

Property Info Pack

56 RIVERSTONE DRIVE, ROLLESTON

Any questions? Ready to pursue this property? Contact Michael Calder
022 308 2210 michael@calderandco.nz



Calder & Co.

R E S I D E N T I A L

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Agent X (2001) Ltd Licensed REAA 2008

Welcome to **Calder & Co.** RESIDENTIAL

Hello, Michael Calder here, I'm the listing agent for this property.

I'm a local Christchurch real estate specialist with more than seven years of experience selling Christchurch properties of all shapes and sizes. I'm excited to announce that I have left the corporate blue and have launched my own local real estate agency named, Calder & Co. Residential.

I'll continue to deliver the same professional service, marketing avenues and advice, but now I'm excited to offer my clients a fairer fee, a more personalised level of care and commitment.

Enjoy the information pack attached and if you have any questions at all, or if you'd like to pursue this property, let me know at your earliest convenience.

You can contact me on the details below or pop by our lounge for a change located at 149 Victoria Street, nearby our local Vic's Cafe. Have a lovely week ahead and enjoy the information within.

Kindly,



Michael Calder - 022 308 2210
Brand Owner & Residential Specialist

149 Victoria Street, Christchurch Central
michael@calderandco.nz

Visit our website calderandco.nz

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Statement Relating to Passing Over Information

The attached material has been compiled by the collection of records, documents, or information which may have been supplied by third parties, the vendor or the vendor's agent. Accordingly it is merely passing over the information as supplied to us.

Warning

No responsibility for the accuracy of the materials whole or in any part is made by Calder and Co. Limited T/A Calder and Co. Residential or any of the company's licensees, employees or officers. This material is provided to assist you with obtaining relevant information about the property, it is not intended that you rely solely on this information and you should conduct your own investigation. This could be legal, technical or any other advice relating to the property or information on the property.

Obtaining Advice

Calder and Co. Limited T/A Calder and Co. Residential and its licensees recommend you seek legal advice before signing a sale and purchase agreement or other contractual documents. You should also be aware you can and may need to seek technical or other advice and information prior to signing a sale and purchase agreement or other contractual document.

Property Details.

Legal Description	Certificate of Title 785547 Lot 18 Deposited Plan 510089
Address	56 Riverstone Drive, Rolleston
Rateable Valuation	\$860,000 (1/09/21)
Rates	\$3,611.95 (2022)
Land Area	653 sqm (Approx.)
House Area	217 sqm (Approx.)
Age	Code of compliance issued 2018
Warranty	Halo 10 year warranty transferable on sale
TC Land Rating	This location has not been given a Technical Category. Refer to; www.propertysearch.canterburymaps.govt.nz
Bedrooms	Four double bedrooms, each with storage
Bathrooms	Two bathrooms, master with ensuite
Garaging	Two car garaging plus 4+ car OSP
Construction	Shadowclad with cavity batten system. 70 series clay brick. Coloursteel fascia and gutter system and coloursteel garage door.
Heating/Cooling	2 x Heatpumps and Woodfire. Fully insulated.
Joinery	Powder coated aluminium windows and doors with double glazing throughout.
Insurance	Fully insured.
Chattels	Refer to Agreement for further details.

Contact Agent.

Michael Calder 022 308 2210, michael@calderandco.nz
or visit our lounge at 149 Victoria Street, Christchurch Central

Enquire via www.calderandco.nz, Trade Me or Realestate.co.nz to receive all property files accordingly.



56 RIVERSTONE DRIVE ROLLESTON

Calder & Co.

R E S I D E N T I A L

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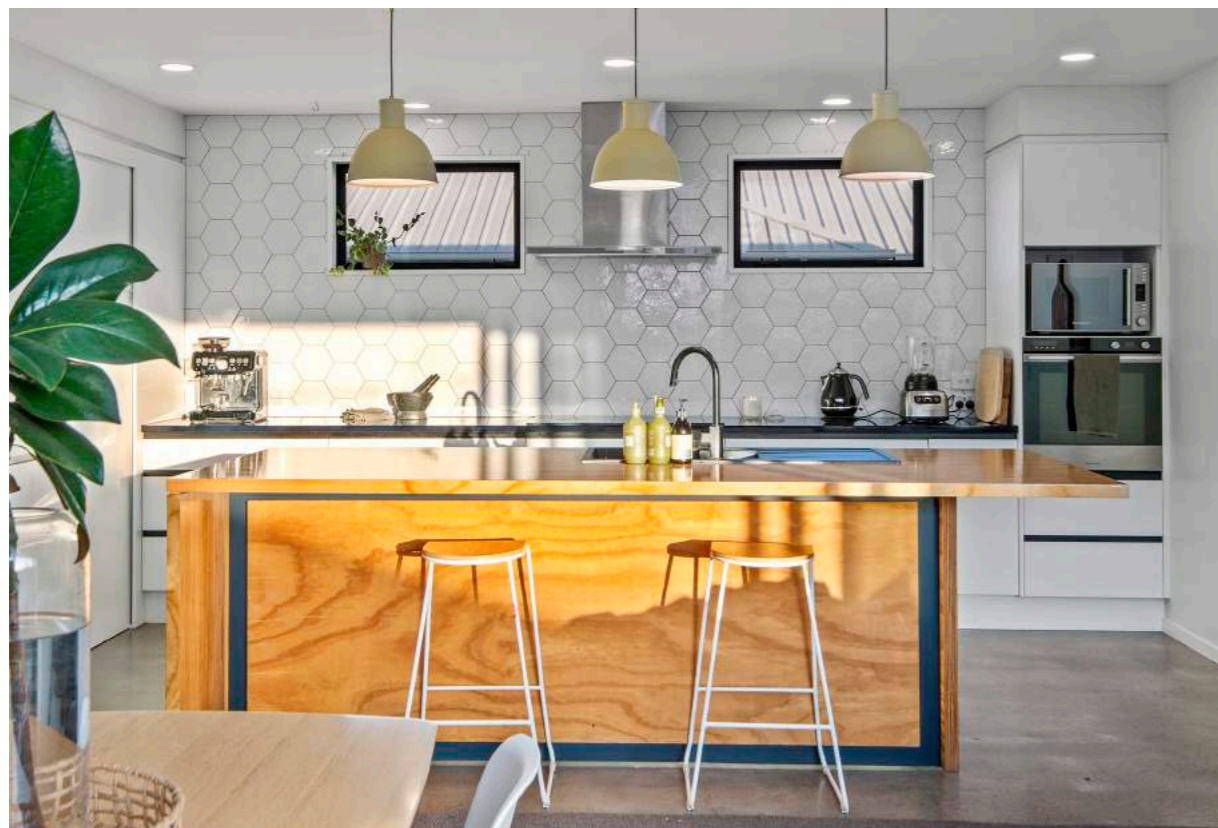
Architectural flair & affordability from every angle

Auction 4:30pm Thursday 23rd June at 149 Victoria St, Christchurch. Unless sold prior. All conditional offers welcomed post auction.

Designed with the utmost attention to style and detail, 56 Riverstone Drive delivers a desirable entertainer's layout in a well-established family setting. After comfortably residing here, our vendors are relocating for work, so auction action is required. Conditional offers will be presented post auction - if not sold prior. Remainder of the Halo 10 year warranty will be transferable on sale.

Showcasing this commitment to comfort and quality, the home's lavish proportions and superb finishes come together to create the ideal family home. The central living hub has a social orientation. The well-appointed kitchen delivers a bespoke island bench with broad preparation areas and effortlessly oversees dining and the relaxed day lounge. The pitched ceiling, generous glazing and twin sliding doors fill the home with natural light with a feeling of spaciousness from the 217 sqm (Approx.) floor plan.

The luxuriously appointed main suite comes equipped with a walk-in-wardrobe, a lavish ensuite and a outlook bathed in the afternoon sun. A further three double bedrooms, including an adjoining bathroom and separate toilet, successfully ensures no accommodation shortage. This layout offers exceptional versatility for families of all sizes, with a secluded second lounge, practical laundry and a home office or study nook ensuring everyday peace or productivity.



This property ticks every box with an oversized double garage and plenty of parking options for the toys. The 653 sqm (Approx.) section is easy-care and enjoys excellent privacy and a picturesque green outlook from every angle, perfect for children and pets to run free. With architectural flair and affordability from every angle, enquire today.

Please be aware that this information may have been sourced from Core Logic /Land Information New Zealand/ Local Council and we may not have been able to verify the accuracy of the same. Refer to our Passing Over of Information Statement. Calder & Co Residential Powered by Agent X Licensed Agent REAA 2008.

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Calder & Co.
RESIDENTIAL



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD**

**Guaranteed Search Copy issued under Section 60 of the Land
Transfer Act 2017**




R.W. Muir
Registrar-General
of Land

Identifier 785547
Land Registration District Canterbury
Date Issued 14 August 2017

Prior References
316132

Estate Fee Simple
Area 653 square metres more or less
Legal Description Lot 18 Deposited Plan 510089

Registered Owners
Amy Lee Nomdo and Ulrich Karl Nomdo

Interests

Subject to Part IV A Conservation Act 1987

Appurtenant hereto is a right of way, right to drain sewage and a right to convey water, electric power and telephonic communications specified in Easement Certificate A204853.21 - 14.11.1995 at 12:12 pm

The easements specified in Easement Certificate A204853.21 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Transfer A204853.22 - 14.11.1995 at 12:12 pm

Appurtenant hereto are rights of way, rights to drain water and sewage and rights to convey water, electricity, computer media, telecommunications and liquid petroleum gas created by Easement Instrument 6691810.12 - 15.12.2005 at 9:00 am

Appurtenant hereto are rights to drain sewage created by Easement Instrument 6718862.3 - 17.1.2006 at 9:00 am

10808174.8 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 14.8.2017 at 2:54 pm

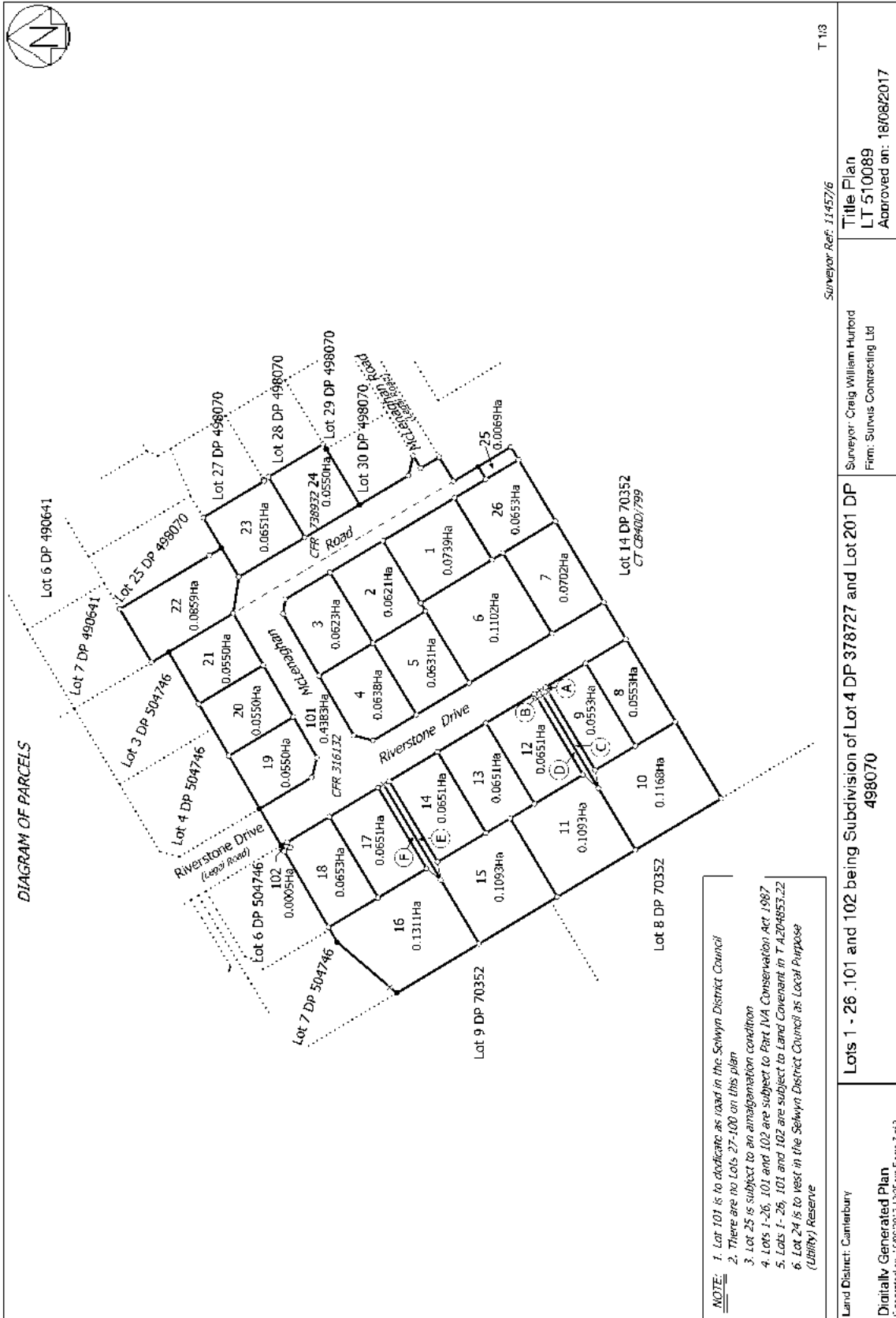
Land Covenant in Easement Instrument 10808174.12 - 14.8.2017 at 2:54 pm

Fencing Covenant in Easement Instrument 10808174.12 - 14.8.2017 at 2:54 pm

11211027.1 Court Order Varying Land Covenant in Transfer A204853.22 - 24.8.2018 at 7:00 am

12222677.1 Court Order modifying Land Covenant in Transfer A204853.22 - 15.9.2021 at 12:31 pm

12221686.3 Mortgage to ASB Bank Limited - 1.10.2021 at 2:50 pm



Form 7

Code Compliance Certificate

Section 95, Building Act 2004

The Building

Street address of building: 56 Riverstone Drive, Rolleston

Legal description of land where building is located: of S/D of Lot 4 DP 378727

Building name: N/A

Location of building within site/block number: 56 Riverstone Drive
Rolleston

Level/unit number: N/A

Current, lawfully established, use: 2.0 Housing: 2.0.2 Detached Dwelling

Number of Occupants: N/A

Year first constructed: 2017

The Owner

Name of owner: R L & L L Harvey

Contact person: Regan Harvey

Mailing address: 18 Mendip Place , Casebrook , Christchurch

Street address/registered office: N/A

Phone number: N/A

Mobile: 0272137638

Facsimile number: N/A

Email address: regan.harvey@moveologistics.co.nz

First point of contact for communications with the council/building consent authority: Lance Dixon (Dixon Design Ltd); Mailing Address: 704 Hills Rd

Christchurch 8051; Phone: 3862502; Email: dixondesign@xtra.co.nz

Building Work

Building consent number: 171688

Description: 4 Bedroom Domestic Dwelling with Attached Garage

Issued by: Selwyn District Council

Code Compliance

The building consent authority named below is satisfied, on reasonable grounds, that -

- the building work complies with the building consent.

Aaron Brown

Building Consent Officer

On behalf of: Selwyn District Council

Issue Date: 23 Apr 2018

Approved Building Consent Documents

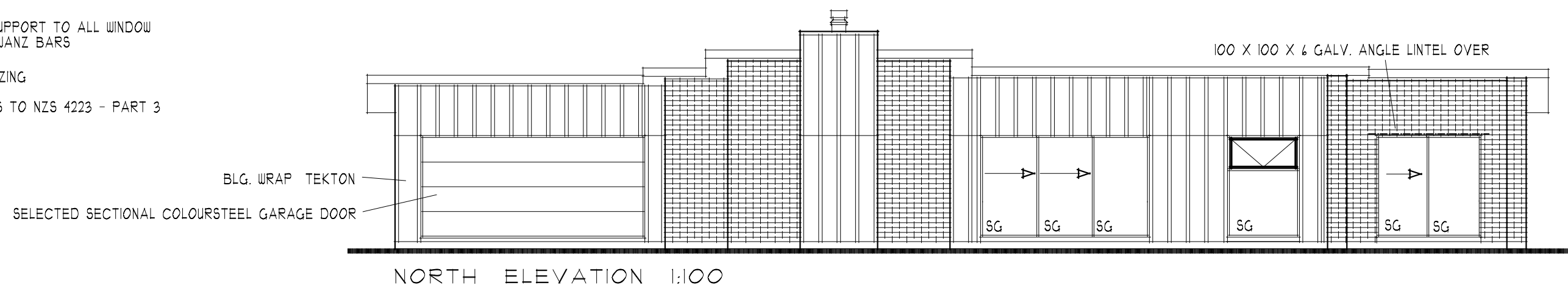
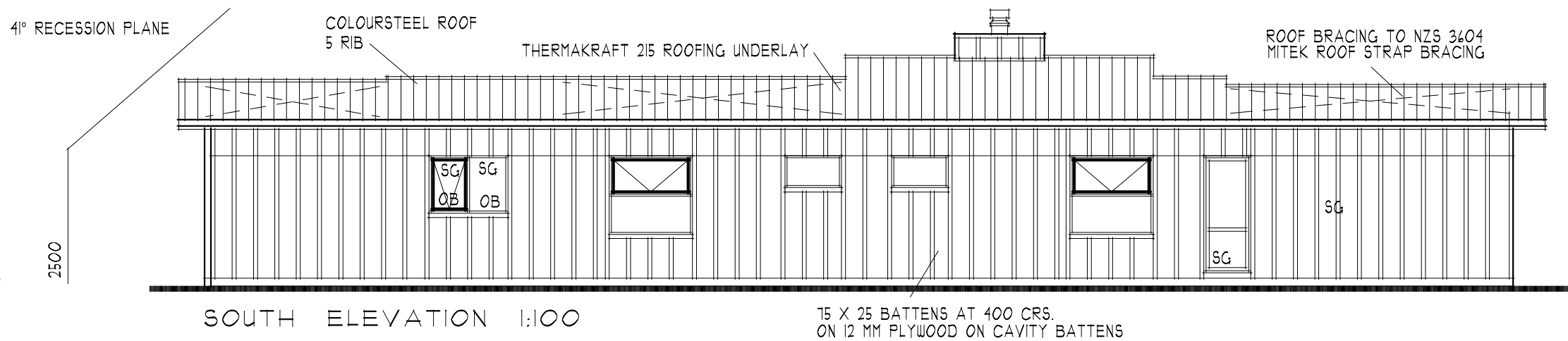
Please Note: A copy of the stamped approved documents must be available on site for all inspections.

INSPECTION BOOKING TIMEFRAMES		
Telephone 03 347 2839		
Call received	<i>Before 3pm inspection will be done</i>	<i>After 3pm inspection will be done</i>
Monday	Wednesday	Thursday
Tuesday	Thursday	Friday
Wednesday	Friday	Monday
Thursday	Monday	Tuesday
Friday	Tuesday	Wednesday

-BUILDING WRAP IS TO BE FIXED OVER SILLS AND OPENING STUDS
 -FLEXIBLE FLASHING TAPE IS REQUIRED TO LINTELS AND 250 MM DOWN OPENING STUDS AT EITHER END
 -FLEXIBLE FLASHING TAPE IS REQUIRED TO SILL TRIMERS AND 150 MM UP OPENING STUDS AT EITHER END
 - FLASHING TAPE IS ALSO REQUIRED 250 MM IN EITHER DIRECTION AT UPPER CORNERS OF WINDOWS AND DOORS
 - AS THE BUILDING WRAP / PAPER EXTENDS AROUND AND IS FIXED TO THE UNDERSIDE OF THE LINTEL THE HEAD FLASHINGS NEED TO BE SEALED TO THE BUILDING WRAP WITH 50 MM WIDE FLASHING TAPE

WANZ BARS
 - ADDITIONAL SILL SUPPORT TO ALL WINDOW / DOOR JOINERY IE WANZ BARS

OB OBSCURE GLAZING
 SG SAFETY GLASS TO NZS 4223 - PART 3



CORROSION ZONE C
 WIND ZONE - MEDIUM
 EARTHQUAKE ZONE - 2
 SNOW ZONE - N4 46.00 M

NORTH ELEVATION

RISK FACTOR	LOW	MEDIUM	HIGH	VERY HIGH
WIND ZONE			1	
NUMBER OF STOREYS	0			
ROOF/WALL INTERSECTION DESIGN	0			
EAVES WIDTH				5
ENVELOPE COMPLEXITY			3	
DECK DESIGN	0			
TOTAL RISK FACTOR	9			

SOUTH ELEVATION

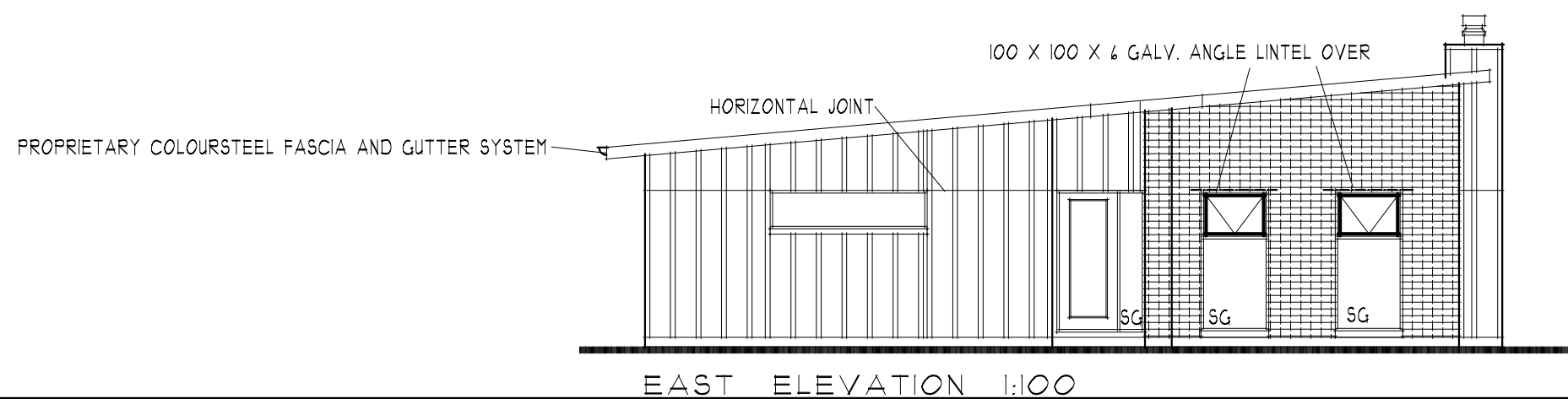
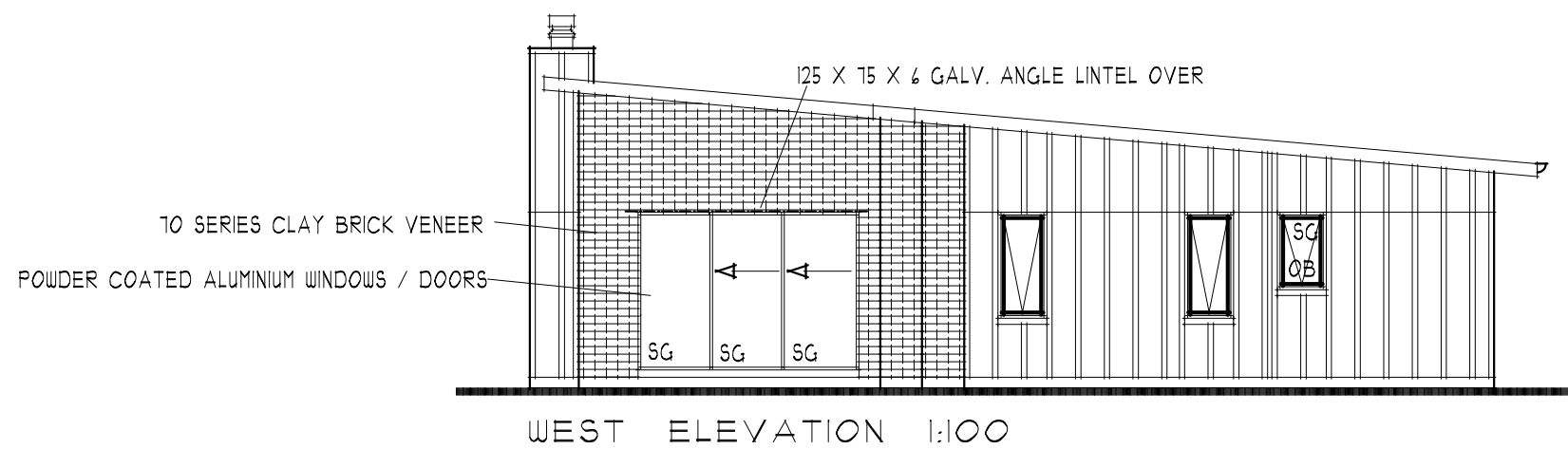
RISK FACTOR	LOW	MEDIUM	HIGH	VERY HIGH
WIND ZONE			1	
NUMBER OF STOREYS	0			
ROOF/WALL INTERSECTION DESIGN			3	
EAVES WIDTH				5
ENVELOPE COMPLEXITY			3	
DECK DESIGN	0			
TOTAL RISK FACTOR	12			

WEST ELEVATION

RISK FACTOR	LOW	MEDIUM	HIGH	VERY HIGH
WIND ZONE			1	
NUMBER OF STOREYS	0			
ROOF/WALL INTERSECTION DESIGN			3	
EAVES WIDTH				5
ENVELOPE COMPLEXITY			3	
DECK DESIGN	0			
TOTAL RISK FACTOR	12			

EAST ELEVATION

RISK FACTOR	LOW	MEDIUM	HIGH	VERY HIGH
WIND ZONE			1	
NUMBER OF STOREYS	0			
ROOF/WALL INTERSECTION DESIGN			3	
EAVES WIDTH	0			5
ENVELOPE COMPLEXITY			3	
DECK DESIGN	0			
TOTAL RISK FACTOR	12			

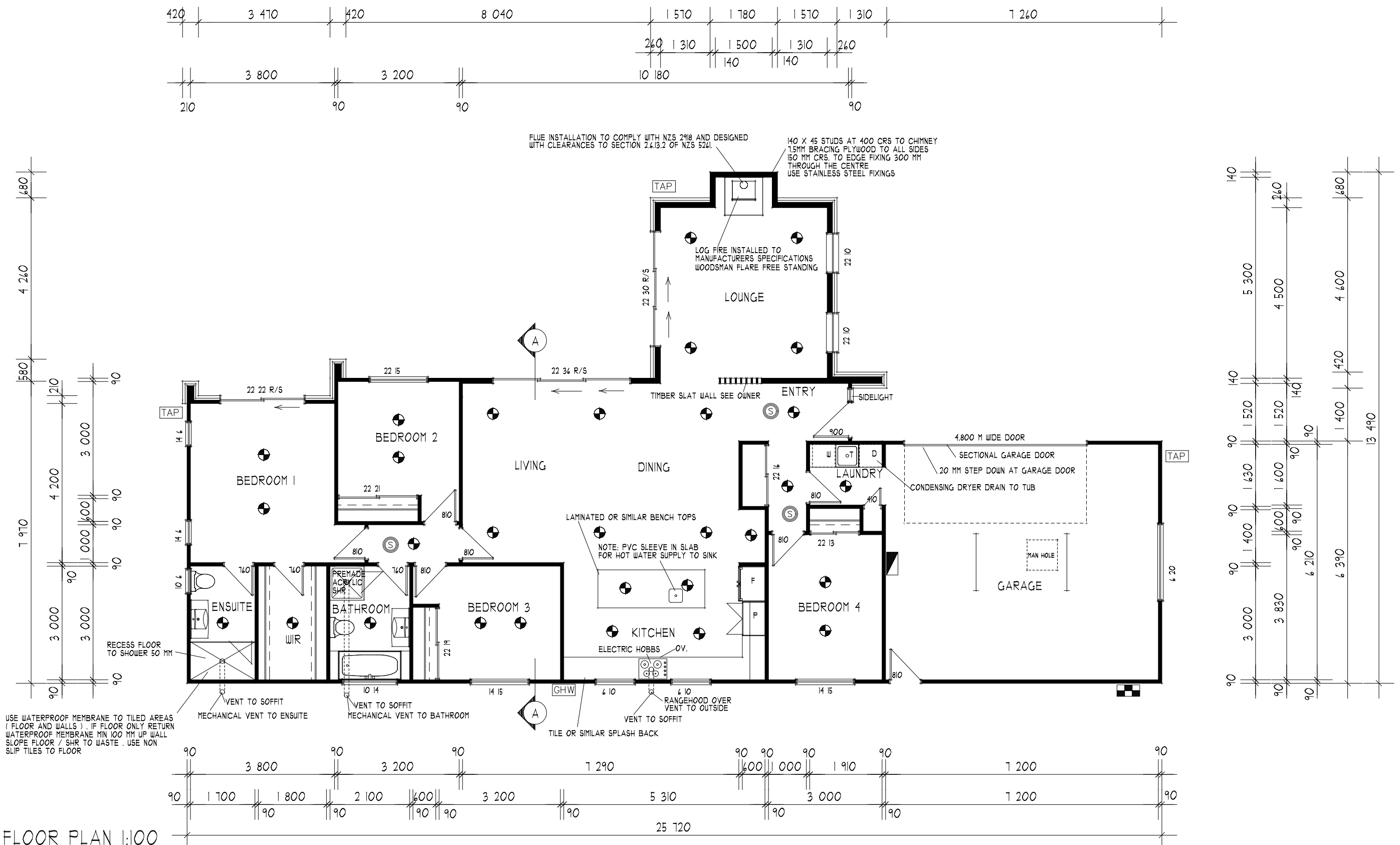


DIXON DESIGN LTD.
 704 HILLS ROAD
 CHRISTCHURCH 8051
 PH/FAX 03 386 2502
 EMAIL dixondesign@xtra.co.nz

HARVEY RESIDENCE LOT 18 RIVERSTONE DRIVE ROLLESTON

SHEET: **1** OF **11**
 DRAWN: DATE: JULY 2017
 REF. NO.: 201711

ALL PLANS TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ENGINEER'S DETAILS. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK. WRITTEN DIMENSIONS ARE TO TAKE PRIORITY OVER SCALED DIMENSIONS



FLOOR PLAN 1:100

LEGEND:

- SMOKE ALARM
- DOWNLIGHT
- FLUORESCENT LINER LIGHT FITTING
- TAP
- DISTRIBUTION BOARD
- METER BOX
- GAS HOT WATER

SMOKE ALARM:
TO BE INSTALLED TO NZBC F1 ASI 3.1, 3.2, 3.3, 3.4 WITH HUSH FACILITY

DOWNLIGHTS TO BE CA RATED

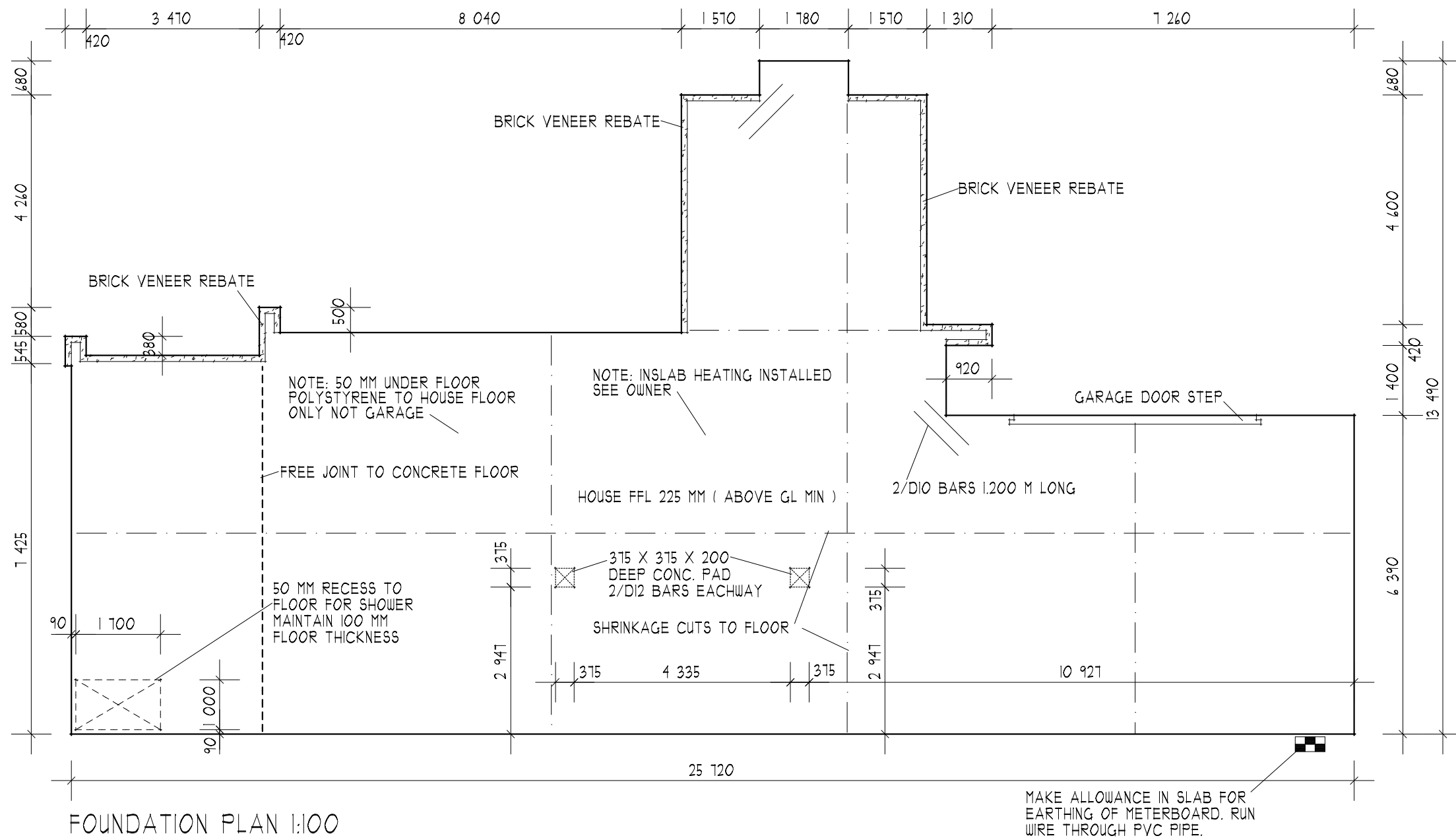
FITTINGS SHALL BE CA 80, CA 135, IC OR IC-F FOR RESIDENTIAL INSTALLATIONS AS SPECIFIED IN AS/NZS 4059:2.2.

LIGHTING MIN LUMINANCE PER M² AS PER NZBC G8/ASI TABLE 1

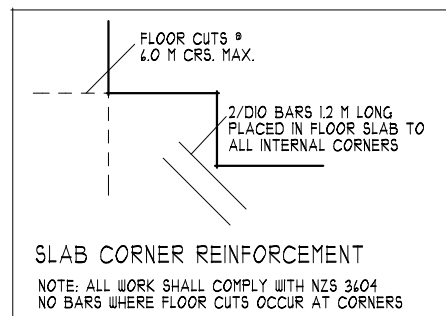
FLOOR FINISH

- ENSUITE FLOOR VINYL OR TILES
- BATHROOM FLOOR VINYL OR TILES
- KITCHEN FLOOR VINYL OR TILES
- LAUNDRY FLOOR VINYL OR TILES

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NOTE:
 ALL DIMENSIONS OVER FOUNDATION FACE.
 ALLOW TO MM VENEER AND 50 MM CAVITY TO AREAS SHOWN.
 MESH TO BE SUPPORTED BY PLASTIC CHAIRS AT 800 CRS.
 FOUNDATION STEEL TO BE SUPPORTED WITH WIRE TIES
 ALL REINFORCING TO BE DUCTILITY CLASS E
 THE MAXIMUM PLAN DIMENSION OF CONCRETE BETWEEN CONSTRUCTION JOINTS / SHRINKAGE CONTROL JOINTS IS 4M TO SLAB
 SUPPLEMENTARY REINFORCING TO INTERNAL CORNERS TO COMPLY WITH NZS 3404 CLAUSE 15.8.4.2
 CONTRACTOR TO CONSULT MANUFACTURERS DOCUMENTATION TO DETERMINE THE CORRECT LOCATION FOR ALL WASTES POSITIONED THROUGH FLOOR SLABS.



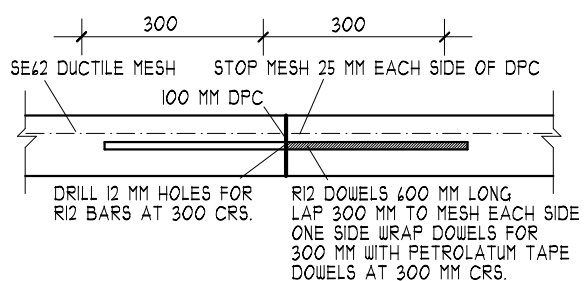
NOTE: ALL COPPER AND UPVC PIPES SHALL INCORPORATE EXPANSION JOINTS THE PROVISION DESCRIBED IN CHAPTER 8 OF NZS 1643 SHALL BE USED FOR UPVC PIPES. AT SUPPORTS, AND AT WALL AND FLOOR PENETRATIONS NOT INCORPORATING EXPANSION JOINTS, MOVEMENT SHALL BE ACCOMMODATED USING PIPE SLEEVES OR A DURABLE AND FLEXIBLE LAGGING MATERIAL

NOTE: SAWCUTS AVOID WET AREAS AND KITCHEN NOT TO GO UNDER BRACING WALLS
 20 MPA TO CONCRETE FLOOR
 20 MPA TO FOUNDATION , STEPS, PILES AND PADS

GROUND TO TOP OF FLOOR SLAB, AND PAVED TO FLOOR SLAB DIMENSIONS TO COMPLY WITH E2/AS1 AND OR NZS 3604

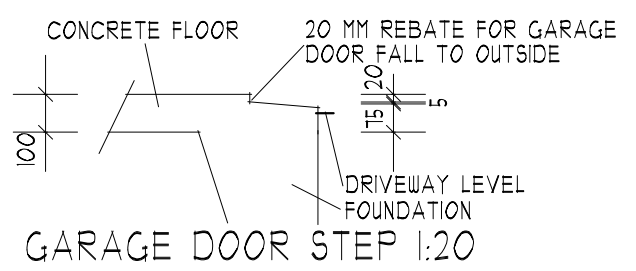
SEE TRUSS LAYOUT FOR LOADBEARING WALLS AND SLAB THICKENING / PAD DETAILS

MESH IN SLAB TO BE EARTHED. EARTH WITH 16 MM REO ROD BROUGHT UP INTO GARAGE WALL BELOW METERBOX AND WIRED TO THE MESH. AT PREWIRE , CONNECT A CLAMP AND PIECE OF WIRE TO THE ROD AND EARTH IT TO THE METERBOX.

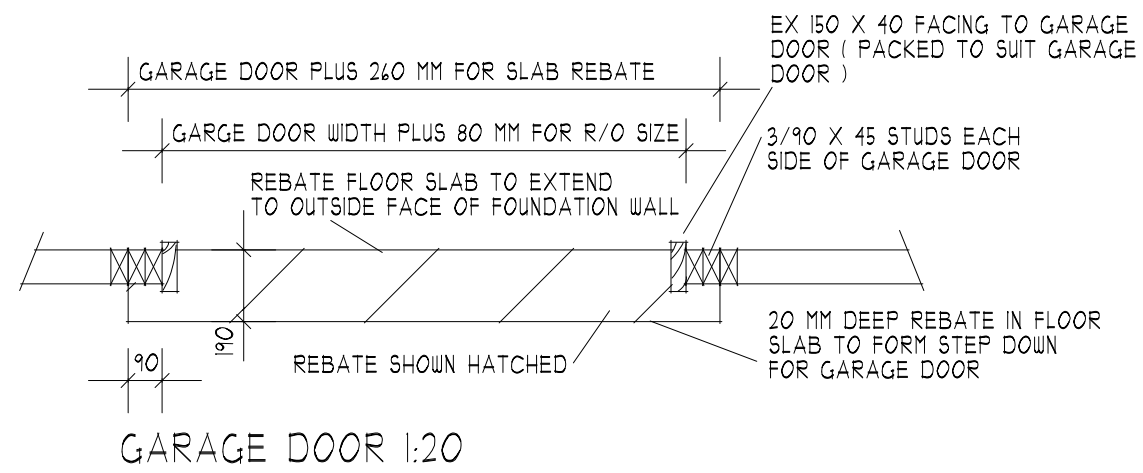


FLOOR FREE JOINT 1:10

FOUNDATION PLAN 1:100



GARAGE DOOR STEP 1:20



GARAGE DOOR 1:20

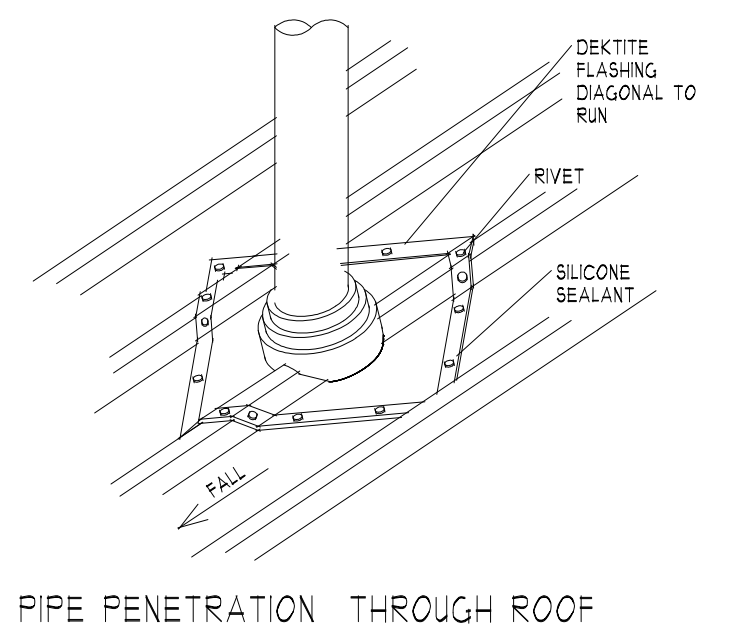
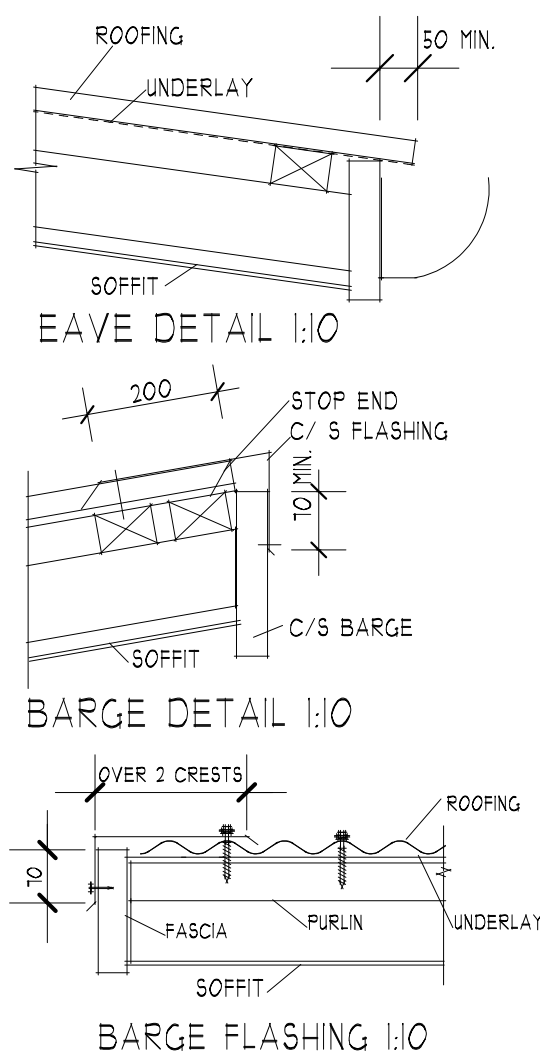
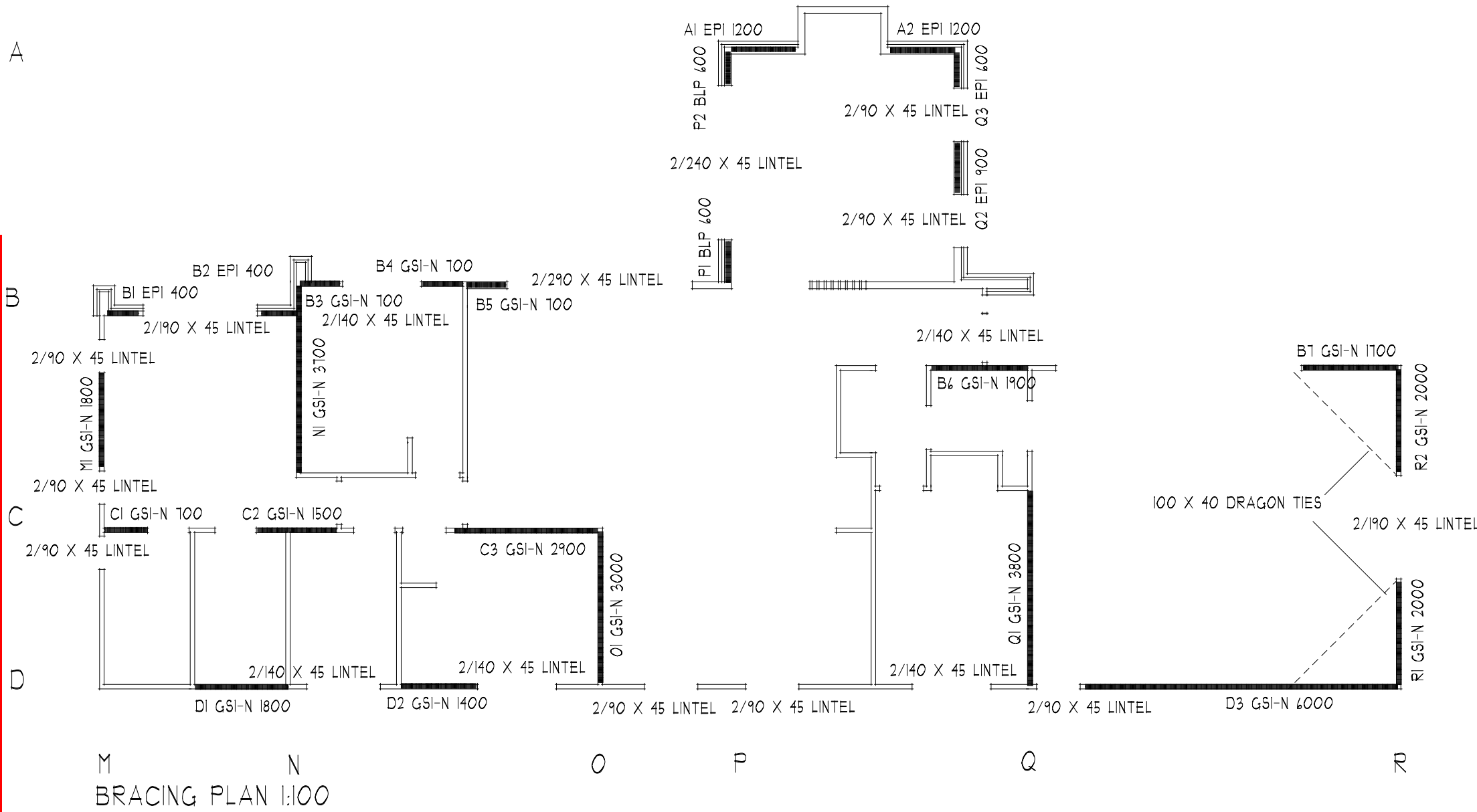
HARVEY RESIDENCE LOT 18 RIVERSTONE DRIVE ROLLESTON

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SHEET: **3** OF **11**
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ENERGY EFFICIENCY CALCULATION SHEET

CLIMATE ZONE 3

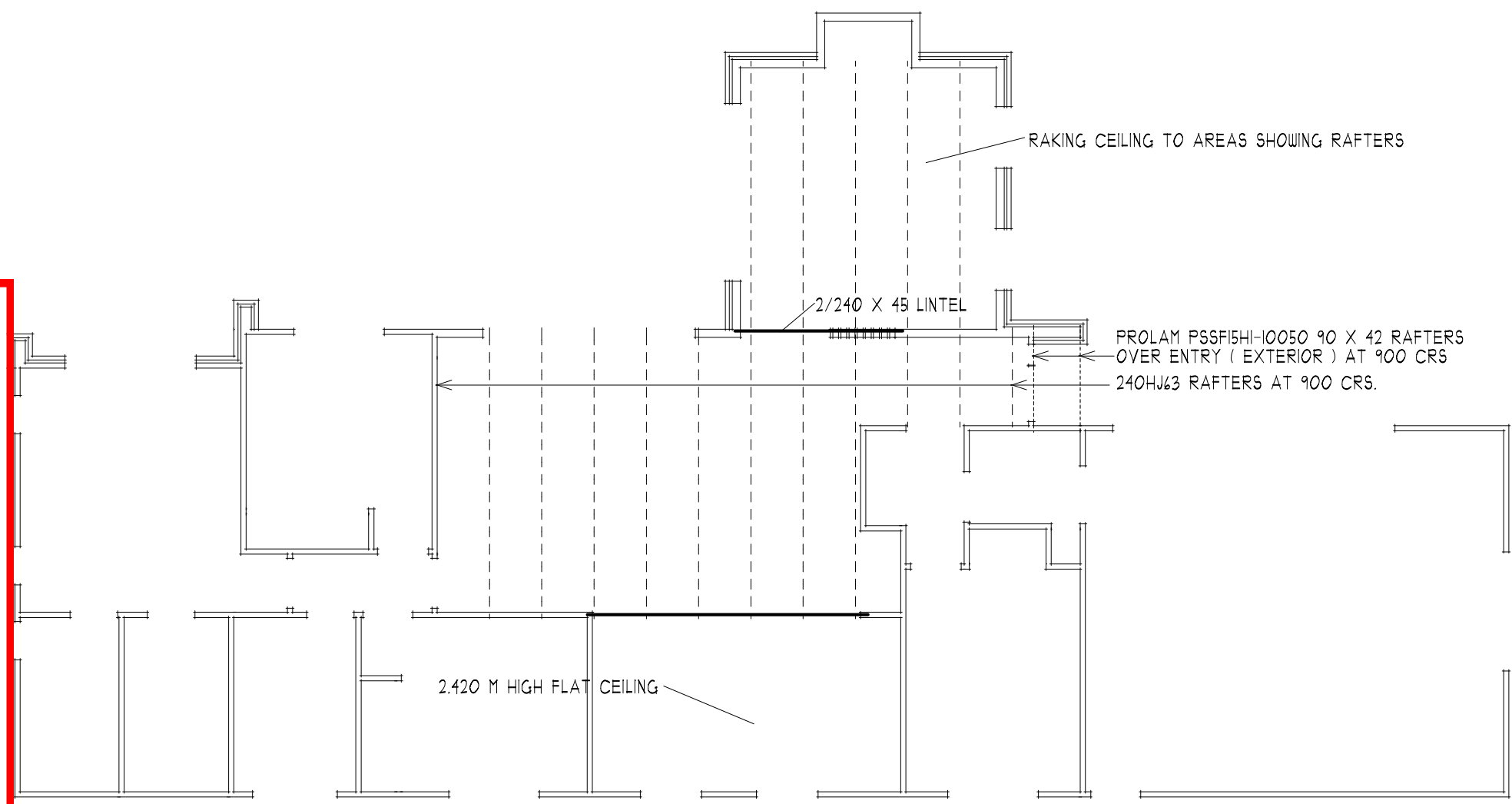
TOTAL AREA SKYLIGHTS	0	M ²
TOTAL AREA GLAZING INCLUDING SKYLIGHTS	39.22	M ²
TOTAL AREA OF WALLS	153.38	M ²
% GLAZING / WALL	25.51	%
TOTAL AREA GLAZING EAST , WEST & SOUTH WALLS	23.16	M ²
TOTAL AREA WALLS EAST , WEST & SOUTH	108.14	M ²
% GLAZING / WALL	21.41	%

NOTE: IF UNDER 30% WITH MAXIMUM AREA OF SKYLIGHTS OF 1.2 M² USE THE SCHEDULE METHOD

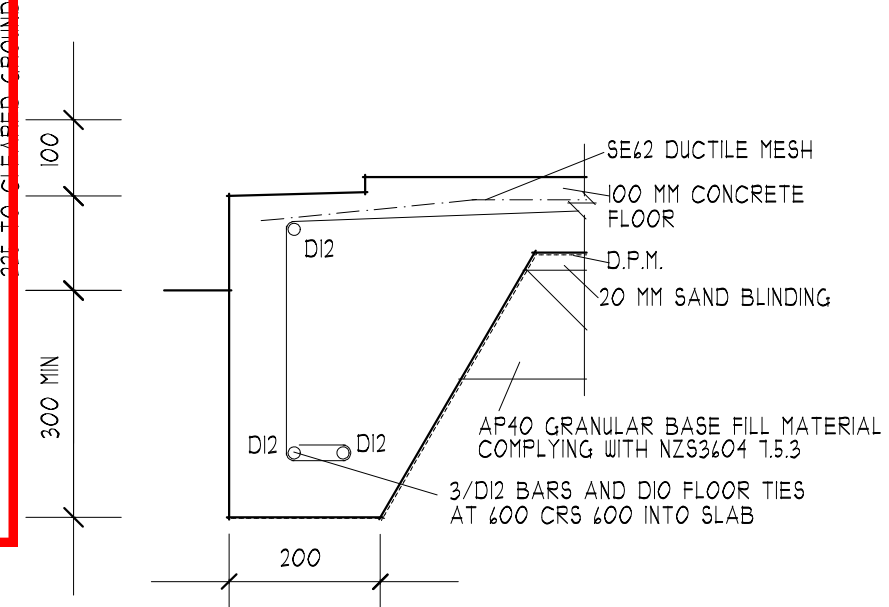
SOLUTION:
 ROOF R 3.6 WALL R 2.6 FLOOR R 1.3 GLAZING R 0.26

ALL TIMBER MEMBERS TO BE USED ARE SG8 UNLESS OTHERWISE SPECIFIED

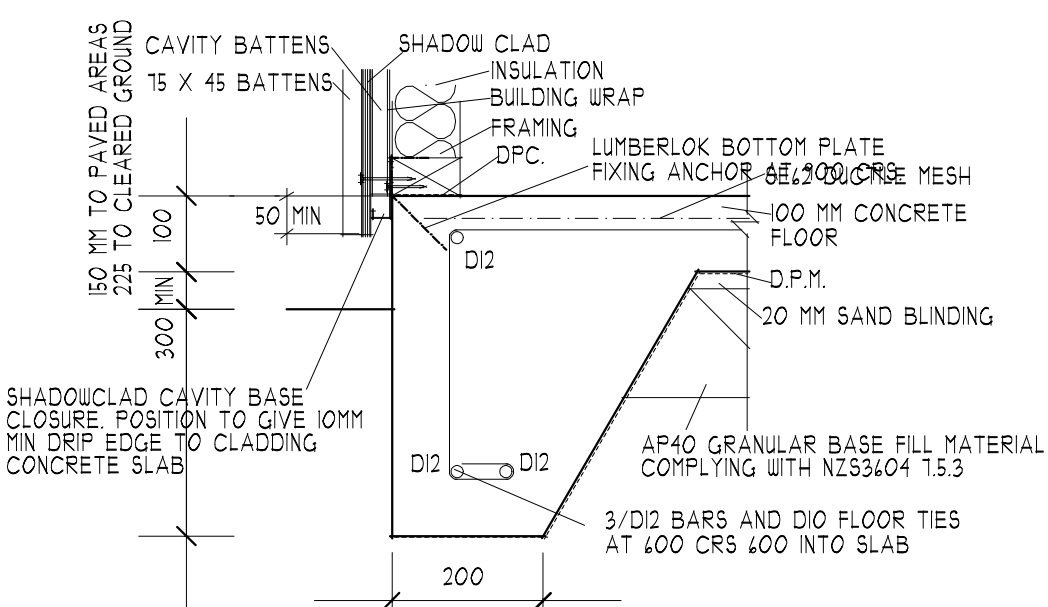
NOTE:
 FOR STUD TO TOP PLATE FIXING AND LINTEL FIXING SEE LUMBERLOK FIXING SCHEDULE IN SPECIFICATIONS



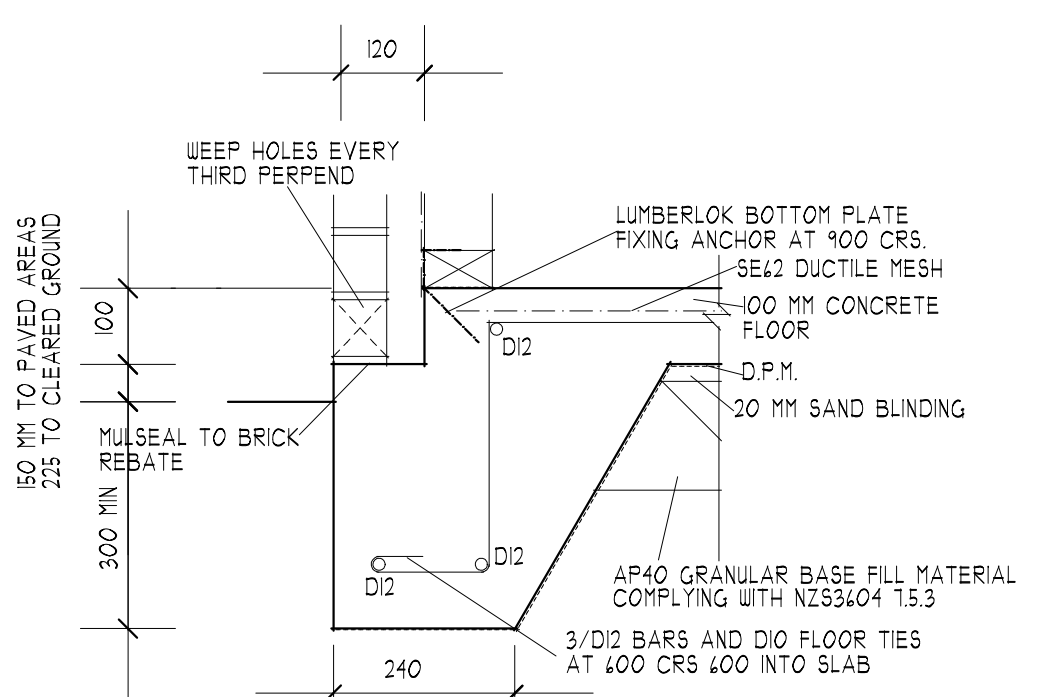
RAFTER LAYOUT 1:100



FOUNDATION DETAIL 1:10

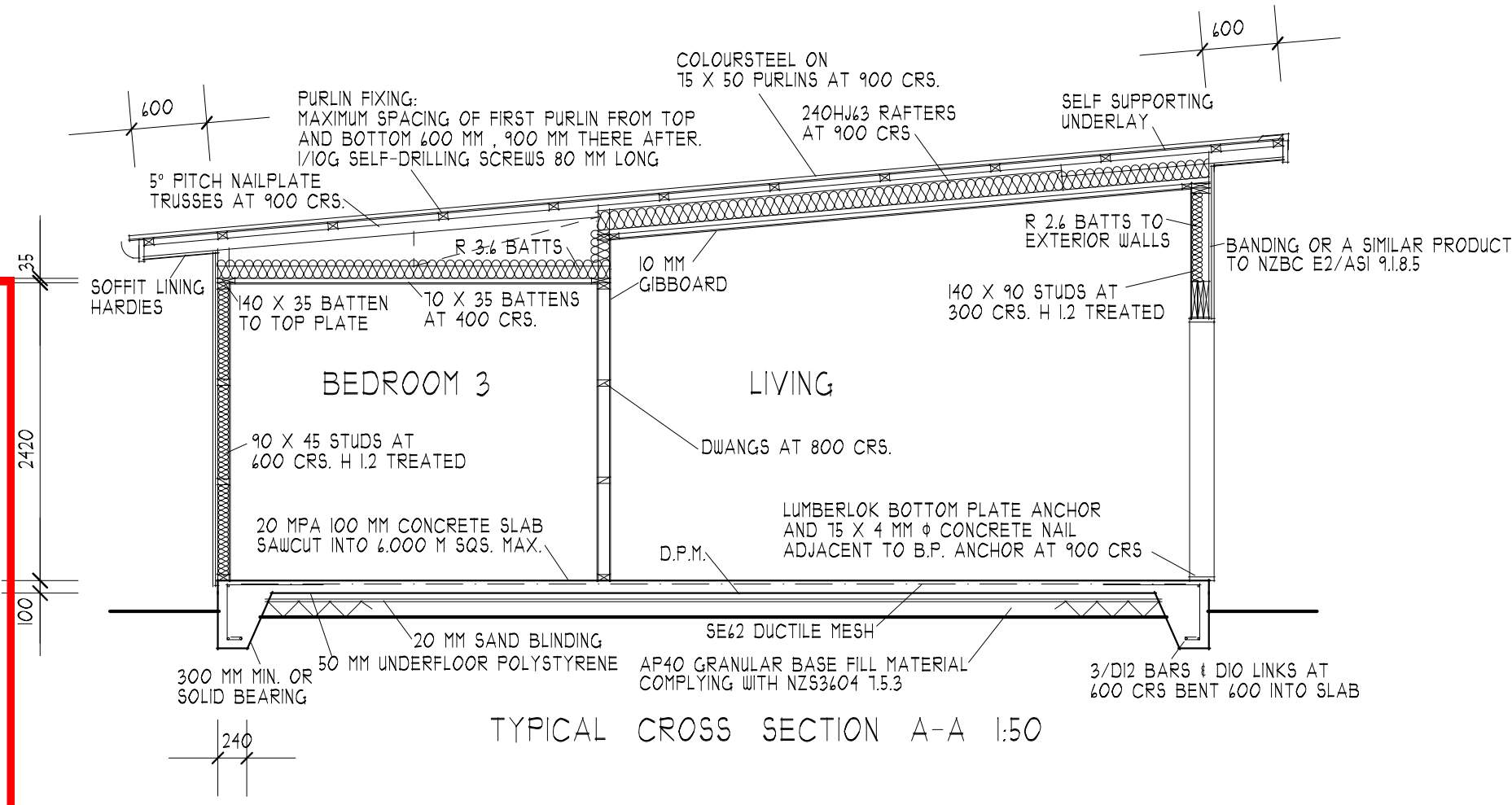


FOUNDATION DETAIL 1:10

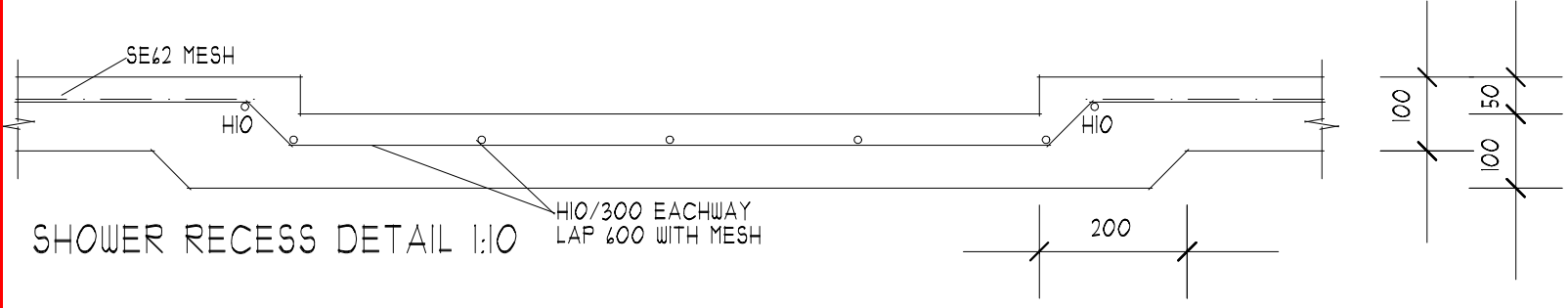


FOUNDATION DETAIL 1:10

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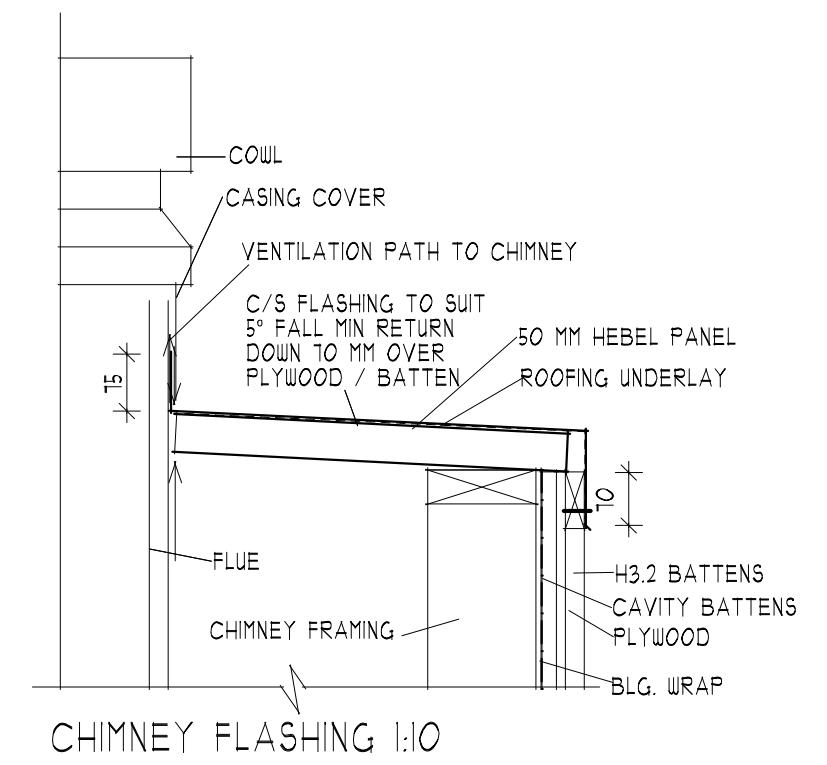


TYPICAL CROSS SECTION A-A 1:50

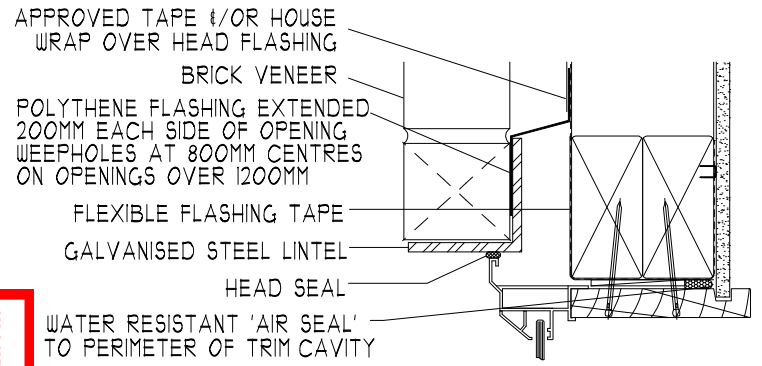


SHOWER RECESS DETAIL 1:10

GENERAL SCHEDULE OF TIMBER TREATMENT	
ELEMENT	TREATMENT, SPECIES
INTERIOR WALL FRAMING ROOF FRAMING, TRUSSES, CEILING JOISTS	RADIATA PINE OR DOUGLAS FIR H 1.2
EXTERIOR WALL FRAMING (REFER TO NZS 3602 FOR CLARIFICATION) ENCLOSED SKILLION ROOF PURLINS FRAMING SUPPORTING SHELF LINTELS AND THEIR ADJOINING AND SUPPORT MEMBERS, INCLUDING LOWER STOREY STUDS.	
BATTENS AND COVER BOARDS WALL CAVITY BATTENS ALUMINIUM WINDOW REVELS GARAGE DOOR JAMBS	H 3.2
ALL TIMBER USED IS TO BE TREATED AS REQUIRED BY NZS 3602 THIS TABLE IS INTENDED AS A SUMMARY OF THESE REQUIREMENTS ONLY. TREATMENT LEVELS SHOWN ARE THE MINIMUM LEVEL REQUIRED. HIGHER TREATMENT LEVELS MAY BE USED IF APPROPRIATE	

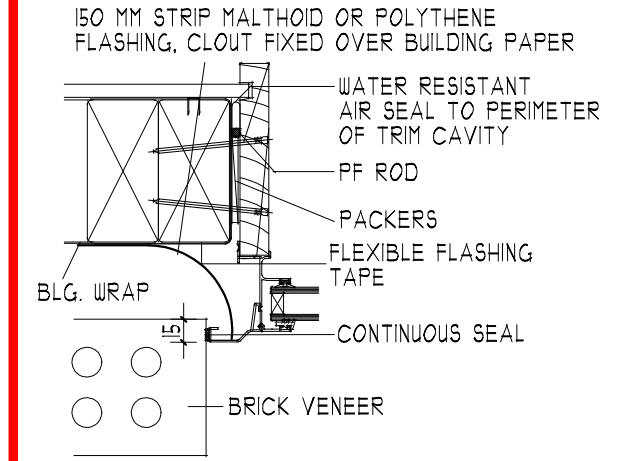


CHIMNEY FLASHING 1:10

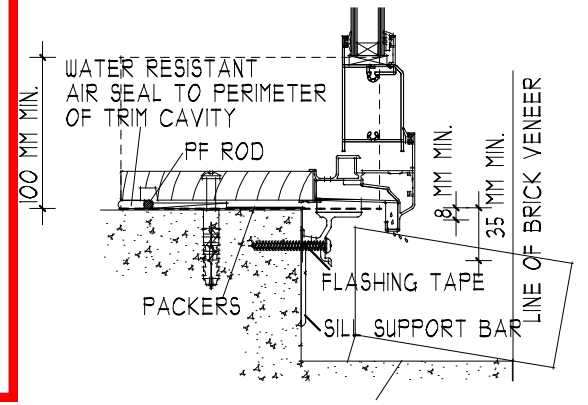


NOTE:
 FOR OPENINGS GREATER THAN 2.0M, PROVIDE A LANDING FOR THE LINTEL OF 200MM FOR EACH SIDE OF THE OPENING
 FOR OPENINGS LESS THAN 2.0M ALLOW 100MM EACH SIDE OF THE OPENING

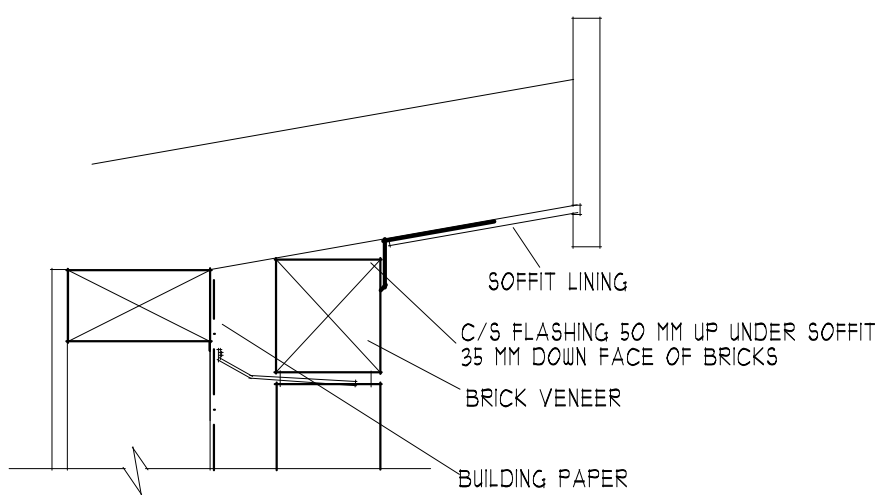
IMPORTANT:
 A. ALL LINTEL BARS MUST BE PROPPED UNTIL MORTAR IS SET (7 DAYS).
 B. IT IS IMPORTANT TO ALLOW THE FIRST 3 COURSES OF THE BRICKWORK OVER AN OPENING TO SET BEFORE LAYING ANY MORE BRICKS
 C. PROVIDE BRICK TIES WITHIN THE BOTTOM TWO COURSES.



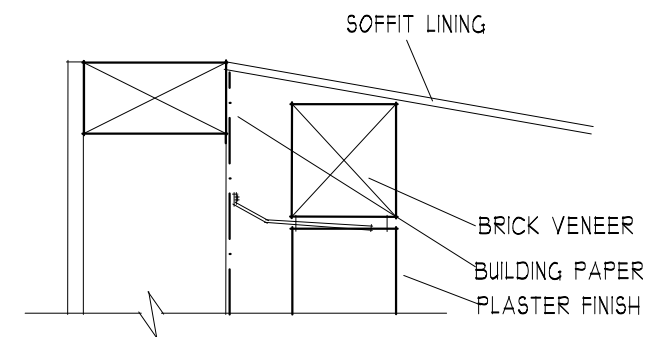
JAMB DETAIL 1:5



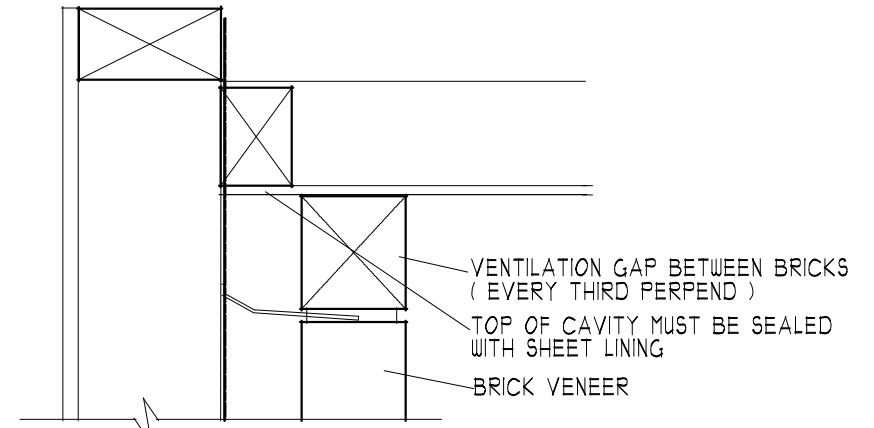
2 COATS OF BITUMEN EMULSION
 DOOR SILL DETAIL 1:5



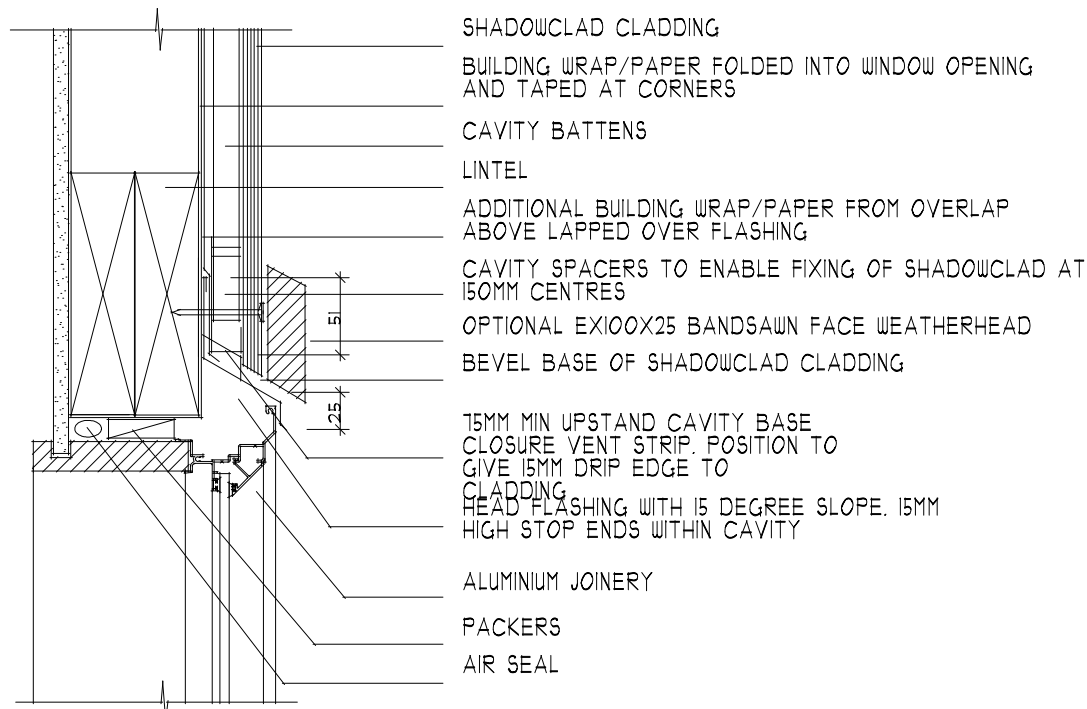
SOFFIT 1:5



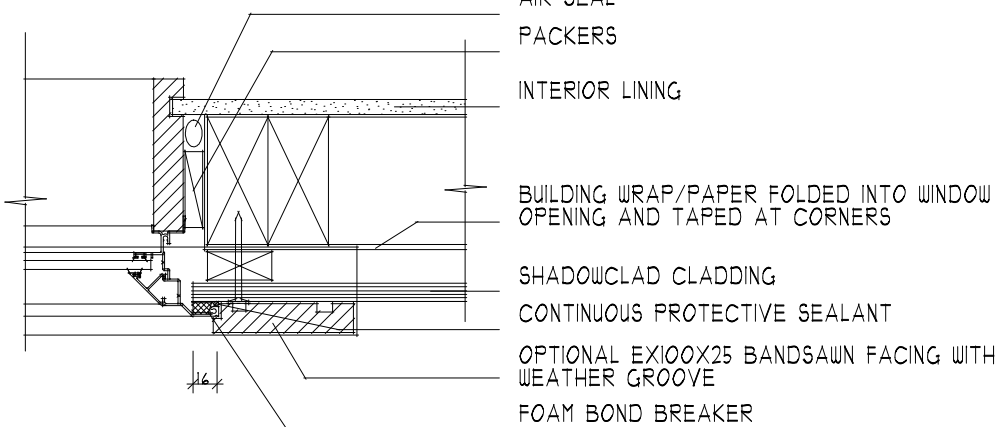
SOFFIT 1:5



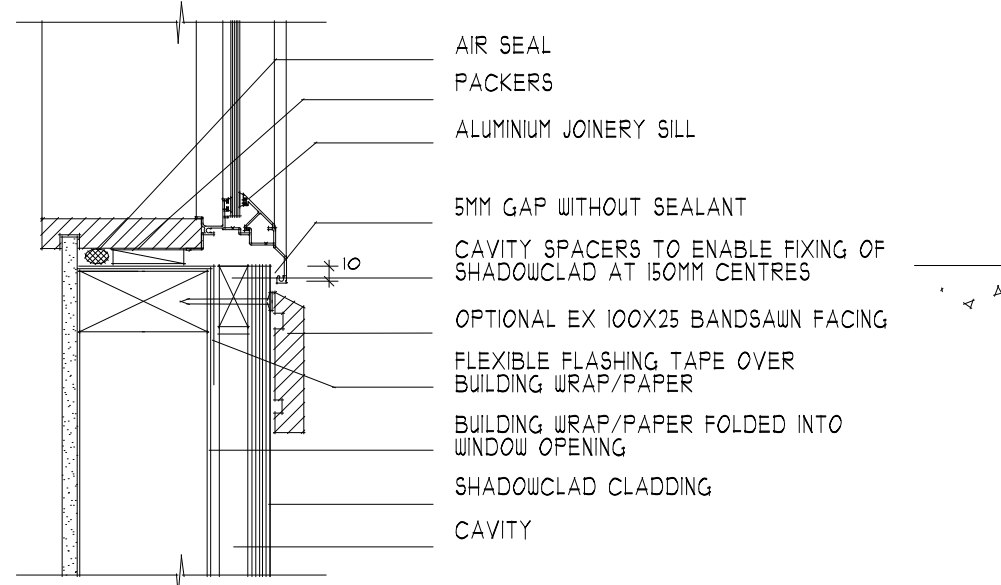
FLAT SOFFIT 1:5



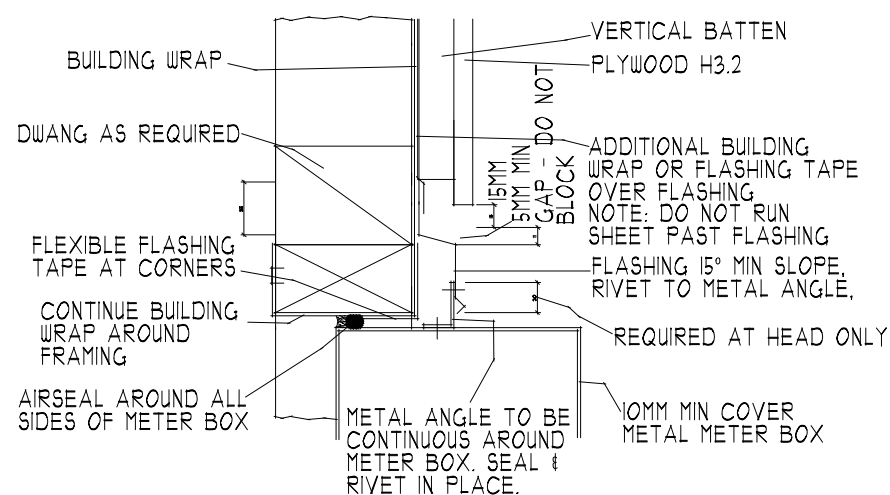
ALUMINIUM WINDOW HEAD DETAIL 1:5



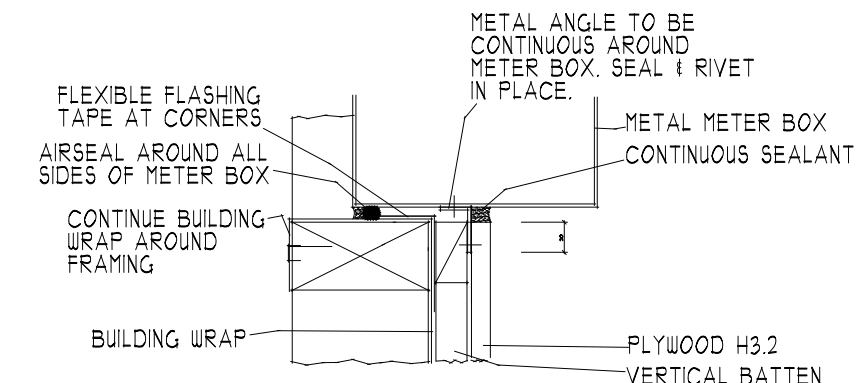
ALUMINIUM WINDOW JAMB DETAIL 1:5



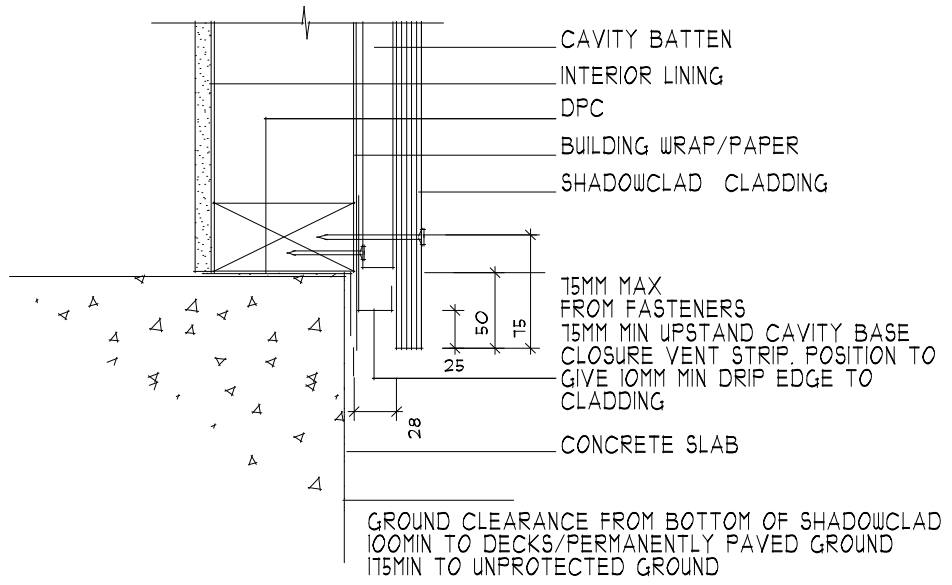
ALUMINIUM WINDOW SILL DETAIL 1:5



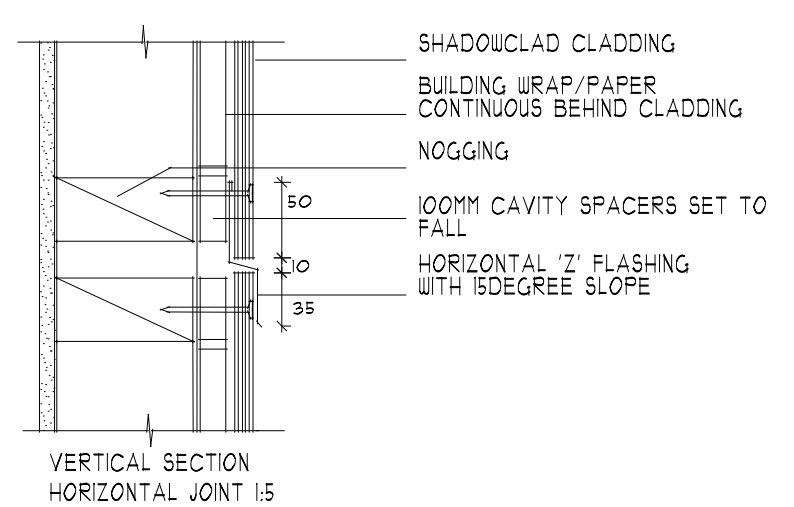
METER BOX AT HEAD 1:5



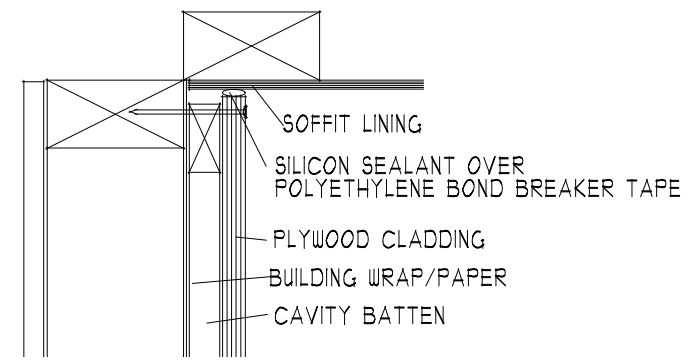
METER BOX AT SILL / JAMB 1:5



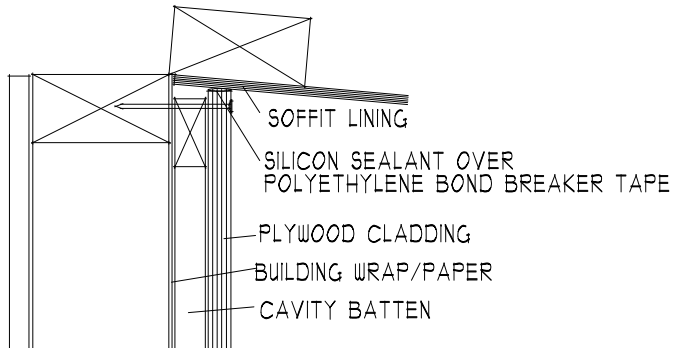
OVERHANGS AND GROUND CLEARANCE 1:5



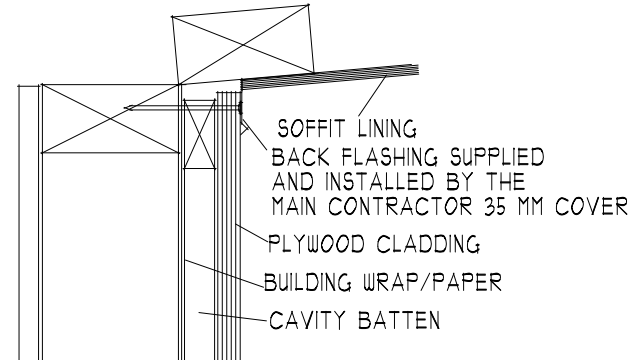
VERTICAL SECTION HORIZONTAL JOINT 1:5



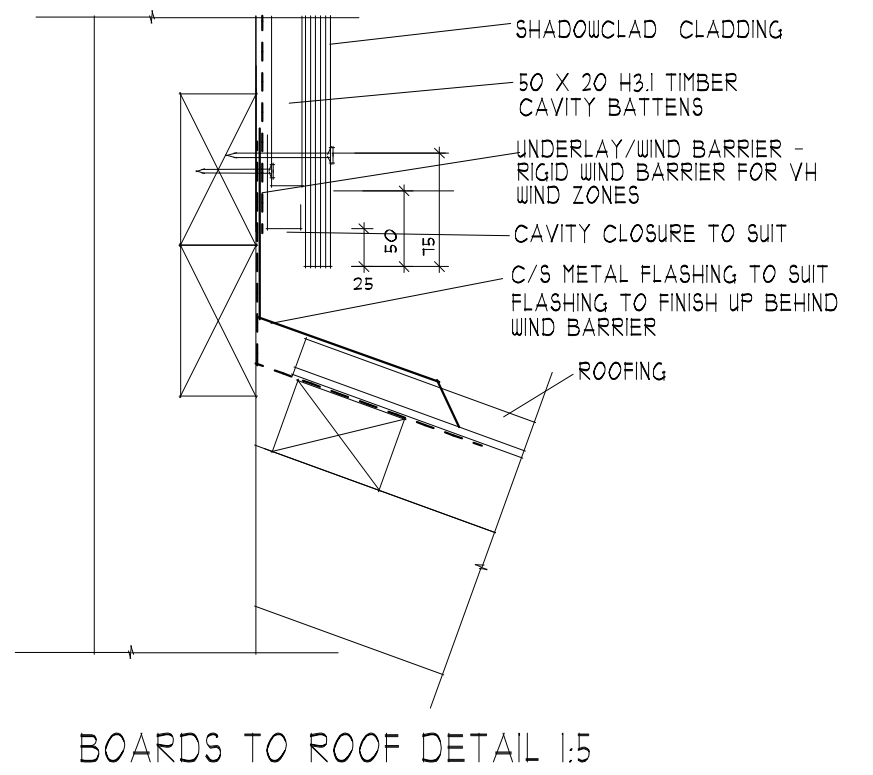
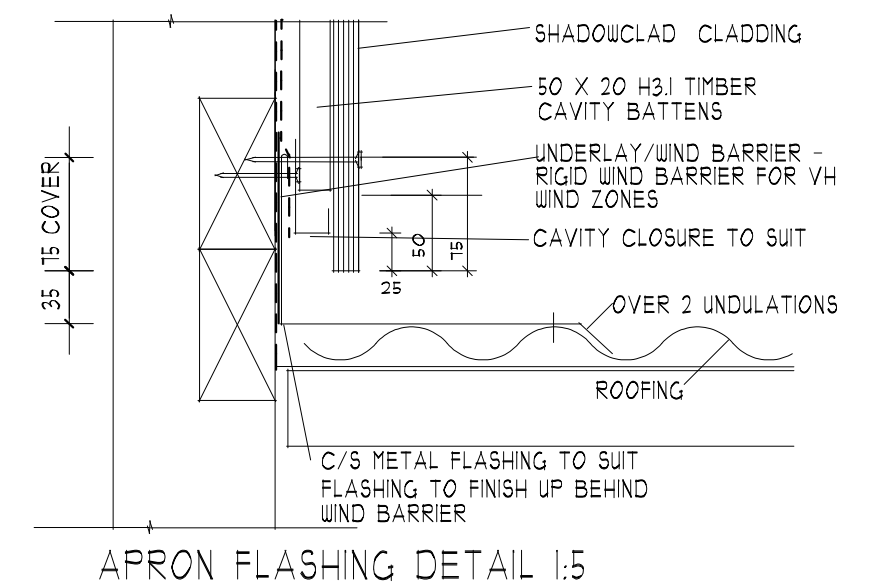
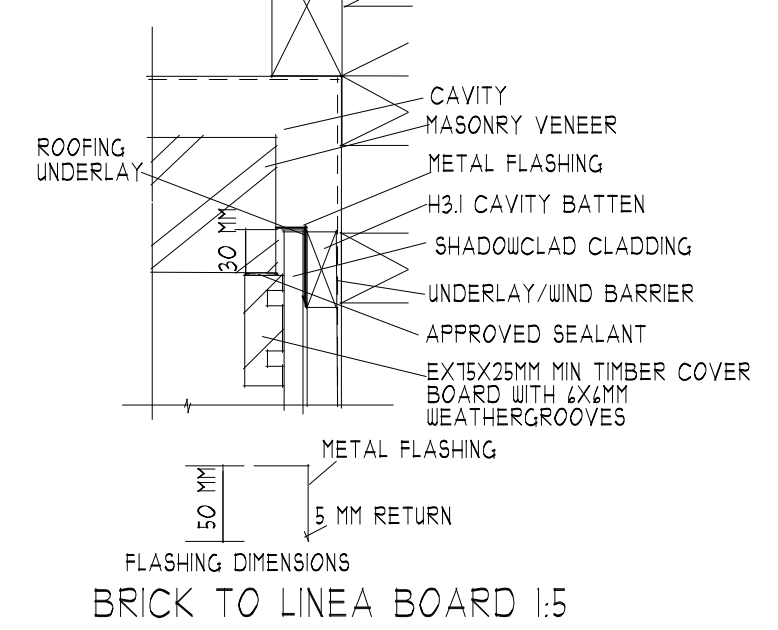
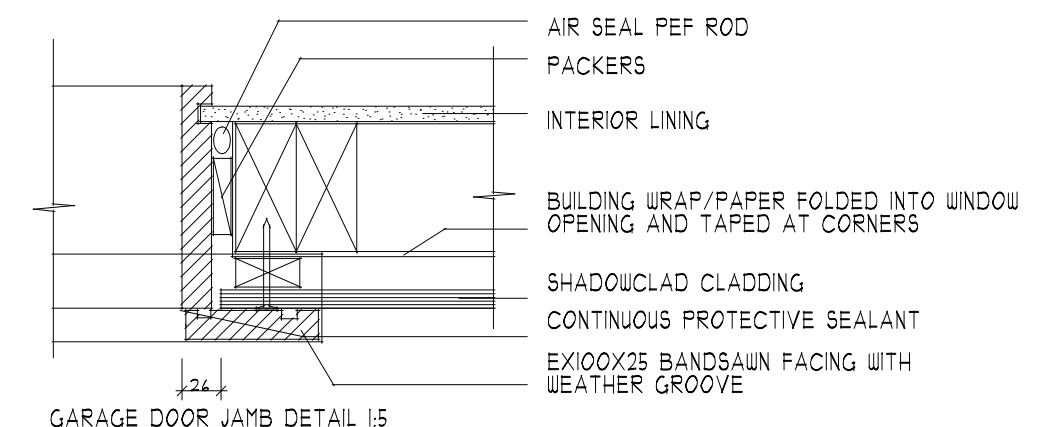
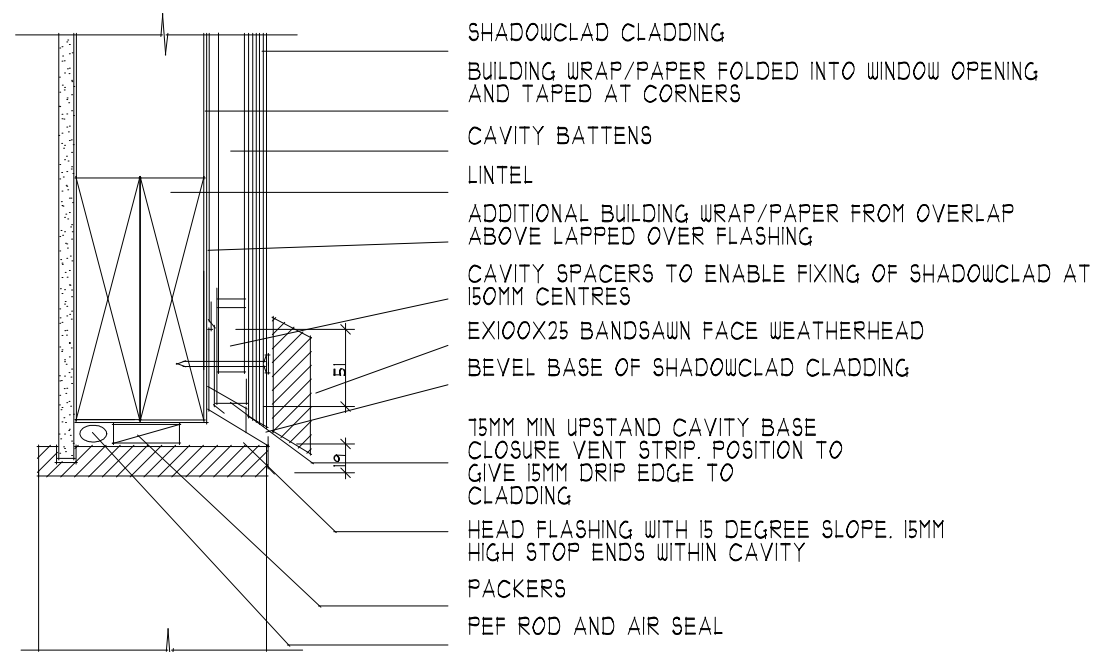
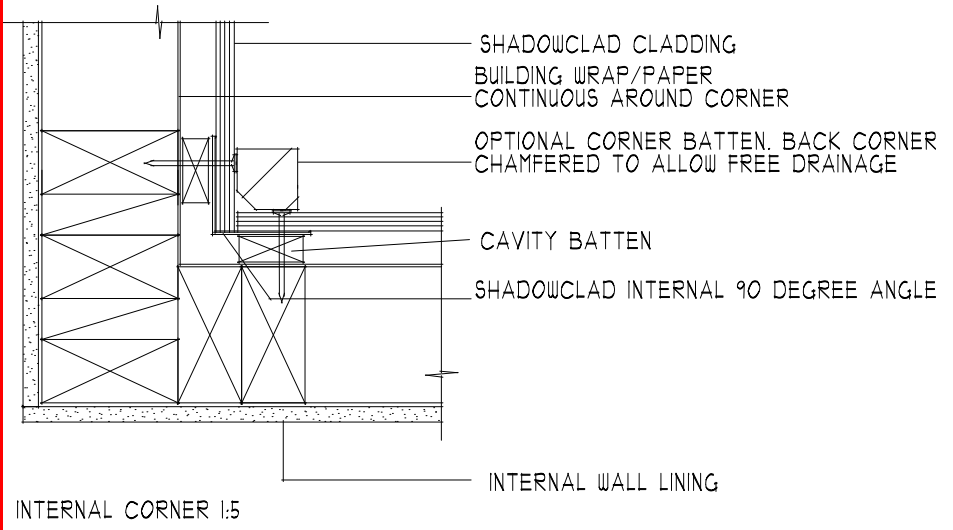
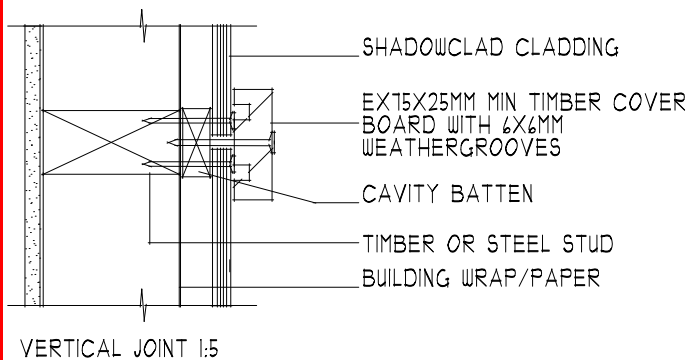
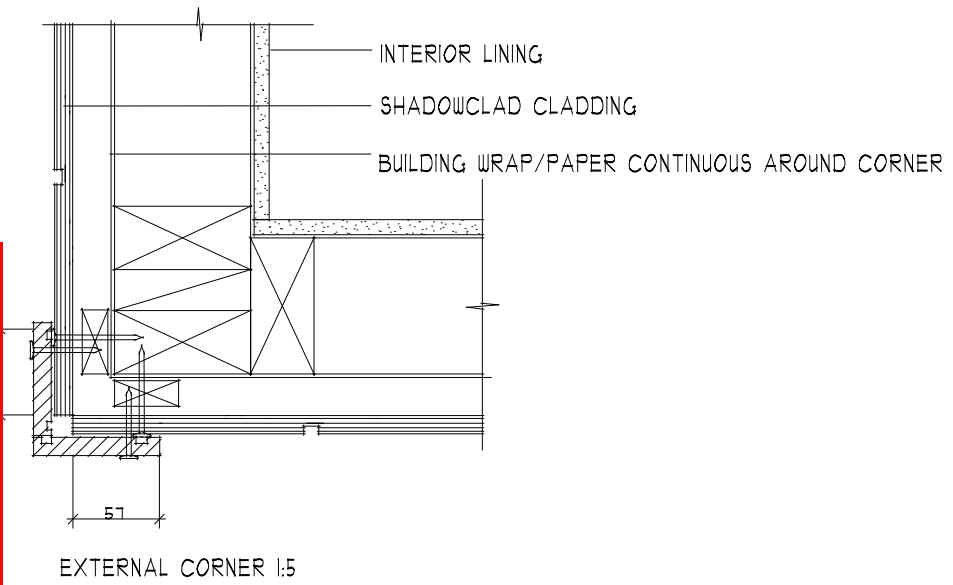
SOFFIT DETAIL 1:5



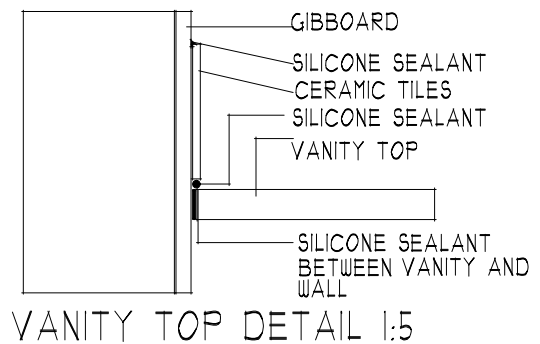
RAKING SOFFIT DETAIL 1:5



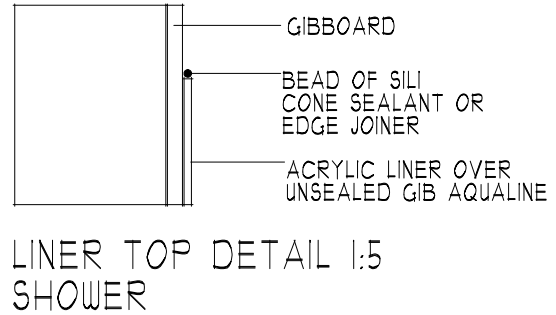
SOFFIT DETAIL 1:5



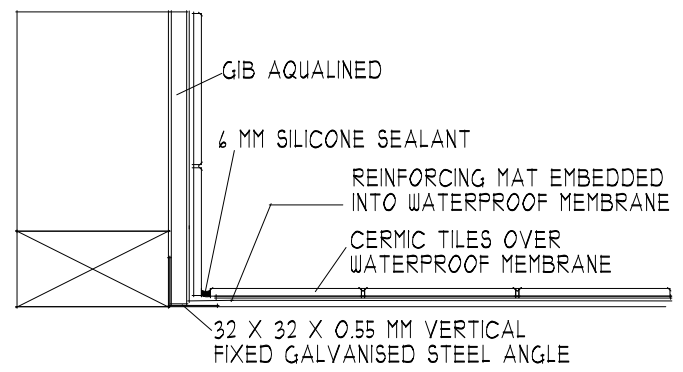
SDC - Approved Building Consent Document - BC171688 - Pg 11 of 13 - 7/09/2017 - hamib



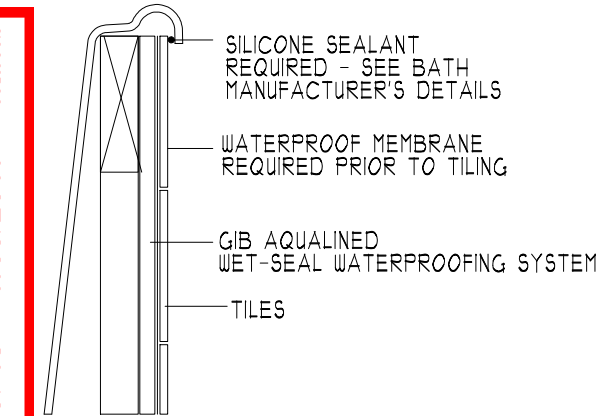
VANITY TOP DETAIL 1:5



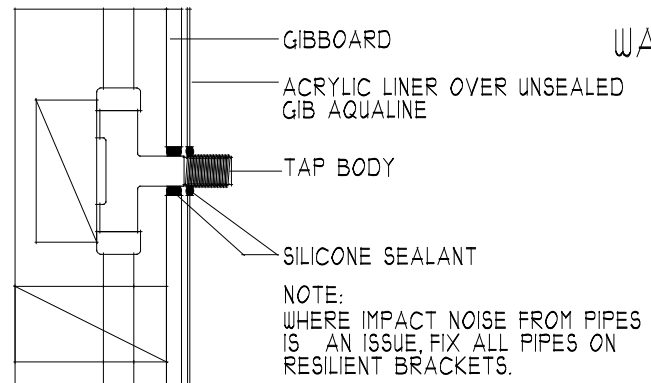
LINER TOP DETAIL 1:5 SHOWER



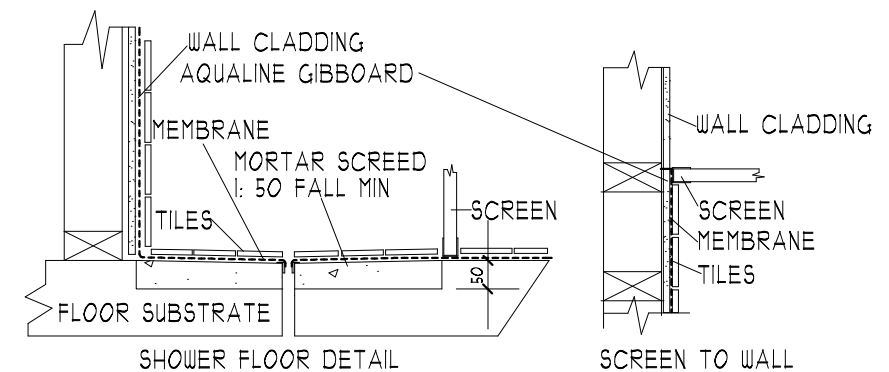
WALL/BATH/FLOOR DETAIL 1:5



BATH EDGE DETAIL 1:5

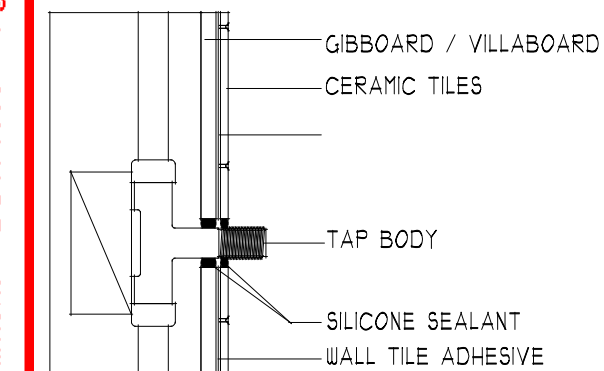


PENETRATION DETAIL 1:5 SHOWER



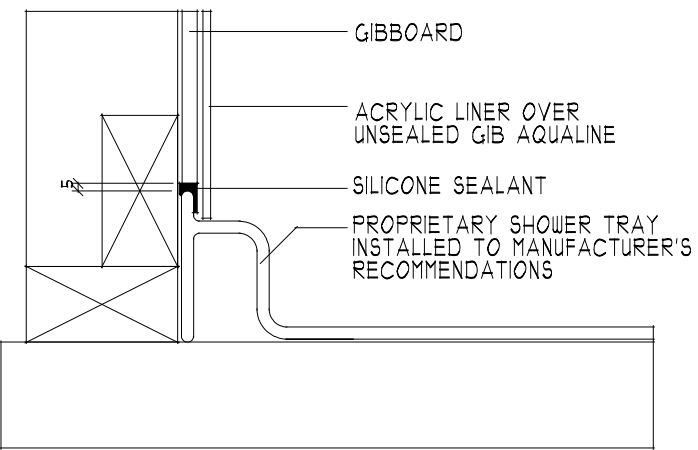
SHOWER FLOOR DETAIL

SCREEN TO WALL

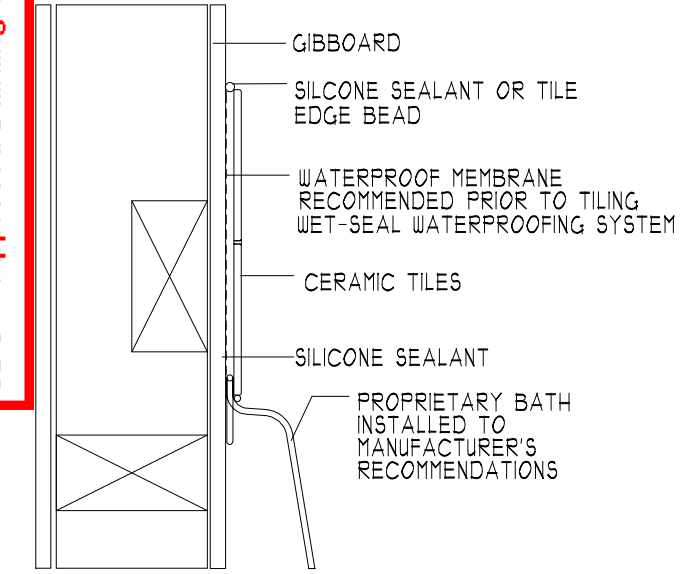


NOTE:
WHERE IMPACT NOISE FROM PIPES IS AN ISSUE, FIX ALL PIPES ON RESILIENT BRACKETS.

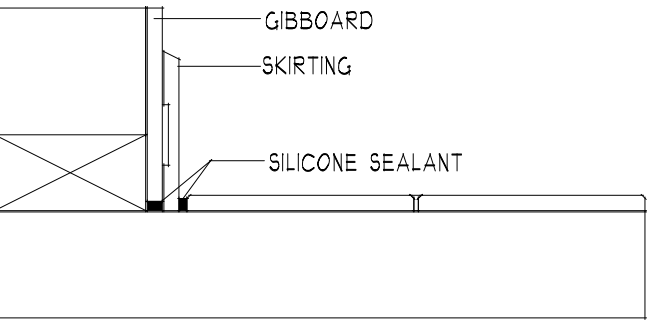
PENETRATION DETAIL 1:5



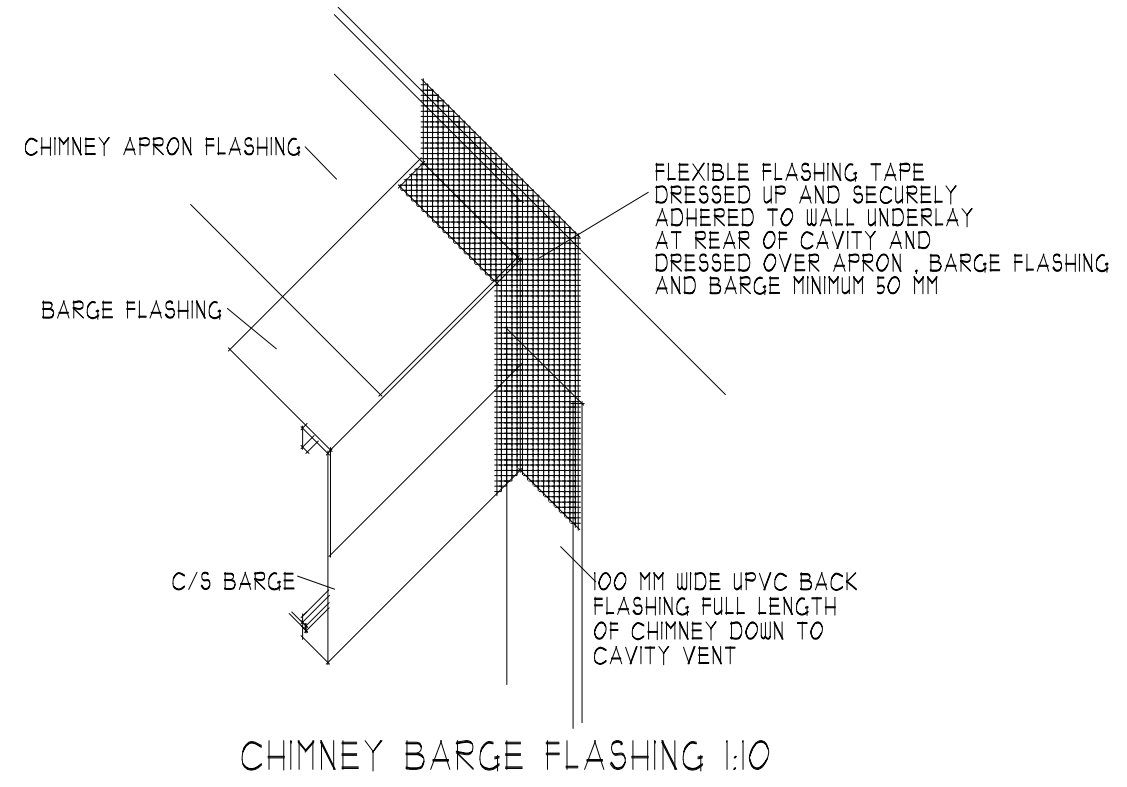
SHOWER WALL/TRAY DETAIL 1:5 SHOWER - ACRYLIC LINER AND BASE



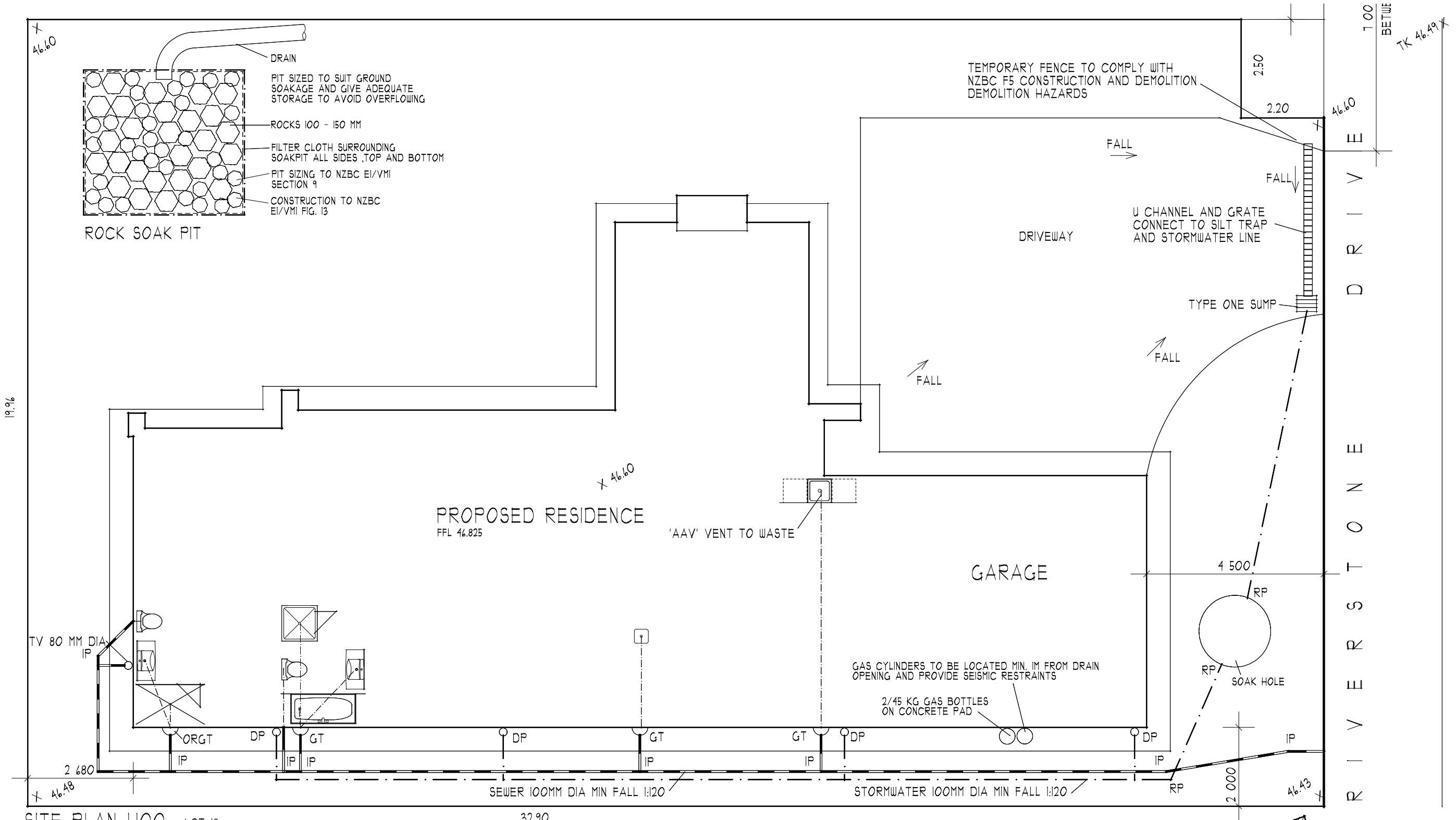
BATH/WALL DETAIL 1:5



WALL/FLOOR DETAIL 1:5



CHIMNEY BARGE FLASHING 1:10



SITE PLAN 1:100 LOT 18

DRAIN LEAK TEST IS TO BE CARRIED OUT AS REQUIRED BY CLAUSE 8.0 EI/ASI AND CLAUSE 6.0 G13/AS2.

