prolam
Engineered Timber Innovations

19-01
6 March 2019

SN-R10115268

PROLAM SUMMARY

Customer/Project: 19-01
Physical Address: 13 pearl grove

Designer: Plans .co.nz, Plans.co.nz
43 Walding Street, , Palmerston North 4410
E: admin@plans.co.nz P: 06 3592844

VB2

Prolam Verandah Beams

Building Type	House	Roof Weight	Light without Ceiling
Timber	Pine, Machined	Roof Load	0.25 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	Yes		1.10 kN concentrated
Exposed	Yes	Wind Zone	High (44.0 m/s)
Roof Pitch	25 °	Snow Region	No Snow
Eaves	600 mm		
Roof Span	2.30 m		
Lintel Span	3.20 m		

Use Prolam PLVL8H1-200100 190 x 88mm PL8

Capacity Ratio	2.8
Long Term Deflection	< 1.0 mm
Max. Bearing Reaction	3.5 kN
Load Combination	1.2G + 1.5Qpoint
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	3.5 kN Characteristic Load

PRODUCER STATEMENT

TC E Ltd TASMAN CONSULTING ENGINEERS CIVIL & STRUCTURAL

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

David King
ME (civil, MIPENZ CPEng (no 145511) IntPE
For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050
6 March 2019

prolam
Engineered Timber Innovations

19-01
6 March 2019

SN-R10115269

PROLAM SUMMARY

Customer/Project: 19-01
Physical Address: 13 pearl grove
Designer: Plans .co.nz, Plans.co.nz
43 Walding Street, , Palmerston North 4410
E: admin@plans.co.nz P: 06 3592844

VB1

Prolam Verandah Beams

Building Type	House	Roof Weight	Light without Ceiling
Timber	Pine, Machined	Roof Load	0.25 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	Yes		1.10 kN concentrated
Exposed	Yes	Wind Zone	High (44.0 m/s)
Roof Pitch	25 °	Snow Region	No Snow
Eaves	600 mm		
Roof Span	3.30 m		
Lintel Span	3.88 m		

Use Prolam PLVL8H1-250100 240 x 88mm PL8

Capacity Ratio	2.4
Long Term Deflection	< 1.0 mm
Max. Bearing Reaction	4.8 kN
Load Combination	1.2G + W_down
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	5.375 kN Characteristic Load

PRODUCER STATEMENT

TC E Ltd TASMAN CONSULTING ENGINEERS CIVIL & STRUCTURAL

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

David King
ME (civil, MIPENZ CPEng (no 145511) IntPE
For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050
6 March 2019

PAINTING SPECIFICATIONS

IMPORTANT PLEASE READ!

This laminated treated product must be protected from the elements until it is sealed. Timber naturally absorbs moisture from the surrounding environment. This can cause the product to alter dimensionally. Sealing the product with a quality paint system dramatically reduces the incidence of dimensional change and increases longevity.

Recommended procedure:

1. Fill nail holes with an exterior grade woodfiller.
2. Sand back until surface is smooth and completely free from dirt and dust.
3. If painting, prime all surfaces and cut ends and joints with a good quality alkyd primer and allow drying as per paint manufacturer's instructions.
4. Apply two full coats of a premium brand acrylic or enamel topcoat.
5. If staining apply three full coats of a premium stain including cut ends and joints.
6. Product must be recoated every 2 years.

NOTE: Light colours are recommended. As timber moves with environmental changes, resin bleeding, distortion and cracking may occur.

NO WARRANTY APPLIES TO ANY PRODUCT THAT HAS NOT BEEN KEPT DRY, OR HAS NOT BEEN PAINTED AS RECOMMENDED ABOVE.

283 Waiwhero Rd P O Box 413 Motueka New Zealand Phone 03 526 7436 Fax 03 526 7437
Email: info@prowoodnz.com

LUMBERLOK®

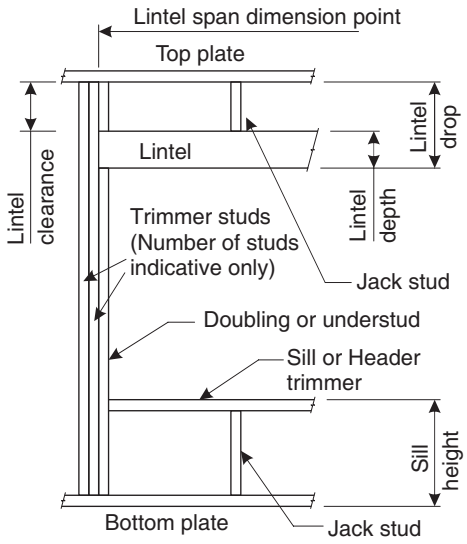
LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

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 m²	G	G	H	G	G	H
11.6 m²	G	H	H	G	G	H
12.1 m²	G	H	H	G	H	H
15.3 m²	H	H	-	G	H	H
19.1 m²	H	-	-	G	H	-
20.9 m²	H	-	-	H	H	-
21.8 m²	H	-	-	H	-	-
34.3 m²	-	-	-	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

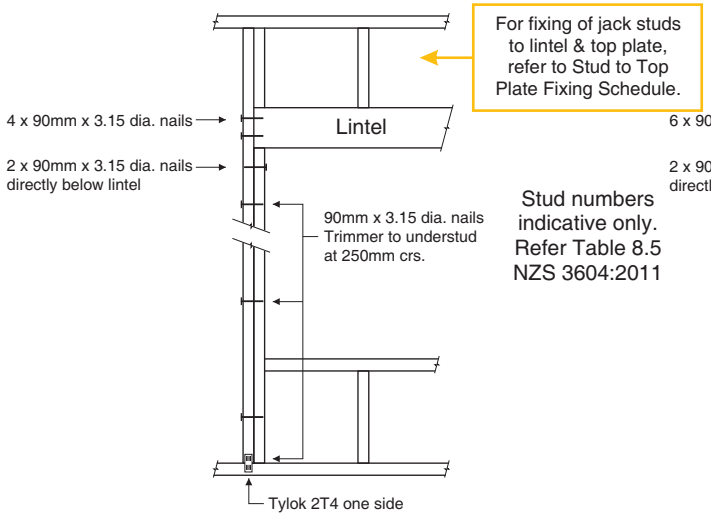
Lintel Span	Loaded Dimension (See Fig. 1.3 NZS 3604:2011)	Light Roof Wind Zone					Heavy Roof Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
0.7	2.0	E	E	E	E	F	E	E	E	E	E
	3.0	E	E	E	F	F	E	E	E	E	F
	4.0	E	E	F	F	F	E	E	E	F	F
	5.0	E	F	F	F	G	E	E	F	F	F
	6.0	E	F	F	G	G	E	E	F	F	G
0.9	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	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	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	-	F	F	G	H	-
	4.0	F	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-

MiTek®

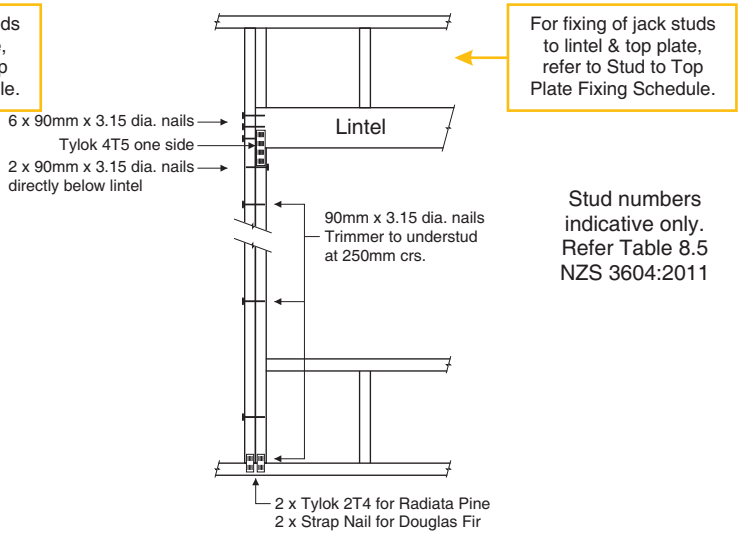
LUMBERLOK®

LINTEL FIXING OPTIONS

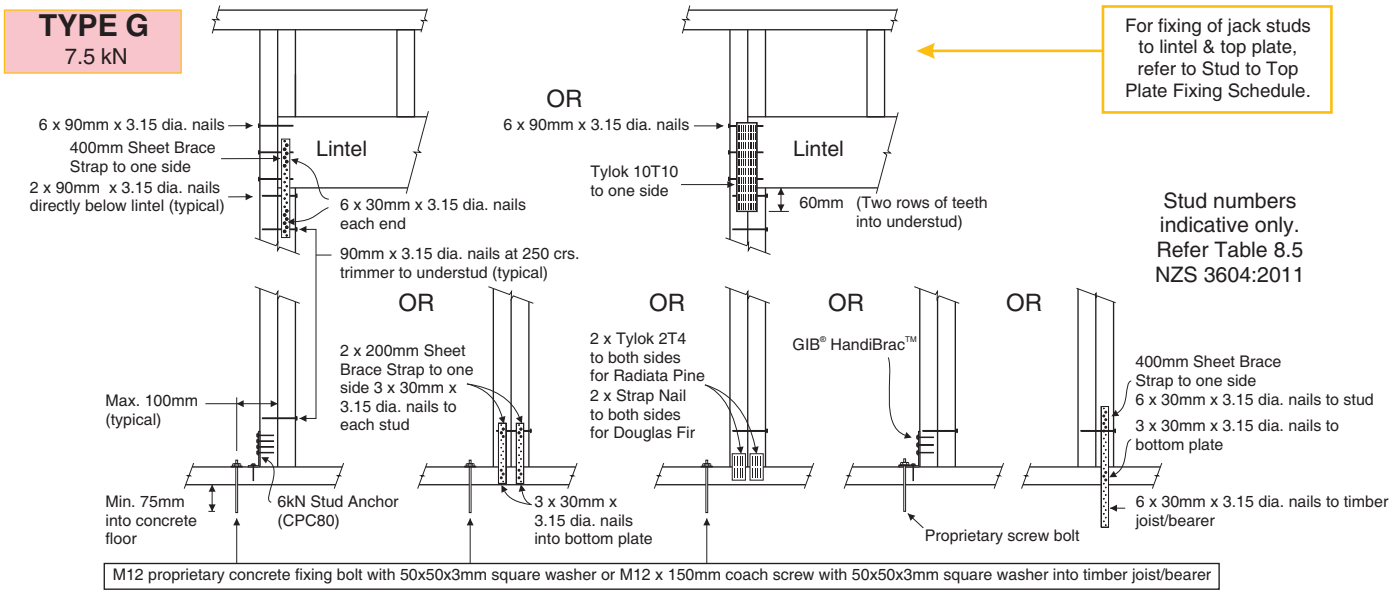
TYPE E
1.4 kN



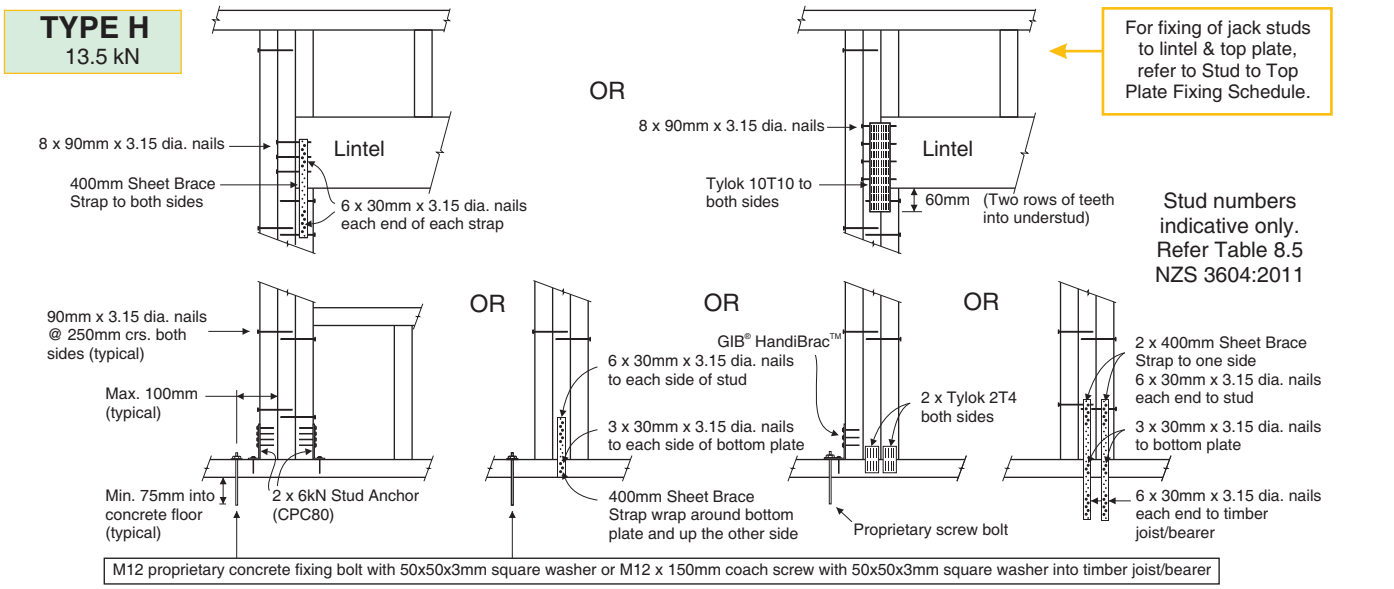
TYPE F
4.0 kN



TYPE G
7.5 kN



TYPE H
13.5 kN



MiTek® GANG-NAIL® LUMBERLOK® BOWMAC®

MiTek New Zealand Limited

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

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

www.miteknz.co.nz

PROLAM® products are manufactured to the requirements of AS/NZS 1328.1:1998 Glue Laminated Structural Timber, and AS/NZS 1491:1996 Finger Jointed Structural Timber under an approved quality system based on the 1S0 9000 series of standards. As such if the product is used in accordance with **PROLAM®** product literature, it will meet the durability clauses of the New Zealand Building Code B2.

Subfloor Applications:

- **PROLAM®** may be used where approved practices for clearance and ventilation are used.

External Use:

- **PROLAM®** is recommended for weather exposed applications if sealed and maintained in accordance with **PROLAM®** literature.

Preservative Treatment:

- **PROLAM®** Beams are CCA H3.2 treated as defined by NZS 3640:2003, for weather exposed applications, such as verandah beams, deck bearers, and subfloor applications.

- **PROLAM®** Posts are CCA H5 treated as defined by NZS 3640:2003 for in-ground and weather exposed applications, such as deck piles, verandah posts and similar applications.

Storage of **PROLAM®:**

- To ensure **PROLAM®** remains straight and true at the time of installation, follow the below recommendations:

1. Store under cover so that it remains dry until installation.
2. Stack clear of the ground for good ventilation.
3. Stack on bearers to keep flat and straight.

Branded **PROLAM®:**

- **PROLAM®** is branded for your protection. Look-alike materials may not perform to the standard of **PROLAM®**. For your protection do not accept unauthorized substitution

MiTek New Zealand Limited

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.miteknz.co.nz

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

ISSUED BY: **MiTek New Zealand Limited**

TO: **Pre-Nail Systems LTD**

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

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **Q94162** 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 Clause B1 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: Tuesday, February 26, 2019**

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

Job: Q94162 Client: GJ Gardner Homes Site: Badenhorst Residence
Phone: 13 pearl Gr
Ashhurst
Description:
Building Consent No.: Phone:
MiTek 20/20 Engineering 4.7.301.0 MiTek New Zealand Limited Printed: 13:33:13 26 Feb 2019

MITEK FABRICATOR DESIGN STATEMENT

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

MiTek 20/20® TRUSS DESIGN DATA

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

Job Details Importance Level : 2 Design Working Life : 50 years

Roof Truss

Timber Group:	PNS MSG8 H1.2	Pitch:	25.000 deg	Nominal Overhang:	590 mm
Roof		**Ceiling**		**Wind**	
Material:	Metal Tiles	Material:	Rondo screwed to BC	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:	400 mm centres	Restraints:	600 mm centres		
Live Load:	Qur = 0.250 kPa Qc = 1.100 kN	Live Load:	Qc = 1.400 kN		

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

MiTek® Truss List

Legend: * = detail only, ? = input only, ~~Txx~~ = 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)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
J01	1	4232	25.000	900	J04C	2	1532	25.000	900	T06B	1	4708	25.000	900
J03	1	3420	25.000	900	J05	1	3332	25.000	900	V01	1	1053	25.000	900
J06A	1	2907	25.000	900	J05A	1	3332	25.000	900	V02	1	453	25.000	900
T01	1	8510	25.000	900	J05B	1	3332	25.000	900	V03	1	1353	25.000	900
T02	1	8510	25.000	900	J05C	1	3332	25.000	900	V04	1	2108	25.000	900
T03	1	6860	25.000	900	J05D	1	3332	25.000	900	*HB01	3	6820	18.249	900
T03A	2	6860	25.000	900	J05E	1	3332	25.000	900	*HB02	1	1210	18.249	900
T04	1	7688	25.000	900	J05F	1	3332	25.000	900	*HB03	1	6219	18.249	900
TG01	1	6860	25.000	900	J05G	1	3332	25.000	900	*HB04	1	1274	18.249	900
TG02	1	7660	25.000	900	J06	1	2907	25.000	900	*HB05	2	5173	18.249	900
TG03	1	6180	25.000	900	J07	1	2007	25.000	900	*R01	2	1235	25.000	900
J01A	1	4232	25.000	900	J07A	1	2007	25.000	900	*R01A	1	1235	25.000	900
J02	1	2432	25.000	900	J08	1	2167	25.000	900	*R02	4	903	25.000	900
J02A	2	2432	25.000	900	J08A	1	2167	25.000	900	*R02A	4	903	25.000	900
J02B	1	2432	25.000	900	J08B	1	2167	25.000	900	*R03	1	1506	25.000	900
J02C	1	2432	25.000	900	J08C	1	2167	25.000	900	*R04	1	1398	25.000	900
J02D	1	2432	25.000	900	J08D	1	2167	25.000	900	*R05	1	970	25.000	900
J02E	1	2432	25.000	900	J09	1	1267	25.000	900	*R05A	1	970	25.000	900
J03A	1	3420	25.000	900	J09A	1	1267	25.000	900	*R05B	1	970	25.000	900
J04	2	1532	25.000	900	T05	4	6180	25.000	900	*R05C	1	970	25.000	900
J04A	1	1532	25.000	900	T06	1	4708	25.000	900					
J04B	1	1532	25.000	900	T06A	1	4708	25.000	900					

Total quantity : 81

The computer design input has been carried out by:

Signed: .....

Date: ...Tuesday, February 26, 2019....

Name of Detailer: .....Austin Brown.....

Qualifications and Title:

On behalf of:

Pre-Nail Systems LTD
21 Coventry Street, LEVIN 5510, ,
Phone: 06 368 9470

Q94162

26 February 2019

SN-R10114533

PROLAM SUMMARY

Customer/Project: Q94162
Physical Address: Badenhorst, 13 Pearl Gr, Ashhurst

Designer: Austin Brown, Detail Direct LTD
PO BOx 10, Southland 9641
E: ddlaustin@xtra.co.nz P: 027 241 8777

Garage

Prolam Lintels Supporting Girder/Setback Trusses

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	High (44.0 m/s)
Roof Pitch	25 °	Snow Region	Region N1
Eaves	600 mm	Altitude	100 m
Position of Girder Truss on Lintel	1.51 m	Ground Snow Load	0.00 kPa
Setback	2.17 m	Roof Snow Load	0.00 kPa
Supported Truss Span	6.18 m		
Lintel Span	4.84 m		

Use Prolam PL17H1-300100 290 x 90mm PL17

Capacity Ratio	2.5
Long Term Deflection	< 1.0 mm
Max. Bearing Reaction	11.8 kN
Load Combination	1.2G + W_down
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	8.875 kN Characteristic Load

PRODUCER STATEMENT

TASMAN CONSULTING ENGINEERS CIVIL & STRUCTURAL

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

David King
ME (civil, MIPENZ CPEng (no 145511) IntPE
For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050
26 February 2019

Q94162

26 February 2019

SN-R10114535

PROLAM SUMMARY

Customer/Project: Q94162
Physical Address: Badenhorst, 13 Pearl Gr, Ashhurst

Designer: Austin Brown, Detail Direct LTD
PO BOx 10, Southland 9641
E: ddlaustin@xtra.co.nz P: 027 241 8777

Master

Prolam Lintels Supporting Girder/Setback Trusses

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	High (44.0 m/s)
Roof Pitch	25 °	Snow Region	Region N1
Eaves	600 mm	Altitude	100 m
Position of Girder Truss on Lintel	0.37 m	Ground Snow Load	0.00 kPa
Setback	3.33 m	Roof Snow Load	0.00 kPa
Supported Truss Span	6.86 m		
Lintel Span	1.80 m		

Use Prolam PL8H1-150100 140 x 90mm PL8

Capacity Ratio	1.3
Long Term Deflection	1.4 mm
Max. Bearing Reaction	8.2 kN
Load Combination	1.2G + W_down
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	7 kN Characteristic Load

PRODUCER STATEMENT

TASMAN CONSULTING ENGINEERS CIVIL & STRUCTURAL

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

David King
ME (civil, MIPENZ CPEng (no 145511) IntPE
For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050
26 February 2019

LUMBERLOK®

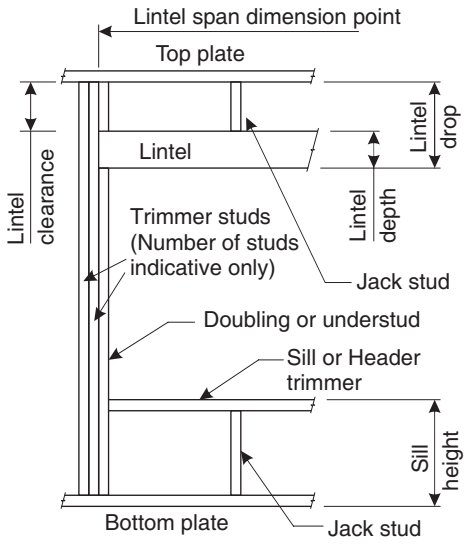
LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

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 Wind Zone			Heavy Roof Wind Zone		
	L, M, H	VH	EH	L, M, H	VH	EH
8.6 m²	G	G	H	G	G	H
11.6 m²	G	H	H	G	G	H
12.1 m²	G	H	H	G	H	H
15.3 m²	H	H	-	G	H	H
19.1 m²	H	-	-	G	H	-
20.9 m²	H	-	-	H	H	-
21.8 m²	H	-	-	H	-	-
34.3 m²	-	-	-	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

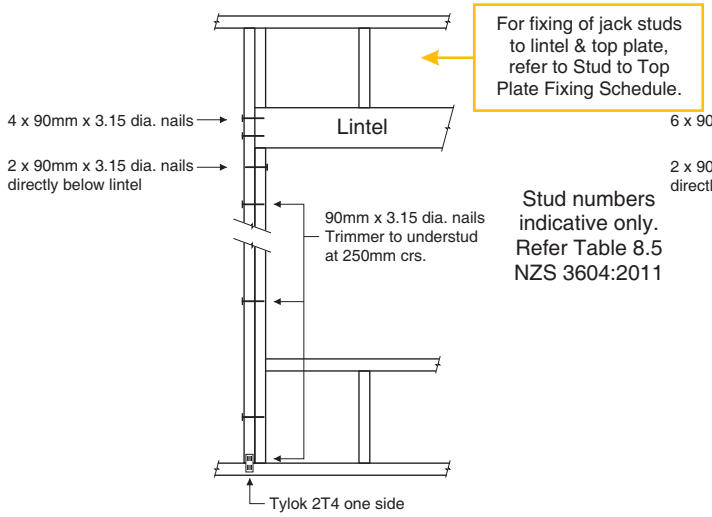
Lintel Span	Loaded Dimension (See Fig. 1.3 NZS 3604:2011)	Light Roof Wind Zone					Heavy Roof Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
0.7	2.0	E	E	E	E	F	E	E	E	E	E
	3.0	E	E	E	F	F	E	E	E	E	F
	4.0	E	E	F	F	F	E	E	E	F	F
	5.0	E	F	F	F	G	E	E	F	F	F
	6.0	E	F	F	G	G	E	E	F	F	G
0.9	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	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	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	-	F	F	G	H	-
	4.0	F	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-

MiTek®

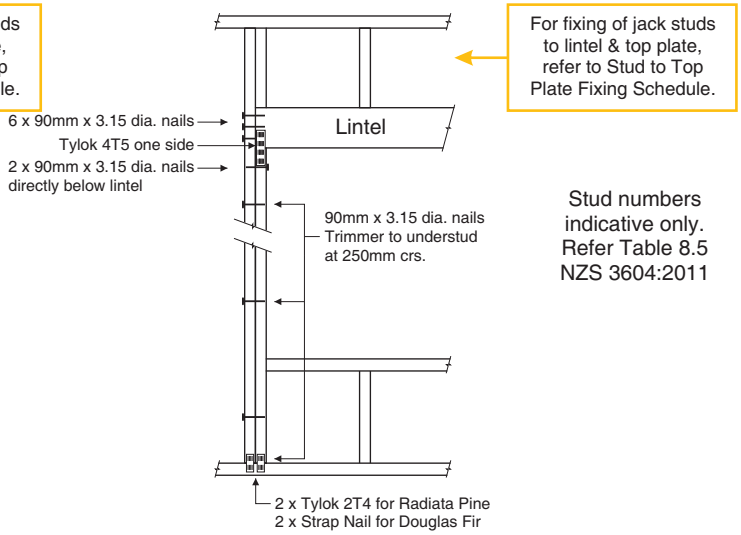
LUMBERLOK®

LINTEL FIXING OPTIONS

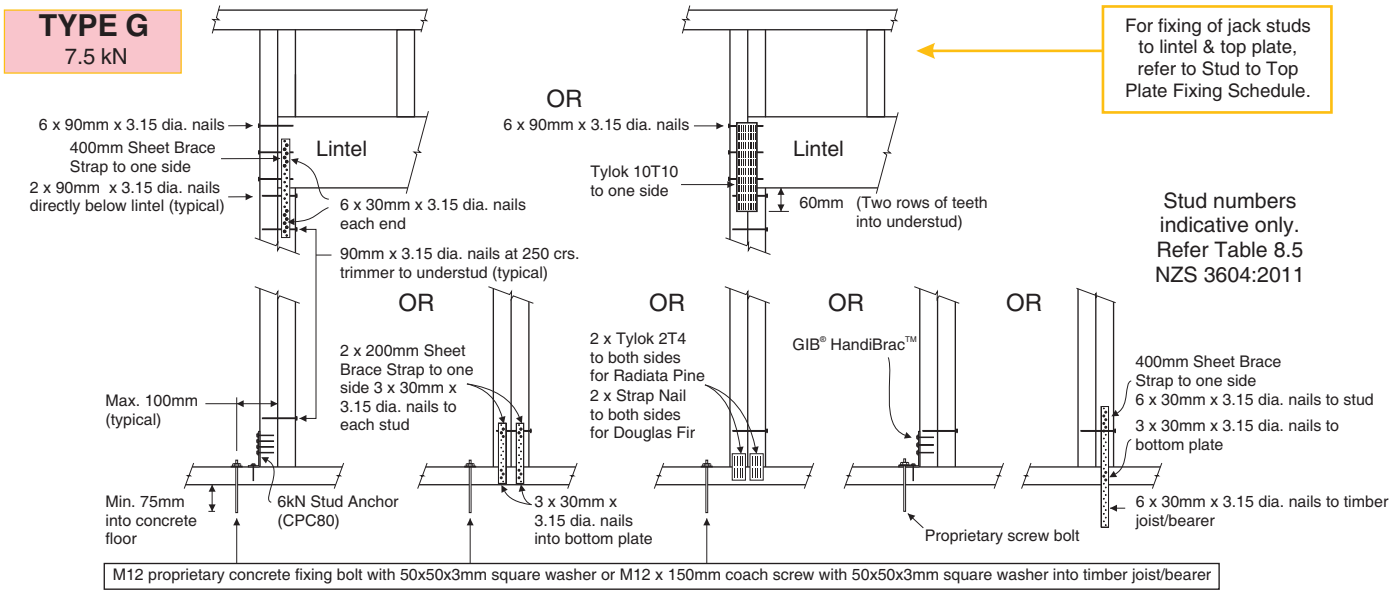
TYPE E
1.4 kN



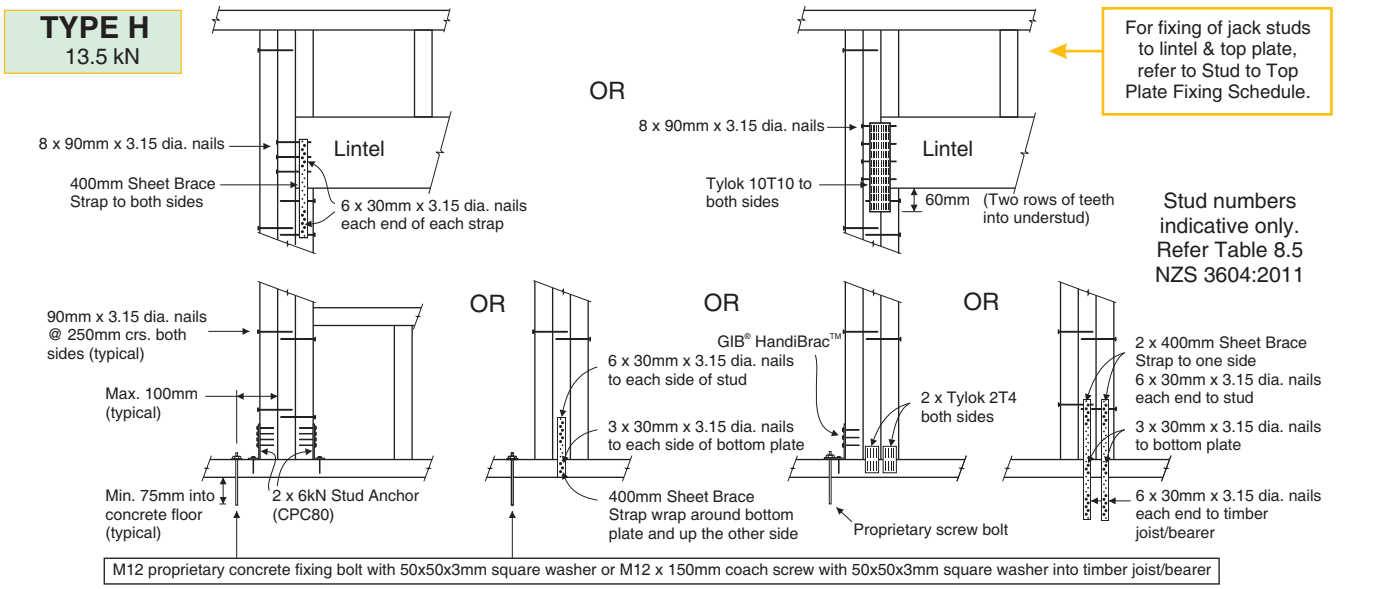
TYPE F
4.0 kN



TYPE G
7.5 kN



TYPE H
13.5 kN



MiTek New Zealand Limited

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

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

www.miteknz.co.nz

MiTek®
GANG-NAIL® LUMBERLOK® BOWMAC®

PROLAM® products are manufactured to the requirements of AS/NZS 1328.1:1998 Glue Laminated Structural Timber, and AS/NZS 1491:1996 Finger Jointed Structural Timber under an approved quality system based on the 1S0 9000 series of standards. As such if the product is used in accordance with **PROLAM®** product literature, it will meet the durability clauses of the New Zealand Building Code B2.

