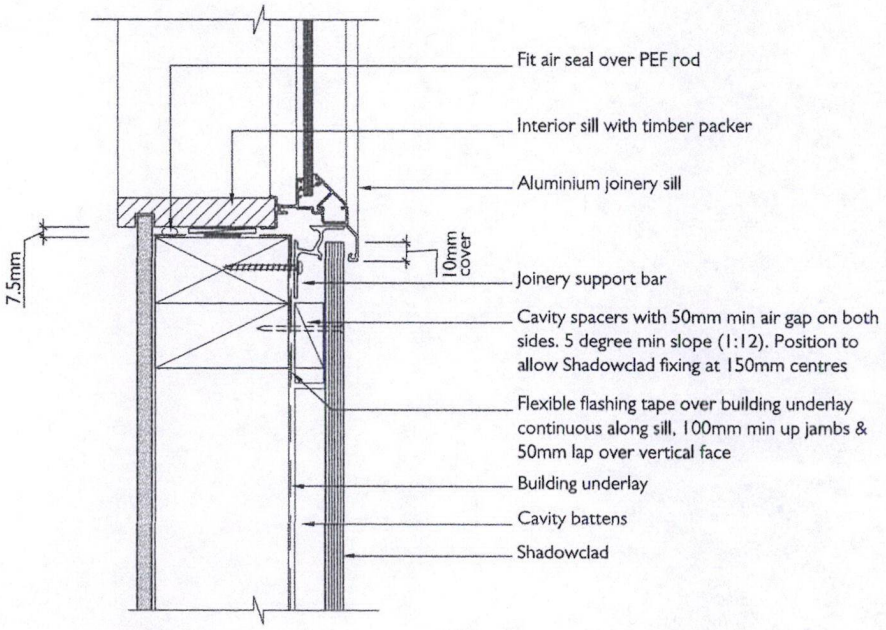
Plan

Note:

1. Treat all cut edges with Holdfast® Metalex® Clear
2. 50mm strip of neutral cure silicon sealant must be provided at the termination point of all Z flashings at windows, corner boxes, etc.



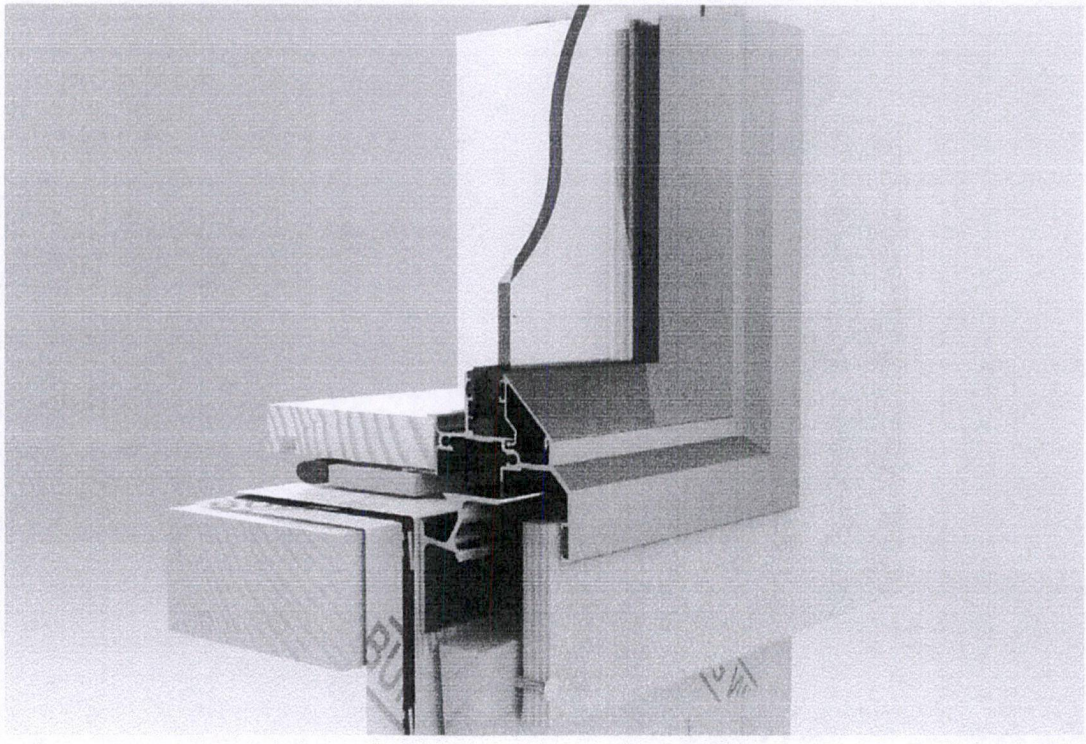
SC032: Shadowclad® Window Sill Detail (Cavity)



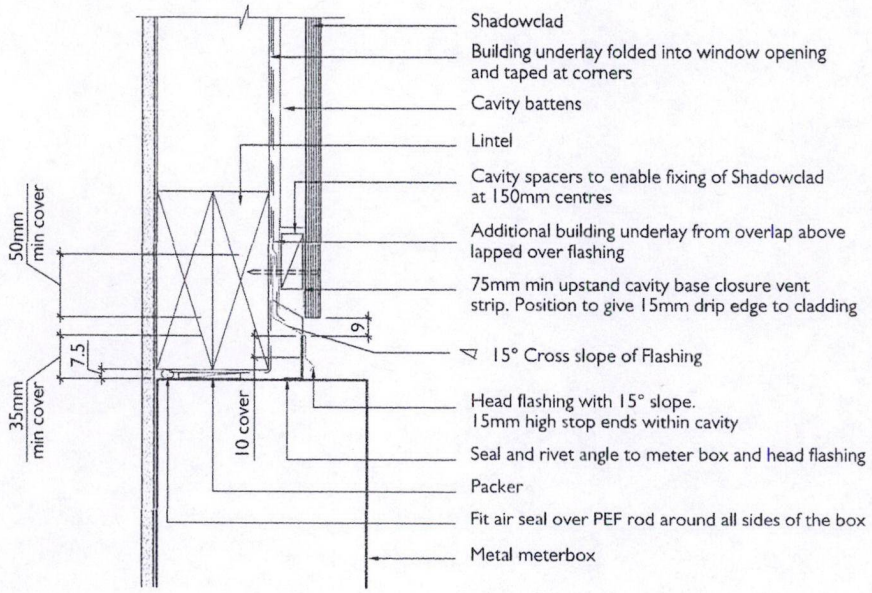
Vertical section

Note:

1. Treat all cut edges with Holdfast® Metalex® Clear



SC034A: Shadowclad® Meterbox Vertical Cross Section (Cavity)

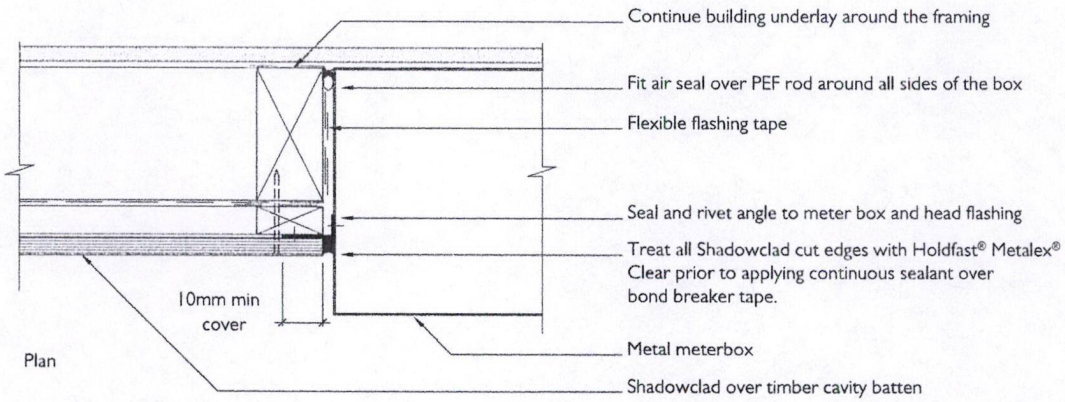


Vertical section

Note:

1. Treat all cut edges with Holdfast® Metalex® Clear

SC034B: Shadowclad® Meterbox Horizontal Cross Section (Cavity)

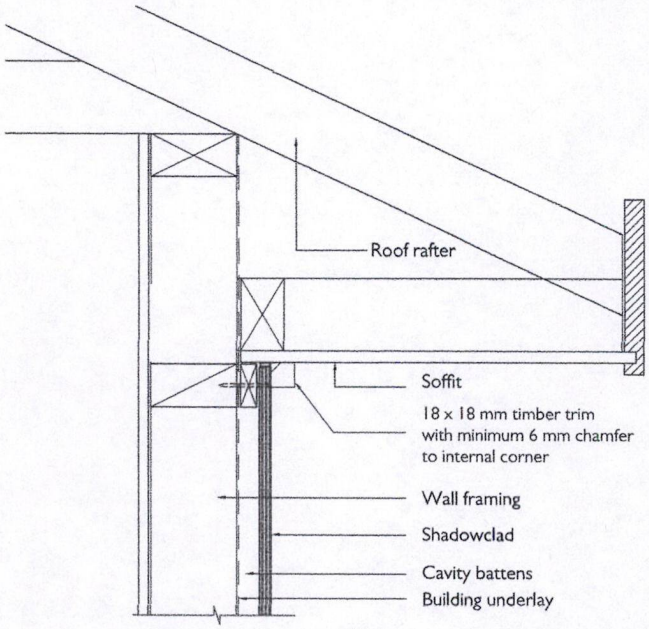


Plan

Note:

1. Treat all cut edges with Holdfast® Metalex® Clear
2. 50 mm strip of neutral cure silicon sealant must be provided at termination points of all Z flashings at meter boxes

SC036: Shadowclad® Soffit Detail (Cavity)

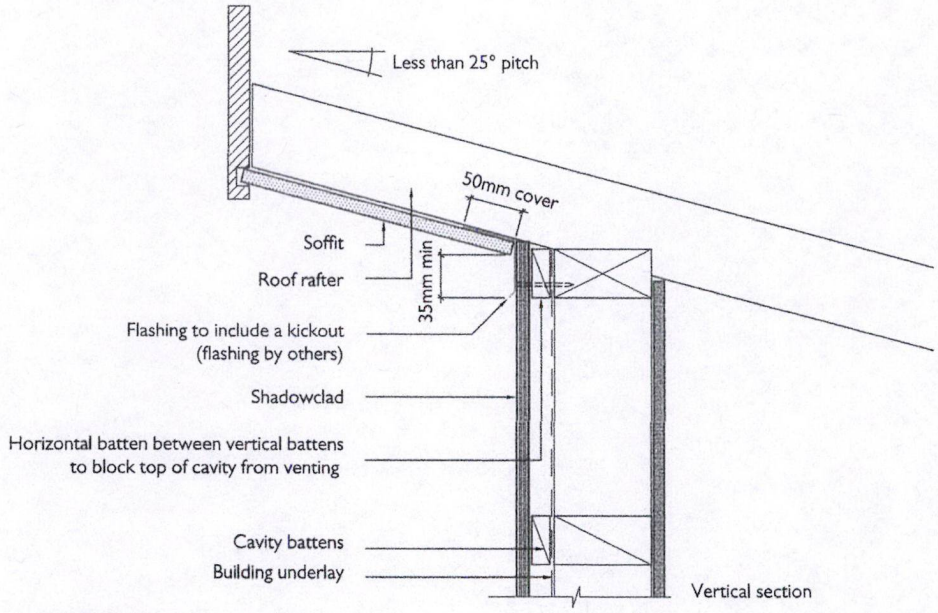


Vertical section

Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC036A: Shadowclad® Alternative Soffit Detail (Cavity)

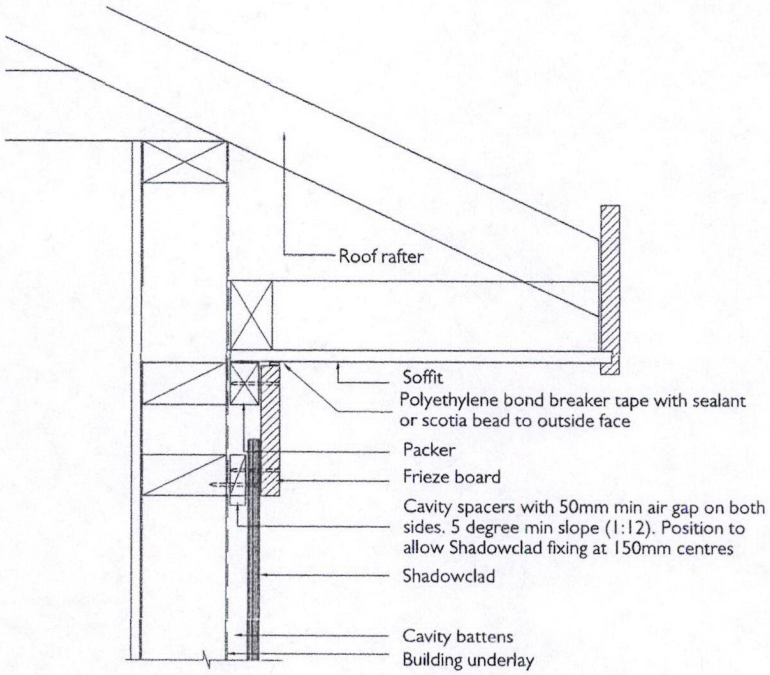


Vertical section

Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC038: Shadowclad® Soffit Alternative Detail (Cavity)

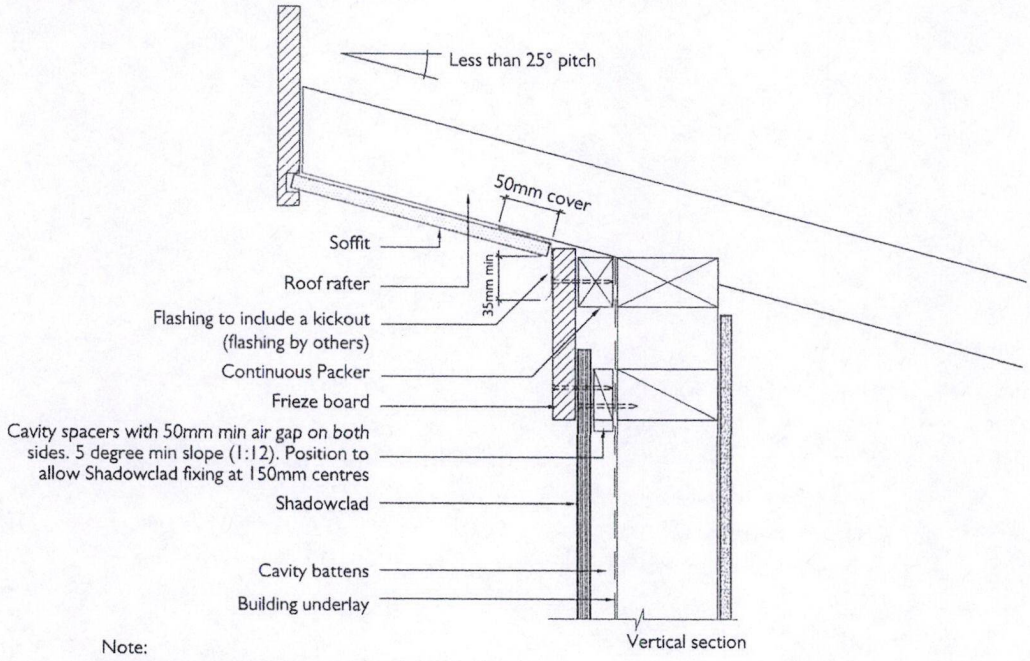


Vertical section

Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC038A: Shadowclad® Alternative Soffit Detail (Cavity)

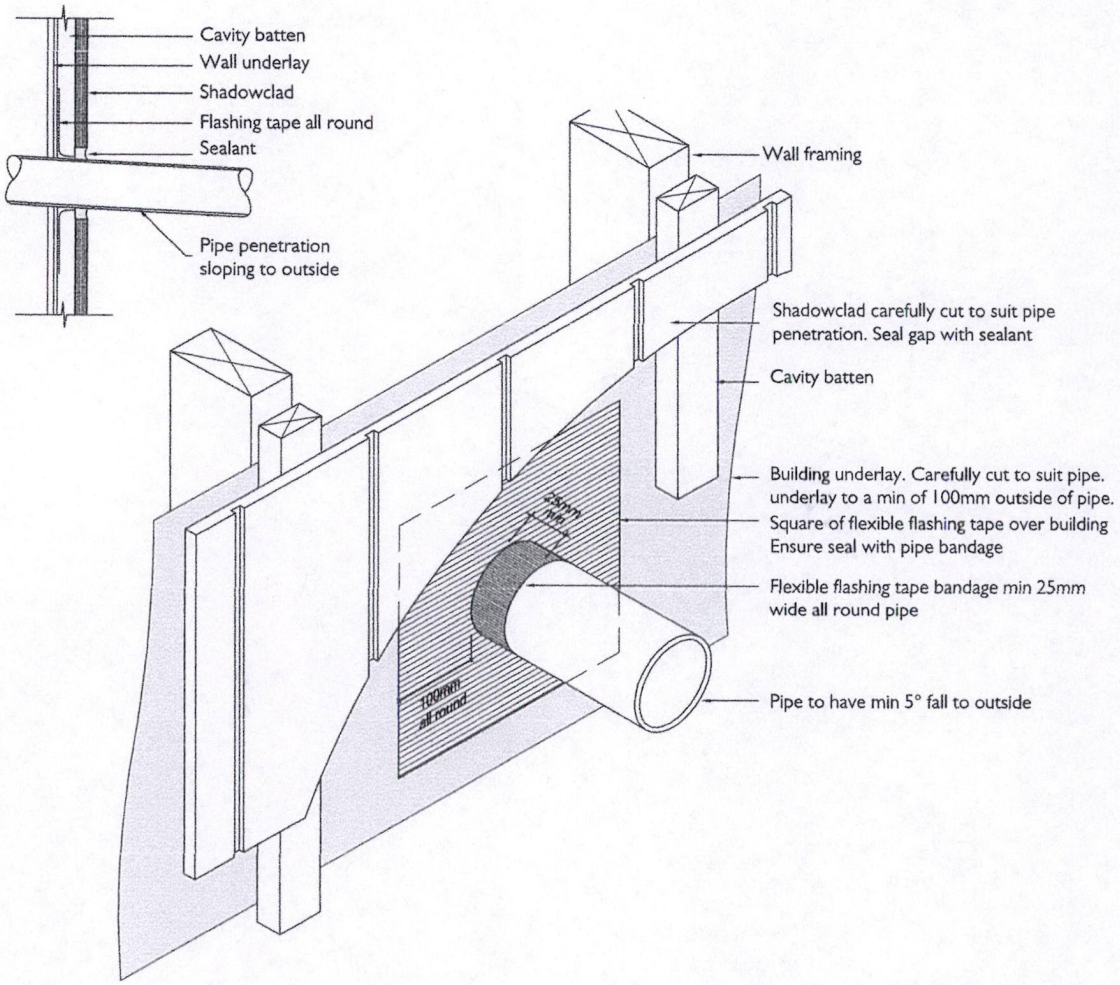


Vertical section

Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC040: Shadowclad® Pipe Penetration (Cavity)



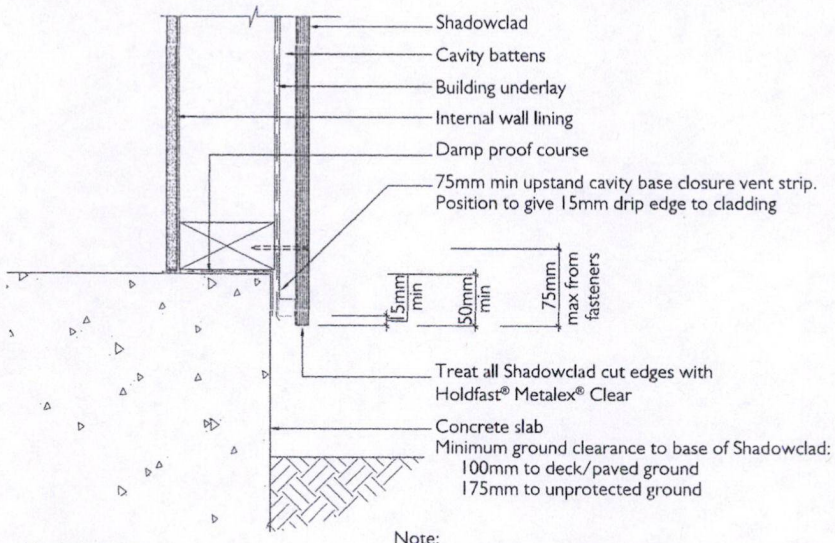
Ground Clearances

Shadowclad must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZS 3604 and E2 - External Moisture. Maximum distance from the bottom of the sheet to the fixing shall not exceed 75mm.

The bottom edge of the Shadowclad sheet must be a minimum of 50mm above decks and verandahs, 100mm above paved ground and a minimum of 175mm above unprotected ground.

For garage door openings, refer Paragraph 9 "Openings to garages" in Acceptable Solution E2/AS1.

SC042: Shadowclad® Overhangs and Ground Clearances (Cavity)

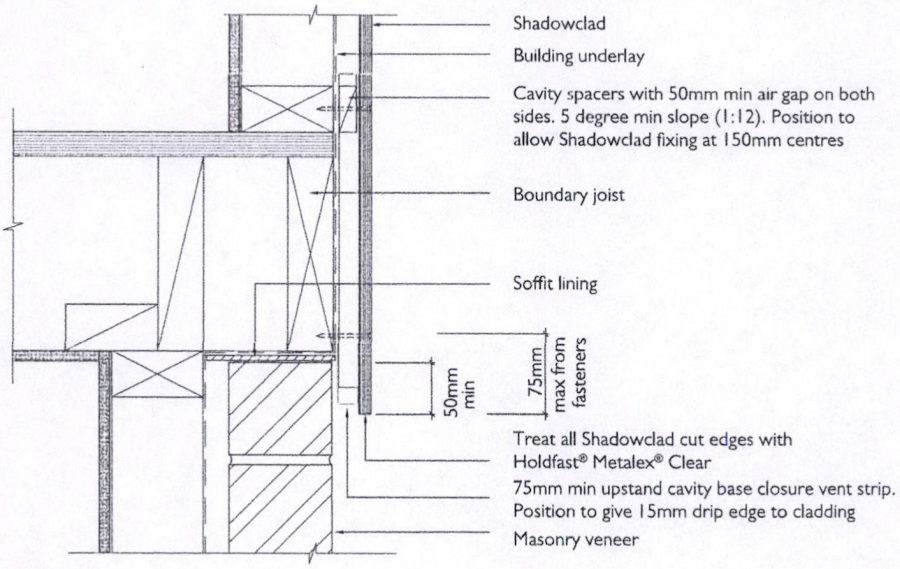


Vertical section

Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC044: Shadowclad® Upper Storey to Masonry Lower Storey (Cavity)

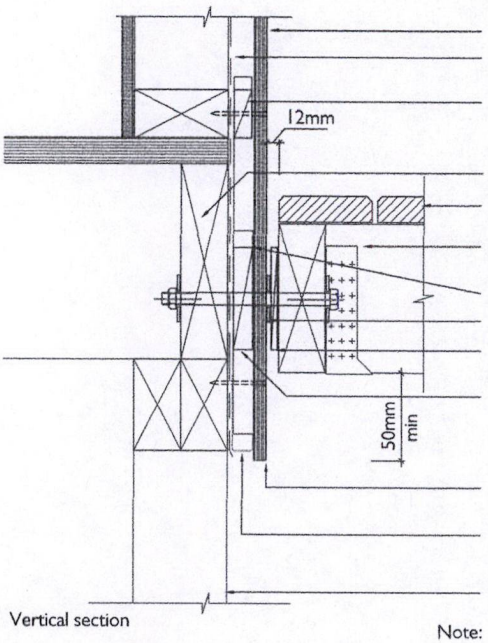


Vertical section

Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC046: Shadowclad® Timber Ground Floor to Non-Cantilevered Deck (Cavity)



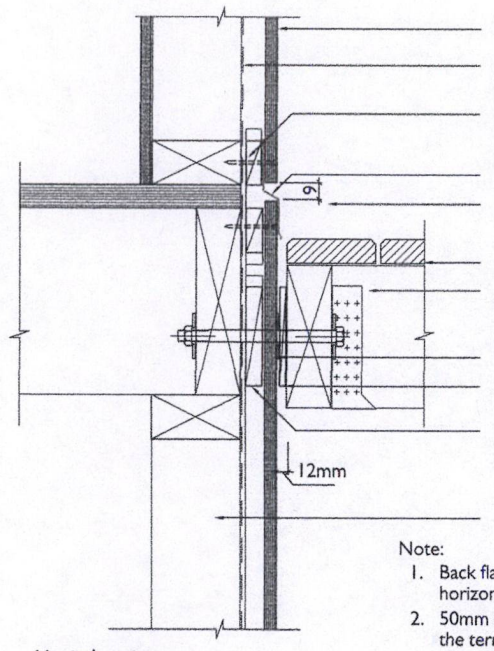
Vertical section

Shadowclad
Building underlay
Cavity spacers with 50mm min air gap on both sides. 5 degree min slope (1:12). Position to allow Shadowclad fixing at 150mm centres
Boundary joist
Decking
Deck joists attached to stringer with joist hangers. Refer NZS3604 for fixing details. Shadowclad sealed prior to fixing packer
Packer with top edge on a slope per cavity battens
50 x 3mm thick EPDM washer
12mm thick by 150mm long H3.2 CCA treated solid timber packer at fixings
Timber packer behind Shadowclad at bolt
Treat all Shadowclad cut edges with Holdfast® Metalex® Clear
75mm min upstand cavity base closure vent strip. Position to give 15mm drip edge to cladding
Jack stud / bearer

Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC048: Shadowclad® Mid Floor to Non-Cantilevered Deck (Cavity)



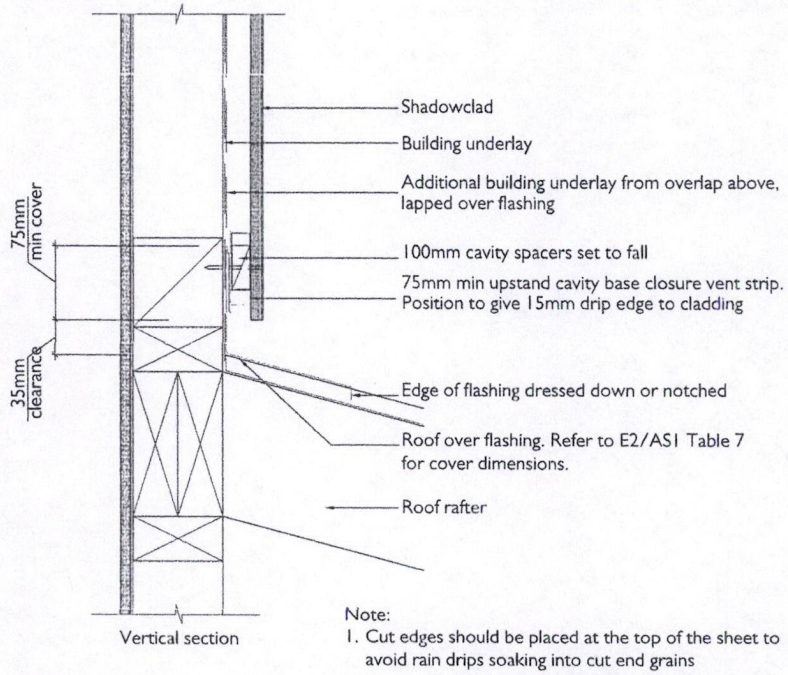
Vertical section

Shadowclad
Building underlay
Cavity spacers with 50mm min air gap on both sides. 5 degree min slope (1:12). Position to allow Shadowclad fixing at 150mm centres
◁15° Cross slope of Flashing
Shadowclad horizontal "Z" head flashing
Decking
Deck joists attached to stringer with joist hangers. Refer NZS3604 for fixing details. Shadowclad sealed prior to fixing packer
50 x 3mm thick EPDM washer
12mm thick by 150mm long H3.2 CCA treated solid timber packer at fixings
Timber packer behind Shadowclad at bolt
Slope top of packer per cavity battens
Foundation / sub-floor

Note:

1. Back flashing or 150mm overlap required at all horizontal flashing butt joints
2. 50mm strip of neutral cure silicon sealantmust be provided at the termination point of all Z flashings at windows, corner boxes, etc.
3. Treat all cut edges with Holdfast® Metalex® Clear

SC050: Shadowclad® Basic Apron Flashing (Cavity)

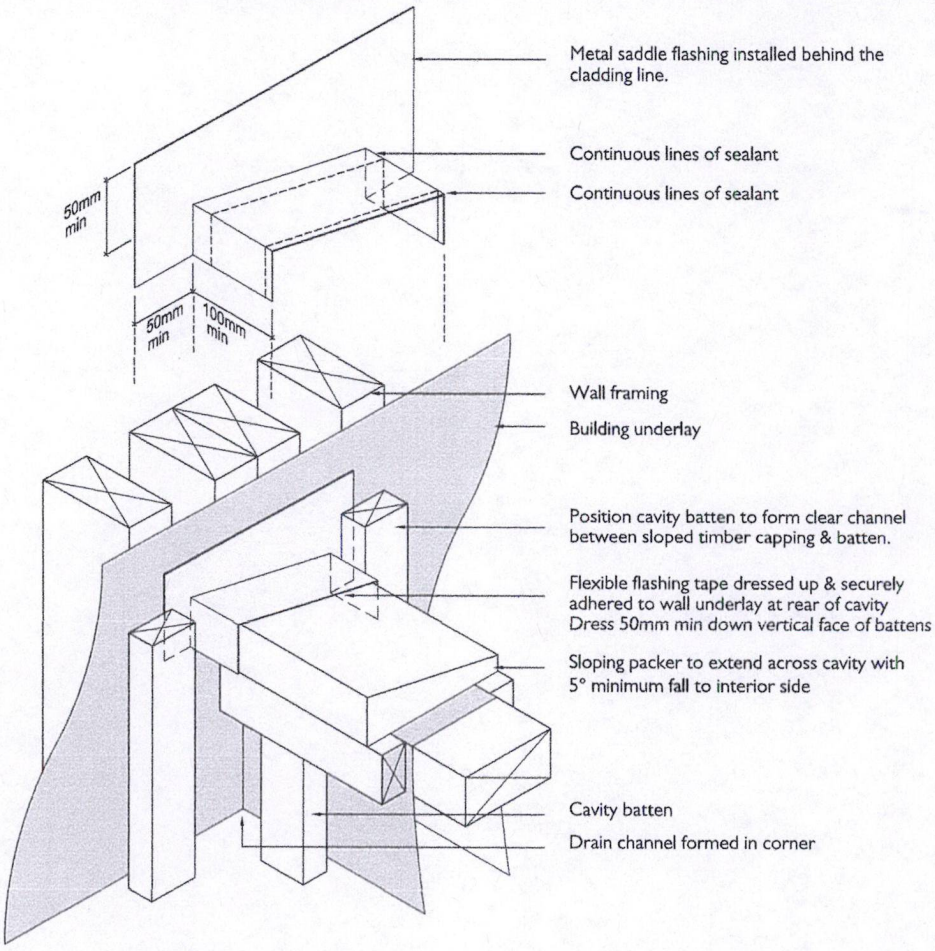


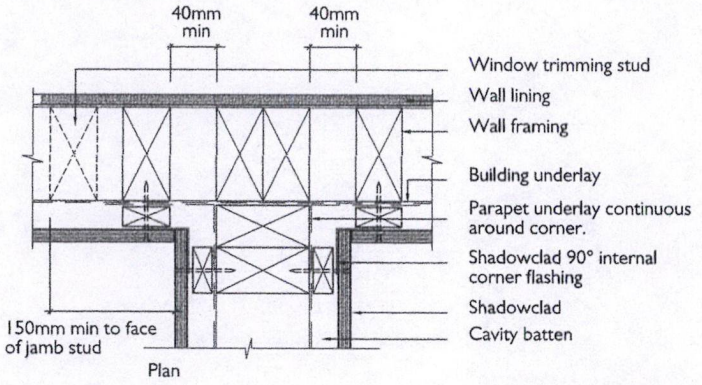
Vertical section

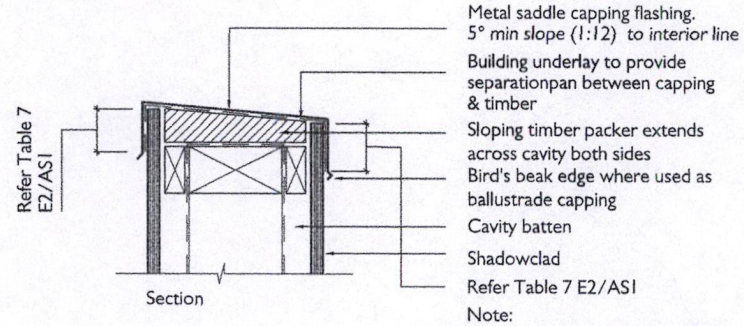
Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

SC052: Shadowclad® Balustrade to Wall Junction (Cavity)



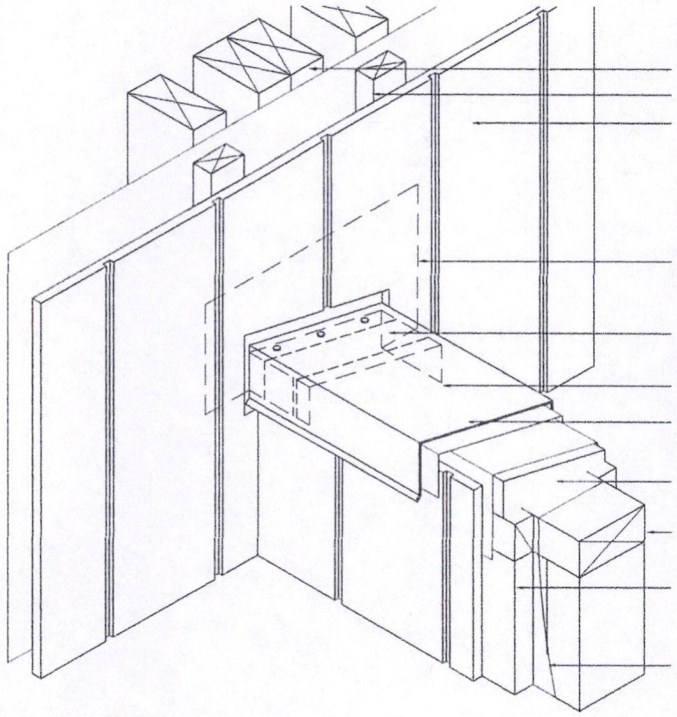




Note:

1. Treat all cut edges with Holdfast® Metalex® Clear

SC054: Shadowclad® Balustrade to Wall Junction (Cavity)



Wall framing

Cavity batten

Shadowclad

Metal saddle flashing under parapet capping. Refer E2/AS1 Figure 13 for min dimensions. Flexible flashing tape dressed up & adhered to building underlay behind battens

Rivet through sealant & seal capping to saddle flashing across top

Flexible flashing tape to extend min 50mm down face of battens

Parapet flashing with 5° min fall to interior side. Building underlay to provide insulation of metal flashing to timber