ORGT - GULLY TRAP 150 MM BELOW FFL MIN 100 MM ABOVE GROUND

GROUND CLEARANCES TO GROUND:
-TO PAVING, DRIVEWAY 150MM
-NATURAL GROUND 225 MM

→ = 1:100 FALLS TO PAVING

NOTE: ALL ENTRIES AND EXITS TO COMPLY WITH N.Z.B.C., DI, ASI. TREAD MINIMUM 280 MM, RISER MAXIMUM 190 MM. NON-SLIP FINISH TO TREADS

MINIMUM REQUIREMENTS FOR WASTE PIPES G13/ASI	
SHOWER WASTE :	40 MM AT 1 IN 40
BASIN WASTE :	32 MM AT 1 IN 20
WC WASTE :	100 MM AT 1 IN 60
TUB WASTE :	40 MM AT 1 IN 30
SINK WASTE :	50 MM AT 1 IN 40
'AAV' VENT TO WASTES OVER 3.500 M LONG	
ALL TOILETS TO BE VENTED IN ACCORDANCE WITH G13/ASI TABLE 5	

LEVELS IN ASSUMED DATUM RL 46.49 AT KERB

NOTE: " BEDDING " AND " BACKFILLING " OF DRAINS COMPLIANT WITH G13/AS2 FIG 1

NOTE: ALL DOWNPIPES 14 MM DIAMETER

NOTE: DRAINS LAID AT A GRADIENT OF 1:80 OR LESS A VARIABLE LEVELLING DEVICE SHALL BE USED TO ENSURE UNIFORM AND ACCURATE GRADIENTS. (G13/AS2 CLAUSE 5.22)

NOTE: SEE OWNER FOR CLOTHESLINE, LETTERBOX BIN, HEAT PUMP UNIT (IF APPLICABLE) AND FENCES AND GATES

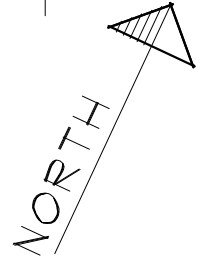
NOTE: SLIP RESISTANCE FOR WALKING SURFACES TO BE COMPLIANT WITH DI - ASI TABLE 2, CLAUSE 2.11 AND COMMENTS 1 AND 2

DRAIN SCHEDULE

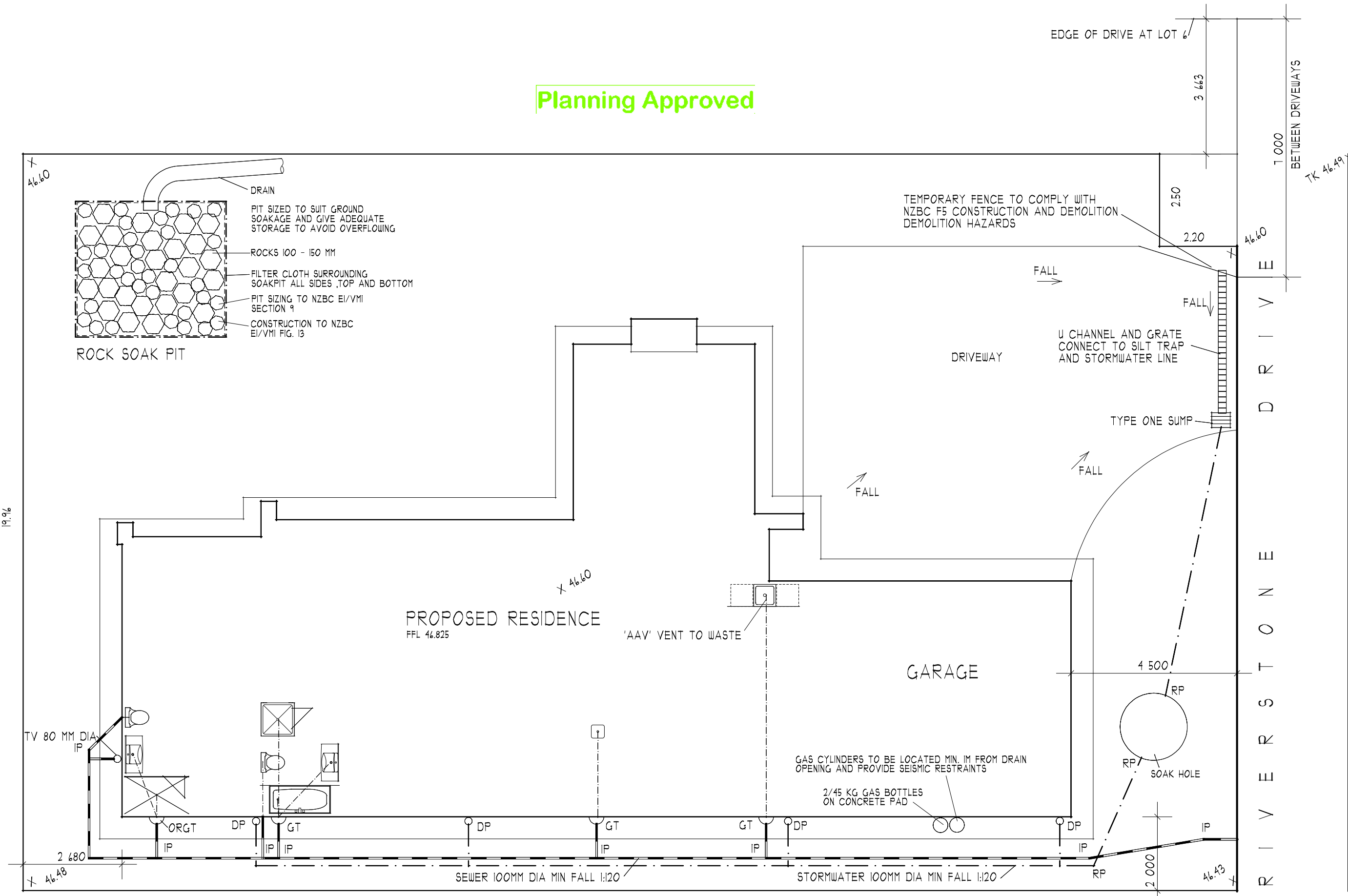
- IP INSPECTION POINT
- DP DOWNPIPE
- RP RODDING POINT
- GT GULLY TRAP

AREAS:

PROPOSED RESIDENCE	217.20 M ²
LAND	653 M ²
SITE COVERAGE	33.26 %



Planning Approved



SITE PLAN 1:100 LOT 18

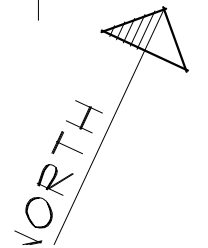
DRAIN LEAK TEST IS TO BE CARRIED OUT AS REQUIRED BY CLAUSE 8.0 EI/AS1 AND CLAUSE 6.0 G13/AS2.

ORGT - GULLY TRAP 150 MM BELOW FFL
MIN 100 MM ABOVE GROUND

MINIMUM REQUIREMENTS FOR WASTE PIPES G13/AS1	
SHOWER WASTE :	40 MM AT 1 IN 40
BASIN WASTE :	32 MM AT 1 IN 20
WC WASTE :	100 MM AT 1 IN 60
TUB WASTE :	40 MM AT 1 IN 30

NOTE: " BEDDING " AND " BACKFILLING " OF DRAINS COMPLIANT WITH G13/AS2 FIG 1
NOTE: ALL DOWNPIPES 14 MM DIAMETER
NOTE: DRAINS LAID AT A GRADIENT OF 1:80 OR LESS A VARIABLE LEVELLING DEVICE SHALL BE USED TO ENSURE UNIFORM AND ACCURATE GRADIENTS.

- DRAIN SCHEDULE**
- IP INSPECTION POINT
 - DP DOWNPIPE
 - RP RODDING POINT
 - GT GULLY TRAP



Approved Building Consent Documents

Please Note: A copy of the stamped approved documents must be available on site for all inspections.

INSPECTION BOOKING TIMEFRAMES		
Telephone 03 347 2839		
Call received	<i>Before 3pm inspection will be done</i>	<i>After 3pm inspection will be done</i>
Monday	Wednesday	Thursday
Tuesday	Thursday	Friday
Wednesday	Friday	Monday
Thursday	Monday	Tuesday
Friday	Tuesday	Wednesday

Riccarton Branch
P.O.Box 2653
2-20 Mandeville St
Christchurch
Phone: 03 348 2039
Fax: 03 341 7057

Date: 17 May 2017

Fabricator: PlaceMakers Riccarton

Customer Name: Regan Harvey

Job Name: Harvey residence

Job Number: 17125605A

Territorial Authority Name: _____

Building Consent No: _____

(To be provided by the City/District Council)

Attn: **Territorial Authority
Environmental Services Unit**

We have been engaged to provide the trusses for the above project and have enclosed the Buildable truss layout and Producer Statement to allow completion of the consent application. On advice from the building project owner, the structure will be designed under the following parameters.

The truss layout includes lintels supporting girder trusses and slab thickening details required for truss point loads.

Wind Zone: Medium

Snow Load (ground): 0.9 Kpa.

Roof Material: Light

Truss timber treatment: H1.2 treated minimum

We can advise that the following will be provided at the time of truss manufacture to both the building owner and your office:

- 1: A full as-built truss layout and Producer Statement
- 2: Specific truss/truss and truss/top plate fixing details indicated on the truss layout
- 3: Top plate to stud connections and Lintel fixings will be indicated on the truss or frame layout

Acknowledgement of this letter, along with the Building Consent number, by fax to our office, would be appreciated.

Regards

Truss Department
PlaceMakers Riccarton

SDC Approved Building Consent Document - BC171688 - Pg 2 of 38 - 7/09/2017 - harrib



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

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

www.mitek.nz.co.nz

MiTek 20/20 Engineering 4.6.6.323

Printed: 07:46:30 17 May 2017

PRODUCER STATEMENT for MiTek 20/20® TRUSS DESIGN - Version 4.6

ISSUED BY: MiTek New Zealand Limited

PlaceMakers - Riccarton

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 125605A 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: Wednesday, 17 May 2017

Handwritten signature

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

Approved Building Consent Document - BC171038 - 7/05/2017 hamib

Job: 125605A

Client: Regan Harvey
Phone:

Site: Peru street
Christchurch

Description: Residence
Building Consent No.:
MITek 20/20 Engineering 4.8.6.323

Phone:

MITek New Zealand Limited

Printed: 07:28:30 17 May 2017

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator PlaceMakers - Riccarton, being licensed to use the MiTek 20/20[®] software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MITek 20/20[®] TRUSS DESIGN DATA

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

Job Details		Importance Level :	2	Design Working Life :	50 years
Roof Truss		Pitch:	5.000 deg	Nominal Overhang:	600 mm
Truss Group:	CTF Pine	Ceiling		Wind	
Material:	Light	Material:	Standard	Area:	Medium (37.0 m/s)
Dead Load:	0.250 kPa	Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Restraints:	900 mm centres	Restraints:	400 mm centres	Snow	
Live Load:	Q _{ur} = 0.250 kPa	Live Load:	Q _c = 1.400 kN	Location:	Christchurch (N4) at 100 m
	Q _c = 1.100 kN			Open Ground Load:	0.900 kPa
				Basic Roof Load:	0.630 kPa

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

MITek[®] Truss List

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

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
T0001	1D	5490	0.000	900	T05	8	6390	5.000	820
T001	1	7470	5.000	778	T06	3	3180	5.000	821
T002	1	6390	5.000	820	T07	6	3090	5.000	821
T01	4	8050	5.000	811					
T01A	1	8050	5.000	811					
T02	4	7470	5.000	778					
T03	2	6390	5.000	755					
T04	3	6390	5.000	733					

Total quantity : 34

The computer design input has been carried out by:

Signed: 

Date: ...Wednesday, 17 May 2017....

Name of Detailer: Brian Mee

Qualifications and Title: Truss Estimator

On behalf of:

PlaceMakers - Riccarton
Mandeville street, Riccarton, Christchurch, New Zealand
Phone: 03 3438613 brian.mee@placemakers.co.nz

SDC - Approved Building Consent Document - 7/09/2017

Job: 125605A

Client: Regan Harvey
Phone:

Site: Panu street
Christchurch

Description: Residence
Building Consent No.:
MiTek 2020 Engineering 4.6.6.323

Phone:
Printed: 07:46:34 17 May 2017

TRUSS FIXING SELECTION REPORT - Characteristic Loads

Fixings are selected from the LUMBERLOK Brochure 08/2014 (Timber Connectors Characteristic Loadings Data)

MiTek® Truss List

Legend: * = detail only, ? = input only, ✗ = failed design, Ø = non certified, Unmarked trusses = designed successfully

Truss	Qty	Span (mm)	Joint	Down (kN)	Uplift (kN)	Bearing	Fixing	
							Qty	Selected
TRUSS01	1D	5490	J	24.860	7.934	Cross	1	CT200 pair
			R	24.541	7.730	Cross	1	CT200 pair
TRUSS01	1	7470	AD			Wide		No fixing selected
TRUSS02	1	6390	Z			Wide		No fixing selected
TRUSS01	4	8050	J	3.498	0.652	Cross	4	Pair of Wire Dog Staples
			P	5.057	0.764	Cross	4	Pair of Wire Dog Staples
			M	8.859	2.408	Cross	4	Pair of Wire Dog Staples
TRUSS02	1	8050	J	3.507	0.708	Cross	1	Pair of Wire Dog Staples
			Q	4.625	0.682	Cross	1	Pair of Wire Dog Staples
			M	8.774	1.320	Cross	1	Pair of Wire Dog Staples
			P	0.508	0.226	Cross	1	Pair of Wire Dog Staples
TRUSS01	4	7470	J	3.135	0.564	Cross	4	Pair of Wire Dog Staples
			P	4.688	0.704	Cross	4	Pair of Wire Dog Staples
			M	7.812	2.130	Cross	4	Pair of Wire Dog Staples
TRUSS01	2	6390	J	6.454	1.451	Cross	2	Pair of Wire Dog Staples
			O	7.242	1.870	Cross	2	Pair of Wire Dog Staples
			H	2.154	0.879	Cross	2	Pair of Wire Dog Staples
TRUSS01	3	6390	H	6.337	1.448	Cross	3	Pair of Wire Dog Staples
			M	5.671	1.293	Cross	3	Pair of Wire Dog Staples
TRUSS01	8	6390	J	7.042	1.619	Cross	8	Pair of Wire Dog Staples
			P	7.345	1.434	Cross	8	Pair of Wire Dog Staples
TRUSS01	3	3180	F	4.078	0.803	Cross	3	Pair of Wire Dog Staples
			I	3.134	0.690	Cross	3	Pair of Wire Dog Staples
TRUSS01	6	3090	F	3.995	0.750	Cross	6	Pair of Wire Dog Staples
			I	2.851	0.815	Butt	6	JH 47x90

Fixing list

Selected Fixing

- CT200 pair
- Pair of Wire Dog Staples
- JH 47x90
- No fixing selected

Note:

- 1) Fixings have been selected based on loading only. Please check that selected fixings are practical for each situation and that appropriate nailing can be applied on site.
- 2) Fixings are selected from the LUMBERLOK Brochure 08/2014 (Timber Connectors Characteristic Loadings Data) with down and uplift characteristic loads of at least the values shown for each joint.

SDC - Approved Building Consent Document - BC 171688 - Pg 5 of 38 - 7/09/2017



PROLAM SUMMARY

Customer/Project: 17125605
 Physical Address: Christchurch
 Designer: Brian Mee, PlaceMakers Riccarton
 PO Box 2653, Christchurch
 E: bmee@placemakers.co.nz P: 3438613

L 1

Prolam Lintels Supporting Roof and Ceiling

Building Type	House	Roof Weight	Light with Ceiling
Timber	Pine, Machined	Roof Load	0.40 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	No		1.10 kN concentrated
Exposed	No	Wind Zone	Low (32.0 m/s)
Roof Pitch	5 °	Snow Region	Region N4
Eaves	600 mm	Altitude	100 m
Roof Span	6.40 m	Ground Snow Load	0.90 kPa
Lintel Span	4.80 m	Roof Snow Load	0.00 kPa

Use Prolam PL12H1-300100 290 x 90mm PL12

Capacity Ratio	1.9
Long Term Deflection	1.3 mm
Max. Bearing Reaction	8.5 kN
Load Combination	1.2G + 1.5Q
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	4 kN Characteristic Load

PRODUCER STATEMENT



Tasman Consulting Engineers Limited has been engaged by Prowood to provide design services for the development of the Prolam Online calculator.

The design has been carried out using sound and widely accepted engineering principles to the requirements of AS/NZS1170:2002, NZS3603:1993 and NZS3604:2011 using the timber properties for GL8, GL12 and GL17 glulam and LVL15.

I believe on reasonable grounds that the above design will meet the requirements of clauses B1/VM1 of the Building Code Documents.



David King

ME (civil, MIPENZ CPEng (no 145511) IntPE

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

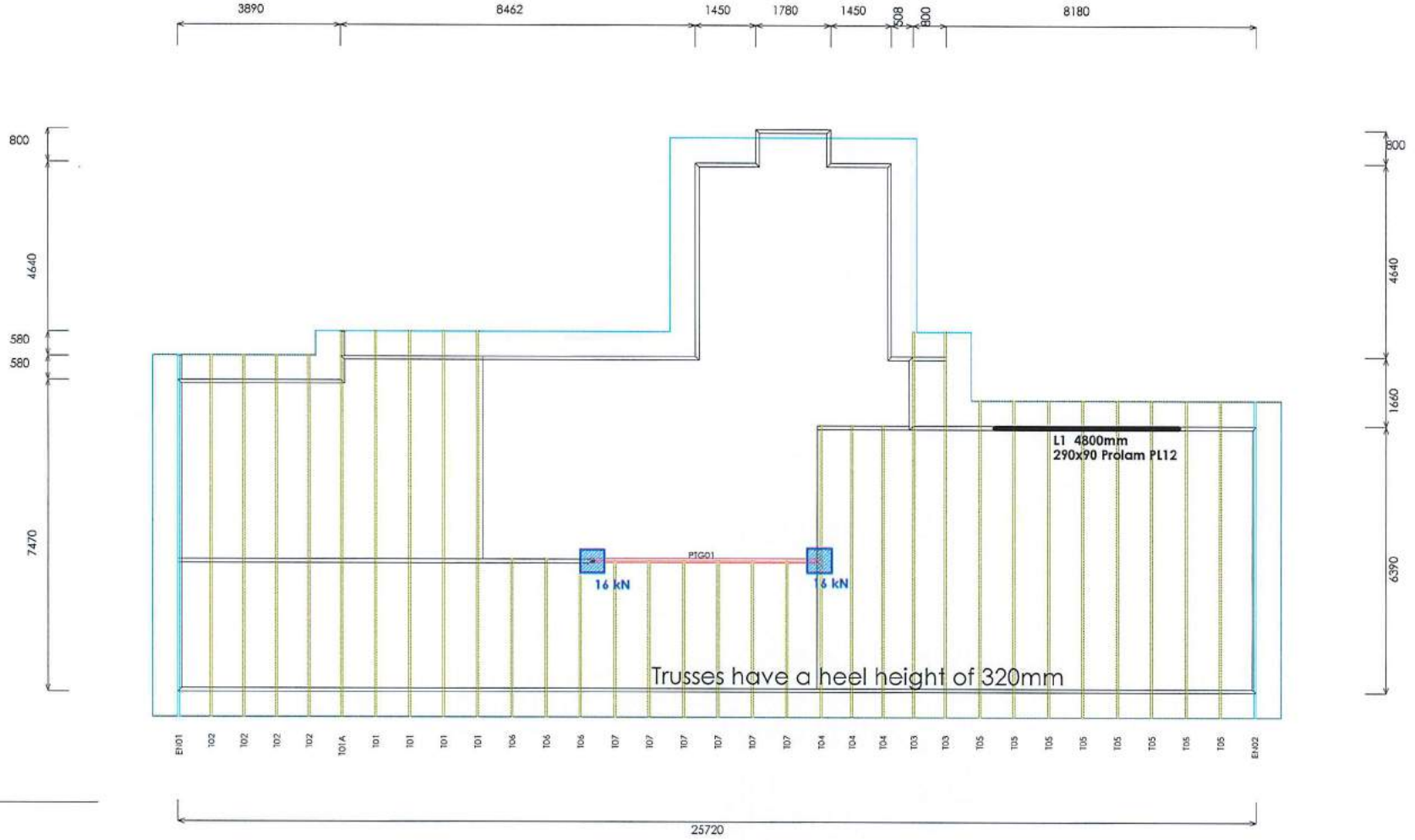
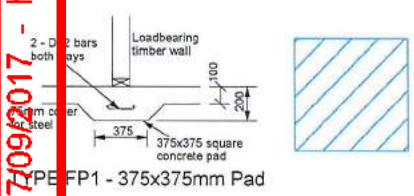
16 May 2017

283 Waiwhero Rd PO Box 413 Motueka New Zealand Phone 03 526 7436 Fax 03 526 7437

Email: info@prowoodnz.com • www.prolamnz.com

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Slab Thickening Details



NOTES:
 Refer to:
 Site internal load bearing on concrete
 slabs brochure 10/2011.
 Slab thickening details are for floor slabs
 on buildings complying with NZS 3604:2011.
 (all other foundations by others)

It is the customers responsibility to have
 these details checked and approved by
 a suitably qualified LBP.

Site Address :
 Peru street
 Christchurch

Sheet Title :
**For Building Consent
 Slab Thickening**
 Date : 17 May,2017 Drawn : Brian Mee
 Scale : System : MITek 20/20

Job Details:
 Roof Pitch : 5.00deg
 Roof Material : Light
 Ceiling Material : Standard
 Wind Zone : Medium
 Roof Snow Load : 0.630kPa

Truss Centres : 900mm
 Roof Live Load : 0.250kPa
 Floor Live Load :
 Wind Speed : 37m/s
 Overhang : 600mm



Job Title :
 125605A
 Sheet :
 1
 Revision Number :

PrimeCad v4.6.6.323



Demand Calculation Sheet

Job Details

Name: Harvey
 Street and Number: Riverstone drive
 Lot and DP Number: lot 18
 City/Town/District: Rolleston
 Designer:
 Company:
 Date:

Building Specification

Number of Storeys: 1
 Floor Loading: 2 kPa
 Foundation Type: Slab

Single
 Cladding Weight: Light
 Roof Weight: Light
 Room in Roof Space: 0 to 12.5%
 Roof Pitch (degrees): 5
 Roof Height above Eaves (m): 1.4
 Building Height to Apex (m): 4.4
 Ground to Lower Floor (m): .2

 Average Stud Height (m): 2.42
 Building Length (m): 25.72
 Building Width (m): 13.90
 Building Plan Area (m²): 217.20

Building Location

Wind Zone = High

Wind Region: A
 Lee Zone: No
 Ground Roughness: Open
 Site Exposure: Exposed
 Topography Class: T1

Earthquake Zone 2

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

Bracing Units required for Wind

	Along	Across
Single Level	652	1029

Bracing Units required for Earthquake

	Along & Across
Single Level	1047

SDC - Approved Building Consent Document - BC171688 - Pg 8 of 38 - 7/09/2017 - hambi



Single Level Along Resistance Sheet

Job Name: Harvey

Wind	EQ
Demand	
652	1047
Achieved	
1690	1583
259%	151%
286 OK	
321 OK	
433 OK	
412 OK	
342 OK	
303 OK	
630 OK	
547 OK	

SDC - Approved Building Consent Document - BC171688 - Pg 9 of 38 - 7/09/2017 - Harmb

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)
a	1	1.20		2.42	EP1 1.2	ply	143	161
	2	1.20		2.42	EP1 1.2	ply	143	161
b	1	0.40		2.42	EP1 .4	ply	32	38
	2	0.40		2.42	EP1 .4	ply	32	38
	3	0.70		2.42	GS1-N	GIB®	41	41
	4	0.70		2.42	GS1-N	GIB®	41	41
	5	0.70		2.42	GS1-N	GIB®	41	41
	6	1.90		2.42	GS1-N	GIB®	130	113
	7	1.70		2.42	GS1-N	GIB®	116	101
c	1	0.70		2.42	GS1-N	GIB®	41	41
	2	1.50		2.42	GS1-N	GIB®	103	89
	3	2.90		2.42	GS1-N	GIB®	198	173
d	1	1.80		2.42	GS1-N	GIB®	123	107
	2	1.40		2.42	GS1-N	GIB®	96	83
	3	6.00		2.42	GS1-N	GIB®	411	357



Single Level Across Resistance Sheet

Job Name: Harvey

Wind	EQ
Demand	
1029	1047
Achieved	
1370	1251
133%	119%

SDC - Approved Building Consent Document - BC171688 - Pg 10 of 38 - 7/09/2017 - hamp

Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1370	1251
m	1	1.80		2.42	GS1-N	GIB®	123	107		
									123 OK	107 OK
n	1	3.70		2.42	GS1-N	GIB®	253	220		
									253 OK	220 OK
o	1	3.00		2.42	GS1-N	GIB®	205	179		
									205 OK	179 OK
p	1	0.60		2.42	EP1 .6	ply	57	62		
	2	0.60		2.42	EP1 .6	ply	57	62		
									113 OK	125 OK
q	1	3.80		2.42	GS1-N	GIB®	260	226		
	2	0.90		2.42	EP1 .6	ply	85	94		
	3	0.60		2.42	EP1 .6	ply	57	62		
									401 OK	382 OK
r	1	2.00		2.42	GS1-N	GIB®	137	119		
	2	2.00		2.42	GS1-N	GIB®	137	119		
								274 OK	238 OK	



Custom Wall Elements

Supplier	System	Min. Length m	Wind BUs/m	EQ BUs/m
ply	EP1 .4	.4	80	95
ply	EP1 .6	.6	95	105
ply	EP1 1.2	1.2	120	135
ply	EPG .4	.4	100	115
ply	EPG 1.2	1.2	150	150
conc block	RC0.75	1.5	42	42
conc block	RC1.5	1.5	100	100
conc block	RC3.0	1.5	200	200
conc block	RC4.5	1.5	300	300
nzsip	nzsip	.6	114	116

SDC - Approved Building Consent Document - BC171688 - Pg 11 of 38 - 7/09/2017 - hamib

BUILDING CODE ASSESSMENT

General Provision	Building Code Clause		Means of Compliance		Waiver / Modification required
			Acceptable Solution	Alternative Solution. Details verifying compliance.	
STABILITY	B1	Structure	Yes	AS1 , VM1 (Trusses) , NZS3604 , VM4	N/A
	B2	Durability	Yes	B2/AS1, NZS3101, NZS3602, NZS3604	N/A
FIRE SAFETY	C1	Objectives of clauses C2-C6	Yes	C/AS1	N/A
	C2	Prevention of fire occurring	Yes	C/AS1	N/A
	C3	Fire affecting areas beyond the fire source	N/A	C/AS1	N/A
	C4	Movement to place of safety	Yes	C/AS1	N/A
	C5	Access and safety for firefighting operations	N/A	C/AS1	N/A
	C6	Structural stability	N/A	C/AS1	N/A
ACCESS	D1	Access Routes	Yes	D1/AS1,NZS4121	N/A
	D2	Mechanical installations for access	N/A	D2/AS1,NZS4332, EN81, EN115	N/A
MOISTURE	E1	Surface water	Yes	E1/AS1, AS/NZS3500.3	N/A
	E2	External moisture	Yes	E2/AS1 Specific design and testing	N/A
	E3	Internal moisture	Yes	E3/AS1	N/A
SAFETY OF USERS	F1	Hazardous agents on site	Yes	F1/VM1	N/A
	F2	Hazardous building materials	Yes	F2/AS1, NZS4223	N/A
	F3	Hazardous substances and processes	N/A	F3/AS1	N/A
	F4	Safety from falling	Yes	F4/AS1, FSP Act	N/A
	F5	Construction and demolition hazards	Yes	F5/AS1	N/A
	F6	Lighting for emergency	N/A	F6/AS1	N/A
	F7	Warning systems	Yes	F7/AS1, AS/NZS1668, NZS4512, NZS4515	N/A
	F8	Signs	N/A	F8/AS1	N/A
	F9	Restricting access by young children to residential pools	N/A	F9/AS2	N/A
SERVICES AND FACILITIES	G1	Personal hygiene	Yes	G1/AS1	N/A
	G2	Laundering	Yes	G2/AS1	N/A
	G3	Food preparation and prevention of contamination	Yes	G3/AS1	N/A
	G4	Ventilation	Yes	G4/AS1, AS1668.2	N/A
	G5	Interior environment	N/A	G5/AS1	N/A
	G6	Airborne and impact sound	N/A	G6/AS1	N/A
	G7	Natural light	Yes	G7/AS1	N/A
	G8	Artificial light	Yes	G8/AS1, NZS6703,	N/A
	G9	Electricity	Yes	G9/AS1	N/A
	G10	Piped services	Yes	G10/AS1	N/A
	G11	Gas as an energy source	Yes	G11/AS1, NZS5601	N/A
	G12	Water supplies	Yes	G12/AS1,	N/A
	G13	Foul water	Yes	G13/AS1 , G13/AS2	N/A
	G14	Industrial liquid waste	N/A	G14/AS1	N/A
	G15	Solid waste	N/A	G15/AS1	N/A
ENERGY EFFICIENCY	H1	Energy efficiency provisions	Yes	H1/AS1, NZS4218, NZS4243, NZS4214	N/A

SDC - Approved Building Consent Document - BC171688 - Pg 12 of 38 - 7/09/2017 - harrib

Form 2A

Memorandum from licensed building practitioner: Certificate of design work

Section 30C or section 45, Building Act 2004

The building

Street address of building: lot 18 Riverstone dr Rolleston

The owner

Name: R & L Harvey

Address

Telephone number 0272137638

Email address: regan.harvey@moveologistics.co.nz

BASIS FOR PROVIDING THIS MEMORANDUM

	I am providing this memorandum in my role as the: Please tick the option that applies (X)
()	sole designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project
()	lead designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and no other person will be providing any additional memoranda for the project
(x)	lead designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design
()	specialist designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work

Identification of design work that is restricted building work

I carried out or supervised the following design work that is restricted building work:

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
<i>[Tick]</i>	<i>[If appropriate, provide details of the restricted building work]</i>	<i>[Specify whether you carried out this design work or supervised someone else carrying out this design work]</i>	<i>[If appropriate, specify references]</i>

Primary structure

Foundations and	(x)	(x) Carried out	
Conc. floor		() Supervised	
Walls	(x)	(x) Carried out	

		() Supervised	
Roof trusses by others	(x)	() Carried out (x) Supervised	
Columns and beams	(x)	(x) Carried out () Supervised	
Bracing	(x)	(x) Carried out () Supervised	
Purlin fixing and Roof bracing	(x)	(x) Carried out () Supervised	

External moisture management systems

Damp proofing	(x)	(x) Carried out () Supervised	
Roof cladding or roof cladding system	(x)	(x) Carried out () Supervised	
Ventilation system (for example, subfloor or cavity)	(x)	(x) Carried out () Supervised	
Wall cladding or wall cladding system	(x)	(x) Carried out () Supervised	
Waterproofing	(x)	(x) Carried out () Supervised	
Other	()	() Carried out () Supervised	

Fire safety systems

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

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

Note: continue on another page if necessary.

Are waivers or modifications of the building code required? () Yes (x) No

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

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

Note: continue on another page if necessary.

Issued by

Name: Lance Dixon

LBP or registration number: BP111614

The practitioner is a: Design LBP Registered architect Chartered professional engineer

Mailing address: 704 Hills rd Chch

Street address or registered office:

Phone number: Landline: 3862502 Mobile:

Daytime: 3862502 After hours:

Fax number:

Email address: dixondesign@xtra.co.nz

Website:

Declaration

I Lance Dixon *[name of practitioner]*

LBP state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the restricted building work described on this form and that based on this I also state that the RBW

(a) complies with the building code; or

(b) complies with the building code subject to any waiver or modification of the building code recorded on this form.

Signature: 

On behalf of Dixon Design Ltd

Date: 27 / 7 / 2017

29th May 2017

Regan Harvey
Regan.harvey@moveologistics.co.nz

Ref: 3021

Dear Sir,

Re: Proposed Dwelling, Lot 18 Riverstone Drive, Rolleston.

SUBSOIL INVESTIGATION AND FOUNDATION REPORT

Further to your request I report on the subsoil conditions at the site of the proposed dwelling construction.

SITE GEOGRAPHY

The site of the proposed building project is on the alluvial planes of Canterbury, on the southern outskirts of Rolleston township.

PROPOSED DEVELOPMENT

It is proposed to construct a light weight, timber framed dwelling, with a concrete foundation and slab-on-ground, on this site.

LOCAL GEOLOGY

From the geological record, the anticipated underlying geology of the area consists of river gravel and alluvium.
(From Geological Map of NZ, Sheet 18 Christchurch, D. R. Gregg. NZ Geological Survey).

SITE INVESTIGATION

The investigation consisted of, observation of a manually dug inspection hole. Scalar Penetrometer testing was not undertaken due to the close proximity of the coarse gravel beneath the topsoil.

SOIL PROFILE AND GROUND BEARING STRENGTH

In summary, the profile of the subsoil consisted of a 200-350mm deep topsoil layer, overlaying clay and gravel (GW) to depth, known to exceed 30 meters (based well bore-logs from within the vicinity).

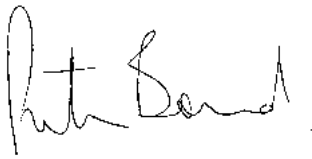
The profile was consistent with undisturbed natural ground. There was no evidence on or around the site of liquefaction, subsidence or lateral movement as a result of the recent seismic activity.

FOUNDATION REQUIREMENTS

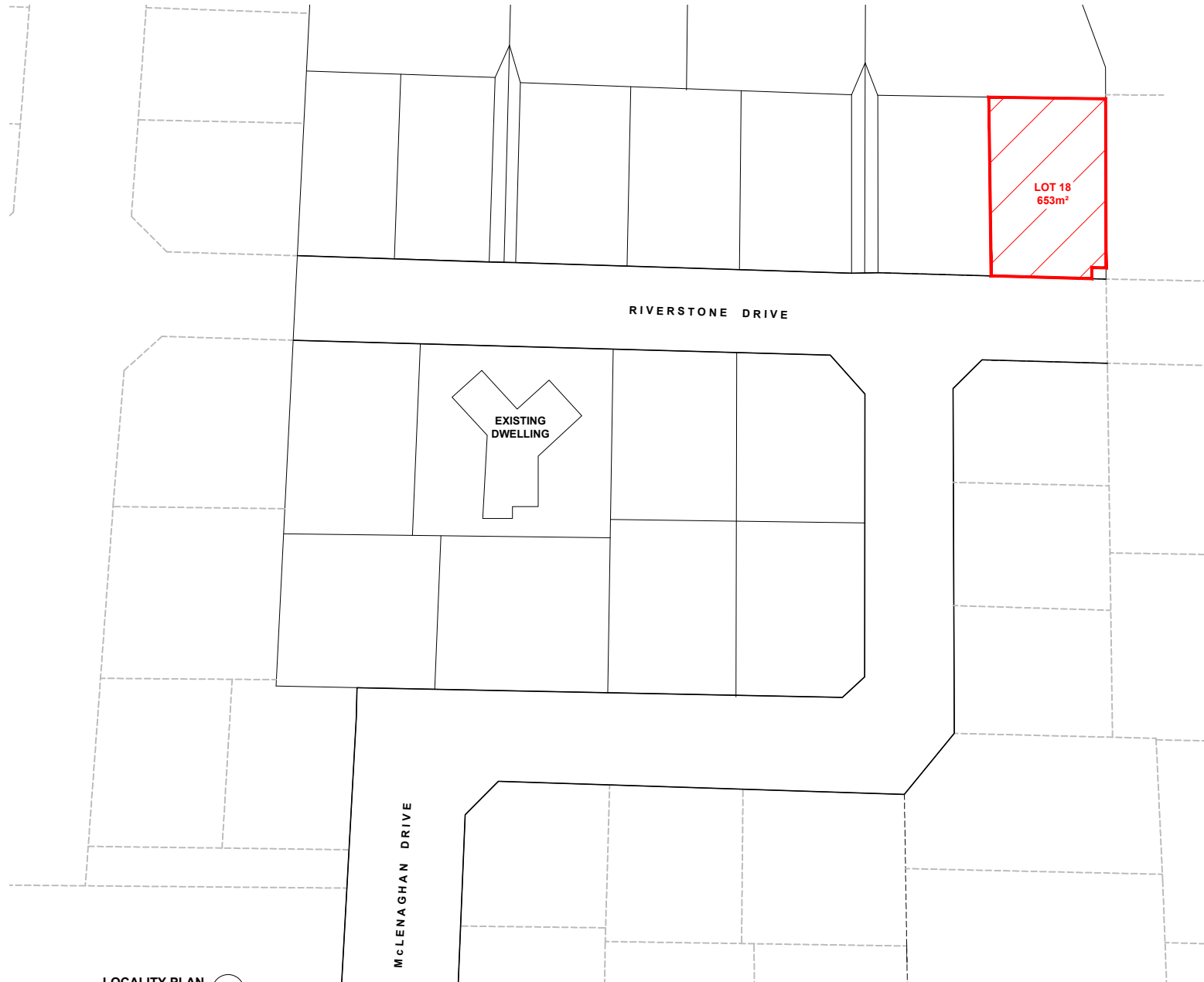
A foundation constructed in accordance with NZS 3604:2011 as amended by NZBC B1/AS1, would be appropriate at this site, with the underside of the footing bearing at least on the clay beneath the topsoil. Should any soft area be encountered during the excavation they shall to over-excavated by an additional 200mm and backfilled with compacted, crushed AP20.

If you have any queries with regard to matters raised by this report please give me a call.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Peter Bond', written in a cursive style.

**Peter Bond CPeng MIPENZ.
Bond Frew Ltd**



LOCALITY PLAN 

Bond Frew LTD ENGINEERING & DESIGN		Unit 6, 2 McMillan Street P.O. Box 61 Darfield 7541 T. 03 3188900 E. bondfrew@xtra.co.nz
PROJECT: REGAN HARVEY PROPOSED DWELLING		
LOCATION: LOT 18 RIVERSTONE DRIVE 2/675 EAST MADDISONS ROAD, ROLLESTON		
SHEET TITLE: LOCALITY PLAN		
DATE:	MAY 2017	
SCALE:	1:700 (A3) APPROX	
ISSUE:	LOCALITY	
REVISION:	0	
JOB NO:	3021	
DRAWING NO:	S2.1	
CAD FILE: N:\3021\Locality Plan.dwg		



Bore or Well No	M36/5050
Well Name	DUNNS CROSSING ROAD
Owner	KAJENS TRADING DEVELOPMENT LTD

Well Number	M36/5050	File Number	CO6C/10311
Owner	KAJENS TRADING DEVELOPMENT LTD	Well Status	Active (exist, present)
Street/Road	DUNNS CROSSING ROAD	NZTM Grid Reference	BX23:49118-70590
Locality	ROLLESTON	NZTM X and Y	1549118 - 5170590
Location Description		Location Accuracy	50 - 300m
OWMS Zone	Selwyn - Waihora	Use	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	Water Level Monitoring	-
Depth	33.00m	Water Level Count	0
Diameter	150mm	Initial Water Level	7.20m below MP
Measuring Point Description		Highest Water Level	
Measuring Point Elevation	45.14m above MSL (Lyttelton 1937)	Lowest Water Level	
Elevation Accuracy	< 2.5 m	First reading	
Ground Level	0.00m above MP	Last reading	
Strata Layers	10	Calc Min 95%	9.80m below MP
Aquifer Name		Aquifer Tests	0
Aquifer Type	Unknown	Yield Drawdown Tests	1
Drill Date	01 Dec 1995	Max Tested Yield	4 l/s
Driller	Dynes Road Drilling	Drawdown at Max Tested Yield	2 m
Drilling Method	Cable Tool	Specific Capacity	1.70 l/s/m
Casing Material	STEEL	Last Updated	08 Nov 2013
Pump Type	Unknown	Last Field Check	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
	Stainless steel	31	33				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Dec 1995	1	3.63	47.90941	2.13	2

SDC - Approved Building Consent Document - BC171688 - Pg 19 of 38 - 7/09/2017 - hamib

Comments

Comment Date	Comment
	2ND PUMP TEST: 2HRS AT 7.58 (l/sec) FOR 2.74M DRAWDOWN

SDC - Approved Building Consent Document - BC171688 - Pg 20 of 38 - 7/09/2017 - harrib

Bore Log

SDC - Approved Building Consent Document - BC171688 - Pg 21 of 38 - 7/09/2017 - hamib

Borelog for well M36/5050

Grid Reference (NZTM): 1549118 mE, 5170591 mN
 Location Accuracy: 50 - 300m
 Ground Level Altitude: 45.1 m +MSD Accuracy: < 2.5 m
 Driller: Dynes Road Drilling
 Drill Method: Cable Tool
 Borelog Depth: 33.5 m Drill Date: 01-Dec-1995



SDC - Approved Building Consent Document - BC171688 - Pg 22 of 38 - 7/09/2017 - hamib

Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
			Small gravel sandy	
		4.00m		
5		6.19m	Small gravel Yellow silt	
			Small gravel open clean	
		8.39m		
10			Small medium gravel silt bound and tight	
		11.60m		
			Medium small gravel sandy	
		13.40m		
15			Small medium gravel wet silt enough water to keep the sand pump going	
		17.50m		
20			Small medium gravel sandy	
		24.70m		
25			Small Black gravel clean plenty water	
		27.50m		
			As above	
30				
		33.00m		
		33.50m	Small gravel silt bound tight started	

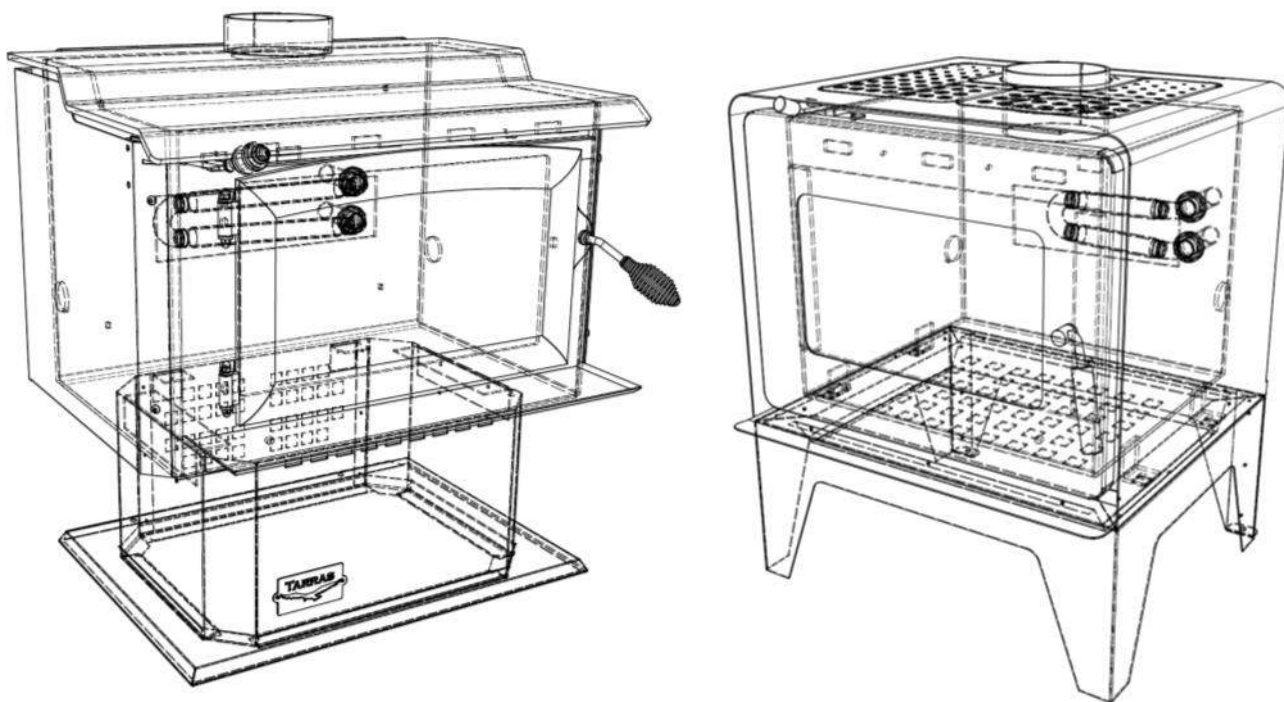
SDC - Approved Building Consent Document - BC171688 - Pg 23 of 38 - 7/09/2017 - harrib



WOODSMAN

Warming kiwi homes since 1887.

Specifications and Installation Instructions for Woodsman Solid Fuel Burners



The installation of any Woodsman solid fuel burner requires a Building Consent prior to installation commencing. We recommend the installation of a Woodsman solid fuel burner or flue system be undertaken by the holder of a current SFAIT (Solid Fuel Appliance Installation Technician) qualification issued by the NZHHA (NZ Home Heating Association Inc.).

www.nzhha.co.nz

Proudly Manufactured By:



Harris Home Fires
41 Braddon St
Addington
Christchurch 8024
New Zealand
Email sales@hhf.co.nz

P O Box 4043
Christchurch 8140
New Zealand

Phone 03 366 1796
Freephone 0800 3661796
Fax 03 366 1795

Contents

	PAGE
Testing and Certification	3
Clearances	4 & 5
Flue Shields	6
Ceiling Heights	6
Flue Shield Deflector	6
Floor Protector/Hearth Graph (Graph 1)	7
Rear Deflector	7
Dimensions	8
Reducing Clearances	9
Installation Instructions	10
Floor Protector Materials	10
Minimum Flue Height	11
Flue Installation Details	11
Sealing Flue Joints	12
Fitting The Wetback To The Firebox	13

Testing and Certification

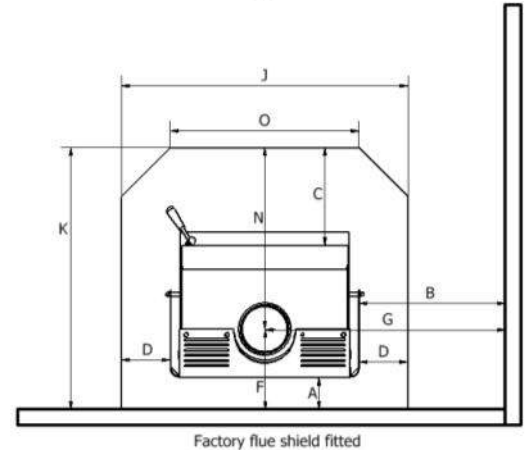
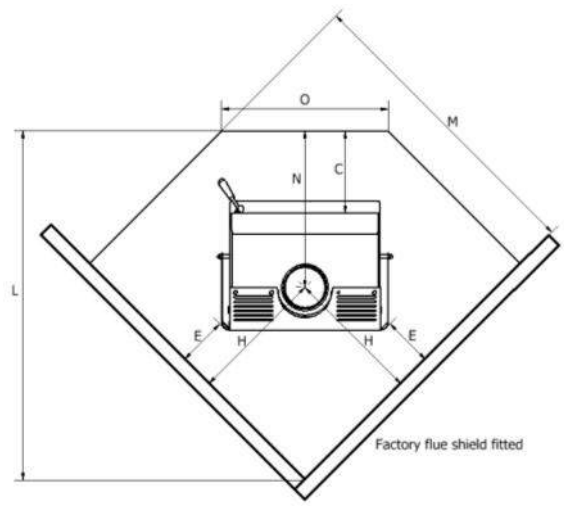
MODEL	AS/NZS 2918:2001, APP B	AS/NZ 2918:2001, APP E	AS/NZS 4012:1999	AS/NZS 4013:1999	ECan Cert Number
ECR NoVo	Complies	N/A	67%	0.9g/kg	153733
ECR NoVo Wet	Complies	N/A	65%	0.9g/kg	155148
Totara	Complies	Complies	67%	0.9g/kg	110220
Matai ECR MkIII	Complies	N/A	71%	0.7g/kg	102148
Matai ECR MkV	Complies	N/A	65%	0.7g/kg	102454
IMF	Complies	Complies	N/A	3.9g/kg	N/A
Flare - Wood	Complies	N/A	68%	0.97g/kg	134775
Flare - Wood WB	Complies	N/A	65%	0.89g/kg	135021
Flare - Multi	Complies	N/A	N/A	N/A	N/A
RMF	Complies	N/A	83%	3.9g/kg	N/A
Strongman	Complies	N/A	N/A	N/A	N/A
Aspen	Complies	N/A	71%	0.5g/kg	111306
Aspen WB	Complies	N/A	65%	0.5g/kg	111307
Brunner MKII	Complies	N/A	71%	0.5g/kg	142896
Brunner MKII WB	Complies	N/A	65%	0.5g/kg	142897
Tasman MKII	Complies	N/A	71%	0.5g/kg	142898
Tasman MKII WB	Complies	N/A	65%	0.5g/kg	142899
Tarras MKIII	Complies	N/A	69%	0.37g/kg	143492
Tarras MKIII WB	Complies	N/A	65%	0.5g/kg	143494

Minimum Safe Installation Clearances to COMBUSTIBLE Materials

SDC - Approved Building Consent Document - C171688 - Pg 27 of 38 - 7/09/2017 - harrib

BRUNNER MKII & TASMAN MKII	BRUNNER MKII & TASMAN MKII With Rear Deflector Fitted (see Page 7)	FLARE-WOOD	FLARE-MULTI	TARRAS MKIII	TARRAS MKIII With Rear Deflector Fitted (see Page 7)
200	120	100	100	230	160
450	450	320	350	480	460
300	300	300	300	300	300
118	118	110	110	67	67
230	240	120	150	250	220
345	265	281	281	372	302
758	758	635	665	863	843
535	545	449	479	611	581
850	850	850	850	898	898
1025	945	933	933	1052	982
1437	1451	1287	1329	1544	1500
1220	1230	1122	1152	1304	1274
680	680	652	652	680	680
615	615	600	600	600	600
1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted	1200 With flue shield deflector fitted

ECR MkIII, MkIV, MkV	ECR NoVo With Rear Deflector Fitted (see Page 7)	ASPEN	RMF	STRONGMAN
100	110	255	125	300
400	490	435	500	875*
300	300	300	300	GRAPH 1
150	115	118	150	150
200	200	230	180	380
251	265	404	276	441
690	800	743	790	1233**
512	517	521	492	711
880	850	850	880	1015
807	792	1084	832	1364
1280	1259	1417	1252	1928
1110	1049	1219	1060	1616
556	527	680	556	923
580	450	615	580	715
900	1200	1200	900	1200

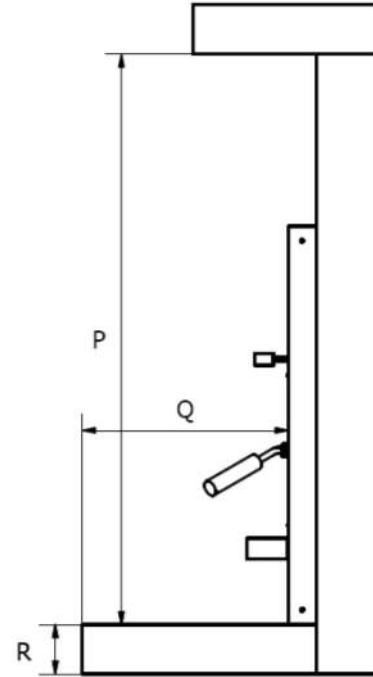
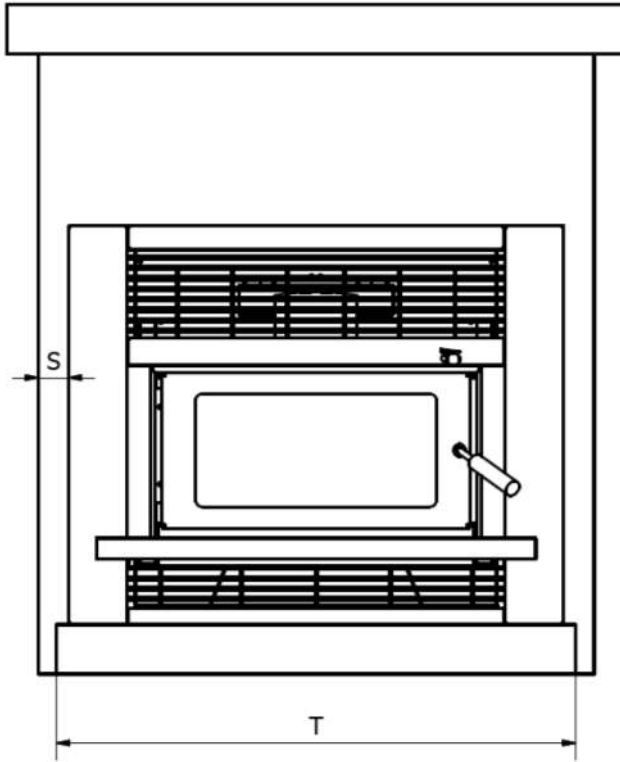


Dimensions **A, B & E** are taken from the combustible wall to the closest point of the appliance including panels
 Dimension **C** is measured from the edge of the hearth to the closest point of the firebox door frame as in AS/NZS 2918:2001 3.3.2

All dimensions are given in millimetres .
 *610mm with firebox side panels fitted.
 **968mm with firebox panels fitted.

Minimum Safe Installation Clearances to COMBUSTIBLE Materials

SDC - Approved Building Consent Document - BC171688 - Pg 28 of 38 - 7/09/2017 - harrib



	IMF	Totara
P	980	1060*
Q	Graph 1	Graph 1
R	Graph 1	Graph 1
S	50	50
T	840	840

* Dimension P can be 920mm with a factory supplied heat deflector fitted

Ceiling Heights

All Woodsman free standing fires have been tested and approved to AS/NZ 2918:2001 App B with a ceiling height of 2.4m and with the factory flue shield fitted in the below configurations. In some cases, the top of the flue shield terminates within 600mm of the ceiling height (refer to AS/NZ 2918:2001 **4.5.2**) but all ceiling temperatures did not exceed the allowable limit in these cases and are therefore able to be installed. Reports are available on request for Councils.

If the ceiling height is less than 2.4m, then heat shielding is required as per AS/NZ 2918:2001 Table 3.2

Factory Flue Shields

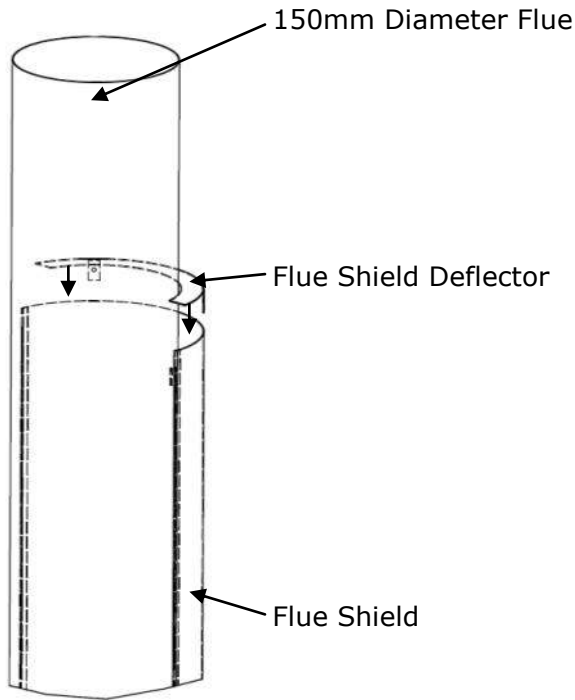
Standard 900mm high flue shield:
ECR MKIII & RMF

Standard 1200mm high flue shield:
Brunner, Tasman, Aspen, ECR NoVo & Strongman

1200mm high flue shield with flue shield deflector (REQUIRED)
Tarras MKII, Tarras MKIII, Brunner/Tasman MKII & Flare (All Variants) - See Below

IMPORTANT - Flue shields should be no further than 10mm off the top of the fire box

Fitting the Flue Shield Deflector for Tarras MKII, Tarras MKIII, Brunner/Tasman MKII and Flare (All Variants)



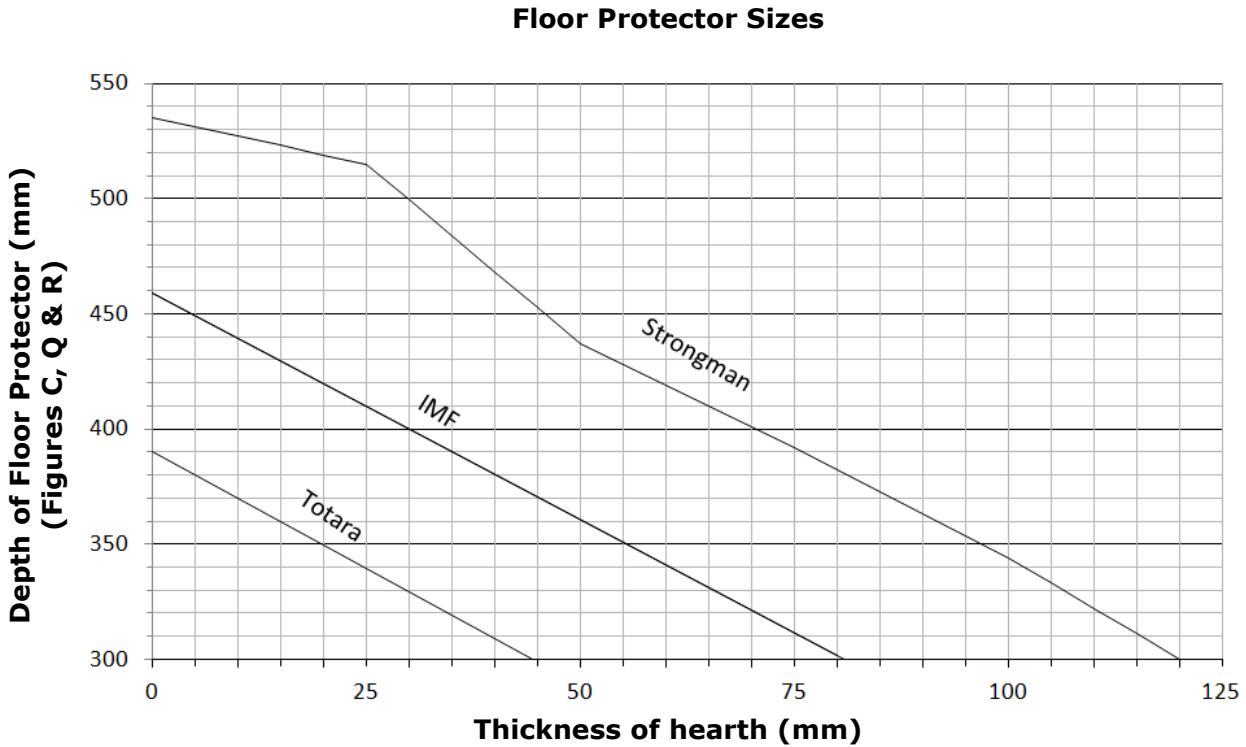
To fit the heat shield deflector:

- Place the deflector on top of the heat shield and ensure no large gaps
- Fix in place by securing the tabs with rivets to the heat shield

WARNING
This part is required to be installed on the listed models with ALL types of flue kits. Failure to do so, may cause the ceiling to over heat. The part is located in the fire itself and not the flue kit packaging.

Floor Protector Graph

Graph 1



This graph refers to Page 4 dimension C and Page 5 dimension Q & R.

The floor protector distance out in front of the fire (taken from the door), is dependent on the thickness of the floor protector. The thicker the floor protector is above the surrounding combustible floor, the less this distance is out in front of the fire.

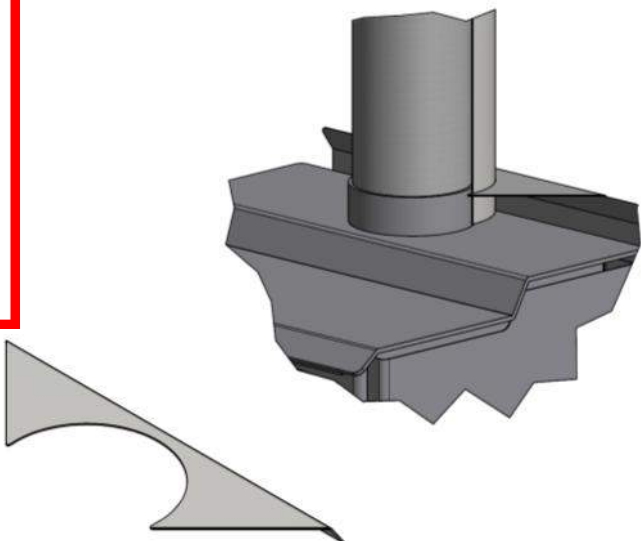
Rear Deflector

The rear deflector is used for reducing rear clearances for applicable fires (see page 4 for details). It is located loose in the firebox.

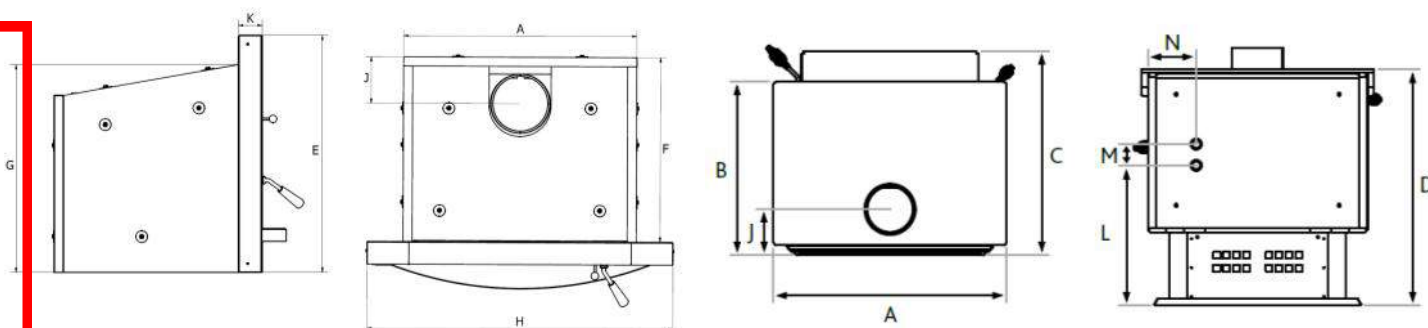
To fit the rear deflector, simply attach it to the rear shield of the fire using 2 rivets in the predrilled holes.

The rear deflector should be positioned tight up against the flue shield as shown.

Available for:
Brunner MKII, Tasman MKII, ECR NoVo & Tarras MKIII



Dimensions



	TOTARA	ECR MKIII, V	ECR NoVo	BRUNNER MKII & TASMAN MKII	TARRAS MKIII	FLARE WOOD	FLARE MULTI	RMF	STRONG-MAN	IMF Deluxe
A Overall Stove Width	642	580	620	615	765	630	630	580	715	590
B Stove Depth Door Frame to Rear		390	382	525	522	540	540	390	521	
C Overall Stove Depth Ledge to rear		450	466	630	640	602	602	450	590	
D Overall Stove Height		620	705	757	772	764	764	620	695	
E Insert Fascia Height	650									740
F Insert Depth	506									480
G Insert Maximum Height	570									590
H Insert Fascia Width	840									850
J Flue Centre to Back of Unit	136	150	155	145	142	181	181	150	141	115
K Insert Fascia Depth	62									120/6 5
L Wetback Height		283	414	478	479	502	502			
M Wetback Centres		130	65	65	65	65	65			
N Wetback Position		290	108	107	180	133	133			

Disclaimer;

While every attempt is made to ensure this information is as accurate as possible, a tolerance of +/- 5mm should be allowed for in these dimensions

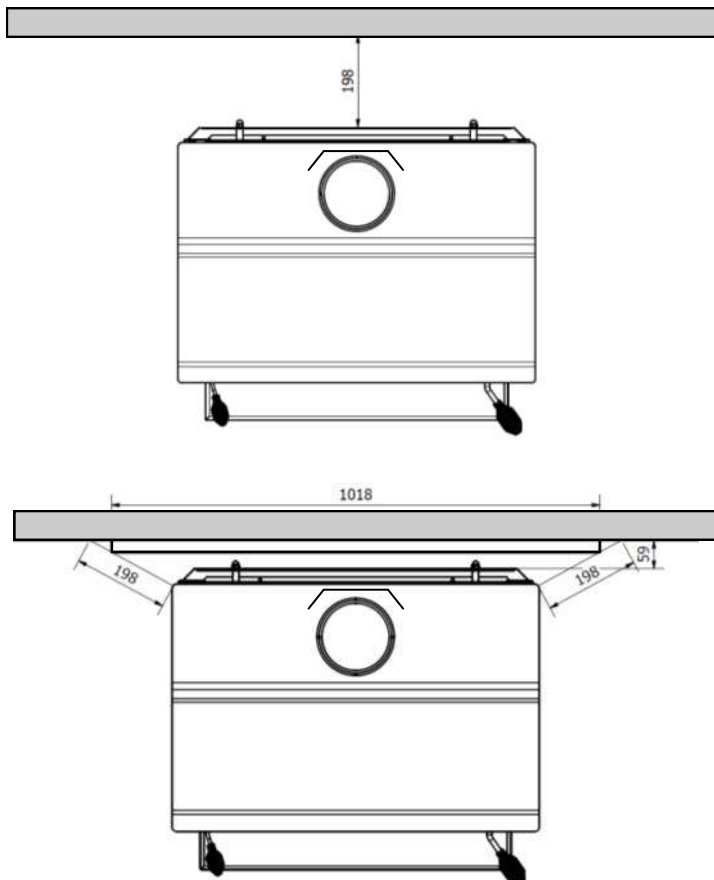
Reducing Clearances

The clearances that are provided on page 4 are to combustible materials. You can safely reduce those clearances by following the instructions located in AS/NZS 2918:2001 table 3.1 and 3.2

You can reduce the clearances by placing a non-combustible heat shield, with an air gap behind it and vented top and bottom, between the fire and the combustible wall. Masonry may be used as a heat shield material. The heat shield must extend a minimum of **450mm** beyond the top of the appliance and must be of appropriate width to ensure that the unshielded rear clearance is adhered to beyond the sides of the heat shield. See example below.

Clearance factors for heat shields which are within 45 degrees of the vertical

Heat Shield Construction	Minimum Air Gap Dimension	Clearance Factor
Single layer of continuous material	12mm	0.4
Single layer of continuous material	25mm	0.3
Two spaced layers of continuous material	12mm + 12mm	0.2



Unshielded Dimension for Woodsman Tarras MKII

Rear Clearance - 198mm (combustible to stove)

Heat shield with 25mm air gap with Woodsman Tarras MKII

Heat Shield - Single layer of continuous material with 25mm air gap.
Size 1018mm wide x 1222mm high

Reduced Rear Clearance - 59mm (combustible to stove)

Calculation: **198mm x 0.3 = 59mm**

WARNING - This is only an example, you must refer to the full AS/NZS 2918:2001 document for more details and consult your local building inspector. Where heat shields are used to reduce appliance dimensions, additional flue shielding may be required (refer 4.5.2).

Installation Instructions

This appliance should only be installed by a trained and NZHHA qualified installer.

Warning: the appliance and flue system shall be installed in accordance with AS/NZS 2918 and the appropriate requirements of relevant building code/codes.

Warning: appliances installed in accordance with this standard shall comply with the requirements of AS/NZS 4013 where required by the regulatory authority, i.e. the appliance shall be identifiable by a compliance plate with the marking "Tested to AS/NZS 4013".

Any modification of the appliance that has not been approved in writing by the testing authority is considered to be in breach of the approval granted for compliance with AS/NZS 4013.

Caution: mixing of appliance or flue system components from different sources or modifying the dimensional specification of components may result in hazardous conditions. Where such action is considered, the manufacturer should be consulted in the first instance.

Caution: cracked and broken components e.g. glass panels or ceramic tiles, may render the installation unsafe.

- Maintain a clearance of at least 1 metre between front of the appliance and building structure or any other substantial immovable object.

- If the appliance is installed on a heat sensitive floor, the floor should be protected with an insulation floor protector, which shall extend entirely beneath the heater. For the correct floor protector extension, refer to dimension C in FIG 1 & 2.

- Your appliance shall be seismically restrained, including the floor protector using the provided holes or brackets. The restraints should be sufficient enough to resist a seismic loading equal to 0.4 times the mass of the appliance. We recommend a minimum of 8mm dynabolts on concrete floors and 8mm coach screws for wooden floors of appropriate length.

Minimum Material Specifications For Floor Protectors on a Floor of Combustible Material

MODEL	SPECIFICATION
ASPEN	9mm Eterpan LD + 8mm ceramic tiles (or equivalent)
FLARE (All Variants) ECR (MkIII, IV, V) RMF TOTARA*	8mm ceramic tiles only (or equivalent)
STRONGMAN	24mm Eterpan LD (or equivalent)
BRUNNER MKII TASMAN MKII TARRAS MKIII ECR NoVo	Ash Floor Protector. Any non-combustible material of any thickness

*The Totara is also approved with 1mm sheet steel with a 10mm spacing above combustible material. For use when extending hearths.

Minimum Flue Height

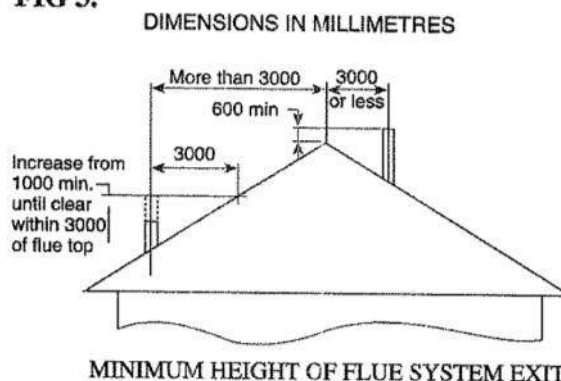
The top of the flue system should be at least 600mm above the highest point of the roof ridgeline, if the point of intersection of the flue system and the roofline is less than 3 metres from the ridgeline horizontally.

If the point of intersection of the flue system and the roofline is greater than 3 metres horizontally, the top of the flue system shall be at least 1 metre above the point of intersection with the roofline. (refer FIG 3)

The total flue height should be no less than 4.6m from the level of the hearth.

These are considered to be **minimum dimensions**, and depending on local conditions, **taller flue system heights may be required for satisfactory performance.**

FIG 3.



Flue Installation Detail

Your Woodsman appliance should be installed with a HeatSaver Flue System.

A HeatSaver Flue System is available from all authorised Woodsman dealers throughout New Zealand.

The HeatSaver Flue System contains a complete installation drawing and correct clearances from the ceiling level up. Minimum clearances from the appliance to nearby combustible surfaces are given in FIGS 1 & 2.

Use of a flue system other than a genuine HeatSaver Flue System may affect the safety of the installation, and may affect your Woodsman warranty.

Insist on a genuine HeatSaver Flue System.

Installation requirements for Woodsman fireplace inserts and flue system where timber framing is less than 50mm from the chimney structure.

Installation should be carried out by a qualified installer who will ensure:

- That the minimum clearances determined by tests in accordance with AS/NZS 2918:2001 are complied with to prevent overheating of nearby combustibles.
- That the minimum opening size of **600mm wide x 600mm high x 500mm deep** is available when firebricks are removed, and that extra provision also be made for plumbing where a hot water booster is fitted (where permitted).
- That any flue requirements specific to the model being installed are met in full - refer HeatSaver Flue System Instructions.
- Where the fireplace opening is in a heat sensitive wall, a non-metallic heat resistant material shall extend not less than 50mm beyond each side of the appliance and 150mm beyond the top of the appliance.
- Clearance of at least 1 metre between the front of the appliance and building structure, or any other substantial material object.
- That the insulating floor protector of non-combustible material is provided, extending not less than the dimensions shown in the chart. (Refer Table 2)
- A fireplace appliance shall not be connected to a flue common with an open fireplace.

Sealing Flue Joints

IMPORTANT

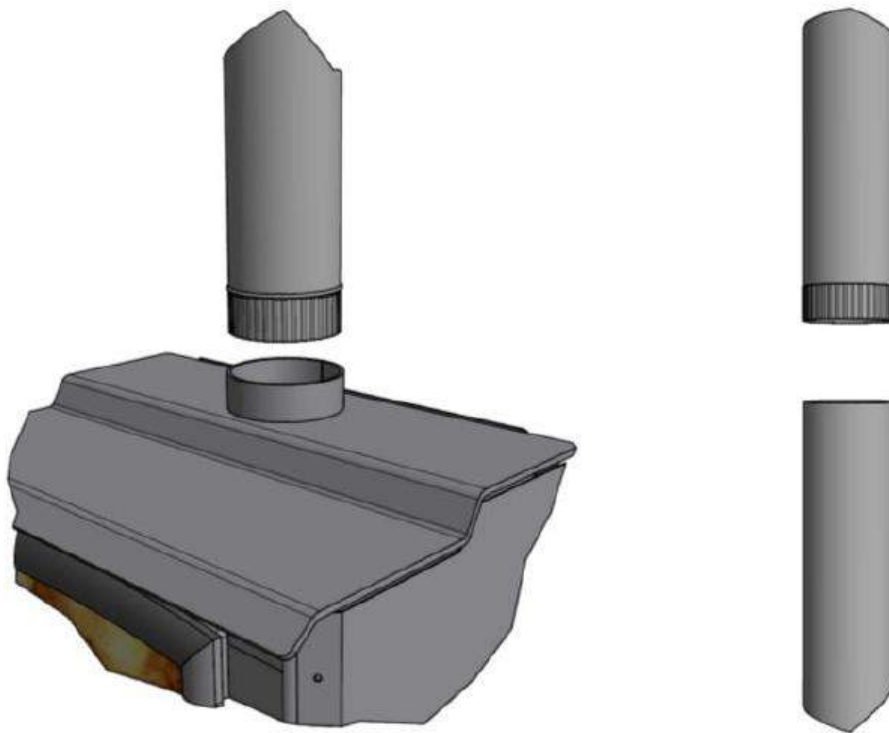
All Flue Joints Are Required To Be Sealed Using Flue Cement

It is extremely important that ALL flue joints are sealed at the time of installation using flue cement or a suitable exhaust cement.

If flue joints are not sealed properly, it can lead to performance issues with the fire such as;

- Lower heat output of the fire, due to decreased performance
- Blocked flue
- Smoke coming out the door when open, due to decreased suction
- Hard to light

The formation of soot and creosote will not seal the flues, especially on the lower lengths, as the high temperatures inhibit its formation.



Any issues that arise as a result of the flues not being sealed, are not covered by the warranty and are not the responsibility of the manufacturer.

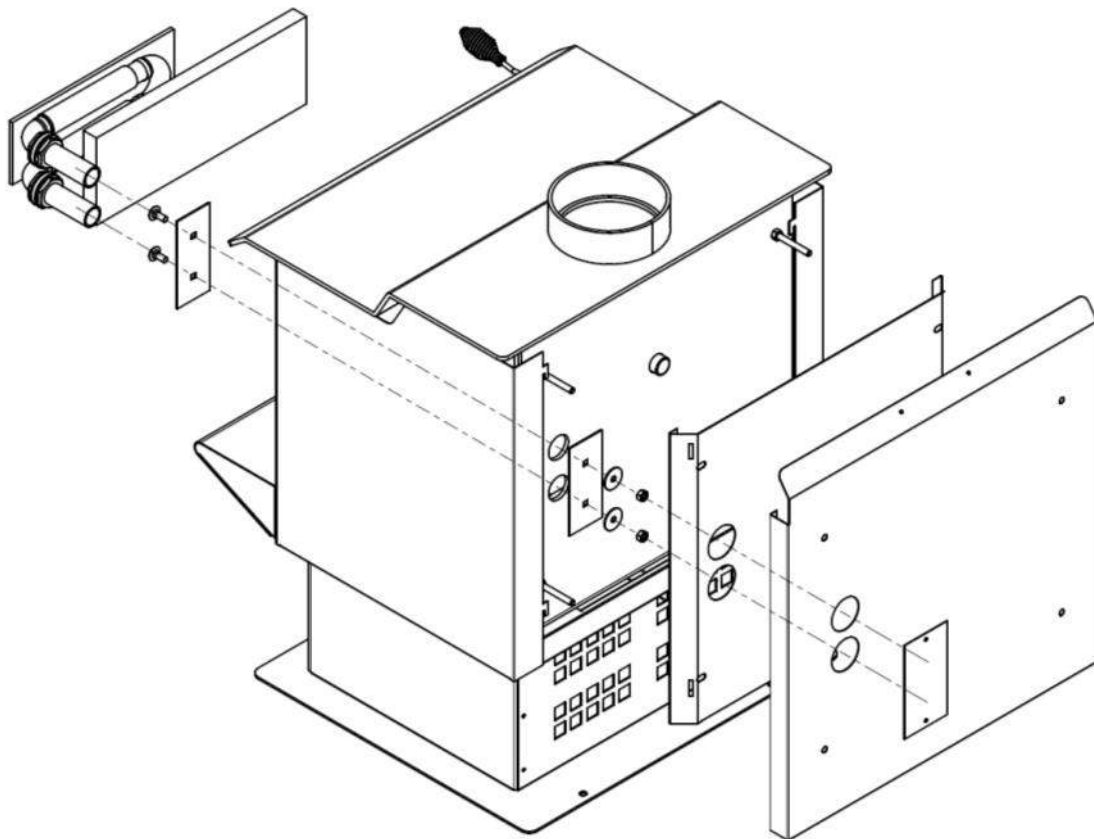
It is the installers responsibility to ensure that this is done at the time of installation.

Fitting the Wetback To The Firebox

Instructions for fitting a loose wetback to the firebox where the fire has been pre-punched with wetback holes.

- Remove knock-outs and cover plates in the rear panels
- Remove top rear firebrick
- Undo coach bolts on firebox plug to expose wetback holes
- Cut rear firebrick with a saw only enough to expose the wetback holes on the inside and to allow for the placement of the wetback in front of the brick
- Remove 1 nut off each wetback tube
- Place wetback into fire with firebrick behind it
- Replace nuts onto the rear of the wetback. Ensure the wetback is level before tightening using a 40mm tube socket

This task should be completed before the fire is positioned in place.



Note: Rear panels do not need to be removed if a tube socket is used for tightening

WETBACK WARNINGS:

- Do not connect to an unvented hot water system.
- **NEVER** burn the appliance without the wetback connected to the water system. This will immediately damage the wetback and void the warranty.
- AS/NZS 2918:2001 states; "all water connections to an appliance shall be in accordance with the appropriate requirements of AS 3500.4.1 or NZS 4603 and the regulatory authority, as appropriate".



Raika
DRAINAGE

raikadrainage@gmail.com

021 221 0032

Percolation Test of Soak Hole

Issued By Raika Drainage Ltd

Registration No: 18659 (Emmanuel Raika)

To: Selwyn District Council

In respect of the following:

Percolation test of Soak Hole

Location: 56 Riverstone drive

Owner: Regan and Lucy Harvey

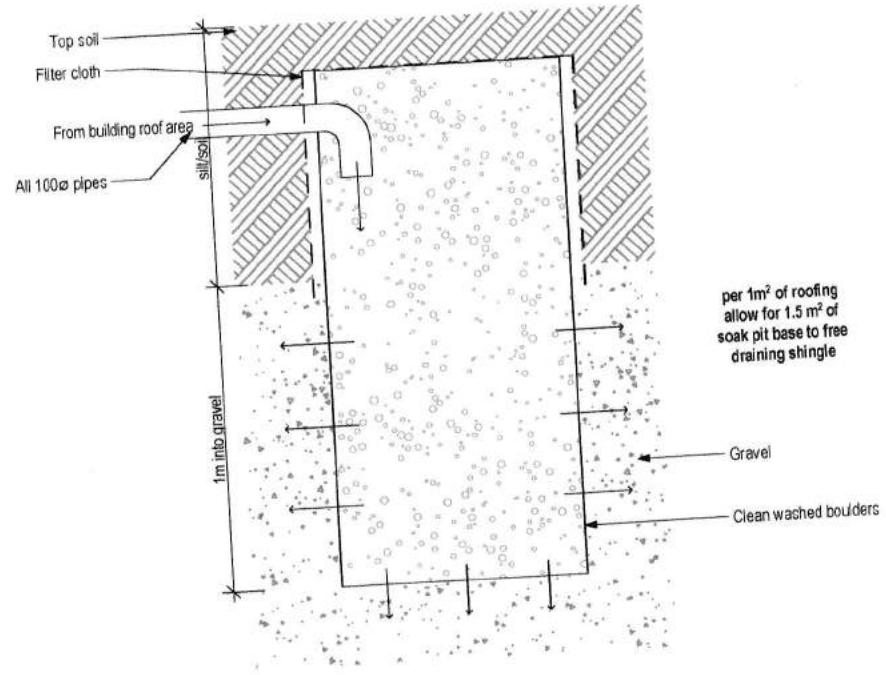
Building Consent No:

A percolation test was carried out by our staff on the soak hole at the above address. We ran a hose into the hole and we observed the water draining at an equal rate to the speed we were pouring. Water poured had completely drained through the soak hole in approximately 3 seconds. The hose was left running into the hole for 1 hour.

As a certified Drainlayer, currently holding an annual practicing licence, certify that I, or personnel under my control have carried out the installation/testing of the above systems and I believe on reasonable grounds that the installation complies with the New Zealand Building Code (Clause E1).

Signed

Date 28 August 2017



D-41

Soakpit

1:20

Approved Building Consent Documents

Please Note: A copy of the stamped approved documents must be available on site for all inspections.

INSPECTION BOOKING TIMEFRAMES		
Telephone 03 347 2839		
Call received	<i>Before 3pm inspection will be done</i>	<i>After 3pm inspection will be done</i>
Monday	Wednesday	Thursday
Tuesday	Thursday	Friday
Wednesday	Friday	Monday
Thursday	Monday	Tuesday
Friday	Tuesday	Wednesday

SPECIFICATION

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

HARVEY RESIDENCE

LOT 18 RIVERSTONE DRIVE

ROLLESTON

CONTENTS

3 Preliminaries & General

6. Excavator

7. Concreter

8. Carpenter

11. Metal Worker

12. Bricklayer

13. Electrician

14. Plumber

17. Drainlayer

22. Roofer

23. Joiner

24. Windows

25. Glazier

26. Painter

27. Gas System

29. Formed Driveway

PRELIMINARIES & GENERAL

- **READING OF PLANS & SPECIFICATIONS:**

The plans and specifications will be read as one document. The contractor should ask all sub tradesmen to read the particular section of the specification to see what specific requirements apply, apart from general trade practice.

- **SITE**

Visit the site so as to be fully acquainted with the facilities or difficulties of access thereto and the nature and extent of the proposed work.

- **CONTRACT DOCUMENTS**

The Contract Documents are complimentary and comprise this specification, the accompanying Architectural, Civil, Structural, Mechanical, Electrical and Fire Service drawings, the General Conditions of Contract in accordance with NZS 3910: 2003 . Documents are to be returned with the Tender.

The Specification and Drawings define generally the services, systems and requirements, are mutually explanatory and shall be read together.

Drawings do not attempt to detail items regarded as standard trade practice and are not intended for use as construction drawings. It shall be the responsibility of the Contractor to check all dimensions and details on site and prepare working drawings.

- **REGULATIONS AND GOVERNING AUTHORITIES**

The construction, installation and its execution shall be in strict accordance with the requirements of the Building Act, New Zealand Building Code, all Statutory and Local Authority Regulations, By-Laws and all amendments thereto.

The Contractor shall be responsible for obtaining a Certificate of Compliance in accordance with the Building Code should this be required.

- **TEMPORARY SERVICES**

The Contractor shall arrange with the Local Power Supply Authority, temporary power supply for the duration of the Contract or until such times as permanent power is supplied to the building. Pay all charges in connection with this temporary supply, including the cost of electricity used.

The Contractor shall arrange for and provide temporary water supply for building purposes, including the provision of all necessary pipes, hoses, etc. for every requirement of this Contract and pay all fees and charges in accordance with the same.

The Contractor shall provide all necessary hoists, lighting gear, ladders, staging, scaffolding, tackle, tarpaulins, tools and any other plant (mechanical or otherwise) necessary for carrying out of the works, and pay for all fees, charges, labour and materials in installing, operating, moving, adapting and maintaining as necessary. The Contractor shall provide all temporary accommodation for the use of site administration, staff, Foreman, operatives, tool storage, tearooms, offices etc. All provisions shall be in accordance with Award requirements and Local By-Laws. Site sheds shall be located within the fenced site, but not on the existing sealed area.

The Contractor shall arrange with the appropriate Authority for the provision and installation of a telephone, and pay all fees and charges in connection therewith.

The Contractor shall provide temporary toilet and washing facilities, all in accordance with the Award requirements and Local By-Laws.

The Contractor shall allow sub-contractors free use of all the above mentioned facilities as necessary and when required for the carrying out of their Contracts.

The Contractor shall allow for the dismantling and removal of all temporary services and plant on completion of the Contract.

- **SCOPE OF DRAWINGS**

The drawings and this Specification shall be read together, and anything shown on the drawings and not specified, or vice versa shall be equally binding as though included in both. In the event of ambiguities occurring, the Contractor shall allow for the more costly method or materials and he shall report any such items to the Principal before proceeding with the work. The drawings shall be held to illustrate the general character of the work, and the parts not particularly detailed shall be constructed in accordance with other similar work.

Continued.....

PRELIMINARIES & GENERAL Continued.....

The works shall be completed to the true intent and meaning of the Drawings and Specification taken together. Before submitting their proposals, tenderers shall inform themselves of the nature of the work required.

No claims will be considered in respect of extra work resulting from inadequate knowledge of the site, building or documents unless it is clearly outside the spirit and meaning of the Drawings and Specification, and such work shall have been ordered in writing by the Designer.

The work shall include all items and work required to provide a completed fully operational installation. Items necessary to achieve this shall be deemed as included even though not specifically mentioned in the documents.

- **DIMENSIONS AND LEVELS**

All dimensions and levels are believed to be reasonably accurate but all must be checked on the site before the work is put in hand, and discrepancies reported to the Principal, so that his decision may be obtained before proceeding further.

Figured dimensions on drawings shall take preference to scaled dimensions and large scale drawings given preference to smaller, unless expressly stated otherwise. Dimensions shall be taken to define bare surfaces on concrete, timber framing, and the like, unless otherwise shown. All dimensions are to be checked on site by the Contractor before commencing fabrication

- **TRADE DIVISIONS**

This specification is divided into Trade Divisions for convenience only, and it shall not be construed that each trade section is a complete separate contract. The whole of the forgoing Preliminary Clauses shall be read in conjunction with and shall apply to each and every trade section of the specification to their full extent and meaning.

- **PROVIDE AND FIX**

The words "Provide" and "Fix" when used separately in this specification shall be taken to mean "provide and fix" unless otherwise stated

- **WORKS PROTECTION, DAMAGE, CLEARANCE, MAKING GOOD**

Throughout the Contract, the Contractor shall store his materials and equipment in a secure and orderly manner and shall take all reasonable steps to protect the work of this trade from damage by others or natural elements. He shall also make good, at his own expense, all damage caused by him to work of other trades, remove promptly from site all trade wastes and surplus materials and maintain the site clear of all trade wastes and debris associated with this Contract. The Contractor shall make good all damage done by him to the Building and make repairs to reinstate surfaces to their original condition.

The Contractor shall allow for the completion of the building in all respects. The Contractor, shall from time to time, remove all rubbish, debris, and builders spoil, as it accumulates, and keep the site and building clean and tidy.

- **RECORD DRAWINGS AND INSTRUCTIONS**

Neat, accurate, up-to-date on site records, of all deviations from the Contract Drawings and Schedules shall be kept and made available for inspection by the throughout the Contract. At the completion of the Contract, the Contractor shall update the drawings for inclusion in the Maintenance Manuals and As-Built documents as detailed in the Trade sections of this Specification.

- **CERTIFICATE OF COMPLIANCE**

The Contractor is to obtain a Certificate of Compliance for all work completed by him and his associated subtrades for issuing to the Territorial Authority should it be required. The Certificate is to satisfy that all the relevant NZ Building Code provisions have been met. The contractor is to check with the TA as to the need for this compliance.

The Contractor shall make good at his own expense any items deemed not to comply with the NZ Building Code that are a result of faulty workmanship, materials or negligence.

- **HEALTH AND SAFETY IN EMPLOYMENT ACT 1992**

It is the Contractor's sole responsibility to comply with all the requirements of the Health and Safety Act. The Contractor must establish and monitor an appropriate safety plan for this project. This safety plan must be presented to the principal to the contract before any work commences. The Contractor must present fortnightly reports on all Health and Safety issues to the principal to the contract.

- **CONSENTS & FEES**

Allow for giving all notice to local and other authorities, obtain all necessary consents and paying all fees and charges.

Continued.....

PRELIMINARIES & GENERAL Continued.....

- **INSURANCE**

The contractor/owner shall insure the works in an approved Fire Office and such insurance shall cover the full value of the premises when completed. The contractor shall maintain a Public Liability Policy with an Insurance Company in New Zealand indemnifying the contractor against claims in respect of damage to property arising out of the operations of the Contractor or his Subcontractors in the execution of said works.

- **VARIATIONS**

No variations of any kind shall be made to the contract without direct instruction in writing from the employer. The price of any variations must be agreed to in writing before being proceeded with.

- **ATTENDANCE OF TRADES**

Make good after all trades. The contractor shall leave all necessary holes, chases, sleeves, ducts etc as required by subsequent trades.

- **SETTING OUT**

Any discrepancy between work as set out and the drawing must be reported to the designer before any work is carried out. The contractor is responsible for the accuracy of the setting out.

- **SURVEY PEGS**

Survey pegs required by the Contractor to define the site, unless already established, shall be provided by a Surveyor employed by the owner.

- **STABILITY**

The Contractor shall take all precautions to ensure the works are braced, supported or covered as required to prevent damage by wind and protect the works from the elements as necessary at the time.

- **DAMAGE**

The Contractor shall, at his expense, be responsible for any damage to footpaths, kerbs, drains etc, to the satisfaction of the local authority. The Contractor will however be able to recover costs when it is known that such damage is caused by one of the Subcontractors e.g. concrete truck damaging a kerb will therefore establish that the concrete supply company shall reimburse the Contractor.

- **MATERIALS AND WORKMANSHIP**

All materials shall be the best of their respective kinds, qualities, classes and grades as hereinafter specified and shall comply with the requirements of the relevant New Zealand Standards.
Workmanship; conform to good trade practice and the relevant Codes of Practice in current use in NZ. All work to be level, plumb, and true to line and face. Employ only experienced workers familiar with the materials and techniques specified.

- **FINISHED WORK**

It should be clearly understood that a high standard of workmanship and finish is required throughout this contract. Should any trade consider that any surface finish or fitting be not in a satisfactory condition to ensure a proper fitting of his own thereon, it shall be his responsibility to notify the contractor before anything further is done, and under no circumstances whatever shall such finished work be proceeded with until the necessary improvements have been made. Failing such notification and correction, the finishing trade concerned will be held responsible for the poor finish due to such unsatisfactory conditions.

- **CLEARING THE SITE**

The contractor shall allow in his tender for the completion of the building in all respects. At completion, the site and the whole of the building shall be left completely free from rubbish and residue and ready for occupation.

- **MAINTENANCE**

A period of minimum 30 days or to a time agreed between all parties and entered on to the Specification. Any defects in materials, workmanship or any part/s that require adjusting or replacing, which have to been included in the contract shall be adjusted or replaced at the contractors expense.

EXCAVATOR

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary clauses which shall apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **SCOPE**

The extent of the excavation and associated work shall be as generally shown on the drawings, including all excavation for all building work, backfilling and making good. It shall include all work associated with site works.

- **PROTECTION**

All excavation works shall meet all safety requirements and shall be protected from all water or associated damage. All precautions shall be taken to avoid damage to all public and private property.

- **EXCAVATION**

The area of the top of the site to be covered by the building shall be stripped of all top growth and vegetable matter.

Excavate for all foundation pads, piles, slabs etc as shown on the drawings.

Should soft clay, peat or filled ground be encountered, an engineer shall be consulted for additional foundation details.

Before placing steel or pouring concrete, the excavation shall be cleaned and the bottoms dry and firm.

- **GROUND WATER**

Excavations shall be kept free of water. Any ground water in the excavations shall be away by means of a sump dug clear of the excavation or by other de-watering system as appropriate.

- **BACKFILLING**

Backfill around foundations with approved material and thoroughly consolidate. Remove all timber and other rubbish and loose material before backfilling.

- **REMOVAL OF SPOIL**

The excavator shall remove all surplus material away from the area of the building. Stockpile on the site where directed by the owner.

CONCRETER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **SCOPE**

This section of the contract is for the supply, forming and casting of all new concrete, including the supply, bending and placing of reinforcement and other associated work as shown on the drawings.

- **MATERIALS AND WORKMANSHIP**

The whole of the concrete work shall comply with the New Zealand Building Code and New Zealand Standards 3109, , NZS 3114, NZS 3124, NZS 3112, NZBC, B2 durability.

- **CONCRETE STRENGTH**

The following strengths shall be used unless specified otherwise on plans;

[A]	Foundations,	20.0Mpa @ 28 Days
[B]	Floor	20Mpa @ 28 Days
[C]	Filling of Reinforced Blockwork	20Mpa @ 28 Days

- **FORMWORK**

The formwork and falsework shall be constructed to provide a high standard of "fairface" finish.

- **REINFORCING**

The reinforcing steel shall comply with AS/NZS 4671 and is ductility class E

- **FLOOR SLAB**

[A]Damp proofing: Lay 0.250 mm "moistop" DPM complying with NZS3604 7.5.6.1 over granular fill. Ensure 150mm wide lap on sheets and the application of pressure sensitive tape to all joints and to the penetrations by all services. Any damage to barrier shall be repaired prior to pouring.

[B]Floor Slab: The concrete floor slab laid over "moistop" and AP40 fill material complying with NZS3604 7.5.3.2 and compacted in layers of 150 mm thick unless otherwise specified on the plans.

[C]Floor Finish: The slab shall be finished while still green...Any resulting ridges shall be trowelled off with a steel float. A high standard of finish is expected. Allow to fill and finish with a steel float all pockets, recesses, chase etc left for pipework and other trades.

[D]Construction Joints: Form construction joints by saw cuts 6mm wide to a depth of $\frac{1}{4}$ slab thickness or nominal maximum size of the slab aggregate, whichever is the greatest, made not more than two days after the concrete has been placed. Saw cuts shall be filled with grout to prevent edges fretting. Reinforcing shall be continuous across all construction joints. Saw cuts and construction joints shall be 6.000m crs. Maximum for 100 mm slab.

- **CHASES ETC**

Form all chases, pockets, flashing grooves etc are necessary for the complete and proper execution of the work.

- **EMBEDDED ITEMS**

Provide and build in all bolts, fixings etc necessary for the proper execution of the works. Co-operate with all other tradesmen and trades and build in all items required by them.

CARPENTER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **SCOPE**

This trade shall include all materials, equipment and labour necessary to carry out the complete carpentry and joinery as shown together with any other items of work reasonably inferred as part of this section

- **MATERIALS**

All materials used shall be the best of their respective types.

Framing generally shall be gauged and treated to NZ timber Preservation Council 3602 and NZMP 3640.

Finishing timber shall be dressed on four sides.

All timber shall conform to relevant standards NZS 3602, NZS 3640 NZS 3631 and the New Zealand Building Code B2 Durability, B1 Stability.

- **WORKMANSHIP**

All work shall be carried out in a workmanlike manner using the best practices in accordance with the New Zealand Building Code and NZS 3604.

- **LINTELS**

Calculate lintel sizes as set out in NZS 3604 unless designed by other ie truss manufacturer .

- **FRAMING**

All framing shall be generally Ex. 100mm x 50mm as shown on the drawings

Purlins, beams , rafters, etc shall be as shown on the drawings

Roof to pitch as indicated on the plan and to detail, well fixed in accordance with NZS 3604.

Allow to frame up and finish whole work as detailed Allow to do all bracing, dwwanging, packing etc for linings, finishings and fittings as drawn.

Trussed Roofs; Drawings showing clearly the type, pitch, span, spacing and overhangs of roof trusses and details of roof claddings shall be provided to the truss manufacturer to allow him to comply with Clause 10.2 of NZS 3604. Thereafter, the Contractor shall match construction with the drawings and details provided by the truss manufacturer throughout all stages of fixing and bracing. In all cases anchorage of all trusses to plates shall be with not less than 2/100mm skew nails plus 2/4.9mm wire dogs.

All structurally engineered timber members outside the scope of NZS3604 are to be SG8 timber or better unless otherwise specified .

- **DOORS AND FRAMES**

Internal doors shall be hollow core paint grade unless otherwise indicated by the Owner.

All external doors to be Aluminium glazed doors, with the exception of the front door which is to be Cedar door in Timber Frame, unless otherwise indicated by Owner.

- **WARDROBES**

To be lined full height. Provide inside each with 400X25mm full width shelf at 1.7m from floor and 20mm galvanised pipe coat rail at 75mm below shelf, unless shown otherwise on the drawings. Sliding Doors 2.200m High, unless otherwise indicated by Owner.

- **ARCHITRAVES AND SKIRTINGS**

Fit all skirtings to all rooms throughout unless shown otherwise. Confirm with owner as to type of skirting or architrave.

- **FINISHING**

Provide all finishing trims to baths, showers, joinery etc. if required.

- **DAMP PROOFING**

All timber to be protected from dampness, with a continuous D.P.C. strip when in contact with concrete, except as under Clause 2.3.3. of NZS 3604.

Continued.....

CARPENTER Continued....

- **PRIMING**

All exterior finishing timber, all timbers in contact with concrete blockwork and all external faces, rebate, etc., of all doors, windows, frames and all woodwork of sashes, shall be primed before fixing unless otherwise specified in Painter.

- **CLEANING**

The Contractor at the conclusion of the contract shall have all ceilings, walls and woodwork carefully dusted and wiped down. Windows washed and glass free from scratches and paint. Floors brushed and the entire building site left in a clean condition for occupation.

- **FASTENINGS AND FABRICATION**

The contractor should especially note that all aspects of fastening and fabrication of timber framing members and wood based products in this contract shall be in accordance with the relevant clauses of NZS 3604. Reference shall also be made to NZS 3604 for the proper fixing of sheet lining and cladding materials for walls and ceilings that are not wood based especially where such materials are used as diaphragms and for wall bracing. Mild steel structural components used in sub floor spaces, exposed to the weather or in a position where condensation or dampness could occur shall be hot dipped galvanised after forming and shall provide necessary "capacities" called for by NZS 3604 dependant on function and location. In all other cases, select and use connectors according to manufacturers literature conforming to NZS 3604 requirements.

- **INSULATION**

R 3.6 (or greater) fibreglass shall be installed to all roofed ceilings, R 2.6 (or greater) to exterior walls.

- **BUILDING PAPER**

Breather type building paper to be fixed to the outside faces of the exterior timber wall framing and fixed horizontally with 150mm laps.

- **METER RECESS**

Provide recess for electrical meter board where directed to the satisfaction of the local Electrical Supply Authority and Owner.

- **ACCESS HATCH**

Provide access hatch to ceiling 800mm x 800mm in accordance with NZS 3604 section 13.3.1.

- **FITTED JOINERY**

The carpenter shall take delivery of all joinery fittings and frames and build in carefully, fitting up with the necessary hardware.

- **HARDWARE**

Allow to supply and fit all hardware to include locks, door furniture, cupboard door and drawer handles. Consult with Owner for types and finishes.

- **INTERNAL LININGS**

Internal walls and ceilings (unless otherwise shown) shall be 10 mm and 13 mm Gibralter Board fixed to manufacturers specifications. Wall and ceiling linings to wet areas (kitchen , bathroom , ensuite , laundry etc.) use Aqualine gibboard . Gibralter Board shall be stopped and sanded to paint finish at B2 durability 5 years.

- **WALL BRACING**

Provide all wall bracing has shown on drawings and Wall bracing calculation sheets as is intended to satisfy the N Z B C. Keep strictly to the other our ' type', Lengths and locations shown on the plan. Refer bracing schedules.

Sheet wall bracing elements – permitted penetrations

Plasterboard systems No penetrations are permitted within 90 mm of the perimeter of any bracing element.

Where light switches are near a braced panel edge, a block will need to be fixed to the stud to provide the edge separation and fixing for a flush box. For penetrations in the body of the sheet, one supplier allows small penetrations (90 x 90 mm maximum) anywhere else within the bracing element. Another allows up to 125 mm diameter penetrations as long as they are more than 300 mm from the edge of the bracing element.

One plywood system Small openings (such as power outlets) of 90 x 90 mm or less may be located no closer than 90 mm to the edge of the braced element. Wastepipe outlets of up to 150 mm diameter may be located no closer than 150 mm to the edge of the braced element.

One fibre-cement system Holes or penetrations up to 100 x 100 mm are permitted no closer than 200 mm to the edge of lining or another hole.

8.7.3.4

Each wall that contains one or more wall bracing elements shall be connected at the top plate level, either directly, or through a framing member in the line of the wall, to external walls at right angles to it. Top plate fixing(s) of the capacity in tension or compression along the line of the wall bracing element are given as follows:

- (a) For each wall containing wall bracing elements with a total bracing capacity of not more than 125 bracing units: to at least one such external wall by a fixing as shown in figure 8.16 of 6 kN capacity;
- (b) For each wall containing wall bracing elements with a total bracing capacity of not more than 250 bracing units: to at least 2 external walls by fixings as shown in figure 8.16 each of 6 kN capacity;
- (c) For each wall containing wall bracing elements with a total bracing capacity of more than 250 bracing units: to at least 2 external walls by fixings as shown in figure 8.16 each having a rating of not less than 2.4 kN per 100 bracing units.

SECTION 8 – WALLS

NZS 3604:2011

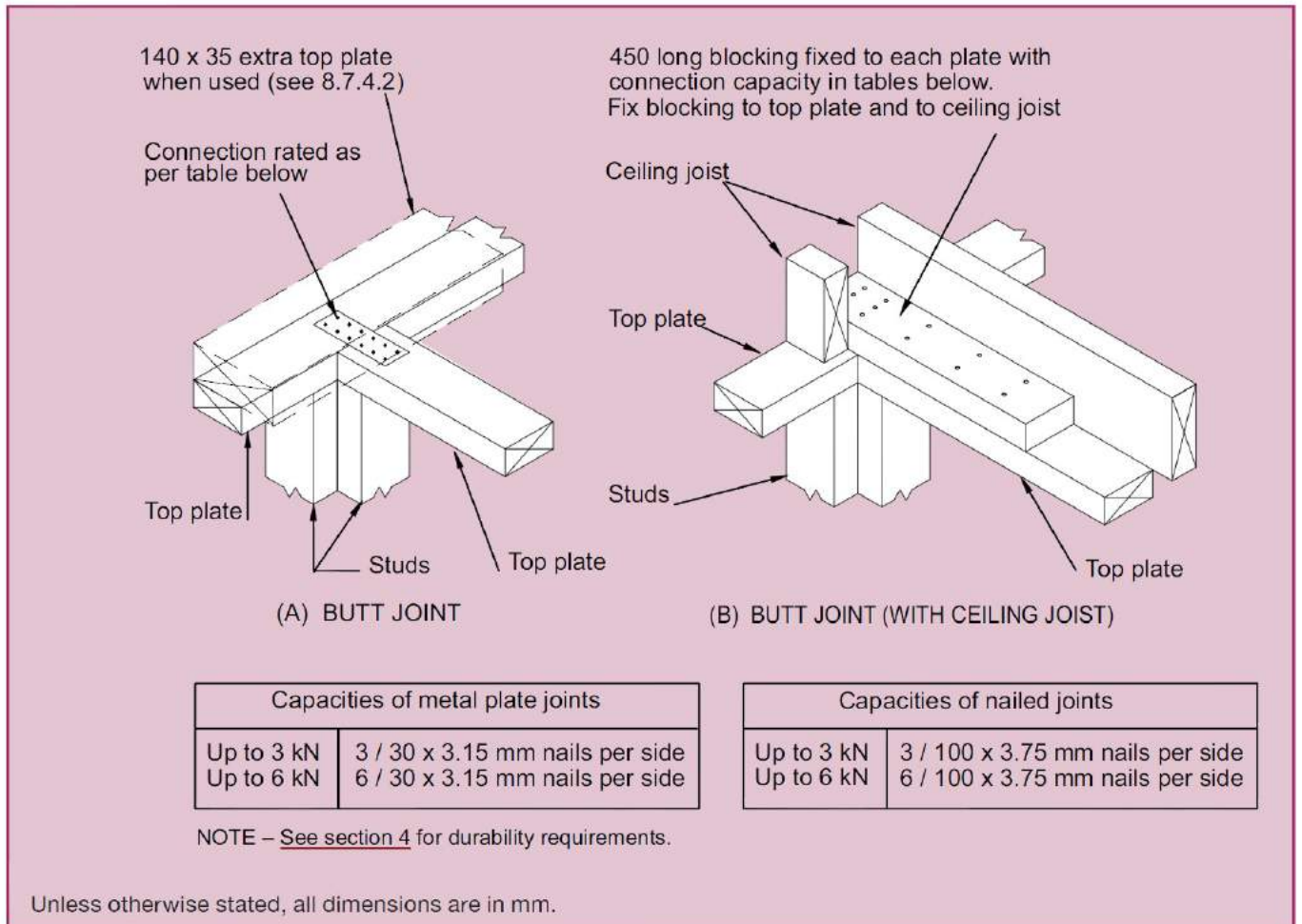


Figure 8.16 – Connecting top plates to external walls at right angles – Walls containing bracing (see 8.7.3.4)

METAL WORKER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to all work in this section.

Where any standard specifications are quoted, they shall be the current issue including any amendments or standards issued in substitution, as at the date of the engineers producer statement.

- **SCOPE**

Fabrication and supply of all steel work as shown on the drawings.

All steel work shall comply with the NZBC and NZS 3404.

- **MATERIALS AND WORKMANSHIP**

Steelwork shall be accurately fabricated so that all parts fit truly in assembly. All similar parts shall be interchangeable. Fabrication shall be carried out in accordance with S.A.A. M.A. 1.8. The steel worker shall check all concrete and fixing dimensions on site before fabricating any steelwork affected by these dimensions.

- **GALVANISED MS LINTELS**

Masonry veneer above windows and door openings shall be supported by galvanised MS Lintels.

Angle lintel dimensions shall be calculated as set out in Table 18b E2/AS1

MS Lintels shall have a minimum landing of 200 mm on their supporting masonry unless stated otherwise on the drawings

BRICKLAYER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **MATERIALS AND WORKMANSHIP**

All materials and workmanship shall be in accordance with the best bricklaying trade practices and conform to all relevant standards of the New Zealand Building Code and, NZS 3103, NZS 3122, NZS 3604 and NZS 4210.

(A) Bricks for external veneers shall be of colour and type selected by the owner.

(B) Plasticisers shall be used in accordance with the manufacturers instructions. No other additives are to be used in conjunction with these materials. On no account will further additions be made at the time of re-tempering mortars.

(C) Water shall be of drinking quality.

- **PREPARATION OF MORTAR**

Mortar shall be prepared by mixing in an approved mixer. Measurement of materials shall be by volume using suitable containers. Mortar shall be mixed until a homogenous mass is obtained but not for less than five minutes. All mortar whether on boards or left in mixer shall be used within 90 minutes.

- **BRICKLAYING**

Bricks shall be laid in stretcher bond true to line level and plumb and in accordance with best trade practice. All joints will be completely filled with mortar and the bricks shall be disturbed as little as possible up to 24 hours after initial positioning. Joints shall not be more than 9.5mm thick and shall be tooled as work proceeds. Construct brick veneer with approved ties at spacings in accordance with materials and workmanship to NZS 4210. A cavity of not less than 40mm and not more than 75mm shall be maintained between building paper and veneer. Brick ties shall be positioned along the wall at max. 600mm centres and max. 350mm vertically. Alternative spacings to these as detailed in NZ Standards may be used. Form weepholes in the bottom course of walls at ground level, intermediate beams and ledges and wherever the cavity is closed at the base such as window and door openings. Weepholes shall be formed wherever the cavity is closed at the base. Weepholes shall be formed every third perpend (1000sqmm/lineal metre of wall) and shall be clean and free of mortar and other restrictions. Keep the cavity and upstand clean, free from mortar protrusions and droppings. Supply and fix ties to all veneer walls as bricks are laid. Tie sizes shall vary to suit the varying widths of cavities. Wall tie anchorage shall be 35mm minimum into the mortar, with 15mm minimum cover from weather face. Additional ties shall be placed within 200mm of the edge around openings and at the end of unsupported wall panels. Keep pipes or electrical wire, junction boxes etc out of the cavity.

- **BRICK OVERHANG**

The veneer shall not overhang its supporting foundation by more than 20 mm.

- **CLEANING**

Thoroughly clean down the face of the work on completion and leave free of mortar stains and efflorescence.

SDC - Approved Building Consent Document - BC171688 - Pg 13 of 264 - 7/09/2017 - hamib

Table 18A: Specification of maximum tie spacings for type B (4) veneer ties
Paragraph 9.2.7

Seismic zone	Masonry veneer Less than 180 kg/m ²			Masonry veneer 180 – 220 kg/m ²			Masonry veneer more than 220 kg/m ²
	Tie type (4)(5)	Maximum spacings (1)		Tie type (4)(5)	Maximum spacings (1)		
		Horizontal	Vertical		Horizontal	Vertical	
1	EL	600	400	EM	600	400	SED (2)
2 (6)	EM	600	400	EH (3)	600	400	SED (2)
3	EH (3)	600	400	EH (3)	600	400	SED (2)
4	SED (2)	SED (2)	SED (2)				

NOTES

- (1) Maximum masonry tie spacings of 600 mm horizontally and 400 mm vertically
- (2) Spacing of ties to be determined by specific engineering design
- (3) EM may be used if the horizontal spacings do not exceed 400 mm and the vertical spacings do not exceed 300 mm
- (4) Type B and Prefix E indicate masonry ties manufactured to AS/NZS 2699.1
- (5) L (Light), M (Medium), H (High) indicate strength capability of ties in AS/NZS 2699.1
- (6) Use seismic zone 2 (minimum) for Christchurch region comprising Christchurch City, Waimakariri District and Selwyn District.

Table 18D: Corrosion protection to lintels
Paragraph 9.2.9, Table 18E

	316 or 316L or 304(2) stainless steel or 600 g/m ² galvanising on mild steel plus duplex coating(1)	600 g/m ² galvanising on mild steel(1) or 300 g/m ² galvanising on mild steel plus Duplex coating(1)
Zone B	Yes	Yes
Zone C	Yes	Yes
Zone D	Yes	

- 1) To AS/NZS 2699.3
- 2) 304 stainless steel will exhibit greater levels of surface rusting than 316 stainless steel, especially where not exposed to rain washing.

ELECTRICIAN

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to this section of the contract. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **SCOPE**

The electrical contract consists of the supply of all materials, plant and labour for the complete light and power system.

- **MATERIALS AND WORKMANSHIP**

All electrical work to be carried out in a tradesman like manner and comply with New Zealand Building Code G8, G9 and relevant New Zealand Standards and the New Zealand Electrical Wiring Regulations Handbook and the local authority regulations.