Subfloor Applications:

- **PROLAM®** may be used where approved practices for clearance and ventilation are used.

External Use:

- **PROLAM®** is recommended for weather exposed applications if sealed and maintained in accordance with **PROLAM®** literature.

Preservative Treatment:

- **PROLAM®** Beams are CCA H3.2 treated as defined by NZS 3640:2003, for weather exposed applications, such as verandah beams, deck bearers, and subfloor applications.

- **PROLAM®** Posts are CCA H5 treated as defined by NZS 3640:2003 for in-ground and weather exposed applications, such as deck piles, verandah posts and similar applications.

Storage of **PROLAM®:**

- To ensure **PROLAM®** remains straight and true at the time of installation, follow the below recommendations:

1. Store under cover so that it remains dry until installation.
2. Stack clear of the ground for good ventilation.
3. Stack on bearers to keep flat and straight.

Branded **PROLAM®:**

- **PROLAM®** is branded for your protection. Look-alike materials may not perform to the standard of **PROLAM®**. For your protection do not accept unauthorized substitution

DESIGN CERTIFICATE

Technical basis for structural design methodology contained in designIT for houses - New Zealand.

designIT for houses, New Zealand has been developed by experienced timber engineers to assist designers in selecting appropriate sizes of structural laminated veneer lumber products manufactured by Carter Holt Harvey LVL Limited (including hySPAN, hy90, hyONE and hyJOIST) and other generic stress grades of timber, to be used as structural elements for the construction of buildings that fall within the scope of NZS 3604.

The design methodology used for the software complies with the loading and general design requirements contained within AS/NZS 1170 and with timber structural design in accordance with NZS 3603:1993 including Amendment 4 (Verification method B1/VM1, 6.1).

designIT relies on the accurate input of span and loading information by the user. Where accurate inputs are submitted the product and/or stress grade and the size given will comply with the structural requirements of the New Zealand Building Code (NZBC), provided the installation is in accordance with the installation requirements provided by designIT and/or in product literature and/or NZS 3604, or specific engineering design, as appropriate.

Futurebuild LVL and SG8 components, when used and treated to the required treatment levels prescribed in NZS 3602 and NZS 3604, as modified by Acceptable Solution B2/AS1, will comply with the requirements of the NZBC (Acceptable Solution B2/AS1, 3.2).

References:
1. NZS 3603:1993 Timber Structures Standard.
2. NZS 3604:2011 Timber-framed buildings.
3. AS/NZS 1170:2002 Structural design actions, Parts 0 and 1.
4. AS/NZS 1170:2011 Structural design actions, Part 2: Wind actions.
5. AS/NZS 1170:2003 Structural design actions, Part 3: Snow and ice actions.
6. AS 1720.1:2010 Timber structures. Part 1: Design methods.
7. AS 1720.3:2016 Timber structures. Part 3: Design criteria for timber-framed residential buildings.

This Design Certificate, and any associated warranty/certification, is void where there has been substitution of alternate products not detailed within the Member Specification.

Version date: 12 November 2018

For further information or advice contact:
Carter Holt Harvey LVL Limited,
173 Captain Springs Road, Onehunga. Auckland
Telephone: 0800 808 131
Email: designit@futurebuild.co.nz
Web: www.futurebuild.co.nz

Specifier details:

Specifier:	Jonathan
Business name:	Plans.co.nz
Address:	43 Walding Street
Email:	Jonathan@plans.co.nz

Project & site details:

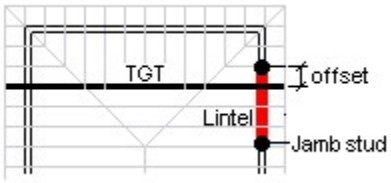
Project:	Proposed Residence
Reference:	GJ 19-01
Site address:	13 Pearl Grove Ashhurst
For (owner/s):	Dirk Badenhorst
Design wind zone	High
Snow loading	Design snow zone: N1, Altitude: 50 m (sub-alpine), Ground snow load, $S_g^{1,2}$ = 0.0 kPa

1. designIT does not include any allowance for the effects of drifting and sliding of snow.
2. Snow loads are applied to roofed over structures only, the design of exposed floors/decks are not covered by designIT.

MEMBER DESIGN DETAILS

Member 1

1) Member code and description JS1 - Jamb studs - In single or upper storey load bearing walls



2) Date prepared 05 March 2019

3) Serviceability criteria AS 1720.1: 2010 and AS 1720.3: 2016

4) Design inputs

Roof type and mass	Light roof and ceiling - 40 kg/m²
Roof pitch	25.0 °
Eaves overhang	600 mm
TGT span	6180 mm
TGT setback	2200 mm
TGT offset	1540 mm
Opening width	4840 mm
Stud height	2420 mm

5) Member specification

Size, stress grade/product	Use 3/90 x 45 SG8
Material type	Dry softwood, machine stress graded and verified (NZS 3622)
Assumed design density	< 480 kg/m²

6) Serviceability

Load case	Limit[3] on average deflection[2]	Estimated average deflection[2]	Rigidity ratio[4]
Wind load - W_s*	16.1 mm	14.5 mm	1.1

*Critical serviceability load case
See 'Notes for interpretation of serviceability data' at the end of this report

7) Reactions

		Limit States Design Reaction[2,3]	
Load case	k_1[1]	End kN[4]	Horizontal kN
1.35G	0.60	-5.2	
1.2G + 1.5Q	0.80	-8.2	
1.2G + W_u + Ψ_cQ	1.00	-10.9	2.7
0.9G + W_u	1.00	6.4	2.2

8) Installation requirements

- Jamb studs to be nogged at maximum 1350 mm
- Notching of the jamb studs not permitted
- Nail Laminate studs in accordance with NZS 3604 Clause 2.4.4.7
- Provide 2 full length studs plus 1 secondary Jamb Stud to Detail H19

Notes for interpretation of serviceability data

1. 'average deflection' is an engineering concept based upon a notional estimated load, notional member rigidity and, in some cases, an approximate model of material response to environmental conditions. These parameters are, 'standardised' in AS 1170 and AS 1720.

2. Deflection is the flexural response to load 'out-of-level' measurements of installations are not necessarily deflections and can incorporate 'initial out-of-straightness', whether intended or not. Furthermore, loads can be higher/lower than the notional estimate and in any comparison with measured levels, material variability needs to also be considered. AS 1720 gives the following basis for estimation of upper bound deflections for various materials.

No 1 Framing – visually graded to NZS 3631	Average + 100%
SG grades - mechanically graded to AS/NZS 1748	Average + 43%
GL grades for glulam to AS 1328	Average + 33%
LVL to AS/NZS 4357 (includes hySPAN and hyJOIST)	Average +18%

As can be seen, comparison of the 'average deflection' for different materials, even if calculated on the same basis, does not give the whole picture!

3. The limits referred are those specified in AS 1720.3 for the stated load case.

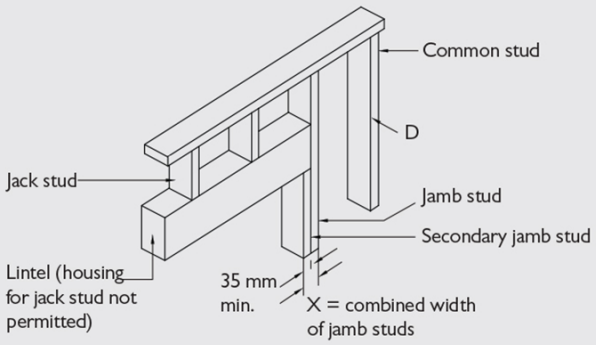
4. 'Rigidity ratio' expresses the rigidity of the specified beam relative to the rigidity of a notional beam just meeting the serviceability requirements detailed.

Notes for interpretation of reaction data

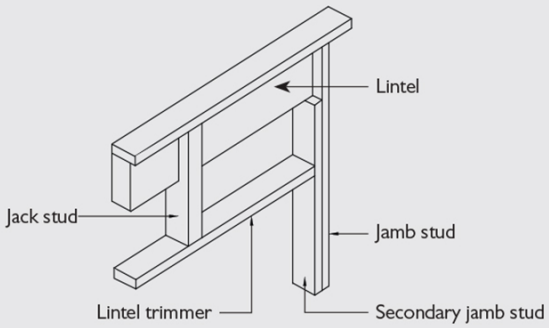
1. Duration of load factor 'k_1' for strength as per NZ 3603:1993
2. Negative (-) reactions relate to the 'gravity' or 'downwards' force on the support
3. Positive reactions relate to the 'upwards' forces or 'tie-down' requirement on the support
4. End reaction includes allowance for overhang/cantilever where one has been designed

Detail H19: Multiple Stud Configuration

Lintels having breadth greater than half stud depth



Lintel directly below top plate



GIB EzyBrace® Bracing Software

Demand Calculation Sheet

Job Details

Name:	Badenhorst Residence
Street and Number:	13 Pearl Grove
Lot and DP Number:	Lot: 45 DP: 524726
City/Town/District:	Ashhurst
Designer:	Jonathan Barlow
Company:	Plans.co.nz
Date:	Friday, 8 March 2019

Building Specification

Number of Storeys	1
Floor Loading	2 kPa
Foundation Type	Slab
	Single
Cladding Weight	Heavy
Roof Weight	Light
Room in Roof Space	No
Roof Pitch (degrees)	25
Roof Height above Eaves (m)	2.64
Building Height to Apex (m)	4.8
Ground to Lower Floor (m)	0.2
Average Stud Height (m)	2.4
Building Length (m)	16.73
Building Width (m)	13.14
Building Plan Area (m^2)	151

Building Location

Wind Zone = High

Earthquake Zone 3

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	**675**	**886**

Bracing Units required for Earthquake

	Along & Across
Single Level	**1199**

Single Level Along Resistance Sheet

Job Name: Badenhorst Residence

									Wind	EQ
									Demand	
									675	1199
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1413 209%	1469 123%
a	1	1.20		2.4	EP1 1.2	Ecoply®	144	162		
	2	1.20		2.4	EP1 1.2	Ecoply®	144	162		
	3	1.20		2.4	STR9	Strandboard	120	138		
	4	1.20		2.4	EP1 1.2	Ecoply®	144	162		
									552 OK	624 OK
b	1	1.76		2.4	GS1-N	GIB®	121	106		
	2	2.76		2.4	GS1-N	GIB®	190	166		
									312 OK	271 OK
c	1	1.05		2.4	EP1 0.6	Ecoply®	100	110		
	2	1.00		2.4	GS1-N	GIB®	65	60		
	3	1.65		2.4	GS1-N	GIB®	114	99		
	4	1.00		2.4	EP1 0.6	Ecoply®	95	105		
	5	0.40		2.4	EP1 0.4	Ecoply®	32	38		
									406 OK	412 OK
d	1	1.20		2.4	EP1 1.2	Ecoply®	144	162		
									144 OK	162 OK

Single Level Across Resistance Sheet

Job Name: Badenhorst Residence

									Wind	EQ
									Demand	
									886	1199
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1331 150%	1417 118%
m	1	0.95		2.4	EP1 0.6	Ecoply®	90	100		
	2	1.20		2.4	EP1 1.2	Ecoply®	144	162		
									234 OK	262 OK
n	1	0.90		2.4	EP1 0.6	Ecoply®	86	95		
	2	0.84		2.4	EP1 0.6	Ecoply®	80	88		
	3	1.26		2.4	GS1-N	GIB®	87	76		
									252 OK	258 OK
o	1	1.00		2.4	EP1 0.6	Ecoply®	95	105		
	2	1.00		2.4	EP1 0.6	Ecoply®	95	105		
	3	1.60		2.4	GS1-N	GIB®	110	96		
	4	1.80		2.4	GS1-N	GIB®	124	108		
									425 OK	414 OK
p	1	1.20		2.4	STR9	Strandboard	120	138		
	2	1.20		2.4	STR9	Strandboard	120	138		
									240 OK	276 OK
q	1	0.60		2.4	STR9	Strandboard	60	69		
	2	1.20		2.4	STR9	Strandboard	120	138		
									180 OK	207 OK

Custom Wall Elements

Supplier	System	Min. Length m	Wind BUs/m	EQ BUs/m
Strandboard	STR9	.6	100	115
Ecoply®	EP1 0.4	.4	80	95
Ecoply®	EP1 0.6	.6	95	105
Ecoply®	EP1 1.2	1.2	120	135
Daiken	CUS 0.6	0.6	115	120
Daiken	CUS1.2	1.2	153	136
James Hardie	HPgn	.4	73	66

GIB EzyBrace® Systems specification GS1-N

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

WALL FRAMING

Wall framing to comply with;

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

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

BOTTOM PLATE FIXING

Timber floor

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

Concrete floor

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

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

WALL LINING

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

PERMITTED ALTERNATIVES

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

FASTENING THE LINING

Fasteners

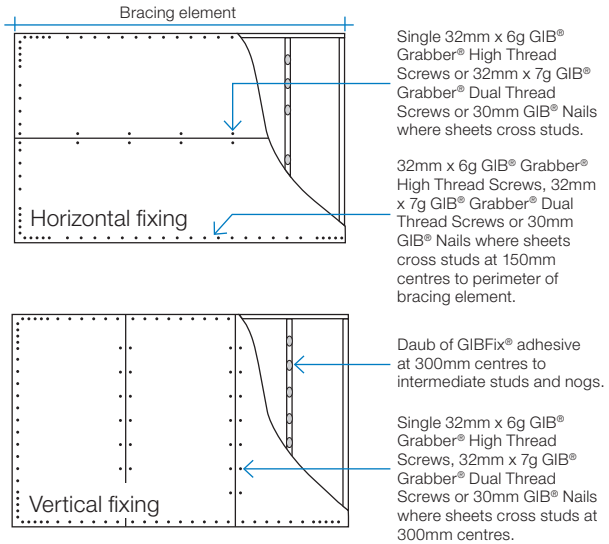
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

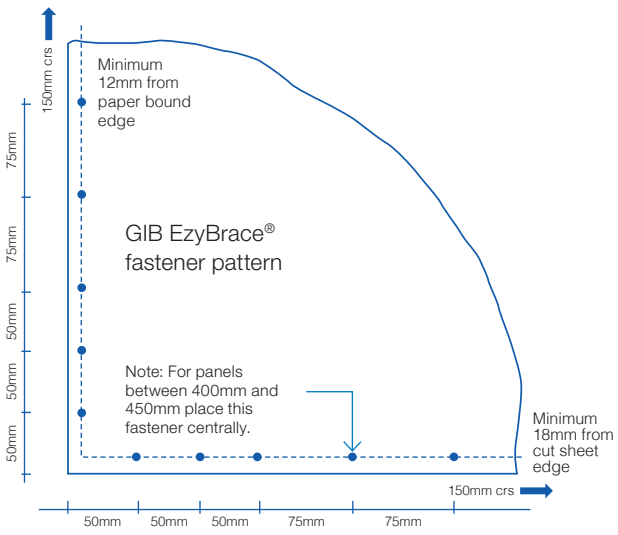
Fastener centres

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

JOINTING

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





Unless stated all fastener spacings are maximums.

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

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 futher 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

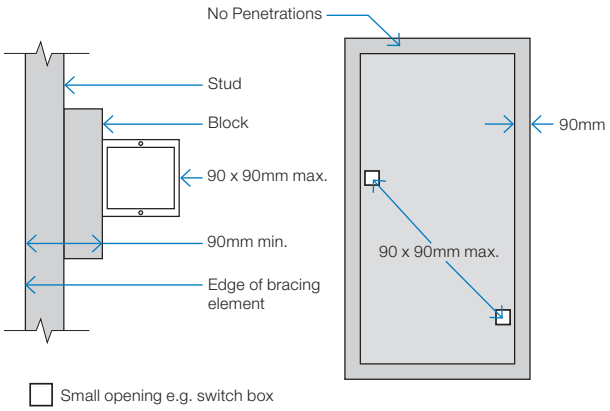
SMALL OPENINGS

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

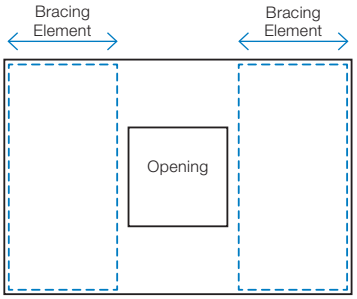
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

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.

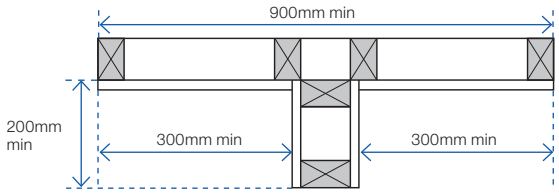
Guidelines for intersection walls

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).

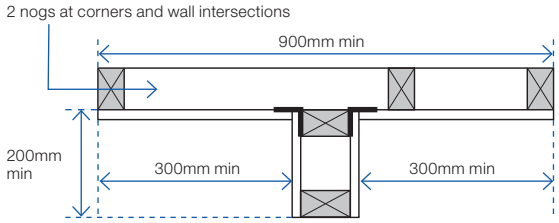
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



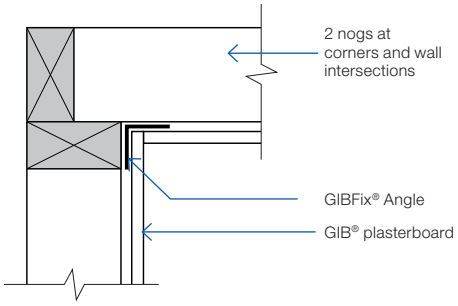
GEB002

FIGURE 13: WALL INTERSECTION (GIBFIX® FRAMING SYSTEM)



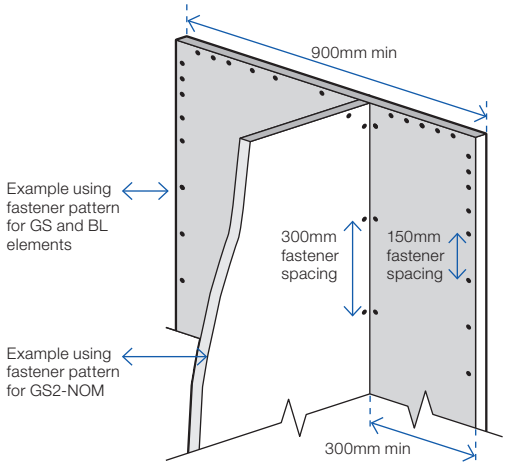
GEB003

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

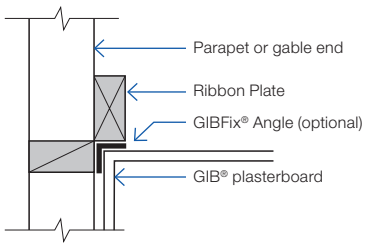
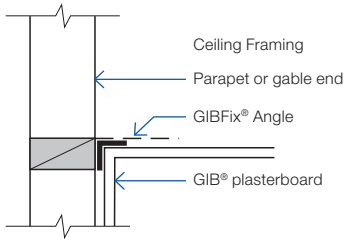


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



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.	

CBI 5113
July 2015

GIB HandiBrac®

Panel Hold-Down Bracket

NEW GIB HANDIBRAC® UPDATES INSIDE

GIB HandiBrac®

Panel Hold-Down Bracket

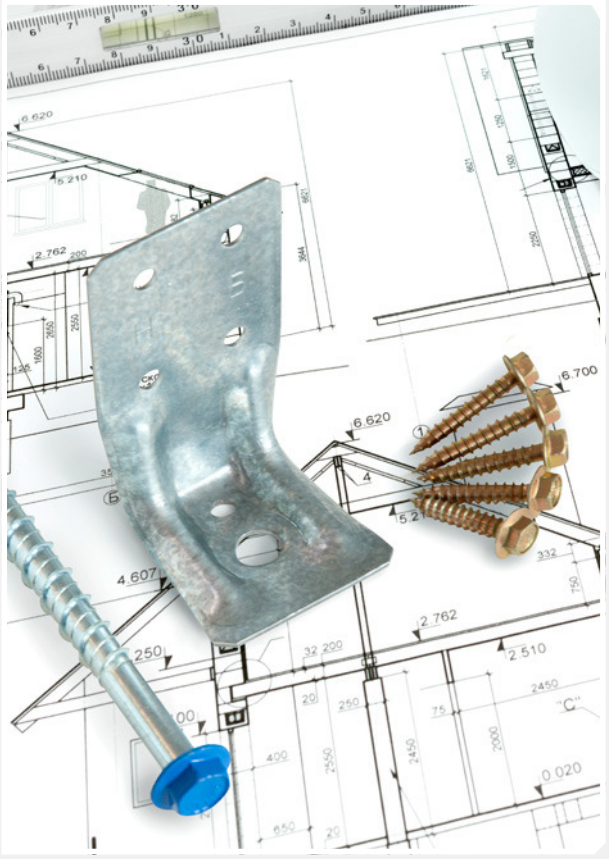
Developed in conjunction with MiTek™, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs. The GIB HandiBrac® is a substitute for bottom plate hold-down straps.

- 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

The GIB HandiBrac® provides quick and easy installation. The registered design provides a flush surface for the wall linings because it is fitted inside the framing.

There is therefore no need to check in the framing as is recommended with conventional straps. Because the GIB HandiBrac® conveniently allows for installation and inspection at any stage prior to fitting internal linings, it is suitable for both new and retrofit construction.



GIB HANDIBRAC® OVERVIEW

COMPONENTS

GIB HandiBrac® is available in boxes of 10, each containing 5 pairs.

Components per paired pack include:

- 2 x GIB HandiBrac® Brackets
- 10 x Tek Screws
- 2 x BOWMAC® screw bolts included within specific GIB HandiBrac® pack

GIB® BRACING ELEMENTS

The GIB HandiBrac® is a proprietary product that has been tested and is suitable for use with specified GIB EzyBrace® Systems.

FIXING TO TIMBER FRAMED FLOORS

BOWMAC® screw bolt to achieve a characteristic uplift strength of 12kN.

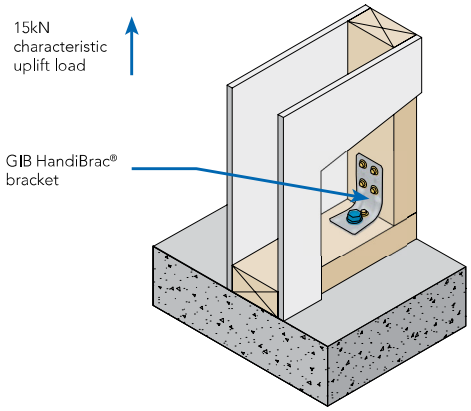
FIXING TO CONCRETE SLABS

BOWMAC® screw bolt to achieve a characteristic uplift strength of 15kN

PANEL HOLD-DOWN DETAILS

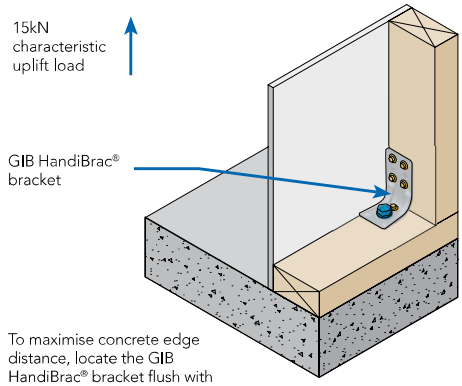
CONCRETE FLOOR – INTERNAL WALL

The bottom plate at both ends of the bracing element is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page



CONCRETE FLOOR – EXTERNAL WALL

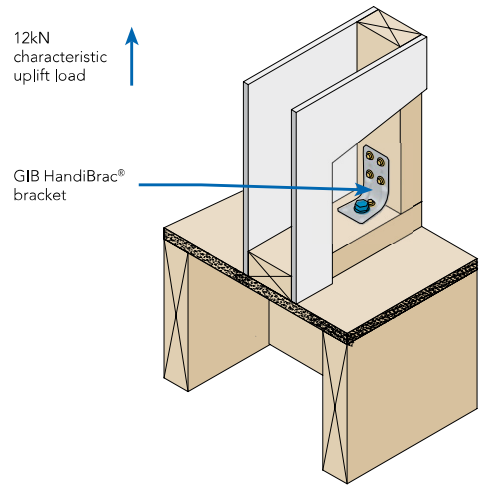
The bottom plate at both ends of the bracing element is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



To maximise concrete edge distance, locate the GIB HandiBrac® bracket flush with the inside face of the stud

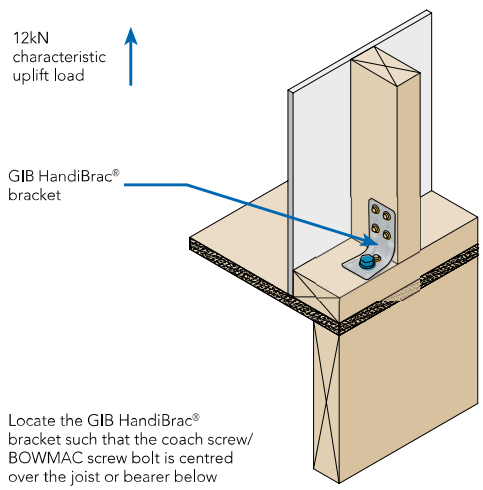
TIMBER FLOOR – INTERNAL WALL

Bottom Plate is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



TIMBER FLOOR – EXTERNAL WALL

Bottom Plate is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



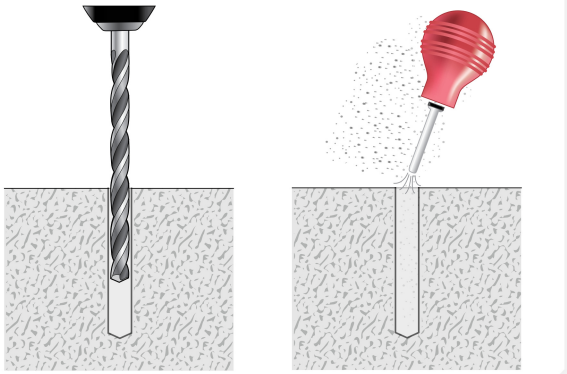
Locate the GIB HandiBrac® bracket such that the coach screw/ BOWMAC screw bolt is centred over the joist or bearer below

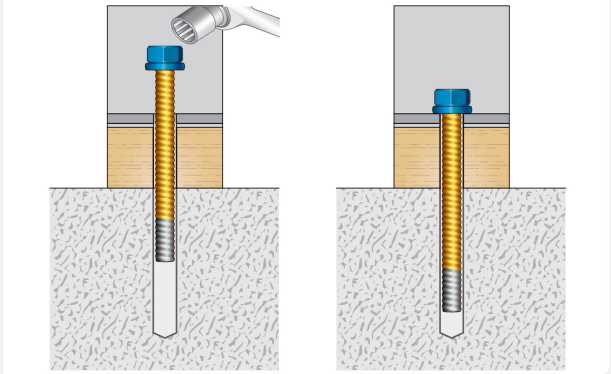
INSTALLATION OF GIB HANDIBRAC® BRACKET

1. Install the screw located in the bracket base
2. Install the BOWMAC® screw bolt as per instructions below
3. Install remaining four screws into the face of the timber stud

Installation Tips

- Use quality hexagonal socket with a ratchet spanner
- During installation debris or dust created by the thread cutting action may cause some resistance to be experienced. This is easily overcome by unscrewing the BOWMAC® screw bolt for one turn or more and then continuing to fix to the full embedment.