Sloping packer with building underlay

Wall framing

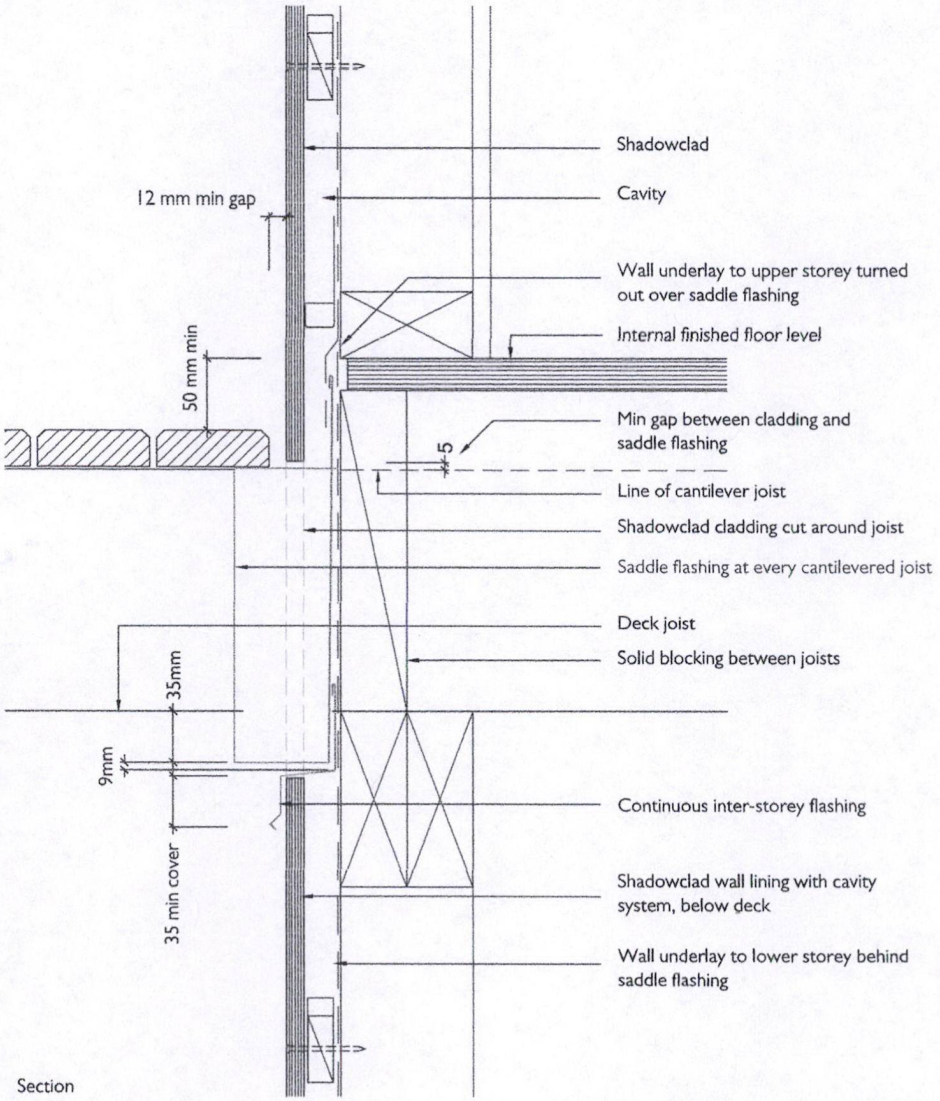
Cavity batten

Building underlay continuous over top of wall framing

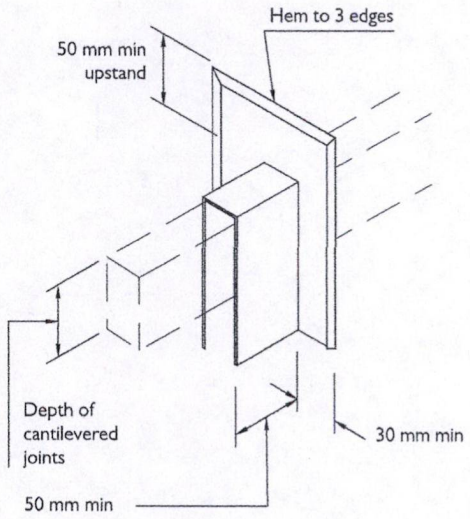
Note:

1. Treat all cut edges with Holdfast® Metalex® Clear

SC056: Shadowclad® Junction with Wall for Cantilevered Deck (Cavity)



Section

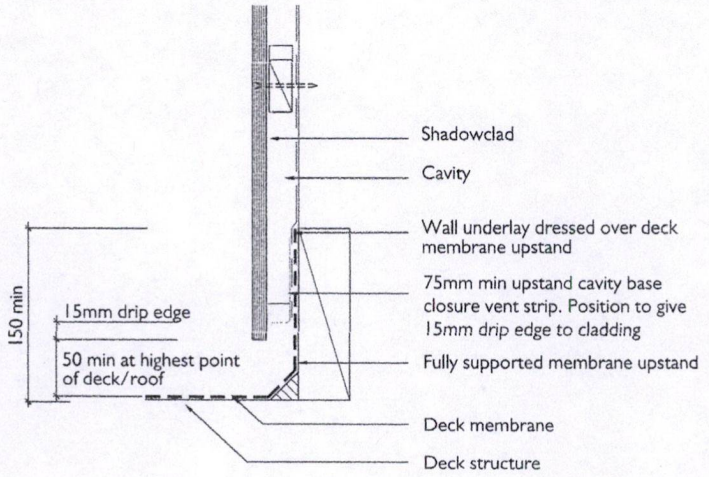


Saddle Flashing 3D Detail

Note:

1. Building wrap at back of cavity shall be taped around joist penetration
2. The back of the saddle flashing shall be positioned behind the cladding
3. Saddle flashing terminates over inter-story flashing
4. Treat all cut edges with Holdfast® Metalex® Clear

SC058: Shadowclad® Detailing for Enclosed Balustrade (Cavity)



Note:

1. Cut edges should be placed at the top of the sheet to avoid rain drips soaking into cut end grains
2. Treat all cut edges with Holdfast® Metalex® Clear

5.0 COATING & APPLICATION – EXTERIOR CLADDING

5.1 SURFACE PREPARATION

- Shadowclad is manufactured, treated and stored in dry conditions at CHH Woodproducts manufacturing facilities. The H3 treatment provides temporary repellence to mould prior to on site coating, however it remains the applicators responsibility to ensure the surface is dry and free from dust and mould prior to coating
- If Shadowclad has been exposed to external weathering for over 3 months wash surfaces with a mild detergent solution to remove any dirt, dust, mould or sea spray prior to coating
- If recoating, remove loose, flaking or unsound coatings and wash walls prior to recoating
- The Shadowclad surface must be dry prior to applying any surface coating

5.2 COATING APPLICATION

- If sheets feel greasy to touch, separate and place in a dry, well ventilated area to allow any residual solvents from the treatment process to flash off prior to applying coatings
- Panels are envelope treated. Sheet cuts **must** have a brush on treatment applied such as Holdfast® Metalex® Clear prior to applying coatings
- Coatings should be applied by brush to ensure adequate coating film build is achieved. Application via roller or spray is not recommended
- Shadowclad Natural panels should be coated within 3 months of installation
- Priming of sheet edges and on the rear of the sheet to a height of 150mm is considered good practice, and required at the base of all sheets
  - Shadowclad Ultra sheets are coated on the rear to a height of 150mm (min.) to meet this requirement
- A minimum total coating system film build of 90 microns is recommended when painting or using film forming stains, including a minimum 30 micron thickness per coat
- For detailed advice on surface preparation, coating product suitability and general coating practice always refer to the coating manufacturer prior to application

5.3 COATING SELECTION

The following coating information should be treated as a generic guide to coating systems typically used with Shadowclad exterior cladding. The selection, application and maintenance of coatings is the responsibility of building owners and the professionals that they engage. For advice on specific coating products and their suitability for use on Shadowclad always refer to the coating manufacturer.

It is important to note regardless of the cladding materials selected there will always be a level of coating maintenance required to ensure the cladding material is sufficiently protected from the elements and maintains the desired appearance.

Paints & Film Forming Stains

Three coats (1 undercoat, 2 top coats) of a good quality, 100% acrylic paint system with a light reflectance value (LRV) of 50% or greater (i.e. light colours) which is regularly maintained will provide the highest level of protection and durability for Shadowclad and is likely to require the least amount of coating maintenance over the life of the cladding.

Dark colours (LRV of below 50%) may still be used, however they are likely to increase heat and stress on the panel surface, reducing the panels overall lifespan and increasing the level of coating maintenance required to maintain an acceptable visual appearance.

Some film forming stains (i.e. coatings with the consistency of paint but with an appearance similar to penetrating stains) may offer similar protection qualities to paints however advice and assurance should be sought from the coating manufacturer as to their suitability for use with Shadowclad prior to application.

Where paints or film forming stains are to be used, Shadowclad Ultra is recommended. Shadowclad Ultra features a factory applied performance coating which in most cases eliminates the use of time consuming wet primers. (See Table 9)

Shadowclad Natural can also be used with paint however a conventional wet primer is required as part of the coating manufacturers overall system specification.

Penetrating Stains

Penetrating stains show the natural texture and character of timber and are widely used on Shadowclad exterior cladding.

Penetrating stains offer less protection for panels from exterior weathering than paints and film forming stains which are considerably thicker in surface film build. Due to their translucency, penetrating stains are likely to require additional coating maintenance during the panel's life to maintain an acceptable visual appearance.

Penetrating stains should only be used on Shadowclad Natural and are not recommended for use on Shadowclad Ultra.

CHH Woodproducts does not recommend the use of linseed oil based coating which have the potential to promote mould growth in this product.

Clear Coatings & Uncoated Shadowclad®

If Shadowclad is left uncoated or is clear coated in exterior applications the long term aesthetics of the board will be significantly reduced. While the product will meet durability and weathertightness requirements under E2/AS1 a high visual appearance will not be achieved in the long term.

Face Checking

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 which is exacerbated by darker colours. 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 before finalising colour choice. If checking occurs, repaint with a good quality, 100% acrylic exterior house paint in accordance with the manufacturer's instructions, thoroughly working paint into the face checks with a paint brush.

Table 9 **Coating System for Shadowclad® Ultra**

Within 3 months of erection	**Ensure the panel is clean and dry prior to top coating. Top coat with two coats of premium 100% acrylic exterior house paint.**
OR	
Within 3 to 6 months of erection	**Wash the surface with a mild detergent solution to remove any chalky material prior to top coating. Top coat with two coats of premium 100% acrylic exterior house paint.**

Note: For best results

i/ allow 24 hours between coats

ii/ use a light coloured paint system, LRV above 50%

iii/ Recommend panel be washed down prior to painting to remove any sea salt spray or dirt deposits

iv/ Minimum total coating film build of 90 microns is recommended, including a minimum 30 microns per coat

Chemical manufacturers recommend that any run-off from treated surfaces should not be used for drinking water. Unsealed (eg unpainted) plywood claddings should not be used in situations where run-off directly from such claddings is collected in water tanks for drinking water. Ensure selected coatings act as a sealant and refer to the coating manufacturer's Material Safety Data Sheets to confirm specified coatings are suitable for use in these applications.

6.0 MAINTENANCE

All cladding materials, including Shadowclad, require careful and regular product maintenance by the building owner throughout the cladding's normal service life to ensure long term durability and to maintain visual aesthetics.

Claddings:

At a minimum, Shadowclad should be maintained by:

- Regularly washing it down (at least annually) with a mild detergent or solution to remove surface dirt, moss, mould, and sea spray
- Inspect on at least a yearly basis paying particular attention to sheet joints, corners and bases
- Keep dirt, soil or leaf build-up at least 150 mm away from the base of panels
- Clean spouting and downpipes as required, so that stormwater is not overflowing onto the cladding
- Repaint as soon as the first sign of coating deterioration is identified in accordance with the coating manufacturer's specifications (including edges and sheet bottoms)
- Panel recoating requirements may vary depending on climate, orientation to the sun, coating type and coating colour selected
- Maintain the exterior envelope and connections including joints, penetrations, flashings, heat pumps, and sealants that may provide a means of moisture entry beyond exterior cladding to comply with the requirements of the NZBC Clause E2 - External Moisture
- Prune back vegetation which is close to or touching the building as well as ensuring the NZBC ground clearance requirements are maintained especially where gardens are concerned
- DO NOT use water blasters to wash down the cladding

Flashings:

- Flashings should be periodically cleaned on a similar basis to the glass in windows
- Clean Shadowclad™ flashings with a diluted solution of mild liquid detergent avoiding excessively hot solutions. Use a soft bristle brush. DO NOT use abrasive tools or cleaners on the coating
- After cleaning, rinse thoroughly with fresh water. DO NOT use strong solvent type cleaners. Where the use of solvents is required, such as cleaning paint spills, use nothing other than methylated spirit. Ensure contact time is as short as possible, and rinse the solvent cleaner thoroughly from the surface with copious amounts of quality drinking water
- Where cavity base closures are installed, ensure drainage holes are kept clear

Q: Where can Shadowclad be used?
Shadowclad can be used as both exterior cladding or as an internal lining (moisture free areas only). For interior linings untreated Shadowclad should be used. For exterior cladding H3 treated Shadowclad is required.

Q: Do I have to re-treat cut edges of Shadowclad panels?
H3 treated Shadowclad is envelope preservative treated. All cuts made in treated plywood **must** have a brush on preservative treatment applied fully to the cut area. CHH Woodproducts recommends the use of Holdfast® Metalex® Clear.

Q: When used as an exterior cladding what are the durability expectations of Shadowclad?
Under the NZBC Shadowclad (when used as an exterior cladding) is required to meet a 15 year minimum durability level.

To achieve a 15 year durability Shadowclad must be:

- H3 preservative treated
- Uncoated Shadowclad will meet the durability and weathertightness requirements, but a high visual appearance will not be achieved in the long term
- Coated with a good quality penetrating stain, film forming stain or paint system
- Coatings must be regularly maintained as part of a normal building maintenance program throughout the life of the building

Shadowclad is not recommended to be left uncoated when used as an exterior cladding

Note – durability according to the NZBC refers to the products ability to continue to perform its primary function as protection for the building structure. Appearance including the performance of the coating product is not covered under the NZBC durability requirements.

Q: Can Shadowclad, when used as an exterior cladding, be coated in dark colours?
Dark colours (coatings with an LRV of below 50%) will achieve a 15 year durability however customers must expect an increased level of recoat and general product maintenance compared to where light coating colours are used.

The greatest level of cladding protection and least amount of coating maintenance can be achieved by using a good quality paint system (applied as per the coating manufacturers specifications) with an LRV of 50% or greater and a minimum total coating system film build of 90 microns, including a minimum 30 micron thickness per coat.

For further information on coatings always refer to the applicable coating manufacturer's specification material

Q: Does Shadowclad comply with the NZBC Requirements?
Shadowclad has been tested in accordance with E2/VM1 and AS/NZS 4284 "Testing of Building Facades" for compliance with the NZBC requirements and has been BRANZ appraised for use in cavity fix construction.

Q: In the Shadowclad™ exterior flashing range can I colour the flashings to match the colour of my building?
Shadowclad aluminium exterior flashings are available in either anodised or mill finishes. Anodised flashings are silver in colour and can be installed immediately. Mill finished flashings can be powder coated to specific colours by the customer.

Q: Does face checking affect the performance of Shadowclad?
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 which is exacerbated by darker coloured coatings. These checks are superficial, being confined to the face veneer. They do not alter the structural integrity of the plywood in any way.

8.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code (NZBC)
- AS/NZS 2269:2012 "Plywood Structural"
- AS/NZS 1604.3:2010 "Specification for Preservative Treatment, Part 3: Plywood"
- NZS 3602:2003 "Timber and Wood-Based Products for use in Buildings"
- AS/NZS 4284:2008 "Testing of Building Facades"
- NZS 3603:1993 "Timber Structures Standard"
- NZS 3604:2011 "Timber Framed Buildings"
- AS 3715:2002 "Metal Finishing – Thermoset powder coating for architectural application of aluminium and aluminium alloys"
- NZBC Clause 'E1/AS1 – Surface Water'
- NZBC Clause 'E2/AS1 – External Moisture'
- NZBC Clause 'E3/AS1 – Internal Moisture'
- NZBC Clause 'B2/AS1 – Durability'
- Product Technical Statement – Shadowclad for Cavity Construction
- Ecoply® Specification and Installation Guide
- Ecoply Barrier Specification and Installation Guide
- CHH Woodproducts technical notes – downloadable from www.chhwoodproducts.co.nz/document-library
- Material Safety Data Sheets
  - MSDS Azole Treated Plywood, LVL & I-Joists
  - MSDS CCA Treated Plywood & I-Joist
  - MSDS Stainless Steel flashings
- Producer Statement Aluminium Flashing
- Window Association of New Zealand (www.wanz.org.nz)
- APA (www.buildabetterhome.org)
- EWPAA (www.ewp.asn.au)
- BRANZ Appraised 764 – Shadowclad Cavity Fixed Cladding System
- BRANZ Recommendations for Building Maintenance

Standards can be purchased online at www.standards.co.nz

Building Code Compliance Documents can be downloaded free of charge at www.dbh.govt.nz

Line drawings within this literature can be downloaded from www.chhwoodproducts.co.nz/document-library

9.0 LIMITATIONS

The information contained in this document is current as at September 2015 and is based on data available to CHH Woodproducts at the time of going to print.

All photographic images are intended to provide a general impression only and should not be relied upon as an accurate example of Shadowclad products installed in accordance with this document or the NZBC compliance documents.

This publication replaces all previous CHH Woodproducts design information and literature relating to Shadowclad structural plywood products and flashings. CHH Woodproducts reserves the right to change the information contained in this document without prior notice. It is your responsibility to ensure that you have the most up to date information available, including at the time of applying for a building consent. You can call toll free on 0800 326 759 or visit www.chhwoodproducts.co.nz to obtain current information.

CHH Woodproducts has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document. However, to the maximum extent permitted by law, CHH Woodproducts assumes no responsibility or liability for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

SHADOWCLAD® KEY INSTALLATION & DESIGN POINTS

EXTERIOR CLADDING APPLICATIONS

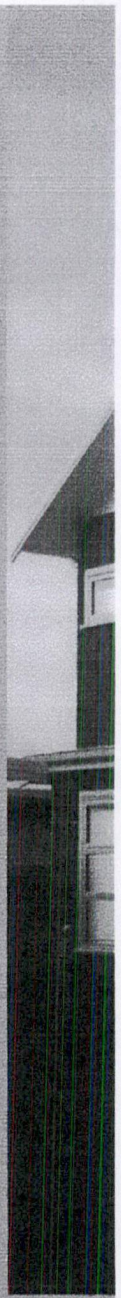
The following tasks are provided to installers to point out key installation and design factors when used as an exterior cladding. These do no detract from the requirements to read and understand this literature as a whole.

Task	Tick when checked
Prior to Specification and Installation	
Read the Shadowclad Specification and Installation Guide in its entirety	☐
Framing Plan	
Framing setout drawings to suit Shadowclad fixing and installation guidelines	☐
Sheet Cuts	
Coat all sheet cuts with a preservative timber treatment such as Holdfast® Metalex® Clear	☐
After applying Holdfast® Metalex® Clear, apply the surface coating (e.g. paint or stain) to cut edges	☐
Place uncut edge to bottom	☐
Fastener Material Type	
Galvanised fasteners or better used (Stainless steel annular groove nails required in sea spray zones and with H3.2 CCA treated Shadowclad Ultra)	☐
Sheet Fastener Pattern	
Around sheet edge – maximum 150mm centre spacing	☐
Within sheet body – maximum 300mm centre spacing	☐
Horizontal Sheet Joints	
Minimum 9mm separation gap between sheets above all Horizontal Z flashings	☐
Prime the bottom of the sheet edge and 150mm up the back (rear) of the sheets	☐
50 mm strip of neutral cure silicon sealant or stop ends at all Z flashing terminations excluding terminations at Shadowclad™ metal corner flashings	☐
Back flashings or 150 mm overlap to all flashing butt joints	☐
Expansion Gaps Between Sheets (Vertical Sheet Joints)	
Texture Profile Sheets - 2mm gap between vertical edges of sheets	☐
Groove Profile Sheets - 9mm gap (i.e. full groove space) between vertical edges of sheets	☐
Note: Expansion gaps required between vertical edges of sheets to accommodate natural expansion and contraction of sheets	
Ground Clearances	
Paved/ Sealed Ground - minimum 100mm distance from the ground to sheet bottom	☐
Broken Ground - minimum 175mm distance from the ground to sheet bottom	☐
Prime the bottom of the sheet 150mm up the back (rear) of the sheet	☐

Refer to the current Shadowclad Specification and Installation Guide for full installation specifications and suggested details

shadowclad

BRANZ Appraised
Appraisal No.764 [2011]



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www.chhwoodproducts.co.nz

September 2015

JAS-ANZ

PRODUCT CERTIFIED paa ENGINEERED WOOD

ewpaa

NEW ZEALAND MANUFACTURED

CARDRONA WOOD FIRE Relocater

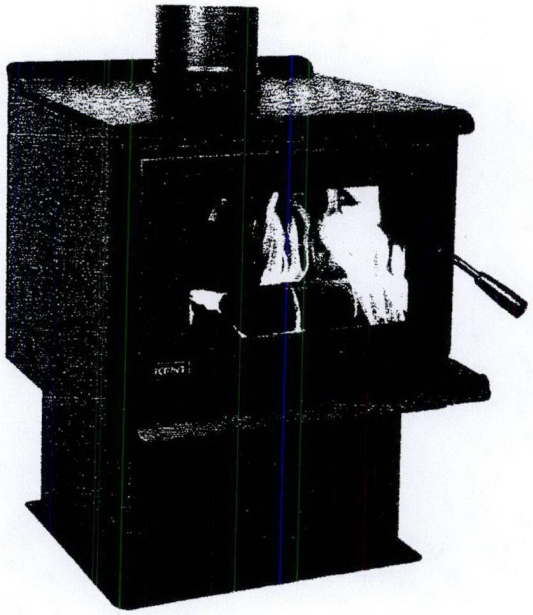
KENT®

FEATURES:

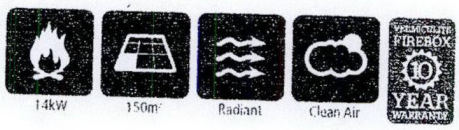
- Clean air approved small-size radiant wood fire
- Contemporary matt black design, 5mm steel
- Vermiculite brick lined firebox
- Multi-burn firebox helps glass remain clear
- Steel plate top for cooking use

SPECIFICATIONS:

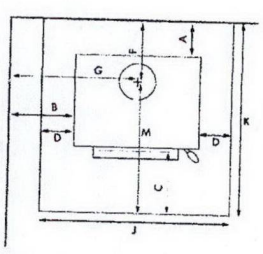
- Estimated maximum heat output: 14kW
- Heats area up to 150m² (typically up to three standard rooms)
- Average emission rate: 0.80g/kg
- Overall average efficiency: 69%
- ECAN Authorisation No. 165498



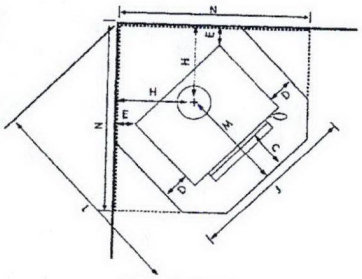
KWF295-6960



INSTALLATION CLEARANCES:



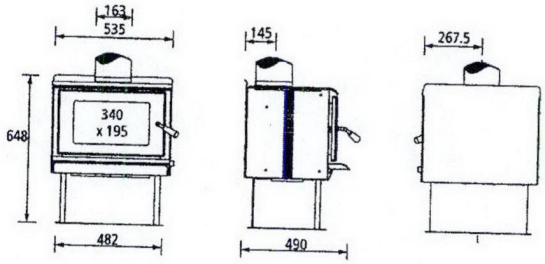
Wall Clearances



Corner Clearances

Minimum Installation Clearances (with flue shield) mm								Hearth Clearances (mm)				
A	B	C	D	E	F	G	H	J	K	L	M	N
135	350	300	130	120	255	610	395	795	865	1140	585	1000

DIMENSIONS (mm):



RECOMMENDED FLUE KITS:

Standard	KWF298-7005
Energy Saver	KWF298-7006

Flue kits are tested to AS/NZS2918 Appendix F report no. 02/649.

CLEAN AIR WOOD FIRE APPROVALS

KENT®

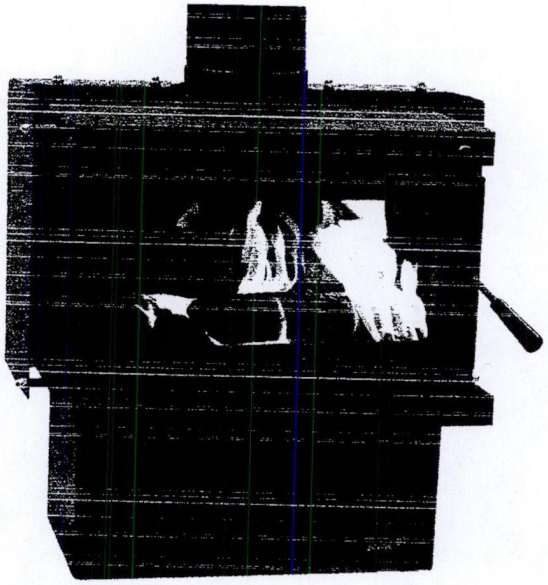
Cardrona	Freestanding	Dry wood	165498		Spectrum Laboratories
Oxford	Freestanding	Dry wood	165500		Spectrum Laboratories
Benmore	Freestanding	Dry wood	165499		Spectrum Laboratories
Kiwi Rad II	Freestanding	Dry wood	111356		Spectrum Laboratories
Tui Rad	Freestanding	Dry wood	111269		Spectrum Laboratories
Tui Rad with Wetback	Freestanding	Dry wood	111270		Spectrum Laboratories
Firenze	Freestanding	Dry wood	110613		Spectrum Laboratories
Astron (Black/Pewter)	Freestanding	Dry wood	110612		Spectrum Laboratories
Geneva	Freestanding	Dry wood		N0032	John Yolland & Associates
Haast	Freestanding	Dry wood	144660		Spectrum Laboratories
Aspiring	Freestanding	Dry wood	144661		Spectrum Laboratories
Murchison	Freestanding	Dry wood	144662		Spectrum Laboratories
Signature	Freestanding	Dry wood	111733		Spectrum Laboratories
Tilefire Max C/A II	Freestanding	Dry wood	132877		Spectrum Laboratories
Quantum	Freestanding	Dry wood	121974		Applied Research Services
Barker II	Freestanding	Dry wood	111240		Spectrum Laboratories
Barker II with Wetback	Freestanding	Dry wood	111241		Spectrum Laboratories
Rata	Insert	Dry wood	142831		Spectrum Laboratories
Logfire II	Insert	Dry wood	142832		Spectrum Laboratories

TUI RAD WOOD FIRE Garage/Studio

KENT®

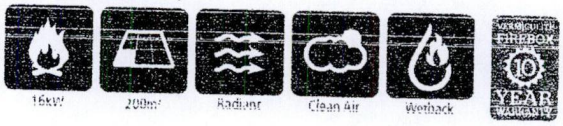
FEATURES:

- Clean air approved compact radiant wood fire
- Heat is emitted directly and warms all objects in its path before heating the air
- Ideal for draughty homes or higher ceilings
- Traditional matt black design, 6mm steel
- Vermiculite brick lined firebox
- Multi-burn firebox helps glass remain clear
- Steel plate top for cooking use
- Wetback option suitable for clean-air zones (1.5kW water heating)



KWF295-6931

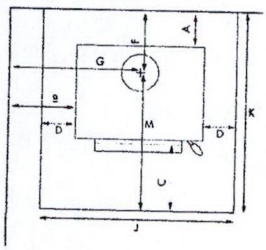
KWF295-6932 (Wetback)



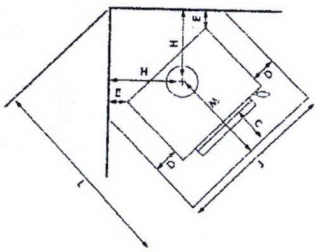
SPECIFICATIONS:

- Estimated maximum heat output: 16kW
- Heats area up to 150m² (typically up to three standard rooms)
- Overall average efficiency: 71%
- ECAN Authorisation No.111269

INSTALLATION CLEARANCES:



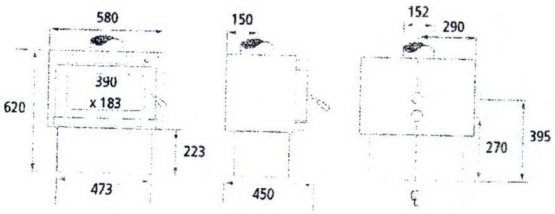
Wall Clearances



Corner Clearances

Minimum Installation Clearances (with flue shield) mm								Hearth Clearances (mm)				
A	B	C	D	E	F	G	H	J	K	L	M	N
100	400	300	155	200	250	690	512	840	800	1275	550	1110

DIMENSIONS (mm):



RECOMMENDED FLUE KITS:

Standard	KWF298-7005
Energy Saver	KWF298-7006

Flue kits are tested to AS/NZS2918 Appendix F report no. 02/649.

KENT®
wood fires & heating

INSTALLATION & OPERATING INSTRUCTIONS

Clean Air Freestanding Wood Fires

CONTENTS

GENERAL INFORMATION

1. This Kent freestanding wood fire must be installed by an approved installer, ideally registered with the New Zealand Home Heating Association. Do not allow any makeshift or compromising installation methods as this could result in a house fire. This Kent freestanding wood fire must be installed according to these instructions.

2. A Building Consent from the Local Authority must be obtained before installing this wood fire, and we suggest that the Insurance Company covering building insurance be advised of the installation.

3. This Kent freestanding wood fire, when installed according to these instructions, complies with the provisions of AS/NZS 2918-2001 "Installation of Domestic Solid Fuel Burning Appliances".

4. The clearances given in these instructions are necessary to prevent overheating of nearby combustibles and drying out of the house structure. They may not be reduced without authorisation.

5. There must be a clearance of at least 1 metre between the front of this Kent freestanding wood fire and any building structure or other substantial immovable object in front of the wood fire.

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

Important: the installer or seller must leave these instructions with the purchaser

LOVED HERE.

TESTING & APPROVALS

		External fire dimensions (mm)			Performance		
Model	Model no.	Width	Depth	Height	Average emissions	Average efficiency	ECAN NO*
Cardrona	KWF295-6960	535	407	648	0.80g/kg	69%	165498
Oxford	KWF295-6961	535	407	648	0.80g/kg	69%	165500
Benmore	KWF295-6962	535	407	648	0.80g/kg	69%	165499
Kiwi Rad II	KWF295-5910	585	475	645	0.80g/kg	69%	111356
Tui Rad	KWF295-6931	580	450	620	0.70g/kg	71%	111269
Tui Rad (Wetback)	KWF295-6932	580	450	620	0.66g/kg	65% WB	111270
Firenze	KWF295-5908	600	490	660	0.70g/kg	71.30%	110613
Astron	KWF295-5987	600	490	770	0.70g/kg	71.30%	110612
Astron (Pewter grey)	KWF295-5991	600	490	770	0.70g/kg	71.30%	110612
Signature	KWF295-6824	700	505	715	0.85g/kg	71.34%	111733
Haast	KWF295-6950	575	560	730	0.98g/kg	66%	144660
Aspiring	KWF295-6951	575	560	730	0.98g/kg	66%	144661
Murchison	KWF295-6952	575	560	730	0.98g/kg	66%	144662
Tilefire Max CA/II	KWF295-6936	554	730	665	0.53g/kg	69%	132877
Quantum	KWF295-5990	685	635	730	0.54g/kg	68.70%	121974
Barker II	KWF295-6934	615	634	730	0.54g/kg	71%	111240
Barker II (Wetback)	KWF295-6935	615	634	730	0.53g/kg	65% WB	111241

* ECAN NO = Environment Canterbury authorisation number.

TABLE 1

FREESTANDING WOOD FIRE INSTALLATION

To adequately install a Kent freestanding wood fire the following items are required: an assembled wood fire, a floor protector, a flue system and a suitable flashing system for flashing the roof penetration.

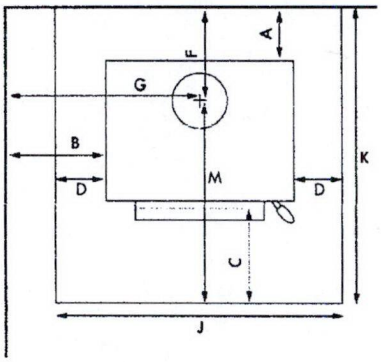
An insulating floor protector is not required for the Kent freestanding wood fire, but a single layer ash floor protector of non-combustible material must be used. The floor protector must extend under the appliance and not less than 300mm in front of the fuel-loading and ash removal openings. The width of the floor protector shall be not less than the width of the appliance and shall extend not less than 200mm from each side of any ash removal or fuel-loading openings.

Select a location for the wood fire, considering the minimum clearances required (Refer Fig.1 & Table 2).

Place the wood fire into the desired position and plumb for the ceiling and roof penetrations. Allow for 150mm diameter flue pipe, 200mm diameter inner casing and 250mm outer casing. Check the proposed route of the flue to ensure it is clear of roof trusses and rafters in the ceiling space or other obstructions. It may be necessary to move the location of the wood fire to ensure this.

Once the location is confirmed, the wood fire must be restrained against movement due to earthquakes. The Kent freestanding wood fire is restrained by fixing the wood fire to the floor with two bolts of 6mm minimum diameter through the holes provided in the plinth base, through the floor protector and floor. For solid concrete floors, use 8mm DYNABOLTS® or similar, with a minimum depth of engagement into the floor of 50mm.

Wall Clearances



Corner Clearances

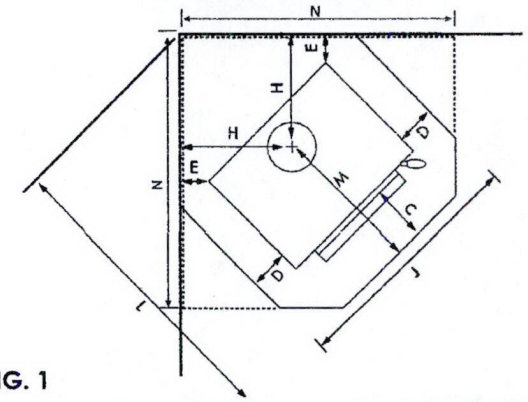


FIG. 1

		Minimum Installation Clearances (with flue shield) mm								Hearth Clearances (mm)				
Model	Model No.	A	B	C*	D	E	F	G	H	J	K	L	M	N
Cardrona	KWF295-6960	135	350	300	130	120	255	610	395	795	865	1140	585	1000
Oxford	KWF295-6961	135	350	300	130	120	255	610	395	795	865	1140	585	1000
Benmore	KWF295-6962	135	350	300	130	120	255	610	395	795	865	1140	585	1000
Kiwi Rad II	KWF295-5910	140	285	300	125	100	265	577	390	785	830	1115	565	970
Tui Rad	KWF295-6931 KWF295-6932	100	400	300	155	200	250	690	512	840	800	1275	550	1110
Firenze	KWF295-5908	100	225	300	90	50	235	525	360	780	820	1085	585	960
Astron	KWF295-5987 KWF295-5991	100	225	300	90	50	235	525	360	780	820	1085	585	960
Signature	KWF295-6824	100	250	300	90	50	245	600	400	880	805	1120	560	1140
Haast	KWF295-6950	160	360	300	130	190	320	645	500	835	960	1340	640	1160
Aspiring	KWF295-6951	160	360	300	130	190	320	645	500	835	960	1340	640	1160
Murchison	KWF295-6952	160	360	300	130	190	320	645	500	835	960	1340	640	1160
Tilefire Max C/A II	KWF295-6936	100	270	300	145	150	275	547	465	844	1015	1400	740	1200
Quantum	KWF295-5990	100	300	300	80	50	260	642	440	845	940	1300	680	1100
Barker II	KWF295-6934 KWF295-6935	255	435	300	130	190	404	743	485	875	1084	1365	680	1200
Tilefire (non C/A)	KWF296-6068	100	400	300	145	150	265	580	455	890	1120	1350	760	1200

* Fuel loading opening to end of floor protector.

TABLE 2

STANDARD FLUE INSTALLATION

Cut a 260mm square penetration for the passage of the flue pipe and casings through the ceiling. Trim back and reframe timbers to allow for fixing the ceiling plate and outer liner.

Cut and frame an opening in the roof and position the outer casing through the roof until it is flush with the underside of the ceiling. Fix with 4 adequate screws to the framing of the square opening in the ceiling. Centralize 250mm flue casing in the 260mm square cut holes so each fixing point has a 5mm gap between flue casing and timber.

Ensure a suitable flashing is installed on any roof penetration point. Flash the outer casing to the roof, to make a permanent, weatherproof seal. Place the ceiling plate with folded edges upwards over the flue spigot on the wood fire.

Join the required number of flue pipes by inserting the swaged ends of the upper piece into the plain end of the lower piece. Drill and fix each length with three stainless rivets or self-tapping screws. It is important that each flue pipe joint is sealed with commercially available flue sealing compound, including the joint between the flue spigot and the first length of flue pipe.