- **METER BOX AND SWITCHBOARD**

Supply and install meter box and switchboard where directed by the owner, with underground supply to local authority supply. The switchboard shall be fitted with appropriate circuit breakers and have all circuits neatly labeled.

- **WIRING**

All sub-circuit wiring shall be completely TPS cable reticulated through wall and roof framing. Holes in framing for cable shall be no more than 20mm dia and shall be in the centre of the depth of the member. All wiring including mains shall be concealed. Lighting circuits to be wired in 1.0mm twin cable. Power circuits to be wired in 2.5mm twin and earth cable. Wire to all the wall mounted power points with vertical droppers only – no horizontal runs to adjacent points.

- **SOCKET OUTLETS**

All wall plugs shall be 230v. 10amp, 3 pin flush type. Generally install plugs 300mm above the floor or 225mm above bench top. Points to washer/dryer space and refrigerator 1200mm from the floor. The exact position of all power points shall be determined on the job by the Owner. All plugs to be doubles and horizontally placed.

- **LIGHT FITTINGS**

Wire for, supply, install and connect to services 75Watt light bulbs and batten holders unless otherwise specified. Electrician is to confirm location of all lights and points with the owners prior to commencing wiring.

- **SWITCHES**

Light switches shall be 10 amp, all insulated P.D.L. micro-gap type or equivalent. Where indicated fit flush type with plain bakelite flush plate. Fix switches generally 1200mm above the floor.

- **ELECTRIC WALLOWEN AND HOB**

Provide and fix a 30-amp flush switch for walloven and hob sufficient cable for connection and allow for installation.

- **TELEPHONES**

Allow to meet with Owner and discuss exact telephone/modem and line requirements, and wire for these.

- **TV AERIAL AND OUTLETS**

Provide and install aerial and outlets, check final position of the Owner.

PLUMBER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to this section of the contract. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **SCOPE**

The work shall consist of the supply of all plant, materials and labour for the completion of the installation of a rainwater catchment system, water reticulation and sanitary services, all flashings and cappings, valley gutters, vents, flues, ducts etc.

- **MATERIALS AND WORKMANSHIP**

All materials and workmanship shall be supplied and carried out in accordance with relevant clauses of the New Zealand Building Code G12 AS1, G13 AS1, E 1 & B 2 durability

UPVC WASTE, SOIL AND VENT PIPES

UPVC pipe to AS/NZS 1260 complete with fittings brand-matched to the pipe and manufacturer's requirements.

- **TESTS**

Subject all water installation to a full water pressure test before pipework is closed in.

- **FASCIA AND GUTTERING**

Fascia and guttering shall be as shown on the drawings together with downpipes, all in accordance with manufacturers specifications and recommendations.

- **FLASHINGS**

Flash as necessary to render building watertight where not supplied and fitted by other trades, ie roofing contractor.

- **WASTES**

Waste and vent pipes are to be installed with all work carried out in strict accordance with the manufacturers instructions for working and using the material. Great care will be taken to ensure that they are adequately supported where they run horizontally.

- **PIPES AND PIPEWORK**

Supply and run 25mm alkathene pipe supply line from street.

Cold Water reticulation within the dwelling to be run in installed in polybutylene AS/NZS 2462.2 strict accordance with the manufacturers instructions for working and using the material.

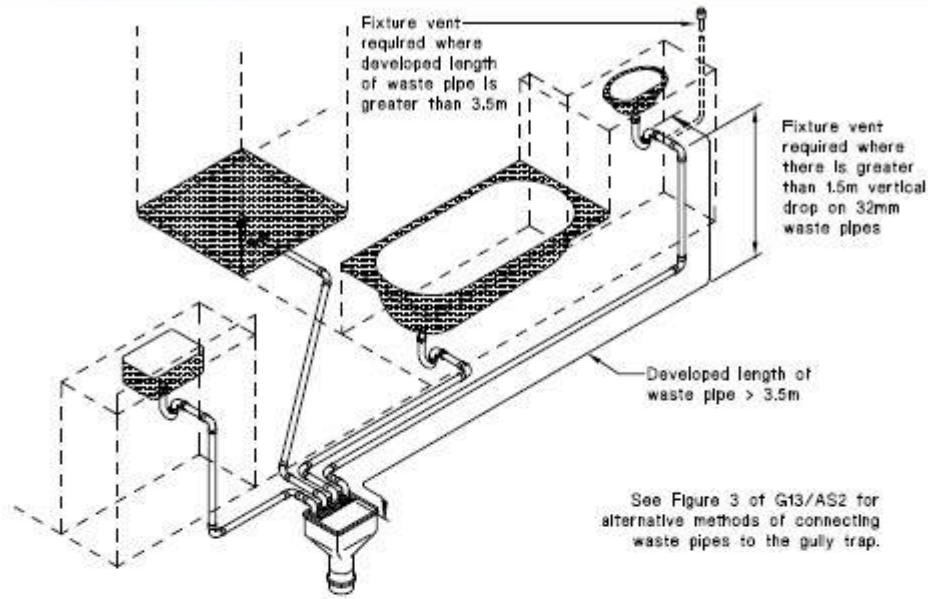
Hot Water reticulation within the dwelling to be run in copper or from Butylene polybutylene AS/NZS 2462.2, all fixed exactly to the manufactures specifications. All hot water pipes to be insulated with Aeroflex.

All pipes to be concealed in the walls or under the floor.

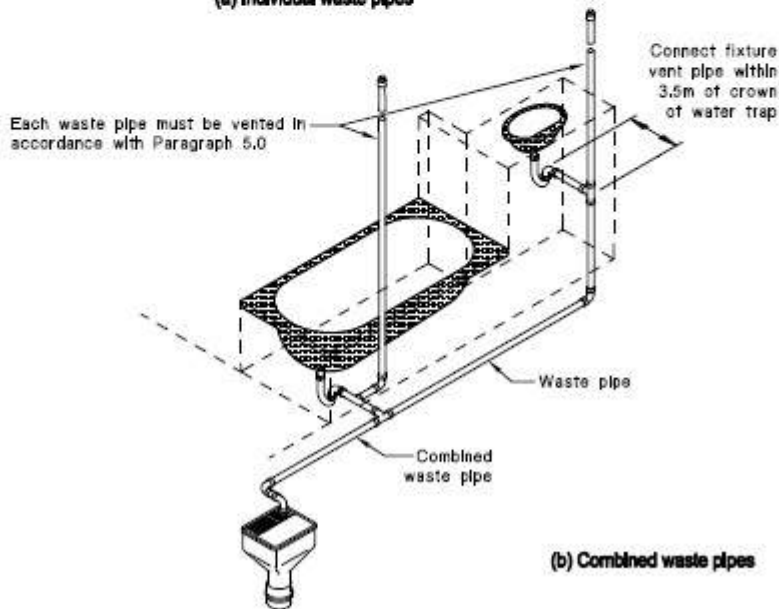
- **TAPS, FAUCETS AND VALVES**

Consult with the owner on choice of brands and fixing of all taps, faucets and mixing valves.

Figure 5: Waste pipes discharging to a gully trap
Paragraph 4.5.1 a)



(a) Individual waste pipes



(b) Combined waste pipes

Note:
Upper floor waste pipes may discharge to a gully trap however venting will be required where wastes are combined or where specified lengths are exceeded. See Table 5.
Waste pipes may also discharge to a stack. See Figures 7 and 8.

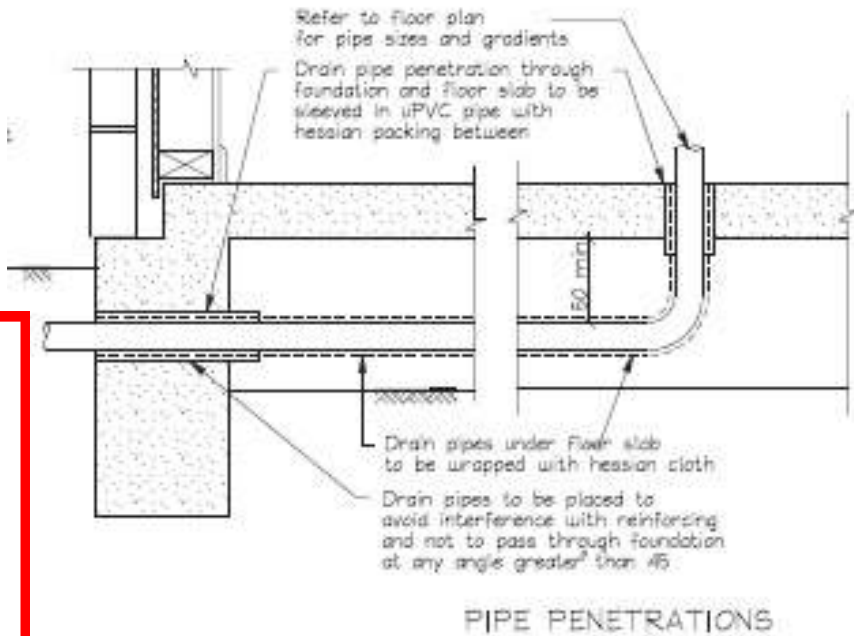
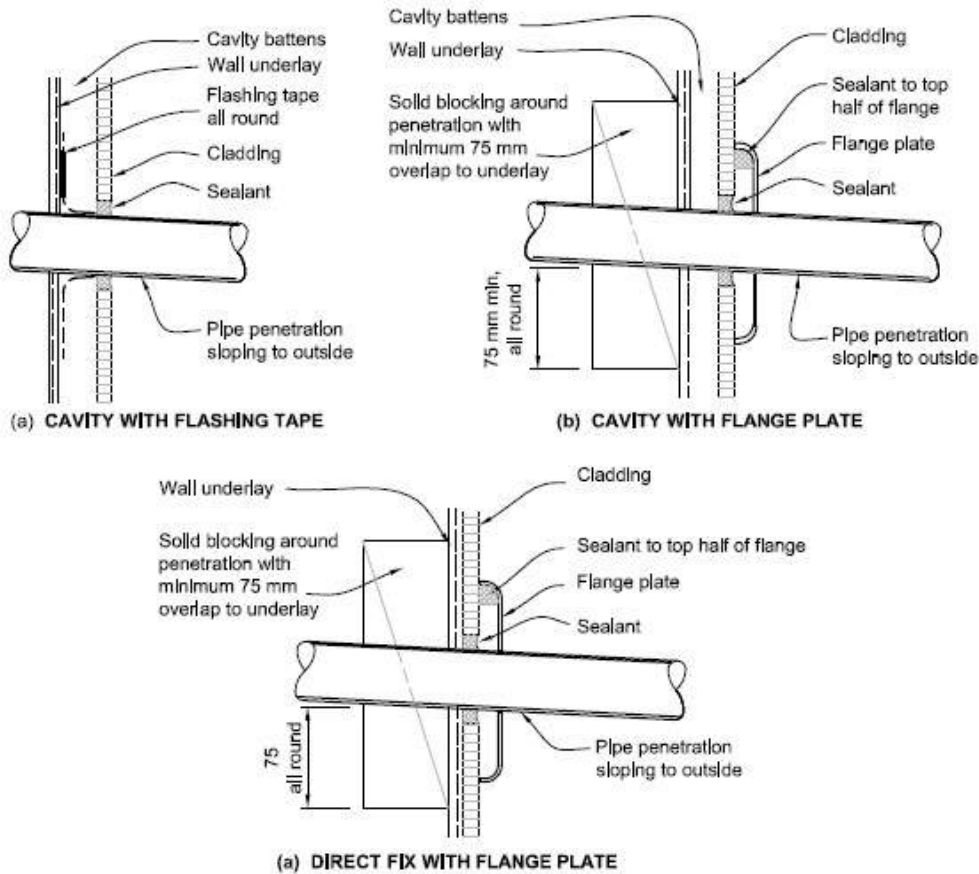


Figure 68: General pipe penetration
Paragraph 9.1.9.3, Figure 126



DRAINLAYER

- PRELIMINARY AND GENERAL

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments of standards issued in substitution

- SCOPE

Work in this section of the contract comprises all surface and foul water drainage up to and above ground level to connect to plumbers work. Include all pipes and fittings, construction of manholes, all gully traps and connections for terminal vents, soil and waste pipes. The drainlayer shall confer with the contractor before the foundations are laid to fix exact position of all connections of wastes and drains.

MATERIALS AND WORKMANSHIP

All materials and workmanship shall be in accordance with the best drainlaying practices conforming to all relevant clauses of the New Zealand Building Code G13 AS2, G14, E1 & B2 durability.

uPVC Pipes bends, junctions, fittings and joints to AS/NZS 1254 and AS/NZS 1260.

- CONNECTION TO EXISTING

The drainlayer is responsible for verifying the position and depth of the connection and commence laying his drains from this point.

- TRENCHES

The excavation of trenches for drains shall be accurately made with base clean and true grade so that unnecessary filling is not required. Adequate width shall be allowed in accordance with depth of drain to enable laying and jointing to be properly carried out. Trenches shall be kept firm and dry and shall be opened up only in lengths that can be protected, utilised and refilled within a reasonable time.

- FITTINGS

The drawings show the layout of the system. Additional fittings such as inspection points and inspection bends that are normally required but are not specifically shown must be allowed for by the drainlayer to comply with the New Zealand Building Code.

- FALL IN DRAINS

The whole of the soil and stormwater drains are to be layed to a regular and even fall.

- GULLY TRAPS

Supply all gully traps and securely bed and build up with 5:1 concrete surround, overflow level of the dish to be no less than 25mm above paved surfaces, or 100mm above unpaved surfaces as per G13/AS2 3.3.1.

- COMPLETION

Drain leakage test is to E1/VM1 sec 8.0 .Properly backfill all trenches, consolidate as filling proceeds and leave area in a tidy state.

Figure 8: Relationship of pipe trench to building foundation
Paragraph 5.6.1

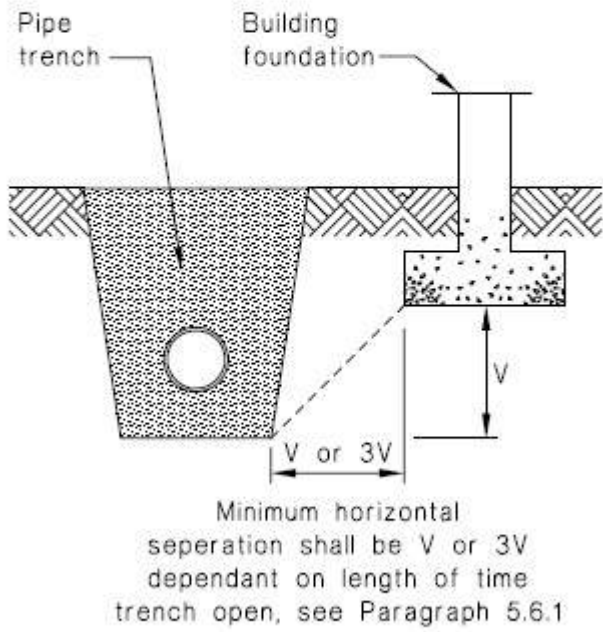


Figure 9: Inspection points
Paragraph 5.7.3

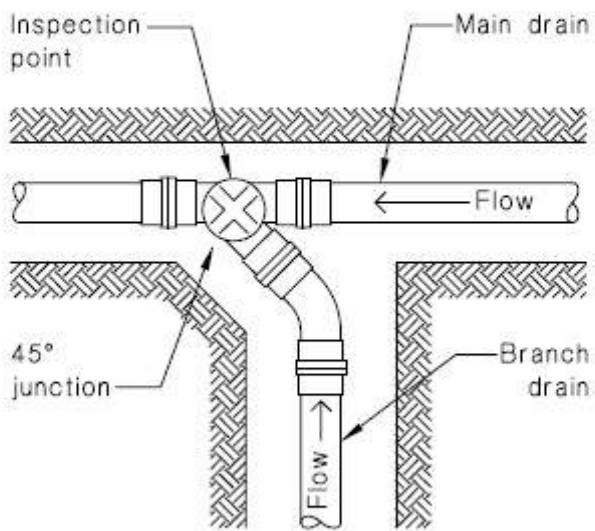


Table 5: Venting requirements
Paragraphs 4.5.2, 4.6.2, 5.1.1, 5.5.1, 5.5.2 and 5.8.1

Stacks

Stack vent: All stacks discharging to another stack or to a *drain* require an open vent, sized in accordance with Table 6. Venting with an *air admittance valve* is permitted only on second and subsequent stacks as at least one open vent (the stack vent, if acting as main *drain* vent) is required to ventilate the *drain*.

Relief vent: All stacks that receive discharges from 3 floor levels shall be vented with a *relief vent* sized in accordance with Table 6. *Relief vents* shall be open vented.

Fixtures connected to a stack

All connections to a stack, except the highest connection, require venting by either an open vent, or an *air admittance valve*, sized in accordance with Table 6.

Highest fixture connected to a stack

The individual highest connection to a stack requires venting by either an open vent, or an *air admittance valve*, sized in accordance with Table 6, if the *discharge pipe* is longer than:

- 6 m for 100 mm pipe,
- 1.5 m for 80 mm pipe, and
- 3.5 m for 65 to 32 mm pipes.

Soil fixtures connected to an unvented branch drain

All *soil fixtures* connected to an unvented branch *drain* require venting by either an open vent, or an *air admittance valve*, sized in accordance with Table 6.

Soil fixtures connected to a vented drain with a gradient of less than 1:60

All *soil fixtures* connected to a vented *drain*, where the branch and the vented *drain* are at a gradient of less than 1:60, require venting by either an open vent, or an *air admittance valve* sized in accordance with Table 6.

Individual soil fixtures connected to a vented drain with a gradient of 1:60 or steeper

Individual *soil fixtures* connected to a vented *drain*, where the branch and the vented *drain* are at a gradient of 1:60 or steeper, require venting by either an open vent, or an *air admittance valve*, sized in accordance with Table 6, if the *discharge pipe* is longer than:

- 6 m for 100 mm pipe, or includes a vertical drop greater than 2 m, and
- 1.5 m for 80 mm pipe *diameters*.

Fixtures discharging to a gully trap

1. *Fixtures* connected to a combined *waste pipe* require venting by either an open vent, or an *air admittance valve*, sized in accordance with Table 6.
2. Individual *fixture discharge pipes* over 3.5 m in length require venting by either an open vent, or an *air admittance valve*, sized in accordance with Table 6.
3. Where any 32 mm *discharge pipe* has a vertical drop of greater than 1.5 m it shall be vented with a 32 mm vent pipe or an *air admittance valve*.

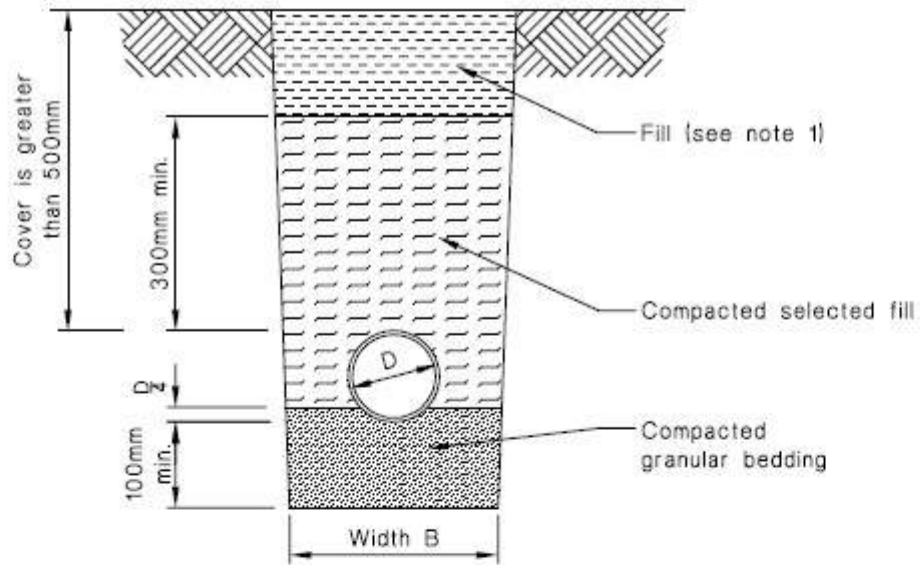
Venting of main drains

Main *drains* discharging to the *sewer* or to an on-site disposal system are required to be vented with a minimum 80 mm open vent.

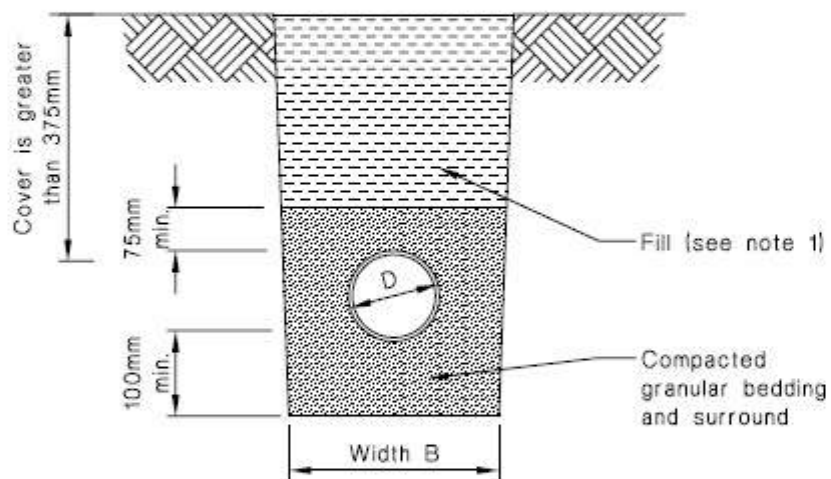
Venting of branch drains

Branch *drains* connected to a vented *drain* that exceed 10 m in length require venting with an open vent, sized in accordance with Table 6.

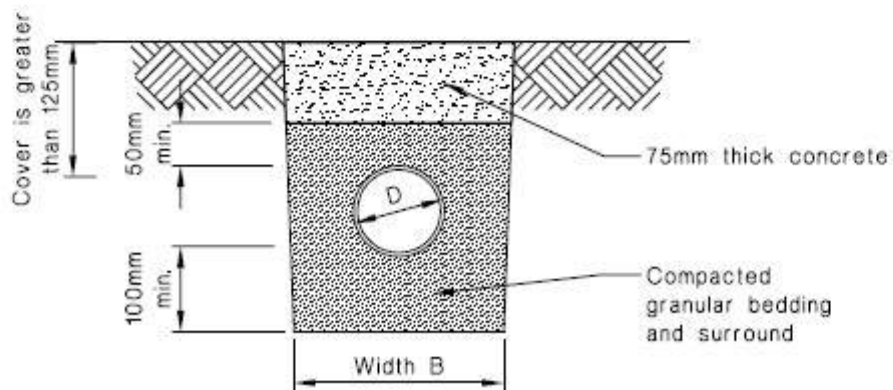
Figure 13: Bedding and Backfilling
 Paragraphs 3.9.2, 3.9.4 and 3.9.5



(a) Cover greater than 500 mm
 Bedding type 'B' of NZS 4452



(b) Cover greater than 375 mm
 Bedding type 'D' of NZS 4452



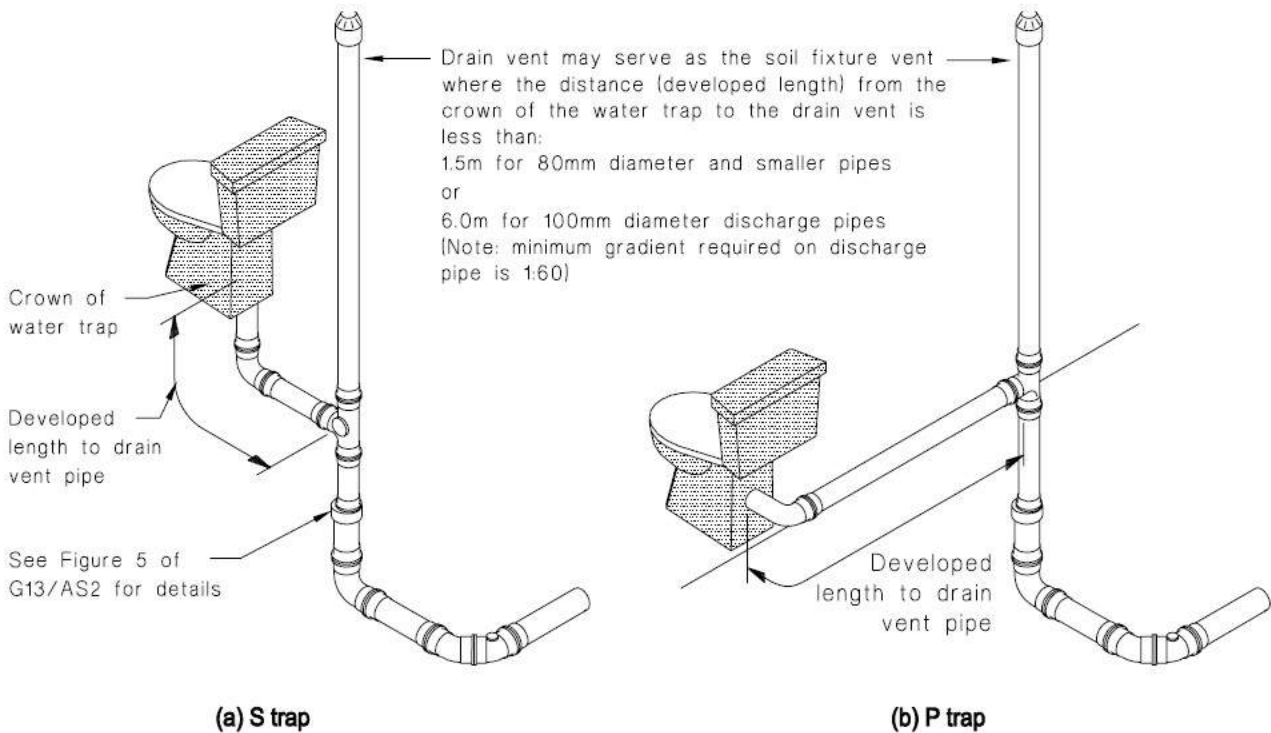
(c) Cover greater than 125 mm

NOTE:

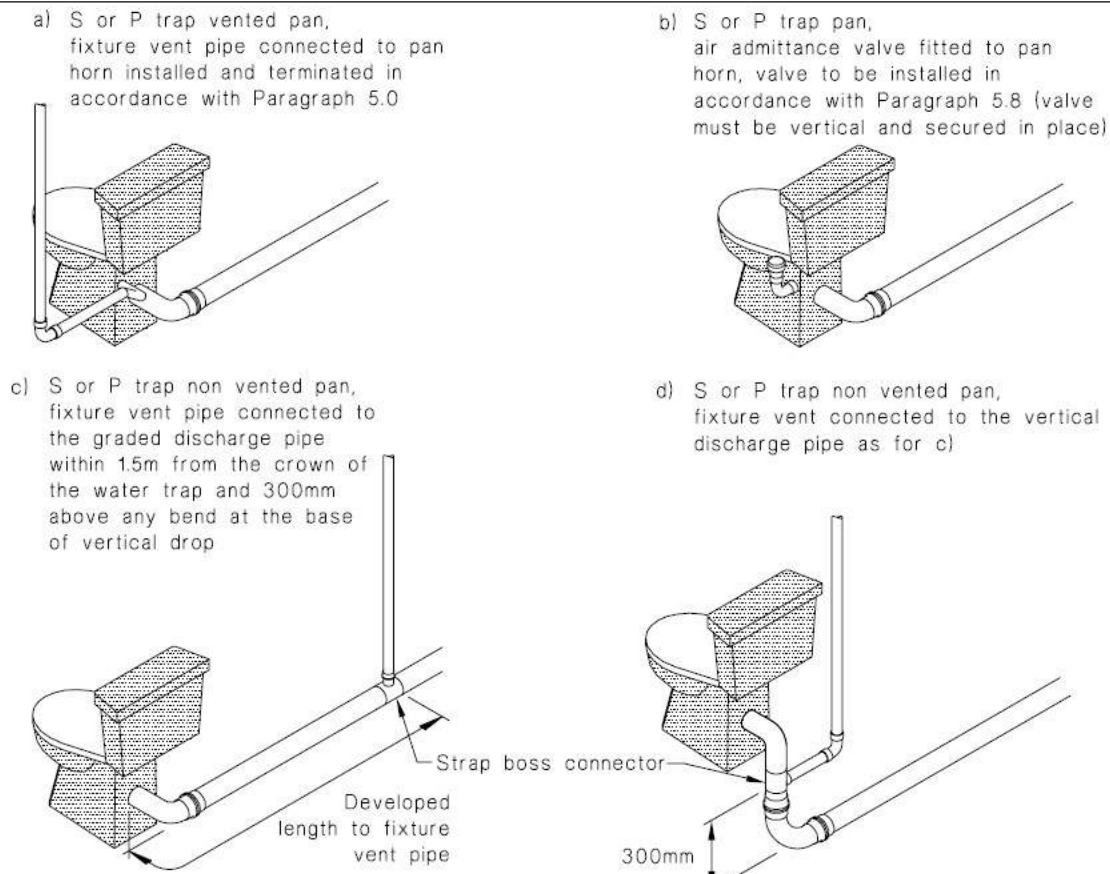
- 1. Fill shall be:
 - Ordinary fill where drains are located below gardens and open country.
 - Compacted selected fill where the drains are located below residential driveways and similar areas subjected to light traffic.

SDC - Approved Building Consent Document - BC171688 - Pg 21 of 264 - 7/09/2017 - harrib

Figure 6: Soil fixture discharge pipes
 Paragraphs 4.6.1 a), 4.6.2, 5.5.2 a)



1) Discharge pipes serving soil fixtures connected individually to the drain and utilising a drain vent as fixture vent



2) Discharge pipes serving soil fixtures connected individually to the drain or to a stack and utilising a fixture vent

ROOFER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution. (See also Plumber)

- **SCOPE**

Supply all labour and supply and fix all materials necessary to complete the roof as shown on the drawings and to render the building watertight.

- **WORKMANSHIP AND MATERIALS**

All workmanship and materials shall be carried out in accordance with the relevant clauses of the New Zealand Building Code and NZS 3601, 3602, 1170 and 3604. Self supporting breather type roofing underlay shall be to NZS 4217 and B2 durability.

- **PREPARATORY WORK**

Provide all gutters, fascias, valleys and underflashings before cladding commences. Ensure all edges of roof cladding are adequately supported around projections such as pipes, ducting and roof lights. Confirm with owner type and colour of roofing materials.

SDC - Approved Building Consent Document - BC171688 - Pg 23 of 264 - 7/09/2017 - hamib

JOINER

- **PRELIMINARY AND GENERAL**

Refer to the General Conditions of Contract and the Preliminary Clauses which apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **MATERIALS AND WORKMANSHIP**

[A] All timbers are to be the best of their classes, free from large, loose or dead knots, waney edges and other defects.

[B] All interior finishing timbers are to be dried not exceeding the required maximum moisture content.

[C] All timbers described as Dressing Grade are to be dressed and sanded smooth on all faces.

[D] All joinery is to be accurately set out, properly machined and framed together, and finished to a clean, even and smooth surface, and free from cutter marks or other imperfections.

[E] The prices shall include for all work in providing and fixing joinery work complete.

[F] Before commencing any fabrication work the joiner shall verify all sizes on the job, as measurements shown take no account for wall linings and other variations beyond the designers control.

[G] All timbers used in joinery shall be treated against borer attack.

- **EXTERIOR JOINERY**

Fabricate exterior timber joinery as shown on the drawings, Check jambs and mullions into head and sills. Generally house members to the depth of the rebate

- **INTERIOR DOOR FRAMES**

Fabricate grooved interior door frames glued and nailed.

- **KITCHEN JOINERY**

Construct kitchen joinery units complete with doors, drawers, shelves and bench tops as shown on the drawings or kitchen plans supplied by the owner. Kitchen design to NZBC G3 AS1 fig 1 & 1.5. Finishes to be selected by the owner.

- **BATHROOM UNITS**

To be constructed as for kitchen joinery. Finishes to be selected by the owner.

WINDOWS

- **PRELIMINARY AND GENERAL**

Refer to the General Conditions of Contract and the Preliminary Clauses which apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **SCOPE**

For the supply of Aluminium windows, doors, ranchsliders, wardrobe sliders and any associated flashings required as shown on the drawings.

- **MATERIALS AND WORKMANSHIP**

All materials used, shall be the best of their respective types. All work shall be carried out in a workmanlike manner using the best practices in accordance with the NZS4211, B2 durability 15 years.

- **ALUMINIUM JOINERY**

All aluminium joinery shall be site measured and manufactured by a recognised supplier, colour as selected by the owner. Restriction stays shall be fitted to opening windows less than 760mm from floor, limiting opening of sash to 100mm maximum.

- **FINISH**

Aluminium frames to be Powdercoat or Anodised as confirmed by Owner.

- **REVEALS**

Reveals to be graded material suitable for paint finish or as confirmed by Owner.

- **HARDWARE**

Hardware as required and selected by Owner.

GLAZIER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which shall apply to all work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **SCOPE**

The glazing contractor shall supply all labour, plant and materials necessary to complete glazing work as shown on the drawings.

- **WORKMANSHIP AND MATERIALS**

All workmanship and materials shall be in accordance with the New Zealand Building Code F2, NZBC BIASI 7-1 B2 durability 15 years and , NZS 4211, NZS 4223 part 1 and 2 (Code of practice for glazing in buildings) , and NZS 4223 part 3 (Human impact safety requirements) 2016. Ensure Safety Glass to relevant locations.

- **MIRRORS**

As required and selected by owners.

- **DOUBLE GLAZING**

To windows and doors

- **OBSCURE GLAZING**

As required and selected by owner.

PAINTER

- **PRELIMINARY AND GENERAL**

Refer to the General and Special Conditions of Contract and Preliminary Clauses which apply to work in this section. Where any standard specifications are quoted they shall be the current issue including any amendments or standards issued in substitution.

- **MATERIALS AND WORKMANSHIP**

All paints, varnishes and stains used shall be proprietary brand names of first quality premium grade and applied to surfaces strictly in accordance with manufacturer's specifications and recommendations.

All preparatory work, ie cleaning, filling, sanding etc, shall be carried out in accordance with the best painting trade practices and with materials of appropriate quality.

- **COLOURS**

The owner shall provide the Building Contractor and the Painter with a full schedule of finishes and colours. The contractor shall ensure that all necessary priming is carried out at the required stage of construction.

- **FINISHES GENERALLY**

Exterior Timber: One coat of primer/undercoat; two top coats acrylic/enamel.

Or alternatively: One coat sealer and two coats of polyurethane.

Or alternatively: Propriety timber stain to manufacturer's specification.

Interior:

Gibraltar Board: One coat of approved sealer and then two coats of Acrylic . Apply to wet area walls and ceilings ,

ie bathroom , ensuite , kitchen , laundry etc.

One coat of approved sealer and then two coats of enamel .

Timber Work One coat Primer/undercoat then two coats gloss/low sheen acrylic.

Or alternatively Approved sealer then two coats of polyurethane

- **WALLPAPER**

All walls to be sized before wallpapering and wall paper hung strictly in accordance with manufacturer's specifications and recommendations.

- **CLEANING UP**

At completion of contract, Painter shall clean up and remove all stains, putty marks and paint splashes, and clean glass to the satisfaction of the Contractor

GAS SYSTEM

- **PRELIMINARY AND GENERAL**

Refer to the General Conditions of Contract and the Preliminary and General Clause of this Specification which are equally binding on all trades. This section shall be read in conjunction with all other sections

- **SCOPE**

Fabrication, installation and operation of piping systems for low pressure natural gas Carry out the whole of this work to the requirements of NZBC G10/AS1: Piped services (Gas); NZBC G11/AS1: Gas as an energy source and NZS 5601. Arrange for the network utility operator to connect their distribution system to the primary meter, to NZS 5258. Check the location of the meter enclosure with the owner Comply with the Gas Regulations, Electricity Regulations and the network utility operator's requirements. Give notices for inspections and carry out tests as required Include for the cost of this service complete with excavation and backfilling

- **Documents**

Documents referred to in this section are: NZBC G10/AS1 Piped services (Gas)NZBC G11/AS1, Gas as an energy Source , AS/NZS 4129 Fittings for polyethylene pipes for pressure applications , AS/NZS 4130 Polyethylene(PE) pipes for pressure applications - Dimensions for series 2 pipes - gas (nominal outside diameter series) , AS/NZS 4130 Polyethylene (PE) pipes for pressure applications - Dimensions for series 3 pipes - gas (nominal inside diameter series) , AS 4176 Polyethylene/aluminium and cross linked polyethylene/aluminium macrocomposite pipe systems for pressure applications , NZS 525 Gas distribution , NZS 5261 Gas Installation , AS 5601 Gas Installations , Electricity Regulations 1997 , Gas Regulations 1993 , Plumbers, Gasfitters and Drainlayers Act 2006

- **MATERIALS AND WORKMANSHIP**

Pipework requirements to NZS 5601, NZS 5601 Table 24 - Gas Pipework, and AS 5601 Table 3.1 Consumer piping materials and duty limits. Complete with fittings to NZS 5061. Polyethylene/aluminium and cross linked polyethylene/aluminium macrocomposite pipe systems for pressure applications to AS 4176. Polyethylene pipes to AS/NZS 4130 Series two, or AS/NZS 4130 Series three. Fittings to AS/NZS 4129. Manual shut-off valves to NZS 5061. Primary meter to suit design load, supply pressure and pressure drop, supplied and installed by the network utility operator. Gasfitters to be experienced competent workers, familiar with the materials and the techniques specified and registered under the Plumbers, Gasfitters and Drainlayers Act Supply a 1:100 scale as-built plan of gas pipe runs, sizes, componentry and fittings at completion of the installation.

- **DESIGN**

Design the piping system to NZS 5061 and AS 5601, with pipe sizes to give a minimum pressure at any appliance inlet of 1.13 kPa for natural gas, when all appliances are in use; and with a maximum design pressure drop from meter outlet to any appliance of 80 Pa.

- **APPLICATION**

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 NZS 5061. Confirm the type of pipe and its location. Label pipework to distinguish it from other services.

HEATSHIELDS

Glazed ceramic tiled heatshields or similar to be installed to walls.

RANGE ANTI TIPPING BRACKETS

Anti tipping brackets must be fitted to all free standing range installations to manufacturer's requirements.

- **TESTS**

Pressure test the system for leakage to NZS 5261 before pipework is concealed. Submit the work for inspection and test and prove to the satisfaction of the network utility operator that the installation complies with all Acts and Regulations and has been tested for leakage and proved to be sound. Provide a Gasfitting Certification Certificate as required by Regulation 24 of the Gas Regulations 1993 and when required provide a copy to the energy supplier.

- **COMPLETION**

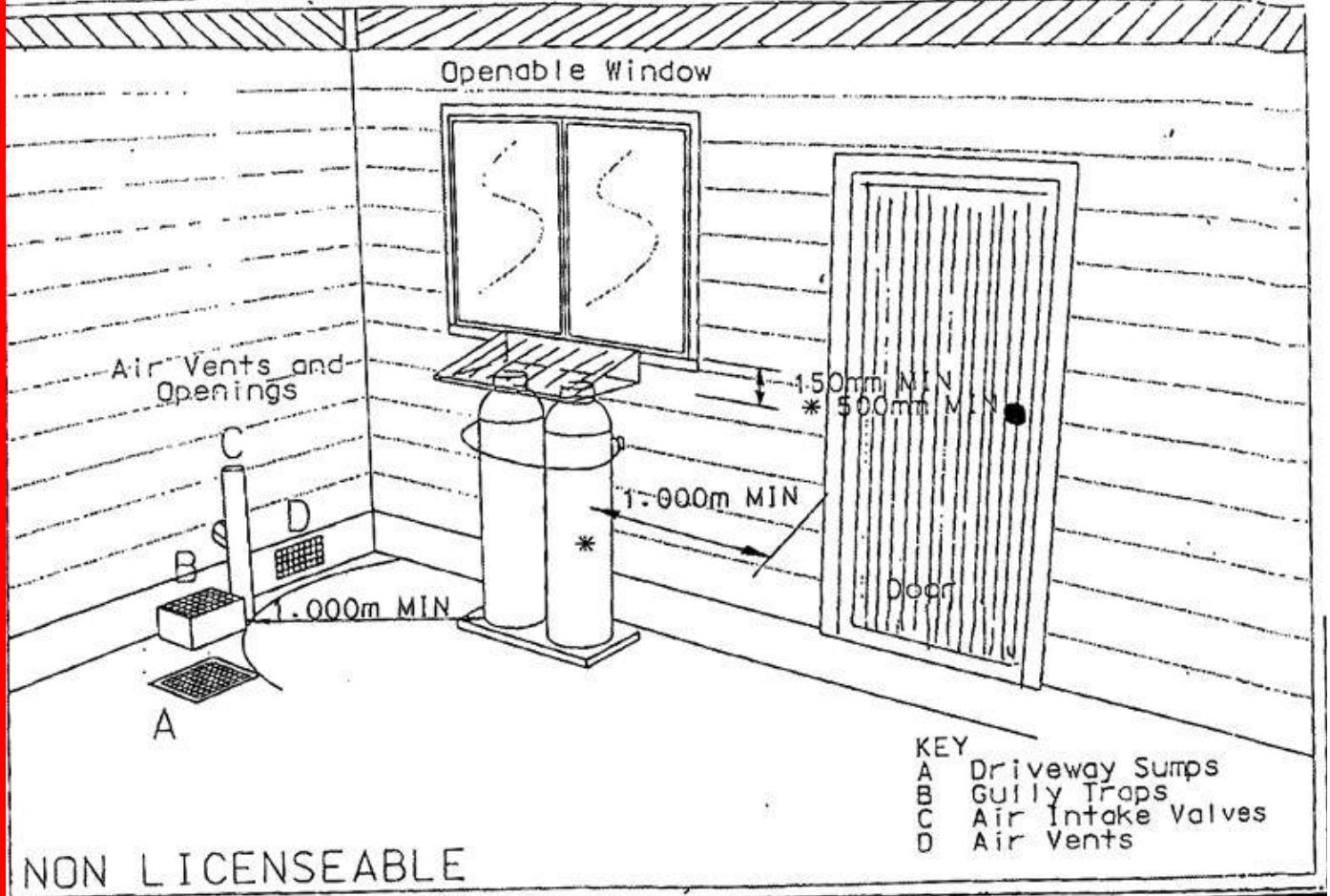
Replace damaged, cracked or marked elements. Leave appliances clean and in full working order to the standard required by following procedures. Remove debris, unused materials and elements from the site.

Hazardous Substances and New Organisms Act 1996.

Compliance guidelines are set out below.

- * Cylinders shall be positioned on a concrete base or concrete pavers.
- * An approved hood, covering such fittings as valves, hoses, seals plus cylinder valve caps shall be fitted and the appropriate warning notice located on or beside the gas cylinders.
- * Exchange cylinders shall have not less than 150mm.
- * An approved method of restraint shall be installed to prevent the likelihood of cylinders falling, e.g. chain fixed to wall.
- * Openings into a building or a drain are not permitted within 1 metre of the gas cylinders.
- * The surface of building elements (including fences) within 1 metre of the cylinders is is to be sealed to prevent gas from spilling to the neighbouring site or under the building, and be of non combustible construction.

SDC - Approved Building Consent Document - BC171688 - Pg 29 of 264 - 7/09/2017 - harrib



FORMED DRIVEWAY

- **PRELIMINARY AND GENERAL**

Refer to the General Conditions of Contract and the Preliminary and General Clause of this Specification which are equally binding on all trades. This section shall be read in conjunction with all other sections

- **SCOPE**

This section of the contract consists of;

- (a) The stripping of top soil from driveway
 - (b) Excavation, forming and grading to concrete driveway.
 - (c) Supply and laying of sub-base, base course and concrete.
- All as shown on drawings.

- **MATERIALS AND WORKMANSHIP**

All materials shall be of the best of their respective kinds. All plant shall be of the appropriate type to produce the required standard of workmanship.

All materials and workmanship shall fully comply with the Specification listed herein.

- **MAINTAIN PUBLIC PROPERTY**

The Contractor is to maintain and protect public property and that of drainage, electricity, gas, highway, water and telephone authorities, and that of similar undertakings, and is to make good or pay for the reinstatement of all damage thereto.

- **PROGRAMME OF WORK**

Basecourse and concrete shall not be laid until the work under Drainlayer is completed and power mains have been laid and all kerb and channels and walls have been laid.

- **EXCAVATING AND GRADING**

Excavate to 175mm below the finished driveway levels and grade to the required falls. Provide and lay 175mm finished thickness of basecourse material, laid and compacted in two layers. Basecourse material shall be approved well graded TNZ AP40. It shall be laid at optimum moisture content and mechanically compacted to a level surface in accordance with NRB Specification M14; Aug 1986.

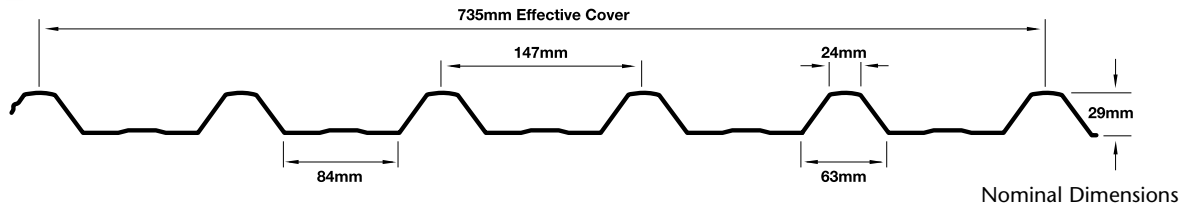
- **CONCRETE**

The surface shall be finished to smooth, even grades with no local depressions or bumps exceeding 6mm in 3.0 metres, and shall be such as to direct water into channels and sumps. Finish neatly against concrete kerbs, channels, slabs and foundations at other boundaries and at the correct surface level. Full precautions are to be taken to prevent disfigurement of any concrete work with the concrete. Any disfigurement or damage shall be make good at the Contractor's expense.

- **CO-OPERATE**

Allow to co-operate with all other trades for holes, chases, etc. for drains, pipes and waste

TRIMLINE



Introduction

Trimline is a premium low rib, six-ribbed trapezoidal profile, offering great looks and exceptional performance.

Applications



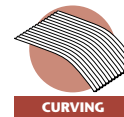
Residential
Roofing &
Cladding

RESIDENTIAL



Industrial/
Commercial
Roofing &
Cladding

INDUSTRIAL



Curving

CURVING

Features

Trimline has an extra rib compared to most other products in its class, giving it unequalled good looks and greater rigidity.

Options

Trimline in .55 G300 material can be crimp curved to minimum radii of 400mm. Depending on grade and purlin spacings, it can be sprung curved down to convex radii of 24 metres. Matching clear sheeting available in G.R.P. (fibreglass).

Materials

Available in metallic coated and pre-painted steel in .40 and .55mm B.M.T. (base metal thickness) Aluminium plain and pre-painted in .70 and .90mm, and other non-ferrous metals.

Fasteners

Typically: Steelfix 12g x 55mm, Timberfix 12g x 65mm, Class 4 minimum, of material compatible with that being fastened and durability no less than the sheet material. Provision for thermal expansion should be considered for lengths in excess of 12 metres.

Durability

All material selections must be compatible with prevailing environmental conditions and adjacent materials, see Product Guide or Specifiers Guide for details. Areas not exposed to rain washing will require programmed maintenance.

Warranty *Plus*

Steel & Tube Warranty *Plus* is the most comprehensive warranty available in the industry. Warranty *Plus* covers an extended range of performance criteria, is supported back-to-back by our suppliers, includes site-specific maintenance requirements and is transferable to subsequent owners.

Sectional Properties

TRIMLINE

Measure	Mass	Area	I	Z Top	Z Bottom	Y (centroid)
Unit	kg/m ²	mm ²	mm ⁴	mm ³	mm ³	mm
.40mm B.M.T.	4.13	479	55096	3095	5402	10.2
.55mm B.M.T.	5.68	658	75816	4259	7433	10.2

Notes: 1. Properties are for 1 metre width of cladding 2. Values are nominal only 3. Yield strength is 550 Mpa typical.

Performance Data

Maximum spans for normal and heavy traffic in millimetres. Distributed Loads in kPa at Maximum Spans using 5 fasteners per sheet per support. Loads for alternative fastener frequencies available on request.

Gauge	Controlled Traffic			
	Internal		End	
	Span	Load	Span	Load
.40mm	1700	4.45 st	1450	4.95 st
		3.03 sv		3.31 sv
.55mm	2300	5.35 st	1700	6.21 st
		2.12 sv		3.96 sv

Gauge	Heavy Traffic			
	Internal		End	
	Span	Load	Span	Load
.40mm	1100	7.07 st	800	8.01 st
		6.00 sv		5.70 sv
.55mm	1800	8.19 st	1400	7.43 st
		4.27 sv		5.65 sv

st = Limit State Strength Load. sv = Limit State Serviceability Load.

Minimum Pitch

In accordance with Acceptable Solution E2, the minimum pitch for Trimline for roofing dwellings is 3°. Lesser-pitched designs are subject to Specific Design criteria. Roof runs in excess of 35 metres should be checked for water runoff capacity.

Foot Traffic

Foot Traffic up the roof must take place in the pan of the profile, or over purlin lines. Traffic across the roof must take place along purlin lines.

Installers

A list of Approved Installers for your area and contract type is available from your local Steel & Tube Roofing Products' sales office.

Specifications

Recommended specifications are available in the branded sections of MasterSpec® BASIC or MasterSpec® STANDARD, or from your local Steel & Tube Roofing Products sales office.

Design Details

Design Solutions covering many applications are available in CAD or hard copy.

Important

For your installation to perform to its potential, it is essential that it is designed, installed and maintained in accordance with good trade practice. Please refer to:

- Steel & Tube Roofing Products: Product Guide
- New Zealand Steel: Installation Guide
- New Zealand Steel: Builders and Specifiers Guide
- BRANZ: Good Profiled Metal Roofing Practice

Technical Helpline: 0800 333 247 Website: www.stroofing.co.nz Email: info@stroofing.co.nz
Specification templates available on masterspec 09 631 7044

WHANGAREI
29 South End Avenue
Otaika
PO Box 1869
Whangarei 1040
Tel: 09 438 4600
Fax: 09 438 0342

NORTH SHORE
2 Ride Way
North Harbour
Industrial Estate
PO Box 100182
North Shore
North Shore City 0745
Tel: 09 415 8080
Fax: 09 415 9192

AUCKLAND
30 Business Parade North
Highbrook
PO Box 204216
Highbrook
Manukau 2161
Tel: 09 274 4056
Fax: 09 274 8972

HAMILTON
40 Northway Street
Te Rapa
PO Box 10458
Te Rapa
Hamilton 3241
Tel: 07 850 9200
Fax: 07 850 9330

TAURANGA
28A Jean Batten Drive
Mt Maunganui
PO Box 2001
Seventh Avenue
Tauranga 3140
Tel: 07 578 1089
Fax: 07 577 0186

WELLINGTON
41 Randwick Road
Lower Hutt
PO Box 36082
Wellington Mail Centre
Lower Hutt 5045
Tel: 04 568 4359
Fax: 04 568 6770

CHRISTCHURCH
106 Antigua Street
Sydenham
PO Box 7306
Sydenham
Christchurch 8240
Tel: 03 377 0994
Fax: 03 377 2680



Metaline Quad Gutter

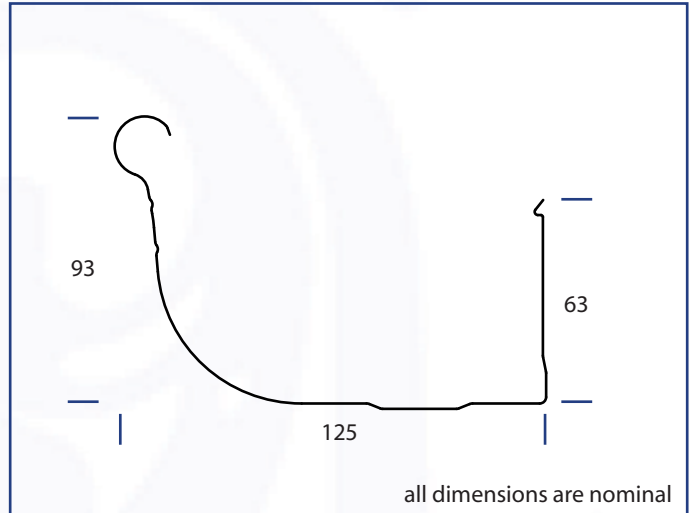
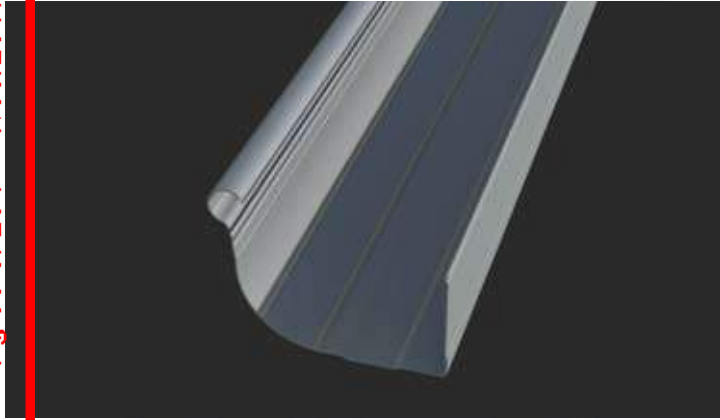
In Christchurch product is known as Colonial Quad Gutter

0800 ROOFNZ (0800 766369)
Issue Date August 2008

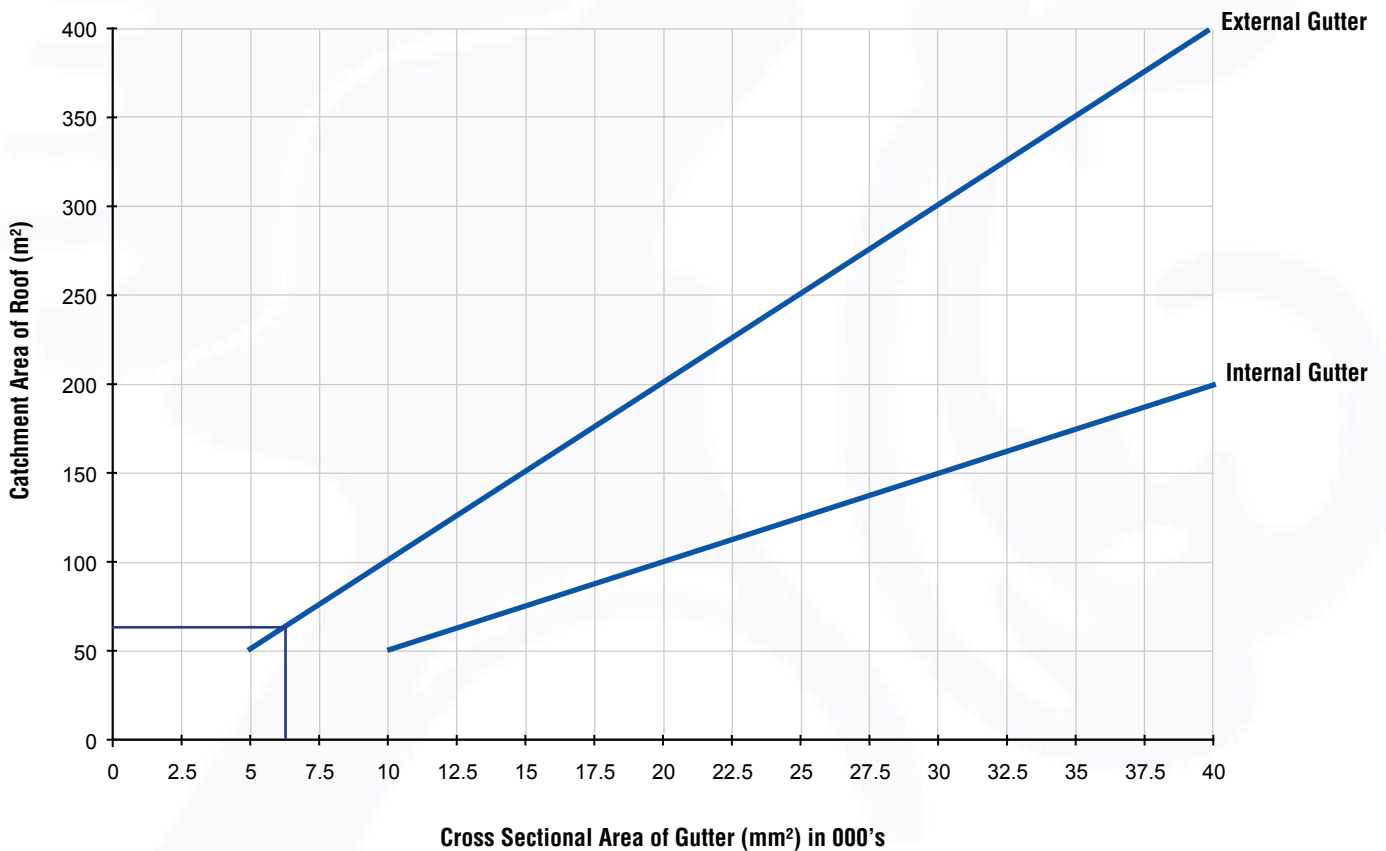
Metaline Quad Gutter is our most popular residential profile. Whether you are renovating or involved in a new build, this profile will enhance the appearance of your home. The Metaline system uses concealed brackets and is compatible with Metalcraft Metaline Fascia or timber fascia. Metaline Quad Gutter is available with overflow slots to prevent flooding from blockages, and snow straps are stocked to suit this profile if required. Metaline Quad Gutter is available in Zinalume, Galvsteel, Colorsteel Endura and Colorsteel Maxx.

SDC - Approved Building Consent Document - BC171688 - Pg 33 of 264 - 7/09/2017 - harrib

Cross-sectional Area: 5550mm²



Catchment Area of Roof v Cross Sectional Area of Gutter



Note: The graph is based on a rainfall intensity of 100mm / hour and roof pitches less than 10 degrees. For more information on roof catchment areas and the effect of gutter cross sectional areas download the document on Roof Drainage

Manufacturing Locations Auckland, Christchurch

Metaline Quad Gutter is available for purchase from all Metalcraft branch locations

www.metalcraftroofing.co.nz



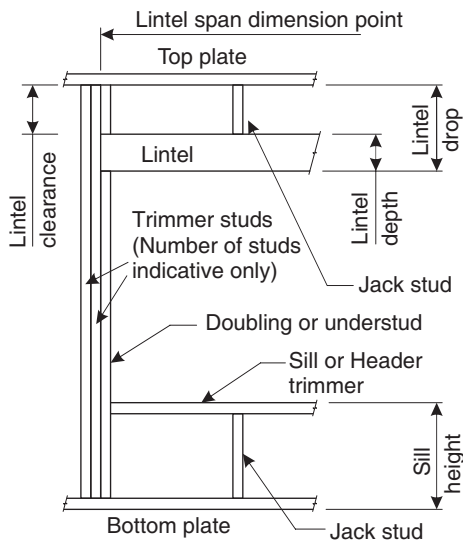
LINTEL FIXING SCHEDULE ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

SDC - Approved Building Consent Document - BC171688 - Pg 34 of 264 - 7/09/2017 - harrib

NOTE:

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

DEFINITIONS



Lintel Supporting Girder Trusses:

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

Notes:

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

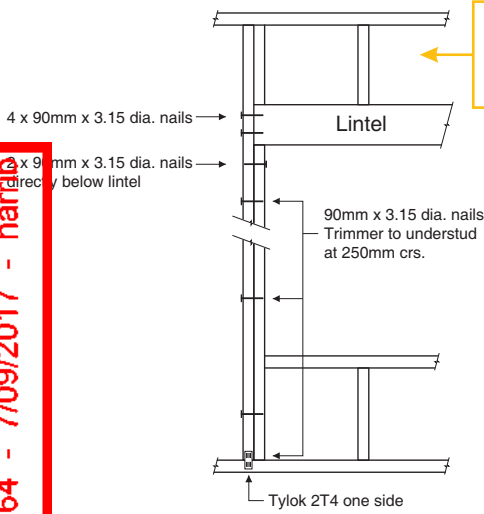
SELECTION CHART FOR LINTEL FIXING

Lintel Span	Loaded Dimension (See Fig. 1.3 NZS 3604:2011)	Light Roof					Heavy Roof				
		Wind Zone					Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
0.7	2.0	E	E	E	E	F	E	E	E	E	E
	3.0	E	E	E	F	F	E	E	E	E	F
	4.0	E	E	F	F	F	E	E	E	F	F
	5.0	E	F	F	F	G	E	E	F	F	F
	6.0	E	F	F	G	G	E	E	F	F	G
0.9	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	F	F	E	E	E	F	F
	4.0	E	E	F	F	F	E	E	F	F	F
	5.0	E	F	F	F	G	E	E	F	F	F
	6.0	E	F	F	G	G	E	E	F	F	G
1.0	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	F	F	E	E	E	F	F
	4.0	E	F	F	F	G	E	E	F	F	F
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	E	F	F	G	G	E	E	F	F	G
1.2	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	E	F	F	F	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	F	F	G	G	H	E	E	F	G	G
1.5	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	F	F	F	G	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	F	F	G	G	H	E	E	F	G	G
	6.0	F	F	G	H	H	E	E	F	G	H
2.0	2.0	E	F	F	F	G	E	E	F	F	F
	3.0	E	F	F	G	G	E	E	F	F	G
	4.0	F	F	G	G	H	E	E	F	G	G
	5.0	F	F	G	H	H	E	E	F	G	H
	6.0	F	G	H	H	-	E	F	G	H	H
2.4	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	G	H	E	E	F	G	G
	4.0	F	F	G	H	H	E	E	F	G	H
	5.0	F	G	G	H	H	E	F	G	H	H
	6.0	F	G	H	H	-	E	F	G	H	H
3.0	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	H	H	E	E	F	G	H
	4.0	F	G	G	H	H	E	F	G	H	H
	5.0	F	G	H	H	-	E	F	G	H	H
	6.0	F	G	H	-	-	E	F	G	H	-
3.6	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	F	G	H	H	E	F	G	G	H
	4.0	F	G	H	H	-	E	F	G	H	H
	5.0	F	G	H	-	-	E	F	G	H	-
	6.0	G	H	H	-	-	E	F	H	-	-
4.2	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	H	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
4.5	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.4	F	G	H	H	-	E	F	G	H	-
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
6.0	G	H	-	-	-	E	F	H	-	-	
4.8	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.2	F	G	H	H	-	E	F	G	H	-
	4.0	F	G	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
6.0	G	H	-	-	-	E	F	H	-	-	



LINTEL FIXING OPTIONS

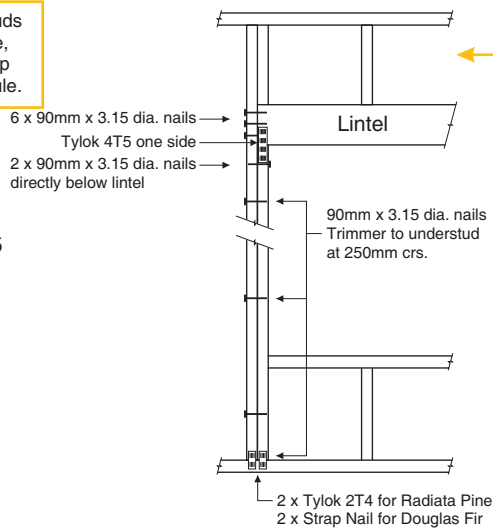
TYPE E 1.4 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

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

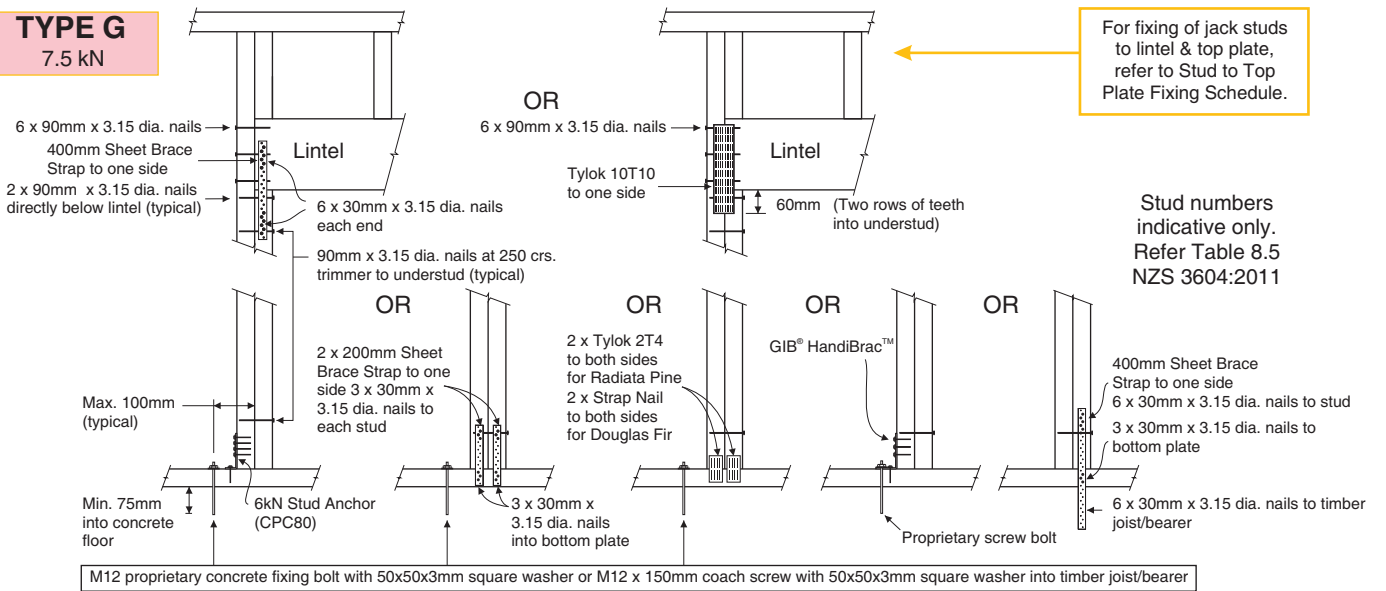
TYPE F 4.0 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

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

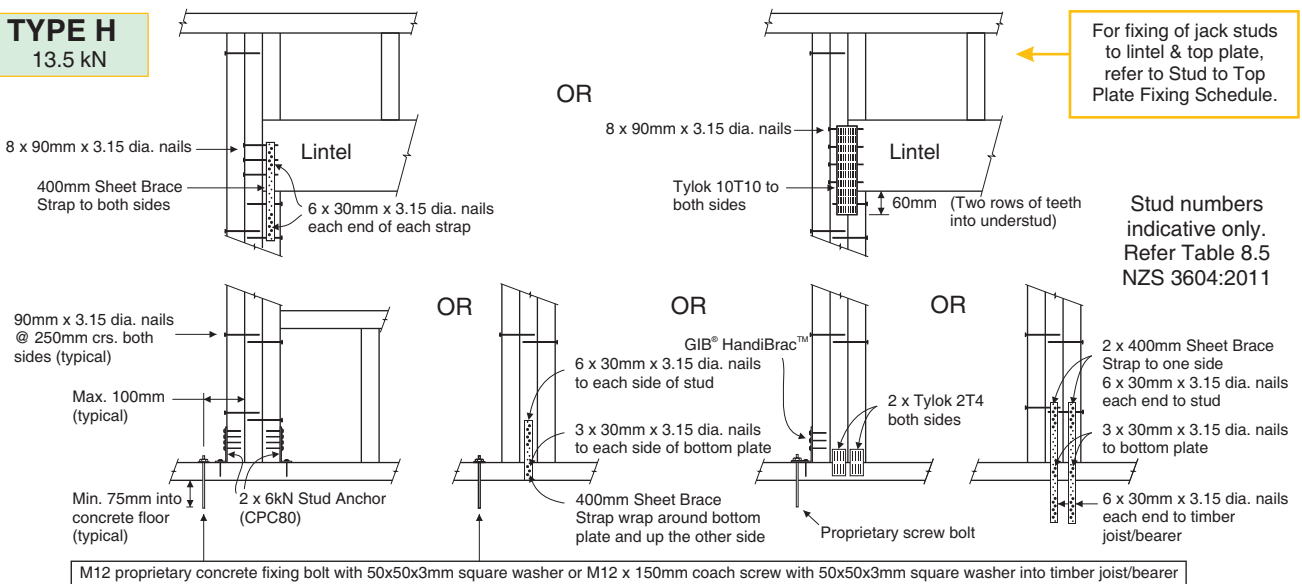
TYPE G 7.5 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

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

TYPE H 13.5 kN



For fixing of jack studs to lintel & top plate, refer to Stud to Top Plate Fixing Schedule.

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

SDC - Approved Building Consent Document - BC171688 - Pg 35 of 264 - 7/09/2017 - hamib

THERMAKRAFT 215

BITUMINOUS
SELF SUPPORTING
ROOFING UNDERLAY

APPLICATION AND INSTALLATION

Product Description	<p>Thermakraft 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY is specifically designed for use in Domestic and Commercial type buildings.</p> <p>Thermakraft 215 is a breathable, absorbent bituminous wall and roofing underlay.</p> <p>Thermakraft 215 will provide the following functions:</p> <ul style="list-style-type: none"> • Reduce wind entry into the cavity, thereby assisting the performance of thermal insulation. • Highly water vapour permeable, thereby allowing excess water vapour which might otherwise condense in the structure, to escape. • Provides a temporary protection against wind, dust, rain and other weathering elements until the external cladding is applied. 				
Applications	<p>Thermakraft 215 is suitable as a wall and roofing underlay where Fire Retardancy is NOT required, and with all cladding types.</p> <p>Thermakraft 215 is self-supporting to 1200mm rafter/purlin spacing.</p> <p>Thermakraft 215 can be used as an Air Barrier.</p> <p>Thermakraft 215 must not be left exposed to the elements for more than 7 days. Cladding on the same day is recommended.</p> <p>If Fire Retardancy (FI <5) is required, use Thermakraft CoverTek roof underlay</p>				
Installation Roofing	<p>Thermakraft 215 may be run unsupported vertically over purlins with a 150mm lap if roof pitch ≥ 8 degrees. May be run vertically at pitches $\geq 3-8$ degrees if supported</p> <p>Fix securely to purlins with 8mm staples or 20mm clouts.</p> <p>The membrane should be firmly laid to avoid excessive dishing between purlins.</p>				
Control of Condensation	<p>Thermakraft 215 may be run horizontally across rafter/trusses with a 150mm lap, for roof pitches ≥ 3 degrees. Fix securely with 8mm staples or 20mm clouts.</p> <p>In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation to prevent moisture build-up in the roof cavities. Factors which adversely affect the condensation risk in roofing systems include;</p> <table border="0"> <tr> <td> <ul style="list-style-type: none"> • Humid, and/or cold climatic regions • Warm/Skillion roof construction • Low roof cavity air volume and restricted air movement • Omitting Vapour Control Layers • Ceiling penetrations and entry of warm air into roof cavities </td> <td> <ul style="list-style-type: none"> • Occupancy activities which have high moisture loading on conditioned spaces • Low pitched roof • Bulk insulation • Building structures ability to naturally dry </td> </tr> </table> <p>Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer MRM Code of Practice for details.</p>	<ul style="list-style-type: none"> • Humid, and/or cold climatic regions • Warm/Skillion roof construction • Low roof cavity air volume and restricted air movement • Omitting Vapour Control Layers • Ceiling penetrations and entry of warm air into roof cavities 	<ul style="list-style-type: none"> • Occupancy activities which have high moisture loading on conditioned spaces • Low pitched roof • Bulk insulation • Building structures ability to naturally dry 		
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Storage	<p>Thermakraft 215 should be stored on end in dry conditions.</p> <p>Protect from the weather and direct sunlight.</p>				
Roll Dimensions	<table border="0"> <tr> <td>1250mm x 40.0m = 50m²</td> <td>20kg</td> </tr> <tr> <td>1250mm x 20.0m = 25m²</td> <td>10kg</td> </tr> </table>	1250mm x 40.0m = 50m ²	20kg	1250mm x 20.0m = 25m ²	10kg
1250mm x 40.0m = 50m ²	20kg				
1250mm x 20.0m = 25m ²	10kg				

For more information regarding **Thermakraft COVERTEK₄₀₇ FIRE RETARDANT SELF SUPPORTING ABSORBENT BREATHABLE SYNTHETIC NON WOVEN ROOFING UNDERLAY** refer to the "DESIGNER and USER GUIDELINES" - Direct and Cavity Fix, or contact **Thermakraft Customer Services** on 0800 806 595.

THERMAKRAFT 215

BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

TECHNICAL SPECIFICATIONS

Technical Data THERMAKRAFT 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY complies with the requirements of NZBC E2/AS1 Table 23.
Nominal Grammage 400g/m²

NZBC E2/AS1 TABLE 23 AS A WALL UNDERLAY REQUIREMENTS

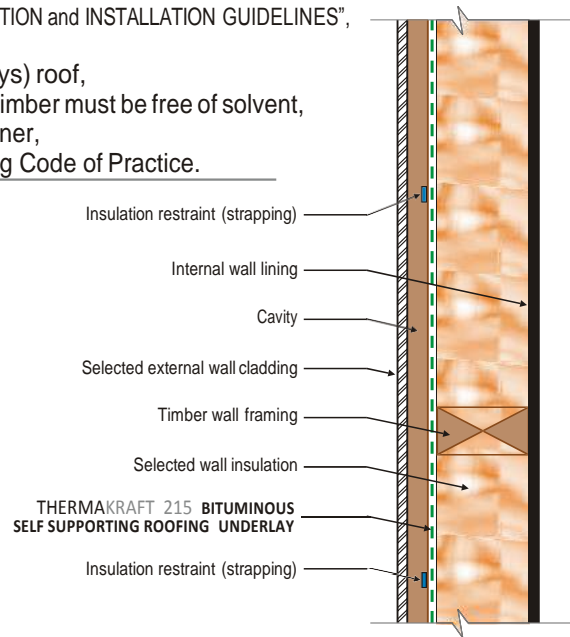
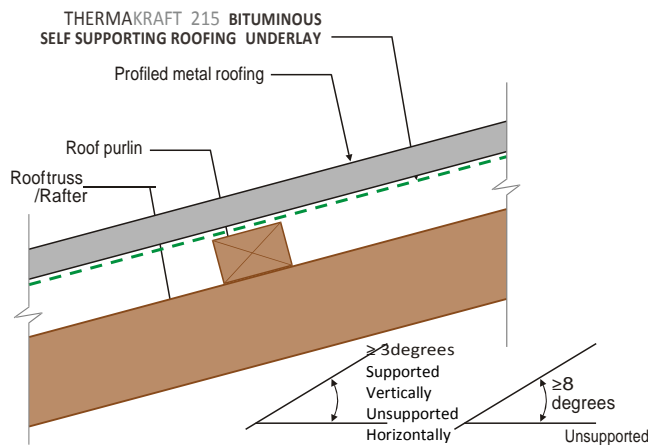
NZBC E2/AS1 TABLE 23 WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥100gsm	Pass
Vapour Resistance	≤7 MN.s/g	Pass
pH of Extract	≥6 and ≤9	Pass
Shrinkage	≤0.5%	Pass
Water Resistance	≥100mm	Pass
Air Barrier	≥0.1 MN.s/m ³	Pass
Duty		Heavy

NZS2295:2206 Classification

Flammability Index		Non Fire Retardant
Wind Zone	R2	Up to Very High
NZS2295:2006 Classification	R2	Self Supporting

Durability/Limitations For THERMAKRAFT 215 to meet the Performance Requirements of NZBC Clause B2, Durability B2.3.1(a) 50 years and B2.3.1(b) 15 years, E2 External Moisture, THERMAKRAFT 215:

- must be installed in accordance to the "APPLICATION and INSTALLATION GUIDELINES",
- run length no greater than 10 metres,
- is not left exposed for more than (7 days) roof,
- when used on LOSP treated timber, the timber must be free of solvent,
- installed by a licensed building practitioner,
- Installed in accordance with the Roofing Code of Practice.



The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards.

GABLE END RAKING VERGE OVERHANG OPTIONS

SDC - Approved Building Consent Document - BC171688 - Pg 38 of 264 - 7/09/2017 - harrib



- ★ Covers raking verge using standard purlin overhang options.
- ★ Covers up to 750mm overhang using standard verge outriggers.
- ★ Covers up to 1200mm overhang using verge outrigger/purlin combination.

OVERHANG OPTIONS

- All gable end loading parameters are based on the design considerations used in NZS 3604:2011 and covers heavy roof weight, extra high wind load and snow load S_g of up to 1.0 kPa.
- All live load considerations as per AS/NZS 1170.
- All timber to be minimum grade SG8 as defined in NZS 3604:2011.

CANTILEVER PURLIN OPTION

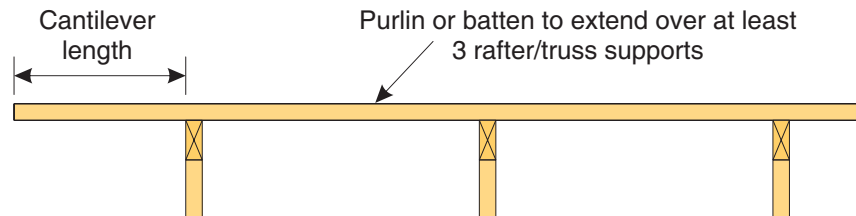


TABLE 1

PURLIN SIZE & ORIENTATION	MAX. CANTILEVER LENGTH (mm)	PURLIN CENTRES (mm)
45x45	200	400
70x45	300	900
90x45	450	900

CANTILEVER OUTRIGGER OPTION

(Note: Maximum sidewall overhang of 750mm)

(See details on page 3)

TABLE 2

MAX. CANTILEVER LENGTH 750mm	OUTRIGGER SIZE & ORIENTATION	MAX. CANTILEVER LENGTH (mm)	OUTRIGGER CENTRES (mm)
	70x45		750
		600	900
90x45		750	900
		600	1200
90x45		750	400
		600	600

CANTILEVER OUTRIGGER/PURLIN COMBINATION OPTION

(Note: Maximum sidewall overhang of 1200mm)

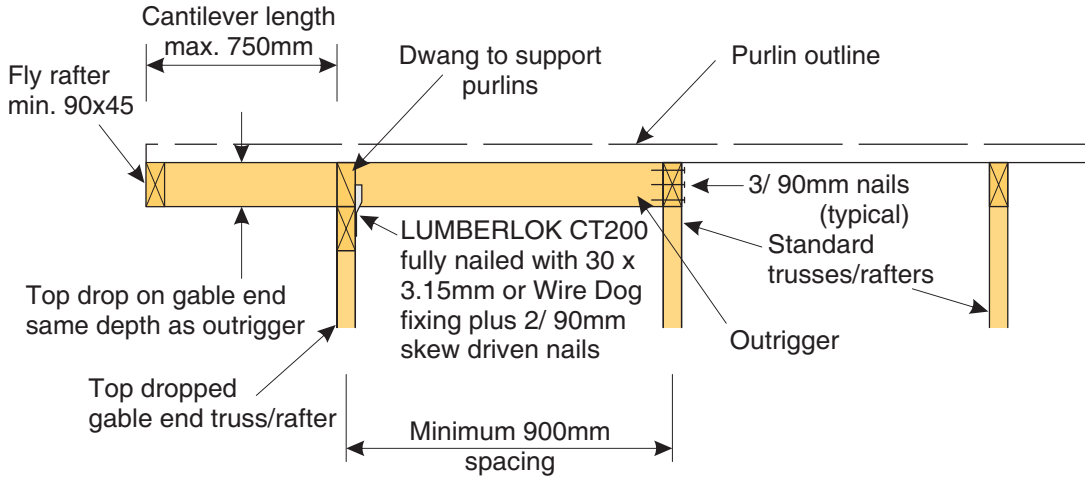
(See details on page 4)

TABLE 3

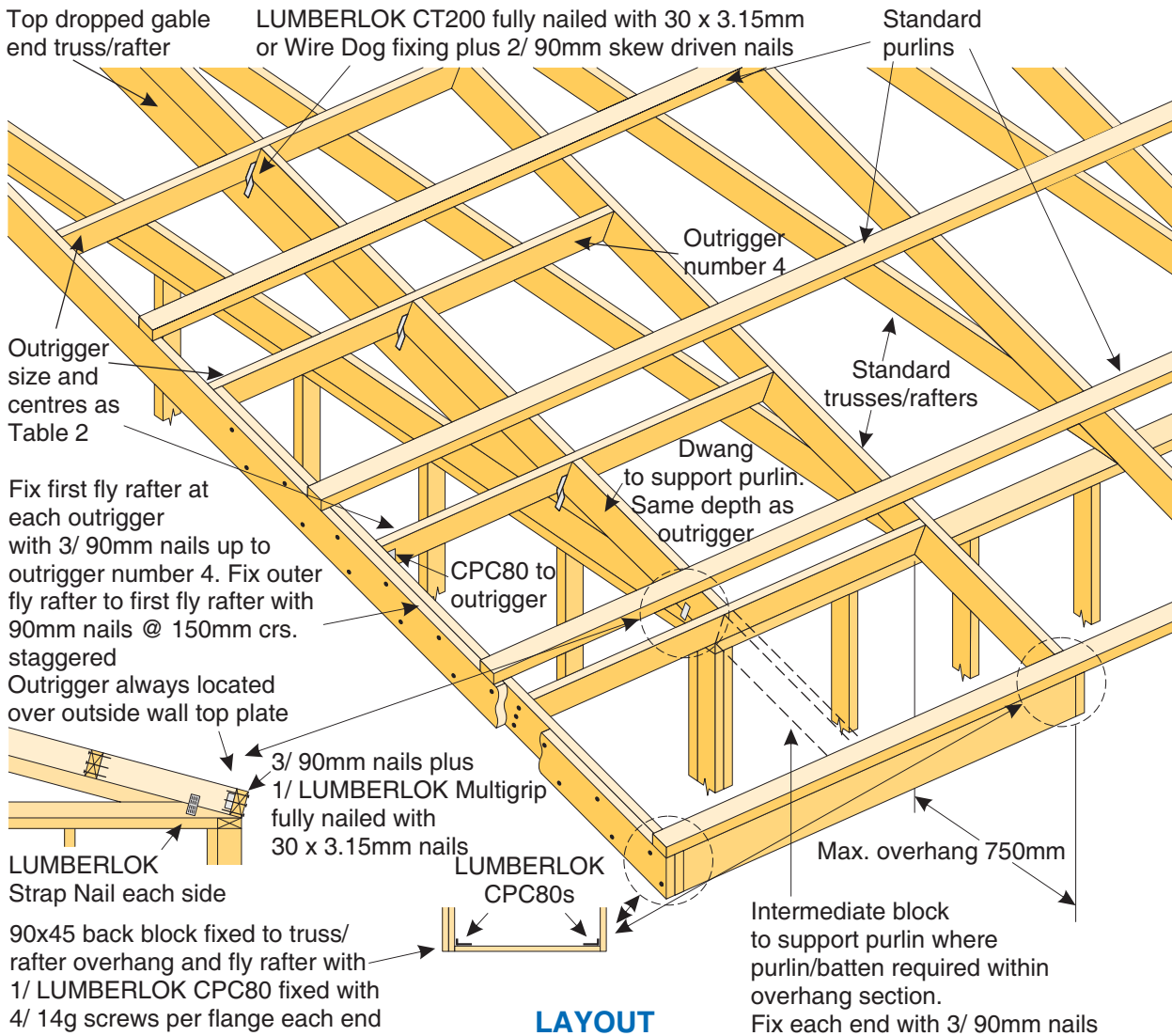
MAX. CANTILEVER LENGTH 1200mm	OUTRIGGER SIZE & ORIENTATION	MAX. CANTILEVER LENGTH (mm)	OUTRIGGER CENTRES (mm)
	45x45 Purlin 90x45 Outrigger	1200	450
	70x45 Purlin 90x45 Outrigger	1200	700
90x45 Purlin 90x45 Outrigger	1200	900	

CONSTRUCTION DETAILS FOR CANTILEVER OUTRIGGER OPTION

(SPANS & CENTRES AS TABLE 2 ON PAGE 2)



CROSS SECTION



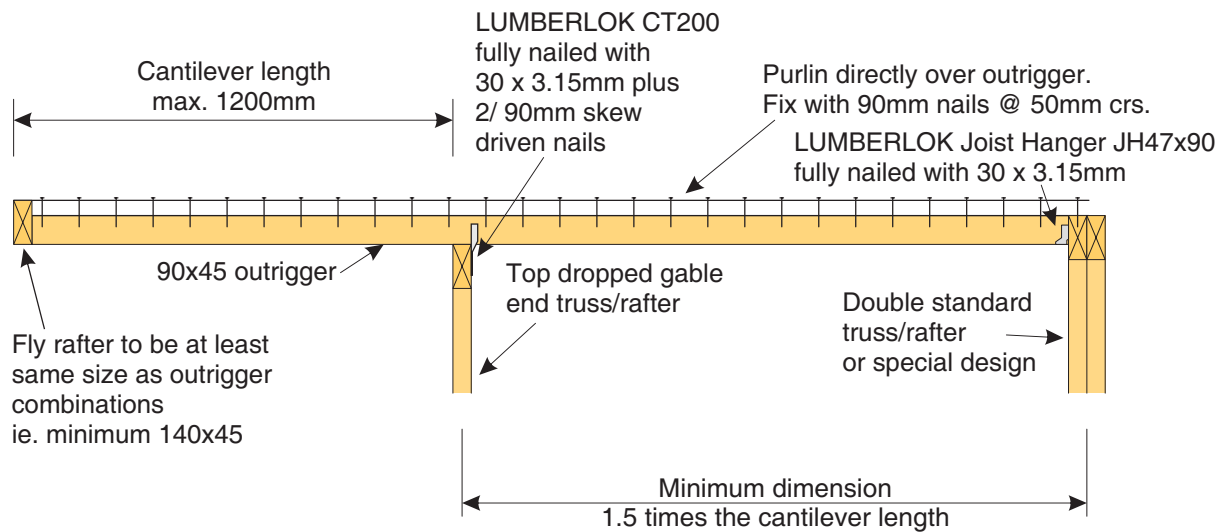
LAYOUT

SDC - Approved Building Consent Document - BC171688 - Pg 40 of 264 - 7/09/2017 - harrib

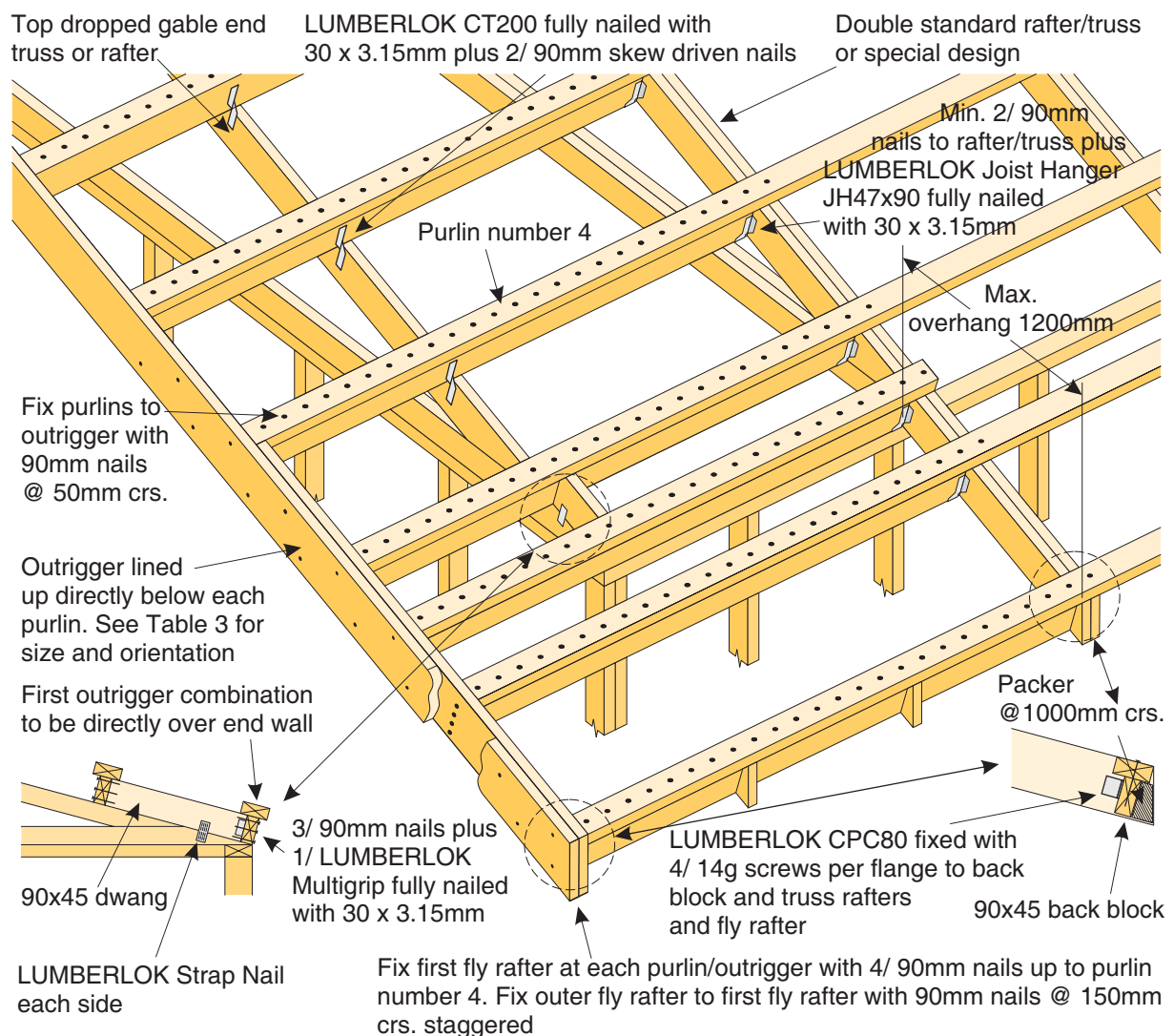
CONSTRUCTION DETAILS FOR OUTRIGGER/PURLIN COMBINATION



(SPANS & CENTRES AS TABLE 3 ON PAGE 2)



CROSS SECTION



LAYOUT

SDC - Approved Building Consent Document - BC171688 - Pg 41 of 264 - 7/09/2017 - harrib



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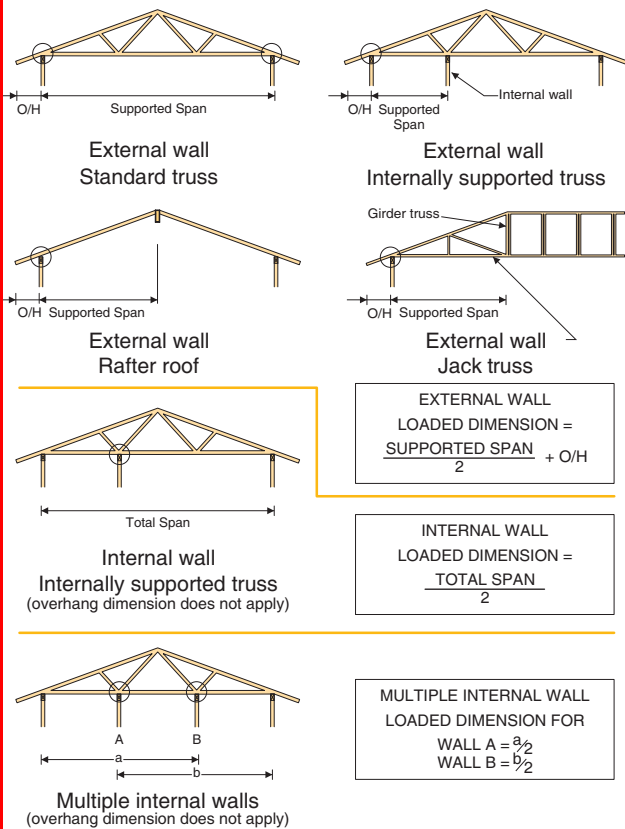


STUD TO TOP PLATE FIXING SCHEDULE ALTERNATIVE TO TABLE 8.18 NZS 3604:2011

NOTE:

- ★ All fixings are designed to resist vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20 kPa. Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist lateral loads.
- ★ These fixings assume the correct choice of rafter/truss to top plate connections have been made.
- ★ Gable end wall top plate/stud connections where the adjacent rafter/truss is located within 1200mm of gable end wall with a maximum verge overhang of 750mm, requires fixing type A as shown below.
- ★ All fixings assume top plate thickness of 45mm maximum.
- ★ Wall framing arrangements under girder trusses are not covered in this schedule.
- ★ All timber selections are as per NZS 3604:2011.

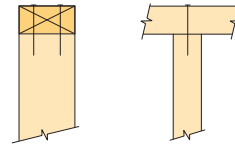
LOADED DIMENSION DEFINITION



FIXING OPTIONS

FIXING TYPE A
0.7 kN

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

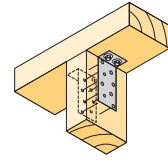
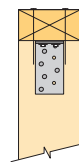
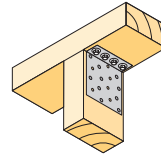
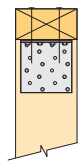


FIXING TYPE B
4.7 kN

CHOOSE ANY OF THE 3 OPTIONS BELOW

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

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

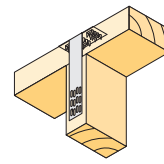
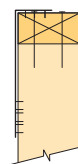


Plus LUMBERLOK 6kN Stud Anchor (CPC80)

Plus 2 x LUMBERLOK CPC40

Recommended for internal wall options to avoid lining issues

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



Plus LUMBERLOK Stud Strap (one face only)

FIXING SELECTION CHART

(Suitable for walls supporting roof members at 600, 900 or 1200mm crs.)

Wind Zones L, M, H, VH, EH, as per NZS 3604:2011

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

Note:

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

SDC - Approved Building Consent Document - BC171688 - Pg 42 of 264 - 7/09/2017 - harrib



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GANG-NAIL® LUMBERLOK® BOWMAC®

TEKTON SPECIFICATION

PRODUCT DESCRIPTION

Tekton Wall Underlay is a synthetic breather-type Wall Underlay for use as a wall underlay and air barrier under direct and non-direct fixed wall cladding on timber and steel framed buildings. The product is a coated spun-bonded polypropylene, and is approximately 0.6mm thick. Tekton Wall Underlay is supplied in rolls 2740mm x 37m and 1370mm x 37m.

FEATURES /BENEFITS

- Tekton Wall Underlay can be used in all wind zones up to and including very high and extra high with RAB Systems.
- Tekton Wall Underlay is fire retardant with a zero flammability index and can be used without restriction on all buildings, however must be separated from fireplaces, heating appliances, flues and chimneys in accordance with the NZ Building Code.
- Tekton Wall Underlay can be installed as an air barrier to walls that are not lined, such as gable ends.
- Tekton Wall Underlay has superior water hold out - keeping framing drier while permanent cladding is installed.
- Tekton Wall Underlay has 50 year durability.
- Tekton Wall Underlay can be left exposed for up to 60 days.
- Tekton Wall Underlay has optimal surfactant resistance (will not lose integrity if exposed to most soaps, detergents and cleaning chemicals).
- Tekton Wall Underlay is Branz appraised # 548 (2013)
- Tekton Wall Underlay can be used as a non-rigid backing material for stucco plaster and as a slip layer over rigid backing for stucco plaster.
- Tekton Wall Underlay is compatible with metal cavity battens.

APPLICATION RANGE

TIMBER FRAMED BUILDINGS

- With absorbent wall claddings directly fixed to the framing.
- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity.
- With masonry veneer.
- In building wind zones up to and including very high.

STEEL FRAMED BUILDINGS

- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity.
- With masonry veneer.
- In building wind zones up to and including very high.

Tekton Wall Underlay can also be used on buildings subject to specific weathertightness design.

STORAGE

Tekton Wall Underlay must be stored on its end in a clean and dry environment. It is the responsibility of the installer to protect the roll from damage and weather.

SURFACE PREPARATION

Studs must be provided at a maximum of 600mm centres. Nogs must be fitted flush between the studs at a maximum of 1200mm centres. The framing must be free from any sharp protrusions that may damage the wall underlay.

TEKTON Specification

INSTALLATION

PLACEMENT

- The branded side of the wall underlay must face away from the framing.
- The wall underlay must run horizontally.
- The wall underlay must extend from the upper side of the top plate to the underside of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs.
- Horizontal laps must be no less than 75mm with the direction of the lap ensuring that water is shed to the outside.
- End laps must be made over framing and be no less than 150mm wide.

It is preferable to tape all joins.

APPLICATION

- Position the roll of Tekton Wall Underlay against the framing with a short length of wall underlay free of the roll.
- Align the guide marks printed on the Tekton Wall Underlay with visible studs and nail /staple to the framing

Fix the wall underlay into place using 6-8mm zinc/ stainless plated staples, hot dip galvanised large head clouts or proprietary wall underlay fixings.

- Unroll the wall underlay across the framing and fix to all framing members at a maximum of 300mm centres.
- Keep the wall underlay straight and taut over the framing.
- The wall underlay should be run over any openings and these should be left covered until the windows and doors are ready to be installed. To form the openings cut the wall underlay at a 45 degree diagonal in from each corner. Fold and staple the wall underlay to the inside of the framed opening. Excess wall underlay can be trimmed.

- All openings must be detailed using a Branz appraised flexible flashing system like Super-Stick, Protecto One Piece Sill Tape or the Protecto Sill System.
- Where cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the wall underlay bulging into the cavity space when insulation is installed.
- Tekton Wall Underlay can be added as a second layer over head flashings as per E2/AS1 or the headflashing can be sealed to the wall underlay using Protecto Head Flashing Tape.
- Any damaged areas of the wall underlay must be repaired by overlapping with new material and taping, or by taping small tears .

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

WARRANTY

Tekton Wall Underlay meets the durability requirements of NZBC B2.3.1(a), 50 years and B2.3.1(b), 15 years. Tekton Wall Underlay is warranted to be free of defect in manufacture. This warranty is limited to replacement of the Tekton Wall Underlay material. Marshall Innovations NZ/AUS Ltd (the distributor) is not liable for incorrect installation or any accidental or wilful damage to the product.

PROTECTO SILL SYSTEM SPECIFICATION

PRODUCT DESCRIPTION

The Protecto Wrap Protecto Sill System combines Protecto Wrap Detail Tape, Sill Tape and Tak Primer/Adhesive to form a flexible flashing around openings in timber and steel framed buildings.

The Tak Primer /Adhesive is applied to provide superior adhesion for the tapes. The Detail Tape is moulded into the corners of the framing opening .The Sill tape is then applied and folded out onto to the face of the opening. Head Flashing tape is used at the joinery heads to seal the flashing onto the wall underlay.

- Protecto Tak – a light blue spray on primer/adhesive used to prepare the surface for the application of the tapes. Available in a 369gm can.
- Detail Tape – a 1mm thick highly conformable tape that can be stretched and moulded to any shape. Available in 150mm wide x 15m long rolls.
- Sill Tape – a .5mm thick polyethylene backed asphalt adhesive tape.

STORAGE

Store all materials under cover, in clean dry conditions and away from direct exposure to sunlight. Do not remove the tape from the carton until ready to use and always replace in the carton for storage.

FEATURES /BENEFITS

- A true flexible flashing system as specified by WANZWIS, E2/AS1 and the New Zealand Building Code.
- BRANZ Appraised as a flexible flashing system for use around openings in **timber and steel** framed buildings.
- Zero waste as tapes can be joined by overlapping 100mm.
- A versatile and flexible system that can be used on bevelled sills, variable jamb angles and to seal around penetrations in wall underlay.
- Can be used on all accepted wall underlays including bituminous paper.
- **Specified for use with RAB systems.** Install to RAB manufacturers specifications.

DURABILITY

On the basis that the exposure to the weather does not exceed 90 days the Protecto Sill System can expect to have a serviceable life equal to that of the cladding.

When used as a waterproofing tape over the joins in RAB board the exposure can be 90 days.

SAFETY PRECAUTIONS

The materials must be kept away from direct exposure to heat and flames. Extra precautions must be taken when using the Protecto Tak Primer/Adhesive in areas where there is insufficient ventilation. Do not breathe the fumes and avoid skin contact.

SHELF LIFE

The materials have a recommended shelf life of 1 year.

SURFACE PREPARATION

The surface to receive Protecto Tape must be clean, dry and free of any foreign matter that may adversely affect adhesion. It is recommended that the tapes be installed between 10°C and 32°C.

When the Protecto Wrap Sill system is used in conjunction with LOSP treated timber, the timber must be allowed to breathe for a minimum of 7 days prior to application.

The wall underlay must extend over the opening and be cut on a 45° angle away from each corner. The flaps are folded into the opening and secured to the interior face of the framing.

INSTALLATION

PRIMING

Ensure all surfaces are clean and dry. Spray a light film of Protecto Tak Primer/Adhesive to all surfaces that are to receive the Sill System tapes. The spray is coloured light blue for easy identification. Allow the Tak Spray sufficient time to cure. The spray should not pull away from the surface when touched. The curing time will vary depending on the temperature. The spray can be left uncovered for a reasonable length of time; however the tapes should be applied soon after application of the Tak Spray to avoid contamination of the prepared surface.

DETAIL TAPE

Detail Tape must be installed to all corners.

AFTER PRIMING

- Cut a 250mm length of Detail Tape.
- Remove the backing paper and fold the length in half with the exposed membrane to the outside.
- Position into the corner and smooth the first half of the tape onto the jamb. Keep the tape flush with the inside edge of the framing.

- Fold the remaining 125mm of tape across the lintel or sill and press firmly into place, particularly into the corner junction.
- Pinch the corner of the tape and pull away to free the corner of the release film.
- Remove the release film.
- Fan your fingers across the surface of the tape and using your thumb take hold of each direction of tape
- Gently pull the tape forward and around onto the face of the opening.
- Smooth the tape firmly into place to enhance adhesion.

Do not overstretch the tape. The corner will form as the tape is folded onto the face of opening.

Do not allow the detail tape to come in contact with itself.

This process is repeated for all corners of the opening.

For the top corners the installation is now complete.

SILL TAPE

Install Sill Tape in separate pieces across the sill and 200mm up the jambs.

Sill Installation

AFTER PRIMING

- Cut a length of Sill Tape slightly shorter than the length of the sill.
- Roll up the length of Sill Tape keeping the backing paper to the outside of the roll.
- Peel back 100mm of backing paper.
- Align the tape with the inside edge of the framing, keeping the overhang to the outside.
- Press the exposed end of the tape into the sill - jamb junction, adhering the Sill Tape to the top of the already installed Detail Tape.
- Continue removing the backing paper and adhering the Sill Tape along the entire length of the sill.
- Starting in the centre of the tape, fold the overhang of Sill Tape onto the face of the opening.

SILL TAPE (Continued)

Jamb Installation

- Cut a 200mm length of Sill tape.
- Remove the backing paper.
- Align the length of Sill Tape with the inside edge of the framing and starting at the jamb - sill junction, smooth the tape onto the jamb.
- Fold the overhang of Sill Tape onto the face of the opening.

Smooth all tape firmly into place to enhance adhesion.

HEAD FLASHING TAPE

To fit the head flashing do not cut the wall underlay but fix the head flashing directly over the top of the wall underlay.

AFTER PRIMING

- Cut a length of Head Flashing Tape 100mm longer than the head flashing.
- Begin applying the Head Flashing Tape 50mm from the end of the installed head flashing. Apply the tape so that it adheres 40mm onto the head flashing and 35mm onto the wall underlay.

The Head Flashing Tape should run past each end of the head flashing by 50mm.

Smooth the tape firmly into place to enhance adhesion.

REPAIRS

Should air become trapped under the tapes at any stage of installation, smooth the trapped air to the outside of the tape.

If minor damage occurs then another piece of tape can be used for repair as long as it extends at least 100mm beyond the damaged area. If the damage is more than minor then the installed tape must be replaced.

WARRANTY

The materials used in the Protecto Sill System are warranted free of defect in manufacture for a period of 15 years. This warranty is limited to the replacement of the product only.

NOTE

Some sealants can cause damage to the tapes. Please check the compatibility with the sealant manufacturer before using any sealant that may contact the tapes.

***The building industry typically uses bitumen containing sill wraps for doors and windows. The NZBC code dictates that a sealant conforming to ISO 11600 Group F Class 25LM is to be used as the window Joint sealant. Sealants that conform to the ISO standard are NOT compatible with bitumen containing sill wraps and degradation of the sealant may occur. Even sill wraps that have a polyethylene protective film are considered as incompatible as long-term isolation of the materials is not guaranteed.**

In order to ensure a long-term seal that will meet NZBC requirements an impervious aluminium tape Danko TD830 has to be applied to the sill Tapes to provide a barrier between the tapes and the Bostik Seal n Flex1.

Specification & Installation Guide February 2012

SDC - Approved Building Consent Document - BC171688 - Pg 48 of 264 - 7/09/2017 - harrib



Contents

1.0	Shadowclad Product Range.....	2
1.1	Technical Information and Cad Details	2
1.2	Product Description and Range.....	3
1.3	Building Materials for Use with Shadowclad (Exterior Cladding)	6
1.4	Preservative Treatment.....	7
1.5	Sustainability.....	7
1.6	Product Identification	7
2.0	Design Considerations.....	8
2.1	Design Responsibility.....	8
2.2	Literature Scope	8
2.3	Code Compliance	8
2.4	Site & Foundations	8
2.5	Ground Clearances.....	8
2.6	Moisture Management.....	9
2.7	Wind Loading.....	9
2.8	Durability.....	9
2.9	Textured vs. Smooth Finished Plywood as Exterior Cladding	9
2.1	Health & Safety	10
2.1	Storage & Handling	10
2.1	Limitations.....	10
3.0	Installation - Bracing Specifications... ..	11
3.1	Design to Comply with the New Zealand Building Code	11
3.2	Shadowclad Bracing Specifications ..	13
3.3	GIB Handibrac - Recommended Installation Method	14
4.0	Installation - Internal Linings.....	15
5.0	Installation - Exterior Cladding.....	15
5.1	Framing - Durability.....	15
5.2	Framing - Construction	15
5.3	Preparation - Building Underlay and Rigid Air Barrier	15
5.4	Preparation - Direct Fix Construction	15
5.5	Preparation - Cavity Construction..	15
5.6	Sheet Layout	18
5.7	Fixings - Fastener Durability	18
5.8	Fixings - Fastener Size & Layout.....	18
5.9	Vertical Sheet Joints	19
5.1	Horizontal Sheet Joints	22
5.1	External Corners	23
5.1	Internal Corners.....	24
5.1	Shadowclad Flashing Junction Points..	25
5.1	Window Penetrations	26
5.1	Wall Penetrations	29
5.1	Sheet Clearances	32
5.1	Other Details	33
6.0	Coating & Application - Exterior Cladding.....	37
6.1	Surface Penetration.....	37
6.2	Coating Application.....	37
6.3	Coating Selection	37
6.4	Shadowclad Coating Requirements if Run Off is Used for Drinking Water ..	37
7.0	Shadowclad Maintenance.....	39
8.0	Frequently Asked Questions.....	40
9.0	References & Sources of Information	41

1.0 SHADOWCLAD® PRODUCT RANGE

Manufactured by Carter Holt Harvey® Woodproducts, Shadowclad® is suitable for use as an exterior wall cladding when using H3 treated panels or as an internal wall and 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 both direct and cavity fixed construction. To view the appraisals visit www.chhwoodproducts.co.nz.

For information relating to Ecoply® structural plywood and applications other than exterior cladding, refer to the Ecoply Specification & Installation Guide. Or for specific information on plywood as a rigid air barrier, refer to the Ecoply Barrier Specification and Installation Guide.

The Shadowclad BRANZ appraisals do not cover:

- Ecoply Barrier used with Shadowclad
- Shadowclad used as an interior lining
- Downgrade plywood products

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.

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

The information contained in this manual relates specifically to Shadowclad branded structural plywood manufactured by Carter Holt Harvey Woodproducts and cannot be used with any other plywood manufacturers product however similar they may appear.

Alternative plywood products can differ in a number of ways which may not be immediately obvious and substituting them for products is not appropriate and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the New Zealand Building Code.

1.2 PRODUCT DESCRIPTION AND RANGE

Shadowclad® is a structural plywood panel 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 1200 mm and features a unique textured appearance which also helps to defuse UV rays for increased aesthetic performance when exposed to weather.

Shadowclad is available in either Textured or Texture Groove profiles and in either Natural or Pre Primed finishes.

Shadowclad® Natural

Shadowclad Natural is an uncoated panel suitable for use with penetrating stains, film forming stains and paint systems.

Shadowclad® Prime

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

Shadowclad® Prime features:

- High 70 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 dryer more consistent painting surface
- Saves time and money as traditional wet primers are not normally required
- Panel surface and edges factory primed for increased panel durability
- Can be exposed to weather for up to 3 months prior to top coat application
- Low volatile organic compound (VOC) primer coating

Shadowclad Prime 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 Prime finish and is not available with Natural finish products.

Shadowclad Prime is not suitable for use with penetrating stains. For advice on specific coating systems and their suitability for use with Shadowclad Prime always refer to the coating manufacturer.

TABLE 1: SURFACE FINISHES





Natural		Prime	
Texture	Texture Groove	Texture	Texture Groove
			
Shadowclad Natural is an uncoated panel suitable for staining and painting. Panels can also be clear coated when used in internal dry applications.		Shadowclad Prime features a pre primed surface saving time and money when using paints and film forming stains and is suitable for use in exterior applications only.	

TABLE 2: SHADOWCLAD® PRODUCT RANGE

Profile	Texture	Texture Groove
Finish	Natural or Prime	Natural or Prime
Sheet Length	2440 & 2745 mm	2440 & 2745 mm
Width (overall)	1216 mm	1216 mm
Width (effective)	1200 mm	1200 mm
Length/Width Tolerance	+/- 1 mm	+/- 1 mm
Nominal Thickness	12 mm	12 mm
Weight (kg/m ²)	6.6	6.6
R-value (m ² .C/W)	0.104	0.104
Groove Profile	N/A	9 mm wide, 5 mm deep at 150 mm centres
Edge Profile	Shiplap with weather groove	Shiplap with weather groove
Treatment Available	<ul style="list-style-type: none"> • H3.1 LOSP (Azole) • H3.2 CCA (Prime finish only) • Untreated- internal dry applications (Natural finish only) 	<ul style="list-style-type: none"> • H3.1 LOSP (Azole) • H3.2 CCA (Prime finish only) • Untreated- internal dry applications (Natural finish only)

Downgrade Plywood Cladding

Downgrade plywood cladding (commonly referred to as Utilityclad, Downgrade or Shadowclad® Seconds) may become available during the normal manufacture of Shadowclad panels. Downgrade products may contain sheet defects and visual imperfections and are **not** permitted for use as a cladding material for habitable spaces such as residential and commercial projects.

Downgrade plywood cladding does not meet NZ Building Code durability requirements and are only suitable for use in non habitable buildings such as barns, sheds and general utility buildings.

Downgrade plywood cladding panels are easily identified by markings on the rear of all panels.

For more information on downgrade cladding products refer to information bulletin "Downgrade Plywood Cladding Information Bulletin" downloadable from www.chhwoodproducts.co.nz

Shadowclad® Exterior Flashing Range

Manufactured from extruded aluminium, the Shadowclad flashings range is purpose designed to complement Shadowclad panels used in exterior applications.

Independently tested for weather tightness 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.

Horizontally installed flashings come in 3600 mm lengths and vertically installed angles are available in standard Shadowclad panel lengths.

Flashings not supplied by CHH Woodproducts must comply with E2/AS1 specifications and be compatible for use with H3.1 LOSP or H3.2 CCA treated plywood.

Flashing Finishes

Shadowclad 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.

Visit www.duluxpowdercoatings.co.nz to find a powder coater in your area or refer to your local yellow pages directory.

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.

Stainless steel flashings are not supplied by CHH Woodproducts and must meet requirements of E2/AS1.