PREPARATION

- Use a 10mm diameter masonry bit for a solid concrete substrate and an 8mm diameter bit for fixing to a timber sub-floor.
- Drill a hole into the base material to depth 8 mm deeper than the required embedment and clean out the hole of dust and debris prior to installation of BOWMAC® screw bolt.

FIXING THE BRACKET

- Insert the bolt through the GIB HandiBrac® plate and bracket and into the hole.
- Begin tightening the bolt by applying forward pressure when engaging the first thread.
- Additional forward pressure may be required for installation in high strength, dense base materials.
- Continue tightening the anchor until the head is firmly seated against the GIB HandiBrac® base.
- In extremely dense material, use of an impact wrench is recommended.
- Be sure the bolt is at the required embedment depth.
- The installation is now complete.

GIB HANDIBRAC®

TRADEMARKS

The name GIB®, GIB HandiBrac® and the shield device are registered trademarks of Fletcher Building Holdings Limited.

NZ Registered Design Application #420161

MANUFACTURER

GIB HandiBrac® is manufactured and distributed by MiTek New Zealand Ltd.

Auckland Office
40 Neales Rd, East Tamaki, Auckland 2013, New Zealand
P O Box 58-014, Botany, Auckland 2163, New Zealand
Ph: 64-9-274 7109, Fax: 64-9-274 7100

Christchurch Office
14 Pilkington Way, Riccarton 8440, Christchurch, New Zealand
P O Box 8387, Riccarton, New Zealand
Ph: 64-3-348 8691, Fax: 64-3-348 0314

www.miteknz.co.nz

Winstone Wallboards Limited - National Support
37 Felix Street, Penrose, Auckland 1061, New Zealand
P O Box 12 256, Penrose 1642, Auckland, New Zealand
Ph: 64-9-633 0100, GIB® Helpline: 0800 100 442
Fax: 64-9-633 0101, Free Fax: 0800 229 222
Email: info@gib.co.nz
Web: www.gib.co.nz

Length of GIB EzyBrace® elements ('N' Type)

The length of GIB EzyBrace® elements with an 'N' extension (requiring standard NZS3604:2011 plate connections) can be taken as the full frame length measured from the outside of the end-stud to the opening face as illustrated in figures 29-32.

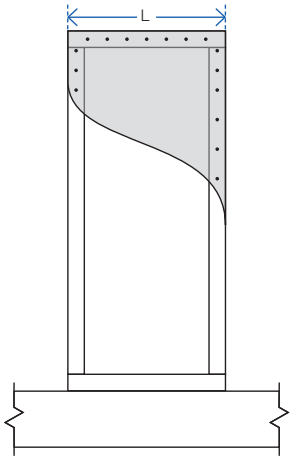
'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

The dimension 'L' shall not be less than 400mm.

Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening.

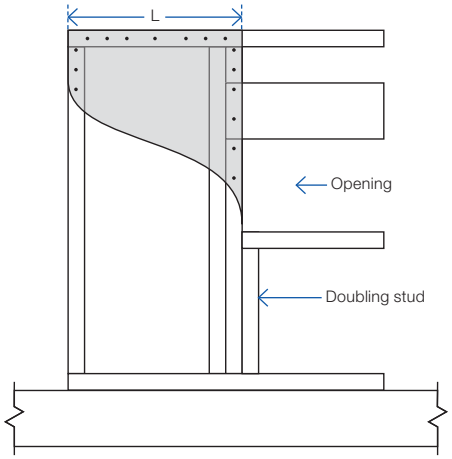
Fastener spacings and diagram scales shown in Figures 29–32 are indicative only. Refer to p.23–30 for construction details.

FIGURE 29: GS BRACING ELEMENTS (OPTION A)



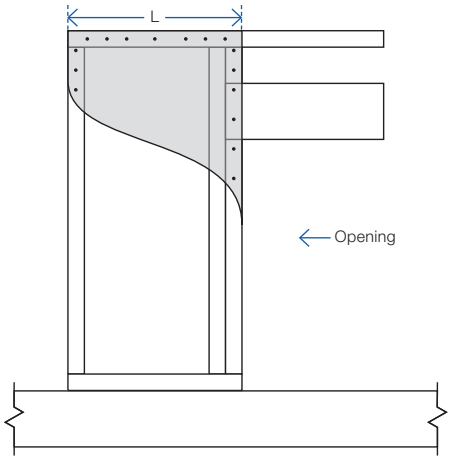
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



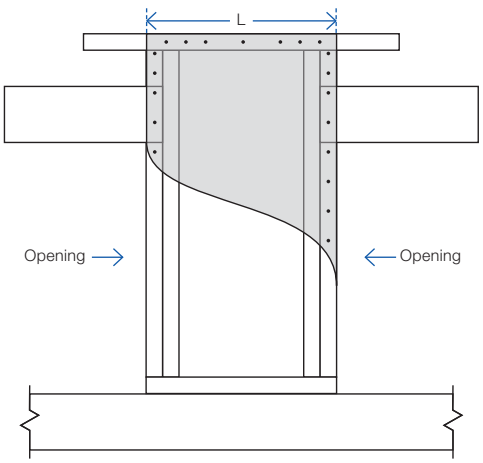
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

Length of GIB EzyBrace® elements ('H' Type)

GIB EzyBrace® elements with an 'H' extension (requiring special panel hold-down fixings) can be used when the dimension 'L' as illustrated in figures 33–36 is 400mm or more.

'H' type GIB EzyBrace® elements are identified by GIB® specification numbers GSP-H, BL1-H, BLG-H and BLP-H.

The length of an 'H' type element is not only determined by the sheet material, but also by the placement of the hold-down fixings.

Hold-down fixings cannot be placed closer together than what is shown for the standard panel in figure 33.

Hold-down fixings can be placed under windows provided sill trimming studs beneath the opening are connected to the bracing element using 8/90mm gun nails, as illustrated in figure 34.

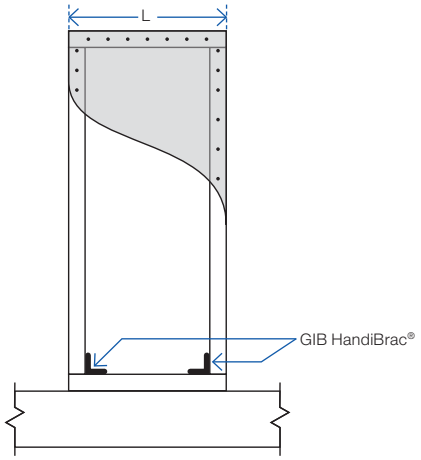
Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening as indicated in figures 34-36.

When using bracing straps, installed in accordance with p.17, fix the strap to the same framing member as shown for the GIB Handibrac® below, and install the adjacent anchor bolt in the same position as the GIB HandiBrac® bolt.

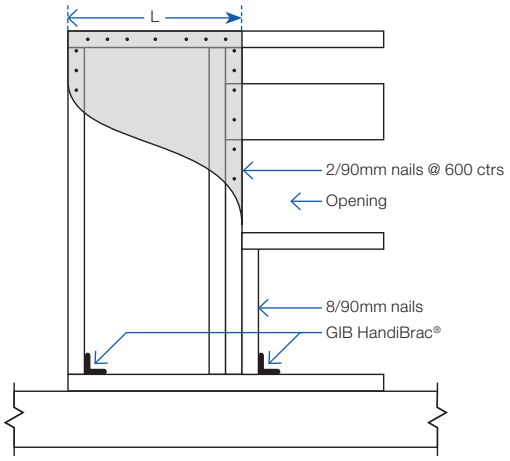
Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

FIGURE 33: BL BRACING ELEMENTS (OPTION A)



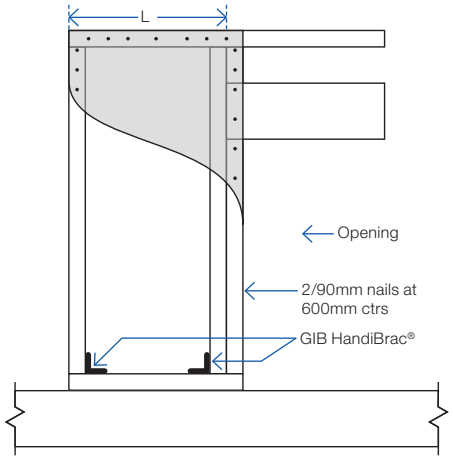
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



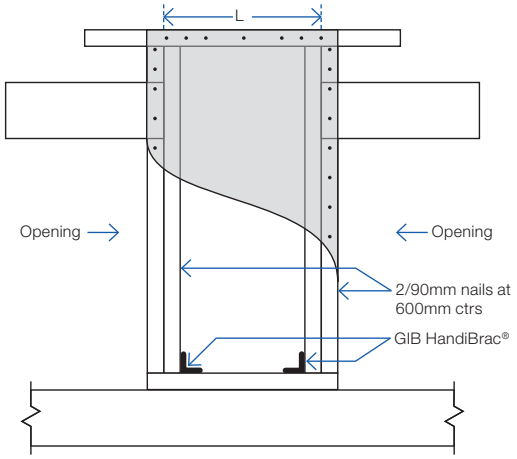
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

strandboard™

another **trade essential** from
THE **laminex** GROUP™

Introduction

Trade Essentials® Strandboard™ is a versatile reconstituted wood panel manufactured entirely from renewable plantation pine timber. It is designed specifically for a range of building and furniture & joinery applications.

Product Description

Strandboard™ is identified by its characteristic wood strand surface. The resin used has been developed to resist the effects of moisture in areas of high humidity and reduce the emission of formaldehyde.

Uses:

- Wall and ceiling linings
- Partitions – in general areas including changing rooms and toilets
- Flooring overlays
- General cabinet carcass work
- Wall bracing

Product Details

Durability

When stored, handled, installed and maintained in accordance with this document, Strandboard™ will meet the provisions of NZBC B2.3.1(c) for five years (dependent on end use).

Limitations

Strandboard™:

- Is recommended for dry interior use only and must not be used in an external situation (floors, walls or sarking) even if these surfaces are subsequently covered over.
- Must not be used for a flush plaster stopped jointing system, to be subsequently wallpapered or painted (exceptions to this may apply to proprietary glued drywall partition systems).
- Ceiling lining installations exposed on the upper face to elevated temperatures and low humidity conditions in roof spaces, must have insulation placed directly on the upper surface and have adequate provision for air change within the roof space.
- All panels laid over exposed rafters/purlins, must be paint sealed on all edges and both faces after conditioning and prior to installation to reduce moisture and humidity uptake during construction and building occupation.
- Surfaces facing the habitable space must be coated or covered prior to occupation of the building (Refer to Finishing section for more information.
- The application of water based spray-on textured coatings must not be used.

Strandboard™ **must not** be used for:

- Exterior applications
- Areas subjected to repeated water spill or constant dampness
- Marine use
- Shower lining
- Saunas
- Window reveals
- Exterior door panels

Strandboard™ panels are **not waterproof** and therefore **must not** be allowed to come in direct or prolonged contact with water. The panels must be finished with a protective coating prior to occupation of the building.

Product Care and Handling

Adequate pre-conditioning prior to installation and precise following of installation instructions are essential for satisfactory results, especially during wet seasons and high humidity.

- Due to the uptake of airborne moisture, permanent board distortion may occur if Strandboard™ is placed in close proximity to framework with moisture content exceeding 18%.
- Attention to storage, regular stock rotation, preconditioning at the installation point and provision of adequate joint clearances will help accommodate any board movement.

Storage

Correct storage procedure will eliminate sagging and permanent distortion of sheets.

- Store away from heat and direct sunlight.
- The panels must be flat stacked on evenly placed level bearers clear of dry ground, or on a dry concrete floor.
- Bearers must be of uniform thickness and must extend across the full width of the pack. (Refer Figure 1)
- Strandboard™ panels must be protected from the weather. A breather type cover must be supported clear of the top and sides of the panels using battens to allow air to circulate freely. (Refer Figure 1)

Stock Rotation

The uptake of atmospheric moisture into board edges which causes edge peaking will be minimised by regular stock turn. Cut plastic strapping as soon as practicable to avoid edge indentations. Avoid storing close to doorways adjacent to external atmosphere.

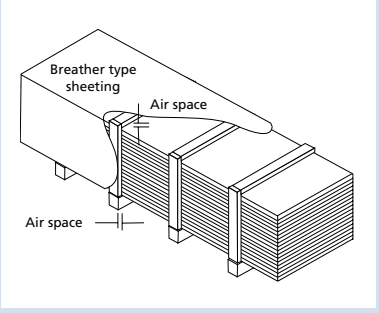


Figure 1

Stack panels using equally spaced bearers and, if necessary, a breather-type cover for weather protection. (Note: provision for air circulation)

Composition

Strandboard™ is composed of engineered wood strands bonded under heat and pressure.

Bonding Adhesives

Strandboard™ is bonded with a pMDI resin system.

The resulting Strandboard™ sheets are sanded and ready for use.

Moisture

Strandboard™ must not be exposed to water or high humidity situations such as shower enclosures, steam rooms and saunas. (Refer Limitations)

As with most wood based products, Strandboard™ is subject to minor dimensional variations due to changes in relative humidity resulting in expansion and shrinkage.

Identification

Board size, classification and production batch number are denoted on the packaging banner.

Table 1

Physical Properties (value ex-press)

	9mm	12mm
Density (kg/m^3) (nominal)	660	660
MoR (Mpa) (minimum)	18	18
MoE (Mpa) (minimum)	2900	2900
Internal Bond (kPa) (minimum)	500	500
24 hour thickness swell (%) (maximum)	20	20

Table 2

Product Range (nominal)

	9mm		12mm		
Panel Sizes (mm)	3600 x 1200	2400 x 1200	3600 x 1200	2400 x 1200	3600 x 2400
Weight (kg) per m^2	6.13	6.13	8.19	8.19	8.19
Weight (kg) per panel	26.5	17.7	35.4	23.6	70.8
Panels per pack	50	50	50	50	20
Weight (kg) per pack	1330	890	1775	1185	1421

Table 3

Tolerances (ex factory)

Dimensions	Target
Length	+/- 2mm per metre with a 5mm maximum
Width	+/- 2mm per metre with a 5mm maximum
Thickness	+/- 0.2mm
Squareness	≤ 2mm per metre difference in the diagonals

Heat

Precautions must be taken to ensure that Strandboard™ is kept well clear of nearby heat sources, such as free standing fireplaces, space heaters, ovens, cooking elements, etc.

The structural life of Strandboard™ may be impaired if surface temperatures exceed 50°C. Manufacturers of heat appliances must be consulted to ascertain the clearances or protection required to ensure 50°C is not exceeded.

Formaldehyde

Strandboard™ complies with the E0 category of AS/NZS 1859.1:2004 when tested to AS/NZS 4266.16. During construction and after close-in formaldehyde emission levels can be best controlled by room ventilation and sealing or covering the surface facing the habitable space.

Table 4

Thermal Resistance of Strandboard™

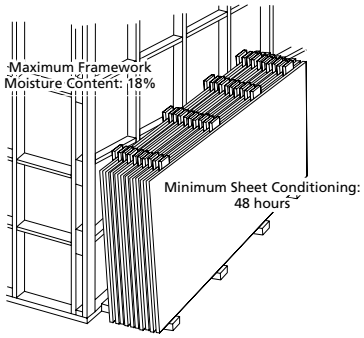
	9mm	12mm
Thermal Conductivity (w/m °C)	0.11	0.11
Thermal Resistance (m^2 °C/w)	0.08	0.11

Design Considerations

Attention to site storage, pre-conditioning at the point of installation and provision of specified edge clearances will reduce the effects of moisture uptake after installation and minimise panel movement.

Panel conditioning of raw board prior to installation is of utmost importance, especially during periods of high rainfall and accompanying high humidity. (Refer Figure 2)

Figure 2



Wall and Ceiling Lining

Strandboard™ must not be placed in close proximity to framework with moisture contents in excess of 18%. (Refer Figure 2)

Framework Setout

Allow for the stud, purlin, rafter, beams etc, to accommodate a 2mm expansion gap at Strandboard™ panel joints especially where large areas or long walls are to be covered. (Refer Figure 3a)
For negative detailing, allow an 8mm gap on a pre-painted stud. (Refer Figure 3b)

NOTE:
Ensure sheets are pre-conditioned prior to being sealed.

Figure 3a

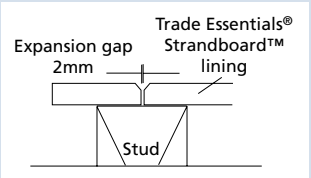


Figure 3b

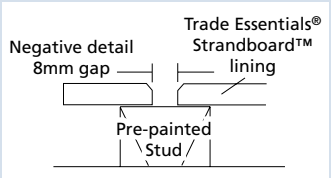


Table 5

Framework Support Centres

Panel Thickness 9 & 12mm (maximum spacing)			
Wall Lining (mm)		**Ceiling Lining (mm)**	
Stud Centres	**Dwang Centres**	**Joist/Truss / batterns**	**Dwang Centres**
400	1200	400/450	1200
450	1200	600	1200
600	800	900	600
		1200	600

Exposed Beam Ceilings

- Pre-condition all sheets, and then prime all surfaces and edges prior to fixing ceiling sheets.
- Weather protection is essential to avoid exposure to inclement conditions during the construction period.
- Where practicable, install exposed interior ceiling lining progressively with the exterior roof covering. The preferred method of installation is to fix after the roof is in place.
- Skillion roofs require special care. Maintain an air gap between the top of the insulation and underside of the roofing underlay, from the soffit to the ridge. This gap allows air circulation to regulate humidity and temperature.

Flooring Overlays

When upgrading existing wooden floors, Strandboard™ may be used as a substrate for other floor finishes.

Preparation guidelines are:

- The existing floor should be sanded level.
- Using a staggered sheet layout pattern, preconditioned Strandboard™ boards must be fixed combining a nail and full spread adhesive application.
- For full instructions refer to the Flooring Overlays section of the Strandfloor™ Technical Manual.

Table 6

Nailing Schedule

	9mm	12mm
Nail Size* (mm)	40 x 2.5	40 x 2.5
Fixing Centres (mm) Edges	150	150
Fixing Centres (mm) Intermediate	200	200
From Sheet Edge (mm)	10	10

*All fastenings must be corrosive resistant.

Wall Bracing Values

Wall bracing tests have been carried out for 9mm and 12mm Strandboard. Please refer Table 7 bracing values.

Table 7

Wall Bracing Information

Bracing Units (BU) per metre	9mm	12mm
Wind	105	110
Earthquake	115	125

NOTES:

Nails to be 40 x 2.8mm galvanised flathead at 150mm centres around the perimater and at 300mm centre up any intermediate stud.
Tested panel on one side of framing only – no consideration given to other lining material.
Minimum braced wall length to be 600mm.
End tie downs to be 6kN.
At least one row of dwangs (nogs) are required.
The bracing units shown are for a 2.4m high wall. For walls greater than 2.4, the bracing units shall be reduced on a pro-rata basis as per NZS 3604.

Working Characteristics

Strandboard™ can be easily machined, grooved and routed in any direction. To avoid break-outs use a fine toothed hand saw or circular saw adjusted to protrude just through the board surface and apply only nominal pressure when using power drills. Tungsten-tipped machine tools are recommended for volume production.

NOTE:

For best results ensure hand and machine tools are sharp, and always use approved eye protection when machining Strandboard.

Fixing

- The installation of linings must not begin until the building is closed in and waterproof.
- A 3mm sheet edge clearance is advisable for all sheet sizes during wet winter months or in extremely humid conditions.
- Board surfaces should be primed or clear sealed immediately after fixing, to minimise the effects of atmospheric moisture, or direct sunlight and to resist marking during construction activities.

Finishing

All surfaces will require sanding prior to finishing.

Stopping

Fill fastening holes with a solvent-based wood dough tinted as required for the specific coating applications.

Clear Finishing

Best results are achieved by employing a professional painter who should follow the coating manufacturers instructions. Sound advice about clear coatings and colour washing is available from Handley Industries – 09 444 4558 or your local Resene Paints store.

Painting

Acrylic primer coatings will provide a more textured surface than solvent based paint systems. Strandboard™ is a good substrate for most paint applications.

strandboard™

Liability

The Laminex Group™ will not be liable to any person if the instructions as to storage, use and installation of Strandboard™ as outlined in this brochure are not complied with.

Any proprietary products referred to in this brochure must be used in accordance with the relevant manufacturer's instructions. The Laminex Group™ accepts no liability for these proprietary products.

Nothing contained in this paragraph or elsewhere in this brochure affects any rights a person may have under the Consumer Guarantees Act 1993.

This brochure supersedes all previous issues.

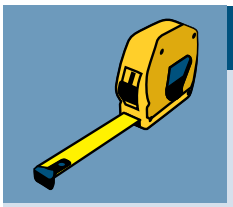
All Acts, Codes and Standards referred to in this brochure are the current editions at the date of brochure publication.

Health and Safety

Health and safety precautions must be taken when working with wood products.

- Exposure to wood dust and/or to formaldehyde may cause irritation to the eyes, respiratory system and skin, and may cause sensitisation resulting in asthma, and by skin contact resulting in dermatitis.
- Wood dust is classified as a known carcinogen. Repeated inhalation of wood dust over many years may cause nasal cancer.
- Formaldehyde is classified as a known carcinogen.
- Storage areas containing large quantities of Strandboard™ must be adequately ventilated.
- Work areas must be well ventilated and kept clean. Sawing, sanding and machining equipment must be fitted with dust extractors to ensure that dust levels are kept within standards laid down by Worksafe Australia, Occupational Health and Safety New Zealand, or the specific country of use. If not, a dust mask conforming with AS/NZS 1715 and AS/NZS 1716 and eye protection conforming with AS/NZS 1337 must be worn.
- Offcuts, shavings and dust must be disposed of in a manner which avoids the generation of dust and in accordance with the requirements of local waste authorities.
- In end use applications all product surfaces exposed to occupied space must be sealed.

For further information and safety data information, please phone The Laminex Group™ Customer Services Department.



Technical Support

As not all product use options can be described in this brochure, additional end use and specifying information is available as a complimentary service. The information contained in this brochure must not be reproduced or published in whole or in part without the prior consent of The Laminex Group™. The Laminex Group™ reserves the right to revise without notice any information contained in this brochure. Please contact The Laminex Group™ Customer Services Department to check the currency of information contained in this brochure, or visit the website.

Contact Details:

For more product information or order enquires please phone

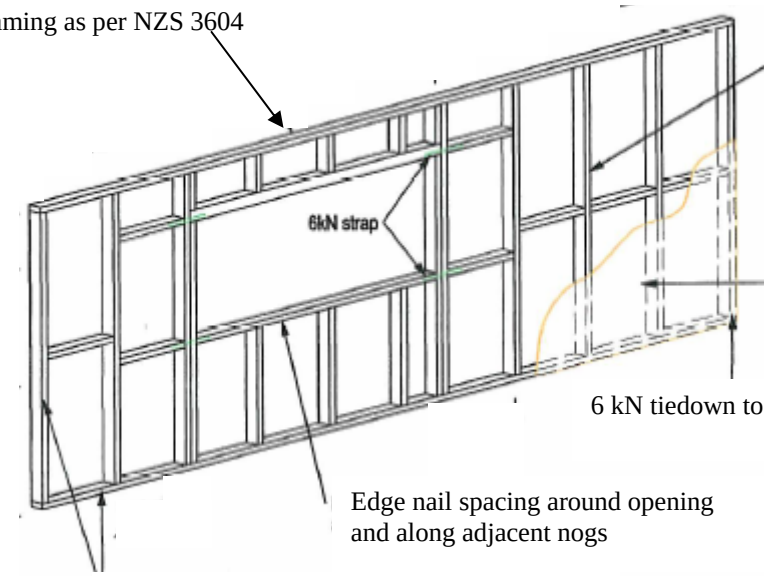
The Laminex Group on **0800 303 606** to speak with a representative.

www.thelaminexgroup.co.nz

Imagery on cover: Cavell's Department of Conservation Area Office, Designed by Insitu Architecture, Queenstown

TLG1810

JUKEN NEW ZEALAND LTD



Type of board	Minimum wall length (mm)	Nail spacing (mm)	Tiedowns (kN)	BU/m wind	BU/m e'quake
9mm Strandboard	600	150	6	100	115
9mm Triboard	600	150	6	105	125
12mm Strandboard	600	150	6	105	125
15mm Triboard	600	150	6	115	130
15mm Triboard	1200	75	12	150	165

Notes

1. 12kN tie down only to be used into concrete floor.
2. Nails for fixing board to wall framing to be 40 x 2.8mm diameter galvanised flat head nails.
3. Intermediate nogs are not necessary for 15mm Triboard
4. The bracing units shown are for board fixed to only one side of the framing.
5. The bracing units shown are for a 2.4m high wall. For walls more than 2.4m high, the bracing units need to be reduced on a pro rata basis as per NZS 3604, e.g. for a 3m high wall, the bracing units (wind) for 9mm Strandboard are $^{2.4}/_{3}$ x 100 = 80.

The above information has been developed from tests carried out in the Timber Laboratory of SCION, Rotorua over the period 31 October to 26 November 2008. The testing was carried out in accordance with the P21 test method and the results were evaluated on 23 February 2012 as per the P21 2010 test method.

JUKEN NEW ZEALAND LTD – TRIBOARD MILL
Kaitaia, New Zealand
Telephone: +64 9 408 0300
Facsimile: +64 9 408 9113
www.triboard.com

Date of issue 27 February 2012

1.0 ECOPLY® PRODUCT RANGE

Manufactured in New Zealand by Carter Holt Harvey Woodproducts, the Ecoply® portfolio represents a range of structurally rated plywood products.

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

For information relating to Shadowclad® panels and plywood used as an exterior cladding, refer to the current Shadowclad Specification & Installation Guide for Cavity Construction. For information relating to Ecoply Barrier used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide. Both of these documents can be downloaded from www.chhwoodproducts.co.nz.

Ecoply products must be competently installed in accordance with good building practices and sound design principles to satisfy the requirements of the Building Act 2004, the New Zealand Building Code (NZBC), and applicable New Zealand Standards. This is the responsibility of building owners and the design professionals and builders that they engage. This document contains information, limitations, and cautions regarding the properties, handling, installation, usage, and the maintenance of Ecoply products. However, to the maximum extent permitted by law, Carter Holt Harvey Woodproducts assumes no legal liability to you in relation to this information.

1.1 TECHNICAL INFORMATION AND CAD DETAILS

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

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

The information contained in this publication relates specifically to Ecoply structural plywood products manufactured by Carter Holt Harvey Woodproducts and must not be used with any other plywood manufacturer's product no matter how similar they may appear.

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

1.2 PRODUCT DESCRIPTION AND RANGE

Ecoply structural plywood panels are manufactured from radiata pine wood veneers. The veneers are placed at right angles to each other for maximum strength and stability then bonded together with synthetic phenolic (PF) resin to form a strong and permanent Type A bond.

The strength of Ecoply plywood is optimised for maximum performance parallel to the face grain with cross plies providing enhanced stability across the grain.

The Ecoply plywood range can be specified for:

- Surface grade (e.g. CD) - where the first letter describes the face veneer appearance and the second letter describes the back veneer of the Ecoply sheet. Surface grades are defined in AS/NZS 2269 and summarised in Tables 2A & 2B
- Stress grade - utilises the symbol F and a suffix, for example;
  - F8 as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. F8 is the standard stress grade for Ecoply products
  - Ecoply 19 mm Longspan Flooring and 15 mm Ecoply Roofing are F11[1] stress grade (See Tables 1, 4 and 5). Other Ecoply products are also available in F11[1] upon request
- Thickness - ranging from 7 mm to 25 mm. (Thicknesses above 25 mm subject to availability)
- Length - being 2400 mm and 2700 mm with a standard nominal width of 1200 mm
- Preservative treatment - being untreated, H3.2 CCA or H3.1 LOSP Azole treated
- Edge finish - being square edge or for Ecoply Flooring and Roofing, routed on the long edges of the sheet with a polypropylene plastic tongue inserted into one side for a tongue-in-groove joint

For general installation advice refer to section 2.0: General Installation Guide.