Note: Black painted flue pipes may only be used where they are visible. Flue pipes located wholly inside the casings in the roof space **must** be stainless steel only. Position the flue pipe into the spigot in the top of the wood fire. The flue pipe can either be lowered from the top as a single unit or fed up from the room a length at a time, ensuring that all joints are sealed and fixed properly.

Slide the inner 200mm Ø casing into place, between the outer casing and the flue pipe, ensuring that the spacers are fitted to maintain equal clearances around the flue and casings.

The flue pipe must extend at least 200mm above the outer casing at the top of the flue system. Extra lengths of flue pipe, inner casing and outer casing may be required to achieve the minimum distance above the roof. Joins between lengths of outer casing must be made with the upper end of the lower section inside the bottom edge of the upper length (the opposite of the method used for the flue pipe).

Place the top spreader in place and tighten. Slide the cowl transition over the flue pipe until it rests on the top spreader. Secure with stainless rivets or self-tapping screws.

Fit the rain-hat. **Note:** It must be removable for cleaning.

Screw the ceiling plate securely in position, through the holes provided, into the outer casing support framing. Ensure that the ceiling plate is spaced off from the ceiling by means of the spacers supplied in the flue kit. Do not fix the ceiling plate directly to the ceiling.

Where a flue terminates more than two metres above the roof penetration, it may be necessary to fit restraining guy wires for stability in high wind conditions.

The flue system should be vertical and without bends. If an offset is required, it should be as close to the wood fire as practicable and should not be offset more than 0.5 metres from the centre line of the flue stub. Clearances from the flue pipe to combustible materials must be maintained (Refer Table 2). Restrictions or leaks in the flue system may reduce the draught and, in severe conditions, could cause smoke to enter the room.

The flue pipe shall extend not less than 4.6 metres above the top of the floor protector.

The flue cowl must be at least 0.6 metres above the highest point of the roof if within 3 metres of it, or 1m above the roof penetration if more than 3 metres from point of the roof (Refer Fig. 2).

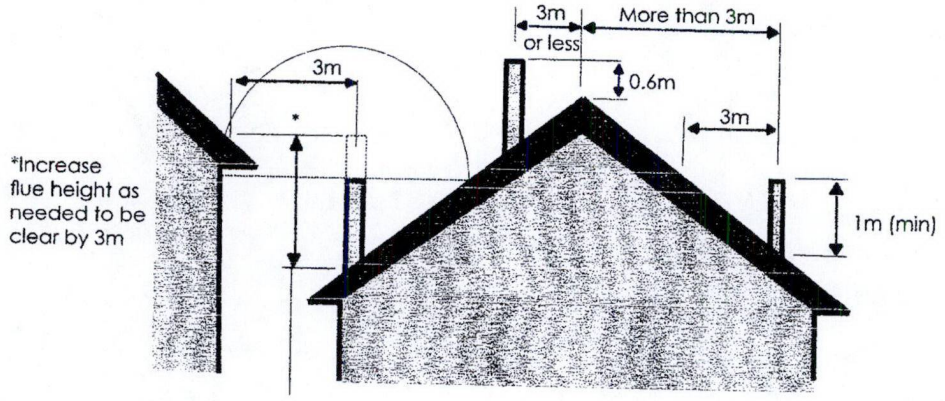


FIG. 2

No part of a building, or any adjacent object, may be in or above a circular area of 3 metres from the flue exit.

These heights are given as a general minimum, and in actual practice the presence of surrounding structures, trees, fences, etc. **may necessitate additional height for satisfactory performance.**

FOR MORE INFORMATION, REFER TO THE INSTALLATION INSTRUCTIONS INCLUDED WITH THE FLUE KIT.

Before the wood fire is used, ensure that a Compliance Certificate (supplied by a Registered Installer and/or Territorial Authority Inspector) is obtained for the user. We encourage initial demonstrations on how to light and operate the fire to ensure the user can confidently operate the fire for safe and efficient performance.

Single storey flue install

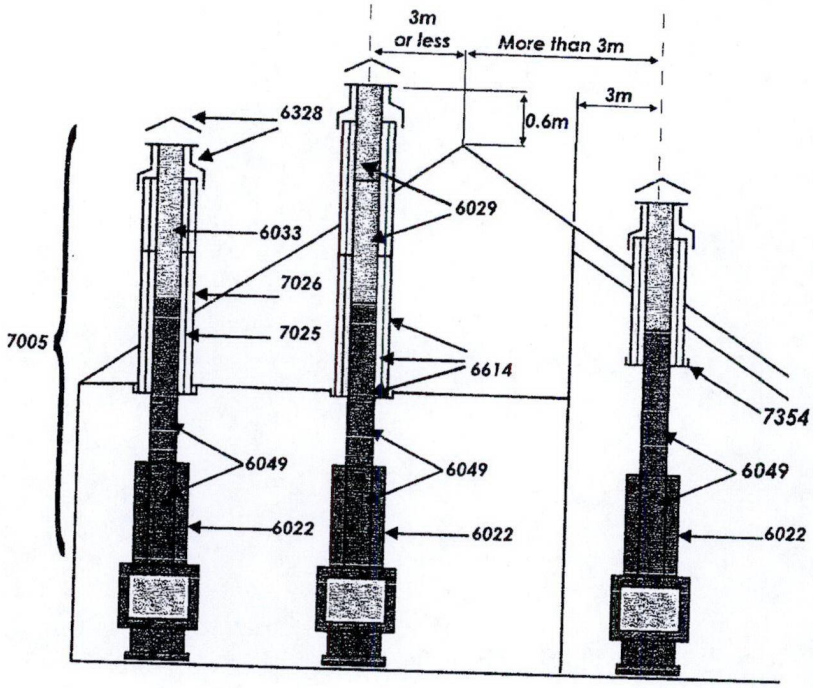


FIG. 3

Second storey flue install

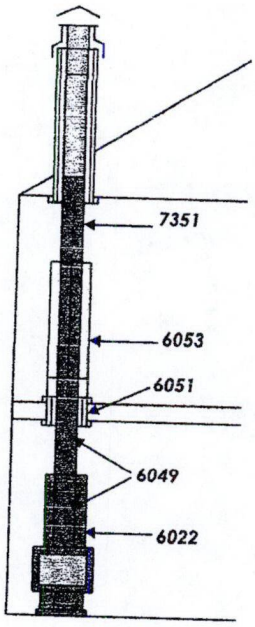


FIG. 4

Model No.	Description
KWF298-7005	Kent standard flue kit 4.2m
KWF298-7006	Kent energy saver flue kit 4.2m
KWF298-6033	Kent single length stainless steel flue 150 x 1200mm
KWF298-6022	Kent stainless steel flue reflector
KWF298-6029	Kent stainless steel flue twin pack 150mm
KWF298-6049	Kent black stainless steel flue twin pack 150 x 1200mm
KWF298-6051	Kent floor penetration 200/250mm diameter
KWF298-6053	Kent 360 degree flue pipe guard
KWF298-6328	Kent stainless steel hat and cowl
KWF298-6614	Kent extension flue 150-200-250 - 1200mm
KWF298-7025	Kent galvanised flue 200 x 1200mm
KWF298-7026	Kent galvanised flue 250 x 1200mm
KWF298-7351	Kent black flue 150 x 1200mm
KWF298-7354	Kent sloping ceiling kit

For all practical purposes, the air control should be fully open when there is unburnt wood in the wood fire. Fire holding periods may be increased by turning down the air control, this is at the cost of greater emissions and creosote production. At low settings, creosote may condense on the glass, reducing the visibility of the fire. The best indication that the fire is operating correctly is that the glass remains clean, without build-up of black or brown deposits. Some whitish bloom on the glass is normal and does not generally indicate a fault in operation.

The way you burn your wood fire will also determine what is happening up the flue. Continued burning at high rates with a good clean flame will minimise soot and creosote deposits in the flue.

CLEANING OUT THE WOOD FIRE

Your wood fire should require minimum cleaning. If the wood fire is operated correctly according to the instructions most of the ash will be consumed by later fires and a bed of ash will be maintained that does not build up to any great extent.

If you find that you have to clean out ashes every day or so, it indicates that the wood fire is not being operated correctly. Either excessively wet wood or foreign materials are being burnt, or the air control is being turned down too much.

Don't clean out the firebox completely. Leave approximately 25mm of ash in the bottom of the firebox after cleaning. These ashes in the bottom of the wood fire assist the burning process, by insulating the firebox and allowing air circulation under the fire bed.

When emptying ashes use a metal container with a tight fitting lid. Do not use this container for any other purpose. The closed container of ashes should immediately be taken outdoors to a location well away from any combustible materials, pending final disposal. If the ashes are to be disposed of by burial in the garden or otherwise locally dispersed, they should be retained in the container until they are completely extinguished and cold. This may take several days.

CREOSOTE FORMATION AND NEED FOR REMOVAL

We recommend the flue of your wood fire is inspected before use at the start of the heating season and also periodically during the season. When you are able to operate the wood fire without creating creosote deposits, the interval between inspections may be increased, but the flue must always be inspected and cleaned at least once a year.

The flue should be swept by a professional chimney sweep to remove any build-up of creosote and soot. A professional sweep should also advise of any problems that may be detected in the inspection of the flue and offer advice on any repair and replacements. Your Kent wood fire requires minimal maintenance, and will keep its good looks for a long time with just a little attention.

DO NOT BURN TREATED TIMBER
DO NOT BURN WET OR UNSEASONED WOOD

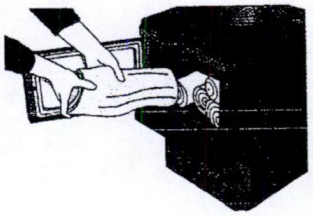
OPERATION

Thank you for purchasing a Kent wood fire. Used and maintained correctly, it will provide you with many years of warmth in your home. Kent wood fires have been the main source of heating for many Kiwi homes, with nearly 400,000 installed.

Please ensure your installer completes and signs the warranty registration card in this booklet. We encourage you to read the warranty conditions and draw your attention to improper fuel use.

LIGHTING

On initial light up, the presence of smoke may be noticed. This is normal and will dissipate quickly. **DO NOT BURN YOUR WOOD FIRE TOO QUICKLY TO BEGIN WITH.** Allow several small fires to build up a layer of ash in the wood fire, and cure the paint before using maximum power.



1. Adjust the air control knob, until it is fully open.
2. Place several pieces of crumpled newspaper in the base of the firebox, and criss-cross with 8-10 pieces of dry split kindling. Stack several pieces of dry split firewood no greater than 30cm in length on top of the kindling.
3. Ignite the paper and leave the door slightly ajar (resting it on the latch). Let the fire establish itself for 4-5 minutes, then open the door and add some more pieces of wood. Do not leave the fire unattended during this process.
4. Close the door fully, but leave the air control fully open until the wood is well alight and burning brightly.

Note: It may be necessary in some cases to leave the door ajar for longer periods and use more small kindling in order to establish enough heat to warm up the flue. Only when the flue is sufficiently warm to create the necessary draft to maintain the fire may the door be fully closed. It may take trial and error to find a lighting procedure that suits your situation.

NORMAL OPERATION ONCE THE FIRE IS ESTABLISHED

The Kent wood fire requires fresh air for optimal burning, and this must come from outside the house. A normal house will allow enough air in through incidental openings to satisfy this. We recommend that a source of air be located near the wood fire for best performance. This can be simply a window that is left ajar while the wood fire is in use. If this is not possible, and the house is particularly air-tight, a vent may need to be installed next to the wood fire to provide the air required. Lack of air will lead to a wood fire that is hard to light and get going, or in bad cases, to smoke spilling back into the room.

While an air control is fitted, it is recommended that, for the cleanest operation, this is left fully open and the amount of heat generated is adjusted by the amount of fuel that is used. The heater burns cleanest when it is running at a high rate.

Once the fire is well established, the output can be regulated by the amount of wood that is used.

To reload the fire, open the air control fully, and then open the door. Note that the fire burns hottest at the front of the firebox and so there may be unburnt wood at the back when it comes time to reload. This is normal. Rake through the contents to move any unburnt wood forward and then place the desired amount of wood into the firebox. Close the door.

The view of the flame through the glass door will give you the best indication of how your wood fire is performing. In order to accomplish maximum combustion performance, the fire should give a rolling, boiling flame pattern. At reduced setting the flame will be slower.

MAINTENANCE

CLEANING

The exterior surfaces of the wood fire should be cleaned when needed with a damp cloth and non-abrasive cleaner. Use of caustic or abrasive cleaners will damage the finish on the wood fire. If, due to continued burning at low temperature, the door glass is dirty, use a paper towel moistened with water and dipped in the cold ashes from the fire to lightly scrub the inside of the glass. Remember that a properly operated wood fire will keep the glass clean by itself.

LUBRICATION

The door hinges, door handle spindle and air slide mechanism should be lubricated periodically with a suitable high temperature grease. Do not use too much as this can melt and drop down onto the hearth staining it.

RE-PAINTING

All Kent wood fires are finished in high temperature paint. If marks or scratches occur, it can easily be touched up using Stove paint in the correct colour. Paint is available from your Kent retailer.

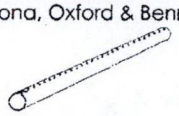
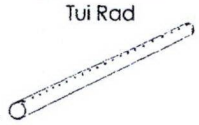
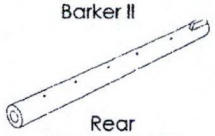
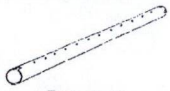
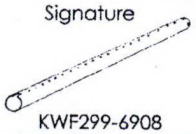
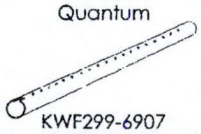
MAINTENANCE RECORDS

Date	Maintenance

REPLACEMENT PARTS

Replacement parts must be original Kent parts. Maintenance required should be carried out by qualified service people. Please consult your Kent retailer for their details. The wood fire should not be modified in any way except in accordance with instructions supplied by Kent.

KENT AIR TUBES

<table>
<tr>
<td>Kiwi Rad II, Astron, Firenze, Cardrona, Oxford & Benmore
 
KWF299-6903</td>
<td>Tui Rad
 
KWF299-6986</td>
<td>Barker II
 
Rear
KWF299-6992</td>
</tr>
<tr>
<td rowspan="2">Haast, Aspiring, Murchison & Tilefire Max CA II
 
Top front
KWF299-6905
 
Top rear
KWF299-6906</td>
<td>Signature
 
KWF299-6908</td>
<td>Quantum
 
KWF299-6907</td>
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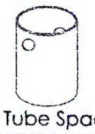
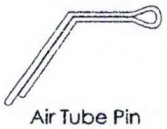
<tr>
<td>All Fires
 
Air Tube Spacer
KWF299-6257</td>
<td>All Fires
 
Air Tube Pin
KWF299-6900</td>
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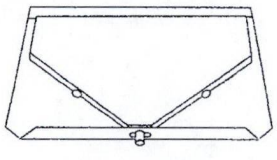
The air tube in your Kent wood fire is an important part of the appliance and helps ensure a clean, efficient and controllable burn. However, air tubes are a consumable item and are designed to be replaced as they are likely to degrade with use due to the exposure to the extreme heat of the fire.

The life of the air tube will depend on what is burnt in the fire, how hot the fire usually burns and also the ash level. If the ash level is allowed to build up. It means hot embers are in closer proximity to the tube, increasing the temperature exposure. Keep ember levels to the recommended maximum height of 3cm below air tubes.

Replacing air tubes:

1. Remove bricks from both sides
2. Remove the pin from the end of the old tube
3. Slide tube to one side; this will release the opposite end
4. Pull released end up and towards the door and remove
5. Reverse process for new tube

KENT BAFFLES

<table>
<tr>
<td>Tui Rad
 
Dimensions (mm): 488 x 238
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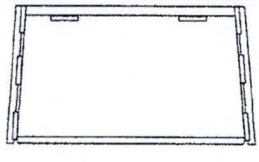
<td>Kiwi Rad II, Astron, Firenze, Cardrona, Oxford & Benmore
 
Dimensions (mm): 400 x 208
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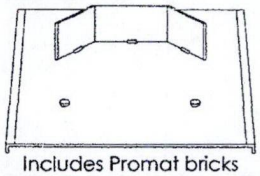
<td>Haast, Aspiring, Murchison & Tilefire Max CA II
 
Includes Promat bricks
Dimensions (mm): 480 x 200
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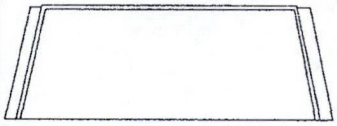
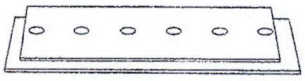
<td>Signature
 
Dimensions (mm): 495 x 190
KWF299-6189</td>
<td>Quantum
 
Firebox requires 2 baffles
Dimensions (mm): 529 x 157
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 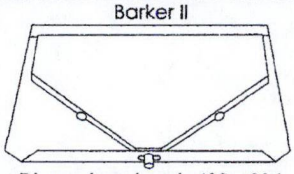
Dimensions (mm): 488 x 314
KWF299-6993</td>
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</table>

The baffle in your Kent wood fire is an important part of the appliance and helps ensure a clean, efficient and controllable burn. However, baffles are a consumable item and are designed to be replaced as they are likely to degrade with use due to the exposure to the extreme heat of the fire.

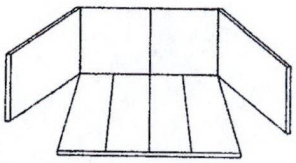
The life of the baffle will depend on what is burnt in the fire and how hot the fire usually burns.

Replacing baffles:

1. Remove side bricks from the fire
2. Pull the old baffle out of the locater hole in the rear of the fire
3. Allow the front of the baffle to drop forward and down to the bottom of the fire
4. Rotate and remove through the door
5. Reverse process to install new baffle

KENT FIRE BRICKS

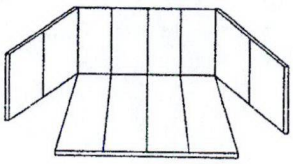
Kiwi Rad II, Cardrona, Oxford & Benmore



Dimensions (mm):
4 - 220 x 115 x 28
2 - 221 x 221 x 25
2 - 229 x 220 x 25

KWF299-6123

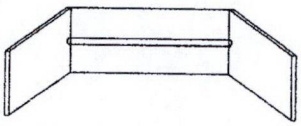
Astron & Firenze



12 per pack
Dimensions (mm):
220 x 115 x 28

KWF299-6122

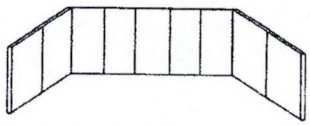
Tui Rad



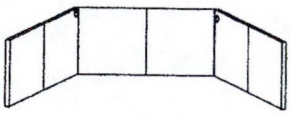
Dimensions (mm):
2 - 498 x 100 x 25
2 - 260 x 255 x 25

KWF299-7038

Signature



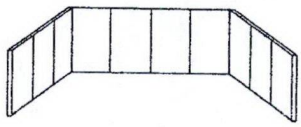
Haast, Aspiring & Murchison



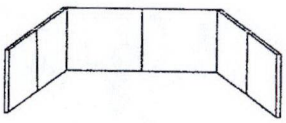
Dimensions (mm):
2 - 240 x 190 x 25
2 - 245 x 177 x 25

KWF299-7089

Barker II



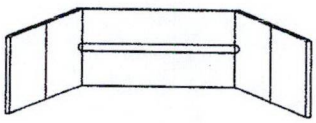
Tilefire Max CA II



Dimensions (mm):
2 - 205 x 176 x 25
4 - 180 x 176 x 25

KWF299-7040

Quantum



Dimensions (mm):
1 - 490 x 140 x 25
1 - 490 x 110 x 25
2 - 355 x 190 x 25
2 - 330 x 190 x 25

KWF299-7039

The fire bricks in your Kent wood fire are an important part of the appliance and helps ensure a clean and efficient burn. However, fire bricks are a consumable item and are designed to be replaced as they are likely to degrade with use due to the exposure to the extreme heat of the fire.

The life of the fire bricks will depend on what is burnt in the fire and how hot the fire usually burns and also any damage sustained from wood not being positioned correctly.

At the risk of damaging the fire box, fire bricks should be replaced when they are damaged enough that they no longer remain in place and cannot perform their intended function. Fire bricks which are only cracked but still remain in place do not need to be replaced and are safe to use.

NOTE: For all other fire parts please contact your Kent dealer.

Kent products are distributed by:
Aber Holdings Ltd T/A Aber,
Hamilton
Free Phone: 0800 161 161
Free Fax: 0800 163 163
www.aber.co.nz

KWF299-7108-05/16

NZHHA
New Zealand Home Heating Association Inc.

www.kent.co.nz

WARRANTY

STANDARD WARRANTY

Your Kent wood fire is warranted for 10 years on the firebox with the exception of the following Kent parts: glass, glass seal, door seal, fire bricks, flue, secondary air system and removable baffle which will all have a 12 month warranty (parts only) provided they have been installed by an approved installer. The warranty does not apply to normal wear and tear, misuse or neglect, nor if parts of the wood fire are replaced with non genuine Kent parts. Kent recommends a flue sweep and annual service with replacement of any worn parts recommended, to obtain maximum life out of your wood fire. Please note that with everyday use you must expect some visual signs of wear on the surface of this product.

CONDITIONS

Your Kent wood fire must be installed in accordance with the manufacturer's instructions and all applicable standards, regulations and by-laws. Your Kent wood fire must be installed with an approved flue system. Failure to do so may void your warranty in its entirety. The company is not liable for any consequential damage by a failure or defect covered in this warranty. All claims against the warranty must be directed in the first instance to the retail outlet from which you made your purchase. Any repairs undertaken without the express authority of Kent will invalidate this warranty. This warranty does not cover damage caused by wetbacks/water boosters, burning improper fuels including but not limited to (driftwood/treated wood/coal or plastic-based waste), or installation, plumbing and sweeping work done by others (the installer is liable for any incorrect procedures or poor workmanship).

TRANSFERABILITY

Your Kent wood fire warranty is transferable on the sale of the home where the wood fire is installed. Nothing in this warranty is intended to limit any conditions of the warranty right or remedy pursuant to the Consumer Guarantee Act 1993, except to the extent permitted under the Act. Your Kent wood fire is intended for domestic use only and the warranty is not valid for wood fires to be used for business purposes. Kent reserves the right to alter or amend specifications or designs of its product without prior notice.

KENT WARRANTY REGISTRATION

Please keep this copy for your records.

MODEL: .....

SERIAL NUMBER: .....

RETAILER: .....

PURCHASE DATE: .....

INVOICE NUMBER: .....
(Please keep your invoice attached to your warranty record)

INSTALLER NAME: .....

DATE INSTALLED: .....

NZ HOME HEATING
ASSOCIATION NUMBER: .....

INSTALLER SIGNATURE: .....

SPECIFICATION

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

DAJI STUDIO/SLEEPOUT/ GARAGES AND HOUSE RELOCATION

(project name)

265 SH 12 OMAPERE

(project address)

G AND Y DAJI

(owners name)

Job Number: ~2017001

Date: ~8/1/2017

1012 TABLE OF CONTENTS

1220 GENERAL REQUIREMENTS

1. GENERAL

1.1 THE WORKS
The works are as described in this specification and shown on the drawings.

1.2 PERSONNEL
Owner: The person defined as "owner" in the New Zealand Building Code.
Contractor: The person contracted by the owner to carry out the contract.

1.3 THE SITE
The site of the works, the site address and the legal description are listed under the sections 1210 PROJECT. Confine access and work to the area of site indicated on the drawings.

1.4 SPECIFICATION SECTIONS
Sections are for reference and convenience only and do not constitute individual trade sections or work elements. Read all sections together and read this section with all other sections.

1.5 INTERPRETATIONS

Required:	Required by the documents, or by a statutory authority.
Proprietary:	Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
Approval:	Approval in writing.
Direction:	Direction in writing.
Notified:	Notified in writing.

1.6 ABBREVIATIONS
The following abbreviations are commonly used throughout the specification:

AS	Australian Standard
AS/NZS	Joint Australian/New Zealand Standard
BCA	Building Consent Authority
BRANZ	Building Research Association of New Zealand
LBP	Licensed Building Practitioner
NZBC	New Zealand Building Code
NZS	New Zealand Standard
NZS/AS	Joint New Zealand/Australian Standard
NUO	Network Utility Operator
OSH	Occupational Safety and Health
RBW	Restricted Building Work
TA	Territorial Authority

1.7 INCONSISTENCIES
If there are any inconsistencies, errors or omissions in or between documents, the contractor must seek direction in resolving it. Figured dimensions take precedence over scaled dimensions; drawings to a larger scale take precedence over drawings to a smaller scale and drawings take precedence over specification.

1.8 SUBSTITUTIONS
A substitution may be proposed where specified products are not available, or if substitute products are brought to the attention of and are considered by the owner as equivalent or superior to those specified. Except where a specified product is not available, the owner is not bound to accept any substitutions.
Notify proposed substitution of specified products. Include sufficient information to allow the owner to confirm that the substitution is equivalent or superior to that specified.
Advise the owner whether an amendment will or may be required to the Building Consent and the expected costs of such amendment.

1.9 THE WORDS "PROVIDE" OR "FIX"
The words "provide" (or "supply") or "fix" if used separately mean "provide and fix" unless explicitly stated otherwise.

1.10 MANUFACTURERS AND SUPPLIERS
Manufacturers and suppliers requirements, instructions, specifications or details are those issued by them for their particular material, product or component and are the latest edition.

1.11 REFERENCED DOCUMENTS
Reference is made to various New Zealand Building Code (NZBC) acceptable solutions (AS) and verification methods (VM) for criteria and/or methods used to establish compliance with the Building Act 2004. Reference is also made to various Standards produced by Standards New Zealand (NZS, AS/NZS) 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. Documents cited both directly and within other cited publications are part of this specification.

1.12 PRECEDENCE OF REFERENCED DOCUMENTS
This specification takes precedence in the event of it being at variance with and requiring a higher standard than, the cited documents. Resolution of any variance must be confirmed in writing and where Building Consent is affected, the change notified to the BCA for advice as to whether an amendment is required to the Building Consent Authority.

1.13 BUILDING CONSENT COMPLIANCE
It is an offence under the Building Act 2004 to carry out any work not in accordance with the Building Consent. Refer the resolution of matters concerning compliance to the owner for a direction. Where Building Consent is affected refer any change to the BCA for advice as to whether an amendment is required to the Building Consent.

1.14 STATUTORY OBLIGATIONS
Comply with all statutory obligations and regulations of regulatory bodies controlling execution of the works.

1.15 BUILDING CONSENT
Obtain the original or copies of the Building Consent form and documents from the owner and keep on site. Liaise with the BCA and/or the building certifier for all required notices and all inspections required during construction to ensure compliance. Return the consent form and documents to the owner on completion.

1.16 INSPECTIONS
Do not proceed with work noted on the Building Consent for inspection until it has been inspected and passed by the BCA inspector.

1.17 KEY PERSONNEL
Provide names and contact detail of LBP's/ key personnel. Prior to Restricted Building Work being carried out, provide names, registrations numbers (where appropriate) and contact detail of LBP's that are required for RBW by the Building Consent Authority as part of the Building Consent.

Include the following as applicable:
- Person with the appropriate site license
- Carpenter
- Registered drainlayer
- Registered plumber
- Registered gasfitter
- Registered electrician
- Roofer
- Block layer
- Bricklayer
- External plasterer

- External window manufacturer
- Waterproof membrane applicator

1.18 PRODUCER STATEMENTS AND LBP DOCUMENTATION
When Records of Work or producer statements verifying construction are required, for the application for the Code Compliance Certificate, provide copies to both the BCA and the owner. Provide LBP documents and producer statements in the form required by the BCA.

1.19 CERTIFICATE OF COMPLIANCE
Provide Certificates of Compliance for electrical and gas work carried out.

1.20 CODE COMPLIANCE CERTIFICATE
Provide documentation that the Owner requires in order to obtain a Code Compliance Certificate for the consented work.

1.21 TRADE GUARANTEES AND WARRANTIES
Where specific trade guarantees/warranties are offered covering materials and/or execution of proprietary products or complete installations, or are required as a condition of Building Consent, provide guarantees/warranties to the owner.

1.22 SITE ACCOMMODATION
Provide, erect and maintain scaffolding, sheds, toilets, water, power and hoardings. Allow for cartage, craneage, plant hire and storage. Arrange for temporary works and services necessary for the completion of the works.

1.23 HEALTH AND SAFETY
Make the works safe and provide and maintain a safe working environment, to the requirements of the Health and Safety at Work Act 2015. Ensure that all those working on or visiting the site are aware of the rules governing site safety, are properly supervised and are not unnecessarily exposed to hazards and risks.

1.24 PROTECT THE WORKS
Protect parts of the work liable to damage until completion of the works. Take all precautions necessary to protect the works from damage by unauthorised entry or inclement weather. Brace and support all parts of the works against damage during construction.

1.25 STORAGE AND PROTECTION
Provide temporary storage areas and protective covers and screens. Fillet stack and protect all framing and structural members from moisture and contamination. Completely protect finishing materials from the weather and damage and store in accordance with the manufacturer's requirements. Protect fabricated elements from the weather and damage, and store in accordance with suppliers requirements.

1.26 ANTIQUITIES AND ITEMS OF VALUE AND INTEREST
Report immediately the finding of any fossils, antiquities, pre-1900 items, or objects of value. Ensure they remain undisturbed until approval is given for their removal.

1.27 MEANS OF COMMUNICATION
All directions and approvals in writing.

1.28 PROGRAMME
Provide a programme for the contract works, including the work of separate contractors being carried out concurrently with this contract. Form of programme: A dated bar chart, identifying the contract work's critical path and all key dates for the provision of labour, materials and elements. Supply a copy of the programme, and any updates to the owner.

1.29 WORKING HOURS
Work on site is restricted to between 0800 to 1800, Monday to Friday, excluding statutory holidays. Work outside these hours may be permitted, with prior approval in writing by the owner.

1.30 RESTRICTIONS

Do not:

- smoke on site
- light rubbish fires on the site
- bring dogs on to or near the site
- bring radios/audio players on to the site.

1.31 QUALITY ASSURANCE

Carry out and record regular checks of material quality and accuracy. Provide all necessary materials, equipment, plant, attendances, supervision, inspections and programming to ensure required standards are met.

1.32 DAMAGE AND NUISANCE

Prevent damage and nuisance from water, fire, smoke, vehicles, dust, rubbish, noise and other causes resulting from the contract works. Comply with the requirements of the TA and relevant Acts and Standards.

1.33 SET-OUT AND DATUM

Set out the works to conform with the drawings. Establish a permanent site datum to confirm the existing ground floor level and its relationship to other existing and new building levels.

1.34 EXECUTION OF THE WORK

Conform to the requirements of this specification. Ensure work is level, plumb, and true to line and face. Employ only experienced workers familiar with the materials and techniques specified.

1.35 MATERIALS AND PRODUCTS

Use only new materials and products, unless stated otherwise, of the specified quality and complying with cited documents.

1.36 COMPATIBILITY

Ensure all parts of a construction or finish are compatible and their individual use approved by the manufacturers and suppliers of other parts of the system. Source all parts of a system from a single manufacturer or supplier.

1.37 COMPLETE ALL SERVICES

Ensure completed building services are operational, with temporary labelling removed, required labelling fixed and service instructions provided.

1.38 CLEAR AWAY

Regularly clear away trade debris, unused materials and elements from the site. On completion of the work leave the building clean and ready for occupancy, with all services operating and mechanical parts in good working order. Remove temporary markings, coverings and protective wrappings.

1.39 CLEAN

Clean and wash down external surfaces to remove dirt, debris and marking. Clean interior surfaces including floors, glass, cabinetwork, joinery, sanitary and hardware items.

1233 DOCUMENTS REFERENCED

1. GENERAL

Documents listed below are, when referred to in the text, part of this specification. However, this specification takes precedence in the event of it being at variance with and requiring a higher standard than any cited document.

1.1 ACTS AND REGULATIONS

Building Act 2004
Gas (Safety and Measurement) Regulations 2010
Health and Safety at Work Act 2015
Health and Safety at Work (Asbestos) Regulations 2016
Electricity (Safety) Regulations 2010 (Reprint as at 4 April 2016)
Plumbers, Gasfitters and Drainlayers Act 2006

1.2 NEW ZEALAND BUILDING CODE VERIFICATION METHODS

NZBC E2/VM1	External moisture
NZBC G12/VM1	Water supplies

1.3 NEW ZEALAND BUILDING CODE ACCEPTABLE SOLUTIONS

NZBC B1/AS1	Structure - general
NZBC B2/AS1	Durability
NZBC C/AS1-AS7	Protection from fire
NZBC D1/AS1	Access routes
NZBC E1/AS1	Surface water
NZBC E2/AS1	External moisture
NZBC E2/AS3	External moisture
NZBC F2/AS1	Hazardous building materials
NZBC F7/AS1	Domestic smoke alarms
NZBC G1/AS1	Personal hygiene
NZBC G10/AS1	Piped services - Gas
NZBC G11/AS1	Gas as an energy source
NZBC G12/AS1	Water supplies
NZBC G13/AS2	Foul water - Drainage

1.4 NEW ZEALAND STANDARDS

AS/NZS 1604.3	Specification for preservative treatment - Plywood
NZS/AS 1884	Floor coverings - Resilient sheet and tiles - Installation practices
AS/NZS 2269.0	Plywood - Structural - Specifications
AS/NZS 2455.1	Textile floor coverings - Installation practice - General
AS/NZS 2455.2	Textile floor coverings - installation practice - Carpet tiles
AS/NZS 2589	Gypsum linings - Application and finishing
AS/NZS 2642.2	Polybutylene pipe systems - Polybutylene pipe for hot and cold water applications
AS/NZS 2699.1	Built-in components for masonry construction Wall ties
AS/NZS 3000	Electrical installations (known as the Australian/NZ Wiring Rules)
NZS 3101.1	Concrete structures standard
NZS 3103	Sands for mortars and plasters
NZS 3104	Specification for concrete production
NZS 3109	Concrete construction
NZS 3114	Concrete surface finishes
AS/NZS 3500.2:2003	Plumbing and drainage - Sanitary plumbing and drainage
NZS 3501	Specification for copper tubes for water, gas and sanitation
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 3631	New Zealand national timber grading rules
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
NZS 4210	Masonry construction materials and workmanship
NZS 4211	Specification for the performance of windows
NZS 4218 2004	Energy efficiency - Housing and small building envelope

NZS 4223.1	Glazing in buildings - Glass selection and glazing
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 actions
NZS 4229	Concrete masonry buildings not requiring specific engineering design
NZS 4246	Energy efficiency - Installing bulk thermal insulation in residential buildings
NZS 4251.1	Solid plastering - Cement plasters for walls, ceilings and soffits
AS/NZS 4666	Insulating glass units
AS/NZS 4671	Steel reinforcing materials
AS/NZS 4858	Wet area membranes
AS/NZS 5601.1: 2010	Gas installations - general installations
NZS 6803	Acoustics - Construction noise

Note:
Dated Standards are old versions of Standards that still are cited in NZBC AS's or VM's. However for health and safety reasons, the latest versions of the NZS 4223 Glazing in Buildings set of Standards are used, these now incorporate the requirements of NZBC B1/AS1 and NZBC F2/AS1, and meet or exceed the requirements of the Acceptable Solutions.

1.5 BUILDING RESEARCH ASSOCIATION OF NEW ZEALAND (BRANZ)
Weathertight Solutions Vol. 2: Stucco
Good practice guide: Tiling
Good practice guide: Membrane roofing
Bulletin 441 - Sealed joints in external claddings - 2. Sealants
Bulletin 519 - Fasteners selection

1.6 OTHER DOCUMENTS
Cement & Concrete Association of New Zealand
- CCANZ CP 01: Code of practice for weathertight concrete and concrete masonry construction

WorkSafe New Zealand (OSH)
- Good Practice Guidelines - Excavation Safety
- Repainting lead based paints
- Management and Removal of Asbestos (Approved CoP)

Waterproofing Membrane Association Inc.
- WMAI CoPTM: Code of practice for torch-on membrane systems for roofs and decks

New Zealand Demolition and Asbestos Association (NZDAA)
- Best Practice Guideline for Demolition in New Zealand.