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

For further information relating to H3.2 CCA treated Shadowclad contact CHH Woodproducts on 0800 746 399

TABLE 3: SHADOWCLAD® FLASHING RANGE

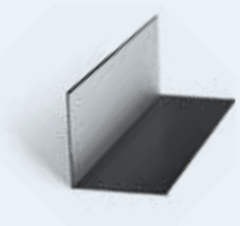
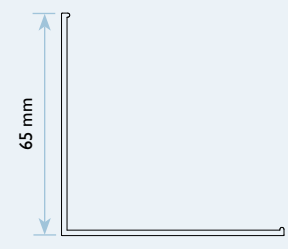
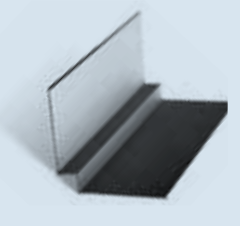
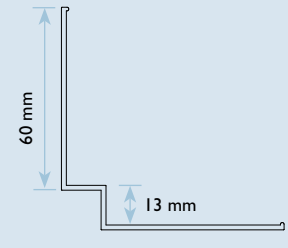
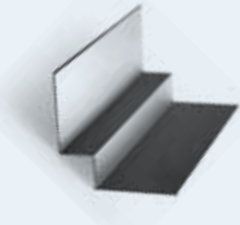
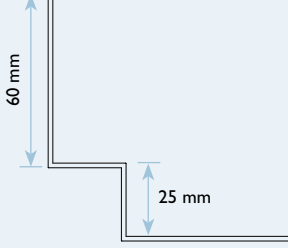

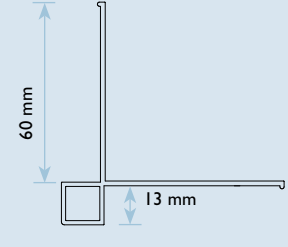
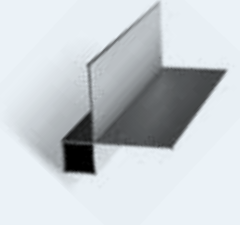
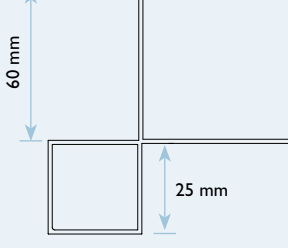
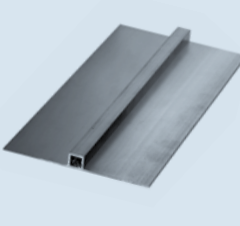
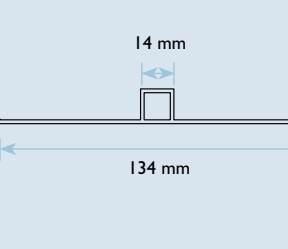
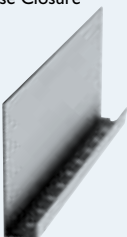
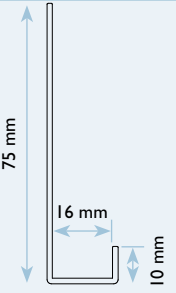
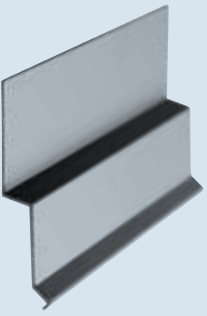
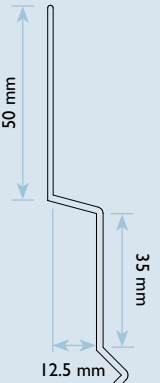
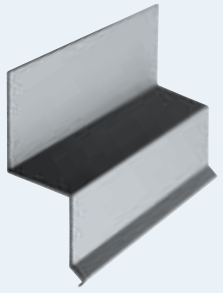
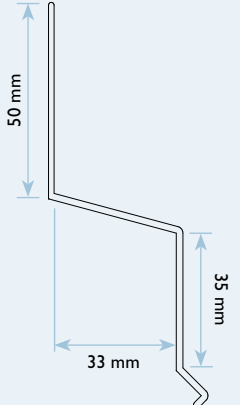
Flashing	Line Drawing	Description	Finish Available	Length (mm)
 <p>Internal 90° Angle</p>	 <p>65 mm</p>	Back flashing for internal corners	Natural Anodised	2440 2745
 <p>Internal 'W' Angle</p>	 <p>60 mm 13 mm</p>	'W' back flashing for internal corners providing a flush finish with panels (13 mm x 13 mm)	Natural Anodised	2440 2745
 <p>Large Internal 'W' Angle</p>	 <p>60 mm 25 mm</p>	'W' back flashing for internal corners (25 mm x 25 mm) Design Tip: Use a Large 'W' where a flush junction between the Horizontal 'Z' flashing and corner flashing is desired	Natural Anodised Mill	2440 2745
 <p>External Box Angle</p>	 <p>60 mm 13 mm</p>	Box corner for external corners providing a flush finish with panels	Natural Anodised Mill	2440 2745
 <p>Large External Box Angle</p>	 <p>60 mm 25 mm</p>	Box corner for external corners (25 mm x 25 mm) Design Tip: Use Large External Box where a flush junction between the Horizontal 'Z' flashing and corner flashing is desired	Natural Anodised Mill	2440 2745
 <p>Vertical Top Hat</p>	 <p>14 mm 134 mm</p>	Vertical sheet joint flashing	Natural Anodised Mill	2440 2745

TABLE 3: SHADOWCLAD® FLASHING RANGE CONTINUED

Flashing	Line Drawing	Description	Finish Available	Length (mm)
		Restricts vermin from accessing the cavity space	Natural Anodised	3600
		Horizontal Z flashing for horizontal joints between panels	Natural Anodised Mill	3600
		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

1.3 BUILDING MATERIALS FOR USE WITH SHADOWCLAD® (EXTERIOR CLADDING)

TABLE 4: MATERIALS AVAILABLE FROM CHH WOODPRODUCTS

	Description	Treatment	Length
Cavity Battens ¹	47 x 21 mm merch grade 75 x 21 mm merch grade	H3.1 LOSP	Random
Exterior Battens ¹ (with 6x6 mm weather grooves)	65 x 18 mm vertical batten (dressed) 65 x 18 mm vertical batten (bandsawn)	H3.1 LOSP	Random
Ecoply® Barrier ²	Rigid Air Barrier System	H3.2 CCA	2440 / 2745 & 1200 mm

¹ Batten dimensions are nominal

² 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
- Flexible flashing tape to prepare window openings
- Window/door head flashings supplied by window joinery company
- Window sill flashings (direct fixed only) supplied by window joinery company

1.4 PRESERVATIVE TREATMENT

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 Prime panels if required.

Shadowclad is envelope preservative treated. Where sheets are cut, cuts must be coated with a brush on timber preservative. Holdfast Metalex Clear is recommended. Failure to do so may 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 recommended to fix H3.1 LOSP treated Shadowclad to framing.

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 a pre primed finish (Shadowclad Prime).

TABLE 5: PRESERVATIVE TREATMENT

	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 solvent
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: e.g. SHADOWCLAD
- Glue bond: e.g. A BOND
- Intended application: e.g. STRUCTURAL
- Australasian Standard: e.g. AS/NZS 2269:2008
- Date and time of manufacture: e.g. 01/01/12 19:45:45
- Formaldehyde emission class: E₀
- The Engineered Wood Products Association of Australasia

(EWPA) brand and mill number: e.g. 911 (Tokoroa mill)

For example:

SHADOWCLAD A BOND STRUCTURAL
AS/NZS 2269:2008 PAT 01/01/12 19:45:45 E0



If the plywood is treated it will also be marked in accordance with the treatment standard AS/NZS 1604.3

2.0 DESIGN CONSIDERATIONS

2.1 DESIGN RESPONSIBILITY

The specifier for the project must ensure that the details in the specification are appropriate for the intended application and that additional detailing is provided for specific design or any areas that fall outside the scope and specifications of this literature.

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". There are two methods of installing Shadowclad depending on the risk assessment for each wall face to be clad:

- Direct-fixed, where the cladding is fixed directly to the timber frame
- Drained and ventilated cavity, where the cladding is fixed onto timber battens fixed over the timber frame

Details in this publication reference cavity fixed applications only. Direct fix details can be downloaded from www.chhwoodproducts.co.nz/shadowclad-plywood-cladding

To determine which fixing method is required by the Acceptable Solution, assess each wall face using the building envelope risk matrix in 'E2/AS1 - External Moisture' (latest edition). For each wall with a risk score of 0 - 6, Shadowclad can be direct-fixed and where the risk score is 7 - 20, Shadowclad must be fixed over a drained and ventilated cavity.

2.3 CODE COMPLIANCE

Shadowclad is tested in accordance with E2/VMI and NZS4284 "Testing of Building Facades" for compliance with NZ Building code requirements.

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 (New Zealand Building Code) Clause E1 "Surface Water".

2.5 GROUND CLEARANCES

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

Shadowclad must overhang the bottom plate on a concrete slab by a minimum of 50 mm as required by NZS 3604.

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

2.6 MOISTURE MANAGEMENT

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

Wall construction design must effectively manage moisture, 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 appropriate flashing and waterproofing. Materials, components and the installation used to manage moisture in framed wall construction must, at a minimum, comply with the requirements of relevant Sections and Clauses of the NZ Building Code.

2.7 WIND LOADING

Shadowclad is suitable for use in all wind zones up to and including extra high (55m/s) as defined by NZS 3604 and

specific design wind pressures up to design differential ultimate limit state (ULS) of 2.5 kPa.

2.8 DURABILITY

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 NZ Building Code.

Internal Linings - 50 year Durability

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

Exterior Cladding - 50 year Durability

To meet the requirements for a 50 year minimum durability level, when used as an exterior cladding (as per NZ Building Code Clause B2 for claddings used as bracing or structural element) Shadowclad panels must be:

- H3 preservative treated
- Coated with a 3 coat acrylic coating system such as a good quality paint or film forming stain system. (Penetrating stains do not meet this requirement)
- Coating colours must have a light reflectance value (LRV) of 40% or more
- Minimum total coating system film build of 90 microns
- Coating must be regularly maintained as part of a normal building maintenance program throughout the life of the building

Advice and assurances from the coating manufacturer must be sought and details submitted for approval with any building consent application to ensure the applicable requirements for 50 year durability are achieved.

For further information on Shadowclad used as both cladding and bracing refer to section: 3.0 Bracing Specifications.

Exterior Cladding - 15 year Durability

NZ Building Code Clause B2 requires claddings which do not form part of the bracing or structural element 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 40%) 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.

Failure to adequately maintain the surface coating of the cladding is unlikely to affect the durability of the panel however the risk of aesthetic related issues such as face checking are increased and are not covered by manufacturer durability obligations under the NZ Building Code.

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

For further advice on coatings selections refer to section 6.0: Coating and Application - Exterior Cladding.

2.9 TEXTURED VS. SMOOTH FINISHED PLYWOOD AS 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 appearance when directly exposed to external weather.

Where a high appearance is desired (such as exterior cladding) CHH Woodproducts recommends the use of Shadowclad over smooth faced plywood. Shadowclad features a textured

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

Surface 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) downloadable from www.chhwoodproducts.co.nz.

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

2.12 LIMITATIONS

The information contained in this document is current as at February 2012 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 installed in accordance with this document or NZ Building Code compliance documents.

This publication replaces all previous CHH Woodproducts design information and literature relating to Shadowclad panel installation and flashings. CHH Woodproducts reserves

the right to change the information contained in this document without prior notice. It is important that you visit www.chhwoodproducts.co.nz or call 0800 326 759 to confirm that you have the most up to date information available.

CHH Woodproducts has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document and, to the extent permitted by law, will not be liable for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

3.0 BRACING SPECIFICATIONS

The Shadowclad® 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 NZ Building Code - B1 Structure, and NZS 3604 *Timber Framed Buildings* or specifically designed to NZS 3603 *Timber Structures Standard*.

Any Shadowclad structural panel may be used for bracing provided the Shadowclad bracing specifications outlined in this publication are followed.

Shadowclad panels may be used as a dual cladding and structural bracing system either direct fixed or over a ventilated cavity.

Where Shadowclad is to be used as both cladding and structural bracing the following is required:

- Panels must be coated with a three coat acrylic coating system such as a good quality paint or film forming stain. (Penetrating stains do not meet this requirement)
- Coating colours must have light reflectance value (LRV) of 40% or more
- Minimum total coating system film build of 90 microns
- The coating must be regularly maintained as part of a normal building maintenance program throughout the life of the building

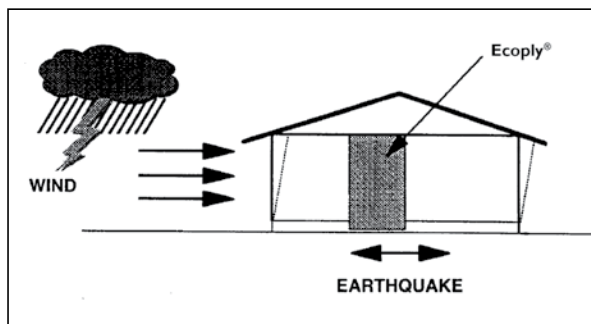
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

Structure

Timber framed buildings to NZS 3604

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 3604:2011.



Specific design

Because Shadowclad is structural plywood manufactured to AS/NZS 2269, 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 Ezy-Brace software, downloadable from www.gib.co.nz

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 if the full element rating is to be accounted for.

Durability

Shadowclad 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 NZ Building Code.

Table 6 summarises the applications in which Shadowclad can be used as structural bracing together with the preservative treatment and fastener material required.

TABLE 6: SHADOWCLAD® SUITABILITY FOR BRACING APPLICATIONS INCLUDING TREATMENT TYPE AND FASTENER MATERIAL

Application	Plywood Treatment	Fastener Material
Shadowclad® bracing exposed to exterior weather conditions and dampness but not in contact with ground in exposure zones¹ B & C: E.g. Shadowclad used as both cladding and bracing (direct fixed to framing or over a drained ventilated cavity system)	Shadowclad H3.1 LOSP	Hot dipped galvanised or better
	Shadowclad H3.2 CCA	Stainless steel
Shadowclad bracing exposed to exterior weather conditions and dampness but not in contact with ground in exposure zones¹ D (sea spray): E.g. Shadowclad used as both cladding and bracing (direct fixed to framing or over a 20 mm drained ventilated cavity system)	Shadowclad H3.1 LOSP	Stainless steel
	Shadowclad H3.2 CCA	

¹ Exposure zones as per section 4 of NZS 3604

Subfloor sheet bracing

H3 treated Shadowclad 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 Shadowclad subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, maintained acrylic exterior coating system with a light reflectance value of 40% 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 should be multiplied by $2.4 \div$ 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.”

Joining panels for walls higher than maximum sheet length

Shadowclad bracing panels must be fixed from top plate to bottom plate. For wall heights over 2.45 m, Shadowclad is available in 2.745 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 Shadowclad bracing specifications.

Cladding as bracing

Shadowclad is recommended as a cladding which can be used for bracing as well.

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 weather tight cladding and bracing element when installed in accordance with the specifications in this Guide.

However 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 exterior cladding applications where a high visual appearance is desired, CHH Woodproducts strongly recommends the use of Shadowclad as an exterior cladding.

Soil

Shadowclad 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 SHADOWCLAD® BRACING SPECIFICATION – SCI

SINGLE SIDED SHADOWCLAD® BRACE

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
SCI	0.6 m	Shadowclad one side	105	120

Framing

Wall framing must comply with:

NZBC B1 - Structure: ASI Clause 3 Timber (NZS 3604:2011)
 NZBC B2 - Durability: ASI Clause 3.2 Timber (NZS 3602)

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe®, 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 Shadowclad® fixed directly to framing or over cavity battens. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet.

Fastening the Shadowclad®

Fasteners

Fasten with 60 x 3.15 mm galvanised or stainless steel flat head nails for direct fix or over cavity battens. Place fasteners no less than 7 mm from sheet edges.

Fasteners for H3.2 CCA treated Shadowclad

Use stainless steel fasteners where fasteners are in contact with H3.2 CCA treated timber or plywood.

Where stainless steel nails are required, annular grooved nails must be used.

Refer to table 8 of the Shadowclad Specification and Installation Guide for further fastener selection advice.

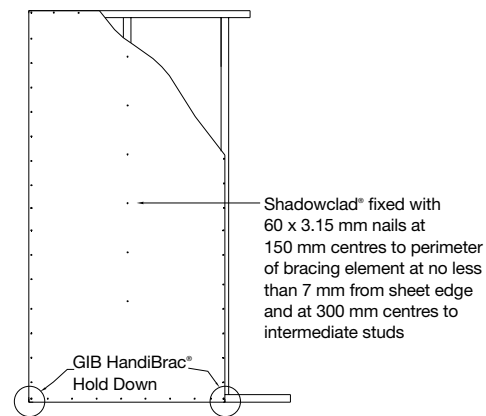
Fastening centres

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.

Fastening to cavity battens

The brace element may be fixed over cavity battens

The cavity battens must be a minimum of 40 x 20 mm nailed in staggered formation at 150 mm centres to studs around the perimeter of the brace element; and nailed to the intermediate studs within the element at 300 mm centres. 60 mm x 3.15 mm flat head galvanised or annular grooved stainless steel nails should be used.



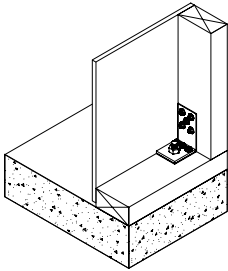
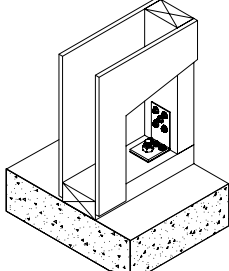
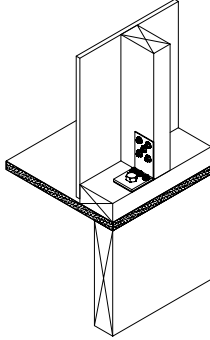
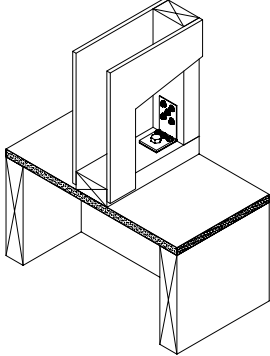
3.3 GIB HANDIBRAC® - RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek™ NZ, GIB HandiBrac® has been tested for use as a hold-down in all SC bracing elements.

- The GIB HandiBrac® registered design provides for quick and easy installation
- 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		Timber Floor	
External walls	Internal walls	External walls	Internal walls
			
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate		Position GIB HandiBrac® at the stud/plate junction	
Position GIB HandiBrac® in the centre of the perimeter joist or bearer		Position GIB HandiBrac® in the centre of the floor joist or full depth solid block	
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket		12 x 150 mm galvanised coach screw or screw bolt supplied with the bracket	

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4.0 INSTALLATION - INTERNAL LININGS

The use of untreated Shadowclad® is recommended 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 section 4.0 of the Ecoply® Specification and Installation Guide

5.0: INSTALLATION - EXTERIOR CLADDING

5.1 FRAMING - DURABILITY

Refer to NZ Building Code 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®).

5.2 FRAMING - CONSTRUCTION

Use kiln dried framing such as Laserframe® in accordance with timber framing manufacturer's specifications and treated in accordance with NZS 3602.

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 600 mm centres
- Nogs must be provided at a maximum of 800 mm centres

When direct fixing, position the framing to allow a 6 mm capillary gap behind panels where they overlap the edge of concrete floor, brick veneer or lower storey cladding.

- 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 600 mm (e.g. Below windows or ballestrades)

5.3 PREPARATION - BUILDING UNDERLAY & RIGID AIR BARRIER

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

- Barriers to air flow are required regardless of direct or cavity construction
- For more information on rigid air barriers refer to the Ecoply Barrier Specification and Installation Guide
- Rigid sheathing is required in extra high wind zones and above

5.4 PREPARATION - DIRECT FIX CONSTRUCTION

Shadowclad can be installed either as direct fix or cavity construction.

This publication shows suggested details for cavity construction only.

Direct fix details can be downloaded from www.chhwoodproducts.co.nz or obtained by calling CHH Woodproducts on 0800 746 399.

5.5 PREPARATION - CAVITY CONSTRUCTION

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 20 mm thick (between limits of 18 mm and 25 mm in thickness); at least the same width as the stud; and minimum H3.I LOSP treated in accordance with NZS 3640.

DO NOT use polystyrene battens which may melt in contact with solvents from H3.I LOSP treated Shadowclad.

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

If studs are at 600 mm centres:

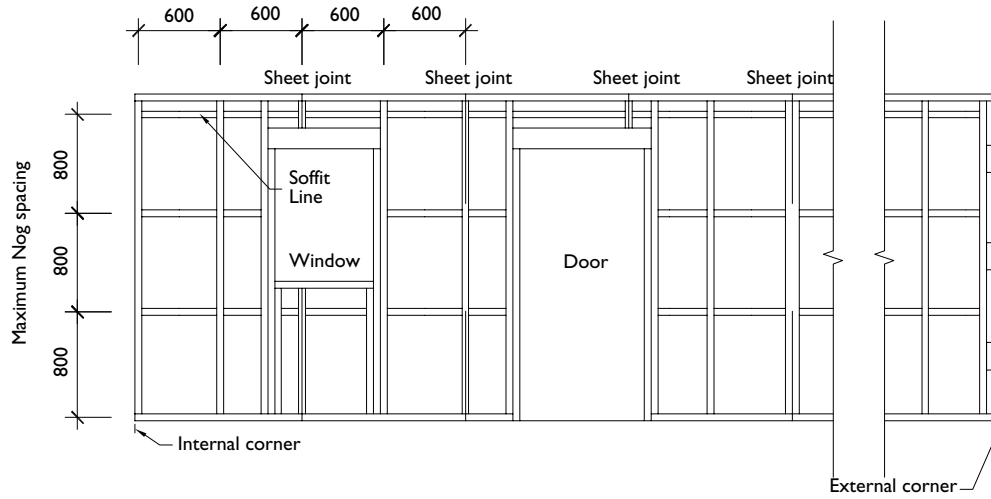
- Battens must be fixed at 300 mm centres vertically (i.e. a batten on studs and one in between the two studs fixed to top and bottom plates and nogs)
- Battens fixed between studs are to restrain the building underlay and insulation from bulging into the drained cavity
- The Shadowclad must not be fixed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

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

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

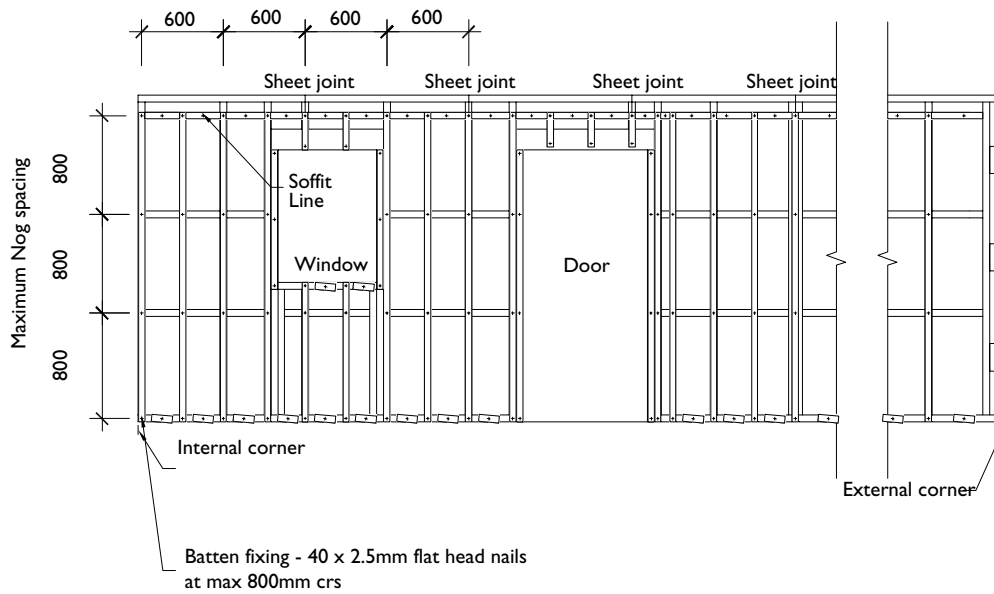
Cavity spacers (i.e. short pieces of cavity batten) may be used to support the bottom sheet edge (or provide intermediate support where required eg above window openings) but must allow water drainage to the outside. The cavity spacers must be fixed at a 5° minimum slope with a 50 mm minimum air gap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

SC001: Typical Framing Setout (without Battens)



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

SC002: Typical Framing Setout (with Battens)



5.6 SHEET 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 should be placed at the top of the sheet to avoid rain drips soaking in to cut end grains
- Priming or pre coating of bottom edges and sheet rears to a depth of 150 mm is required for sheets which will be in close proximity to moisture such as sheets overhanging building framing close to ground and apron flashings on roofs

5.7 FIXINGS - FASTENER DURABILITY

TABLE 7: FASTENER DURABILITY FOR SHADOWCLAD® (INCLUDING BRACING)

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

5.8 FIXINGS - FASTENER SIZE & LAYOUT

TABLE 8: FASTENER LENGTHS FOR SHADOWCLAD®

Application	Fastener Length (Direct Fix)		Fastener Length (Cavity Fix)	
	Cladding	Cladding & Bracing	Cladding	Cladding & Bracing
Nails in Timber	50 x 2.8 mm	60 x 3.15 mm	60 x 2.8 mm	60 x 3.15 mm
Screws in Timber	8g x 40 mm	N/A	8g x 65 mm	N/A

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 150 mm centres and within the panel on all supports at 300 mm centres
- When fixing over a ventilated cavity do not fix to battens that are not installed over studs as the nails will puncture the building wrap
- Fasten no closer than 7 mm 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

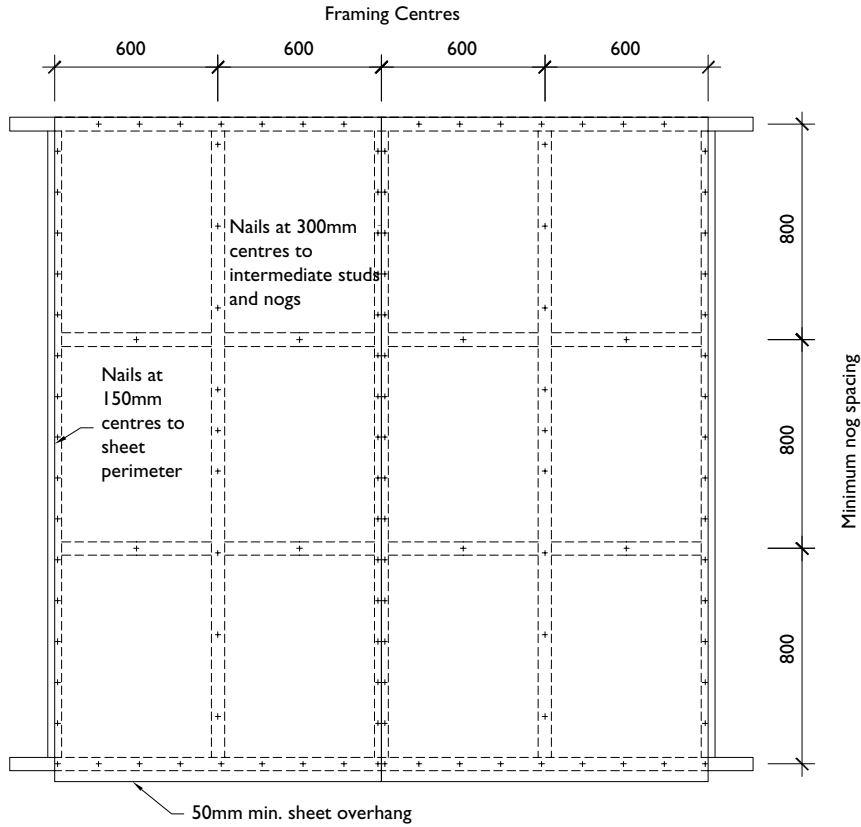
Fastening In Curved Applications

- Minimum radius for Shadowclad is 3600 mm along the face and 2200 mm across the face panels
- Nail sheet body as well as sheet edges at 150 mm centres

Power Driven Fastening

- 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
- For cladding used as bracing, fixings must be hand driven

SC003: Shadowclad® Fastener Layout



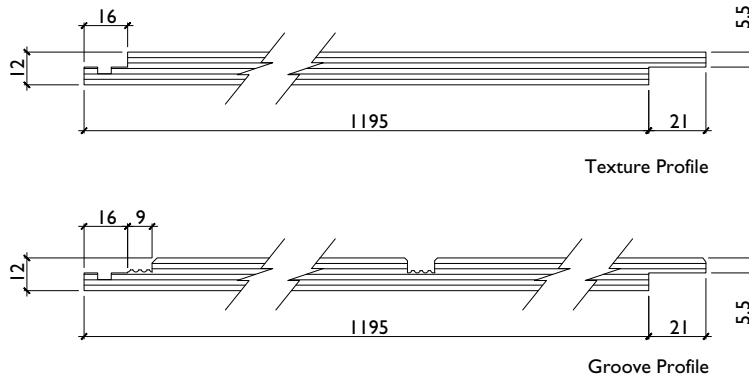
5.9 VERTICAL SHEET JOINTS

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

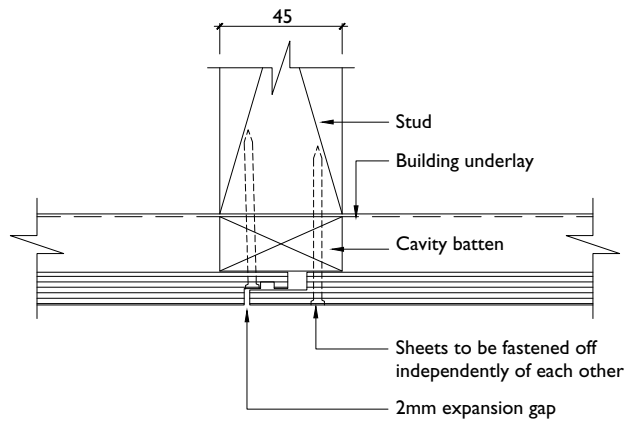
Treat all cut edges with a suitable brush on preservative treatment such as Holdfast Metalex Clear.

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

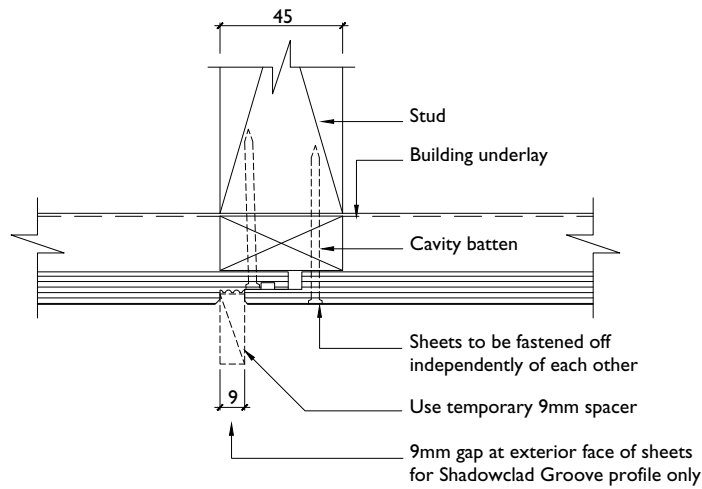
SC004: Shadowclad® Texture and Groove Sheet Dimensions



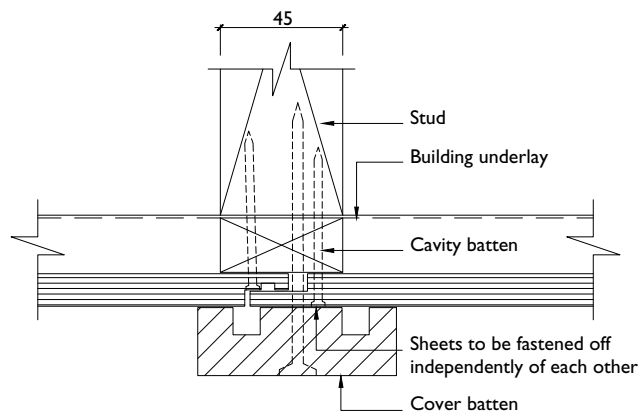
SC006: Shadowclad® Texture Vertical Joint (Cavity)



SC008: Shadowclad® Groove Vertical Joint (Cavity)

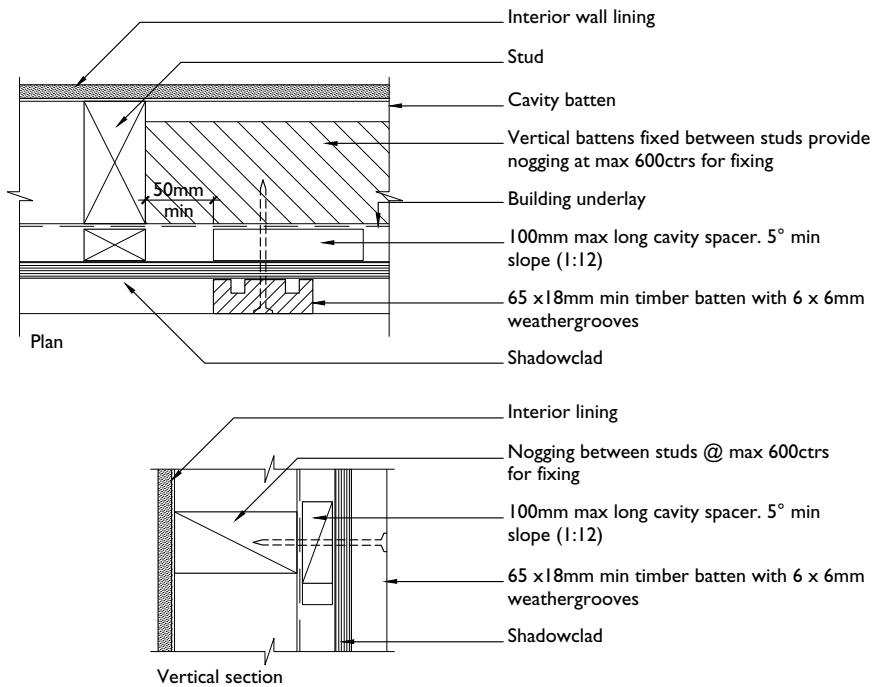


SC010: Shadowclad® Vertical Joint with Optional Cover Batten (Cavity)

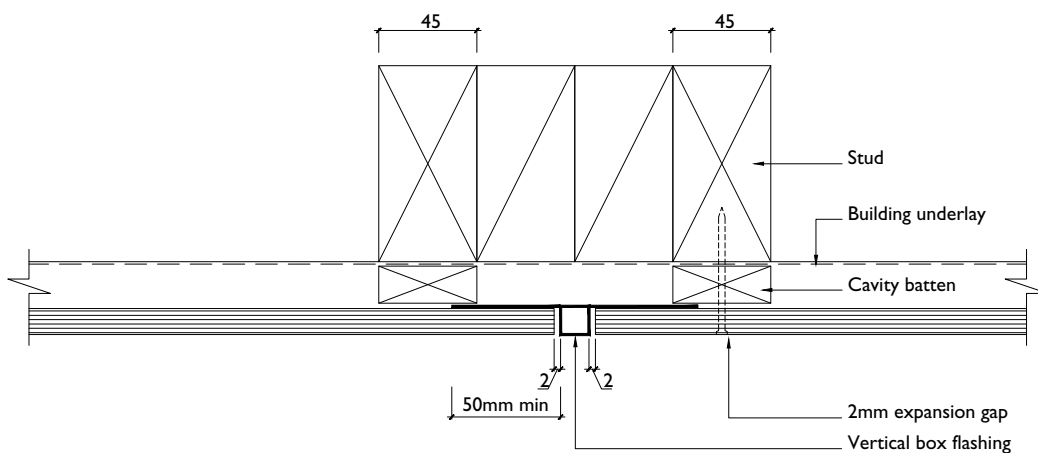


*Direct fix details download from www.chhwoodproducts.co.nz

SC012: Shadowclad® Vertical Joint with Cover Batten (Cavity)



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



*Direct fix details download from www.chhwoodproducts.co.nz

5.10 HORIZONTAL SHEET JOINTS

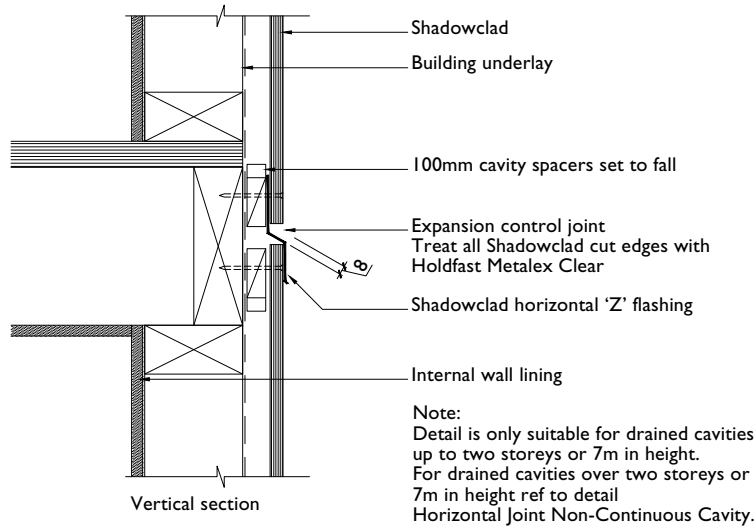
At floor joist level a horizontal joint must be provided to accommodate the movement resulting from timber joist shrinkage and settlement.

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

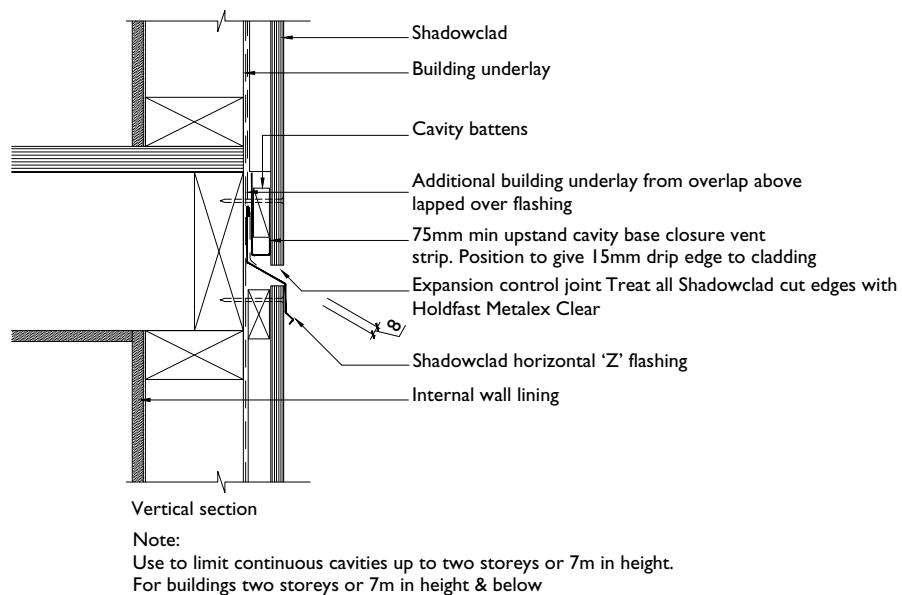
Note: When direct fixing Shadowclad, additional building wrap is used to lap over the 'Z'-flashing upstand. Alternatively, flashing tape should be dressed over the flashing upstand.

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

SC016: Shadowclad® Mid Floor Horizontal Joint (Cavity)



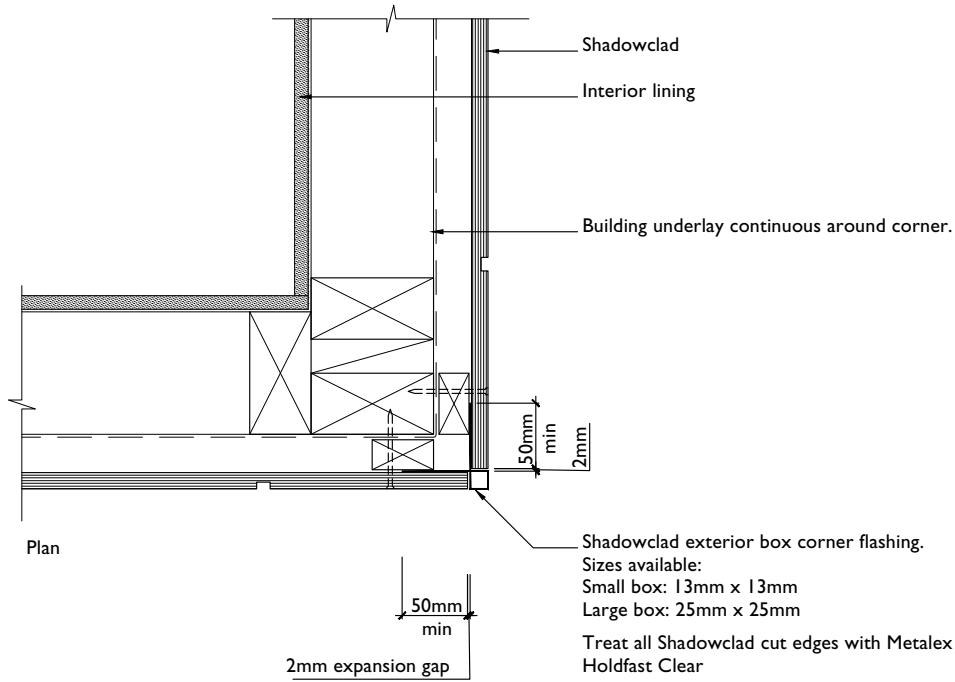
SC018: Shadowclad® Mid Floor Horizontal Joint - Non Continuous (Cavity)



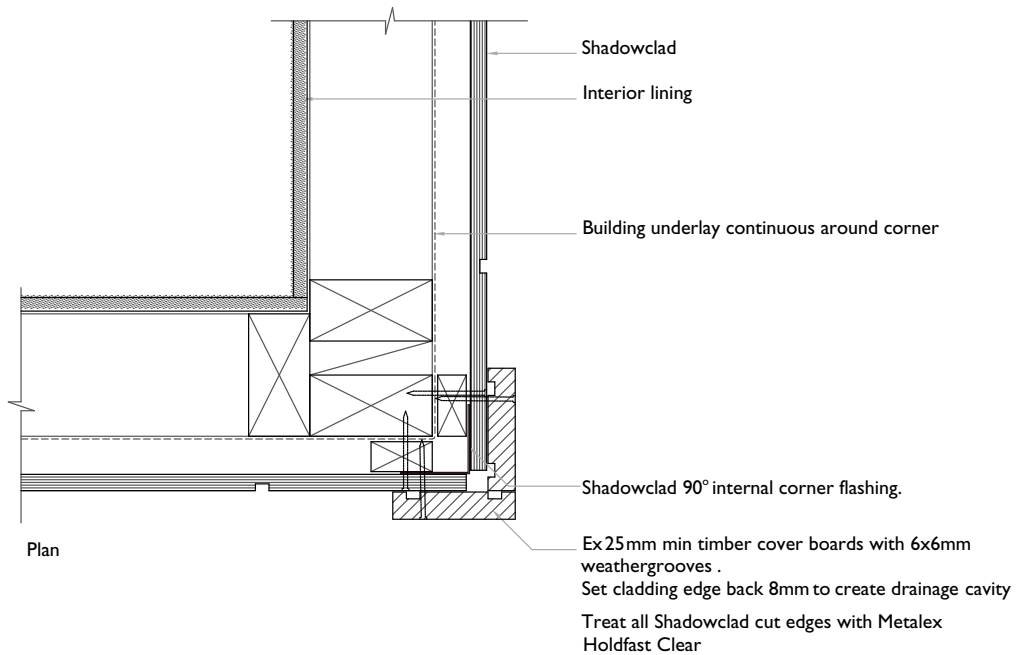
*Direct fix details download from www.chhwoodproducts.co.nz

5.11 EXTERNAL CORNERS

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



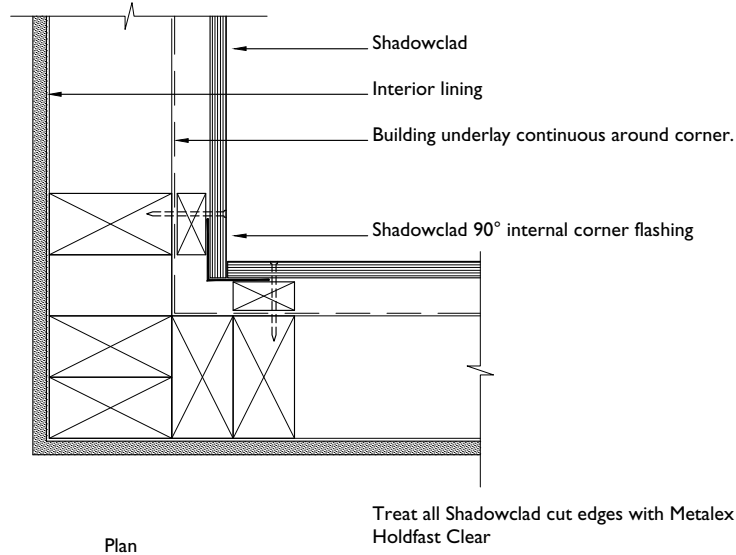
SC022: Shadowclad® External Corner with Cover Boards (Cavity)



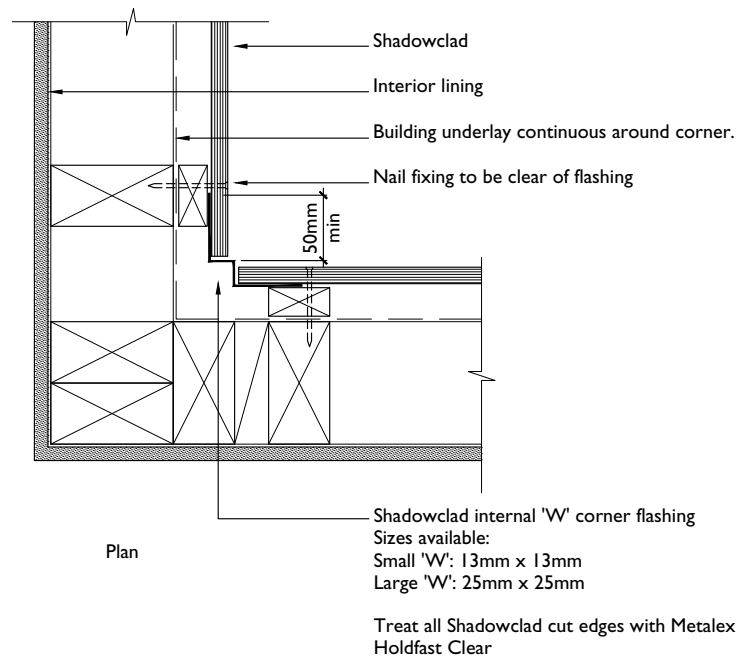
*Direct fix details download from www.chhwoodproducts.co.nz

5.12 INTERNAL CORNERS

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



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



*Direct fix details download from www.chhwoodproducts.co.nz

5.13 SHADOWCLAD® FLASHING JUNCTION POINTS

Flashings should have expansion joints where necessary to provide adequate allowance for thermal expansion.

- Expansion joints to be provided for joined aluminium 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 2.5 mm, hot dipped galvanised flat head nails at 300 mm centres.

The cavity base closure should be positioned to allow a minimum drip edge to the wall cladding of 10 mm at the base of walls, and 15 mm above window head flashings.

Internal and External Flashings

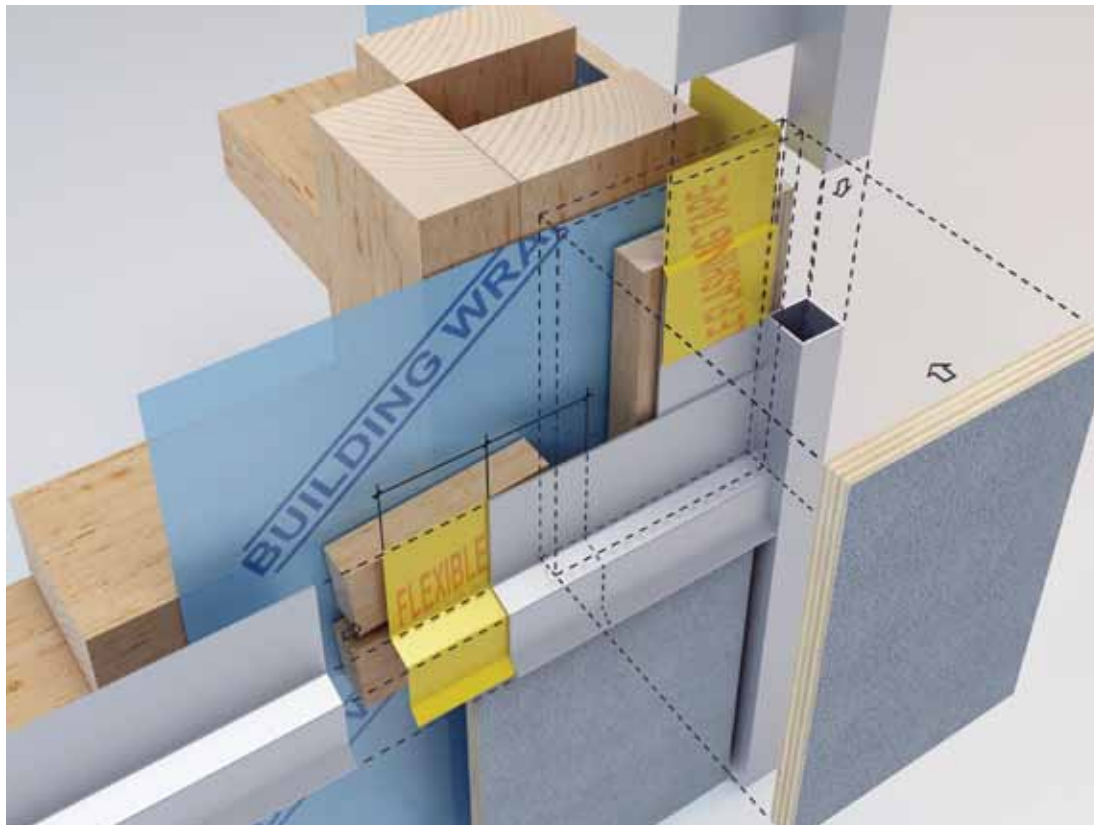
Internal and external angles and 'Z' flashings can be nominally fixed with hot dipped galvanised flat head nails and then permanently fixed with the Shadowclad fasteners penetrating the flashing wings/upstands.

Horizontal 'Z' Flashings

Horizontal 'Z' flashings should be butted together with a UV-resistant flexible flashing tape placed on the underside of the joint to create a weathertight joint.

Flexible flashing tapes should also be used to create weathertight joints where horizontal and vertical flashings meet.

Shadowclad® Flashing Junctions and Connections

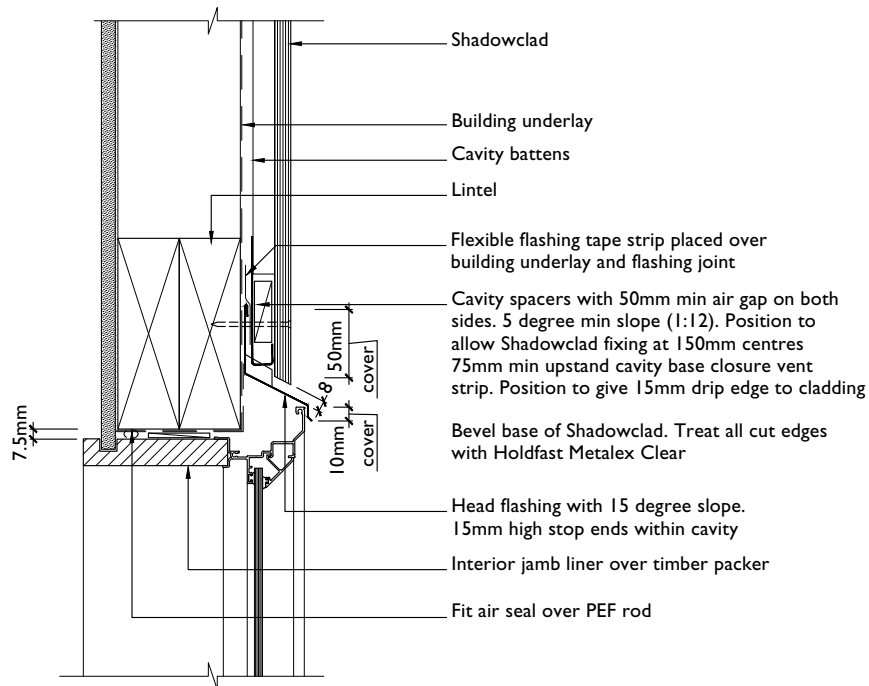


5.14 WINDOW PENETRATIONS

Window joinery flashings (ie head and sill flashings) should be sourced from the joinery fabricator to meet the requirements of Acceptable Solution E2/ASI or an Alternative Solution such

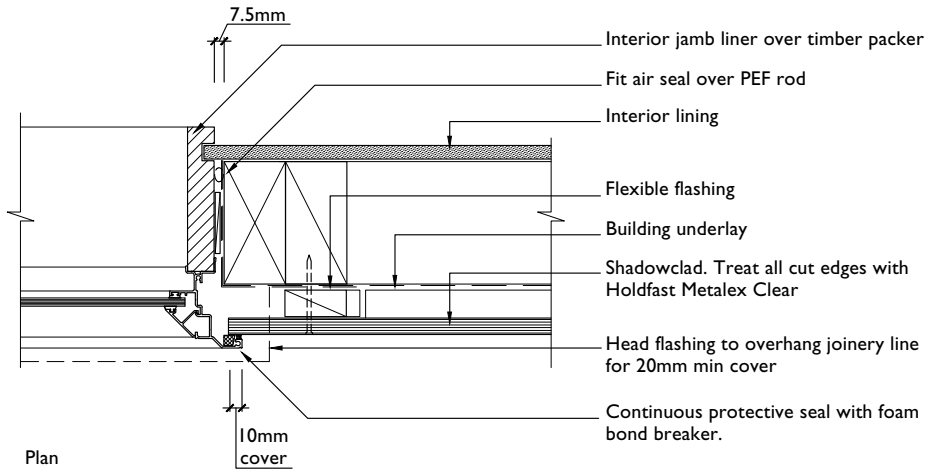
as the Window Association of New Zealand Window Installation System (WANZ WIS) which can be downloaded at www.wanz.org.nz.

SC028: Shadowclad® Window Head Detail (Cavity)



*Direct fix details download from www.chhwoodproducts.co.nz

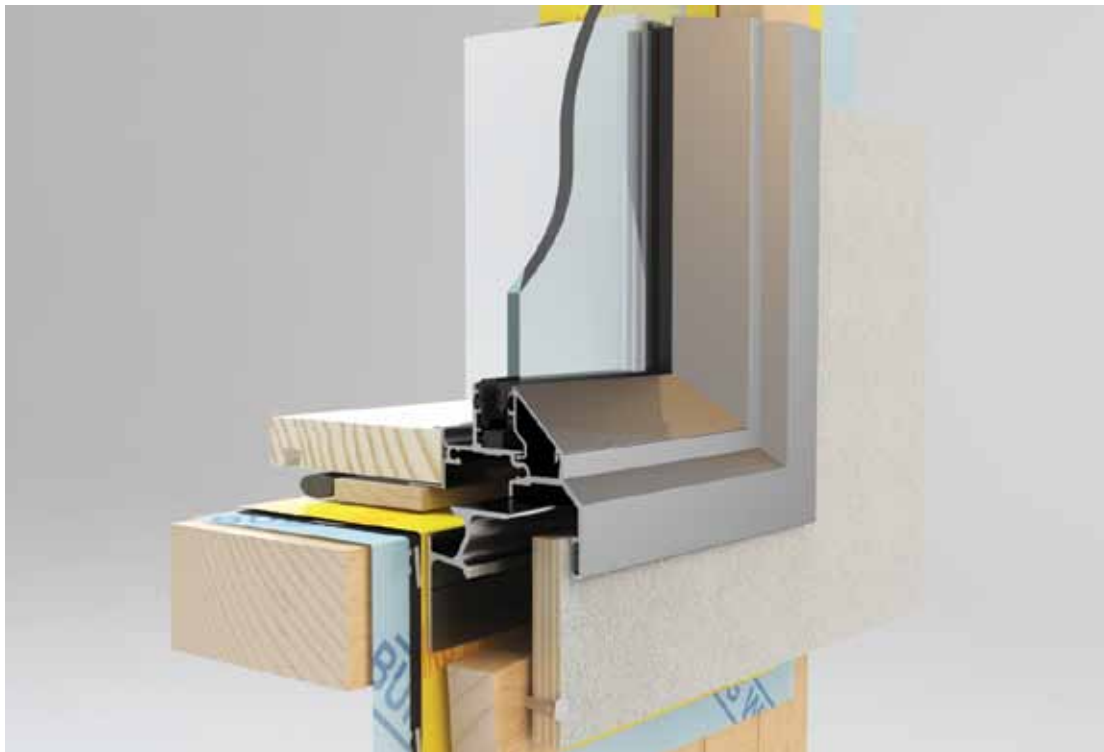
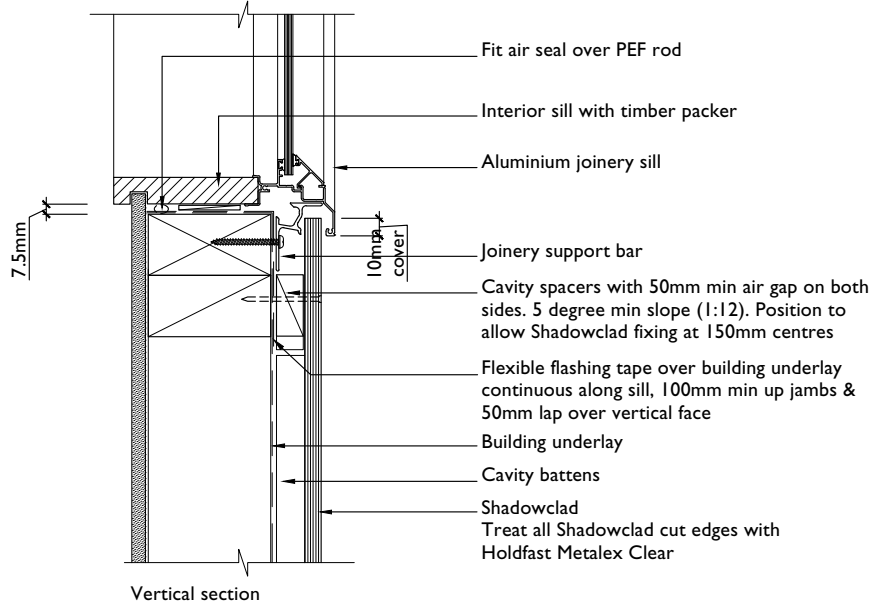
SC030: Shadowclad® Jamb Detail (Cavity)



SDC - Approved Building Consent Document - BC171688 - Pg 74 of 264 - 7/09/2017 - harrib

*Direct fix details download from www.chhwoodproducts.co.nz

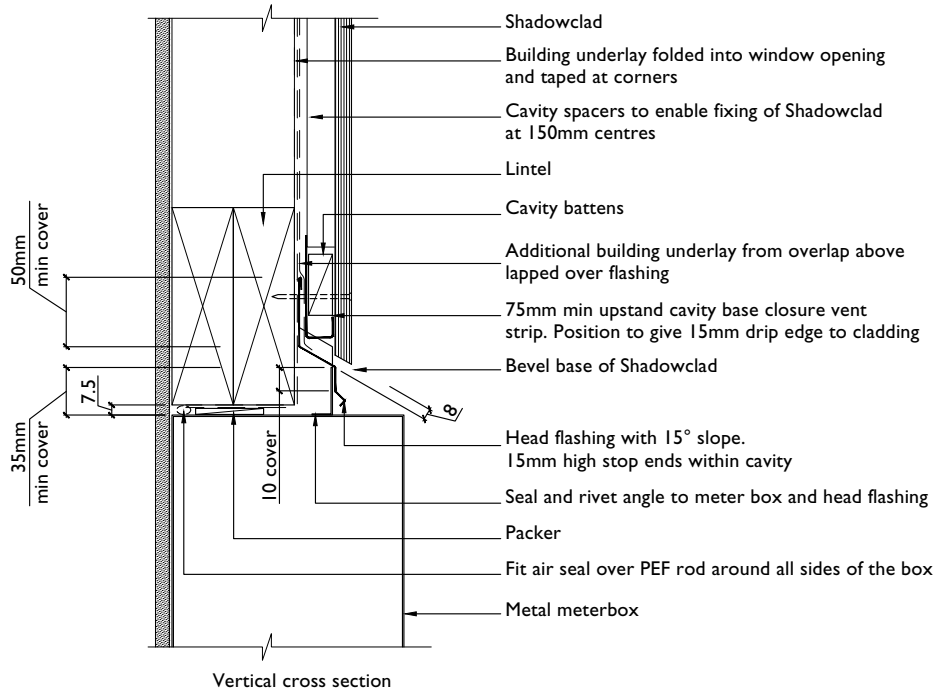
SC032: Shadowclad® Window Sill Detail (Cavity)



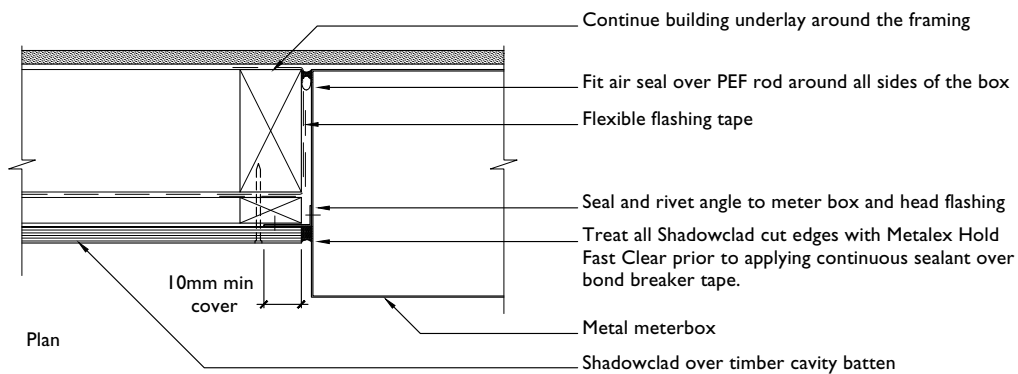
*Direct fix details download from www.chhwoodproducts.co.nz

5.15 WALL PENETRATIONS

SC034A: Shadowclad® Meterbox Side Profile (Cavity)

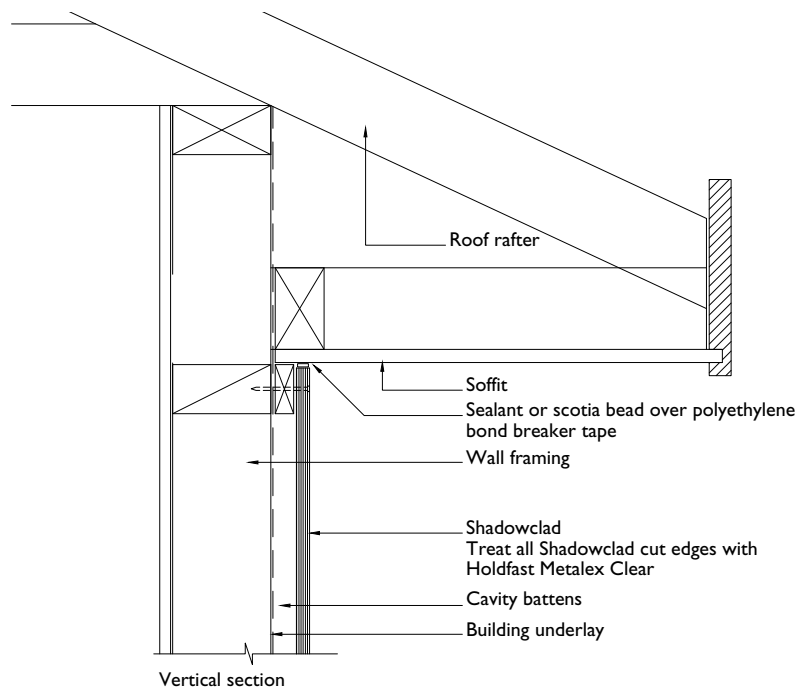


SC034B: Shadowclad® Meterbox Top Profile (Cavity)

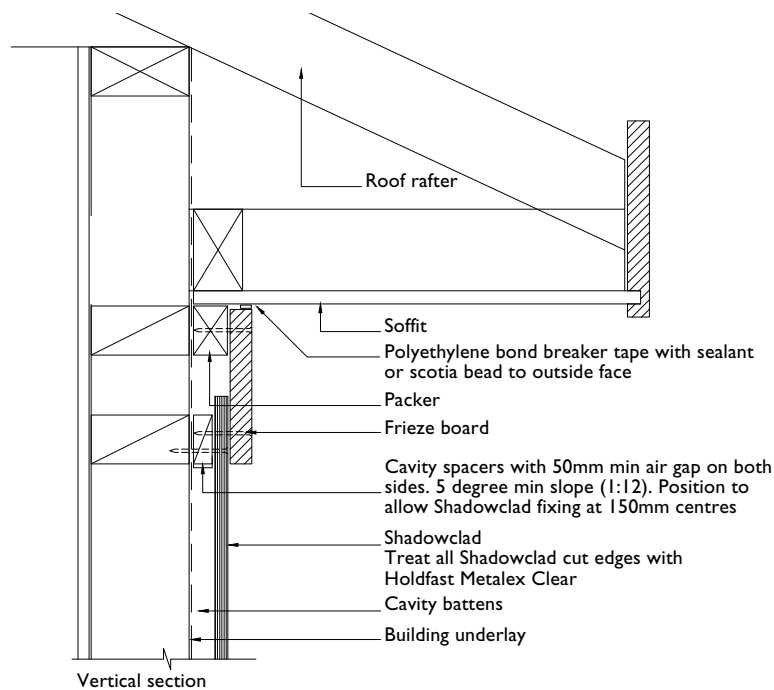


*Direct fix details download from www.chhwoodproducts.co.nz

SC036: Shadowclad® Soffit Detail (Cavity)

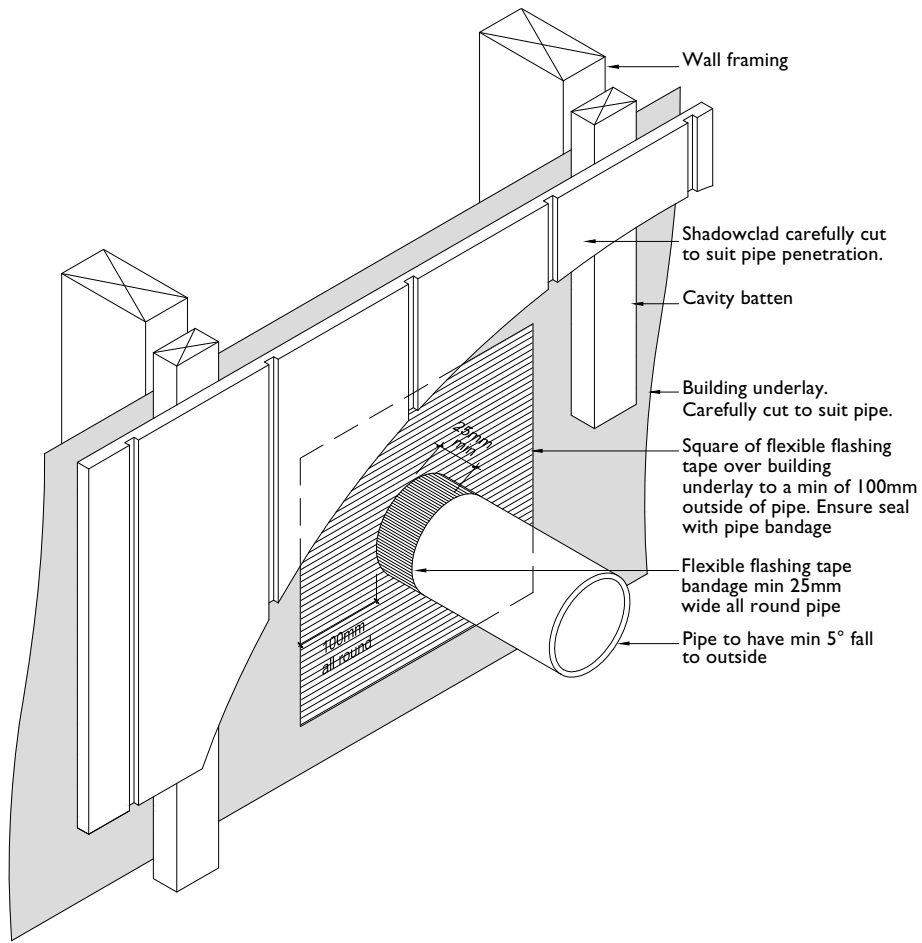


SC038: Shadowclad® Soffit Alternative Detail (Cavity)



*Direct fix details download from www.chhwoodproducts.co.nz

SC040: Shadowclad® Pipe Penetration (Cavity)



*Direct fix details download from www.chhwoodproducts.co.nz

5.16 SHEET CLEARANCES

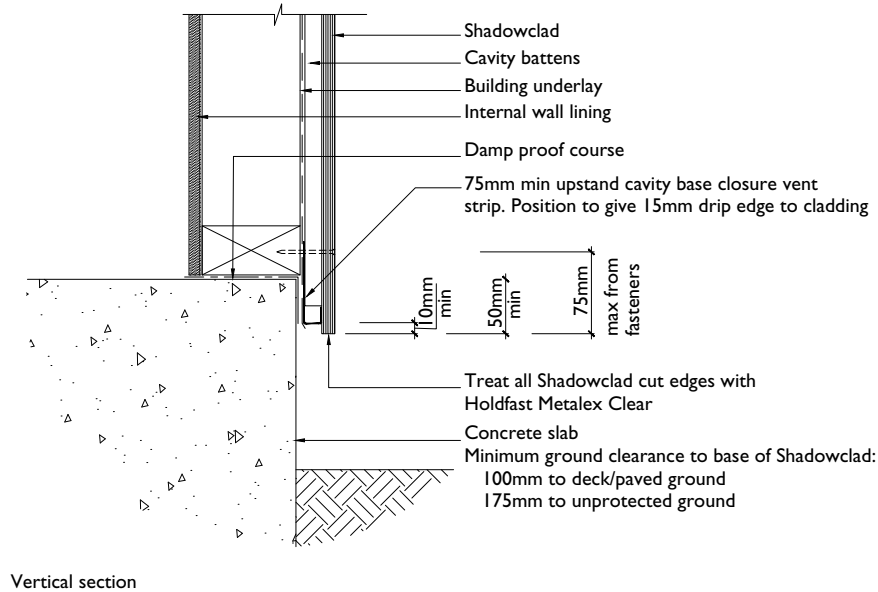
Ground Clearances

Shadowclad® must overhang the bottom plate on a concrete slab by a minimum of 50 mm as required by NZS 3604.

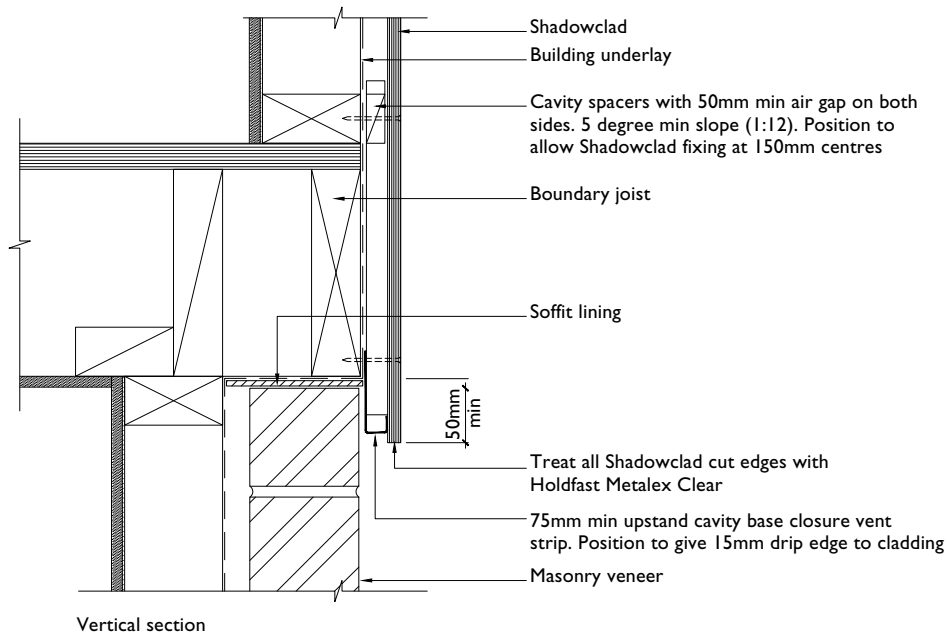
For garage door openings, refer Paragraph 9 "Openings to garages" in Acceptable Solution E2/AS1.

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

SC042: Shadowclad® Overhangs and Ground Clearances (Cavity)



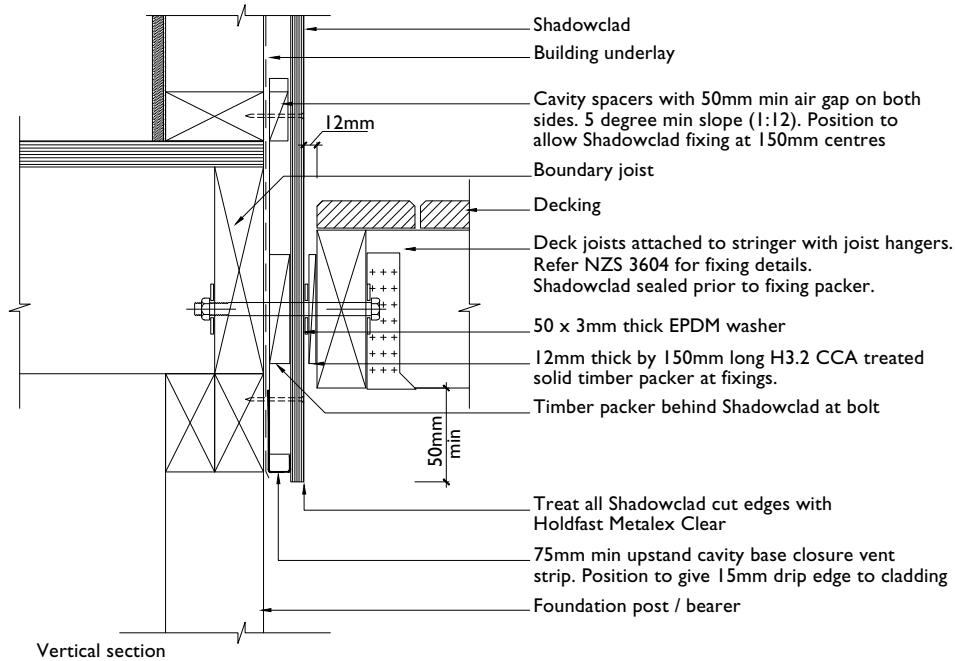
SC044: Shadowclad® Upper Storey to Masonry Lower Storey (Cavity)



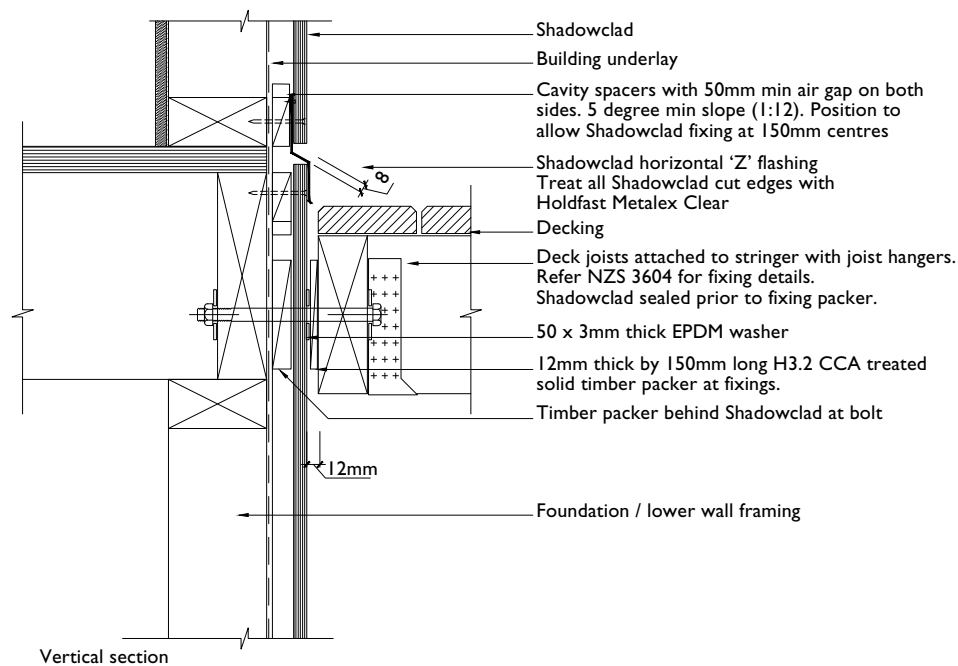
*Direct fix details download from www.chhwoodproducts.co.nz

5.17 OTHER DETAILS

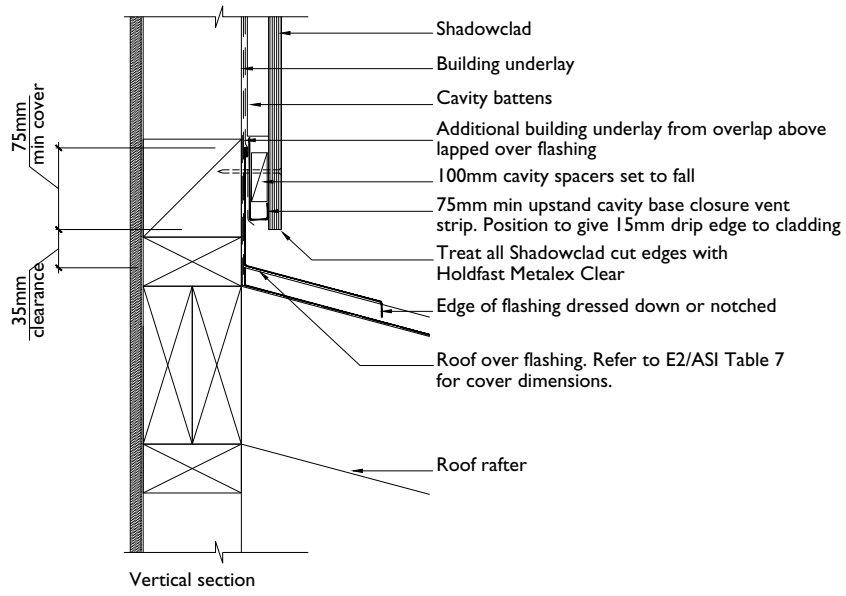
SC046: Shadowclad® Timber Ground Floor to Non-Cantilevered Deck (Cavity)



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

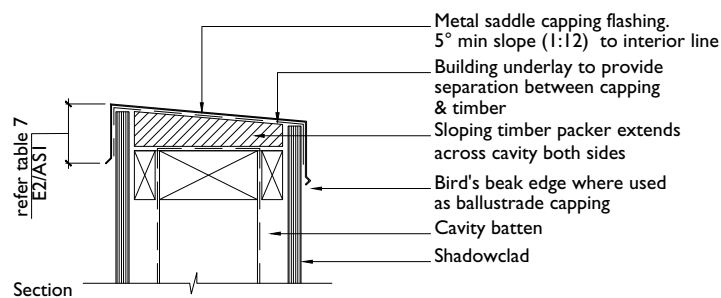
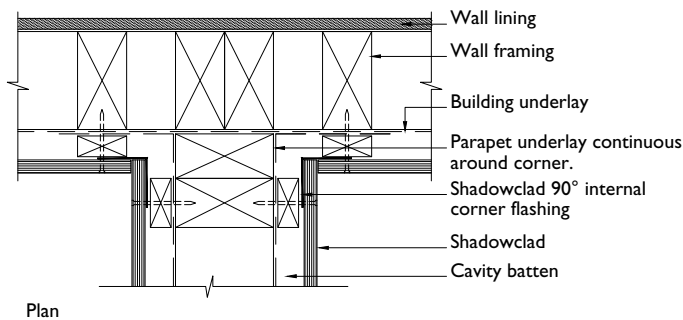
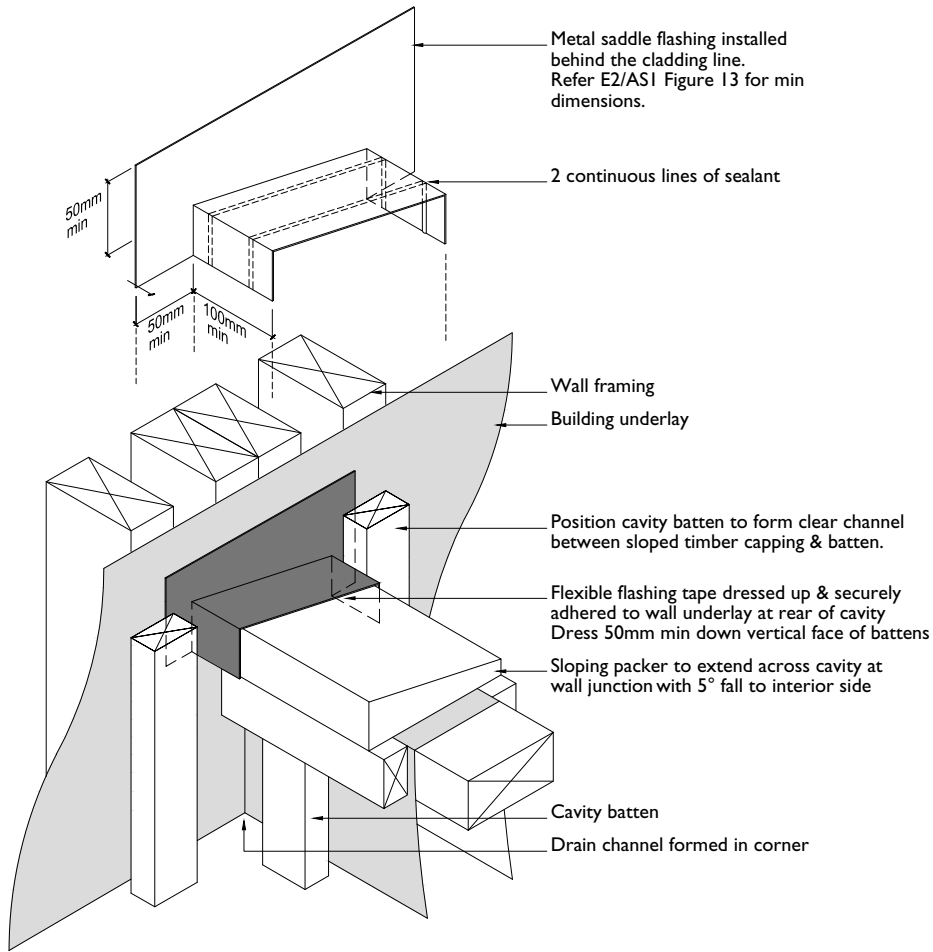
*Direct fix details download from www.chhwoodproducts.co.nz

SC050: Shadowclad® Basic Apron Flashing (Cavity)



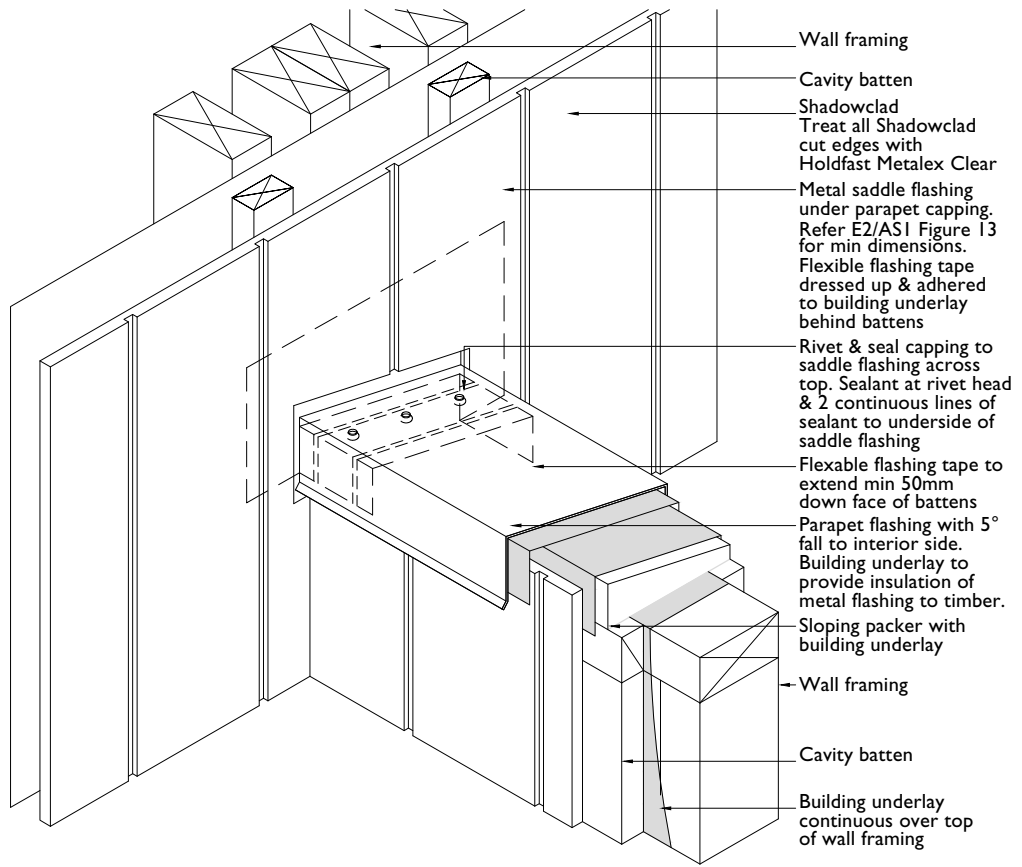
*Direct fix details download from www.chhwoodproducts.co.nz

SC052: Shadowclad® Balustrade to Wall Junction (Cavity)



SDC - Approved Building Consent Document - BC171688 - Pg 82 of 264 - 7/09/2017 - hamib

SC054: Shadowclad® Balustrade to Wall Junction (Cavity)



6.0 COATING & APPLICATION - EXTERIOR CLADDING

6.1 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

6.2 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
- Coating of sheet edges and on the rear of the sheet to a depth of 150 mm is considered good practice, especially in areas where the cladding is in close proximity to moisture, ground or overhangs building framing
- A minimum total coating system film build of 90 microns is recommended when painting or using film forming stains
- For detailed advice on surface preparation, coating product suitability and general coating practice always refer to the coating manufacturer prior to application

6.3 COATING SELECTION

The following coating information should be treated as a generic guide to coating systems typically used with Shadowclad exterior cladding. 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 material 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

The use of a good quality 100% acrylic latex paint system with a light reflectance value (LRV) of 40% 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 40%) 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, the use of Shadowclad Prime is recommended. Shadowclad Prime features a factory applied primer which in most cases eliminates the use of time consuming wet primers.

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 Prime.

CHH Woodproducts does not recommend the use of CD50 or other lynseed oil based coating which have the potential to promote mould growth in this product.

Clear Coatings & Uncoated Shadowclad®

For reasons of long term aesthetics Shadowclad is not recommended to be left uncoated or clear coated for exterior cladding applications.

If left uncoated, structurally Shadowclad will meet its durability and weather tightness obligations under E2/AS1 however a high visual appearance should not be expected over the life of the cladding.

TABLE 9: COATING SYSTEM FOR SHADOWCLAD® PRIME

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. For full top coat specifications by paint manufacturer refer to recommended paint systems chart.
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. For full top coat specifications by paint manufacturer refer to recommended paint systems chart.
<p>Note: For best results</p> <ul style="list-style-type: none"> i/ allow 24 hours between coats ii/ use a light coloured paint system, LRV above 40% 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 	

6.4 SHADOWCLAD® COATING REQUIREMENTS IF RUN OFF IS USED FOR DRINKING WATER

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 sealer and refer to coating manufacturer's Material Safety Data Sheets to confirm specified coatings are suitable for use in these applications.

7.0 SHADOWCLAD® MAINTENANCE

All cladding materials including Shadowclad® will require routine product maintenance during the claddings normal service life to ensure long term durability and visual aesthetics are maintained.

Claddings:

- Regularly wash down (yearly) with a mild detergent solution removing 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
- Panel recoating requirements may vary depending on climate, orientation to the sun, coating type and coating colour selected

Flashings:

- Aluminium 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 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

8.0 FREQUENTLY ASKED QUESTIONS

Q: Where can Shadowclad® be used?

A: 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?

A: 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 a cladding what are the durability expectations of Shadowclad?

A: Under the NZ Building Code Shadowclad (when used as an exterior cladding) is required to meet either a 15 or 50 year minimum durability level.

To achieve a 50 year durability Shadowclad must be:

- H3 preservative treated
- Coated with a 3 coat (undercoat and two top coats) acrylic latex coating system such as a good quality paint of film forming stain (penetrating stains do not meet this requirement) and recoat when necessary
- Coatings must have an LRV (light reflectance value) of 40% or greater (light colours)
- Coatings must be regularly applied and maintained as part of a normal building maintenance program throughout the life of the building
- Minimum total coating system film build of 90 microns

To achieve a 15 year durability Shadowclad must be:

- H3 preservative treated
- 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 NZ Building Code 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 NZ Building Code durability requirements.

Q: Can Shadowclad be used as structural bracing?

A: Shadowclad can be used as structural bracing for both internal and exterior cladding applications when installed according to specifications.

Where Shadowclad is used as both exterior cladding and structural bracing a minimum 50 year durability level is required.

Q: Can Shadowclad, when used as an exterior cladding, be coated in dark colours?

A: Dark colours (coatings with an LRV of below 40%) 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 40% or greater and a minimum total coating system film build of 90 microns.

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

Q: Does Shadowclad comply with NZ Building Code Standards?

A: Shadowclad has been tested in accordance with E2/VMI and NZS4284 "Testing of Building Facades" for compliance with NZ building code requirements and has been BRANZ appraised for use in both direct and cavity fix construction.

Q: In the Shadowclad exterior flashing range can I colour the flashings to match the colour of my building?

A: Shadowclad 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.

9.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code
- AS/NZS 2269:2008 "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"
- Acceptable Solution 'E1/AS1 – Surface Water'
- Acceptable Solution 'E2/AS1 – External Moisture'
- Acceptable Solution 'E3/AS1 – Internal Moisture'
- Acceptable Solution 'B2/AS1 – Durability'
- 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 Sheet
- Window Association of New Zealand (www.wanz.org.nz)
- APA (www.buildabetterhome.org)
- EWPAA (www.ewp.asn.au)
- BRANZ appraised 764 - Shadowclad Direct Fixed Cladding System
- Branz Appraised 765 - Shadowclad Cavity Fixed Cladding System

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 with this literature can be downloaded from www.chhwoodproducts.co.nz/document-library

SDC - Approved Building Consent Document - BC171688 - Pg 89 of 264 - 7/09/2017 - harrib

SHADOWCLAD® INSTALLATION CHECK LIST

EXTERIOR CLADDING APPLICATIONS

Attention Mr Builder - the below installation areas are considered critical to the successful installation of Shadowclad® when used as an exterior cladding.

Using this sheet as an on site check list during installation will aid in problem free product installation and long term product durability post construction.

TASK	Tick when checked	
Sheet Cuts		
Coat all sheet cuts with a preservative timber treatment such as Holdfast Metalex Clear	<input type="checkbox"/>	
After applying Metalex apply the surface coating (e.g. paint or stain) to cut edges	<input type="checkbox"/>	
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 Prime)	<input type="checkbox"/>	
Sheet Fastener Pattern		
Around sheet edge - maximum 150 mm centre spacing	<input type="checkbox"/>	
Within sheet body - maximum 300 mm centre spacing	<input type="checkbox"/>	
Horizontal Sheet Joints		
Minimum 8 mm separation gap between sheets above all Horizontal Z flashings	<input type="checkbox"/>	
Apply the surface coating on the sheet edge and 150 mm up the rear of the back of the sheet	<input type="checkbox"/>	
Expansion Gaps Between Sheets (Vertical Sheet Joints)		
Texture Profile Sheets	2 mm gap between vertical edges of sheets	<input type="checkbox"/>
Groove Profile Sheets	9 mm gap (i.e. full groove space) between vertical edges of sheets	<input type="checkbox"/>
Note: Expansion gaps required between vertical edges of sheets to accommodate natural expansion and contraction of sheets		
Ground Clearances		
Paved/ Sealed Ground	Minimum 100 mm distance from the ground to sheet bottom	<input type="checkbox"/>
Broken Ground	Minimum 175 mm distance from the ground to sheet bottom	<input type="checkbox"/>
Apply the surface coating on the sheet edge and 150 mm up the rear of the back of the sheet		<input type="checkbox"/>
Shadowclad® Used As Structural Bracing		
Panels coated with a good, quality three coat acrylic paint or film forming stain. (Penetrating stains not permitted)		<input type="checkbox"/>
Coating colour must have a light reflectance value (LRV) of 40% or more (i.e. light colours)		<input type="checkbox"/>

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



As part of our ongoing commitment to the environment we have printed this brochure on FSC paper stock.



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SDC - Approved Building Consent Document - BC171698 - Pg 92 of 264 - 7/09/2017 - hamib



FUTUREBUILD® LVL RESIDENTIAL DESIGN GUIDE

JULY 2014

Contents

1.0 Laminated Veneer Lumber..... 3

1.1 Futurebuild® LVL..... 3

1.2 Application..... 4

1.3 Sustainability..... 4

1.4 Disclaimer 4

2.0 Product Range 5

2.1 Product Availability..... 6

3.0 General Design Considerations 7

3.1 CHH Software solutions..... 8

3.2 Manufacture..... 8

3.3 Structural Properties..... 8

3.4 Structural Reliability 8

3.5 Structural Certification..... 9

3.6 Quality Assurance..... 9

3.7 Durability 10

3.8 Preservative Treatment 10

4.0 Design Considerations – hyJOIST® I-beams..... 11

4.1 Bearing Support – Joist Not Transferring
Load From Upper Walls..... 11

4.2 Bearing Support For Joists Transferring Upper
Storey Wall and Roof Loads at Supports..... 11

4.3 Bearing Support for Lower Storey of
2 Storey Construction..... 12

4.4 Concentrated Loads from Jamb Studs/Posts... 12

4.5 Web Holes for hyJOIST® I-beams 12

5.0 Design Considerations – Solid LVL 14

5.1 Fastening Futurebuild® LVL..... 14

5.2 Storage of Futurebuild® LVL..... 14

5.3 Rip Sawing Futurebuild® LVL..... 14

5.4 Using Double Sections 15

6.0 Terminology..... 16

6.1 Span..... 16

6.2 Overhang Span (Cantilever)..... 16

6.3 Holes in Members in Houses and Residential
Buildings 16

6.4 Spacing..... 17

6.5 Load Widths..... 17

6.6 Determination of RoofLoad Width..... 17

6.7 Determination of Floor Load Width 18

6.8 Lintels..... 18

6.9 Roof Mass 18

6.10 Technical Support 18

7.0 Span Tables 19

7.1 Floor Beams or Bearers 19

7.2 Floor Joists..... 25

7.3 Walls 32

7.4 Ceiling Joists..... 36

7.5 Hanging Beams 37

7.6 Hip or Valley Rafters..... 38

7.6 Hip or Valley Rafters continued..... 39

7.7 Rafters 41

7.8 Rafter Span Tables 42

7.9 Roof Beams 44

8.0 Verandah Beams 47

SDC - Approved Building Consent Document - BC171600 - Pg 93 of 264 - 7/09/2017 - hamib





1.0 LAMINATED VENEER LUMBER

Laminated Veneer Lumber (LVL) is the engineered solution for residential housing design and construction. Futurebuild® LVL is an engineered wood product with high structural reliability and performance, and consistent dimensional accuracy. It allows architects and designers to specify Futurebuild LVL with confidence and is readily available in a range of thicknesses, depths and lengths.

- Futurebuild LVL has been tried and trusted in Australasia for over 30 years
- Made in New Zealand
- Available FSC “Chain of Custody” certified on request
- Fully supported by Carter Holt Harvey® Woodproducts design and technical expertise
- Easy to work with using traditional building tools
- Clearly branded for easy identification on-site
- Engineered to precise tolerances

This guide is intended for use by professionals and good building practice must be followed at all times.

1.1 FUTUREBUILD® LVL

Manufactured by Carter Holt Harvey Woodproducts New Zealand, the Futurebuild LVL range is New Zealand's leading brand of LVL. The Futurebuild LVL range of products features specific material property 'recipes'. As such the information contained within this guide is specific to the Futurebuild LVL range and cannot be used with any other LVL product no matter how similar they may appear.

For more information about the Futurebuild LVL range including technical notes and limit state design information visit www.chhwoodproducts.co.nz

The information contained in this manual relates specifically to Futurebuild® LVL products manufactured by Carter Holt Harvey® Woodproducts and cannot be used with any other manufacturers LVL product no matter how similar they may appear.

Alternative LVL products can differ in a number of ways which may not be immediately obvious and substituting them for products is not appropriate and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the New Zealand Building Code.

1.2 APPLICATION

The span tables and technical information in this guide are intended to be used by designers or builders to select the appropriate Futurebuild® LVL products for use in the framing of houses and similar buildings within the scope of NZS 3604.

The tabulated data given applies for Futurebuild LVL members installed in accordance with traditionally recognised framing practice as described in NZS 3604 Timber Framed Buildings, the installation specifications contained in this guide and the Futurebuild LVL Residential Installation Guide.

The software specification program designIT® for houses provides the ability to review reaction information for the determination of support and tie-down information where required. For more information or to download CHH design software free of charge, visit www.chhsoftware.com or contact CHH Woodproducts on 0800 808 131.

1.3 SUSTAINABILITY

Futurebuild LVL is manufactured from radiata pine, a plantation grown medium density softwood. It is grown on tree farms which are tended and harvested to provide wood for LVL manufacture and other applications. 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, a voluntary agreement signed in 1991 between

New Zealand forest managers and environmental non-government organisations. Futurebuild LVL is manufactured in New Zealand, at the CHH Woodproducts Marsden Point Laminated Veneer Mill. Futurebuild LVL is available Forestry Stewardship Council (FSC) (SCS-COC-001316) certified upon request.

1.4 DISCLAIMER

The information contained in this document is current as of July 2014 and is based on data available to CHH Woodproducts at the time of going to print. This publication replaces all previous CHH Woodproducts Futurebuild LVL residential design literature. CHH Woodproducts reserves the right to change the information contained in this literature without prior notice. It is important that you call 0800 808 131 to confirm that you have the most up to date information available or refer to www.chhwoodproducts.co.nz

CHH Woodproducts has used all reasonable endeavours to ensure the accuracy and reliability of the information contained in this document. This information does not replace professional advice and we recommend that professional advice should be obtained specific to your circumstances. To the extent permitted by law, CHH Woodproducts will not be liable for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

2.0 PRODUCT RANGE

Structural Products

FUTUREBUILD®
STRUCTURAL LVL

**hy
SPAN®**

hySPAN® has high structural properties and is available in a large range of sizes and lengths. hySPAN is typically specified for structural beams and is also used for lintels, rafters and floor joists in residential structures.

FUTUREBUILD®
STRUCTURAL LVL
BEAMS

**hy
90®**

hy90® is a 90 mm thick LVL product manufactured primarily for lintels or beams to match 90 mm light timber framing. It has lower structural properties than hySPAN but its thickness offers better member stability when used as long span structural beams or columns.

FUTUREBUILD®
STRUCTURAL LVL

**hy
ONE®**

hyONE® is a 90 mm thick, high stiffness and strength LVL product manufactured primarily for lintels or floor beams where large spans or depth restrictions apply.

FUTUREBUILD®
LVL TRUSS CHORDS

**hy
CHORD®**

hyCHORD® is available in smaller section sizes to match SG Structural Timber such as Laserframe®. hyCHORD is primarily specified as roof truss chords, but can also be used for lintels, rafters, purlins, floor joists, wall studs or other members where smaller section sizes are required.

FUTUREBUILD®
LVL ENGINEERED
I-JOISTS

**hy
JOIST®**

hyJOIST® is an engineered 'I-beam' utilising LVL flanges and a plywood web. It is ideally suited to floor joist and rafter applications due to its light weight, straightness and the ability to cut large holes through the web (e.g. for services or ventilation)

FUTUREBUILD®
LVL JOIST

**hy
BOUND**

hyBOUND® is a treated boundary joist for enhanced weather protection and to aid in the transfer of upper storey loads.

Formwork Products

FUTUREBUILD®
LVL FORMWORK
BEAMS

**tru
FORM®**

truFORM® is manufactured for use in concrete formwork and is suitable for joists, bearers, walers and soldiers.

FUTUREBUILD®
LVL FORMWORK
EDGE BOARDS

**edge
FORM®**

edgeFORM® is manufactured for use in concrete formwork as edge boards.

Access Products

FUTUREBUILD®
LVL SCAFFOLD
PLANKS

**hy
PLANK®**

hyPLANK® is a strong, lightweight LVL scaffold plank with significantly higher structural reliability than sawn timber.

Building Systems

FUTUREBUILD®
LVL BUILDING
SYSTEMS

**hy
FRAME®**

hyFRAME® is a CHH Woodproducts building system designed for the agricultural market.

Formwork and Access products are outside the scope of this guide. For more information on these products visit www.chhwoodproducts.co.nz or contact CHH Woodproducts.

2.1 PRODUCT AVAILABILITY

TABLE 1: FUTUREBUILD® LVL STANDARD PRODUCT RANGE

Product	Depth (mm)	Thickness (mm)				Length (0.6 m increments where indicated)
		28	45	63	90	
hySPAN®	150		✓	✓		2.4 – 13.2 m
	170		✓			
	200		✓	✓		
	240		✓	✓		
	300		✓	✓		
	360		✓	✓		
	400		✓	✓		
	450			✓		
hy90°	150				✓	4.8 – 7.2 m
	200				✓	
	240				✓	
	300				✓	
	360				✓	
	400				✓	
hyONE®	240				✓	4.8 – 6.0, 7.2 m
	300				✓	4.8 – 6.0, 7.2 m
	360				✓	5.4, 6.0, 7.2 m
	400				✓	5.4, 7.2 m
hyCHORD®	90		✓			4.8*, 6.0*, 7.2 m*
	140		✓			4.8*, 6.0*, 7.2 m*
	190		✓			4.8*, 6.0*, 7.2 m*
hyJOIST®	200		✓			2.4 – 13.2 m
	240			✓	✓	
	300			✓	✓	
	360			✓	✓	
	400				✓	
hyBOUND®	200	✓				4.8, 6.0 m
	240	✓				
	300	✓				
	360	✓				
	400	✓				

- * Indicates untreated product available on a make to order basis. Additional lead times may apply
- Non standard products and lengths may be available subject to production availability. Additional lead times may apply
- A comprehensive range of accessories including joist hangers, blocking and web stiffeners are available. Contact CHH Woodproducts or refer to "designIT for houses" software for more information

Available treated only

Available either untreated or treated

3.0 GENERAL DESIGN CONSIDERATIONS

The design methodology used in the preparation of this guide complies with the requirements of the following design standards:

- AS/NZS 1170:2002/3 Structural Design Actions
- NZS 3603:1993 Timber Structures Standard, an Acceptable Solution to NZBC Clause 1 Structure.

Guidance has been taken from AS 1684.1:1999, Residential timber-framed construction, Part 1: Design criteria, and reviewed to ensure agreement with NZS 3604:2011 Timber Framed Buildings. When selected and installed in accordance with the specifications, details and limitations in this guide and the Residential Installation Guide, Futurebuild® LVL will comply with the requirements of the New Zealand Building Code.

The spans given in these tables have been developed by experienced timber design engineers in accordance with NZS3603:1993 and include the most up-to-date loading combinations from AS/NZS 1170.

Floor loading applied includes an allowance for:

- Floor mass not exceeding 40 kg/m², unless otherwise notified
- Live load of up to 1.5 kPa/1.8 kN, for use in domestic houses

For other situations, such as decks, balconies, tiled areas and apartment floors, designIT® for houses software should be used for specification where alternate loading conditions may be applied. For commercial, industrial and other heavily loaded floors use designIT for Commercial Floors or contact CHH Woodproducts.

Wind Loading

Unless noted otherwise, the tables given in this guide are suitable for applications in building wind zones up to very high (VH) exposure.

Snow Loading

All tables are suitable for ground snow loads up to 1.0 kPa. For snow loads over 1.0 kPa refer to designIT for houses software.

Member Specification

In selecting an appropriate beam size, specifiers should also consider the applicability of design deflection limits for the beams intended use. Deflection limits applied in this guide may not be suitable for some designs and further advice should be obtained.

Reaction/Support Considerations

For tie down, support and reaction information refer to designIT for houses software.

Deflection Limits

The deflection limits used in these span tables have been determined on the basis of experience with the known serviceability performance of individual member types in typical applications. Where reduced deflections or higher levels of performance are required consult designIT for houses software or select members that have an increased spanning capability as required.

DL – Dead Load, sometimes referred to as permanent load, considers load that is deemed to apply for periods of more than 6 months.

LL – Live Load, sometimes referred to as transient load, is load that is considered to be temporary in its nature.

Dynamic – Dynamic serviceability limits are applied to floor joists and relate to the dynamic response of a floor joist to load. The 1 kN for 2 mm deflection is provided to reflect a dynamic performance level of the floor corresponding 8 Hz.

3.1 CHH SOFTWARE SOLUTIONS

CHH Software Solutions include specification software for both residential and non-residential structural systems. They enable designers and engineers, even those unfamiliar with the specifics of timber engineering to produce high quality, reliable specifications using engineered wood products.

Residential Software

design^{it} HOUSES **designIT[®] for houses** is a software tool for all building practitioners for designing with the Futurebuild[®] LVL range of engineered wood products and other selected materials for houses and similar structures.

designIT for houses enables a wide range of applications to be considered, including floor layouts, wind and other loads, which are not included in this publication without the need for engineering knowledge or the exercise of professional engineering judgment.



The **designIT Site** app has been developed as a handy reference tool for the specifier or tradesman on the go. It is a trimmed down version of designIT for houses.



floorIT site is a smartphone app to aid specifiers in the specification, selection and estimation of quantities for a range of flooring applications.



layIT out **layITout[®]** is an integrated design and layout tool that allows users to enter a house plan, propose and then design a floor joist layout for a fully integrated engineered floor system.

Non Residential Software



designIT for Commercial Floors is a software tool for all building practitioners

for designing with the Futurebuild LVL range of engineered wood products and other selected materials in commercial, industrial and other heavily loaded floors.

The **computeIT[®]** software suite is designed to aid in the specification of heavy structural members and non residential structural systems. It includes three software packages; **computeIT** for beams, **computeIT** toolkit and **computeIT** for portal frames.



computeIT for beams is an all purpose beam analysis package that enables

engineers to develop design solutions for a range of engineered wood products.



computeIT toolkit is a series of design tools allowing quick and easy design of

beams, columns, rigid moment connections, purlins and girts.



computeIT for portal frames is a fully integrated portal frame design, analysis

and specification package for the development of optimised timber design solutions.



slabIT site is an app for the design of **truFORM** and **gripFORM** members for use as joists and bearers for forming slab soffits.

For more information or to download CHH software free of charge, visit www.chhsoftware.com or contact CHH Woodproducts.

3.2 MANUFACTURE

Futurebuild LVL is manufactured by using phenolic adhesive to laminate radiata pine veneer, in a continuous assembly in which the grain direction of all veneers is orientated in the longitudinal direction. It is pressed as a 1.2 m nominal width continuous billet in various standard thicknesses, docked to any specified

length and then ripped into standard widths for use as structural beams etc.

For product range and size information refer to section 2.1 Product Availability.

3.3 STRUCTURAL PROPERTIES

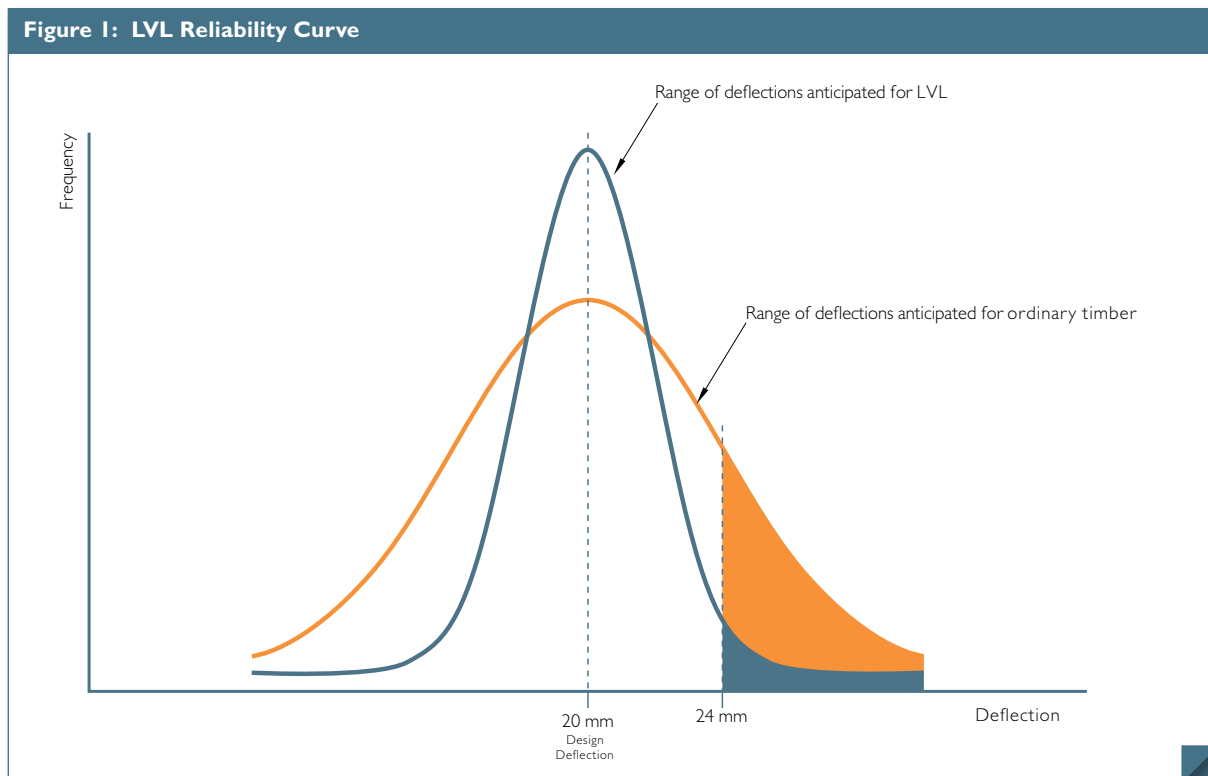
The structural properties for Futurebuild LVL have been determined by testing in accordance with the requirements of AS/NZS 4357 and section 4 of AS/NZS 4063.2:2010 and so comply with the provisions of the NZ Building Code through clause C2.3 in NZS3603.

Refer to the Futurebuild LVL Specific Engineering Design Guide for engineering design information.

3.4 STRUCTURAL RELIABILITY

Futurebuild LVL is manufactured by laminating various grades of veneer in a predetermined pattern to impart predictable and reliable structural properties. The uniformity of LVL is the key to its high strength and stiffness properties and its reputation for reliable and predictable performance. It is the reliability of LVL that makes it a genuine engineering material suitable for high load, high risk applications such as large span portal frames.

For ordinary applications the reliability of LVL, illustrated graphically in Figure 1, rewards specifiers and builders with the confidence of meeting customer expectations and reduction in the incidence of expensive and disruptive call backs.



3.5 STRUCTURAL CERTIFICATION

The span tables and details in this guide for Futurebuild® LVL have been designed in accordance with sound and widely accepted engineering principles.

The design properties of Futurebuild LVL in this guide were determined in accordance with clauses 2.3 and C2.3 of NZS 3603: "Timber Structures Standard." Futurebuild LVL is Product Certified by the Engineered Wood Products Association of Australasia (EWPAA) as being manufactured in accordance with the joint New Zealand / Australian Standard AS/NZS 4357: "Structural Laminated Veneer Lumber." The EWPAA is accredited for product certification by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Structural design is in accordance with NZS 3603 (verification method BI/MMI, 6.1) with loads and deflection criteria as indicated on the tables. Serviceability and other criteria were selected using guidelines available from joint Australian / New Zealand standards technical committees and correspond to those used in NZS 3604, (Acceptable Solution BI / ASI, 4.1).

When installed in accordance with the specifications, details and limitations in this guide and the Residential Installation Guide, Futurebuild LVL members will comply with the requirements of the New Zealand Building Code.

3.6 QUALITY ASSURANCE

Futurebuild LVL is manufactured in a fully quality controlled process, independently third party audited by the Engineered Wood Products Association of Australia (EWPAA). The EWPAA certifies Futurebuild LVL manufactured by CHH Woodproducts at its Marsden Point (New Zealand) mill.

Participation and compliance with the requirements of the EWPAA's process based quality control scheme includes product testing and monitoring of properties. It provides the basis for the EWPAA's Product Certification of Futurebuild LVL as conforming to the requirements of AS/NZS 4357 (Structural Laminated Veneer Lumber). Conformance with AS/NZS 4357

ensures that Futurebuild LVL is suitable for structural applications in accordance with NZS 3603 Timber Structures Standard and NZS 3604 Timber Framed Buildings.

The EWPAA's product certification scheme is accredited under the government Joint Accreditation System of Australia and New Zealand (JAS-ANZ).



3.7 DURABILITY

Futurebuild LVL is manufactured to meet the requirements of the New Zealand Building Code Clause B2 Durability. As such, if the product is used in accordance with CHH Woodproducts specifications and good building practices, and treated to the levels prescribed in NZS 3602, Timber and Wood-based Products for Use in Building, it will comply with the requirements of the NZ Building Code.

The recent changes to the New Zealand Building Code Clause B2 Durability (Amendment 8) have provided clarification around Acceptable Solutions for various treatment levels of LVL, these include the use of untreated LVL, H1.2 glueline and surface spray treated LVL, and H3.1 Azole LOSP treated LVL options.

There is no change to how LVL can be applied untreated in situations where it is protected from weather (with no risk of moisture penetration conducive to decay) i.e. mid floors, sub floors, etc. This is identified in Sections C and E of Table 1 of NZS 3602.

With regard to treated LVL, citing of NZS 3604:2011 in Clause B2/AS1 dictates that if LVL is not specifically referred to in NZS3602 the LVL can be preservative treated to the same level as that required in Clause B2/AS1 of the New Zealand Building Code for kiln dried Radiata Pine. Clause B2/AS1 allows for treatment to be to either a H1.2 or H3.1 LOSP Azole level. This includes situations covered by NZS 3602 Table 1 Section D, "Members protected from the weather but with a risk of moisture penetration conducive to decay." This would include, for example, enclosed external framing situations including lintels, studs, boundary joists, etc.

3.8 PRESERVATIVE TREATMENT

For weather-protected applications covered by NZS 3602 Section D, "Members protected from the weather but with a risk of moisture penetration conducive to decay", LVL can be either H1.2 glueline treated with a surface spray (in accordance with NZS 3640) or H3.1 Azole LOSP treated to Table 6.2 of NZS 3640. Both treatments meet the requirements intended by H1.2 of the New Zealand Building Code Clause B2/AS1 and NZS 3604.

Two Acceptable Solution options exist specifically for treated LVL in Clause B2/AS1:

1. H3.1 Azole LOSP treated, or
2. H1.2 glueline treated with a surface spray.

LVL products must be protected from water, condensation and dampness by good detailing. For uses where there is risk of temporary moisture, use appropriate treatment levels.

For more information, refer to technical note Futurebuild LVL: Durability and Moisture Statement available from www.chhwoodproducts.co.nz

Sub-floor Applications

Good building practice ensures that raised timber floors are well ventilated underneath, as such the durability of these floors is subject to the floor space being ventilated for the life of the building to the provisions of NZS 3604 or E2/AS1. This is intended to eliminate the possibility of decay for sub-floor members and flooring therefore, in accordance with NZS 3602, untreated Futurebuild LVL may be safely used where standard practices for ventilation and clearance are followed.

External Use

Futurebuild LVL is NOT recommended for fully weather exposed applications, such as open deck joists and pergola beams.