For specification and installation advice for Ecoply used in typical applications refer to the following sections.

Typical Application	Section
Structural bracing and ceiling diaphragms	3.0
Roofs and decks	4.0
Flooring	5.0

Note: Technical notes referenced in this guide can be downloaded from www.chhwoodproducts.co.nz or contact Carter Holt Harvey Woodproducts on 0800 326 759.

Table 1: Ecoply® Product Range

Nominal Thickness (mm)		7		9		12		15		17		19		21		25	
Sheet length (x 1200 mm width)		2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
Ecoply Structural Square Edge	BD			●		●	●	●		●							
	CD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	DD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ecoply Flooring (pt)	CD							●	●	●	●	● LS	● LS	●	●		●
Ecoply Roofing (pt)	DD							●	●	●	●						

- ● Available untreated only
- ● Available either untreated or H3.2 CCA
- ● Available either untreated or H3.1 LOSP

pt Machine grooves on both long edges with a plastic polypropylene tongue in one groove, 1200 mm cover

LS Ecoply 19 mm F11/F8 Longspan Flooring

- Full range may not always be available ex stock, check with your Ecoply supplier to ensure availability
- Non standard specifications, including thicker sheets may be available to special order in significant quantities
- All products are F8 stress grades
- Ecoply 15 mm/17 mm Roofing and Ecoply 19 mm Longspan Flooring are supplied as standard in F11 stress grade[1]
- Other Ecoply products are also available in F11[1] upon request

[1] Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

1.3 SURFACE GRADES

Table 2A summarises the surface appearance grades in which Ecoply structural plywood is available with some typical applications for each surface grade.

The surface grade specifications are defined in AS/NZS 2269. Table 2B details surface appearance grades for specialty Ecoply plywood and typical applications.

Table 2A: Ecoply® Structural Square Edge Products

Face Grade B	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:**
• Furniture/Joinery/Signs • Interior Linings • Sheathing • Engineering components where a superior visual finish is required	• Structural gussets • Stressed skin panels • Bins, boxes, crates • Hoardings • Membrane substrate	• 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:**
• Substrate for flooring overlays such as linoleum, tiles and rigid coverings • Substrate for membrane roofing and decking where visible appearance is critical	• Substrate for asphalt shingles • Substrate for roof systems where a smooth substrate is not required

Notes: A higher visual grade may be substituted if required. e.g. Ecoply CD can be used anywhere DD is used. Pictures shown above are scaled down versions of typical Ecoply sheets. Grain pattern and colour may vary. If sheet appearance is critical select panels individually.

1.4 PRESERVATIVE TREATMENT

Ecoply structural plywood is available untreated or treated in accordance with AS/NZS 1604.3. If treated, Ecoply structural plywood is treated with either H3.2 CCA (Copper Chrome Arsenate) or H3.1 LOSP (Azole) clear treatment. H3.1 LOSP is the standard preservative treatment for BD Structural Square Edge products and by special request for other Ecoply plywood products.

H3.2 CCA and H3.1 LOSP treated plywood in accordance with AS/NZS 1604.3 is described as suitable for: "outside, above ground, subject to periodic moderate wetting and leaching."

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

The characteristics of the treatments are shown in Table 3.

Table 3: Preservative Treatment

	Untreated	H3.2 CCA	H3.1 LOSP (Azole)
Preservative carrier	N/A	Water	Light organic oil (white spirits)
Colour	Natural	Green	Clear (i.e. natural)
Fungicide	Heat treated dry wood	Copper	Propiconazole and Tebuconazole
Insecticide	Heat treated dry wood	Arsenate	Permethrin
Other chemicals	N/A	Chrome (to fix preservative in wood)	Butyl Oxitol (co-solvent to assist active stability)
Mouldicide	N/A	Copper (limited efficacy)	IPBC
Notes	Plywood for dry interior use, supplied ex mill at <15% moisture content	Dried after treatment to average 18% moisture content for use in service at higher moisture contents	Solvent does not affect dimensions. Solvent smell disappears over time
Availability	Readily available	Standard treatment except for Ecoply BD	Treated to order for CD, DD, flooring and roofing products. Standard treatment for Ecoply BD
Applications (Refer NZ3602)	Interior dry protected	Exterior/Interior damp (service performance subject to detailing & coatings)	

H3.2 CCA

Ecoply structural plywood, which is H3.2 CCA treated (waterborne preservative with a green colour), is dried following treatment so that sheets may return to the correct dimensions. The moisture content after treatment with CCA and drying will be higher than the limits placed in AS/NZS 2269 on untreated product. The target is for an average moisture content of approximately 18% to provide a panel closer to the expected equilibrium moisture content for most H3.2 CCA applications.

The fillets used to separate sheets in drying may leave marks on the sheet surface. These will fade over time as the plywood weathers, and can be disguised with paint but may be visible under stain. The process of treating with H3.2 CCA and subsequent drying is likely to increase the face checking of the panel.

For more information on face checking refer to section 1.8 General Design Considerations - Aesthetics.

H3.1 LOSP

H3.1 LOSP treated Ecoply retains the wood colour and does not contain moisture so the plywood remains at the same dimensions and moisture content during treatment. However, the plywood when freshly treated may contain more than 60 litres of organic fluid per cubic metre. When coating H3.1 LOSP treated plywood, traces of residual solvent may be present on the sheet surface from the treatment process. Sheets feeling greasy to touch should be placed in a well ventilated area and allowed to flash off to ensure proper adhesion of paints and stains to the sheet surface.

The H3.1 LOSP solvent smell can be quite strong and venting is recommended until most of the solvent has evaporated. Untreated plywood is recommended for internal applications where NZS 3602 allows the use of untreated plywood

Mechanical fasteners are recommended to fix H3.1 LOSP treated Ecoply to framing. If adhesives are required, thorough venting is recommended and H3.1 LOSP tolerant adhesives should be applied according to the adhesive manufacturer's instructions. See section 2.3 Adhesives.

1.5 SECTION PROPERTIES

Table 4A: Section Properties of Ecoply® Structural Plywood

		Section properties per mm width						
		Parallel to the face grain			Perpendicular to the face grain			
Nominal plywood thickness[2] (mm)	**ID code**[3]	**Mass** (kg/m²)	**Parallel Moment of Inertia** (mm⁴)	**Section Modulus** Z (mm³)	**Shear Constant** I/Q (mm²)	**Perpendicular Moment of Inertia** I (mm⁴)	**Section Modulus** Z (mm³)	**Shear Constant** I/Q (mm²)
7	7-24-3	4.0	30.0	8.3	5.2	2.0	1.7	2.3
9	9-30-3	5.0	58.6	13.0	6.4	4.0	2.7	2.9
12	12-24-5	6.6	115.0	19.2	9.3	33.4	9.3	5.4
15	15-30-5	8.3	225.0	29.9	11.6	65.2	14.5	6.8
17	17-24-7	9.2	285.0	33.9	12.2	122.0	20.4	9.4
17	17-24-6	9.2	273.0	32.5	12.3	134.0	22.3	9.5
19	19-30-7	10.6	451.0	46.9	13.7	157.0	23.8	10.7
21	21-30-7	11.6	556.0	52.9	15.2	239.0	31.9	11.8
25	25-30-9	13.5	897.0	72.9	17.8	381.0	41.0	13.9

Table 4B: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F8 Grade

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F8)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	**ID code**[3]	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)
12	12-24-5	1046.5	480.0	15.6	303.9	231.7	9.2
15	15-30-5	2047.5	747.5	19.5	593.3	362.5	11.4
17	17-24-7	2593.5	847.5	20.5	1110.2	510.0	15.9
17	17-24-6	2484.3	812.5	20.7	1219.4	557.5	16.0
19	19-30-7	4104.1	1172.5	23.0	1428.7	595.0	18.0
21	21-30-7	5059.6	1322.5	25.5	2174.9	797.5	19.8
25	25-30-9	8162.7	1822.5	29.9	3467.1	1025.0	23.4

Table 4C: Nominal Strengths of Sections of Ecoply® Structural Plywood For Limit States Design: F11[1] Grade (Including Longspan Flooring)

		Nominal strengths (Limit States) per mm width					
		Parallel to the face grain (F11)			Perpendicular to the face grain (F8)		
Nominal plywood thickness[2] (mm)	**ID code**[3]	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)	**Bending Stiffness EI** (1000 Nmm²)	**Bending Moment $f_{pb}Z$** (Nmm)	**Rolling Shear $f_{pr}I/Q$** (N)
12	12-24-5	1207.5	595.2	16.7	303.9	231.7	9.2
15	15-30-5	2362.5	926.9	20.9	593.3	362.5	11.4
17	17-24-7	2992.5	1050.9	22.0	1110.2	510.0	15.9
17	17-24-6	2866.5	1007.5	22.1	1219.4	557.5	16.0
19	19-30-7	4735.5	1453.9	24.7	1428.7	595.0	18.0
21	21-30-7	5838.0	1639.9	27.4	2174.9	797.5	19.8
25	25-30-9	9418.5	2259.9	32.0	3467.1	1025.0	23.4

1 Where the stress grade F11 is referred to in all CHH Woodproducts plywood literature actual stress grade properties of panels are F11 parallel to the face grain and F8 perpendicular to the face grain

2 Actual thickness of Ecoply sheets manufactured to thickness tolerances stated in AS/NZS 2269

3 Identification code: panel thickness – outermost veneer thickness x 10 – number of plies

4 I/Q values for rolling shear are for stress at the neutral axis calculated as in NZS 3603

Notes:

- Use Tables 4A & B values for all F8 stress grade Ecoply products
- Use Tables 4A & C values for all F11 stress grade Ecoply (including 19 mm Ecoply Longspan Flooring)
- The section properties in Tables 4A, B & C have been calculated in accordance with AS/NZS 2269
- For section properties for other thicknesses and Shadowclad® products contact CHH Woodproducts on 0800 326 759

Structural properties of Ecoply® plywood

The majority of Ecoply plywood is F8 grade (exceptions are identified in section 1.2: Product Description & Range) and the characteristic values may be used in conjunction with both NZS 3603 and AS 1720 for the design of timber components. The characteristic strengths in Table 5 have been used to provide the nominal strengths in Tables 4B and 4C.

Table 5: Structural Properties of Ecoply® Plywood

	Characteristic Strength MPa	
Stress Grade	**F8**	**F11**
Bending (f_{pb})	25.0	31.0
Tension (f_{pt})	15.0	18.0
Panel shear (f_{ps})	4.2	4.5
Rolling shear (f_{pr})	1.7	1.8
Compression in plane of sheet (f_{pc})	20.0	22.0
Compression normal to the plane of the sheet (f_{pp})	9.7	12.0
Modulus of elasticity (E)	9100	10500
Modulus of rigidity (G)	455	525

Source: AS/NZS 2269

Wood is strongest when stressed parallel to the grain and weakest across the grain, so the lay up or arrangement of veneers in the panel determines the properties. Because of its cross banded construction, plywood possesses significant strength and stiffness both parallel and perpendicular to the direction of the face grain, but is generally strongest and stiffest along the direction of the face grain.

The section properties of structural plywood in Table 4A are calculated in accordance with AS/NZS 2269 to allow for the reduced contribution of veneers perpendicular to the direction of stress. For engineering design to NZS 3603, the section properties are multiplied by stresses and 'k' and ø factors to determine resistances for limit states design.

Resistances and nominal strengths in Tables 4B and 4C assume all 'k' factors are equal to 1.0. Multiply tabled values by the strength reduction factor ø and 'k' factors for specific in-service conditions for design to a structural code such as NZS 3603.

Table 5A: Strength Reduction Factors

Structural Timber Material	**Application of Structural Member**		
	Category 1	**Category 2**	**Category 3**
	Structural members for houses for which failure would be unlikely to affect an area[1] greater than 25 m²; OR secondary members in structures other than houses	Primary structural members in structures other than houses; OR elements in houses for which failure would be likely to affect an area[1] greater than 25 m²	Primary structural members in structures intended to fulfil essential services or post disaster function
	Value of Strength Reduction Factor Ø		
Structural Plywood – AS/NZS 2269.0	0.95	0.85	0.75

[1] In this context area should be taken as plan area.

1.6 PRODUCT IDENTIFICATION

In accordance with AS/NZS 2269, Ecoply structural plywood sheets have the following information marked on the back:

- Brand name: e.g. ECOPLY
- Face grade, back grade: e.g. CD
- Intended application: e.g. STRUCTURAL
- Panel construction code: e.g. 19-30-7 (Thickness (mm)-Face veneer thickness (mm x 10)-Number of veneers)
- Glue bond: eg. A BOND
- Formaldehyde emission class: E0 for A Bond Ecoply
- Australasian Standard: e.g. AS/NZS 2269
- Treatment Standard (if applicable): eg. AS/NZS 1604.3:2012
- Date and time of manufacture: e.g. 01/12/15 12:23:45
- Stress grade: e.g. F8 (exceptions include Shadowclad® and Grooved Lining which are performance rated)
- The Engineered Wood Products Association of Australasia (EWPAA) brand and mill number: e.g. 911 (Tokoroa mill)

Untreated example:

ECOPLY CD FLOORING STRUCTURAL
19-30-7 A BOND E0 AS/NZS 2269.0:2012
PAT 01/12/15 12:23:45 F11/F8
911

Treated example:

ECOPLY CD STRUCTURAL
25-30-9 A BOND E0 AS/NZS 2269.0:2012
AS/NZS 1604.3:2012 046 01 H3 E CCA
RETREAT CUTS PAT 01/12/15 12:23:45 F8/F8
911

Note: Performance based products like Grooved Lining and Shadowclad may include brand identification instead of visual quality, stress grade, and panel code. These panels, when accompanied with specification literature, are still deemed to comply with AS/NZS 2269

1.7 CODE COMPLIANCE

Ecoply plywood manufacture is third-party audited through the product quality control programme of the Engineered Wood Products Association of Australasia (EWPAA) which is itself audited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

CHH Woodproducts is licensed by the EWPAA to stamp plywood with the EWPAA/JAS-ANZ Product Certification Mark. This certifies it has been manufactured under the third party audited Joint Product Certification programme to monitor compliance with joint Australian/New Zealand Standard AS/NZS 2269 Plywood – Structural. Plywood to this standard is referenced in the NZBC Acceptable Solutions and Verification Methods through:

- NZS 3602 The Use of Timber and Wood-based products for Use in Building
- NZS 3603 Timber Structures
- NZS 3604 Timber Framed Buildings
- AS/NZS 1604.3 Specification for Preservative Treatment, Part 3:Plywood
- E2/AS1 External Moisture

WARNING: Plywood which is non-certified or is manufactured to standards other than AS/NZS 2269, such as US voluntary standard PS1-95, is not referenced in the NZBC. There can be significant differences between AS/NZS 2269 certified and non certified plywood around bond durability, structural ratings and veneer quality.

Structure B1

Design to NZS 3603 Timber Structures complies with the NZBC in Verification Method B1/VM1 Clause 6.0 Timber. Plywood is the only sheet material with properties listed in NZS 3603. Ecoply structural plywood is available in F8 stress grade. Some specialty products are available F11 or with specifically designed properties for specialised applications.

1.8 GENERAL DESIGN CONSIDERATIONS

Durability (Clause B2) and exterior moisture (Clause E2)

Ecoply plywood is made from softwood solid radiata pine veneer. Designers should assess the level of exposure to biological, moisture, and other hazards and apply appropriate preservative treatment and detailing to minimise exposure to these hazards.

Information in this manual outlines suggested practices for detailing building components to exclude moisture to comply with the durability requirements of the NZBC.

Formaldehyde

Ecoply plywood is manufactured using phenol formaldehyde resins which are fully cured in the hot press. Cured resin is thermally and moisture stable and formaldehyde emissions for the glued plywood are similar to background levels for the wood by itself when tested to AS/NZS 2098.11 Determination of formaldehyde emissions for plywood. Accordingly every panel is branded with the lowest emission class (less than 0.5 mg/litre for E_0).

Actual formaldehyde emissions for Ecoply plywood have been tested and approved as having an actual formaldehyde emission level of less than 0.3 mg/ litre (equivalent to a Super E_0 emission level).

Moisture content and dimensional change

At the time of leaving the factory, the moisture content of untreated Ecoply plywood should generally be in the range of 8% to 15% as required by AS/NZS 2269. All wood products including plywood respond to changes in ambient humidity so the eventual moisture content of plywood varies according to how dry or how wet the environment is. After manufacture, the moisture content will move to equilibrium with the environment, and the veneers swell or shrink across the grain in response. The total expansion both along and across a 2400 x 1200 mm panel can be in the order of 1.5 mm to 3 mm as the plywood changes from a dry to a saturated state.

Ecoply that is treated with waterborne preservatives (e.g. H3.2 CCA) is expected to be used in applications that have higher humidity than interior dry use, so following treatment it is dried to a higher average moisture content of approximately 18%. This provides for a more stable panel in service than placing a dry (less than 15%) sheet in a higher moisture environment.

Detailing and construction must allow for movement if the plywood will be subject to cycles of moisture change. Seasonal and daily cycles can be significant depending on the end use.

Temperature

Wood will expand upon heating as do practically all solids. The thermal expansion of plywood is quite small and there is little effect on the structural performance or durability of plywood when used in temperatures below 54°C. The average co-efficient of thermal expansion of plywood is 4.5 x 10-6 mm/mm/°C. At temperatures above 55°C wood begins to deteriorate. Colours of coatings and finishes should be selected to reduce heat gain. For extreme conditions, further technical information is available by calling CHH Woodproducts on 0800 326 759.

The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214 Methods of determining the total thermal resistance of parts of buildings. e.g. Plywood has a Conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance R = 0.012/0.13 = 0.09.

Aesthetics

Ecoply plywood products can be selected for decorative or weather protection functions as well as structural performance. Acceptable Solution E2/AS1- External Moisture allows plywood manufactured to AS/NZS 2269, (minimum CD appearance grade, minimum 12 mm thickness and treated as required by NZS 3602) to be used for exterior cladding. For exterior cladding applications CHH Woodproducts strongly recommends Shadowclad® exterior cladding rather than smooth faced plywood such as Ecoply.

Shadowclad® features a textured (bandsawn) face which reduces the visibility of face checking and other appearance related issues which can occur on smooth faced plywood if not regularly maintained by the homeowner. For more information on plywood used as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction.

Face checks on plywood exposed to weather

Face checks are lengthwise separations of wood fibres in the face veneer of the plywood. They result from the normal swelling and shrinking of wood as it gains and loses moisture. It is important to realise that these checks are superficial, being confined to the face veneer. They do not alter the structural integrity of the plywood in any way. If you are the specifier, it is important to discuss these issues with your client and consider the length of exterior exposure, climate conditions and protection offered by the surface coating before finalising product choice.

Durability

The durability of Ecoply structural plywood will depend on the application. Detailing, treatment and installation details need careful consideration to satisfy the requirements of the NZBC.

Normally, 50 year durability can be achieved with untreated Ecoply in dry, interior exposure. For internal environments subject to high humidity or condensation H3.2 CCA treated Ecoply should be used.

For plywood as a rigid air barrier (including rigid air barrier acting as bracing) refer to the current Ecoply Barrier Specification and Installation Guide which can be downloaded from www.chhwoodproducts.co.nz.

Fire, spread of flame and smoke development

The following data on early fire hazard properties of uncoated Ecoply plywood are the result of tests carried out by Australian Wool Testing Authority AWTA to test structural plywood manufactured to AS/NZS 2269 in accordance with ISO 5660, reaction to fire tests (heat release, smoke production and mass loss rate). Part 1: Heat Release rate (cone calorimeter method).

Table 6 summarises the test configurations and associated material groups.

For plywood with decorative finish coatings or intumescent coating, performances depend on spread rates of the coating. For advice on specific coating systems and their suitability for use with Ecoply products, always refer to the coating manufacturer.

Table 6: Early Fire Hazard Properties of Ecoply® Plywood

Material	Species	Origin	Thickness	Treatment	Material groups
Plywood	Radiata Pine	New Zealand	7mm	CCA Treated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	12mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	Untreated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	LOSP Treated	Group 3
Plywood	Radiata Pine	New Zealand	19mm	CCA Treated	Group 3

1.9 SUSTAINABILITY

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

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

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

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

1.10 HEALTH & SAFETY

Ecoply should be handled in accordance with the Material Safety Data Sheets (MSDS) for untreated, H3.2 CCA and H3.1 LOSP treated Ecoply, which can be downloaded from www.chhwoodproducts.co.nz.

Always wear safety glasses or non-fogging goggles when machining Ecoply panels.

If wood dust exposures are not controlled when machining (sawing, routing, planing, drilling etc) a class P1 or P2 replaceable filter or disposable face piece respirator should be worn.

Wear comfortable work gloves to avoid skin irritation and the risk of splinters. Wash hands with mild soap and water after handling panels.

1.11 STORAGE & HANDLING

Ecoply panels must be stored and handled with care to maintain good condition before use and after installation:

- The storage area must be protected from sun, rain and wind that would otherwise bring about rapid changes in temperature and humidity
- Support for the sheets must be provided at both ends and middle to avoid distortion. Ensure bearers in packs above are aligned over bearers below (to avoid inducing curves in sheets)
- The stack must be kept dry and clear of ground contact, and placed so that it will not be exposed to mechanical damage
- The sheets must be stacked flat, NOT on edge
- Store in well-ventilated areas away from sources of heat, flame or spark
- To avoid staining, fading and surface checking, the sheets must not be exposed to the weather while awaiting installation
- Store in well-ventilated areas away from sources of heat, flames or sparks

2.0 GENERAL INSTALLATION GUIDE

The following is a general guide to be followed unless otherwise specified. For additional installation instructions for typical applications refer to sections 3, 4 and 5.

2.1 FRAMING

Use kiln dried framing e.g. Laserframe® in accordance with timber framing manufacturer's specifications and treated in accordance with NZS 3602. All timber frame sizes and set out must comply with NZS 3604 (or be specifically designed to NZS 3603). The current Laserframe Product Guide can be downloaded from www.chhwoodproducts.co.nz. Ecoply may be specified for frame spacing determined by design, or using tables in section 3 for specific product applications such as bracing, flooring and as a substrate for shingle roofs or membrane roofs and decks.

H3.1 LOSP treated framing should be vented before fixing and if construction adhesives are required (for example to screw and glue floor panels) the adhesive must be compatible with H3.1 LOSP. See section 1.4: Preservative Treatment.

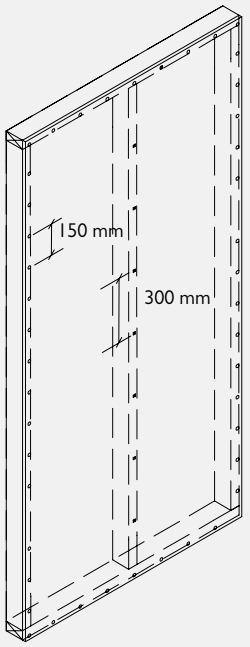
For plywood used as exterior cladding refer to the current Shadowclad® Specification & Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz

For plywood used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide which can be downloaded from www.chhwoodproducts.co.nz

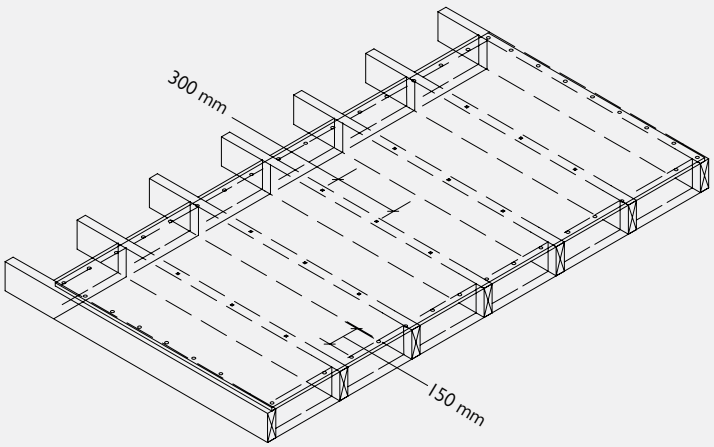
2.2 SHEET FASTENERS AND FIXING

- Where there is risk of panel size change due to changes in moisture levels, allow a 2 to 3 mm expansion gap between sheets
- Use only flathead nails or screws, with or without construction adhesives
- Fastener length should penetrate at least 10 nail diameters into the framing or be three times the sheet thickness, whichever is the greater. Longer or ring shank nails may be specified
- Fasteners must be at least 3 fastener diameters or 7 mm from the edge of the sheet
- For tongue and groove products such as flooring and roofing fasten 15 mm from tongue and groove edges
- Standard fixing pattern: unless otherwise specified fasten edges and ends of sheets at 150 mm centres, and within the panel at no more than 300 mm centres (see diagram below)
- Use hot dipped galvanised fasteners or corrosion resistant fasteners (i.e. stainless steel) determined by design for specific hazards
- Where using stainless steel nails, nails must be annular grooved
- Refer to Table 7 for minimum fastener sizes
- Do not overdrive power driven nails

EC001: Fastener spacings for Ecoply®



Ecoply® fastened in vertical plane



Ecoply® fastened in horizontal plane

Table 7: Fasteners and Characteristic Shear Loads for Ecoply®

Nominal Thickness (mm)	7mm / 9mm	Load[1]	12mm / 15 mm	Load[1]	17 mm	Load[1]	19mm / 21mm	Load[1]	25 mm	Load[1]
Minimum nail size in timber framing[2]	40 x 2.5 mm	570	60 x 2.8 mm	736	60 x 2.8 mm	736	60 x 2.8 mm	736	75 x 3.15 mm	883
Screw size in timber framing[2]	8g x 30 mm	1230	8g x 40 mm	1230	10g x 40 mm	1650	10g x 45 mm	1650	10g x 50 mm	1650
1.15 mm steel framing[3]	10-24-35[4]	1300	10-24-40[4]	2000	10-16-45[4]	2100	10-16-45[4]	2100	10-16-45[4]	2100
Screw size in 2.80 mm steel framing[3]	10-24-35[4]	1200	10-16-404	1200	14-20-45[4]	3000	14-20-45[4]	4000	14-20-45[4]	5000

1 The load is the characteristic load (N) for one fastener in single shear

2 Characteristic load based on fixing into a timber of J5 joint group or better

3 Self tapping, self countersinking screw

4 Screw Numbers indicate: Gauge – Threads per inch – Length (mm)

Notes

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested
- Other screw sizes may be used. Screw properties vary between screw suppliers and the suitability of a particular size should be verified by the designer for performance under changing physical conditions and cyclic loading
- Non-standard nailing may be specifically designed with NZS 3603 or similar

Fasteners for H3.2 CCA treated Ecoply®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Notes

H3.2 CCA treated timber should not be fixed in direct contact with light gauge steel products. Refer to the framing manufacturer for advise on fixing and treatments.

2.3 ADHESIVES

Tube applied construction adhesives

Site applied construction adhesives may be used together with nails and screws for non permanent loads, reduced fastener popping, and to lower the risk of squeaking in floors. Available types include polyurethane (e.g. Holdfast® Gorilla Nailpower®) and elastomeric (e.g. Bostik® Wallboard Gold) based adhesives.

Elastomeric adhesives should meet the requirements of APA Performance specification AFG 01 Adhesives for field gluing plywood to wood framing. Other types should have appraisal from an independent authorising body such as BRANZ or equivalent authorities for the specific applications proposed. Follow manufacturer's recommendations. In addition:

- Use a bead or daubs of adhesive as per manufacturer's recommendations
- Apply pressure using fastener patterns outlined in section 2.2: Sheet Fasteners and Fixing
- Work from the middle of the sheet outwards to develop glueline pressure
- Ensure adhesives are compatible with treatment in the framing timber, see section 1.4: Preservative Treatment

Structural adhesive joints

Structural bonds are generally only achievable in factory controlled conditions using approved structural adhesives in accordance with approved standards for glue lamination, e.g. Resorcinol formaldehyde joints made to AS/NZS 1328 Glued laminated structural timber. Site gluing is not recommended for structural plywood components. Contact CHH Woodproducts on 0800 326 759 for further information.

3.0 STRUCTURAL BRACING & CEILING DIAPHRAGMS

The Ecoply bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading, to meet the requirements of the NZBC - B1 Structure, and NZS 3604 *Timber Framed Buildings* or specifically designed to NZS 3603 *Timber Structures Standard.*

Any Ecoply structural panel may be used for bracing as long as it is 7 mm, 9 mm or 12 mm thick, has a minimum wall length as described in Table 9, treated for the specific application in accordance with NZS 3602 (summarised in Table 8) and fixed in accordance with Ecoply bracing specifications outlined in this guide.