New Zealand Metal Roofing Manufacturers Inc
- NZMRM COP: NZ Metal roof and wall cladding: Code of practice

Window Association of New Zealand Incorporated (WANZ)
- WANZ PQAS: Powder Coating Quality Assurance System
- WANZ Installation Guide: The WANZ Guide to Window Installation as described in E2/AS1 Amendment 6.

2100 DEMOLITION WORK

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS
Carry out work using persons competent and experienced in the trade.

1.2 SURVEY EXISTING BUILDING
Carry out a thorough survey and examination of the building to ensure the extent, sequence, technique and method of demolition proposed can be safely and efficiently carried out.

1.3 HEALTH AND SAFETY
Conform with the Health and Safety at Work Act 2015 and WorkSafe Management and Removal of Asbestos (Approved CoP)

1.4 NUISANCE
Take all precautions necessary to minimise nuisance caused by dust, dirt, rubbish and water.

1.5 NOISE
Refer to NZS 6803, table 2, **Recommended upper limits for construction noise...** for the allowable upper limits of construction work noise in residential areas over the various time periods. Use silenced and noise insulated plant to ensure compliance.

2. PRODUCTS

2.1 MATERIAL FROM DEMOLITION
Material from the demolition becomes the property of the contractor except for items designated for reuse or removal by others. Remove redundant materials from the site as work proceeds.

3. EXECUTION

3.1 DISCONNECT SERVICES
Before commencing demolition, disconnect services and remove associated fittings and equipment.

3.2 PROTECTION
Protect retained parts of existing buildings, site and site structures, trees and shrubs.

3.3 SUPPORT
Support and brace the existing structure during the cutting of new openings or the replacement of structural parts. Prevent debris from overloading any part of the structure. Do not remove supports until the new work is strong enough to support the existing structure. Ensure all work remains structurally stable and sound.

3.4 TEMPORARY SCREENS
Erect screens to maintain security and to prevent penetration of weather, dust and dirt.

3.5 SITE SAFETY
Prevent access by unauthorised persons. Illuminate and protect all holes, unsafe buildings and other hazards. Leave site and buildings safe at the close of each day's work.

3.6 ASBESTOS
Where demolition work includes contact with or removal of material containing asbestos, conform with the, Health and Safety at Work (Asbestos) Regulations 2016, WorkSafe NZ requirements including WorkSafe Management and Removal of Asbestos (Approved CoP).

3.7 SALVAGE ITEMS

Carefully dismantle and safely store salvage items where directed; for removal, use on the site, or until completion of the works.

2200 GROUNDWORKS & PREPARATION

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work using persons competent and experienced in the trade.

1.2 SITE SAFETY

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

2. PRODUCTS

2.1 FILLING MATERIALS

Volcanic tuff:	Scoriaceous tuff of variable grading excluding silt or clay material, capable of being placed and compacted as specified.
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.
Sand fill:	Clean sand of such grading in particle size as to allow for mechanical compaction to 90% maximum density.
Hardcore:	Scoria or crushed rock to GAP (General All Passing) 40 grading.
Granular base:	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.
Dressing course:	Scoria to GAP 20 grading, or "dirty footpath scoria", or equivalent "all in" graded crushed metal aggregate.
Free-draining aggregate:	Scoria or crushed gravel graded 50 to 14 clean.

3. EXECUTION

3.1 EXCAVATION GUIDELINES

Carry out excavation to the guidelines set in WorkSafe NZ, Good Practice Guidelines - Excavation Safety.

3.2 PROTECT EXISTING

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

3.3 SURFACE PREPARATION

To NZS 3604, 3.5 **Site preparation**, remove all turf, vegetation, trees, topsoil, stumps and rubbish from the area being built on.

3.4 UNDERGROUND ELEMENTS AND SERVICES

Break out and remove underground elements and redundant services. Report for instructions when unexpected voids, made-up ground or services are encountered. Seal off the ends of drains or remove to NUO approval.

3.5 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.

3.6 GENERAL EXCAVATION

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

3.7 EXCAVATION FOR FOUNDATIONS

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

3.8 INADEQUATE BEARING

If bearing is inadequate then excavate further and backfill with material as follows:

Slabs on grade:	Hardfill
Footings:	10 MPa concrete
Service trenches:	Hardfill

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

3.9 GRANULAR BASE FOR SLABS

To NZS 3604, 7.5.3 **Granular base**. Consolidate with a vibrating roller. Blind the surface with coarse sand or sand/cement and roll ready to receive a damp-proof membrane.

3.10 GENERAL BACKFILLING

Compact backfilling in 150mm layers, with the last 200mm in clean topsoil, lightly compacted and neatly finished off.

2310 PILE FOUNDATIONS

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work using persons competent and experienced in the trade. Work to be carried out by or supervised by the appropriate LBP.

2. PRODUCTS

2.1 TIMBER PILES

Radiata pine H5 CCA (preservative code 01 or 02) treated , to NZS 3602, table 1 **Requirements for wood-based building components**, and to NZS 3604, 6.4 **Piles**, for types and footings.

2.2 ACCESSORIES

Nails:	Steel, stainless steel and galvanized steel of pattern to NZS 3604, table 6.6 **Nailing schedule for hand-driven and power driven-nails**, and NZS 3604, 4, **Durability**.
Bolts and screws:	Steel, stainless steel and galvanized steel to NZS 3604, 6 **Foundation and subfloor framing**, and NZS 3604, 4 **Durability**.
Nail plates:	Stainless steel and galvanized steel toothed or nailed steel plates to the plate manufacturer's design for the particular locations shown on the drawings and to NZS 3604, 4 **Durability**.
Concrete:	For piles, prescribed grade 17.5 MPa to NZS 3104, table 3.1 **Prescribed mixes (P)**.
Corrosion risk	If timber treatments other than CCA (preservative code 01 or 02) are used, stainless steel fixings/connectors must be used in wet/damp areas in all zones.

3. EXECUTION

3.1 EXECUTION GENERALLY

Comply with NZS 3602, NZBC B2/AS1 and NZS 3604 except as varied by 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).
In the Canterbury Earthquake Region comply with the changes to NZS 3604 in NZBC B1/AS1.

3.2 INSTALL DRIVEN ROUND TIMBER PILES

Prepare for and drive timber piles to NZS 3604, 6.6 **Driven timber piles**. Protect pile heads with a suitable cushion.

3.3 INSTALL SQUARE TIMBER PILES

Prepare for, place and secure as detailed on the drawings.

3110 CONCRETE WORK

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work using persons competent and experienced in the trade. Structural and foundation work to be carried out by or supervised by the appropriate LBP.

2. PRODUCTS

2.1 REINFORCEMENT

Bars to AS/NZS 4671, grade 300E deformed, other than for ties, stirrups and spirals, unless shown otherwise on the drawings. Welded reinforcing mesh to AS/NZS 4671 Class E. Mild drawn steel tying wire not less than 1.2mm diameter.

2.2 MESH FOR SLABS TO NZS 3604 OR NZS 4229

For slabs on ground, welded reinforcing mesh to AS/NZS 4671, minimum to NZBC B1/AS1 - Grade 500E, 2.27kg/m2 (1.14kg/m2 in each direction).

2.3 SPACERS AND CHAIRS

Precast concrete or purpose made moulded PVC. Use concrete spacer blocks only where the concrete surface is not exposed in the finished work.

2.4 CONCRETE

Strength as selected. Ready-mix normal grade, maximum aggregate size 19mm to NZS 3104. Site mixed prescribed grade, using either separate batching of sand and coarse aggregate, or builder's mix, to NZS 3104.

3. EXECUTION

3.1 HANDLE AND STORE REINFORCING

Handle and store reinforcing steel and accessories without damage or contamination. Ensure reinforcement is clean and remains clean and free of contamination that may reduce bonding capacity.

3.2 FALSEWORK AND FORMWORK

Use falsework and formwork of sufficient strength to retain and support the wet concrete to the required profiles and tolerances. Select formwork finish to produce the specified finished quality.

3.3 CUT AND BEND

Cut and bend bars using proper bending tools to avoid notching and to the requirements of NZS 3109. Do not rebend bars without written approval. Bend main reinforcing bars, stirrups and ties to the former pin diameters as given in NZS 3109, figure 3.1, **Standard bend, hook and stirrup**.

3.4 SECURE REINFORCEMENT

Secure reinforcement adequately with tying wire and place, support and secure against displacement when concreting. Bend tying wire back well clear of the formwork. Spacing as dimensioned, or if not shown, to the clear distance minimums laid down in NZS 3109, 3.3.**Hooks and bends**.

3.5 LAPPED SPLICES

Set length of laps, where not dimensioned on the drawings, in accordance with NZS 3109: 3.7, **Splices in reinforcement**. Increase laps of plain round steel by 100%.

3.6 MESH LAPS FOR SLABS TO NZS 3604 OR NZS 4229

For slabs on ground, mesh to be lapped and tied, so the outermost wires overlap by the greater of:- the spacing of the cross wires plus 50mm or, 150mm or, manufacturer's requirements. Do not count bar extensions beyond the outermost cross wire.

3.7 REINFORCEMENT COVER TO NZS 3604

Minimum cover to all reinforcing bars, stirrups, ties and spirals, as shown on drawings. Where cover is not shown on drawings provide minimum cover to NZS 3604 requirements.

3.8 CONCRETE PLACEMENT

To comply with NZS 3109.

3.9 SURFACE FINISHES

To comply with NZS 3114, section 105 **Specification of finishes**, or as denoted on the drawings. Formwork linings and surface finishes as nominated for both fair face and concealed or exposed surfaces. Surface tolerances to comply with NZS 3114, section 104 **Surface tolerances** and 105.3.2.

3.10 DAMP-PROOF MEMBRANE

Apply membrane to prepared basecourse with 150mm laps between sheets. Tape seal laps and penetrations with 50mm wide pressure sensitive plastic tape. Refer to drawings for perimeter details.

3.11 CASTING IN

Build in grounds, bolts and fixings for wall plates and bracing elements, holding down bolts, pipes, sleeves and fixings as required. Form pockets, chases and flashing grooves as required. No grounds exceeding 100mm in length. Minimum cover on conduits 40mm. Do not encase aluminium items in concrete. Do not paint steel embedded items more than 25mm into the concrete encasement. Cut back form ties to specified cover and fill the cavities with mortar. Wrap all pipes embedded in concrete with tape to break the bond and to allow for expansion.

3.12 FLOOR SLABS TO NZS 3604

Slabs on ground to NZS 3604 as modified by NZBC B1/AS1 and NZBC E2/AS3. Construct to NZS 3604, 4.5 **Concrete and concrete masonry** and NZS 3604, 7.5, **Concrete slab-on-ground floors in timber buildings** as modified by NZBC B1/AS1, 3.0 **Timber**. Lay to true and straight surfaces, screeded, floated and steel (manual or power) trowelled finish. Tolerance on flatness: maximum 3mm gradual deviation over a 3 metre straight-edge, to NZS 3114, 304, **Surface tolerances**. Allow for free joints maximum 24m centres to NZBC B1/AS1, 3.1.13 **NZS 3604 New clause**.
In the Canterbury Earthquake Region comply with the changes to NZS 3604 in NZBC B1/AS1.

3.13 SAW CUTS TO NZS 3604

Cut slabs where indicated on the drawings as required to control shrinkage cracking. Form by saw cutting the slab (blade width approximately 5 mm) to a quarter of the depth of the slab after it has hardened (saw cutting shall take place no later than 24 hours after initial set for average ambient temperatures above 20 °C, and 48 hours for average ambient temperatures below 20 °C). If saw cuts are not indicated on the drawings, than provide saw cuts as per the requirements for shrinkage control joints in NZS 3604.

3.14 SURFACE REPAIRS

Make good surface defects as soon as forms are stripped. Make good hollows or bony areas with 1:2 mortar, finished to the same tolerances as the parent concrete. Fill tie rod holes with 1:2 mortar.

3.15 CURING OF CONCRETE

Keep damp for not less than seven days. Ensure curing of slabs commences as soon as possible after final finishing, by the use of continuous water sprays, or ponding. Alternately, apply a curing membrane. Ensure any membrane used will not affect subsequent applied finishes.

3.16 STRIKE FORMWORK

Strike formwork without damaging or overloading structure.

3.17 CLEAN OUT

Clean out saw cuts. Fill with cement grout where the floor will be covered with carpet or vinyl.

3800 TIMBER FRAMING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

Use experienced competent carpenter familiar with the materials and techniques specified. Work to be carried out by or supervised by the appropriate LBP.

2. PRODUCTS

2.1 TIMBER FRAMING GENERALLY

Species, grade and level of treatment to NZBC B2/AS1, NZS 3602, tables 1 to 3 **Requirements for wood-based building components**..., and moisture content to NZS 3602, table 4 **Allowable moisture content**..... Structural Grade (SG) to NZS 3604, NZS 3622 with properties to NZS 3603.

2.2 TIMBER TRUSSES

To FTMA Code of Practice. Moisture content 16% at supply.

2.3 ACCESSORIES

Damp-proof course:	High impact embossed polyethylene
Stud straps	Polypropylene tape run horizontal at 300mm centres over flexible wall underlay, for drained cavities with stud spacings greater than 450mm.
Nails, bolts and screws:	Steel, stainless steel, galvanized steel of pattern to suit the location and to BRANZ BU 519: Fasteners selection. To NZS 3604, 4 **Durability** and NZBC E2/AS1.
Nail plates connectors:	Stainless steel and/or galvanized steel toothed or nailed plates to the plate manufacturer's design for the particular locations as shown on the drawings and to NZS 3604, 4 **Durability**. Galvanized steel and stainless steel connectors and brackets to the connector manufacturer's design for locations shown on drawings and to NZS 3604, 4 **Durability** and NZBC E2/AS1
Corrosion risk	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). For interior timber, treated with copper-based timber preservatives (H3.2 or higher), use a minimum of hot-dipped galvanized steel fixings and fasteners.

3. EXECUTION

3.1 ATTENDANCE

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

3.2 MOISTURE CONTENT

Maximum allowable moisture content to NZS 3602, table 4 **Allowable moisture content...**, for framing supporting interior linings:

Framing at erection	24%
Framing at enclosure	20%
Framing at lining	16%

3.3 EXECUTION GENERALLY

To NZS 3604 except as varied in this specification. 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). Set out framing

in accordance with the requirements of NZS 3604 and as required to support sheet linings and claddings.

3.4 INSTALL SUB-FLOOR FRAMING

Frame up off foundation walls and piles, all fabricated, fastened and braced to NZS 3604, 6 **Foundation and subfloor framing**.

3.5 INSTALL FLOOR, WALL AND ROOF FRAMING

Floors and bottom plates framed and fastened to NZS 3604, 7 **Floors**. Frame walls to required loading and bracing complete with lintels, sills and nogs, all fabricated and fastened to NZS 3604, 8 **Walls**. Frame roof to required loading and bracing complete with valley boards, ridge boards and purlins to NZS 3604, 10 **Roof framing**. Design and fit roof trusses complete with anchorage. All fabricated and fastened to NZS 3604, 9 **Posts**, and NZS 3604, 10 **Roof framing**.

3.6 BATTENS

For drained cavity construction nominal 20mm H3.1 cavity battens (non-structural) to NZBC E2/AS1, 9.1.8.4 **Cavity battens**. For direct fix cladding window and door openings nominal 20mm H3.1 jamb battens to NZBC E2/AS1, Fig. 72A.

4220 WALL CLADDING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work using persons competent and experienced in the trade.

2. PRODUCTS

2.1 PLYWOOD

Structural plywood to AS/NZS 2269.0.

2.2 FIBRE CEMENT WEATHERBOARD

Cellulose cement autoclaved boards.

2.3 FIBRE CEMENT SOFFIT LINING

Cellulose cement autoclaved sheets.

2.4 TIMBER FASCIAS AND BARGE BOARDS

As selected, or radiata pine to NZS 3631 for grading and to NZS 3602, table 2 **Requirements for wood-based building components...**, for selection and treatment.

2.5 ACCESSORIES

Wall underlay:	Breather type, waterproof.
Rigid Air Barriers:	Proprietary rigid sheet pre-cladding systems.
Jointers:	To suit cladding type and thickness.
Nails, screws, fastenings:	Metal, size and pattern, to cladding manufacturer's requirements and complying with the relevant aspects of NZS 3604, section 4: **Durability** and E2/AS1.

3. EXECUTION

3.1 MOISTURE CONTENT

Maximum allowable moisture content to NZS 3602, table 4 **Allowable moisture content....**

3.2 EXECUTION GENERALLY

To NZBC E2/AS1 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).

3.3 INSTALL WALL UNDERLAY/RIGID AIR BARRIER

Fix to the manufacturer's requirements. Refer to 1213 SELECTIONS for type.

3.4 CAVITY BATTENS OR JAMB BATTENS

As specified in the section 3800 TIMBER FRAMING, to suit the selected wall cladding and construction type.

3.5 INSTALL PLYWOOD

Install plywood sheet and timber joint battens to NZBC E2/AS1, 9.8 **Plywood sheet**.

3.6 INSTALL FIBRE CEMENT WEATHERBOARD

Install level, true to line and face, to the manufacturer's requirements and NZBC E2/AS1, 9.5 **Fibre cement weatherboards**.

3.7 INSTALL FIBRE CEMENT SOFFITS

Cut sheets dry and scribe fit to fully support all edges and joints. Nail and drill for and insert fasteners to the sheet manufacturer's requirements. Fit complete with jointers and

capping moulds. Refer to the cladding manufacturer's literature for fixing details and fixings durability requirements to NZS 3604, section 4 **Durability**.

3.8 INSTALL EXTERIOR TIMBER FINISHINGS
Install timber fascias, barge boards, facings, beads, trim and enclosures level, true to line and face, with all end grain sealed and joints mitred.

3.9 INSTALL FLASHINGS
Install flashings, covers and soakers as detailed on the drawings and to NZBC E2/AS1, 4.0 **Flashings**.

3.10 USE OF SEALANTS
Selection and use of sealants to follow BRANZ BU 601: Sealants for cladding joints.

3.11 COMPLETE
Complete all flashings, finishings and trim so the cladding system is completely weathertight.

4310 ROOFING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Use experienced competent roofers familiar with the materials and techniques specified. Work to be carried out by or supervised by the appropriate LBP.

1.2 WIND AND EARTHQUAKE LOADINGS

Use fixings and methods capable of sustaining the loads appropriate to the area as set out in NZS 3604, section 5 **Bracing design**, and confirmed under 1212 COMPLIANCE.

2. PRODUCTS

2.1 PROFILED METAL

Profile, metal and finish as selected. Accessories, cappings, flashings and fixings to match and to the roofing manufacturer's requirements.

2.2 ACCESSORIES

Tile battens:	Douglas fir or radiata pine, SG6, treated H1.2, size, spacing and fixing to NZS 3604, table 10.12, **Tile battens for all wind zones**.
Roof underlays:	As selected.
Nails, screws, fastenings:	Metal, size and pattern, to roofing manufacturer's requirements and complying with the relevant aspects of NZS 3604, section 4 **Durability** and NZBC E2/AS1.
Flashings:	As required.

3. EXECUTION

3.1 STORAGE

Stack roofing and accessories on clean, level areas of the site. Cover and protect from damage and from weather until ready to fix in place.

3.2 SET-OUT

Set out the planned layout before fixing commences, to ensure true lines and the correct relationship to module, grid and roof features. Overlaps to face away from prevailing wind direction.

3.3 LAY ROOF UNDERLAY

Lay and fix to NZBC E2/AS1, 8.1.5 **Roof Underlays**.

3.4 TAKE CARE

Take care to avoid damaging pre-finished roofing both during and after fixing. Mark only with chalk or spirit-based pen. Wear only soft-soled shoes on the finished surface. Remove metal filings daily.

3.5 INSTALL PROFILED METAL

Use cutting tools recommended by the roofing manufacturer. Fold ends and seal cut edges to the roofing manufacturer's requirements. Fix complete with matching accessories, flashed to roof features and penetrations; all in accordance with NZ metal roof and wall cladding code of practice and NZBC E2/AS1: 8.4 **Profiled metal roof cladding**.

3.6 INSTALL ROOF WINDOWS/ROOFLIGHTS/SKYLIGHTS

Check that the trimmed openings are formed and constructed to suit. Install and fix roof windows/lights/skylights in accordance with the manufacturer's installation instructions. Install flashings and overflashings as detailed and as required to make the installation completely weatherproof. Install selected accessories and hardware. Install and complete operating systems.

3.7 FIXINGS AND SEALANTS

Refer to the roofing manufacturer's literature for fixing details and to NZS 3604 for fixings durability requirements. Select and use sealants only as recommended by the roofing manufacturer.

3.8 INSTALL COVERS AND FLASHINGS

Provide apron, verge and ridge flashings. Install and fix as detailed and to the roofing manufacturer's details and to comply with NZBC E2/AS1, 4.0 **Flashings**, NZBC E2/AS1: 5.0 **Roof/wall junctions**, and NZBC E2/AS1: 6.0 **Parapets**.

3.9 PENETRATIONS

Flash and overflash penetrations through the roof. Fit proprietary boots to pipework penetrations.

3.10 COMPLETE

Ensure the work is complete with flashings, undercloaks, valleys, ridges and hips properly installed so the finished roof is completely weathertight.

3.11 CLEAR

Clear trade debris and unused materials from the roof and surrounds regularly during the work and at completion. Sweep down the completed roof and flush out spoutings, gutters and rainwater pipes.

4337 TIMBER & PLYWOOD, DECKING & ROOFING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Installers to be experienced, competent trades people familiar with the materials and techniques specified.

2. PRODUCTS

2.1 TIMBER SPACED BOARDING FOR EXTERIOR DECKS

Selected radiata pine, treated to H3.2 to NZS 3602, table 2A. Dressed four sides and with arrises.

2.2 FIXINGS FOR DECKING

Galvanised 60mm X 3.15mm annular grooved jolt head nails for up to 21mm thick boards, 75mm nail length for boards over 21mm.
Use stainless steel nails for Exposure Zones D & E, refer to section 1212 COMPLIANCE for project zone.

2.3 PLYWOOD MEMBRANE SUBSTRATE

Radiata pine veneer ply to AS/NZS 2269.0, face sanded, 17 to 25mm thick, CD grade as scheduled. H3 CCA treated to AS/NZS 1604.3. Stress grade F11 for decks.

2.4 FIXINGS FOR PLYWOOD

Stainless steel, counter-sunk No.10 X 50mm screws. Or to the plywood manufacturer's requirements for size and use. Single pack waterproof general purpose construction adhesive.

3. EXECUTION

3.1 LAY TIMBER DECKING

Drill for all fixings. Stagger end joints. Space boards a minimum of 2mm apart in general conditions, or minimum 3mm apart if boards are likely to swell after fixing. Leave a 12mm minimum gap between the exterior wall and the adjacent timber slat. Fix using annular grooved jolt head nails, heads driven flush with the board surface.

3.2 SUPPORT PLYWOOD EDGES AND JOINTS

Fully support edges and joints of sheets.

3.3 FIXING PLYWOOD UNDER MEMBRANES

To NZBC E2/AS1, 8.5 **Membrane roofs and decks**. Screw and adhesive fix sheets for membrane type roofing to the plywood and membrane manufacturers' requirements.
Provide a 5mm radius chamfer to external edges where the membrane is to be wrapped over. Fix H3.2 CCA treated internal corner fillets.
Provide the required falls.

3.4 PROTECT PLYWOOD

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

4520 ALUMINIUM WINDOWS & DOORS

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Fabricators/Installers to be experienced, competent trades people familiar with the materials and techniques specified.

1.2 CERTIFICATION

Provide documentation that the windows and doors comply with NZS 4211 and safety glass complies with NZS 4223.3.

1.3 WIND LOADINGS

Refer to section 1212 COMPLIANCE for wind zone.

2. PRODUCTS

2.1 WINDOW AND DOOR REVEALS

As selected, manufactured to comply with NZS 4211. Timber jamb liners to NZS 3602.

2.2 FLASHINGS

To NZBC E2/AS1, 9.1.10 **Windows and Doors** and as required.

2.3 POWDER COATING FINISH

To WANZPQAS: Powder Coating Quality Assurance System. All finished surfaces to show uniformity of gloss and colour (to match sample) free of all coating defects.

2.4 SEALANT, GLAZING TAPE AND GASKETS

To the window manufacturer's requirements.

2.5 FIXINGS

Ensure fixings and bracketing are compatible with aluminium. Do not use electroplated zinc fasteners or brass fastenings.

3. EXECUTION

3.1 OPENING PREPARATION

Confirm framing openings (including jamb battens for direct fix cladding) on site for dimension, plumb and straightness prior to fabrication or ordering of aluminium joinery. Prepare and trim to WANZ Window Installation Guide requirements. For openings over 600mm wide on cavity construction provide sill support bars.

3.2 EXECUTION GENERALLY

To NZBC E2/VM1 and NZBC E2/AS1. Install to WANZ Window installation Guide requirements.

3.3 HANDLING

Avoid distortion of elements during transit, handling and storage. Prevent pre-finished surfaces from rubbing together. Prevent contact with mud, plaster and cement. Do not deliver to site any elements which cannot be immediately unloaded into suitable conditions of storage.

3.4 CORROSION PROTECTION

Seal or suitably coat cut ends and holes drilled in aluminium before the frames are installed. Before fixing, apply bituminous coatings, slips or underlays between dissimilar metals in contact, or aluminium in contact with concrete.

3.5 FIX FRAMES

Fix frames rigidly in place without distortion, to the window manufacturer's requirements and to NZBC E2/AS1, 9.1.10.8, **Attachments for windows and doors**, plumb, true to line and face, weathertight and with all openings operating freely.

3.6 DRAINAGE

Anti-condensation channels to sills. All sills to sashes and fixed lights to incorporate positive drainage to the exterior.

3.7 GLAZING INSTALLATION

All glass held in aluminium beads and black PVC gaskets.

3.8 SAFETY GLASS INSTALLATION

Use in doors, sidelight panels, low level windows and all other locations to comply with NZS 4223.3.

3.9 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 on head flashings to match window finish.

3.10 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. Provide a continuous internal air seal between reveals and framing, using sealant over a backing rod.

3.11 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. Permanent manifestations, if required, to NZS 4223.3, 2.2 Manifestation (making glass visible).

3.12 CLEAN GLASS AND FRAMES

Clean off or remove glass indicators at completion of the building. Clean glass inside and out to a shining finish. Clean down both sides of window and door frames using the methods required by the window and door manufacturer.

4610 GLAZING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Glaziers to be experienced, competent trades people familiar with the materials and techniques specified.

1.2 CERTIFICATION

If not supplied with windows, provide documentation that the safety glass complies with NZS 4223.3.

2. PRODUCTS

2.1 GLAZING TAPE

Pressure sensitive, self-adhesive vinyl foam tapes, selected to suit the glazing detail.

2.2 GLASS THICKNESS

As selected and to NZS 4223.1, NZS 4223.3, NZS 4223.4.

2.3 FLOAT GLASS

Clear ordinary annealed glass for general window glazing. Thickness as required by NZS 4223.1.

2.4 LAMINATED GLASS

To NZS 4223.3.

2.5 TOUGHENED GLASS

To NZS 4223.3.

2.6 INSULATED GLASS UNITS

As selected and to AS/NZS 4666. and NZS 4223.2

2.7 SETTING BLOCKS

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

3. EXECUTION

3.1 EXECUTION GENERALLY

To NZS 4223.1, and for human impact safety glazing to NZS 4223.3. Insulating glass units to AS/NZS 4666 and NZS 4223.2.

3.2 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.

3.3 SAFETY GLASS INSTALLATION

Use in doors, sidelight panels, low level windows, bathrooms and all other locations to comply with NZS 4223.3.

3.4 SAFETY

Indicate the presence of transparent glasses, with whiting, tape or signs compatible with the glass type. Do not apply indicators other than whiting to the glass surface. Permanent manifestations if required, to comply with NZS 4223.3, 2.2 Manifestation (making glass visible).

3.5 CLEAN

Clean off or remove indicators at completion of the building. Clean glass inside and out to a shining finish.

4710 THERMAL INSULATION

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Installers to be experienced, competent trades people familiar with the materials and techniques specified.

2. PRODUCTS

2.1 THERMAL INSULATING PADS

Rectangular insulating pads manufactured from fibreglass, polyester, wool or similar.

2.2 CELLULAR PLASTIC RIGID BOARD

Polystyrene foam board manufactured from fire retardant grade resin.

3. EXECUTION

3.1 INSTALL INSULATION - GENERAL

Lay, install, fit and fix to NZBC H1/AS1: Energy efficiency, 2.0 Building thermal envelope, and to the insulation manufacturer's requirements. Install in housing to NZS 4218 and NZS 4246.

3.2 FIT THERMAL INSULATING PADS

Friction fit insulating pads in place to completely fill the whole of the cavities. Carefully scribe cut insulating pads slightly oversize to maintain friction fit to each other, to smaller spaces and around penetrations. Leave no gaps between, and maintain full thickness of the insulating pads over the whole of the installation. Do not cover vents.

3.3 FIT CELLULAR PLASTIC RIGID BOARD

Friction fit board after roof and wall claddings have been installed. Cut oversize lengthways for a tight compression fit between framing. Leave no gaps between, and maintain full thickness of the insulating segments over the whole of the installation. Fit board between floor joists and timber framing using proprietary fixing clips. Ensure separation from electric cabling. Do not cover vents. Leave a 200mm clear gap around recessed light fittings and metal flues. In windy locations secure floor insulation with proprietary support brackets.

3.4 GAPS AROUND RECESSED LIGHTS AND FLUES

New recessed light fittings to AS/NZS 3000, must be types IC-F, IC, CA-80 or CA-135 and do not require clearance from most, fibre glass, polyester or wool insulation. For all other insulation types and lighting types, or existing undefined types, allow clearance from the insulation of 100mm clear gap to incandescent or halogen lights, or as recommended by the lighting manufacturer.

Around metal flues allow 200mm minimum clear gap or as recommended by the fireplace/flue manufacturer.

5110 INTERIOR LININGS AND TRIM

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 FRAMING MOISTURE CONTENT

Maximum allowable moisture content to NZS 3602, table 4 **Allowable moisture content....**

1.2 PROTECT

Protect joinery, fittings and finishes already in place from water staining or damage from lining installation. Ensure building is weatherproof before lining work commences.

2. PRODUCTS

2.1 PLASTERBOARD

Gypsum plaster core encased in a durable face and backing paper formed for standard use, bracing use, fire rated use and water resistance use.

2.2 PLASTERBOARD ACCESSORIES

External angles:	Slim type 0.5mm galvanized steel.
Casing bead:	Slim type 0.5mm galvanized steel or PVC.
Cornice:	Plasterboard scotia type.
Nails:	Galvanized clouts 40mm x 2.5mm.
Screws:	40mm x 6 gauge zinc electro-plated bugle head gypsum drywall screws
Jointing compound & paper tape:	To the board manufacturer's requirements.
Adhesive:	Multi-purpose water based wallboard adhesive.

2.3 PRE-FINISHED SHEET

Proprietary sheets with factory applied finish.

2.4 PLYWOOD

Appearance grade plywood sheet

2.5 NAILS

Zinc-plated steel, stainless steel and galvanized steel of pattern to suit location and to BRANZ BU 519: **Fasteners selection**.

2.6 INTERIOR FINISHING TRIM

Timber selection to NZS 3602, table 3 **Requirements for wood-based building components....** Profile as selected or to match existing. Jointer profiles to suit location.

3. EXECUTION

3.1 SUBSTRATE

To NZS 3604, section 8 **Walls**, section 10 **Roof framing**, section 12 **Interior linings**, section 13 **Ceilings**, and the standard required by the lining manufacturer's requirements. Ensure moisture content of timber framing is at or below specified levels.

3.2 CONFIRM LEVELS OF PLASTERBOARD FINISH

Before commencing work, confirm the surface finish assessment procedures necessary to ensure the specified levels of finish will be obtained. Provide levels of finish as laid down in AS/NZS 2589.

3.3 LINE PLASTERBOARD CEILINGS AND WALLS

Line walls and ceilings with plasterboard sheets, fastened to the plasterboard manufacturer's requirements.

3.4 SPECIAL PLASTERBOARD LININGS

Line wet area walls with water resistant plasterboard sheets using adhesive and nail fixing to studs at centres to suit the surface finish. Form bracing panels using high density plasterboard sheets fixed with clout-washers and clouts and to conform to NZS 3604, 5.4 **Wall bracing design**, and 13.5 **Structural ceiling diaphragms**. Form sound rated panels following the sheet manufacturer's specifications and details for the required sound rating. Form fire rated panels following the sheet manufacturer's specifications and details for the required fire rating.

3.5 FIX PLASTERBOARD EXTERNAL ANGLES

Fix full length to external corners, with clouts at 100mm each side staggered.

3.6 PLASTERBOARD JOINTING AND STOPPING

Fill joint recess with bedding compound, centre the paper tape, apply second coat of bedding compound followed by a coat of finishing compound. Allow to dry and lightly sand off. Fill nail holes and flush up external angles with two successive coats of bedding compound followed by a coat of finishing compound. Allow to dry and lightly sand off. All to the plasterboard manufacturer's requirements.

3.7 LEVELS OF FINISH

Provide levels of finish to standards laid down by AS/NZS 2589 as follows:

Level 4:	For thin coating finishes (paint) and surfaces receiving light texture or wall covering finishes
Level 5:	Where specifically detailed for surfaces receiving thin coating finishes (paint).

3.8 INSTALL PREFINISHED SHEET LININGS

Adhesive fix to timber framing with selected jointers as detailed and to the panel manufacturer's requirements.

3.9 INSTALL PLYWOOD LININGS

Adhesive and nail to timber framing with jointing as detailed and to the panel manufacturer's requirements. Punch nails and fill to suit finish required.

3.10 INSTALL TRIM

Scribe and fit reveal linings to exterior timber joinery, architraves to interior joinery, skirtings to walls and timber beads to wall/ceiling junctions, and other trim as detailed.

5230 INTERIOR DOORS & FRAMES

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Trades people qualified or experienced in 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, and stairs).

2. PRODUCTS

2.1 DOORS GENERALLY

As selected.

2.2 GLAZED DOORS

Solid timber framed and bead glazed.

2.3 INTERIOR CAVITY SLIDERS

Hollow core door within a proprietary cavity slider frame, with brand-matched sliding door gear.

2.4 INTERNAL JOINERY FRAMES

Fabricate as detailed.

2.5 DOOR HINGES

Type:	loose-pin zinc-plated steel
Size:	89mm
Material:	zinc-plated steel
Number:	3 hinges per door

2.6 INTERIOR SLIDING-FOLDING DOOR GEAR

Bi-fold pattern to suit size and weight of doors and as detailed.

2.7 DOOR HARDWARE

As selected.

2.8 NAILS

Zinc-plated steel, stainless steel and galvanized steel of pattern to suit location and to BRANZ BU 519: **Fasteners selection**.

3. EXECUTION

3.1 PROTECT

Protect joinery, fittings and finishes already in place from water staining or damage from lining installation. Ensure building is weatherproof before lining work commences.

3.2 FIT INTERNAL JOINERY FRAMES

Wedge and rigidly fix in place without distortion, plumb, and true to line and face.

3.3 INTERNAL CAVITY SLIDERS

Install in accordance with the door manufacturer's requirements.

3.4 FIT HARDWARE

Fit hardware selected and provided, all in accordance with the hardware manufacturer's requirements.

3.5 CHECK

Check and adjust operation of doors sets, hardware and furniture.

5410 FLOORS

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Workers / Installers to be experienced, competent trades people familiar with the materials and techniques specified.

2. PRODUCTS

2.1 PARTICLEBOARD FLOORING

Flooring grade high density resin bonded.

2.2 PLYWOOD FLOORING

Structural plywood for bracing and floors, F11, CD grade, sanded face, H3.2 CCA.

2.3 SCREW FIXING PARTICLEBOARD OR PLYWOOD

Sure-fast type countersunk 50mm x 10 gauge screws, with one-component polyurethane based construction adhesive or elastomeric construction adhesive. Increase screw lengths for flooring over 21mm thick.

3. EXECUTION

3.1 LAY PARTICLEBOARD FLOORING

Fasten to the flooring manufacturer's requirements and NZS 3604, 7.2.3 **Wood-based sheet flooring**. Punch nails, fill holes, then sand with one coarse and one fine paper, hand sanding into corners.