LVL can be preservative treated for weather-protected applications, such as verandah beams and for poorly ventilated or damp sub-floor applications.

All H3.1 LOSP treated LVL is envelope treated. Where section ends are cut, ends must be coated with a brush on timber preservative. Holdfast Metalex End Seal is recommended.

4.0 DESIGN CONSIDERATIONS – hyJOIST® I-BEAMS

hyJOIST® I-Beams are ideally suited for long span, low load applications such as floor joists and rafters.

The following design considerations should be taken into account in the design and detailing of hyJOIST floor systems sized and specified within this guide.

4.1 BEARING SUPPORT – JOIST NOT TRANSFERRING LOAD FROM UPPER WALLS

Figure 2: For joists not transferring load from upper walls

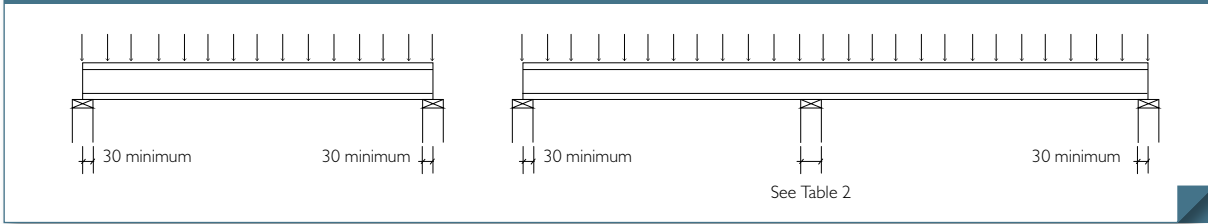


TABLE 2: MINIMUM BEARING FOR hyJOIST® I-BEAMS SUPPORTING FLOOR LOADS ONLY

	End Supports Single or Continuous Span	Intermediate Supports Continuous Span	
Joint Spacing (mm)	ALL	450	600
Minimum Bearing (mm)	30	45	65
Minimum Bearing – Heavy Floors (mm)	30	55	75

4.2 BEARING SUPPORT FOR JOISTS TRANSFERRING UPPER STOREY WALL AND ROOF LOADS AT SUPPORTS

Figure 3: End Supports – Single or Continuous Span

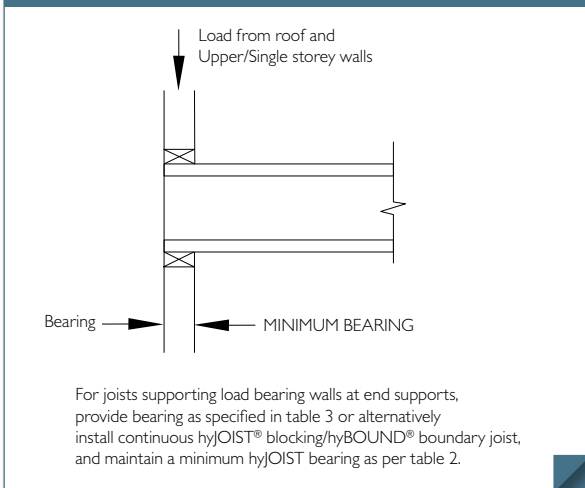


Figure 4: Intermediate Supports – Continuous Span

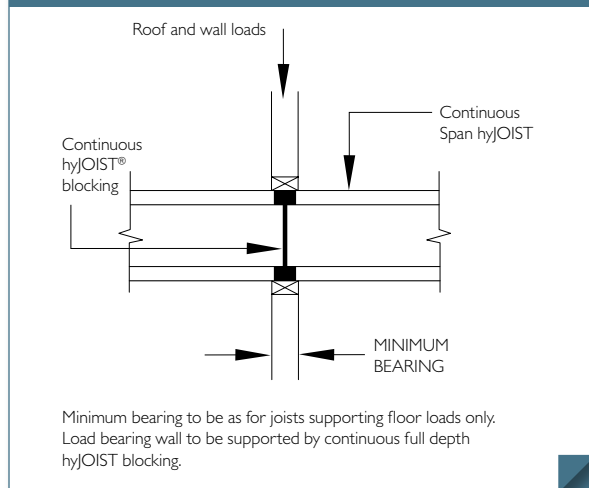


TABLE 3: MINIMUM BEARING FOR hyJOIST® I-BEAMS TRANSFERRING UPPER STOREY ROOF OR FLOOR LOADS

Load Type	Joist Spacing (mm)	
	450	600
	Minimum Bearing (mm)	
Light Roof and ceiling	30	65 ¹
Heavy Roof and ceiling	45	90 ²

1. If web stiffeners installed bearing may be reduced to 45 mm
2. If web stiffeners installed bearing may be reduced to 65 mm
- For all cases bearing may be reduced to 30 mm if continuous full depth blocking or compression blocks are installed
- designIT® for houses software may give a reduced bearing requirement
- Roof mass allowances are defined in Table 7

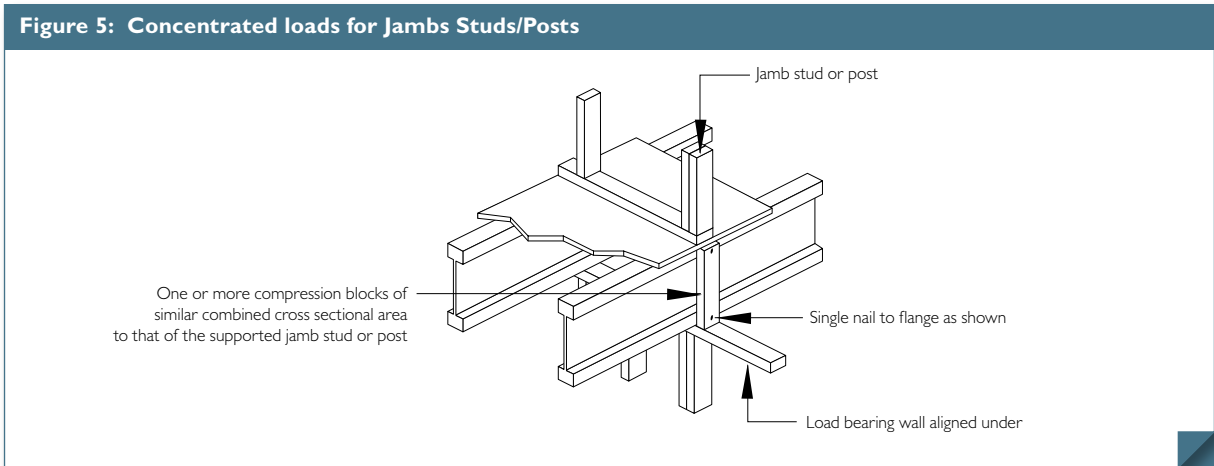
4.3 BEARING SUPPORT FOR LOWER STOREY OF TWO STOREY CONSTRUCTION

Continuous full depth hyJOIST® blocking should be installed to transfer compression loads from load bearing walls to the supports.

In most cases continuous hyJOIST blocking will be adequate to support the roof, wall and floor loads. Refer to designIT® for houses software for confirmation.

4.4 CONCENTRATED LOADS FROM JAMB STUDS/POSTS

Use compression blocks to transfer loads through to supports as shown.

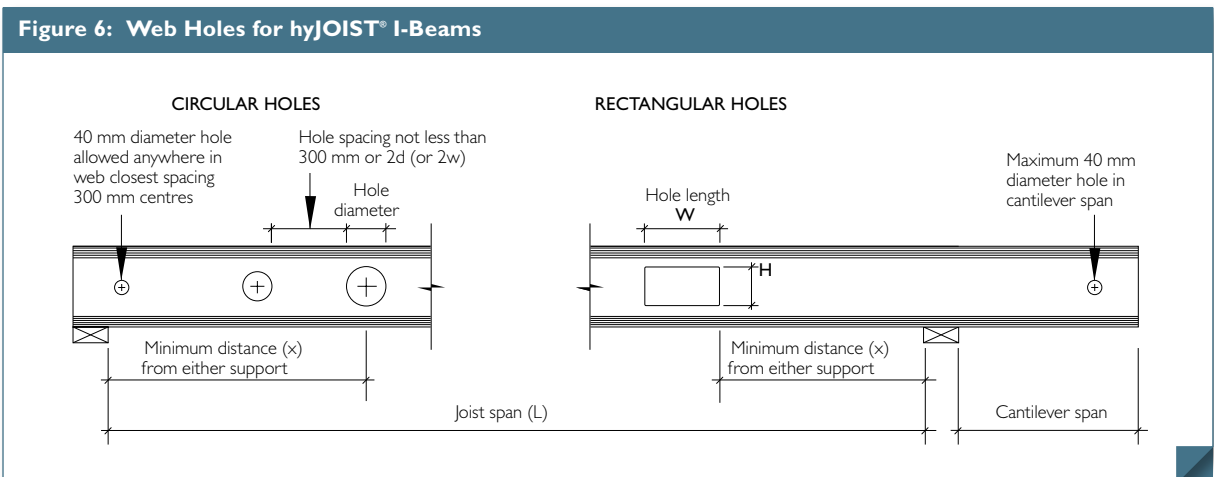


4.5 WEB HOLES FOR HYJOIST® I-BEAMS

Holes may be cut through the web of hyJOIST provided they are located within the central part of the span as specified below.

For cases involving non-uniform loading or where the possibility of locating the hole closer to supports needs to be assessed, use the web hole option in the floor joist calculator in designIT® for houses software.

For hole sizes other than those stated in tables 4 and 5 refer to the web hole calculator in designIT® for houses software, or the designIT site smartphone application



All treated Futurebuild® LVL is envelope treated. Holes and cuts made in treated hyJOIST must be adequately coated with

a brush on timber preservative. Holdfast Metalex End seal is recommended.

TABLE 4: CIRCULAR HOLES FOR hyJOIST® I-BEAMS

hyJOIST® Section Code	Maximum Hole Diameter (mm)	Minimum Distance from Support 'X'	Hole Diameter (mm)			
			80	110	125	150
			Circular Holes – Minimum Distance 'X' from support – (m)			
HJ200 45	118	0.34 L'	0.16 L	0.28 L	N/A	N/A
HJ240 63	158	0.38 L	0.12 L	0.21 L	0.26 L	0.33 L
HJ240 90						
HJ300 63	218	0.41 L	0.10 L*	0.15 L	0.18 L	0.24 L
HJ300 90				0.10 L*	0.14 L	0.20 L
HJ360 63	278	0.42 L	0.3 m*	0.08 L*	0.11 L	0.16 L
HJ360 90		0.40 L	0.3 m*	0.3 m*	0.3 m*	0.05 L*
HJ400 90	318	0.40 L	0.3 m*	0.3 m*	0.3 m*	0.08 L*

* Minimum distance from any support is 0.3 metres

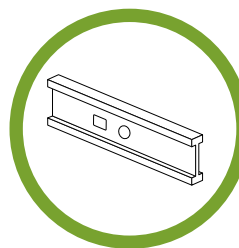
1. Example, if actual span 'L' = 4.0 m then minimum distance 'X' from hole to support (see figure 6) is 0.34 x 4.0 = 1.365 m

TABLE 5: RECTANGULAR HOLES FOR hyJOIST® I-BEAM

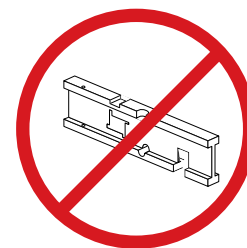
hyJOIST® Section Code	Hole Size		Permitted Locations for Rectangular Holes								
	Height (mm)	Length (mm)	L	Actual Span 'L' in metres							
			X	Minimum Distance from the side of the hole to any support – (m)							
HJ200 45	118	250	L	≤ 3.8	4.0	4.2	4.4	4.5			
			X	0.34 L	1.38	1.59	1.80	1.90			
HJ240 63	158	330	L	≤ 3.5	5.5						
			X	0.38 L	2.13						
HJ240 90	158	330	L	≤ 5.8	6.0	6.1					
			X	0.38 L	2.36	2.45					
HJ300 63	218	400	L	≤ 5.2	5.4	5.6	5.8	6.0	6.2	6.3	
			X	0.41 L	2.25	2.39	2.54	2.69	2.83	2.91	
HJ300 90	218	400	L	≤ 6.4	6.6	6.8	7.0				
			X	0.40 L	2.73	2.88	3.04				
HJ360 63	278	500	L	≤ 5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8
			X	0.42 L	2.37	2.49	2.62	2.75	2.88	3.02	3.15
HJ360 90	278	500	L	≤ 7.2	7.4	7.6	7.7				
			X	0.40 L	2.97	3.10	3.17				
HJ400 90	318	600	L	≤ 8.0							
			X	0.40 L							

Interpolate to obtain values of 'X' for spans intermediate between the values given

- Data applies for floor joists or rafters supporting uniform loads (and concentrated live load not exceeding 1.8 kN)
- Hole locations closer to supports may be possible for some load and support conditions; refer to the 'floor joist calculator' in designIT® for houses software
- Spacing between holes to be not less than 300 mm or twice the width (or twice the diameter) of the larger hole, whichever is greater
- Not more than three holes with width or diameter greater than 80 mm in any span
- For cantilever spans holes greater than 40 mm diameter are not permitted
- Not more than one rectangular (or square) hole per span



Do cut in web area as specified



Do NOT cut, notch or bore through flange

5.0 DESIGN CONSIDERATIONS – SOLID LVL

Solid Futurebuild® LVL products (including hySPAN®, hyONE®, hy90® and hyCHORD®) can be installed in accordance with traditionally recognised framing practice as described in NZ 3604 and other installation details contained and referenced within this guide.

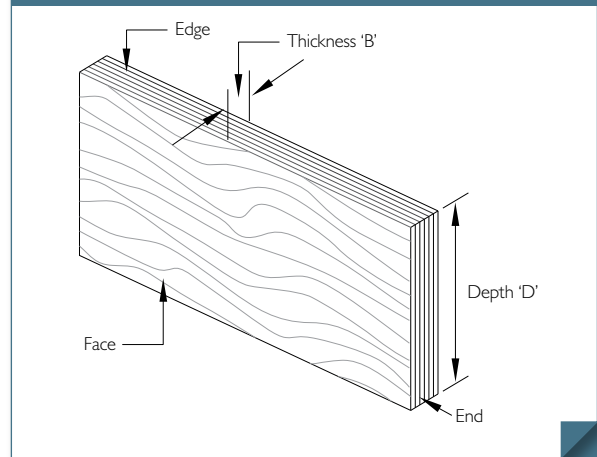
For specific support and tie-down calculation, consult designIT® for houses software where reactions are provided for all members for specification with typical connection details.

5.1 FASTENING FUTUREBUILD® LVL

Futurebuild LVL may be nailed, bolted or screw fixed exactly the same way as dry timber. For installation and performance of fasteners there is no need to distinguish between fasteners installed into either the face or edge (see figure 7). Due to the high density of Futurebuild LVL, to ensure adequate driving, pneumatic nailers should be operated at slightly higher pressures than normally used. Standard edge, end distances and spacings between fasteners appropriate for seasoned softwood timber may be used.

The load carrying capacity of nail, screw or bolt fasteners used with Futurebuild LVL depends on the type of fastener and its orientation. Refer to Table 4 of the Futurebuild LVL Specific Engineering Design Guide.

Figure 7: Solid Futurebuild LVL Profile



5.2 STORAGE OF FUTUREBUILD® LVL

Futurebuild LVL requires care in storage and handling prior to installation:

- Stack well clear of the ground (at least 150 mm) for good ventilation
- Stack on level bearers to keep flat and straight

- Store under cover to keep dry prior to installation
- During construction Futurebuild LVL may be exposed to limited sun and rain. Refer to the Futurebuild LVL Durability Statement downloadable from www.chhwoodproducts.co.nz for detailed information

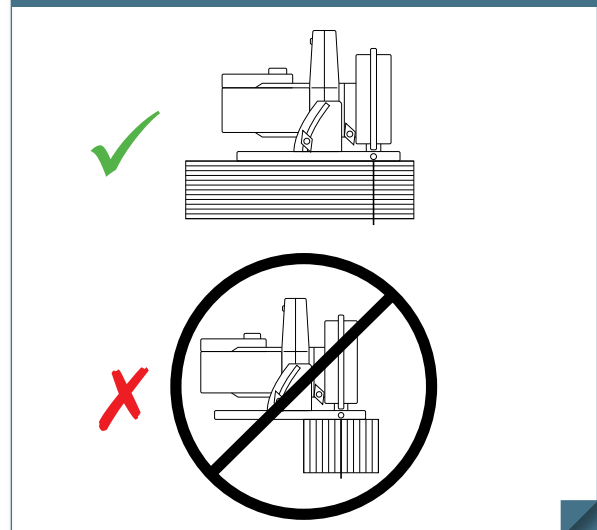
5.3 RIP SAWING FUTUREBUILD® LVL

Unlike graded timber, solid Futurebuild LVL products may be rip sawn through the thickness to the smaller standard section depths given in these span tables without affecting the basic strength properties. Care must be taken to comply with the no negative tolerance specification (i.e. do not cut undersize) if the maximum spans given in these tables are to apply.

Rip sawing through the depth to produce sections of reduced thickness is not permitted and may adversely affect strength properties.

Treated Futurebuild LVL is envelope preservative treated. Where ripping treated LVL, retreatment of the entire beam is required.

Figure 8: Ripsawing of Futurebuild LVL



5.4 USING DOUBLE SECTIONS

Where double sections are specified these need to be securely nail laminated. This does not apply for bearers used in pole frame construction. Whilst nail lamination may ordinarily be satisfactorily achieved using the procedures given in NZS 3604 the fixing will often not be adequate if double sections are required to support incoming members face fixed on one side.

Any moisture between the two sections of LVL which are to be joined must be avoided. In order to meet these requirements the following detail for jointing double sections of Futurebuild® LVL is recommended.

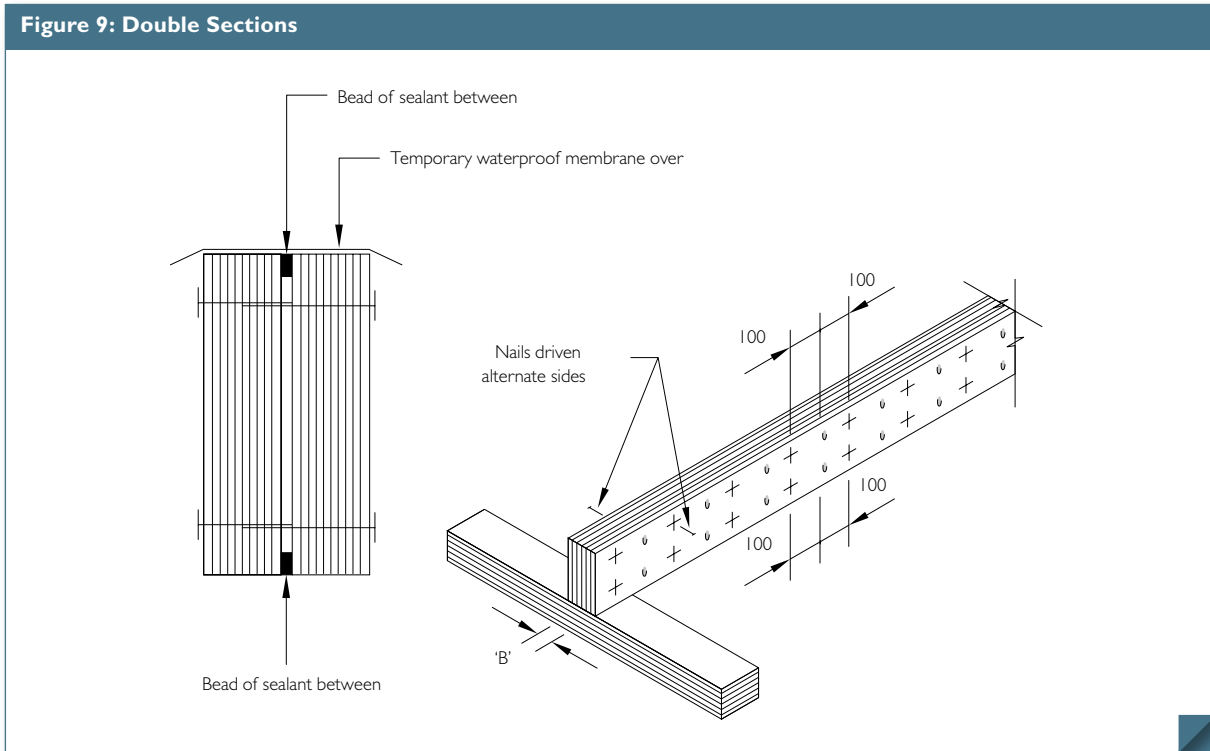


TABLE 6: FASTENER SIZES FOR NAIL LAMINATION OF FUTUREBUILD® LVL

Section Size 'B'	Minimum Nail Diameter (mm)	Minimum Nail Length (mm)
45	3.3	90
63	3.3	100

6.0 TERMINOLOGY

6.1 SPAN

For the purpose of using the following tables, span may be interpreted as the clear distance between supports measured along the beam.

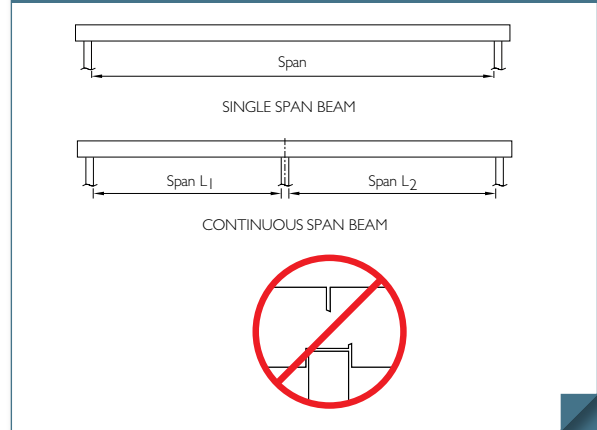
Single Span Beams are beams supported at two points only. Continuous Span Beams are beams supported at three or more points along their length.

Continuous span values given in the tables should only be used where:

- The beam is not notched or partially cut through at internal support points and,
- If the spans are not equal, the largest span is not greater than twice the smallest adjacent span.

However if either of the above conditions are not met, use the single span tables for the purpose of obtaining the appropriate size.

Figure 10: Beam Spans

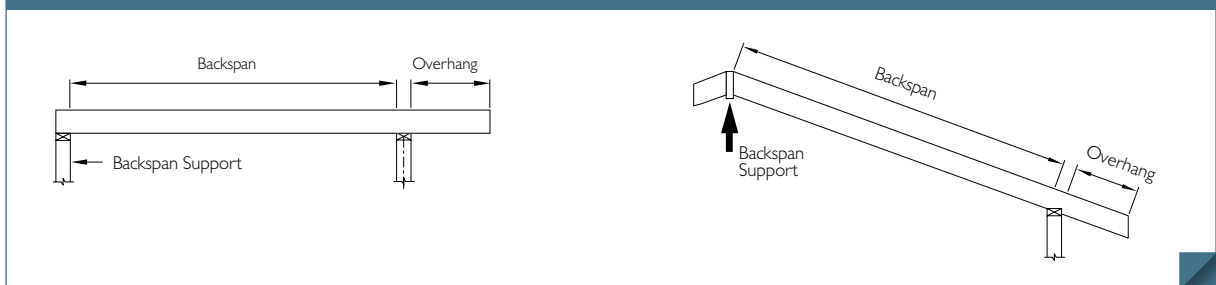


6.2 OVERHANG SPAN (CANTILEVER)

Sometimes referred to as cantilever, overhang is the distance from the face of the support to the free end of the beam, measured along the beam as illustrated.

For beams with overhangs, the backspan should be at least twice the length of the overhang in order to limit uplift forces on the backspan support.

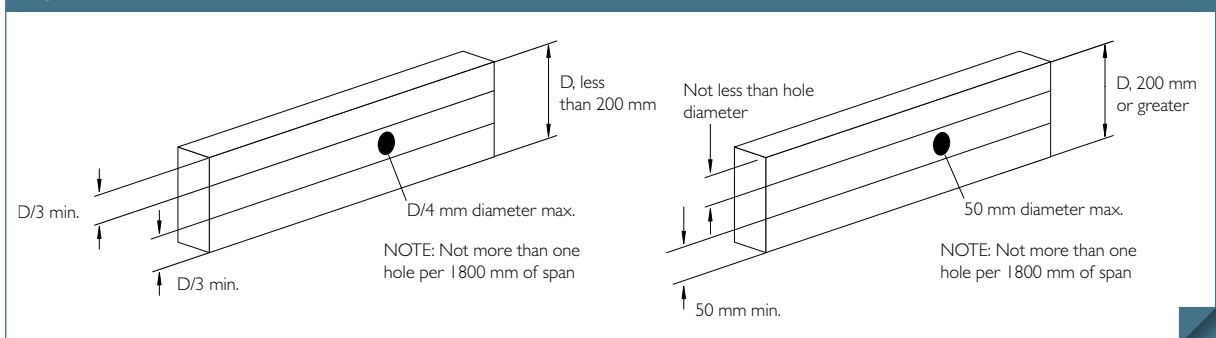
Figure 11: Beams with Overhangs



6.3 HOLES IN MEMBERS IN HOUSES AND RESIDENTIAL BUILDINGS

Holes may be drilled in Futurebuild® LVL members used in houses within the scope of NZS 3604 as detailed below.

Figure 12: Holes in Futurebuild® LVL members



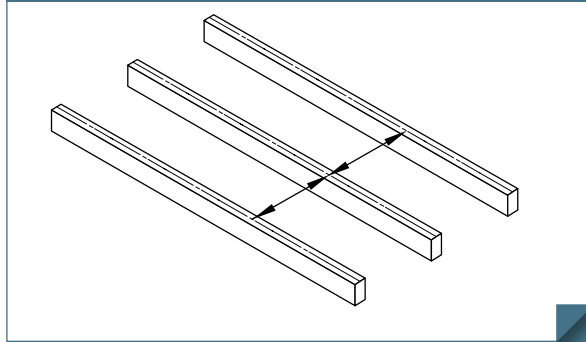
All treated Futurebuild LVL is envelope treated. Holes and cuts made in treated Futurebuild LVL must be coated with a brush on

timber preservative. Holdfast Metalex End Seal is recommended.

6.4 SPACING

Tables such as those for rafters, floor joists and ceiling joists, require the spacing of members to be known or selected in order to obtain the required size for a given span. Spacing should be interpreted as the centre to centre distance between adjacent parallel members.

Figure 13: Beam Spacing



6.5 LOAD WIDTHS

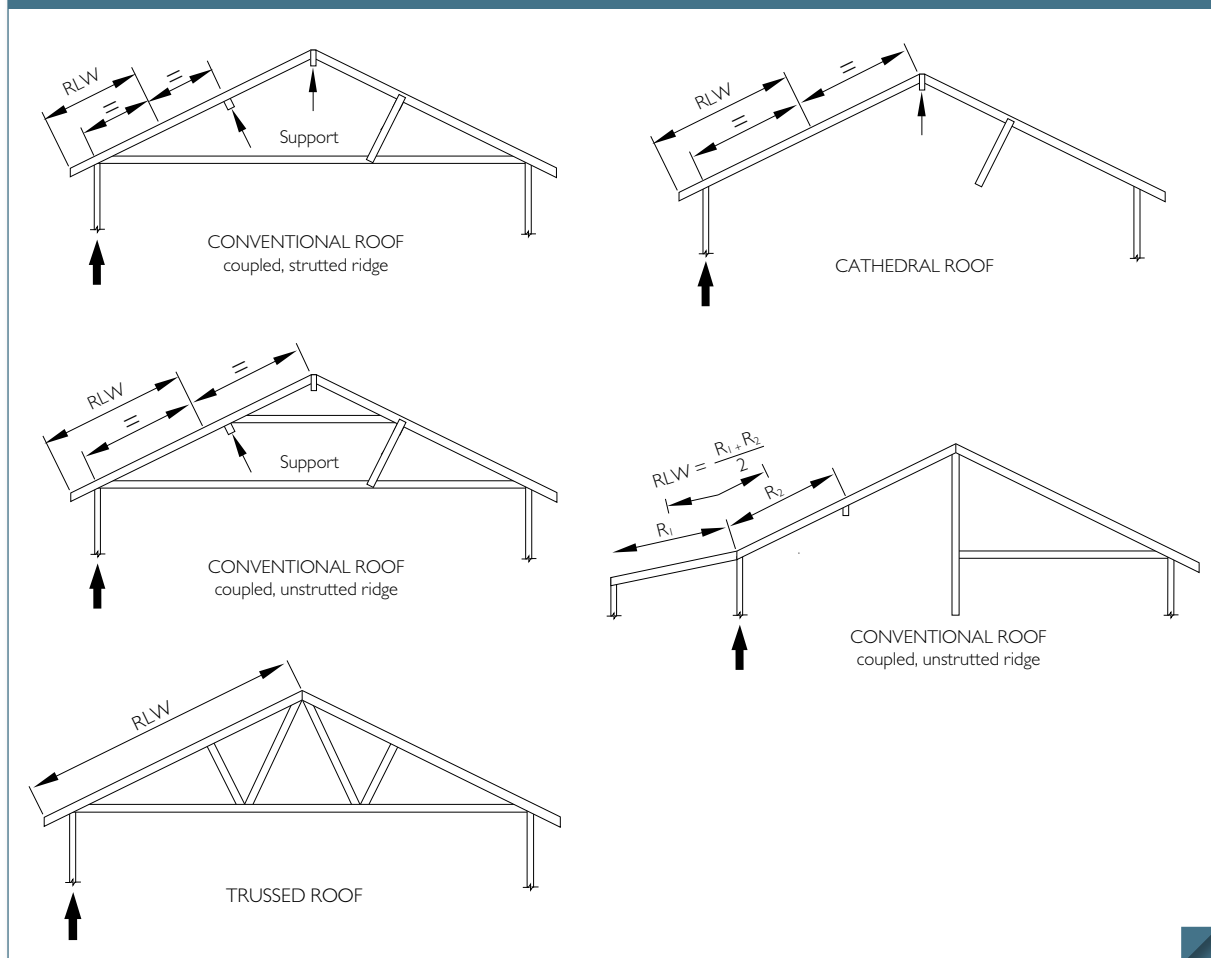
Load width is used in these tables in order to determine the load applied to isolated beams such as lintels, bearers, hanging beams, etc. Roof load width (RLW), ceiling load width (CLW) and floor load width (FLW) are measures of the load applied from roofs, ceilings and floors respectively.

Roof load width (RLW) has a similar function to 'Roof dimensions' used in NZS 3604 in order to determine wall framing sizes, including lintels.

Examples showing the determination of roof load width, floor load width and ceiling load width are illustrated as appropriate throughout this guide

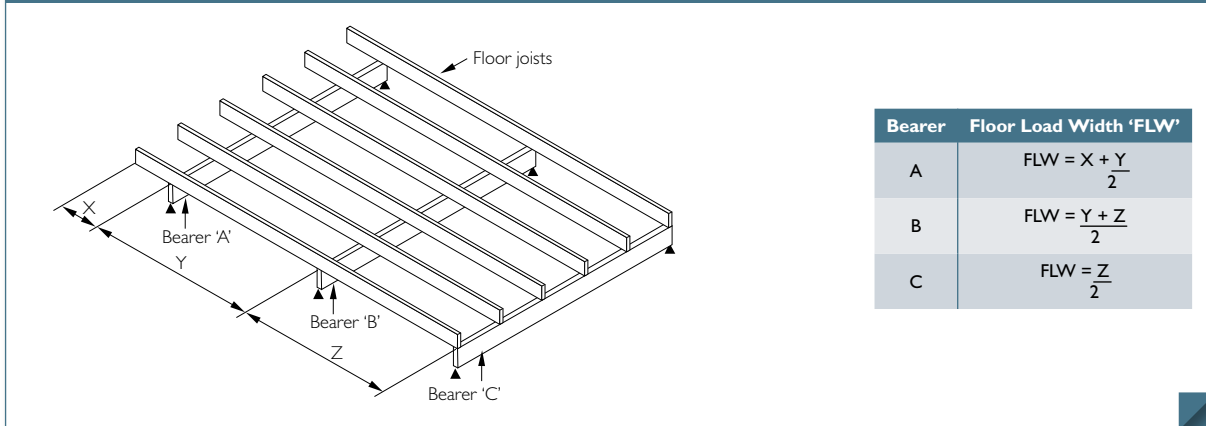
6.6 DETERMINATION OF ROOF LOAD WIDTH

Figure 14: Roof Loads Width



6.7 DETERMINATION OF FLOOR LOAD WIDTH

Figure 15: Floor Load Width



6.8 LINTELS

Lintels are beams contained in walls required to support load over doors and windows. Their design includes stringent

limitations on deflection required in order to maintain clearance of non-structural joinery items below the lintels.

6.9 ROOF MASS

For most applications roof mass has been separated into four categories related to the type of roof cladding and whether or not a ceiling is included. The four categories together with the roof mass allowance for each case, are given in table 7 below.

A corrugated roof would be considered a light weight roof with a concrete tiled roof considered heavy.

For the rafter and verandah beam tables designers need to determine the applicable roof mass of framing and roof materials.

TABLE 7: ROOF MASS ALLOWANCES

Roof Type	Roof Mass Allowed
Light Roof	25 kg/m ²
Light Roof and Ceiling	40 kg/m ²
Heavy Roof	75 kg/m ²
Heavy Roof and Ceiling	90 kg/m ²

6.10 TECHNICAL SUPPORT

For further information on Futurebuild® LVL, guidance on the use of these tables or assistance with applications not included, please contact CHH Woodproducts.

Freephone: 0800 808 131
 Website: www.chhwoodproducts.co.nz
 Software: www.chhsoftware.com

For member types and other design options not in these tables use designIT® for houses software.

7.0 SPAN TABLES

7.1 FLOOR BEAMS OR BEARERS

Design Deflection Limits:
 D.L. SPAN/300 OR 12 mm
 L.L. SPAN/360 OR 9 mm

TABLE 8: BEARERS – FLOOR LOADS ONLY

Section D x B (mm)	Product	Floor Load Width 'FLW' (m)											
		1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.6	4.1	4.8	5.4	6.0
		Maximum Single Span (m)											
2/90 x 45	hyCHORD®	1.9	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1
150 x 63	hySPAN®	2.9	2.7	2.6	2.4	2.3	2.2	2.2	2.0	1.9	1.8	1.7	1.7
150 x 90	hy90°	2.9	2.7	2.6	2.4	2.3	2.2	2.2	2.0	1.9	1.8	1.7	1.7
2/150 x 45	hySPAN	3.3	3.1	2.9	2.7	2.6	2.5	2.4	2.3	2.2	2.0	2.0	1.9
2/170 x 45	hySPAN	3.7	3.5	3.3	3.1	3.0	2.8	2.7	2.6	2.5	2.3	2.2	2.1
200 x 63	hySPAN	3.8	3.6	3.4	3.2	3.1	3.0	2.9	2.7	2.6	2.4	2.3	2.2
200 x 90	hy90	3.8	3.6	3.4	3.2	3.1	3.0	2.9	2.7	2.6	2.4	2.3	2.2
2/200 x 45	hySPAN	4.2	3.9	3.8	3.6	3.5	3.3	3.2	3.0	2.9	2.7	2.6	2.5
240 x 63	hySPAN	4.4	4.1	4.0	3.8	3.7	3.6	3.4	3.2	3.1	2.9	2.8	2.7
240 x 90	hy90	4.3	4.1	3.9	3.8	3.7	3.6	3.4	3.2	3.1	2.9	2.8	2.7
2/200 x 63	hySPAN	4.5	4.3	4.1	3.9	3.8	3.7	3.6	3.4	3.2	3.0	2.9	2.8
2/240 x 45	hySPAN	4.7	4.5	4.3	4.1	4.0	3.9	3.8	3.6	3.5	3.3	3.1	3.0
240 x 90	hyONE®	5.0	4.7	4.5	4.3	4.2	4.1	4.0	3.8	3.6	3.5	3.3	3.2
300 x 63	hySPAN	5.1	4.9	4.7	4.5	4.3	4.2	4.1	3.9	3.8	3.6	3.5	3.3
300 x 90	hy90	5.1	4.9	4.6	4.5	4.3	4.2	4.1	3.9	3.8	3.6	3.5	3.3
2/300 x 45	hySPAN	5.6	5.3	5.1	4.9	4.7	4.6	4.5	4.3	4.1	3.9	3.8	3.7
300 x 90	hyONE	5.8	5.5	5.3	5.1	4.9	4.8	4.7	4.5	4.3	4.1	4.0	3.9
360 x 90	hy90	5.8	5.5	5.3	5.1	5.0	4.8	4.7	4.5	4.3	4.1	4.0	3.9
360 x 63	hySPAN	5.9	5.6	5.3	5.1	5.0	4.8	4.7	4.5	4.3	4.1	4.0	3.9
2/360 x 45	hySPAN	6.3	6.0	5.8	5.6	5.4	5.2	5.1	4.9	4.7	4.5	4.4	4.3
400 x 63	hySPAN	6.3	6.0	5.8	5.5	5.4	5.2	5.1	4.8	4.7	4.5	4.3	4.2
400 x 90	hy90	6.3	6.0	5.7	5.5	5.3	5.2	5.1	4.8	4.7	4.5	4.3	4.2
360 x 90	hyONE	6.6	6.3	6.0	5.8	5.6	5.5	5.3	5.1	4.9	4.7	4.6	4.4
2/400 x 45	hySPAN	6.8	6.5	6.2	6.0	5.8	5.7	5.5	5.3	5.1	4.9	4.7	4.6
450 x 63	hySPAN	6.9	6.5	6.3	6.0	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.6
400 x 90	hyONE	7.1	6.8	6.5	6.3	6.1	5.9	5.8	5.5	5.3	5.1	4.9	4.8
2/400 x 63	hySPAN	7.3	7.0	6.7	6.5	6.3	6.1	6.0	5.7	5.5	5.3	5.1	5.0
2/450 x 63	hySPAN	7.9	7.6	7.3	7.1	6.8	6.7	6.5	6.2	6.0	5.8	5.6	5.4

- Indicates 90 mm required bearing at end supports
- Bearing requirements as per NZS 3604 unless otherwise indicated
- Where joists are loaded into sides of bearers, double sections built up by vertical lamination (see page 15 section 5.4)

SDC - Approved Building Consent Document - BC171688 - Pg 110 of 264 - 7/09/2017 - hamib

Design Deflection Limits:

DL. SPAN/300 OR 12 mm
 LL. SPAN/360 OR 9 mm

TABLE 8 CONTINUED: BEARERS – FLOOR LOADS ONLY

Section D x B (mm)	Product	Floor Load Width 'FLW' (m)											
		1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.6	4.1	4.8	5.4	6.0
		Maximum Continuous Span (m)											
2/90 x 45	hyCHORD®	2.3	2.2	2.1	1.9	1.9	1.8	1.7	1.6	1.6	1.4	1.3	1.3
150 x 63	hySPAN®	3.6	3.4	3.2	3.1	2.9	2.8	2.7	2.5	2.4	2.1	2.0	1.9
150 x 90	hy90®	3.6	3.4	3.2	3.1	2.9	2.7	2.6	2.4	2.2	2.0	1.9	1.8
2/150 x 45	hySPAN	3.9	3.7	3.5	3.4	3.3	3.2	3.1	2.9	2.8	2.5	2.3	2.2
2/170 x 45	hySPAN	4.3	4.1	3.9	3.7	3.6	3.5	3.4	3.3	3.0	2.8	2.7	2.5
200 x 63	hySPAN	4.4	4.2	4.0	3.9	3.7	3.6	3.5	3.3	3.0	2.7 [■]	2.6 [■]	2.4 [■]
200 x 90	hy90	4.4	4.2	4.0	3.9	3.7	3.6	3.4	3.1	2.8	2.6	2.4	2.3
2/200 x 45	hySPAN	4.8	4.6	4.4	4.2	4.1	4.0	3.9	3.7	3.6	3.2	3.0	2.9
240 x 63	hySPAN	5.1	4.8	4.6	4.4	4.3	4.2	4.0	3.8 [■]	3.5 [■]	3.2 [■]	3.1 [■]	2.9 [■]
240 x 90	hy90	-	-	4.6	4.4	4.3	4.2	4.0	3.6	3.3	3.1	2.9	2.7
2/240 x 45	hySPAN	5.6	5.3	5.0	4.8	4.7	4.5	4.4	4.2	4.1	3.8 [■]	3.6 [■]	3.4 [■]
240 x 90	hyONE®	-	-	-	-	-	-	4.6	4.4	4.3	4.1 [■]	4.0 [■]	3.9 [■]
300 x 63	hySPAN	6.0	5.7	5.4	5.2	5.1	4.9 [■]	4.8 [■]	4.6 [■]	4.3 [■]	#	#	#
300 x 90	hy90	-	-	-	-	-	-	-	4.4	4.1	3.8 [■]	3.5 [■]	3.3 [■]
2/300 x 45	hySPAN	6.6	6.2	5.9	5.7	5.5	5.4	5.2	5.0	4.7 [■]	4.4 [■]	4.2 [■]	4.0 [■]
360 x 63	hySPAN	6.9	6.5	6.2	6.0	5.8 [■]	5.6 [■]	5.5 [■]	#	#	#	#	#
360 x 90	hy90	-	-	-	-	-	-	-	-	-	4.5 [■]	4.2 [■]	4.0 [■]
2/300 x 63	hySPAN	7.1	6.8	6.5	6.2	6.0	5.8	5.7	5.4	5.3	5.1	4.9 [■]	4.8 [■]
2/360 x 45	hySPAN	7.5	7.1	6.8	6.6	6.3	6.2	6.0	5.5 [■]	5.2 [■]	4.9 [■]	#	#
400 x 63	hySPAN	7.5	7.1	6.7	6.5 [■]	6.3 [■]	6.1 [■]	5.9 [■]	#	#	#	#	#
450 x 63	hySPAN	8.1	7.7	7.4 [■]	7.1 [■]	6.9 [■]	#	#	#	#	#	#	#
2/400 x 45	hySPAN	8.2	7.7	7.4	7.1	6.8	6.5	6.3 [■]	5.8 [■]	5.5 [■]	5.2 [■]	#	#
2/400 x 63	hySPAN	-	8.4	8.0	7.7	7.5	7.2	7.1	6.7	6.5 [■]	6.3 [■]	6.1 [■]	#
2/450 x 63	hySPAN	-	-	-	8.4	8.1	7.9	7.7	7.4 [■]	7.1 [■]	6.9 [■]	#	#

- Indicates 45 mm required bearing at end supports and 135 mm required bearing at intermediate supports
- #Indicates bearing requirement is greater than the above. See designIT® for houses software for span and bearing information
- Bearing requirements as for NZS 3604 except where indicated otherwise
- Where joists are loaded into sides of bearers, double sections built up by vertical lamination (see page 15 section 5.4)

Design Deflection Limits:

DL. SPAN/300 OR 12 mm
LL. SPAN/360 OR 9 mm

TABLE 9: BEARERS – SUPPORTING SINGLE OR UPPER STOREY WALLS

Section D x B (mm)		Product		Light Roof & Ceiling														
				Floor Load Width 'FLW' (m)														
				1.2					2.1					3.0				
				Roof Load Width 'RLW' (m)														
		Maximum Single Span (m)																
		1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6		
2/90 x 45	hyCHORD®	1.5	1.4	1.3	1.3	1.2	1.3	1.3	1.2	1.2	1.1	1.2	1.2	1.2	1.1	1.1		
150 x 63	hySPAN®	2.4	2.2	2.1	2.0	1.9	2.1	2.0	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.7		
150 x 90	hy90®	2.4	2.2	2.1	2.0	1.9	2.1	2.0	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.7		
2/150 x 45	hySPAN	2.6	2.5	2.4	2.2	2.2	2.4	2.3	2.2	2.1	2.0	2.2	2.1	2.0	2.0	1.9		
2/170 x 45	hySPAN	3.0	2.8	2.7	2.5	2.4	2.7	2.6	2.5	2.4	2.3	2.5	2.4	2.3	2.2	2.2		
200 x 63	hySPAN	3.1	2.9	2.8	2.7	2.6	2.8	2.7	2.6	2.5	2.4	2.6	2.5	2.4	2.3	2.3		
200 x 90	hy90	3.1	2.9	2.8	2.7	2.6	2.8	2.7	2.6	2.5	2.4	2.6	2.5	2.4	2.3	2.3		
2/200 x 45	hySPAN	3.5	3.3	3.1	3.0	2.9	3.2	3.0	2.9	2.8	2.7	2.9	2.8	2.7	2.6	2.6		
240 x 63	hySPAN	3.7	3.5	3.3	3.2	3.1	3.4	3.2	3.1	3.0	2.9	3.1	3.0	2.9	2.8	2.7		
240 x 90	hy90	3.7	3.5	3.3	3.2	3.1	3.4	3.2	3.1	3.0	2.9	3.1	3.0	2.9	2.8	2.7		
2/200 x 63	hySPAN	3.8	3.7	3.5	3.3	3.2	3.5	3.4	3.2	3.1	3.0	3.2	3.1	3.0	2.9	2.9		
2/240 x 45	hySPAN	4.0	3.9	3.7	3.6	3.4	3.7	3.6	3.5	3.3	3.2	3.5	3.4	3.2	3.1	3.1		
240 x 90	hyONE®	4.2	4.0	3.9	3.7	3.6	3.9	3.8	3.7	3.5	3.4	3.7	3.5	3.4	3.3	3.2		
300 x 63	hySPAN	4.4	4.2	4.0	3.9	3.8	4.0	3.9	3.8	3.7	3.6	3.8	3.7	3.6	3.5	#		
300 x 90	hy90	4.4	4.2	4.0	3.9	3.8	4.0	3.9	3.8	3.7	3.6	3.8	3.7	3.6	3.5	3.4		
2/300 x 45	hySPAN	4.8	4.5	4.4	4.2	4.1	4.4	4.3	4.1	4.0	3.9	4.1	4.0	3.9	3.8	3.8		
300 x 90	hyONE	5.0	4.7	4.6	4.4	4.3	4.6	4.4	4.3	4.2	4.1	4.3	4.2	4.1	4.0	3.9		
		Maximum Continuous Span (m)																
2/90 x 45	hyCHORD	2.0	1.9	1.8	1.7	1.6	1.8	1.7	1.6	1.6	1.5	1.7	1.6	1.5	1.5	1.5		
150 x 63	hySPAN	3.2	3.0	2.8	2.7	2.5	2.8	2.7	2.6	2.5	2.4	2.6	2.4	2.3	2.3	2.2		
150 x 90	hy90	3.2	3.0	2.8	2.6	2.4	2.8	2.6	2.5	2.4	2.2	2.4	2.3	2.2	2.2	2.1		
2/150 x 45	hySPAN	3.5	3.3	3.2	3.0	2.9	3.2	3.0	2.9	2.8	2.7	2.9	2.8	2.7	2.6	2.6		
2/170 x 45	hySPAN	3.9	3.7	3.6	3.4	3.3	3.6	3.4	3.3	3.2	3.1	3.3	3.2	3.1	3.0	2.9		
200 x 63	hySPAN	4.0	3.9	3.7	3.6	3.2	3.7	3.6	3.5	3.3	3.1	3.3	3.1	3.0	3.0	2.9		
200 x 90	hy90	4.0	3.8	3.7	3.4	3.1	3.6	3.4	3.3	3.1	2.9	3.1	2.9	2.9	2.8	2.7		
2/200 x 45	hySPAN	4.4	4.2	4.0	3.9	3.8	4.1	3.9	3.8	3.7	3.6	3.8	3.7	3.6	3.5	3.4		
240 x 63	hySPAN	4.6	4.4	4.2	4.1	3.9	4.3	4.1	4.0	3.9	3.7	3.8	3.7	3.6	3.5	3.4		
240 x 90	hy90	4.6	4.4	4.2	4.0	3.7	4.3	4.1	3.9	3.7	3.5	3.6	3.5	3.4	3.3	3.2		
2/200 x 63	hySPAN	4.8	4.5	4.4	4.2	4.1	4.4	4.3	4.1	4.0	3.9	4.1	4.0	3.9	3.8	3.8		
2/240 x 45	hySPAN	5.0	4.8	4.6	4.5	4.3	4.6	4.5	4.4	4.2	4.1	4.4	4.2	4.1	4.1	4.0		
240 x 90	hyONE	-	-	-	4.7	4.5	-	4.7	4.5	4.4	4.3	4.6	4.4	4.3	4.2	4.1		
300 x 63	hySPAN	5.5	5.2	5.0	4.8	4.7	5.0	4.9	4.7	4.6	4.5	4.7	4.6	4.5	4.4	#		
300 x 90	hy90	-	-	-	-	4.5	-	-	4.7	4.6	4.3	4.4	4.3	4.2	4.1	4.0		
2/300 x 45	hySPAN	5.9	5.7	5.4	5.3	5.1	5.5	5.3	5.1	5.0	4.9	5.1	4.9	4.8	4.7	4.6		
2/300 x 63	hySPAN	6.4	6.1	5.9	5.7	5.5	5.9	5.7	5.6	5.4	5.3	5.6	5.4	5.3	5.2	5.1		

- Indicates 45 mm required bearing at end supports and 135 mm required bearing at intermediate supports
- # Indicates bearing requirement is greater than the above. See designIT® for houses software for span and bearing information
- Bearing requirements as for NZS 3604 except where indicated otherwise
- Where joists are loaded into sides of bearers, double sections built up by vertical lamination (see page 15 section 5.4)

TABLE 9 CONTINUED: BEARERS – SUPPORTING SINGLE OR UPPER STOREY WALLS

Design Deflection Limits:

DL. SPAN/300 OR 12 mm
LL. SPAN/360 OR 9 mm

		Heavy Roof & Ceiling														
		Floor Load Width 'FLW' (m)														
Section D x B (mm)	Product	1.2					2.1					3.0				
		Roof Load Width 'RLW' (m)														
		1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6
		Maximum Single Span (m)														
2/90 x 45	hyCHORD®	1.3	1.2	1.1	1.1	1.0	1.2	1.1	1.1	1.0	1.0	1.2	1.1	1.0	1.0	0.9
150 x 63	hySPAN®	2.1	1.9	1.8	1.7	1.6	1.9	1.8	1.7	1.6	1.5	1.8	1.7	1.6	1.5	1.5
150 x 90	hy90®	2.1	1.9	1.8	1.7	1.6	1.9	1.8	1.7	1.6	1.5	1.8	1.7	1.6	1.5	1.5
2/150 x 45	hySPAN	2.4	2.2	2.0	1.9	1.8	2.2	2.0	1.9	1.8	1.7	2.0	1.9	1.8	1.7	1.7
2/170 x 45	hySPAN	2.7	2.4	2.3	2.1	2.0	2.5	2.3	2.1	2.0	1.9	2.3	2.2	2.1	2.0	1.9
200 x 63	hySPAN	2.8	2.5	2.4	2.2	2.1	2.6	2.4	2.2	2.1	2.0	2.4	2.3	2.1	2.0	2.0
200 x 90	hy90	2.8	2.5	2.4	2.2	2.1	2.6	2.4	2.2	2.1	2.0	2.4	2.3	2.1	2.0	2.0
2/200 x 45	hySPAN	3.1	2.9	2.7	2.5	2.4	2.9	2.7	2.5	2.4	2.3	2.7	2.5	2.4	2.3	2.2
240 x 63	hySPAN	3.4	3.1	2.8	2.7	2.5	3.1	2.9	2.7	2.6	2.4	2.9	2.7	2.6	2.5	2.4
240 x 90	hy90	3.4	3.1	2.8	2.7	2.5	3.1	2.9	2.7	2.6	2.4	2.9	2.7	2.6	2.5	2.4
2/200 x 63	hySPAN	3.5	3.2	3.0	2.8	2.7	3.2	3.0	2.8	2.7	2.6	3.0	2.8	2.7	2.6	2.5
2/240 x 45	hySPAN	3.7	3.4	3.2	3.0	2.8	3.5	3.2	3.0	2.9	2.7	3.3	3.1	2.9	2.8	2.7
240 x 90	hyONE®	3.9	3.6	3.4	3.2	3.0	3.7	3.4	3.2	3.0	2.9	3.4	3.2	3.1	2.9	2.8
300 x 63	hySPAN	4.0	3.8	3.5	3.3	#	3.8	3.6	3.4	3.2	#	3.6	3.4	#	#	#
300 x 90	hy90	4.0	3.8	3.5	3.3	3.2	3.8	3.6	3.4	3.2	3.0	3.6	3.4	3.2	3.1	2.9
2/300 x 45	hySPAN	4.4	4.1	3.9	3.7	3.6	4.1	3.9	3.7	3.6	3.4	3.9	3.8	3.6	3.4	3.3
300 x 90	hyONE	4.6	4.3	4.0	3.9	3.7	4.3	4.1	3.9	3.7	3.6	4.1	3.9	3.8	3.6	#
		Maximum Continuous Span (m)														
2/90 x 45	hyCHORD	1.8	1.6	1.5	1.4	1.4	1.7	1.5	1.4	1.4	1.3	1.5	1.5	1.4	1.3	1.3
150 x 63	hySPAN	2.8	2.6	2.4	2.2	2.1	2.6	2.4	2.3	2.1	2.0	2.4	2.2	2.2	2.1	1.9
150 x 90	hy90	2.8	2.6	2.4	2.1	2.0	2.6	2.4	2.2	2.0	1.8	2.3	2.1	2.0	1.9	1.8
2/150 x 45	hySPAN	3.2	2.9	2.7	2.5	2.4	2.9	2.7	2.5	2.4	2.3	2.7	2.6	2.4	2.3	2.2
2/170 x 45	hySPAN	3.6	3.3	3.0	2.9	2.7	3.3	3.1	2.9	2.7	2.6	3.1	2.9	2.8	2.6	2.5
200 x 63	hySPAN	3.7	3.4	3.2	3.0	2.7	3.5	3.2	3.0	2.9	2.6	3.0	2.9	2.8	2.6	2.4
200 x 90	hy90	3.7	3.4	3.1	2.8	2.6	3.4	3.1	2.9	2.7	2.4	2.9	2.7	2.6	2.4	2.3
2/200 x 45	hySPAN	4.1	3.8	3.6	3.4	3.2	3.8	3.6	3.4	3.2	3.1	3.6	3.4	3.2	3.1	3.0
240 x 63	hySPAN	4.3	4.0	3.7	3.6	3.3	4.0	3.8	3.6	3.3	3.1	3.6	3.4	3.2	3.1	3.0
240 x 90	hy90	4.3	4.0	3.6	3.4	3.1	3.9	3.7	3.4	3.1	3.0	3.4	3.2	3.0	3.0	2.8
2/200 x 63	hySPAN	4.4	4.1	3.9	3.7	3.6	4.1	3.9	3.7	3.6	3.4	3.9	3.8	3.6	3.4	3.3
2/240 x 45	hySPAN	4.6	4.3	4.1	3.9	3.8	4.4	4.1	3.9	3.8	3.6	4.2	4.0	3.8	3.7	3.5
240 x 90	hyONE	4.8	4.5	4.3	4.1	3.9	4.6	4.3	4.1	4.0	3.8	4.3	4.1	4.0	3.8	3.7
300 x 63	hySPAN	5.0	4.7	4.4	4.2	#	4.7	4.5	4.3	#	#	4.5	#	#	#	#
300 x 90	hy90	-	4.7	4.4	4.1	3.8	4.7	4.5	4.2	3.9	3.6	4.2	4.0	3.8	3.7	3.5
2/300 x 45	hySPAN	5.5	5.1	4.8	4.6	4.3	5.2	4.9	4.6	4.4	4.1	4.8	4.6	4.4	4.2	4.0
300 x 90	hyONE	-	-	-	-	4.6	-	-	-	4.7	4.5	-	-	4.7	4.5	#

- Indicates 45 mm required bearing at end supports and 135 mm required bearing at intermediate supports
- # Indicates bearing requirement is greater than the above. See designIT® for houses software for span and bearing information
- Bearing requirements as for NZS 3604 except where indicated otherwise
- Where joists are loaded into sides of bearers, double sections built up by vertical lamination (see page 15 section 5.4)

Design Deflection Limits:

DL. SPAN/300 OR 12 mm
 LL. SPAN/360 OR 9 mm

TABLE 10: BEARERS – SUPPORTING TWO STOREY LOAD BEARING WALLS

Section D x B (mm)		Product		Light Roof & Ceiling									
				Floor Load Width ₁ 'FLW ₁ ' (m)									
				1.5					3.0				
				Floor Load Width ₂ 'FLW ₂ ' (m)									
				1.5		3.0			1.5			3.0	
Roof Load Width 'RLW' (m)													
		2.4	4.5	6.6	2.4	4.5	6.6	2.4	4.5	6.6	2.4	4.5	6.6
Maximum Single Span (m)													
2/90 x 45	hyCHORD®	1.2	1.1	1.1	1.1	1.0	1.0	1.1	1.0	1.0	1.0	1.0	0.9
150 x 63	hySPAN®	1.9	1.8	1.7	1.7	1.6	1.6	1.7	1.6	1.6	1.6	1.5	1.5
150 x 90	hy90®	1.9	1.8	1.7	1.7	1.6	1.6	1.7	1.6	1.6	1.6	1.5	1.5
2/150 x 45	hySPAN	2.1	2.0	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.7	1.7
2/170 x 45	hySPAN	2.4	2.2	2.1	2.2	2.1	2.0	2.2	2.1	2.0	2.0	1.9	1.9
200 x 63	hySPAN	2.5	2.3	2.2	2.3	2.2	2.1	2.3	2.2	2.1	2.1	2.0	2.0
200 x 90	hy90	2.5	2.3	2.2	2.3	2.2	2.1	2.3	2.2	2.1	2.1	2.0	2.0
2/200 x 45	hySPAN	2.8	2.6	2.5	2.5	2.4	2.3	2.5	2.4	2.3	2.4	2.3	2.2
240 x 63	hySPAN	3.0	2.8	2.7	2.7	2.6	2.5	2.7	2.6	2.5	2.5	2.4	2.4
240 x 90	hy90	3.0	2.8	2.7	2.7	2.6	2.5	2.7	2.6	2.5	2.5	2.4	2.4
2/200 x 63	hySPAN	3.1	2.9	2.8	2.8	2.7	2.6	2.8	2.7	2.6	2.6	2.5	2.5
2/240 x 45	hySPAN	3.3	3.2	3.0	3.0	2.9	2.8	3.0	2.9	2.8	2.8	2.7	2.6
240 x 90	hyONE®	3.5	3.3	3.2	3.2	3.1	3.0	3.2	3.1	3.0	3.0	2.9	2.8
300 x 63	hySPAN	3.7	3.5	3.4	#	#	#	#	#	#	#	#	#
300 x 90	hy90	3.7	3.5	3.3	3.4	3.2	3.1	3.4	3.2	3.1	3.1	3.0	2.9
2/300 x 45	hySPAN	4.0	3.9	3.7	3.7	3.6	3.5	3.7	3.6	3.5	3.5	3.4	3.3
300 x 90	hyONE	4.2	4.0	3.9	3.9	3.8	3.7	3.9	3.8	3.7	#	#	#
2/300 x 63	hySPAN	4.4	4.2	4.0	4.1	3.9	3.8	4.1	3.9	3.8	3.9	3.8	3.7
Maximum Continuous Span (m)													
2/90 x 45	hyCHORD	1.6	1.5	1.4	1.4	1.4	1.3	1.4	1.4	1.3	1.3	1.2	1.2
150 x 63	hySPAN	2.5	2.4	2.3	2.2	2.1	2.0	2.2	2.1	2.0	1.9	1.9	1.9
150 x 90	hy90	2.5	2.4	2.2	2.1	2.0	1.9	2.1	2.0	1.9	1.8	1.7	1.7
2/150 x 45	hySPAN	2.8	2.7	2.5	2.6	2.4	2.4	2.6	2.4	2.4	2.4	2.3	2.2
2/170 x 45	hySPAN	3.2	3.0	2.9	2.9	2.8	2.7	2.9	2.8	2.7	2.7	2.6	2.5
200 x 90	hy90	3.2	3.0	2.8	2.6	2.6	2.5	2.6	2.6	2.5	2.4	2.3	2.2
200 x 63	hySPAN	3.3	3.1	3.0	2.8 ■	2.7 ■	2.6 ■	2.8 ■	2.7 ■	2.6 ■	2.6 ■	2.5 ■	2.4 ■
2/200 x 45	hySPAN	3.7	3.5	3.4	3.4	3.3	3.1	3.4	3.3	3.1	3.1	3.0	2.9
240 x 63	hySPAN	3.9	3.7 ■	3.5 ■	3.3 ■	3.2 ■	3.1 ■	3.3 ■	3.2 ■	3.1 ■	3.1 ■	3.0 ■	2.9 ■
240 x 90	hy90	3.9	3.6	3.3	3.1	3.1	3.0	3.1	3.1	3.0	2.9	2.8	2.7
2/200 x 63	hySPAN	4.0	3.9	3.7	3.7	3.6	3.5	3.7	3.6	3.5	3.5	3.4	3.3
2/240 x 45	hySPAN	4.2	4.1	3.9	3.9	3.7 ■	3.6 ■	3.9	3.7 ■	3.6 ■	3.6 ■	3.4 ■	3.4 ■
240 x 90	hyONE	4.4	4.2	4.1	4.1 ■	4.0 ■	3.9 ■	4.1 ■	4.0 ■	3.9 ■	3.9 ■	3.8 ■	3.7 ■
300 x 63	hySPAN	4.6 ■	4.4 ■	4.2 ■	#	#	#	#	#	#	#	#	#
300 x 90	hy90	4.6	4.4	4.0	3.9	3.7 ■	3.6 ■	3.9	3.7 ■	3.6 ■	3.5 ■	3.4 ■	3.4 ■
2/300 x 45	hySPAN	5.0	4.8	4.6 ■	4.5 ■	4.3 ■	4.2 ■	4.5 ■	4.3 ■	4.2 ■	4.2 ■	4.1 ■	3.9 ■
300 x 90	hyONE	-	-	-	-	4.7 ■	4.6 ■	-	4.7 ■	4.6 ■	#	#	#
2/300 x 63	hySPAN	5.4	5.2	5.0	5.1	4.9	4.8	5.1	4.9	4.8	4.8 ■	4.7 ■	4.6 ■

- Indicates 45 mm required bearing at end supports and 135 mm required bearing at intermediate supports
- # Indicates bearing requirement is greater than the above. See designIT® for houses software for span and bearing information
- Bearing requirements as for NZS 3604 except where indicated otherwise
- Where joists are loaded into sides of bearers, double sections built up by vertical lamination (see page 15 section 5.4)

Design Deflection Limits:

DL. SPAN/300 OR 12 mm
LL. SPAN/360 OR 9 mm

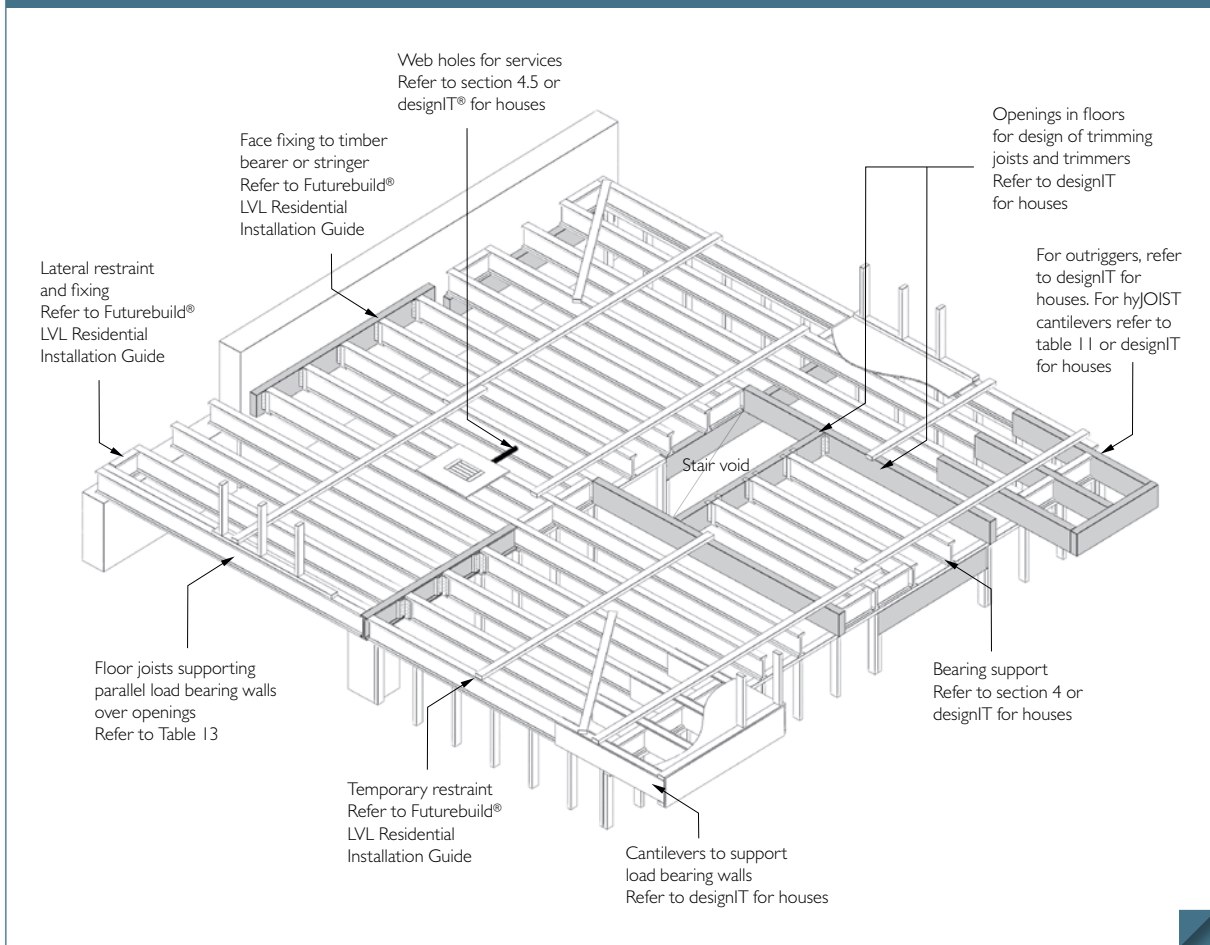
TABLE 10 CONTINUED: BEARERS – SUPPORTING TWO STOREY LOAD BEARING WALLS

		Heavy Roof & Ceiling											
		Ground Floor Load Width 'FLW' (m)											
		1.5						3.0					
Section D x B (mm)	Product	First Floor Load Width 'FLW' (m)											
		1.5			3.0			1.5		3.0			
		Roof Load Width 'RLW' (m)											
		2.4	4.5	6.6	2.4	4.5	6.6	2.4	4.5	6.6	2.4	4.5	6.6
		Maximum Single Span (m)											
2/90 x 45	hyCHORD®	1.1	1.0	0.9	1.0	0.9	0.9	1.0	0.9	0.9	1.0	0.9	0.8
150 x 63	hySPAN®	1.7	1.6	1.5	1.6	1.5	1.4	1.6	1.5	1.4	1.5	1.4	1.3
150 x 90	hy90°	1.7	1.6	1.5	1.6	1.5	1.4	1.6	1.5	1.4	1.5	1.4	1.3
2/150 x 45	hySPAN	1.9	1.8	1.6	1.8	1.7	1.6	1.8	1.7	1.6	1.7	1.6	1.5
2/170 x 45	hySPAN	2.2	2.0	1.9	2.0	1.9	1.8	2.0	1.9	1.8	1.9	1.8	1.7
200 x 63	hySPAN	2.3	2.1	1.9	2.1	2.0	1.9	2.1	2.0	1.9	2.0	1.9	1.8
200 x 90	hy90	2.3	2.1	1.9	2.1	2.0	1.9	2.1	2.0	1.9	2.0	1.9	1.8
2/200 x 45	hySPAN	2.6	2.4	2.2	2.4	2.2	2.1	2.4	2.2	2.1	2.2	2.1	2.0
240 x 63	hySPAN	2.8	2.5	2.3	2.6	2.4	#	2.6	2.4	#	2.4	#	#
240 x 90	hy90	2.8	2.5	2.3	2.6	2.4	2.2	2.6	2.4	2.2	2.4	2.2	2.1
2/200 x 63	hySPAN	2.9	2.6	2.4	2.7	2.5	2.3	2.7	2.5	2.3	2.5	2.4	2.2
2/240 x 45	hySPAN	3.1	2.8	2.6	2.9	2.7	2.5	2.9	2.7	2.5	2.7	2.5	2.4
240 x 90	hyONE®	3.3	3.0	2.8	3.0	2.8	2.6	3.0	2.8	2.6	2.9	2.7	2.5
300 x 63	hySPAN	3.4	#	#	#	#	#	#	#	#	#	#	#
300 x 90	hy90	3.4	3.1	2.9	3.2	3.0	2.8	3.2	3.0	2.8	3.0	2.8	#
2/300 x 45	hySPAN	3.8	3.5	3.3	3.6	3.3	#	3.6	3.3	#	3.4	#	#
300 x 90	hyONE	4.0	3.7	#	3.7	3.5	#	3.7	3.5	#	#	#	#
		Maximum Continuous Span (m)											
2/90 x 45	hyCHORD	1.5	1.3	1.2	1.4	1.3	1.1	1.4	1.3	1.1	1.3	1.2	1.0
150 x 63	hySPAN	2.3	2.1	1.9	2.0	1.9	1.7	2.0	1.9	1.7	1.9	1.7	1.5
150 x 90	hy90	2.3	2.0	1.8	1.9	1.8	1.7	1.9	1.8	1.7	1.8	1.7	1.5
2/150 x 45	hySPAN	2.6	2.4	2.2	2.4	2.2	2.1	2.4	2.2	2.1	2.3	2.1	1.9
2/170 x 45	hySPAN	2.9	2.7	2.5	2.7	2.5	2.4	2.7	2.5	2.4	2.6	2.4	2.2
200 x 90	hy90	3.0	2.6	2.3	2.6	2.3	2.2	2.6	2.3	2.2	2.3	2.2	2.0
200 x 63	hySPAN	3.1	2.7 [■]	2.4 [■]	2.7 [■]	2.4 [■]	2.2 [■]	2.7 [■]	2.4 [■]	2.2 [■]	2.5 [■]	2.3 [■]	2.0 [■]
2/200 x 45	hySPAN	3.5	3.2	2.9	3.2	3.0	2.7 [■]	3.2	3.0	2.7 [■]	2.9	2.7 [■]	2.6 [■]
240 x 90	hy90	3.5	3.1	2.7	3.0	2.8	2.6 [■]	3.0	2.8	2.6 [■]	2.7	2.6	2.4 [■]
240 x 63	hySPAN	3.7 [■]	3.3 [■]	2.9 [■]	3.1 [■]	3.0 [■]	#	3.1 [■]	3.0 [■]	#	2.9 [■]	#	#
2/200 x 63	hySPAN	3.8	3.5	3.3	3.6	3.3	3.1	3.6	3.3	3.1	3.4	3.2	3.0
2/240 x 45	hySPAN	4.0	3.7	3.4 [■]	3.7 [■]	3.5 [■]	3.2 [■]	3.7 [■]	3.5 [■]	3.2 [■]	3.4 [■]	3.2 [■]	3.0 [■]
240 x 90	hyONE	4.2	3.9 [■]	3.7 [■]	3.9 [■]	3.7 [■]	3.5 [■]	3.9 [■]	3.7 [■]	3.5 [■]	3.8 [■]	3.6 [■]	#
300 x 63	hySPAN	4.3 [■]	#	#	#	#	#	#	#	#	#	#	#
300 x 90	hy90	4.3	3.7 [■]	3.3 [■]	3.7 [■]	3.5 [■]	3.1 [■]	3.7 [■]	3.5 [■]	3.1 [■]	3.4 [■]	3.2 [■]	3.0 [■]
2/300 x 45	hySPAN	4.7	4.3 [■]	4.0 [■]	4.3 [■]	4.0 [■]	#	4.3 [■]	4.0 [■]	#	4.1 [■]	#	#
300 x 90	hyONE	-	4.6 [■]	#	4.7 [■]	#	#	4.7 [■]	#	#	#	#	#

- Indicates 45 mm required bearing at end supports and 135 mm required bearing at intermediate supports
- # Indicates bearing requirement is greater than the above. See designIT® for houses software for span and bearing information
- Bearing requirements as for NZS 3604 except where indicated otherwise
- Where joists are loaded into sides of bearers, double sections built up by vertical lamination (see page 15 section 5.4)

7.2 FLOOR JOISTS

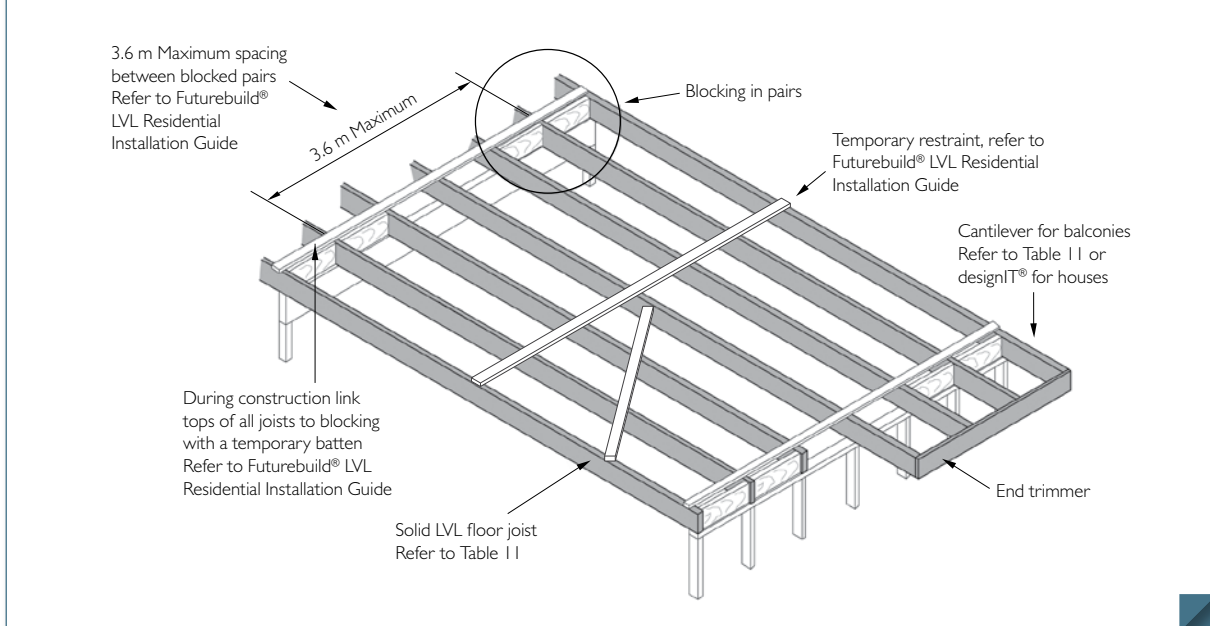
Figure 16: Typical hyJOIST® Floor Layout



- Refer to designIT® for houses software for floor design guidance

Figure 17: Solid LVL Floor Joist Blocking or Lateral Support Requirements

Joists should have intermittent blocking at supports as shown below. During construction, provide a temporary batten connecting the top of the blocked joists to the other joists to prevent them rolling prior to flooring being fixed.



Design Deflection Limits:

DL	L.L	Dynamic Criteria
SPAN/300	SPAN/360	2 mm/1 kN
OR 15 mm	OR 9 mm	

TABLE 11: FLOOR JOISTS

Floor Joists Section D x B (mm)	Product	Cross Section	Max hole diameter, (mm)	Floor Joist Spacings (mm)							
				300		400		450		600	
				Maximum Single Span and Overhang 'O/H' (m)							
				Span	O/H	Span	O/H	Span	O/H	Span	O/H
90 x 45	hyCHORD®		20	2.0	0.5	1.7	0.4	1.6	0.4	1.6	0.3
140 x 45	hyCHORD		35	3.6	0.9	2.8	0.8	2.7	0.8	2.6	0.7
150 x 45	hySPAN®		35	4.0	1.0	3.3	0.9	3.1	0.9	3.0	0.8
170 x 45	hySPAN		40	4.4	1.2	3.8	1.1	3.6	1.0	3.4	0.9
HJ200 45	hyJOIST®		112	4.5	1.2	3.8	1.1	3.5	1.0	3.3	0.9
190 x 45	hyCHORD		44	4.6	1.2	4.1	1.1	3.8	1.1	3.6	1.0
200 x 45	hySPAN		50	5.0	1.4	4.6	1.2	4.4	1.2	4.1	1.1
HJ240 63	hyJOIST		152	5.4	1.5	5.0	1.4	4.9	1.3	4.5	1.2
240 x 45	hySPAN		50	5.7	1.6	5.3	1.5	5.1	1.4	4.8	1.3
HJ240 90	hyJOIST		152	6.0	1.7	5.6	1.5	5.4	1.5	5.0	1.4
HJ300 63	hyJOIST		212	6.2	1.7	5.7	1.6	5.5	1.5	5.1	1.4
300 x 45	hySPAN		50	6.7	1.9	6.3	1.8	6.1	1.7	5.7	1.6
HJ300 90	hyJOIST		212	6.8	1.9	6.3	1.8	6.1	1.7	5.7	1.6
HJ360 63	hyJOIST		272	6.9	1.9	6.4	1.8	6.2	1.7	5.7	1.6
HJ360 90	hyJOIST		272	7.6	2.1	7.0	2.0	6.8	1.9	6.3	1.8
360 x 45	hySPAN		50	7.7	2.2	7.2	2.0	7.0	2.0	6.5	1.8
HJ400 90	hyJOIST		312	8.1	2.3	7.5	2.1	7.2	2.0	6.7	1.9
400 x 45	hySPAN		50	8.3	2.4	7.8	2.2	7.5	2.1	7.0	2.0
Maximum Continuous Span and Overhang 'O/H' (m)											
90 x 45	hyCHORD		20	2.7	0.5	2.0	0.4	1.9	0.4	1.8	0.3
140 x 45	hyCHORD		35	4.2	0.9	3.5	0.8	3.2	0.8	3.0	0.7
150 x 45	hySPAN		35	4.6	1.0	4.2	0.9	3.8	0.9	3.5	0.8
170 x 45	hySPAN		40	5.1	1.1	4.8	1.0	4.4	1.0	4.0	0.9
HJ200 45	hyJOIST		112	5.1	1.2	4.7	1.0	4.3	1.0	3.9	0.9
190 x 45	hyCHORD		44	-	-	-	-	4.7	1.1	4.3	1.0
200 x 45	hySPAN		50	5.8	1.4	5.4	1.2	5.2	1.2	4.8	1.1
HJ240 63	hyJOIST		152	6.2	1.5	5.7	1.4	5.5	1.3	5.1	1.2
240 x 45	hySPAN		50	6.6	1.6	6.2	1.5	6.0	1.4	5.6	1.3
HJ240 90	hyJOIST		152	6.8	1.7	6.3	1.5	6.1	1.5	5.6	1.4
HJ300 63	hyJOIST		212	7.0	1.7	6.5	1.6	6.3	1.5	5.8	1.4
300 x 45	hySPAN		50	7.8	1.9	7.3	1.8	7.1	1.7	6.6	1.6
HJ300 90	hyJOIST		212	7.8	1.9	7.2	1.8	7.0	1.7	6.4	1.6
HJ360 63	hyJOIST		272	7.8	1.9	7.2	1.8	6.9	1.7	6.1	1.6
HJ360 90	hyJOIST		272	8.7	2.1	8.0	2.0	7.8	1.9	7.1	1.8
360 x 45	hySPAN		50	-	-	8.3	2.0	8.1	2.0	7.5	1.8
HJ400 90	hyJOIST		312	-	-	8.4	2.1	8.0	2.0	7.2	1.9
400 x 45	hySPAN		50	-	-	-	-	-	-	8.2	2.0

- Refer to section 6.3 or designIT® for houses software for permitted hole sizes and locations
- For solid LVL sections bearing at end supports as for NZS 3604, bearing at intermediate supports 60 mm minimum. For hyJOIST design considerations, refer to section 4: Design Considerations – hyJOIST
- Joists should be blocked at supports – refer to the Futurebuild LVL Residential Installation Guide.



TABLE 12 FLOOR JOISTS – HEAVY FLOOR

Tiled floors and heavy furniture may result in floor joists which have not been designed for these loads, deflecting excessively in the long term. The following tables should therefore be used where the loads from floor coverings or furniture are likely to exceed 50 kg/m but are not greater than 100 kg/m². For other loading options consult designIT® for Houses.

Design Deflection Limits:

D.L.	LL	Dynamic Criteria
SPAN/300	SPAN/360	2 mm/1 kN
OR 15 mm	OR 9 mm	

SDC - Approved Building Consent Document - BC171688 - Pg 118 of 264 - 7/09/2017 - hamib

Section D x B (mm)	Product	Cross Section	Max hole diameter, (mm)	Floor Joist Spacings (mm)			
				300	400	450	600
Maximum Single Span (m)							
90 x 45	hyCHORD®	█	20	2.0	1.7	1.6	1.6
140 x 45	hyCHORD	█	35	3.1	2.8	2.7	2.5
150 x 45	hySPAN®	█	35	3.5	3.2	3.1	2.8
170 x 45	hySPAN	█	40	4.0	3.6	3.5	3.2
HJ200 45	hyJOIST®	I	112	4.1	3.7	3.5	3.2
190 x 45	hyCHORD	█	44	4.2	3.8	3.7	3.4
200 x 45	hySPAN	█	50	4.6	4.3	4.1	3.8
HJ240 63	hyJOIST	I	152	5.0	4.7	4.5	4.1
240 x 45	hySPAN	█	50	5.3	4.9	4.8	4.5
HJ240 90	hyJOIST	I	152	5.5	5.2	5.0	4.7
HJ300 63	hyJOIST	I	212	5.7	5.3	5.2	4.8
300 x 45	hySPAN	█	50	6.2	5.8	5.6	5.3
HJ300 90	hyJOIST	I	212	6.3	5.9	5.7	5.3
HJ360 63	hyJOIST	I	272	6.4	5.9	5.7	5.3
360 x 45	hySPAN	█	50	7.0	6.6	6.4	6.0
HJ360 90	hyJOIST	I	272	7.0	6.5	6.3	5.9
HJ400 90	hyJOIST	I	312	7.4	6.9	6.7	6.3
400 x 45	hySPAN	█	50	7.6	7.1	6.9	6.5
Maximum Continuous Span (m)							
90 x 45	hyCHORD	█	20	2.5	2.0	1.9	1.8
140 x 45	hyCHORD	█	35	3.9	3.5	3.2	3.0
150 x 45	hySPAN	█	35	4.4	4.0	3.8	3.5
170 x 45	hySPAN	█	40	4.9	4.5	4.4	4.0
HJ200 45	hyJOIST	I	112	4.9	4.5	4.3	3.3
190 x 45	hyCHORD	█	44	-	4.7	4.6	4.2
200 x 45	hySPAN	█	50	5.5	5.1	5.0	4.6
HJ240 63	hyJOIST	I	152	5.8	5.4	5.2	4.3
240 x 45	hySPAN	█	50	6.2	5.8	5.7	5.3
HJ240 90	hyJOIST	I	152	6.4	6.0	5.8	5.3
HJ300 63	hyJOIST	I	212	6.6	6.1	5.9	5.4
300 x 45	hySPAN	█	50	7.3	6.9	6.7	6.3
HJ300 90	hyJOIST	I	212	7.3	6.8	6.6	6.1
HJ360 63	hyJOIST	I	272	7.3	6.8	6.5	5.8
HJ360 90	hyJOIST	I	272	8.1	7.5	7.3	6.6 ■
360 x 45	hySPAN	█	50	8.3	7.8	7.6	7.2
HJ400 90	hyJOIST	I	312	8.6	8.0	7.7	6.6 ■
400 x 45	hySPAN	█	50	-	8.5	8.2	7.7

- Indicates 90 mm required bearing at intermediate supports
- Refer to section 6.3 or designIT® for houses software for permitted hole sizes and locations
- Bearing at end supports as for NZS 3604, bearing at intermediate supports 60 mm minimum except where indicated otherwise
- Joists should be blocked at supports – refer to the Futurebuild LVL Residential Installation Guide for detailing

TABLE 13: FLOOR JOISTS – SUPPORTING PARALLEL LOAD BEARING WALLS OVER OPENINGS

Design Deflection Limits:

DL. SPAN/300 OR 15 mm
LL. SPAN/360 OR 9 mm

Floor joists supporting parallel load bearing walls over large spans are likely to deflect excessively even if the 'rule of thumb' practice of doubling joists is followed. The following tables give maximum spans for double joists for various roof loads. Roof load width may be determined by reference to the diagrams in section 6.6 Determination of Roof Load Width.

This table allows for the mass of lightweight claddings/linings such as horizontal boards or planks and sheet materials (plywood or plasterboard) to be partially offset by their contribution to overall wall stiffness.

Section D x B (mm)	Product	Cross Section	Light Roof & Ceiling								
			Roof Load Width 'RLW' (m)								
			1.2	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
			Maximum Single Span (m)								
2/90 x 45	hyCHORD®	█	1.9	1.7	1.6	1.5	1.5	1.4	1.4	1.4	1.3
2/140 x 45	hyCHORD	█	2.9	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.0
150 x 90	hy90®	█	2.9	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.1
2/150 x 45	hySPAN®	█	3.3	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.3
2/170 x 45	hySPAN	█	3.7	3.3	3.2	3.0	2.9	2.9	2.8	2.7	2.6
2/HJ200 45	hyJOIST®	I	3.8	3.3	3.1	3.0	2.8	2.5	2.3	2.1	1.9
200 x 90	hy90	█	3.8	3.5	3.3	3.2	3.1	3.0	2.9	2.8	2.8
2/190 x 45	hyCHORD	█	3.9	3.5	3.3	3.2	3.1	3.0	2.9	2.8	2.8
HJ240 90	hyJOIST	I	4.3	3.8	3.3	2.8	2.5	2.2	2.0	1.8	1.6
2/200 x 45	hySPAN	█	4.3	3.9	3.7	3.6	3.5	3.3	3.3	3.2	3.1
240 x 90	hy90	█	4.6	4.1	4.0	3.8	3.7	3.6	3.5	3.4	3.3
2/HJ240 63	hyJOIST	I	4.7	4.3	4.0	3.9	3.7	3.3	3.0	2.7	2.5
HJ300 90	hyJOIST	I	5.0	4.5 [■]	3.8 [■]	3.3 [■]	2.9 [■]	2.6 [■]	2.3 [■]	2.1 [■]	1.9 [■]
2/240 x 45	hySPAN	█	5.0	4.6	4.4	4.3	4.1	4.0	3.9	3.8	3.7
240 x 90	hyONE	█	5.2	4.8	4.7	4.5	4.4	4.2	4.1	4.0	3.9
2/HJ300 63	hyJOIST	I	5.4	4.9	4.7	4.6	4.4	4.3	3.9	3.4	3.1
300 x 90	hy90	█	5.4	5.0	4.8	4.7	4.6	4.4	4.3	4.2	4.1 [■]
HJ360 90	hyJOIST	I	5.5	4.6 [■]	3.8 [■]	3.3 [■]	2.9 [■]	2.6 [■]	2.3 [■]	2.0 [■]	1.8 [■]
2/300 x 45	hySPAN	█	5.8	5.4	5.2	5.1	5.0	4.9	4.8	4.7 [■]	4.6 [■]
HJ400 90	hyJOIST	I	5.9	4.6 [■]	3.8 [■]	3.3 [■]	2.9 [■]	2.6 [■]	2.2 [■]	2.0 [■]	1.8 [■]
2/HJ360 63	hyJOIST	I	6.0	5.5	5.3	5.1	4.9 [■]	4.8 [■]	4.3 [■]	3.9 [■]	3.6 [■]
360 x 90	hy90	█	6.1	5.7	5.5	5.3	5.2	5.1	5.0 [■]	4.9 [■]	4.8 [■]
300 x 90	hyONE	█	6.1	5.7	5.5	5.3	5.2	5.1	5.0 [■]	4.9 [■]	4.8 [■]
2/360 x 45	hySPAN	█	6.7	6.2	6.0	5.8	5.7	5.6 [■]	5.4 [■]	5.3 [■]	5.2 [■]
400 x 90	hy90	█	6.6	6.1	5.9	5.8	5.6	5.5 [■]	5.4 [■]	5.3 [■]	5.2 [■]
360 x 90	hyONE®	█	7.0	6.5	6.3	6.1	5.9	5.8 [■]	5.7 [■]	5.6 [■]	5.5 [■]
2/400 x 45	hySPAN	█	7.2	6.7	6.5	6.3	6.1 [■]	6.0 [■]	5.9 [■]	5.8 [■]	5.7 [■]

- Indicates minimum bearing at end supports = 45 mm
- Bearing at end supports as for NZS 3604 except where indicated otherwise

TABLE 13 CONTINUED: FLOOR JOISTS – SUPPORTING PARALLEL LOAD BEARING WALLS OVER OPENINGS

Design Deflection Limits:

D.L. SPAN/300 OR 15 mm
L.L. SPAN/360 OR 9 mm




























Section D x B (mm)	Product	Cross Section	Light Roof & Ceiling								
			Roof Load Width 'RLW' (m)								
			1.2	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
Maximum Continuous Span (m)											
2/90 x 45	hyCHORD®	█	2.5	2.2	2.1	2.0	2.0	1.9	1.9	1.8	1.8
2/140 x 45	hyCHORD	█	3.8	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.6
150 x 90	hy90°	█	3.9	3.5	3.3	3.2	3.1	2.9	2.7	2.6	2.5
2/150 x 45	hySPAN®	█	4.4	3.9	3.7	3.6	3.5	3.4	3.3	3.2	3.1
2/HJ200 45	hyJOIST®	I	4.8	3.6	2.9	2.6	2.3	2.0	1.8	1.7	1.5
2/170 x 45	hySPAN	█	4.8	4.4	4.2	4.1	3.9	3.8	3.7	3.6	3.5
200 x 90	hy90	█	-	4.6	4.4	4.3	4.0	3.8	3.6	3.5	3.3
2/190 x 45	hyCHORD	█	-	4.6	4.5	4.3	4.1	4.0	3.9	3.7	3.5
HJ240 90	hyJOIST	I	5.2	3.0	2.5	2.3	2.0	1.8	1.6	1.5	1.3
2/200 x 45	hySPAN	█	5.4	5.0	4.9	4.7	4.6	4.5	4.4	4.2	4.1
240 x 90	hy90	█	-	-	-	-	4.7	4.5	4.3	4.0	3.9
2/HJ240 63	hyJOIST	I	5.7	4.5	3.7	3.2	2.8	2.7	2.4	2.2	2.0
HJ300 90	hyJOIST	I	5.9 [■]	3.5 [■]	2.9 [■]	2.7 [■]	2.3 [■]	2.1 [■]	1.9 [■]	1.7 [■]	1.6 [■]
HJ360 90	hyJOIST	I	6.1 [■]	3.5 [■]	2.9 [■]	2.7 [■]	2.3 [■]	2.1 [■]	1.9 [■]	1.7 [■]	1.6 [■]
HJ400 90	hyJOIST	I	6.1 [■]	3.5 [■]	2.9 [■]	2.7 [■]	2.3 [■]	2.1 [■]	1.9 [■]	1.7 [■]	1.6 [■]
2/240 x 45	hySPAN	█	6.1	5.7	5.5	5.4	5.3	5.1	5.0	4.8 [■]	4.6 [■]
2/HJ300 63	hyJOIST	I	6.5	5.9	4.9	4.2	3.7	3.6	3.2	2.9	2.7
2/HJ360 63	hyJOIST	I	7.2	6.5 [■]	5.8 [■]	4.9 [■]	4.3 [■]	4.1 [■]	3.7 [■]	3.4 [■]	3.1 [■]
2/300 x 45	hySPAN	█	7.3	6.7	6.5	6.4	6.2	6.0 [■]	5.7 [■]	5.5 [■]	5.3 [■]
2/360 x 45	hySPAN	█	8.3	7.7	7.5	7.2 [■]	6.8 [■]	6.5 [■]	6.3 [■]	6.1 [■]	5.8 [■]
2/400 x 45	hySPAN	█	8.9	8.2	7.8	7.4 [■]	7.0 [■]	6.8 [■]	6.5 [■]	6.4 [■]	6.2 [❖]

- Indicates minimum bearing at intermediate supports = 90 mm
- ❖ Indicates minimum bearing at end supports = 45 mm and intermediate supports = 135 mm
- Minimum bearing at end supports as per NZS 3604 & intermediate supports = 60 mm, unless otherwise indicated

TABLE 13 CONTINUED: FLOOR JOISTS – SUPPORTING PARALLEL LOAD BEARING WALLS OVER OPENINGS

Design Deflection Limits:

DL. SPAN/300 OR 15 mm
LL. SPAN/360 OR 9 mm

Section D x B (mm)	Product	Cross Section	Heavy Roof & Ceiling								
			Roof Load Width 'RLW' (m)								
			1.2	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
Maximum Single Span (m)											
2/90 x 45	hyCHORD®		1.6	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.0
2/140 x 45	hyCHORD		2.5	2.2	2.0	1.9	1.9	1.8	1.7	1.7	1.6
150 x 90	hy90®		2.5	2.2	2.1	2.0	1.9	1.8	1.8	1.7	1.7
2/150 x 45	hySPAN®		2.9	2.4	2.3	2.2	2.1	2.0	2.0	1.9	1.9
2/170 x 45	hySPAN		3.2	2.8	2.6	2.5	2.4	2.3	2.2	2.2	2.1
2/HJ200 45	hyJOIST®		3.2	2.7	2.5	2.3	2.0	1.8	1.6	1.4	1.3
200 x 90	hy90		3.4	2.9	2.7	2.6	2.5	2.4	2.3	2.3	2.2
2/190 x 45	hyCHORD		3.4	2.9	2.8	2.6	2.5	2.4	2.3	2.3	2.2
HJ240 90	hyJOIST		3.7	2.8	2.3	2.0	1.7	1.5	1.4	1.3	1.2
2/200 x 45	hySPAN		3.8	3.3	3.1	2.9	2.8	2.7	2.6	2.5	2.5
240 x 90	hy90		4.0	3.5	3.3	3.1	3.0	2.9	2.8	2.7	2.6
2/HJ240 63	hyJOIST		4.1	3.4	3.2	3.0	2.6	2.3	2.1	1.9	1.7
HJ300 90	hyJOIST		4.4 [■]	3.3 [■]	2.7 [■]	2.3 [■]	2.0 [■]	1.8 [■]	1.6 [■]	1.5 [■]	1.3 [■]
2/240 x 45	hySPAN		4.5	3.9	3.7	3.5	3.4	3.2	3.1	3.0	3.0
240 x 90	hyONE		4.7	4.1	3.9	3.7	3.6	3.4	3.3	3.2	3.1 [■]
2/HJ300 63	hyJOIST		4.8	4.1	3.8	3.6	3.4	3.1	2.8	2.5	2.3
300 x 90	hy90		4.9	4.3	4.1	3.9	3.7	3.6	3.5	3.4 [■]	3.3 [■]
HJ360 90	hyJOIST		4.9 [■]	3.3 [■]	2.7 [■]	2.3 [■]	2.0 [■]	1.8 [■]	1.6 [■]	1.5 [■]	1.3 [■]
HJ400 90	hyJOIST		5.2 [■]	3.3 [■]	2.8 [■]	2.3 [■]	2.0 [■]	1.8 [■]	1.6 [■]	1.5 [■]	1.3 [■]
2/300 x 45	hySPAN		5.3	4.8	4.6	4.4	4.2	4.0	3.9 [■]	3.8 [■]	3.7 [■]
2/HJ360 63	hyJOIST		5.4	4.7	4.5	4.2 [■]	4.0 [■]	3.6 [■]	3.2 [■]	2.9 [■]	2.7 [■]
360 x 90	hy90		5.6	5.0	4.8	4.6	4.5	4.3 [■]	4.2 [■]	4.1 [■]	3.9 [■]
300 x 90	hyONE®		5.6	5.0	4.8	4.6	4.4	4.3 [■]	4.1 [■]	4.0 [■]	3.9 [■]
400 x 90	hy90		6.0	5.4	5.2	5.0	4.8 [■]	4.7 [■]	4.6 [■]	4.5 [■]	4.4 [◇]
2/360 x 45	hySPAN		6.1	5.4	5.2	5.0	4.9 [■]	4.8 [■]	4.6 [■]	4.5 [■]	4.4 [◇]
360 x 90	hyONE		6.3	5.7	5.5	5.3 [■]	5.1 [■]	5.0 [■]	4.8 [■]	4.7 [◇]	4.6 [◇]
2/400 x 45	hySPAN		6.6	5.9	5.6	5.5 [■]	5.3 [■]	5.1 [■]	5.0 [■]	4.9 [◇]	4.8 [◇]

- Indicates minimum bearing at end supports = 45 mm
- ◇ Indicates minimum bearing at end supports = 60 mm
- Bearing at end supports as per NZS 3604 except where indicated otherwise

TABLE 13 CONTINUED: FLOOR JOISTS – SUPPORTING PARALLEL LOAD BEARING WALLS OVER OPENINGS

Design Deflection Limits:

D.L. SPAN/300 OR 15 mm
L.L. SPAN/360 OR 9 mm

Section D x B (mm)	Product	Cross Section	Heavy Roof & Ceiling								
			Roof Load Width 'RLW' (m)								
			1.2	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
			Maximum Continuous Span (m)								
2/90 x 45	hyCHORD®		2.2	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.4
2/140 x 45	hyCHORD		3.4	2.9	2.7	2.6	2.5	2.4	2.3	2.2	2.2
150 x 90	hy90°		3.4	2.9	2.8	2.6	2.5	2.4	2.2	2.2	2.1
HJ240 90	hyJOIST®		3.7	2.3	1.9	1.6	1.3	1.2	1.1	1.0	0.9
2/150 x 45	hySPAN®		3.8	3.3	3.1	3.0	2.8	2.7	2.6	2.6	2.5
2/HJ200 45	hyJOIST		4.1	2.6	2.2	1.8	1.6	1.3	1.2	1.1	1.0
HJ360 90	hyJOIST		4.3 [■]	2.5 [■]	2.1 [■]	1.9 [■]	1.6 [■]	1.4 [■]	1.3 [■]	1.1 [■]	1.0 [■]
HJ400 90	hyJOIST		4.3 [■]	2.5 [■]	2.1 [■]	1.9 [■]	1.6 [■]	1.4 [■]	1.3 [■]	1.2 [■]	1.1 [■]
2/170 x 45	hySPAN		4.3	3.7	3.5	3.3	3.2	3.1	3.0	2.9	2.8 [■]
HJ300 90	hyJOIST		4.4 [■]	2.7 [■]	2.1 [■]	1.8 [■]	1.5 [■]	1.4 [■]	1.2 [■]	1.1 [■]	1.0 [■]
200 x 90	hy90		4.5	3.9	3.7	3.5	3.4	3.1	3.0	2.8	2.7
2/190 x 45	hyCHORD		4.5	3.9	3.7	3.5	3.4	3.2	3.1	3.0	3.0 [■]
2/200 x 45	hySPAN		4.9	4.4	4.1	3.9	3.8	3.6	3.5 [■]	3.4 [■]	3.3 [■]
2/HJ240 63	hyJOIST		5.0	3.4	2.7	2.3	2.0	1.8	1.6	1.4	1.3
240 x 90	hy90		5.2	4.6	4.4	4.2	4.0	3.8	3.5 [■]	3.3 [■]	3.2 [■]
2/240 x 45	hySPAN		5.6	5.0	4.8	4.7	4.5 [■]	4.4 [■]	4.2 [■]	4.1 [■]	4.0 [■]
2/HJ300 63	hyJOIST		5.8	4.3	3.6	3.0	2.6	2.3	2.1	1.9	1.7
240 x 90	hyONE®		-	-	-	-	4.7 [■]	4.6 [■]	4.5 [■]	4.3 [◇]	4.2 [◇]
300 x 90	hy90		-	-	-	-	-	4.5 [■]	4.3 [■]	4.1 [■]	4.0 [■]
2/HJ360 63	hyJOIST		6.4	5.0 [■]	4.2 [■]	3.5 [■]	3.1 [■]	2.7 [■]	2.4 [■]	2.2 [■]	2.0 [■]
2/300 x 45	hySPAN		6.6	5.9	5.7 [■]	5.5 [■]	5.3 [■]	5.1 [■]	5.0 [◇]	4.7 [◇]	4.5 [◇]
2/360 x 45	hySPAN		7.6	6.8 [■]	6.4 [■]	6.1 [■]	5.9 [■]	5.6 [◇]	5.4 [◇]	5.3 [◇]	5.0 [◇]
2/400 x 45	hySPAN		8.2	7.1 [■]	6.7 [■]	6.4 [■]	6.1 [◇]	5.9 [◇]	5.7 [◇]	5.5 [◇]	5.3 [◇]

- Indicates minimum bearing at intermediate supports = 90 mm
- ◇ Indicates minimum bearing at end supports = 45 mm and intermediate supports = 135 mm
- Minimum bearing at end supports as for NZS 3604 & intermediate supports = 60 mm, except where indicated otherwise

7.3 WALLS

Design Deflection Limits:

DL. SPAN/300 OR 10 mm
LL. SPAN/360 OR 10 mm

TABLE 14: LINTELS – UPPER/SINGLE STOREY

Section D x B (mm)	Product	Light Roof And Ceiling									
		Roof Load Width 'RLW' (m)									
		1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2
Maximum Span (m)											
90 x 45	hyCHORD®	1.7	1.5	1.3	1.2	1.1	1.1	1.0	1.0	0.9	0.8
2/90 x 45	hyCHORD	2.3	2.0	1.8	1.7	1.5	1.5	1.4	1.3	1.3	1.2
140 x 45	hyCHORD	2.7	2.5	2.4	2.3	2.1	2.0	1.8	1.8	1.7	1.6
150 x 45	hySPAN®	3.0	2.8	2.7	2.5	2.4	2.4	2.3	2.1	2.0	2.0
150 x 63	hySPAN	3.2	3.0	2.9	2.7	2.6	2.5	2.5	2.4	2.4	2.3
2/140 x 45	hyCHORD	3.2	3.0	2.8	2.7	2.6	2.5	2.5	2.4	2.4	2.3
150 x 90	hy90®	3.2	3.0	2.9	2.7	2.6	2.5	2.5	2.4	2.4	2.3
170 x 45	hySPAN	3.3	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.4
190 x 45	hyCHORD	3.4	3.2	3.0	2.9	2.8	2.7	2.6	2.5	2.5	2.4
2/150 x 45	hySPAN	3.5	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.6	2.5
200 x 45	hySPAN	3.7	3.5	3.3	3.1	3.0	2.9	2.8	2.8	2.7	2.6
2/170 x 45	hySPAN	3.8	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.8
200 x 63	hySPAN	4.0	3.7	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.9
2/190 x 45	hyCHORD	4.0	3.7	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.9
200 x 90	hy90	4.0	3.7	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.9
240 x 45	hySPAN	4.2	4.0	3.8	3.6	3.5	3.3	3.3	3.2	3.1	3.0
2/200 x 45	hySPAN	4.4	4.1	3.9	3.7	3.6	3.5	3.4	3.3	3.2	3.1
240 x 63	hySPAN	4.6	4.3	4.1	3.9	3.7	3.6	3.5	3.4	3.4	3.3
240 x 90	hy90	4.6	4.3	4.0	3.9	3.7	3.6	3.5	3.4	3.4	3.3
2/240 x 45	hySPAN	5.0	4.7	4.5	4.2	4.1	4.0	3.8	3.7	3.7	3.6
300 x 45	hySPAN	5.0	4.8	4.5	4.2	4.1	4.0	3.8	3.7	3.7	3.6 ■
240 x 90	hyONE®	5.2	4.9	4.7	4.5	4.3	4.1	4.0	3.9	3.8	3.7
300 x 90	hy90	5.3	5.0	4.8	4.6	4.5	4.3	4.2	4.1	4.0	3.9
300 x 63	hySPAN	5.4	5.1	4.8	4.6	4.5	4.3	4.2	4.1	4.0	3.9
360 x 45	hySPAN	5.7	5.3	5.1	4.9	4.8	4.6	4.5	4.3	4.2 ■	4.0 ■
2/300 x 45	hySPAN	5.8	5.4	5.2	5.0	4.9	4.8	4.6	4.5	4.4	4.2

- Indicates minimum bearing at end supports = 90 mm
- Minimum bearing at end supports 45 mm, except where indicated otherwise
- Double sections built-up by vertical lamination – see section 5.4

Design Deflection Limits:

DL. SPAN/300 OR 10 mm
 LL. SPAN/360 OR 10 mm

TABLE 14 CONTINUED: LINTELS – UPPER/SINGLE STOREY

Section D x B (mm)	Product	Heavy Roof And Ceiling									
		Roof Load Width 'RLW' (m)									
		1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2
		Maximum Span (m)									
90 x 45	hyCHORD®	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.9	0.8
2/90 x 45	hyCHORD	1.7	1.5	1.4	1.4	1.3	1.2	1.2	1.2	1.2	1.1
140 x 45	hyCHORD	2.0	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.4	1.3
150 x 45	hySPAN®	2.4	2.2	2.0	1.8	1.7	1.7	1.6	1.5	1.5	1.4
150 x 63	hySPAN	2.6	2.4	2.2	2.0	1.9	1.9	1.8	1.7	1.7	1.6
170 x 45	hySPAN	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.7	1.6
2/140 x 45	hyCHORD	2.6	2.4	2.2	2.0	1.9	1.8	1.8	1.7	1.6	1.6
150 x 90	hy90®	2.6	2.4	2.2	2.0	1.9	1.9	1.8	1.7	1.7	1.6
190 x 45	hyCHORD	2.8	2.6	2.4	2.2	2.1	2.0	1.9	1.8	1.8	1.7
2/150 x 45	hySPAN	2.9	2.6	2.5	2.4	2.2	2.1	2.0	1.9	1.9	1.8
200 x 45	hySPAN	3.0	2.8	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9
2/170 x 45	hySPAN	3.2	3.0	2.8	2.6	2.5	2.4	2.3	2.3	2.2	2.1
200 x 63	hySPAN	3.4	3.1	2.9	2.7	2.6	2.5	2.4	2.4	2.3	2.2
2/190 x 45	hyCHORD	3.4	3.1	2.9	2.7	2.6	2.5	2.4	2.4	2.3	2.2
200 x 90	hy90	3.3	3.1	2.9	2.7	2.6	2.5	2.4	2.4	2.3	2.2
240 x 45	hySPAN	3.5	3.3	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.4
2/200 x 45	hySPAN	3.6	3.4	3.2	3.0	2.9	2.8	2.7	2.6	2.6	2.5
240 x 63	hySPAN	3.8	3.6	3.4	3.2	3.1	3.0	2.9	2.8	2.7	2.6
240 x 90	hy90	3.8	3.6	3.4	3.2	3.1	3.0	2.9	2.8	2.7	2.6
2/240 x 45	hySPAN	4.1	3.8	3.7	3.5	3.4	3.2	3.2	3.1	3.0	2.9
300 x 45	hySPAN	4.1	3.8	3.7	3.5	3.4	3.2	3.1	3.1	3.0	2.9 ■
240 x 90	hyONE®	4.3	4.0	3.8	3.7	3.6	3.4	3.3	3.2	3.1	3.1
300 x 63	hySPAN	4.5	4.2	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2
300 x 90	hy90	4.4	4.2	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2
360 x 45	hySPAN	4.8	4.4	4.2	4.0	3.8	3.8	3.7	3.6	3.5 ■	3.4 ■
2/300 x 45	hySPAN	4.9	4.6	4.3	4.1	4.0	3.8	3.8	3.7	3.6	3.5

- Indicates minimum bearing at end supports = 90 mm
- Minimum bearing at end supports 45 mm, except where indicated otherwise
- Double sections built-up by vertical lamination – see section 5.4

Design Deflection Limits:

DL. SPAN/300 OR 10 mm
LL. SPAN/360 OR 10 mm

TABLE 15: LINTELS – LOWER STOREY

Section D x B (mm)	Product	Light Roof And Ceiling														
		Floor Load Width 'FLW' (m)														
		1.8					2.4					3.0				
		Roof Load Width 'RLW' (m)														
Maximum Span (m)																
		1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6
90 x 45	hyCHORD®	1.2	1.1	1.1	1.0	1.0	1.1	1.0	1.0	1.0	0.9	1.0	1.0	1.0	0.9	0.9
2/90 x 45	hyCHORD	1.5	1.4	1.3	1.3	1.3	1.4	1.3	1.3	1.2	1.2	1.3	1.3	1.2	1.2	1.2
140 x 45	hyCHORD	1.7	1.7	1.6	1.5	1.5	1.6	1.6	1.5	1.5	1.4	1.5	1.5	1.4	1.4	1.4
150 x 45	hySPAN®	2.0	1.9	1.8	1.7	1.7	1.9	1.8	1.7	1.6	1.6	1.8	1.7	1.6	1.6	1.5
150 x 63	hySPAN	2.2	2.1	2.0	1.9	1.9	2.1	2.0	1.9	1.8	1.8	2.0	1.9	1.8	1.8	1.7
170 x 45	hySPAN	2.2	2.1	2.0	1.9	1.9	2.1	2.0	1.9	1.9	1.8	2.0	1.9	1.8	1.8	1.7
2/140 x 45	hyCHORD	2.2	2.1	2.0	1.9	1.9	2.1	2.0	1.9	1.8	1.8	2.0	1.9	1.8	1.8	1.7
150 x 90	hy90®	2.2	2.1	2.0	1.9	1.9	2.1	2.0	1.9	1.8	1.8	2.0	1.9	1.8	1.8	1.7
190 x 45	hyCHORD	2.3	2.2	2.1	2.0	2.0	2.2	2.1	2.0	2.0	1.9	2.1	2.0	1.9	1.9	1.8
2/150 x 45	hySPAN	2.5	2.4	2.3	2.2	2.1	2.3	2.2	2.2	2.1	2.0	2.2	2.1	2.1	2.0	1.9
200 x 45	hySPAN	2.6	2.5	2.4	2.3	2.2	2.5	2.3	2.3	2.2	2.1	2.3	2.2	2.2	2.1	2.0
2/170 x 45	hySPAN	2.8	2.7	2.5	2.4	2.4	2.6	2.5	2.4	2.3	2.3	2.5	2.4	2.3	2.3	2.2
200 x 63	hySPAN	2.9	2.8	2.6	2.5	2.5	2.7	2.6	2.5	2.4	2.4	2.6	2.5	2.4	2.3	2.3
200 x 90	hy90	2.9	2.8	2.6	2.5	2.5	2.7	2.6	2.5	2.4	2.4	2.6	2.5	2.4	2.3	2.3
2/190 x 45	hyCHORD	2.9	2.8	2.7	2.6	2.5	2.8	2.6	2.5	2.5	2.4	2.6	2.5	2.4	2.4	2.3
240 x 45	hySPAN	3.1	3.0	2.8	2.7	2.6	2.9	2.8	2.7	2.6	2.5	2.8	2.7	2.6	2.5	2.4
2/200 x 45	hySPAN	3.2	3.1	3.0	2.9	2.8	3.1	2.9	2.8	2.7	2.7	2.9	2.8	2.7	2.6	2.6
240 x 63	hySPAN	3.4	3.2	3.1	3.0	2.9	3.2	3.1	3.0	2.9	2.8	3.1	3.0	2.9	2.8	2.7
240 x 90	hy90	3.4	3.2	3.1	3.0	2.9	3.2	3.1	3.0	2.9	2.8	3.1	3.0	2.9	2.8	2.7
300 x 45	hySPAN	3.6	3.5	3.4	3.3	3.2	3.5	3.4	3.3	3.2	3.1	3.3	3.3	3.2	3.1	3.0
2/240 x 45	hySPAN	3.7	3.5	3.4	3.3	3.2	3.5	3.4	3.3	3.2	3.1	3.4	3.3	3.2	3.1	3.1
240 x 90	hyONE®	3.8	3.7	3.6	3.5	3.4	3.6	3.5	3.4	3.3	3.3	3.5	3.4	3.3	3.2	3.2
300 x 63	hySPAN	4.0	3.8	3.7	3.6	3.5	3.8	3.7	3.6	3.5	3.4	3.6	3.5	3.4	3.4	3.3
300 x 90	hy90	3.9	3.8	3.7	3.6	3.5	3.8	3.7	3.6	3.5	3.4	3.6	3.5	3.4	3.4	3.3
360 x 45	hySPAN	4.2	4.0	3.9	3.8	3.7	4.0	3.9	3.8	3.7	3.6	3.8	3.7	3.6	3.6	3.5
2/300 x 45	hySPAN	4.3	4.2	4.0	3.9	3.8	4.1	4.0	3.9	3.8	3.7	4.0	3.9	3.8	3.7	3.6

- Indicates minimum bearing at end supports = 90 mm
- Minimum bearing at end supports 45 mm, except where indicated otherwise
- Double sections built-up by vertical lamination – see section 5.4

Design Deflection Limits:

DL. SPAN/300 OR 10 mm
 LL. SPAN/360 OR 10 mm

TABLE 15 CONTINUED: LINTELS – LOWER STOREY

Section D x B (mm)	Product	Heavy Roof And Ceiling														
		Floor Load Width 'FLW' (m)														
		1.8					2.4					3.0				
		Roof Load Width 'RLW' (m)														
Maximum Span (m)																
		1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6	1.8	3.0	4.2	5.4	6.6
90 x 45	hyCHORD®	1.1	1.0	0.9	0.9	0.8	1.0	0.9	0.9	0.8	0.8	1.0	0.9	0.9	0.8	0.8
2/90 x 45	hyCHORD	1.4	1.2	1.2	1.1	1.1	1.3	1.2	1.1	1.1	1.0	1.2	1.2	1.1	1.0	1.0
140 x 45	hyCHORD	1.6	1.5	1.4	1.3	1.2	1.5	1.4	1.3	1.3	1.2	1.4	1.4	1.3	1.2	1.2
150 x 45	hySPAN®	1.8	1.7	1.5	1.5	1.4	1.7	1.6	1.5	1.4	1.4	1.6	1.5	1.5	1.4	1.3
150 x 63	hySPAN	2.0	1.8	1.7	1.6	1.6	1.9	1.8	1.7	1.6	1.5	1.8	1.7	1.6	1.5	1.5
170 x 45	hySPAN	2.0	1.9	1.7	1.7	1.6	1.9	1.8	1.7	1.6	1.5	1.9	1.7	1.6	1.6	1.5
2/140 x 45	hyCHORD	2.0	1.8	1.7	1.6	1.6	1.9	1.8	1.7	1.6	1.5	1.8	1.7	1.6	1.5	1.5
150 x 90	hy90®	2.0	1.8	1.7	1.6	1.6	1.9	1.8	1.7	1.6	1.5	1.8	1.7	1.6	1.5	1.5
190 x 45	hyCHORD	2.1	2.0	1.8	1.7	1.7	2.0	1.9	1.8	1.7	1.6	1.9	1.8	1.7	1.6	1.6
2/150 x 45	hySPAN	2.3	2.1	2.0	1.8	1.8	2.2	2.0	1.9	1.8	1.7	2.1	1.9	1.8	1.8	1.7
200 x 45	hySPAN	2.4	2.2	2.1	1.9	1.8	2.3	2.1	2.0	1.9	1.8	2.2	2.0	1.9	1.8	1.8
2/170 x 45	hySPAN	2.6	2.4	2.2	2.1	2.0	2.4	2.3	2.1	2.0	1.9	2.3	2.2	2.1	2.0	1.9
200 x 63	hySPAN	2.7	2.4	2.3	2.2	2.1	2.5	2.4	2.2	2.1	2.0	2.4	2.3	2.2	2.1	2.0
2/190 x 45	hyCHORD	2.7	2.5	2.3	2.2	2.1	2.6	2.4	2.2	2.1	2.0	2.4	2.3	2.2	2.1	2.0
200 x 90	hy90	2.7	2.4	2.3	2.2	2.1	2.5	2.4	2.2	2.1	2.0	2.4	2.3	2.2	2.1	2.0
240 x 45	hySPAN	2.9	2.6	2.5	2.3	2.2	2.7	2.5	2.4	2.3	2.2	2.6	2.4	2.3	2.2	2.1
2/200 x 45	hySPAN	3.0	2.8	2.6	2.4	2.3	2.9	2.7	2.5	2.4	2.3	2.7	2.6	2.4	2.3	2.2
240 x 63	hySPAN	3.1	2.9	2.7	2.6	2.5	3.0	2.8	2.7	2.5	2.4	2.9	2.7	2.6	2.5	2.4
240 x 90	hy90	3.1	2.9	2.7	2.6	2.5	3.0	2.8	2.7	2.5	2.4	2.9	2.7	2.6	2.5	2.4
2/240 x 45	hySPAN	3.4	3.2	3.1	2.9	2.8	3.3	3.1	3.0	2.8	2.7	3.2	3.0	2.9	2.8	2.7
300 x 45	hySPAN	3.4	3.2	3.0	2.9	2.8	3.3	3.1	3.0	2.8	2.7	3.2	3.0	2.9	2.7	2.6
240 x 90	hyONE®	3.6	3.4	3.2	3.1	2.9	3.4	3.3	3.1	3.0	2.9	3.3	3.2	3.0	2.9	2.8
300 x 63	hySPAN	3.7	3.5	3.3	3.2	3.1	3.6	3.4	3.2	3.1	3.0	3.5	3.3	3.2	3.1	2.9
300 x 90	hy90	3.7	3.5	3.3	3.2	3.1	3.6	3.4	3.2	3.1	3.0	3.5	3.3	3.2	3.1	2.9
360 x 45	hySPAN	3.9	3.7	3.5	3.3	3.2	3.8	3.6	3.4	3.3	3.2	3.6	3.5	3.3	3.2	3.1
2/300 x 45	hySPAN	4.0	3.8	3.6	3.5	3.3	3.9	3.7	3.5	3.4	3.3	3.8	3.6	3.5	3.3	3.2

- Indicates minimum bearing at end supports = 90 mm
- Minimum bearing at end supports 45 mm, except where indicated otherwise
- Double sections built-up by vertical lamination – see section 5.4

7.4 CEILING JOISTS

Design Deflection Limits:

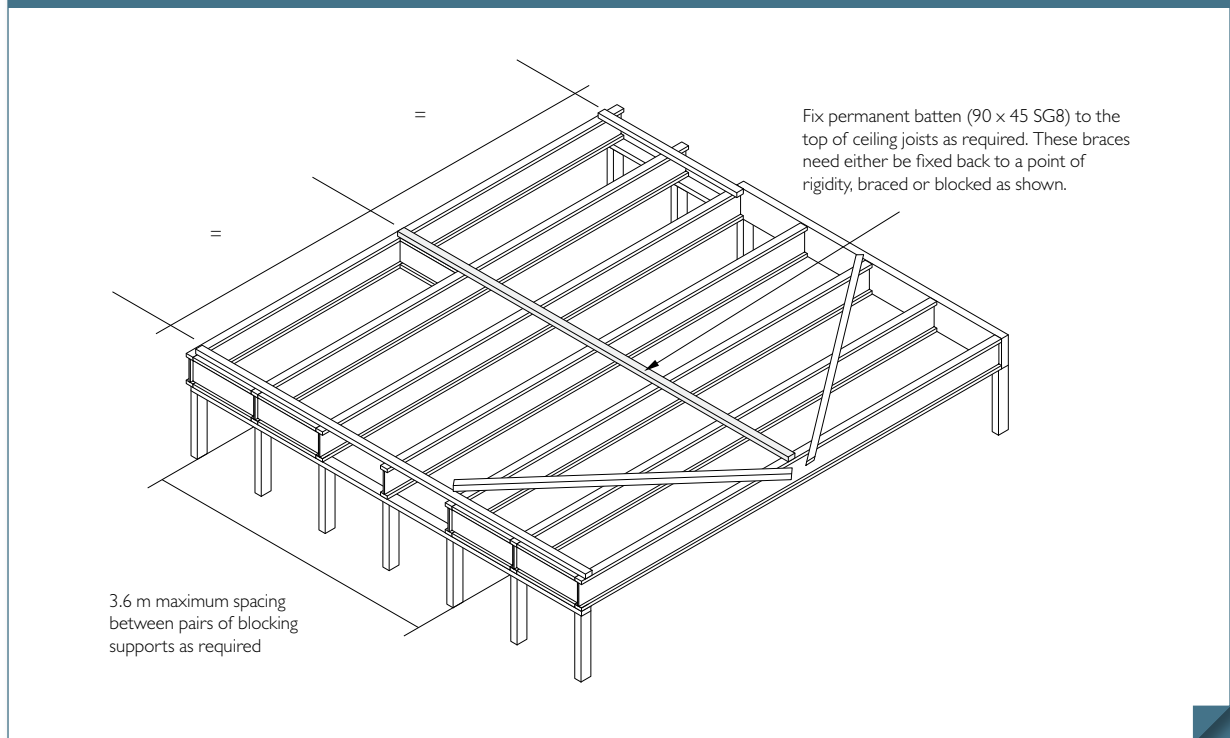
DL
SPAN/400
OR 12 mm

TABLE 16: CEILING JOISTS

Section D x B (mm)	Product	Cross Section	Single Span				Continuous Span			
			Joist Spacing (mm)							
			450	600	900	1200	450	600	900	1200
90 x 45	hyCHORD®		2.6	2.6	2.6	2.4	3.0	3.0	3.0	3.0
140 x 45	hyCHORD		4.7 [■]	4.4 [■]	4.0 [■]	3.7 [■]	-	-	-	-
150 x 45	hySPAN®		5.2 [■]	4.9 [■]	4.5 [■]	4.2 [■]	6.4 [■]	6.1 [■]	5.7 [■]	5.4 [■]
170 x 45	hySPAN		5.6 [■]	5.3 [■]	5.0 [■]	4.7 [■]	7.0 [■]	6.7 [■]	6.2 [■]	5.9 [■]
190 x 45	hyCHORD		5.7 ^{*■}	5.5 ^{*■}	5.1 ^{*■}	4.9 ^{*■}	-	-	-	-
HJ200 45	hyJOIST®		5.8 [■]	5.5 [■]	5.0 [■]	4.8 [■]	6.7 [■]	6.3 [■]	5.8 [■]	5.5 [■]
200 x 45	hySPAN		6.2 ^{*■}	5.9 ^{*■}	5.6 ^{*■}	5.3 ^{*■}	7.7 ^{*■}	7.4 ^{*■}	6.9 ^{*■}	6.6 ^{*■}
200 x 63	hySPAN		6.5	6.2	5.9	5.6	8.1	7.8	7.3	7.0
240 x 45	hySPAN		7.0 ^{*■}	6.7 ^{*■}	6.3 ^{*■}	6.0 ^{*■}	8.7 ^{*■}	8.3 ^{*■}	7.8 ^{*■}	7.4 ^{*■}
HJ240 63	hyJOIST		7.2 [■]	6.8 [■]	6.3 [■]	5.9 [■]	-	8.4 [■]	7.7 [■]	7.2 [■]
HJ300 63	hyJOIST		7.3 [■]	6.9 [■]	6.3 [■]	6.1 [■]	8.6 [■]	8.1 [■]	7.4 [■]	7.2 [■]
HJ240 90	hyJOIST		7.6 [■]	7.3 [■]	6.8 [■]	6.4 [■]	-	-	8.3 [■]	7.9 [■]
HJ300 90	hyJOIST		8.6 [■]	8.2 [■]	7.7 [■]	7.3 [■]	-	-	-	-

- Indicates that a permanent batten should be fixed at mid span to the top of all joists and braced back to a point of rigidity to prevent roll over under construction and maintenance loads – see figure 18
- * Indicates ceiling joists not fixed to rafters should be blocked at supports to prevent roll over – see figure 18
- Mass of ceiling lining and battens not to exceed 15 kg/m²

Figure 18: Ceiling Joists (hySPAN® similar showing hyJOIST below)





7.5 HANGING BEAMS

Design Deflection Limits:

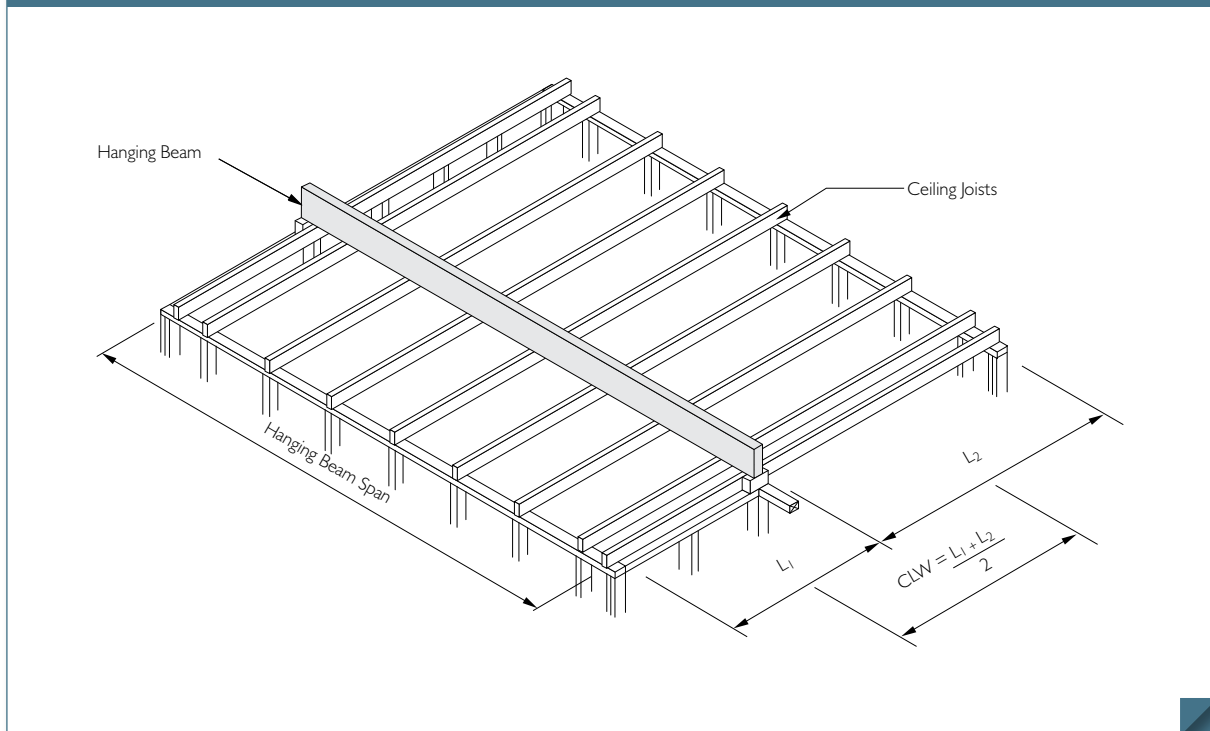
DL.	L.L.
SPAN/300	SPAN/270
OR 20 mm	OR 50mm

TABLE 17: HANGING BEAMS

Section D x B (mm)	Product	Ceiling Load Width 'CLW' (m)									
		1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.6	4.2	4.8
		Maximum Span (m)									
90 x 45	hyCHORD®	2.0	2.0	2.0	1.9	1.8	1.8	1.7	1.6	1.5	1.4
140 x 45	hyCHORD	3.6	3.4	3.1	3.0	2.8	2.7	2.6	2.4	2.3	2.1
150 x 45	hySPAN®	4.1	3.8	3.6	3.4	3.2	3.1	3.0	2.8	2.6	2.4
150 x 63	hySPAN	4.5	4.2	4.0	3.8	3.6	3.4	3.3	3.1	2.9	2.7
170 x 45	hySPAN	4.6	4.3	4.0	3.8	3.6	3.5	3.4	3.1	2.9	2.8
190 x 45	hyCHORD	4.8	4.5	4.2	4.0	3.8	3.7	3.5	3.3	3.1	2.9
200 x 45	hySPAN	5.4	5.0	4.7	4.5	4.3	4.1	3.9	3.7	3.4	3.2
200 x 63	hySPAN	5.9	5.5	5.2	4.9	4.7	4.5	4.4	4.1	3.8	3.6
240 x 45	hySPAN	6.3	6.0	5.6	5.3	5.1	4.9	4.7	4.4	4.1	3.9
240 x 63	hySPAN	6.7	6.4	6.1	5.9	5.6	5.4	5.2	4.9	4.6	4.3
300 x 45	hySPAN	7.3	7.0	6.7	6.5	6.2	6.0	5.8	5.4	5.1	4.8
300 x 63	hySPAN	7.8	7.5	7.2	6.9	6.7	6.5	6.3	6.0	5.7	5.4

- Mass of ceiling lining, battens and ceiling joists not to exceed 20 kg/m²
- Minimum bearing at end supports 30 mm

Figure 19: Hanging Beams



7.6 HIP OR VALLEY RAFTERS

Design Deflection Limits:

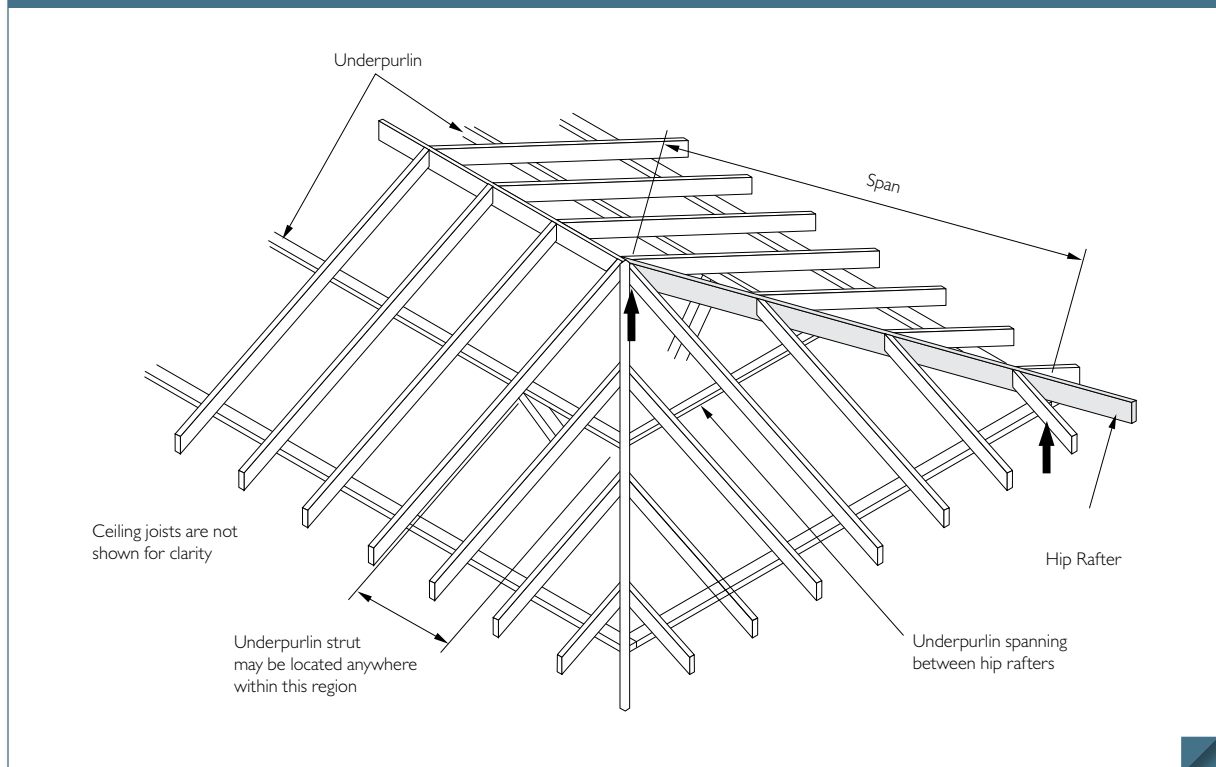
DL	LL
SPAN/300	SPAN/250
OR 20 mm	OR 20 mm

TABLE 18: HIP RAFTERS – SUPPORTING RAFTERS AND UNDERPURLINS

Section D x B (mm)	Product	Light Roof	Heavy Roof
		Maximum Hip Rafter Span (m)	
150 x 45	hySPAN®	3.5	2.7
170 x 45	hySPAN	3.8	3.0
200 x 45	hySPAN	4.3	3.3
240 x 45	hySPAN	4.8	3.8
240 x 63	hySPAN	5.4	4.2
300 x 45	hySPAN	5.1	4.5
300 x 63	hySPAN	6.3	4.9
360 x 45	hySPAN	5.4	5.2
360 x 63	hySPAN	7.0	5.7
400 x 45	hySPAN	5.5	5.6
400 x 63	hySPAN	7.4	6.1

- See Table 7 for Roof Mass Allowances

Figure 20: Supporting Rafters and Underpurlins





7.6 HIP OR VALLEY RAFTERS CONTINUED

Figure 21: Single Span Hip Rafter

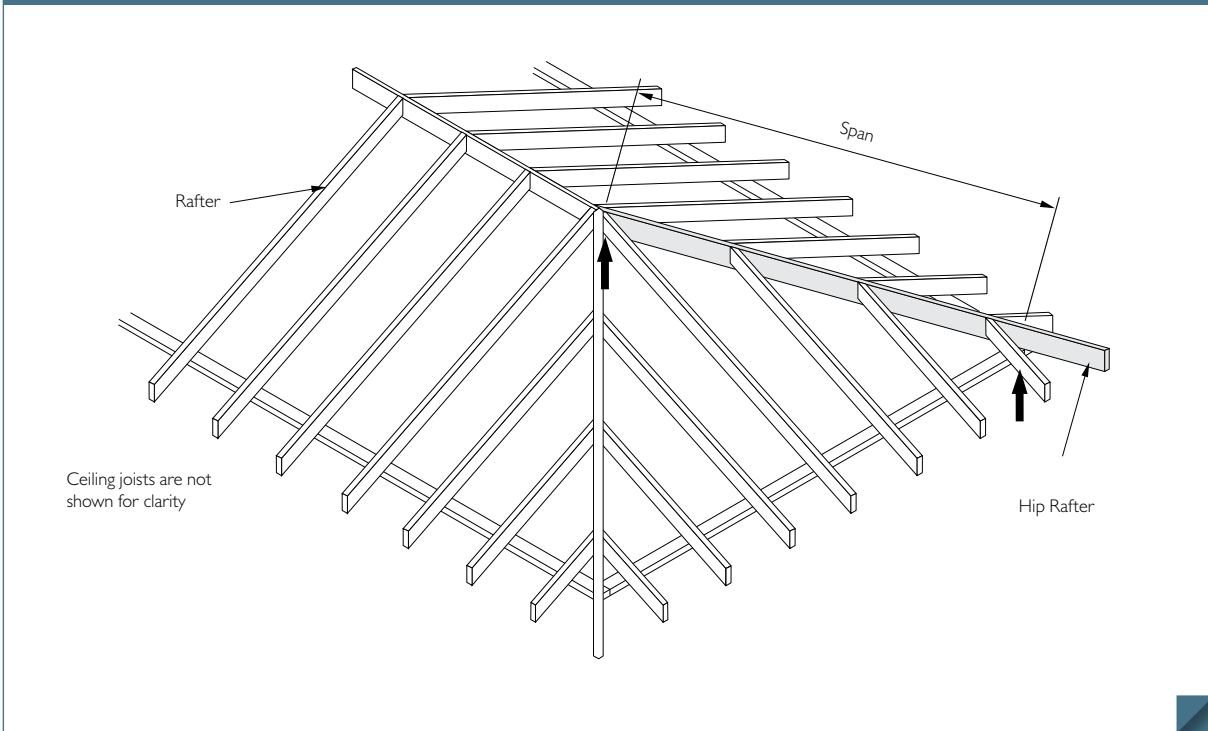
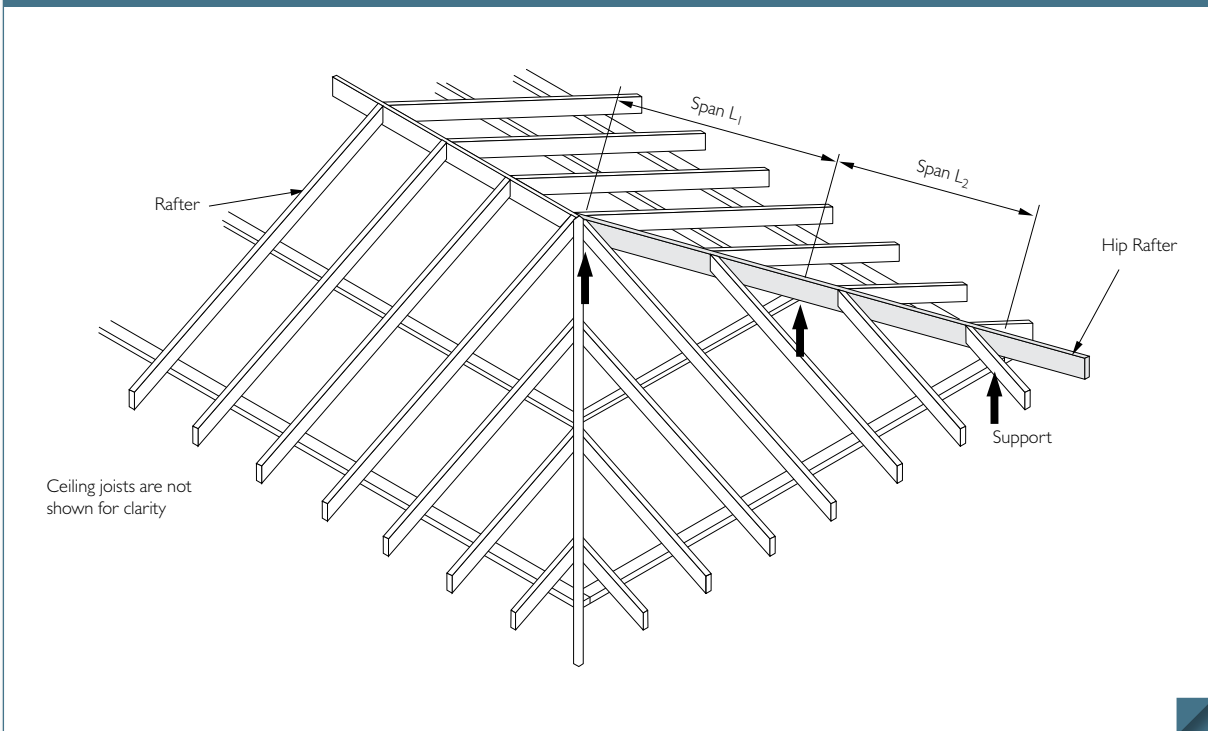


Figure 22: Continuous Span Hip Rafter



Notes

- Use the largest span (L_1 or L_2) to enter the table
- The largest span should not be greater than twice the adjacent span otherwise use the single span table

Design Deflection Limits:

DL	LL
SPAN/300	SPAN/250
OR 20 mm	OR 20 mm

TABLE 19: HIP RAFTERS – SUPPORTING RAFTERS ONLY

Section D x B (mm)	Product	Light Roof	Light Roof & Ceiling	Heavy Roof	Heavy Roof & Ceiling
		Maximum Single Span (m)			
150 x 45	hySPAN®	3.7	3.4	2.9	2.8
170 x 45	hySPAN	4.1	3.7	3.2	3.1
200 x 45	hySPAN	4.6	4.2	3.6	3.5
240 x 45	hySPAN	5.3	4.8	4.2	4.0
240 x 63	hySPAN	5.7	5.2	4.5	4.3
300 x 45	hySPAN	6.0	5.7	4.9	4.7
300 x 63	hySPAN	6.5	6.1	5.3	5.1
360 x 45	hySPAN	6.3	5.9	5.7	5.4
360 x 63	hySPAN	7.3	6.8	6.1	5.9
400 x 45	hySPAN	6.5	6.1	6.1	5.9
400 x 63	hySPAN	7.7	7.2	6.5	6.3
Maximum Continuous Span (m)					
150 x 45	hySPAN	4.7	4.2	3.7	3.5
170 x 45	hySPAN	5.1	4.6	4.0	3.9
200 x 45	hySPAN	5.8	5.2	4.6	4.4
240 x 45	hySPAN	6.2	6.0	5.2	5.0
240 x 63	hySPAN	6.9	6.4	5.7	5.4
300 x 45	hySPAN	6.7	6.4	6.1	5.8
300 x 63	hySPAN	7.8	7.3	6.5	6.3
360 x 45	hySPAN	7.1	6.8	6.4	6.2
360 x 63	hySPAN	8.7	8.1	7.3	7.0
400 x 45	hySPAN	7.3	7.0	6.7	6.5
400 x 63	hySPAN	-	8.6	7.7	7.5

- See Table 7 for Roof Mass Allowances

7.7 RAFTERS

Figure 23: Single Span Rafter

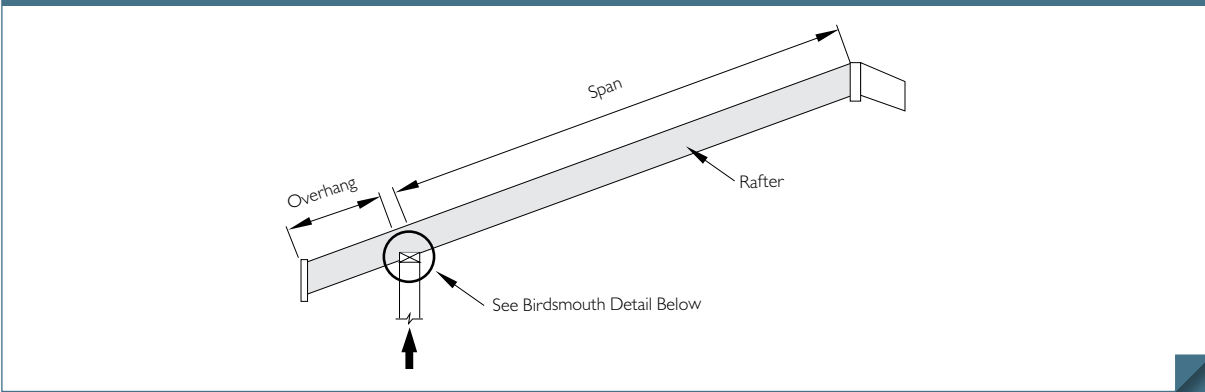
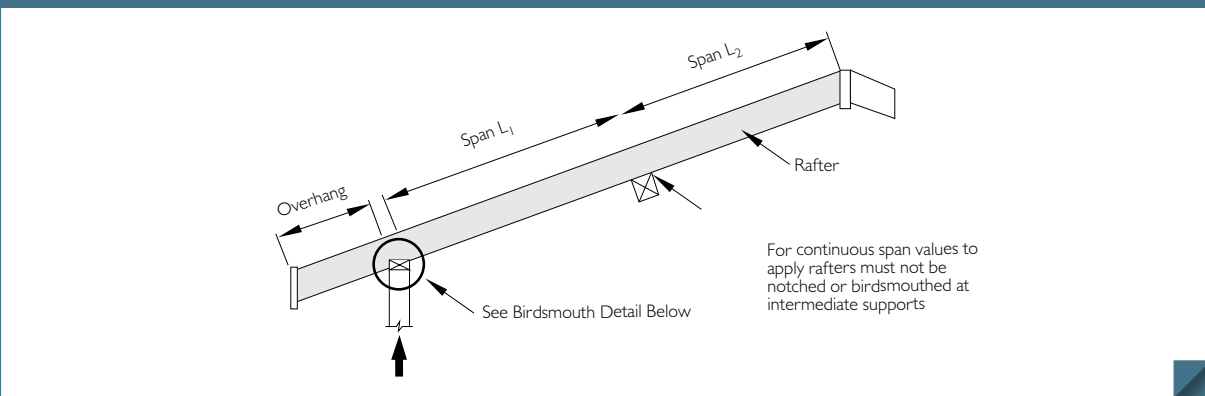


Figure 24: Continuous Span Rafter



The largest span of L_1 and L_2 should be selected for entering the table, however the largest span should not be greater than twice

the adjacent span otherwise use the single span table.

Figure 25: Overhangs – Solid Futurebuild LVL Products

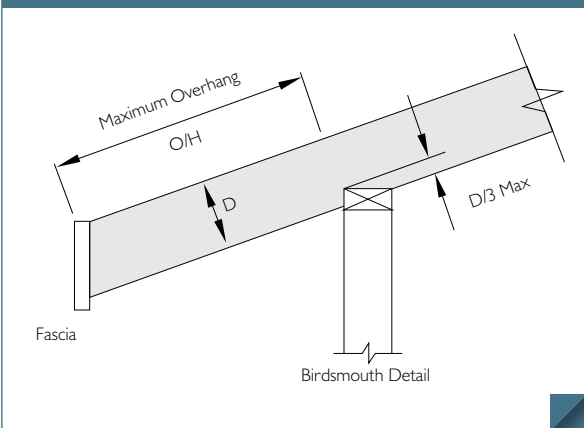
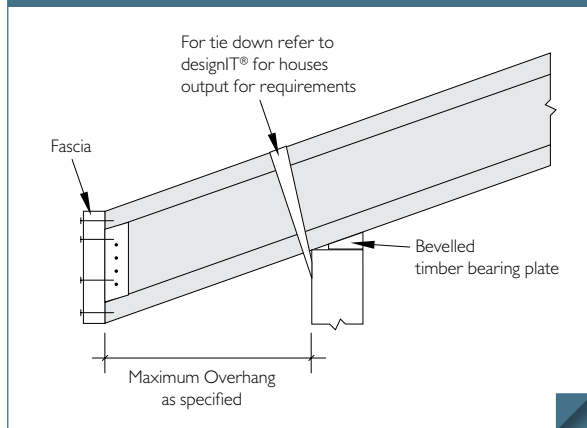


Figure 26: Rafter Overhang – hyJOIST® I-Beams



Refer to designIT® for houses software for alternative hyJOIST® overhang details.

7.8 RAFTER SPAN TABLES

Design Deflection Limits:

DL. SPAN/300 OR 20 mm
LL. SPAN/250 OR 20 mm

TABLE 20A: RAFTERS – LOW AND MEDIUM WIND EXPOSURE

Section D x B (mm)	Product	Cross Section	Single Span								Continuous Span							
			450		600		900		1200		450		600		900		1200	
			Maximum Rafter Span and Overhang 'O/H' (m) for Light Roofs and Ceilings = 40 kg/m'															
Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	
90 x 45	hyCHORD®	■	2.7	0.7	2.4	0.7	2.2	0.6	2.0	0.6	3.1	0.7	3.0	0.6	2.8	0.6	2.6	0.6
140 x 45	hyCHORD	■	4.0	1.1	3.7	1.0	3.3	1.0	3.0	1.0	-	-	-	-	4.4	0.9	4.1	0.9
150 x 45	hySPAN®	■	4.6	1.3	4.2	1.2	3.8	1.1	3.4	1.2	6.1	1.1	5.7	1.0	5.0	1.0	4.6	1.0
150 x 63	hySPAN	■	5.0	1.5	4.6	1.4	4.2	1.3	3.8	1.3	6.5	1.3	6.2	1.2	5.6	1.1	5.1	1.1
170 x 45	hySPAN	■	5.2	1.5	4.8	1.3	4.2	1.3	3.9	1.3	6.7	1.3	6.3	1.2	5.7	1.1	5.2	1.2
190 x 45	hyCHORD	■	5.4	1.5	5.0	1.4	4.4	1.4	4.1	1.3	-	-	-	-	-	-	-	-
HJ200 45	hyJOIST®	I	5.6	1.4	5.1	1.4	4.4	1.3	4.0	1.3	7.0	1.3	6.5	1.2	5.8	1.2	4.8	1.2
200 x 45	hySPAN	■	6.0	1.7	5.6	1.6	5.0	1.5	4.6	1.5	7.5	1.6	7.1	1.4	6.5	1.3	6.1	1.4
200 x 63	hySPAN	■	6.4	2.0	6.0	1.8	5.5	1.7	5.0	1.7	7.9	1.8	7.5	1.6	7.0	1.5	6.5	1.6
240 x 45	hySPAN	■	6.8	2.1	6.4	1.9	5.9	1.8	5.4	1.9	8.5	1.9	8.0	1.8	7.4	1.7	6.9	1.6
HJ240 63	hyJOIST	I	6.8	1.9	6.3	1.8	5.7	1.7	5.2	1.7	8.3	1.8	7.8	1.7	7.0	1.6	6.2	1.6
240 x 63	hySPAN	■	7.2	2.4	6.9	2.2	6.3	2.1	6.0	2.0	-	-	8.5	2.0	7.9	1.9	7.5	1.8
HJ240 90	hyJOIST	I	7.3	2.3	6.9	2.1	6.3	2.0	5.9	1.9	-	-	8.5	1.9	7.7	1.8	7.2	1.8
HJ300 63	hyJOIST	I	7.7	2.4	7.2	2.2	6.6	2.1	6.1	2.0	-	-	-	-	8.0	1.9	7.4	1.9
300 x 45	hySPAN	■	7.9	2.8	7.5	2.5	6.9	2.3	6.5	2.3	-	-	-	-	8.6	2.1	8.1	2.1
300 x 63	hySPAN	■	8.3	3.2	8.0	2.9	7.4	2.7	7.0	2.6	-	-	-	-	-	-	8.7	2.4
HJ300 90	hyJOIST	I	8.3	2.8	7.8	2.6	7.2	2.4	6.7	2.3	-	-	-	-	-	-	8.2	2.2

TABLE 20B: RAFTERS – LOW AND MEDIUM WIND EXPOSURE

Section D x B (mm)	Product	Cross Section	Single Span								Continuous Span							
			450		600		900		1200		450		600		900		1200	
			Maximum Rafter Span and Overhang 'O/H' (m) for Heavy Roofs and Ceilings = 90 kg/m'															
Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	
90 x 45	hyCHORD®	■	2.1	0.8	1.9	0.8	1.7	0.7	1.5	0.7	2.8	0.7	2.5	0.7	2.2	0.6	2.0	0.6
140 x 45	hyCHORD	■	3.2	1.3	2.9	1.2	2.6	1.1	2.3	1.1	4.3	1.1	3.9	1.0	3.5	1.0	3.1	1.0
150 x 45	hySPAN®	■	3.6	1.4	3.3	1.3	2.9	1.3	2.7	1.2	4.9	1.3	4.5	1.2	3.9	1.1	3.6	1.1
150 x 63	hySPAN	■	4.0	1.6	3.7	1.5	3.3	1.4	3.0	1.4	5.4	1.4	4.9	1.3	4.4	1.3	4.0	1.2
170 x 45	hySPAN	■	4.1	1.6	3.8	1.5	3.3	1.4	3.0	1.4	5.5	1.4	5.0	1.3	4.4	1.3	4.1	1.2
190 x 45	hyCHORD	■	4.3	1.7	3.9	1.6	3.5	1.5	3.2	1.5	-	-	-	-	4.7	1.3	4.3	1.3
HJ200 45	hyJOIST®	I	4.3	1.6	3.8	1.5	3.3	1.4	3.0	1.4	5.6	1.4	5.0	1.4	4.2	1.3	3.2	1.4
200 x 45	hySPAN	■	4.8	1.9	4.4	1.8	3.9	1.7	3.5	1.6	6.3	1.7	5.9	1.6	5.2	1.5	4.8	1.5
200 x 63	hySPAN	■	5.3	2.2	4.9	2.0	4.3	1.9	3.9	1.8	6.8	1.9	6.4	1.8	5.8	1.7	5.3	1.6
HJ240 63	hyJOIST	I	5.5	2.1	4.9	2.0	4.3	1.9	3.8	1.8	6.8	1.9	6.3	1.8	5.5	1.7	4.2	1.8
240 x 45	hySPAN	■	5.7	2.3	5.2	2.1	4.6	2.0	4.2	2.0	7.2	2.1	6.8	1.9	6.2	1.8	5.7	1.7
HJ240 90	hyJOIST	I	6.1	2.4	5.6	2.3	4.9	2.2	4.4	2.1	7.5	2.2	7.0	2.1	6.3	2.0	5.5	2.0
240 x 63	hySPAN	■	6.2	2.6	5.8	2.4	5.1	2.3	4.7	2.2	7.7	2.4	7.3	2.2	6.7	2.0	6.2	2.1
HJ300 63	hyJOIST	I	6.4	2.6	5.9	2.4	5.1	2.3	4.6	2.2	7.8	2.4	7.2	2.2	6.4	2.1	5.6	2.1
300 x 45	hySPAN	■	6.8	2.9	6.4	2.7	5.8	2.5	5.3	2.4	8.4	2.7	7.9	2.4	7.3	2.3	6.8	2.2
HJ300 90	hyJOIST	I	7.0	3.0	6.5	2.8	5.9	2.6	5.3	2.5	8.5	2.8	7.9	2.6	7.1	2.4	6.4	2.4
300 x 63	hySPAN	■	7.2	3.4	6.8	3.1	6.3	2.8	5.8	2.8	-	-	8.5	2.8	7.8	2.6	7.3	2.5

The following notes relate to TABLE 20A and TABLE 20B.

- Maximum overhangs (O/H) have been determined for the support conditions and a minimum backspan of twice O/H
- Bottom edge to be restrained by ceiling or ceiling battens at maximum 600 c/c

Design Deflection Limits:

DL. SPAN/300 OR 20 mm
 LL. SPAN/250 OR 20 mm

TABLE 21A: RAFTERS – HIGH AND VERY HIGH WIND EXPOSURE

Section D x B (mm)	Product	Cross Section	Single Span								Continuous Span								
			450		600		900		1200		450		600		900		1200		
			Maximum Rafter Span and Overhang 'O/H' (m) for Light Roofs and Ceilings = 40 kg/m ²																
Span		O/H		Span		O/H		Span		O/H		Span		O/H		Span		O/H	
90 x 45	hyCHORD®	■	2.7	0.7	2.4	0.7	2.2	0.6	2.0	0.6	3.1	0.7	3.0	0.6	2.8	0.6	2.6	0.6	
140 x 45	hyCHORD	■	4.0	1.1	3.7	1.0	3.3	1.0	3.0	1.0	-	-	-	-	4.4	0.9	4.1	0.9	
150 x 45	hySPAN®	■	4.6	1.3	4.2	1.2	3.8	1.1	3.4	1.2	6.1	1.1	5.7	1.0	5.0	1.0	4.6	1.0	
150 x 63	hySPAN	■	5.0	1.5	4.6	1.4	4.2	1.3	3.8	1.3	6.5	1.3	6.2	1.2	5.6	1.1	5.1	1.1	
170 x 45	hySPAN	■	5.2	1.5	4.8	1.3	4.2	1.3	3.9	1.2	6.7	1.3	6.3	1.2	5.7	1.1	5.2	1.2	
190 x 45	hyCHORD	■	5.4	1.5	5.0	1.4	4.4	1.4	4.1	1.3	-	-	-	-	-	-	-	-	
HJ200 45	hyJOIST®	■	5.6	1.4	5.1	1.4	4.4	1.3	4.0	1.3	7.0	1.3	6.5	1.2	5.8	1.2	4.8	1.2	
200 x 45	hySPAN	■	6.0	1.7	5.6	1.6	5.0	1.5	4.6	1.4	7.5	1.6	7.1	1.4	6.5	1.3	6.1	1.4	
200 x 63	hySPAN	■	6.4	2.0	6.0	1.8	5.5	1.7	5.0	1.7	7.9	1.8	7.5	1.6	7.0	1.5	6.5	1.6	
240 x 45	hySPAN	■	6.8	2.1	6.4	1.9	5.9	1.8	5.4	1.7	8.5	1.9	8.0	1.8	7.4	1.7	6.9	1.6	
HJ240 63	hyJOIST	■	6.8	1.9	6.3	1.8	5.7	1.7	5.2	1.7	8.3	1.8	7.8	1.7	7.0	1.6	6.2	1.6	
240 x 63	hySPAN	■	7.2	2.4	6.9	2.2	6.3	2.1	6.0	2.0	-	-	8.5	2.0	7.9	1.9	7.5	1.8	
HJ240 90	hyJOIST	■	7.3	2.3	6.9	2.1	6.3	2.0	5.9	1.9	-	-	8.5	1.9	7.7	1.8	7.2	1.8	
HJ300 63	hyJOIST	■	7.7	2.4	7.2	2.2	6.6	2.1	6.1	2.0	-	-	-	-	8.0	1.9	7.4	1.9	
300 x 45	hySPAN	■	7.9	2.8	7.5	2.5	6.9	2.3	6.5	2.0	-	-	-	-	8.6	2.1	8.1	2.0	
300 x 63	hySPAN	■	8.3	3.2	8.0	2.9	7.4	2.7	7.0	2.5	-	-	-	-	-	-	8.7	2.4	
HJ300 90	hyJOIST	■	8.3	2.8	7.8	2.6	7.2	2.4	6.7	2.3	-	-	-	-	-	-	8.2	2.2	

TABLE 21B: RAFTERS – HIGH AND VERY HIGH WIND EXPOSURE

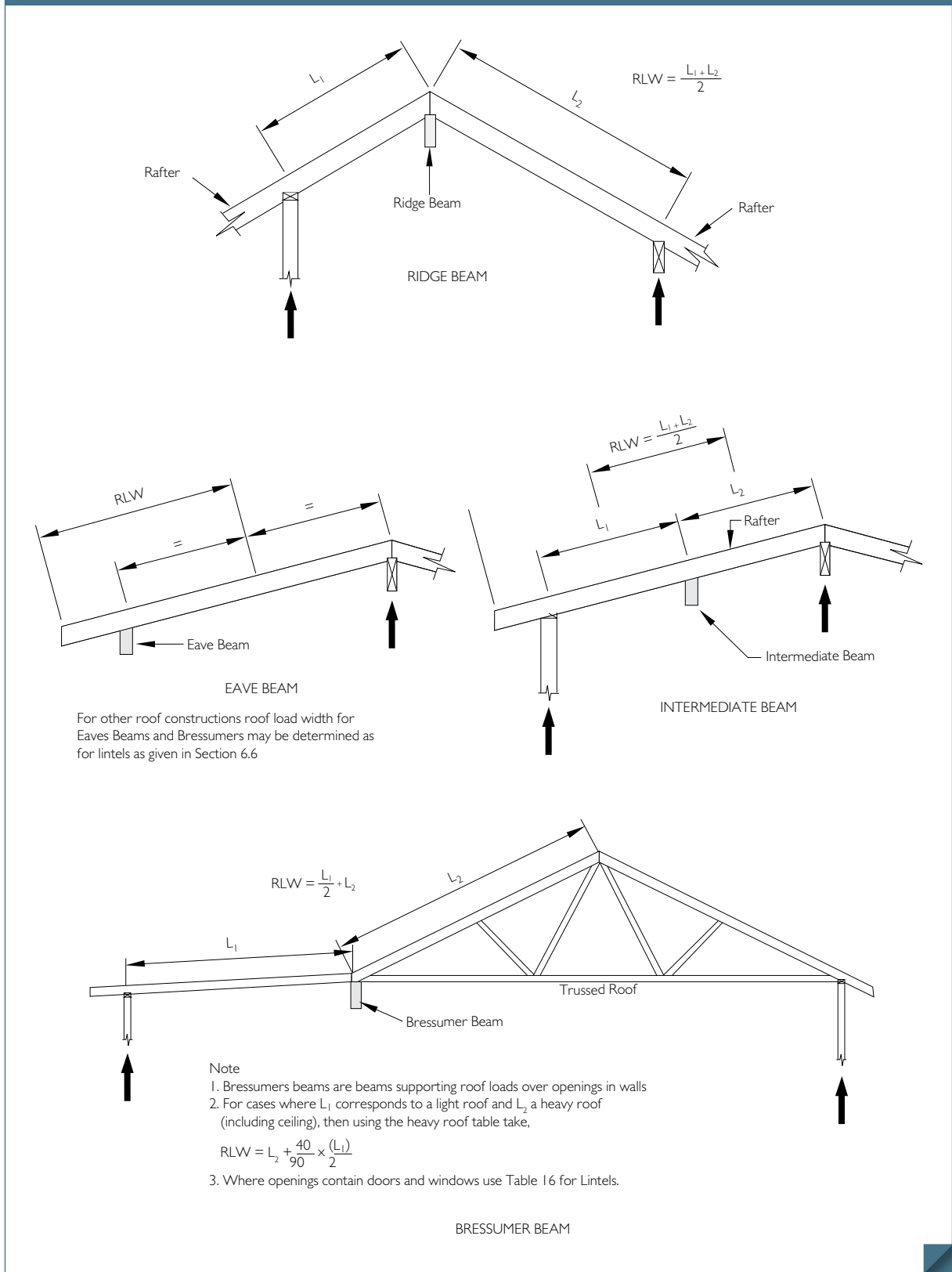
Section D x B (mm)	Product	Cross Section	Single Span								Continuous Span								
			450		600		900		1200		450		600		900		1200		
			Maximum Rafter Span and Overhang 'O/H' (m) for Heavy Roofs and Ceilings = 90 kg/m ²																
Span		O/H		Span		O/H		Span		O/H		Span		O/H		Span		O/H	
90 x 45	hyCHORD®	■	2.1	0.8	1.9	0.8	1.7	0.7	1.5	0.7	2.8	0.7	2.5	0.7	2.2	0.6	2.0	0.6	
140 x 45	hyCHORD	■	3.2	1.3	2.9	1.2	2.6	1.1	2.3	1.1	4.3	1.1	3.9	1.0	3.5	1.0	3.1	1.0	
150 x 45	hySPAN®	■	3.6	1.4	3.3	1.3	2.9	1.3	2.7	1.2	4.9	1.3	4.5	1.2	3.9	1.1	3.6	1.1	
150 x 63	hySPAN	■	4.0	1.6	3.7	1.5	3.3	1.4	3.0	1.4	5.4	1.4	4.9	1.3	4.4	1.3	4.0	1.2	
170 x 45	hySPAN	■	4.1	1.6	3.8	1.5	3.3	1.4	3.0	1.4	5.5	1.4	5.0	1.3	4.4	1.3	4.1	1.2	
190 x 45	hyCHORD	■	4.3	1.7	3.9	1.6	3.5	1.5	3.2	1.5	-	-	-	-	4.7	1.3	4.3	1.3	
HJ200 45	hyJOIST®	■	4.3	1.6	3.8	1.5	3.3	1.4	3.0	1.4	5.6	1.4	5.0	1.4	4.2	1.3	3.2	1.4	
200 x 45	hySPAN	■	4.8	1.9	4.4	1.8	3.9	1.7	3.5	1.6	6.3	1.7	5.9	1.6	5.2	1.5	4.8	1.5	
200 x 63	hySPAN	■	5.3	2.2	4.9	2.0	4.3	1.9	3.9	1.8	6.8	1.9	6.4	1.8	5.8	1.7	5.3	1.6	
HJ240 63	hyJOIST	■	5.5	2.1	4.9	2.0	4.3	1.9	3.8	1.8	6.8	1.9	6.3	1.8	5.5	1.7	4.2	1.7	
240 x 45	hySPAN	■	5.7	2.3	5.2	2.1	4.6	2.0	4.2	1.9	7.2	2.1	6.8	1.9	6.2	1.8	5.7	1.7	
HJ240 90	hyJOIST	■	6.1	2.4	5.6	2.3	4.9	2.2	4.4	2.0	7.5	2.2	7.0	2.1	6.3	2.0	5.5	2.0	
240 x 63	hySPAN	■	6.2	2.6	5.8	2.4	5.1	2.3	4.7	2.2	7.7	2.4	7.3	2.2	6.7	2.0	6.2	2.1	
HJ300 63	hyJOIST	■	6.4	2.6	5.9	2.4	5.1	2.3	4.6	2.1	7.8	2.4	7.2	2.2	6.4	2.1	5.6	2.0	
300 x 45	hySPAN	■	6.8	2.9	6.4	2.7	5.8	2.5	5.3	2.3	8.4	2.7	7.9	2.4	7.3	2.3	6.8	2.2	
HJ300 90	hyJOIST	■	7.0	3.0	6.5	2.8	5.9	2.6	5.3	2.3	8.5	2.8	7.9	2.6	7.1	2.4	6.4	2.3	
300 x 63	hySPAN	■	7.2	3.3	6.8	3.1	6.3	2.8	5.8	2.6	-	-	8.5	2.8	7.8	2.6	7.3	2.5	

The following notes relate to TABLE 21A and TABLE 21B.

- Maximum overhangs (O/H) have been determined for the support conditions and a minimum backspan of twice O/H
- Bottom edge to be restrained by ceiling or ceiling battens at maximum 600 c/c

7.9 ROOF BEAMS

Figure 27: Ridge, Intermediate, Eave and Bressumer Beams



Design Deflection Limits:

DL. SPAN/300 OR 20 mm
 LL. SPAN/250 OR 20 mm

TABLE 22A: ROOF BEAMS

Section D x B (mm)	Product	Light Roof and Ceiling											
		Roof Load Width 'RLW' (m)											
		1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.8	5.4	6.0
Maximum Single Span (m)													
150 x 45	hySPAN®	3.0	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9
2/140 x 45	hyCHORD®	3.2	3.1	2.9	2.8	2.7	2.6	2.5	2.5	2.4	2.3	2.2	2.1
150 x 63	hySPAN	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1
170 x 45	hySPAN	3.3	3.2	3.0	2.9	2.8	2.7	2.6	2.5	2.5	2.3	2.2	2.1
190 x 45	hyCHORD	3.5	3.3	3.2	3.0	2.9	2.8	2.7	2.7	2.6	2.5	2.3	2.3
2/150 x 45	hySPAN	3.7	3.5	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4
200 x 45	hySPAN	3.9	3.7	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.6	2.5
2/170 x 45	hySPAN	4.1	3.9	3.8	3.6	3.5	3.4	3.3	3.2	3.1	2.9	2.8	2.7
200 x 63	hySPAN	4.3	4.1	3.9	3.8	3.7	3.5	3.4	3.3	3.2	3.1	2.9	2.8
2/200 x 45	hySPAN	4.8	4.6	4.4	4.2	4.1	3.9	3.8	3.7	3.6	3.4	3.3	3.2
240 x 63	hySPAN	5.2	4.9	4.7	4.5	4.4	4.2	4.1	4.0	3.9	3.7	3.5	3.4
2/240 x 45	hySPAN	5.8	5.5	5.3	5.1	4.9	4.7	4.6	4.4	4.3	4.1	3.9	3.8
300 x 63	hySPAN	6.3	6.1	5.9	5.6	5.4	5.3	5.1	4.9	4.8	4.6	4.4	4.2
2/300 x 45	hySPAN	6.8	6.6	6.4	6.2	6.0	5.9	5.7	5.5	5.4	5.1	4.9	4.7
Maximum Continuous Span (m)													
150 x 45	hySPAN	4.0	3.8	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.7	2.4	2.3
150 x 63	hySPAN	4.4	4.2	4.0	3.8	3.7	3.6	3.4	3.3	3.3	3.1	3.0	2.7
2/140 x 45	hyCHORD	4.3	4.1	3.9	3.8	3.6	3.5	3.4	3.3	3.2	3.1	2.9	2.8
170 x 45	hySPAN	4.5	4.3	4.1	3.9	3.7	3.6	3.5	3.3	3.2	2.9	2.8	2.6
190 x 45	hyCHORD	4.7	4.5	4.3	4.1	3.8	3.6	3.5	3.3	3.2	2.9	2.7	2.6
2/150 x 45	hySPAN	4.9	4.7	4.5	4.3	4.1	4.0	3.9	3.8	3.7	3.5	3.3	3.2
200 x 45	hySPAN	5.3	5.0	4.8	4.6	4.4	4.1	4.0	3.9	3.7	3.5	3.2	3.1
2/170 x 45	hySPAN	5.5	5.3	5.0	4.8	4.7	4.5	4.4	4.2	4.1	3.9	3.8	3.6
200 x 63	hySPAN	5.8	5.5	5.3	5.1	4.9	4.7	4.6	4.4	4.3	4.1	3.8	3.6
2/200 x 45	hySPAN	6.4	6.1	5.9	5.7	5.5	5.3	5.1	5.0	4.8	4.6	4.4	4.2
240 x 63	hySPAN	6.7	6.5	6.2	6.1	5.9	5.7	5.5	5.3	5.2	4.8	4.5	4.3
2/240 x 45	hySPAN	7.2	7.0	6.8	6.6	6.4	6.2	6.0	5.9	5.6	5.3	5.1	4.8
300 x 63	hySPAN	7.9	7.6	7.3	7.1	6.9	6.8	6.6	6.4	6.1	5.8	5.5	5.2
2/300 x 45	hySPAN	8.5	8.2	7.9	7.6	7.3	7.0	6.8	6.6	6.4	6.0	5.7	5.5

- Indicates minimum bearing at end supports = 45 mm and minimum bearing at intermediate supports = 135 mm
- Unless otherwise indicated minimum bearing at end supports = 45 mm and minimum bearing at intermediate supports = 90 mm
- Double sections built up by vertical lamination (see section 5.4)

Design Deflection Limits:

DL. SPAN/300 OR 20 mm
LL. SPAN/250 OR 20 mm

TABLE 22B: ROOF BEAMS

Section D x B (mm)	Product	Heavy Roof and Ceiling											
		Roof Load Width 'RLW' (m)											
		1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.8	5.4	6.0
Maximum Single Span (m)													
150 x 45	hySPAN®	2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.6	1.6	1.5
150 x 63	hySPAN	2.6	2.4	2.3	2.2	2.2	2.1	2.0	2.0	1.9	1.8	1.8	1.7
170 x 45	hySPAN	2.6	2.5	2.4	2.3	2.2	2.1	2.1	2.0	2.0	1.9	1.8	1.7
2/140 x 45	hyCHORD®	2.5	2.4	2.3	2.2	2.1	2.1	2.0	2.0	1.9	1.8	1.7	1.7
190 x 45	hyCHORD	2.8	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.1	2.0	1.9	1.8
2/150 x 45	hySPAN	2.9	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.2	2.1	2.0	1.9
200 x 45	hySPAN	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.0
2/170 x 45	hySPAN	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.5	2.3	2.2	2.2
200 x 63	hySPAN	3.4	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.6	2.4	2.3	2.3
2/200 x 45	hySPAN	3.8	3.6	3.5	3.4	3.2	3.1	3.0	3.0	2.9	2.7	2.6	2.5
240 x 63	hySPAN	4.1	3.9	3.7	3.6	3.5	3.3	3.2	3.2	3.1	2.9	2.8	2.7
2/240 x 45	hySPAN	4.6	4.4	4.2	4.0	3.9	3.8	3.6	3.5	3.4	3.3	3.2	3.0
300 x 63	hySPAN	5.1	4.9	4.6	4.5	4.3	4.2	4.0	3.9	3.8	3.7	3.5	3.4
2/300 x 45	hySPAN	5.7	5.4	5.2	5.0	4.8	4.7	4.5	4.4	4.3	4.1	3.9	3.8
Maximum Continuous Span (m)													
150 x 45	hySPAN	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.0
2/140 x 45	hyCHORD	3.4	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2
150 x 63	hySPAN	3.5	3.3	3.1	3.0	2.9	2.8	2.7	2.7	2.6	2.5	2.4	2.3
170 x 45	hySPAN	3.5	3.3	3.2	3.1	2.9	2.9	2.8	2.7	2.6	2.5	2.3	2.2
190 x 45	hyCHORD	3.7	3.5	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.4	2.3	2.1
2/150 x 45	hySPAN	3.9	3.7	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6
200 x 45	hySPAN	4.1	3.9	3.7	3.6	3.5	3.4	3.3	3.2	3.1	2.8	2.7	2.5
2/170 x 45	hySPAN	4.4	4.2	4.0	3.8	3.7	3.6	3.5	3.4	3.3	3.1	3.0	2.9
200 x 63	hySPAN	4.6	4.4	4.2	4.0	3.9	3.7	3.6	3.5	3.4	3.3	3.1	3.0
2/200 x 45	hySPAN	5.1	4.9	4.7	4.5	4.3	4.2	4.1	4.0	3.9	3.7	3.5	3.4
240 x 63	hySPAN	5.5	5.2	5.0	4.8	4.6	4.5	4.3	4.2	4.1	3.9	3.8	3.5
2/240 x 45	hySPAN	6.1	5.8	5.6	5.4	5.2	5.0	4.9	4.7	4.6	4.4	4.2	4.1
300 x 63	hySPAN	6.6	6.4	6.2	6.0	5.8	5.6	5.4	5.3	5.1	4.9	4.6	4.3
2/300 x 45	hySPAN	7.2	6.9	6.7	6.5	6.2	6.0	5.9	5.6	5.5	5.2	4.9	4.7

- Indicates minimum bearing at end supports = 45 mm and minimum bearing at intermediate supports = 135 mm
- Unless otherwise indicated minimum bearing at end supports = 45 mm and minimum bearing at intermediate supports = 90 mm
- Double sections built up by vertical lamination (see section 5.4)



8.0 VERANDAH BEAMS

Design Deflection Limits:
 DL. SPAN/400 OR 10 mm
 LL. SPAN/250 OR 12 mm

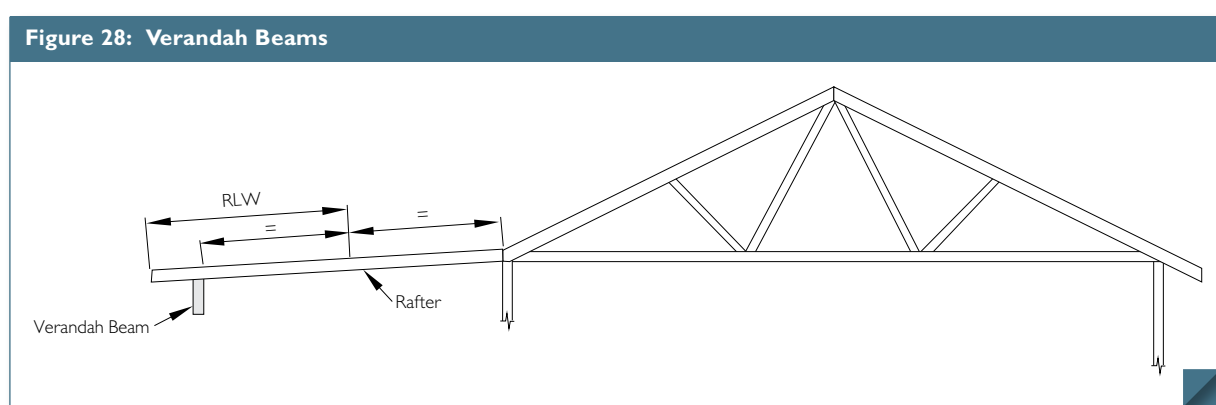
TABLE 23A: VERANDAH BEAMS – HIGH AND VERY HIGH WINDS

Section D x B (mm)	Product	Single Span							Continuous Span						
		Roof Load Width 'RLW' (m)													
		0.9	1.2	1.5	1.8	2.1	2.4	2.7	0.9	1.2	1.5	1.8	2.1	2.4	2.7
Maximum Span (m) for Roof Mass = 10 kg/m ²															
150 x 45	hySPAN®	3.8	3.5	3.3	3.1	2.9	2.8	2.7	4.9	4.5	4.3	4.1	3.9	3.8	3.5
150 x 63	hySPAN	4.3	4.0	3.6	3.4	3.3	3.1	3.0	5.3	5.0	4.8	4.5	4.3	4.2	4.1
170 x 45	hySPAN	4.3	4.0	3.7	3.4	3.3	3.2	3.0	5.4	5.0	4.8	4.5	4.3	4.2	3.9
190 x 45	hyCHORD®	4.5	4.2	3.9	3.6	3.4	3.3	3.2	-	-	-	-	4.5	4.3	3.9
200 x 45	hySPAN	4.9	4.6	4.3	4.1	3.9	3.7	3.5	6.1	5.7	5.4	5.2	5.0	4.8	4.6
200 x 63	hySPAN	5.3	5.0	4.8	4.5	4.4	4.2	4.0	6.6	6.2	5.9	5.6	5.4	5.2	5.1
240 x 45	hySPAN	5.6	5.2	5.0	4.8	4.6	4.5	4.3	7.0	6.5	6.2	5.9	5.7	5.4	5.2
240 x 63	hySPAN	6.0	5.7	5.4	5.2	5.0	4.9	4.7	7.5	7.2	6.7	6.4	6.2	6.0	5.8
300 x 45	hySPAN	6.6	6.2	5.8	5.6	5.4	5.3	5.1	8.3	7.7	7.3	7.0	6.5	6.2	5.9
300 x 63	hySPAN	7.2	6.7	6.4	6.1	5.8	5.7	5.5	-	8.4	8.0	7.6	7.3	7.2	6.9

TABLE 23B: VERANDAH BEAMS – HIGH AND VERY HIGH WINDS

Section D x B (mm)	Product	Single Span							Continuous Span						
		Roof Load Width 'RLW' (m)													
		0.9	1.2	1.5	1.8	2.1	2.4	2.7	0.9	1.2	1.5	1.8	2.1	2.4	2.7
Maximum Span (m) for Roof Mass = 40 kg/m ²															
150 x 45	hySPAN®	3.3	3.0	2.8	2.7	2.6	2.5	2.4	4.3	4.1	3.8	3.6	3.4	3.2	3.1
150 x 63	hySPAN	3.7	3.3	3.1	3.0	2.8	2.7	2.7	4.7	4.3	4.2	3.9	3.8	3.6	3.4
170 x 45	hySPAN	3.8	3.4	3.2	3.0	2.9	2.8	2.6	4.8	4.4	4.2	4.0	3.8	3.6	3.5
190 x 45	hyCHORD®	3.9	3.6	3.3	3.1	3.0	2.8	2.8	-	4.6	4.3	4.2	4.0	3.8	3.7
200 x 45	hySPAN	4.3	4.0	3.7	3.5	3.3	3.1	3.0	5.3	5.0	4.8	4.5	4.3	4.2	4.1
200 x 63	hySPAN	4.6	4.4	4.1	3.9	3.7	3.5	3.4	5.8	5.4	5.1	4.9	4.8	4.5	4.4
240 x 45	hySPAN	4.9	4.6	4.4	4.2	4.0	3.8	3.6	6.1	5.7	5.4	5.2	5.0	4.9	4.7
240 x 63	hySPAN	5.3	5.0	4.7	4.5	4.4	4.2	4.1	6.5	6.2	5.9	5.6	5.4	5.2	5.1
300 x 45	hySPAN	5.7	5.4	5.1	4.9	4.8	4.6	4.4	7.2	6.7	6.4	6.1	5.9	5.7	5.5
300 x 63	hySPAN	6.1	5.8	5.5	5.3	5.1	5.0	4.8	7.6	7.3	6.8	6.6	6.4	6.2	6.0

The following notes relate to Table 23A and Table 23B.
 • Minimum bearing at end supports = 45 mm & intermediate supports = 90 mm



SDC - Approved Building Consent Document - BC171688 - Pg 138 of 264 - 7/09/2017 - harrib

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ECOPLY[®] SPECIFICATION & INSTALLATION GUIDE

SEPTEMBER 2015



ECOPLY® SPECIFICATION & INSTALLATION GUIDE

Contents

- 1.0 Ecoply® Product Range 3
- 1.1 Technical Information and CAD Details..... 3
- 1.2 Product Description and Range 4
- 1.3 Surface Grades 5
- 1.4 Preservative Treatment..... 6
- 1.5 Section Properties 7
- 1.6 Product Identification..... 8
- 1.7 Code Compliance 9
- 1.8 General Design Considerations 9
- 1.9 Sustainability 11
- 1.10 Health & Safety..... 11
- 1.11 Storage & Handling 11
- 2.0 General Installation Guide 12
- 2.1 Framing 12
- 2.2 Sheet Fasteners and Fixing..... 12
- 2.3 Adhesives..... 14
- 3.0 Structural Bracing & Ceiling Diaphragms 15
- 3.1 Design to Comply with the New Zealand Building Code 15
- 3.2 Ecoply Bracing Specifications Summary 17
- 3.3 Ecoply Bracing Specification - EPI..... 18
- 3.4 Ecoply Bracing Specification – EPG..... 20
- 3.5 GIB Handibrac® – Recommended Installation Method 22
- 3.6 Structural Ceiling Diaphragms 22
- 4.0 Roofs and Decks 23
- 4.1 Flexible Membrane Systems 23
- 4.2 Roof Tile Systems 24
- 4.3 Roofing & Decking – Product Selection Guide 24
- 4.4 Frame Spacings for Ecoply Roofs and Decks.... 25
- 4.5 Roofing – Design Considerations..... 26
- 4.6 Roofing – Installation..... 28
- 5.0 Flooring..... 30
- 5.1 Flooring – Range 30
- 5.2 Flooring – Installation..... 30
- 5.3 Flooring – Finishing..... 31
- 6.0 Frequently Asked Questions 32
- 7.0 References and Sources of Information 34
- 8.0 Limitations 34



1.0 ECOPLY® PRODUCT RANGE

Manufactured in New Zealand by Carter Holt Harvey 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 (EWPA) Joint Accreditation System - Australia and New Zealand (JAS-ANZ) certification.

For information relating to Shadowclad® panels and plywood used as an exterior cladding, refer to the current Shadowclad Specification & Installation Guide for Cavity Construction. For information relating to Ecoply Barrier used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide. Both of these documents can be downloaded from www.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 F11¹ stress grade (See Tables 1, 4 and 5). Other Ecoply products are also available in F11¹ upon request
- Thickness - ranging from 7 mm to 25 mm. (Thicknesses above 25 mm subject to availability)
- Length - being 2400 mm and 2700 mm with a standard nominal width of 1200 mm

- Preservative treatment - being untreated, H3.2 CCA or H3.1 LOSP Azole treated
- Edge finish - being square edge or for Ecoply Flooring and Roofing, routed on the long edges of the sheet with a polypropylene plastic tongue inserted into one side for a tongue-in-groove joint

For general installation advice refer to section 2.0: General Installation Guide.

For specification and installation advice for Ecoply used in typical applications refer to the following sections.

Typical Application	Section
Structural bracing and ceiling diaphragms	3.0
Roofs and decks	4.0
Flooring	5.0

Note: Technical notes referenced in this guide can be downloaded from www.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							●	●	●	●	●	●	●	●		●
DD							●	●	●	●	●	●	●	●		
Ecoply Roofing (pt)																
DD							●	●	●	●						

- Available untreated only
- Available either untreated or H3.2 CCA
- Available either untreated or H3.1 LOSP

pt Machine grooves on both long edges with a plastic polypropylene tongue in one groove, 1200 mm cover

LS Ecoply 19 mm F11/F8 Longspan Flooring

- Full range may not always be available ex stock, check with your Ecoply supplier to ensure availability
- Non standard specifications, including thicker sheets may be available to special order in significant quantities
- All products are F8 stress grades
- Ecoply 15 mm/17 mm Roofing and Ecoply 19 mm Longspan Flooring are supplied as standard in F11 stress grade¹
- Other Ecoply products are also available in F11 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	Face Grade C	Face Grade D
		
Appearance grade with a solid sanded surface. Suitable for a higher quality finish.	Solid sanded surface with filled holes and splits, with intergrown knots. Suitable for a basic paint finish.	Non appearance grade allowing open imperfections up to 75 mm across the face veneer. Splits and knots allowable
Possible Uses:	Possible Uses:	Possible Uses:
<ul style="list-style-type: none"> Furniture/Joinery/Signs Interior Linings Sheathing Engineering components where a superior visual finish is required 	<ul style="list-style-type: none"> Structural gussets Stressed skin panels Bins, boxes, crates Hoardings Membrane substrate 	<ul style="list-style-type: none"> Non visual bracing Strength critical pallets Structural components Portal frame gussets

Table 2B: Speciality Ecoply® Products

Flooring CD	Roofing DD
	
Solid sanded C grade surface with tongue and groove profile on long edges. Features void free second layer under the face veneer for increased protection against high point loads	Unfilled D grade surface with tongue and groove profile on long edges
Possible Uses:	Possible Uses:
<ul style="list-style-type: none"> Substrate for flooring overlays such as linoleum, tiles and rigid coverings Substrate for membrane roofing and decking where visible appearance is critical 	<ul style="list-style-type: none"> 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.

SDC - Approved Building Consent Document - BC171688 - Pg 144 of 264 - 7/09/2017 - harrib

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

Nominal plywood thickness ² (mm)	ID code ³	Section properties per mm width						
		Mass (kg/m ²)	Parallel to the face grain		Perpendicular to the face grain			
			Parallel Moment of Inertia (mm ⁴)	Section Modulus Z (mm ³)	Shear Constant I/Q (mm ²)	Perpendicular Moment of Inertia I (mm ⁴)	Section Modulus Z (mm ³)	Shear Constant I/Q (mm ²)
7	7-24-3	4.0	30.0	8.3	5.2	2.0	1.7	2.3
9	9-30-3	5.0	58.6	13.0	6.4	4.0	2.7	2.9
12	12-24-5	6.6	115.0	19.2	9.3	33.4	9.3	5.4
15	15-30-5	8.3	225.0	29.9	11.6	65.2	14.5	6.8
17	17-24-7	9.2	285.0	33.9	12.2	122.0	20.4	9.4
17	17-24-6	9.2	273.0	32.5	12.3	134.0	22.3	9.5
19	19-30-7	10.6	451.0	46.9	13.7	157.0	23.8	10.7
21	21-30-7	11.6	556.0	52.9	15.2	239.0	31.9	11.8
25	25-30-9	13.5	897.0	72.9	17.8	381.0	41.0	13.9

Table 4B: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F8 Grade

Nominal plywood thickness ² (mm)	ID code ³	Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F8)			Perpendicular to the face grain (F8)		
		Bending Stiffness EI (1000 Nmm ²)	Bending Moment f _{pb} Z (Nmm)	Rolling Shear f _{pr} I/Q (N)	Bending Stiffness EI (1000 Nmm ²)	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 Grade (Including Longspan Flooring)

Nominal plywood thickness ² (mm)	ID code ³	Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F11)			Perpendicular to the face grain (F8)		
		Bending Stiffness EI (1000 Nmm ²)	Bending Moment f _{pb} Z (Nmm)	Rolling Shear f _{pr} I/Q (N)	Bending Stiffness EI (1000 Nmm ²)	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

SDC – Approved Building Consent Document – BC171688 – Pg 146 of 264 – 7/09/2017 – harrib

Structural properties of Ecoply® plywood

The majority of Ecoply plywood is F8 grade (exceptions are identified in section 1.2: Product Description & Range) and the

characteristic values may be used in conjunction with both NZS 3603 and AS 1720 for the design of timber components. The characteristic strengths in Table 5 have been used to provide the nominal strengths in Tables 4B and 4C.

Table 5: Structural Properties of Ecoply® Plywood

Stress Grade	Characteristic Strength MPa	
	F8	F11
Bending (f_{pb})	25.0	31.0
Tension (f_{pt})	15.0	18.0
Panel shear (f_{ps})	4.2	4.5
Rolling shear (f_{pr})	1.7	1.8
Compression in plane of sheet (f_{pc})	20.0	22.0
Compression normal to the plane of the sheet (f_{pp})	9.7	12.0
Modulus of elasticity (E)	9100	10500
Modulus of rigidity (G)	455	525

Source: AS/NZS 2269

Wood is strongest when stressed parallel to the grain and weakest across the grain, so the lay up or arrangement of veneers in the panel determines the properties. Because of its cross banded construction, plywood possesses significant strength and stiffness both parallel and perpendicular to the direction of the face grain, but is generally strongest and stiffest along the direction of the face grain.

reduced contribution of veneers perpendicular to the direction of stress. For engineering design to NZS 3603, the section properties are multiplied by stresses and 'k' and ϕ factors to determine resistances for limit states design.

The section properties of structural plywood in Table 4A are calculated in accordance with AS/NZS 2269 to allow for the

Resistances and nominal strengths in Tables 4B and 4C assume all 'k' factors are equal to 1.0. Multiply tabled values by the strength reduction factor ϕ and 'k' factors for specific in-service conditions for design to a structural code such as NZS 3603.

Table 5A: Strength Reduction Factors

Structural Timber Material	Application of Structural Member		
	Category 1	Category 2	Category 3
	Structural members for houses for which failure would be unlikely to affect an area ¹ greater than 25 m ² ; OR secondary members in structures other than houses	Primary structural members in structures other than houses; OR elements in houses for which failure would be likely to affect an area ¹ greater than 25 m ²	Primary structural members in structures intended to fulfil essential services or post disaster function
Value of Strength Reduction Factor ϕ			
Structural Plywood – AS/NZS 2269.0	0.95	0.85	0.75

¹ In this context area should be taken as plan area.

1.6 PRODUCT IDENTIFICATION

In accordance with AS/NZS 2269, Ecoply structural plywood sheets have the following information marked on the back:

- Brand name: e.g. ECOPLY
- Face grade, back grade: e.g. CD
- Intended application: e.g. STRUCTURAL
- Panel construction code: e.g. 19-30-7 (Thickness (mm)-Face veneer thickness (mm x 10)-Number of veneers)
- Glue bond: e.g. A BOND
- Formaldehyde emission class: E0 for A Bond Ecoply
- Australasian Standard: e.g. AS/NZS 2269
- Treatment Standard (if applicable): e.g. AS/NZS 1604.3:2012
- Date and time of manufacture: e.g. 01/12/15 12:23:45
- Stress grade: e.g. F8 (exceptions include Shadowclad® and Grooved Lining which are performance rated)
- The Engineered Wood Products Association of Australasia (EWPA) brand and mill number: e.g. 911 (Tokoroa mill)

Untreated example:

ECOPLY CD FLOORING STRUCTURAL
19-30-7 A BOND E0 AS/NZS 2269.0:2012
PAT 01/12/15 12:23:45 F11/F8



Treated example:

ECOPLY CD STRUCTURAL
25-30-9 A BOND E0 AS/NZS 2269.0:2012
AS/NZS 1604.3:2012 046 01 H3 E CCA
RETREAT CUTS PAT 01/12/15 12:23:45 F8/F8



Note: Performance based products like Grooved Lining and Shadowclad may include brand identification instead of visual quality, stress grade, and panel code. These panels, when accompanied with specification literature, are still deemed to comply with AS/NZS 2269



1.7 CODE COMPLIANCE

Ecoply plywood manufacture is third-party audited through the product quality control programme of the Engineered Wood Products Association of Australasia (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 PSI-95, is not referenced in the NZBC. There can be significant differences between AS/NZS 2269 certified and non certified plywood around bond durability, structural ratings and veneer quality.

Structure B1

Design to NZS 3603 Timber Structures complies with the NZBC in Verification Method B1/VM1 Clause 6.0 Timber. Plywood is the only sheet material with properties listed in NZS 3603. Ecoply structural plywood is available in F8 stress grade. Some specialty products are available F11 or with specifically designed properties for specialised applications.

1.8 GENERAL DESIGN CONSIDERATIONS

Durability (Clause B2) and exterior moisture (Clause E2)

Ecoply plywood is made from softwood solid radiata pine veneer. Designers should assess the level of exposure to biological, moisture, and other hazards and apply appropriate preservative treatment and detailing to minimise exposure to these hazards.

Information in this manual outlines suggested practices for detailing building components to exclude moisture to comply with the durability requirements of the NZBC.

Formaldehyde

Ecoply plywood is manufactured using phenol formaldehyde resins which are fully cured in the hot press. Cured resin is thermally and moisture stable and formaldehyde emissions for the glued plywood are similar to background levels for the wood by itself when tested to AS/NZS 2098.11 Determination of formaldehyde emissions for plywood. Accordingly every panel is branded with the lowest emission class (less than 0.5 mg/litre for E₀).

Actual formaldehyde emissions for Ecoply plywood have been tested and approved as having an actual formaldehyde emission level of less than 0.3 mg/ litre (equivalent to a Super E₀ emission level).

Moisture content and dimensional change

At the time of leaving the factory, the moisture content of untreated Ecoply plywood should generally be in the range of 8% to 15% as required by AS/NZS 2269. All wood products including plywood respond to changes in ambient humidity so the eventual moisture content of plywood varies according to how dry or how wet the environment is. After manufacture, the moisture content will move to equilibrium with the environment, and the veneers swell or shrink across the grain in response. The total expansion both along and across a 2400 x 1200 mm panel can be in the order of 1.5 mm to 3 mm as the plywood changes from a dry to a saturated state.

Ecoply that is treated with waterborne preservatives (e.g. H3.2 CCA) is expected to be used in applications that have higher humidity than interior dry use, so following treatment it is dried to a higher average moisture content of approximately 18%. This provides for a more stable panel in service than placing a dry (less than 15%) sheet in a higher moisture environment.

Detailing and construction must allow for movement if the plywood will be subject to cycles of moisture change. Seasonal and daily cycles can be significant depending on the end use.

Temperature

Wood will expand upon heating as do practically all solids. The thermal expansion of plywood is quite small and there is little effect on the structural performance or durability of plywood when used in temperatures below 54°C. The average co-efficient of thermal expansion of plywood is 4.5×10^{-6} mm/mm/°C. At temperatures above 55°C wood begins to deteriorate. Colours of coatings and finishes should be selected to reduce heat gain. For extreme conditions, further technical information is available by calling CHH 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.

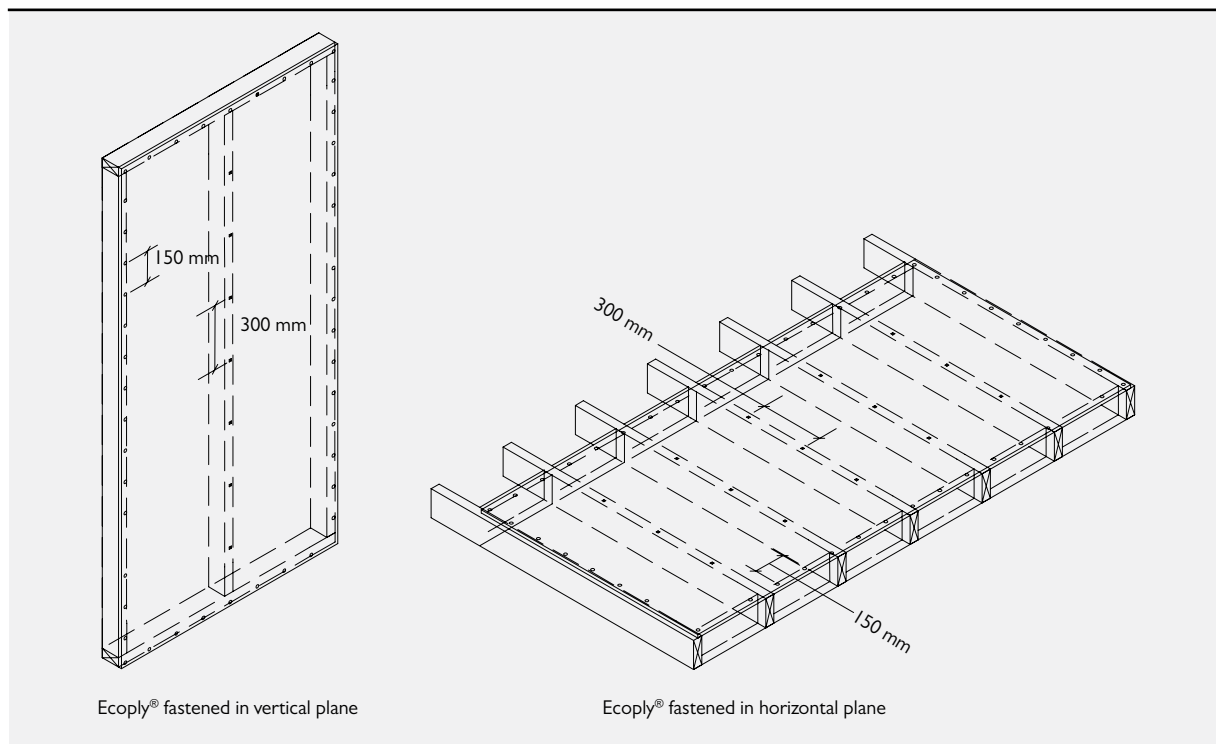
For plywood used as exterior cladding refer to the current Shadowclad® Specification & Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz

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®

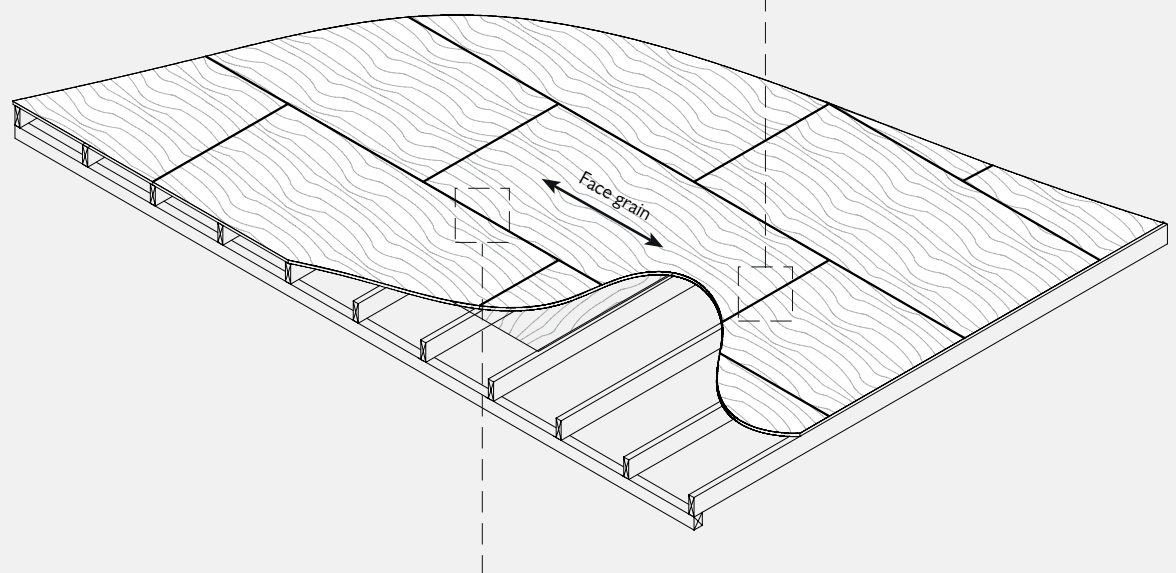
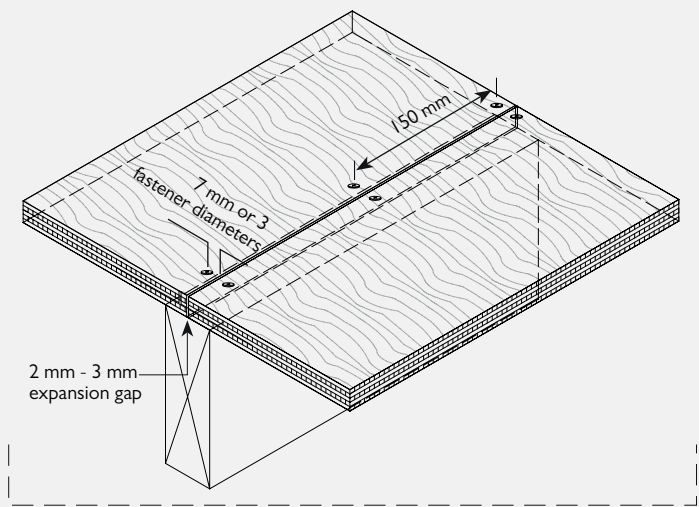




EC002: Fastener spacings from edges

SDC - Approved Building Consent Document - BC171688 - Pg 152 of 264 - 7/09/2017 - harrib

Ecoply® Square Edge Plywood and Butt Ends



Ecoply® Tongue and Groove Plywood

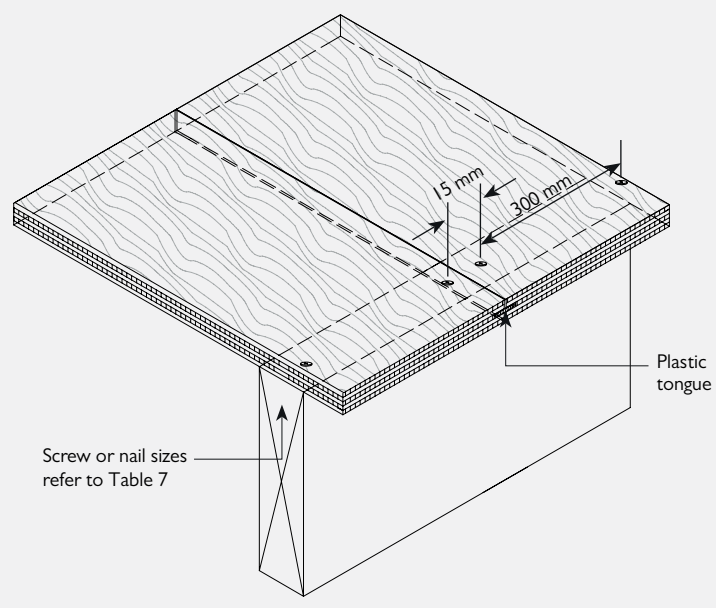


Table 7: Fasteners and Characteristic Shear Loads for EcoPLY®

Nominal Thickness (mm)	7mm		12mm		17 mm	Load'	19mm		25 mm	Load'
	9mm	Load'	15 mm	Load'			21mm	Load'		
Minimum nail size in timber framing¹	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 framing²	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 framing³	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 framing³	10-24-35 ⁴	1200	10-16-40 ⁴	1200	14-20-45 ⁴	3000	14-20-45 ⁴	4000	14-20-45 ⁴	5000

- 1 The load is the characteristic load (N) for one fastener in single shear
- 2 Characteristic load based on fixing into a timber of J5 joint group or better
- 3 Self tapping, self countersinking screw
- 4 Screw Numbers indicate: Gauge – Threads per inch – Length (mm)

Notes

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested
- Other screw sizes may be used. Screw properties vary between screw suppliers and the suitability of a particular size should be verified by the designer for performance under changing physical conditions and cyclic loading
- Non-standard nailing may be specifically designed with NZS 3603 or similar

Fasteners for H3.2 CCA treated EcoPLY®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Notes

H3.2 CCA treated timber should not be fixed in direct contact with light gauge steel products. Refer to the framing manufacturer for 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 - BI Structure, and NZS 3604 *Timber Framed Buildings* or specifically designed to NZS 3603 *Timber Structures Standard*.

Any Ecoply structural panel may be used for bracing as long as it is 7 mm, 9 mm or 12 mm thick, has a minimum wall length as described in Table 9, treated for the specific application in accordance with NZS 3602 (summarised in Table 8) and fixed in accordance with Ecoply bracing specifications outlined in this guide.

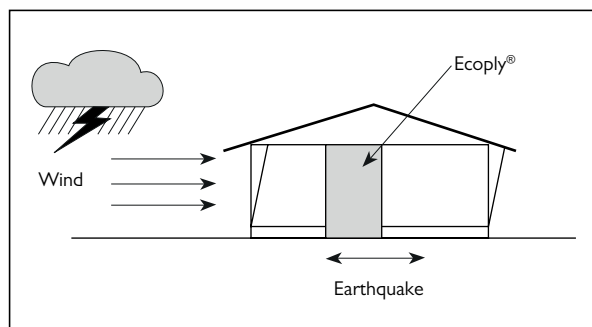
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

Structure

Timber framed buildings to NZS 3604 *Timber Framed Buildings* is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution BI/ASI Structure.

CHH 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 BI/VM1 under Clause 6.0 Timber for use in buildings over three storeys in height.

Demand is calculated by following section 5, Bracing Design of NZS 3604 or using the GIB EzyBrace® software, downloadable from www.gib.co.nz

EP bracing systems properties can be easily loaded into the EzyBrace software by way of an Excel patch downloadable from www.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 Applications Including Treatment Type & Fastener Material

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray): E.g. Interior linings	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/ without building paper/ wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/without building paper/wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply® Barrier Specification and Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones' D	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones, as per section 4 of NZS 3604 (including sea spray)	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

Note: Power driven nails are suitable for use. Do not overdrive, nails must be full round head

Rain wetting and construction bracing

Untreated Ecoply will withstand normal exposure conditions during construction for up to 3 months however aesthetically the sheet appearance will deteriorate as the level of exposure increases. Rain and exposure can cause thinner plywood panels to buckle. Plywood stability is related to the number of veneers and thickness of the panel. Where panel stability is critical, consider using thicker panels.

Humidity and condensation

In conditions where the moisture content may exceed 18% for prolonged periods, Ecoply must be H3.1 LOSP or H3.2 CCA treated to resist decay or insect hazard.

Subfloor sheet bracing

H3.2 CCA treated Ecoply can be used as sheet bracing where dampness does not allow the use of untreated plywood or other sheet materials (section 5 of NZS 3604). Where Ecoply subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, 100% acrylic exterior coating system with a light reflectance value of 50% or greater.

Adjustments for wall height

Use section 5 of NZS 3604 to calculate bracing values: "Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

- (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 $2.4 \div \text{element height in metres}$, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
- (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 Ecopy (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 Ecopy 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 Ecopy 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

Ecopy 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 Ecopy® Wall Elements

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPI	0.4 m		80	95
	0.6 m	Ecopy one side	95	105
	1.2 m		120	135
EPG	0.4 m	Ecopy one side and	100	115
	1.2 m	10 mm GIB® Standard plasterboard other side	150	150

Note: Bracing and other technical information has been specifically tested using Ecopy 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

Ecopy® 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 Ecopy 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 - EPI

Table 10: Singled Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPI_0.4	0.4 m	Ecoply one side	80	95
EPI_0.6	0.6 m	Ecoply one side	95	105
EPI_1.2	1.2 m	Ecoply one side	120	135

Framing

Wall framing must comply with:

- NZBC B1 - Structure: ASI Clause 3 Timber (NZS 3604)
- NZBC B2 - Durability: ASI Clause 3.2 Timber (NZS 3602)

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

One layer of 7 mm, 9 mm or 12 mm Ecoply plywood fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Fastening the Ecoply® panels

Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

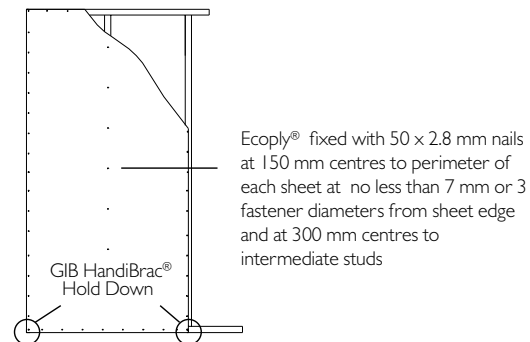
Fasteners for H3.2 CCA treated Ecoply® panels

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/ASI Structure. Testing was carried out using Ecoply manufactured by Carter

Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB Handibrac® are registered trade marks of Fletcher Building Holdings Ltd.

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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	BU/s/m Wind	BU/s/m Earthquake
EPG_0.4	0.4 m	Ecoply one side and 10 mm	100	115
EPG_I.2	1.2 m	GIB® Standard plasterboard other side	150	150

Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

Side 1: One layer of 7 mm, 9 mm or 12 mm Ecoply plywood exterior wall cladding fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Side 2: One layer of 10 or 13 mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

Fastening the Ecoply® panels

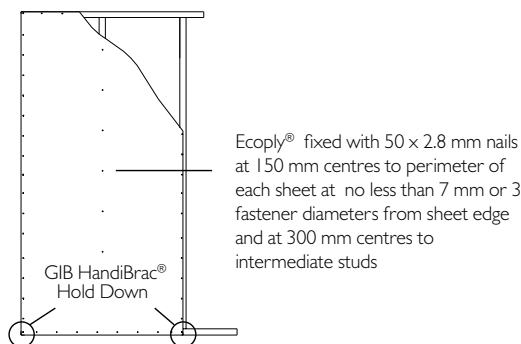
Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

Fasteners for H3.2 CCA treated Ecoply®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter

Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

SEPTEMBER 2015

Fastening the GIB® Plasterboard

32 mm x 6 g GIB® Grabber® Screws or 35 mm GIB® Nails

Fastening centres

Fasten 50, 100, 150, 225 and 300 mm from each corner and 150 mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300 mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12 mm from paper bound edges and 18 mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.

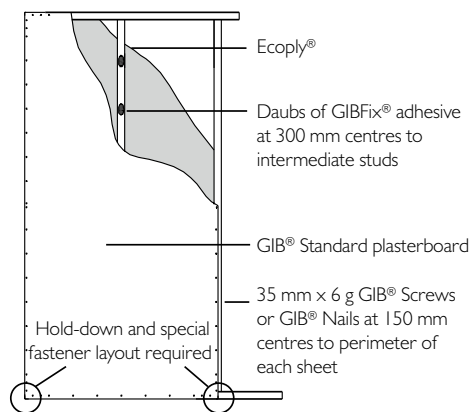


Table 13: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones including sea spray, as per section 4 of NZS3604):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones I B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone I D (sea spray), as per section 4 of NZS3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zone D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

3.5 GIB HANDIBRAC® – RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as the hold-down in all EP bracing elements.

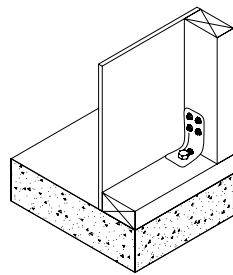
- The GIB HandiBrac® registered design provides for quick and easy installation
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to

check in the framing as recommended with conventional straps

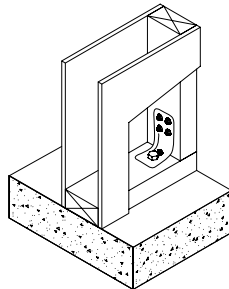
- The GIB HandiBrac® is suitable for both new and retrofit construction
- The design also allows for installation and inspection at any stage prior to fitting internal linings

Concrete Floor

External Walls



Internal Walls



Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate

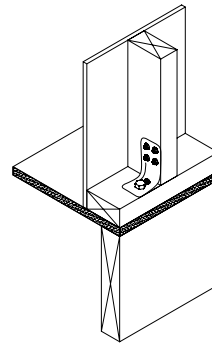
Position GIB HandiBrac® at the stud/plate junction

Hold-down fastener requirements

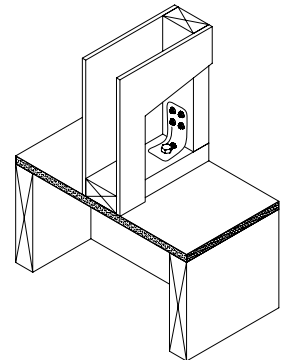
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket

Timber Floor

External Walls



Internal Walls



Position GIB HandiBrac® in the centre of the perimeter joist or bearer

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

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3.6 STRUCTURAL CEILING DIAPHRAGMS

Diaphragms are used to transfer lateral loads to braced walls and allow for greater spacing between bracing lines. Diaphragms do not have a BU rating themselves.

Plywood diaphragms are an acceptable solution as described in section 13 of NZS 3604 13.5.2 which allows for plywood not less than 6 mm thick and a minimum of three ply for:

- Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
- Diaphragms not steeper than 45 degrees to the horizontal and not exceeding 7.5 metres long under light or heavy roofs

Plywood ceiling diaphragms required to comply with NZS 3604 must be constructed as follows:

- The length of diaphragm shall not exceed twice its width measured between supporting walls
- The ceiling lining must consist of plywood over the entire area of the diaphragm
- Complete sheets with a minimum size of 1800 x 900 must be used
- Framing size and spacing must comply with NZS 3604
- Fastener size should comply with Table 7 of this guide. E.g. 40 mm x 2.5 mm flat head nails for 7 mm and 9 mm Ecoply
- Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
- Fixings are no closer than 10 mm from sheet edges
- Perimeter ceiling framing must be connected to wall framing by a perimeter 140 mm x 35 mm ribbon plate nailed to the top of the top plate or alternative such as a 0.55 mm thick steel angle or proprietary steel channel
- Sheets must be laid in a staggered pattern
- The basic shape of a ceiling diaphragm should be rectangular. Protrusions are permitted but cut-outs are not (see Figure 13.4 NZS 3604)

4.0 ROOFS AND DECKS

The section below covers the use of Ecoply plywood used as a substrate for flexible membrane and tile systems in roofing and decking applications. The information below should be considered as supplementary to system specifications from roofing and decking suppliers.

Further guidance on installation and detailing factors can be found in the EWPA Technical Note; Plywood Roofing and Flooring: Installation and Detailing Factors. This can be downloaded from www.ewp.asn.au

Ecoply is not recommended as a substrate for exterior decks without a properly detailed barrier material such as butyl rubber, vinyl or E.P.D.M to protect the surface from weathering.

Always refer to the roofing and decking system supplier for installation, plywood selection and surface preparation requirements for specific roofing and decking products.

4.1 FLEXIBLE MEMBRANE SYSTEMS

- Roofing and decking membranes may comprise synthetic rubber sheeting glued to the Ecoply, or torch welded bitumen membranes
- Always ensure Ecoply is dry and free of imperfections such as surface dust and blemishes as membranes coatings will telegraph any substrate imperfections
- Use Ecoply Flooring or Structural Square Edge (CD Grade)
- Where Ecoply Flooring is used consider the use of a small daub of glue or nail in the Tongue & Groove of each sheet if potential movement of the plastic tongue joint is not acceptable
- For trafficable decks use a minimum 17 mm thickness, refer to Table 15A and 15C for specification
- Use countersunk stainless steel screws and adhesive on framing to avoid head popping. Apply adhesive between screw locations
- Use kiln dried timber framing such as Laserframe® or appropriate LVL framing from the Futurebuild® range
- Consult the membrane manufacturer regarding use of bond breaker tapes over joints to allow elongation with natural plywood movement
- Where treatment is required use only H3.2 CCA treated Ecoply. Do not use H3.1 LOSP treated Ecoply (solvent based carrier). It is not compatible with most membrane systems. If there is evidence of treatment salt crystals on the Ecoply surface remove by scrubbing with a small amount of water and allow the surface to dry prior to laying the membrane system

Plywood substrates, face checking and flexible membrane systems

All natural wood based products (including Ecoply) have the potential to develop natural surface face checks when exposed to external environmental conditions. The degree of face checking is dependent on a number of factors including the length of time and level of exposure to weather during construction which is outside the manufacturing control of CHH 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 tongue and groove edges (unless otherwise specified)
Thicknesses Available	12, 15, 17, 19, 21, 25 mm	15, 17, 19, 21, 25 mm	15, 17 mm
Sheet Sizes Available	2400/2700 x 1200m		
Stress Grades Available	F8 (F11' available upon request)	F8 (F11' available upon request) 19 mm Longspan supplied F11' as standard	F11'
Treatment	Untreated, H3.2 CCA and H3.1 LOSP	Untreated, H3.2 CCA, (H3.1 LOSP available upon request)	
Span Capabilities	Refer to frame spacings in Tables 15A to 15C		

- 1 Where the stress grade F11 is referred to in all CHH 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/m ² (additional to Ecoply weight or 40 kg/m ² including Ecoply)	>2°	F8	Extra High	600	600	800	800	900
			High	900	900			
			Very High	800	900			
	>20°	F11	Extra High	800	800			
			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.

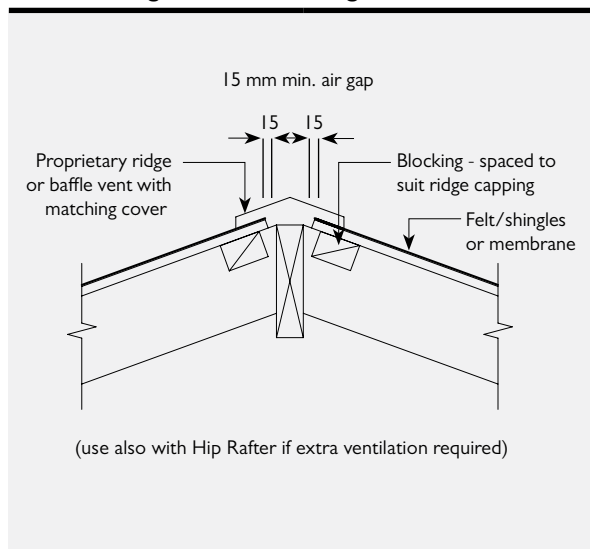
Bubbling

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.

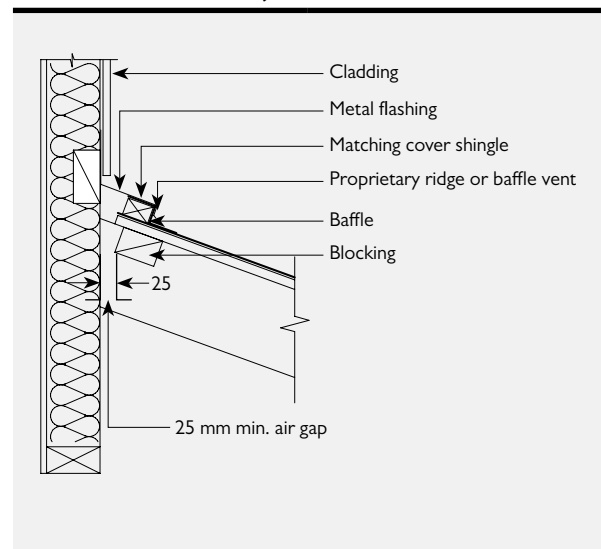
Soil

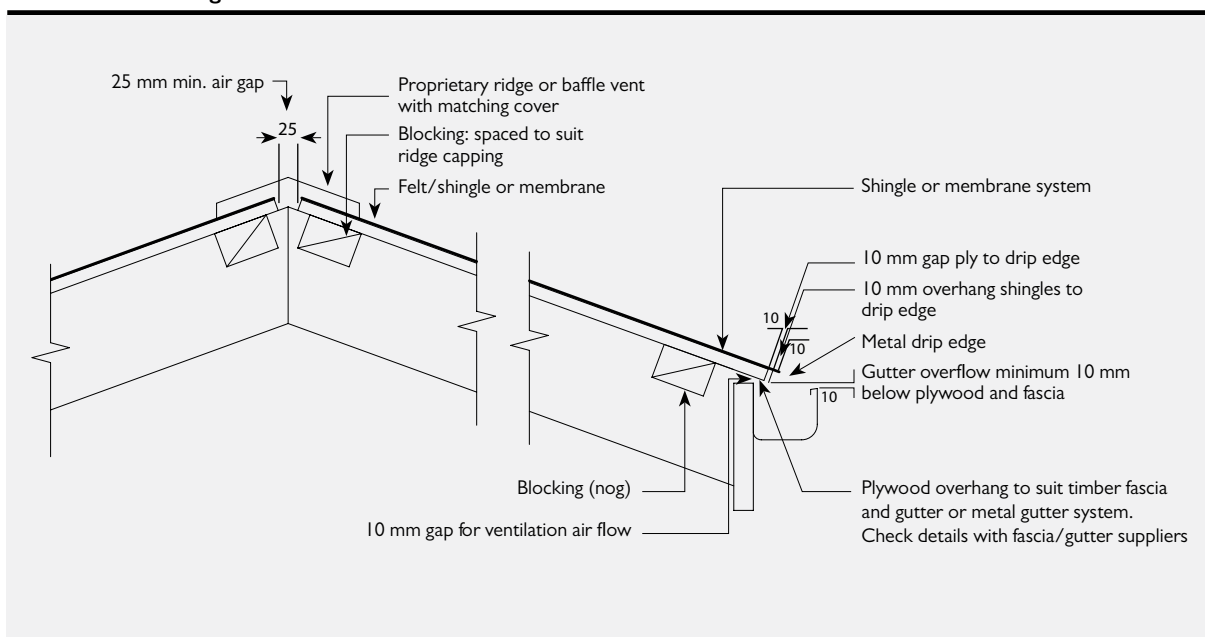
Ecoply plywood (untreated or H3.1 LOSP/H3.2 CCA treated) must not be allowed to come in contact with soil. Surfaces, flashings and gutters should be detailed to avoid trapping detritus and moisture.

EC003: Ridge detail with ridgeboard



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:

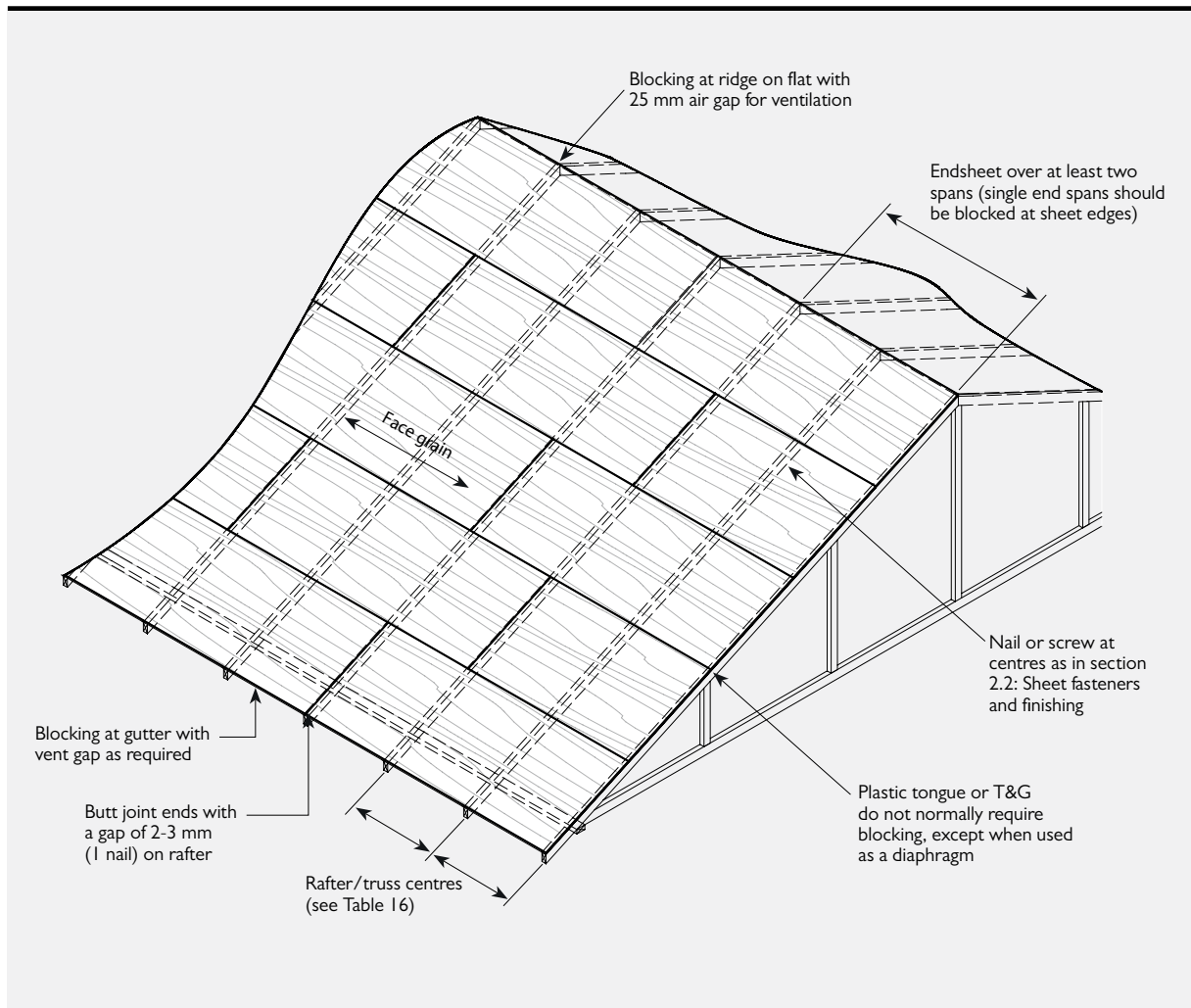
- Ensure top edges of framing are properly aligned
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to lower moisture level in roof spaces, second floor spaces, and reduce differential truss, rafter or joist deflections

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 m²) confirms commercial floor capabilities.

Refer to Table 16 to match frame set outs with 2400 mm and 700 mm sheet modules.

Framing

- Joist spacings should be at spacings to suit plywood thicknesses in Table 17
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to achieve a moisture content of 18% or less

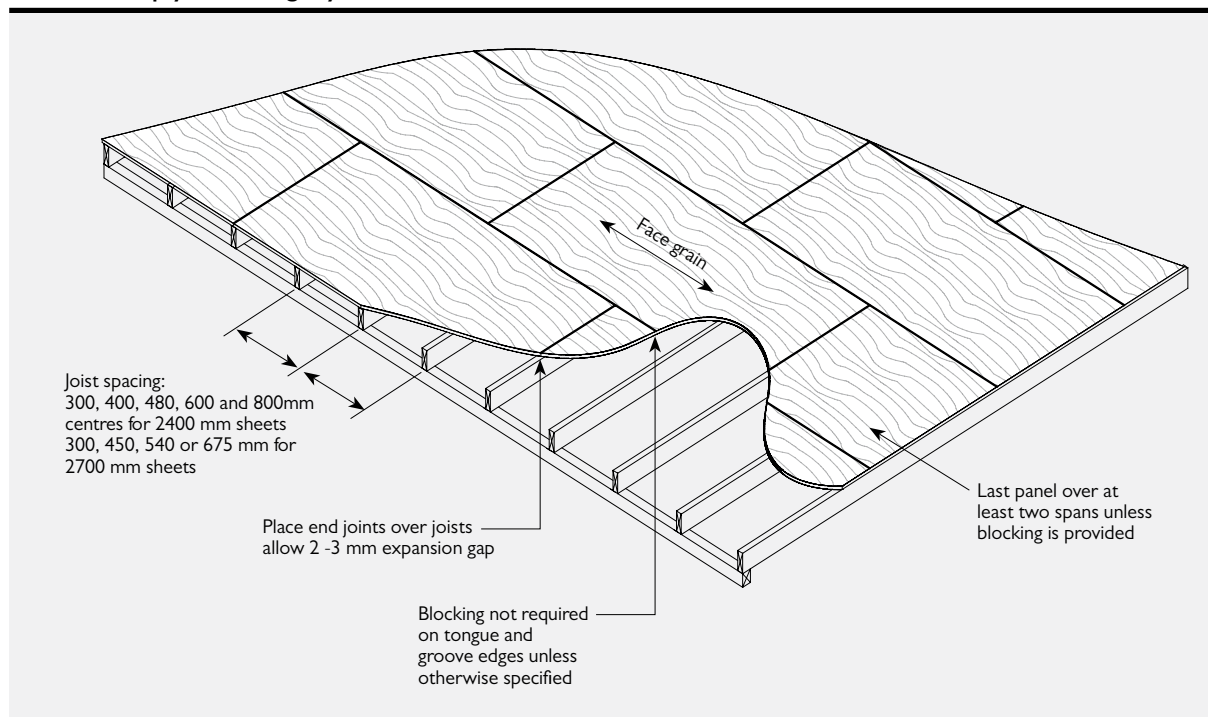
Blocking

- Blocking within the body of the floor is not required under tongue and groove edges unless otherwise specified (such as in domestic garage floors)

Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- For panels at floor edges where a continuous two span coverage is not possible, sheet edges must be supported by blocking
- Lay sheets in a staggered pattern
- Allow clearance for ventilation as required

EC007: Ecoply® Flooring layout



Fastener selection and treatment

Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture.

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Fasteners and fixing of sheets

- Ecoply Flooring may be fixed with nails or screws or a combination of mechanical fasteners and construction adhesives
- For fastener specifications (including lay out and sizes) refer to section 2.2: Sheet Fasteners and Fixing
- For construction adhesive specifications refer to section 2.3: Adhesives
- Ring shank or annular grooved nails, or screws are recommended for additional holding power
- To reduce the risk of fastener popping or floor squeak the use of construction adhesives is advised.
- Do not use jolt or bullet head nails

5.3 FLOORING – FINISHING

- Overlays and coatings should be applied following the manufacturer's specifications
- Avoid heavy sanding that may remove the critically important structural face veneer
- Adhesives must be compatible with CCA (Copper Chrome Arsenic) treatment in H3.2 CCA treated sheets. Compatibility can often be improved by lightly washing, scrubbing and drying the plywood surface prior to fixing
- Where clear or stained finishes are desired, designers should select sheets and protect the floor as much as possible from the weather and construction activities
- Ecoply is made from relatively soft radiata pine and as such will dent or mark more easily than hardwood flooring systems. This is to be expected and designers must consider the long term appearance requirements of the project. Ecoply Flooring is a good substrate for harder wearing flooring overlays, and is not primarily intended for clear finishing, especially if it is exposed to moisture during construction
- For improved surface finish, floors should be protected from weather during construction as soon as possible

6.0 FREQUENTLY ASKED QUESTIONS

Q: How much space should be allowed for expansion?

A: Allow a 2 - 3mm expansion gap between square edges of Ecoply® sheets. If using Ecoply Flooring, a 5 mm expansion gap is recommended at the perimeter of the floor or deck. Check by calculation for large areas.

Q: Can power driven nails be used to fix Ecoply?