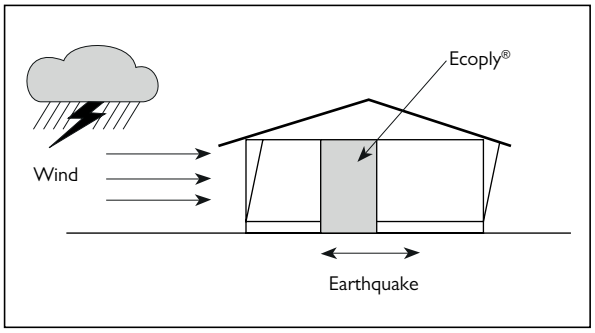
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

Structure

Timber framed buildings to NZS 3604 Timber Framed Buildings is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution B1/AS1 Structure.

CHH Woodproducts have developed a range of wall bracing elements tested using P21 testing methods referenced in NZS 3604.

Specific design



Ecoply structural plywood is manufactured to AS/NZS 2269, and it is suitable for design and use in earthquake and wind bracing systems constructed in accordance with NZS 3603 and AS/NZS 1170.

Structural plywood to AS/NZS 2269 is the only sheet brace material with properties defined in a published New Zealand engineering design code, NZS 3603 Timber Structures, and so can be designed in compliance with Verification method B1/VM1 under Clause 6.0 Timber for use in buildings over three storeys in height.

Demand is calculated by following section 5, Bracing Design of NZS 3604 or using the GIB EzyBrace® software, downloadable from www.gib.co.nz

EP bracing systems properties can be easily loaded into the EzyBrace software by way of an Excel patch downloadable from www.chhwoodproducts.co.nz together with loading instructions.

Timber Floors

When carrying out a bracing design for buildings with timber floor structures, the maximum bracing rating that can be accounted for when summing up the bracing units is 120 BUs/m. This does not exclude the installation of bracing elements that are rated higher than 120 BUs/m, however the extra bracing capacity can not be accounted for in the bracing design.

Specific design of floor and sub-floor framing is required for elements rated higher than 120 BUs/m.

Durability

Ecoply plywood is manufactured to meet the requirements of NZS 3602 Timber and Wood based products for use in buildings. If the product is used, handled and installed in accordance with CHH Woodproducts product literature it will meet the durability Clauses of the NZBC.

Table 8 summarises the applications in which Ecoply can be used as structural bracing together with the required preservative treatment and fastener material.

Table 8: Ecoply® Suitability for Bracing Applicatons Including Treatment Type & Fastener Material

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray): E.g. Interior linings	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/ without building paper/ wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/without building paper/wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply® Barrier Specification and Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones' D	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones, as per section 4 of NZS 3604 (including sea spray)	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

Note: Power driven nails are suitable for use. Do not overdrive, nails must be full round head

Rain wetting and construction bracing

Untreated Ecoply will withstand normal exposure conditions during construction for up to 3 months however aesthetically the sheet appearance will deteriorate as the level of exposure increases. Rain and exposure can cause thinner plywood panels to buckle. Plywood stability is related to the number of veneers and thickness of the panel. Where panel stability is critical, consider using thicker panels.

Humidity and condensation

In conditions where the moisture content may exceed 18% for prolonged periods, Ecoply must be H3.1 LOSP or H3.2 CCA treated to resist decay or insect hazard.

Subfloor sheet bracing

H3.2 CCA treated Ecoply can be used as sheet bracing where dampness does not allow the use of untreated plywood or other sheet materials (section 5 of NZS 3604). Where Ecoply subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, 100% acrylic exterior coating system with a light reflectance value of 50% or greater.

Adjustments for wall height

Use section 5 of NZS 3604 to calculate bracing values: "Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

(a) For wall bracing elements of heights other than 2.4 m, the bracing rating determined by test or from Table 9 should be multiplied by 2.4 ÷ element height in metres, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
(b) Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height."
(c) Walls with heights < 1.5m, Specific Engineering Design is required.

Joining panels for walls higher than maximum sheet length

Ecoply bracing panels must be fixed from top plate to bottom plate. For wall heights over 2.4 m, Ecoply and Shadowclad® is available in 2.7 m sheet lengths. Alternatively, a part sheet can be stacked above a full sheet, butt joined on a single row of nogs with each sheet/part sheet independently nailed off as per the nail spacing in the Ecoply bracing specifications (e.g. 2.4 m x 1.2 m sheet with a 0.3 m x 1.2 m part sheet above it to give a 2.7 m x 1.2 m bracing element).

Cladding as bracing

12 mm Ecoply (CD face grade or better) can be H3 treated to meet the requirements of Acceptable Solution E2/AS1 and will perform as a structural, durable and weathertight cladding and bracing element when installed in accordance with E2/AS1.

It should be noted smooth faced plywood such as Ecoply may be prone to appearance related issues such as face checking which occurs naturally and is not considered by CHH Woodproducts to be a manufacturing or product fault. For more information refer to section 1.8: General Design Considerations - Face Checks on Plywood Exposed to Weather. H3.2 CCA treated Ecoply may also have a green tinge to the wood surface and may have fillet marks on the face of the sheet.

Plywood for exterior cladding applications where a high visual appearance is desired, CHH Woodproducts recommends the use of Shadowclad as an exterior cladding. Shadowclad has a textured (bandsawn) face which reduces the visibility of face checking and is most commonly H3.1 LOSP treated (clear preservative treatment) which does not leave fillet marks on the panel face.

For further information on Shadowclad as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz.

Soil

Ecoply must not be allowed to come in contact with soil. The bottom edge of the plywood sheet must be a minimum of 100 mm above decks or paved ground and a minimum of 175 mm above unprotected ground.

Service penetrations in bracing elements

Small openings (e.g. power outlets) of 90 x 90 mm or less may be placed no closer than 90 mm to the edge of the braced element, or waste pipe outlets of max. 150 mm diameter placed at no closer than 150 mm to the edge of the braced element.

3.2 ECOPLY® BRACING SPECIFICATIONS SUMMARY

CHH Woodproducts has a range of bracing specifications called the EP bracing series. The EP bracing series simplifies the design and construction of bracing elements using plywood, by itself or in conjunction with GIB® Plasterboard and features:

- Single sided and double sided bracing elements High performance bracing element utilising GIB® Standard plasterboard
- A single type, GIB Handibrac®, hold-down for all bracing elements
- Specifications for each bracing element type

Table 9: Summary P21 Ratings for 2.4m High Ecoply® Wall Elements

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EP1	0.4 m	Ecoply one side	80	95
	0.6 m		95	105
	1.2 m		120	135
EPG	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
	1.2 m		150	150

Note: Bracing and other technical information has been specifically tested using Ecoply branded structural plywood. This information cannot be used with any other plywood brand and bracing data must be sought directly from the specific plywood manufacturer.

More information

The following pages provide a full specification of EP bracing elements. Copies of specifications can be downloaded from www.chhwoodproducts.co.nz

NZS 3604 provides the method of calculating demand on a building. Calculation sheets are available from BRANZ or GIB EzyBrace® software is available as a free download from www.gib.co.nz. Information is available at www.chhwoodproducts.co.nz which can be placed in the custom elements of GIB EzyBrace® for ease of calculation

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

SEPTEMBER 2015

3.3 ECOPLY® BRACING SPECIFICATION - EPI

Table 10: Singled Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EP1_0.4	0.4 m	Ecoply one side	80	95
EP1_0.6	0.6 m	Ecoply one side	95	105
EP1_1.2	1.2 m	Ecoply one side	120	135

Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

One layer of 7 mm, 9 mm or 12 mm Ecoply plywood fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Fastening the Ecoply® panels

Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

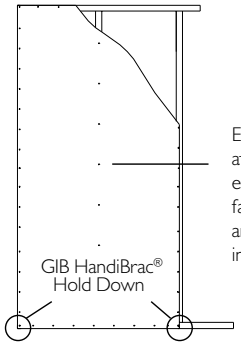
Fasteners for H3.2 CCA treated Ecoply® panels

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

SEPTEMBER 2015

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.

SEPTEMBER 2015

3.4 ECOPLY® BRACING SPECIFICATION – EPG

Table 12: Structural Plywood Brace with Plasterboard Other Side

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EPG_0.4	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
EPG_1.2	1.2 m		150	150

Framing

Wall framing must comply with:

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

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

Side 1: One layer of 7 mm, 9 mm or 12 mm Ecoply plywood exterior wall cladding fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Side 2: One layer of 10 or 13 mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

Fastening the Ecoply® panels

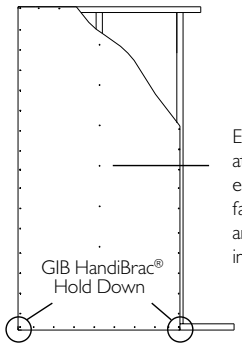
Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

Fasteners for H3.2 CCA treated Ecoply®

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



Ecoply® fixed with 50 x 2.8 mm nails at 150 mm centres to perimeter of each sheet at no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB HandiBrac® are registered trade marks of Fletcher Building Holdings Ltd.

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.

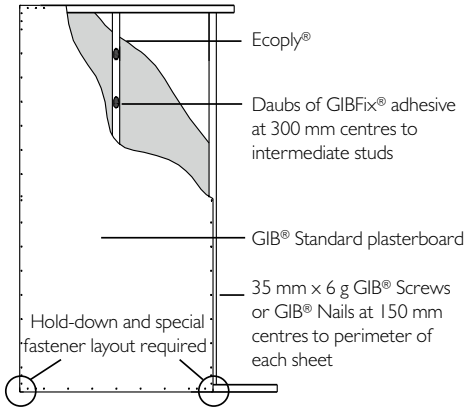


Table 13: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

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 zones1 B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone1 D (sea spray), as per section 4 of NZS3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in eexposure zone D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

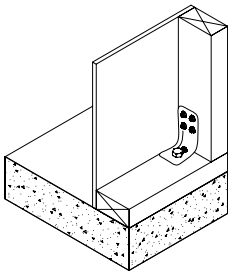
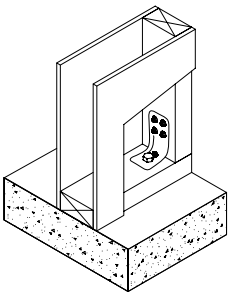
* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

3.5 GIB HANDIBRAC® – RECOMMENDED INSTALLATION METHOD

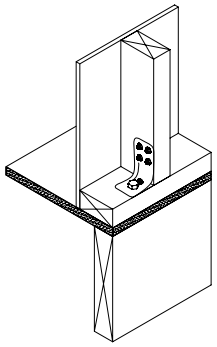
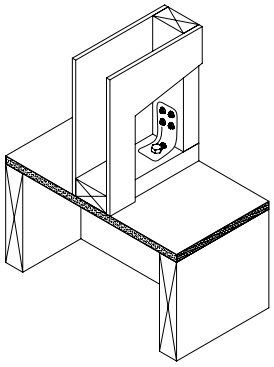
Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as the hold-down in all EP bracing elements.

- The GIB HandiBrac® registered design provides for quick and easy installation
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to check in the framing as recommended with conventional straps
- The GIB HandiBrac® is suitable for both new and retrofit construction
- The design also allows for installation and inspection at any stage prior to fitting internal linings

Concrete Floor

External Walls	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	

Reproduced with the permission of Winstone Wallboards Ltd

3.6 STRUCTURAL CEILING DIAPHRAGMS

Diaphragms are used to transfer lateral loads to braced walls and allow for greater spacing between bracing lines. Diaphragms do not have a BU rating themselves.

Plywood diaphragms are an acceptable solution as described in section 13 of NZS 3604 13.5.2 which allows for plywood not less than 6 mm thick and a minimum of three ply for:

(a) Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
(b) Diaphragms not steeper than 45 degrees to the horizontal and not exceeding 7.5 metres long under light or heavy roofs

Plywood ceiling diaphragms required to comply with NZS 3604 must be constructed as follows:

(a) The length of diaphragm shall not exceed twice its width measured between supporting walls
(b) The ceiling lining must consist of plywood over the entire area of the diaphragm
(c) Complete sheets with a minimum size of 1800 x 900 must be used
(d) Framing size and spacing must comply with NZS 3604
(e) Fastener size should comply with Table 7 of this guide. E.g. 40 mm x 2.5 mm flat head nails for 7 mm and 9 mm Ecoply
(f) Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
(g) Fixings are no closer than 10 mm from sheet edges
(h) Perimeter ceiling framing must be connected to wall framing by a perimeter 140 mm x 35 mm ribbon plate nailed to the top of the top plate or alternative such as a 0.55 mm thick steel angle or proprietary steel channel
(i) Sheets must be layed in a staggered pattern
(j) The basic shape of a ceiling diaphragm should be rectangular. Protrusions are permitted but cut-outs are not (see Figure 13.4 NZS 3604)

7.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code (NZBC)
- CHH Woodproducts technical notes - downloadable from www.chhwoodproducts.co.nz/document-library
- NZS 3640:2003 "Chemical Preservation of Round and Sawn Timber"
- NZS 3602:2003 "Timber and Wood-based products for use in Buildings"
- NZS 3603:1993 "Timber Structures Standard"
- NZS 3604:2011 "Timber Framed Buildings"
- AS/NZS 1170:2011 "Structural design actions"
- AS/NZS 2269:2012 "Plywood Structural"
- AS/NZS 1604.3:2010 "Specification for Preservative Treatment, Part 3: Plywood"
- AS 1684:2010 "Residential Timber Framed Construction"
- US Product Standard PS1-95
- Acceptable Solution 'E2/AS1 – External Moisture'
- Acceptable Solution 'B2/AS1 – Durability'
- BRANZ Bulletin 345: Flat membrane roofs – design and installation
- BRANZ Bulletin 346: Flat membrane roofs – materials
- BRANZ Bulletin 289: Asphalt shingle roofing
- BRANZ Appraisals 307, 404, 411
- Shadowclad® Specification & Installation Guide for Cavity Construction
- Ecoply® Barrier Specification & Installation Guide
- Material Safety Data Sheets
  - MSDS Azole Treated Plywood, LVL & I-Joists
  - MSDS H3 CCA Treated Plywood & I-Joist
  - MSDS Untreated Plywood
- APA (www.buildabetterhome.org)
- EWPAA (www.ewp.asn.au)
- Product Technical Statement for Ecoply available online (www.chhwoodproducts.co.nz/product-technical-statements)
- EWPAA Technical Note - Plywood Roofing and Flooring: Installation and detail factors

Standards can be purchased online at www.standards.co.nz
Building Code Compliance Documents can be downloaded free of charge at www.dbh.govt.nz

8.0 LIMITATIONS

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

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

This publication replaces all previous CHH Woodproducts design information and literature relating to Ecoply structural plywood products. CHH Woodproducts reserves the right to change the information contained in this document without prior notice.

It is your responsibility to ensure that you have the most up to date information available, including at the time of applying for a building consent. You can call toll free on 0800 326 759 or visit www.chhwoodproducts.co.nz to obtain current information.

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

LUMBERLOK®

09/2011

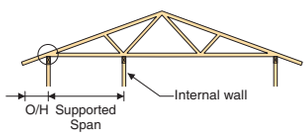
STUD TO TOP PLATE FIXING SCHEDULE
ALTERNATIVE TO TABLE 8.18 NZS 3604:2011

NOTE:

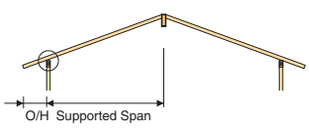
- ★ All fixings are designed to resist vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20 kPa.
- ★ Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist lateral loads.
- ★ These fixings assume the correct choice of rafter/truss to top plate connections 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

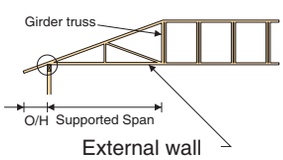
External wall
Standard truss



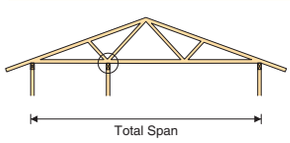
External wall
Internally supported truss



External wall
Rafter roof



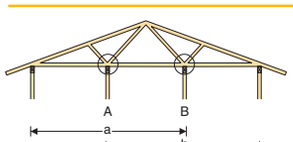
External wall
Jack truss



Internal wall
Internally supported truss
(overhang dimension does not apply)

EXTERNAL WALL
LOADED DIMENSION =
$\frac{\text{SUPPORTED SPAN}}{2}$ + O/H

INTERNAL WALL
LOADED DIMENSION =
$\frac{\text{TOTAL SPAN}}{2}$



Multiple internal walls
(overhang dimension does not apply)

MULTIPLE INTERNAL WALL
LOADED DIMENSION FOR
WALL A = $\frac{a}{2}$
WALL B = $\frac{b}{2}$

FIXING SELECTION CHART

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

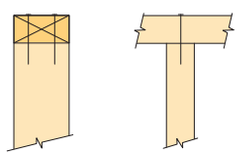
Wind Zones L, M, H, VH, EH, as per NZS 3604:2011

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

FIXING OPTIONS

FIXING TYPE A
0.7 kN

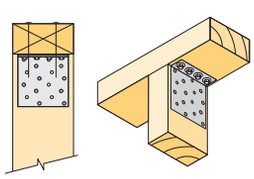
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



FIXING TYPE B
4.7 kN

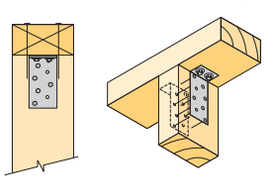
CHOOSE ANY OF THE 3 OPTIONS BELOW

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



Plus
LUMBERLOK
6kN Stud Anchor
(CPC80)

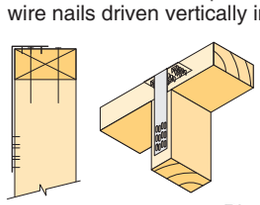
2 x 90mm x 3.15 dia. plain steel wire nails driven vertically into stud.



Plus
2 x LUMBERLOK
CPC40

Recommended for internal wall options to avoid lining issues

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



Plus
LUMBERLOK
Stud Strap
(one face only)

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

MiTek New Zealand Limited

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

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

www.miteknz.co.nz

MiTek®
GANG-NAIL® LUMBERLOK® BOWMAC®

09/2011

LUMBERLOK®

TOP PLATE JOINTING

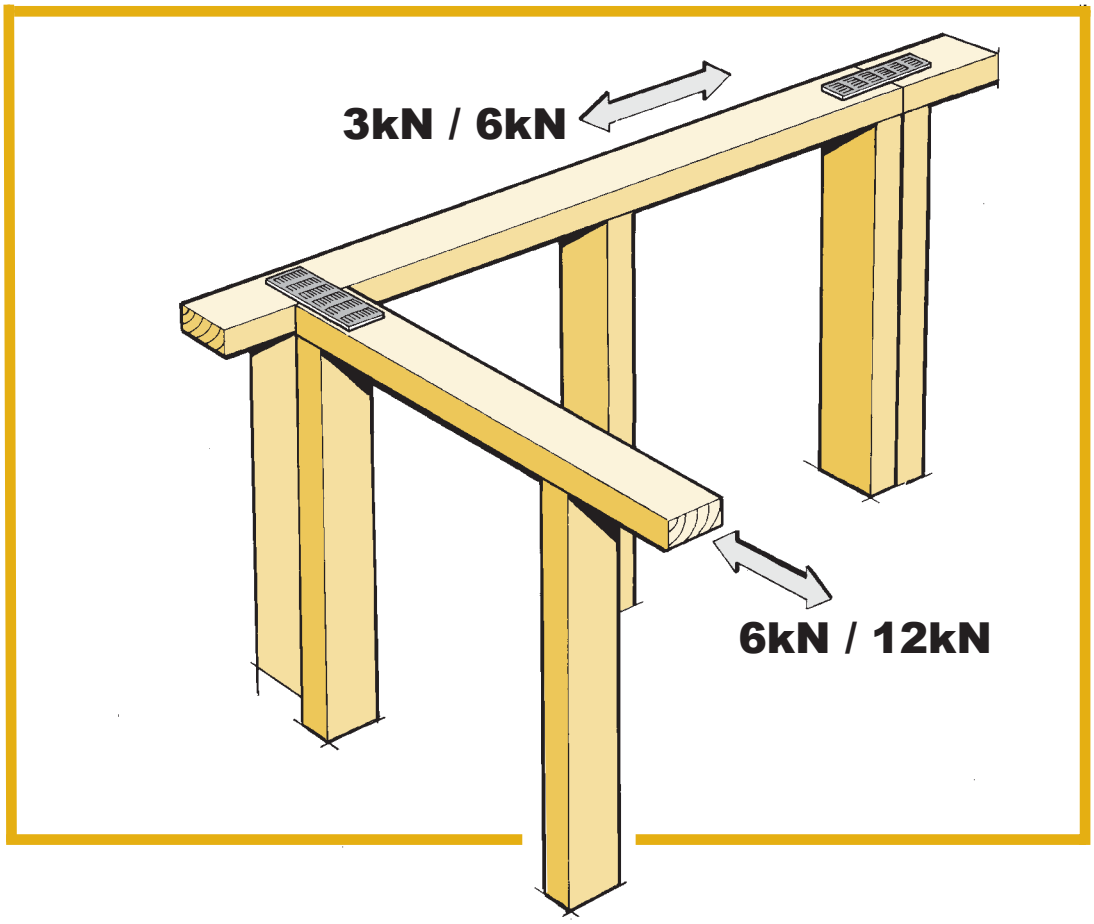
AS PER CLAUSE 8.7.3 NZS 3604:2011

Top Plates at Right Angles

Connection capacity	LUMBERLOK Connector
6 kN	Tylok 6T10 **OR** 2 x Strap Nails
12 kN	2 x Sheet Brace Straps fixed with 6 x LUMBERLOK Product Nails 30mm x 3.15 dia. per end per strap (24 nails total)

Top Plates in Line

Connection capacity	LUMBERLOK Connector
3 kN	Tylok 6T5 **OR** Strap Nail
6 kN	Tylok 6T10 **OR** 2 x Strap Nails



Available from leading Builders Supply Merchants throughout New Zealand

MiTek New Zealand Limited

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

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

www.miteknz.co.nz

MiTek®
GANG-NAIL® LUMBERLOK® BOWMAC®

BRANZ Appraised
Appraisal No.427 [2007]

BRANZ Appraisals

Technical Assessments of products for building and construction

BRANZ APPRAISAL No. 427 (2007)

Amended 31 January 2012

GIB AQUALINE® WET AREA SYSTEMS

Winstone Wallboards Limited
P O Box 12 256
Penrose
Auckland 1642

Tel: 09 633 0100
Fax: 09 633 0101
Helpline Tel: 0800 100 442
Helpline Fax: 0800 229 222
Web: www.gib.co.nz
Email: info@gib.co.nz

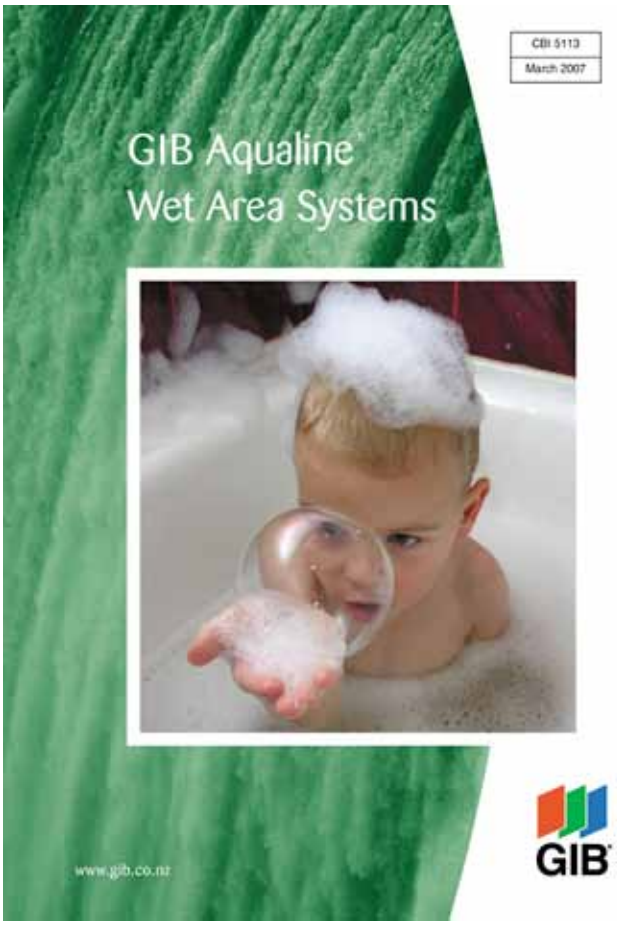
BRANZ

BRANZ Limited
Private Bag 50 908
Porirua City
New Zealand
Tel: +64 4 237 1170
Fax: +64 4 237 1171
www.branz.co.nz

WFTAO

Product

1.1 GIB Aqualine® Wet Area Systems are for the interior lining of timber and steel frame walls and ceilings in wet areas such as bathrooms, laundries, kitchens and toilets where a water resistant lining material is desirable.
1.2 GIB Aqualine® Wet Area Systems are based on 10 mm and 13 mm thick GIB Aqualine® water resistant plasterboard.



Scope

2.1 GIB Aqualine® Wet Area Systems have been appraised for use as a wet area wall and ceiling lining in buildings within the following scope:

- on framed walls and ceilings within the scope limitations on NZS 3604; and,
- on timber and light gauge steel framed walls and ceiling subject to specific design; and,

2.2 GIB Aqualine® may also be used to substitute for some other GIB® Plasterboards in fire-rated, sound-rated and bracing-rated wall and floor/ceiling constructions.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the GIB Aqualine® Wet Area Systems, 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 B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. GIB Aqualine® Wet Area Systems meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 (a), (f), (h) and (j)]. See Paragraphs 8.1 - 8.3.
Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.1 (c) 5 years. GIB Aqualine® Wet Area Systems meet these requirements. See Paragraphs 9.1 - 9.5.

Clause C3 SPREAD OF FIRE: Performance C3.3.1, C3.3.2, and C3.3.5. GIB Aqualine® Wet Area Systems meet these requirements by providing passive fire and smoke protection.
Clause E3 INTERNAL MOISTURE: Performance E3.3.4, E3.3.5 and E3.3.6. GIB Aqualine® Wet Area Systems meet these requirements. See Paragraphs 13.1 - 13.3.
Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. GIB Aqualine® Wet Area Systems meet this requirement and will not present a health hazard to people.
Clause G6 AIRBORNE AND IMPACT SOUND: Performance G6.3.1 and G6.3.2. GIB Aqualine® Wet Area Systems meet the requirements. See Paragraph 14.1.

3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

4.1 The GIB® plasterboards and accessories used in the GIB Aqualine® Wet Area System and supplied or specified by Winstone Wallboards Limited are as follows:

GIB Aqualine®

4.2 GIB Aqualine® is a paper-bound, modified water-resistant gypsum-plaster core sheet lining material. The sheets have a taper on the two long sheet edges. GIB Aqualine® is available in 10 mm and 13 mm sheet thicknesses, a sheet width of 1200 mm and in lengths of 2400 mm, 2700 mm, 3000 mm and 3600 mm. The maximum weights are 7.8 kg/m^2 and 10.2 kg/m^2 for 10 mm and 13 mm thick sheets respectively. GIB Aqualine® face paper is green in colour.

Fastenings

- GIB® Grabber® High Thread Drywall screws for fixing to timber:
  6g x 25 mm and 32 mm.
- GIB® Grabber® Self Tapping Drywall screws for fixing to light gauge steel:
  6g x 25 mm and 32 mm.
- GIB® Nails
  30 mm and 40 mm x 2.8 mm

Adhesive and Sealants

- GIBFix® One (Acrylic)
- GIBFix® All-Bond (Solvent)

GIB® Accessories and GIB® Jointing Compounds

- As specified in the GIB Aqualine® Wet Area Systems and GIB® Site Guide Technical Literature.

Finishes

4.3 Finishes such as tiling, flexible sheet vinyl, paints and wallpapers have not been assessed and are outside the scope of this Appraisal.

Handling and Storage

5.1 The best results are achieved when GIB Aqualine® is treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the GIB® Site Guide. Sheets must be carried on edge and not dragged.
5.2 All accessories must be kept dry.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the GIB Aqualine® Wet Area 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 GIB Aqualine® provides a water-resistant lining as a base for finishing systems in wet areas such as bathrooms, toilets, laundries and kitchens. The typical finishes are ceramic tiles and flexible sheet vinyl to walls and paint, and wallpaper to walls and ceilings.
7.2 GIB Aqualine® must not be used in the following situations:

- For bracing applications in shower areas or adjacent baths (See Paragraphs 7.4 and 8.2).
- In areas of high humidity (above 90% RH) or continually wet such as group showers, steam rooms, or swimming pools.
- Installed over a vapour barrier.
- Applied directly to masonry, concrete or solid plaster.
- Applied over other sheet lining materials.
- Used externally of the building envelope.
- Exposed to temperatures of 52ºC or greater for prolonged periods. (Refer to appliance and fitting manufacturer's for installation details.)

7.3 GIB Aqualine® may be substituted for some other GIB® Plasterboard products in specific GIB® Bracing Systems, GIB® Fire Rated Systems, GIB® Noise Control Systems and GIB Ultraline® PLUS Lining System.