3.2 LAY PLYWOOD FLOORING

Fix to the plywood manufacturer's requirements and to NZS 3604, 7.2.3 **Wood-based sheet flooring**. Punch nails, fill holes, then sand , hand sanding into corners.

5510 JOINERY FIXTURES AND FITTINGS

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

To include those methods, practices and processes contained in the current syllabus for the National Certificate in Carpentry and the National Certificate in Joinery (cabinetry, exterior joinery, stairs).

2. PRODUCTS

2.1 TIMBER BOARDS AND FRAMES

Carefully sawn to minimise the inherent warping, twisting and bowing of the selected species and to give a finish suitable for clear finishing.

2.2 MEDIUM DENSITY FIBRE BOARD

Resin bonded wood fibre sheet with selected finish.

2.3 STAIRCASE ELEMENTS

Exposed stairs to NZS 3602, table 1 **Requirements for wood-based building components...**, and protected stairs to NZS 3602, table 2 **Requirements for wood-based building components...**.

3. EXECUTION

3.1 TRANSIT AND DELIVERY

Load, transport and unload fittings without distortion or damage and keep covered to protect from the weather. Do not deliver fittings until floor, wall and ceiling surfaces are in place and the fittings can be placed in their final location.

3.2 FABRICATION QUALITY

Check site dimensions. Carry out machining within the practices required for the particular timber or wood product being used. Machine drill and cut holes and recesses and form joints to the componentry manufacturer's requirements. Work accurate, square and true to line and face.

3.3 FABRICATE JOINERY FITTINGS

Carry out jointing, dowelling and other operations necessary for the proper assembly of the fittings as detailed, with fixings concealed unless otherwise detailed. Use glue joints where provision for shrinkage is not required, with contact surfaces, glueing and pressure all applied to the glue manufacturer's requirements. Locate and drive connectors and fasteners to the bolt manufacturer's requirements. Scribe fit adjustable shelves with 4 shelf pins and locate force fit pin holes at 50mm maximum centres in solid cheeks. Hang doors on concealed hinges.

3.4 FABRICATE TIMBER STAIRS

To NZBC D1/AS1, 4.0. **Stairways, closed type**, unless detailed otherwise. Fabricate and install the handrails and balustrading as detailed, complete with associated metal componentry and hardware.

3.5 ASSEMBLE PROPRIETARY ITEMS

Check all components are included. Assemble to manufacturer's instructions to achieve finished item.

3.6 INSTALL FITTINGS

Scribe fit on site and install level, square, plumb and true to line and face.

6200 TILING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Use tilers experienced with the materials and techniques specified.

1.2 SLIP RESISTANCE

Accessible routes slip resistance to NZBC D1/AS1, 2.1 Slip resistance.

2. PRODUCTS

2.1 ADHESIVES COMPATIBILITY

On proprietary substrates or waterproof membranes use only adhesives with documented compatibility approval from the respective manufacturers.

2.2 ACCESSORIES

Waterproofing membranes:	As selected.
Cement-based screed:	Mix of 3:1 Portland cement, wash-mix sand, gauged with liquid polymer additive to the tile manufacturer's requirements.
Tile adhesive:	To the tile manufacturer's requirements.
Grout:	Cement based, compressible and to suit the particular location and use.
Control joint sealant:	To BRANZ Good practice guide: Tiling, section 5.0.

3. EXECUTION

3.1 HANDLING AND STORAGE

Handle tiles with care to avoid chipping, soiling and damage. Store on hard, level standings in non-traffic, non-work areas that are enclosed, clean and dry. Reject all damaged tiles.

3.2 SUBSTRATE

Ensure all services and accessories are in place, located to suit the tile layout, with the substrate required for tiling work.

3.3 TEMPERATURE

Do not carry out tiling where the ambient temperature is below 5°C, or onto a substrate with a temperature higher than 40°C.

3.4 LAYOUT

Obtain confirmation of the proposed layout of tiles, expansion joints and other visual considerations.

3.5 EXECUTION GENERALLY

Prepare surfaces and carry out the tiling work in accordance with BRANZ Good practice guide: Tiling.

3.6 SURFACE PREPARATION

To BRANZ Good practice guide: Tiling, section 4.0.

3.7 LAY PROPRIETARY SCREED

Apply a proprietary cement slurry bond coat over the whole of the floor. Mix and place a 40mm thick mortar bed over the bond coat and firmly tamp, screed and compact to the required level. In waterproofed areas where the cement screed has been laid over the waterproofing membrane, prepare the screed surface by applying a further waterproof coating before laying tiles.

3.8 APPLY LIQUID WATERPROOFING MEMBRANE

Apply the selected liquid waterproof membrane system to the membrane manufacturer's requirements. Flood test shower cubicle floors.

3.9 TILE FIXING, CONCRETE, CEMENT-BASED ADHESIVE

Apply and float thin (thick) bed cement-based adhesive to a minimum 3mm (6mm) bed thickness to the tile manufacturer's requirements. Rib surface with a notched trowel, press the tile and beat it into place with 3mm joints, and to obtain required coverage of adhesive on the back of each tile.

3.10 TILE FIXING, RIGID SHEET

Prime the surface after the curing of any waterproof membrane. Spread adhesive to a uniform minimum thickness of 3mm and rib it with a notched trowel to the tile manufacturer's requirements. Press the tile and beat it into place to obtain the required coverage by adhesive on the back of each tile.

3.11 TILE FIXING, INTERIOR TIMBER FLOORS

Install underlay to the tile manufacturer's requirements. After the curing of any waterproof membrane, prime the surface, spread adhesive to a uniform minimum thickness of 3mm and rib it with a notched trowel to the tile manufacturer's requirements. Press the tile and beat it into place to obtain the required coverage by adhesive on the back of each tile.

3.12 GROUTING

Remove spacers. Prepare joints, mix and apply proprietary grout and finish off the grout uniform in colour, smooth and without voids, pinholes or low spots.

3.13 MOVEMENT CONTROL JOINTS

Minimum width of 6mm, carried through tile and bedding. Where substantial movement is anticipated, carry through the rigid sheet to the structure. Ensure joints are clean, formed, filled, and the sealant inserted to the sealant manufacturer's requirements.

3.14 CLEAN

Upon completion of setting and grouting, thoroughly sponge and wash the tiles to leave clean and free of blemish. Finally polish tiles with a clean, dry cloth.

6300 FLOOR COVERING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specificproduct, material, accessories and finish selections.

1.1 QUALIFICATIONS

Use flooring trades people appropriately experienced with the materials and techniques specified.

2. PRODUCTS

2.1 ADHESIVES COMPATIBILITY

Use only compatible adhesives approved by the respective manufacturers.

2.2 RESILIENT FLOOR COVERING

Includes vinyl, linoleum or rubber, either sheet or tile

2.3 ACCESSORIES - RESILIENT FLOOR COVERING

Rigid sheet underlay:	Wood based sheet overlays for uneven timber floors
Primer and sealers:	To the adhesive manufacturer's requirements for the particular substrate.
Adhesive:	To the manufacturer's requirements.
Trims and edging:	As supplied by the manufacturer to complete the work.

2.4 CARPET

Textile floor coverings to, AS/NZS 2455.1 for broadloom or AS/NZS 2455.2 for tiles.

2.5 ACCESSORIES - CARPET

Rigid sheet underlay:	Wood based sheet overlays for uneven timber floors
Underlay:	To AS/NZS 2455.1 Soft underlay and underlays manufacturer's requirements.
Adhesives:	To the manufacturer's requirements.
Edge grippers:	To the manufacturer's requirements.
Tape:	To the manufacturer's requirements.
Trims and edging:	Binder bars, divider strips and nosings to complete the work.

2.6 TIMBER OVERLAY FLOORING

Laminated timber overlay flooring strips/planks for floating floor installation.

2.7 ACCESSORIES - TIMBER OVERLAY FLOORING

Rigid sheet underlay:	Wood based sheet overlays for uneven timber floors
Primer and sealers:	To the adhesive manufacturer's requirements for the particular substrate.
Adhesive:	To the manufacturer's requirements.
Foam underlay	2mm thick, closed cell foam underlay to provide a moisture membrane.
Trims and edging:	As supplied by the manufacturer to complete the work.

3. EXECUTION

3.1 HANDLING AND STORAGE

Maintain materials and accessories undamaged and dry. Store any rolls and other material to manufacturers requirements, on level surfaces, in non-work areas that are enclosed, clean and dry. Avoid distortion, marking and damage to edges while shifting and handling materials and accessories. Do not use faulty or damaged material.

3.2 SUBSTRATE

Ensure the building is enclosed, wet work complete, finishes and trim complete, and good lighting available. Inspect the substrate to ensure it is of the standard required for work in this section.

3.3 TEMPERATURE
Acclimatise flooring to a room temperature above 16°C to manufacturer's requirements. In air-conditioned buildings run air-conditioning to flooring manufacturer's requirements. Turn off floor heating for at least 48 hours before and after laying.

3.4 LAYOUT
Before beginning the installation confirm the proposed layout of material, location of joins and other visual considerations of the finished work.

3.5 SURFACE PREPARATION - RESILIENT FLOORING
To NZS/AS 1884 including necessary repairs and sealing. Check for moisture content to NZS/AS 1884, Appendix A, and do not commence final sanding or laying until readings for the whole area show a maximum moisture content of, 75% RH for concrete, 14% for timber or 12% for timber with air conditioning. Clean surface.

3.6 SURFACE PREPARATION - CARPET
To AS/NZS 2455.1, section 2. including necessary repairs and sealing. Check for moisture content to AS/NZS 2455.1, Appendix B, and do not commence laying until readings for the whole area show a maximum moisture content of, 75% RH for concrete, 14% for timber or 12% for timber with air conditioning. Clean surface.

3.7 SURFACE PREPARATION - TIMBER OVERLAY FLOORING
To manufacturer's requirements. Clear substrate of debris, repair and sand/grind as necessary. Check moisture content and do not commence final sanding or laying until readings for the whole area show a maximum moisture content of, 60/70% RH for concrete, 14% for timber or 12% for timber with air conditioning. For concrete apply sealer if necessary. Clean surface.

3.8 INSTALLING RIGID SHEET UNDERLAY
Over rough or uneven timber floors, lay sheet overlay with joints staggered, with a 1mm gap between sheets and 2mm at perimeters. Use 18mm divergent staples at 100mm centres throughout the whole sheet and 30mm apart, 18mm in from the edges of the sheets. Punch staples below the surface and sand joints level.

3.9 RESILIENT FLOOR LAYING
Carry out the whole of the work to NZS/AS 1884, and the flooring manufacturer's requirements.

3.10 RESILIENT FLOOR JOINTING
Provide the joints/seams described in 1213 SELECTIONS or the drawings, to NZS/AS 1884, and the flooring manufacturer's requirements.

3.11 RESILIENT FLOOR COVES
Pencil cove flooring to the specified height and finish off as detailed. Perform butterfly method to internal and external mitres. Joints to manufacturers requirements.

3.12 CARPET INSTALLATION, CONVENTIONAL SYSTEM
Install underlay to manufacturer's requirements, and lay at right angles to the carpet direction.
Tape carpet joints, fix grippers to floor and install underlay and carpet to AS/NZS 2455.1, section 3. Stretch carpet tight in both width and length evenly without bowing, square with walls. Fix trim.

3.13 TIMBER OVERLAY FLOORING, INSTALLATION, FLOATING
Install 2mm foam underlay to the total floor area, in long, continuous runs, allowing to cove up walls 50mm. Tape joints using moisture resistant tape, to create an impervious membrane. Install the timber floor strictly in accordance with the flooring manufacturer's requirements. Ensure the required expansion gap is left at perimeters and around fixed obstacles. Adhesive fix flooring to stair treads, risers and landings, to manufacturer's requirements.

3.14 CLEAN
Upon completion clean to manufacturer's requirements.

6700 PAINTING

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work using competent and experienced painters.

1.2 HEALTH AND SAFETY

Refer to the requirements of the Health and Safety at Work Act 2015 and if elimination or isolation is not possible, then minimise the hazards in this work. Refer to WorkSafe NZ publication, Repainting lead based paints, for the required procedures and precautions when treating or removing lead based paint, burning or sanding off paint, or using solvent based paint removers.

1.3 SELECTIONS

Confirm all selections, colours and finishes with the owner.

2. PRODUCTS

2.1 PAINT

As selected and to the paint manufacturer's standards for exterior and/or interior primers, undercoats, sealers, stains, clear coatings, solvent-borne and water-borne paints.

2.2 GAP FILLERS

Linseed oil, putty, plastic wood, wood filler or plastic filler, to suit and to match the surface being prepared.

3. EXECUTION

3.1 INSPECT SURFACES

Inspect surfaces being painted and report to the owner any that will not, after the preparatory work laid down by the paint manufacturer, allow work of the required standard. Confirm that all areas have adequate lighting and are sufficiently free of other construction activities to enable painting work to proceed.

3.2 EXISTING FINISHED SURFACES

Ensure that all surfaces are sound, remove any, blistered, drummy, chalky, powdery, loose, soft or corroded material and make good. Remove or treat any surface contaminates or moss and mould to manufacturer's requirements.

3.3 PROTECT

Cover up adjoining surfaces and areas liable to damage or over-painting.

3.4 REMOVE HARDWARE

Remove hardware and door/window furniture and replace on completion. Do not paint over permanently attached hinges, or any hardware items which cannot be removed.

3.5 PRIMING AND SEALING

Ensure that priming and sealing work needed before or during construction is carried out when required.

3.6 ENVIRONMENTAL CONDITIONS

Carry out work within acceptable temperature and humidity limits, with timber dry, all to the requirements of the paint manufacturer.

3.7 SHARP EDGES, CRACKS AND HOLES

Repair as required by the paint manufacturer.

3.8 PREPARE SURFACES
Prepare surfaces as required by the paint manufacturer. Make good all damage and defects.

3.9 PAINT APPLICATION
Apply paint by brush and/or roller to suit the location of the coating and to the paint manufacturer's requirements. Do not spray on site without express permission.

3.10 MANUFACTURER'S MANUALS
Refer to the paint manufacturers' manuals and follow their preparation, sequence and application requirements applying to each system. Ensure all paint coats in any system are supplied by the same manufacturer.

3.11 SCUFF BETWEEN COATS
Scuff between all coats to remove any dust pick-up, protruding fibres and coarse particles.

3.12 FINISHED PAINT SURFACES
Finished paint surfaces to show uniformity of gloss and colour, with the correct thickness for each coat, and freedom from painting defects. Ensure finished work is clean and free of any disfigurement.

3.13 CLEAN
Clean adjoining surfaces, glass and fittings of any paint contamination.

3.14 REFIT HARDWARE
Refit hardware without damage to the hardware or the adjoining surfaces.

7120 WATER SYSTEM

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work by or under the direct supervision of a certifying person under the Plumbers, Gasfitters and Drainlayers Act 2006.

2. PRODUCTS

2.1 POLYBUTYLENE WATER PIPE

Polybutylene tubing complete with fittings and accessories brand-matched to AS/NZS 2642.2.

2.2 POLYPROPYLENE WATER PIPE

PP-R Polypropylene pipes complete with fusion welded fittings and accessories brand-matched to NZBC G12/VM1.

2.3 INSULATION FOR HOT WATER PIPES

Preformed closed cell foam.

2.4 VALVES AND FITTINGS

All valves and fittings required for the system, to NZBC G12/AS1.

3. EXECUTION

3.1 EXECUTION GENERALLY

Carry out work and tests as applicable to NZBC G12/AS1.

3.2 INSTALL POLYBUTYLENE/POLYETHYLENE/POLYPROPYLENE WATER SUPPLY

Type as selected. Size the piping layout to eliminate loss of pressure at any point by simultaneous draw-off. Run pipes complete with all fittings, support and fixing, and jointed to the pipe manufacturer's specifications, all to NZBC G12/AS1, 5.0 **Water supply**. Conceal pipework and pressure test before wall linings are fixed.

3.3 OUTLET LOCATIONS

Ensure wall outlets for exposed pipes are level and centred on the fixture to ensure the neat installation of exposed pipework.

3.4 BACKFLOW PREVENTION

Fit back flow prevention devices to all outlets where it is possible for water or contaminants to backflow in to the potable water supply system.

3.5 INSTALL HOT WATER PIPE INSULATION

Insulate hot water pipes in accordance with the insulation manufacturer's instructions. Cut insulation sections tight between timber framing and tight between the webs of steel studs. Where hair felt is used, wrap around pipes in two layers in opposite directions and secure with galvanized steel wire ties.

3.6 INSTALL WATER HEATER

Install where shown complete with all the necessary fittings to the water heater manufacturer's requirements and NZBC G12/AS1, 6.11 **Water heater installation**. Gas water heaters also to AS/NZS 5601.1 and NZBC C/AS1-AS7, 7.2 **Gas-burning appliances**.

3.7 PENETRATIONS

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

3.8 COMPLETION

Pressure test to ensure no leakage and leave in proper working order. Clean tapware and fittings.

7150 SANITARYWARE, TAPWARE & ACCESSORIES

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work by or under the direct supervision of a certifying person under the Plumbers, Gasfitters and Drainlayers Act 2006.

2. PRODUCTS

2.1 SANITARY FIXTURES, TAPWARE, APPLIANCES AND ACCESSORIES

Refer to 1213 SELECTIONS and drawings for product selections.

3. EXECUTION

3.1 EXECUTION GENERALLY

Carry out installation work and tests to AS/NZS 3500.2:2003, as applicable.

3.2 INSTALL SANITARYWARE

Fit and install sanitaryware and associated screens, elements and hardware, plumb, true to line and rigid, to the fixture manufacturer's requirements. Supply standard chrome plated brass wastes and plastic plugs on chrome plated chains with all basins, tubs and baths.

3.3 INSTALL TAPWARE

Install tapware in accordance with the tap manufacturer's requirements. Flush out on completion. Check that washers or ceramic discs are operating correctly.

3.4 INSTALL SHOWER CUBICLE

Install to NZBC G1/AS1 and in accordance with shower manufacturer's details and requirements. Ensure that screens and doors fit closely and accurately. Test for water egress around sides and base.

3.5 TEST

Test soil and waste disposal systems to ensure no leakage exists and leave in working order.

3.6 ENSURE

Ensure all sanitary plumbing fittings and pipework are complete and operational.

7210 GAS SYSTEM

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 REGULATIONS
Comply with the Gas (safety and Measurement) Regulations, Electricity (Safety) Regulations and other NUO requirements. Give notices for inspections and carry out tests as required.

1.2 QUALIFICATIONS
Gasfitters to be experienced competent craftsman gasfitters, or registered gasfitters working under the direction of a craftsman gasfitter, familiar with the materials and techniques specified.

1.3 GAS CERTIFICATE OF COMPLIANCE
Provide a Certificate of Compliance (CoC) before connection.

1.4 GAS SAFETY CERTIFICATION
Provide a Gas Safety Certificate (GSC) at completion of work.

1.5 APPLIANCE COMPLIANCE
Supplier to provide a Supplier Declaration of Compliance (SDoC) for appliances.

1.6 PRESSURE TEST
Pressure test the system for leakage to AS/NZS 5601.1 before pipework is concealed by linings.

1.7 FINAL INSPECTION AND TEST
Carry out final inspections and testing, pressure test the system for leakage to AS/NZS 5601.1. Submit the work for inspection and test and prove to the satisfaction of the gas retailer that the installation complies with all Acts and Regulations and has been tested for leakage and proved to be sound.

2. PRODUCTS

2.1 DESIGN LPG CYLINDER SUPPLY
Design and install the 45kg LPG twin cylinder system to AS/NZS 5601.1 and the requirements of the LPG Association. Include, pipes, valves, change over valves and a cylinder anchor system.

3. EXECUTION

3.1 EXECUTION GENERALLY
Carry out the whole of this work to the requirements of NZBC G10/AS1, NZBC G11/AS1 and AS/NZS 5601.1.

3.2 INSTALL PIPING
Run the system, completely concealed, in the most suitable type of pipe for each part of the installation, bent, supported, jointed and complete with all fittings to AS/NZS 5601.1. Confirm the type of pipe to be used and its location.

3.3 INSTALL GAS APPLIANCES
Fit and connect the gas appliances to AS/NZS 5601.1, complete with flues where required and to the appliance manufacturer's requirements.

3.4 COMPLETION
Leave the installation including appliances clean and in full working order.

7410 RAINWATER SPOUTING SYSTEM

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 LIAISON

Ensure liaison with associated installations to ensure material selections are compatible and required flashing work is completed.

1.2 ELECTROLYTIC ACTION

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

2. PRODUCTS

2.1 PVC-U SPOUTING

Profile, jointing, brackets and fittings brand matched and complete to the spouting manufacturer's specifications.

2.2 PVC-U DOWNPIPES

Tubes, stand-off brackets and fittings brand matched and complete to the manufacturers specifications.

2.3 ALUMINIUM/ZINC ALLOY COATED PRE-PAINTED STEEL SPOUTING

Profile, jointing, brackets and fittings brand matched and complete to the spouting manufacturer's specifications.

2.4 ALUMINIUM/ZINC ALLOY COATED PRE-PAINTED STEEL DOWNPIPES

Seam jointed and complete with stand-off brackets, galvanized screw fixed.

2.5 RAINWATER HEADS, DROPPERS, OVERFLOWS

Fabricate and install as detailed.

3. EXECUTION

3.1 INSTALL PVC-U SPOUTING AND DOWNPIPES

Fit and screw fix brackets, set to falls to outlets. Ensure solvent welded or rubber ring jointed spouting sections are complete with all fittings to the spouting manufacturer's requirements. Screw fix stand-off brackets, set pipes plumb and clear of the wall, solvent welded. Discharge into stormwater bends.

3.2 INSTALL ALUMINIUM/ZINC ALLOY COATED STEEL PRE-PAINTED SPOUTING AND DOWNPIPES

Screw fix brackets, set to falls to outlets, with spouting joints silicone sealed and pop-riveted to the spouting manufacturer's requirements. Screw fix stand off brackets, set pipes plumb and clear of the wall, with joints silicone sealed. Discharge into stormwater bends.

3.3 ENSURE

Ensure rainwater services are operational, flashings complete and the building weathertight.

7420 SANITARY WASTE SYSTEM

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work by or under the direct supervision of a certifying person under the Plumbers, Gasfitters and Drainlayers Act 2006.

2. PRODUCTS

2.1 PVC-U WASTE, SOIL AND VENT PIPES

PVC-U pipe, complete with fittings brand-matched to the pipe manufacturer's requirements.

2.2 EXPOSED PIPES AND TRAPS

As selected and to the following details:
- chrome plate on copper pipes and associated copper and brass fittings
- white polybutylene or PVC, including all associated fittings.

3. EXECUTION

3.1 EXECUTION GENERALLY

Carry out sanitary plumbing work and tests as applicable to:
- NZBC G13/AS1

3.2 ELECTROLYTIC ACTION

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

3.3 INSTALL TRAPS, WASTE AND VENT PIPES

Connect waste outlets to traps and run waste pipes and back vents concealed, sized and fixed to NZBC G13/AS1. Discharge wastes into floor waste gully, drainage system stack, soil pipe, or gully trap as shown. Bird proof mesh to roof vents and vermin proof mesh to untrapped waste pipes.

3.4 PENETRATIONS

At penetrations through constructions provide and fit collars and escutcheon plates to match pipework. Exterior roof and wall penetrations to NZBC E2/AS1.

3.5 TEST

Test soil and waste disposal systems to ensure no leakage exists and leave in working order.

3.6 ENSURE

Ensure all sanitary plumbing fittings and pipework are complete and operational.

7430 DRAINAGE SYSTEMS

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 QUALIFICATIONS

Carry out work by or under the direct supervision of a person registered under the Plumbers, Gasfitters and Drainlayers Act 2006.

1.2 AS BUILT DOCUMENTS

Supply a 1:100 as-built drawing to the BCA and the owner on completion.

2. PRODUCTS

2.1 MATERIALS

Concrete:	17.5 MPa prescribed grade.
Reinforcement:	Grade 300 deformed bars.
PVC-U pipes:	PVC-U pipes bends, junctions, fittings and joints.
Field drains:	Plastic pipes for field drains perforated and coiled with filter fabric over.
Drainage/filling materials	
Granular fill:	Clean gravel or crushed stone or a blend of these. Particle size from minimum 7mm to maximum 20mm.
Selected fill:	Fine grain soil or granular material suitable for bedding, excluding topsoil.
Ordinary fill:	Top soil or other excavated materials.

2.2 FITTINGS

Gully traps:	To NZBC G13/AS2, 3.3 **Gully traps**, complete with grating.
Strip drain channel:	Proprietary, modular, variable invert, PVC-U or precast concrete drainage channel sections and drainage sump, embedded in site concrete and fitted with selected metal gratings.

3. EXECUTION

3.1 EXCAVATE

Excavate for drains to a firm even base with correct gradients set in straight runs.

3.2 MANUFACTURER'S REQUIREMENTS

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

3.3 EXECUTION GENERALLY

Carry out drainage work as applicable to:
- NZBC G13/AS2 and NZBC E1/AS1.

3.4 LAY WASTEWATER DRAINS

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

3.5 INSTALL GULLY TRAPS

Set on concrete 50mm above surrounding ground or paving and brought up to protect the top of the fitting. Trowel off.

3.6 LAY STORMWATER DRAINS

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

3.7 LAY GROUNDWATER DRAINS

Lay perforated coil piping firmly in a granular bed in straight runs to correct gradients, discharging into a sump. Carry the granular bed up over the pipes without disturbing them, to a total depth of 300mm and cover with geotextile fabric; all to the pipe manufacturer's requirements.

3.8 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.

3.9 INSTALL SURFACE WATER SUMP

To NZBC E1/AS1, 3.6 Surface water inlets to drains. Ceramic half-siphon pipe. Cast iron frame with a lift out grating.

3.10 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.

3.11 FIELD TEST

Field test drains for watertightness to the satisfaction of the BCA inspector.

3.12 BACKFILL

Backfill drain lines in 150mm layers, well tamped but without disturbing the drains. Finish off garden areas with 150mm of topsoil, slightly mounded above the finished ground line. Public roads and footpaths to be made good to the controlling authority requirements.

7700 ELECTRICAL

1. GENERAL

Refer to 1213 SELECTIONS/drawings for specific product, material, accessories and finish selections.

1.1 COMPLY

Comply with the Electricity (Safety) Regulations 2010, AS/NZS 3000 for listed and prescribed work and with the NUO's requirements. Apply for the service connection. Arrange for the required inspections of listed work. Pay all fees.

1.2 QUALIFICATIONS

Carry out work by or under the direct supervision of an electrical licensed supervisor under the Electricity (safety) Regulations 2010.

1.3 ELECTRICAL CERTIFICATE OF COMPLIANCE

Provide, prior to connection, a Certificate of Compliance (CoC) as required by the Electricity (Safety) Regulations 2010, to the owner and if required to the NUO. Allow the NUO to view before the meter installation, listed work inspection, polarity check and livening of supply.

1.4 ELECTRICAL SAFETY CERTIFICATE

Provide an Electrical Safety Certificate (ESC), as required by the Electricity (Safety) Regulations 2010, to the owner and when required the BCA. To be provided at completion of the work, prior to Practical Completion.

1.5 SAFETY OF INSTALLATION

When required by the Electrical (Safety) Regulations 2010, before installation work commences, provide a Certified Design to Electrical (Safety) Regulations 2010, regulations 58. This will may not be required for domestic installations or Low Risk Work.

2. PRODUCTS

2.1 METER BOARD / DISTRIBUTION BOARD / SUB BOARD

Proprietary manufactured meter board complete with flashing kit. Proprietary manufactured distribution board, zinc plated powder coated, or heavy duty plastic, fire resistant enclosed construction, complete with neutral and earth busbars, MCB's, RCD's and main switch. All protective devices: 6kA MCB's of the appropriate rating. Fit to board manufacturer's requirements where detailed. Recess into wall and ensure fire containment properties of the enclosure is maintained.

2.2 MAIN SUPPLY

Excavate, lay underground mains to NUO requirements, install cable marker, back fill. Public roads and footpaths to be made good to the controlling authority requirements.

2.3 CABLES

Tough plastic sheathed copper conductors. Minimum sizes are indicated below. Increase these as necessary due to method of installation, cable length or load.
Lighting circuits: 1.5mm2 on 10 amp MCBs for domestic construction
Power circuits: 2.5mm2 on 16 amp MCBs for domestic construction

2.4 ELECTRICAL ACCESSORIES

As selected and to the following details:

Switch units	Minimum 16 amp, 230 volt flush polycarbonate units. For number of switches per unit, dimmer units, neon (indicator or toggle) units, locator units and 2-way units refer to the electrical drawings.
Switched socket units:	10 amp, 230 volt flush polycarbonate 3 pin combined switch units.
Hot water system switch:	One way 20 amp switch complete with clamp for flexible PVC conduit.

Stove/range socket outlet and switch:	32 amp, 230 volt flush polycarbonate 3 pin combined switch unit, with remote isolating switch.

3. EXECUTION

3.1 CABLING

Install with a maximum of 10 light outlet units or 6 switched socket units on any circuit. Separate circuits for all electric heating appliances. 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. Provide earth bonding and main earth.

3.2 INSTALL SWITCH AND SOCKET UNITS

Fit single and double switch units and socket units level and plumb where shown on the drawings. Install at the following heights (to the centre of the unit) unless shown otherwise on the drawings or to match existing.

Switch Units:	1000mm above floor
Socket Units:	400mm above floor
	150mm above work benches

Mount switches vertically and socket units horizontally. Label switch units which control electrical equipment by engraving on the rocker switch.

3.3 INSTALL LIGHT FITTINGS

Install selected light fittings in the locations and heights shown on the drawings and in accordance with the fitting manufacturer's requirements. Recessed fittings to AS/NZS 3000, types IC-F, IC, CA-80 or CA-135 only (no clearance to insulation required for these types).

3.4 ELECTRIC HOT WATER SYSTEM

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.

3.5 GAS HOT WATER SYSTEM

Wire for control system to continuous flow gas hot water system.

3.6 WIRE FOR PLUMBING FITTINGS

Wire for fittings to the Electricity (Safety) Regulations 2010 and to the fitting manufacturer's requirements.

3.7 INSTALL DOMESTIC SMOKE ALARMS

Install alarms to NZBC F7/AS1, 3.3 Location of smoke alarms, and to manufacturer's requirements, fitted neatly and without damage to the surrounding finish.

3.8 ELECTRIC POWERED FITTINGS AND EQUIPMENT

Install and wire selected fittings and equipment to the Electricity (Safety) Regulations 2010 and the individual fittings and equipment manufacturer's requirements. Refer to the drawings for required layouts and locations for equipment.

3.9 COMPLETION

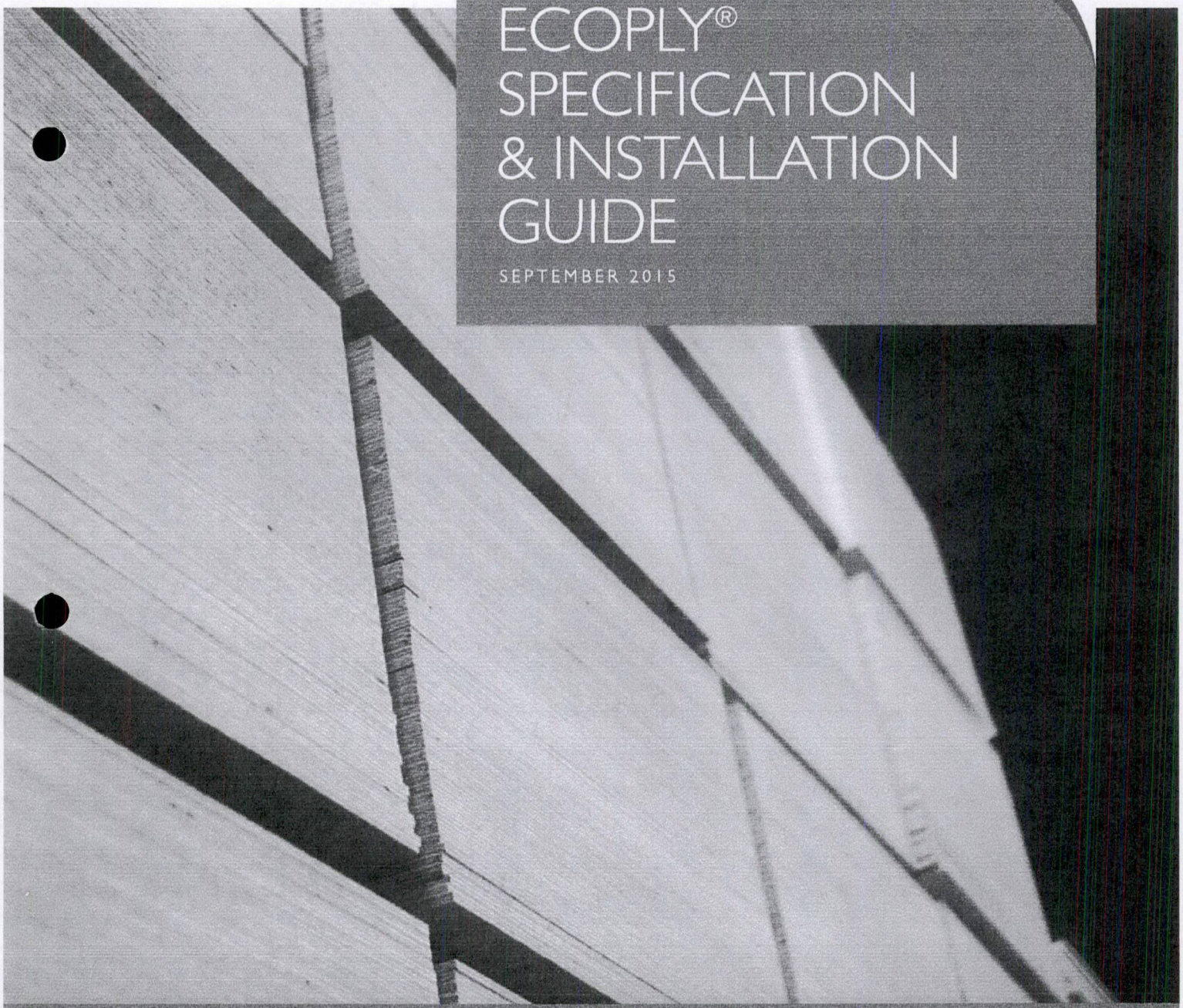
Leave all fittings, lamps and tubes operational, with equipment and diffusers clean.

ecoply
Proven. Durable. Strong

FLOORING | ROOFING | Square EDGE | BARRIER

ECOPLY® SPECIFICATION & INSTALLATION GUIDE

SEPTEMBER 2015



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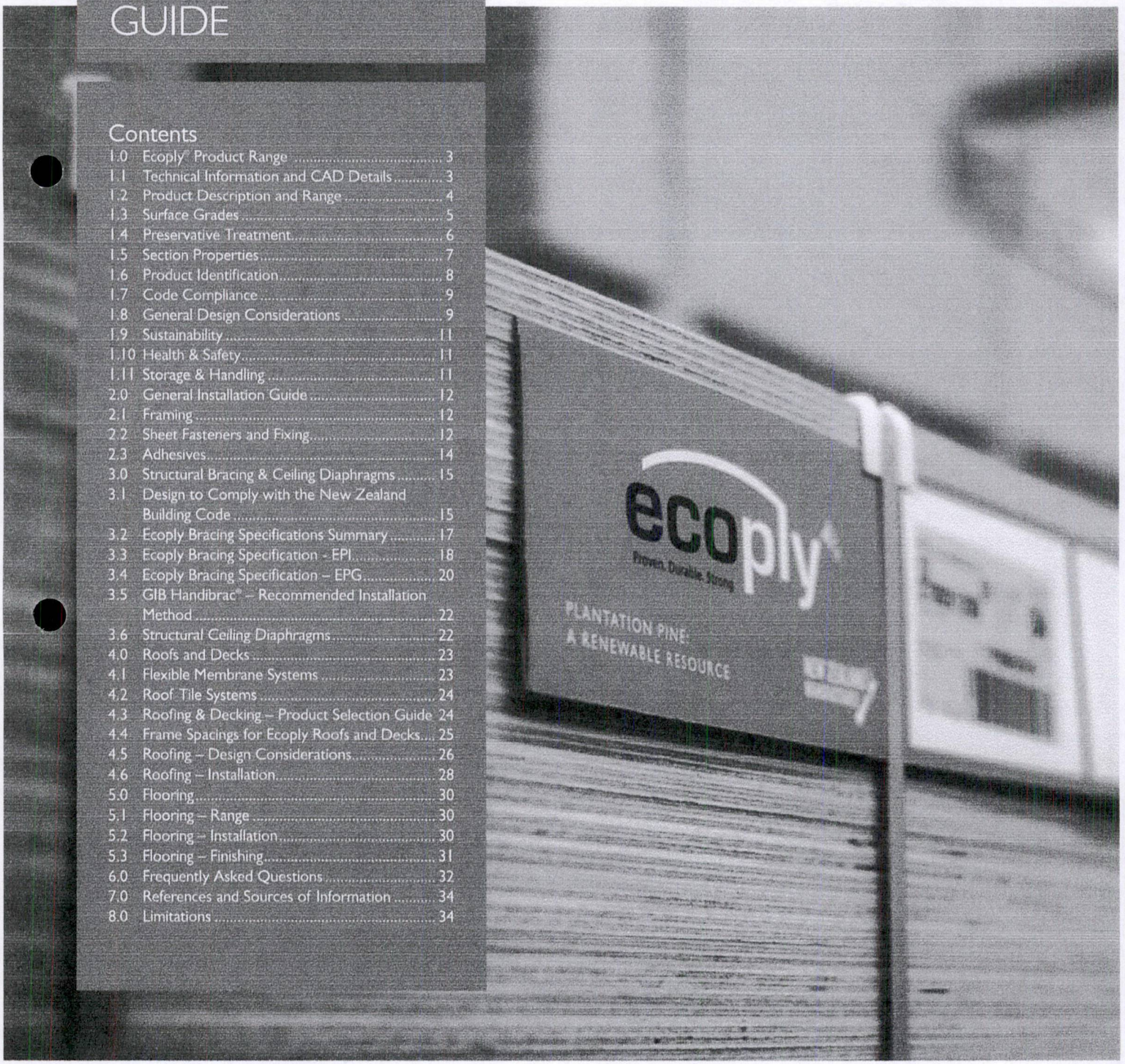
Information contained within is specific to Ecoply® structural plywood products and must not be used with any other plywood products, no matter how similar they may appear.