A: Paslode power driven nails have been tested for fixing Ecoply and Shadowclad® plywood products for particular bracing and cladding applications. For power driven nail specifications refer to the Paslode Special Fixing Applications document available from <http://www.paslode.co.nz/images/fix-app-CHH-woodproducts.pdf>. Use the Paslode Impulse Compact Nailer fitted with a No Mar(k) work contact element to eliminate any contact marks on the plywood. Adjust the work contact element to the flush position and fire the nail at 90° to the work surface. Hammer any nails flush which are left proud. Do not overdrive.

Q: How close to sheet edges can I nail?

A: Fixings must be at least 3 fastener diameters or 7 mm from the sheet edge.

Q: Do I have to use stainless steel nails when using Ecoply for bracing?

A: Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners must be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Q: What is the weight of Ecoply?

A: Refer to Table 4A for weight (kg/m²) of different Ecoply thicknesses.

Q: What is the R-value of Ecoply?

A: The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214. Plywood has a conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance $R = 0.012/0.13 = 0.09$.

Q: Are there any compatibility issues when using Ecoply with other materials?

A: Adhesives for flexible rubber membranes may react with LOSP treatment and should therefore only be applied to H3.2 CCA treated Ecoply unless the membrane supplier advises differently. Check with the membrane manufacturer if in doubt. H3.2 CCA treatment is also corrosive and this must be taken into account when specifying H3.2 CCA treated plywood next to metals. For further guidance, refer to Tables 21 and 22 in Acceptable Solution E2/AS1.

Q: Can Ecoply be used as a rigid sheathing (air barrier)?

A: CHH has a specific system called Ecoply Barrier. Ecoply Barrier has been developed as a rigid air barrier. Refer to the current Ecoply Barrier Specification & Installation Guide for further information. 7mm H3.2 CCA treated Ecoply can also be used if combined with building underlay in accordance with E2/AS1 for a rigid air barrier system.

Q: What is the relevance of AS/NZS 2269?

A: Ecoply structural plywood is manufactured to AS/NZS 2269 Plywood Structural. This Standard is referenced by the NZBC Compliance Documents including NZS 3602 Timber and Wood-based Products for Use in Building, NZS 3603 Timber Structures, NZS 3604 Timber Framed Buildings, AS/NZS 1604.3 Specification for Preservative Treatment, Part 3: Plywood and Acceptable Solution E2/AS1 - External Moisture. Plywood not manufactured to AS/NZS 2269 does NOT meet the requirements of these NZBC Compliance Documents.

Q: What is the relevance of the PAA stamp?

A: Ecoply is manufactured under a third party audited, product quality control programme by the Engineered Wood Products Association of Australasia (EWPAA) to monitor compliance with AS/NZS 2269. Given that compliance with Standards is not actively policed by Standards New Zealand, this third party auditing provides important peace of mind for users and consumers of Ecoply plywood products.

Q: What is marine ply?

A: Marine plywood manufactured to AS/NZS 2272 Plywood Marine may contain species of low durability (source: BRANZ Good Practice Guide – Timber Cladding). Whilst marine plywood has a Type A glue bond, it is generally specified for its high surface appearance grade and lack of core knots as opposed to structural performance. AS/NZS 2272 limits marine plywood to a number of approved species that pass stringent property requirements for things like moisture permeability. These requirements are different from those in standards from other countries. Marine plywood is rarely treated as it is usually coated with resin, fibreglass, or a paint finish for long term durability.

Q: What should a specification for structural plywood include?

A: A specification for structural plywood should include:

Specification check list	Example
Quantity/size	20 sheets of 2400 x 1200
Thickness	12 mm
Edge finish	Square edge
Brand name	Ecoply® structural plywood
Reference to Standard	To AS/NZS 2269
Stress grade/layup	F8 (12-24-5)
Surface grade/bond type	CD A-Bond ¹
Accreditation	EWPAA product certified ³

1 Stress grades may vary between different manufacturers and products.

2 Type A-bonds are suitable for permanent exposed applications and structural applications.

3 The EWPAA JAS-ANZ Product Certification Mark certifies that Ecoply structural plywood products have been manufactured under a third party audited joint product certification programme to monitor compliance with AS/NZS 2269

Q: What are F-grades?

A: The stress grading system is a ranking system which utilises the symbol F and a suffix 8, 11 etc as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. For plywood of a given thickness, the higher the F-grade, the further it will span. For load bearing applications (e.g. flooring, roofing) the required F-grade as well as the plywood thickness must be specified to achieve the required span. F8 is the most common structural plywood grade found in New Zealand. All Ecoply® structural products are F8. Ecoply 15 mm roofing and Ecoply 19 mm Longspan Flooring are F11/F8. Other Ecoply Flooring products are also available in F11 upon request.

Q: What are surface/appearance grades (eg CD)?

A: Appearance grades (eg BD, CD, DD) denote the appearance grade of the plywood including the number and size of knot holes as defined in AS/NZS 2269 and summarised in Table 2A & 2B of this guide. The first letter describes the appearance of the face veneer and the second letter describes the back face.

Q: How long can Ecoply be left exposed to the weather?

A: Untreated Ecoply will typically maintain its structural integrity when exposed to the weather during construction for up to 3 months. The surface colour will start to silver off and face checking will become evident. Where the finished appearance of the Ecoply is important, it should be protected during construction. Ecoply is also available H3 treated to resist decay or insect hazard. When used in accordance with this guide, it can be specified to meet the durability requirements of the NZBC, however appearance issues such as face checking may still occur dependent upon the degree of exposure to weather during construction.

Q: What treatment levels and types are used for Ecoply?

A: Ecoply is available untreated or preservative treated. Ecoply is treated to the H3 hazard class for above ground use. The standard Ecoply treatment type is H3.2 CCA (Copper Chrome

Arsenate) although H3.1 LOSP Azole (Light Organic Solvent Preservative) may also be specified where a clear treatment is required. LOSP Azole is the standard treatment type for BD, Grooved Lining and Shadowclad®. CCA treatment gives the plywood sheets a green tinge and the drying process after CCA treatment may leave fillet marks on the face of the sheet.

Q: Does Ecoply have to be treated when used as structural bracing?

A: Ecoply used as bracing must be treated unless it is installed in an interior dry situation. Note, behind exterior cladding and in cavities (even if the Ecoply is covered with building wrap) are not considered to be an interior dry situation.

Q: Do I have to re-treat cut edges of treated Ecoply?

A: It is important to re-treat any cuts and holes with a brush on remedial treatment such as Holdfast® Metalex® Clear.

Q: What type of glue is used to manufacture Ecoply?

A: Phenol formaldehyde (PF) resins are used to bond the plywood veneers. This forms a Type A (Marine) bond suitable for structural applications and exterior use. Phenol formaldehyde resins are dark red/brown in colour. Product details printed on the back of Ecoply sheets indicate the 'A Bond'.

Q: Does Ecoply emit formaldehyde?

A: Formaldehyde occurs naturally in the environment and is emitted by processes such as combustion, decay and naturally by all timber species. Ecoply and Shadowclad meets the lowest formaldehyde emission class (E₀ - less than 0.5 mg/litre). Actual formaldehyde emissions have been tested to be less than 0.3 mg/litre.

Q: How should Ecoply be installed to maximise its stiffness properties?

A: Structural plywood has greatest stiffness along the long grain of the sheet (i.e. along its length). Therefore, flooring/roofing should be laid across joists/rafters rather than parallel to them.

7.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code (NZBC)
 - CHH 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)
 - EWPA (www.ewp.asn.au)
 - Product Technical Statement for Ecoply available online (www.chhwoodproducts.co.nz/product-technical-statements)
 - EWPA Technical Note - Plywood Roofing and Flooring: Installation and detail factors
- Standards can be purchased online at www.standards.co.nz
Building Code Compliance Documents can be downloaded free of charge at www.dbh.govt.nz

8.0 LIMITATIONS

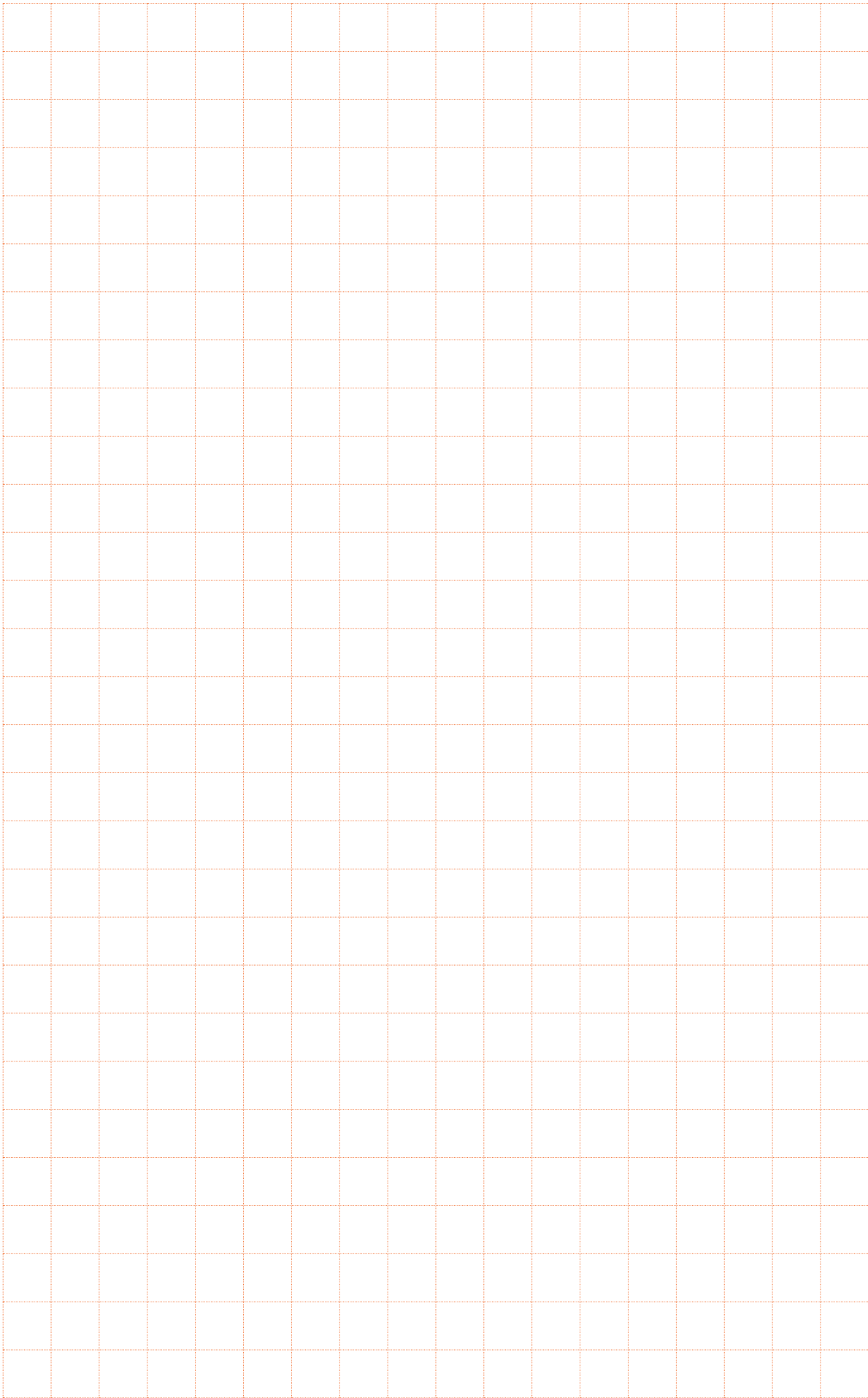
The information contained in this document is current as at September 2015 and is based on data available to CHH Woodproducts at the time of going to print.

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.

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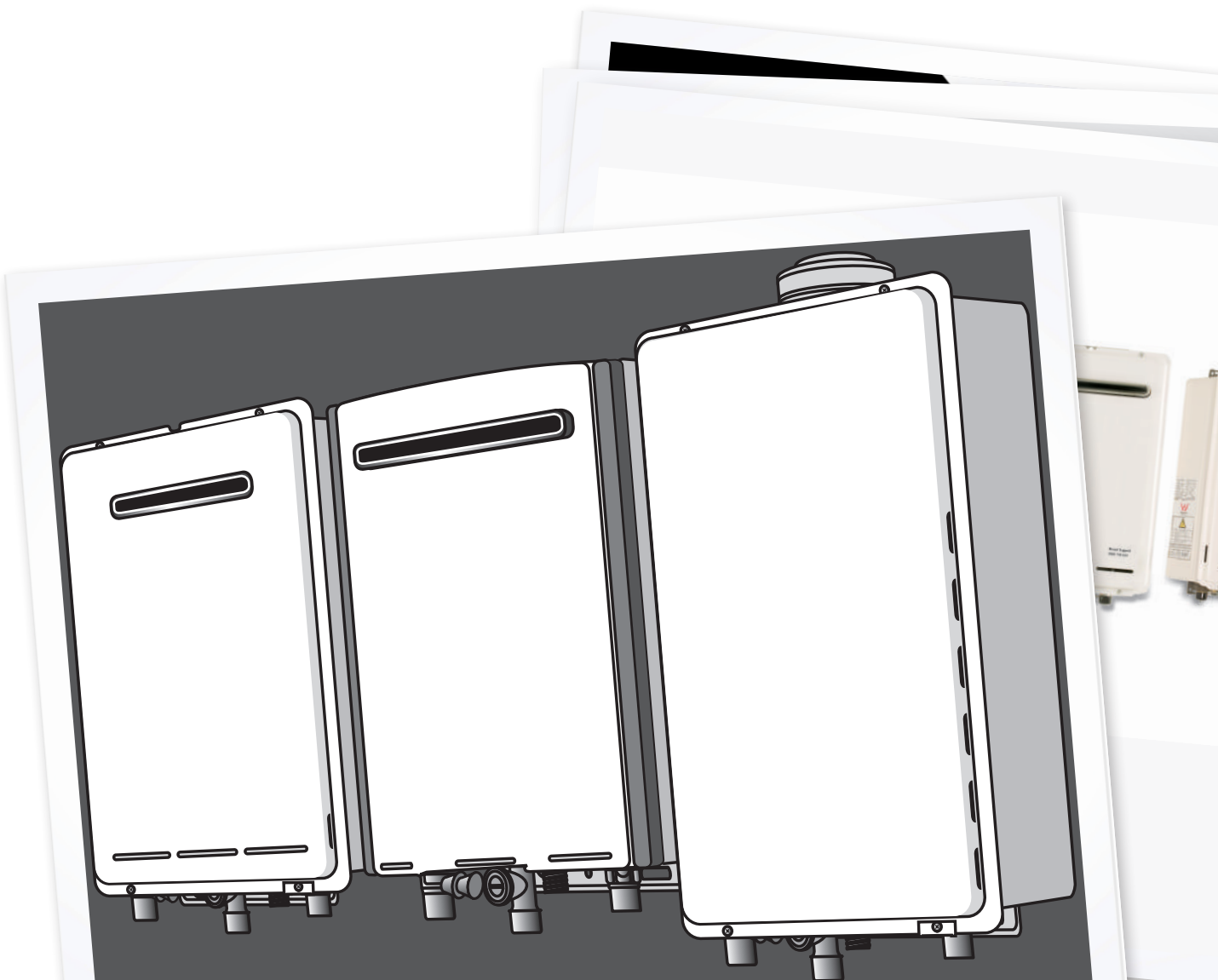


Rinnai

Installation guide

Continuous flow water heaters

Models: VT16-26, HD200, HDi200, HD250, EF24, EF250, EFi250



Important:

This appliance must be installed in accordance with:

- Manufacturer's installation instructions
- Current AS/NZS3000, AS/NZS3500, AS/NZS 5601.1 and G12/AS1
- Local regulations and municipal building codes

For use with Natural Gas or Universal LPG as indicated on the appliance.

Not suitable as a spa or swimming pool heater.

Rinnai continuous flow internal water heaters ('i' models) must be installed with an approved Rinnai flue system.

Appliance must be installed, commissioned and serviced by an authorised person, being in New Zealand a licensed gasfitter, in accordance with these instructions and all applicable local rules and regulations.

Warning

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

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

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contents:

Before installation	4
Appliance location	5
General installation information	7
Flued (internal) water heaters	8
Water delivery temperature	9
Connections and fittings	10
Dimensions: VT and HD models	11
Dimensions: EF models	12
EF250 models: Earthing the unit	13
EF models: Condensate drain	14
Controllers - general information	15
Controllers - Universal (Compact)	16
Controllers - Kitchen Deluxe	17
Controllers - Bathroom Deluxe	18
Controllers - communication cables	19
Commissioning	20
Recommended solar system layout	21
DIP switch settings - important	23
DIP switch settings	24

Before installation

Check for damage

Unpack the appliance and flue components (if applicable) and check for damage. DO NOT install any damaged items.

Check components and gas type

Check all components have been supplied and that you have the correct gas type.

Read these instructions before starting

Read these instructions to get an overview of the steps required before starting the installation. Failure to follow these instructions could cause a malfunction of the appliance. This could result in serious injury and property damage.

Solar installations

For Rinnai continuous flow water heaters used in solar installations, refer 'Recommended Solar System Layout'.

EF models are heavy

The Rinnai Infinity EF models are 32 kg. Please use care when lifting and seek assistance if required.

Applicable models

These installation instructions apply to the following Rinnai continuous flow water heaters.

Rinnai Infinity VT16	External	REU-VR1620WG	Model number Note: The model number is written on the data plate on the left hand side of the appliance.
Rinnai Infinity VT20	External	REU-VR2024WG	
Rinnai Infinity VT24	External	REU-VR2426WG	
Rinnai Infinity VT26	External	REU-VR2626WG	
Rinnai Infinity HD200	External	REU-VRM2632WC	
Rinnai Infinity HDi200	Internal	REU-VR2632FFUC	
Rinnai Infinity HD250	External	REU-VR3237WG	
Rinnai Infinity EF24	External	REU-K2430WG	
Rinnai Infinity EF250	External	REU-KM3237WD	
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD	

i = internal—these must be installed with an approved Rinnai flue system

For nominated gas consumption, gas pressures, and gas types please refer to the data plate on the left hand side of the appliance.

Appliance location

Installation in environments free from corrosive compounds

Air surrounding the water heater, venting and vent termination(s) is used for combustion and must be free from compounds that cause corrosion of internal components. These include corrosive compounds that are found in aerosol sprays, detergents, bleaches, cleaning solvents, oil based paints/varnishes, and refrigerants. Therefore Rinnai recommends outdoor models be used for these locations where possible. The water heater, venting and vent termination(s) should not be installed in any areas where the air may contain these corrosive compounds. Chemicals that are corrosive in nature should not be stored or used near the water heater or vent termination.

Damage and repair due to corrosive compounds in the air is not covered by warranty.

If it is necessary for a water heater to be located in areas which may contain corrosive compounds, Rinnai strongly recommends the following:

Indoor (internal) water heaters

- DO NOT install in areas where contaminated air is present.
- Consider, before installation, where air has the ability to travel within the building.
- Where possible, install the heater in a sealed closet so that it is free of contaminated indoor air.

Outdoor (external) water heaters and vent terminations of indoor (internal) water heaters

- Install as far away as possible from exhaust vent hoods
- Install as far away as possible

from air inlet vents—corrosive fumes may be released through these vents when air is not being run through them

Internal models



Internal models are designed for indoor installations only. They may be installed in an enclosure if the requirements of

AS/NZS 5601.1 are satisfied. An enclosure is defined as a compartment, enclosed area or partitioned off space primarily used for the installation of the appliance. If installed in an enclosure either internally or externally, the location should be ventilated to allow gas to dissipate.

They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed in roof spaces or elevated structures, specific requirements apply. Refer to AS/NZS 5601.1 for details.

Catch pan



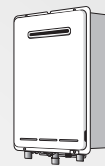
It is important that a suitably drained catch pan is fitted where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

This appliance **MUST** be used with the appropriate Rinnai flue system.

This appliance must be located so that the flue terminal exits the building at a suitable point, refer 'Minimum Clearances Required for Flue Terminals', in AS/NZS 5601.1 Fig 6.2.

Manufacturer's instructions for model REU-KM3237FFUD (EFi250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

External models



External models are designed for outdoor installations only. They must be located in an above ground open-air situation with natural ventilation, without stagnant areas, and where gas leakage and products of combustion are rapidly dispersed by wind and natural convection.

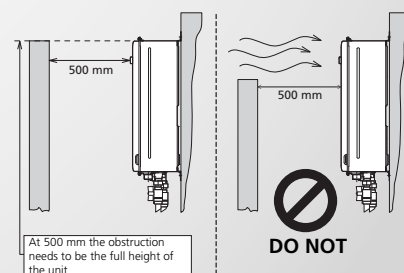
They must be mounted on a vertical structure with the water and gas connections on the underside pointing downwards. For appliances installed on elevated structures or under floors specific requirements apply. Refer to AS/NZS 5601.1 Fig 6.2 for details.

This appliance must be located so that the flue terminal exits the building at a suitable point, refer 'Minimum Clearances Required for Flue Terminals', AS/NZS 5601.1 Fig 6.2.

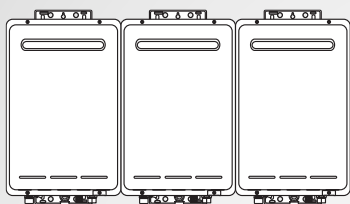
Manufacturer's instructions for model REU-KM3237WD (EF250); for reference j, gas appliances over 200 MJ/h input, use ≥ 300 mm.

Horizontal obstructions

AS/NZS 5601 stipulates a minimum horizontal clearance of 500 mm between a building structure and obstruction facing the terminal. At 500 mm the obstruction needs to be the full height of the unit (as shown), and not a partial obstruction. A partial obstruction of less than 1 m could result in wind pushing flue gases back into the flue terminal.



When multiple units of the same model are installed on the same vertical face, with the flue terminals at the same height, they can be installed next to each other (as shown).



All models

This appliance must be placed as close as possible to the most frequently used hot water outlet or outlets to minimise the delay for hot water delivery.

For installations where the distance between the water heater and the outlets is considerable, a flow and return system can be used to minimise the waiting time for hot water delivery. Alternatively, multiple appliances can be strategically placed to serve different outlets. Contact Rinnai for further information.

An AC 230 V, 10 Amp, earthed power point must be provided adjacent to the appliance. For outdoor installations, this power point must be weatherproof. It must be clear of the gas and water connections to the appliance and also the flue exhaust and water pressure relief valve. The power cord of the appliance is 1.5 m long.

All appliances must be installed to ensure access can be gained without hazard or undue difficulty for inspection, repair, renewal or operational purposes. Sufficient clearances shall allow access to and removal of all serviceable components.

Appliances should not be mounted higher than 3.5 m above the ground or floor level unless the customer can arrange permanent and safe access or can provide another means of access such as scissor or boom lifts.

Clearances from combustible materials

The appliance can be mounted directly against the wall or structure. There is no need to use non-combustible sheeting or leave an air gap between the appliance back panel and the wall or structure for the purposes of meeting the temperature hazard requirements of AS/NZS 5601.

General installation information

Catch pan

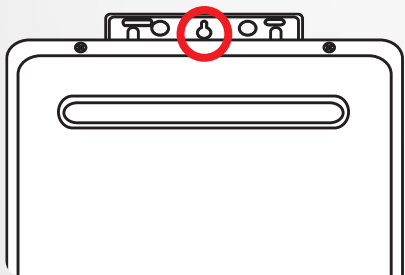
It is important a suitably drained catch pan is fitted (especially for internal units) where damage could be caused by discharge from the water heater. Provision must be made for safe disposal of any leaking water to an external location.

Mounting the appliance

Refer 'Connections and Fittings' for individual appliance weights. The wall or structure on which these units are to be mounted must be capable of supporting these weights and the associated pipe work.

Ensure suitable fixing screws or bolts are used to secure the units to the walls, in accordance with AS/NZS 5601.1. Wooden plugs shall not be used.

The top bracket has a keyhole slot (circled below) so the appliance can be positioned by hanging it on one screw while the other screws are secured.



Circuit diagrams

Refer to commissioning sheet supplied with the appliance (inside front cover of appliance).

Pipe sizing



Refer 'Connections and Fittings' for appliance gas consumption. If the gas pipe sizing is insufficient the customer will not get the full performance benefit. Gas pipe sizing must consider the gas input to this appliance as well as all the other gas appliances in the premises. The gas meter and regulator must be specified for this gas rate.

An approved sizing chart such as the one in AS/NZS 5601.1, or proprietary system manufacturer guide should be used.

Water pipe sizing and layout should be performed in accordance with AS/NZS 3500. All hot water pipe work should be insulated to optimise performance and energy efficiency.

Water supply



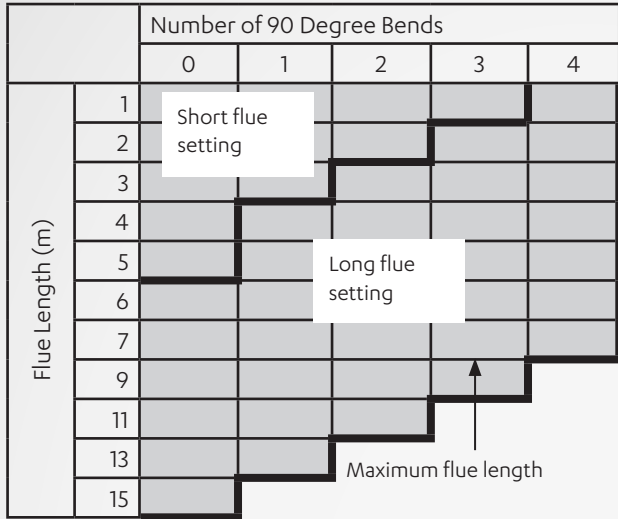
Refer 'Connections and Fittings' for applicable water pressures. Approved pressure limiting valves may be required if the stated maximum rated water supply pressures are exceeded. To achieve the rated flow, the stated minimum water supply pressures must be supplied. The water heaters will operate at lower pressures but will not achieve the rated flow.

Water chemistry and impurity limits are stated in our detailed warranty statement. Most metropolitan water supplies fall within these requirements. If you are unsure about the quality of the water, please contact Rinnai and we will provide you with the details of an authorised agency who are able to test your water for compliance to Rinnai standards. If sludge or foreign matter is present in the water supply, a suitable filter or strainer should be incorporated in the water supply to the water heater.

Flued (internal) water heaters

This water heater must be fitted with the appropriate Rinnai flue system.

The chart below highlights the maximum flue length and number of bends. It also shows the difference between a short and long flue—this is important if changing settings (DIP switches).



Refer to separate Rinnai flue guide for further details.

Water delivery temperature

Local regulations and/or requirements of AS/NZS3500.4 must be considered regarding the temperature limitations of hot water supplied to areas used primarily for personal hygiene. The temperature of these areas may be limited to 55 °C or less.

If the appliance is to deliver water primarily for the purposes of personal hygiene in an early childhood centre, school, nursing home or similar facility as defined in AS/NZS3500.4 a Temperature Limiting Device (TLD), such as a Tempering Valve may be required (even if the appliance is set to 55 °C or less). For these types of applications contact Rinnai.

Requirements for Rinnai continuous flow units installed without controllers

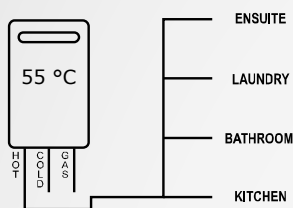


Diagram 1 - 55 °C Appliance

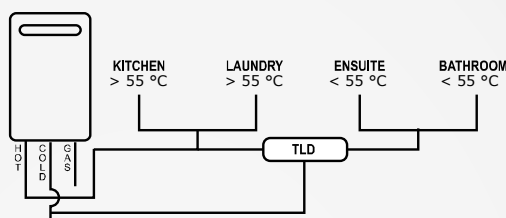


Diagram 2 - Not a 55 °C Appliance
(TLD = Temperature Limiting Device)

When the continuous flow unit is set to deliver water at a temperature higher than 55 °C, it will be necessary to fit a Temperature Limiting Device for delivery to areas used for the purposes of personal hygiene.

Connections and fittings

Models	Gas consumption MJ/h	Water Supply kPa		Weight kg	Fittings			Condensate
		Min.	Max.		Hot	Cold	Gas	
VT16 external REU-VR1620WG	125	120	1000	15	R $\frac{1}{2}$ (15 mm)	R $\frac{1}{2}$ (15 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT20 external REU-VR2024WG	160	160	1000	16	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT24 external REU-VR2426WG	188	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
VT26 external REU-VR2626WG	199	180	1000	17	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD200 external REU-VRM2632WC	199	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HDi200 internal REU-VR2632FFUG	195	140	1000	21	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
HD250 external REU-VR3237WG	249	200	1000	29	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	N/A
EF24 external REU-K2430WG	162	240	1000	27	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EF250 external REU-KM3237WD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)
EFI250 internal REU-KM3237FFUD	211	240	1000	32	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{3}{4}$ (20 mm)	R $\frac{1}{2}$ (15 mm)

Service connection points

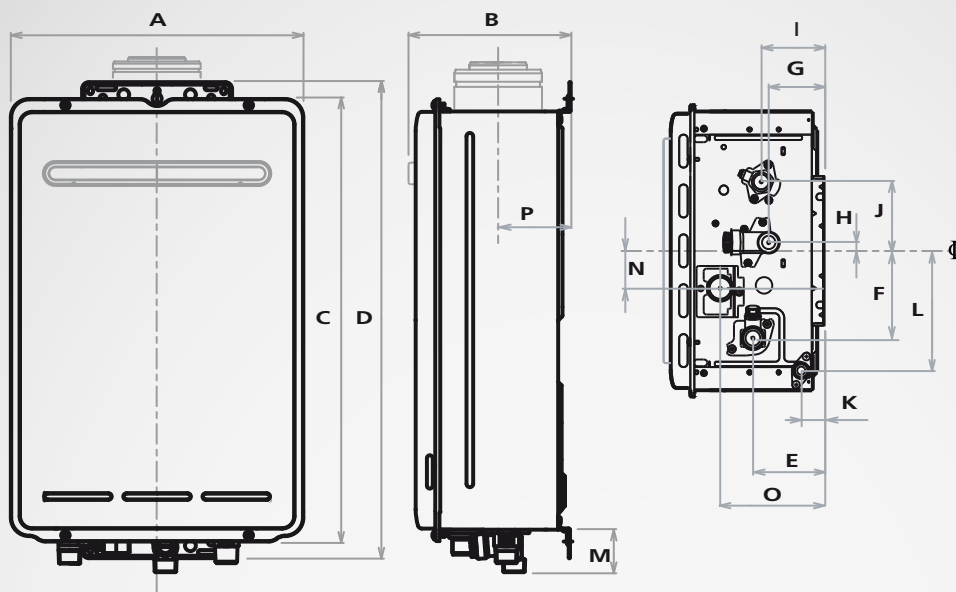
These dimensions are NOT an indication of the pipe sizes required.

An approved full flow isolation valve and disconnection union MUST be fitted to the cold water inlet. A non-return valve is not required unless required by local regulations.

Isolation valves must be fitted so the appliance can be removed.

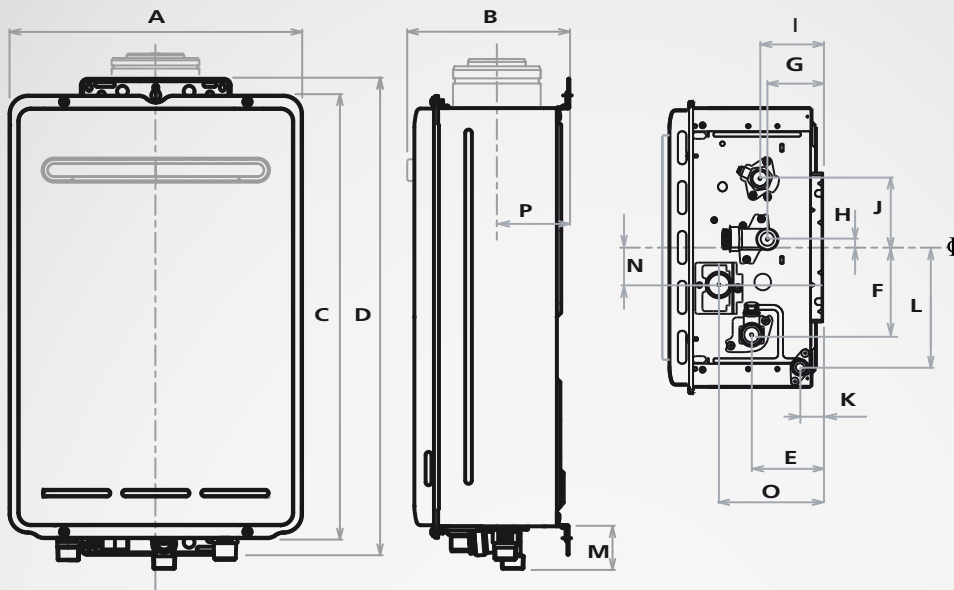
Purge gas and cold water supply lines to remove air and swarf before final connection of the appliance. Swarf in the gas or water supplies may cause damage.

Dimensions: VT and HD models



Dimensions table (mm)		VT16 external (REU-VR1620WG)	VT20 external (REU-VR2024WG)	VT24 external (REU-VR2426WG)	VT26 external (REU-VR2626WG)	HD200 external (REU-VRM2632WC)	HDi200 internal (REU-VR2632FFUG)	HD250 external (REU-VR3237WG)
A	Width	350	350	350	350	350	350	470
B	Depth	194	194	194	194	250	235~275	244
C	Height - unit	530	530	530	530	600	600	600
D	Height - including brackets	571	571	571	571	636	641	644
E	Hot water outlet (from wall)	87	87	87	87	95	91~131	115
F	Hot water outlet (from centre)	105	105	105	105	110	110	61
G	Cold water inlet (from wall)	68	68	68	68	74	70~110	99
H	Cold water inlet (from centre)	10	10	10	10	27*	27*	52
I	Gas connection (from wall)	77	77	77	77	103	99~139	61
J	Gas connection (from centre)	83	83	83	83	89	89	110
K	Condensate outlet (from wall)	-	-	-	-	-	-	-
L	Condensate outlet (from centre)	-	-	-	-	-	-	-
M	Gas: Length gas connection (from base)	40	40	40	40	41	41	41
	Cold: Length of cold water inlet (from base)	50	50	50	50	51	51	51
	Hot: Length of hot water outlet (from base)	39	39	39	39	42	42	42
N	Electrical connection (from centre)	45	45	45	45	21**	21**	2**
O	Electrical connection (from wall)	128	128	128	128	160	160~200	100
P	Flue spigot centre line (from wall)	-	-	-	-	-	95~135	-
* This measurement is to the left of the centre line		** This measurement is to the right of the centre line						
HDi200, height of flue spigot from base of unit approx. 85 mm								

Dimensions: EF models



SDC - Approved Building Consent Document - BC171688 - Pg 187 of 264 - 7/09/2017 - harrib

Dimensions table (mm)		EF24 external (REU-K2430WG)	EF250 external (REU-KM3237WD)	EFi250 internal (REU-KM3237FFUD)
A	Width	350	470	470
B	Depth	277	283.1	257~307
C	Height - unit	600	654	654
D	Height - including brackets	644	721.6	721.6
E	Hot water outlet (from wall)	164.5	100	100~140
F	Hot water outlet (from centre)	100	100	100
G	Cold water inlet (from wall)	83	64.6	64.6~104
H	Cold water inlet (from centre)	53*	27.2	27.7
I	Gas connection (from wall)	70.5	89	89~129
J	Gas connection (from centre)	25	103.2	103.2
K	Condensate outlet (from wall)	33	122.6	122.6
L	Condensate outlet (from centre)	132	195	195
M	Gas: Length gas connection (from base)	51	40.2	40.2
	Cold: Length of cold water inlet (from base)	62	50.2	50.2
	Hot: Length of hot water outlet (from base)	41	41.2	41.2
	Condensate connection length (from base)	24	22.4	22.4
N	Electrical connection (from centre)	10**	49	49
O	Electrical connection (from wall)	175	200	200~240
P	Flue spigot centre line (from wall)	-	-	155~195
* This measurement is to the left of the centre line				
** This measurement is to the right of the centre line				

EF250 models: Earthing the unit

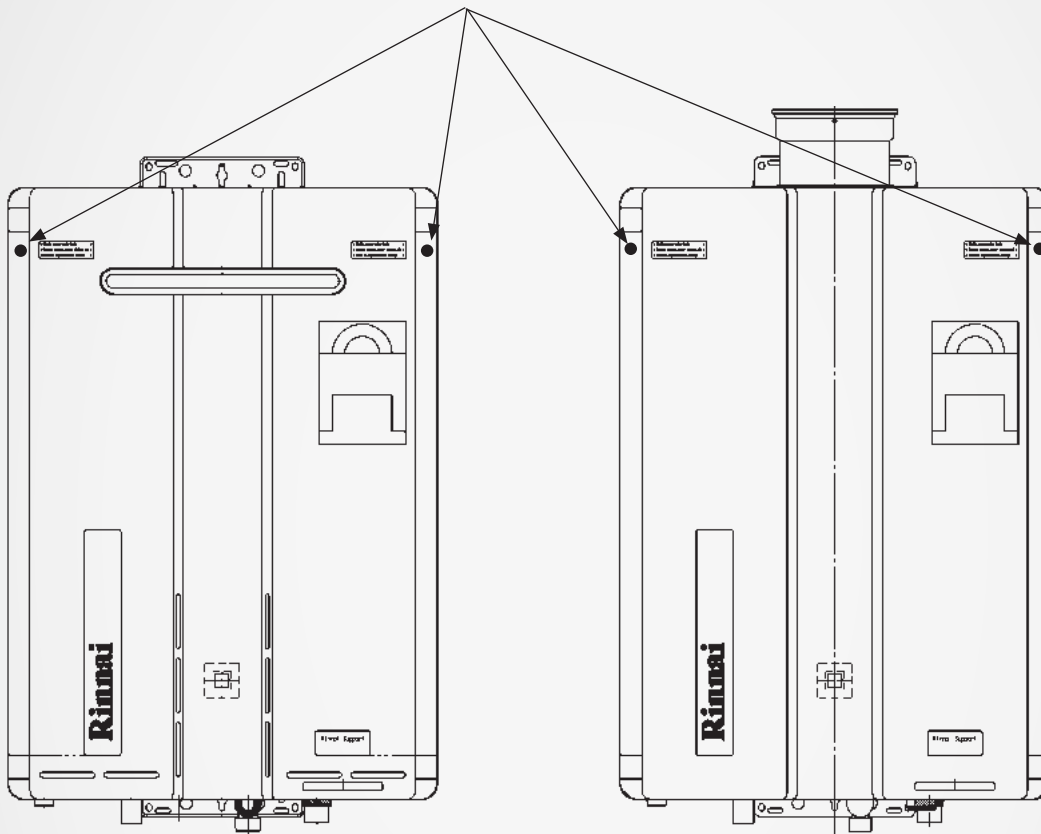
Removing the cover and earthing the unit

For the Rinnai condensing continuous flow water heaters (EF250 & EFi250), the earthing screws are located under the side trim, refer image below. First remove the trim and then the earthing screws before lifting off the cover.



For safe operation of the appliance the earthing screws **MUST** be replaced.

Earthing screws located under side trim



EF models: Condensate drain

The Rinnai Infinity EF water heaters generate condensate continuously at a rate of up to five litres per hour as a by-product of a highly efficient gas burner. Condensate must be drained via a pipe to a suitable discharge point.

As condensate is a by-product of gas combustion it is mildly acidic. For this reason copper tube and fittings **MUST NOT** be used as it will corrode. Instead Rinnai recommend plastic pipes and fittings.

Important considerations for the condensate drain pipe

Content of AS3500.4.2003 section 5.12 'Temperature/Pressure Relief and Expansion Control Valve Drain Lines' has been used as a guide in preparing these considerations.

- Water heater drain outlet connection, ½" (15 mm) BSP male.
- PE ½" BSP (15 mm) female to barbed ignition system connector (13-19 mm) or equivalent plastic fitting.
- Drain pipe and fittings to match (B).
- Continuous fall of at least 2° from water heater to discharge point, length and bends in accordance with 'Maximum length and changes of direction greater than 45°'.
- Suitable points of discharge are deemed to be sewers or pits. **DO NOT** discharge onto electrical connections, earth stakes, copper pipes, concrete paths, or into a pond.

Maximum length and changes of direction greater than 45°

Length and changes of direction				
Max. length (m)	9	8	7	6
Max. changes of direction (> 45°)	3	4	5	6

Installation of a condensate drain

Point of discharge from each drain line shall be located so the release of condensate does not cause a nuisance, is readily discernible and incurs no risk of building damage. There shall be no tap, valve or other restrictions in any line. Each line shall fall continuously from the valve to the approved point of discharge.

Drain lines shall not discharge into a storage water heater safe tray. The end of the condensate drain line shall be:

- Not lower than 200 mm, or higher than 300 mm above an unpaved surface; or
- Not lower than 75 mm, or higher than 300 mm above a gravel pit, and not less than 100 mm in diameter in a paved surface.

Where discharging over a tundish or gully trap, drain lines shall have an air gap of a size at least twice the diameter of a drain line.

Joining of condensate drain lines

Condensate drain lines from multiple water heaters may be joined together provided they conform with the installation requirements stated on this page.

Common stack discharge

Where individual heaters are installed in a multistory building, the condensate drain lines may discharge into a common stack subject to the following:

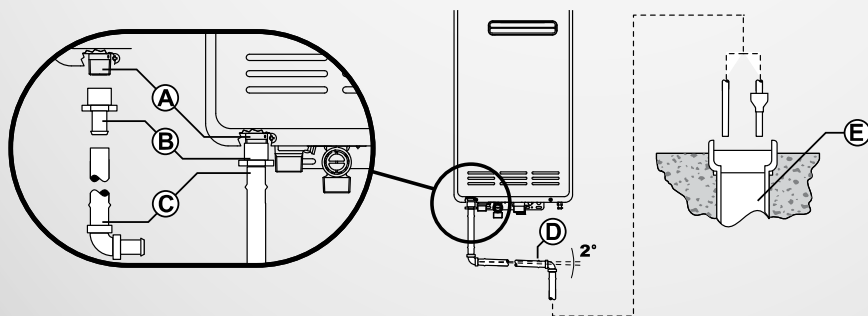
- Drained to a tundish having a discharge line that is not less than the common stack, directly connected to a fixture trap, and installed in a connection with any adjacent soil or waste stack.
- Discharge point of the common stack is readily visible and does not cause any nuisance.
- Common stack is vented by extending the pipe upwards, above the roof level.

Tundish drain lines

The drain line from any tundish shall be not less than DN 20 or less than one size larger than that of the largest drain line discharging into the tundish. Tundish drain lines shall comply with the installation requirements above.

Areas subject to freezing

In areas where water pipes are prone to freezing, the drain pipe from any valve shall be insulated and not exceed 300 mm in length. It shall discharge into a tundish through an air gap of not less than 75 mm and not exceed more than 150 mm measured from the outlet of the drain pipe to the rim of the tundish.



Controllers - general information

Water controllers are available as an optional extra. Universal (Compact), Deluxe, and Wireless controllers can be used together.

Maximum number of controllers

A maximum of four water controllers can be fitted with the following limitations:

- Max. of one Kitchen Deluxe controller (MV-100V)
- Max. of two Bathroom Deluxe controllers (BC-100V)

Only one controller can be set to deliver 55 °C, this cannot be a Bathroom Deluxe controller.

This next section refers to wired controllers. For details on wireless controllers refer to separate instructions.

Important

Others manufacturers' controllers are not compatible with Rinnai Infinity continuous flow water heaters.

Installation of controllers

Do not install controllers:

- near a heat source such as, a cook top, stove or oven—heat, steam, smoke, or hot oil may cause damage
- in direct sunlight
- outdoors unless protection from dust ingress and sunlight are provided
- against a metal wall unless in accordance with AS3000

Positioning

Controllers must be installed in shaded and clean locations. They should be fitted out of reach of children (suggested height 1.5 m). The Compact and Bathroom Deluxe Controllers are water resistant, however, durability is improved when positioned outside the shower recess or at least 400 mm above the highest part of a sink, basin or bath.

Water controller cables

Water controllers operate at extra low voltage (12 Volts DC) which is supplied from the water heater. Controllers come with 15 m of electrical cable. The appliance end of the controller cables are fitted with spade terminals.

Extension cabling is available as an accessory from Rinnai. Alternatively, a two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used.

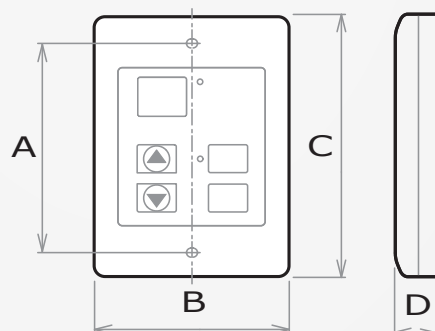
Maximum individual cable runs:

One controller	= 100 m
Two controllers	= 50 m*
Three plus controllers	= 20 m*

* per controller

Water controller cables are not polarity sensitive.

Dimensions



Dim.	Description	Compact (MC-91)	Kitchen Deluxe (MC-100V)	Bathroom Deluxe (BC-100V)
A	Distance between mounting holes	83	83	181
B	Width	90	120	195
C	Height	120	120	97
D	Depth	20	20	22

Controllers - Universal (Compact)

Fitting the Universal (Compact) controller

1. Determine the most suitable position for the controller.
2. Drill three holes as shown (Fig. 1 and Fig. 2) for securing screws and one to provide cable access.

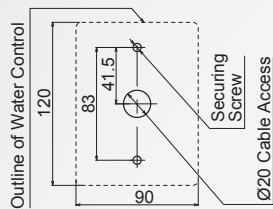


Fig.1

3. When running cable through the access hole ensure the connector and the end of the cable is located nearest to the controller (Fig. 2).

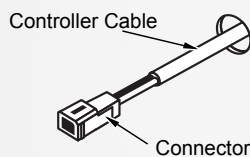


Fig.2

4. Carefully remove the face plate from the controller using the screwdriver (Fig. 3).

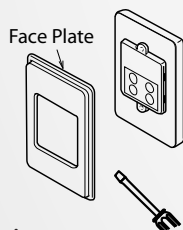


Fig.3

5. Fix the controller to the wall using appropriate fittings as shown (Fig. 4).

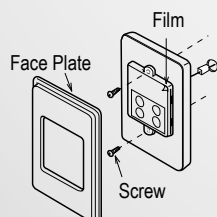


Fig.4

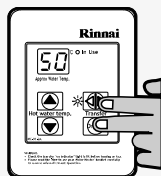
6. Remove protective plastic from the controller face as shown (Fig. 4) and replace the face plate.

Optional programming of the Universal controller

Step one

Are four controllers connected?
If NO—refer to step two. If YES, activate the fourth controller as follows.

1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).



2. Check display on all four controllers is displaying a temperature when switched on. If any controller displays two dashes, repeat above step.



Step two

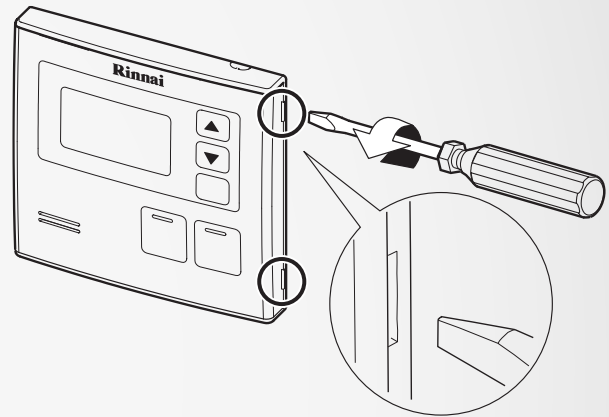
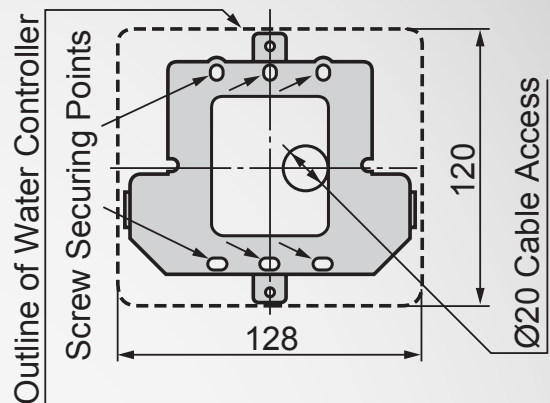
1. For the controller in the kitchen only, press and hold the 'Transfer' and 'On/Off' buttons simultaneously until a beep is heard (approximately five seconds).
2. When the controller fitted in the kitchen is switched on it will be possible to select temperatures higher than 50 °C (at this controller). If not repeat above step.

If the kitchen controller is swapped repeat the programming procedure.

Controllers - Kitchen Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Use the wall mounting bracket as a template to mark and drill three holes, locating the cable access hole as shown.
3. Fix the mounting bracket to the wall using the appropriate fixings.
4. Run the water controller cable through the hole in the wall.
5. Carefully remove the face plate from the controller using a screwdriver as shown.
6. Connect the controller cable to the kitchen water controller. At this point cables from other controllers (if fitted) may also be connected to the kitchen water terminals, eliminating the need for multiple cable runs directly to the water heater. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the water controllers.
7. Fasten water controllers to wall mounting bracket. Avoid the use of impact drills and over-tightening of fixings as this may damage the controllers.
8. Remove the protective plastic from the controller face and replace the face plate.



Controllers - Bathroom Deluxe

Installation

1. Determine the most suitable position for the controller.
2. Mark and drill three holes, locating the cable access hole as shown (Fig.1).
3. When running a cable through the access hole ensure the connector end of the cable is located nearest to the controller (Fig.2).
4. Affix the double sided self-adhesive seal to the back of the controller (Fig.3).
5. Carefully remove the face plate from the controller. Do this by placing your thumbs on the front digital display while hooking your fingers behind the top plate and gently push down as shown (Fig.4). Do not use a screwdriver as this may damage the controller.
6. Connect the cable to the bathroom controller. Feed excess cable lengths into the wall cavity to avoid pinching of cables between the wall and the controller.
7. Fix bathroom controller to the wall using appropriate fixings. Avoid the use of impact drills and over-tightening of fixings as this may damage the controller.
8. Remove the protective plastic from the controller face and replace the face plate.

Outline of Water Controller

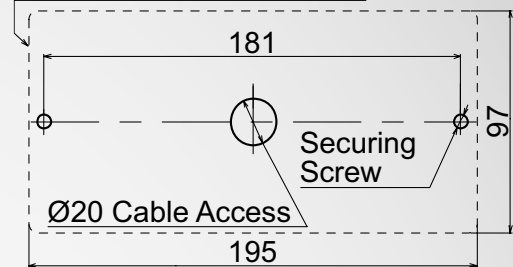


Fig.1

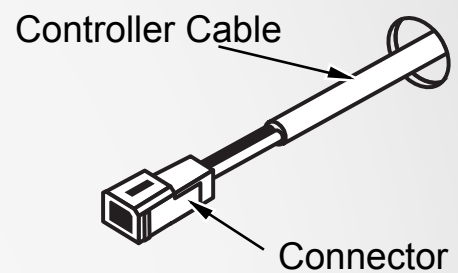


Fig.2

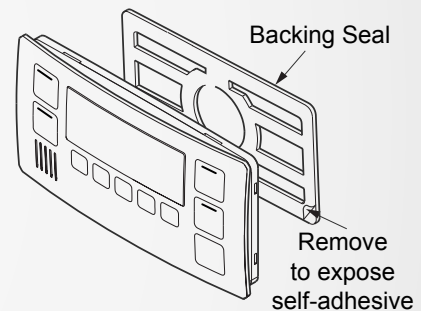


Fig.3

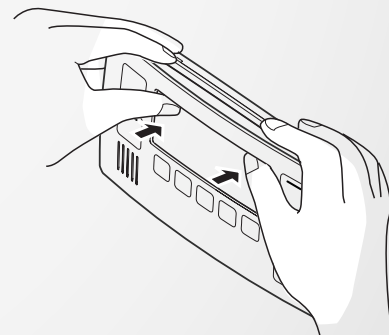


Fig.4

Controllers - communication cables

Communication cables connect the water heater to the water controllers and operate at an extra low voltage (12 Volts DC) which is supplied from the water heater. Communication cables are supplied with the water controllers (15 m) and are fitted with spade terminals for connection to the water heater.

Up to two cables can be connected to the cable connector at the water heater. Extension cables are available from Rinnai. Alternatively two core sheathed (double insulated) flex with a minimum cross sectional area of 0.5 mm² may be used (refer maximum individual cable lengths on p. 15).



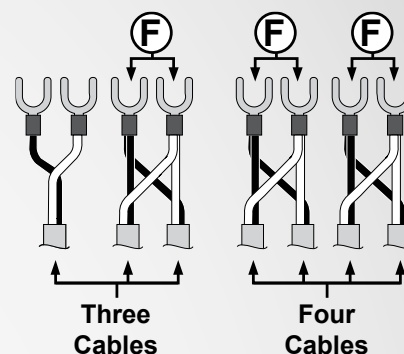
Do not attempt to connect cables to the cable connector at the water heater unless the electric power supply to the water heater is switched off otherwise damage to electrical components may occur.

To connect up to two cables to the cable connector

1. Turn off power supply and unplug water heater from the power point.
2. Remove retaining screw of the cable connector at the base of the appliance.
3. Swing the cable connector door open. Thread the cable through the weather seal of the cable access hole (B) in the direction shown allowing sufficient cable length so the cable sheath can be secured with the cable clamp (C) supplied with the transceiver.
4. Loosen screw terminals (D) and (E) and connect cable spade connectors to these terminals and re-tighten. Polarity is not important, either wire colour can be connected to either terminal.
5. Return the cable connector to the original position taking care not to damage cable wires in the process and replace the retaining screw.

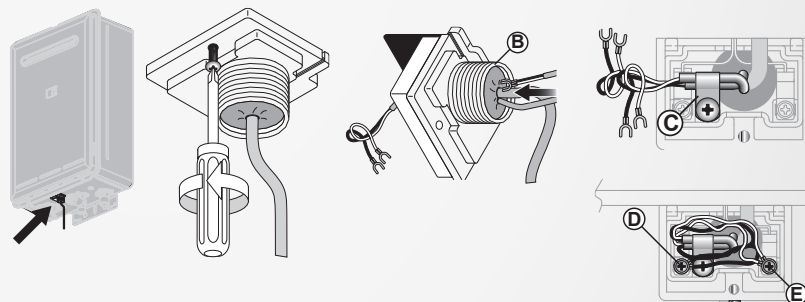
Connecting three to four controllers

1. Repeat steps 1-3 for connecting up to two controllers.
2. To connect three to four controllers, separate all the cables to be fitted into pairs. Cut off the existing spade connectors from each pair and re-terminate each pair into a new spade connector (F) so there are only two sets of spade connectors. Four spade connectors in total to be terminated.
3. Repeat steps 4 and 5 for connecting up to two controllers.

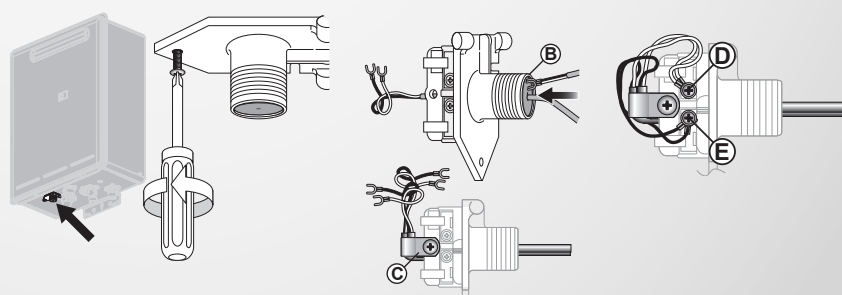


Spade connectors are available from your local electrical supplier.

Cable connector for VT26, VT24, VT20, and VT16



Cable connector for HD250, HD200, HDi200, and EF models



Commissioning



The appliance operation must be tested after installation. Ensure building occupants do not have access to the hot water outlets during this procedure.

Testing

1. Before final connection of the water heater, purge the gas and hot and cold water supply lines. Swarf in the gas or water supplies may cause damage.
2. Turn on the gas and water supplies and test for leaks (gas and water) near the unit.
3. Isolate gas supply. Remove test point screw located on the gas inlet and attach pressure gauge.
4. Turn the power on at the power point socket and turn on the gas.
5. If water controllers are fitted ensure they are on. Select the maximum delivery temperature and open all available hot water taps including the shower. If water controllers are not fitted, open all available hot water taps.
6. Operate all other gas appliances at their maximum gas rate.
7. With all gas appliances operating on maximum, the pressure should read between 1.0-3.5 kPa (NG) or 2.75-3.5 kPa (LPG). If the pressure is lower, the gas supply is inadequate and the appliance will not operate to specification. It is the responsibility of the installer to check the gas meter, service regulator and pipe work for correct operation and sizing. The gas regulator on the appliance is electronically controlled and factory preset. Under

normal circumstances it does not need adjustment during installation.

8. Close all hot water outlets.
9. Inspect and clean the strainer located on the cold water inlet connection. This may need to be repeated to ensure the strainer remains clear, especially on new installations.
10. If water controllers are fitted, it is necessary to test their operation through the complete range of functions (refer operation guide).
11. Confirm hot water delivery temperatures using a thermometer. If controllers are fitted, ensure temperatures exceeding 55 °C cannot be selected on bathroom controllers.
12. After testing is completed, explain to the customer how to operate the water heater and water controllers (if fitted). Ensure your details are entered in the customer operation guide (Installer details).

Gas pressure setting

The gas regulator on the appliance is electronically controlled and factory preset. Under normal circumstances it does not need adjustment during installation. Make adjustments only if the unit is not operating correctly and all other causes for incorrect operation have been eliminated. Instructions for gas pressure setting are in the instruction pocket located inside the appliance front cover.

Commissioning checklist

Commission the unit in accordance with the Commissioning Checklist supplied with the appliance (inside front cover of appliance). Ensure you leave the completed checklist with the customer.

If the appliance can not be adjusted to perform correctly call 0800 RINNAI (0800 746 624) for assistance.

Recommended solar system layout

Rinnai continuous flow water heaters configured for solar systems produce hot water at 75 °C and are not suitable for use with water controllers. The household water supply MUST be protected by a suitable tempering valve.

Installation

Rinnai continuous flow water heaters in solar installations are only suitable as gas boosters in solar hot water systems. These models produce water at higher than normal temperatures and must be connected to the hot water supply by use of a suitable tempering valve.

Install a Rinnai continuous flow water heater using a flow diversion valve as shown. Remember 'B to Boiler' when setting up the flow diversion valve.

The water heater must be set to 75 °C (refer dip switch settings on following pages).

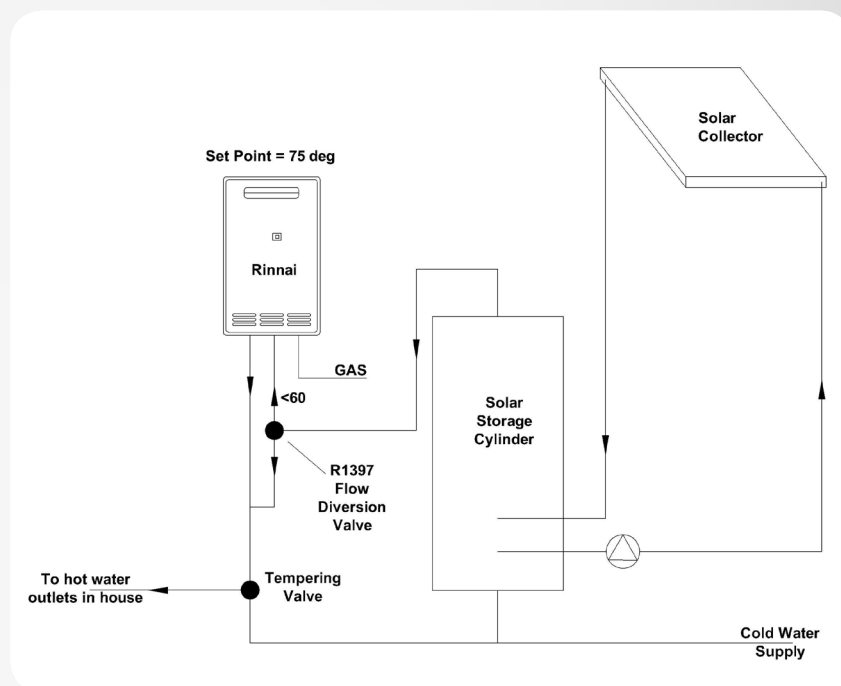
Rinnai water controllers cannot be used with Rinnai Infinity solar units as the hot water does not always pass through the Rinnai Infinity, and the Rinnai Infinity dip switch setting of 75 °C is unable to be adjusted.

System configuration to protect for Legionella

If the system is configured according to the details above it will meet the requirements of the Acceptable Solution G12/AS2 for protection against Legionella. Section 3.5.2 states:

b) the instantaneous water heater must heat all water passing through it to not less than 70 °C.

Recommended system layout using a Rinnai Continuous Flow water Heater and Flow Diversion Valve



DIP switch settings

DIP switch settings - important

DIP switch settings must only be changed by a licensed gasfitter. They have been provided as there may be a requirement to change the temperature of the water delivered from the water heater.



Care must be taken when changing the temperature settings as the DIP switches are small and can be easily switched or bumped into the wrong position. Please use this information carefully and fully check the operation of the water heater before leaving site including the temperature of the water delivered.

The cover of the water heater will need to be removed to carry out this operation. As this will expose live mains voltage wiring **please disconnect the power supply before removing the front cover.**

We wish to draw your attention to the requirements of the New Zealand Building Code and compliance document G12. This requires that water delivered to sanitary fixtures be no more than 55 °C. Increasing the water heater set temperature will therefore require that you protect all sanitary fixtures to which the appliance is plumbed with suitable tempering valves or similar.

Rinnai will accept no liability for issues arising out of the use of this DIP switch information.

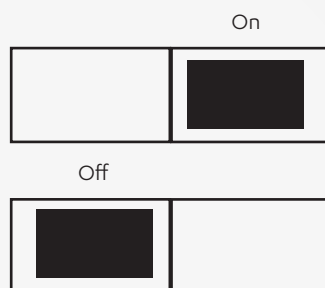
If you have any doubts about the performance of the water heater please contact Rinnai by phoning 0800 TO RINNAI (0800 86 746 624).

The setting of water temperatures in domestic model Infinity units (white cases) to greater than 55 °C (with the exception of units set to 75 °C in domestic solar installations) will reduce the warranty period. Refer to warranty

information in the Operation Guide for further information.

The following pages detail DIP switch settings for the specific Rinnai continuous flow water heaters listed. They ARE NOT applicable for older models.

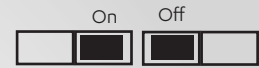
Legend for DIP switch settings (black indicates position of switch)



Short and long flues

Reference to what is a short and long flue can be found on page 8.

DIP switch settings



Applicable models and REU numbers

Rinnai Infinity VT16	External	REU-VR1620WG
Rinnai Infinity VT20	External	REU-VR2024WG
Rinnai Infinity VT24	External	REU-VR2426WG
Rinnai Infinity VT26	External	REU-VR2626WG
Rinnai Infinity EF24	External	REU-K2430WG

DIP switch 1: Upper SW (8P)

SW No.	Note						
1		Off					
2	Fixed temperature (with controllers)	Off	Fixed temperature	On	With controllers		
3	Temperature settings	See Chart A					
4							
5							
6		Off					
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.
8		Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	not to be used	40	40
On	On	On	not to be used	55	75

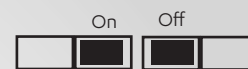
DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	LPG	On	NG
2,3,4	Model settings	See Chart B			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	VT26 (VR2626WG) and EF24 (K2430WG)
Off	On	Off	VT24 (VR2426WG)
Off	Off	On	VT20 (VR2024WG)
Off	On	On	VT16 (VR1620WG)

DIP switch settings



Applicable models and REU numbers

Rinnai Infinity HD200	External	REU-VRM2632WC
Rinnai Infinity HDi200	Internal	REU-VR2632FFUG
Rinnai Infinity HD250	External	REU-VR3237WG

DIP switch 1: Upper SW (8P)

SW No.	Note						
1		Off					
2	Fixed temperature (with controllers)	Off	Fixed temperature			On	With controllers
3	Temperature settings	See Chart A					
4							
5							
6		Off					
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.
8		Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5		No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	85, 95 ¹	40	40
On	On	On	85	55	75

¹ 95 °C setting only available for HD250 model

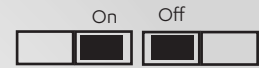
DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type	Off	LPG	On	NG
2,3,4	Model settings	See Chart B			
5,6	Not in use	Off			

Chart B: Model settings

DIP. SW.2-SW No. (4P)			Model (REU-number)
2	3	4	
Off	Off	Off	HD250 (VR3237WG)
Off	Off	On	HD200 (VRM2632WC)
Off	On	On	HDi200 (VR2632FFUG)

DIP switch settings



Applicable models and REU numbers

Rinnai Infinity EF250	External	REU-KM3237WD
Rinnai Infinity EFi250	Internal	REU-KM3237FFUD

DIP switch 1: Upper SW (8P)

SW No.	Note						
1	Flue settings	Off	EF250 Ext & EFi250 Int long flue (p. 8)	On	EFi250 Internal short flue (p. 8)		
2	Fixed temperature (with controllers)	Off	Fixed temperature	On	With controllers		
3	Temperature settings	See Chart A					
4							
5							
6	Not in use	Factory setting is 'Off'					
7	Gas pressure	Off	Normal	On	Forced min.	On	Forced max.
8		Off		Off		On	

Chart A: Temperature settings

DIP. SW.1-SW No. (8P)			SW No. 2 = Off (fixed temperature)	SW No. 2 = On (with controllers)	
3	4	5	No controllers (fixed temp.)	No controllers (fixed temp.)	With controllers (max. set temp.)
Off	Off	Off	55	55	55
On	Off	Off	75	55	75
Off	On	Off	65	55	65
On	On	Off	60	55	60
Off	Off	On	50	50	50
On	Off	On	42	42	42
Off	On	On	95	40	40
On	On	On	85	55	75

DIP switch 2: Lower SW (4P)

SW No.	Note				
1	Gas type settings	Off	LPG	On	NG
2		Off		Off	
3	Type settings	Off	External	Off	Internal
4		Off		On	
5	Automatic return	Off	Inactive	On	Active
6	External device	Off	S-BMS	On	AH

SDC - Approved Building Consent Document - BC171688 - Pg 203 of 264 - 7/09/2017 - harrib



Experience our innovation

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<http://www.youtube.com/rinnainz>

Installation Manual



U298-1272(00)



EzyBrace[®] Systems

Specification and installation manual

SDC - Approved Building Consent Document - BC171688 - Pg 204 of 264 - 7/09/2017 - harrib



CBI 5113

AUGUST 2016

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GIB® HELPLINE

0800 100 442

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

NEW GIB EZYBRACE® 2016 DESIGN SOFTWARE

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

NEW GIB® BRACING ELEMENT GS2-NOM

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

¹ Actual savings dependent on building and bracing design

UPDATE TO OPENINGS IN BRACING ELEMENTS AND CEILING DIAPHRAGMS

- Large hole specification updated to use a more conservative methodology.
- Guidance included for fireplace flues and range hoods.

NEW – GIBFIX® FRAMING SYSTEM

- Reduced potential for fastener pop and joint cracking as a result of timber frame movement.
- Reduced potential for on-site call backs.
- Improved thermal performance.
- Reinforced plasterboard junctions.



CONTENTS

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

GIB EzyBrace® Systems — August 2016

Winstone Wallboards Ltd accepts no liability if GIB EzyBrace® Systems are not designed and installed in strict accordance with instructions contained in this publication.

USE ONLY THE CURRENT SPECIFICATION

This publication may be superseded by a new publication at any time. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. Check for the current publication at gib.co.nz/library before using this publication. If you are unsure whether this is the current publication, call the GIB® Helpline on 0800 100 442.

GIB EzyBrace® 2011 software and specification literature remains valid until further notice.

PATENTS

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

Beware of substitution

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

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

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

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

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

Scope of use

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

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

Finish quality — framing and substrates

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

New GIBFix® Framing System

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

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

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

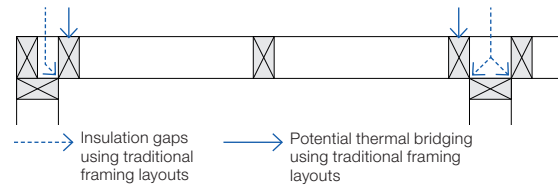
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

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

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

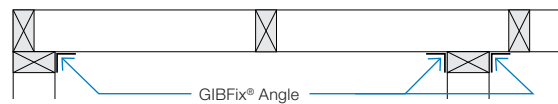
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

FIGURE 1: TRADITIONAL WALL FRAMING LAYOUT



GFS004

FIGURE 2: GIBFix® FRAMING SYSTEM (ALTERNATIVE LAYOUT)



GFS005

NEW GS2-NOM Bracing Element

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

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

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

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

1. Actual savings dependent on building and bracing design.

Compliance with the NZ Building Code

NZBC CLAUSE B1 – STRUCTURE

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

NZBC CLAUSE B2 – DURABILITY

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

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

NZBC CLAUSE F2 – HAZARDOUS BUILDING MATERIALS

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

NZBC CLAUSE H1 – ENERGY EFFICIENCY

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

CAD design details

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

Appraisal

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

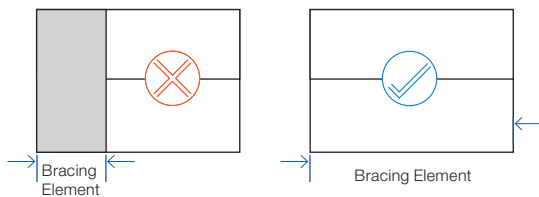
It is of prime importance to comply with the details of design, construction and workmanship in this document.

Bracing resistance

WALL BRACING LAYOUT

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

FIGURE 3: WALL BRACING LAYOUT



BRACING DISTRIBUTION

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

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

Space bracing lines no more than:

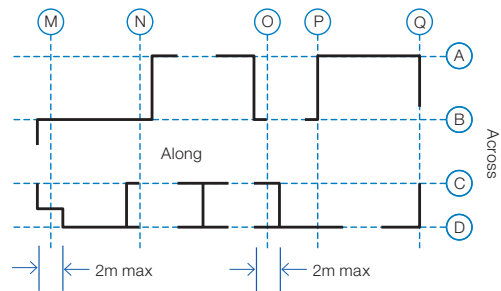
- 6 metres for standard construction with any GIB® plasterboard ceiling, or
- 7.5 metres where dragon ties in accordance with NZS3604:2011 have been installed, or
- 12 metres with a GIB® plasterboard ceiling diaphragm.

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

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

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

FIGURE 4: BRACING GRID LAYOUT



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

GIB EZYBRACE® SYSTEMS

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

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

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

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

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

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

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

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

Bracing demand

GIB EZYBRACE® CALCULATOR

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

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

DEMAND

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

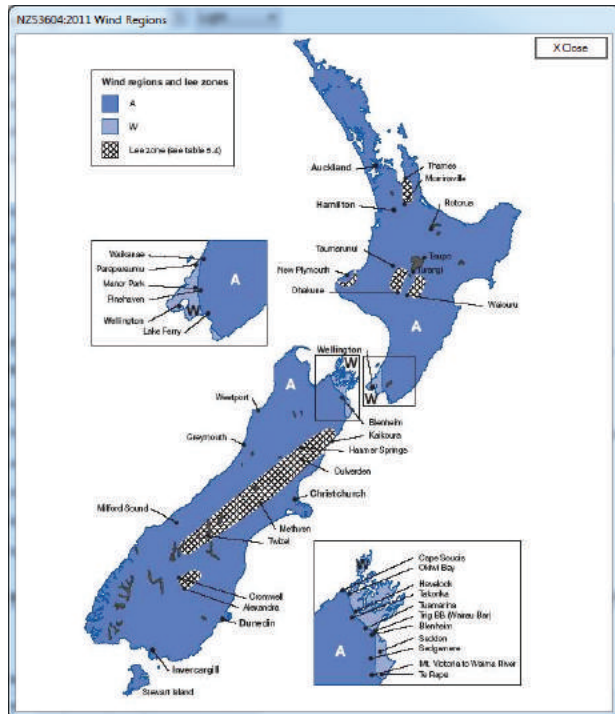
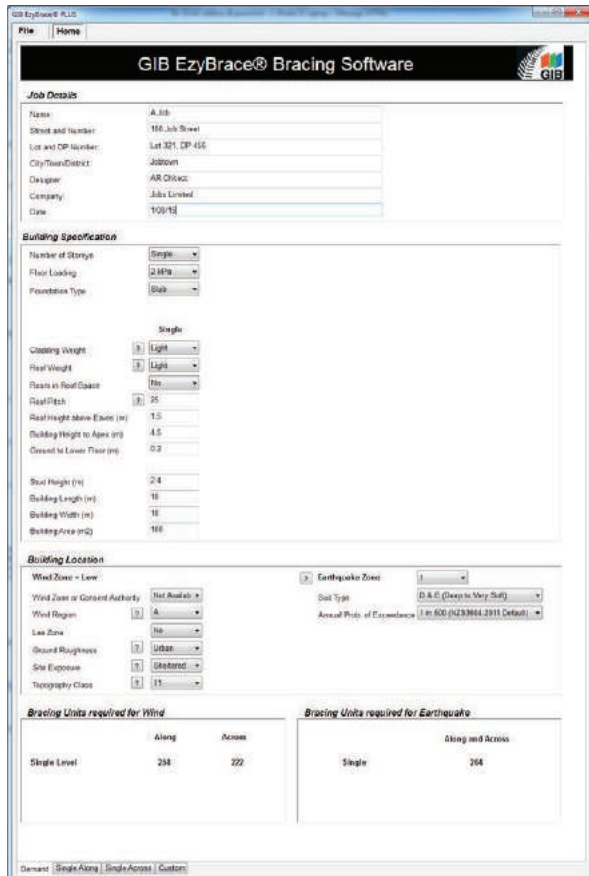
Bracing resistance sheets ('tabs') are added depending on the building specification entered. For example, subfloor bracing resistance tabs only show when a 'subfloor' foundation type has been selected.

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

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

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

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



[Download GIB EzyBrace® 2016 design software from gib.co.nz/ezybrace](http://gib.co.nz/ezybrace)

Software functionality

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

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

bracing units required on that line. The NZS 3604:2011 rules and associated software output are not the only check.

Designers must additionally check the building layout to ensure adequate bracing distribution.

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

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

Line	Ext. Len (m)	Element	Length (m)	Angle (degrees)	Stud Hl. (m)	Type	Supplier	Wind (BU)	Earthquake (BU)
a	11.25	1	0.5		2.44	GSP-H	GIB®	53	58
		2	1.1		2.44	GS1-N	GIB®	72	65
		3	0.6		2.44	GSP-H	GIB®	67	73
b	6.41	1	1.2		2.44	GS1-N	GIB®	81	71
		2	0.6		2.44	GS1-N	GIB®	34	35
		3	4		2.44	GS2-NOM	GIB®	197	197
c		1	3.2		2.44	GS2-NOM	GIB®	157	157
d		1	7.9		2.44	GS2-NOM	GIB®	389	389
e	17.9	1	0.6		2.44	BL1-H	GIB®	58	80
		2	0.6		2.44	BL1-H	GIB®	58	60
		3	0.8		2.44	GS1-N	GIB®	48	46
		4	2.1		2.44	GS1-N	GIB®	143	124
		5	1.2		2.44	EP1-1.2	CHH	142	159

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

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

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

Software functionality

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

FIGURE 8: GIB EZYBRACE® 2016 — CUSTOM ELEMENTS SHEET

Supplier	System	Min. Length m	W/rod BU/m	EQ BU/m	Element Height	Element Foundation	Import Proprietary Custom Elements
Custom1	CU1-0.4	0.4	80	95	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Custom1	CU1-0.6	0.6	95	105	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Custom1	CU1-1.2	1.2	120	135	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Custom2	CU2-0.4	0.4	90	98	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Custom2	CU2-0.6	0.6	127	136	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Custom2	CU2-1.2	1.2	164	135	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Engineer	Portal	1	300	300	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Values and systems shown in Custom Elements Sheets are for illustrative purposes only.

Help can be accessed by pressing the ? symbol which displays a window with further information.

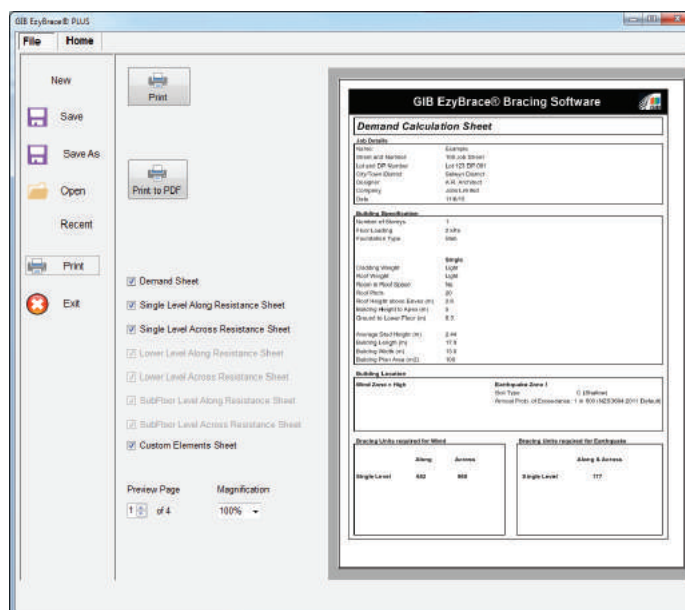
The GIB EzyBrace® 2016 software has a number of options that can be accessed via the File tab at the top left hand corner of the window. The options include: New, Save, Save As, Open, Recent and Print.

- The New option closes any opened job ready for the input of a new job.
- The Save option saves the currently opened job to the same filename and the Save As option saves the job to a new filename.

- The Open option prompts for the name of an existing job.
- The Recent option displays a list of the ten latest jobs and allows for the selection of one of these jobs to be opened.
- The Print option displays the print screen. In this screen, a print preview is displayed. The print preview can be copied to the clipboard by clicking the right-hand mouse button. Also on the print screen is the option to choose which pages are to be printed and the option to print the output to a portable data format, PDF, file.
- The Print Screen View is shown in figure 9.

FIGURE 9: GIB EZYBRACE® 2016 — PRINT SCREEN VIEW

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



GIB® plasterboard linings

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

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

LIMITATIONS

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

GIB EzyBrace® Systems in water-splash areas

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

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

Renovation

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

Openings in bracing elements

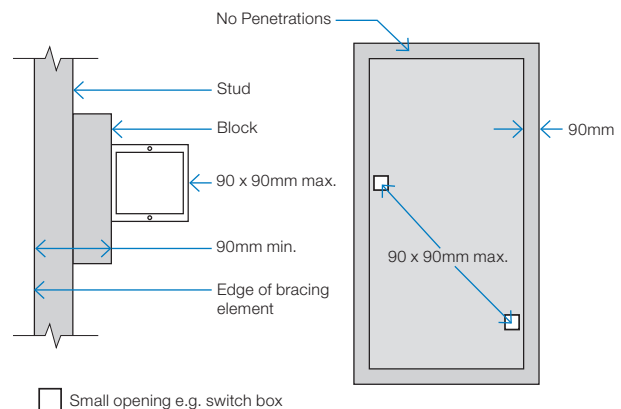
SMALL OPENINGS

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

LARGE OPENINGS

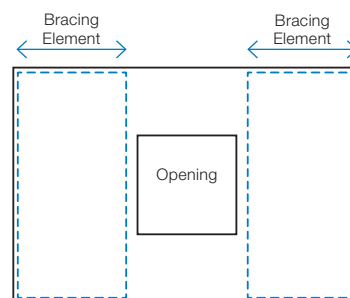
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GEB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS



Timber framing

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

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

GIBFix® Framing System (alternative layout)

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

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

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

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

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

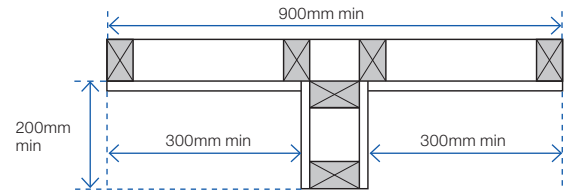
Guidelines for intersection walls

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

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

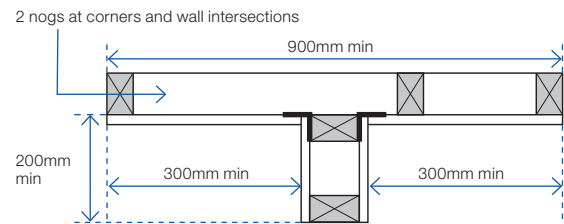
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



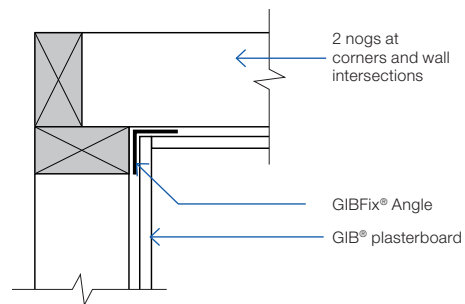
GEB002

FIGURE 13: WALL INTERSECTION (GIBFIX® FRAMING SYSTEM)



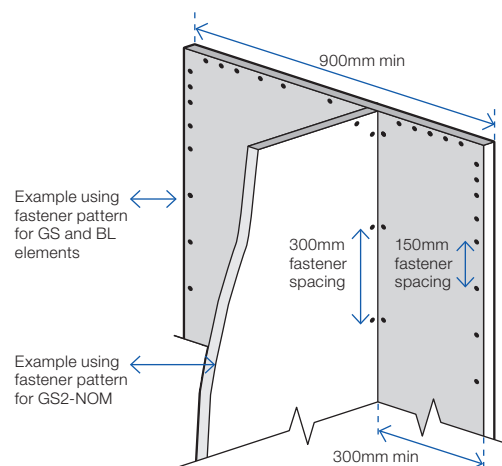
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFIX® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

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

Top plate connections

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

Parapets and gable end walls

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

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

or

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

Bottom plate fixing

TIMBER FLOOR

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

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

CONCRETE FLOOR – EXTERNAL WALL BRACING ELEMENTS

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

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

CONCRETE FLOOR – INTERNAL WALL BRACING ELEMENTS

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

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

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

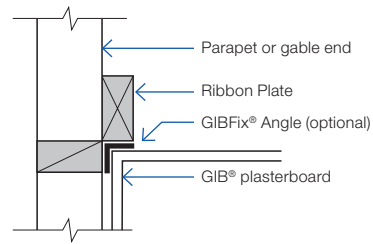
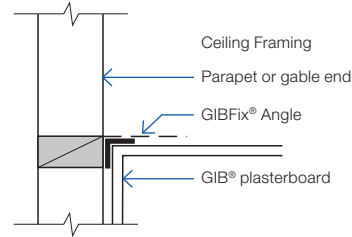


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

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

Bracing strap installation

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

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

SDC - Approved Building Consent Document - BC171688 - Pg 218 of 264 - 7/09/2017 - hamib

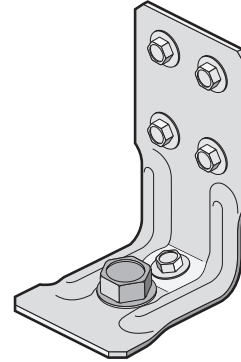
Concrete floor		Timber floor	
<p>400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer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

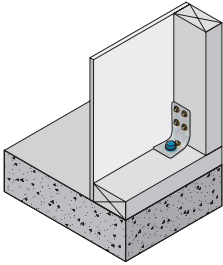
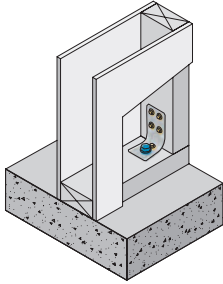
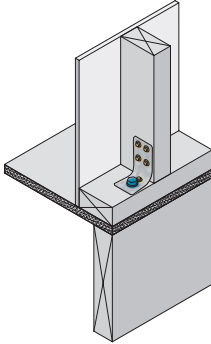
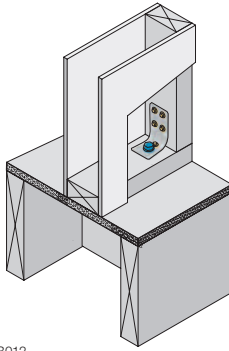
GIB HandiBrac® installation

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

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

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



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

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

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

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

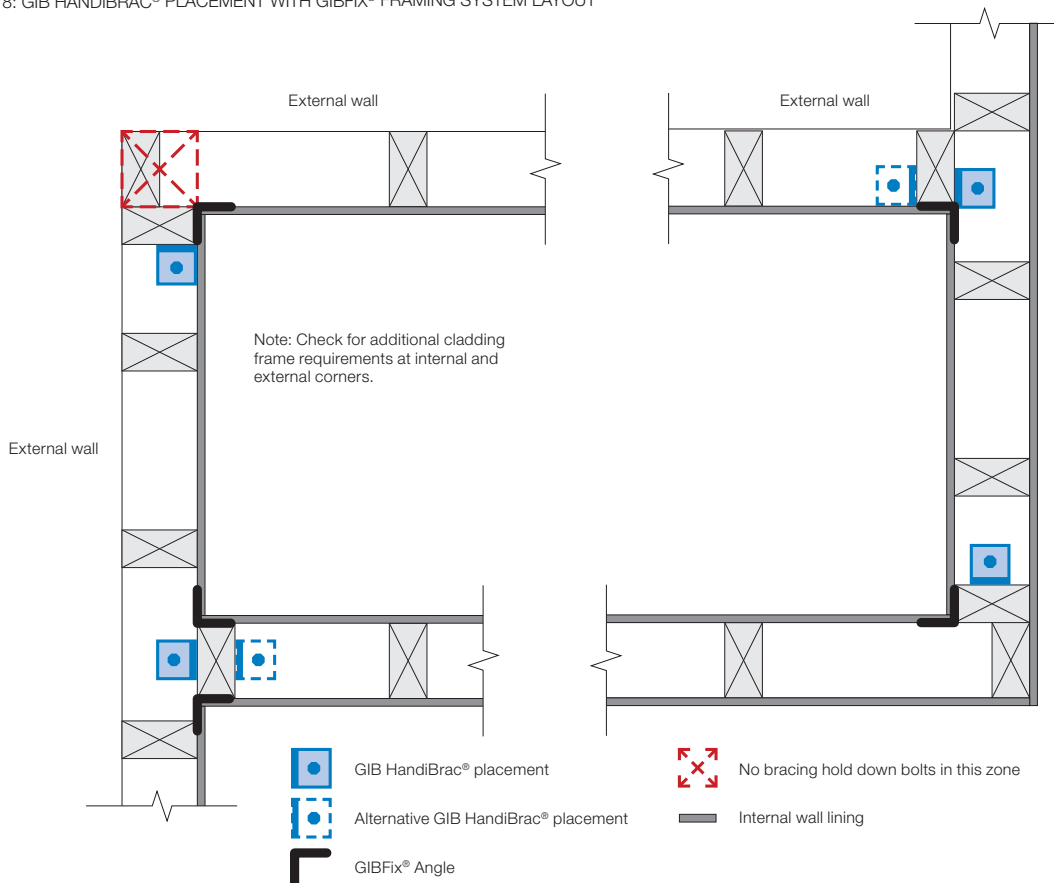
The GIB HandiBrac[®] is fixed to the stud which has the GIBFix[®] Angle.

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

TIMBER FLOORS

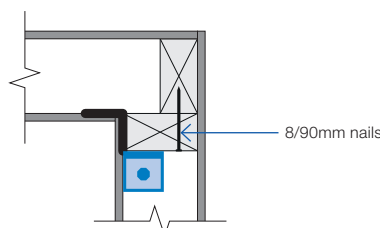
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

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



GEB013

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



GEB014

Ceiling diaphragms

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

Limitations for GIB® plasterboard ceiling diaphragms

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

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

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

Diaphragms outside these parameters must be specifically designed.

General fixing requirements for GIB® Ceiling Diaphragms:

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

FIGURE 20: PROTRUSIONS AND CUTOUTS

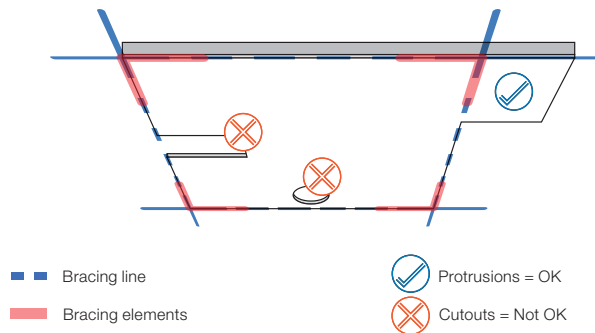


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

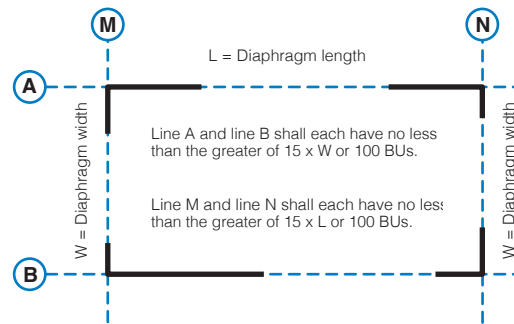
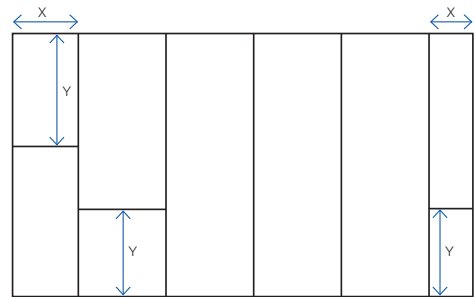
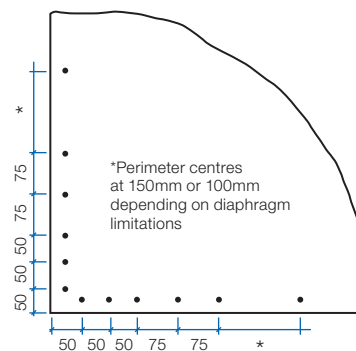


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS



X = 900mm min or 600–900mm Y = 1800mm min sheet lengths min provided all adjacent joints at ends of ceiling diaphragms are back-blocked.

FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



Unless stated all fastener spacings are maximums.

Ceiling battens in ceiling diaphragms

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

Battens shall be spaced at a maximum of:

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

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

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

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

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

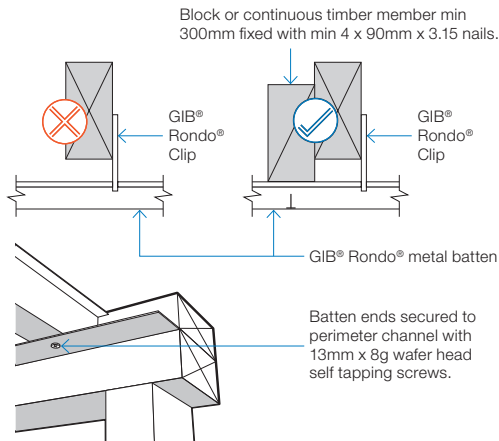
For GIB® Rondo® metal battens, a GIB® Rondo® metal channel or metal angle is required at the perimeter of the diaphragm. The perimeter channel shall be fastened to the top plate with 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screw at 300mm centres maximum.

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

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

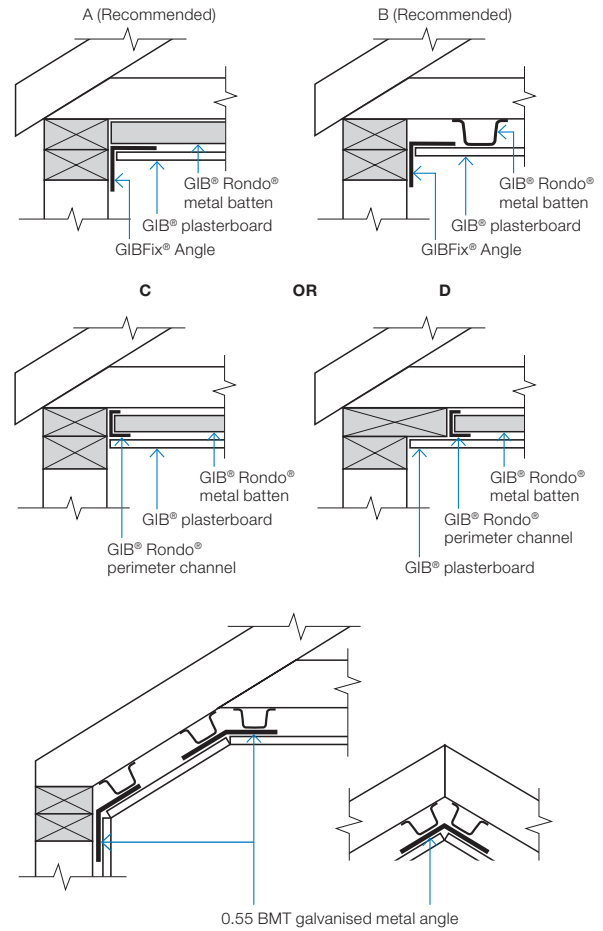
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screws.
- Fastened to timber framing using 32mm x 7g GIB® Grabber® Dual Thread screws when linings are installed.

FIGURE 26: GIB® RONDO® METAL CEILING BATTEN INSTALLATION



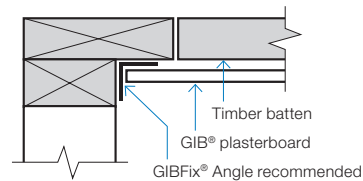
GEB016

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



GEB017

FIGURE 28: TIMBER CEILING BATTENS*



GEB018

Openings in ceiling diaphragms

SMALL OPENINGS

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

LARGE OPENINGS

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

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

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

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

FIGURE 24: LARGE OPENINGS IN CEILING DIAPHRAGMS

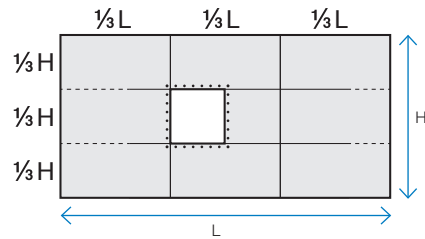
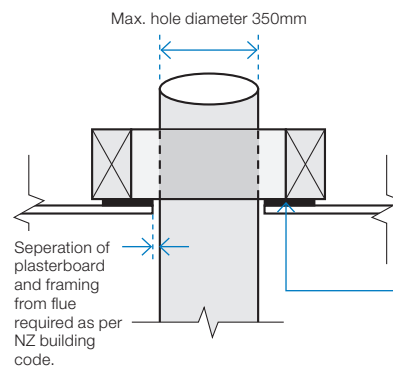


FIGURE 25: FIREPLACE FLUES AND RANGE HOOD OPENINGS

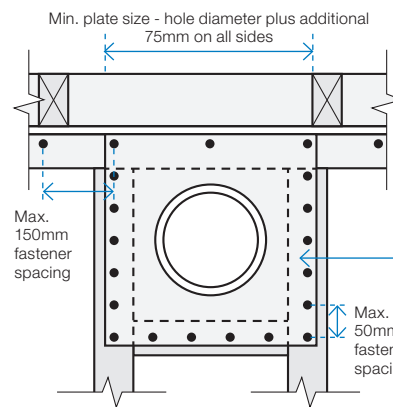
Section view



Steel plate
0.55 BMT
Galvanised sheet
Max. opening
350mm diameter.
Installed prior to
GIB® plasterboard.

Framing
90 x 45mm framing
trimmed to provide
extra fixing.

Plan view



GIB® plasterboard ceiling
Installed over the
steel plate and into
framing using a
minimum of 32mm
x 6g GIB® Grabber
High Thread or
32mm x 7g GIB®
Grabber Dual Thread
screws at 50mm
max centre spacing.

Plasterboard ceiling not shown in plan view

SDC - Approved Building Consent Document - BC171688 - Pg 223 of 264 - 7/09/2017 - harrib

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

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

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

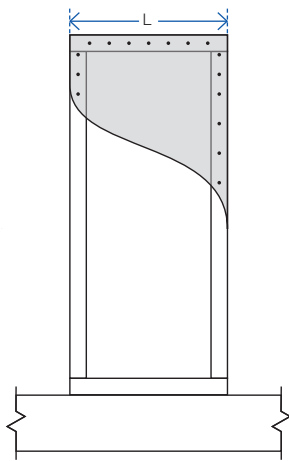
The dimension 'L' shall not be less than 400mm.

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

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

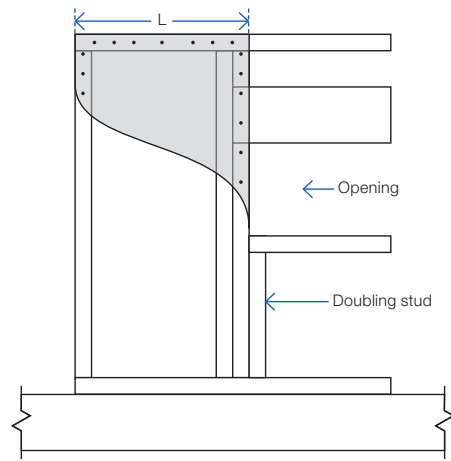
SDC - Approved Building Consent Document - BC171688 - Pg 224 of 264 - 7/09/2017 - harrib

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



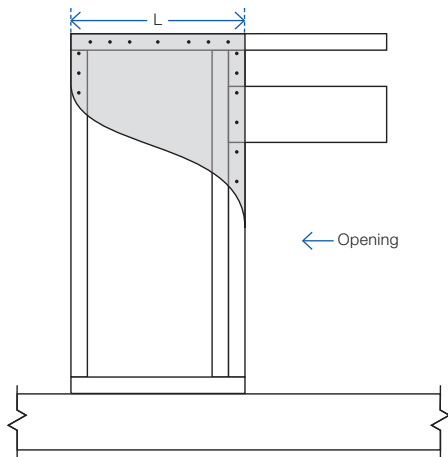
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



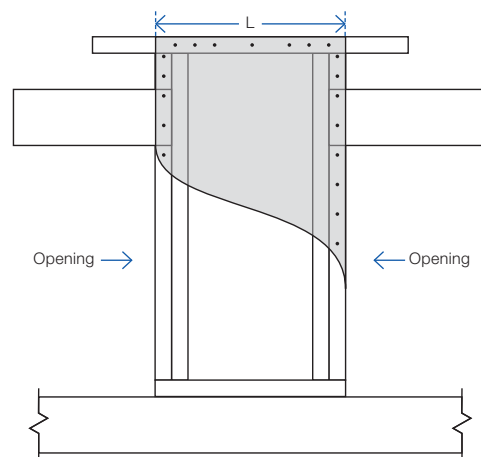
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



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

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



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

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

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

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

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

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

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

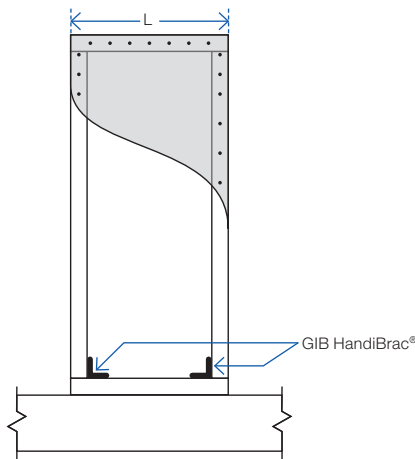
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

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

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

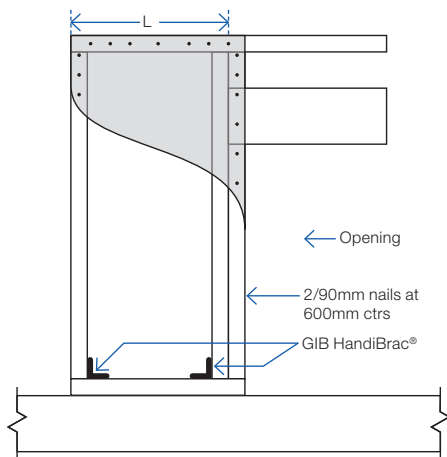
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



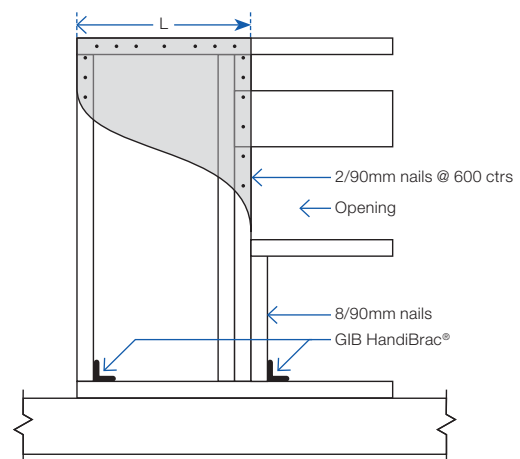
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



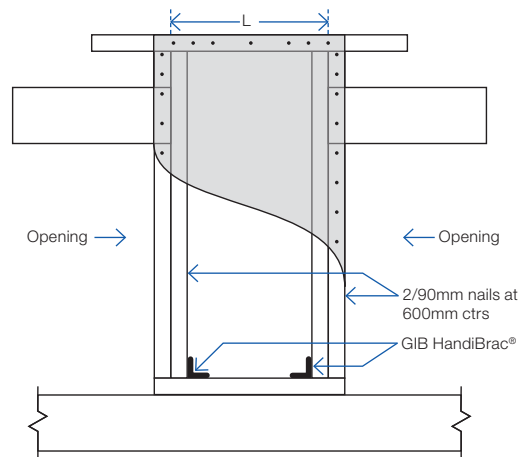
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



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

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



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

GIB EzyBrace® Systems specification GS1-N

SDC - Approved Building Consent Document - BC171688 - Pg 226 of 264 - 7/09/2017 - harrib

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

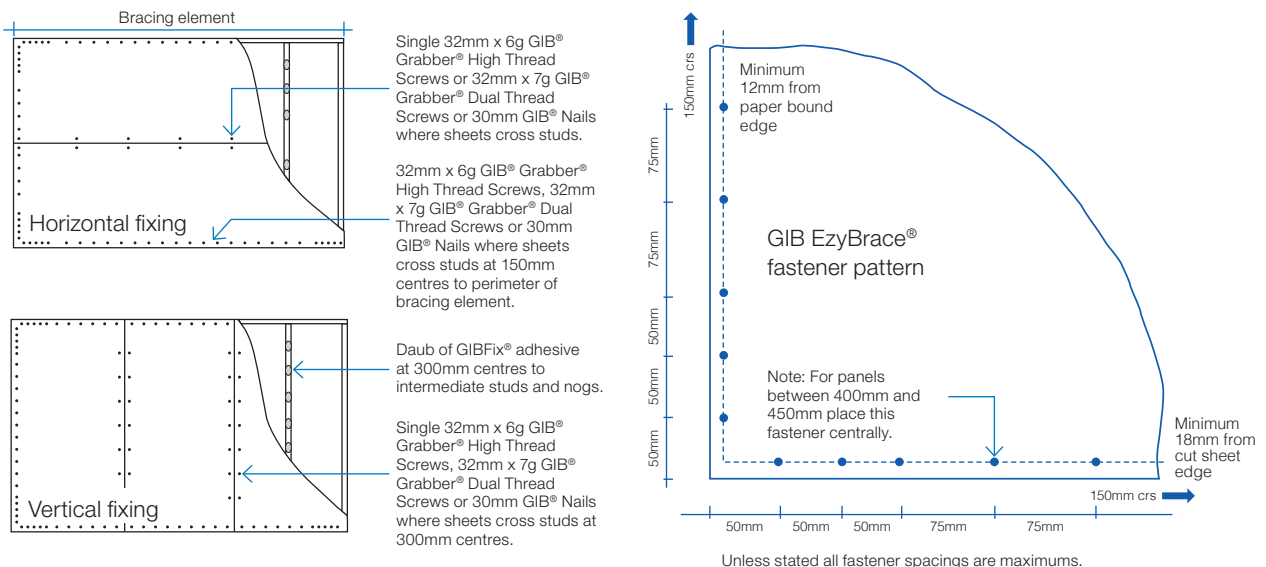
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification GS2-NOM

SDC - Approved Building Consent Document - BC171688 - Pg 227 of 264 - 7/09/2017 - harrib

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

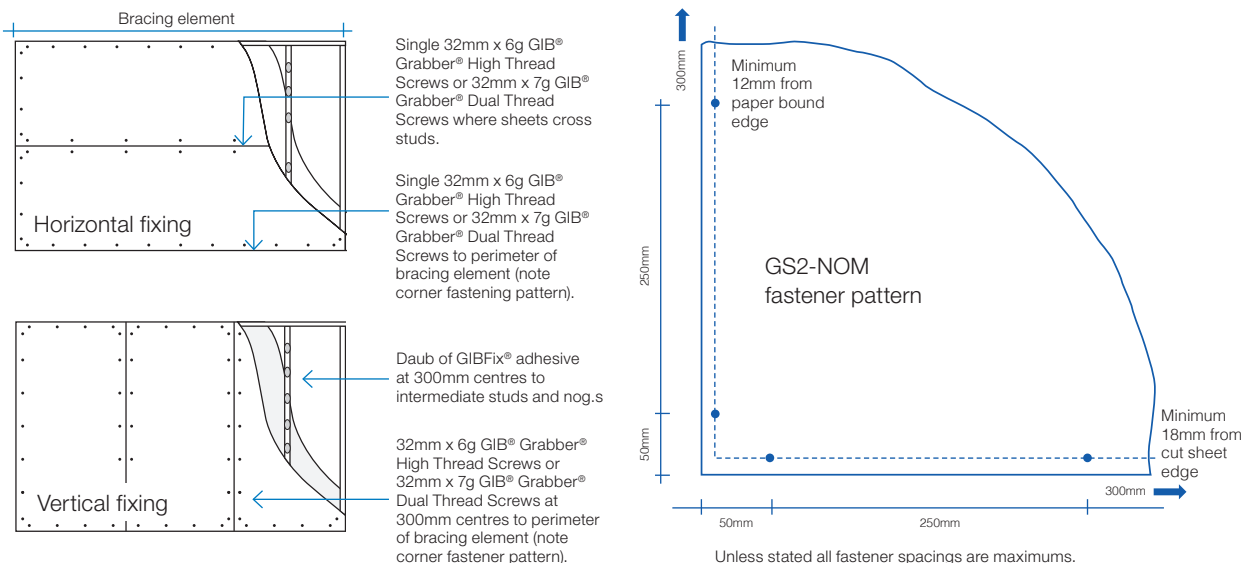
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

SDC - Approved Building Consent Document - BC171688 - Pg 228 of 264 - 7/09/2017 - harrib

GS2-NOM ADHESIVE FIXING OPTION AT DOOR JAMBS

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

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

FIGURE 37: SCREW FIX FOR OPENINGS

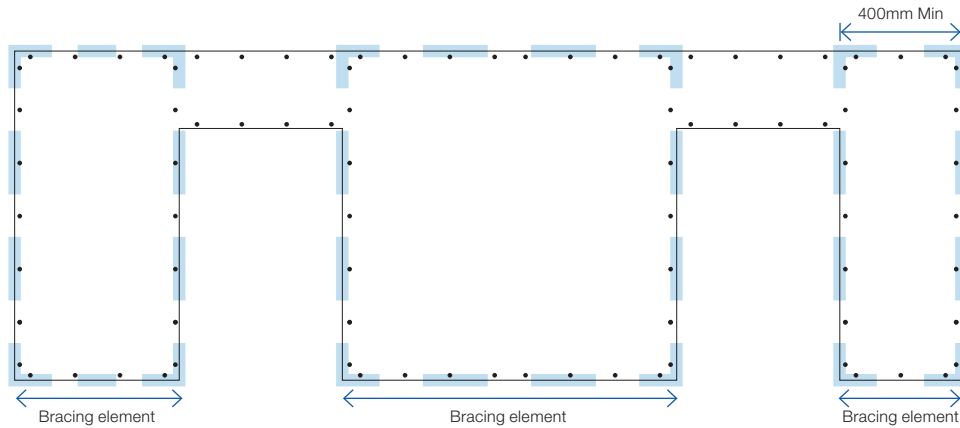
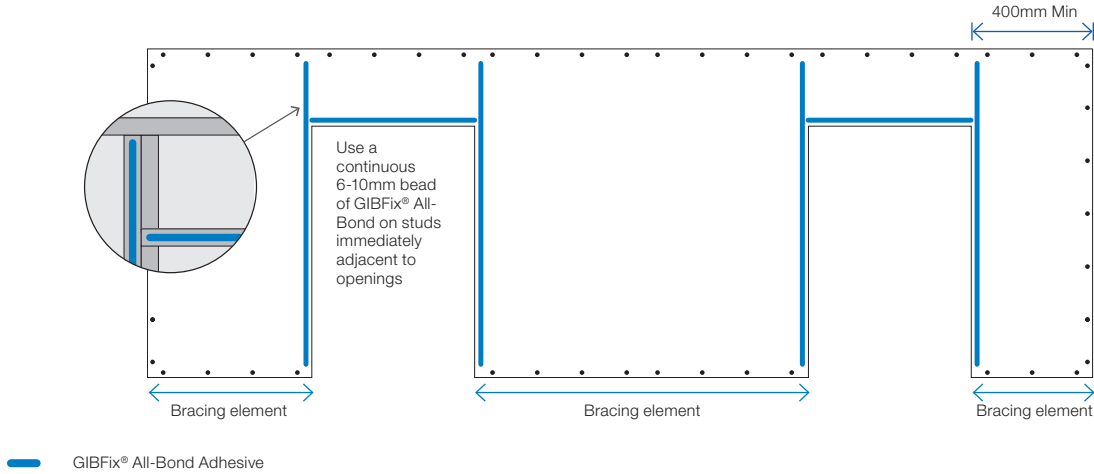
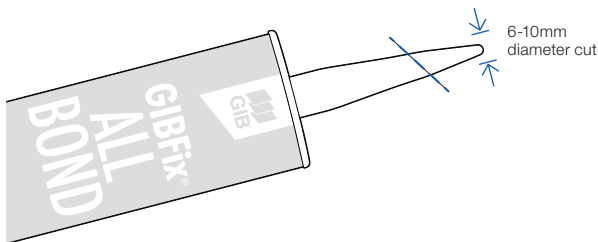


FIGURE 38: SCREW AND ADHESIVE FIX FOR OPENINGS



ADHESIVE NOZZLE APERTURE



GIB EzyBrace® Systems specification GS2-N

SDC - Approved Building Consent Document - BC171688 - Pg 229 of 264 - 7/09/2017 - harrib

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber Floor

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

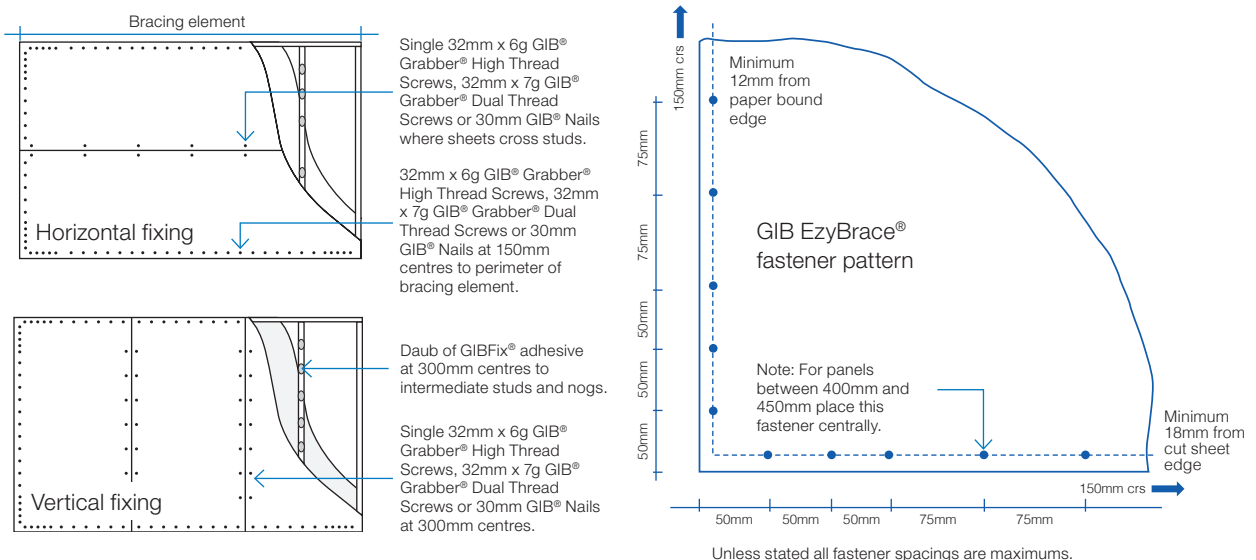
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification GSP-H

SDC - Approved Building Consent Document - BC171688 - Pg 230 of 264 - 7/09/2017 - harrib

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

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

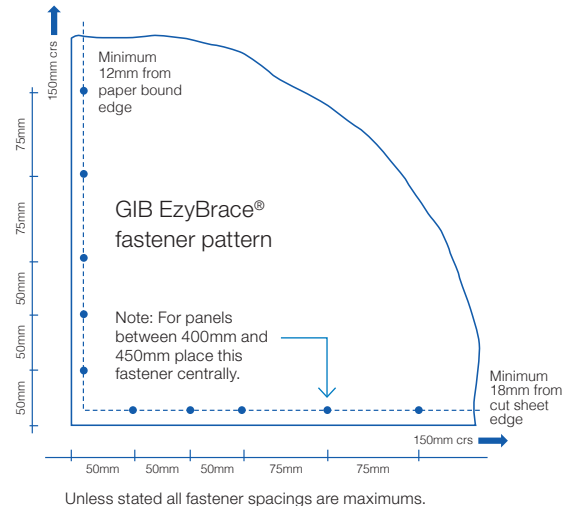
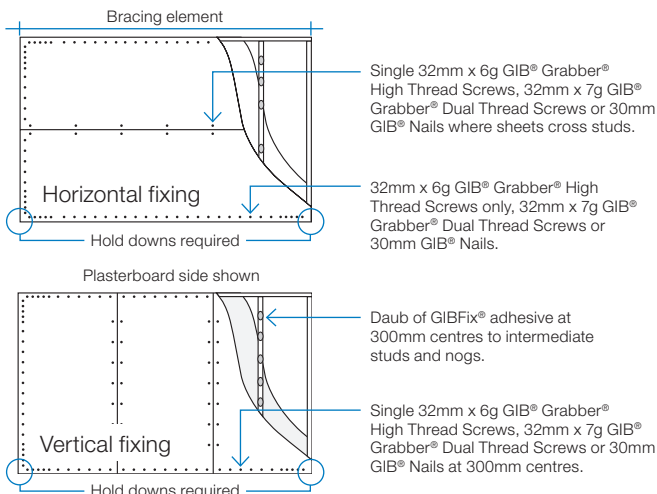
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification BL1-H

SDC - Approved Building Consent Document - BC171688 - Pg 231 of 264 - 7/09/2017 - harrib

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

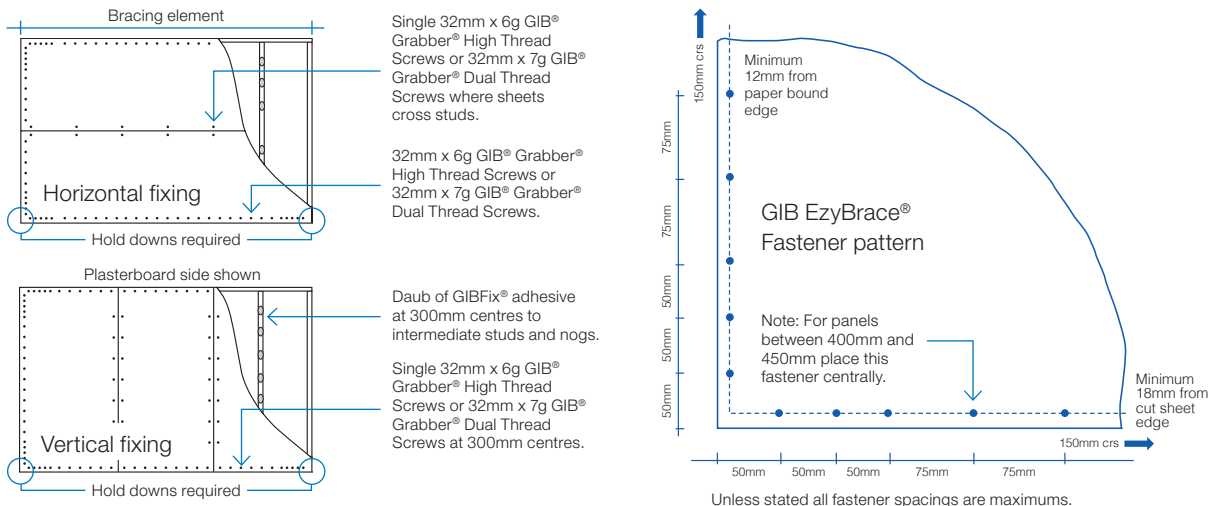
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification BLG-H

SDC - Approved Building Consent Document - BC171688 - Pg 232 of 264 - 7/09/2017 - harrib

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

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

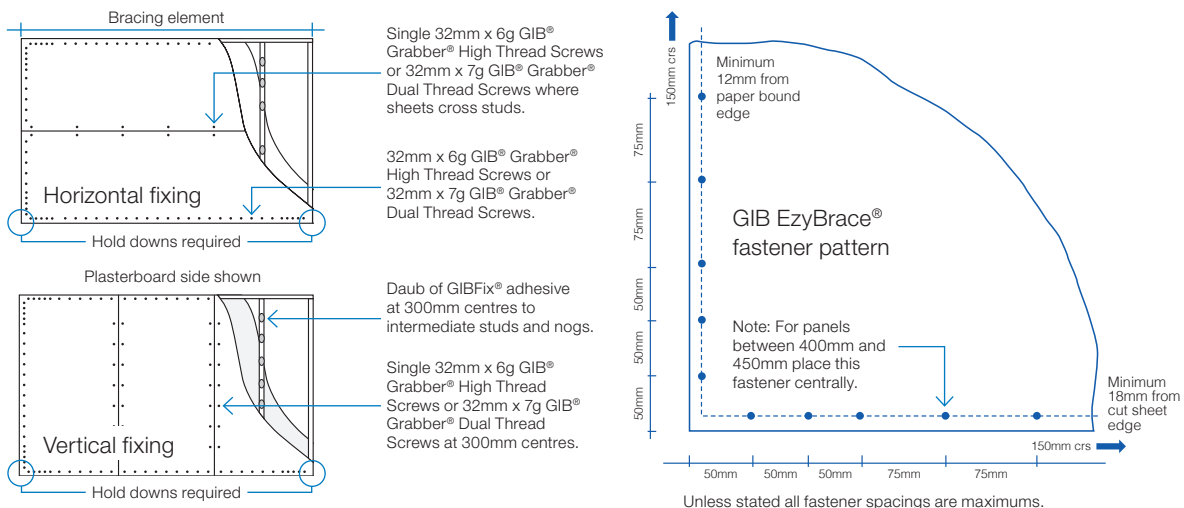
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

JOINTING

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



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

GIB EzyBrace® Systems specification BLP-H

SDC - Approved Building Consent Document - BC171688 - Pg 233 of 264 - 7/09/2017 - harrib

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLP-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

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

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of AS/NZ 2269/0 :2012.