Wet Areas

7.4 Wet areas are spaces where sanitary fixture and sanitary appliances are located such as bathrooms, toilets, laundries and kitchens. There are two general categories of wet areas as follows:

1. Water Splash – These are areas subject to intermittent splashing of water such as around baths, vanities, tubs and sinks.
2. Shower Areas – These are areas subject to frequent and heavy water splash such as enclosed showers, unenclosed shower zones and showers over baths.

7.5 Both the above wet area categories must be finished with surfaces and joints that are impervious and easily cleaned. Shower areas must additionally be waterproof. This can be achieved using proprietary rigid shower lining systems, flexible vinyl shower wall finish, or tiling. Tiled shower areas must include a wet area waterproofing membrane system under the tiles.

Intertenancy Walls – Wet Areas

7.6 Intertenancy drywall constructions that incorporate fire resistance and noise control must be protected from water splash. In shower areas GIB Aqualine® must not be substituted for other GIB® Plasterboards but must be an extra lining layer. Refer to the GIB Aqualine® Wet Area Systems Technical Literature.

Tiling

7.7 GIB Aqualine® is suitable as a substrate for tiling up to the following weights:

- 10 mm GIB Aqualine® up to 20kg/m^2
- 13 mm GIB Aqualine® up to 32kg/m^2.

Note: Most ceramic and porcelain wall tiles weigh less than 20kg/m². For further information on tiling consult the BRANZ Good Practice Guide – Tiling.

Framing

7.8 Supporting framing must comprise one of the following subject to the minimum sizes, dwang centres and all other frame requirements of GIB Aqualine® Wet Area Systems Technical Literature:

- Timber framing must be designed and constructed in accordance with NZS 3604, or to a specific design using NZS 3603 and AS/NZS 1170.
- Steel framing must be designed to withstand loads in accordance with AS/NZS 1170.

Structure

Bracing

8.1 GIB Aqualine® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. GIB Aqualine® can be used in place of GIB Braceline® in GIB® bracing elements 900 mm or longer, provided the perimeter of the element is fixed with GIB Braceline® Nails or GIB Braceline® screws at 100 mm centres, using the GIB Braceline® corner fixing pattern.

8.2 GIB Aqualine® must not be used for bracing in shower areas or behind baths.

Impact Resistance

8.3 GIB® plasterboards provide adequate resistance to soft body impact, based upon experience of use in domestic and light commercial applications.

Durability

Serviceable Life

9.1 GIB Aqualine® has a serviceable life of at least 15 years as a fully protected shower or water splash lining. As a general wall and ceiling lining GIB Aqualine® will have a serviceable life in excess of 50 years. The ability of GIB Aqualine® to remain durable is dependent on being protected and remaining dry in service, and being maintained in accordance with this Appraisal.

Maintenance

9.2 The building must be maintained weathertight and all lining systems protected from internal and external moisture.

9.3 Finishes to water splash and shower areas, including tiles, grout, waterproof membranes, sealants and flexible sheet vinyl must be checked to ensure the integrity of the system is maintained. They must be repaired or replaced if necessary. When repairing or replacing finishes, the GIB Aqualine® substrate must be checked for defects and repaired or replaced, as required.

9.4 For flexible sheet vinyl, particular attention must be paid to joints especially at corners. Checks should be made to ensure the vinyl has not been punctured. Where damage has occurred, repairs must be made immediately.

9.5 Impact damage to GIB Aqualine® plasterboard, resulting in small holes and cracks, may be patched, stopped and finished. For larger areas of damage, expert advice on repair must be sought from Winstone Wallboards Ltd.

Outbreak of Fire

10.1 Separation or protection must be provided to GIB Aqualine® Wet Area Systems from heat sources such as stoves, heaters, flues and chimneys.

10.2 NZBC Acceptable Solution C/AS1, Part 9 and Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

Spread of Fire

11.1 When 10 mm GIB Aqualine® is substituted into fire rated systems in place of 10 mm GIB Fyreline®, the FRR of that system will be maintained. Similarly, the FRR is maintained when 13 mm GIB Aqualine® is substituted for 13 mm GIB Fyreline®.

Flame Barrier

12.1 Where flame barriers are required by Acceptable Solution C/AS1 Table 6.3, GIB Aqualine® is a suitable material to provide a 10 minute flame barrier, provided all sheet joints are formed over framing, or backblocked with GIB® plasterboard.

Internal Moisture

13.1 When installed in accordance with this Appraisal, GIB Aqualine® Wet Area Systems will provide wall surfaces adjacent to sanitary fixtures and sanitary appliances that are impervious and easily cleaned.

13.2 The construction methods meet with the internal moisture requirements of the NZBC Acceptable Solution E3/AS1.

13.3 To minimise internal condensation, adequate levels of ventilation and thermal resistance must be provided to all spaces where moisture may be generated.

Airborne and Impact Sound

14.1 When GIB Aqualine® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®, the STC and IIC rating of that system will be maintained. When GIB Aqualine® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur.

Installation Information

Installation Skill Level Requirement

15.1 Installation of GIB Aqualine® Wet Area Systems can be carried out by any competent building contractor.

General

16.1 GIB Aqualine® Wet Area Systems must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

Cutting

16.2 GIB Aqualine® is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.

Health and Safety

16.3 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.

Framing

16.4 To achieve an acceptable decorative finish, GIB Aqualine® Wet Area Systems and the GIB® Site Guide specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. Winstone Wallbaords Limited recommend a moisture content of 8–12% where buildings are to be air conditioned or centrally heated.

Fixing Sheets

Non-Tiled Areas

17.1 GIB Aqualine® sheets may be installed vertically or horizontally. Sheets are fixed with GIB® Grabber® screws or GIB® Nails at 300 mm centres around the perimeter of the sheet, and with GIBFix® adhesive on all intermediate studs and dwangs. Adhesive must not be used under fasteners. A 5-10 mm gap must be left between the floor and the bottom of the sheet.

Tiled Areas

17.2 Control joints must be provided at maximum 4 m centres.
Internal corners in shower areas must be reinforced with a minimum 32 x 32 x 0.55 mm galvanised metal angle prior to lining the walls.
17.3 GIB Aqualine® sheets may be installed vertically or horizontally. Sheets are fixed with GIB® Grabber® screws at 100 mm centres to perimeter of wall and to all intermediate studs. Adhesive must not be used in place of screws.

Ceilings

17.4 Supports of timber or steel battens or ceiling joists must be 450 centres for 10 mm GIB Aqualine®, or 600 mm centres for 13 mm GIB Aqualine®.
17.5 GIB Aqualine® sheets must be fixed with GIB® Grabber® screws at 600 mm centres around perimeter and at 200 mm centre along supports. Alternatively, sheets are screw fixed at 600 mm centres along the supports and GIBFix® adhesive fixed at 200 mm centre between.

Penetrations and Sealants

18.1 All cut-outs for pipe penetrations must be made neatly using a hole saw. Cut-outs should be made approximately 12 mm diameter greater than the pipe.
18.2 A bead of silicone sealant must be placed to the full thickness of the GIB Aqualine® sheet around all pipe penetrations, at bath rims and preformed shower bases and where an impervious junction is required at the floor/wall line.
18.3 In tiled areas, a bead of silicone sealant 6 mm wide must also be placed to the full thickness of the tiles where the above situation occurs. The sealant manufacturer's technical literature must be followed for installation.

Jointing and Finishing

19.1 Jointing must be carried out in accordance with GIB® Site Guide Technical Literature.
19.2 Tiled shower areas must incorporate a waterproofing membrane over GIB Aqualine®. Waterproofing membranes are outside the scope of this Appraisal and must otherwise be specified and approved.

Investigations

20.1 The GIB Aqualine® Wet Area Systems and GIB® Site Guide Technical Literature have been examined by BRANZ and found to be satisfactory.
20.2 Site visits were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.
20.3 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.
20.4 Winstone Wallboards Limited GIB® plasterboards have been assessed for the following properties: MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, inspection for fungal spores, hard and soft body impact tests.

Quality

21.1 Winstone Wallboards Limited's manufacturing process and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory.
The quality management systems of Winstone Wallboards Limited have been assessed and registered by TELARC as meeting the requirements of ISO 9001, Registration No. 581.
Winstone Wallboards Limited is responsible for the quality of the product supplied.
21.2 The quality of the application and finish on site is the responsibility of the installation, stopping and finishing contractors.
21.3 Designers are responsible for the design of buildings.
21.4 Building owners are responsible for the maintenance in accordance with the instructions of Winstone Wallboards Limited.

Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2588: 1998 Gypsum Plasterboard.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber structures standard.
- NZS 3604: 2011 Timber-framed buildings.
- BRANZ Good Practice Guide - Tiling, March 2004.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.

BRANZ

In the opinion of BRANZ, GIB Aqualine® Wet Area Systems are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to the Client, Winstone Wallboards 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. The Client:
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.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation 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 the Client.
5. 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.

For BRANZ

P Robertson
Chief Executive

Date of issue: 4 April 2007

Amendment No. 1, dated 29 April 2010.
This Appraisal has been amended to include a new adhesive, GIBFix® One, and to update reference to AS/NZS 1170.
Amendment No. 2, dated 31 January 2012.
This Appraisal has been amended to update reference to NZS 3604: 2011.

LUMBERLOK®

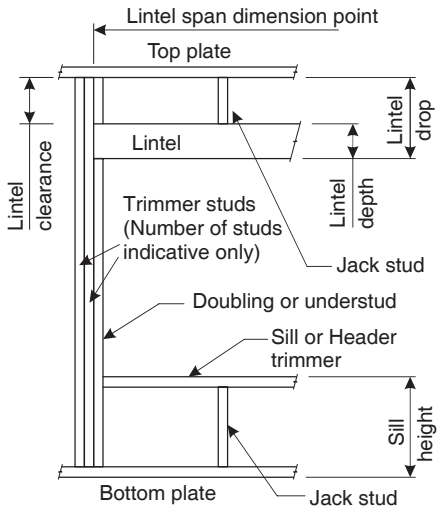
LINTEL FIXING SCHEDULE

ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

NOTE:

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

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
8.6m²	G	G	H	G	G	H
11.6m²	G	H	H	G	G	H
12.1m²	G	H	H	G	H	H
15.3m²	H	H	-	G	H	H
19.1m²	H	-	-	G	H	-
20.9m²	H	-	-	H	H	-
21.8m²	H	-	-	H	-	-
34.3m²	-	-	-	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

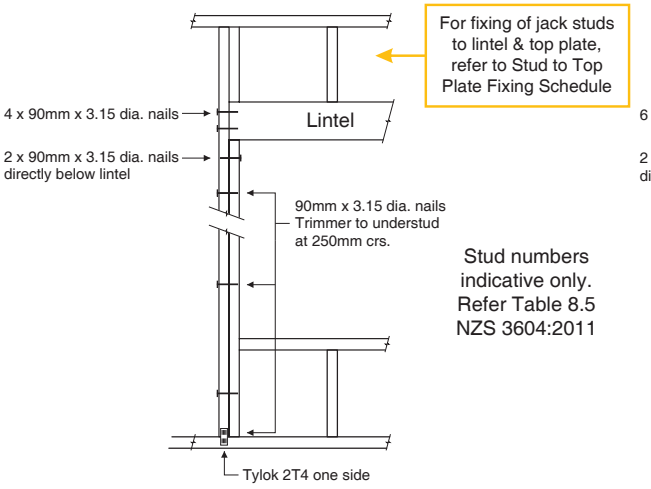
Lintel Span (m)	Loaded Dimension (m) (See Fig. 1.3 NZS 3604:2011)	Light Roof Wind Zone					Heavy Roof Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
1.0	2.0	E	E	E	F	F	E	E	E	E	F
	3.0	E	E	F	F	F	E	E	E	F	F
	4.0	E	F	F	F	G	E	E	F	F	F
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	E	F	F	G	G	E	E	F	F	G
1.2	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	E	F	F	F	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	E	F	F	G	G	E	E	F	F	G
	6.0	F	F	G	G	H	E	E	F	G	G
1.5	2.0	E	E	F	F	F	E	E	E	F	F
	3.0	E	F	F	F	G	E	E	F	F	F
	4.0	E	F	F	G	G	E	E	F	F	G
	5.0	F	F	G	G	H	E	E	F	G	G
	6.0	F	F	G	H	H	E	E	F	G	H
2.0	2.0	E	F	F	F	G	E	E	F	F	F
	3.0	E	F	F	G	G	E	E	F	F	G
	4.0	F	F	G	G	H	E	E	F	G	G
	5.0	F	F	G	H	H	E	E	F	G	H
	6.0	F	G	G	H	H	E	F	G	H	H
2.4	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	G	H	E	E	F	G	G
	4.0	F	F	G	H	H	E	E	F	G	H
	5.0	F	G	G	H	H	E	F	G	H	H
	6.0	F	G	H	H	-	E	F	G	H	H
3.0	2.0	E	F	F	G	G	E	E	F	F	G
	3.0	F	F	G	H	H	E	E	F	G	H
	4.0	F	G	G	H	H	E	F	G	H	H
	5.0	F	G	H	H	-	E	F	G	H	H
	6.0	F	G	H	-	-	E	F	G	H	-
3.6	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	F	G	H	H	E	F	G	G	H
	4.0	F	G	H	H	-	E	F	G	H	H
	5.0	F	G	H	-	-	E	F	G	H	-
	6.0	G	H	H	-	-	E	F	H	-	-
4.2	2.0	F	F	G	G	H	E	E	F	G	G
	3.0	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	H	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
4.5	2.0	F	F	G	H	H	E	E	F	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.4	F	G	H	H	-	E	F	G	H	H
	4.0	F	G	H	-	-	E	F	G	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	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	H
	4.0	F	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	F	H	-	-
5.1	2.0	F	F	G	H	H	E	F	G	G	H
	3.0	F	G	H	H	-	E	F	G	H	H
	3.5	F	G	H	-	-	E	F	G	H	-
	4.0	G	G	H	-	-	E	F	H	H	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	G	H	-	-
5.4	2.0	F	F	G	H	H	E	F	G	G	H
	2.8	F	G	H	H	-	E	F	G	H	H
	3.0	F	G	H	-	-	E	F	G	H	-
	4.0	G	H	H	-	-	E	F	H	-	-
	5.0	G	H	-	-	-	E	F	H	-	-
	6.0	G	H	-	-	-	E	G	H	-	-

MiTek®

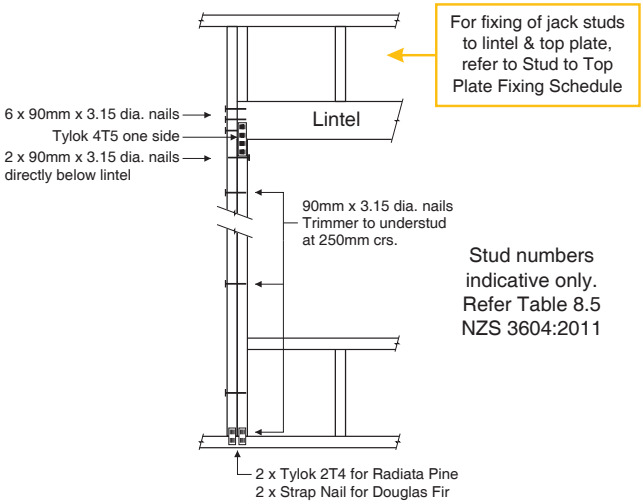
LUMBERLOK®

LINTEL FIXING OPTIONS

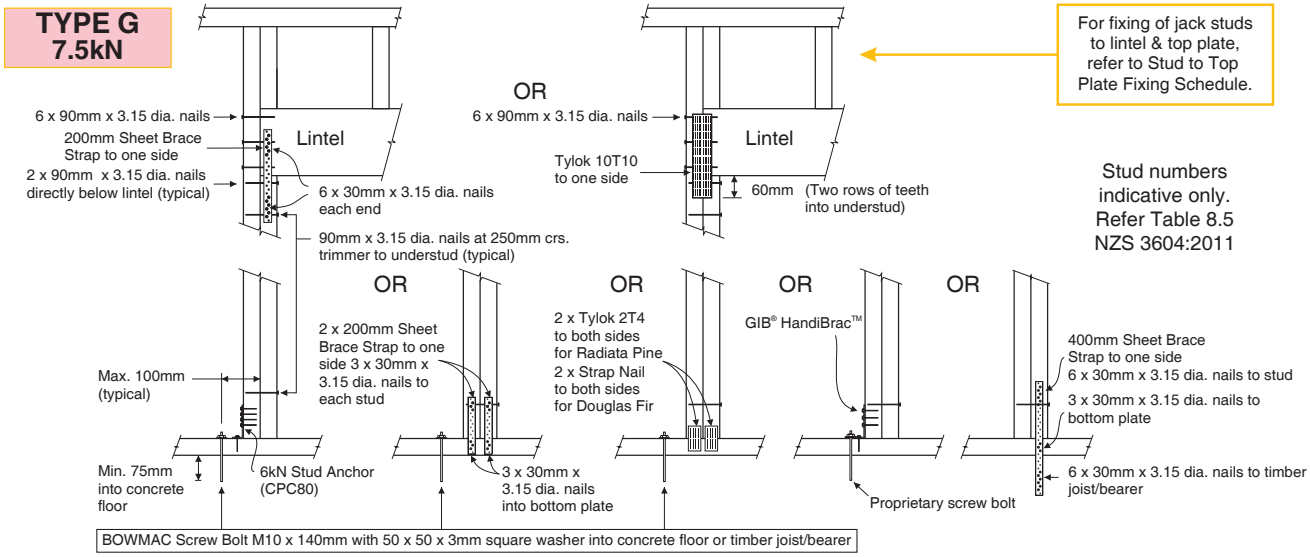
TYPE E 1.4kN



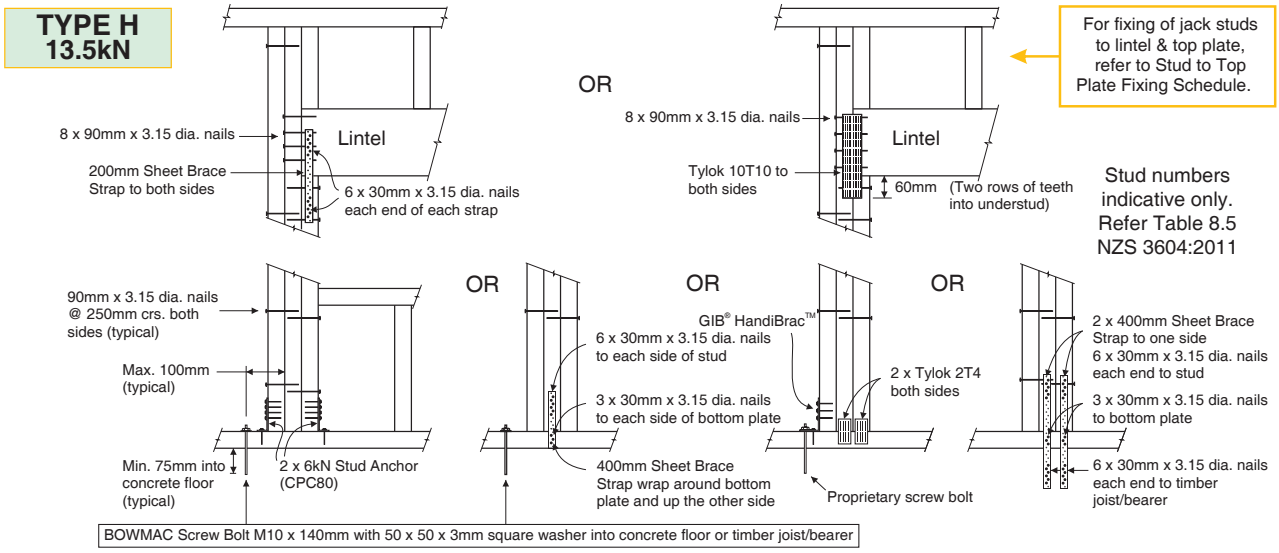
TYPE F 4.0kN



TYPE G 7.5kN



TYPE H 13.5kN



MiTek New Zealand Limited

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

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

www.miteknz.co.nz

MITEK® LUMBERLOK® BOWMAC®

BRANZ Appraised
Appraisal No. 447 [2010]

LINEA® WEATHERBOARD CAVITY CLADDING

Appraisal No. 447 (2010)

Amended 01 March 2016

BRANZ Appraisals

Technical Assessments of products for building and construction.

James Hardie
a smarter way

James Hardie New Zealand
PO Box 12 070
Penrose
Auckland

Tel: 0800 808 868
Fax: 0800 808 988
Web: www.jameshardie.co.nz

BRANZ

BRANZ
1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz

WFTAO

Product

1.1 Linea® Weatherboard Cavity Cladding is a cavity-based bevelbacked fibre cement weatherboard wall cladding. It is designed to be used as part of an external cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 Linea® Weatherboard Cavity Cladding consists of Linea® Weatherboard, which is a bevelbacked fibre cement weatherboard, fixed over timber battens to form the cavity. The cladding is finished with a latex paint system.

1.3 The cladding incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the cladding from the external wall framing with a nominal 20 mm cavity. The cavity allows for any occasional ingress of water that may get past the external skin to drain to the exterior of the building, and any remaining moisture to dry by evaporation.

Scope

2.1 Linea® Weatherboard Cavity Cladding has been appraised as an external wall cladding for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- constructed with timber framing complying with the NZBC; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Wind Zones up to, and including Extra High.

2.2 Linea Weatherboard Cavity Cladding has also been appraised for weathertightness and structural wind loading when used as an external horizontally fixed wall cladding solution for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
- constructed with timber framing complying with the NZBC; and,
- situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.

2.3 Linea® Weatherboard must only be installed horizontally on vertical surfaces.

2.4 Linea® Weatherboard Cavity Cladding is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(The Appraisal of Linea® Weatherboard Cavity Cladding relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone.)*

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

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Linea® Weatherboard Cavity Cladding if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Linea® Weatherboard Cavity Cladding meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 9.1 - 9.3.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years and B2.3.2. Linea® Weatherboard Cavity Cladding meets these requirements. See Paragraphs 10.1 and 10.2.

Clause C3 FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE: Performance C3.7. Linea® Weatherboard Cavity Cladding meets this requirement. See Paragraph 12.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Linea® Weatherboard Cavity Cladding meets this requirement. See Paragraphs 14.1 - 14.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Linea® Weatherboard Cavity Cladding meets this requirement and will not present a health hazard to people.

3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

4.1 Linea® Weatherboards are bevelback weatherboards with a tongue and groove at each end for jointing. The weatherboards are pre-primed with an acrylic primer on the front face and both edges. Linea® Weatherboards are 16 mm thick and are available 135 mm, 150 mm and 180 mm wide. All boards are supplied 4200 mm long.

4.2 Linea® Weatherboards are manufactured from a reduced density cellulose fibre cement formulation. The boards are formed, cut to length and then cured by high-pressure autoclaving. After autoclaving, a bevel is cut on the back face of the weatherboards, the front edge at the bottom of the board is chamfered and the ends are tongue and grooved for jointing. Linea® Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

Accessories

4.3 Accessories used with Linea® Weatherboard Cavity Cladding which are supplied by James Hardie New Zealand are:

- **Axent™ Trim** - a 16 mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Axent™ Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 84 mm and 100 mm wide by 2600 mm long.
- **External and internal corner mouldings** - chromate treated aluminium external box corner, 90° internal corner 'W' mould and 135° internal corner 'W' mould. The mouldings are available in 2700 mm and 4000 mm lengths.
- **Corner soakers** - 90° soakers are available for 135 mm, 150 mm and 180 mm Linea® Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.
- **Cavity vent strip** - uPVC, available in 3000 mm lengths.

4.4 Accessories used with Linea® Weatherboard Cavity Cladding which are supplied by the building contractor are:

- **Flexible wall underlay** – building paper complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
- **Flexible building underlay support** – polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. *(Note: mesh and wire galvanising must comply with AS/NZS 4534.)*

- **Rigid wall underlay** – Plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1, Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.
- **Flexible sill, head and jamb flashing tape** - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- **Cavity battens** - nominal 50 mm wide by 25 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- **Joinery head flashings** - folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.
- **Planted sill and scribers** - timber treated to Hazard Class H3.1, pre-primed before installation.
- **Window and door trim cavity air seal** - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal suitable for use around window, door and other wall penetration openings.
- **Flexible sealant** - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- **Cavity batten fixings** - 40 x 2.8 mm flat head hot-dip galvanised nails.
- **Linea® Weatherboard fixings** - 60 x 3.15 mm flat head hot-dip galvanised HardieFlex nails or stainless steel ring shank HardieFlex nails (for concealed nailing in NZS 3604 wind zones up to and including Very High), 75 x 3.15 mm jolt head hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in NZS 3604 wind zones up to and including Very High), and 90 x 4.0 mm jolt head hot-dip galvanised nails or stainless steel ring shank nails (for face nailing in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa).
- **Axent™ Trim fixings** - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolt head nails and stainless steel ring shank jolt head nails.

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

Paint System Specification

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

4.6 All exposed faces, including top edges at sills and all bottom edges of Linea® Weatherboard, Axent™ Trim and accessories must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.

Handling and Storage

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

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

Technical Literature

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

Design Information

Framing

Timber Treatment

7.1 Timber wall framing behind Linea® Weatherboard Cavity Cladding must be treated as required by NZBC Acceptable Solution B2/AS1.

Timber Framing

7.2 Timber framing must comply with NZS 3604 for buildings or parts of a building within the scope limitations of NZS 3604. Buildings or parts of a building outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. Studs must be at maximum 600 mm centres in Low, Medium, High and Very High Wind Zones and maximum 400 mm centres for the NZS 3604 Extra High Wind Zone and specifically designed buildings. Nogs must be fitted flush between the studs at maximum 800 mm centres (for studs at 600 mm centres) or maximum 1200 mm centres (for studs at 400 mm centres).

7.3 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *(If weatherboards are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.)*

7.4 Timber wall framing must have a maximum moisture content of 18% before the weatherboards are painted.

General

8.1 When the Linea™ Weatherboard Cavity Cladding is used for specifically designed buildings up to 2.5 kPa ULS wind pressure, only the weathertightness and structural aspects of the cladding are within the scope of this Appraisal. All other aspects of the building need to be specifically designed and are outside the scope of this Appraisal.

8.2 Punchings in the cavity vent strip provide a minimum ventilation opening area of 1000 mm^2 per lineal metre of wall.

8.3 At ground level the bottom edge of Linea® Weatherboards must be kept clear of paved surfaces, such as footpaths, by a minimum of 100 mm and unpaved surfaces by 175 mm in accordance with NZBC Acceptable Solution E2/AS1, Table 18. The ground clearances to finished floor levels as set out in NZS 3604 must be adhered to.

8.4 At balcony, deck or low pitch roof/wall junctions, the bottom edge of Linea® Weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 50 mm.

8.5 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for wind zones up to and including Very High, and rigid underlays for buildings in the Extra High wind zone and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure. Unlined gables and walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Where rigid underlays are used, the cavity batten fixing lengths must be increased by a minimum of the thickness of the underlay.

8.6 Where cladding penetrations are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities by leaving a minimum gap of 10 mm between the bottom of the vertical cavity batten and the flashing to the opening.

8.7 Where Linea® Weatherboard Cavity Cladding abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Interstorey Junctions

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

Structure

Mass

9.1 The mass of the 135 mm wide Linea® Weatherboard when installed on the wall is 25.7 kg/m^2 at equilibrium moisture content (EMC). The mass of the 150 mm wide board is 24.9 kg/m^2 at EMC and the mass of the 180 mm wide board is 23.9 kg/m^2 at EMC. Linea® Weatherboard Cavity Cladding is therefore considered a light wall cladding in terms of NZS 3604.

Impact Resistance

9.2 Linea® Weatherboard Cavity Cladding will resist impacts likely to be encountered in normal residential use. The likelihood of impact damage to the cladding when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers provided for vulnerable areas.

Wind Zones

9.3 Linea® Weatherboard Cavity Cladding is suitable for use in all Wind Zones of NZS 3604 up to, and including, Extra High where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, or up to 2.5 kPa ULS wind pressure where buildings are specifically designed.

Durability

Serviceable Life

10.1 Linea® Weatherboard Cavity Cladding installations are expected to have a serviceable life of at least 50 years provided the paint coating system is maintained in accordance with this Appraisal to ensure the Linea® Weatherboards and fixings remain dry in service. Linea® Weatherboards must be painted within 3 months of fixing.

10.2 Coastal locations can be very corrosive to fasteners, especially locations within distances of up to 500 m from the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets, and otherwise as shown in NZS 3604, Figure 4.2. These coastal locations are defined in NZS 3604 as Zone D. To achieve a 50 year serviceable life in Zone D, Linea® Weatherboards must be fixed with stainless steel fasteners. Fasteners outside Zone D may be hot-dip galvanised steel.