ECOPLY® SPECIFICATION & INSTALLATION GUIDE

Contents



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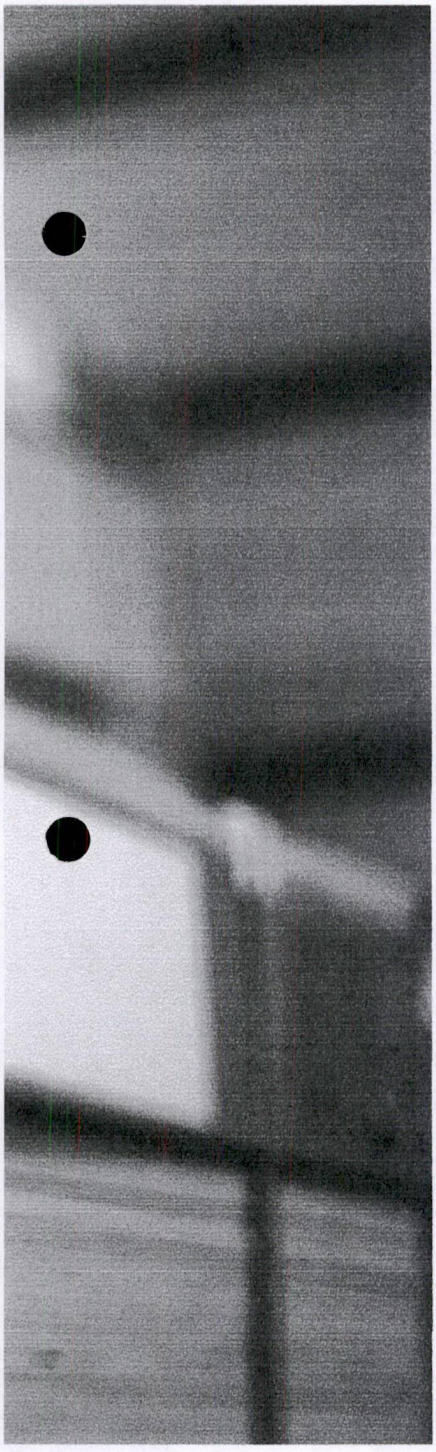


1.0 ECOPLY® PRODUCT RANGE

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

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

For information relating to Shadowclad® panels and plywood used as an exterior cladding, refer to the current Shadowclad Specification & Installation Guide for Cavity Construction. For information relating to Ecoply Barrier used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide. Both of these documents can be downloaded from www.chhwoodproducts.co.nz.

Ecoply products must be competently installed in accordance with good building practices and sound design principles to satisfy the requirements of the Building Act 2004, the New Zealand Building Code (NZBC), and applicable New Zealand Standards. This is the responsibility of building owners and the design professionals and builders that they engage. This document contains information, limitations, and cautions regarding the properties, handling, installation, usage, and the maintenance of Ecoply products. However, to the maximum extent permitted by law, Carter Holt Harvey Woodproducts assumes no legal liability to you in relation to this information.

1.1 TECHNICAL INFORMATION AND CAD DETAILS

When specifying or installing any Ecoply® plywood products visit www.chhwoodproducts.co.nz or call 0800 326 759 to ensure you have current specification material and any relevant technical notes.

The information contained in this document is current as at September 2015. It is your responsibility to ensure you have the most up to date information available.

The information contained in this publication relates specifically to Ecoply structural plywood products manufactured by Carter Holt Harvey Woodproducts and must not be used with any other plywood manufacturer's product no matter how similar they may appear.

Alternative plywood products can differ in a number of ways which may not be immediately obvious and substituting them for Ecoply structural plywood products is not appropriate, and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the NZBC.

1.2 PRODUCT DESCRIPTION AND RANGE

Ecoply structural plywood panels are manufactured from radiata pine wood veneers. The veneers are placed at right angles to each other for maximum strength and stability then bonded together with synthetic phenolic (PF) resin to form a strong and permanent Type A bond.

The strength of Ecoply plywood is optimised for maximum performance parallel to the face grain with cross plies providing enhanced stability across the grain.

The Ecoply plywood range can be specified for:

- Surface grade (e.g. CD) - where the first letter describes the face veneer appearance and the second letter describes the back veneer of the Ecoply sheet. Surface grades are defined in AS/NZS 2269 and summarised in Tables 2A & 2B
- Stress grade - utilises the symbol F and a suffix, for example;
  - F8 as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. F8 is the standard stress grade for Ecoply products
  - Ecoply 19 mm Longspan Flooring and 15 mm Ecoply Roofing are F11[1] stress grade (See Tables 1, 4 and 5). Other Ecoply products are also available in F11[1] upon request
- Thickness - ranging from 7 mm to 25 mm. (Thicknesses above 25 mm subject to availability)
- Length - being 2400 mm and 2700 mm with a standard nominal width of 1200 mm
- Preservative treatment - being untreated, H3.2 CCA or H3.1 LOSP Azole treated
- Edge finish - being square edge or for Ecoply Flooring and Roofing, routed on the long edges of the sheet with a polypropylene plastic tongue inserted into one side for a tongue-in-groove joint

For general installation advice refer to section 2.0: General Installation Guide.

For specification and installation advice for Ecoply used in typical applications refer to the following sections.

Typical Application	Section
Structural bracing and ceiling diaphragms	3.0
Roofs and decks	4.0
Flooring	5.0

Note: Technical notes referenced in this guide can be downloaded from www.chhwoodproducts.co.nz or contact Carter Holt Harvey Woodproducts on 0800 326 759.

Table 1: Ecoply® Product Range

Nominal Thickness (mm)		7		9		12		15		17		19		21		25	
Sheet length (x 1200 mm width)		2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
Ecoply Structural Square Edge	BD			●		●	●	●		◌							
	CD	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
	DD	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌
Ecoply Flooring (pt)	CD							◌	◌	◌	◌	◌ LS	◌ LS	◌	◌		◌
Ecoply Roofing (pt)	DD							◌	◌	◌	◌						

● Available untreated only
◌ Available either untreated or H3.2 CCA
◌ Available either untreated or H3.1 LOSP

pt Machine grooves on both long edges with a plastic polypropylene tongue in one groove, 1200 mm cover

LS Ecoply 19 mm F11/F8 Longspan Flooring

- Full range may not always be available ex stock, check with your Ecoply supplier to ensure availability
- Non standard specifications, including thicker sheets may be available to special order in significant quantities
- All products are F8 stress grades
- Ecoply 15 mm/17 mm Roofing and Ecoply 19 mm Longspan Flooring are supplied as standard in F11 stress grade[1]
- Other Ecoply products are also available in F11[1] upon request

[1] Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

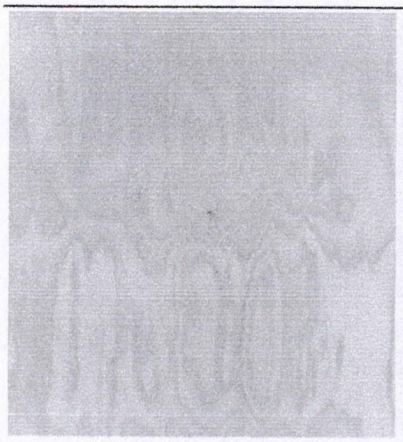
1.3 SURFACE GRADES

Table 2A summarises the surface appearance grades in which Ecoply structural plywood is available with some typical applications for each surface grade.

The surface grade specifications are defined in AS/NZS 2269. Table 2B details surface appearance grades for specialty Ecoply plywood and typical applications.

Table 2A: Ecoply® Structural Square Edge Products

Face Grade B

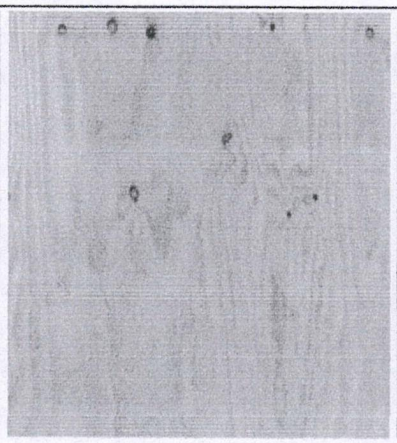


Appearance grade with a solid sanded surface. Suitable for a higher quality finish.

Possible Uses:

- Furniture/Joinery/Signs
- Interior Linings
- Sheathing
- Engineering components where a superior visual finish is required

Face Grade C

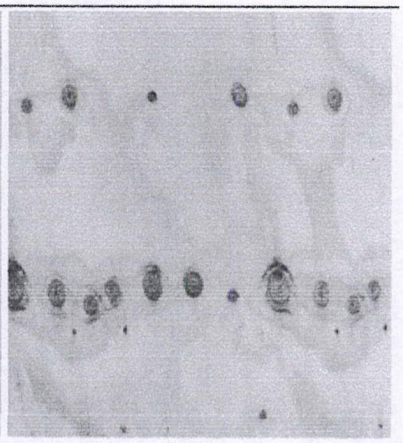


Solid sanded surface with filled holes and splits, with intergrown knots. Suitable for a basic paint finish.

Possible Uses:

- Structural gussets
- Stressed skin panels
- Bins, boxes, crates
- Hoardings
- Membrane substrate

Face Grade D



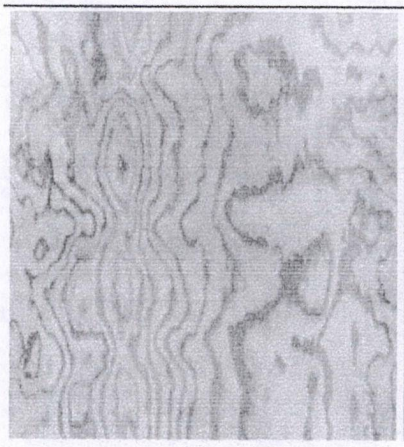
Non appearance grade allowing open imperfections up to 75 mm across the face veneer. Splits and knots allowable

Possible Uses:

- Non visual bracing
- Strength critical pallets
- Structural components
- Portal frame gussets

Table 2B: Speciality Ecoply® Products

Flooring CD

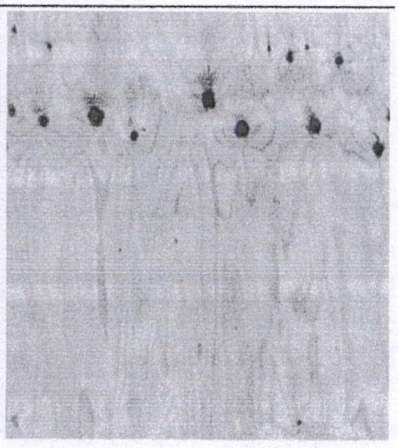


Solid sanded C grade surface with tongue and groove profile on long edges. Features void free second layer under the face veneer for increased protection against high point loads

Possible Uses:

- Substrate for flooring overlays such as linoleum, tiles and rigid coverings
- Substrate for membrane roofing and decking where visible appearance is critical

Roofing DD



Unfilled D grade surface with tongue and groove profile on long edges

Possible Uses:

- Substrate for asphalt shingles
- Substrate for roof systems where a smooth substrate is not required

Notes: A higher visual grade may be substituted if required. e.g. Ecoply CD can be used anywhere DD is used. Pictures shown above are scaled down versions of typical Ecoply sheets. Grain pattern and colour may vary. If sheet appearance is critical select panels individually.

1.4 PRESERVATIVE TREATMENT

Ecoply structural plywood is available untreated or treated in accordance with AS/NZS 1604.3. If treated, Ecoply structural plywood is treated with either H3.2 CCA (Copper Chrome Arsenate) or H3.1 LOSP (Azole) clear treatment. H3.1 LOSP is the standard preservative treatment for BD Structural Square Edge products and by special request for other Ecoply plywood products.

H3.2 CCA and H3.1 LOSP treated plywood in accordance with AS/NZS 1604.3 is described as suitable for: "outside, above ground, subject to periodic moderate wetting and leaching."

Ecoply plywood is envelope preservative treated. Where sheets are cut, cuts must be coated with a brush on timber preservative. Holdfast® Metalex® Concentrated Timber Preservative Clear (Holdfast® Metalex® Clear) is recommended. Failure to do so will affect the long term durability of the panel.

The characteristics of the treatments are shown in Table 3.

Table 3: Preservative Treatment

	Untreated	H3.2 CCA	H3.1 LOSP (Azole)
Preservative carrier	N/A	Water	Light organic oil (white spirits)
Colour	Natural	Green	Clear (i.e. natural)
Fungicide	Heat treated dry wood	Copper	Propiconazole and Tebuconazole
Insecticide	Heat treated dry wood	Arsenate	Permethrin
Other chemicals	N/A	Chrome (to fix preservative in wood)	Butyl Oxitol (co-solvent to assist active stability)
Mouldicide	N/A	Copper (limited efficacy)	IPBC
Notes	Plywood for dry interior use, supplied ex mill at <15% moisture content	Dried after treatment to average 18% moisture content for use in service at higher moisture contents	Solvent does not affect dimensions. Solvent smell disappears over time
Availability	Readily available	Standard treatment except for Ecoply BD	Treated to order for CD, DD, flooring and roofing products. Standard treatment for Ecoply BD
Applications (Refer NZ3602)	Interior dry protected	Exterior/Interior damp (service performance subject to detailing & coatings)	

H3.2 CCA

Ecoply structural plywood, which is H3.2 CCA treated (waterborne preservative with a green colour), is dried following treatment so that sheets may return to the correct dimensions. The moisture content after treatment with CCA and drying will be higher than the limits placed in AS/NZS 2269 on untreated product. The target is for an average moisture content of approximately 18% to provide a panel closer to the expected equilibrium moisture content for most H3.2 CCA applications.

The fillets used to separate sheets in drying may leave marks on the sheet surface. These will fade over time as the plywood weathers, and can be disguised with paint but may be visible under stain. The process of treating with H3.2 CCA and subsequent drying is likely to increase the face checking of the panel.

For more information on face checking refer to section 1.8 General Design Considerations - Aesthetics.

H3.1 LOSP

H3.1 LOSP treated Ecoply retains the wood colour and does not contain moisture so the plywood remains at the same dimensions and moisture content during treatment. However, the plywood when freshly treated may contain more than 60 litres of organic fluid per cubic metre. When coating H3.1 LOSP treated plywood, traces of residual solvent may be present on the sheet surface from the treatment process. Sheets feeling greasy to touch should be placed in a well ventilated area and allowed to flash off to ensure proper adhesion of paints and stains to the sheet surface.

The H3.1 LOSP solvent smell can be quite strong and venting is recommended until most of the solvent has evaporated. Untreated plywood is recommended for internal applications where NZS 3602 allows the use of untreated plywood

Mechanical fasteners are recommended to fix H3.1 LOSP treated Ecoply to framing. If adhesives are required, thorough venting is recommended and H3.1 LOSP tolerant adhesives should be applied according to the adhesive manufacturer's instructions. See section 2.3 Adhesives.

1.5 SECTION PROPERTIES

Table 4A: Section Properties of Ecoply® Structural Plywood

		Section properties per mm width						
		Parallel to the face grain			Perpendicular to the face grain			
Nominal plywood thickness[2] (mm)	ID code[3]	Mass (kg/m²)	Parallel Moment of Inertia (mm⁴)	Section Modulus Z (mm³)	Shear Constant I/Q (mm³)	Perpendicular Moment of Inertia I (mm⁴)	Section Modulus Z (mm³)	Shear Constant I/Q (mm³)
7	7-24-3	4.0	30.0	8.3	5.2	2.0	1.7	2.3
9	9-30-3	5.0	58.6	13.0	6.4	4.0	2.7	2.9
12	12-24-5	6.6	115.0	19.2	9.3	33.4	9.3	5.4
15	15-30-5	8.3	225.0	29.9	11.6	65.2	14.5	6.8
17	17-24-7	9.2	285.0	33.9	12.2	122.0	20.4	9.4
17	17-24-6	9.2	273.0	32.5	12.3	134.0	22.3	9.5
19	19-30-7	10.6	451.0	46.9	13.7	157.0	23.8	10.7
21	21-30-7	11.6	556.0	52.9	15.2	239.0	31.9	11.8
25	25-30-9	13.5	897.0	72.9	17.8	381.0	41.0	13.9

Table 4B: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F8 Grade

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F8)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	ID code[3]	Bending Stiffness EI (1000 Nmm²)	Bending Moment $f_{pb}Z$ (Nmm)	Rolling Shear $f_{pr}I/Q$ (N)	Bending Stiffness EI (1000 Nmm²)	Bending Moment $f_{pb}Z$ (Nmm)	Rolling Shear $f_{pr}I/Q$ (N)
12	12-24-5	1046.5	480.0	15.6	303.9	231.7	9.2
15	15-30-5	2047.5	747.5	19.5	593.3	362.5	11.4
17	17-24-7	2593.5	847.5	20.5	1110.2	510.0	15.9
17	17-24-6	2484.3	812.5	20.7	1219.4	557.5	16.0
19	19-30-7	4104.1	1172.5	23.0	1428.7	595.0	18.0
21	21-30-7	5059.6	1322.5	25.5	2174.9	797.5	19.8
25	25-30-9	8162.7	1822.5	29.9	3467.1	1025.0	23.4

Table 4C: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F11[1] Grade (Including Longspan Flooring)

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F11)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	ID code[3]	Bending Stiffness EI (1000 Nmm²)	Bending Moment $f_{pb}Z$ (Nmm)	Rolling Shear $f_{pr}I/Q$ (N)	Bending Stiffness EI (1000 Nmm²)	Bending Moment $f_{pb}Z$ (Nmm)	Rolling Shear $f_{pr}I/Q$ (N)
12	12-24-5	1207.5	595.2	16.7	303.9	231.7	9.2
15	15-30-5	2362.5	926.9	20.9	593.3	362.5	11.4
17	17-24-7	2992.5	1050.9	22.0	1110.2	510.0	15.9
17	17-24-6	2866.5	1007.5	22.1	1219.4	557.5	16.0
19	19-30-7	4735.5	1453.9	24.7	1428.7	595.0	18.0
21	21-30-7	5838.0	1639.9	27.4	2174.9	797.5	19.8
25	25-30-9	9418.5	2259.9	32.0	3467.1	1025.0	23.4

1 Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

2 Actual thickness of Ecoply sheets manufactured to thickness tolerances stated in AS/NZS 2269

3 Identification code: panel thickness – outermost veneer thickness x 10 – number of plies

4 *I/Q values for rolling shear are for stress at the neutral axis calculated as in NZS 3603*

Notes:

- Use Tables 4A & B values for all F8 stress grade Ecoply products
- Use Tables 4A & C values for all F11 stress grade Ecoply (including 19 mm Ecoply Longspan Flooring)
- The section properties in Tables 4A, B & C have been calculated in accordance with AS/NZS 2269
- For section properties for other thicknesses and Shadowclad® products contact CHH Woodproducts on 0800 326 759

Structural properties of Ecoply® plywood

The majority of Ecoply plywood is F8 grade (exceptions are identified in section 1.2: Product Description & Range) and the characteristic values may be used in conjunction with both NZS 3603 and AS 1720 for the design of timber components. The characteristic strengths in Table 5 have been used to provide the nominal strengths in Tables 4B and 4C.

Table 5: Structural Properties of Ecoply® Plywood

	Characteristic Strength MPa	
Stress Grade	**F8**	**F11**
Bending (f_{pb})	25.0	31.0
Tension (f_{pt})	15.0	18.0
Panel shear (f_{ps})	4.2	4.5
Rolling shear (f_{pr})	1.7	1.8
Compression in plane of sheet (f_{pc})	20.0	22.0
Compression normal to the plane of the sheet (f_{pp})	9.7	12.0
Modulus of elasticity (E)	9100	10500
Modulus of rigidity (G)	455	525

Source: AS/NZS 2269

Wood is strongest when stressed parallel to the grain and weakest across the grain, so the lay up or arrangement of veneers in the panel determines the properties. Because of its cross banded construction, plywood possesses significant strength and stiffness both parallel and perpendicular to the direction of the face grain, but is generally strongest and stiffest along the direction of the face grain.

The section properties of structural plywood in Table 4A are calculated in accordance with AS/NZS 2269 to allow for the reduced contribution of veneers perpendicular to the direction of stress. For engineering design to NZS 3603, the section properties are multiplied by stresses and 'k' and ø factors to determine resistances for limit states design.

Resistances and nominal strengths in Tables 4B and 4C assume all 'k' factors are equal to 1.0. Multiply tabled values by the strength reduction factor ø and 'k' factors for specific in-service conditions for design to a structural code such as NZS 3603.

Table 5A: Strength Reduction Factors

Structural Timber Material	**Application of Structural Member**		
	Category 1	**Category 2**	**Category 3**
	Structural members for houses for which failure would be unlikely to affect an area[1] greater than 25 m²; OR secondary members in structures other than houses	Primary structural members in structures other than houses; OR elements in houses for which failure would be likely to affect an area[1] greater than 25 m²	Primary structural members in structures intended to fulfil essential services or post disaster function
	Value of Strength Reduction Factor Ø		
Structural Plywood – AS/NZS 2269.0	0.95	0.85	0.75

[1] In this context area should be taken as plan area.

1.6 PRODUCT IDENTIFICATION

In accordance with AS/NZS 2269, Ecoply structural plywood sheets have the following information marked on the back:

- Brand name: e.g. ECOPLY
- Face grade, back grade: e.g. CD
- Intended application: e.g. STRUCTURAL
- Panel construction code: e.g. 19-30-7 (Thickness (mm)-Face veneer thickness (mm x 10)-Number of veneers)
- Glue bond: eg. A BOND
- Formaldehyde emission class: E0 for A Bond Ecoply
- Australasian Standard: e.g. AS/NZS 2269
- Treatment Standard (if applicable): eg. AS/NZS 1604.3:2012
- Date and time of manufacture: e.g. 01/12/15 12:23:45
- Stress grade: e.g. F8 (exceptions include Shadowclad® and Grooved Lining which are performance rated)
- The Engineered Wood Products Association of Australasia (EWPAA) brand and mill number: e.g. 911 (Tokoroa mill)

Untreated example:

ECOPLY CD FLOORING STRUCTURAL
19-30-7 A BOND E0 AS/NZS 2269.0:2012
PAT 01/12/15 12:23:45 F11/F8
911

Treated example:

ECOPLY CD STRUCTURAL
25-30-9 A BOND E0 AS/NZS 2269.0:2012
AS/NZS 1604.3:2012 046 01 H3 E CCA
911
RETREAT CUTS PAT 01/12/15 12:23:45 F8/F8

Note: Performance based products like Grooved Lining and Shadowclad may include brand identification instead of visual quality, stress grade, and panel code. These panels, when accompanied with specification literature, are still deemed to comply with AS/NZS 2269

1.7 CODE COMPLIANCE

Ecoply plywood manufacture is third-party audited through the product quality control programme of the Engineered Wood Products Association of Australasia (EWPAA) which is itself audited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

CHH Woodproducts is licensed by the EWPAA to stamp plywood with the EWPAA/JAS-ANZ Product Certification Mark. This certifies it has been manufactured under the third party audited Joint Product Certification programme to monitor compliance with joint Australian/New Zealand Standard AS/NZS 2269 Plywood – Structural. Plywood to this standard is referenced in the NZBC Acceptable Solutions and Verification Methods through:

- NZS 3602 The Use of Timber and Wood-based products for Use in Building
- NZS 3603 Timber Structures
- NZS 3604 Timber Framed Buildings
- AS/NZS 1604.3 Specification for Preservative Treatment, Part 3:Plywood
- E2/AS1 External Moisture

WARNING: Plywood which is non-certified or is manufactured to standards other than AS/NZS 2269, such as US voluntary standard PS1-95, is not referenced in the NZBC. There can be significant differences between AS/NZS 2269 certified and non certified plywood around bond durability, structural ratings and veneer quality.

Structure B1

Design to NZS 3603 Timber Structures complies with the NZBC in Verification Method B1/VM1 Clause 6.0 Timber. Plywood is the only sheet material with properties listed in NZS 3603. Ecoply structural plywood is available in F8 stress grade. Some specialty products are available F11 or with specifically designed properties for specialised applications.

1.8 GENERAL DESIGN CONSIDERATIONS

Durability (Clause B2) and exterior moisture (Clause E2)

Ecoply plywood is made from softwood solid radiata pine veneer. Designers should assess the level of exposure to biological, moisture, and other hazards and apply appropriate preservative treatment and detailing to minimise exposure to these hazards.

Information in this manual outlines suggested practices for detailing building components to exclude moisture to comply with the durability requirements of the NZBC.

Formaldehyde

Ecoply plywood is manufactured using phenol formaldehyde resins which are fully cured in the hot press. Cured resin is thermally and moisture stable and formaldehyde emissions for the glued plywood are similar to background levels for the wood by itself when tested to AS/NZS 2098.11 Determination of formaldehyde emissions for plywood. Accordingly every panel is branded with the lowest emission class (less than 0.5 mg/litre for E_0).

Actual formaldehyde emissions for Ecoply plywood have been tested and approved as having an actual formaldehyde emission level of less than 0.3 mg/ litre (equivalent to a Super E_0 emission level).

Moisture content and dimensional change

At the time of leaving the factory, the moisture content of untreated Ecoply plywood should generally be in the range of 8% to 15% as required by AS/NZS 2269. All wood products including plywood respond to changes in ambient humidity so the eventual moisture content of plywood varies according to how dry or how wet the environment is. After manufacture, the moisture content will move to equilibrium with the environment, and the veneers swell or shrink across the grain in response. The total expansion both along and across a 2400 x 1200 mm panel can be in the order of 1.5 mm to 3 mm as the plywood changes from a dry to a saturated state.

Ecoply that is treated with waterborne preservatives (e.g. H3.2 CCA) is expected to be used in applications that have higher humidity than interior dry use, so following treatment it is dried to a higher average moisture content of approximately 18%. This provides for a more stable panel in service than placing a dry (less than 15%) sheet in a higher moisture environment.

Detailing and construction must allow for movement if the plywood will be subject to cycles of moisture change. Seasonal and daily cycles can be significant depending on the end use.

Temperature

Wood will expand upon heating as do practically all solids. The thermal expansion of plywood is quite small and there is little effect on the structural performance or durability of plywood when used in temperatures below 54°C. The average co-efficient of thermal expansion of plywood is 4.5 x 10-6 mm/mm/°C. At temperatures above 55°C wood begins to deteriorate. Colours of coatings and finishes should be selected to reduce heat gain. For extreme conditions, further technical information is available by calling CHH Woodproducts on 0800 326 759.

The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214 Methods of determining the total thermal resistance of parts of buildings. e.g. Plywood has a Conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance R = 0.012/0.13 = 0.09.

Aesthetics

Ecoply plywood products can be selected for decorative or weather protection functions as well as structural performance. Acceptable Solution E2/AS1- External Moisture allows plywood manufactured to AS/NZS 2269, (minimum CD appearance grade, minimum 12 mm thickness and treated as required by NZS 3602) to be used for exterior cladding. For exterior cladding applications CHH Woodproducts strongly recommends Shadowclad® exterior cladding rather than smooth faced plywood such as Ecoply.

Shadowclad® features a textured (bandsawn) face which reduces the visibility of face checking and other appearance related issues which can occur on smooth faced plywood if not regularly maintained by the homeowner. For more information on plywood used as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction.

Face checks on plywood exposed to weather

Face checks are lengthwise separations of wood fibres in the face veneer of the plywood. They result from the normal swelling and shrinking of wood as it gains and loses moisture. It is important to realise that these checks are superficial, being confined to the face veneer. They do not alter the structural integrity of the plywood in any way. If you are the specifier, it is important to discuss these issues with your client and consider the length of exterior exposure, climate conditions and protection offered by the surface coating before finalising product choice.

Durability

The durability of Ecoply structural plywood will depend on the application. Detailing, treatment and installation details need careful consideration to satisfy the requirements of the NZBC.

Normally, 50 year durability can be achieved with untreated Ecoply in dry, interior exposure. For internal environments subject to high humidity or condensation H3.2 CCA treated Ecoply should be used.

For plywood as a rigid air barrier (including rigid air barrier acting as bracing) refer to the current Ecoply Barrier Specification and Installation Guide which can be downloaded from www.chhwoodproducts.co.nz.

Fire, spread of flame and smoke development

The following data on early fire hazard properties of uncoated Ecoply plywood are the result of tests carried out by Australian Wool Testing Authority AWTA to test structural plywood manufactured to AS/NZS 2269 in accordance with ISO 5660, reaction to fire tests (heat release, smoke production and mass loss rate). Part 1: Heat Release rate (cone calorimeter method).

Table 6 summarises the test configurations and associated material groups.

For plywood with decorative finish coatings or intumescent coating, performances depend on spread rates of the coating. For advice on specific coating systems and their suitability for use with Ecoply products, always refer to the coating manufacturer.

Table 6: Early Fire Hazard Properties of Ecoply® Plywood

Material	Species	Origin	Thickness	Treatment	Material groups
Plywood	Radiata Pine	New Zealand	7mm	CCA Treated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	CCA Treated	Group 3

1.9 SUSTAINABILITY

Ecoply is manufactured from radiata pine. It is grown on tree farms which are tended and harvested to provide wood for plywood manufacture. The crop is managed on a sustainable basis to yield millable trees.

New Zealand plantations are managed in compliance with the New Zealand Forest Accord.

Ecoply is manufactured in New Zealand at CHH Woodproducts Tokoroa plywood mill.

Ecoply is available Forestry Stewardship Council (FSC) (SCS-COC-001316) certified upon request.

1.10 HEALTH & SAFETY

Ecoply should be handled in accordance with the Material Safety Data Sheets (MSDS) for untreated, H3.2 CCA and H3.1 LOSP treated Ecoply, which can be downloaded from www.chhwoodproducts.co.nz.

Always wear safety glasses or non-fogging goggles when machining Ecoply panels.

If wood dust exposures are not controlled when machining (sawing, routing, planing, drilling etc) a class P1 or P2 replaceable filter or disposable face piece respirator should be worn.

Wear comfortable work gloves to avoid skin irritation and the risk of splinters. Wash hands with mild soap and water after handling panels.

1.11 STORAGE & HANDLING

Ecoply panels must be stored and handled with care to maintain good condition before use and after installation:

- The storage area must be protected from sun, rain and wind that would otherwise bring about rapid changes in temperature and humidity
- Support for the sheets must be provided at both ends and middle to avoid distortion. Ensure bearers in packs above are aligned over bearers below (to avoid inducing curves in sheets)
- The stack must be kept dry and clear of ground contact, and placed so that it will not be exposed to mechanical damage
- The sheets must be stacked flat, NOT on edge
- Store in well-ventilated areas away from sources of heat, flame or spark
- To avoid staining, fading and surface checking, the sheets must not be exposed to the weather while awaiting installation
- Store in well-ventilated areas away from sources of heat, flames or sparks

2.0 GENERAL INSTALLATION GUIDE

The following is a general guide to be followed unless otherwise specified. For additional installation instructions for typical applications refer to sections 3, 4 and 5.

2.1 FRAMING

Use kiln dried framing e.g. Laserframe® in accordance with timber framing manufacturer's specifications and treated in accordance with NZS 3602. All timber frame sizes and set out must comply with NZS 3604 (or be specifically designed to NZS 3603). The current Laserframe Product Guide can be downloaded from www.chhwoodproducts.co.nz. Ecoply may be specified for frame spacing determined by design, or using tables in section 3 for specific product applications such as bracing, flooring and as a substrate for shingle roofs or membrane roofs and decks.

H3.1 LOSP treated framing should be vented before fixing and if construction adhesives are required (for example to screw and glue floor panels) the adhesive must be compatible with H3.1 LOSP. See section 1.4: Preservative Treatment.