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

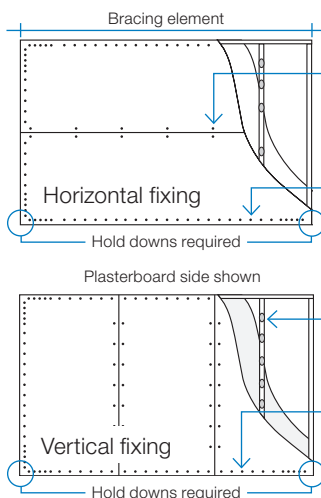
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

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

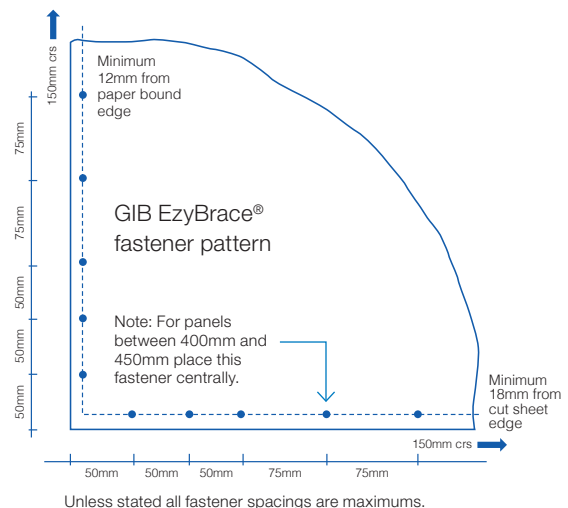
JOINTING

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



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

Daub of GIBFix® adhesive at 300mm centres to intermediate studs and noggs.
Single 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws at 300mm centres.



Unless stated all fastener spacings are maximums.

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



Winstone Wallboards is committed to protecting the environment. Environmental matters are integrated into all business activities:

- Our operations strive to exceed all environmental regulatory requirements at all times.
- Protection of the environment is a day to day responsibility that we all must accept.
- We allocate appropriate management time and resources to address relevant environmental issues and continuously improve our activities in that area.
- We will achieve our standards of performance through positive action, employee involvement and constant communication with our neighbours, local authorities and customers.

Minimise on-site waste when designing and/or installing GIB® Systems. For larger projects give consideration to our cut-to-length service to reduce waste. GIB® plasterboard off-cuts, if separated from other waste building materials, can be readily recycled.

For larger projects waste can be diverted to compost manufacturers who grind up the GIB® plasterboard and use it in compost. For smaller projects, the GIB® plasterboard can be ground up and spread around the building site.

GLOBAL GREENTAG^{CERT}™

The Global GreenTag^{Cert}™ certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag^{Cert}™

GIB® plasterboard has a Level B green rating.

DECLARE CERTIFICATION

Declare is a database of non-toxic, sustainably sourced building products.

Many GIB® plasterboard products including GIB® Standard, GIB Braceline®, GIB Noiseline® and GIB Aqualine® have achieved Red List Free status in Declare certification.

For more information on Winstone Wallboards sustainability commitments visit gib.co.nz.

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Winstone Wallboards asserts its moral rights and reserves all other intellectual property rights in the materials contained in this brochure and related to GIBFix® Framing System and GIB EzyBrace® Systems.

TRADEMARKS

The names GIB®, GIB Fyrelite®, GIB Ultralite®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, GIB HandiBrac®, GIB EzyBrace®, the colour blue for GIB Braceline®, the colour pink for GIB Fyrelite®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

PATENTS

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

SDC – Approved Building Consent Document – BC-171688 – Pg 234 of 264 – 7/09/2017 – harrib



SDC - Approved Building Consent Document - BC171688 - Pg 235 of 264 - 7/09/2017 - harrib

FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442



w e t - s e a l®

"Your Waterproofing Specialists"

Construction Information and Details for Alternative Solution for Waterproofing of Internal Wet Areas

using

Wet-seal IS 511

All information contained in this installation is commercial-in-confidence and only to be used by a Wet-seal franchisee in the application of a building consent in New Zealand for City Council.

This document always remains the property of Wet-seal Holdings Pty Ltd.

Note: No third party is to use /copy or distribute this Wet-seal Document.

The Wet-seal Enviro-coat IS 511 system is used for all internal wet areas. Branz Appraisal 655 (2013).

The Product is a single component liquid fully reinforced with fabric including lineal floor to wall junction and full floor where waterproofing is required. No reinforcing is required above the retained water level within the shower except for the internal or external angles.

1.0 SCOPE OF WORKS

Consultation

Wet-seal (Franchisee/Applicator) will consult with you regarding the wet area waterproofing work required, thus ensuring it complies with the New Zealand Building Code (NZBC) and Department of Building and Housing Clause E3 Internal Moisture. Also to ensure all your specific requirements are catered for.

Provide Plans/Drawings

All measurements for quotation will be based on the plans/drawings you have provided.

Any variations to this information are to be communicated in writing to Wet-seal.

Site Preparation Prior to Wet-seal Arrival

The area to be waterproofed must be clean and dry with no contaminates.

The structural flooring, substrate, wall sheets must be installed in accordance with the Manufacturers specifications (e.g. minimum wood float finish for concrete or sheeting glued/screwed correctly).

Extra noggins to be installed to allow for increased height of waterproofing if laminated sheeting is being installed.

Provide a work site that meets with the relevant OSH regulations.

Plumbing fittings correctly fitted. Wet-seal must be able to seal onto base fittings not spindle and into flanges or waste pipes.

Duty Of Care - Cure Time & Membrane Protection

Allowing adequate drying time of 48 hours at 25 degrees, allow longer at lower temperatures.

Protect the membrane system from being damaged by others (e.g. Corflute).

If the membrane is not being covered with tiles, vinyl or timber then the Wet-seal membrane must have a suitable approved Wet-seal protective coat applied.

Use adhesives that meet the requirements of AS/4992.2 Tiles to be laid in accordance with BRANZ Good Tiling Practice.

1.2 SUBSTRATE TYPES

Concrete Relative Humidity 75% , mortar screed / bedding ,Fibrous cement sheeting to comply with AS/NZS 2908.2

Wet area linings manufactured to comply with AS/NZS 2588

Plywood sheeting, Triboard, Strandboard,

All suitable structural flooring substrates must be fixed in accordance to manufacturers' specifications.

Hobs (if applicable) must be constructed from masonry, concrete or similar material.

Fall within the shower must be a minimum of 1/50

1.3 SUBSTRATE ACCEPTANCE

Acceptance of Substrate (i.e. area to be waterproofed).

Ensure the substrate is acceptable in accordance with the Wet-seal training programme and Procedures

NOTE: If waterproofing work cannot be undertaken correctly as per the Wet-seal Installation Procedures and in accordance E/3 and the New Zealand building code then the job must be referred back to the Builder/Supervisor for rectification.

Communication with the Builder/Supervisor and Tiler is critical (e.g. skirting tile heights, Water stop position and size).

PREPARATION OF AREA TO BE WATERPROOFED

- Clean and remove any debris from the area to be waterproofed.
- Check that the substrate is smooth (minimum wood float finish) to apply the membrane.
- Ensure the drainage flanges are adequate.
- Mark out the area to be waterproofed.
- Check moisture readings.

1.4 **SAMPLE CHECK LIST**



CHECK LIST for WET-SEAL NZ INTERNAL IS 511 WATERPROOFING SYSTEM

Builder/Company :		Date:	
Job Address:		Area to be Waterproofed in M ²	
All work to meet requirements of New Zealand Building Code (NZBC) Acceptable Solution E3/AS1; and also the Wet-seal Procedures			
Access: The area MUST meet New Zealand Occupational Safety & Health requirements			
What is the substrate?			
concrete or suitable structural flooring. Any other type of substrate must be checked with Technical.			
Has underfloor heating been requested? If so include in preparation and detail work!			
Is the surface acceptable to apply membrane?			
Is the surface dry to enable primer/membrane to be applied?			
Does the fall on the substrate meet the NZBC Acceptable Solution E3/AS1 requirements (3.3.5)?			
Is there a drainage flange (e.g. Allproof Flange/Englefield)?			
KEY POINTS TO BE VERIFIED			
PREPARATION			
Personal Protection Equipment (PPE), must be used at ALL times!			
Clean and prepare areas to be waterproofed (e.g. remove plaster droppings, sweep area)			
Abrade PVC fittings for Enviro-coat IS 511 application, Light abrasion prior to using Superseal/Max Fix Caulking Compound			
Abrade angles etc, prior to applying membrane (aluminium, stainless steel)			
SETUP			
Apply Superseal/Max Fix to radial edge of drainage flange			
Install BOND BREAKER - Silicone Tape			
Superseal/Max Fix any gaps in bond breaker tape and any gaps elsewhere within waterproofing area			
Mask off all items that require bordering or protection including baths and shower walls			
Prepare and Detail: shower rose, mixer or tap spindle body			
Check all detailing to ensure the work is neat and tidy			
If plaster top coat has been applied over base coat in waterproofing area, etch with sandpaper			
Install shower and door angles where required and detail and re check fitting details			
Important: If Wet-seal Franchisee has been advised by the Builder not to install Waterstop Angles in doorway, then refer to Wet-seal Installation Certificate clause regarding Waterstop Angles.			
Tape all joints in sheet flooring with 48mm silicone release tape. This may alternatively be done after priming			
If soap boxes are to be waterproofed, carry out setup in accordance with Wet-seal Procedures Manual			
PRIMING			
Tape all joints in sheet flooring with 48mm silicone release tape if not already done			
Prime areas to be waterproofed in accordance with Wet-seal Procedures Manual e.g. concrete/screed			
MEMBRANE			
Apply linear membrane and detail soap boxes/nib walls steps, etc with membrane			
Check all detailing to ensure the work is neat and tidy, then apply membrane to full floor			
When applying membrane, detail into flanges or waste pipe and ensure adequate overlaps in fabric			
Always re-check your work for air bubbles or patchiness and overall neatness			
Remember to do a visual check to ensure you have detailed all the required areas and check that there are no white spots. Also ensure that there is adequate membrane on the surface/smooth slippery coating while wet.			
FINISH			
Important: Advise Client to protect Membrane from being damaged.			
Always do a final check of work and remove any of your waste			
Leave the Job looking neat and tidy at all times - we want to impress!			
Builders/Site Supervisor Signature:		Franchisees Signature:	

Ref: Technical/Construction Requirement Sheets/Wet-seal System for NZ Internal IS 511 Waterproofing System Quote Check List - 30-4-2012.xlsx

SDC - Approved Building Consent Document - BC171688 - Pg 238 of 264 - 7/09/2017 - hamib

1.5 SAFETY INFORMATION

Ensure there is a safe working area.

Use correct personal protection Equipment (PPE) at all times on site, and have a First aid kit on site at all times.

Eye Wash Bottle

All applicators **MUST** carry their Eye Wash Bottle filled with clean water at all times (on all jobs). If any material is splashed into your eyes use your Eye Wash Bottle immediately to flush out the contamination. If serious contamination occurs, get to a tap, flush eyes continually holding the eyelids open and seek medical advice.

Personal Protective Equipment (PPE)

Mask/Respirator, Latex Gloves & Protective Eyeglasses **MUST** be worn by all Franchisees and their employees whilst mixing or applying any products supplied by Wet-seal in accordance with this Installation Procedures Manual.

WORKING IN OCCUPIED PREMISES

For occupied buildings, you **MUST** notify, all persons that the fumes from your work could have an adverse effect on them.

PLEASE NOTE: It is recommended that all pregnant ladies, asthmatics and elderly vacate the premises for 24 hours.

1.6 APPLICATION

Application

The Wet-seal applicator applies the membrane in accordance with:

- New Zealand Building Code & Acceptable Solution E3/AS1



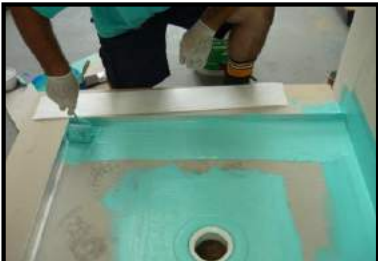
1.7 SETTING UP

PREPARE AREA READY FOR APPLICATION OF THE WET-SEAL IS 511MEMBRANE

Install upstand (Waterstop if required)

- Apply primer if required (Two part or EP 20)
- Mark out line boundaries
- Install bond breaker
- Etch drainage flange (Allproof)
- Etch penetrations
- Detail around tap and pipe penetrations
- Measure area/room
- Cut and tailor fabric
- Install bond breaker at floor to wall junction and over structural floor butt joints.
- Caulk where required

1.8 BASIC INSTALLATION

BOND BREAKER & INSTALLATION	
	<p>Install the bond breaker at the floor to wall junction.</p> <p>Install bond breaker over structural floor junctions.</p>
	<p>Wet-out and detail the floor to wall junction</p>
	<p>Detail over up stands/water stops.</p> <p>Detail into waste outlets.</p> <p>Detail around pipe and tap penetrations.</p> <p>Apply the meter wide where required overlapping onto the lineal floor/wall detail.</p>

NOTE: Lineal fabric to either side of up stand (top edge), then top fabric turned down either side of hob.

- Shower verticals to a height of 1800mm from floor or 50mm above shower rose.
- Aluminium/stainless angles within the shower area must have waterproofing applied no less than 5mm below the top edge on the internal side. On external side the membrane must be a minimum of 10mm from the substrate. Water stop angles at doorways, membrane must finish within 1mm from the top of the angle height.



Installed Newline bases.
Detailing is the same as above.

WATERPROOFING THE WALLS



Screws to be detailed.
Position the Lineal fabric up to required height and wet out
Seal the wall sheets to comply with the NZBC.



Caulking internal joints of any recessed area.







Wet out the fabric and finish off neatly with IS 511 Membrane.

NIB WALL. UPSTAND & BATHS



Cut and tailor fabric over the nib wall/upstand.

	<p>Wet out the fabric and seat neatly into position.</p>
	<p>Protect bath area before caulking at the bath to wall section.</p>
	<p>If a shower is over the bath detail around taps and penetrations and seal the wall sheeting.</p>
	<p>Waterproofing the Full Floor Area: The same methods of detailing and application are used when a full floor is waterproofed. Ensure the membrane overlaps onto the lineal floor to wall detail.</p>

1.9 CARRY OUT A FINAL INSPECTION

Carry out a final inspection prior to washing up the equipment.
Record all product used with batch numbers.

General Information:

UNENCLOSED/DISABLED SHOWER INFORMATION

Due to the inability of frameless shower screens to completely retain water the whole room must be treated as a shower. A bond breaker must be fitted to the wall floor joint and a layer of lineal must be used as flashing around the entire room.

TILE GLUE INFORMATION

IF TILES ARE TO BE LAID DIRECTLY ONTO THE MEMBRANE WE RECOMMEND THE USE OF AN ADHESIVE THAT HAS A TECHNICAL BULLETIN SHOWING IT HAS BEEN TESTED TO A.S. 4992 OVER THE Wet-seal SYSTEM.

NOTE: You **MUST** place an "Important Notice" Sticker in an appropriate place where it can be visibly seen by the Builder/Tiler (Membrane to be cured prior to tiling ,Minimum of 48 hours @ 23°C /55% RH



BRANZ Appraised

Appraisal No. 444 [2011]

PROTECTO SILL WINDOW SEALING TAPE

Appraisal No. 444 [2011]

This Appraisal replaces BRANZ

Appraisal No. 444 [2005]

Amended 19 June 2013

BRANZ Appraisals

Technical Assessments of products for building and construction.



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Product

- 1.1 The Protecto Sill Window Sealing System comprises Protecto Wrap Detail Tape, Protecto Wrap Sill Tape and Protecto Tak spray-on adhesive primer. The system is used around timber framed joinery openings as a secondary weather resistant barrier.
- 1.2 The system is installed into and around the framed joinery opening over the building wrap and exposed timber frame to cover both the face and edge of the opening framing. Protecto Wrap Sill Tape is also used at joinery heads to seal flashing upstands to the building wrap.

Scope

- 2.1 The Protecto Sill Window Sealing System has been appraised as a flexible flashing system for use around window and door joinery openings for buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
 - with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
 - with wall cladding systems complying with NZBC Acceptable Solution E2/AS1 or a valid BRANZ Appraisal that specifies a flexible flashing system; and,
 - with wall wraps compatible with the flashing tape; and,
 - situated in NZS 3604 Wind Zones up to, and including, Extra High.
- 2.2 The Protecto Sill Window Sealing System has also been appraised as a flexible flashing system for use around window and door joinery openings for steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, with regards to building height and floor plan; and,
 - constructed with steel framing complying with the NZBC; and,
 - with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
 - with wall wraps compatible with the flashing tape and steel frame cladding systems; and,
 - situated in NZS 3604 Wind Zones up to, and including, Extra High.



SDC - Approved Building Consent Document - BC171688 - Pg 242 of 264 - 7/09/2017 - hamib

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, the Protecto Sill Window Sealing System, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 [b], 15 years and B2.3.2. The Protecto Sill Window Sealing System meets these requirements. See Paragraphs 8.1 and 8.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The Protecto Sill Window Sealing System contributes to meeting this requirement. See Paragraphs 7.1 - 7.4 and 11.1.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Protecto Sill Window Sealing System meets this requirement and will not present a health hazard to people.

- 3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance. See Paragraph 7.1.

Technical Specification

- 4.1 System components and accessories supplied by Marshall Innovations Limited are:
- **Protecto Wrap Detail Tape** is a black, self-adhering, un-reinforced, conformable, modified SBS [styrene-butadiene-styrene] rubberised asphalt membrane tape. The tape is covered on one side by a silicone release paper and on the other side by a protective removable film. The tape is 1.0 mm thick and is supplied in rolls 150 mm wide and 15 m long.
 - **Protecto Wrap Sill Tape** is a polyethylene backed, modified SBS rubberised asphalt adhesive membrane tape. The adhesive surface of the tape is covered with a silicone release paper. The tape is 0.5 mm thick and is supplied in rolls of 200, 150 and 50 mm wide and 30 m long.
 - **Protecto Tak** is a solvent based spray-on adhesive primer, coloured blue. It is supplied in 369 g cans.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by Marshall Innovations Limited, whether on or off site, is under the control of the installer. The Protecto Sill Window Sealing System components must be protected from damage and weather. Rolls must be stored under cover, in clean, dry conditions away from direct exposure to sunlight.

Technical Literature

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

Design Information

General

- 7.1 The Protecto Sill Window Sealing System meets the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.5 [b]. Refer to the Technical Literature for details of the underlays that are compatible with the system. The installation method for the Protecto Sill Window Sealing System is an alternative solution to the installation method shown within NZBC Acceptable Solution E2/AS1, Figure 72.
- 7.2 The use of flexible flashing systems around window and door joinery openings is critical to assist the overall weathertightness performance of window and door joinery installations.

- 7.3 The Protecto Sill Window Sealing System is designed to prevent air leakage and water penetration around window and door openings at framing junctions [e.g. at the sill trimmer and opening stud junction], and to keep any water that gets past the cladding, or through the joinery, from direct contact with the framing.
- 7.4 The Protecto Sill Window Sealing System is not designed to overcome poor detailing and workmanship of the window or door joinery installation. The system must not be considered in isolation, but be considered as part of the wall cladding system. The Protecto Sill Window Sealing System is designed to be used in conjunction with air seals and joinery flashing systems, not as a substitute.
- 7.5 When the Protecto Sill Window Sealing System is used in conjunction with LOSP [light organic solvent preservative] treated timber, the solvent from the timber treatment must be allowed to evaporate [generally at least one week] prior to the installation of the system.

Durability

- 8.1 Assessment of durability to meet the NZBC is based on difficulty of access and replacement, and the ability to detect failure of the Protecto Sill Window Sealing System both during normal use and maintenance of the building.

Serviceable Life

- 8.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 90 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, the Protecto Sill Window Sealing System is expected to have a serviceable life equal to that of the cladding.

Maintenance

- 9.1 No maintenance is required for the Protecto Sill Window Sealing System. Regular checks, at least annually, must be made of the junctions between the joinery and wall cladding to ensure that they are maintained weathertight and that the primary means of weather resistance for the junction e.g. flashing, sealant, etc continues to perform its function, to ensure that water will not penetrate the cladding.

Prevention of Fire Occurring

- 10.1 Separation or protection must be provided to the Protecto Sill Window Sealing System from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 11.1 Where a cladding manufacturer specifies the use of generic flashing tapes around window and door joinery openings at framing junctions as part of their system, or they specify the use of flexible flashing tapes that comply with NZBC E2/AS1, Paragraph 9.1.5 [b], the Protecto Sill Window Sealing System may be used.

Installation Information

Installation Skill Level Requirements

- 12.1 Installation of the Protecto Sill Window Sealing System must be completed by tradespersons with an understanding of flexible flashing systems, in accordance with instructions given within the Protecto Sill Window Sealing System Technical Literature and this Appraisal.

General

- 13.1 The selected building underlay must be installed in accordance with the manufacturer's instructions, and must completely cover the joinery opening. The wrap is then cut on a 45° angle away from each corner of the opening so the flaps can be folded into the opening and secured to the interior face of the timber framing.

- 13.2 Before the Protecto Tak adhesive primer is applied, the substrate surfaces must be clean, dry and free from any surface contaminants such as dust and grease that may cause loss of adhesion. The Protecto Tak adhesive primer must be sprayed onto the wrap and exposed timber frame along the entire length of the sill trimmer, the inside and front face of the opening studs and into the top corners of the joinery opening.
- 13.3 A 300 mm length of Protecto Wrap Detail Tape is installed around all four corners of the opening, keeping the tape flush with the interior face of the opening and ensuring the exposed timber framing is covered. After removing the protective film, the tape that overhangs the front of the opening is 'moulded' onto the face of the building wrap to create an airtight seal at the framing junction.
- 13.4 The Protecto Wrap Sill Tape is cut in individual lengths to suit the opening of the sill. The Protecto Wrap Sill Tape is installed flush with the interior face of the opening and is applied along the entire length of the sill. The overhanging tape is folded onto the face of the building underlay.
- 13.5 Two 300 mm lengths of Protecto Wrap Sill Tape are cut for the jambs. The tape is installed flush with the interior face of the opening and tight into the sill/jamb junction. The overhanging tape is folded onto the face of the building underlay.
- 13.6 Protecto Wrap Sill Tape must not be stretched. To avoid wastage, the tape can be lapped 100 mm minimum onto itself without reducing the performance of the Protecto Sill system.
- 13.7 If Protecto Sill is exposed to the weather or UV light for more than 90 days, then it must be replaced with new material.

Installation Temperature

- 13.8 The Protecto Sill Window Sealing System must not be installed at temperatures of less than 10°C.

Inspections

- 13.9 The Technical Literature must be referred to during the inspection of Protecto Sill Window Sealing System installations.

Basis of Appraisal

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

Tests

- 14.1 Cyclic and static water pressure leakage tests in accordance with AS/NZS 4284 were carried out by BRANZ on cladding systems incorporating the Protecto Sill system. The test results were reviewed by BRANZ experts and found to be satisfactory.
- 14.2 The adhesion of Protecto Wrap Sill Tape and Protecto Wrap Detail Tape to black bituminous Kraft building paper complying with the requirements of NZBC Acceptable Solution E2/AS1, Table 23 and selected other synthetic wall underlays have been tested by BRANZ and found to be satisfactory.
- 14.3 Tests have been carried out on Protecto Wrap Sill Tape in accordance with ICC Evaluation Service Criteria for Flashing Materials, AC148. The results have been reviewed by BRANZ experts and found to be satisfactory.

Other Investigations

- 15.1 An assessment was made of the durability of the Protecto Sill Window Sealing System by BRANZ technical experts.
- 15.2 Site inspections were carried out by BRANZ to examine the practicability of installation.
- 15.3 The Technical Literature has been reviewed by BRANZ and found to be satisfactory.

Quality

- 16.1 The manufacture of the Protecto Sill Window Sealing System has not been examined by BRANZ, but details of the quality and composition of the materials used were obtained and found to be satisfactory.

- 16.2 The quality of supply to the market is the responsibility of Marshall Innovations Limited.
- 16.3 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and building wraps in accordance with the instructions of the designer.
- 16.4 The quality of installation, handling and storage on site is the responsibility of the installer in accordance with the instructions of Marshall Innovations Limited.

Sources of Information

- ICC Evaluation Service, Inc, AC148 Acceptable Criteria for Flexible Flashing Materials, July 2001.
- NZS 3604: 2011 Timber-framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 [Amendment 5, 1 August 2011].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 31 January 2012.

This Appraisal has been amended to update clause changes as required by the introduction of NZS 3604: 2011 and NZBC Acceptable Solution E2/AS1 Third Edition, Amendment 5.

Amendment No. 2, dated 15 April 2013.

This Appraisal has been amended to update Appraisal Holder details.

Amendment No. 3, dated 19 June 2013.

This Appraisal has been amended to update clause changes as required by the introduction of NZBC Fire Clauses C1 – C6 Protection from Fire and A3 Building Importance Levels.



In the opinion of BRANZ, **Protecto Sill Window Sealing Tape** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

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

Conditions of Appraisal

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

For BRANZ



Pieter Burghout

Chief Executive

Date of Issue:

01 February 2011

SDC - Approved Building Consent Document - BC171688 - Pg 247 of 264 - 7/09/2017 - hamib



BRANZ Appraised

Appraisal No. 548 [2013]

TEKTON® BUILDING WRAP

Appraisal No. 548 [2013]

This Appraisal replaces BRANZ Appraisal No. 548 (2007), issued 20 July 2007. Amended 17 December 2013.



Product

- 1.1 Tekton® Building Wrap is a synthetic breather-type flexible wall underlay and air barrier for use under direct and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured of a coated spun-bonded polypropylene.

Scope

- 2.1 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on timber framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent wall claddings directly fixed to framing; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1; and,
 - situated in NZS 3604 Wind Zones up to, and including Very High.
- 2.2 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer subject to specific design; and,
 - situated in NZS 3604 Wind Zones up to, and including Very High.
- 2.3 Tekton® Building Wrap has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Extra High.
- 2.4 Tekton® Building Wrap has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Tekton® Building Wrap into their design in accordance with the declared properties and the instructions of Marshall Innovations Limited.

BRANZ Appraisals

Technical Assessments of products for building and construction.



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SDC - Approved Building Consent Document - BC171688 - Pg 248 of 264 - 7/09/2017 - harrib

Building Regulations

New Zealand Building Code (NZBC)

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

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

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Tekton® Building Wrap will contribute to meeting this requirement. See Paragraphs 12.1 – 12.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Tekton® Building Wrap meets this requirement and will not present a health hazard to people.

3.2 This is an Appraisal of an **Alternative Solution** in terms of the New Zealand Building Code compliance.

Technical Specification

4.1 Tekton® Building Wrap is a 100 g/m² light grey sheet polypropylene membrane material approximately 0.6 mm thick.

4.2 The product is supplied in rolls 1.370 m x 74 m and 2.743 m x 37 m. The product is printed with the Tekton® logo repeated along the length of the roll. The rolls are wrapped with an instruction sticker.

Accessories

4.3 Accessories used with Tekton® Building Wrap which are supplied by the installer are:

- Fixings – staples, clouts, screws or proprietary wrap fixings, or other temporary fixings to attach the wall wrap to the framing.
- Wall underlay support – polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall wrap in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

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

Technical Literature

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

Design Information

Timber and Steel Framing

7.1 Studs must be provided at maximum 600 mm centres. Dwargs must be fitted flush between the studs at maximum 1200 mm centres.

General

7.2 Tekton® Building Wrap is intended for use as an alternative to conventional building papers which are fixed over timber and steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain.

- 7.3 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.
- 7.4 Tekton® Building Wrap must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.
- 7.5 Tekton® Building Wrap is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23, except that it must not be used with non-absorbent wall claddings such as vinyl or metal based sidings or weatherboards in direct fixed installations. Tekton® is suitable for use under cavity based wall claddings as a non-absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings. Refer to Table 1.
- 7.6 Tekton® Building Wrap is also suitable for use as an air barrier to walls that are not lined, such as attic spaces at gable ends, as called up in NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 [c]. Refer to Table 1.

Table 1: NZBC E2/AS1 Table 23 Requirements

NZBC E2/AS1 Table 23 Wall Wrap Properties	Property Performance Requirement	Actual Property Performance
Absorbency	$\geq 100 \text{ g/m}^2$	Classified as non-absorbent [see paragraph 7.4]
Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Water Resistance	$\geq 20 \text{ mm}$	Pass
pH of Extract	$\geq 5.5 \text{ and } \leq 8$	9.78 [Note 1]
Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Edge tear and tensile strength	Edge tear: Machine direction = 228 N Cross direction = 186 N Tensile strength: Machine direction = 4.4 kN/m Cross direction = 3.9 kN/m
Air Barrier	Air resistance: $\geq 0.1 \text{ MN s/m}^3$	Pass

Note 1: Further testing of Tekton® Building Wrap was completed to determine the effect of the high pH level on the wall underlay and materials it is likely to come into contact with during its serviceable life. The testing confirmed that the high pH had no adverse effects on the wall underlay performance, or the performance of other materials.

- 7.7 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the wall underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Stucco Plaster

- 7.8 Tekton® Building Wrap is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The wall underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.2.
- 7.9 Tekton® Building Wrap may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3 [b].

Structure

- 8.1 Tekton® Building Wrap is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a flexible building underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid building underlays.

Durability

- 9.1 Tekton® Building Wrap meets code compliance with NZBC Clause B2.3.1 [a], not less than 50 years for building wraps used where the cladding durability requirement or expected serviceable life is not less than 50 years, and code compliance with NZBC Clause B2.3.1 [b], 15 years for building wraps used where the cladding durability requirement is 15 years.

Serviceable Life

- 9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Tekton® Building Wrap is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

- 10.1 Tekton® Building Wrap has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to Tekton® Building Wrap from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 12.1 Tekton® Building Wrap must be used behind claddings that meet the requirements of the NZBC, e.g. such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.
- 12.2 Tekton® Building Wrap, when installed in accordance with the Technical Literature and this Appraisal, will assist in the total cladding systems compliance with NZBC Clause E2.
- 12.3 When used as an air barrier, particular care must be taken to ensure an air tight barrier is achieved, and weather sealing at all openings and penetrations through the cladding meets the requirements of the NZBC.

Installation Information

Installation Skill Level Requirements

- 13.1 Installation must always be carried out in accordance with the Technical Literature and this Appraisal, by competent tradespersons with an understanding of wall wrap installation.

Wrap Installation

- 14.1 Tekton® Building Wrap must be fixed to all framing members at maximum 300 mm centres with hot-dip galvanised, large-head clouts 20 mm long, zinc plated 6-8 mm staples, self-drilling screws, or proprietary wrap fixings. The membrane must be pulled taut over the framing before fixing.
- 14.2 Tekton® Building Wrap must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps must be no less than 75 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the membrane. End laps must be made over framing and be no less than 150 mm wide.
- 14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the membrane by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut membrane must be folded inside the opening and stapled to the penetration framing. Excess wall underlay may be cut off flush with the internal face of the wall frame.
- 14.4 Tekton® Building Wrap can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.
- 14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.
- 14.6 Any damaged areas of Tekton® Building Wrap, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

- 14.7 The Technical Literature must be referred to during the inspection of Tekton® Building Wrap installations.

Basis of Appraisal

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

Tests

- 15.1 The following tests have been carried out on Tekton® Building Wrap by Scion: Folding strength of paper in accordance with AS/NZS 1301.423; edge tear resistance and tensile strength in accordance with AS/NZS 4200.1 and air resistance in accordance with BS 6538-3.
- 15.2 The following tests have been carried out on Tekton® Building Wrap by BRANZ: Absorbency in accordance with AS/NZS 4201.6, Vapour transmission in accordance with ASTM E 96B, Shrinkage in accordance with AS/NZS 4201.3, Water barrier in accordance with AS/NZS 4201.4 and pH of extract in accordance with AS/NZS 1301.421. A range of these tests were completed before and after Tekton® Building Wrap was exposed to ultra-violet light.
- 15.3 The Flammability Index of Tekton® Building Wrap has been evaluated in accordance with AS 1530.2.

Other Investigations

- 16.1 A durability opinion was given by BRANZ technical experts.
- 16.2 Site inspections were carried out by BRANZ to assess methods used for the installation of Tekton® Building Wrap, and to examine completed installations.
- 16.3 The marketer's Technical Literature, including installation instructions, have been examined by BRANZ and found to be satisfactory.

Quality

- 17.1 The manufacture of Tekton® Building Wrap has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ has taken note of product certification by ICC-ES and CCMC covering quality aspects associated with the product.
- 17.2 The quality of supply to the market is the responsibility of Marshall Innovations Limited.
- 17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall wrap into their design in accordance with the instructions of Marshall Innovations Limited.
- 17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Marshall Innovations Limited.

Sources of Information

- AS 1530.2 – 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp – cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays – materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays – Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays – Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays – Methods of test – Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays – Methods of test – Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays – Methods of test – Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, Permeable Building Underlays.
- NZS 3604: 2011 Timber-framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 [Amendment 5, 1 August 2011].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendment

Amendment No. 1, dated 17 December 2013.

This Appraisal has been amended to fix an editorial error.



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

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

Conditions of Appraisal

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

For BRANZ



Cheydra Percy
Chief Executive

Date of Issue:
16 December 2013

SDC - Approved Building Consent Document - BC171688 - Pg 254 of 264 - 7/09/2017 - hamib



BRANZ Appraised

Appraisal No. 372 [2016]

WET-SEAL FIBRECOAT WET AREA WATERPROOFING MEMBRANE

Appraisal No. 372 [2016]

This Appraisal replaces BRANZ
Appraisal No. 372 [2000].



BRANZ Appraisals

Technical Assessments of products for
building and construction.



Wet-seal New Zealand Ltd

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BRANZ

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Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz



Product

1.1 Wet-seal Fibrecoat Waterproofing Membrane is a reinforced, liquid-applied, resin based waterproofing membrane for use under ceramic or stone tile finishes in internal wet areas.

Scope

- 2.1 Wet-seal Fibrecoat Waterproofing Membrane has been appraised for use as a waterproofing membrane for internal wet areas of buildings, within the following scope:
- on floor substrates of concrete, flooring grade particleboard, plywood, compressed fibre cement sheet and fibre cement sheet tile underlay, and on wall substrates of concrete, concrete masonry, wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
 - when protected from physical damage by ceramic or stone tile finishes; and,
 - where floors are designed and constructed such that deflections do not exceed 1/360th of the span.
- 2.2 The use of Wet-seal Fibrecoat Waterproofing Membrane on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Building structural movement and control joints in the substrate must be carried through to the tile finish. The design and construction of the substrate and movement and control joints are specific to each building, and therefore the responsibility of the building designer and building contractor and are outside the scope of this Appraisal.
- 2.4 Ceramic or stone tile finishes are outside the scope of this Appraisal.
- 2.5 The membranes must be installed by Wet-seal Trained and Approved Applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Wet-seal Fibrecoat Waterproofing Membrane if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 [b] 15 years. Wet-seal Fibrecoat Waterproofing Membrane meets this requirement. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Wet-seal Fibrecoat Waterproofing Membrane will meet this requirement. See Paragraphs 11.1-11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Wet-seal Fibrecoat Waterproofing Membrane meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 Materials supplied by Wet-seal are as follows:

- **Wet-seal Fibrecoat Waterproofing Membrane** – is a fibre glass reinforced, polyester resin based waterproofing membrane. It is coloured amber and supplied in 20 litre pails.
- **Topcoat 300** – is a two-part epoxy topcoat used to complete the Wet-seal Fibrecoat Waterproofing Membrane system. It is supplied as a Part A and B, in 10 litre containers, coloured jade green.

Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and out of freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

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

Design Information

General

- 7.1 Wet-seal Fibrecoat Waterproofing Membrane is for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 The membrane must be protected from physical damage by the application of ceramic or stone tile finishes.
- 7.3 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ "Good Practice Guide Tiling".
- 7.4 Timber framing systems must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed 1/360th of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

Substrates

Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with the sanded C face upwards and treated to H3 [CCA treated]. LOSP treated plywood must not be used.
- 8.2 The plywood must be laid with the face grain at right angles to the floor joists. Joists must be at 400 mm centres maximum and the edges of the sheets must be supported with blocking or framing. The Plywood must be fixed with 10 g x 50 mm stainless steel countersunk head screws at 150 mm centres on the edges and 200 mm through the body of the sheets.

Fibre Cement Compressed Sheet/ Fibre Cement Sheet Tile Underlay

- 8.3 Fibre cement compressed sheet and tile underlay must be manufactured to comply with the requirements of AS/NZS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area membrane substrate. Installation must be carried out in accordance with the instructions of the manufacturer.

Particleboard

- 8.4 Particleboard must be specified for the end use in accordance with NZS 3602. Installation must be carried out in accordance with the instructions of the manufacturer.

Concrete and Concrete Masonry

- 8.5 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101, concrete slab-on-ground to NZS 3604 or NZS 4229, and concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

- 8.6 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588 and be suitable for use in internal wet areas.
- 8.7 Fibre cement sheet must be suitable for use in wet areas and comply with AS/NZS 2908.2.
- 8.8 Installation of plasterboard or fibre cement wall linings must be carried out in accordance with the instructions of the manufacturer.

Durability

Serviceable Life

- 9.1 The Wet-seal Fibrecoat Waterproofing Membrane, when subjected to normal conditions of environment and use, is expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design service life of 15-25 years.

Maintenance

- 10.1 No maintenance of the membrane will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grouts and sealants.
- 10.2 In the event of damage to the membrane, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.
- 10.3 Drainage outlets must be maintained to operate effectively, and ceramic or stone tile finishes must be kept clean.

Internal Moisture

- 11.1 Wet-seal Fibrecoat Waterproofing Membrane is impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Wet-seal Fibrecoat Waterproofing Membrane is suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of Code Compliance for overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.
- 11.3 Surfaces must be finished with ceramic or stone tile finishes. A means of Code Compliance to NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1, Paragraph 3.1.1 [b], 3.1.2 [b] and 3.3.1 [b].
- 11.4 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes must be provided and the floor must fall to the outlet.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, BRANZ "Good Practice Guide Tiling", and flooring and wallboard manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used; they must flash over the membrane a minimum of 30 mm.
- 11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms where timber, plywood or particleboard floors are used. This is also a requirement of particleboard manufacturers.

Installation Information

Installation Skill Level Requirement

- 12.1 Installation must always be carried out in accordance with Wet-seal Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.
- 12.2 Installation and finishing of components and accessories supplied by Wet-seal New Zealand Ltd and its approved applicators must be completed by trained applicators, approved by Wet-seal New Zealand Ltd.
- 12.3 Installation of the accessories supplied by the building contractor must be carried out in accordance with the Wet-seal Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. With surfaces that are even and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of the concrete must be 75% or less before membrane application. Concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 585.
- 13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/wall junctions must have Idrobuilt Rinforzo installed as set out in the Technical Literature.
- 13.4 Substrates when required must be primed with Top Coat 300 primer and allowed to cure before the membrane is installed.

Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 5°C or above 35°C.
- 14.2 Wet-seal Fibrecoat Waterproofing Membrane must be thoroughly stirred and catalyzed before application.
- 14.3 The fibreglass reinforcement is laid onto the substrate prior to the membrane being applied
- 14.4 The membrane is applied in one coat over the fibre glass reinforcement at the rates set out in the Technical Literature. The total finished system thickness of the Wet-seal Fibrecoat Waterproofing Membrane must be a minimum of 1.0 mm.
- 14.5 Application can be made by roller or brush (long bristle).
- 14.6 Once the resin coat has cured, the Top Coat 300 is applied as per the Technical Literature.
- 14.7 The Technical Literature should be consulted for the cleanup procedures.

Tiling

- 15.1 The membrane must be fully cured before tiling. The cured membrane must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and BRANZ "Good Practice Guide Tiling". The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer or Wet-seal Pty Ltd.

Inspections

16.1 Critical areas of inspection are:

- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
- Moisture content of the substrate prior to the application of the membrane.
- Acceptance of the substrate by the membrane installer prior to application of the membrane.
- Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness and use of reinforcement.
- Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

Health and Safety

17.1 Safe use and handling procedures for the membranes are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

Basis of Appraisal

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

Tests

18.1 The following testing of Wet-seal Fibrecoat Waterproofing Membrane has been undertaken:

- AS/NZS 4858 Appendix A including effect of heat ageing, bleach, detergent and water on tensile and elongation, water vapour transmission, cyclic movement resistance requirements of AS/NZS 4858: 2004, Appendix B, water absorption, peel adhesion, dry pull-off / tensile adhesive test on plywood, dry pull-off / tensile adhesive test on fibre cement, puncture resistance and low temperature flexibility.

The above test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 19.1 An assessment was made of the durability of the Wet-seal Fibrecoat Waterproofing Membrane by BRANZ technical experts.
- 19.2 Site visits have been carried out by BRANZ to assess the practicability of installation and to examine completed installations.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 20.1 The manufacture of the membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 21.1 The quality of supply of the membrane system materials to the market is the responsibility of Wet-seal New Zealand Ltd.
- 21.2 Quality on site is the responsibility of the Wet-seal Approved and Trained Applicators.
- 21.3 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Wet-seal and this Appraisal.
- 21.4 Building owners are responsible for the maintenance of the tiling or stone finishing systems in accordance with the instructions of Wet-seal.

Sources of Information

- AS 2908.2: 2000 Cellulose-cement products - flat sheet.
- AS 3740 - 2010 Waterproofing of domestic wet areas.
- AS 3958.1: 2007 Ceramic Tiles - Guide to the installation of ceramic tiles.
- AS/NZS 4858 - 2004 Wet area membranes.
- AS/NZS 1170: Structural Design Actions
- AS/NZS 2269: 2012 Plywood - Structural.
- NZS 3101: 2006 Concrete Structures Standard.
- NZS 3602: 2003 Timber and wood-based products for use in buildings.
- NZS 3604: 2011 Timber framed buildings.
- NZS 4229: 2013 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of reinforced concrete masonry structures.
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.
- Good Practice Guide Tiling, BRANZ, April 2015.





In the opinion of BRANZ, the **Wet-seal Fibrecoat Wet Area Waterproofing Membrane** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Wet-seal New Zealand Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

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

For BRANZ



Chelydra Percy

Chief Executive

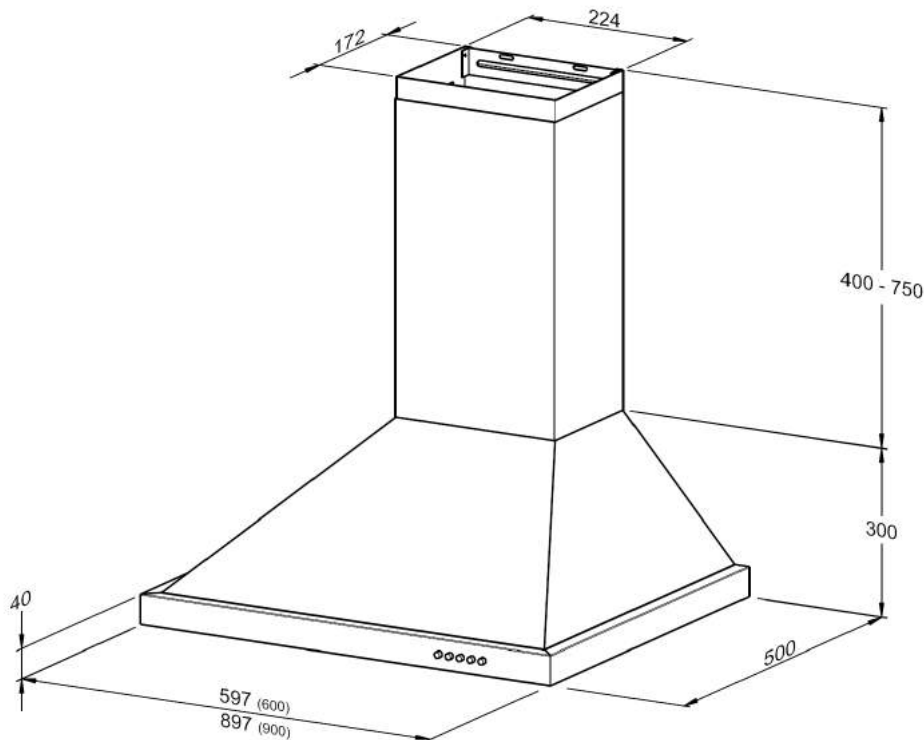
Date of Issue:

01 July 2016

SDC - Approved Building Consent Document - BC171688 - Pg 261 of 264 - 7/09/2017 - hamib

Description: **ROBINHOOD WALL CANOPY**
Model Number: **RWC3CH6SS, RWC3CH9SS**

Typical design



Features and benefits

- **High performance extraction fan**
High performance extraction fan rapidly removes steam, smoke and cooking smells from your kitchen. Three-speed switch lets you select the fan strength you need – half strength for steamed vegetables; full strength for stir fries.
- **Halogen lamps**
2x20 watt halogen lamps illuminate the entire cooking surface. Lamps are quick and easy to replace.
- **Multi-layered micromesh filters**
Multi-layered micromesh filters effectively trap grease. They're simple to remove and are easily maintained with a regular clean in the dishwasher.
- **Rectilinear design**
Simple styling makes cleaning easy. High quality stainless or powder coated steel and the fingertip controls are easy to clean with a damp cloth.
- **Thermal overload switch**
Thermal overload function that senses extreme heat and disconnects power to the motor temporarily. If you have a cooking disaster, and something catches fire, the rangehood automatically switches off to prevent flames and sparks being sucked into the ducting or ceiling. *
- **Recirculation option**
In situations where ducting isn't possible, your rangehood can be fitted with charcoal filters that effectively cleanse the air before returning it to the kitchen.

Specifications

Technical data:

- 3 speed centrifugal motor
- 2 x 20 Watt halogen lamps
- Maximum power consumption: 280 watts
- Gauge of steel: 0.6mm
- Type of steel: 430 stainless steel
- Finish of steel : brush number 4
- 240 Volt. 50 Hertz. 280 Watt Max.
- Tested to EMC AS/NZS – CISPR14:2001
- Electrical approval AS/NZS 3350.2.31.2001
- Performance tested to IEC61591 (replaces AS2682-1984)
- Filter specifications: Three layered micro mesh
- Length of power cord: 1500mm
- Ducting outlet: 150mm diameter round outlet – top ducting
- Recirculation option through top duct outlet

Gross weight: RWC3CH6SS 12.2kg. RWC3CH9SS 15.4kg

Carton volume: 0.132m³ (600 model), 0.194m³ (900 model)

Carton dimensions : 650 x 370 x 550mm (600 model), 955 x 370 x 550mm (900 model)

Rangehood dimensions: 597 x 500 x 300mm (600 model), 897 x 500 x 300mm (900 model)

Performance data:

○ RWC3CH6SS

○ RWC3CH9SS

Fan speed 1	460m ³ /hr	Fan speed 1	460m ³ /hr
Fan speed 2	560m ³ /hr	Fan speed 2	560m ³ /hr
Fan speed 3	650m ³ /hr	Fan speed 3	650m ³ /hr
Noise speed 1	58.5dB	Noise speed 1	58.2dB
Noise speed 2	63.3dB	Noise speed 2	63.1dB
Noise speed 3	67.7dB	Noise speed 3	67.6dB

New Zealand

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Australia

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Sapphire™ Square Corner Shower

Available in a range of sizes and wall options, the Sapphire Square Corner Shower is extremely versatile. Features a fully reversible door with 4mm toughened safety glass, and full length magnetic door seals. The Quick-Fit® tray features the ultra high 40mm upstand to enhance water tightness for long lasting performance.



Note: Tapware and accessories illustrated in photography are not included

Colour/Finish Material

White Frame
 Duracryl Acrylic Walls,
 Tray - fibreglass reinforced acrylic
 White fully framed finish - powder coated aluminium.
 Glass door and return - 4mm toughened safety glass (AS/NZS 2208 compliant).

Shower Height

1920mm including tray

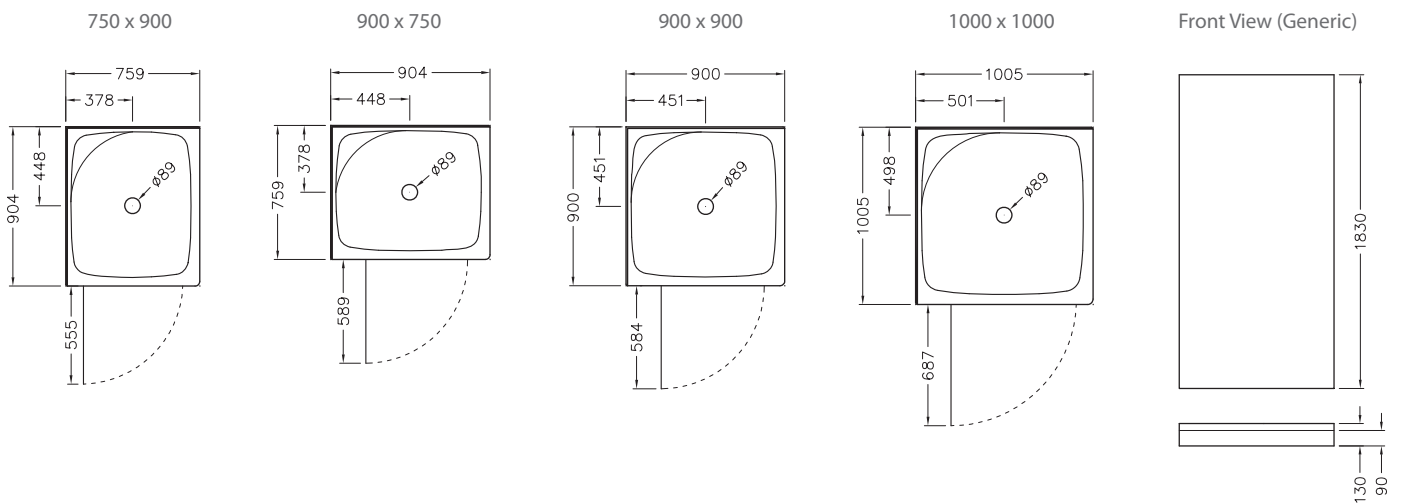
Included Components

Sapphire Door and Return
 Duracryl Acrylic Wall flat or moulded
 Quick-Fit Tray
 Easy Clean Trap Chrome
 Adhesive and Sealant pack

Optional Accessories

Hi-Flow Waste Outlet
 Shower Tower

Product Code	750 x 900mm	900 x 750mm	900 x 900mm	1000 x 1000mm
Side Contour Wall			13906A-0	13903A-0
Corner Contour Wall	Right: 14809A-0 Left: 14808A-0	Right: 14807A-0 Left: 14806A-0	13909A-0	13904A-0
Flat Wall	Right: 13917A-0 Left: 13915A-0	Right: 13916A-0 Left: 13914A-0	13913A-0	13905A-0



All measurements shown are in millimetres.
 Sizes are approximate.
 1183732-A04-A April 2011

SDC - Approved Building Consent Document - BC171688 - Pg 264 of 264 - 7/09/2017 - harrib



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

Form 6A

Memorandum from licensed building practitioner: Record of building work

Section 88, Building Act 2004

Please fill in the form as fully and correctly as possible.
If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING	
Street address:	56 Riverstone Drive
Suburb:	Rolleston
Town/City:	Christchurch
Postcode:	7614

THE PROJECT	
Building consent number:	171688

THE OWNER(S)	
Name(s):	Regan & Lucy Harvey
Mailing address:	56 Riverstone Drive Rolleston
Suburb:	Rolleston
PO Box/Private Bag:	
Town/City:	Christchurch
Postcode:	7614
Phone number:	027 213 7628
Email address:	regan.harvey@moveologistics.co.nz

RECORD OF WORK THAT IS RESTRICTED BUILDING WORK

PRIMARY STRUCTURE

Work that is restricted building work	Description of restricted building work	Carried out or supervised
Tick <input checked="" type="checkbox"/>	If necessary, describe the restricted building work.	Tick <input checked="" type="checkbox"/> whether you carried out the restricted building work or supervised someone else carrying out the restricted building work.
Foundations and subfloor framing	<input checked="" type="checkbox"/> Dig out, Box for foundation to floor, place steel reinforcing.	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Walls	<input checked="" type="checkbox"/> Erect timber framing & fit fixings	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Roof	<input type="checkbox"/>	<input type="checkbox"/> Carried out <input checked="" type="checkbox"/> Supervised
Columns and beams	<input checked="" type="checkbox"/> Fitted beam as per plan	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Bracing	<input checked="" type="checkbox"/> Ply & gib bracing systems installed.	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Other	<input type="checkbox"/>	<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised

EXTERNAL MOISTURE MANAGEMENT SYSTEMS		
Work that is restricted building work	Description of restricted building work	Carried out or supervised
Tick <input checked="" type="checkbox"/>	If necessary, describe the restricted building work.	Tick <input checked="" type="checkbox"/> whether you carried out the restricted building work or supervised someone else carrying out the restricted building work.
Damp proofing <input checked="" type="checkbox"/>	Building wrap & Brick repate mole seal	<input checked="" type="radio"/> Carried out <input type="radio"/> Supervised
Roof cladding or roof cladding system <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised
Ventilation system (for example, subfloor or cavity) <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised
Wall cladding or wall cladding system <input checked="" type="checkbox"/>	Shade clad fitted on a cavity system with cover butters - @ 600 p.	<input checked="" type="radio"/> Carried out <input type="radio"/> Supervised
Waterproofing <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised
Other <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised

ISSUED BY

Name and contact details of the licensed building practitioner who is licensed to carry out or supervise restricted building work.

Name: Hamish Ferguson LBP number: BP 107177

Class(es) licensed in: Carpentry

Plumbers, Gasfitters and Drainlayers registration number (if applicable):

Mailing address (if different from below):

Street address/Registered office: 12 Erica street

Suburb: Popanui Town/City: Christchurch

PO Box/Private Bag Postcode: 8053

Phone number: Mobile: 021 837 488

After hours: Fax:

Email address: hamish@buildercraft.nz Website:

DECLARATION

I Hamish Ferguson carried out or supervised the restricted building work recorded on this form.

Signature: Ferguson

Date: 12.4.18



For Official use
Date Received:

Application for Code Compliance Certificate (Form 6) Section 92, Building Act 2004

Items marked * are mandatory. Complete this form in BLOCK CAPITALS using BLACK or BLUE ink.

1. The Building Consent

Building Consent
Number*:

171688

Issued by*:

Selwyn District Council

2. The Project

Description of the building work*:

New Residential home.

Project Address*:

56 Riverstone Drive

Floor Area*: 220 m²

Legal Description*:

LOT: 18

DP: 378727

Has the intended use of the
building changed since the Building
Consent was issued/granted? *

YES

→ Provide details of the new use:
[refer NZBC A1 Classified Uses]

NO

3. The Owner [include preferred form of address, eg, Mr, Miss, Dr, if an individual]

Owner's Name*:

Lucy & Regan Harvey

Contact Person (if owner is a company):

Mailing/
Billing Address*:

56 Riverstone Drive
Rolleston

Street Address/
Registered Office:

Phone Number:

Cell Phone:

0272137638

Fax:

E-mail address:

Regan.harvey@moveologistics.co.nz

Website:

4. The Agent (Note - Only required if application is being made on behalf of the owner. The Agent, if nominated, will be the first point of contact for communications with the Council/Building Consent Authority regarding this application/building work and will receive all correspondence including all invoices)

Agent's Name:

Hamish Ferguson

Contact Person (if agent is a company):

Mailing/
Billing Address:

12 Emily St
Paparua, Chch.

Street Address/
Registered Office:

Phone Number:

021837488

Cell Phone:

Fax:

E-mail address:

hamish@burbcraft.nz

Website:

5a. The Application

All building work to be carried out under the above building consent was completed on*:

5b. The Application (Restricted Building Work) *

The licenced building practitioner(s) who carried out, or supervised, the restricted building work is/are as follows:
Note: Enter the licenced building practitioner (LBP) number or registration number if treated as being licenced under section 291 of Building Act 2004.

Name Licence Class LBP number
Particular work carried out or supervised:

Name Licence Class LBP number
Particular work carried out or supervised:

Name Licence Class LBP number
Particular work carried out or supervised:

Name Licence Class LBP number
Particular work carried out or supervised:

Name Licence Class LBP number
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Name Licence Class LBP number
Particular work carried out or supervised:

Name Licence Class LBP number
Particular work carried out or supervised:

Name Licence Class LBP number
Particular work carried out or supervised:

Name Licence Class LBP number
Particular work carried out or supervised:

Note: Use additional sheets if required.

5c. The Application (Key Personnel) *

The personnel who carried out the building work other than restricted building work are as follows:

Builder: BuildCraft Construction Ltd	Registration Number:	107171
Mailing Address: 7 Veran Place Fendalton	Phone (day):	021 837488
e-mail: Jon@buildcraft.nz		
Certifying Plumber: Jake Jacob Pittfort	Registration Number:	26587
Mailing Address: 69 Searells rd strewn, chl	Phone (day):	021 055 8606
e-mail: Mainlandpd@gmail.com		
Certifying Gasfitter: George Abbott	Registration Number:	22949
Mailing Address:	Phone (day):	021 244944
e-mail: admin@abbottgl.co.nz		
Certifying Drainlayer: Raika Drainage	Registration Number:	18659
Mailing Address:	Phone (day):	021 2210032
e-mail: raikadrainage@gmail.com		
Registered Electrician: RJ Pugh Electrical	Registration Number:	E251308
Mailing Address:	Phone (day):	02 76001122
e-mail: robbiepugh@gmail.com		
Name:	Registration Number:	
Mailing Address:	Phone (day):	
e-mail:		
Name:	Registration Number:	
Mailing Address:	Phone (day):	
e-mail:		

Note: Use additional sheets if required.

Other notes or comments which you as the applicant may wish to add:

5d. The Application (Specified Systems)

Are there any specified systems associated with this project? *

YES

NO, there are no specified systems associated with this project.

The following specified systems are contained on the compliance schedule for the building and, in the opinion of the personnel who installed them, are capable of performing to the performance standards set out in the building consent: *[specified systems are defined in regulations]*.

- SS1 Automatic systems for fire suppression (for example, sprinkler systems)
- SS2 Automatic or manual emergency warning systems for fire or other dangers (other than a warning system for fire that is entirely within a household unit & serves only that unit).
- SS3 Electromagnetic or automatic doors or windows (for example, ones that close on fire alarm activation)
 - SS3/1 Automatic doors
 - SS3/2 Access Controlled Doors
 - SS3/3 Interfaced fire or smoke doors or windows
- SS4 Emergency lighting systems
- SS5 Escape route pressurisation systems
- SS6 Riser mains for fire service use
- SS7 Automatic back-flow preventers connected to a potable water supply
- SS8 Lifts, escalators, travelators, or other systems for moving people or goods within buildings
 - SS8/1 Passenger Carrying lifts
 - SS8/2 Service Lifts
 - SS8/3 Escalators and moving walks
- SS9 Mechanical ventilation or air conditioning systems
- SS10 Building maintenance units for providing access to the exterior and interior walls of buildings
- SS11 Laboratory fume cupboards
- SS12 Audio loops or other assistive listening systems
- SS13 Smoke control systems
 - SS13/1 Mechanical Smoke Control
 - SS13/2 Natural Smoke Control
 - SS13/3 Smoke Curtains
- SS14 Emergency power systems for, or signs relating to, a system or feature specified in any of the clauses 1 to 13
 - SS14/1 Emergency Power Systems
 - SS14/2 Signs relating to Specified Systems 1 to 13
- SS15 Other Fire Safety Systems or Features
 - SS15/1 Systems for communicating spoken information intended to facilitate evacuation
 - SS15/2 Final exit (as defined by A2 of the Building Code; and
 - SS15/3 Fire separations
 - SS15/4 Signs for communicating information intended to facilitate evacuation;
 - SS15/5 Smoke separations
- SS16 Cable Cars

Purpose Group*:

Fire Hazard Category*:

Max Occupant Load*:

5e. The Application (Signatory)

I request that you issue a code compliance certificate for this work under section 95 of the Building Act 2004.

Signed by*:

FULL NAME*:

Date*:

I am the*: Owner Agent on behalf of, and with the authority of, the owner.

Address the code compliance certificate should be sent to:

6. Attachments

The following documents are attached to this application:

- Evidence of ownership* (Certificate of Title or Sale & Purchase Agreement)
- Certificates that relate to the energy work (eg Gas & electricity)
- Evidence that the specified systems are capable of performing to the performance standards set out in the building consent
- Proof of potability of drinking water from private well, and/or rainwater catchment, supply (refer to New Zealand Drinking Water Standards 2005)
- Memoranda (Records of Building Work) from licenced building practitioner(s) stating what restricted building work they carried out or supervised*
- Other documents from personnel who carried out the work

For Official use only:



Consenting & Compliance Group

Construction Statement – solid/liquid fuel heater

This statement must be completed by the installer and be provided to the building inspector at the time of the inspection.

TO:

Issued by: (name of installer)

Abbott Gas & Heating Ltd

In respect of building consent number: At: (project address)

52 Riverstone Drive, Rolleston

In relation to the installation of a:

solid fuel heater
 liquid fuel heater
 free-standing
 in-built
 insert

Make:

Noodsman

Model:

Flare Legs

Serial No:

3418

	[Select as appropriate]	Yes	No	N/A
The existing chimney has been cleaned and inspected for soundness prior to installation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
The fireplace surround / chimney face junction is sealed up with heat resistance material.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
The flue pipe is constructed of austenitic stainless steel.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seismic restraint has been fitted.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The flue sections are secured together with stainless steel rivets.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The flue is secured to the appliance.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flue/enclosure has been vented.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flue and appliance clearances have been achieved in terms of the manufacturer's installation instructions and AS/NZS 2918.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The flue height meets the minimum specified in the manufacturer's instructions and Environment Canterbury (ECAN) rules.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flue flashing has been installed as specified in the manufacturer's installation instructions.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The roofing underlay has been installed/repared around flue penetration.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smoke detectors (with hush facility) as detailed on the building consent documents are installed.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connection or re-connection of wetback undertaken by Certifying Plumber, and details of this provided on form B-011 (Application for a code compliance certificate).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Note: It is an offence under the Plumbers, Drainlayers and Gasfitters Act 2006 for unlicensed and unqualified persons to undertake this work.

<i>[Select as appropriate]</i>	Yes	No	N/A
For NEW wetback connections, anti-scald device installed and copy of B-084 (Construction Statement – Pipework Testing) attached, completed and signed by the Certifying Plumber.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Liquid Fuel only: The appliance has been installed and commissioned in accordance with the manufacturer's installation and operating instructions, a copy of commissioning certificate is attached.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
The liquid fuel storage tank and feed system has been installed in accordance with AS1691, or equivalent, and with the requirements of the Council's Environmental Health Officer.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
The fuel storage tank has secondary containment (100% if roofed, 120% if unroofed) in accordance with the proposed City Plan. <i>Note: Audit monitoring will be carried out.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If response to any of the items is no, please comment:

I George Abbott (*print name*) certify that the above specified installation has been carried out as described and in accordance with the manufacturer's installation instructions and the current approved building code requirements.

Installer's Signature:



Date:

16.3.18

Registration No:

3039

I also understand that the plumber in accepting this construction statement, may be relying on it to issue the code compliance certificate at the completion of the building work.

Form 6A

Memorandum from licensed building practitioner: Record of building work

Section 88, Building Act 2004

Please fill in the form as fully and correctly as possible.
If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING	
Street address:	56 Riverstone Drive
Suburb:	Rolleston
Town/City:	Christchurch
Postcode:	7614

THE PROJECT	
Building consent number:	171688

THE OWNER(S)	
Name(s):	Regan & Lucy Harvey
Mailing address:	56 Riverstone Drive Rolleston
Suburb:	Rolleston
PO Box/Private Bag:	
Town/City:	Christchurch
Postcode:	7614
Phone number:	027 213 7628
Email address:	regan.harvey@moveologistics.co.nz

RECORD OF WORK THAT IS RESTRICTED BUILDING WORK

PRIMARY STRUCTURE

Work that is restricted building work	Description of restricted building work	Carried out or supervised
Tick <input checked="" type="checkbox"/>	If necessary, describe the restricted building work.	Tick <input checked="" type="checkbox"/> whether you carried out the restricted building work or supervised someone else carrying out the restricted building work.
Foundations and subfloor framing	<input checked="" type="checkbox"/> Dig out, Box for foundation to floor, place steel reinforcing.	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Walls	<input checked="" type="checkbox"/> Erect timber framing & fit fixings	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Roof	<input type="checkbox"/>	<input type="checkbox"/> Carried out <input checked="" type="checkbox"/> Supervised
Columns and beams	<input checked="" type="checkbox"/> Fitted beam as per plan	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Bracing	<input checked="" type="checkbox"/> Ply & gib bracing systems installed.	<input checked="" type="checkbox"/> Carried out <input type="checkbox"/> Supervised
Other	<input type="checkbox"/>	<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised

EXTERNAL MOISTURE MANAGEMENT SYSTEMS		
Work that is restricted building work	Description of restricted building work	Carried out or supervised
Tick <input checked="" type="checkbox"/>	If necessary, describe the restricted building work.	Tick <input checked="" type="checkbox"/> whether you carried out the restricted building work or supervised someone else carrying out the restricted building work.
Damp proofing <input checked="" type="checkbox"/>	Building wrap & Brick repate mole seal	<input checked="" type="radio"/> Carried out <input type="radio"/> Supervised
Roof cladding or roof cladding system <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised
Ventilation system (for example, subfloor or cavity) <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised
Wall cladding or wall cladding system <input checked="" type="checkbox"/>	Shade clad fitted on a cavity system with cover butters. @ 600 p.	<input checked="" type="radio"/> Carried out <input type="radio"/> Supervised
Waterproofing <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised
Other <input type="checkbox"/>		<input type="radio"/> Carried out <input type="radio"/> Supervised

ISSUED BY

Name and contact details of the licensed building practitioner who is licensed to carry out or supervise restricted building work.

Name: Hamish Ferguson

LBP number: BP 107177

Class(es) licensed in:

Carpentry

Plumbers, Gasfitters and Drainlayers registration number (if applicable):

Mailing address (if different from below):

Street address/Registered office:

12 Erica street

Suburb:

Poparui

Town/City:

Christchurch

PO Box/Private Bag

Postcode:

8053

Phone number:

Mobile:

021 837 488

After hours:

Fax:

Email address:

hamish@buildercraft.nz

Website:

DECLARATION

I Hamish Ferguson carried out or supervised the restricted building work recorded on this form.

Signature:

Ferguson

Date:

12.4.18



Consenting & Compliance Group

Construction Statement – solid/liquid fuel heater

This statement must be completed by the installer and be provided to the building inspector at the time of the inspection.

TO:

Issued by: (name of installer)

Abbott Gas & Heating Ltd

In respect of building consent number: At: (project address)

52 Riverstone Drive, Rolleston

In relation to the installation of a:

solid fuel heater
 liquid fuel heater
 free-standing
 in-built
 insert

Make:

Noodsman

Model:

Flare Legs

Serial No:

3418

	[Select as appropriate]	Yes	No	N/A
The existing chimney has been cleaned and inspected for soundness prior to installation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
The fireplace surround / chimney face junction is sealed up with heat resistance material.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
The flue pipe is constructed of austenitic stainless steel.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Seismic restraint has been fitted.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The flue sections are secured together with stainless steel rivets.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The flue is secured to the appliance.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flue/enclosure has been vented.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flue and appliance clearances have been achieved in terms of the manufacturer's installation instructions and AS/NZS 2918.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The flue height meets the minimum specified in the manufacturer's instructions and Environment Canterbury (ECAN) rules.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flue flashing has been installed as specified in the manufacturer's installation instructions.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The roofing underlay has been installed/repared around flue penetration.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Smoke detectors (with hush facility) as detailed on the building consent documents are installed.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Connection or re-connection of wetback undertaken by Certifying Plumber, and details of this provided on form B-011 (Application for a code compliance certificate).	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Note: It is an offence under the Plumbers, Drainlayers and Gasfitters Act 2006 for unlicensed and unqualified persons to undertake this work.

<i>[Select as appropriate]</i>	Yes	No	N/A
For NEW wetback connections, anti-scald device installed and copy of B-084 (Construction Statement – Pipework Testing) attached, completed and signed by the Certifying Plumber.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Liquid Fuel only: The appliance has been installed and commissioned in accordance with the manufacturer's installation and operating instructions, a copy of commissioning certificate is attached.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
The liquid fuel storage tank and feed system has been installed in accordance with AS1691, or equivalent, and with the requirements of the Council's Environmental Health Officer.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
The fuel storage tank has secondary containment (100% if roofed, 120% if unroofed) in accordance with the proposed City Plan. <i>Note: Audit monitoring will be carried out.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If response to any of the items is no, please comment:

I George Abbott (*print name*) certify that the above specified installation has been carried out as described and in accordance with the manufacturer's installation instructions and the current approved building code requirements.

Installer's Signature:



Date:

16.3.18

Registration No:

3039

I also understand that the plumber in accepting this construction statement, may be relying on it to issue the code compliance certificate at the completion of the building work.



22 NOV 2017
Correspondence from : AUCKLAND
40 Neales Road, East Tamaki 2013
PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

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

MiTek 20/20 Engineering 4.7.105.0

DC-171688

www.mitek.nz.co.nz

Printed: 08:23:25 12 Oct 2017

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

ISSUED BY: MiTek New Zealand Limited
TO: PlaceMakers - Frame & Truss
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 **T132282** 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: Thursday, 12 October 2017

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

Job: T132282

Client: PlaceMakers Riccarton
Phone:Site: Buildcraft Construction
Harvet House
Lot 18 Riverstone Drive
RollestonDescription: Buildcraft Construction
Building Consent No.:
MTR-1226-Exempt-17-3993Phone:
Printed: 09/25/25 12 Oct 2017**MITEK FABRICATOR DESIGN STATEMENT**

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

MiTek 20/20[®] TRUSS DESIGN DATA

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

Job Details

Importance Level : 2

Design Working Life : 50 years

Roof Truss

Timber Group: CTF Pine

Pitch: 5.000 deg

Nominal Overhang: 600 mm

Roof**Ceiling****Wind**

Material: Galv Iron .5mm

Material: Gib Board 13mm

Area: High (44.0 m/s)

Dead Load: 0.210 kPa

Dead Load: 0.200 kPa

Pressure Coeff: Cpe = varies; Cpi = -0.30, 0.20

Restraints: 900 mm centres

Restraints: 600 mm centres

Snow

Live Load: Qur = 0.250 kPa

Live Load: Qc = 1.400 kN

Location: Christchurch (N4) at 100 m

Open Ground Load: 0.900 kPa

Basic Roof Load: 0.630 kPa

Qc = 1.100 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, ~~xxx~~ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required
GB = gable brace required, CF = Chemical Free Treatment


Roof Truss

Treatment: Top Chords - H1.2		Bottom Chords - H1.2		Webs - H1.2		Qty	Span (mm)	Pitch (deg)	Spacing (mm)
Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss				
ET01	1	7850	5.000	900	T03	4	3090	5.000	900
ET02	1	6390	5.000	900	T03A	5	3090	5.000	900
ET03	1	960	5.000	900	T04	4	6300	5.000	900
PTG01	1D	4800	0.000	900	T05	8	6390	5.000	900
T01	3	7470	5.000	900					
T01A	1	7470	5.000	900					
T01B	1	7470	5.000	900					
T02	3	8050	5.000	900					

Roof Truss quantity : 33

Total quantity : 33

The computer design input has been carried out by:

Signed: 

Date: ...Thursday, 12 October 2017....

Name of Detailer: Malcolm Hart

Qualifications and Title: Detailer

On behalf of:

PlaceMakers - Frame & Truss



Asbuilt Layout

Roof Pitch	5.000
Roof Material	Galv Iron .5mm
TC Restraints	900
Overhang	600
Wind Zone	High
Roof Snow	0.630
BC Restraints	600
Ceiling Material	Gib Board 13mm

Trusses And Rafters At 900 Centres Unless Stated Otherwise

Fixings

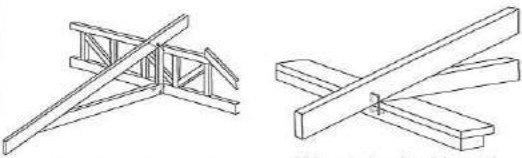
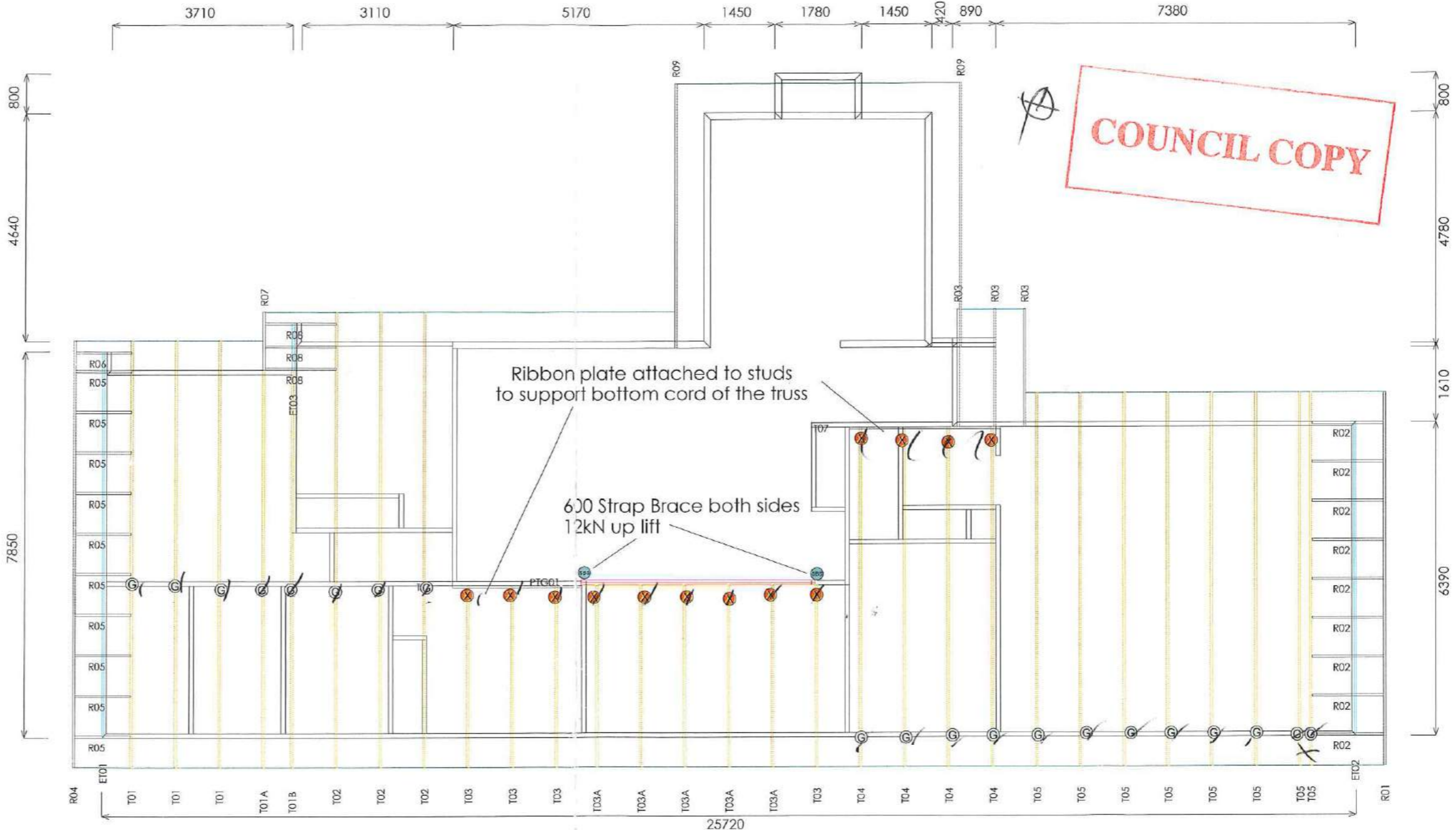
- = CT200 (LH & RH) Pair
- = 9kN TTP
- = 16kN TTP
- = 47x90 JH
- = 47x120 JH
- = 47x190 JH
- = 95x165 JH
- = Multigrips
- = SBS400
- = Split Hanger SP180
- = Nail On Plate

Wiredogs Fixing Per Drawing/Note Below

Please contact PlaceMakers Frame & Truss Manufacturing if any on site remedial work is required. There will be no compensation for work done without PlaceMakers Frame & Truss Manufacturing written authority.

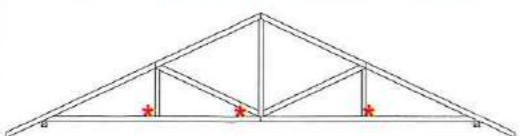
Job No.	T132282
Job Name	Buildcraft Construction
Address	Harvet House Lot 18 Riverstone Drive Rolleston
Consent #	

Drawn	Kye Fothergill
Date	7 Oct, 2017
Main Ph	03-359-9560
Cell Ph	027-7045894
Email	mark.strawbridge@placemakers.co.nz



All Jack truss to truss fixings not indicated on the layout are to be fixed with a pair of 90mm nails.
All truss to top plate fixings not indicated on the layout are to be fixed with 2/100 x 3.75 skewed nail + 2 wire dogs.

Note: Where Internal Load-Bearing Walls are shown on layout Fixings required to all Trusses.



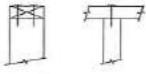
Trusses need bottom chord Restraints at 1800 Centres if Rondo Metal Battren Clip System used [Not Directly Fixed]

Stud to top plate

For alternative fixing see the "Mitek Onsite Guide 2012"

FIXING TYPE A 0.7kN

2/90x3.15 plain steel wire nails driven vertically into stud.

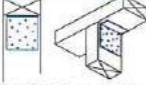


FIXING TYPE B 4.7kN

Single top plate
2/90x3.15 plain steel wire nails driven vertically into stud plus LUMBERLOK Stud Strap

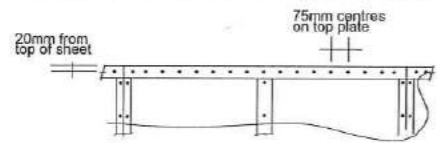
FIXING TYPE B - 4.7kN Option for Internal Walls

2/90x3.15 plain steel wire nails driven vertically into stud plus 6kN Stud Anchor (CPC80)

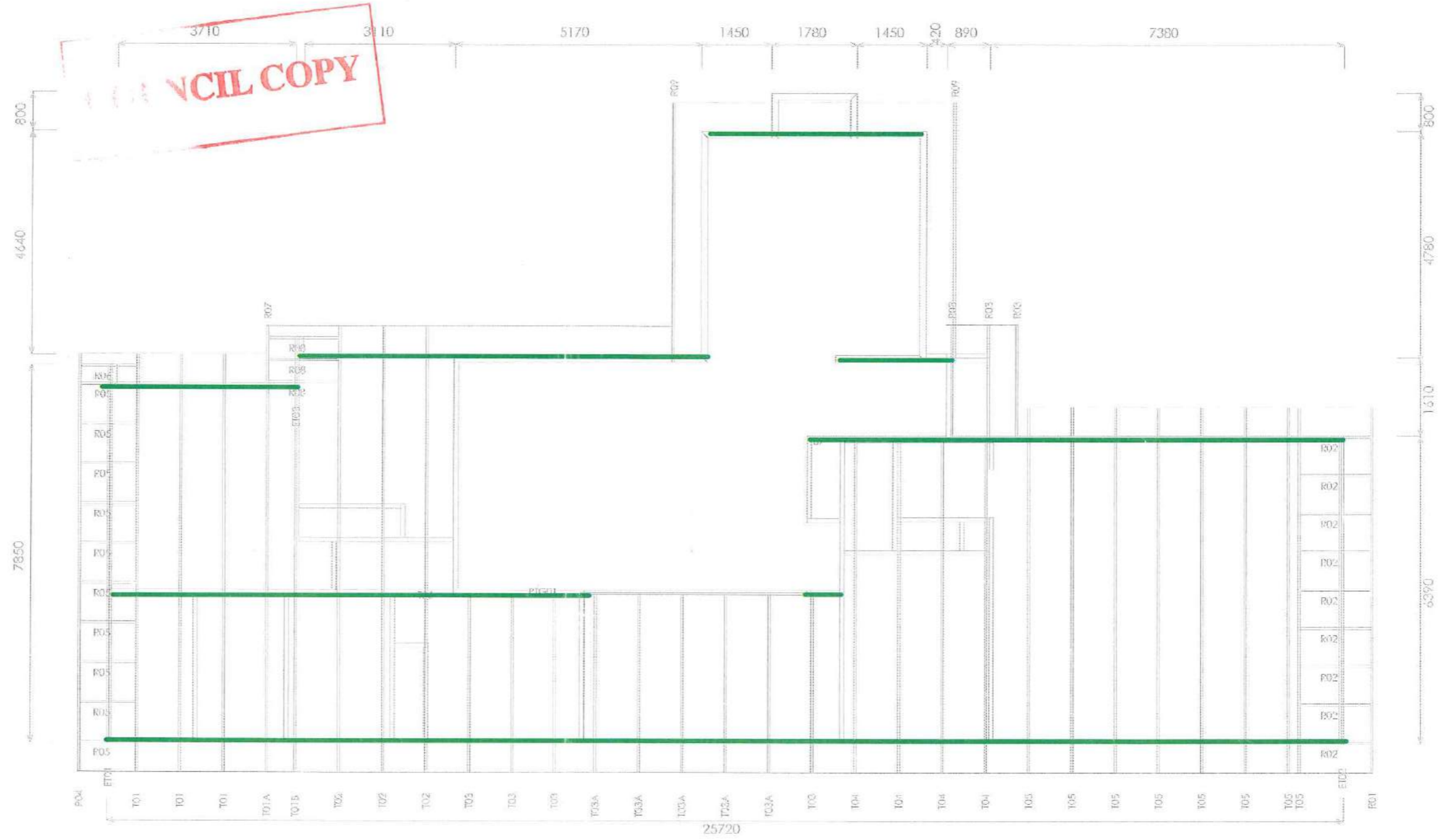


Rigid Air Barriers

If Ecoply Barrier or James Hardies RAB Board or HomeRAB is used on all external walls, the nailing pattern below eliminates the need for any other stud to top plate fixing on those walls. Lintel fixings and loadbearing internal wall fixings will still be required.



See Ecoply Rigid Air Barrier Installation Manual OR James Hardies Rigid Air Barrier Installation Manual for nail selection and nailing pattern on rest of sheet.



Site Address :
Buildcraft Construction
Harvet House
Lot 18 Riverstone Drive
Rolleston

Sheet Title :
**For Building
Stud To Top Plate Fixing**

Date : 7 Oct, 2017
Scale : 1: 150

Drawn : Kye Fothergill
System : MiTek 20/20

Job Details:
Roof Pitch : 5.00deg
Roof Material : Galv Iron .5mm
Ceiling Material : Gib Board 13mm
Wind Zone : High
Roof Snow Load : 0.630kPa

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



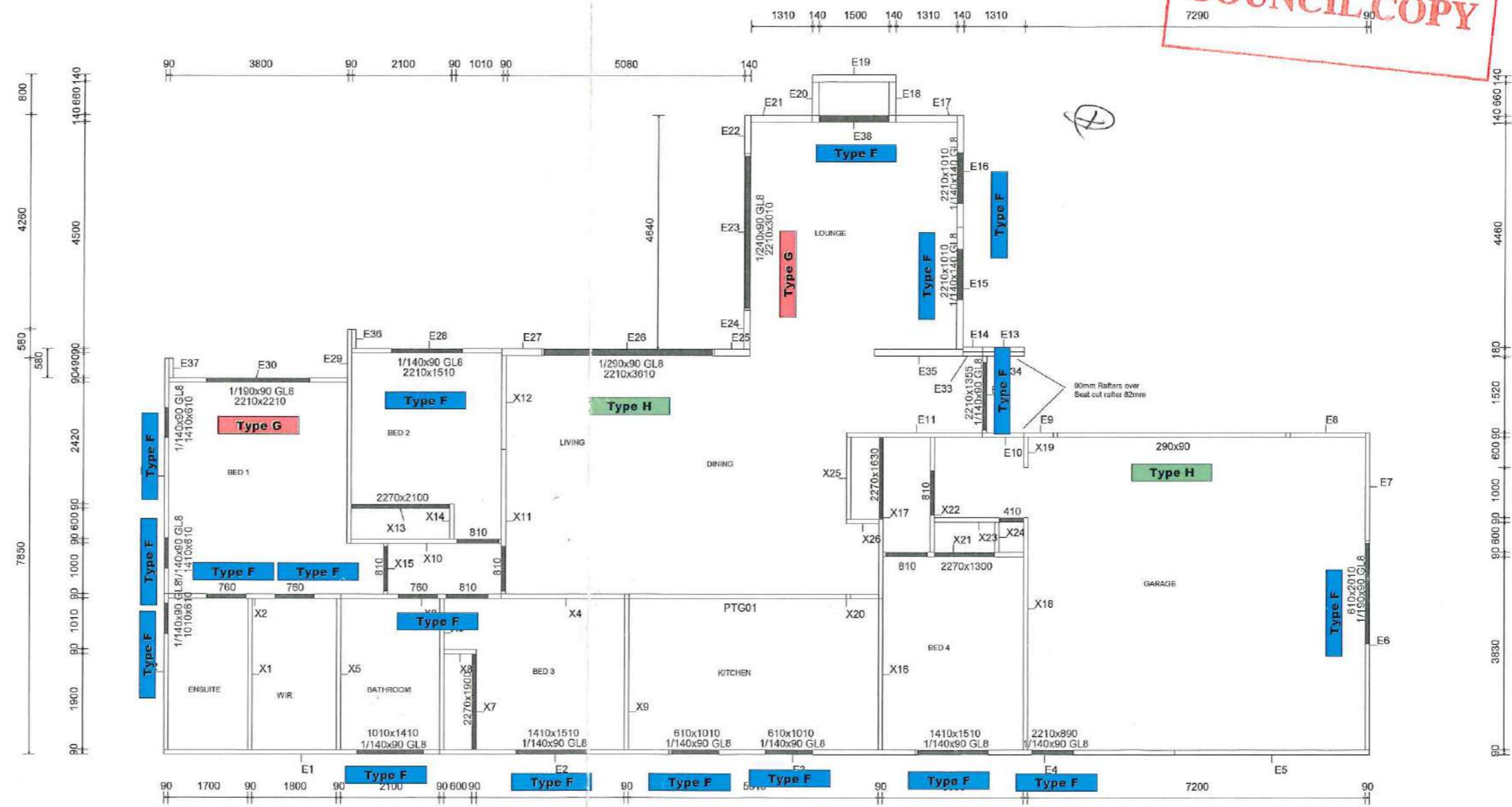
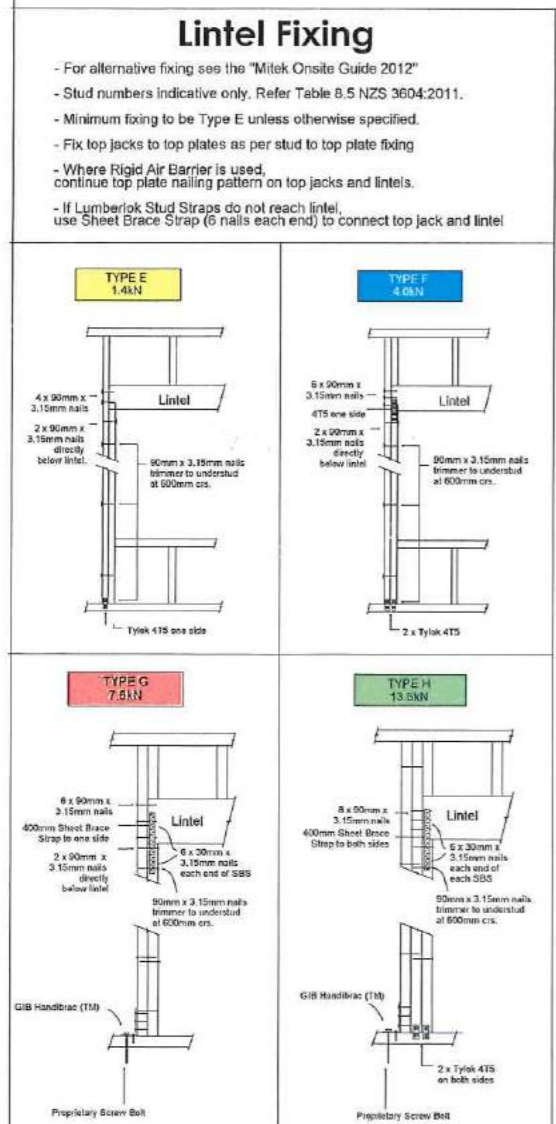
PrimeCad v4.7.105

Job Title :
F132282
Sheet :
3
Revision Number :

Plates are skewed nailed to studs as per NZS 3604:2011.
 All lintels not shown on plans have been sized from Mitek Ganglam Lintels, Beams, Joists & Rafters, Mitek Fitch Beams or CHH Design IT Software.
 PlaceMakers Frame & Truss provide this information as their recommendations only.
 The recommended fixing systems in this wall framing layout may need additional fixings to comply with the building code NZS3604:2011.
 All building contractors or their subcontractors are responsible for ensuring in particular areas "that appropriate additional fixings are fitted on site, where required, to ensure compliance" with the building code.
 All building contractors or their subcontractors are responsible for checking frames are correct before the manufacture or installation of complementary building products

These plans are provided solely to enable the builder to erect the pre-nail on site. They are not intended for any other purpose and PlaceMakers will not accept any liability arising from any other use of these plans.
PLEASE CONTACT PLACEMAKERS FRAME & TRUSS IF ANY ON SITE REMEDIAL WORK IS REQUIRED.
THERE WILL BE NO COMPENSATION FOR WORK DONE WITHOUT PLACEMAKERS FRAME & TRUSS WRITTEN AUTHORITY.
ALL WALLS WITH DOUBLE TOP PLATE DO NOT HAVE CEILING PLATE

COUNCIL COPY



Site Address :
Buildcraft Construction
Harvet House
Lot 18 Riverstone Drive
Rolleston

Sheet Title :
For Building
Lintel Fixing
 Date : 7 Oct, 2017 Drawn : Kye Fothergill
 Scale : 1: 150 System : MiTek 20/20

Job Details:
 Roof Pitch : 5.00deg
 Roof Material : Galv Iron .5mm
 Ceiling Material : Gib Board 13mm
 Wind Zone : High
 Roof Snow Load : 0.630kPa

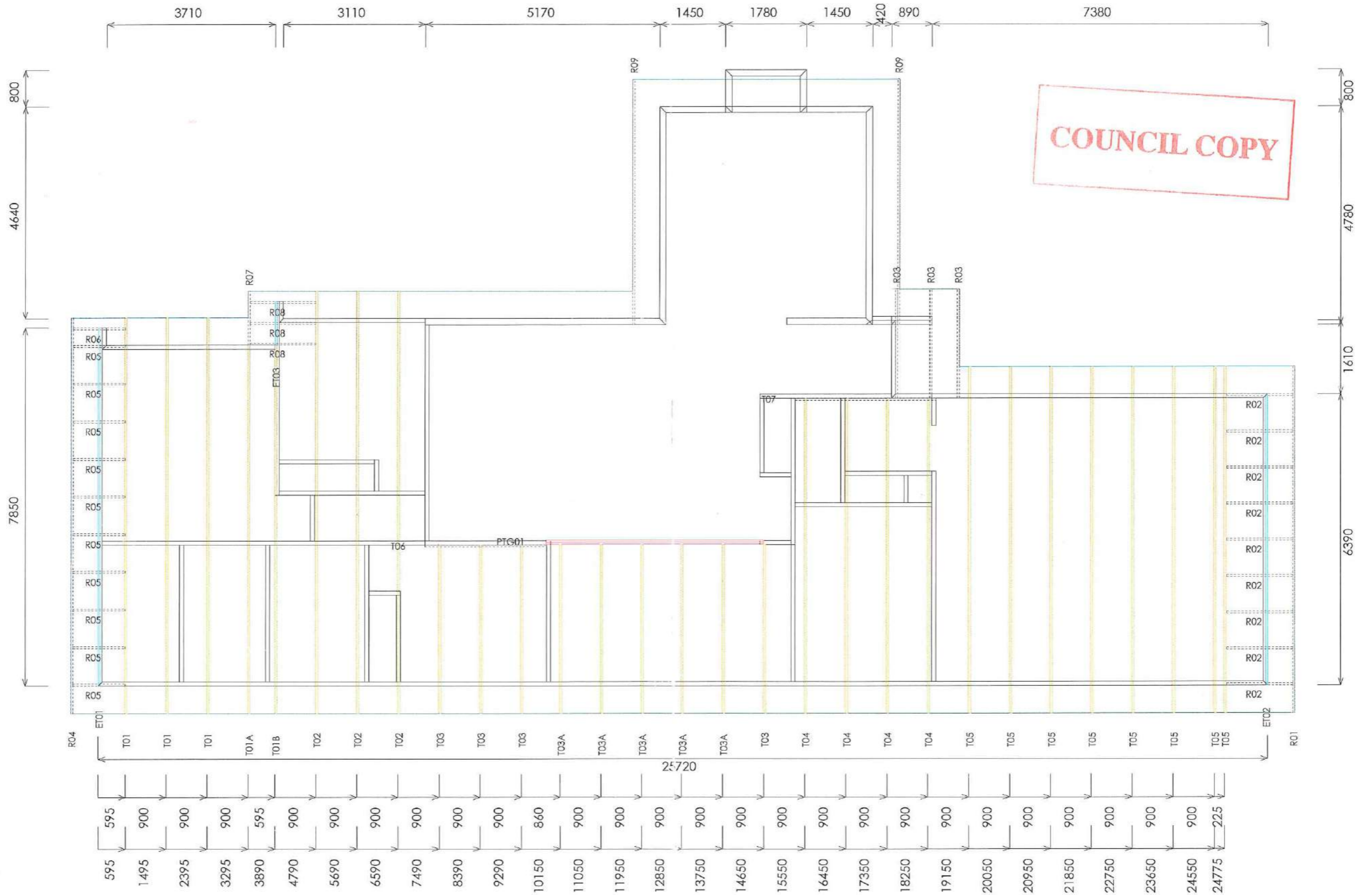
Truss Centres : 900mm
 Roof Live Load : 0.250kPa
 Floor Live Load :
 Wind Speed : 44m/s
 Overhang : 600mm

PrimeCad v4.7.105

Job Title :
F132282

Sheet :
2

Revision Number :



COUNCIL COPY

Site Address :
Buildcraft Construction
Harvet House
Lot 18 Riverstone Drive
Rolleston

Sheet Title :
For Building
Truss Layout

Date : 7 Oct, 2017 Drawn : Kye Fothergill
 Scale : 1:150 System : MiTek 20/20

Job Details:
 Roof Pitch : 5.00deg
 Roof Material : Galv Iron .5mm
 Ceiling Material : Gib Board 13mm
 Wind Zone : High
 Roof Snow Load : 0.630kPa

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



Job Title :
T132282
 Sheet :
1
 Revision Number :

PrimeCad v4.7.105



Compliance and Electrical Safety Certificate

This form has been approved by the Electrical Workers Registration Board



Unique ID: **Nº 1846**

This form has been designed to be used by licensed electrical workers to certify low voltage installations or part installations that comply with Part 2 of AS/NZS 3000 and are safe to be connected to a 230/400 volt multiple earth neutral (MEN) system of electrical supply.

(1) Location of installation

Address: 56 Kiverstone Kelleston

(2) Customer Information

Name: Harvey

Postal Address: _____

Phone and Email: _____

(3) Electrical Worker Information

Name: Ruchell de Gouw Registration/Practising Licence Number: E19074

Organisation: Ace Heat Pumps Limited Telephone Number: 027 444 5180

Email: ru@aceheatpumps.co.nz

Name of person(s) being supervised: _____

(4) Work Details

The work is (circle): **additions** | alterations | **new work**

The prescribed electrical work is: High Risk General Low Risk The homeowner has undertaken part of the electrical installation work.

Indicate the number of each item installed or altered:

Number of lighting outlets: _____

Number of socket outlets: _____

Number of ranges: _____

Number of water heaters: _____

Other Work? Heat Pumps x2

Tick (✓) if work includes:

Mains

MEN switchboard closest to point of supply

Main Earthing System

Electric Lines

(5) Certification of Work

I certify that the completed prescribed electrical work to which this certificate applies, has been done lawfully and safely and the information in the certificate is correct in that the installation, or part of the installation:

- has been installed in accordance with a certified design
- has an earthing system that is correctly rated
- contains fittings which are safe to connect to a power supply
- relies on supplier's Declaration of Conformity (attach or reference¹)
- relies on manufacturer's instructions (attach or reference¹)
- has been satisfactorily tested in accordance with Electricity (Safety) Regulations 2010
- is safe to connect

Test Results:		
	Electrical Worker	Inspector
Polarity (independent earth):		
Insulation resistance:		
Earth continuity:		
Bonding:		
Other (specify):		

Electronic reference: _____

Electrical Worker's Signature: Ruchell de Gouw Date: 11-4-2018

1. If it is impractical to attach a copy of a particular manufacturer's instructions, or of any certified design or supplier declarations of conformity, provide a reference to where the documents can be found, in a readily accessible format, through electronic means.

(6) Electrical Safety Certificate

I certify that the installation, or part of the installation, to which the Electrical Safety Certificate applies is connected to a power supply and is safe to use

Name: Ruchell de Gouw Registration/Practising Licence Number: E19074

Signature: Ruchell de Gouw Date: 11-4-2018
(if certifier is different from electrical worker)

CUSTOMER COPY - THIS IS AN IMPORTANT DOCUMENT AND SHOULD BE RETAINED

Consenting & Compliance Group

Construction Statement – pipework testing

Send this Statement to:

Inspections Team, Consenting & Compliance Group, Christchurch City Council, PO Box 73013, Christchurch 8154, or fax (03) 941 5033, or email to: codecomplianceauditor@ccc.govt.nz.

TO: Christchurch City Council Building Consent Authority

Issued by: *(name of certifying plumber, holding a current licence)*

Jacob Diftort

In respect of Building Consent Number: At: *(project address)*

BC171688

Made by: *(building consent applicant)*

Buildcraft Ltd

In relation to: *(description of work)*

18 Riverstone Drive

I have been engaged to undertake the plumbing work on the above approved building consent. I hereby certify that the work complies with the building consent and the NZ Building Code, and I have undertaken a pressure test for water tightness in accordance with:

<input checked="" type="checkbox"/>	NZBC G12/AS1 7.5.1 (a),(b): By pressurising the pipework to 1500 kpa for a period of not less than 15 minutes for the hot and cold water supply and checking to see that there are no leaks; or
<input type="checkbox"/>	NZBC G12/AS1 7.5.2, NZS 7643 section 9: By pressurising the upvc. pipework to 1.5 times the maximum working pressure for a period of not less than 15 minutes and checking that there are no leaks; or
<input type="checkbox"/>	NZBC G12 VM1, AS/NZS 3500.1:2003: By pressurising the pipework to 1500 kpa for a period of not less than 30 minutes and checking to see that there are no leaks; or
<input type="checkbox"/>	By working pressure (only acceptable for solid/liquid fuel heater wet back connections and solar hot water systems pipework) for a period of not less than 15 minutes and checking that there are no leaks.

For sanitary fixtures used for personal hygiene, I confirm that the anti-scald device has been set so as to not exceed:

<input type="checkbox"/>	45°C for early childhood centres, schools, old people’s homes, institutions for people with psychiatric or physical disabilities, hospitals. (G12/AS1 6.14.1(a)); or
<input checked="" type="checkbox"/>	55°C for all other <i>buildings</i> . (G12/AS1 6.14.1(b))

For hot water supply systems, I confirm the required measures to prevent the growth of Legionella bacteria:

<input checked="" type="checkbox"/>	Hot water supply system has been tested and set in accordance with G12/AS1 6.14.3; or
-------------------------------------	--

<input type="checkbox"/>	Ancillary heating system (solar/heat pump) have been installed and tested in accordance with G12/AS2 3.5.1 ((a), (b) or (c)); or
<input type="checkbox"/>	Chlorine disinfection, UV sterilization or high temperature system as consented to circulating systems.

And I believe on reasonable grounds that the pipework has passed that test.

<input checked="" type="checkbox"/>	All work complies with the NZBC
<input checked="" type="checkbox"/>	Building is connected to a site specific allocated water meter
<input type="checkbox"/>	Water meter serial number is:

Certifying Plumber's Details

Name:

Jacob Diftort

Registration number:

26587

Qualifications:

Certificate in Plumbing

Address:

69 searells road, strewn, chch

Phone numbers:

<i>work</i>	<i>mobile</i>	<i>home</i>	<i>fax</i>
0210558606			

Email:

mainlandpd@gmail.com
--

I hereby state that the work prescribed in this consent application has been carried out by me or my employee and that the employee holds:

(select one)

<input checked="" type="checkbox"/>	A current licence under part 2, subpart 1 of the Plumbers Gasfitters and Drainlayers Act 2006; or
<input type="checkbox"/>	Is an exempt trainee under Section 13 of the Plumbers Gasfitters and Drainlayers Act 2006 and the work done by that trainee is carried out in accordance with a limited certificate issued by the Board to the trainee under section 14 of the Act.

I also understand that the Christchurch City Council in accepting this construction statement may be relying on it to issue the code compliance certificate at the completion of the building work.

Signature of Certifying Plumber:

Date:

Jacob Diftort	11/4/2018
---------------	-----------

R J Pugh

RECORD OF INSPECTION (ROI) OF HIGH-RISK PRESCRIBED ELECTRICAL WORK
PURSUANT TO THE ELECTRICITY (SAFETY) REGULATIONS 2010



Record Number: 954

Issuer (Inspector) details:

Name of Inspector: Phillip Holter Registration #: 12899

Email address: inspections@telpower.co.nz Telephone: 03 339 4152

Location of installation:

Location details: 56 Riverstone Drive - Rolleston

Location type: Domestic Non-Domestic Accommodation Industrial Commercial
 Educational Healthcare Miscellaneous (other)

Certifying Electrical Work and Certificate of Compliance (CoC) details:

Name of Electrical worker(s): R. Pugh Registration #: E251308

RJ Pugh Electrical Ltd

CoC details: 40184

CoC(s) attached

Certifying Electrical Work and COC details:

What was inspected:

Mains, Main Earth, MEN Link, Polarity, Rotation, RCD, Solar

Specify the regulation(s) and companion standard(s) or identify the certified design, followed when carrying out the inspection:

ESR2010 and AS/NZ 3000:2007 Part 2
ECP34

What are the results of the inspection:

Line R	999+ MΩ	Load	999+Ω	Loop Test	R	V	Ω	0.1	Ω	2300	Fa
Line W	MΩ	Load	Ω		W	V	Ω		Ω		Fa
Line B	MΩ	Load	Ω		B	V	Ω		Ω		Fa
Line RW	MΩ	Load	Ω	RCD Test		ms	x5		ms		ma
Line RB	MΩ	Load	Ω			ms	x5		ms		ma
Line WB	MΩ	Load	Ω								
Earth Resistance	0.04 Ω										

Polarity Correct ~~Rotation~~ Clockwise / Anticlockwise

High Risk Category:

- Not to AS/NZS 3000 Part 2 – 6A(2)(a)(i) Photovoltaic system – 6A(2)(a)(iv) Electrical medical area – 6A(2)(a)(vi)
- High voltage installation – 6A(2)(a)(ii) Hazardous area – 6A(2)(a)(v) Mains work – 6A(2)(b)
- Mains parallel generation – 6A(2)(a)(iii) Animal stunning or meat conditioning – 6A(2)(c)

Other – please describe:

Declaration

I hereby confirm that the work described above has been done in ~~fact~~ accordance with the regulations; and the ~~installation~~ / part installation on which the work has been done is, and will be / ~~not be~~, when energised, electrically safe.

(Note: Strike out or delete the inapplicable words highlighted in red above.)

Signature: R

Date: 6.3.2018



ELECTRICAL CERTIFICATE OF COMPLIANCE & ELECTRICAL SAFETY CERTIFICATE

REFERENCE/CERTIFICATE ID No.: 954
This form has been designed to be used by licensed electrical workers to certify that installations or Part installations under Part 1 or Part 2 of AS/NZS 3000 are safe to be connected to the specified system of electrical supply.

Location Details:

56 Riverstone Drive Rolleston

Contact Details:
(Name and address)

Name of Electrical worker:

Phillip Holter

Registration/Practising licence number:

12899

Phone & email:

03 339 4150

inspections@telpower.co.nz

Company:

Telpower (2015) Ltd – Inspections Division

Certificate of Compliance

Type of work:

Addition

Alteration

New work

The prescribed electrical work is:

Low risk

General

High-risk (Specify):

Means of compliance:

Part 1 of AS/NZS 3000

Part 2 of AS/NZS 3000

Additional Standards or electrical code of practice were required:

No

Yes (specify):

Date or range of dates that prescribed electrical work undertaken:

Contains fittings that are safe to connect to a power supply?

Yes

No

Specify type of supply system:

M.E.N.

The installation has an earthing system that is correctly rated (where applicable)

Yes

No

Parts of the installation to which this certificate relates that are safe to connect to a power supply?

All

Parts (specify)

Metering

The work relies on manufacturers instructions:

Yes

No

If yes – identify the instruction manual including name, date and version. Also attach a copy of manufacturer's instructions to this certificate. (Or provide reference to readily accessible electronic format, eg Internet link.)

Identify:

Link:

The work has been done in accordance with a certified design:

Yes

No

If yes – identify the certified design including name, date and version. Also attach a copy of the certified design to this certificate. (Or provide reference to readily accessible electronic format, eg Internet link.)

Identify:

Link:

The work relies on a Supplier Declaration of Conformity (SDoC):

Yes

No

If yes - identify the SDoC including name, date and version OR EESS registration. Also attach a copy of the SDoC to this certificate. (Or provide reference to readily accessible electronic format, eg Internet link.)

Identify:

Link:

The installation has been satisfactorily tested in accordance with the Electricity (Safety) Regulations 2010

No

Yes

Description of Work:

Inspect, test and liven the site to MSB, This COC covers the installation of the Revenue Meter only.

with MSB

Test Results (provide values)

Polarity (Independent earth):	
Insulation resistance:	<u>999+ Ohms</u>
Earth Continuity:	<u>0.04 Ohms</u>
Bonding:	<u>0.04 Ohms</u>
Fault Loop impedance:	<u>0.1/23 Ohms</u>
Other (specify):	

By signing this document I certify that the completed prescribed electrical work to which this Certificate of Compliance applies has been done lawfully and safely, and the information in the certificate is correct.

Certifier's signature: [Signature]

Date: 6-3-2018

Electrical Safety Certificate

By signing this document I certify that the installation, or part of the installation, to which this Electrical Safety Certificate applies is connected to a power supply and is safe to use.

Certifier's name: Phillip Holter

Registration/Practising licence number: 12899

Certifier's signature: [Signature]

Certificate Issue Date: 6-3-2018

Connection Date: 6-3-2018

CUSTOMER COPY – THIS IS AN IMPORTANT DOCUMENT AND SHOULD BE RETAINED FOR A MINIMUM OF 7 YEARS

This Electrical Safety Certificate also confirms that the electrical work complies with the building code for the purposes of Section 19(1)(e) of the Building Act 2004.

23 April 2018



R L & L L Harvey
18 Mendip Place
Casebrook
Christchurch 8051

Dear Sir or Madam,

Reference Number: 171688

Project Location: 56 Riverstone Drive, Rolleston

Legal Description: of S/D of Lot 4 DP 378727

Project Description: 4 Bedroom Domestic Dwelling with Attached Garage

IR Number: 10

Inspection Results:

DRAINAGE - 12 Apr 2018 @ 14:00 by Aaron Brown

Inspection Outcome: **PASS** - The BCA is satisfied, on reasonable grounds, that the aspects of building work pertaining to this inspection demonstrate compliance with the building consent.

FINAL - 23 Apr 2018 @ 16:00 by Aaron Brown

Inspection Outcome: **PASS** - The BCA is satisfied, on reasonable grounds, that the aspects of building work pertaining to this inspection demonstrate compliance with the building consent.

FINAL DOCUMENTS - 23 Apr 2018 @ 16:00 by Aaron Brown

Inspection Outcome: **PASS** - The BCA is satisfied, on reasonable grounds, that the aspects of building work pertaining to this inspection demonstrate compliance with the building consent.

Formal Directive: All Documentation received as requested

Site Communication: N/A - revised inspection report

Inspection Summary: Okay to issue CCC

Your next inspection will be: **No further inspection required**

History

Inspection Name	Summary
Prepour	PASS - 27 Oct 2017
Wastepipes (Underslab)	PASS - 19 Oct 2017
Floor Slab	PASS - 27 Oct 2017
Framing / Pre-wrap	PASS - 18 Dec 2017
Post Wrap	PASS - 07 Feb 2018
Half high Brick	PASS - 07 Feb 2018
Preline	PASS - 07 Feb 2018
Drainage	PASS - 12 Apr 2018
Final	PASS - 23 Apr 2018
Final Documents	PASS - 23 Apr 2018

Yours Sincerely,

Aaron Brown
Building Consent Officer
On behalf of: Selwyn District Council

STATEMENT RELATING TO PASSING OVER INFORMATION

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