10.2 Microclimatic conditions, including geothermal hot spots, industrial contamination and corrosive atmospheres, and contamination from agricultural chemicals or fertilisers can convert mildly corrosive atmosphere into aggressive environments for fasteners. The fixing of Linea® Weatherboards in areas subject to microclimatic conditions requires specific design in accordance with NZS 3604, Paragraph 4.2.4, and is outside the scope of this Appraisal.

Maintenance

11.1 Regular maintenance is essential for Linea® Weatherboard Cavity Cladding installations to continue to meet the NZBC durability performance provision and to maximise their serviceable life.

11.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint coating system, flashings and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress must be repaired immediately. Sealant and paint coatings must be repaired in accordance with the sealant or paint coating manufacturer's instructions.

11.3 Regular cleaning (at least annually) of the paint coating surface is recommended to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Paint systems must be recoated at approximately 7-15 yearly intervals in accordance with the paint manufacturer's instructions.

11.4 Minimum ground clearances as set out in this Appraisal must be maintained at all times during the life of the cladding. *[Failure to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of Linea® Weatherboard Cavity Cladding.]*

Control of External Fire Spread

12.1 Linea® Weatherboard has a peak heat release rate of less than 100 kw/m^2 and a total heat released of less than 25 MJ/m^2 in accordance with NZBC Acceptable Solution C/AS1, Table 5.1. The system is suitable for use on buildings with a SH Risk Group classification, at any distance to the relevant boundary. Linea® Weatherboard is also suitable for use where a non combustible material is specified. When Linea® Weatherboard is finished with a paint coating of not more that 1.0 mm in thickness, the exterior surface finishes requirements of NZBC Acceptable Solutions C/AS2 – C/AS6, Paragraph 5.8.1 do not apply in accordance with NZBC Acceptable Solutions C/AS2 – C/AS6, Paragraph 5.8.2 a).

Prevention of Fire Occurring

13.1 When Linea® Weatherboard Cavity Cladding is finished with a paint coating of not more than 1.0 mm in thickness, clearance separations from chimneys and flues are not required. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from chimneys and flues in accordance with the requirements of NZBC Acceptable Solutions C/AS1 - C/AS6, Paragraph 7.5.9 for the protection of combustible materials.

External Moisture

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

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

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

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

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

Internal Moisture

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

Water Vapour

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

Installation Information

Installation Skill Level Requirements

16.1 Installation of Linea® Weatherboard and accessories supplied by James Hardie New Zealand and the building contractor must be completed by tradespersons with an understanding of cavity construction and bevelback weatherboard installation, in accordance with instructions given within the Linea® Weatherboard Cavity Cladding Technical Literature and this Appraisal.

System Installation

Building Underlay and Flexible Sill and Jamb Tape Installation

17.1 The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the Linea® Weatherboard Cavity Cladding system. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75mm minimum at horizontal joints and 150mm minimum over studs at vertical joints. Generic rigid sheathing materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall underlay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

Cavity Battens

17.2 Cavity battens must be installed over the building underlay to the wall framing at maximum 600 mm centres where the studs are at 600 mm centres or at 400 mm centres when studs are at 400 mm centres. The battens must be fixed in place with 40 x 2.8 mm hot-dip galvanised flat-head nails at maximum 800 mm centres.

17.3 Where studs are at greater than 400 mm centres, a building underlay support must be installed over the building underlay between the cavity battens at maximum 300 mm centres.

Linea® Weatherboard Installation

17.4 Linea® Weatherboards may be cut on site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.

17.5 Weatherboards must be dry prior to installation. Before the weatherboards are installed, cut ends exposed to the exterior such as at aluminium box corners or internal corners must be sealed with an acrylic sealer to reduce the absorbency of the fibre cement.

17.6 Linea® Weatherboards must be installed starting at the bottom of the wall. A cant strip (H3.1 treated timber or fibre cement) must be fixed behind the bottom course of weatherboards to ensure the weatherboards are set at the correct angle. The cant strip must be continuous around the perimeter of the building. The bottom course of weatherboards must overhang the bottom plate by a minimum of 50 mm.

17.7 Before the weatherboards are installed, the corner detail must be prepared to suit the selected option, e.g. external box corner, corner soaker. The necessary flashings, including window flashings, must be installed before commencing weatherboard fixing.

17.8 The first course of weatherboards must be full length, i.e. 4200 mm and commence from an external corner. Jointing of Linea® Weatherboards is made off the stud using the pre-cut tongue and groove joint. Tongue and groove joints may be located centrally between the studs, but must be no closer than 100 mm to the edge of a stud. A bead of sealant must be applied to the front side of the tongue before the corresponding board is inserted. Subsequent courses of weatherboards must be installed so that the tongue and groove joints are staggered by 600 mm minimum from joints in the previous course.

17.9 Linea® Weatherboards must have a minimum lap of 30 mm, and should be set out so as near to a full board as possible will finish under and over windows and doors and at the top of the wall. A storey rod can be used to accurately position weatherboard courses.

17.10 Linea® Weatherboards must be fixed to each stud using concealed fixings behind the lap of the boards or face nailing, except that face nailing must be provided at all corners and vertical edges of openings.

17.11 Concealed fixing must be carried out using 60 x 2.8 mm hot-dip galvanised or stainless steel Hardieflex nails depending on the location - see Paragraph 10.2. Nails must be fixed 25 mm from the top edge of the board and must be driven flush with the board surface.

17.12 Face nailing must be carried out using 75 x 3.15 mm hot-dip galvanised or stainless steel jolt-head nails in NZS 3604 wind zones up to and including Very High, or 90 x 4.0 mm hot-dip galvanised or stainless steel jolt-head nails in the NZS 3604 Extra High Wind Zone and specific design wind pressures up to a maximum design differential ULS of 2.5 kPa, depending on the location - see Paragraph 10.2. Nails must be fixed 15 mm up from the bottom of the board and punched a maximum of 2 mm below the surface of the board. When stainless steel nails are used, the top board at each lap must be pre-drilled.

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

Aluminium Joinery Installation

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

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

Inspections

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

Finishing

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

Health and Safety

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

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

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

Basis of Appraisal

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

Tests

19.1 The following testing has been completed by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for Linea® Weatherboard Cavity Cladding was based on testing and evaluation of all details within the scope and as stated within this Appraisal. Linea® Weatherboard Cavity Cladding was tested to E2/VM1 (as contained within NZBC Clause E2, Third Edition, Amendment 5). The testing assessed the performance of the foundation detail, window head, jamb and sill details, meterbox head, jamb and sill details, balustrade to wall junction, parapet cap and internal and external corners. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of NZBC Acceptable Solution E2/AS1 for drained cavity claddings.
- Uniform wind face load tests to simulate wind pressures on 12 mm thick Linea® Weatherboards were carried out by BRANZ, and the results were used in assessing 16 mm thick Linea® Weatherboard used in Linea® Weatherboard Cavity Cladding.
- Cone Calorimeter testing to determine the peak rate of heat release and total heat release of Linea® Weatherboard was completed by BRANZ. The testing was carried out in accordance with AS/NZS 3837.

19.2 Linea® Weatherboards have been tested by a James Hardie NATA accredited laboratory in accordance with AS/NZS 2908.2. The testing covered: soak-dry, bending strength, warm water soaking, heat/rain, freeze/thaw and apparent density. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

19.3 Testing has been carried out by James Hardie New Zealand to determine the modulus of rupture and inter-laminar bond strength of carbonated and non-carbonated Linea® Weatherboard. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

20.1 Weathertightness, structural, fire and durability opinions have been provided by BRANZ technical experts.

20.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

20.3 The manufacturer's Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

21.1 The manufacture of Linea® Weatherboard has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

21.2 The quality of materials, components and accessories supplied by James Hardie New Zealand is the responsibility of James Hardie New Zealand. The quality control system of James Hardie New Zealand has been assessed and registered as meeting the requirements of ISO 9001: 2008.

21.3 Quality on site is the responsibility of the installer.

21.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of the building underlay, cavity battens, Linea® Weatherboard and accessories in accordance with the instructions of James Hardie New Zealand.

21.5 Building owners are responsible for the maintenance of Linea® Weatherboard Cavity Cladding in accordance with the instructions of James Hardie New Zealand.

Sources of Information

- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2908.2: 2000 Cellulose-cement products - Flat sheet.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- AS/NZS 4534: 1998 Zinc and zinc/aluminium-alloy coatings on steel wire.
- AS/NZS 4680: 2006 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard.
- NZS 3604: 1999 Timber framed buildings.
- NZS 4211: 2008 Specification for performance of windows.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- 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 30 October 2013.

This Appraisal has been amended to change the Appraisal Holder, change the Product Name and to update clause changes as required by the introduction of NZBC Fire Clauses C1 – C6 Protection from Fire and A3 Building Importance Levels.

Amendment No. 3, dated 5 March 2014.

This Appraisal has been amended to alter the scope to include NZS 3604 Wind Zone Extra High, and specific design wind pressures up to and including 2.5 kPa.

Amendment No. 4, dated 01 March 2016.

This Appraisal has been amended to remove the term Scyon®.

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

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

Conditions of Appraisal

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

For BRANZ

Pieter Burghout
Chief Executive

Date of Issue:
14 September 2010

resonant
MULTI-DISCIPLINARY ENGINEERING & SURVEYING SERVICES

118449 LTO 01
JKW

14 February 2019

G J Gardner Homes
PO Box 466
Palmerston North 4440

Attention: Brian White

Dear Brian,

SOILS INVESTIGATION – LOT 45 NO 13 PEARL GROVE, ASHHURST

We have, as requested, visited the above site on 7th February 2019 and carried out soils investigations, results attached.

Soil results shows a firm clay overlaying a gravel material that complies with the requirements of NZS 3604:2011 Clause 3.3.7 (Timber Framed Building).

We therefore recommend foundations to the proposed dwelling be detailed in accordance with NZS 3604:2011 as long as the dwelling's construction is in accordance with the same New Zealand Standard.

Yours sincerely

AE Barr
RESONANT CONSULTING LIMITED

resonant
MULTI-DISCIPLINARY ENGINEERING & SURVEYING SERVICES

Scala Penetrometer Test Sheet

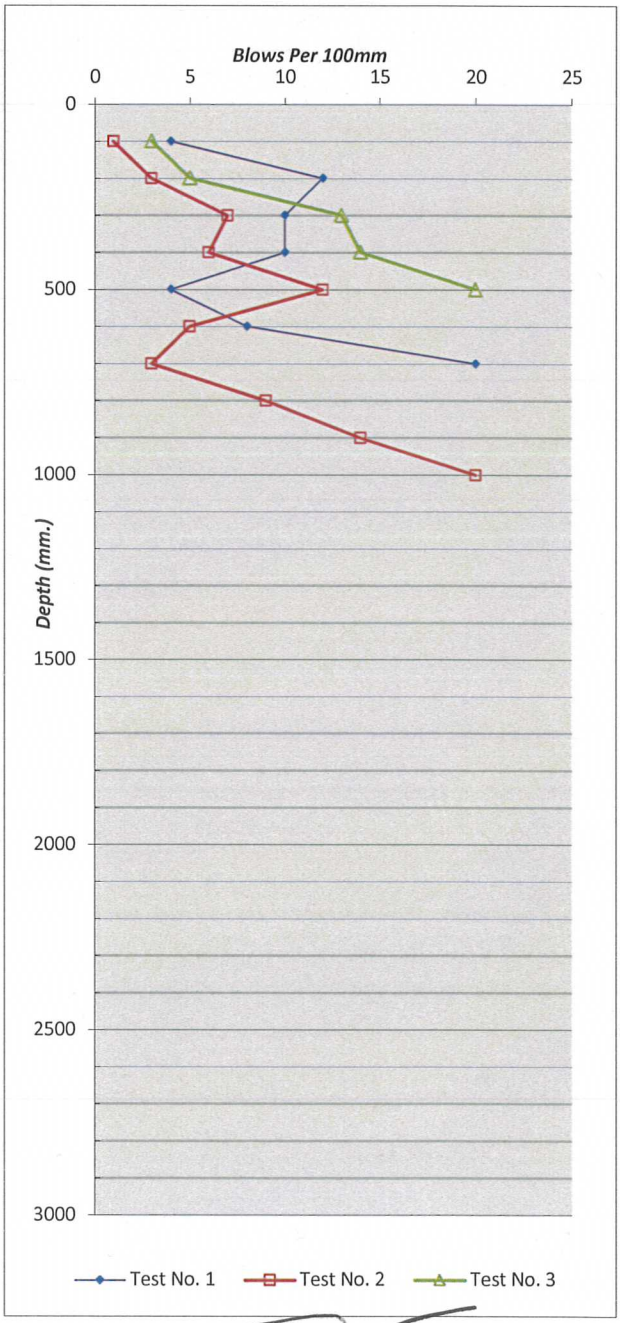
Our Ref: 118449

Project Name:	Soil Investigation	***Date Tested:***	7/02/2019
Project Location:	Lot 45_No.13 Pearl Grove, Ashhurst	***Time Tested:***	10.00 am
Client Name:	G J Gardner Homes	***Tested By:***	Steven Qi
Client Address:		***Report Date:***	11/02/2019

Tests:	NZS4402:1986 Test 6.5.2 Hand Method Using a Scala Penetrometer
	NZGS:2001 Test Method For Determining the Vane Shear Strength of a Cohesive Soil

Test Hole (Blows / 100mm : Bearing Capacity (Kpa)

	Test No. 1		Test No. 2		Test No. 3	
Depth (mm)	Blows per 100mm	Safe Bearing Capacity (Kpa)	Blows per 100mm	Safe Bearing Capacity (Kpa)	Blows per 100mm	Safe Bearing Capacity (Kpa)
100	4	125	1	35	3	100
200	12	270	3	100	5	150
300	10	240	7	190	13	280
400	10	240	6	175	14	300
500	4	125	12	270	20	350
600	8	210	5	150		
700	20	350	3	100		
800			9	230		
900			14	300		
1000			20	350		
1100						
1200						
1300						
1400						
1500						
1600						
1700						
1800						
1900						
2000						
2100						
2200						
2300						
2400						
2500						



Test Location Diagragms: Attached

Remarks:

Checked by: _____ Approved by: _____

Name: Steven Qi Name: _____

Page: 1 of 3

resonant
MULTI-DISCIPLINARY ENGINEERING & SURVEYING SERVICES

Scala Penetrometer Test Sheet

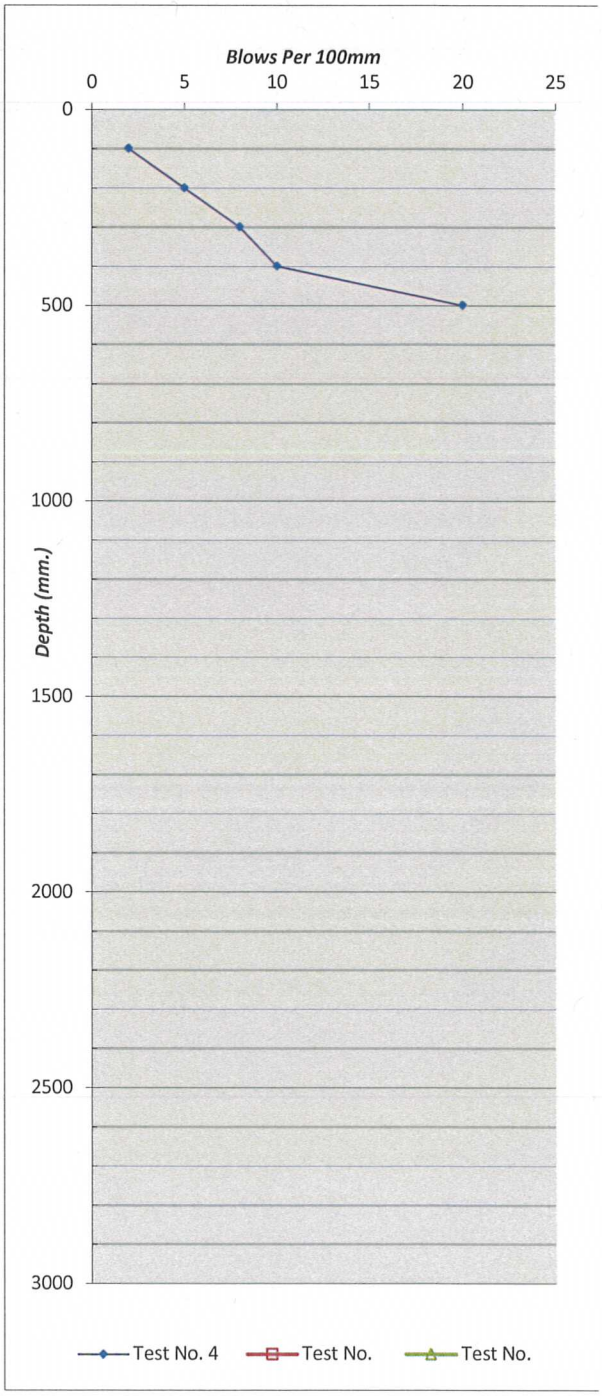
Our Ref: 118449

Project Name:	Soil Investigation	***Date Tested:***	7 February 2019
	Lot 45_No.13 Pearl Grove, Ashhurst	***Time Tested:***	10.00 am
Project Location:	G J Gardner Homes	***Tested By:***	Steven Qi
		Report Date:	11 February 2019

Tests:	NZS4402:1986 Test 6.5.2 Hand Method Using a Scala Penetrometer
	NZGS:2001 Test Method For Determining the Vane Shear Strength of a Cohesive Soil

Test Hole (Blows / 100mm : Bearing Capacity (Kpa)

	Test No. 4		Test No.		Test No.	
Depth (mm)	Blows per 100mm	Safe Bearing Capacity (Kpa)	Blows per 100mm	Safe Bearing Capacity (Kpa)	Blows per 100mm	Safe Bearing Capacity (Kpa)
100	2	70				
200	5	150				
300	8	210				
400	10	240				
500	20	350				
600						
700						
800						
900						
1000						
1100						
1200						
1300						
1400						
1500						
1600						
1700						
1800						
1900						
2000						
2100						
2200						
2300						
2400						
2500						



Test Location Diagragms: Attached

Remarks:

resonant
MULTI-DISCIPLINARY ENGINEERING & SURVEYING SERVICES

Hand Auger & Shear Vane Test Sheet

Our Ref: **118449**

Project Name:	Soil Investigation	***Date Tested:***	7 February 2019
	Lot 45_No.13 Pearl Grove, Ashhurst	***Time Tested:***	10.00 am
Project Location:	G J Gardner Homes	***Tested By:***	Steven Qi
		Report Date:	11 February 2019

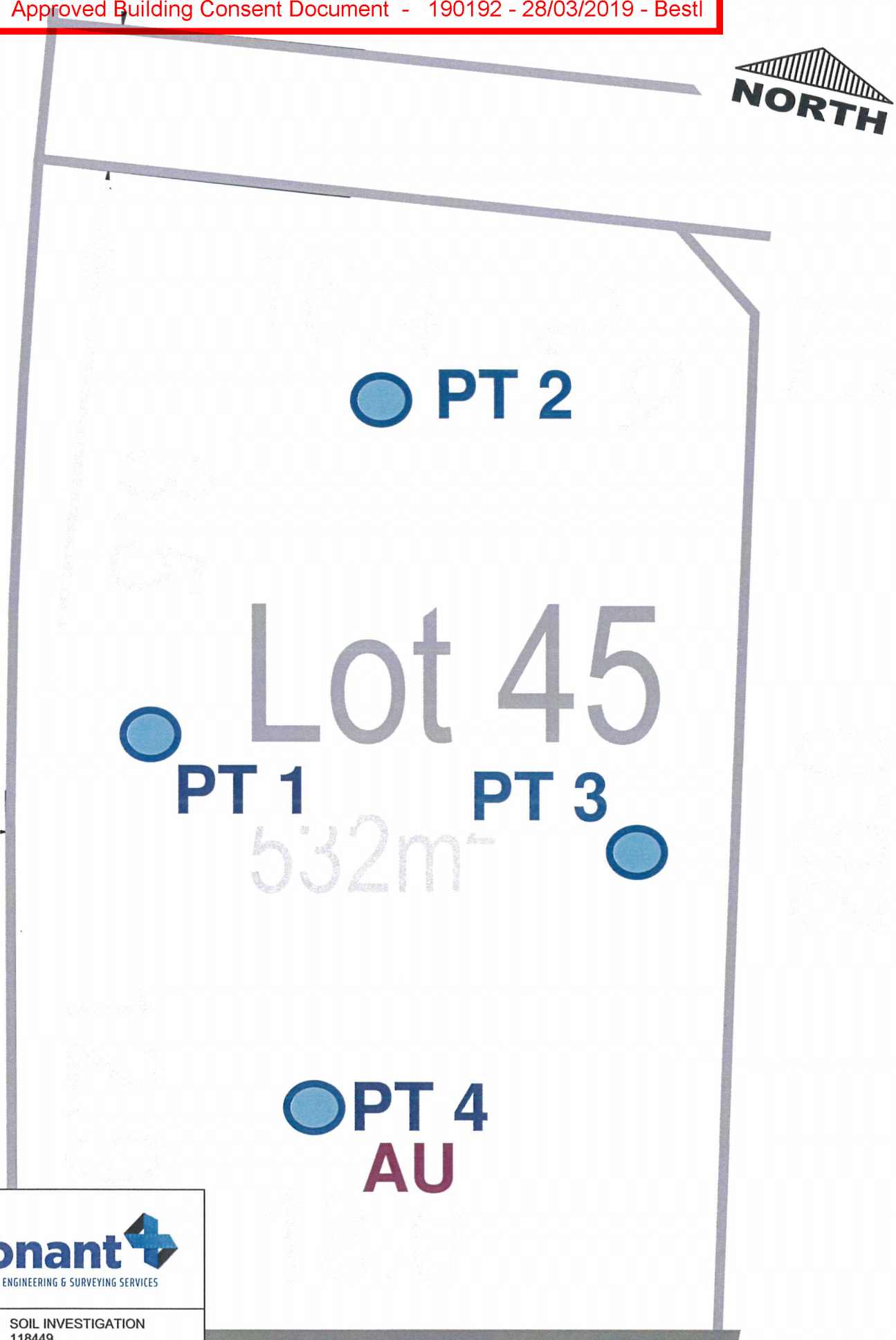
Tests:	NZS4402:1986 Test 6.5.2 Hand Method Using a Scala Penetrometer
	NZGS:2001 Test Method For Determining the Vane Shear Strength of a Cohesive Soil

Shear Vane at PT Test No.

Depth (mm)	SV Divisions = kPa			
300	100	=	170	kPa
600	140	=	237	kPa

50mm Ø Hand Auger at PT Test No.

Depth (mm)	Type and Comment
0-300	Dry clay, Light brown / Mustard, stiff
300-600	Dry clay, Light brown / Mustard, stiff



resonant
MULTI-DISCIPLINARY ENGINEERING & SURVEYING SERVICES

JOB NAME:	SOIL INVESTIGATION
JOB NUMBER:	118449
DRAWING TITLE:	TEST LOCATION PLAN
NUMBER:	LOT 45
REVISION:	A
DATE:	11/02/2019
DESIGNED BY:	SQ
APPROVED BY:	

DO NOT SCALE. If in doubt ask for dimensions.

PT: Penetrometer Test
AU: Auger & Shear Vane
(Plan not to scale)

Ramset™

BOTTOM PLATE FIXING SOLUTIONS 2013

| Meets NZS 3604:2011 Requirements| 90 x 45 Bottom Plate |

Bottom Plate Durability

Fixing Requirements				Installation		
Bottom Plate Location	Bottom Plate Fixing Requirement	Concrete Strength (min.)	Floor Edge Type	Max Spacing	Fastener	Min Edge Distance (FROM OUTERFACE)
External Wall	NZS3604:2011	17.5 MPa	Concrete	900 mm	12120BPAG*1 OR T12140GH*1	55 mm
			Masonry Block	600 mm		
	Proprietary Bracing Systems (15 kN)	17.5 MPa	Concrete	900 mm	AS12150GH + RPBA	
			Masonry Block	600 mm		
Internal Wall	NZS3604:2011	17.5 MPa	N/A	900 mm	12120BPAG*1 OR T12140GH*1	N/A
				600 mm	8x75 Drive Pin & Washer	N/A
	Proprietary Bracing Systems (15 kN)	17.5 MPa	N/A	900 mm	12120BPAG*1 + RPBA OR T12140GH*1 + RPBA	N/A

HD875 DRIVE PIN

AS12150GH ANCHOR

12120BPAG ANCHOR

Ramset Bracing Anchor (RPBA)

Advantages

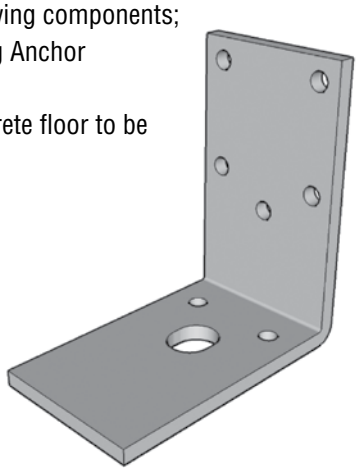
- Ease and speed of installation
- No checking of timber frame to ensure flush fitting of board
- The RPBA is a one piece anchor for either side of stud
- Slotted hole on bottom of bracket provides some flexibility in bolt & bracket position
- Installed prior to fixing of gypsum wallboard
- Easy inspection

The Ramset Bracing Anchor is sold as a set of 2.

Each set includes the following components;

- 2 Each Ramset Bracing Anchor
- 14 Each Tek screws

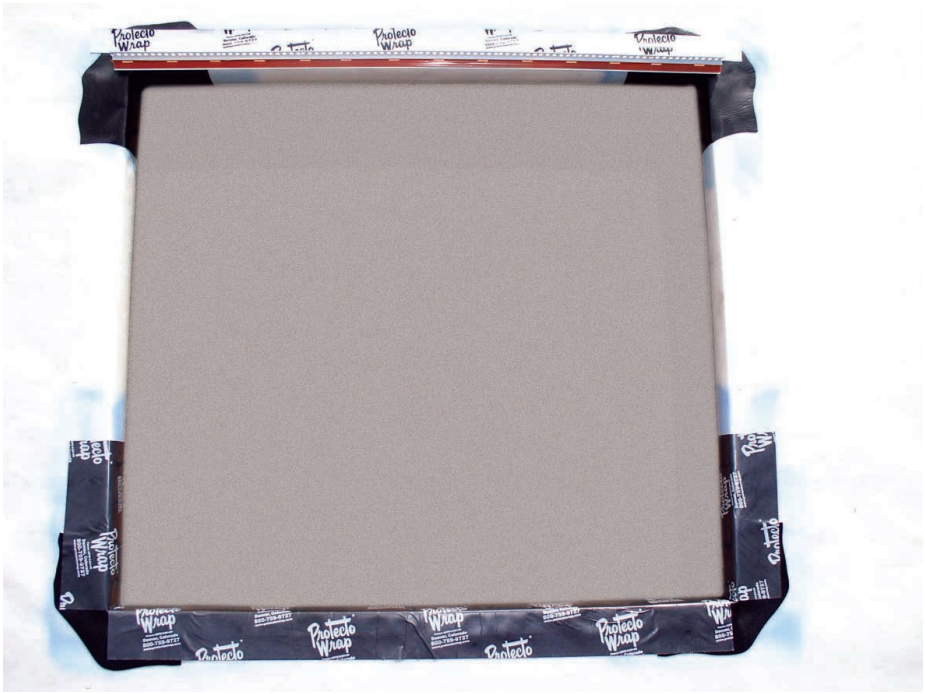
Fixings into timber or concrete floor to be purchased separately



BRANZ Appraised

Appraisal No. 444 [2017]

PROTECTO SILL WINDOW SEALING SYSTEM



Appraisal No. 444 (2017)

This Appraisal replaces BRANZ Appraisal No. 444 (2011)

BRANZ Appraisals

Technical Assessments of products for building and construction.

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.

Marshall Innovations Limited
PO Box 9411
Greerton
Tauranga
Tel: 07 543 0948
Fax: 07 541 1029
Web: www.mwnz.com

BRANZ
1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz

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.

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 must always be carried out in accordance with the Protecto Sill Window Sealing System Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

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 Overseas certifications have been reviewed by BRANZ and found to be satisfactory.

16.3 The quality of supply to the market is the responsibility of Marshall Innovations Limited.

16.4 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.

16.5 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.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 [Amendment 7, 01 January 2017].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

BRANZ

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

The Appraisal is issued only to 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:
28 February 2017

Marshall Innovations Construction Solutions

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.

PROTECTO SILL SYSTEM Specification

Marshall Innovations Construction Solutions

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 10ºC and 32ºC.

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 45º 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.

PROTECTO SILL SYSTEM Specification

Marshall Innovations Construction Solutions

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.

PROTECTO SILL SYSTEM Specification

Marshall Innovations Construction Solutions

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 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

Marshall Innovations Construction Solutions

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.