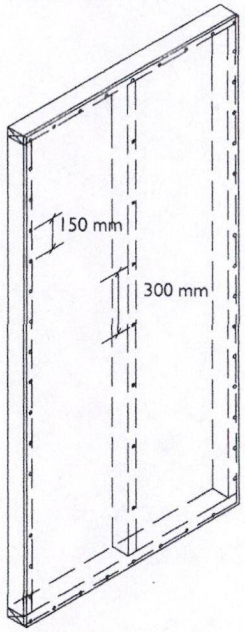
For plywood used as exterior cladding refer to the current Shadowclad® Specification & Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz

For plywood used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide which can be downloaded from www.chhwoodproducts.co.nz

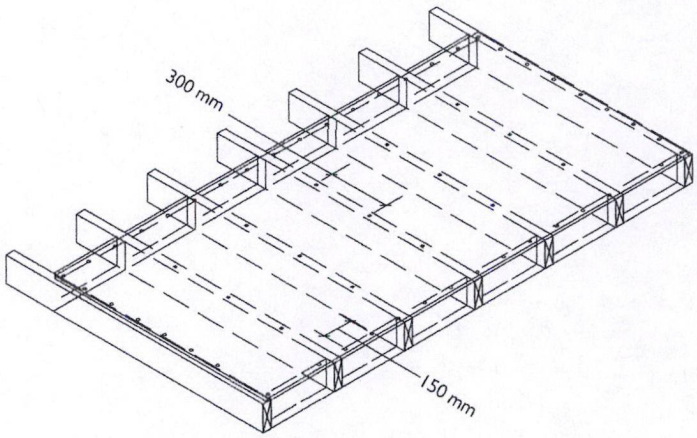
2.2 SHEET FASTENERS AND FIXING

- Where there is risk of panel size change due to changes in moisture levels, allow a 2 to 3 mm expansion gap between sheets
- Use only flathead nails or screws, with or without construction adhesives
- Fastener length should penetrate at least 10 nail diameters into the framing or be three times the sheet thickness, whichever is the greater. Longer or ring shank nails may be specified
- Fasteners must be at least 3 fastener diameters or 7 mm from the edge of the sheet
- For tongue and groove products such as flooring and roofing fasten 15 mm from tongue and groove edges
- Standard fixing pattern: unless otherwise specified fasten edges and ends of sheets at 150 mm centres, and within the panel at no more than 300 mm centres (see diagram below)
- Use hot dipped galvanised fasteners or corrosion resistant fasteners (i.e. stainless steel) determined by design for specific hazards
- Where using stainless steel nails, nails must be annular grooved
- Refer to Table 7 for minimum fastener sizes
- Do not overdrive power driven nails

EC001: Fastener spacings for Ecoply®



Ecoply® fastened in vertical plane



Ecoply® fastened in horizontal plane

EC002: Fastener spacings from edges

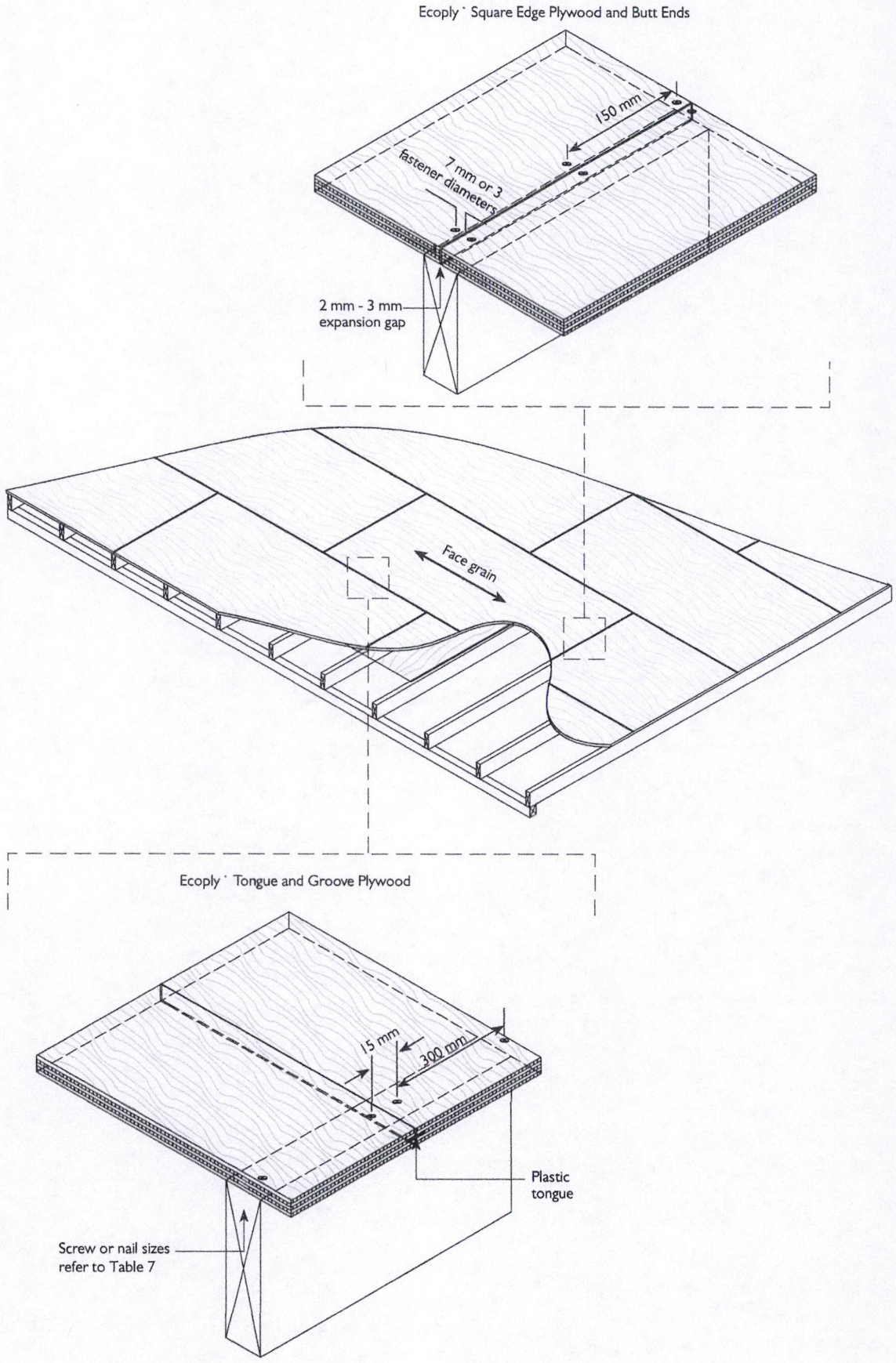


Table 7: Fasteners and Characteristic Shear Loads for Ecoply®

Nominal Thickness (mm)	7mm / 9mm	Load[1]	12mm / 15 mm	Load[1]	17 mm	Load[1]	19mm / 21mm	Load[1]	25 mm	Load[1]
Minimum nail size in timber framing[2]	40 x 2.5 mm	570	60 x 2.8 mm	736	60 x 2.8 mm	736	60 x 2.8 mm	736	75 x 3.15 mm	883
Screw size in timber framing[3]	8g x 30 mm	1230	8g x 40 mm	1230	10g x 40 mm	1650	10g x 45 mm	1650	10g x 50 mm	1650
1.15 mm steel framing[3]	10-24-35[4]	1300	10-24-40[4]	2000	10-16-45[4]	2100	10-16-45[4]	2100	10-16-45[4]	2100
Screw size in 2.80 mm steel framing[3]	10-24-35[4]	1200	10-16-404	1200	14-20-45[4]	3000	14-20-45[4]	4000	14-20-45[4]	5000

1 The load is the characteristic load (N) for one fastener in single shear

2 Characteristic load based on fixing into a timber of J5 joint group or better

3 Self tapping, self countersinking screw

4 Screw Numbers indicate: Gauge – Threads per inch – Length (mm)

Notes

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested
- Other screw sizes may be used. Screw properties vary between screw suppliers and the suitability of a particular size should be verified by the designer for performance under changing physical conditions and cyclic loading
- Non-standard nailing may be specifically designed with NZS 3603 or similar

Fasteners for H3.2 CCA treated Ecoply®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Notes

H3.2 CCA treated timber should not be fixed in direct contact with light gauge steel products. Refer to the framing manufacturer for advise on fixing and treatments.

2.3 ADHESIVES

Tube applied construction adhesives

Site applied construction adhesives may be used together with nails and screws for non permanent loads, reduced fastener popping, and to lower the risk of squeaking in floors. Available types include polyurethane (e.g. Holdfast® Gorilla Nailpower®) and elastomeric (e.g. Bostik® Wallboard Gold) based adhesives.

Elastomeric adhesives should meet the requirements of APA Performance specification AFG 01 Adhesives for field gluing plywood to wood framing. Other types should have appraisal from an independent authorising body such as BRANZ or equivalent authorities for the specific applications proposed. Follow manufacturer's recommendations. In addition:

- Use a bead or daubs of adhesive as per manufacturer's recommendations
- Apply pressure using fastener patterns outlined in section 2.2: Sheet Fasteners and Fixing
- Work from the middle of the sheet outwards to develop glueline pressure
- Ensure adhesives are compatible with treatment in the framing timber, see section 1.4: Preservative Treatment

Structural adhesive joints

Structural bonds are generally only achievable in factory controlled conditions using approved structural adhesives in accordance with approved standards for glue lamination, e.g. Resorcinol formaldehyde joints made to AS/NZS 1328 Glued laminated structural timber. Site gluing is not recommended for structural plywood components. Contact CHH Woodproducts on 0800 326 759 for further information.

3.0 STRUCTURAL BRACING & CEILING DIAPHRAGMS

The Ecoply bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading, to meet the requirements of the NZBC - B1 Structure, and NZS 3604 *Timber Framed Buildings* or specifically designed to NZS 3603 *Timber Structures Standard*.

Any Ecoply structural panel may be used for bracing as long as it is 7 mm, 9 mm or 12 mm thick, has a minimum wall length as described in Table 9, treated for the specific application in accordance with NZS 3602 (summarised in Table 8) and fixed in accordance with Ecoply bracing specifications outlined in this guide.

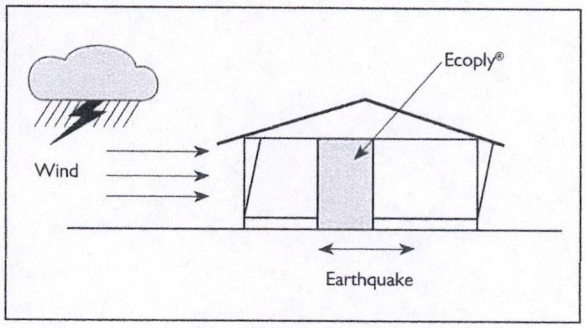
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

Structure

Timber framed buildings to NZS 3604 Timber Framed Buildings is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution B1/AS1 Structure.

CHH Woodproducts have developed a range of wall bracing elements tested using P21 testing methods referenced in NZS 3604.

Specific design



Ecoply structural plywood is manufactured to AS/NZS 2269, and it is suitable for design and use in earthquake and wind bracing systems constructed in accordance with NZS 3603 and AS/NZS 1170.

Structural plywood to AS/NZS 2269 is the only sheet brace material with properties defined in a published New Zealand engineering design code, NZS 3603 Timber Structures, and so can be designed in compliance with Verification method B1/VM1 under Clause 6.0 Timber for use in buildings over three storeys in height.

Demand is calculated by following section 5, Bracing Design of NZS 3604 or using the GIB EzyBrace® software, downloadable from www.gib.co.nz

EP bracing systems properties can be easily loaded into the EzyBrace software by way of an Excel patch downloadable from www.chhwoodproducts.co.nz together with loading instructions.

Timber Floors

When carrying out a bracing design for buildings with timber floor structures, the maximum bracing rating that can be accounted for when summing up the bracing units is 120 BUs/m. This does not exclude the installation of bracing elements that are rated higher than 120 BUs/m, however the extra bracing capacity can not be accounted for in the bracing design.

Specific design of floor and sub-floor framing is required for elements rated higher than 120 BUs/m.

Durability

Ecoply plywood is manufactured to meet the requirements of NZS 3602 Timber and Wood based products for use in buildings. If the product is used, handled and installed in accordance with CHH Woodproducts product literature it will meet the durability Clauses of the NZBC.

Table 8 summarises the applications in which Ecoply can be used as structural bracing together with the required preservative treatment and fastener material.

Table 8: Ecoply® Suitability for Bracing Applicatons Including Treatment Type & Fastener Material

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray): E.g. Interior linings	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/ without building paper/ wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/without building paper/wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply® Barrier Specification and Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones' D	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones, as per section 4 of NZS 3604 (including sea spray)	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

Note: Power driven nails are suitable for use. Do not overdrive, nails must be full round head

Rain wetting and construction bracing

Untreated Ecoply will withstand normal exposure conditions during construction for up to 3 months however aesthetically the sheet appearance will deteriorate as the level of exposure increases. Rain and exposure can cause thinner plywood panels to buckle. Plywood stability is related to the number of veneers and thickness of the panel. Where panel stability is critical, consider using thicker panels.

Humidity and condensation

In conditions where the moisture content may exceed 18% for prolonged periods, Ecoply must be H3.1 LOSP or H3.2 CCA treated to resist decay or insect hazard.

Subfloor sheet bracing

H3.2 CCA treated Ecoply can be used as sheet bracing where dampness does not allow the use of untreated plywood or other sheet materials (section 5 of NZS 3604). Where Ecoply subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, 100% acrylic exterior coating system with a light reflectance value of 50% or greater.

Adjustments for wall height

Use section 5 of NZS 3604 to calculate bracing values: "Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

(a) For wall bracing elements of heights other than 2.4 m, the bracing rating determined by test or from Table 9 should be multiplied by 2.4 ÷ element height in metres, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
(b) Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height."
(c) Walls with heights < 1.5m, Specific Engineering Design is required.

Joining panels for walls higher than maximum sheet length

Ecoply bracing panels must be fixed from top plate to bottom plate. For wall heights over 2.4 m, Ecoply and Shadowclad® is available in 2.7 m sheet lengths. Alternatively, a part sheet can be stacked above a full sheet, butt joined on a single row of nogs with each sheet/part sheet independently nailed off as per the nail spacing in the Ecoply bracing specifications (e.g. 2.4 m x 1.2 m sheet with a 0.3 m x 1.2 m part sheet above it to give a 2.7 m x 1.2 m bracing element).

Cladding as bracing

12 mm Ecoply (CD face grade or better) can be H3 treated to meet the requirements of Acceptable Solution E2/AS1 and will perform as a structural, durable and weathertight cladding and bracing element when installed in accordance with E2/AS1.

It should be noted smooth faced plywood such as Ecoply may be prone to appearance related issues such as face checking which occurs naturally and is not considered by CHH Woodproducts to be a manufacturing or product fault. For more information refer to section 1.8: General Design Considerations - Face Checks on Plywood Exposed to Weather. H3.2 CCA treated Ecoply may also have a green tinge to the wood surface and may have fillet marks on the face of the sheet.

Plywood for exterior cladding applications where a high visual appearance is desired, CHH Woodproducts recommends the use of Shadowclad as an exterior cladding. Shadowclad has a textured (bandsawn) face which reduces the visibility of face checking and is most commonly H3.1 LOSP treated (clear preservative treatment) which does not leave fillet marks on the panel face.

For further information on Shadowclad as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz.

Soil

Ecoply must not be allowed to come in contact with soil. The bottom edge of the plywood sheet must be a minimum of 100 mm above decks or paved ground and a minimum of 175 mm above unprotected ground.

Service penetrations in bracing elements

Small openings (e.g. power outlets) of 90 x 90 mm or less may be placed no closer than 90 mm to the edge of the braced element, or waste pipe outlets of max. 150 mm diameter placed at no closer than 150 mm to the edge of the braced element.

3.2 ECOPLY® BRACING SPECIFICATIONS SUMMARY

CHH Woodproducts has a range of bracing specifications called the EP bracing series. The EP bracing series simplifies the design and construction of bracing elements using plywood, by itself or in conjunction with GIB® Plasterboard and features:

- Single sided and double sided bracing elements High performance bracing element utilising GIB® Standard plasterboard
- A single type, GIB Handibrac®, hold-down for all bracing elements
- Specifications for each bracing element type

Table 9: Summary P21 Ratings for 2.4m High Ecoply® Wall Elements

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EP1	0.4 m	Ecoply one side	80	95
	0.6 m		95	105
	1.2 m		120	135
EPG	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
	1.2 m		150	150

Note: Bracing and other technical information has been specifically tested using Ecoply branded structural plywood. This information cannot be used with any other plywood brand and bracing data must be sought directly from the specific plywood manufacturer.

More information

The following pages provide a full specification of EP bracing elements. Copies of specifications can be downloaded from www.chhwoodproducts.co.nz

NZS 3604 provides the method of calculating demand on a building. Calculation sheets are available from BRANZ or GIB EzyBrace® software is available as a free download from www.gib.co.nz. Information is available at www.chhwoodproducts.co.nz which can be placed in the custom elements of GIB EzyBrace® for ease of calculation

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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3.3 ECOPLY® BRACING SPECIFICATION - EP1

Table 10: Singled Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EP1_0.4	0.4 m	Ecoply one side	80	95
EP1_0.6	0.6 m	Ecoply one side	95	105
EP1_1.2	1.2 m	Ecoply one side	120	135

Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

One layer of 7 mm, 9 mm or 12 mm Ecoply plywood fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Fastening the Ecoply® panels

Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

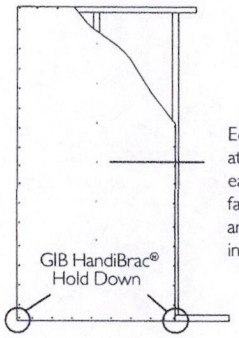
Fasteners for H3.2 CCA treated Ecoply® panels

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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Table 11: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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3.4 ECOPLY® BRACING SPECIFICATION – EPG

Table 12: Structural Plywood Brace with Plasterboard Other Side

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EPG_0.4	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
EPG_1.2	1.2 m		150	150

Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

Side 1: One layer of 7 mm, 9 mm or 12 mm Ecoply plywood exterior wall cladding fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Side 2: One layer of 10 or 13 mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

Fastening the Ecoply® panels

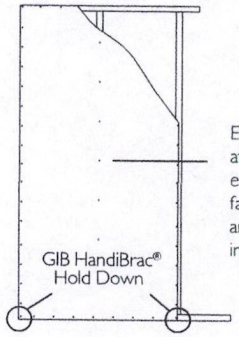
Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

Fasteners for H3.2 CCA treated Ecoply®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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Fastening the GIB® Plasterboard

32 mm x 6 g GIB® Grabber® Screws or 35 mm GIB® Nails

Fastening centres

Fasten 50, 100, 150, 225 and 300 mm from each corner and 150 mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300 mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12 mm from paper bound edges and 18 mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.

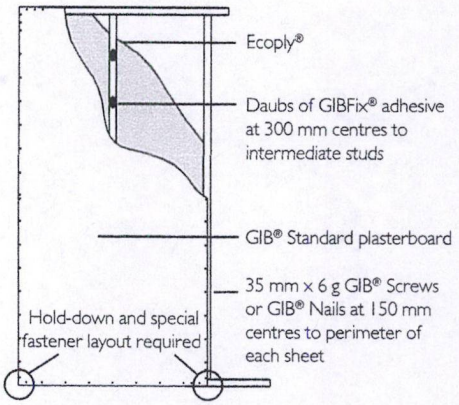


Table 13: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones including sea spray, as per section 4 of NZS3604):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones1 B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone1 D (sea spray), as per section 4 of NZS3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in eexposure zone D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

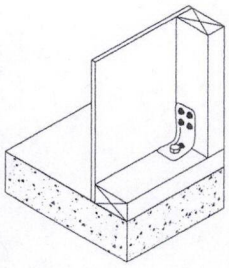
3.5 GIB HANDIBRAC® – RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as the hold-down in all EP bracing elements.

- The GIB HandiBrac® registered design provides for quick and easy installation
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to check in the framing as recommended with conventional straps
- The GIB HandiBrac® is suitable for both new and retrofit construction
- The design also allows for installation and inspection at any stage prior to fitting internal linings

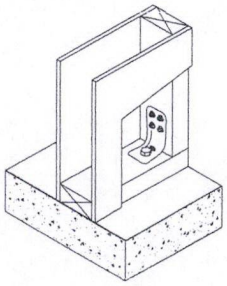
Concrete Floor

External Walls



Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate

Internal Walls



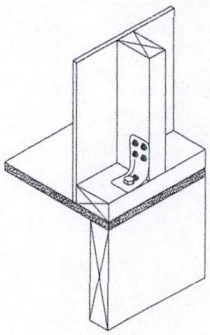
Position GIB HandiBrac® at the stud/plate junction

Hold-down fastener requirements

A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket

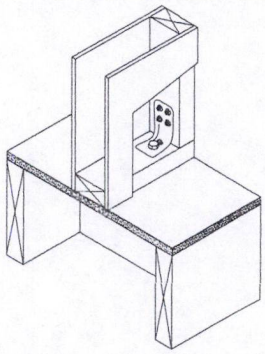
Timber Floor

External Walls



Position GIB HandiBrac® in the centre of the perimeter joist or bearer

Internal Walls



Position GIB HandiBrac® in the centre of the floor joist or full depth solid block

Hold-down fastener requirements

M12 x 150 mm galvanised coach screw

3.6 STRUCTURAL CEILING DIAPHRAGMS

Diaphragms are used to transfer lateral loads to braced walls and allow for greater spacing between bracing lines. Diaphragms do not have a BU rating themselves.

Plywood diaphragms are an acceptable solution as described in section 13 of NZS 3604 13.5.2 which allows for plywood not less than 6 mm thick and a minimum of three ply for:

(a) Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
(b) Diaphragms not steeper than 45 degrees to the horizontal and not exceeding 7.5 metres long under light or heavy roofs

Plywood ceiling diaphragms required to comply with NZS 3604 must be constructed as follows:

(a) The length of diaphragm shall not exceed twice its width measured between supporting walls
(b) The ceiling lining must consist of plywood over the entire area of the diaphragm
(c) Complete sheets with a minimum size of 1800 x 900 must be used
(d) Framing size and spacing must comply with NZS 3604
(e) Fastener size should comply with Table 7 of this guide. E.g. 40 mm x 2.5 mm flat head nails for 7 mm and 9 mm Ecoply
(f) Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
(g) Fixings are no closer than 10 mm from sheet edges
(h) Perimeter ceiling framing must be connected to wall framing by a perimeter 140 mm x 35 mm ribbon plate nailed to the top of the top plate or alternative such as a 0.55 mm thick steel angle or proprietary steel channel
(i) Sheets must be layed in a staggered pattern
(j) The basic shape of a ceiling diaphragm should be rectangular. Protrusions are permitted but cut-outs are not (see Figure 13.4 NZS 3604)

4.0 ROOFS AND DECKS

The section below covers the use of Ecoply plywood used as a substrate for flexible membrane and tile systems in roofing and decking applications. The information below should be considered as supplementary to system specifications from roofing and decking suppliers.

Further guidance on installation and detailing factors can be found in the EWPAA Technical Note; Plywood Roofing and Flooring: Installation and Detailing Factors. This can be downloaded from www.ewp.asn.au

Ecoply is not recommended as a substrate for exterior decks without a properly detailed barrier material such as butyl rubber, vinyl or E.P.D.M to protect the surface from weathering.

Always refer to the roofing and decking system supplier for installation, plywood selection and surface preparation requirements for specific roofing and decking products.

4.1 FLEXIBLE MEMBRANE SYSTEMS

- Roofing and decking membranes may comprise synthetic rubber sheeting glued to the Ecoply, or torch welded bitumen membranes
- Always ensure Ecoply is dry and free of imperfections such as surface dust and blemishes as membranes coatings will telegraph any substrate imperfections
- Use Ecoply Flooring or Structural Square Edge (CD Grade)
- Where Ecoply Flooring is used consider the use of a small daub of glue or nail in the Tongue & Groove of each sheet if potential movement of the plastic tongue joint is not acceptable
- For trafficable decks use a minimum 17 mm thickness, refer to Table 15A and 15C for specification
- Use countersunk stainless steel screws and adhesive on framing to avoid head popping. Apply adhesive between screw locations
- Use kiln dried timber framing such as Laserframe® or appropriate LVL framing from the Futurebuild® range
- Consult the membrane manufacturer regarding use of bond breaker tapes over joints to allow elongation with natural plywood movement
- Where treatment is required use only H3.2 CCA treated Ecoply. Do not use H3.1 LOSP treated Ecoply (solvent based carrier). It is not compatible with most membrane systems. If there is evidence of treatment salt crystals on the Ecoply surface remove by scrubbing with a small amount of water and allow the surface to dry prior to laying the membrane system

Plywood substrates, face checking and flexible membrane systems

All natural wood based products (including Ecoply) have the potential to develop natural surface face checks when exposed to external environmental conditions. The degree of face checking is dependent on a number of factors including the length of time and level of exposure to weather during construction which is outside the manufacturing control of CHH Woodproducts. For more information see section 1.8: General Design Considerations - Face Checking on Plywood Exposed to Weather.

Face checks, while typically not present after manufacture, do not affect structural performance of the sheet and are acceptable under AS/ NZS 2269. They are not a manufacturing fault.

Designers and membrane suppliers must carefully consider the suitability of plywood as a substrate for the membrane system in question if the potential of telegraphing of face checks onto the membrane surface is not acceptable.

The risk of telegraphing can be reduced by protecting the plywood surface from weather and moisture during the construction process.

Where the potential of face checking in the plywood substrate is not acceptable designers should consult the membrane supplier for a more suitable membrane or an alternative substrate.

Allowing for moisture expansion of plywood under roof and floor coverings

Membrane suppliers have held different views on the requirements for plywood substrates. The fixing instructions within this guide are the starting point but designers must detail joints that allow for expansion in accordance with practices recommended by the chosen membrane supplier.

CHH Woodproducts' view, and the recommendation of a number of suppliers here and in North America is that expansion and contraction at sheet edges should be allowed for by loosely butting tongue and grooved edges so that the tongues can absorb movement and providing a small gap (2 to 3 mm) between square sawn edges. Use a bond breaking tape over these joints to spread elongation in the membrane over a longer distance than the narrow gap in the joint itself. This tape can double as a rain seal over the sheet edges during construction.

Other membrane suppliers believe that sheets should be tightly butted and glued and screwed hard up to each other. This practice constrains movement at the small joint between sheets, but over a wider area requires significant allowance for movement around the perimeter of a roof segment. Junctions between the roof slopes and walls need careful detailing to allow for the potential movement. Movement control joints should be provided at regular intervals following the recommendation of the membrane manufacturer, especially if this method is adopted.

4.2 ROOF TILE SYSTEMS

Most fibreglass, asphalt or wooden shingle and tile systems will tolerate DD grade surface characteristics.

- Use unsanded Ecoply Roofing (DD grade), or sanded Ecoply of the required thickness in Table 15A
- The unsanded surface provides extra grip on steeper roofs for roofers
- Fix tiles according to the tile manufacturer's specification
- Under asphalt shingles use felt underlay over the Ecoply

4.3 ROOFING & DECKING – PRODUCT SELECTION GUIDE

Table 14: Roofing and Decking Product Selection Guide

	Structural Square Edge (CD Grade)	**Flooring (CD Grade)**	**Roofing (DD Grade)**
Product Description	CD face grade sheets are available in a range of thicknesses and size	Solid sanded C grade surface with tongue and groove profile on long edges	Unfilled D grade surface with tongue and groove profile on long edges
Recommended Applications	Substrate for flexible coverings requiring a smooth substrate and where avoidance of visible surface indentations is critical. Use as a substrate for flexible roof and deck membranes and thin roofing tiles		Substrate for coverings with the ability to span holes in the D face grade (up to 75 mm in diameter) such as asphaltic roof tiles and torch welded polyester reinforce membranes. Do not use under flexible membrane coverings or where avoidance of visible surface indentation is critical
Face Grades	Front: C solid sanded Back: D unsanded		Front & Back: D unsanded
	Refer to Table 1 for range and treatment options		
Product Features	Blocking required to support all edges	Second void free layer under surface veneer for increased protection against punching through the first veneer under high point loads & increased moisture resistance. Blocking not required to support tongue and groove edges (unless otherwise specified)	15 and 17 mm thickness specifically designed for use under shingles and tiles that have a courser finish. Unsanded surface for extra strength and grip for installers on steep roofs Blocking not required to support[2] tongue and groove edges (unless otherwise specified)
Thicknesses Available	12, 15, 17, 19, 21, 25 mm	15, 17, 19, 21, 25 mm	15, 17 mm
Sheet Sizes Available	2400/2700 x 1200m		
Stress Grades Available	F8 (F11[1] available upon request)	F8 (F11[1] available upon request) 19 mm Longspan supplied F11[1] as standard	F11[1]
Treatment	Untreated, H3.2 CCA and H3.1 LOSP	Untreated, H3.2 CCA, (H3.1 LOSP available upon request)	
Span Capabilities	Refer to frame spacings in Tables 15A to 15C		

1 Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain.

2 Where roofing products use tongue and groove CHH Woodproducts recommends fastening the tongue to rafters/joists at a minimum of one point

4.4 FRAME SPACINGS FOR ECOPLY® ROOFS AND DECKS

Table 15A: Roofing - Sheathing, Non Trafficable, Above 2 Degree Pitch

Application	Roof Pitch	Stress Grade	Maximum Wind Zone	Maximum frame centres (mm) for Ecoply® with face grain across framing				
				Ecoply nominal thickness (mm)				
				15	17	19	21	25
Sheathing, non trafficable roof for all roof pitches above 2 degrees Suitable for roof mass up to 30 kg/m² (additional to Ecoply weight or 40 kg/m² including Ecoply)	>2°	F8	Extra High	600	600	800	800	900
		F11	High	900	900			
			Very High	800	900			
			Extra High	800	800			
	>20°	F11	Very High	900	900			
			Extra High	800	800			

Suggested applications include substrates for Asphalt Shingle and Membrane type roofs. The above suggested maximum framing spans are based on the following deflection criteria:

- Under a short term 1kN point load, deflection is less than Span/130
- Under a long term self weight load, deflection is less than Span/400
- Under a short term wind gust load, deflection is less than Span/150

Table 15B: Sub-Sheathing

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing					
	Ecoply nominal thickness (mm)					
	12	15	17	19	21	25
Under steel or self supporting cladding for support of building paper or lateral diaphragm action. Sag not critical.	800	1200				

Table 15C: Decking

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing			
	Ecoply nominal thickness (mm)			
	17	19	21	25
1. Trafficable roof decking Limited by dynamic response of roof as floor	540	600	600	750
2. Roof decking to Clause 8.5.5.1 c) of E2/AS1	400	400	400	400

- The current requirement in E2/AS1 is extremely conservative when compared with calculations determined for other applications using VM1 Clause 6 and calibrating the spans against codes of practice from North America and Australia. CHH Woodproducts recommends designers consider the alternative solution in row 1 of Table 15C for membrane decking in consultation with the membrane manufacturer.

  Unless otherwise stated spans apply equally to square edge or tongue and groove panels. Check Table 1 for availability of grades and lengths to match span multiples in Table 16
- Use the next lower recommended frame spacing or thicker Ecoply® where appearance is critical
- To suit trusses at 900 centres, 2700 long sheets are available. See Table 16

Table 16: Frame Set Outs to Match 2400mm and 2700mm Sheet Modules

Length (mm)	Typical Frame Spacing to Suit Sheet Length			
2400	400	480	600	800
2700	450	540	675	900

Limitation for the use of Table 16.

CHH Woodproducts does not have access to information about designs for specific sites. Table 16 is a guide to estimate the initial selection of a span for design. Each site should be evaluated by qualified persons to ensure all loading parameters and site conditions have been considered, and appropriate changes should be made by the building designer.

4.5 ROOFING – DESIGN CONSIDERATIONS

Durability

In general, H3.2 CCA treatment of Ecoply plywood with waterborne preservatives is recommended for roofing.

Roofing materials

Various roofing materials used over Ecoply plywood have different durability expectations, normally in excess of the 15 years required by the NZBC Clause B2. Durability of the roofing is subject to the specifications, installation and maintenance requirements of the roofing manufacturer. The durability of the Ecoply can only be assured as long as the overlying roofing and detailing excludes moisture. With good building practice and maintenance, roofing materials can be repaired or replaced at regular intervals to achieve life from the Ecoply in excess of the original roofing. The durability of Ecoply structural plywood will continue to satisfy the relevant requirements of the NZBC for 50 years, if installed in accordance with the instructions and limitations within this guide and the roof system is adequately maintained.

High humidity, condensation and solar driven moisture

Where the moisture content of wood may exceed 18% for prolonged periods, Ecoply must be H3.2 CCA treated, to resist decay hazard. This includes Ecoply used under roof coverings that may be subject to condensation, or where rain moisture soaked in the roof covering can be driven into the Ecoply by the sun. Appropriate building detailing and ventilation is recommended which can reduce the need for treatment.

Roof ventilation

Good ventilation and the avoidance of moisture are important design considerations when using H3.2 CCA treated Ecoply panels. Poorly ventilated spaces can develop very high temperature and moisture levels. The most likely source of moisture is the condensation of vapour from warm interior air on the underside of cold roofing. Good ventilation can limit the build up of excess moisture vapour in warmer climates but in regions where winter nights are consistently colder, H3.2 CCA treated Ecoply should be used. Moisture induced decay is only one risk that needs to be managed. If incorrectly detailed, roof spaces can be very tight and the dark colour of many roofing materials means that excessive heat can build up causing distortion in plywood or even framing members. Use the suggested details or alternatives to suit. Designers must consider roofing type, seasonal conditions, wind effects and the intended use of the building.

As a minimum, CHH Woodproducts recommends a vent area of 1/300th of the ceiling plan area (approx 3350 mm² per square metre of ceiling) equally distributed at the eaves and ridge to allow free flow under the Ecoply, up the roof slope, and out.

Roofing material suppliers should detail vent systems suited to their specific membrane or tile roofing. Proprietary ridge capping profiles or vents are available from roofing suppliers.

Detail gaps of 25 mm in the plywood at ridges, and at walls where a roof slopes up to an upper storey. For flat roofs, natural ventilation flows may be impeded. Use proprietary roof vents. Consider forced ventilation as appropriate.

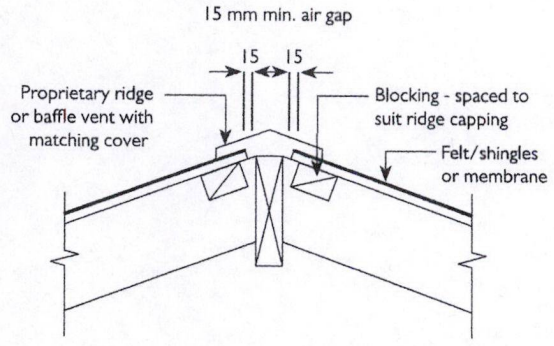
Bubbling

Plywood bubbling occurs when moisture trapped in knot holes in inner veneers expands as the temperature rises. This moisture will dissipate through the face veneer and will not affect the structural integrity of the plywood panel. As membrane coverings can prevent moisture dissipation, Ecoply Flooring and Structural Square Edge CD is recommended if the visual appearance of bubbling is not acceptable, or a high visual finish is required.

Soil

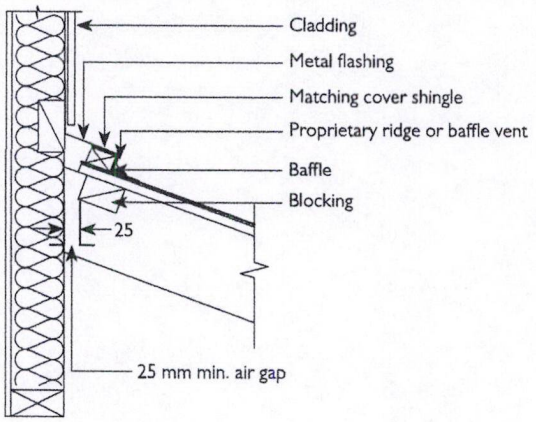
Ecoply plywood (untreated or H3.1 LOSP/H3.2 CCA treated) must not be allowed to come in contact with soil. Surfaces, flashings and gutters should be detailed to avoid trapping detritus and moisture.

EC003: Ridge detail with ridgeboard

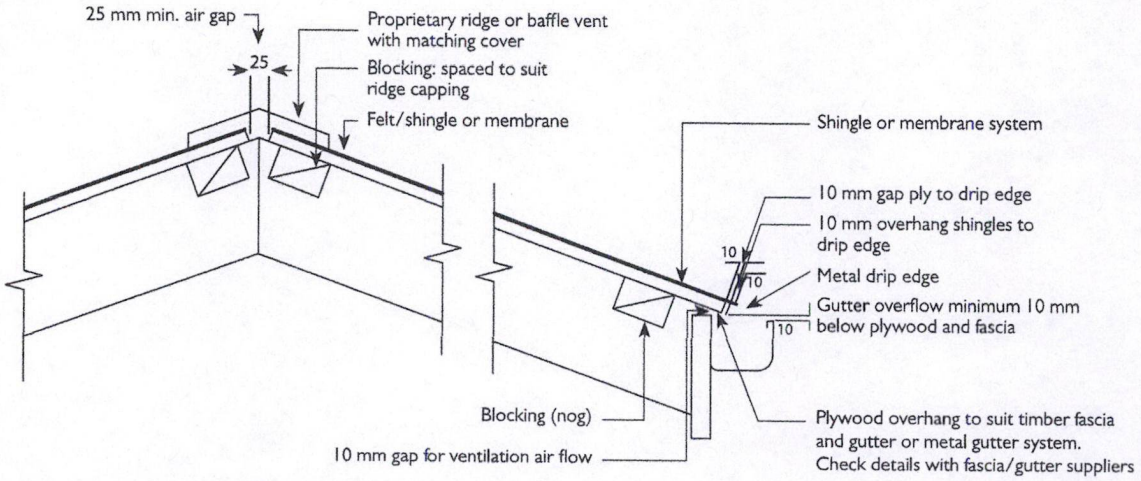


(use also with Hip Rafter if extra ventilation required)

EC004: Roof to wall junction vent



EC005: Truss ridge detail



Rain wetting and construction time

Untreated Ecoply will withstand a reasonable amount of rain wetting and exposure during construction for up to three months. In extreme weather conditions of high temperature and/or high rainfall this period may be less. Appearance issues such as discolouration and face checking of the sheet surface can be expected if Ecoply is exposed. For roofs uncovered for longer periods use H3 treated Ecoply to lower the risk of decay. Return Ecoply to below 18% moisture content before installing moisture sensitive materials, coverings, coatings or adhesives. Where a high visual finish is desired (such as membrane roofing and decking) protect Ecoply from exterior moisture during construction. For detailed information see section 4.1 Flexible Membrane Systems.

Gutter details

Where Ecoply structural plywood sub-sheathing supports roofing at gutters, a metal drip edge must be provided with appropriate gaps to shed water. Gutters should have a front edge overflow or ends lower than the back to shed water overflow away from framing and sub-sheathing Ecoply.

H3.2 CCA treatment is recommended for Ecoply sheets that protrude into gutters, with regular maintenance to avoid leaf mould (soil) development. Untreated Ecoply must not be exposed to gutter splash or moisture.

Fastener spacing for wind suction

Wind pressure applies withdrawal loads to nails holding plywood to purlins and trusses. For the frame spacing in Table 15A designers may use the following guidelines for wind zones expressed in NZS 3604.

Note: Full penetration of fasteners into the supporting member is assumed.

The main body of the roof

For wind zones up to and including high, use 60 x 2.8 mm nails spaced at 150 mm centres on all cross framing. For very high and extra high wind zones, use 75 x 3.15 mm nails spaced at 150 mm centres on all cross framing.

Roof edges

All Ecoply structural plywood used at local pressure suction zones at the roof edges, gutters, eaves and gable ends must be supported on framing, and fixed at 75 mm centres with minimum 60 x 2.8 mm nails for regions up to, and including high wind zones (use 75 x 3.15 mm nails for very high and extra high wind zones). Local pressure zones are interpreted from AS/NZS 1170 as being within 20% of the building length, width or the average of the gutter and ridge height.

Designers and builders should review site conditions to ensure adequate fixing is applied. Buildings in exposed sites and lee zones should be specifically designed using the loading standard (AS/NZS 1170) and the timber structures standard NZS 3603. In some wind conditions, the tiles themselves may be sucked from the plywood. Use a consulting engineer to assess site conditions, calculate wind pressures for the specific site, and determine the fastening and span requirements, and to check that the truss system can resist the loads being applied through the plywood.

Fixing of roofing

Fixing methods for tile, shingle and membrane systems must be designed for the expected wind and weather exposure to protect the Ecoply substrate. Some shingle systems may not be suitable for use in very high or cyclonic wind zones.

Follow the specifications of the roofing manufacturer and refer to the appropriate BRANZ Appraisals.

4.6 ROOFING – INSTALLATION

Framing

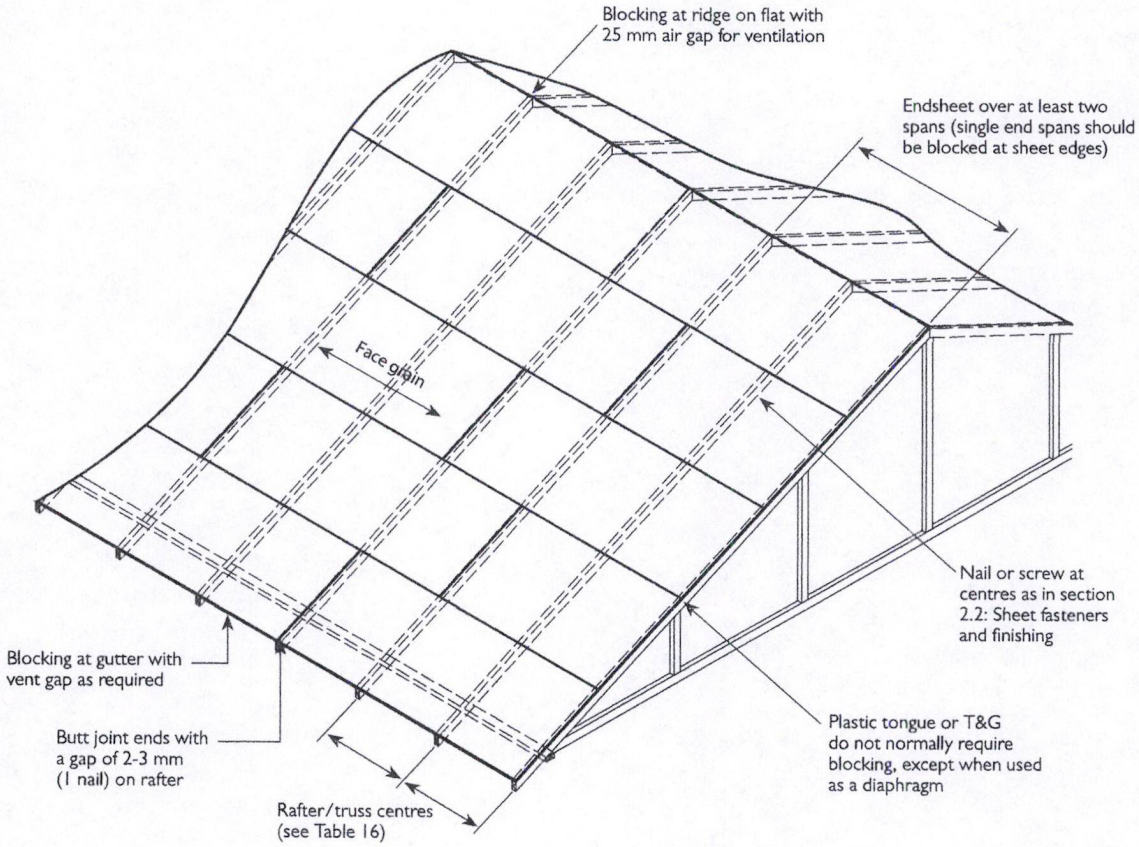
Frames should be at spacings to suit plywood thicknesses in Table 15A, page 25. Additional requirements for roof framing are:

- Ensure top edges of framing are properly aligned
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to lower moisture level in roof spaces, second floor spaces, and reduce differential truss, rafter or joist deflections

Blocking (nogs, dwangs)

- Block all edges of Ecoply Structural Square Edge plywood
- Block all edges at the ridge and gutter lines to prevent sag at capping or gutters
- Block for high face loads or under areas accessed for maintenance
- Blocking within the body of the roof is not required under tongue and grooved edges when using Ecoply Flooring & Roofing, unless required for framing stability or the plywood is being used as a diaphragm to resist horizontal wind or earthquake loads. In this case fixings transfer shear across the joints and details should be specified on drawings
- Use blocking on the flat to provide gaps where air flow is needed for ventilation
- Specific roofing suppliers may require blocking to suit their system

EC006: Sheet and framing layout



Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- Lay the sheets in a staggered pattern
- Allow sufficient clearance inside confining structure such as concrete or brick walls adjacent to the roof. Use extra allowances with large areas
- Allow clearance for ventilation as required

Fixing of sheets

Ecoply may be fixed to different types of framing with nails, screws or a combination of fasteners and construction adhesives.

Fasteners should be corrosion resistant to a level appropriate to the end use life expectancy (15 or 50 years) and expected exposure to moisture. Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

The integrity of a plywood based roof system is directly related to how well the panels are fixed to the framing. Ecoply must be fixed to resist wind suction loads, and to maintain surface qualities of the overlying roof covering.

- Always refer to the roofing system supplier for system requirements
- For roofing, check the additional requirements according to wind exposure
- For very exposed sites, cyclonic conditions or roofs above 10 metres in height, carry out specific structural design to the relevant standards
- Screw fixing must be used for membrane roofing, and is preferred for all systems because of increased holding power and avoidance of head popping
- For minimum fastener spacing for wind suction, refer section 4.5 Roofing - Design Considerations - Fastener spacing for wind suction

Fixing to timber frames

- Ring shank nails or annular grooved nails or screws are recommended for additional holding power
- Use flathead nails. Do not use jolt or bullet head nails
- Stainless steel nails must be annular grooved
- Ensure fastener is compatible with the roofing cover (consult roofing system supplier)
- Staples may be used provided that the withdrawal load is equivalent to the hand driven galvanised flathead nail. A suggested minimum is a 50 mm long staple with 12 mm crown and legs 1.8 mm diameter. Space staples 20% closer than nails. Refer to the manufacturer's information for corrosion resistance and durability

Fixing to steel frames

- Fix directly to roll formed steel (up to 2 mm thick) with self-drilling, self-tapping screws. If plywood gets damp and expands, screws in thicker steel may shear. Keep Ecoply dry or use larger screws or;
- Bolt or screw battens to the steel and apply Ecoply as above for timber. Ensure that battens have adequate thickness for the minimum nail or screw length
- H3.2 CCA treated plywood must not be fixed to steel framing

5.0 FLOORING

The following section covers the use of Ecoply Flooring plywood used as a flooring substrate with flexible and rigid overlays. Ecoply Flooring is suitable as a substrate for overlays such as carpet, tiles and some membrane products (refer to flooring manufacturer).

5.1 FLOORING – RANGE

- Ecoply Flooring features a void free second layer under the surface veneer for increased protection against moisture bubbles and punch through of the first veneer under high point loads than normal Ecoply Structural Square Edge plywood
- The tongue and groove on long sheet edges does not require support blocking under the joint (unless otherwise specified)
- Supplied in F8 stress grade (F11 available upon request)
- Ecoply 19 mm Longspan Flooring supplied as standard in F11/F8 stress grade
- Supplied standard with a sanded C grade surface with D grade back
- Sanded B grade surface is available in 19 mm thickness (untreated only) for clear finish applications. Designers must expect the surface to dent or mark more easily than hardwood flooring systems as Ecoply is manufactured from relatively soft radiata pine.
- Available untreated or H3.2 CCA treated, (H3.1 LOSP treated available upon request)
- LOSP treated plywood is not recommended for internal applications
- Refer to Table 1 for range and treatment options

5.2 FLOORING – INSTALLATION

Table 17: Flooring Frame Spacings

Application	Maximum frame centres (mm) for Ecoply® with face grain across framing				
	Ecoply nominal thickness (mm)				
	15	17	19	21	25
1. Domestic flooring 2kPa - 1.8kN	480	540	600 F11[1] Longspan	600	750
2. Institutional and public assembly up to 4kPa - 2.7kN		300	480	540	750
3. Institutional and crowd assembly up to 5kPa - 3.6kN			400	450	600
4. Corridors, industrial up to 5kPa - 4.5kN			300	400	540
5. Domestic garage floor** 2.5kPa - 9kN					270

** Provide blocking to all edges of the sheet.

- *Use the next lower recommended frame spacing or thicker Ecoply flooring where appearance is critical*
- To suit frames at 900 centres, 2700 long sheets are available. See Table 16

[1] Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain. Please contact CHH Woodproducts for Span/360 deflection limits for internal membrane areas

Floor loads

For domestic garage floors blocking is required under all edges to control wheel loads on the tongue. Testing with 113 mm diameter load head (0.01 m^2) confirms commercial floor capabilities.

Refer to Table 16 to match frame set outs with 2400 mm and 700 mm sheet modules.

Framing

- Joist spacings should be at spacings to suit plywood thicknesses in Table 17
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to achieve a moisture content of 18% or less

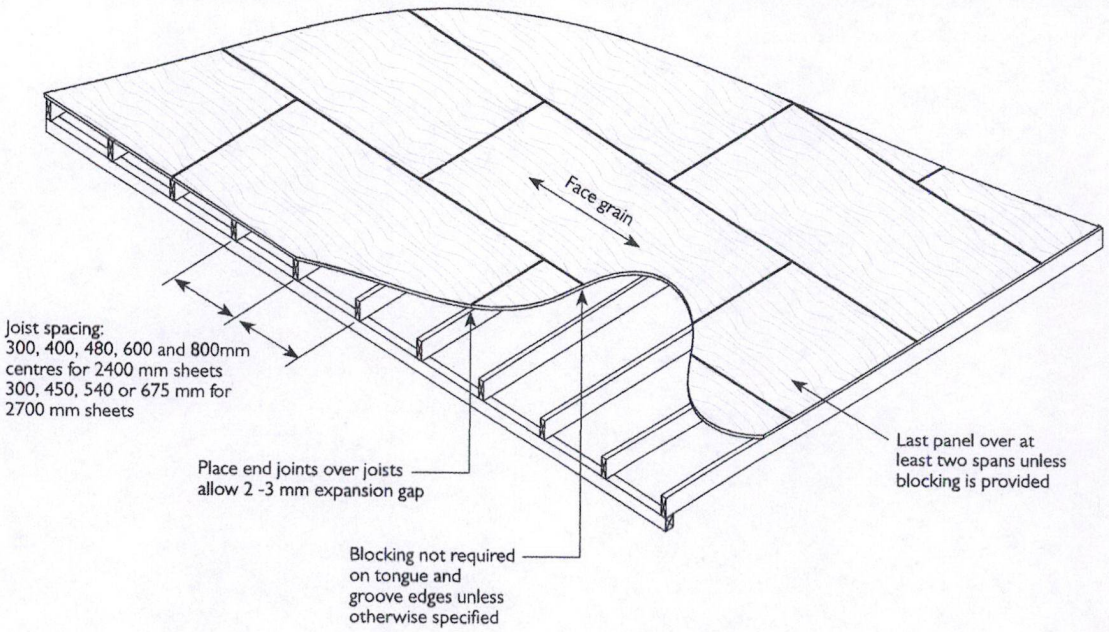
Blocking

- Blocking within the body of the floor is not required under tongue and groove edges unless otherwise specified (such as in domestic garage floors)

Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- For panels at floor edges where a continuous two span coverage is not possible, sheet edges must be supported by blocking
- Lay sheets in a staggered pattern
- Allow clearance for ventilation as required

EC007: Ecoply® Flooring layout



Fastener selection and treatment

Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture.

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Fasteners and fixing of sheets

- Ecoply Flooring may be fixed with nails or screws or a combination of mechanical fasteners and construction adhesives
- For fastener specifications (including lay out and sizes) refer to section 2.2: Sheet Fasteners and Fixing
- For construction adhesive specifications refer to section 2.3: Adhesives
- Ring shank or annular grooved nails, or screws are recommended for additional holding power
- To reduce the risk of fastener popping or floor squeak the use of construction adhesives is advised.
- Do not use jolt or bullet head nails

5.3 FLOORING – FINISHING

- Overlays and coatings should be applied following the manufacturer's specifications
- Avoid heavy sanding that may remove the critically important structural face veneer
- Adhesives must be compatible with CCA (Copper Chrome Arsenic) treatment in H3.2 CCA treated sheets. Compatibility can often be improved by lightly washing, scrubbing and drying the plywood surface prior to fixing
- Where clear or stained finishes are desired, designers should select sheets and protect the floor as much as possible from the weather and construction activities
- Ecoply is made from relatively soft radiata pine and as such will dent or mark more easily than hardwood flooring systems. This is to be expected and designers must consider the long term appearance requirements of the project. Ecoply Flooring is a good substrate for harder wearing flooring overlays, and is not primarily intended for clear finishing, especially if it is exposed to moisture during construction
- For improved surface finish, floors should be protected from weather during construction as soon as possible

6.0 FREQUENTLY ASKED QUESTIONS

Q: How much space should be allowed for expansion?

A: Allow a 2 - 3mm expansion gap between square edges of Ecoply® sheets. If using Ecoply Flooring, a 5 mm expansion gap is recommended at the perimeter of the floor or deck. Check by calculation for large areas.

Q: Can power driven nails be used to fix Ecoply?

A: Paslode power driven nails have been tested for fixing Ecoply and Shadowclad® plywood products for particular bracing and cladding applications. For power driven nail specifications refer to the Paslode Special Fixing Applications document available from http://www.paslode.co.nz/images/fix-app-CHH-woodproducts.pdf. Use the Paslode Impulse Compact Nailer fitted with a No Mar(k) work contact element to eliminate any contact marks on the plywood. Adjust the work contact element to the flush position and fire the nail at 90° to the work surface. Hammer any nails flush which are left proud. Do not overdrive.

Q: How close to sheet edges can I nail?

A: Fixings must be at least 3 fastener diameters or 7 mm from the sheet edge.

Q: Do I have to use stainless steel nails when using Ecoply for bracing?

A: Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances.Where stainless steel nails are required, annular grooved nails must be used.

Q: What is the weight of Ecoply?

A: Refer to Table 4A for weight (kg/m^2) of different Ecoply thicknesses.

Q: What is the R-value of Ecoply?

A: The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214. Plywood has a conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance R = 0.012/0.13 = 0.09.

Q: Are there any compatibility issues when using Ecoply with other materials?

A: Adhesives for flexible rubber membranes may react with LOSP treatment and should therefore only be applied to H3.2 CCA treated Ecoply unless the membrane supplier advises differently. Check with the membrane manufacturer if in doubt. H3.2 CCA treatment is also corrosive and this must be taken into account when specifying H3.2 CCA treated plywood next to metals. For further guidance, refer to Tables 21 and 22 in Acceptable Solution E2/AS1.

Q: Can Ecoply be used as a rigid sheathing (air barrier)?

A: CHH has a specific system called Ecoply Barrier. Ecoply Barrier has been developed as a rigid air barrier. Refer to the current Ecoply Barrier Specification & Installation Guide for further information. 7mm H3.2 CCA treated Ecoply can also be used if combined with building underlay in accordance with E2/AS1 for a rigid air barrier system.

Q: What is the relevance of AS/NZS 2269?

A: Ecoply structural plywood is manufactured to AS/NZS 2269 Plywood Structural. This Standard is referenced by the NZBC Compliance Documents including NZS 3602 Timber and Wood-based Products for Use in Building, NZS 3603 Timber Structures, NZS 3604 Timber Framed Buildings, AS/NZS 1604.3 Specification for Preservative Treatment, Part 3:Plywood and Acceptable Solution E2/AS1 - External Moisture. Plywood not manufactured to AS/NZS 2269 does NOT meet the requirements of these NZBC Compliance Documents.

Q: What is the relevance of the PAA stamp?

A: Ecoply is manufactured under a third party audited, product quality control programme by the Engineered Wood Products Association of Australasia (EWPAA) to monitor compliance with AS/NZS 2269. Given that compliance with Standards is not actively policed by Standards New Zealand, this third party auditing provides important peace of mind for users and consumers of Ecoply plywood products.

Q: What is marine ply?

A: Marine plywood manufactured to AS/NZS 2272 Plywood Marine may contain species of low durability (source: BRANZ Good Practice Guide – Timber Cladding). Whilst marine plywood has a Type A glue bond, it is generally specified for its high surface appearance grade and lack of core knots as opposed to structural performance. AS/NZS 2272 limits marine plywood to a number of approved species that pass stringent property requirements for things like moisture permeability. These requirements are different from those in standards from other countries. Marine plywood is rarely treated as it is usually coated with resin, fibreglass, or a paint finish for long term durability.

Q: What should a specification for structural plywood include?

A: A specification for structural plywood should include:

Specification check list	Example
Quantity/size	20 sheets of 2400 x 1200
Thickness	12 mm
Edge finish	Square edge
Brand name	Ecoply® structural plywood
Reference to Standard	To AS/NZS 2269
Stress grade[1]/layup	F8 (12-24-5)
Surface grade/bond type	CD A-Bond[2]
Accreditation	EWPAA product certified[3]

1 Stress grades may vary between different manufacturers and products.

2 Type A-bonds are suitable for permanent exposed applications and structural applications.

3 The EWPAA JAS-ANZ Product Certification Mark certifies that Ecoply structural plywood products have been manufactured under a third party audited joint product certification programme to monitor compliance with AS/NZS 2269

Q: What are F-grades?

A: The stress grading system is a ranking system which utilises the symbol F and a suffix 8, 11 etc as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. For plywood of a given thickness, the higher the F-grade, the further it will span. For load bearing applications (e.g. flooring, roofing) the required F-grade as well as the plywood thickness must be specified to achieve the required span. F8 is the most common structural plywood grade found in New Zealand. All Ecoply® structural products are F8. Ecoply 15 mm roofing and Ecoply 19 mm Longspan Flooring are F11/F8. Other Ecoply Flooring products are also available in F11 upon request.

Q: What are surface/appearance grades (eg CD)?

A: Appearance grades (eg BD, CD, DD) denote the appearance grade of the plywood including the number and size of knot holes as defined in AS/NZS 2269 and summarised in Table 2A & 2B of this guide. The first letter describes the appearance of the face veneer and the second letter describes the back face.

Q: How long can Ecoply be left exposed to the weather?

A: Untreated Ecoply will typically maintain its structural integrity when exposed to the weather during construction for up to 3 months. The surface colour will start to silver off and face checking will become evident. Where the finished appearance of the Ecoply is important, it should be protected during construction. Ecoply is also available H3 treated to resist decay or insect hazard. When used in accordance with this guide, it can be specified to meet the durability requirements of the NZBC, however appearance issues such as face checking may still occur dependent upon the degree of exposure to weather during construction.

Q: What treatment levels and types are used for Ecoply?

A: Ecoply is available untreated or preservative treated. Ecoply is treated to the H3 hazard class for above ground use. The standard Ecoply treatment type is H3.2 CCA (Copper Chrome Arsenate) although H3.1 LOSP Azole (Light Organic Solvent Preservative) may also be specified where a clear treatment is required. LOSP Azole is the standard treatment type for BD, Grooved Lining and Shadowclad®. CCA treatment gives the plywood sheets a green tinge and the drying process after CCA treatment may leave fillet marks on the face of the sheet.

Q: Does Ecoply have to be treated when used as structural bracing?

A: Ecoply used as bracing must be treated unless it is installed in an interior dry situation. Note, behind exterior cladding and in cavities (even if the Ecoply is covered with building wrap) are not considered to be an interior dry situation.

Q: Do I have to re-treat cut edges of treated Ecoply?

A: It is important to re-treat any cuts and holes with a brush on remedial treatment such as Holdfast® Metalex® Clear.

Q: What type of glue is used to manufacture Ecoply?

A: Phenol formaldehyde (PF) resins are used to bond the plywood veneers. This forms a Type A (Marine) bond suitable for structural applications and exterior use. Phenol formaldehyde resins are dark red/brown in colour. Product details printed on the back of Ecoply sheets indicate the 'A Bond'.

Q: Does Ecoply emit formaldehyde?

A: Formaldehyde occurs naturally in the environment and is emitted by processes such as combustion, decay and naturally by all timber species. Ecoply and Shadowclad meets the lowest formaldehyde emission class (E_0 - less than 0.5 mg/litre). Actual formaldehyde emissions have been tested to be less than 0.3 mg/litre.

Q: How should Ecoply be installed to maximise its stiffness properties?

A: Structural plywood has greatest stiffness along the long grain of the sheet (i.e. along its length). Therefore, flooring/roofing should be laid across joists/rafters rather than parallel to them.

7.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code (NZBC)
- CHH Woodproducts technical notes - downloadable from www.chhwoodproducts.co.nz/document-library
- NZS 3640:2003 "Chemical Preservation of Round and Sawn Timber"
- NZS 3602:2003 "Timber and Wood-based products for use in Buildings"
- NZS 3603:1993 "Timber Structures Standard"
- NZS 3604:2011 "Timber Framed Buildings"
- AS/NZS 1170:2011 "Structural design actions"
- AS/NZS 2269:2012 "Plywood Structural"
- AS/NZS 1604.3:2010 "Specification for Preservative Treatment, Part 3: Plywood"
- AS 1684:2010 "Residential Timber Framed Construction"
- US Product Standard PS1-95
- Acceptable Solution 'E2/AS1 – External Moisture'
- Acceptable Solution 'B2/AS1 – Durability'
- BRANZ Bulletin 345: Flat membrane roofs – design and installation
- BRANZ Bulletin 346: Flat membrane roofs – materials
- BRANZ Bulletin 289: Asphalt shingle roofing
- BRANZ Appraisals 307, 404, 411
- Shadowclad® Specification & Installation Guide for Cavity Construction
- Ecoply® Barrier Specification & Installation Guide
- Material Safety Data Sheets
  - MSDS Azole Treated Plywood, LVL & I-Joists
  - MSDS H3 CCA Treated Plywood & I-Joist
  - MSDS Untreated Plywood
- APA (www.buildabetterhome.org)
- EWPAA (www.ewp.asn.au)
- Product Technical Statement for Ecoply available online (www.chhwoodproducts.co.nz/product-technical-statements)
- EWPAA Technical Note - Plywood Roofing and Flooring: Installation and detail factors

Standards can be purchased online at www.standards.co.nz
Building Code Compliance Documents can be downloaded free of charge at www.dbh.govt.nz

8.0 LIMITATIONS

The information contained in this document is current as at September 2015 and is based on data available to CHH Woodproducts at the time of going to print.

All photographic images are intended to provide a general impression only and should not be relied upon as an accurate example of Ecoply products installed in accordance with this document or NZBC compliance documents.

This publication replaces all previous CHH Woodproducts design information and literature relating to Ecoply structural plywood products. CHH Woodproducts reserves the right to change the information contained in this document without prior notice.

It is your responsibility to ensure that you have the most up to date information available, including at the time of applying for a building consent. You can call toll free on 0800 326 759 or visit www.chhwoodproducts.co.nz to obtain current information.

CHH Woodproducts has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document. However, to the maximum extent permitted by law, CHH Woodproducts assumes no responsibility or liability for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

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September 2015

JAS-ANZ

PRODUCT CERTIFIED paa ENGINEERED WOOD

ewpaa

NEW ZEALAND MANUFACTURED

Rinnai INFINITY® EF

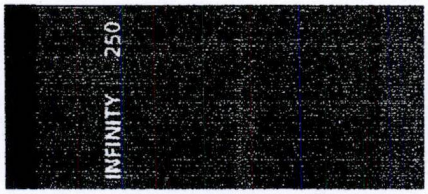
Rinnai INFINITY® EF24 External

A Gas hot water (gas califont) unit fixed to the exterior of your house. It is ideal for those who are environmentally conscious or have large families with high hot water usage, and want to significantly reduce running costs and lower their energy usage, while still having the luxury of endless mains pressure hot water. The EF24 is suitable for homes wanting to run two-three hot water taps simultaneously (eg; hot water in the kitchen & a shower and sometimes an ensuite as well).

Rinnai INFINITY® EF250 External

A Gas hot water (gas califont) unit fixed to the exterior of your house. A unit ideal for both commercial and residential applications, large families with teenagers or households with spa pools or high hot water usage that provides a significant reduction in running costs and lower energy usage, while still providing the luxury of endless mains pressure hot water. Temperatures can be set up to 95°C in commercial installations.

Rinnai INFINITY® EFi250 Internal



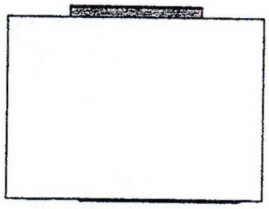
An internal gas hot water (gas califont) unit ideal for both commercial and residential applications that provides the benefit of being able to locate the unit in the centre of a home and closer to hot water outlets and offers an additional reduction in running costs and lower energy usage, while still providing the luxury of endless mains pressure hot water. Temperatures can be set up to 95°C in commercial installations.

www.rinnai.co.nz
info@rinnai.co.nz

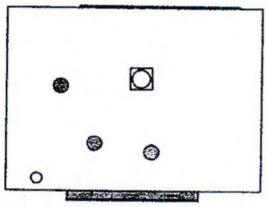
Issue: 1

Note: All dimensions are in millimeters

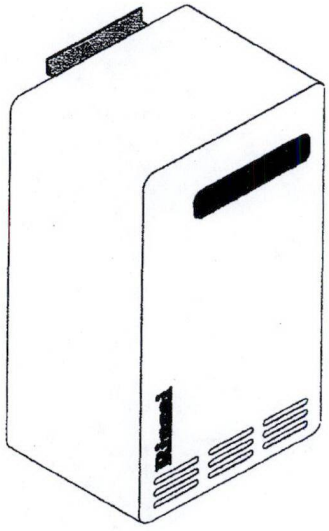
Model Specifications						
Manufacturer	Model	Code	gas consumption MJ/h	water supply min. kPa	water supply max. kPa	weight kg
Rinnai	EF24 External	REU-K2430WG	162	240	1000	27



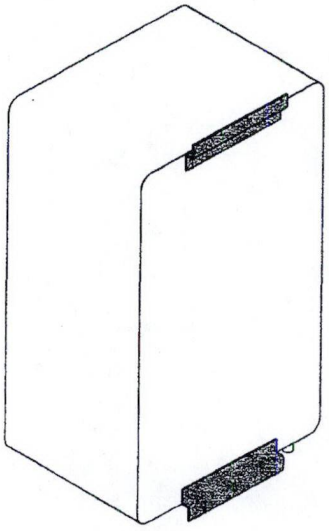
Plan View



Bottom View



Isometric View Front



Isometric View Back

Rinnai

INFINITY® EF24 EXTERNAL

Plan and Isometric Overview

INFINITY® EF24 External

0800 746 624
Family: Rinnai Gas Hot Water EF24 External
Type: EF24
Scale: 1 : 10
Units are millimetres
October 2015
Sheet: rinnai_infinity_ef24_401

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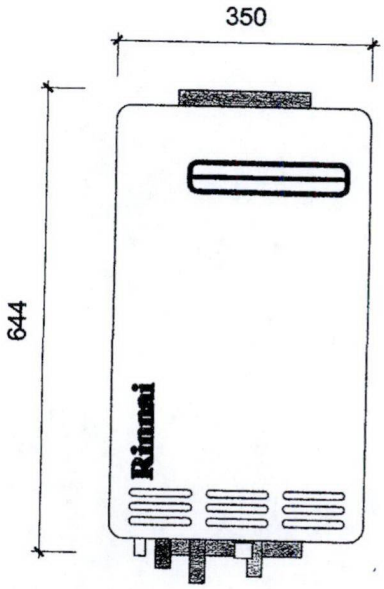
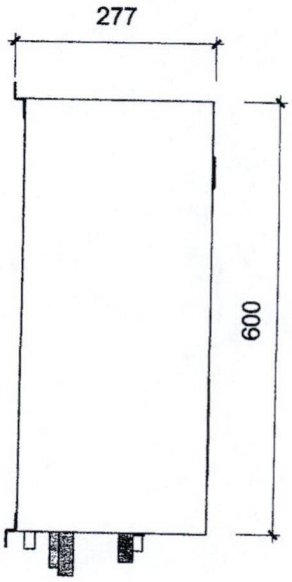
Issue: 1

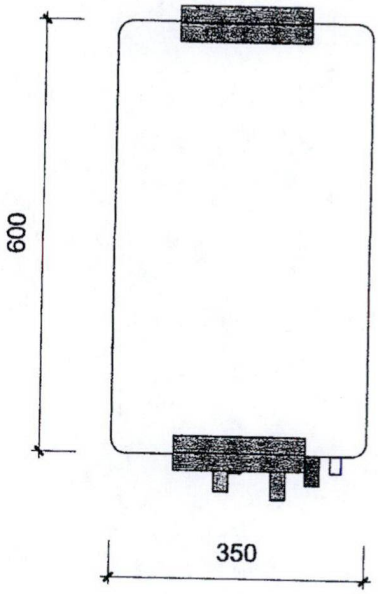
Note: All dimensions are in millimeters



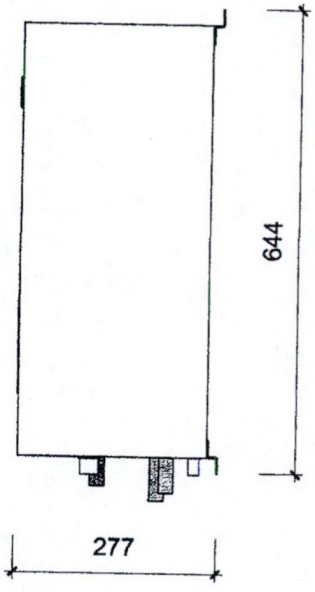
Front



Left



Back View



Right

Rinnai

INFINITY® EF24 EXTERNAL

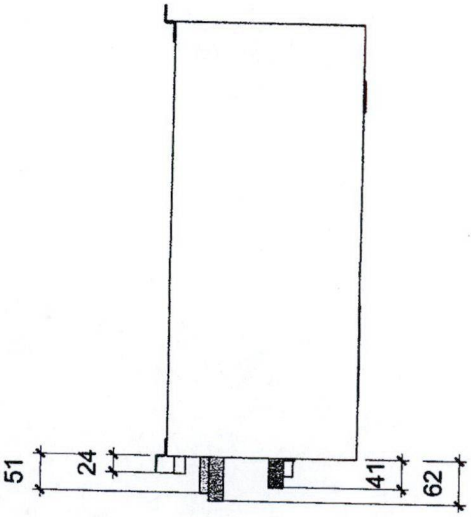
Elevations

INFINITY® EF24 External

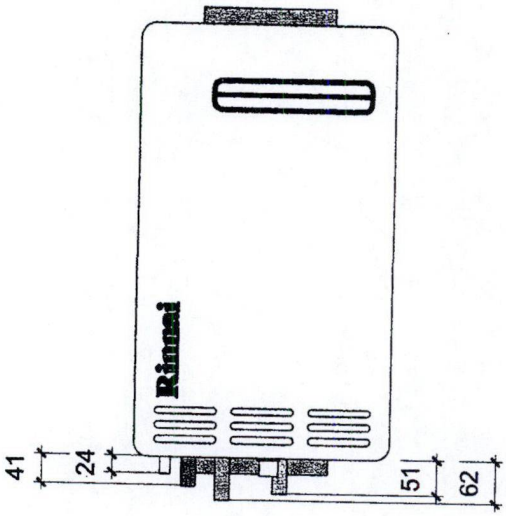
0800 746 624
Family: Rinnai Gas Hot Water EF24 External
Type: EF24
Scale: 1 : 10
Units are millimetres
October 2015
Sheet: rinnai_infinity_ef24_402

Issue: 1

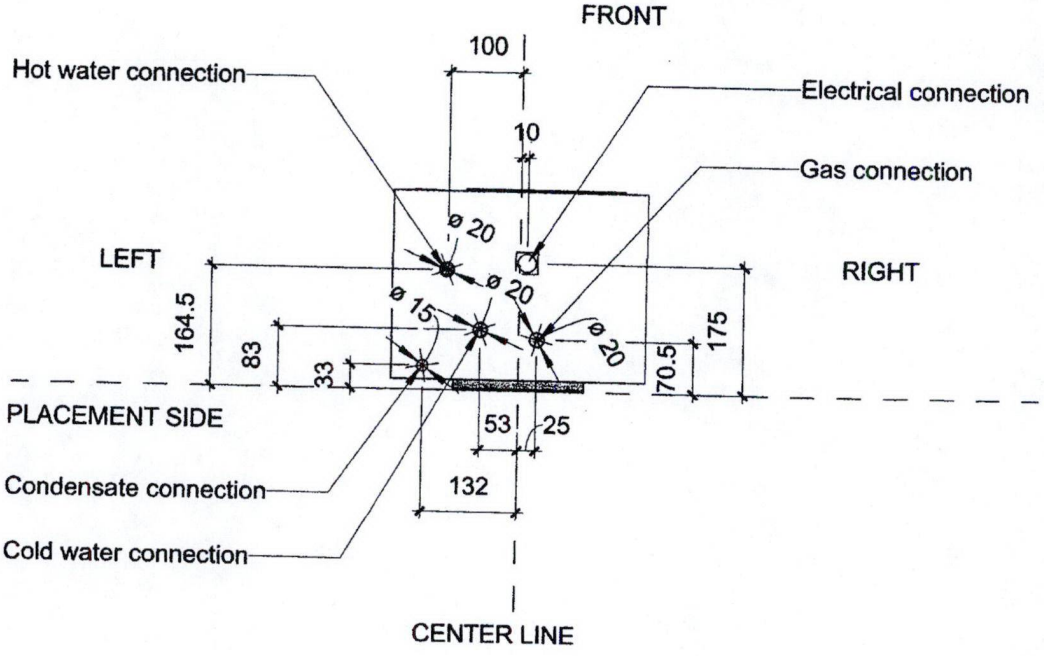
Note: All dimensions are in millimeters



Side View



Front View



Bottom View - Connections

Rinnai

INFINITY® EF24 EXTERNAL

Connections

INFINITY® EF24 External

0800 746 624
Family: Rinnai Gas Hot Water EF24 External
Type: EF24
Scale: 1 : 10
Units are millimetres
October 2015
Sheet: rinnai_infinity_ef24_403