TEKTON Specification

BRANZ Appraised

Appraisal No. 621 [2014]

THE TEKTON® WEATHERIZATION SYSTEM

Appraisal No. 621 (2014)

This Appraisal replaces BRANZ Appraisal No. 621 (2008) issued 8 October 2008.

Amended 15 March 2018

BRANZ Appraisals

Technical Assessments of products for building and construction.

Marshall Innovations Limited
PO Box 9411
Greerton
Tauranga
Tel: 07 543 0948
Fax: 07 541 1029
Web: www.mwnz.com

BRANZ
1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz

Product

1.1 The Tekton® Weatherization System consists of Tekton® Building Wrap, One Piece Sill Tape, Super Stick Tape or Protecto Sill System (flexible flashing tapes), Tekton Seam Tape and TRADE-SEAL. The system is used behind wall cladding systems and around framed joinery openings as a secondary weather resistant barrier for walls.

Scope

2.1 The Tekton® Weatherization System has been appraised for use on buildings within the following scope:

- constructed with timber framing in accordance with the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; or,
- constructed with steel framing subject to specific engineering design, with the building height and floor plan area in accordance with scope limitations of NZBC Acceptable Solution E2/AS1; and,
- with absorbent wall claddings directly fixed to frame complying with NZBC Acceptable Solution E2/AS1 or covered by a valid BRANZ Appraisal that specifies a flexible wall underlay and a flexible flashing system; or,
- with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity complying with NZBC Acceptable Solution E2/AS1 or covered by a valid BRANZ Appraisal that specifies a flexible wall underlay or a rigid wall underlay with flexible underlay over and flexible flashing system; or,
- 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 Very High where the flexible wall underlay is directly fixed to the frame, and up to and including Extra High where the underlay is used over rigid wall underlays.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the Tekton® Weatherization 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 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.2. The Tekton® Weatherization System meets this requirement. See Paragraphs 9.1 - 9.2

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The Tekton® Weatherization System contributes to exterior walls meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Tekton® Weatherization 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.

Technical Specification

4.1 System components supplied by Marshall Innovations Limited are as follows:

- **Flexible wall underlay** - Tekton® Building Wrap is a synthetic breather-type building membrane available in rolls 2740 mm wide and 37 m long or 1370 mm wide and 37 m long. The product is manufactured from coated spun bonded polypropylene.
- **Flexible flashing tape** (1) - Super Stick is a multi-layered silver polyester faced, copolymer, self-adhesive tape. The tape is supplied in rolls of 75 mm x 22.86 m, 150 mm x 22.86 m and 230 mm x 22.86 m.
- **Flexible flashing tape** (2) - Protecto Sill System comprises Protecto Wrap Detail Tape, Protecto Wrap Sill Tape and Protecto Tak spray on primer. Both the tapes are based on modified SBS rubberised asphalt and Protecto Tak is a solvent based spray on adhesive primer. Protecto Wrap Detail Tape is supplied as a 150 mm wide, 15 m long and 1.0 mm thick roll, Protecto Wrap Sill Tape is supplied as a 50, 150, 200 mm wide, 30 m long and 0.5 mm thick roll and Protecto Tak is supplied in 369 g can.
- **TRADE-SEAL** is an EPDM sleeve bonded to a carrier material of spun-bonded high density polyethylene film 150 micron thick. The carrier material is backed with a self-adhesive layer. The TRADE-SEAL is available with various diameter EPDM sleeve sizes to accommodate different size wall penetrations.
- **Adhesive tape** - Tekton Seam Tape is a thin polypropylene joining adhesive tape, available in rolls 48 mm wide and 50 m long.

Handling and Storage

5.1 All products must be kept clean and dry at all times prior to use by storing under cover so that they are protected from the weather and damage. Rolls of Tekton® Building Wrap must be stored on end.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Tekton® Weatherization 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

Timber and Steel Framing

7.1 Studs must be provided at maximum 600 mm centres. Dwangs must be fitted flush between studs at maximum 1200 mm centres.

General

7.2 The Tekton® Weatherization System is intended for use behind wall cladding systems and at joinery openings as a secondary defence against water penetration into framing cavities and is intended for use as an alternative to conventional wall underlays.

7.3 The system will also provide a degree of temporary weather protection during construction. However, it will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed-in, 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 The Tekton® Weatherization System 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.

7.5 TRADE-SEAL when used with Tekton® Building Wrap, provides an alternative solution to the pipes and services penetrations specified in NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.3 and Figure 68.

Table 1: NZBC E2/AS1 Table 23 Requirements

NZBC ES/AS1 Table 23 Wall Underlay Properties	Property Performance Requirement	Actual Property - Tekton® Builidng Wrap
Absorbency	≥ 100 g/m²	Classified as non-absorbent (see Paragraph 7.7)
Vapour Resistance	≤ 7 MN s/g	1.15 MN s/g
Water Resistance	≥ 20 mm	Pass
pH of Extract	≥ 6 and ≤ 9	9.78 (Note 1)
Shrinkage	≤ 0.5%	0.10%
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 = 3.9kN/m
Air Barrier	Air resistance: ≥0.1 MN s/m³	≥ 0.1 MN s/m³

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 underlays performance, or the performance of other materials.*

7.6 The Tekton® Weatherization System is suitable for use under wall cladding as a wall underlay system as called up in NZBC Acceptable Solution E2/AS1, Table 23 on timber framed buildings, except that it must not be used with non-absorbent wall claddings in direct fixed installations. Tekton® Weatherization System is suitable for use under cavity based wall claddings as a non-absorbent synthetic wall underlay system as called up in NZS 2295, Table 2.4 on steel framed buildings.

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.

7.8 When the Tekton® Weatherization 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.

Structure

8.1 The Tekton® Weatherization System 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

Serviceable Life

9.1 The system meets code compliance with NZBC Clause B2.3.1 (a), not less than 50 years where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, and code compliance with NZBC Clause B2.3.1 (b), 15 years where the cladding durability requirement is 15 years. This is provided the system is not exposed to the weather for a total time of more than 60 days The products also must not be exposed to the weather or UV light at any time in service.

9.2 The exterior cladding must be maintained weathertight at all times for the Tekton® Weatherization System to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

10.1 The Tekton® Weatherization System has an AS 1530 Part 2 flammability index of 0 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 the Tekton® Weatherization 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

12.1 The system is used to assist the control of moisture behind wall claddings by ensuring moisture which may occasionally penetrate the wall cladding is directed back to the exterior of the building.

12.2 The system is suitable for use with wall claddings complying with NZBC Acceptable Solution E2/AS1 or a valid BRANZ Appraisal, and where exposed up to, and including Extra High winds as defined by NZS 3604.

Installation Information

Installation Skill Level Requirements

13.1 Installation must always be carried out in accordance with the Technical Literature and this Appraisal, by a competent tradesperson with an understanding of the wall underlays and weatherization system installation.

System Installation

14.1 The system must be installed in accordance with NZBC Acceptable Solution E2/AS1, or when used with BRANZ Appraised wall claddings, in accordance with any instructions given in the Appraisal, along with the instructions given in the Technical Literature.

14.2 Tekton® Building Wrap building wrap must be fixed first to the external face of the timber or steel wall framing over all openings in the framing then cut and dressed into all sides of the openings.

14.3 Openings are dressed with lengths of Super Stick or Protecto Sill System Tapes where required and adhered to the Tekton Building Wrap. The tape is 'fanned' around the corners onto the face of the Tekton Building Wrap and folded over the outside edge of the opening framing. All surfaces must be clean and dry prior to the installation. *[Please Note: Super Stick requires two layers on the sill.]*

14.4 Any other components of the cladding system or joinery installation, such as sill trays, other flashings or seals should be installed as instructed by the cladding or joinery manufacturer. Note that these components, including cladding systems and joinery have not been assessed and are outside the scope of this Appraisal.

Inspections

14.5 The Technical Literature must be referred to during the inspection of Tekton® Weatherization System 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.

15.3 Tests have been carried out on Protecto Wrap Detail Tape, Super Stick and Protecto Wrap Sill Tapes in accordance with ICC Evaluation Service Criteria for Flashing Materials, AC148 (2001). The results have been reviewed by BRANZ experts and found to be satisfactory.

15.4 Peel adhesion testing of Protecto Wrap Detail Tape, Super Stick and Protecto Wrap Sill Tapes, Tekton Seam Tape and TRADE-SEAL on the Tekton® Building Wrap has been completed by BRANZ.

Other Investigations

16.1 Durability opinions have been given by BRANZ technical experts.

16.2 Practicability of installation has been assessed by BRANZ and found to be satisfactory.

16.3 The Technical Literature from Marshall Innovations Ltd has been examined by BRANZ and found to be satisfactory.

Quality

17.1 The manufacture of products covered by this Appraisal 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 certifications covering quality aspects associated with these products.

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 Tekton® Weatherization System 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

- AC 148 [2001] Acceptance criteria for flashing materials ICBO Evaluation Service Inc. July 2001
- 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 4201.3: 1994 Pliable building membranes and underlays - Methods of test - Shrinkage.
- 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.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 [Amendment 7, 01 January 2017].
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 15 March 2018.

This Appraisal has been amended to remove One Piece Sill Tape.

BRANZ

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

The Appraisal is issued only to 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

Cheyldra Percy
Chief Executive

Date of Issue:
11 December 2014

Thermakraft™

THERMAKRAFT215

Thermakraft 215 self-supporting roof and wall underlay is an absorbent, breathable underlay specifically designed for use in Domestic and Commercial buildings. Suitable as a roof and wall underlay with all cladding types, where Fire Retardancy is NOT required.

- ✓ Versatile building Underlay, designed for use in residential and commercial roof and wall applications.
- ✓ Reduces wind entry into wall and roof cavities, improving thermal efficiency of bulk insulation. Can be used as a vapour control layer, and improve thermal performance if installed and taped on the warm side of bulk insulation.
- ✓ High water resistance provides for temporary weather protection prior to installation of cladding, and acts as a secondary layer of water protection during its serviceable life.
- ✓ Highly water vapour permeable, allowing excess water vapour that may otherwise condense in the wall structure to escape.
- ✓ Lap line printed.

Self-Supporting

High Water Barrier

Breathable

Absorbent

THERMAKRAFT 215

ROOF

WALL

ROOF AND WALL UNDERLAY

TECHNICAL SPECIFICATIONS

NZBC E2/AS1 ROOF UNDERLAY REQUIREMENTS		
NZBC E2/AS1 TABLE 23 ROOF UNDERLAY PROPERTIES	**PROPERTY PERFORMANCE REQUIREMENTS**	**PROPERTY PERFORMANCE**
Absorbency	≥ 150gsm	Pass
Vapour Resistance	≤ 7 MN.s/g	Pass
pH of Extract	≥ 5.5 and ≤ 8	Pass
Shrinkage	≤ 0.5%	Pass
Water Resistance	≥ 100mm	Pass
NZS2295:2206 CLASSIFICATION		
Flammability Index		Non Fire Retardant
Wind Zone	R2	Up to Very High
NZS2295:2006	R2	Self Support

NOTE:
For wall cavity systems, NZBC Acceptable Solution E2/AS1 Paragraph 9.1.5.5 requires where stud spacing's are greater than 450mm centres, an intermediate means of restraining the building underlay and insulation from bulging into the drained cavity shall be installed. An acceptable means of achieving this is by fixing with Thermakraft Stud Strap horizontally at 300mm centres.

Flammability Index
Thermakraft 215 is not fire retardant.

Roll Dimensions:
1250mm x 20m (25m2)
1250mm x 40m (50m2)
M2 is the roll size for actual coverage, allow for laps and joins.

Thermakraft 215 complies with the requirements of NZBC E2/AS1 Table 23. Is suitable for use in the following:

- With absorbent wall claddings directly fixed to timber and steel framing; and,
- With non-absorbent wall claddings directly fixed to timber and steel framing; and,
- With absorbent and non-absorbent wall claddings installed over an 18mm minimum drained cavity; and,
- With masonry veneer in accordance with NZS 3604; and,
- Situated in NZS3604 Building Wind Zones up to, and including 'Very High' (wall); and,
- As a ROOF underlay Self-supporting when run horizontally at pitches 3° and greater. When run vertically at pitches >3° and <10° degrees, 215 must be supported. Support recommended at very low pitches; and,
- As a roof underlay suitable for use with all Roofing materials; and
- Is suitable as an air barrier in unlined wall spaces.

DURABILITY

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 providing:

ENVIRONMENTALLY FRIENDLY PRODUCT

- Installed in accordance to the Application and Installation Guidelines.
- Run length no greater than 10 meters.
- Is not left exposed for more than (7 days) roof.
- Is not left exposed for more than (28 days) wall.
- Not recommended for use on LOSP treated timber, if used the timber must be free of solvent.
- Installed by or under guidance of Licensed Building Practitioners.
- Installed in accordance with the Roofing Code of Practice.

Thermakraft™

Customer Services
0800 806 595

11 Turin Place, East Tamaki, Auckland, NZ
P.O Box 58-112, Botany, Auckland 2163
Phone 0800 806 595 or +64 9 273 3727
Fax +64 9 273 3726
Email info@thermakraft.co.nz
www.thermakraft.co.nz

Issue 1, January 2018

Fletcher Reinforcing
Structured for strength

SUPER DUCTILE 500E™

Seismic Grade Reinforcing Mesh

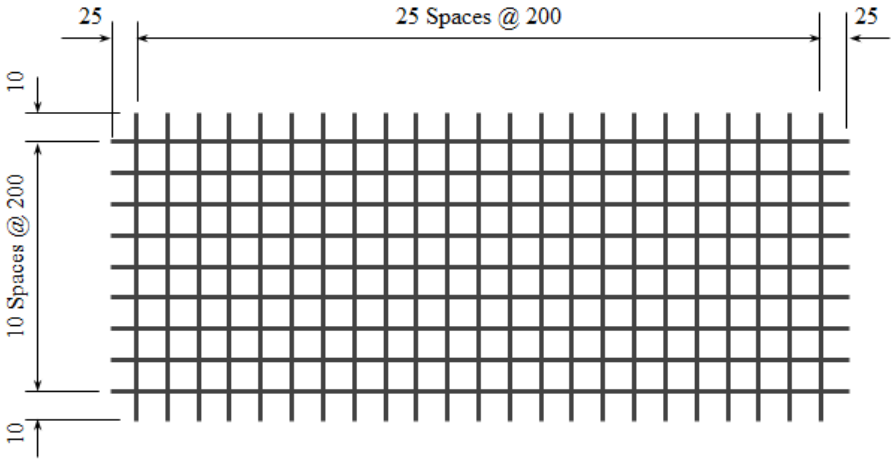
SE62 Res

Mesh Specification

Product Description: 5.05m x 2.02m — 200 x 200 Grid R6.1 Line Wire, R6.1 Cross Wire

	Wire Dia. (mm)	Spacing (mm)	Length (mm)	No. of Wires	Overhangs (mm)		mm²/m	Wire kg/m	Weight (kg)
Longitudinal Wire	6.1 R	200	5050	**11**	**25**	**25**	**146.1**	**0.2294**	12.74
Cross Wire	6.1 R	200	2020	**26**	**10**	**10**	**146.1**	**0.2294**	12.05
							GROSS SHEET WEIGHT (Kg):		24.79
							MASS PER SQ METER (Kg/m²):		2.294

MESH SKETCH (not to scale)

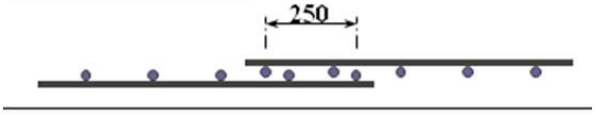


GROSS SHEET AREA (m²):	10.201
NETT COVER (m²):	8.312
Ratio STACK & TURNED (Y/N):	Y
No. OF SHEETS / BUNDLE:	25
ESTIMATED CUBIC (m³):	0.0933
BUNDLE WEIGHT (Tonnes):	0.6198

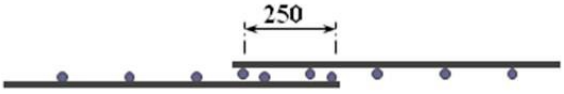
MECHANICAL PROPERTIES

Uniform Elongation %	Yield Strength		Tensile Ratio		Weld Shear Strength
	Min	Max	Min	Max	
≥ 10%	500MPa	600MPa	1.15	1.4	> 5.9

LAPPING ON ENDS



LAPPING ON SIDES



SUPER DUCTILE 500E™ Product is fully tested for Grade 500E compliance as per AS/NZS 4671:2001. All Super Ductile 500E product is Individually tagged . The tag contains the product code and the unique batch number relevant to the sheet. It is important that this tag is kept in position to allow easy identification until covered with concrete.

* All measurements/weights approximate

Fletcher Reinforcing
Structured for strength

Auckland P: (09) 270 4247
E: auckland.quotes@freo.co.nz

Hamilton P: (07) 843 0890
E: hamilton.quotes@freo.co.nz

Tauranga P: (07) 542 9400
E: tauranga.quotes@freo.co.nz

Wellington P: (04) 570 8480
E: wellington.quotes@freo.co.nz

Invercargill P: (03) 214 9090
E: invercargill.quotes@freo.co.nz

Nelson P: (03) 544 0751
E: nelson.quotes@freo.co.nz

Christchurch P: (03) 377 1190
E: wellington.quotes@freo.co.nz

Dunedin P: (03) 479 2730
E: dunedin.quotes@freo.co.nz

www.fletcherreinforcing.co.nz

WANZ Support Bars

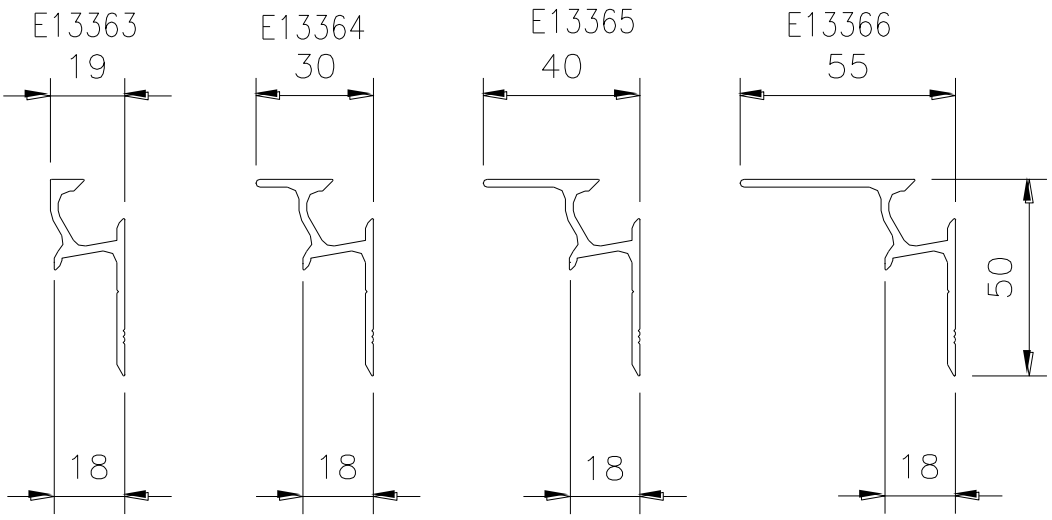
WANZ sill bars offer 6 variations that conform to E2/AS1 Amendment 6 and have been tested to BRANZ EM6.

Recommendation - All windows including full height windows up to 2.2m high use new lightweight support bars.

Recommendation - All Hinged/Bi-fold doors (max. 2 panels on any one side) up to 2.2m high use new lightweight support bar

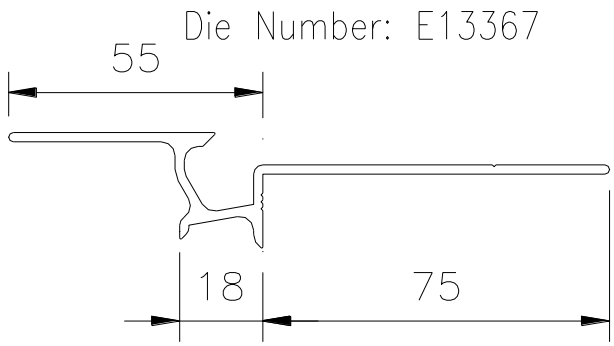
Recommendation - All Sliders/Stacker Sliders and joinery outside of the above use heavy duty support bars.

Four light weight support bars – 19, 30, 40 and 55mm deep.



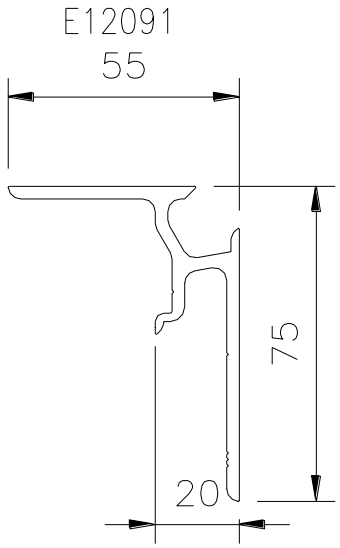
These are primarily designed for windows that are fixing to timber framing. These generically have a weight carrying capacity in the region of 55-60kg/lm.

Light weight full height bar 55mm deep



This is essentially the 55mm lightweight bar but with a horizontal fixing leg rather than a vertical as the typical bars have. Again this bar will carry 55-60kg/lm.

Heavy Duty Support Bar



55mm “old bar”. This bar was a part of the original issue and was re-introduced for two reasons:

- For situations where windows exceed the 55-60kg weight limit, or
- Primarily for fixing to concrete floor edges for full height windows. This bar has a weight bearing capacity up to approximately 150kg/lm. If this bar is required for thinner claddings the nose is ripped to the appropriate depth.

To work out the weight of joinery in kg/lineal metre use the formula below:

Height of unit X 2.5 X glass thickness

Note: This is for quick estimation purposes only as it may not reflect the actual weight of the unit as it is a combination of aluminium, glass, hardware and other components

For glass thickness: If Single Glazed unit enter thickness of glass, if Double Glazed Unit enter sum of thickness of each pane of glass e.g. 22 mm DGU made up of 4mm glass/14 mm spacer/4 mm glass, glass thickness would be 8 mm.

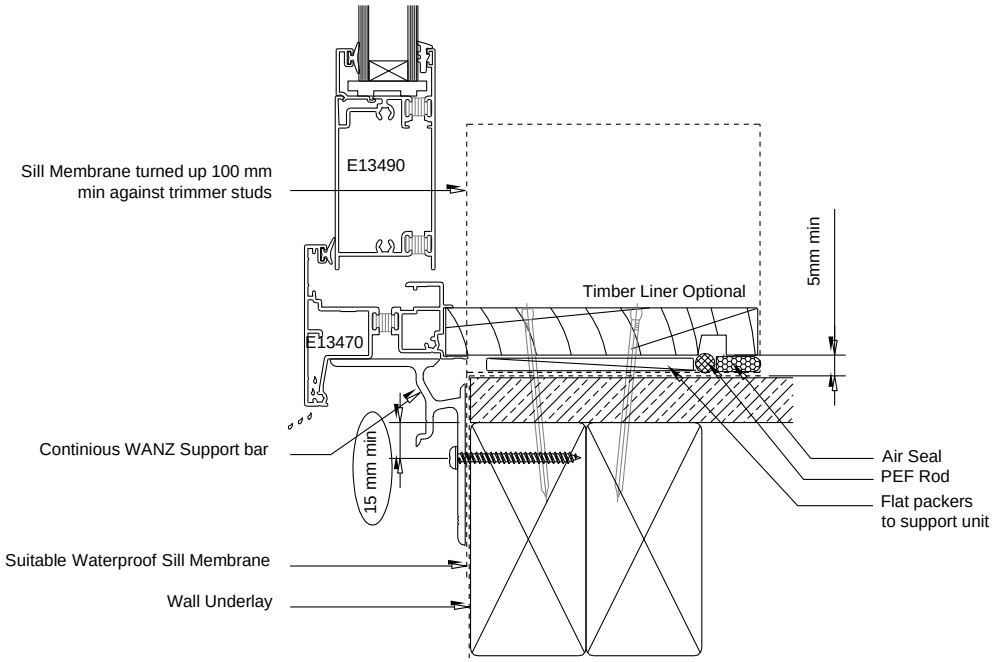
Beyond these limits a specifically designed solution is required.

Fixing of WANZ Bars

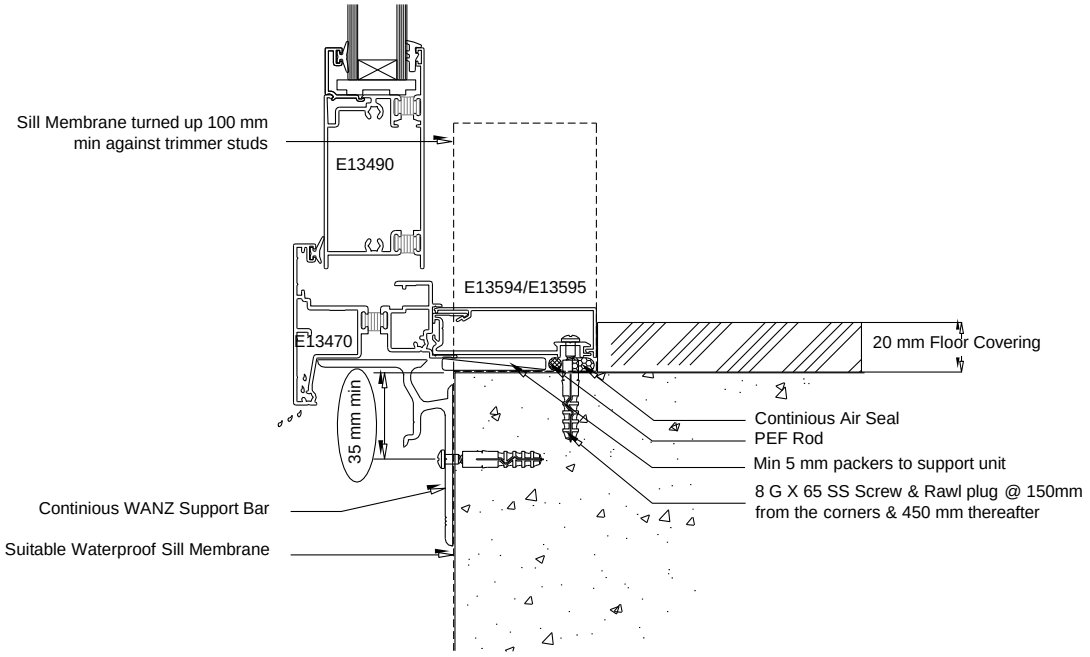
The generic fixing method is 10g x 50mm SS screws positioned at each end of the bar and at maximum 300mm centres between.

This method generally applies to the lightweight bars fixed to timber.
When fixing to concrete it is recommended that the “old bar” is used to ensure adequate edge clearances are achieved. The same fixing centres would apply but the screws would be driven into Rawl plugs or similar.

When fixing to the edge of a timber floor the “old bar” is recommended to ensure the fixing strikes the framing and not the floor edge.



SILL DETAIL - TIMBER



SILL DETAIL - CONCRETE

The “WANZ Guide to Window Installation as described in E2/AS1 Amendment 6” http://www.wanz.org.nz/download/WANZ%20Guide%20to%20E2%20AS1%20Amd%206%20V1.3%20Dec%202014.pdf notes that 6mm masonry anchors may also be used.

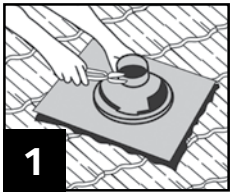
Dektite Aluminium

The best solution for stone chip and pressed metal tiles

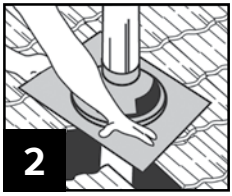
- ✔ The base is 99.9% pure grade aluminium making it strong, malleable and easy to install.
- ✔ Environmentally friendly, ideal where potable water is collected.
- ✔ The best solution for stone chip and pressed metal tiles.
- ✔ EPDM withstands temperatures from -50°C to 115°C and up to 150°C intermittently.

Code	Base (mm)	Pipe (mm)	Pitch	Colour
TFA 12-70	500 x 600	12-70	0-45°	BLACK (EPDM)
TFA 50-170	600 x 600	50-170	0-45°	
TFA 110-220	764 x 764	110-200	0-45°	
TFA 160-300	600 X 900	160-300	0-45°	
TFA 300-450	965 x 965	300-450	0-45°	

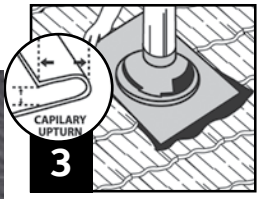
Installation Instructions:



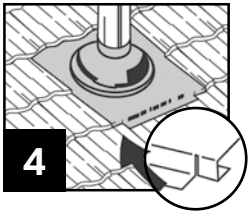
Trim Dektite cone to suit pipe size using sharp tin snips.



After lubricating the flue with water, slide Dektite down to the tile level.



Form an anti-capillary fold then place upper edge of base under up-stream tiles.



Dress base to profile, cut tabs on the bottom corners and fold under to stop wind lift .